

AstroPlanner

V2.4

User Manual

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Star Forming Region LH 95 in LMC. Credit: NASA, ESA & STScI/AURA

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1 Introduction

Software applications for astronomy on the Macintosh are not nearly as abundant as applications on other platforms. Although there are several planetarium-style applications (TheSky, Starry Night, SkySafari, etc.) and a few others for telescope control, CCD camera operation (iCCD, CCDSoft, etc.) and a few minor utilities, there are some serious gaps. One of these is astronomical visual observation planning and logging. AstroPlanner attempts to fill this particular gap.

Although originally developed on and for the Macintosh, a Windows version is available which is functionally identical to the Macintosh version. The examples and descriptions in this manual are illustrated with screen shots from the macOS version, but the Windows version behaves identically (except where noted).

1.1 What AstroPlanner does

AstroPlanner is a stand-alone application that allows the user to plan and execute an observing session. The user can enter objects to be viewed manually, import them from text files, look them up in several supplied catalogues, or use observing plans previously created by others. These objects can be both deep-sky and solar system objects (planets, sun, moon, asteroids, comets, etc.).

Once a list of objects has been created, they can be observed and log entries recorded for each of them. The application will also control a wide range of computerised Go To telescopes, in order to slew to selected objects. Several Digital Setting Circle (DSC) systems are also supported. Telescope control is optional, so AstroPlanner can be used to great effect even if you don't have a computerised telescope mount.

The application computes the visibility of the objects for the current observing session, shows the sky for that time and can show the field-of-view for the current object as if it was being viewed through a virtual eyepiece, or the sensor of an imager.

Additionally, if you have a network connection, you can download high-resolution photographs of any part of the sky from the Digital Sky Survey (DSS and SDSS).

1.2 What AstroPlanner doesn't do

AstroPlanner is not a full-blown planetarium application. It will not produce detailed sky maps or do the kinds of things an application such as Starry Night, Stellarium, or TheSky will do. It will also not do other specialised stuff like controlling CCD cameras or autoguiders, or astronomical image processing.

It is also not a "one button does it all" application, but rather an intricate set of tools that gives you full control over your observation planning. It's not difficult to learn to use the application in its basic form. If you run through the quick start tutorial (Chapter 5 on page 15) you'll get a good feel for the basics. Using the application to its full extent does have a learning curve, but you can assimilate new skills as and when you need them.

You don't need to read this entire manual. We recommend you read through the first dozen chapters. The rest is reference material which you can use when you need to. If you are already familiar with previous versions of AstroPlanner, you might not need to crack the manual at all.

Feel free to experiment!

2 Installation

This chapter runs through the process of installing AstroPlanner V2 on your computer (whether you are a first-time user or upgrading from an earlier version).

2.1 Hardware and operating system requirements

AstroPlanner is a 64-bit application (32-bit also available for Windows).

For both platforms a screen with an **absolute minimum size** (width and height) of 1280 x 720 pixels (2560 x 1440 pixels for Retina/HiDPI) is required. If you are connecting to a telescope, you'll also need a built-in serial port, an USB-to-Serial converter (the Keyspan products are recommended), or a SkyFi/StarSeek WiFi-to-serial device.

2.1.1 macOS

AstroPlanner V2 currently requires macOS 10.14 or later running on an Intel-based or Apple Silicon-based Macintosh¹. You'll need at least 250MB of disk space, and for a complete installation with all optional catalogues, 2GB+ of disk space.

2.1.2 Windows

AstroPlanner V2 requires Windows 8.1 or later running on an Intel-based computer². You'll need at least 250MB of disk space, and for a complete installation with all optional catalogues, 2GB+ of disk space.

2.2 Telescope mount compatibility

AstroPlanner V2 has built-in drivers for the following computerised telescopes and mounts:

Astro-Physics GTO	Orion Intelliscope with COL
Celestron NexStar	Orion SynScan GoTo
Celestron Ultima 2000	Sky Engineering Sky Commander
GTD Pulsar 2	Starmaster Sky Tracker
iOptron GOTONOVA and V2	StellarCAT ServoCAT
Meade LX200 Classic	Takahashi Temma
Meade LX200 GPS/R/ACF (Autostar II)	Tasco Starguide
Meade MAX Mount	Vixen SkySensor
Meade RCX400	Vixen SkySensor 2000PC
Meade ETX, DS, LX, LXD, LS series (Autostar)	Vixen Star Book
Meade Magellan	Wildcard Innovations Argo Navis

1. For V2.4 there might also be available versions compatible with macOS 10.11 through 10.13. Check the website download page for details.

2. For V2.4 there might also be available versions compatible with Windows 7 SP 1 through 8.0. Check the website download page for details.

These drivers are available for both Mac and Windows.

Additionally, basic ASCOM is supported for the Windows version, so that if your telescope mount isn't listed above, you can use the ASCOM driver of your choice (note that only telescopes can be driven via the ASCOM system, not focusers, etc.)

2.3 Macintosh application installation

2.3.1 On-line

Download the application from the download web page:

<https://www.astroplanner.net/download.html>

The application is in the form of a disk image file (.dmg extension).

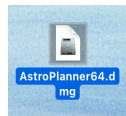


Figure 1: .dmg file in the Finder

If your browser does not mount and open the disk image for you, do so by double-clicking it in the Finder.



Figure 2: Disk image opened

Drag the application file to your Applications folder (or drag in onto the Applications icon in the disk image window). There is no installer - just run the AstroPlanner application.

2.3.2 DVD-ROM or USB Flash Drive

If you ordered the DVD-ROM or USB Flash Drive with the application, then mount the disk in your computer, find the AstroPlanner disk image and proceed as for the on-line installation above.

Note that if your DVD-ROM or USB Flash Drive is outdated, you might want to download the application since it will guarantee the latest version. If you don't have the ability or desire to download the application, you can always order the latest version of the application and catalogues on DVD-ROM or USB Flash Drive for a modest fee.

2.4 Windows application installation

2.4.1 On-line

Download the application from the download web page:

<http://www.astroplanner.net/download.html>

The application is in the form of an installer application (InstallAstroPlanner.exe).

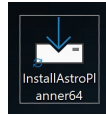


Figure 3: Windows installer icon

Double-click the installer to install the application and supporting files on your hard disk. You will probably get the following window displayed¹. Click Yes to continue with the installation.

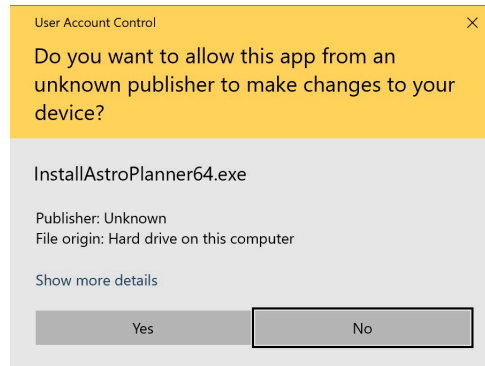


Figure 4: Installer warning

Once you do that the installer starts. Follow the directions...

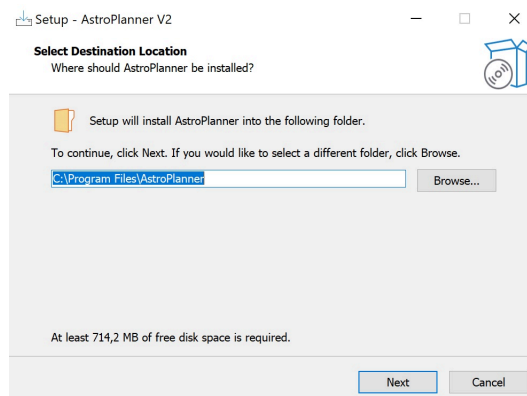


Figure 5: Windows installer in action

1. It's quite expensive to register a Windows installer certificate for iLanga, Inc. Hence you'll have to take our word for it that what you are about to install is a valid application, since income from AstroPlanner registrations is insufficient to warrant purchasing such a certificate. Sorry about that.

2.4.2 USB Flash Drive

If you ordered the USB Flash Drive with the application, then mount the disk in your computer. Find the InstallAstroplanner.exe on the disk and double-click it. Proceed as for the on-line installation above.

Note that if your USB Flash Drive is outdated, you might want to download the application since it will guarantee the latest version. If you don't have the ability or desire to download the application, you can always order the latest version of the application and catalogues on USB Flash Drive for a modest fee.

2.4.3 Uninstalling

When AstroPlanner is installed it also includes information required to uninstall AstroPlanner and an Uninstall application.

2.5 Installing catalogues

When you first run AstroPlanner it only installs a few minimal catalogues by default (Bright Star, Messier, NGC). You will need to install more catalogues to make full use of the application. You can elect to install these catalogues by downloading them from the on-line web site or, if you have a DVD-ROM or USB Flash Drive containing catalogues, by installing them directly from there.

If you are running AstroPlanner for the first time, the Setup Wizard will give you the opportunity to install catalogues (see Section 4.2 on page 8 for first time users, or Section 23.1 on page 352 for installing catalogues via the Setup Wizard at a later date).

Otherwise you use the Catalogue Manager (*File > Catalogue Manager...*) to manage your catalogues. This is detailed in Chapter 23 on page 352.

3 Unregistered users

If you are an unregistered user (i.e. you haven't yet paid for a licence, or need to pay for an upgrade to the current version), then you will find that some features are limited or unavailable to you. While you are welcome to continue using AstroPlanner you will need to register in order to remove these restrictions and limitations.

3.1 Limitations

The most obvious limitation is that each time you run the AstroPlanner application, you will be asked for your licence number. This is irritating, but might help to give you the incentive to register.

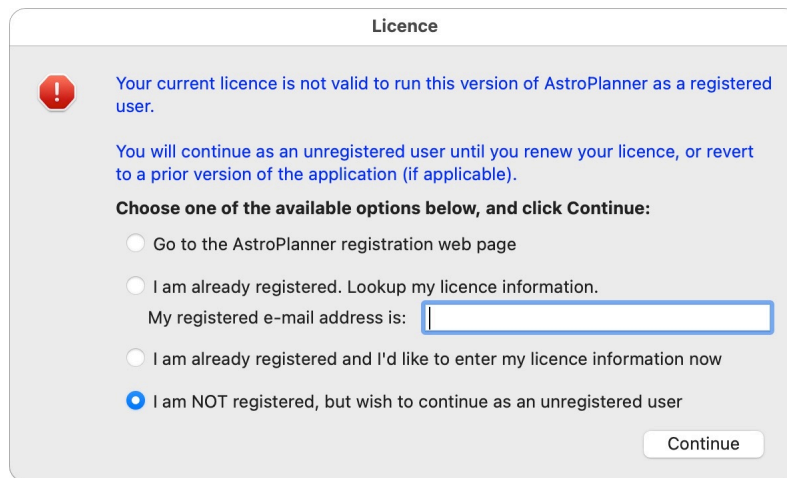


Figure 6: Unregistered user dialog

The second major limitation is that you are limited to the three installed catalogues (Bright Star, Messier and NGC). You cannot download or install any other catalogues. Note that if you are a registered AstroPlanner V1 user, but have not paid the upgrade fee (if required), you are also restricted to using these three catalogues, even if you have others installed via AstroPlanner V1.

Other limitations:

- No external catalogues can be used (USNO A2.0, USNO B1.0, UCAC3, etc.).
- No SIMBAD searches can be performed.
- You can download user-contributed plans only if they contain objects from your installed catalogues (i.e. Messier and NGC objects only)
- You cannot upload user-contributed plans or user-contributed scripts.
- You cannot import objects from files, or by downloading them (e.g. comets, minor planets, tour files, etc.)

3.2 How to register

Go to the web site in your browser:

<https://www.astroplanner.net/>

Navigate to the Purchase page where you will be able to see what your options are.

4 First-time users

If you have never used AstroPlanner before, this is what will happen the first time you run the application after installing it.

4.1 Licence

You'll be asked to agree to the (fairly liberal) AstroPlanner application licence. If you agree, click **Yes**. If you don't, click **No** and the application immediately terminates.

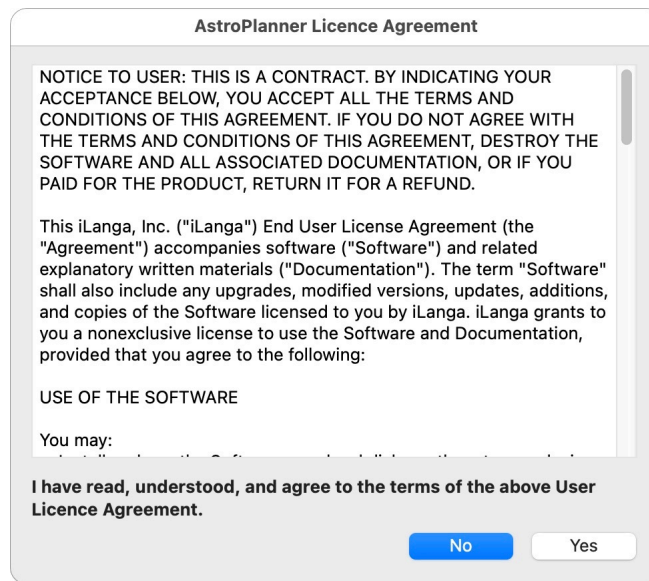


Figure 7: Licence agreement dialog

For your convenience, the text of the agreement is given below:

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4.2 Setup Wizard

As you are a first time user, the application needs you set up or customise various settings so that you can get going without further issue. To do this it presents a Setup Wizard dialog to lead you through the setup.

4.2.1 Licence information

The first thing you'll need to do is enter your licence information in the fields given (unless you have not yet registered, in which case leave the fields blank).

If you've misplaced your licence information, you can get it sent to you via e-mail by entering your e-mail address in the field on the right and clicking the **Retrieve** button. If you have changed your e-mail address since you registered, then you will not get a reply. Please contact support (with your name, new e-mail address, and the old e-mail address):

support@astroplanner.net

Once you have entered your licence info (or not), click the **Next** button.

The screenshot shows a 'Setup Wizard' window with a title bar. Inside, the 'Setup Wizard' section contains instructions: 'Use this wizard to set up the various resources and settings required to customise the application for your use.', 'Note that all of these settings can be changed later. As you work your way through the wizard, using the Next and Previous buttons, you will be advised on how to change these settings in the application.', 'When you have completed the setup process, click the Finish button to transfer the settings into the application. Clicking Cancel will ignore any settings made here.', and 'You can always re-run this wizard via the Setup Wizard... command in the File menu.' Below this, the 'Licence Information' section has two columns. The left column contains instructions: 'Enter your registration information exactly as it appears in the e-mail message you received when you registered, or on the label attached to your CD-ROM (where applicable).', 'If you are not yet registered, leave these fields blank.', and 'If you have misplaced your licence information, use the feature on the right to have it sent to you by e-mail.' It includes input fields for 'Name:' and 'Licence Number:', with a blue error message 'Missing licence number!' below the 'Licence Number' field. The right column is titled 'Retrieve your licence information via the Internet' and contains the label 'Your e-mail address:' followed by an empty text input field and a 'Retrieve' button. At the bottom of the window are four buttons: 'Previous' (disabled), 'Cancel', 'Finish', and 'Next' (disabled).

Figure 8: Setup Wizard - licence information

4.2.2 Observing site data

AstroPlanner requires you to specify information about your observing site or sites. This information is used to figure out visibility at those sites. At least one site must be specified. You'll need to know the latitude and longitude where your site is situated, and its time zone.

However, if you live in the USA or Canada, AstroPlanner includes a database of place names and their geographic locations. Note that you don't have to be particularly accurate with defining the latitude or longitude. Even if you're out by a degree or two, it won't make much difference.

Enter the site information in the given fields. The world map will show where the site is (in case you give E/W or N/S mixed up), and will tell you if your GMT offset is acceptable. Click the **Add this site** button to add the site data to the resources.

Read the text on the right side of the dialog for additional instructions.

Note that you don't have to enter *all* of your possible observing sites at this time, since you can enter and edit them later. Just add your main site.

When you have finished, click the **Next** button to continue.

Setup Wizard

Observing Sites

AstroPlanner uses observing site information to calculate the current sky position from a given observing site. It is important to have at least one site with correct information. You can change these settings later via the Resources... command in the Edit menu.

Sites already defined

- KIRKLAND,WA
-
-
-
-
-
-
-

+
+
−

Site Name:

KIRKLAND,WA

Find...

Latitude:

47°41'00" N

N

Longitude:

122°13'00" E

W

Offset from GMT:

-8

▶

hours

Daylight Saving rules:

U.S.A.

⌵

Give your site a short and informative name (e.g. "Backyard", "Table Mountain", "PGAS Member Site", etc.).

If your site is in the U.S.A or Canada, you can use the "Find..." button to locate your city and set the location, if you wish.

Latitude and longitude can be entered as decimal degrees (e.g. 122.5) or as dd:mm:ss (e.g. 122:30:00).

Give the number of hours difference between GMT and your site, during Standard time (not Daylight Saving time). Sites west of 0° longitude will have a negative number of hours (e.g. New York will be -5 hours). Sites east of 0° longitude will have a positive number of hours.

Also specify the Daylight Saving rule for the site, if applicable.

Click the "+" button to create a new observing site resource on the list, or (if applicable) click the button to the right of it to duplicate the currently selected site.

The map on the left shows:

1. The current site location defined above.
2. GMT (red dotted line).
3. Where the GMT offset puts GMT with respect to your site (green dashed line). If this line is within an hour of GMT (15 degrees of longitude), and inside the central grey area, the GMT Offset for the site location is probably correct.

You can also click on your location on the map to enter the latitude/longitude (with a 2 degree resolution).

← Previous
Cancel
Finish
Next →

Figure 9: Setup Wizard - Observing Sites

4.2.3 Telescope data

AstroPlanner also expects you to enter information about any telescopes you plan to use. The information is used to construct charts showing the view through such a telescope, and what you are likely to see.

The dialog includes a comprehensive list of commercially-available telescopes. If your telescope or telescopes are in that list, select the entry and click the **Add** button.

You can also add the information manually, and use the **Add this telescope** button to add the new telescope entry.

Click the **Next** button when you've finished.

- 10 -

Setup Wizard

Telescopes

AstroPlanner uses telescope resource information to calculate the the field of view and other parameters, as well as adding the ability to communicate with and control most computerised mounts. You can change these settings later via the Resources... command in the Edit menu.

Pre-defined telescopes:

Vendor	Model	Aperture	Focal Length	Finder FoV
Meade	LX200 16"	406	4064	5
Meade	LX200 7" Mak	178	2670	5
Meade	LX200 8"	203	2000	5
Meade	LX200GPS 10"	254	2500	5
Meade	LX200GPS 12"	305	3048	5
Meade	LX200GPS 14"	355	3556	5
Meade	LX200GPS 16"	406	4064	5
Meade	LX200GPS 7"	178	2670	5
Meade	LX200GPS 8"	203	2000	5

Telescopes already defined

LX200 8"

+
+
+

Telescope Name:

LX200 8"

Give your telescope a short and informative name (e.g. "200mm SCT", "8-inch", etc.).

Aperture:

203

 mm

f/Ratio:

9.9

Focal length:

2009.7

 mm

Finder FoV:

5

 °

Click the "+" button to create a new telescope resource on the list, or (if applicable) click the button to the right of it to duplicate the currently selected telescope.

If your telescope is a commercially-made model, then select it from the list on the left (if it exists), and click the "Add" button below to include it as a new telescope resource. You can edit the name and parameters later if you wish.

For a telescope not on the list, use the "+" button to add a new telescope, or the button to the right of "+" to duplicate the selected telescope, if applicable.

Add

← Previous

Cancel

Finish

Next →

Figure 10: Setup Wizard - Telescopes

4.2.4 Eyepiece data

You can also enter information about any eyepieces you plan to use. The information is used in conjunction with the telescope information to construct charts showing the view through such a telescope/eyepiece combination, and what you are likely to see.

The dialog includes a comprehensive list of commercially-available eyepiece. If your eyepiece or eyepieces are in that list, select the entry and click the **Add** button.

You can also add the information manually, and use the **Add this eyepiece** button to add the new eyepiece entry.

Click the **Next** button when you've finished.

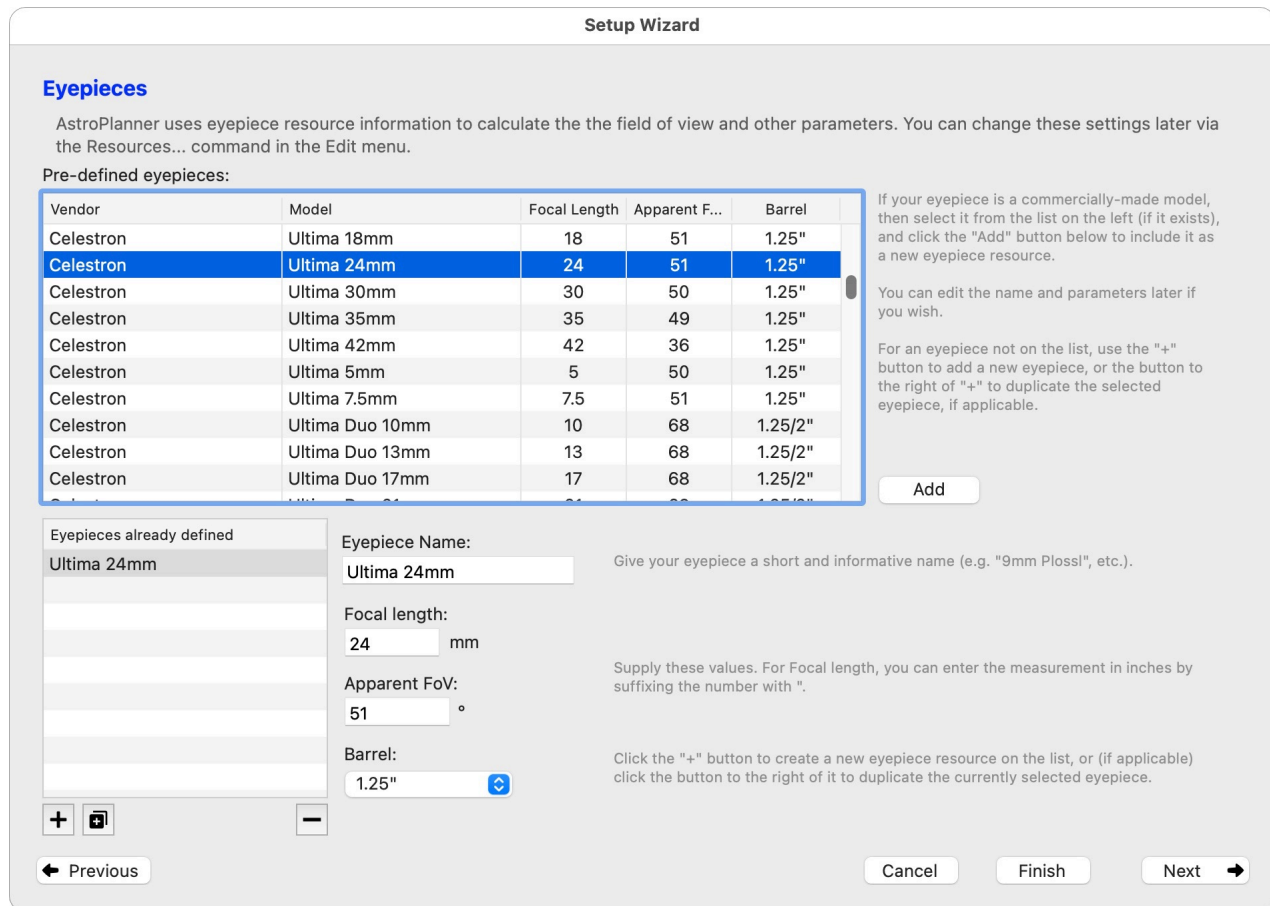


Figure 11: Setup Wizard - Eyepieces

4.2.5 Catalogues

When you enter the Catalogues part of the wizard, you'll be asked if you want to install your catalogues from an AstroPlanner CD/DVD-ROM or USB Flash Drive, if you have such a thing. If you do, make sure the disk/flash drive is inserted and ready to read. Then click **Yes**.

If you'd rather access the on-line inventory and download any catalogues you might need, click **No**.

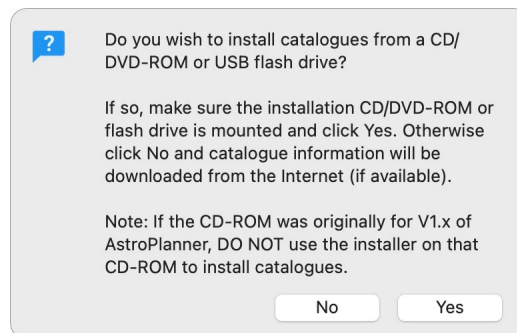


Figure 12: Catalogues from DVD-ROM or USB Flash Drive

A list of available catalogues is presented (on the right side). Check the checkboxes next to the catalogues you wish to install (if you want all of them, click the **Select All** button).

If you're not sure which ones you want, the application can choose some suitable ones for you. In this case, in the User Survey section on the left, check all the checkboxes next to equipment you own,

and the kind of observing you plan to be doing. As you select options, suggested catalogues will be marked in green. You can use this as a guide, or just click the **Select All Suggested** button.

Setup Wizard

Catalogues

Catalogues form the database of astronomical objects (i.e. stars, galaxies, etc.) available to you for adding to your observing plans.

Each catalogue is usually based on a specialised survey done by professional astronomers. Each such catalogue will usually "specialise" in a particular type of object (e.g. double stars, galaxies, planetary nebulae, etc.), and often covers only part of the entire sky visible from where the author was observing.

There are more than 150 such catalogues available to you (as a registered user), ranging from small catalogues with a dozen objects to enormous stellar catalogues such as the USNO A2.0 catalogue that has over half a billion stars.

You probably won't use a lot of them, and you don't need all of them on disk at any one time. You can add and remove them at any time using the Catalogue Manager available from the File menu. The "survey" below attempts to predict what catalogues you are likely to use and suggests which ones you should consider as a basic set. You can, of course, choose them all if you like.

User Survey

Check all items applicable to you

- ☐ greater than 300mm aperture
- ☒ Meade LX200 Classic
- ☐ Meade Autostar II
- ☐ Celestron Nexstar
- ☐ Orion Intelliscope
- Visual Observing**
 - ☐ Moon
 - ☐ Planets
 - ☐ Comet hunting
 - ☒ Double stars
 - ☐ Variable stars
 - ☒ Deep sky objects
 - ☐ Asterisms
- Imaging and Astrophotography**

Suggested Catalogues

Check all catalogues you would like to install from the Internet **Suggested catalogues in green**

Name	Size	Objects
<input type="checkbox"/> Bernes Bright Nebulosity Catalogue	25.2KB	160
<input type="checkbox"/> Bernes Dark Cloud Catalogue	20.7KB	160
<input type="checkbox"/> BeSS Beryllium Star Catalogue	250.3KB	2,021
<input type="checkbox"/> Bonner Durchmusterung	11.2MB	325,037
<input type="checkbox"/> Boss General Catalogue	4.3MB	33,342
Bright Star Catalogue (installed)	810.0KB	9,110
<input type="checkbox"/> Burnham Double Star Catalogue	656.3KB	2,202
<input checked="" type="checkbox"/> Caldwell Catalogue	9.5KB	109
<input type="checkbox"/> Cape Photographic Durchmusterung	15.6MB	454,877
<input type="checkbox"/> Carbon Star Catalogue	655.1KB	6,891
<input type="checkbox"/> Catalogue of Galactic Planetary Nebulae	155.1KB	1,510

Select All Select All Suggested Select None 1 catalogues selected (9.5KB)

Previous Cancel Finish Next

Figure 13: Setup Wizard - Catalogues

When you've finished, click the **Next** button. You'll be warned about the catalogues you selected.

? 1 catalogues were selected for installation. OK to install these (after you click the Finish button)?

No Yes

Figure 14: Catalogue warning

4.2.6 Sample Plan Document

This page of the wizard lets you create a sample plan document if you wish. Type in a suitable file name, and select some suitable astronomical objects to populate it with.

The file will be created on your desktop, and opened for you.

When you've finished, click the **Next** button.

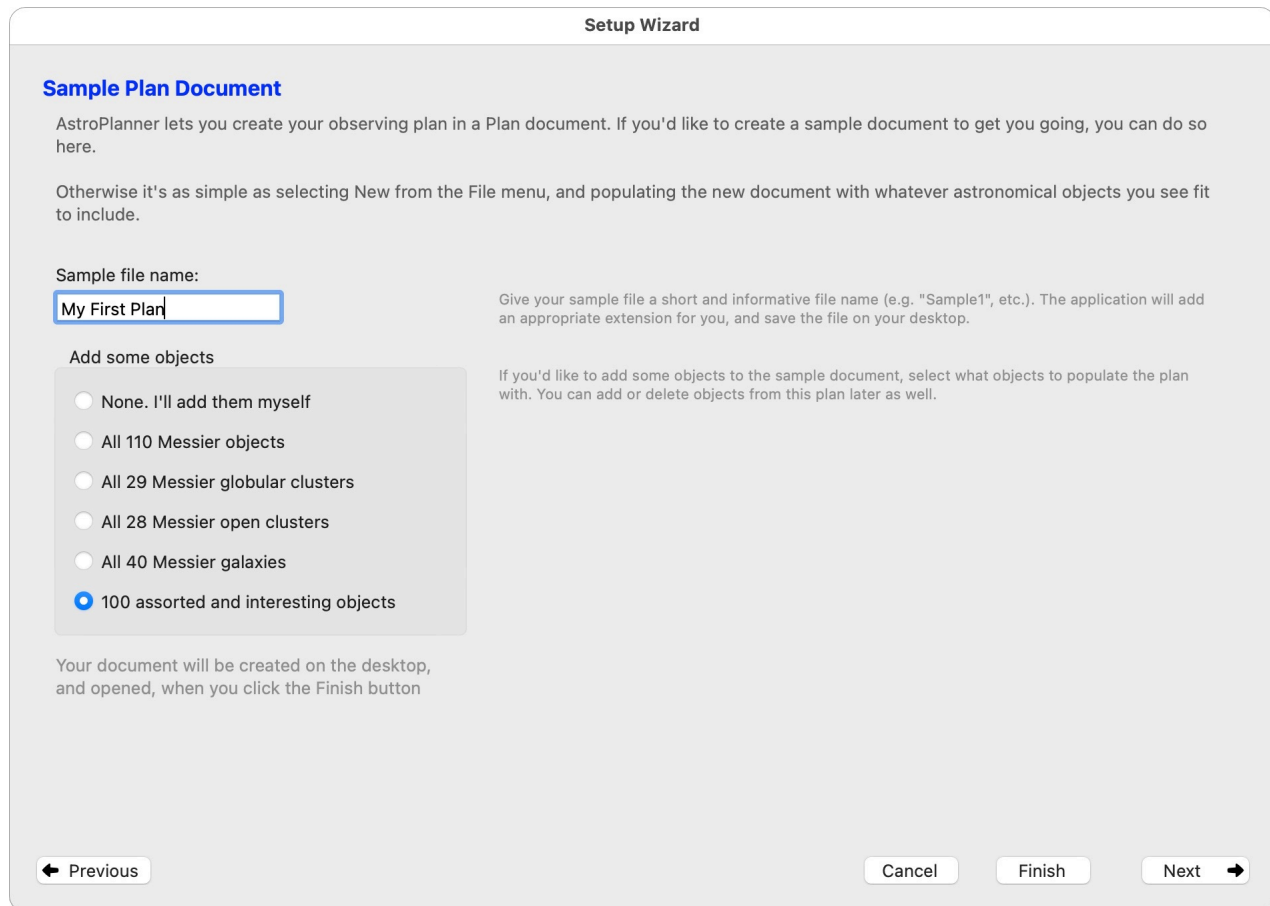


Figure 15: Setup Wizard - Sample Plan Document

4.2.7 Completion

Finally, the actions you performed will be summarised on the Complete page.

To go ahead and create the resources, sample file, and/or install catalogues, click the **Finish** button. Otherwise click the **Cancel** button and all actions will be cancelled.

Note that you can call up the Setup Wizard at any time via the **File > Setup Wizard...** menu item.

If you click **Finish** and there were catalogues selected to install, then the Catalogue manager window is opened, and you'll need to click the **Install** button to finish off the installation.

5 Quick start tutorial

The aim of this chapter is to lead you through some typical tasks you would use AstroPlanner for. By the end of this chapter you should be familiar enough with the application to use it without assistance, and be ready to start experimenting and exploring. We suggest you follow along and duplicate what is described here yourself, as it will aid in your familiarisation.

It's assumed that you have the application open, and that you've completed the installation tasks.

We're going to do the following:

- Set up an observing plan for an article in Sky & Telescope magazine, which just happens to be available for download.
- Set up another observing plan for another Sky & Telescope article that is not available.
- Use the Plan Creation Wizard and let AstroPlanner set up a custom plan for you.

Once we've done that we'll pick one of these plans and do some observing.

5.1 Creating a new plan

5.1.1 Setting up a plan that someone else has already done for you

For illustrative purposes, let's say we just read the article on pages 67 through 70 of the September 2011 issue of Sky & Telescope magazine, entitled *In Praise of the Great Dark North*, by David Rodger. This article talks about a selection of interesting objects in the northern sky. We'd like to set up an observing plan to look at these objects. Perhaps we'll get lucky and someone has already done the work for you and is willing to share. Let's check the on-line user-contributed plan depository.

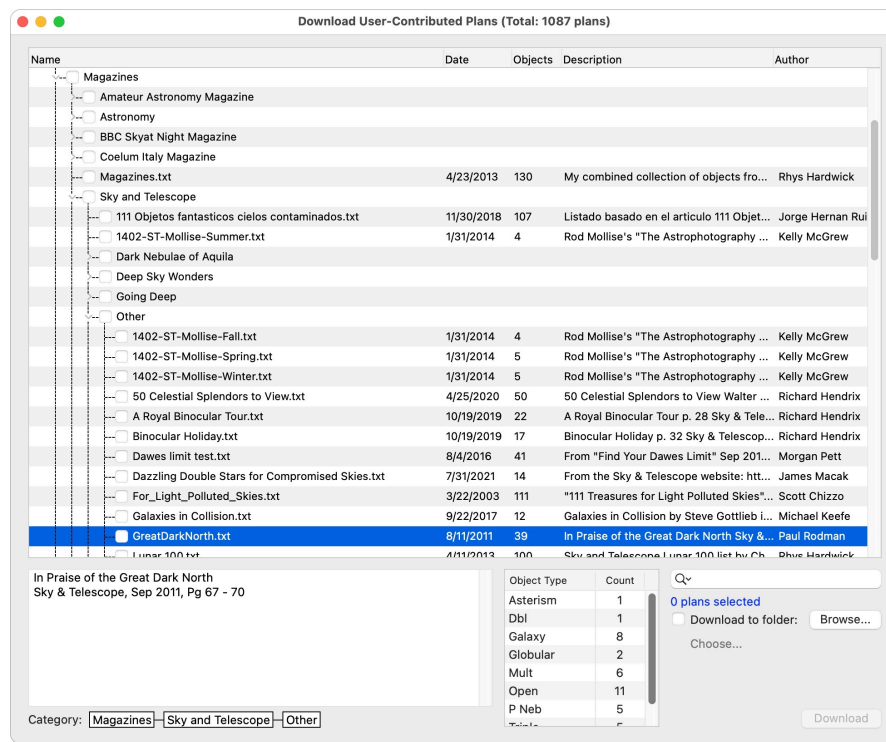


Figure 16: User-contributed plans

Use **File > User-Contributed Plans > Download...** (assuming you are currently connected to the Internet). The window shown in Figure 16 appears. You can look for the item manually in the hierarchical list (you'll find it under **By Category > Magazines > Sky and Telescope > Other**), or even quicker by typing *Great Dark North* into the Find field (centre right) and pressing Enter/Return.

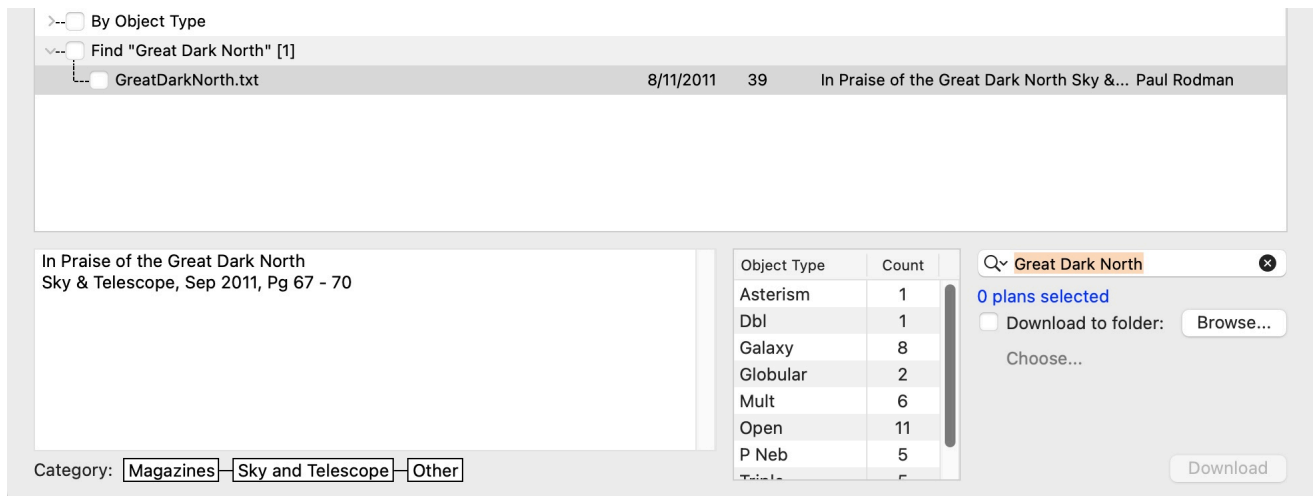


Figure 17: Using the Find feature

Select the *GreatDarkNorth.txt* entry by clicking the checkbox next to it and then clicking the **Download** button. The plan is downloaded and opened. Close the user-contributed plans window and, if you so choose, save the *GreatDarkNorth* plan on your hard disk.

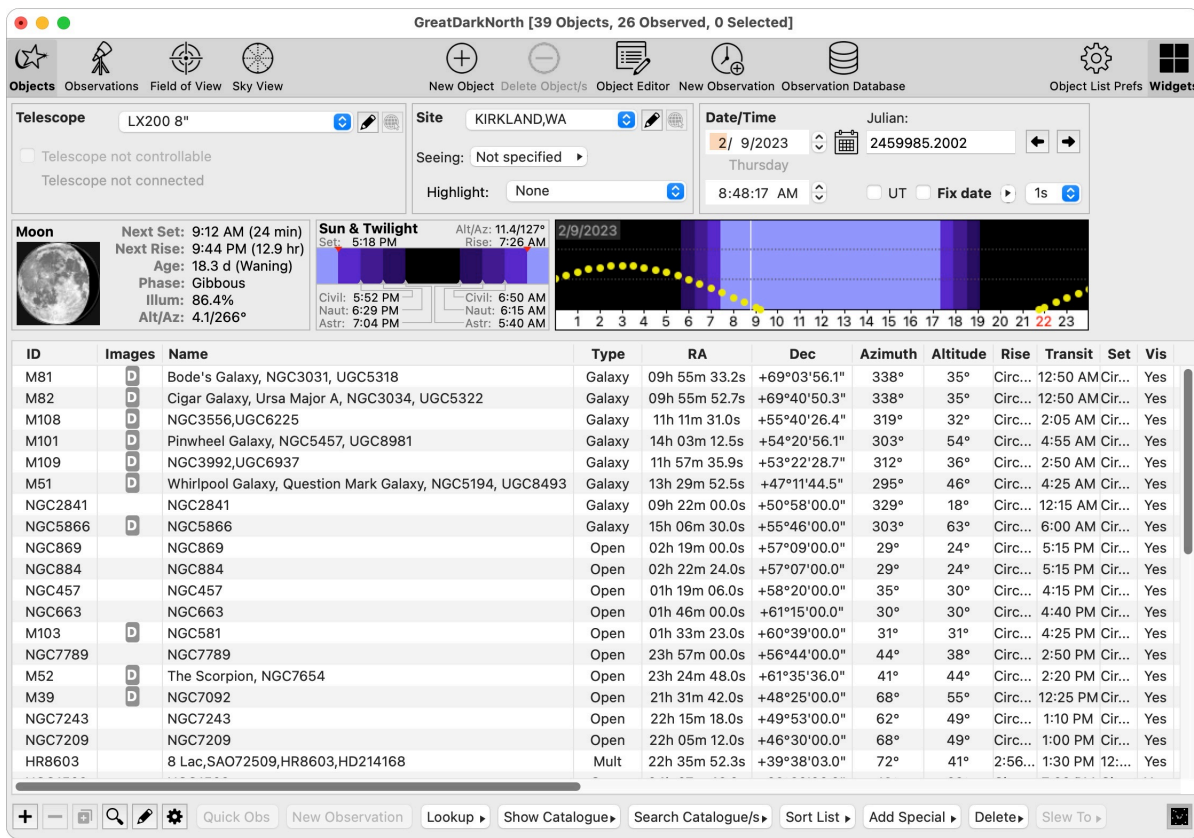


Figure 18: GreatDarkNorth observing plan

5.1.2 Setting up a plan manually

The next plan we are going to set up is for an article in the same issue of Sky & Telescope magazine: *Deep Sky Wonders: The Berkeley Clusters* by Sue French (pages 56 to 58, September 2011 issue). This time we won't assume someone else already uploaded the plan for our convenience, but we'll enter the objects manually.

Note that the Berkeley Catalogue is available (for registered users) which makes this a lot easier. However, for the sake of this exercise, we'll assume the Berkeley Catalogue has not been installed.

On page 57, French conveniently gives us a table containing details about the objects she refers to in the article. Here is a summary:

Object ID	Magnitude	Size	RA	Dec
NGC 6749	12.4	4'	19h 05.3m	+01° 54'
NGC 6791	9.5	10'	19h 20.9m	+37° 46'
IC 1310	~10	4'	20h 10.0m	+34° 58'
Berk 82	~9	4'	19h 11.3m	+13° 07'
Messier 29	6.6	10'	20h 24.1m	+38° 30'
Berk 86	7.9	7'	20h 20.2m	+38° 41'
Berk 87	~7	10'	20h 21.6m	+37° 24'

We're now going to enter these objects manually.

Create a new plan document (**File > New**).

Create a new object by clicking the **+** button at the bottom left of the object list. This reveals the New Object dialog. Type in the ID of the first object, NGC 6749 (you can skip the space if you like). Hit the Return/Enter key or click the **Best** button. NGC 6749 is found in the catalogues and added to the plan.

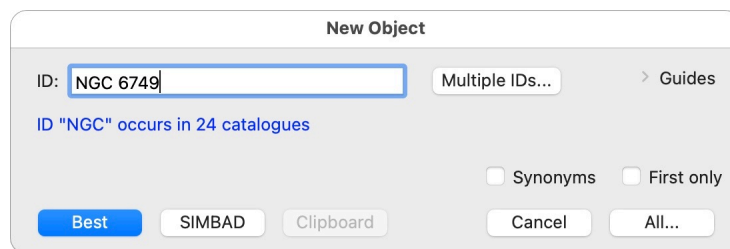


Figure 19: New object dialog

Repeat the above procedure for NGC 6791, and IC 1310¹. The next object is Berk 82. This object can be found in the Berkeley Catalogue, but as mentioned above, we'll assume it isn't installed. Click the

1. Note that you'll need the IC Catalogue installed. Unregistered users are out of luck, and should proceed as for Berk 82.

+ button as before, but this time just click the **Empty** button. This creates an empty entry. To edit this entry you will need to reveal the editing fields by clicking on the **Show editing fields** button (the small button, fifth from the left underneath the object list). Then select the **Object Properties** tab.

Into the **ID** field type "Berk 82".

Into the Right Ascension (**RA**) fields type "19" and "11.3".

Into the Declination (**Dec**) fields type "13" and "7".

Into the **Magnitude** field type "9".

Into the **Size** field type "4".

Use the popup to the right of the **Type** field to choose "Open" as the object type.

The screenshot shows the Starry Night software interface. The title bar indicates "Untitled-1 [4 Objects, 1 Observed, 1 Highlighted, Berk 82 Selected]". The main panel displays various astronomical data and charts, including a Moon phase, Sun & Twilight times, and a sky plot for 1/24/2023. Below the main panel is a table of objects with columns for ID, Images, Name, Type, RA, Dec, Azimuth, Altitude, Rise, Transit, Set, Vis, Obs, Rating, ODM, Mag, Mag 2, Sep, and Diff k. The table lists several objects, including NGC6749, NGC6791, IC1310, and Berk 82. The 'Object Properties' tab is active, showing fields for ID (Berk 82), Name, RA (19h 11m 18s), Dec (+13° 07' 00"), Magnitude (9.0), Size (4), Type (Open), and others.

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise	Transit	Set	Vis	Obs	Rating	ODM	Mag	Mag 2	Sep	Diff k
NGC6749			Globular	19h 05m 15.4s	+01°54'02.0"	195°	43°	4:50 AM	11:00 AM	5:13 PM	Yes	1		28x	11.1			n/a
NGC6791			Open	19h 20m 53.0s	+37°46'18.0"	210°	79°	1:15 AM	11:20 AM	9:19 PM	Yes			28x	9.5			n/a
IC1310				20h 10m 01.0s	+34°58'07.0"	161°	77°	2:39 AM	12:05 PM	9:33 PM	Yes			n/a				n/a
Berk 82			Open	19h 11m 18.0s	+13°07'00.0"	196°	55°	4:05 AM	11:10 AM	6:10 PM	Yes			28x	9.0			n/a

Figure 20: Entering Berk 82 manually

We're going to demonstrate another way to enter Messier 29 (M29). From the **Show Catalogue** pop-up button under the list of objects, choose to show the Messier Catalogue.

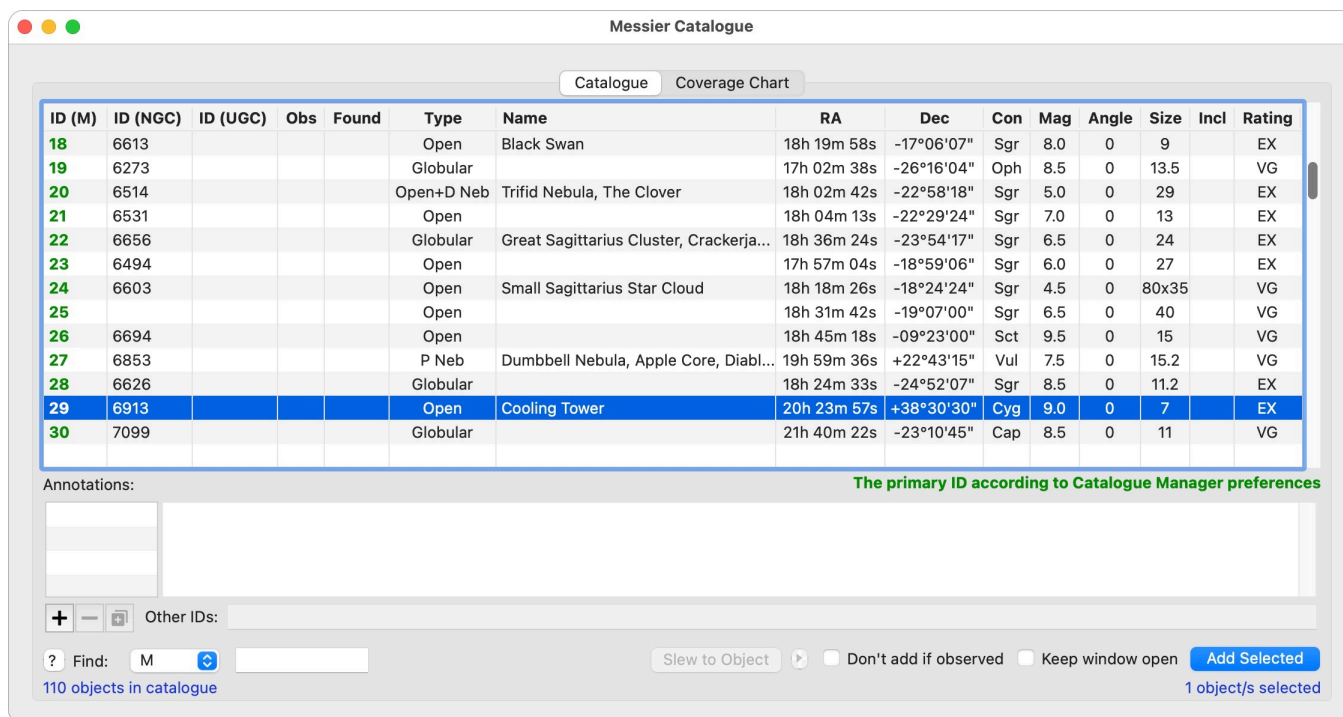


Figure 21: Selecting M29 directly from the catalogue

Select the entry for M29 and click the **Add Selected** button (or drag the object from the window onto the object list in your plan).

Add the final two objects (Berk 86 and Berk 87) using one the above techniques.

Save the plan document to hard disk if you wish.

5.1.3 Letting the Plan Creation Wizard create a plan for you

The Plan Creation Wizard creates a custom observing plan just for you.

Start the wizard using the **File > Plan Creation Wizard...** menu command.

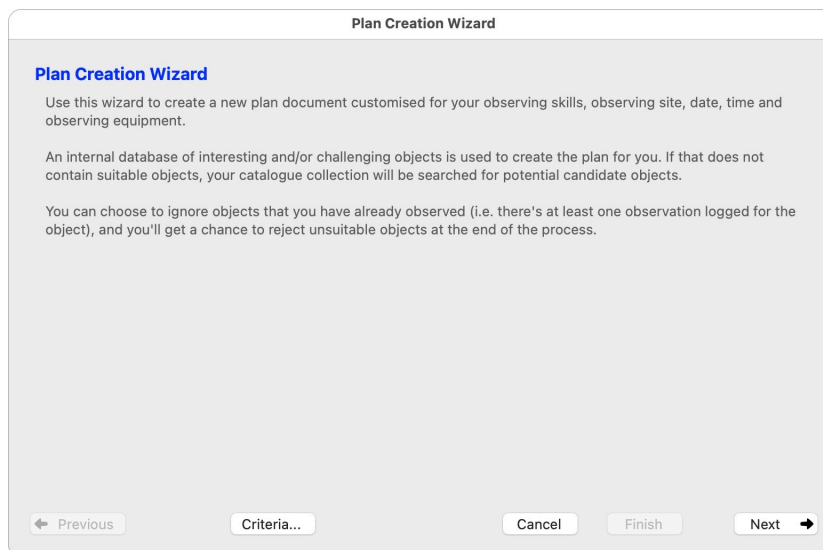


Figure 22: Plan Creation Wizard dialog

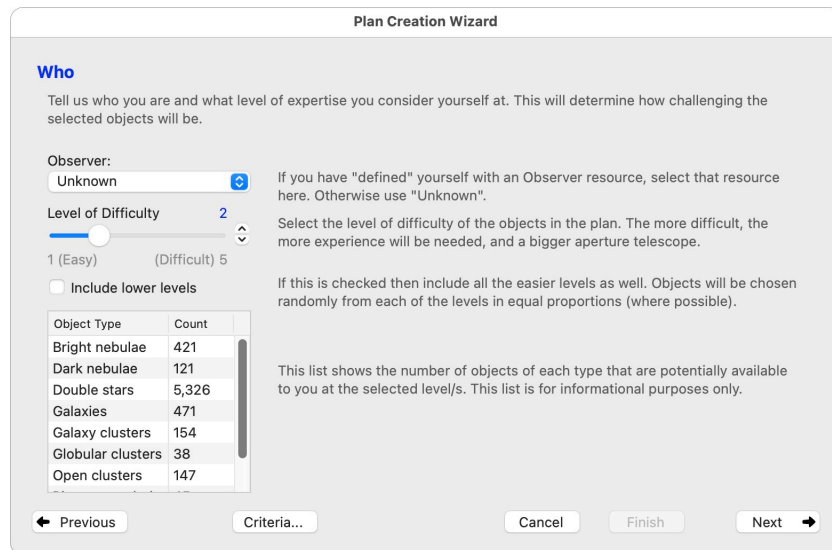


Figure 23: Plan Creation Wizard - Who

Use the **Next** button to move through the stages required to build a plan. At any stage you can also use the **Previous** button to go back and change an option if you need to do so.

The second panel (**Who**) lets you specify the observer (so we can take into account such aspects as age and visual acuity¹). If you haven't created an Observer resource just use the "Unknown" setting².

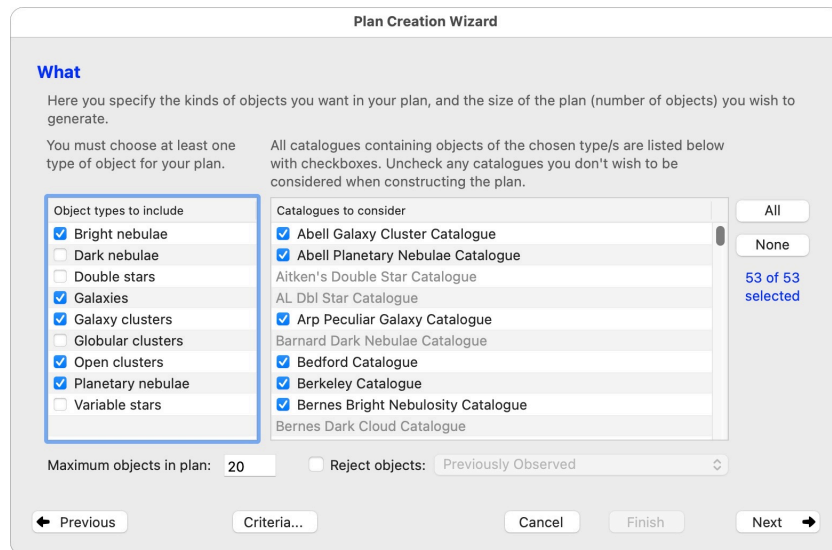
We also specify the level of difficulty for the objects in the resulting observing plan. You can specify five levels, from **Easy** (probably observable in poor skies with minimal equipment and experience) through **Difficult** (probably requiring a lot of experience and large aperture telescopes).

The third panel (**Where and When**) specifies where you will be observing from (your observing site) and when you plan to do the observing. These settings are used to determine what objects will be visible for you. It's not reasonable to choose objects that either never rise above the horizon at your observing site, or objects that never rise during the observing period, but might be visible at other times of the year.

You select the Observing site resource². You then need to specify the dates/times you plan to do your observing (make sure the **Restrict to** option is set to **Date/time**). In our case, we are doing our observing at the Winter Star Party site in Florida, during Winter (go figure), and we'll plan on doing our observing between the start of nautical twilight and 2am (when we collapse into our sleeping bag).

1. In the current version of AstroPlanner, these aspects are *not* taken into account, so any observer has the same weight as any other observer.

2. If you want to or need to set up such a resource you can skip ahead to Section 5.2 on page 23. However, you will need to cancel from this dialog first.



Plan Creation Wizard

What

Here you specify the kinds of objects you want in your plan, and the size of the plan (number of objects) you wish to generate.

You must choose at least one type of object for your plan.

All catalogues containing objects of the chosen type/s are listed below with checkboxes. Uncheck any catalogues you don't wish to be considered when constructing the plan.

Object types to include

- ☒ Bright nebulae
- ☐ Dark nebulae
- ☐ Double stars
- ☒ Galaxies
- ☒ Galaxy clusters
- ☐ Globular clusters
- ☒ Open clusters
- ☒ Planetary nebulae
- ☐ Variable stars

Catalogues to consider

<input checked="" type="checkbox"/> Abell Galaxy Cluster Catalogue
<input checked="" type="checkbox"/> Abell Planetary Nebulae Catalogue
Aitken's Double Star Catalogue
AL Dbl Star Catalogue
<input checked="" type="checkbox"/> Arp Peculiar Galaxy Catalogue
Barnard Dark Nebulae Catalogue
<input checked="" type="checkbox"/> Bedford Catalogue
<input checked="" type="checkbox"/> Berkeley Catalogue
<input checked="" type="checkbox"/> Bernes Bright Nebulosity Catalogue
Bernes Dark Cloud Catalogue

All

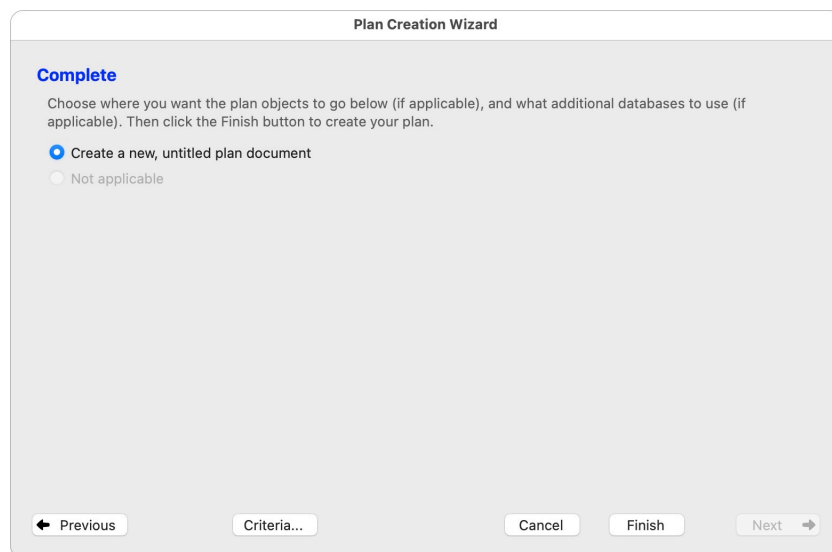
None

53 of 53 selected

Maximum objects in plan: ☐ Reject objects:

Figure 26: Plan Creation Wizard - What

The final panel (Complete) lets you select whether to create a new, untitled plan document for your objects, or to add them to a currently-open plan document. We'll choose a new document.



Plan Creation Wizard

Complete

Choose where you want the plan objects to go below (if applicable), and what additional databases to use (if applicable). Then click the Finish button to create your plan.

☒ Create a new, untitled plan document
☐ Not applicable

Figure 27: Plan Creation Wizard - Complete

When you click the **Finish** button a new document is created with (in this case) 20 objects in it. You can save the plan document with whatever name you see fit to give it.

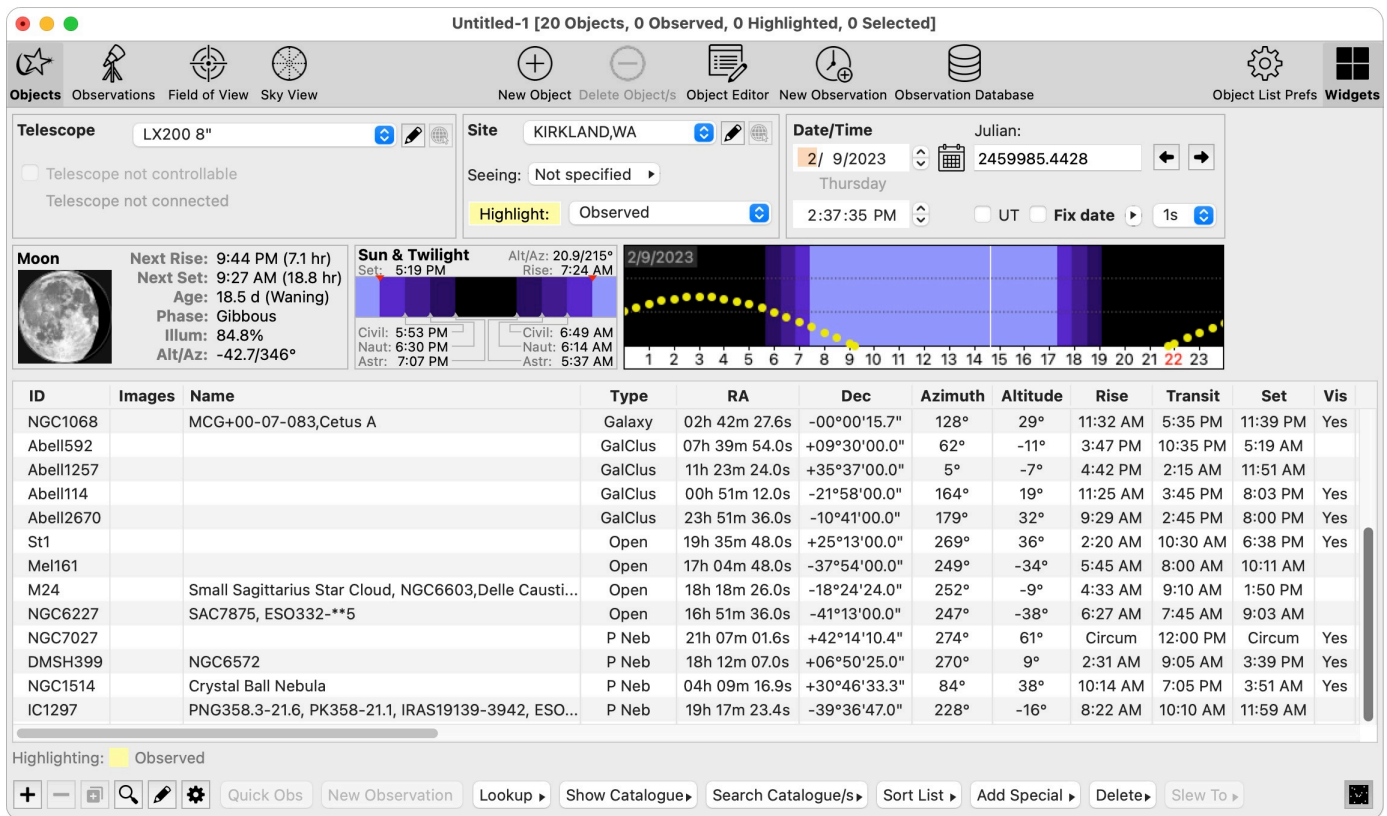


Figure 28: Plan Creation Wizard - The resulting observing plan

For more information on the Plan Creation Wizard see Section 10.3 on page 85.

5.2 Setting up resources

When you first used AstroPlanner (assuming you didn't upgrade from an earlier version, or cancel from the Setup Wizard), the Setup Wizard asked you to enter some basic information about your observing site or sites, telescopes and eyepieces. All of these entities are called "resources" (see Section 7.5 on page 39). You will occasionally need to edit these resources in order to add, modify or delete them. We'll do this to add a telescope with a computerised mount for use later in this chapter (don't worry if you don't have an actual computerised mount - we'll fake it).

To edit resources, use the **Edit > Resources...** menu command.

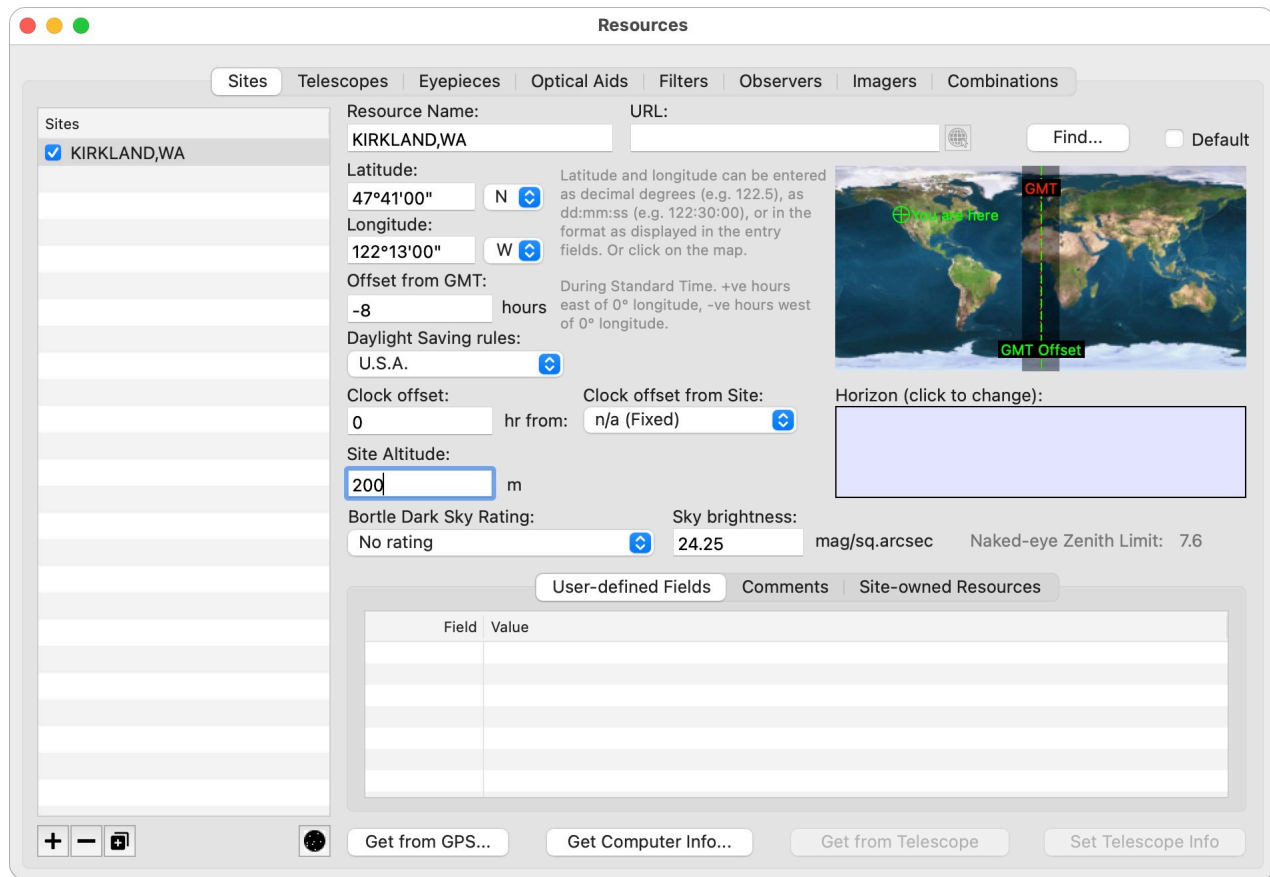


Figure 29: Resources database window

5.2.1 Sites

The window contains several tabs, each one containing a different type of resource. The first tab (**Sites**) contains your observing sites. You should have at least one entry here. If not, click the **+** button under the list on the left to create a new one. Make sure you enter the latitude, longitude and Offset from GMT values correctly (other settings are less critical).

5.2.2 Telescopes

Select the second tab (**Telescopes**). For this exercise you should have at least one telescope defined. You should also set up a telescope with a computerised mount, so that you can experiment with controlling that telescope (see Section 5.4 on page 31). Even if you don't have such a telescope, AstroPlanner includes a telescope emulator that lets you control an internal software telescope that looks to the application like a real telescope.

We are going to create such a "fake" telescope:

- Click the **+** button under the list of telescopes to create a new entry. Alternatively, you can click the **Select from List...** button and choose from a list of commercially-available telescopes.
- Change the **Resource Name** to "Experimental" (or choose your own name).
- Change the **Computerised Mount** via the popup menu to "AstroPlanner: Emulated Go To".
- Leave the other fields as they are.

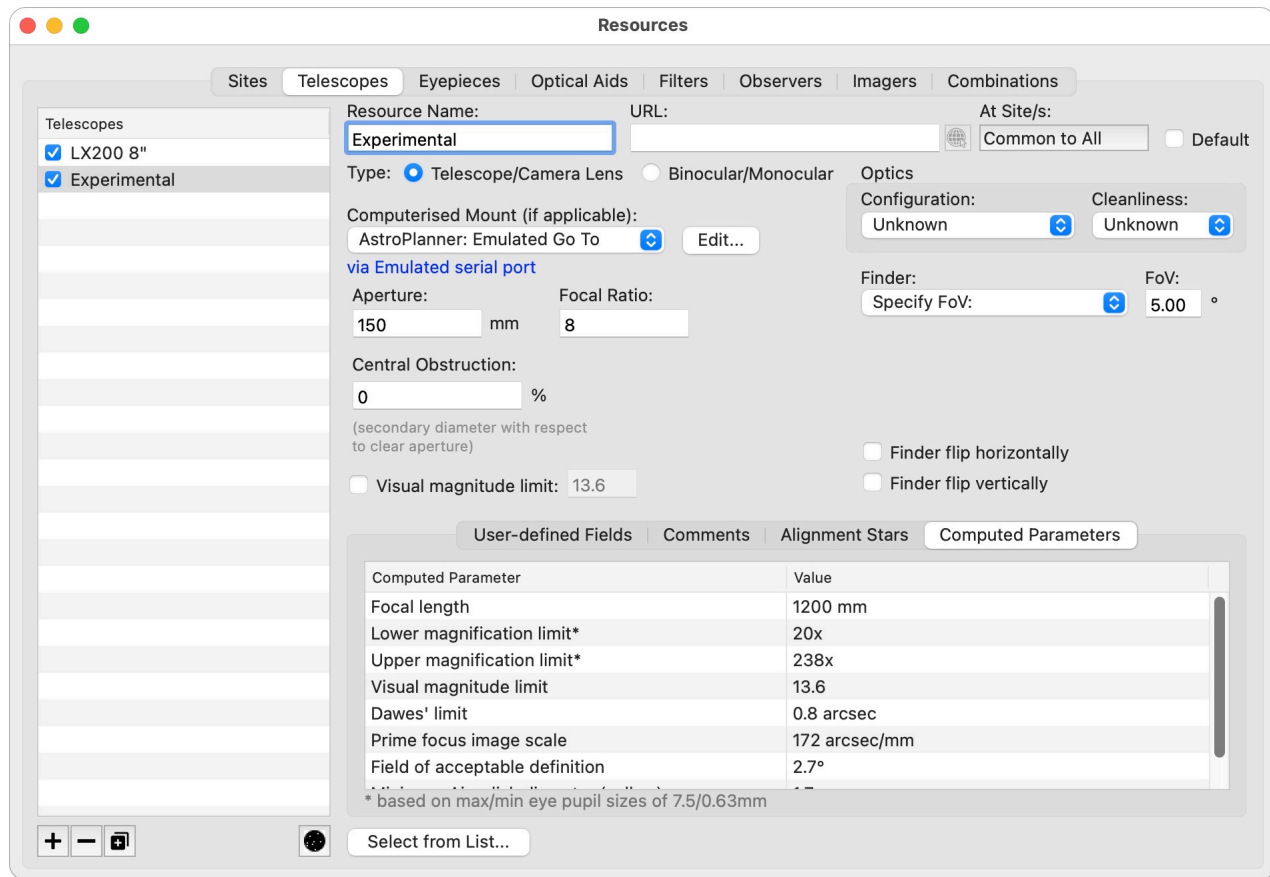


Figure 30: Telescope resources

If you have a physical telescope with a supported computerised mount (e.g. A Meade Autostar- or Celestron NexStar-controlled telescope), then you can set this up quite easily:

- Change the **Computerised Mount** via the popup menu to the particular mount you have (e.g. "Meade: ETX series").
- Click the **Edit...** button to the right of the Computerised Mount Popup. This opens a dialog to allow you to edit various settings of your telescope mount.
- Select the **Serial port** that your telescope will connect to (top left of the edit dialog).
- If available to you, also set the **Bit Rate** (top right of the dialog) to match your mount's bit rate setting. If this is disabled, it means you have no choice, and you can ignore it.
- Leave the other settings as they are, and click **OK**.

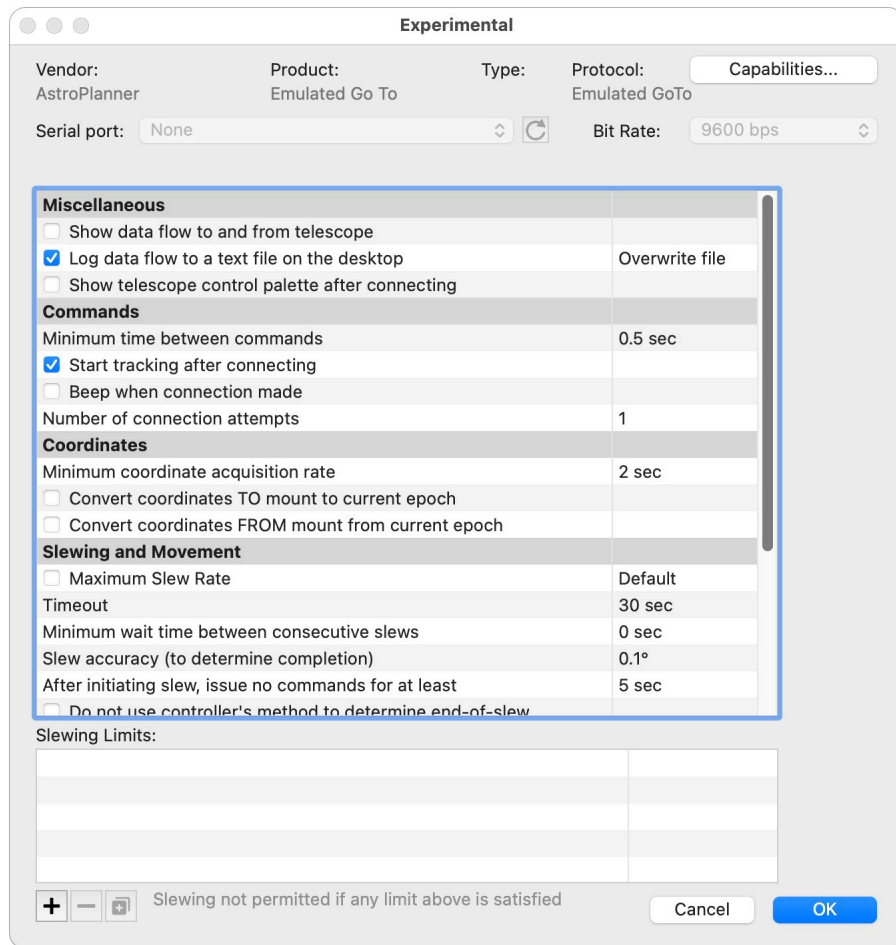


Figure 31: Editing the Computerised Mount settings

5.2.3 Eyepieces

Similarly, select the third tab (**Eyepieces**) and enter at least one eyepiece resource. Make sure, for each eyepiece, you enter the focal length and the apparent field-of-view correctly. Alternatively, you can click the *Select from List...* button and choose from a list of commercially-available eyepieces.

5.3 Visualising objects

We will use the plan we set up manually (see Section 5.1.2 on page 17), but you can use any plan you like, as long as it has a few objects in it. What we would like to do is answer the questions below regarding the actual object in the night sky. This is what observation planning is all about.

In the open plan document set the **Site** popup (top right) to your preferred observing site.

5.3.1 Is an object currently visible in the sky?

Right now (daytime or nighttime), can I see the object?¹ This is easily seen by looking at the Visibility (**Vis**) column of the object list. If the Vis column entry for an object is blank (or contains "Horz"²), it means that the object is not currently visible in the sky and is either below the horizon or is never

1. If it's daytime, this question is theoretical, unless the object is the sun or moon.

2. Hidden by the site horizon (e.g. a wall, trees, a house, etc.)

visible at the latitude of your site. If the Vis column is "Yes" then the object is currently visible. In Figure 32, NGC6749 and Berk 82 are currently not visible, and the others are all visible.

Additionally, you can look at the Rise Time (**Rise**) and Set Time (**Set**) columns to see when the objects will be visible. If Rise is "Never" then the object is *never* visible at the latitude of your selected observing site. If Rise is "Circum" then the object is circumpolar (i.e. is *always* visible at your observing site).

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise	Transit	Set	Vis
NGC1068		MCG+00-07-083,Cetus A	Galaxy	02h 42m 27.6s	-00°00'15.7"	131°	31°	11:32 AM	5:35 PM	11:39 PM	Yes
Abell592			GalClus	07h 39m 54.0s	+09°30'00.0"	65°	-9°	3:47 PM	10:35 PM	5:19 AM	
Abell1257			GalClus	11h 23m 24.0s	+35°37'00.0"	8°	-6°	4:42 PM	2:15 AM	11:51 AM	
Abell114			GalClus	00h 51m 12.0s	-21°58'00.0"	168°	19°	11:25 AM	3:45 PM	8:03 PM	Yes
Abell2670			GalClus	23h 51m 36.0s	-10°41'00.0"	183°	32°	9:29 AM	2:45 PM	8:00 PM	Yes
St1			Open	19h 35m 48.0s	+25°13'00.0"	271°	34°	2:20 AM	10:30 AM	6:38 PM	Yes
Mel161			Open	17h 04m 48.0s	-37°54'00.0"	250°	-36°	5:45 AM	8:00 AM	10:11 AM	
M24		Small Sagittarius Star Cloud, N...	Open	18h 18m 26.0s	-18°24'24.0"	254°	-11°	4:33 AM	9:10 AM	1:50 PM	
NGC6227		SAC7875, ESO332-**5	Open	16h 51m 36.0s	-41°13'00.0"	249°	-40°	6:27 AM	7:45 AM	9:03 AM	
NGC7027			P Neb	21h 07m 01.6s	+42°14'10.4"	276°	59°	Circum	12:00 PM	Circum	Yes
DMSH399		NGC6572	P Neb	18h 12m 07.0s	+06°50'25.0"	273°	7°	2:31 AM	9:05 AM	3:39 PM	Yes
NGC1514		Crystal Ball Nebula	P Neb	04h 09m 16.9s	+30°46'33.3"	86°	40°	10:14 AM	7:05 PM	3:51 AM	Yes
IC1297		PNG358.3-21.6, PK358-21.1, IR...	P Neb	19h 17m 23.4s	-39°36'47.0"	230°	-18°	8:22 AM	10:10 AM	11:59 AM	

Figure 32: Visibility of objects

5.3.2 Will an object be visible when I view the sky at a particular date/time in the future?

The above visibility test is for the current time. You can also check to see whether the object is going to be visible at another time (e.g. next Saturday at 10pm). To do this we use the Fix Date feature of AstroPlanner. This allows you to freeze the Date and Time at specific values and look at the visibility.

The Fix Date feature appears in the **Date/Time** widget at the top of the plan document window. Just change the date or time controls to fix the date. Going back to real time occurs when you uncheck the **Fix date** checkbox.

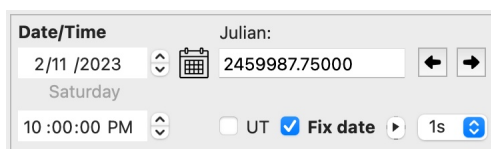


Figure 33: Fixed date/time

5.3.3 Where in the sky is the object?

This is where the **Sky** tab comes in¹. The tab contains an all-sky chart showing the whole sky as it appears at the selected Site at the current or selected date and time. If you had selected the object of interest in the object list before switching to this tab, the object will be shown on the chart if it's above the horizon (in the figure below, Abell1257 is selected).

Feel free to twiddle with the various Display Options on the right of the chart. You can also use the slider under the Display Options to see the chart at other times of the day/night.

1. When "tab" is referred to in this context, it is one of the four icons at the top-left of the plan document window (i.e. Objects, Observations, Field of View, and Sky). Clicking on those icons switches you to the relevant tab.

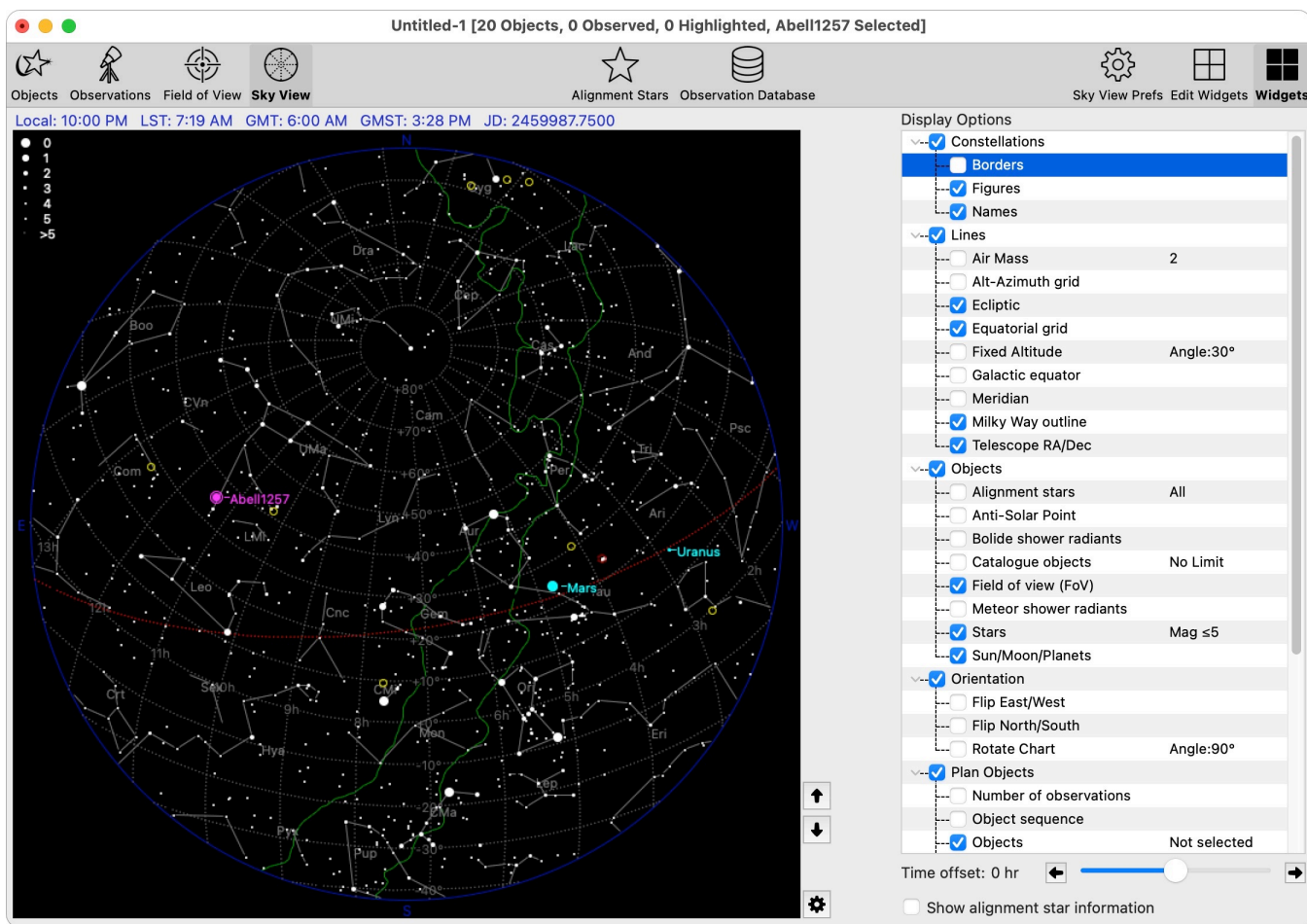


Figure 34: Sky tab

5.3.4 What am I going to see through my telescope?

The next question is figuring out what you are going to see when you look through your telescope with a particular eyepiece. This is done by selecting the object in question in the object list and switching to the **Field of View** tab.

For our example here, we will select M24 in the objects list and then select the **Field of View** tab.

This tab displays a chart that attempts to preview what you will see through a telescope. On the right side are various settings to help you with that. Most importantly, at the top are settings that let you select the telescope and eyepiece you are going to use.

In our case (see Figure 35), we are going to use a telescope called "Orion ED 80 APO" together with a "Panoptic 35mm" eyepiece. Once those are selected, the application computes the actual field diameter (in this case, $3^{\circ} 58'$) and draws a chart centred on M24 of that computed diameter. You will also want to see what stars are going to appear in the field of view. You do that by selecting one (or more) stellar catalogues in the list at the bottom right. If a catalogue's checkbox is checked then any objects in that catalogue that also appear in the field of view will be charted (if they are within the Magnitude Limits defined).

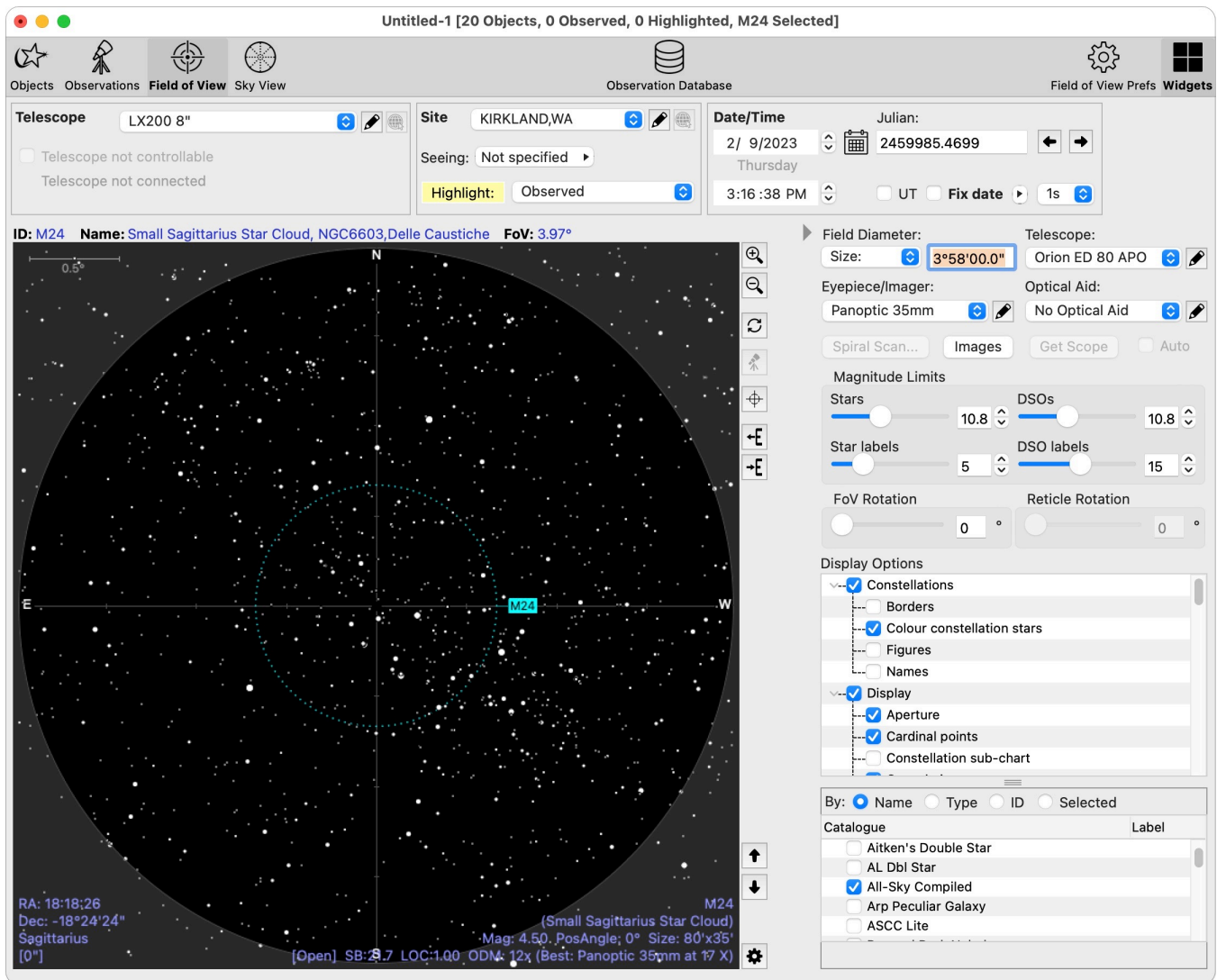


Figure 35: Field of View tab

In the field of view chart, non-stellar objects are displayed using symbols, which means the field of view chart is only a representation of what you will see.

5.3.5 What does the object actually look like?

Figuring out what an object actually looks like through a telescope is not an easy problem to solve. What can be done though, is to look at a photographic image of the object and use that, understanding the fact that in reality it will typically appear much dimmer when viewed visually through a telescope.

AstroPlanner includes the ability to download and save images of the objects you want to observe. These images come from photographic sky surveys (in particular the Digital Sky Survey (DSS)¹ and the Sloan Digital Sky Survey (SDSS)). We will download images for the objects in our plan. Proceed as follows (noting that this will require an Internet connection):

- Select an object in the plan (in the **Objects** tab). In this case we chose NGC1068 (a galaxy)

1. Also known as POSS (Palomar Observatory Sky Survey)

- Select **Image > Download Images...** from the main menu.
- In the Images window (Figure 36) select to download for the 1 selected plan object.
- Select the checkbox to **Select image size from object**, and make the image size 200% of object size.
- Select the **POSS 1st Gen** data source by checking its checkbox.
- Click the **Start Download** button.

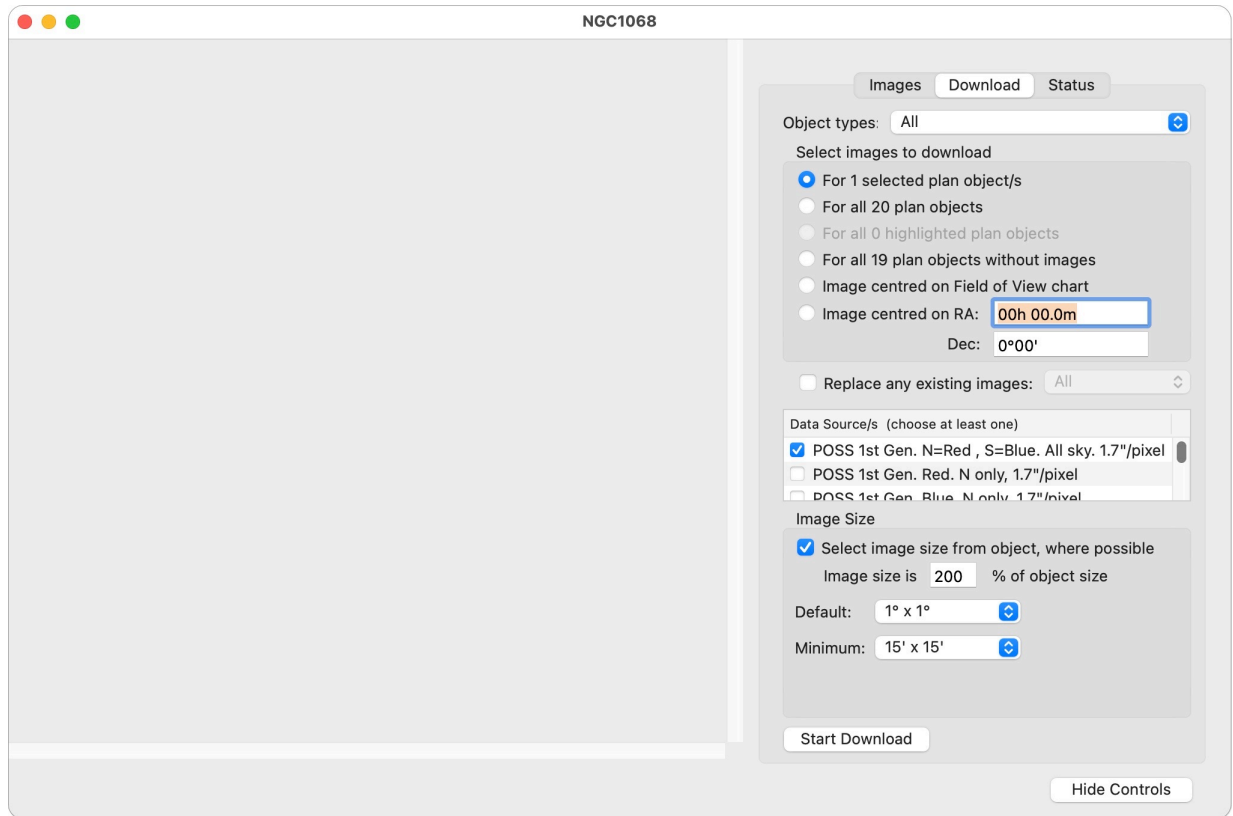



Figure 36: Download Images

The download then proceeds. The **Status** tab shows the progress (although in this case it happens too fast to see).

Once the download has completed (or before if you like), close the download window and go back to the **Objects** tab of your plan document. You'll see that the **Images** column of the list now has a "D" badge in it. This signifies that the object has one or more associated images. If you select such an object then the image of that object will appear on the right of the object list, as shown in Figure 37.

If you then switch to the **Field of View** tab, the image will be displayed as part of the chart, as shown in Figure 38. Note that the Field Diameter was set to a fixed 30' diameter. Note also that the image of the galaxy does not coincide with the centre of the field. This is because the coordinates for NGC1068 in the plan were not exactly correct.

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise
LBN187			BrNeb	20h 07m 52.0s	+36°48'36.0"	284°	40°	1:12 AM
LBN364			BrNeb	20h 24m 32.0s	+48°39'36.0"	296°	49°	Circurr
VdB104		CD-25 1148, HD147165,Alniyat	R Neb+Star	16h 21m 13.0s	-25°35'10.0"	277°	-42°	3:17 AM
IC5070		Pelican Nebula [2]	Neb	20h 51m 00.0s	+44°24'06.0"	287°	51°	Circurr
NGC3184			Galaxy	10h 18m 16.9s	+41°25'27.0"	26°	4°	1:46 PM
NGC4559			Galaxy	12h 35m 57.8s	+27°57'34.9"	1°	-14°	7:02 PM
M83		Southern Pinwheel Galaxy, NGC...	Galaxy	13h 37m 00.3s	-29°51'51.3"	323°	-69°	1:01 AM
NGC1068		MCG+00-07-083,Cetus A	Galaxy	02h 42m 27.6s	-00°00'15.7"	141°	35°	11:32 AM
Abell592			GalClus	07h 39m 54.0s	+09°30'00.0"	72°	-3°	3:47 PM
Abell1257			GalClus	11h 23m 24.0s	+35°37'00.0"	15°	-5°	4:42 PM
Abell114			GalClus	00h 51m 12.0s	-21°58'00.0"	177°	20°	11:25 AM
Abell2670			GalClus	23h 51m 36.0s	-10°41'00.0"	194°	31°	9:29 AM
St1			Open	19h 35m 48.0s	+25°13'00.0"	278°	28°	2:20 AM
Mel161			Open	17h 04m 48.0s	-37°54'00.0"	256°	-42°	5:45 AM
M24		Small Sagittarius Star Cloud, N...	Open	18h 18m 26.0s	-18°24'24.0"	261°	-17°	4:33 AM
NGC6227		SAC7875, ESO332-**5	Open	16h 51m 36.0s	-41°13'00.0"	254°	-46°	6:27 AM
NGC7027			P Neb	21h 07m 01.6s	+42°14'10.4"	282°	53°	Circurr

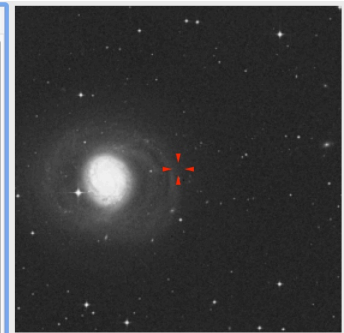
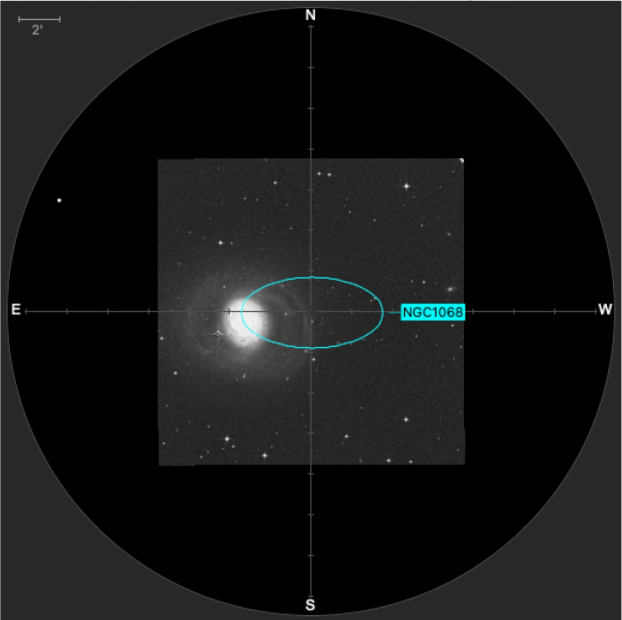


Figure 37: Objects list with images

ID: NGC1068 Name: MCG+00-07-083,Cetus A FoV: 30' RA/Dec: 02h 42m 28s / -00°00'16"



Field Diameter: Fixed (Telrad inner) (30') Telescope: Orion ED 80 APO

Eyepiece/Imager: Panoptic 35mm Optical Aid: No Optical Aid

Spiral Scan... Images Get Scope Auto

Magnitude Limits Stars 10.8 DSOs 10.8

Star labels 5 DSO labels 15

FoV Rotation 0° Reticle Rotation 0°

Display Options

- ☒ Constellations
- ☐ Borders
- ☒ Colour constellation stars
- ☐ Figures

By: ☒ Name ☐ Type ☐ ID ☐ Selected

Catalogue

- ☐ Aitken's Double Star
- ☐ AL Dbl Star
- ☒ All-Sky Compiled

Figure 38: Image of NGC1068 in field of view chart

5.4 Using a computerised telescope

For this demonstration we are going to use our "Experimental" telescope resource that we set up to use an emulated go to mount. You can use a real computerised mount if you wish, the process is identical (if somewhat noisier in the case of a real mount).

In the plan document window **Objects** tab, choose your telescope resource in the **Telescope** widget.

Check the **Connect to telescope** checkbox. The application then attempts to connect to the telescope mount, after which the checkbox caption changes to **Connected to telescope**, with the telescope firmware version number if applicable.

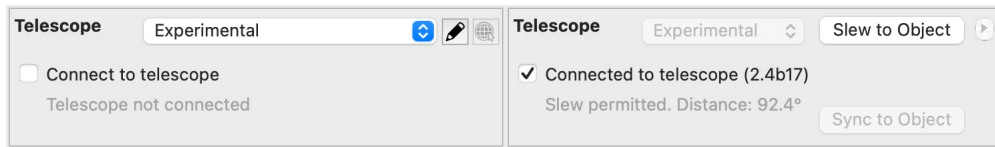


Figure 39: Telescope panel before and after connecting

In the case of the emulated mount, a small floating window appears showing the current status of the emulated telescope.

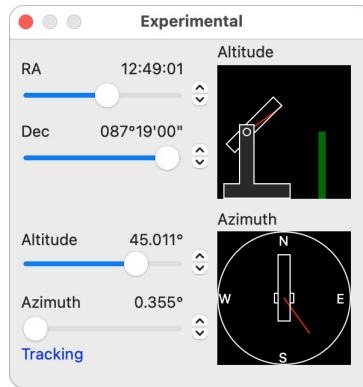


Figure 40: Emulated telescope floating window

At the top of the plan document window the widgets will now include one with the Telescope RA, Dec, Altitude and Azimuth (assuming there's enough width to display them).

Now select an object in the object list. If it is currently visible the **Slew to Object** button in the **Telescope** widget will be enabled. Click the button to slew the telescope to the selected object.

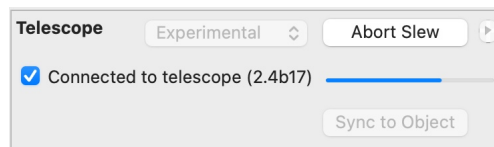


Figure 41: Telescope slewing to selected object

5.5 Making observations and logging them

So now we have an idea on how to construct an observing plan, how to get a heads-up on what we're likely to see, and how to control our telescope. Now we can observe. This section is a brief tutorial on how to log observations.

To log an observation:

- Select the object you are observing in the list in the **Objects** tab of the plan document window.
- Click the **New Observation** button under the list¹. The Observation Date/Time dialog is opened.
- If you are logging observations at your telescope, you click the **Now** button, otherwise enter the date and time of the observation. The graphic at the top shows the current time of day/night and the altitude of the object (red crosses). Click **OK**.

1. This is a short cut for switching to the **Observations** tab and clicking the **+** button under the list of observations.

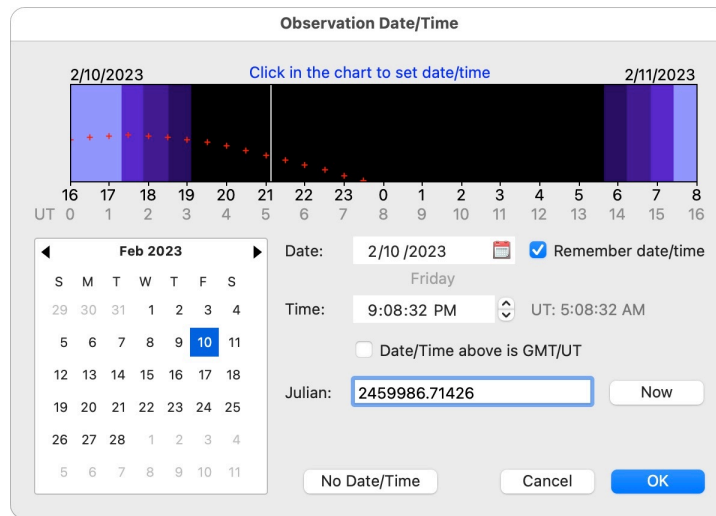


Figure 42: Observation date/time dialog

- The observation is added to list of observations for this object. It's now up to you to fill in the applicable fields for the observing session (this observation is the first observation logged for this session). You should also log a description of what you saw.

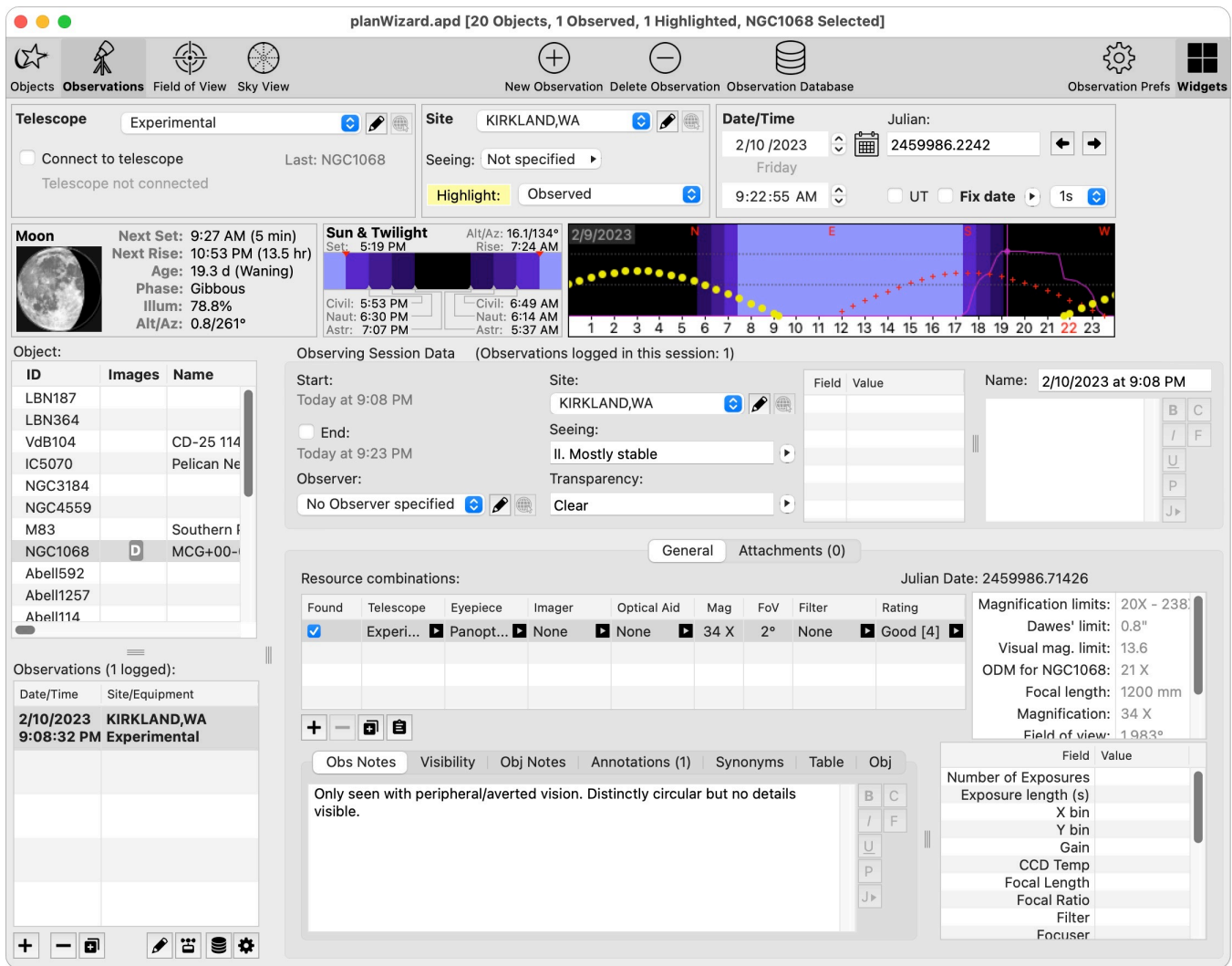


Figure 43: Observations tab with a logged observation

5.6 Printing reports

AstroPlanner includes features for printing observing forms (forms with blank spaces that you can fill in by hand), observing reports (a printed list of observations), and finder charts (for a particular object: charts at various resolutions that help you to find the object in the field).

We will continue using the small plan we devised earlier. Note that you can see the printed output as an on-screen preview without having to print it out on dead trees.

We'll look only at printing observing forms. The other types of printed reports are very similar.

5.6.1 Observing forms

Here's how to print observing forms for the objects in your plan:

- Go to the **Objects** tab.
- Use the **File > Print...** menu command.
- The **Print Objects** dialog is displayed. Choose **Observing Forms** from the **Task** popup.

- Select the informational fields you'd like printed out for each object (under Object fields), and the fields you'd like to print out as a blank template (Session and Observation fields).
- There are a number of Options you can play with. For this exercise we left the default settings, but added the **Object images** setting under **Images and Charts**. We also selected the **Sketching Templates** option. See Figure 44.
- Click the **Preview...** button. The first time you use this in a run the Printer Setup dialog will be displayed so that you can specify paper size, portrait vs. landscape, etc.
- The preview window is then generated (Figure 45). If you're happy with the report format then use the **Print...** button to print it out, otherwise close the preview window and try again.

The 'Print Objects' dialog box is titled 'Print Objects' and has a 'Task' dropdown set to 'Observing forms'. It contains several sections for configuring the print output:

- Page Header includes:** A list of fields to include in the page header. 'Plan file name' is checked.
- Page Footer includes:** A list of fields to include in the page footer. 'Page Number' and 'Date/Time' are checked.
- Restrictions:** A list of restrictions to apply. 'Selected' is checked.
- Object fields:** A list of object-related fields. 'ID', 'R.A.', and 'Declination' are checked.
- Session fields:** A list of session-related fields. 'Name', 'Duration', 'Finish', 'Observer', 'Seeing', 'Site', and 'Start' are listed.
- Observation fields:** A list of observation-related fields. 'Found', 'Julian Date', 'Local Date', 'Local Time', 'Magnification', 'Plan Document', 'RA', 'Type', 'UT Date', 'UT Time', 'Telescope', 'Imager', 'Eyepiece', 'Optical Aid', 'Filter', and 'Rating' are listed.
- Options:** A section with various checkboxes and settings. 'New page per object', 'Include all-blank object fields', 'Grid lines', 'Object images', 'Constellation chart', and 'Sketching templates' are checked. 'Observation templates per object' is set to 1. 'Template diameter' is set to 5 cm.

At the bottom, there are buttons for 'Load...', 'Save...', 'Cancel', and 'Preview...'.

Figure 44: Print dialog for observing forms



6 How to get help

AstroPlanner is a very rich application¹ and it takes some time and effort to get it to do your bidding. There are several ways to get help. Remember: no question is too dumb.

6.1 User Manual

This manual is the "definitive" source of assistance for the application. Use the PDF search features to find what you want within the manual, or just peruse the Table of Contents. If a feature isn't discussed in this manual, it's a bug! (please contact the vendor - see below)

There's a troubleshooting chapter in this manual if you are having problems that you think are abnormal (e.g. the application is crashing, won't connect to your telescope, etc.).

6.2 User group

There's a groups.io group dedicated to AstroPlanner:

<https://groups.io/g/astroplanner/>

There are a lot of friendly people there, including the author of the application, who are ready to answer your questions. There's also an archive of posts, and searching it might throw light on your issue.

6.3 Vendor

Feel free to send your questions, requests, etc. to technical support:

support@astroplanner.net

Although we need sleep too, we'll get back to you as soon as we can.

6.4 FAQ

There's a FAQ (Frequently Asked Questions) page at:

<https://www.astroplanner.net/faq.html>

This will be updated as questions come in that are considered of interest to more than just the asker of the question.

6.5 Blog

Although it can't really be classified as a "help resource", there's a blog written by the AstroPlanner author that might occasionally² offer some insight into the devious mind behind the product:

<https://blog.astroplanner.net/>

1. Some might use the phrases "overly-complex", "feature-laden", or "learning-curve challenged".

2. This hasn't been updated in years, but who is to say it won't be in the future...

7 Anatomy of AstroPlanner

In order to understand how AstroPlanner goes about its functions, you need to understand a little about the entities that make up its “anatomy”. AstroPlanner manipulates these entities in order to plan and log observations, etc.

7.1 Plans

The fundamental entity that you will work with in AstroPlanner is the Plan. This is a list of astronomical objects that are to be observed (or have already been observed). Each plan is stored in a separate Plan document file on disk. For example, you might have a plan containing the Messier objects, or a plan containing interesting galaxies in Andromeda.

These plans will contain anything from a single object to several hundred objects. In fact there is no limit to the number of objects you can have in a plan, although once you get to a few thousand, the application might become sluggish.

You can open several plan documents at a time. Each plan lives in its own window, which has several tabs.

7.2 Objects

An Object is a short term for “astronomical object”, and is the fundamental data type in the application. It might represent a particular galaxy, double star, planet, etc. There are two different types of object:

7.2.1 Plan object

A Plan object resides in a plan document. It has many different attributes, such as an ID, coordinates (RA and Declination), magnitude, etc. It can be added to a plan manually (by typing in the attributes), importing from a text file, or via a catalogue lookup (see below). You are free to change such plan objects as you see fit (for example, by adding some notes, or modifying an attribute)

7.2.2 Catalogue object

A Catalogue object is also an astronomical object, except that it resides in a catalogue (see below). Catalogue objects can be added to plans manually (by dragging them from a catalogue) or via a catalogue search. Once such a catalogue object is added to a plan it becomes a Plan object.

Catalogue objects are effectively immutable (i.e. they cannot be changed by a user unless they are added to a plan first).

7.3 Observations

When you are physically observing an object in your plan, you can log an Observation of that object. This consists of the date and time of the observation, what equipment (resources) was used, and notes on that observation. Observations are stored in a central observation database.

7.4 Sessions

When you create observations (above) you will have an associated observing Session. This is a record of the observing site, seeing conditions, etc. for the observations made during that session. Session data are kept in the central observation database.

7.5 Resources

A Resource is an item that is applicable to planning, and is different for each user. These resources include, observing sites, telescopes, eyepieces, astro-imagers, etc.. In order to facilitate planning, the user must define and add these resources to a database. For example, in order to be able to determine the current sky view, and position of objects with respect to the horizon, a Site resource must be defined (with latitude, longitude, etc.). In order to be able to visualize what you will see through your telescope, you must define a Telescope resource (aperture, focal length, etc.) and an Eyepiece resource (focal length, apparent field-of-view, etc.)

7.6 Catalogues

A Catalogue is a set of related catalogue objects. Such a catalogue contains objects that are typically of a single type (e.g. the PGC (Principal Galaxy Catalogue) Catalogue contains several thousand galaxies). In some cases there is a mixture of object types that were original catalogued by an observer (Messier Catalogue) or perhaps a well-known observing list (e.g. the Herschel 400 Catalogue). There are many catalogues available (each a separate file) that can be installed into the application and used. Currently all catalogues are supplied by the vendor.

7.7 Scripts

AstroPlanner has a built-in scripting language that can be used to add functionality to the application, automate some tedious tasks, etc. A Script is a single “program” in the scripting language. Such a program can access, say, the objects in a plan, observations, etc. You can write your own scripts, or download scripts created by others.

8 Common user-interface elements

There are many common user-interface elements within the AstroPlanner application, most of which share common functionality and features.

8.1 Text fields

There are two types of text fields: single line fields (e.g. for entering numbers or strings) and multi-line text areas for entering significant amounts of text (e.g. entering observation notes, etc.).

8.1.1 Single-line text fields

Non-numeric text values

This type of field is used to enter text data. Generally, any text can be entered.



Figure 46: Text entry field

The contextual menu (attained by right-clicking the field) has various operations available:

- **Cut, Copy and Paste.** The same operations that are also found in the main *Edit* menu.
- **Select All.** Select all text in the field.
- **Change Case.** Change the case of the text in the field, to all UPPERCASE, all lowercase, Title case (each word is capitalised), or Sentence case (each sentence starts with a capital letter).
- **Font.** Change the font face and size for the field (overriding the standard font). See Section 8.1.4 on page 44.
- **Create New Journal Entry from Text.** See page 278.
- **Services.** This is only on macOS, and depends on the services available from the OS, not AstroPlanner.

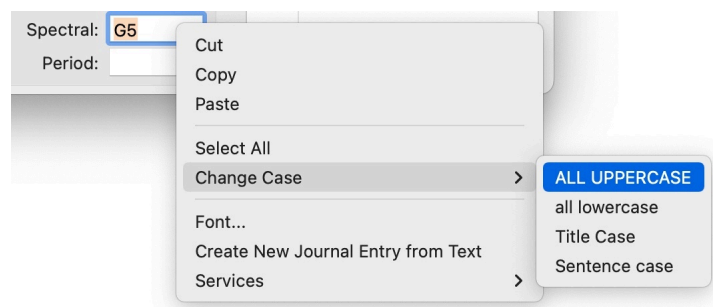


Figure 47: Text field contextual menu

Numeric values

This type of field is used to enter a single numeric value. This might be a floating-point or integer value, or a formatted number (such as latitude, declination, etc.). If the number is valid it will be displayed in the standard black colour. If it is not a valid number or falls outside the correct range, it will be displayed in red, and the tooltip below it will display the acceptable range.

Figure 48: Numeric value entry field

The contextual menu (attained by right-clicking the field) has various operations available:

- **Cut, Copy and Paste.** The same operations that are also found in the main **Edit** menu.
- **Select All.** Select all text in the field.
- **Font.** Change the font face and size for the field (overriding the standard font). See Section 8.1.4 on page 44.
- **Create New Journal Entry from Text.** See page 278.
- **Services.** This is only on macOS, and depends on the services available from the OS, not AstroPlanner.

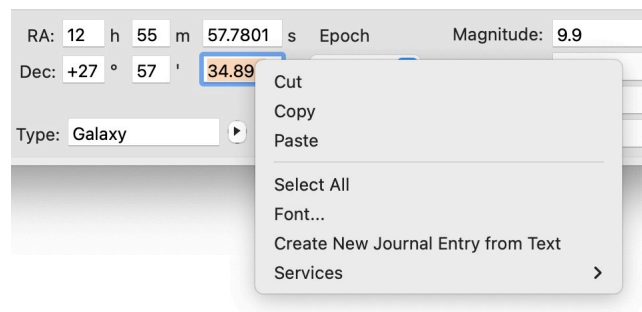


Figure 49: Numeric field contextual menu

8.1.2 Multi-line text fields

Multi-line text fields are used to enter substantial amounts of text, that might contain paragraphs and line endings. It has a scroll bar on the right which is enabled if the text fills more than the visible bounds of the field.

Figure 50: Multi-line text field

The contextual menu (attained by right-clicking the field) has various operations available:

- **Cut, Copy and Paste.** The same operations that are also found in the main **Edit** menu.
- **Spell Checking.** If this is checked then the spelling is checked as you type, and unknown words will be underlined with a red dotted line. You may also get the option of a suggestion for correct spelling on some platforms. If this is not checked, then no spell checking is performed.
- **Select All.** Select all text in the field.

- **Change Case.** Change the case of the text in the field, to all UPPERCASE, all lowercase, Title case (each word is capitalised), or Sentence case (each sentence starts with a capital letter).
- **Font.** Change the font face and size for the field (overriding the standard font). See Section 8.1.4 on page 44.
- **Create New Journal Entry from Text.** See page 278.
- **Edit Window.** If allowed, this will open a larger window with a text field that can be expanded as large as you like. Entering text into this window will be the same as entering directly into the field. This can be convenient if the field contains a lot of text.
- **Save as Plain Text File...** Save the contents of the text field into a text file.
- **Save as Rich Text Format (RTF) File...** Save the contents of the text field into a Rich Text formatted file.
- **Load...** Load the contents of an existing text file into the text field (replacing any text already there)

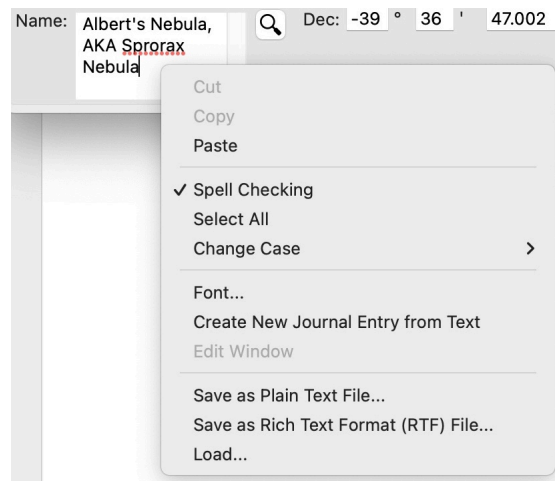


Figure 51: Multi-line field contextual menu

8.1.3 Multi-line rich text fields

Multi-line rich text fields are used to enter substantial amounts of text, that might contain paragraphs and line endings, as well as formatted text. This is used mostly for user notes in objects and observations. It differs from the text field described above in that it has an array of square buttons on the right that allow you to format the selected text.

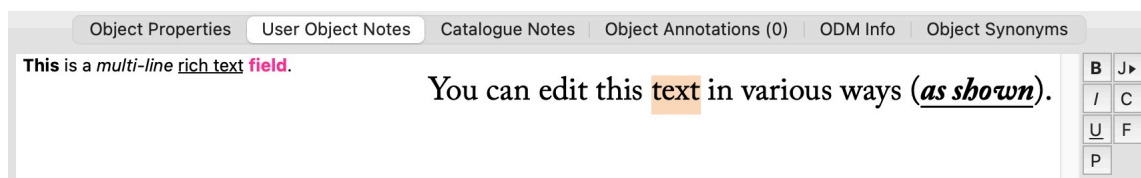


Figure 52: Multi-line rich text field

The formatting buttons are:

- **B.** Make the selected text **bold face**. If it is already bold, remove the bold face.
- **I.** Make the selected text *italicised*. If it is already italicised, remove the italics.

- **U. Underline** the selected text. If it is already underlined, remove the underlining.
- **P.** Make the selected text plain.
- **J.** Change the justification of the selected line - left, right, or centred.
- **C.** Change the colour of the selected text. **Note:** This might not work on Windows.
- **F.** Change the font and font size of the selected text.

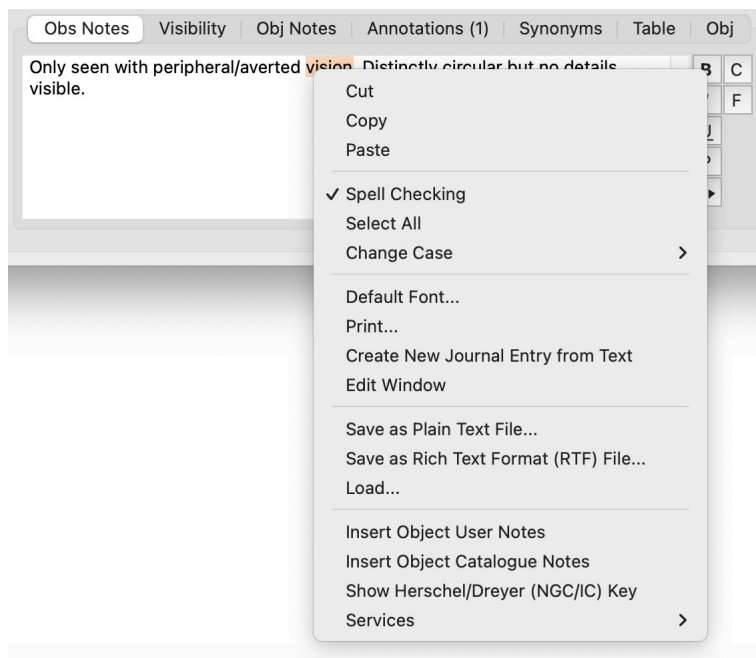


Figure 53: Multi-line rich text field contextual menu

The contextual menu (attained by right-clicking the field) has various operations available:

- **Cut, Copy and Paste.** The same operations that are also found in the main **Edit** menu.
- **Spell Checking.** If this is checked then the spelling is checked as you type, and unknown words will be underlined with a red dotted line. You may also get the option of a suggestion for correct spelling on some platforms. If this is not checked, then no spell checking is performed.
- **Select All.** Select all text in the field.
- **Change Case.** Change the case of the text in the field, to all UPPERCASE, all lowercase, Title case (each word is capitalised), or Sentence case (each sentence starts with a capital letter).
- **Default Font.** Change the default font face and size for the field (overriding the standard font).
- **Print.** Print the contents of the text field.
- **Create New Journal Entry from Text.** See page 278.
- **Edit Window.** If allowed, this will open a larger window with a text field that can be expanded as large as you like. Entering text into this window will be the same as entering directly into the field. This can be convenient if the field contains a lot of text.
- **Save as Plain Text File...** Save the contents of the text field into a text file.

- **Save as Rich Text Format (RTF) File...** Save the contents of the text field into a Rich Text formatted file.
- **Load...** Load the contents of an existing text file into the text field (replacing any text already there)
- Other entries, depending on the context of the field.
- **Services.** This is only on macOS, and depends on the services available from the OS, not AstroPlanner.

8.1.4 Changing fonts

You can use the **Font...** command in the contextual menu to change the appearance of the text in a text field. You can choose the font face, size, and style. The font change is for the targeted field only and is persistent.

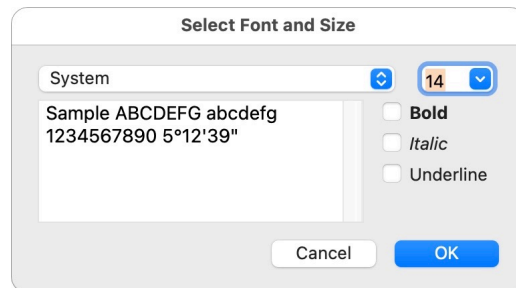


Figure 54: Font change dialog

8.2 Lists

Lists are used to display tabular data and can have one or more columns, and can also have column headings.

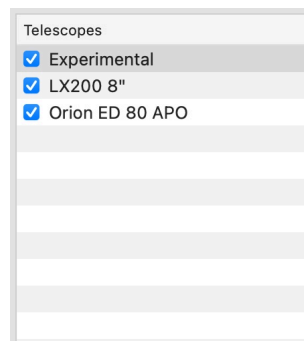


Figure 55: List

The contextual (right-click) menu for a list allows you to export the data and also change the appearance of the list.

You can **Copy** all rows or selected rows (where applicable) to the clipboard.

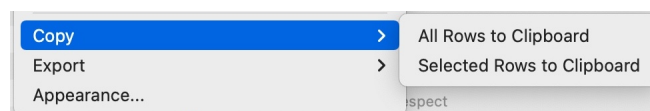


Figure 56: List contextual menu

You can **Export** all rows or selected rows (where applicable) to either a tab-separated text file, or an Excel file.

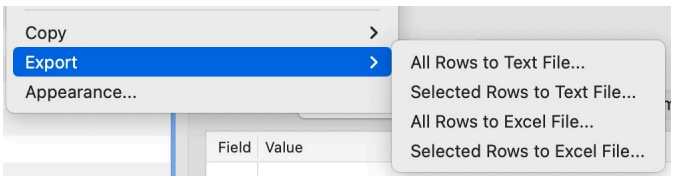


Figure 57: List contextual menu

You can also change the **Appearance** of the list, specifying the font, row height, grid lines, and alternate row striping. You can elect to make the change just to the list you right-clicked on, or to all lists in the application.

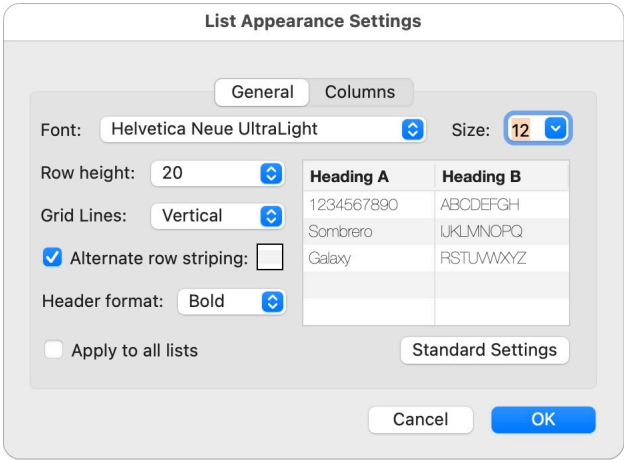


Figure 58: List appearance settings

On most (but not all) list widgets in the application, including the observation database window lists, object list, etc., there's now a **Columns** tab that allows you set the style separately for each column in the list: **bold**, italic, underline, the colour of the text, and the colour of the background.

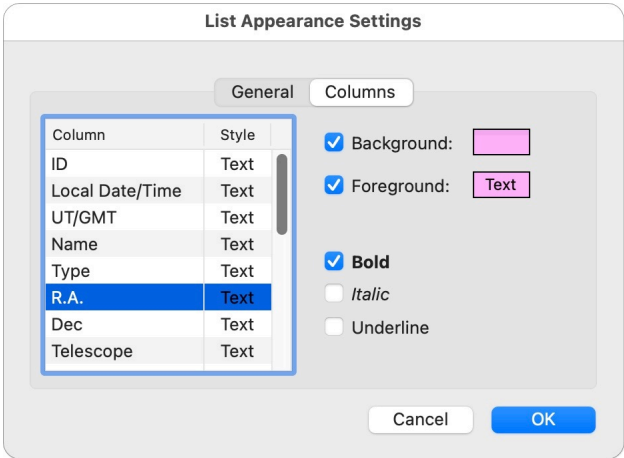


Figure 59: Setting list column styles

8.3 Resource choosers

At various places throughout the application you are required to select a resource (e.g. a Telescope resource - see Figure 60, or field of view chart parameters - see Figure 61). These are presented as a popup menu containing all active resources of the pertinent type. Resources are discussed in Section 7.5 on page 39.

The resource chooser popup can also have a button to the right containing a "pencil" icon. This allows you to edit the selected resource (by opening the Resources window, changing to the requisite tab and selecting the resource. See). There might also be a button containing a small globe. This will be enabled if the particular resource defines an Internet URL. Clicking the button will open the URL in your web browser application.

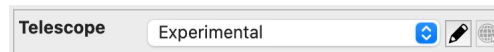


Figure 60: Telescope chooser

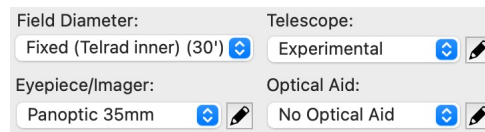


Figure 61: Field of view chart resource choosers

8.4 Hierarchical options lists

At various places in the application, a hierarchical widget is used to display options. Sections of options can be expanded or collapsed using the small grey triangles (Mac OS - See Figure 62) or small "+" and "-" widgets (Windows - See Figure 63). Each option has a checkbox associated with it that controls whether that option is enabled or not.

If a section also has a checkbox associated with its title, then that checkbox can be used to enable or disable all the options within that section. When the checkbox is switched off, all contained options are switched off and disabled.

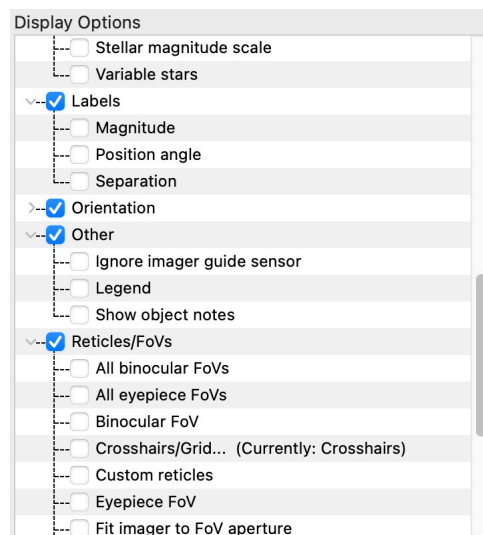


Figure 62: Field of View chart display options (Mac OS style)

If an option has an associated value, then it is displayed on the right. Selecting that option will reveal a means of editing the value at the bottom of the option panel (see Figure 63 for an example).

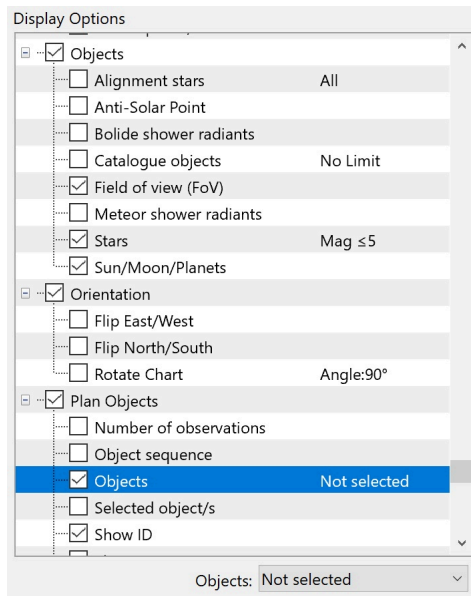


Figure 63: Sky chart display options (Windows style)

8.5 Date/time selectors

At various places in the application's windows there are date/time selectors, allowing the entry of the date and (usually) time. These will be customised to the date and time settings of your operating system by default.

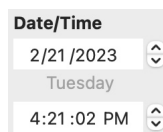


Figure 64: Typical Date/Time selector

Right-clicking the date selector widget (in most cases) will display a popup menu containing various convenience date/time values (e.g. Sunset, Moonrise, etc.).

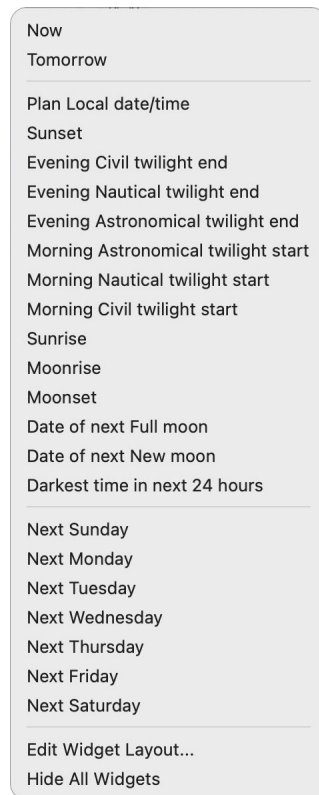


Figure 65: Date selector right-click menu

9 Setting up your resources

9.1 Using the Setup wizard

The simplest way to set up your essential resources is to use the Setup Wizard (**File > Setup Wizard...**). This is detailed in section 4.2 on page 8. This enables you to add observing sites, telescopes, and eyepieces. However, it's fairly simplistic and does not allow setup of other resource types, or the setup of some of the more esoteric settings for resources. To do that, you need to do manual setup, as detailed below.

9.2 Manual setup using Resources window

The Resources window allows you to edit the resources database manually. It is displayed by using the **Edit > Resources...** menu command.

The window contains a tab for each type of resource (and an additional Combinations tab described below).

9.2.1 Common resource elements

Each resource tab contains various editing controls, some of which are common to all tabs. These are described below.

Resource name list

The name list contains an entry for each resource of the type represented by the tab.



Figure 66: Resource name list

Each resource has a checkbox to the left of the name. If the checkbox is unchecked then the resource is deemed to be no longer in use, and will not appear in any lists of those resources elsewhere in the application. The reason for disabling an unused resource rather than deleting it is that it might have been used in, say, the observation database. If such a resource is deleted, the observation database

can no longer access the resource parameters (e.g. a telescope aperture, etc.) for that deleted resource.


If a resource has been marked as the Default resource of this type (see below), then its name is displayed in green.

The buttons below the list, from left to right, are:

- Add a new resource
- Delete the selected resource (see above for caveats).
- Duplicate the selected resource
- Redraw the field of view chart in open plan documents. This will update such charts using any changes to resources you may have made.

Resource name

Allows you to change the name of the selected resource. Note that resource names must be unique, and the single quote character (') cannot be used in the name.




Resource Name:	URL:	At Site/s:	
Experimental	https://notanywhere.com	 Common to All	<input type="checkbox"/> Default

Figure 67: Resource name, URL, At Site and Default settings

URL

An optional field that can contain an URL to an external web page for that resource (e.g. a login page for a remote telescope site, a page on the telescope vendor's web site describing the particular telescope resource, etc.). You can use the button to the right of the field to open the URL in your browser.

At Site/s

(Not applicable to Site resources) If a resource is only applicable to a particular observing Site or Sites, then use this button to select those Site/s in a check list (Figure 68). For example, if your telescope is permanently mounted at an observatory then specify the observatory site. If your resource is portable between sites (e.g. an eyepiece), then select **Common to All**. If you have several sites, and each of them has the same eyepiece, you can select the applicable sites.

When you select a particular Site in a plan document, any resources not marked **Common to All** or allocated to that Site will not appear in the resource popups.

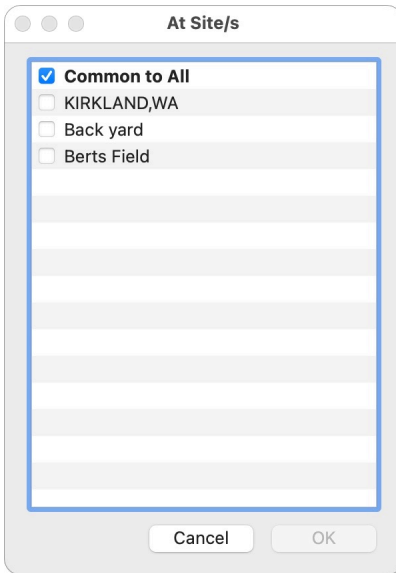


Figure 68: Choosing At Site/s

Default

One resource of each type can be marked as the default. When a new plan document, observation etc. is created and a specific resource is not specified, the default will be used. i.e. you should mark your most-often used resources as Default.

User-defined fields

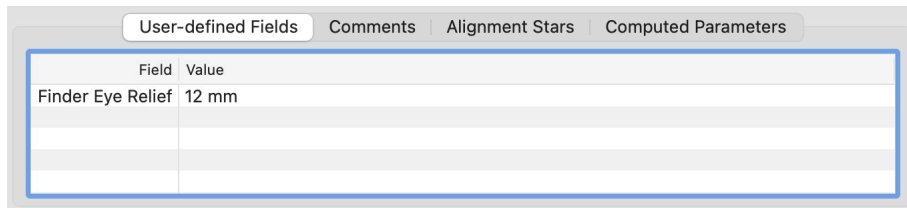


Figure 69: User-defined fields

Each resource type has a set of user-defined field definitions, and each resource can define values for those fields. See Chapter 19 on page 304 for more details.

Comments

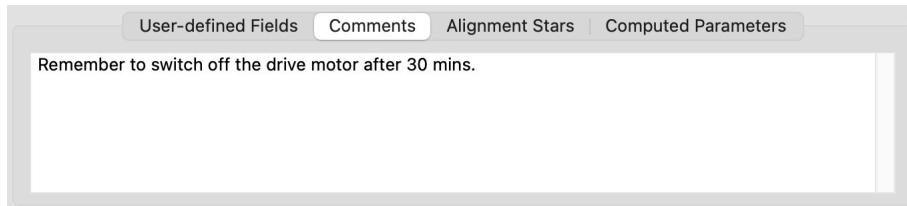


Figure 70: Comments

Each resource has a comment field. You can put whatever text you like here.

9.2.2 Site resources

The screenshot shows the 'Resources' application window. The 'Sites' tab is active, displaying a list of sites on the left: 'KIRKLAND,WA', 'Back yard', and 'Berts Field' (which is selected). The main panel contains the following fields and controls:

- Resource Name:** Berts Field
- URL:** (empty)
- Latitude:** 37°24'00" N
- Longitude:** 102°37'00" W
- Offset from GMT:** -7 hours
- Daylight Saving rules:** U.S.A.
- Clock offset:** 0 hr from: n/a (Fixed)
- Site Altitude:** 200 m
- Bortle Dark Sky Rating:** No rating
- Sky brightness:** 24.25 mag/sq.arcsec
- Naked-eye Zenith Limit:** 7.6

On the right side, there is a world map with a red dot indicating the location. Below the map is a 'Horizon (click to change):' button. At the bottom of the window, there are four buttons: 'Get from GPS...', 'Get Computer Info...', 'Get from Telescope', and 'Set Telescope Info'.

Figure 71: Site resources

Find...

This button allows you to search for your town/city if it is in the U.S.A., Canada, or other countries. You can either select the **U.S.A.**, **Canada**, or **World** tab and select by State/Province/Country and City, or use the **Find** tab to search for any cities containing a search string.

Once you've selected a city, you can choose to create a new site (in which case a new Site resource with the given name, latitude and longitude will be created), or elect to modify the currently selected site (if applicable, in which case the latitude and longitude will be changed).

Find City

U.S.A. | Canada | World | Find

State	Town/City	Latitude	Longitude
AK	BUENA VISTA	38°51'00" N	106°08'00" W
AL	BUFFALO CREEK	39°23'00" N	105°17'00" W
AR	BURLINGTON	39°18'00" N	102°16'00" W
AZ	BURNS	39°52'00" N	106°53'00" W
CA	BYERS	39°43'00" N	104°14'00" W
CO	CADDOA	38°04'00" N	102°56'00" W
CT	CALHAN	39°02'00" N	104°18'00" W
DC	CAMEO	39°09'00" N	108°19'00" W
DE	CAMP BIRD	37°58'00" N	107°44'00" W
FL	CAMPO	37°06'00" N	102°35'00" W
GA	CANON CITY	38°27'00" N	105°41'00" W
HI	CARBONDALE	39°24'00" N	107°13'00" W
IA	CARDIFF	39°31'00" N	107°19'00" W
ID	CARR	40°54'00" N	104°53'00" W

☒ Create new site
☐ Modify "Back yard"

Cancel Select

Figure 72: Select city by state

Find City

U.S.A. | Canada | World | Find

Country	Town/City	Latitude	Longitude
Canada	Buenos Aires	9°10'19" N	83°19'57" W
Cape Verde	Carmona	9°59'37" N	85°15'07" W
Central African Republic	Cañas	10°25'47" N	85°05'35" W
Chad	Ciudad Colón	9°54'54" N	84°14'32" W
Chile	Ciudad Cortés	8°57'47" N	83°31'26" W
China	Ciudad Neily	8°38'50" N	82°56'35" W
Colombia	Ciudad Quesada	10°19'36" N	84°25'52" W
Comores	Curridabat	9°54'52" N	84°02'15" W
Congo Democratic Republic	Desamparados	9°53'51" N	84°03'58" W
Cook Islands	El Tejar	9°50'40" N	83°56'23" W
Costa Rica	Escazú	9°55'12" N	84°08'25" W
Croatia	Espíritu Santo	9°59'30" N	84°39'58" W
Cuba	Filadelfia	10°26'43" N	85°33'09" W

☒ Create new site
☐ Modify "Back yard"

Cancel Select

Figure 73: Select city by country

Find City

U.S.A. | Canada | World | Find

Q alexandria e.g. Springfield or Springfield, IL or Springfield, England

City	State/Province/Country	Latitude	Longitude
ALEXANDRIA	TN	36°05'00" N	86°02'00" W
ALEXANDRIA	VA	38°48'00" N	77°03'00" W
Alexandria	Ontario	45°18'00" N	74°38'00" W
Alexandria	Canada	52°38'00" N	122°27'00" W
Alexandria	Canada	45°18'40" N	74°38'12" W
Alexandria	Brazil	6°24'53" S	38°00'49" W
Alexandria	Scotland	55°59'16" N	4°34'56" W
Alexandria	South Africa And Lesotho	33°39'11" S	26°24'34" E
Alexandria	United States Of America	43°39'13" N	97°46'58" W
Alexandria	United States Of America	38°57'34" N	84°23'17" W
Alexandria	Canada	52°38'00" N	122°27'00" W
Alexandria	United States Of America	45°53'10" N	95°22'46" W

☒ Create new site
☐ Modify "Back yard"

Cancel Select

Figure 74: Find city

Latitude/Longitude

The latitude and longitude of the Site. You can enter these values manually, use the Find function described above, or you can click on the world map to the right to create a rough position. The current position is marked on the map.

Offset from GMT

This is the offset, in hours, of your local time from GMT, during standard time (i.e. not during the daylight-saving period if applicable). It is negative for sites west of 0° longitude, positive otherwise. e.g. in the U.S.A., East-coast time is -5 hours, Pacific coast time is -8 hours.

The offset is used to draw a vertical green dashed line on the world map. If this coincides with GMT (a vertical red dotted line) then your offset is most probably correct. However, it could be within the grey vertical stripe on the map and still be OK. If it's outside the grey stripe, you might want to double check your coordinates or offset.

Daylight Saving rules

If your site does not use daylight saving time during the year, then set this the **None**. If your site is in the U.S.A. and uses daylight saving, the select **U.S.A.** Similarly for the **European Union**.

You can also define up to four different custom rules for daylight saving, and use them by selecting the appropriate entry.

Select the **Edit Custom...** entry to edit those custom rules.

Name	Daylight Saving starts			Standard Time resumes			Hours	
U.S.A.	2nd	Sunday	March @ 02:00	1st	Sunday	November @ 02:00	1	
European Union	Last	Sunday	March @ 01:00	Last	Sunday	October @ 01:00	1	
S Australia	1st	Sunday	October	Last	Sunday	April	1	Computer
			at 2:00 AM			at 2:00 AM		
Custom #2	1st	Sunday	March	Last	Sunday	October	1	Computer
			at 12:00 AM			at 12:00 AM		
Custom #3	1st	Sunday	March	Last	Sunday	October	1	Computer
			at 12:00 AM			at 12:00 AM		
Custom #4	1st	Sunday	March	Last	Sunday	October	1	Computer
			at 12:00 AM			at 12:00 AM		

Cancel OK

Figure 75: Editing custom daylight saving rules

Give a rule an appropriate name, specify when daylight saving starts and ends, and specify the number of hours that are added to standard time.

If your operating system allows, you can click the **Computer** button and insert information into the rule.

Clock offset

This specifies the number of hours the site is offset from the computer's clock. Normally your computer will be present at the observing site and this offset will be zero. However, if you are operating, say, a remote observatory site and that site is in a different time zone, then this offset should be set to the number of hours offset between the computer's time and the remote site's time. Then when you select that site in a plan document the local time, horizon and visibility will be computed for that site rather than the local site.

The best setting is to specify the **Clock Offset from Site** as being your computer's site. Then the current offset is computed based on daylight saving conditions at both sites.

Horizon

The default site horizon is completely flat down to 0° altitude. More often than not the actual site will not have horizon-to-horizon viewing conditions, but will have obstacles (e.g. trees, buildings, observatory walls, etc.) to contend with. You can define your own horizon here, and the application will use that horizon information to determine whether an object is currently hidden or not.

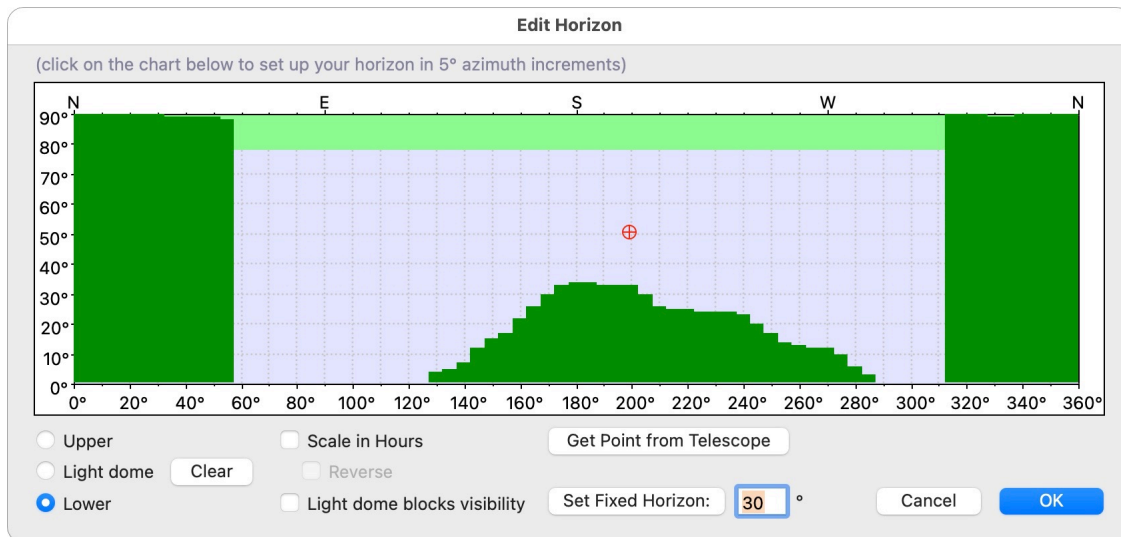


Figure 76: Horizon editing dialog

(Left-) clicking the horizon picture opens the horizon editing dialog. This is a mapping of the entire sky into a rectangular picture with azimuth along the horizontal and altitude on the vertical axis. The horizon definition is divided into three parts:

- **Lower horizon.** These are obstacles on the horizon that reach up from 0° altitude (the true horizon) up to the zenith (90° altitude) if necessary.
- **Upper horizon.** These are obstacles that prevent you from seeing the sky above a given altitude. Typically this might be a parapet on a balcony you are observing from.
- **Light dome.** Sky glow from a distant light source (e.g. a city centre or factory) that lights up the sky. If the **Light dome blocks visibility** checkbox is checked, then any defined light dome will be considered effectively to block object visibility.

The horizontal scale is in degrees from north through east. You can also show that scale in hours (0 to 24) using the **Scale in hours** checkbox, and **Reverse** it if necessary (24 to 0). This is useful if you are using an alt-az mounted telescope to trace out the horizon. In this case, the "polar" axis setting circles might be calibrated in hours rather than degrees.

You can use the **Set Fixed Horizon** button to set a fixed altitude horizon over the entire width.

If you have a computerised telescope, and it is connected to AstroPlanner, the current pointing of the telescope is displayed on the chart, and you can use the **Get Point From Telescope** button to use those pointing coordinates to set the horizon.

(Right-) Clicking the horizon in the Sites tab allows you to export the current horizon info to a tab- or comma- separated file. You can subsequently import from such a formatted text file, or import from a Cartes du Ciel horizon file.

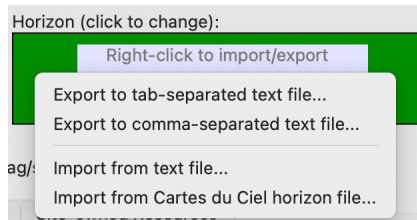


Figure 77: Horizon import/export

Site altitude

The altitude of the Site above sea level.

Bortle Dark Sky Rating

This is a scale of 1 through 9 that defines how good (or bad) your site is. If you select one of these ratings, it will set the Sky Brightness to an appropriate estimated value (which can be changed if necessary).

Sky Brightness

The sky brightness (magnitudes per square arcsecond) of the site. This value is used to compute (advanced) visibility ratings for the sky. The naked-eye stellar magnitude limit at the zenith (straight up) is computed and displayed to the right of this field.

Site-owned Resources

A list of resources available at the site (and any resources available at all sites in grey).

Get from GPS...

If you have a dedicated GPS device connected to a serial port of your computer, you can use this button to interrogate the GPS device and retrieve current latitude and longitude.

Get Computer Info...

(*Macintosh only*) Retrieves the latitude and longitude from the operating system settings and sets those fields for the Site. **Warning:** currently the macOS is returning zero for those two items.

(*All platforms*) Retrieves the GMT offset and displays it.

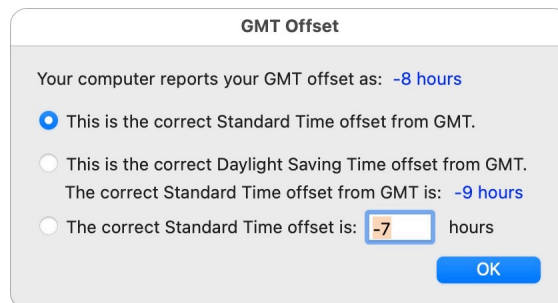


Figure 78: GMT offset selection

You select which option is correct.

Get from Telescope

If a telescope is connected, and allows the retrieval of latitude, longitude and GMT offset, then you can use this button to retrieve that data from the telescope and insert it into the relevant fields.

Set Telescope Info

If a telescope is connected, and allows the setting of site latitude, longitude and GMT offset, then this button will set those parameters on the telescope.

9.2.3 Telescope resources

Figure 79: Telescope resources

Type

This is the type of instrument, and might be either a telescope or a binocular/monocular.

If the type is Telescope then the following fields are displayed:

- **Aperture.** The aperture (diameter of front opening) in mm. You can also enter the aperture in inches by adding " after the value (e.g. 4.5"), in which case the conversion to mm will be done for you.
- **Focal Ratio.** The f/Ratio of the telescope¹.
- **Central Obstruction.** If the telescope has a central obstruction (secondary mirror), then this is the percentage diameter of that obstruction (e.g. if a 250mm aperture telescope has a 50mm diameter secondary, then the obstruction value would be 20%).

1. The equation for focal length is $\text{Focal Length} = \text{Aperture} \times \text{Focal Ratio}$, so if you only know the Aperture and Focal Length of the telescope, then $\text{Focal Ratio} = \text{Focal Length} \div \text{Aperture}$

If the type is Binocular/Monocular then the following fields are displayed:

- **Magnification.** The magnification of the instrument (e.g. the magnification of a 8 × 50 binocular would be 8).
- **Aperture.** The aperture of the instrument in mm (e.g. the aperture of a 8 × 50 binocular would be 50mm). You can also enter the aperture in inches by adding " after the value (e.g. 2.5"), in which case the conversion to mm will be done for you.
- **Actual FoV.** The angular field of view of the instrument in degrees (usually spelled out on the instrument's body).

Optics

Specifies the optical configuration (e.g. refractor, etc.), and how clean the optics are.

Computerised mount

If the telescope has a computerised mount (either Go-To or Digital Setting Circles), then you can select the mount type here (if supported). The **Edit...** button allows you to set up the mount parameters. This is covered in more detail in Section 13.2 on page 221.

Visual magnitude limit

The theoretical visual magnitude of the instrument is computed from the specified aperture. You can check the checkbox and change that value to something else if you feel that the theoretical value does not represent reality.

Finder

(Telescopes only) If the telescope has an attached finder scope, define it here. You can specify its field of view (FoV) in degrees if that is known. Otherwise, if you have a finder that's constructed from other resources (a monocular resource, or a telescope/eyepiece combination, you can specify them here and let the application figure out the FoV.

If the finder flips the sky view horizontally and/or vertically, use the checkboxes to specify that, so that the field of view chart can reflect this if the Finder option is used.

Custom Alignment Stars

This feature allows you to create your own set of alignment stars, independently of any alignment stars that might be defined by the telescope mount. Any such alignment stars will be used and appear as if they were defined for a mount, i.e. you can use the Best Pair mechanism, display them in the Sky chart, etc. Any star in the (Yale) Bright Star catalogue can be used.

This functionality is found in the **Alignment Stars** tab (Figure 80). When the **Use custom list** checkbox is checked, the defined alignment stars will be used when the currently-selected Telescope is selected in the plan document.

The stars are stored in "star sets". Use the "+" button to the right of the Star set popup to create a new star set. Once that has been done you can add stars to the set using the "+" button at the bottom left. The presented dialog (Figure 81) allows you to select one or more stars from the list and add them to the star set. You can limit the displayed stars by magnitude, constellation, or type in a search string.

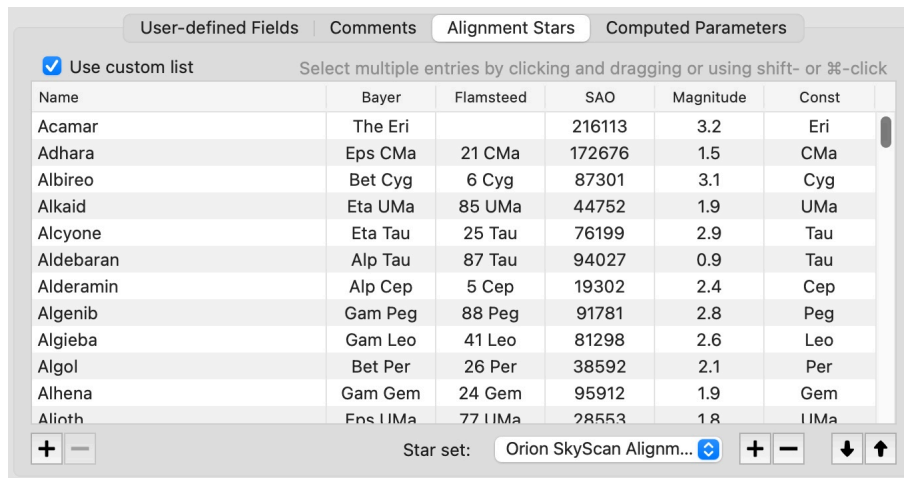


Figure 80: Custom alignment stars

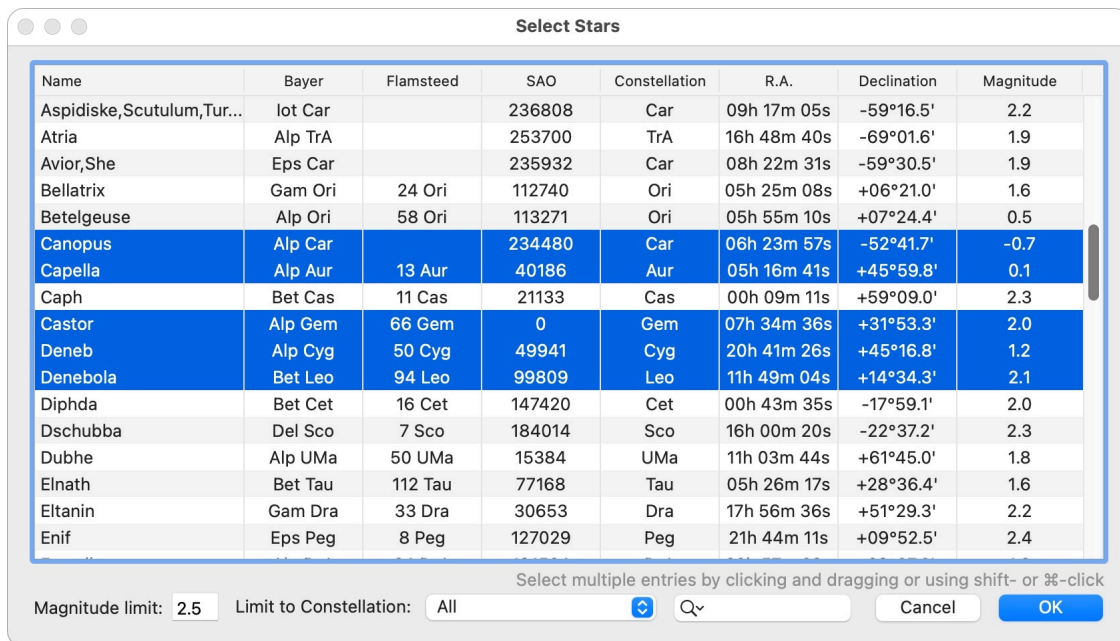


Figure 81: Adding custom alignment stars

You can also download star sets from a user-contributed repository by clicking the down-arrow button at the bottom right. Select one (or more) star sets from the repository and download them (Figure 82). You can also select your own contributions and delete them as necessary, using the **Delete...** button.

Conversely, if you wish to upload the currently-selected star set to the user-contributed repository, then use the up-arrow button and the bottom right of the Alignment Stars tab. This presents a dialog (Figure 83) that lets you enter a description and some keywords before uploading the star set.

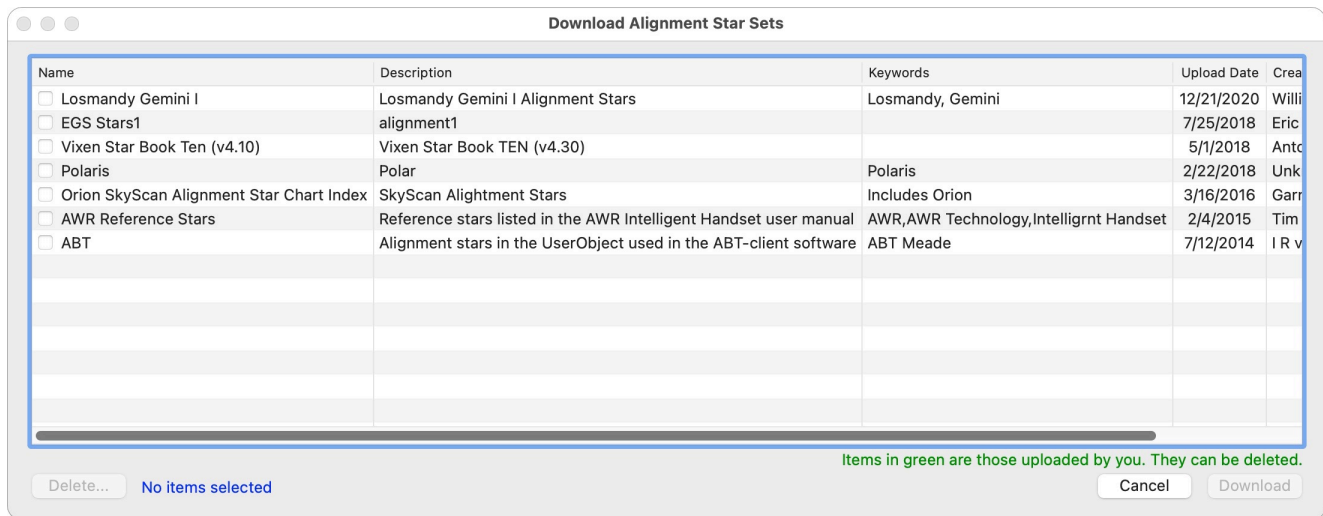


Figure 82: Download user-contributed alignment star sets

Figure 83: Upload user-contributed alignment star set

Computed Parameters

This is a list of computed values for the telescope, and reflects the settings for aperture, etc.

Select from List...

You can create a new Telescope resource by selecting from a list of common (and not-so-common) manufacturer's models using this button.

The listing dialog has three tabs, for Telescopes, Binoculars and Prime Camera Lenses (which are effectively telescopes). Each tab lists as many known telescope models as possible. Obviously keeping these lists up-to-date is time-consuming. Use the **Update** button to check on-line and see if there have been any updates to the lists. If you still don't see your commercial telescope on the list, feel free to send an e-mail message to support@astroplanner.net and complain. We'll try and get the list updated as quickly as possible.

You can select one or more entries manually, or use the **Find** field to specify a search term.

Once you have selected one or more entries, click the **OK** button to create a new resource for each of them.

Telescopes/Binoculars/Lenses

Telescopes

Binoculars

Prime Camera Lenses

93 out of 818 displayed. 2 telescopes selected.

Q celestron

Select multiple entries by clicking and dragging or using shift- or ⌘-click

Vendor	Model	Optics	D (mm)	D (inch)	FL (mm)	f/Ratio	Mag	DL (")	Min	Max	FF (°)
Celestron	Advanced Series C10-N	Newtonian	254	10	1200	4.7	14.7	0.5	34x	403x	
Celestron	Advanced Series C10-NGT	Newtonian	254	10	1200	4.7	14.7	0.5	34x	403x	
Celestron	Advanced Series C4-R	Refractor	102	4	1000	9.8	12.7	1.1	14x	162x	
Celestron	Advanced Series C5-S	Schmidt-Casse...	127	5	1250	9.8	13.2	0.9	17x	202x	
Celestron	Advanced Series C5-SGT	Schmidt-Casse...	127	5	1250	9.8	13.2	0.9	17x	202x	
Celestron	Advanced Series C6-N	Newtonian	150	5.9	750	5	13.6	0.8	20x	238x	
Celestron	Advanced Series C6-R	Refractor	150	5.9	1200	8	13.6	0.8	20x	238x	
Celestron	Advanced Series C6-RGT	Refractor	150	5.9	1200	8	13.6	0.8	20x	238x	
Celestron	Advanced Series C8-N	Schmidt-Casse...	200	7.9	1000	5	14.2	0.6	27x	317x	
Celestron	Advanced Series C8-NGT	Schmidt-Casse...	200	7.9	1000	5	14.2	0.6	27x	317x	
Celestron	Advanced Series C8-S	Schmidt-Casse...	203	8	2032	10	14.2	0.6	27x	322x	
Celestron	Advanced Series C8-SGT	Schmidt-Casse...	203	8	2032	10	14.2	0.6	27x	322x	
Celestron	Advanced Series C9 1/4-S	Schmidt-Casse...	235	9.3	2350	10	14.6	0.5	31x	373x	
Celestron	Advanced Series C9 1/4-SGT	Schmidt-Casse...	235	9.3	2350	10	14.6	0.5	31x	373x	
Celestron	Advanced VX 11" Schmidt-C...	Schmidt-Casse...	280	11	2800	10	14.9	0.4	37x	444x	
Celestron	Advanced VX 6" Newtonian	Newtonian	150	5.9	750	5	13.6	0.8	20x	238x	
Celestron	Advanced VX 6" Refractor	Refractor	150	5.9	1200	8	13.6	0.8	20x	238x	
Celestron	Advanced VX 6" Schmidt-Ca...	Schmidt-Casse...	150	5.9	1500	10	13.6	0.8	20x	238x	
Celestron	Advanced VX 8" EdgeHD	Schmidt-Casse...	203	8	2030	10	14.2	0.6	27x	322x	
Celestron	Advanced VX 8" Newtonian	Newtonian	200	7.9	1000	5	14.2	0.6	27x	317x	
Celestron	Advanced VX 8" Schmidt-Ca...	Schmidt-Casse...	203	8	2032	10	14.2	0.6	27x	322x	

D - Aperture diameter

FL - Focal length

FF - Finder FoV

f/Ratio - Focal Ratio

Mag - Limiting magnitude*

DL - Dawes' limit*

Min - Minimum magnification*

Max - Maximum magnification*

(Based on max/min eye pupil of 7.5/0.63mm)

* note that these are computed approximations and might not agree with manufacturer's advertised values

Update

If you don't see your resource listed, please e-mail us at support@astroplanner.net

Cancel

OK

Figure 84: Telescope listing dialog

Get info from ASCOM

(Windows only) If your computerised mount is specified as an ASCOM mount, you can use this driver to attempt to retrieve some of the telescope parameters (e.g. aperture, focal ratio) from the ASCOM driver.

9.2.4 Eyepiece resources

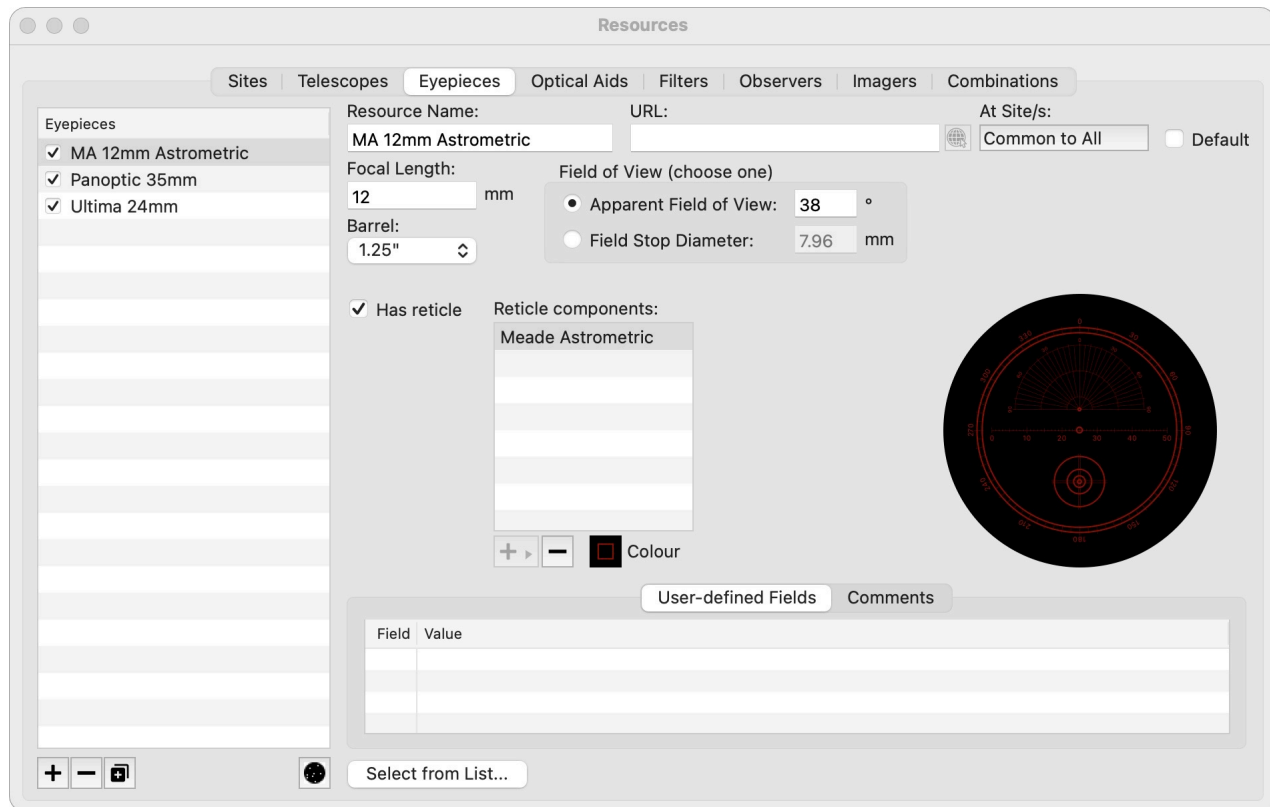


Figure 85: Eyepiece resources

Focal Length

The focal length of the eyepiece in mm. You can also enter the focal length in inches by adding " after the value (e.g. 4.5"), in which case the conversion to mm will be done for you.

Field of View

Choose the field of view of the eyepiece, either as the **Apparent Field of View** (AFoV) in degrees, or by the **Field Stop Diameter** in mm (e.g. Televue Nagler eyepieces all have an apparent FoV of 82°).

Barrel

The barrel size of the eyepiece.

Reticle

If the eyepiece has a built-in reticle, you can define it here. It will have one or more components. Select components using the + button.

You can add cross hair reticles, round reticles, rectangular reticles, or adaptive reticles.

Adaptive reticles allow you to choose the apparent FoV and focal length, and the reticle will adapt itself to the eyepiece. One use might be to simulate a zoom eyepiece. For example, if your zoom eyepiece at its widest setting has an apparent FoV of 20° and a focal length of 20mm, and at its narrowest setting it looks like a 20mm focal length with an apparent FoV of 10°, then create an eyepiece resource with the former parameters and add an adaptive reticle of the latter parameters. Then the FoV will be the widest eyepiece setting, and the reticle will show the FoV if the eyepiece was zoomed.

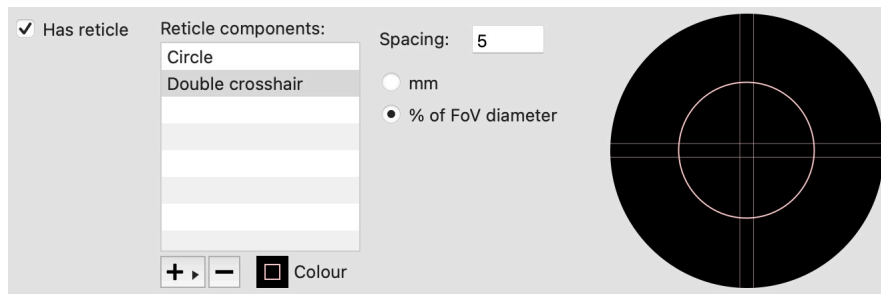


Figure 86: Sample eyepiece reticle

Select from List...

You can create a new Eyepiece resource by selecting from a list of common (and not-so-common) manufacturer's models using this button.

The dialog lists as many known eyepiece models as possible. Obviously keeping these lists up-to-date is time-consuming. Use the **Update** button to check on-line and see if there have been any updates to the lists. If you still don't see your commercial eyepiece on the list, feel free to send an e-mail message to support@astroplanner.net and complain. We'll try and get the list updated as quickly as possible.

You can select one or more entries manually, or use the **Find** field to specify a search term.

Once you have selected one or more entries, click the **OK** button to create a new resource for each of them.

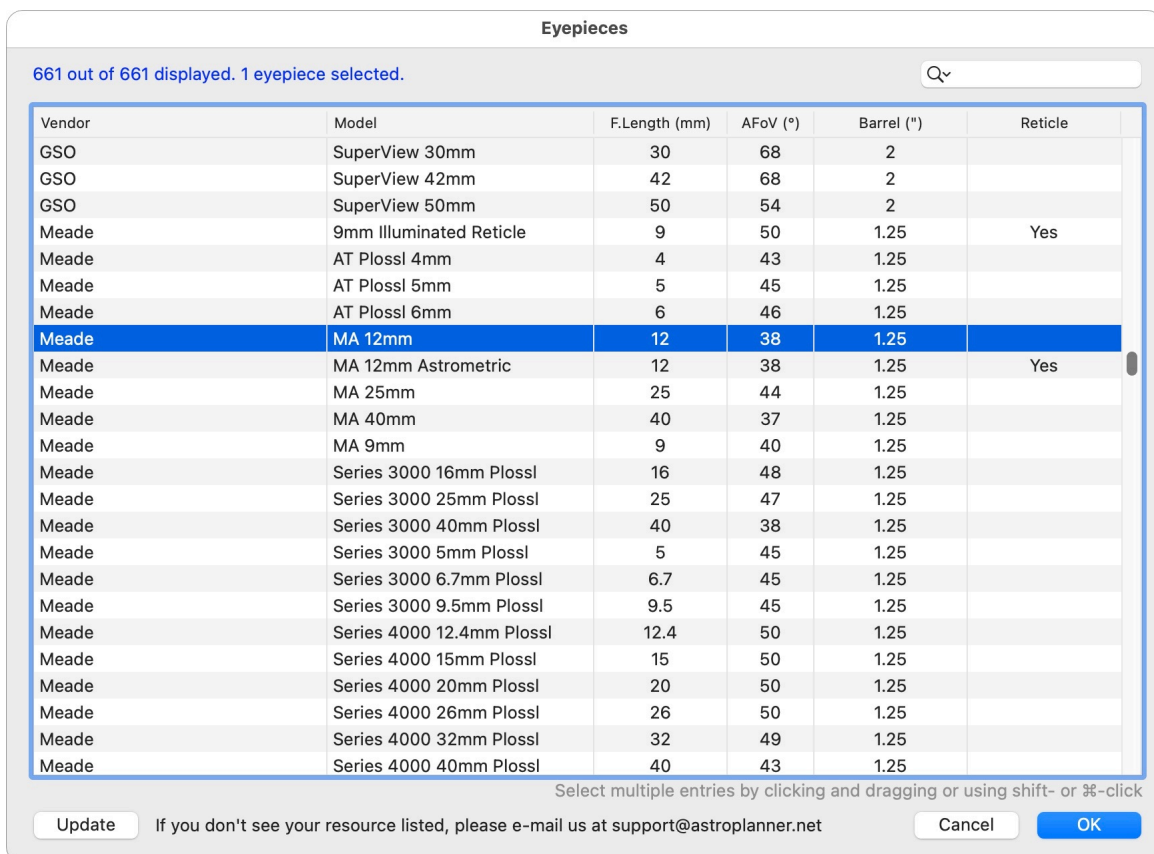


Figure 87: Eyepiece listing dialog

9.2.5 Optical Aid resources

The screenshot shows a software window titled "Resources" with a tabbed interface. The "Optical Aids" tab is selected. On the left, a list of optical aids is shown, with "CCDT67 Telecompressor" checked. The main panel displays configuration options for the selected aid: "Resource Name" is "CCDT67 Telecompressor", "URL" is empty, "At Site/s" is "Common to All", "Magnification" is "0.67 X", and "Additional focal length" is "0 mm". There are checkboxes for "Binocular (e.g. Binoviewer)", "Changes field of view orientation", "Inverts horizontally", and "Inverts vertically". At the bottom, there are tabs for "User-defined Fields" and "Comments", and a "Select from List..." button.

Figure 88: Optical Aid resources

Magnification

The amount of magnification added by using this optical aid.

Additional focal length

The addition focal length that the optical aid adds to the optical path, in mm. You can also enter the focal length in inches by adding " after the value (e.g. 4.5"), in which case the conversion to mm will be done for you.

Binocular

Check if this is a binoviewer.

Changes field of view orientation

The the optical aid changes the field of view orientation, specify how here.

Combine button

The combine button (under the list of resource names) lets you combine two or more optical aid resources into a new resource. The resulting resource will combine the magnifications, focal length extensions, etc. This is often useful since it is only possible to specify one optical aid resource at a time.

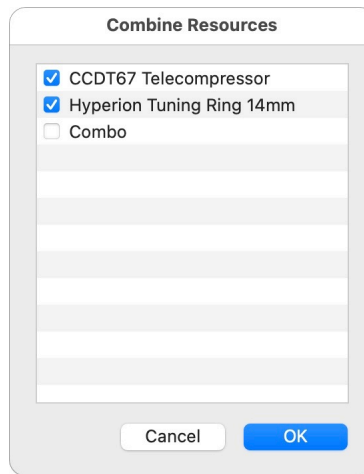


Figure 89: Combining optical aid resources

Select from List...

You can create a new Optical Aid resource by selecting from a list of common (and not-so-common) manufacturer's models using this button.

The dialog lists as many known optical aid models as possible. Obviously keeping these lists up-to-date is time-consuming. Use the **Update** button to check on-line and see if there have been any updates to the lists. If you still don't see your commercial eyepiece on the list, feel free to send an e-mail message to support@astroplanner.net and complain. We'll try and get the list updated as quickly as possible.

You can select one or more entries manually, or use the **Find** field to specify a search term.

Once you have selected one or more entries, click the **OK** button to create a new resource for each of them.

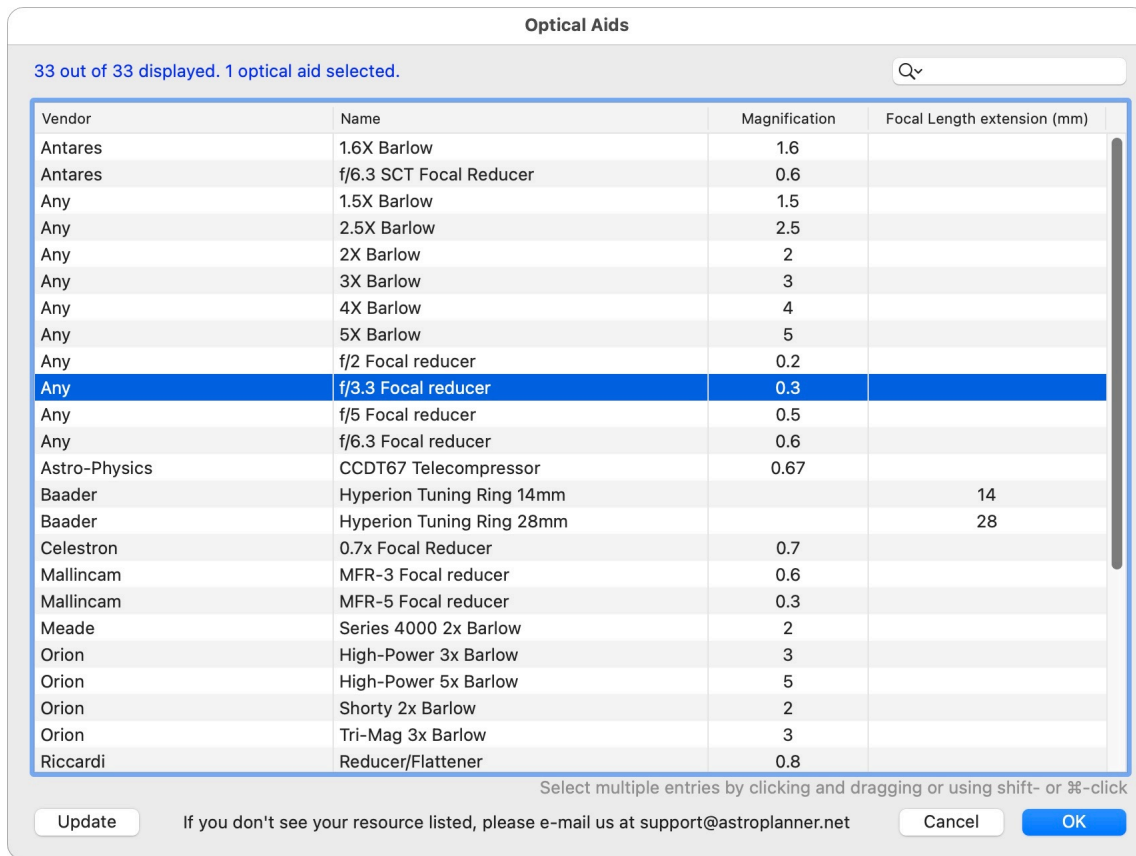


Figure 90: Optical Aid listing dialog

9.2.6 Filter resources

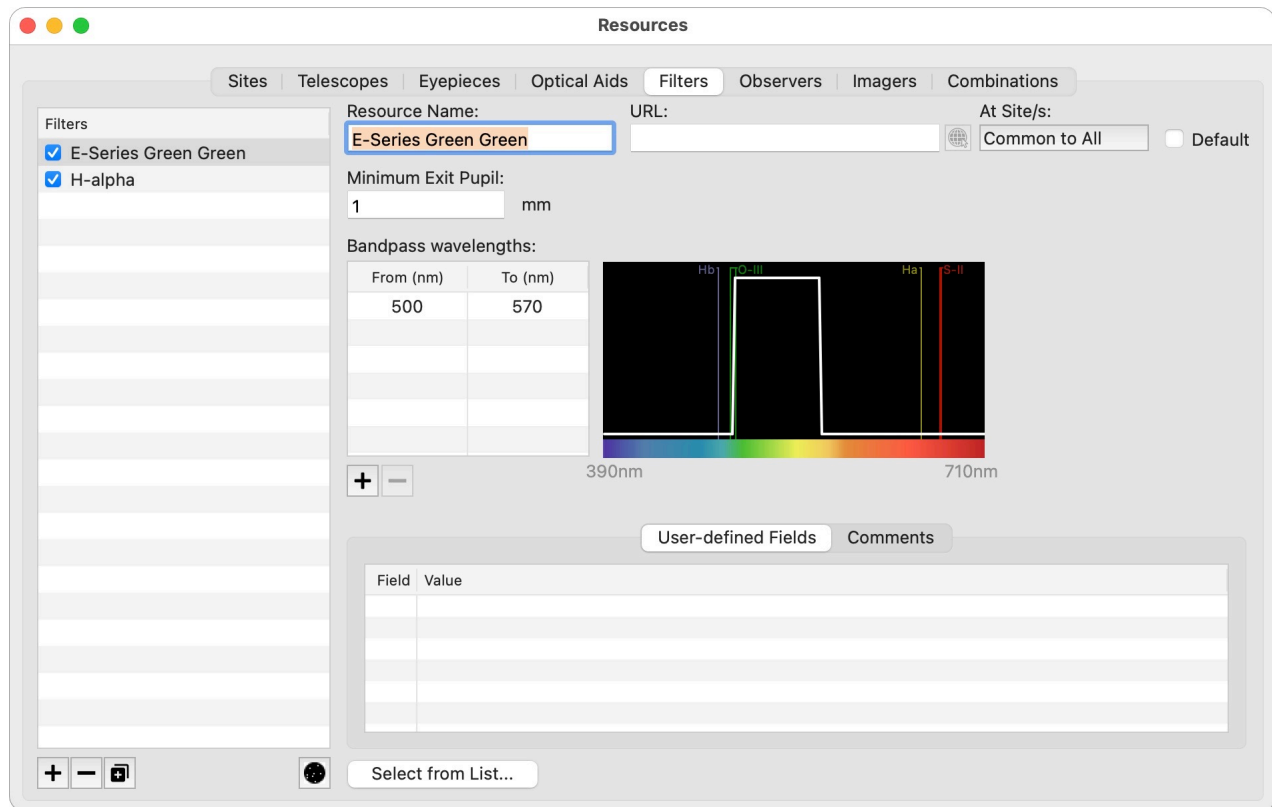


Figure 91: Filter resources

Minimum Exit Pupil

Minimum exit pupil size in mm.

Bandpass wavelengths

A list of filter bandpass wavelength ranges (in nanometers). Use the **+** and **-** buttons to add/delete entries. Click the values to edit them. Note that these values are not used in the application (but can be accessed from scripts if necessary). The graphic on the right of the list displays the bandpasses, as well as some common wavelengths (H α , O-III, etc.).

Select from List...

You can create a new Filter resource by selecting from a list of common (and not-so-common) manufacturer's models using this button.

The dialog lists as many known filter models as possible. Obviously keeping these lists up-to-date is time-consuming. Use the **Update** button to check on-line and see if there have been any updates to the lists. If you still don't see your commercial eyepiece on the list, feel free to send an e-mail message to support@astroplanner.net and complain. We'll try and get the list updated as quickly as possible.

You can select one or more entries manually, or use the **Find** field to specify a search term.

Once you have selected one or more entries, click the **OK** button to create a new resource for each of them.

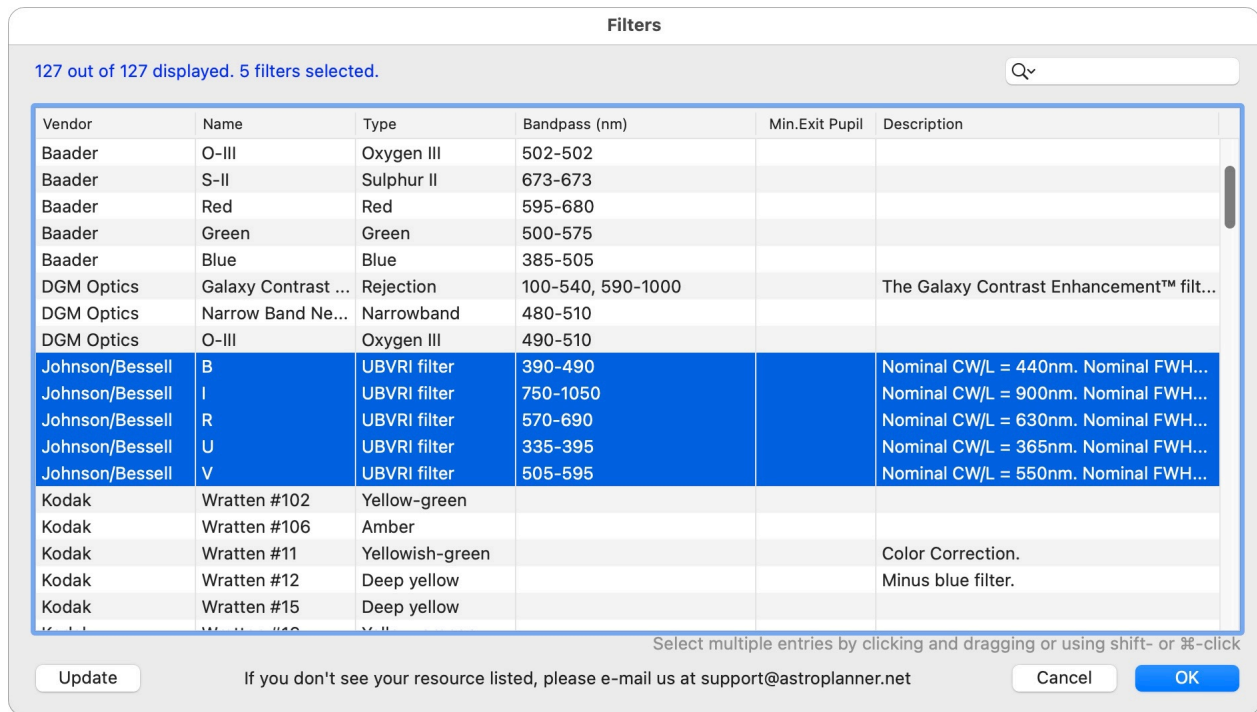


Figure 92: Filter listing dialog

9.2.7 Observer resources

The screenshot shows a macOS-style window titled "Resources". It has a top menu bar with tabs: Sites, Telescopes, Eyepieces, Optical Aids, Filters, Observers (selected), Imagers, and Combinations. On the left is a sidebar titled "Observers" with a list of names, the first of which is "AstroPlanner Support Person" with a checked checkbox. The main content area is for editing the selected observer. It includes fields for "Resource Name" (filled with "AstroPlanner Support Person"), "URL" (empty), "Observer's Name" (filled with "Paul"), "Year of Birth" (filled with "1954"), "E-mail Address" (filled with "paul@ilanga.com"), "Latitude (-ve = S):" (filled with "47.4"), "Longitude (-ve = W):" (filled with "-122.3"), "Experience" (a dropdown menu showing "5"), and "Vision" (a dropdown menu showing "20/40"). To the right of the name field is a "Gravatar" section displaying a small photo of a man. At the bottom right, there are two tabs: "User-defined Fields" and "Comments". The "User-defined Fields" tab is active, showing a table with two columns: "Field" and "Value". The table is currently empty. At the bottom left of the window are several small icons: a plus sign, a minus sign, a magnifying glass, and a trash can.

Figure 93: Observer resources

Observer's Name

Observer's full name. For informational purposes only.

Year of Birth

Observer's year of birth. Use for advanced visibility calculations.

E-Mail Address

Observer's e-mail address. If this is specified and the user has registered a Gravatar image online, then it will be displayed on the right. See <https://gravatar.com> for details.

Latitude/Longitude

The latitude/longitude of the observer's home. Currently not used.

Experience

Observer's relative experience. Use for advanced visibility calculations.

Vision

Observer's vision acuity. Use for advanced visibility calculations.

9.2.8 Imager resources

The screenshot shows the 'Resources' window with the 'Imagers' tab selected. The sidebar lists two imagers: 'ST-9E/XE' and 'STT-8300M', both of which are checked. The main panel displays configuration details for the selected imager, 'ST-9E/XE'. Fields include 'Resource Name' (ST-9E/XE), 'URL' (empty), 'At Site/s' (Common to All), 'Main Sensor Name' (KAF-0261E), 'Guide Sensor Name' (checked, TC-237), 'Pixel Size (um)' (Main: 20 W x 20 H, Guide: 7.4 W x 7.4 H), 'Number of Pixels' (Main: 512 W x 512 H, Guide: 657 W x 495 H), 'Sensor Size (mm)' (Main: 10.24 W x 10.24 H, Guide: 4.86 W x 3.66 H), and 'Offset from main sensor (mm)' (0 X, 8.69 Y). A 'Display colour' checkbox is present. On the right, a diagram shows a 35mm film frame with a 'Main' sensor and a 'Guide' sensor. At the bottom, there are 'User-defined Fields' and 'Comments' sections, and three buttons: 'Select Imager from List...', 'Select Main Sensor from List...', and 'Select Guide Sensor from List...'.

Figure 94: Imager resources

Main Sensor Name

The name of the imager's main sensor chip.

Main Sensor Pixel Size

The main sensor's pixel size (in μm).

Main Sensor Number of Pixels

The number of pixels in the X and Y directions of the main sensor.

Guide Sensor Name

The name of the imager's guide sensor chip. If the imager has a built-in guide sensor then check the checkbox next to this field.

Guide Sensor Pixel Size

The guide sensor's pixel size (in μm).

Guide Sensor Number of Pixels

The number of pixels in the X and Y directions of the guide sensor.

Guide Sensor Offset

The offset of the centre of the guide sensor from the centre of the main sensor (in mm)

35mm comparison

The diagram on the right shows the relative size of the main (and guide sensor if applicable) compared to a 35mm film frame.

Display Colour

Select the default colour used to display the imager outline in the field of view and other charts.

Select Imager from List...

You can create a new Imager resource by selecting from a list of common (and not-so-common) manufacturer's models using this button. Imager models with separate built-in guide sensors are displayed in red.

The dialog lists as many known imager models as possible. Obviously keeping these lists up-to-date is time-consuming. Use the **Update** button to check on-line and see if there have been any updates to the lists. If you still don't see your commercial eyepiece on the list, feel free to send an e-mail message to support@astroplanner.net and complain. We'll try and get the list updated as quickly as possible.

You can select one or more entries manually, or use the **Find** field to specify a search term.

Once you have selected one or more entries, click the **OK** button to create a new resource for each of them.

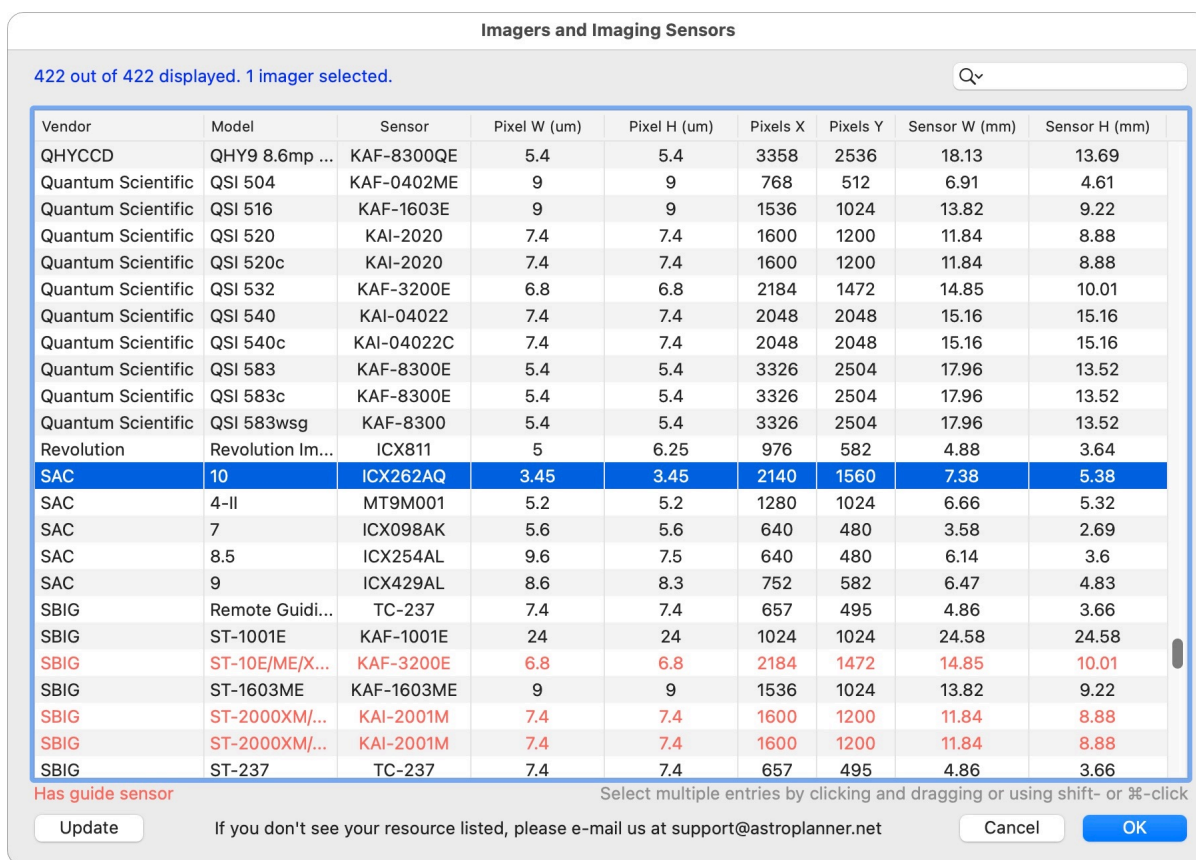


Figure 95: Imager listing dialog

Select Main Sensor from List...

Does the same thing as the above, but only displays a list of sensors and replaces the main sensor data. You will need to have a existing imager resource selected for this to be enabled.

Select Guide Sensor from List...

Does the same thing as the above, but only replaces the guide sensor data. The Guide Sensor checkbox needs to be checked to enable this button.

9.2.9 Resource combinations

This tab allows you to show a tabular display showing combinations of telescopes with eyepieces, imagers and optical aids. In Figure 96 the top table shows all telescope resources paired with eyepieces, showing the magnification achieved in each case. The lower table shows various computed parameters for each telescope

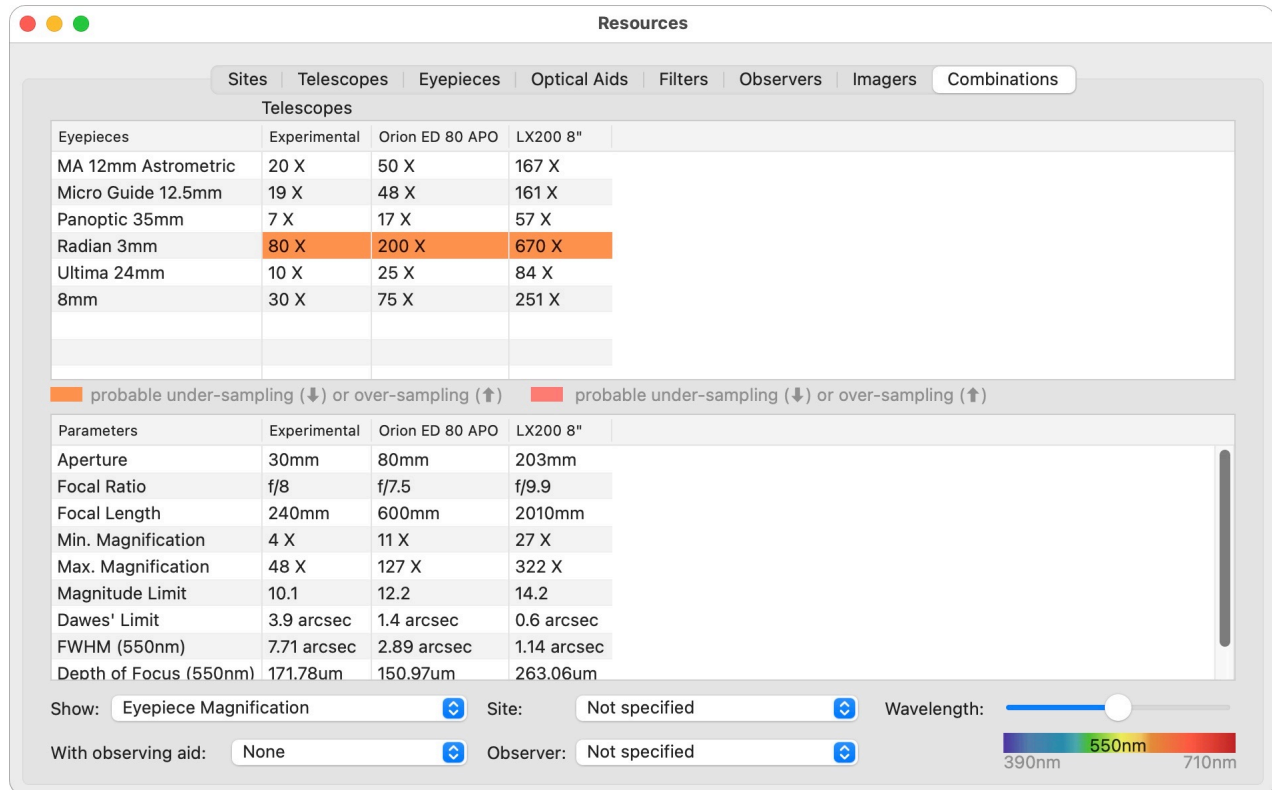


Figure 96: Resource combinations

You can show:

- **Eyepiece magnification.**
- **Eyepiece Apparent FoV.**
- **Eyepiece Actual FoV.**
- **Eyepiece exit pupil.**
- **Telescope limiting magnitude.**
- **Advanced Limiting magnitude (zenith).** In this case you specify a Site and an Observer.
- **Imager Actual FoV.**
- **Imager pixel scale.**

Wavelength

This is used in the computation of some of the computed parameters (e.g. depth of focus).

10 Constructing an observing plan

This chapter discusses how to go about constructing an observing plan (i.e. choosing a selection of objects to observe). There are various ways to do this, covered below.

10.1 Manual construction

The simplest way to construct a plan, while not necessarily being the fastest, is to do so manually. If you have a list of objects you wish to observe, possibly from a book or magazine, then this is the way to go (unless someone else has already done the work - in which case, see Section 10.2 on page 85).

Create a new plan by using **File > New**.

10.1.1 Adding a new object

For each object on your list, click the **+** button under the object list, or use **Object > New Object....** This will invoke the new object dialog.

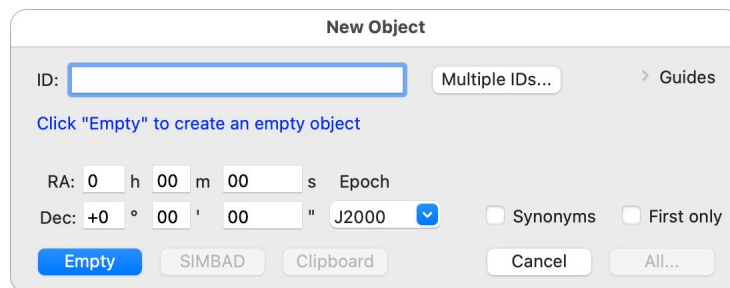
The image shows a 'New Object' dialog box. At the top, it says 'New Object'. Below that is an 'ID:' field with a text input box and a 'Multiple IDs...' button to its right. To the right of the 'Multiple IDs...' button is a '> Guides' link. Below the ID field is a blue link that says 'Click "Empty" to create an empty object'. Underneath this are fields for 'RA: 0 h 00 m 00 s Epoch' and 'Dec: +0 ° 00 ' 00 " J2000'. To the right of these fields are two checkboxes: 'Synonyms' and 'First only'. At the bottom, there are five buttons: 'Empty' (highlighted in blue), 'SIMBAD', 'Clipboard', 'Cancel', and 'All...'.

Figure 97: New Object dialog

You then have various options to create objects in your plan:

Empty button. Clicking this will create an "empty" object in the plan, with no ID or coordinates (you can edit the coordinates in the RA/Dec fields if you wish). You can edit that object later (see Section 10.4 on page 90).

Type in a known ID. Type an ID into the **ID** field (or click the **Clipboard** button if the ID was previously copied there). If the ID prefix (e.g. "NGC") is found in one or more of your installed catalogues, then the dialog announces how many catalogues it appears in and enables a **Best** button. Clicking the **Best** button will search the catalogue most likely to contain the object and if found, the object will be inserted into your plan. If not found, you'll be informed.

Type the abbreviation or name of a constellation in order to add a constellation object. The constellation object is created with the ID equal to the abbreviation, the Name equal to the full constellation name, the RA/Dec coordinates of the centre of the constellation, and the Size equal to the largest dimension of the constellation.

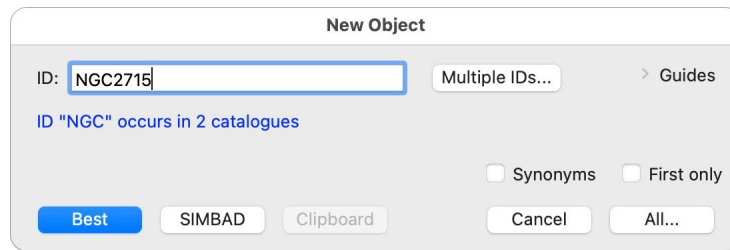


Figure 98: New object based on known ID

SIMBAD search. If you type in an ID, and it doesn't appear in any of your installed catalogues, and you have Internet access, you can request a search of the on-line professional SIMBAD database by using the **SIMBAD** button. This creates an object with a lot of information. You can always edit out what you don't need afterwards.

Search all catalogues. If you want to find all entries in your catalogue collection that match the ID, use the **All...** button. This will search all installed catalogues and create a list of all objects that match the ID. If none is found, you'll be given the chance to repeat the search looking in the catalogue object notes fields for occurrences of the ID (**Warning:** this can take a while). The search results are presented in a window. You can select one or more objects and click the **Add Selected** (or **Add All**) button to add the object/s to your plan. If you are feeling lucky, you can check the **First only** checkbox, in which case the search will stop after finding the first match.

You can also set the **Synonyms** checkbox, in which case the search will also find any synonym objects with the same coordinates.

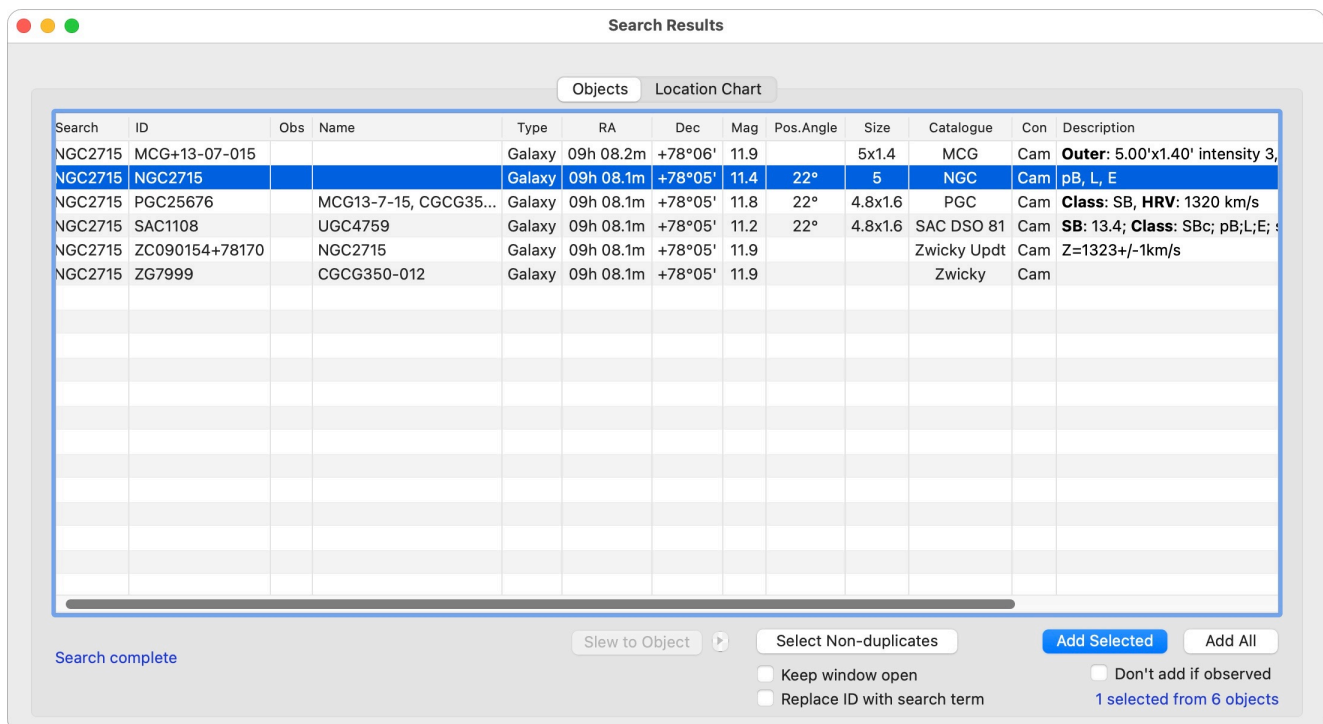


Figure 99: Search results window

If you want to add several objects at once, you can use the **Multiple IDs...** button. This will allow you to enter several IDs, in various forms, and search for all of them at once. The results are presented in the Search Results window as shown above.

Figure 100: Lookup multiple IDs

The Multiple ID lookup also lets you select the catalogues to search. You can choose to search all the catalogues (the default), manually selected catalogues, only catalogues containing certain types of objects, only catalogues containing the ID/s you are searching for, or only catalogues where the ID you are searching for is the primary ID.

You can also lookup the IDs using the on-line SIMBAD catalogue if you wish (***SIMBAD*** button). You can also use the **Cross-index ID fields** checkbox to do an exhaustive search (which will pretty much find every ID and its synonyms in the catalogues, but might also find some false positives too).

Figure 101: Catalogue select dialog

Finally, when you are entering the ID of your object, the dialog can be expanded (using the **Guides** widget at the top right) to display some useful aids to entering ID data. The left hand table contains the symbols of the Greek alphabet. Clicking on a symbol enters the 2- or 3-character abbreviation for that symbol. The centre table lists some common double-star discoverer IDs. Clicking an ID will enter the correct alphabetic prefix as used in the WDS catalogue name field.

New Object

ID: Multiple IDs... Guides

[Click "Empty" to create an empty object](#)

α	β	γ	δ	ε	ζ	Σ	OΣ	Δ	β
η	θ	ι	κ	λ	μ	λ	h	Φ	δ
ν	ξ	ο	π	ρ	σ	Gls	Cor	Hd	Cp
τ	υ	φ	χ	ψ	ω	Mld	NZ	Gale	Jac

Constellation abbreviation... ⌵

Common stars... ⌵

Common deep-sky objects... ⌵

RA: h m s Epoch

Dec: ° ' " J2000 ⌵ ☐ Synonyms ☐ First only

Empty SIMBAD Clipboard Cancel All...

Figure 102: New object dialog showing guides

The **Constellation abbreviation** popup inserts the three-character abbreviation for the selected constellation. **Common stars** lists common names of stars, and when selected will insert the Bayer ID or SAO ID into the ID field. **Common deep-sky objects** lists common names of deep-sky objects and asterisms, and when selected will insert a suitable ID for searching into the ID field.

10.1.2 Adding from a catalogue

You can add objects to your plan directly from an installed catalogue. Open the catalogue display window (usually via the **Show Catalogue** popup under the object list in the plan document window, or via **Object > Open catalogue/s**).

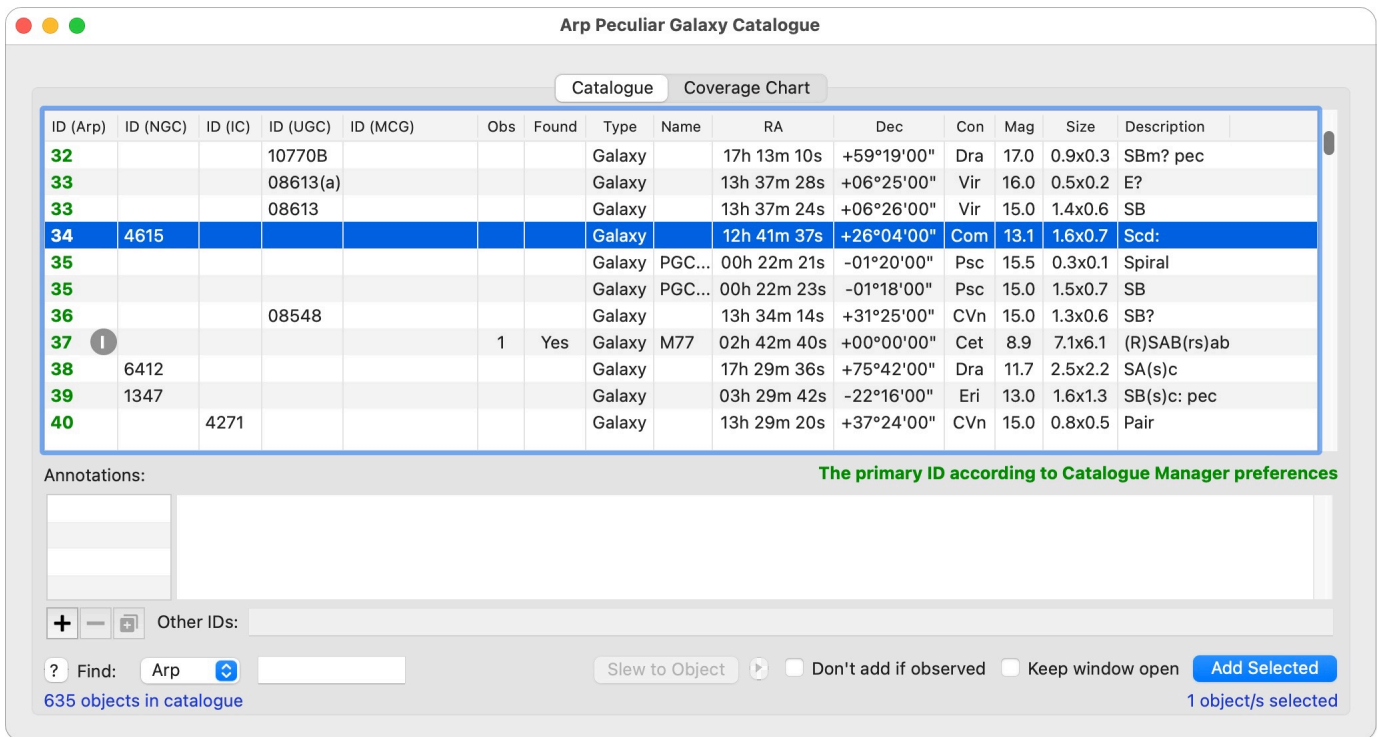


Figure 103: Catalogue display window

Select one or more objects and either drag the rows across to the plan window's object list, or click the **Add Selected** button.

10.1.3 Searching the catalogues

You can also perform a targeted search of one or all catalogues, based on criteria you define. This is done via the **Search Catalogue/s** popup under the object list in the plan document window, or via **Object > Search > Search Catalogue/s**.

If you use the menu command, or if you select the **Choose catalogue/s from list...** entry from the popup, then you will be presented with a dialog that lets you choose one or more catalogues to be searched. The radio buttons at the top of the dialog window display your installed catalogues in various ways (as a single alphabetised list by **catalogue name**, as a hierarchical list by **object types** contained within the catalogues (e.g. nebulae, double stars, etc.), or as a hierarchical list by the **object IDs** supported by the catalogues (e.g. M, NGC, IC, etc.)).

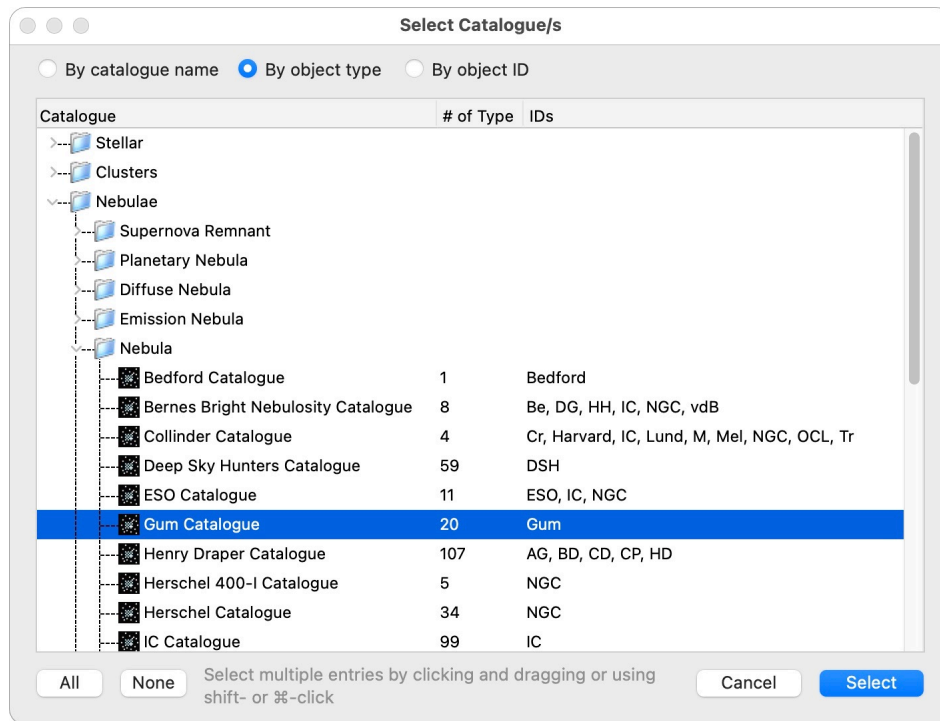


Figure 104: Select catalogue dialog

Once you have identified the catalogue/s to search, the Search dialog is presented. This dialog allows you to specify various search parameters to use to determine which objects are selected from the catalogue/s.

Search: All catalogues

☐ In RA range: 00:00:00 to 23:59:24

☐ In Dec range: -90:00:00 to +90:00:00

☐ Within 1 ° of RA: 00:00:00 Dec: +0:00:00

☒ In Magnitude range: -10 to 11 For telescope... ↕

☐ In Magnitude2 range: -10 to 30 For telescope... ↕

☐ In Magnitude Diff. range: 0 to 30

☐ Splittable with: Experimental from Back yard ↕

☐ In Difficulty Idx range: 0 to 100

☐ In Separation range: 0 to 10000 ☐ Has orbit data

☐ In Size* range: 0 to 100x100

☐ Surface Brightness ↕ 0 to 1000 mag/sq.arcsec

☐ Spectral Data contains: ☐ Regex

☐ Name contains: ☐ Regex

☐ Description contains: ☐ Regex

☐ Limit to Visibility: Altitude between: 0 and 90 °

Site: Back yard ↕ Date: 2/23/2023 📅 Today

☐ Include site horizon Time: 6:00 PM ↕ to 6:00 AM ↕

☐ Transit also occurs ☐ Set plan date/time

* enter Size as either "n" (for linear arcmin) or "m x n" for square arcmin, where m,n are numbers. In the first case, the first dimension only will be considered.

☒ Limit to Types: 1 selected

☐ Active Galaxy (47,711)

☐ Asterism (1,413)

☐ Be Star (2)

☐ BL Lac Object (48,839)

☒ Bright Nebula (1,700)

☐ Dark Nebula (8,679)

☐ Diffuse Nebula (423)

☐ Does not exist (574)

☐ Double Star (593,427)

☐ Eclipsing Binary (3)

☐ Elliptical Galaxy (959)

All None

☐ Limit to Constellations: 0 selected

Display

☐ All constellations

☒ Those visible from: Back yard

☐ Those visible from: Back yard at current date/time

☐ Include partially visible

Fully visible All

Partially visible None

Not visible

☐ And - Andromeda

☐ Ant - Antlia

☐ Aps - Apus

☐ Aql - Aquila

☐ Aqr - Aquarius

☐ Ara - Ara

☐ Ari - Aries

☐ Aur - Auriga

☐ Boo - Bootes

☐ Cae - Caelum

☐ Cam - Camelopardalis

☐ Cap - Capricornus

☐ Car - Carina

☐ Cas - Cassiopeia

☐ Cen - Centaurus

Find object with Min/Max value

☒ Neither ☐ Min ☐ Max

Load... Save... Cancel Search

Figure 105: Catalogue search dialog

The general approach is to check the checkbox for the catalogue object parameter you wish to search on. If you choose more than one, then *all* the checked restrictions must be true for a catalogue object to be considered. Most of the parameters specified either define a range of values, or a character string to look for. The notes below describe those that don't follow this pattern, or have additional features.

Searches will typically find *all* matching objects in the catalogue/s. However, if your selected parameters include a single *numeric* parameter, then the **Find object with Minimum/Maximum value** item appears at the bottom of the dialog. If you select Minimum or Maximum then (for each processed catalogue) only a single object will be returned having the minimum or maximum value of the selected numeric parameter.

Notes

- **Within x° of RA/Dec.** This option only returns objects that are closer than x° from the specified RA/Dec coordinates.
- **In Magnitude/2 range.** You can use the **For telescope...** popup to select the visual magnitude limit for that telescope resource.
- **In Magnitude Diff. range.** Specifies a magnitude difference between Magnitude and Magnitude2 for an object. This can be used for double or variable stars only, where the Magnitude2 value is available.
- **In Size range.** As the footnote specifies, you can either specify *m* or a string of the form *m x n*, where *m* and *n* are numbers. In the former case, only the longest (first) size linear dimension in

arc minutes will be compared. In the second case the angular area in square arc minutes will be compared.

- **Size ratio.** This is one of the options in the parameter with the popup menu. The size ratio is valid for any object that has a specified size. If that size is a single number, then the size ratio is 1.0. The size is $m \times n$, where $m \geq n$, then the size ratio is $m \div n$. In the example shown in Figure 105, the search is for galaxies with a size ratio ≥ 10 , i.e. "flat" galaxies.
- **Spectral Data/Name/Description contains.** Returns any object that has the specified parameter containing the character string. However, if you use the **Regex** checkbox, then the field is considered to contain a regular expression, and the object will be returned if the regular expression is true for the specified object parameter.
- **Limit to Visibility.** An object is returned only if it falls between the given altitude values at the specified site, on the specified date, somewhere between the specified times. If the **Include site horizon** option is checked, then an object will not be returned if it is behind the user-specified horizon for the specified site. If the **Transit also occurs** option is checked, then an object is returned only if it transits (reaches its highest altitude in the sky) during the specified time period. Use the **Set plan date/time** option if you want to set the current plan's date and time to the beginning of the specified period when the search is done (regardless of the search results).
WARNING: *This search option is very compute intensive, and should probably only be used on smaller catalogues.*
- **Limit to Types.** The list contains only those object types available in the search catalogue/s, together with the total number of such objects available.
- **Limit to Constellations.** The constellations displayed in the list can be limited to: All (88) constellations, only those constellations visible from the site, or only those constellations visible from the site at the current date/time. You can also elect to show partially visible constellations.
- **Save...** and **Load...** buttons allow you to save the contents of the search and reload it at a later stage. This is convenient if you have several complex search strategies you'd like to use more than once.

10.1.4 Adding "special" objects

Underneath the object list there is an **Add Special** popup menu. This is a convenient way of adding common objects to your plan. The planets, the moon, the Messier objects, comets, minor planets, etc. can be inserted from here.

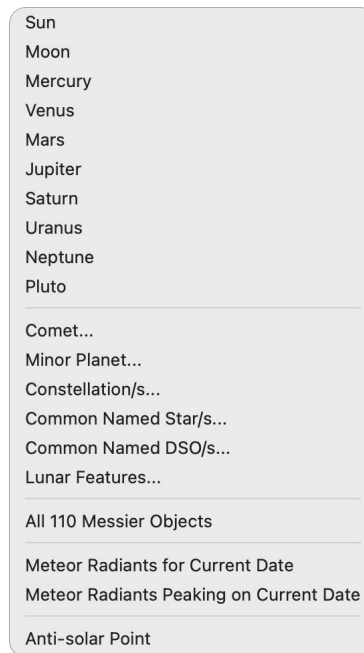


Figure 106: Add Special popup menu

If you choose **Comet...** or **Minor Planet...** then you get the choice to choose from any cached data that was previously downloaded (see Chapter 24 on page 366). Alternatively, you can create a default comet/minor planet and edit the elements manually.

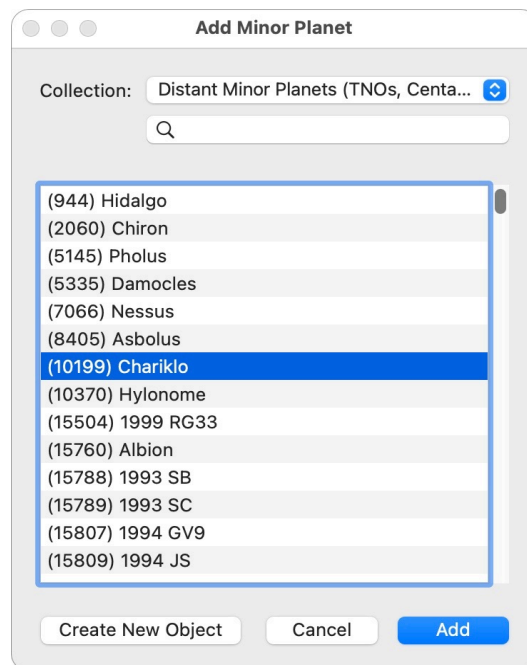


Figure 107: Add minor planet dialog

The **Constellation/s...** entry lets you add one or more constellation objects to the object list.

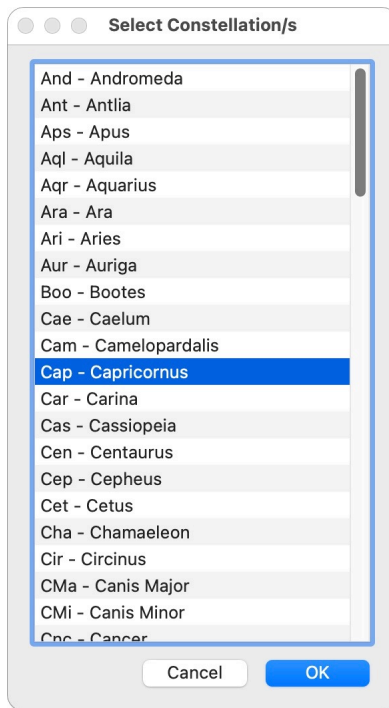


Figure 108: Adding constellation/s

The **Common Named Star/s...** entry lets you add one or more stars with common names to the object list.

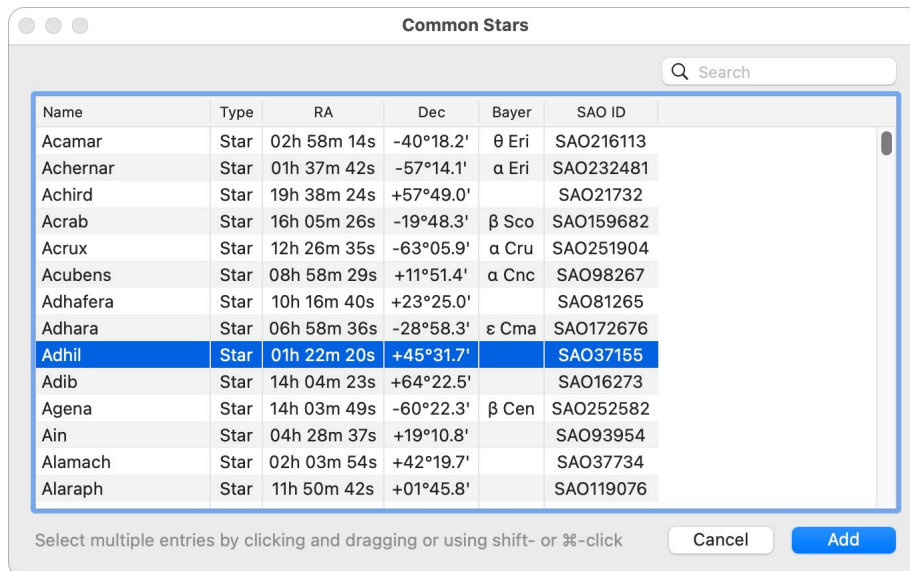


Figure 109: Adding common named stars

The **Common Named DSO/s...** entry lets you add one or more deep sky objects with common names to the object list.

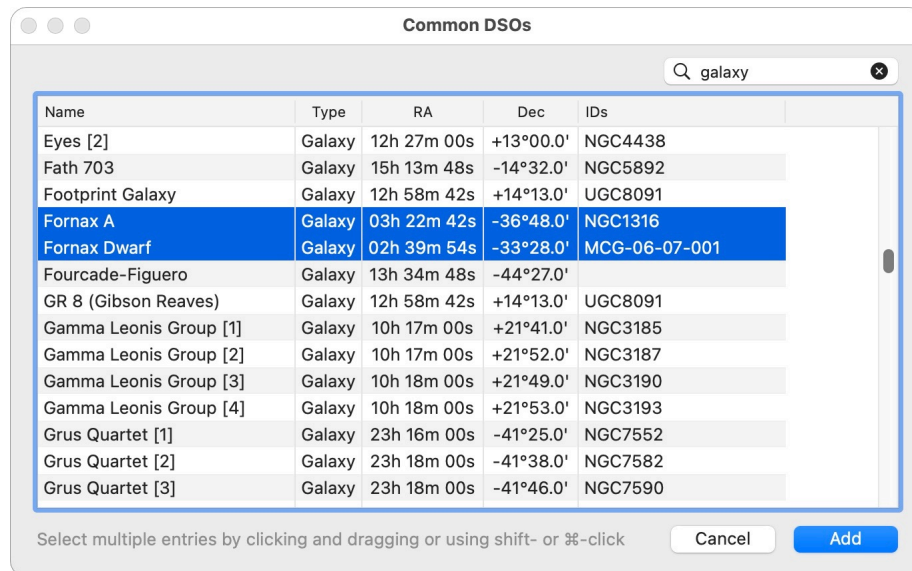


Figure 110: Adding common named DSOs

The **Lunar Features...** entry lets you add features on the lunar surface into your plan.

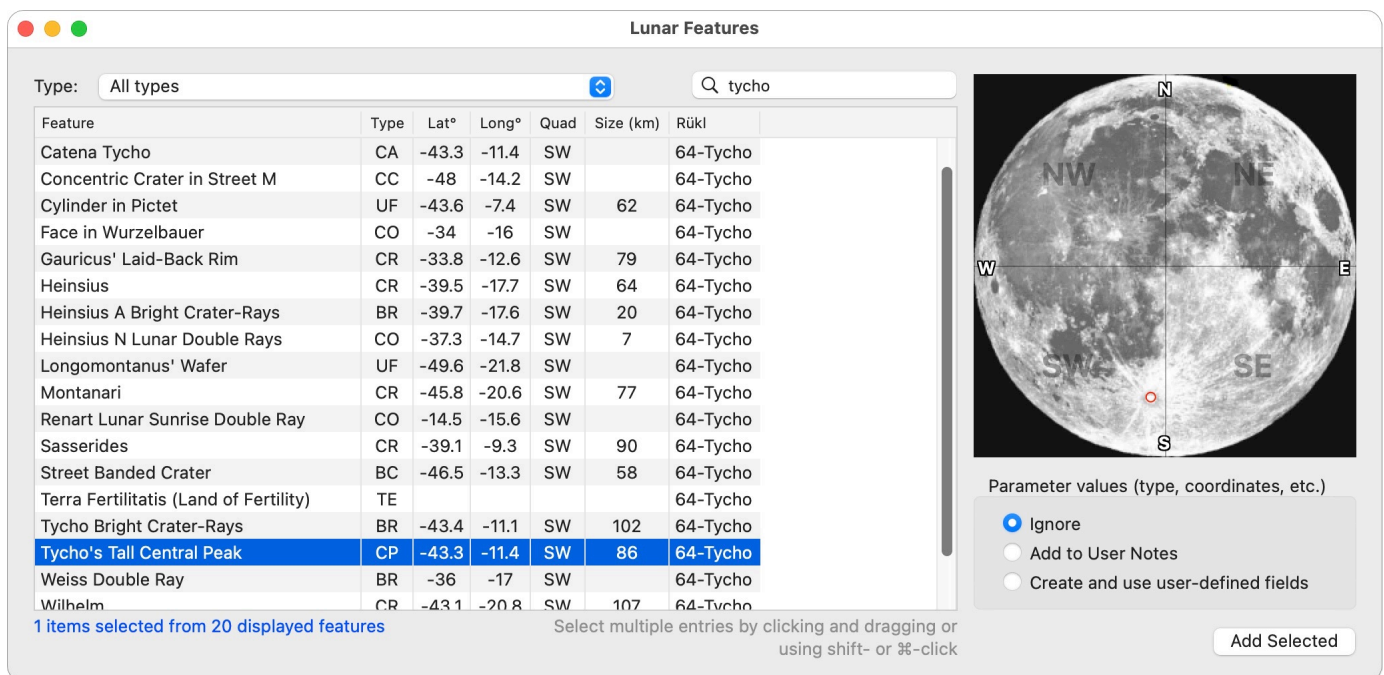


Figure 111: Adding lunar features

10.2 User-contributed plans

A more convenient way to create a plan is to use one that another user has created and uploaded to the user-contributed plan repository. This is described in more detail in Section 22.1 on page 349.

10.3 Plan Creation Wizard

Another convenient way of creating an observing plan is to use the Plan Creation Wizard (PCW). The PCW maintains a database of observable objects that it collects from whatever catalogues you have

installed¹. Using rules (that you can change if you wish), the PCW rates the objects into five levels, from easy to hard. You can then get the PCW to create a plan for you, based on your desired level of difficulty, the telescope you plan to use, the place and time you will be observing, etc.

Objects are selected at random from the database, and wherever possible do not include any objects you've already selected in any previous use of the PCW feature.

To invoke the PCW, use **File > Plan Creation Wizard....** The PCW dialog is presented.

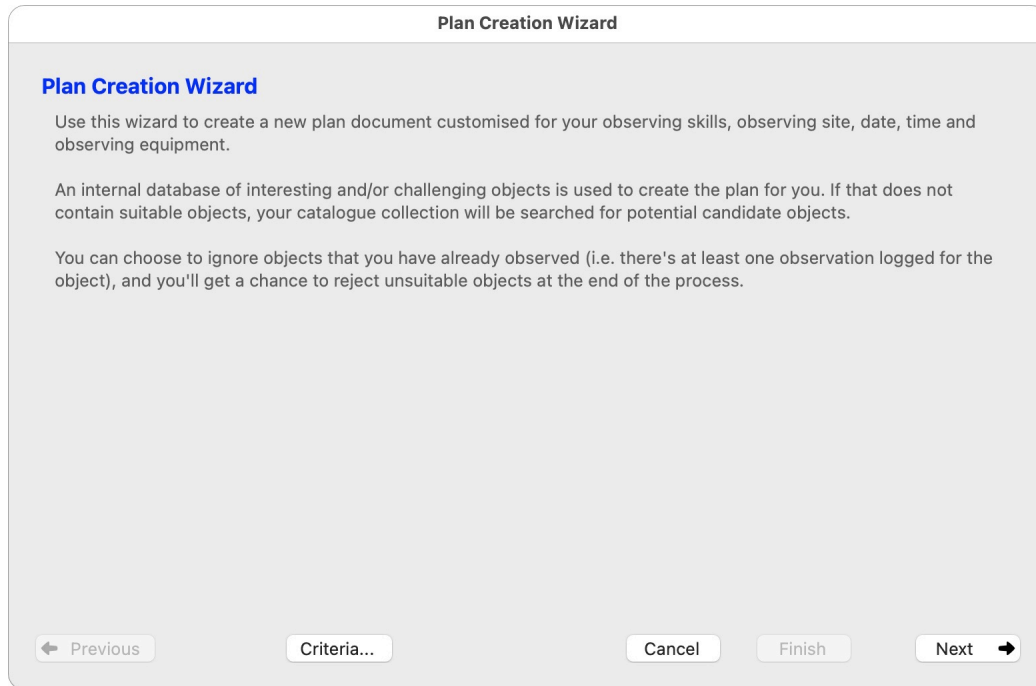


Figure 112: Plan Creation Wizard dialog - page 1

You then navigate through several "pages" using the **Next** (and **Previous**) buttons, and finishing with the **Finish** button.

On the second page you specify who you are and what level of difficulty you need. The plan will contain only objects considered to be of the difficulty rating you specify. You can use the **Include lower levels** checkbox to include objects from *all* levels up to and including the one you specify.

1. Whenever you add, delete or update a catalogue, the PCW database is updated accordingly in the background. You might see the occasional message about this, especially the first time you use AstroPlanner, or if you install a number of new catalogues.

Plan Creation Wizard

Who

Tell us who you are and what level of expertise you consider yourself at. This will determine how challenging the selected objects will be.

Observer:

AstroPlanner Support Per...

If you have "defined" yourself with an Observer resource, select that resource here. Otherwise use "Unknown".

Level of Difficulty

1

1 (Easy) (Difficult) 5

☐ Include lower levels

If this is checked then include all the easier levels as well. Objects will be chosen randomly from each of the levels in equal proportions (where possible).

Object Type	Count
Bright nebulae	161
Dark nebulae	36
Double stars	3,987
Galaxies	18
Galaxy clusters	60
Globular clusters	19
Open clusters	77

This list shows the number of objects of each type that are potentially available to you at the selected level/s. This list is for informational purposes only.

Previous

Criteria...

Cancel

Finish

Next

Figure 113: Plan Creation Wizard dialog - page 2

The third "page" specifies where (your site) and when (date, time, season, etc.) you will be observing. You can specify a specific date, a specific month, or the season (summer, etc.). Alternatively you can select constellations that you are interested in observing.

Plan Creation Wizard

Where and When

Specify the observing site you will be observing from (previously set up as a Site resource), and the date/time you plan to do your observing. This information will determine what objects are going to be visible during your observing session. The more specific you are, the better.

Observing site:

KIRKLAND,WA

Restrict to:
☒ Date/time ☐ Constellation/s

Date/s:

Spring

Time/s:

After astronomical twili...

 to

To time:

12 :00 AM

Previous

Criteria...

Cancel

Finish

Next

Figure 114: Plan Creation Wizard dialog - page 3 (select by date/time)

don't want to consider. There's also a **Reject objects** option that will ignore any catalogue objects if they were previously observed (have at least one observation in the observation database).

Plan Creation Wizard

What

Here you specify the kinds of objects you want in your plan, and the size of the plan (number of objects) you wish to generate.

You must choose at least one type of object for your plan.

Object types to include

☐ Bright nebulae

☐ Dark nebulae

☐ Double stars

☒ Galaxies

☐ Galaxy clusters

☒ Globular clusters

☒ Open clusters

☐ Planetary nebulae

☐ Variable stars

All catalogues containing objects of the chosen type/s are listed below with checkboxes. Uncheck any catalogues you don't wish to be considered when constructing the plan.

Catalogues to consider

Abell Galaxy Cluster Catalogue

Abell Planetary Nebulae Catalogue

Aitken's Double Star Catalogue

AL Dbl Star Catalogue

☒ Arp Peculiar Galaxy Catalogue

Barnard Dark Nebulae Catalogue

☒ Bedford Catalogue

☒ Berkeley Catalogue

Bernes Bright Nebulosity Catalogue

Bernes Dark Cloud Catalogue

All

None

44 of 44 selected

Maximum objects in plan:

30

☐ Reject objects:

Previously Observed

Previous

Criteria...

Cancel

Finish

Next

Figure 117: Plan Creation Wizard dialog - page 5

The final page lets you choose whether the new objects will be placed in a new plan, or placed in the open plan document. Clicking the **Finish** button will create the new plan objects.

Plan Creation Wizard

Complete

Choose where you want the plan objects to go below (if applicable), and what additional databases to use (if applicable). Then click the Finish button to create your plan.

☒ Create a new, untitled plan document

☐ Add the objects to the open plan document: Untitled-1

Previous

Criteria...

Cancel

Finish

Next

Figure 118: Plan Creation Wizard dialog - final page

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10.4 Editing objects

Once you have added objects to your plan document, you might want to edit them. There are two ways to do this.

10.4.1 Editing fields

If the edit fields are not being displayed underneath the object list, you need to toggle the display button (circled in Figure 119).

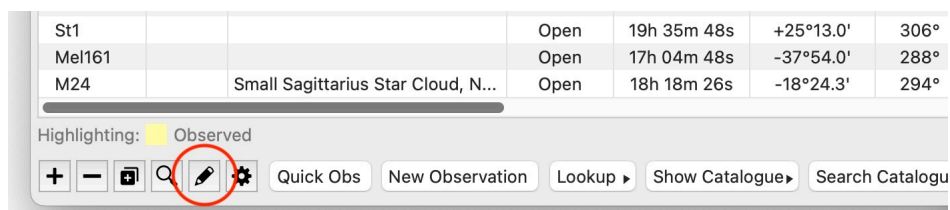


Figure 119: Object editing button

The editing fields are populated and enabled when a single object is selected in the object list. Any changes you make in these fields will be accepted and displayed immediately.

The search buttons to the right of the ID and Name fields will search the catalogues for the entries in those fields. If the ID or Name field is empty, then you'll be asked to enter one or more IDs to search for.

The annotations widget (select the Object Annotations tab) displays any catalogue annotations for the selected object. See Section 23.7 on page 363 for details.

The ODM Info tab displays the ODM information and the best eyepiece and/or eyepiece/visual aid combination to use with the current telescope in order to detect the object (where applicable). See Figure 121.

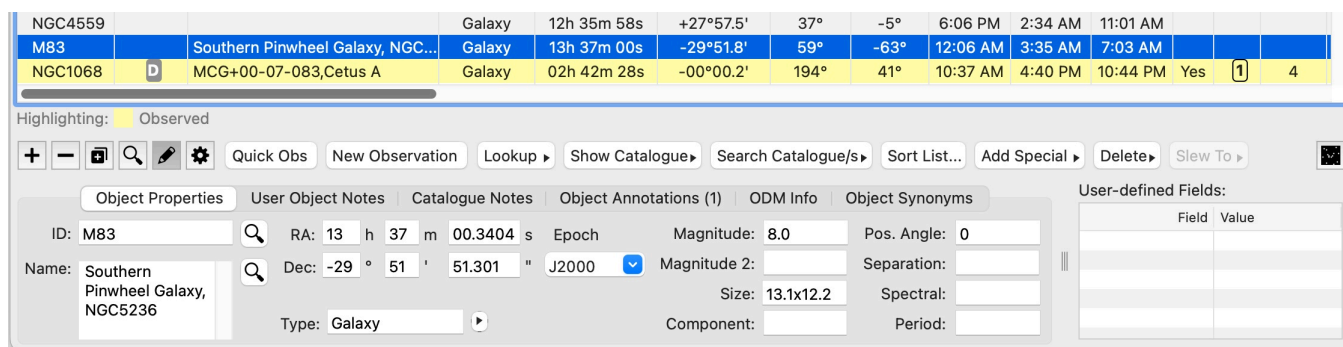


Figure 120: Object editing fields

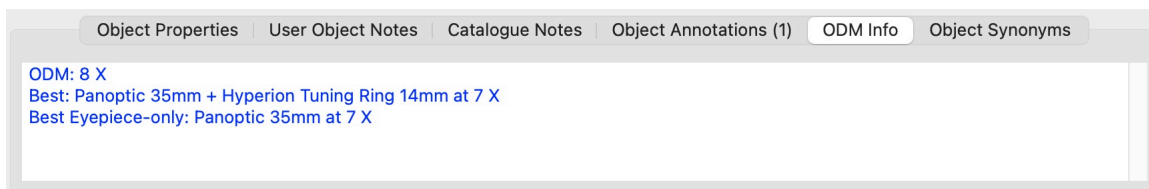


Figure 121: ODM/Eyepiece information

10.4.2 In-line editing

If you have in-line editing switched on (**Object > Object List Preferences > Navigation and editing > In-line editing of object fields**) then you also have the option of editing object data directly in the object list. **WARNING:** after changing the preference option you might have to close and reopen any open plan document windows before this feature functions correctly.

Any field in the selected object that is editable will be displayed with a small triangle on the left and right, as shown below. Fields without the triangles are not editable.

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise	Tra
NGC3184			Galaxy	10h 18m 17s	+41°25.4'	65°	35°	12:51 PM	12:16
NGC4559			Galaxy	12h 35m 58s	+27°57.5'	54°	6°	6:06 PM	2:34
M83		Southern Pinwheel Galaxy, NGC...	Galaxy	13h 37m 00s	-29°51.8'	83°	-48°	12:06 AM	3:35
NGC1068	D	MCG+00-07-083,Cetus A	Galaxy	02h 42m 28s	-00°00.2'	222°	34°	10:37 AM	4:40
Abell592			GalClus	07h 39m 54s	+09°30.0'	124°	39°	2:52 PM	9:38
Abell1257			GalClus	11h 22m 24s	+25°27.0'	60°	22°	2:47 PM	1:21

Figure 122: In-line object list editing

Clicking on an editable field will allow you to edit its value directly.

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise	Tra
NGC3184			Galaxy	10h 18m 17s	+41°25.4'	65°	35°	12:51 PM	12:16
NGC4559			Galaxy	12h 35m 58s	+27°57.5'	54°	6°	6:06 PM	2:34
M83		Southern Pinwheel Galaxy, NGC...	Galaxy	13h 37m 00s	-29°51.8'	84°	-48°	12:06 AM	3:35
NGC1068	D	MCG+00-07-083,Cetus A	Galaxy	02h 42m 28s	-00°00.2'	222°	34°	10:37 AM	4:40
Abell592			GalClus	07h 39m 54s	+09°30.0'	125°	39°	2:52 PM	9:38
Abell1257			GalClus	11h 22m 24s	+25°27.0'	60°	22°	2:47 PM	1:21

Figure 123: In-line editing in action

10.5 Importing objects from other sources

You can import objects from files created by other applications. See Section 26.1 on page 378 for more details.

User-contributed scripts might also exist that allow for import from other non-supported formats. See Section 27.2 on page 401 for more details.

You might be able to import and create objects directly from an external application. See Section 21.2 on page 348 for more details.

11 Plan document window

The plan document window is the fundamental place from which you will operate the application. The window is split into three parts: A toolbar at the top of the window, a set of widgets below that, and content tab taking up the majority of the lower part of the window. This chapter documents all items on the window.

11.1 Toolbar

The toolbar is always visible, but the contents vary according to the tab being displayed. At the left side of the toolbar are four items that let you select the **Objects**, **Observations**, **Field of View**, or **Sky View** tabs. The selected item has a darker background.



Figure 124: Toolbar when Objects is selected

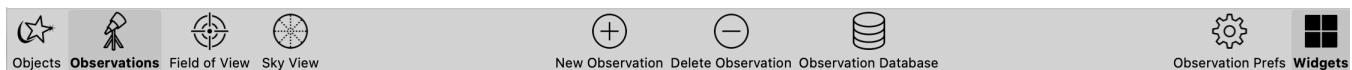


Figure 125: Toolbar when Observations is selected



Figure 126: Toolbar when Field of View is selected



Figure 127: Toolbar when Sky View is selected

At the right side is the **Widgets** item. This toggles the display of any widgets on and off. See below for more details. Next to the **Widgets** item is a shortcut item to **Preferences** appropriate to the tab being displayed. Clicking this item will open the appropriate preferences window.

In the centre of the toolbar are items appropriate to the tab being displayed (apart from the **Observation Database** item which is common to all tabs. Clicking it will show the observation database window).

Right-clicking the toolbar reveals a menu that lets you customise the toolbar, showing either the icon, the caption, or both, and in different sizes. This allows you to shrink the height of the toolbar, or increase the size to make it easier to read.

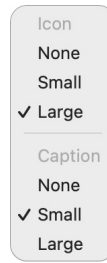


Figure 128: Toolbar contextual menu

11.2 Widgets

Immediately below the toolbar are one or two rows of "widgets". You can show as many, or as few as you like. You can toggle the widgets display off using the **Widgets** toolbar item, or by right-clicking in a widget or between widgets and selecting the **Hide All Widgets** menu item. This will allow more vertical space in the window.

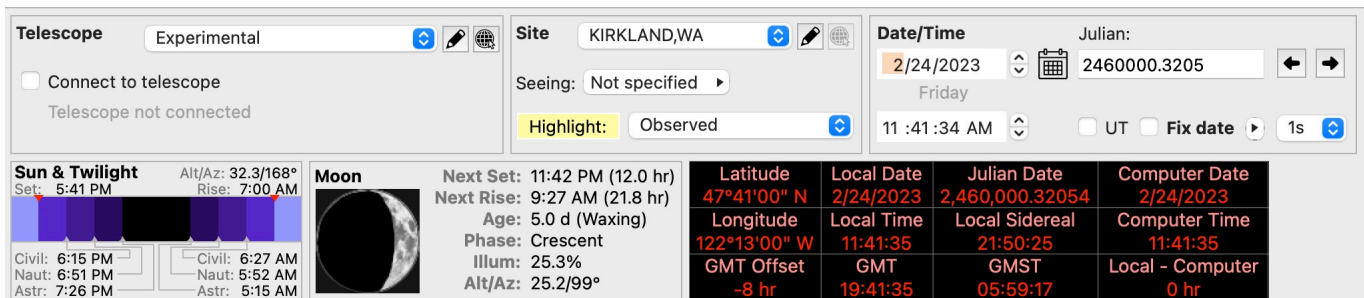


Figure 129: Typical widgets displayed below the toolbar

The widgets will be displayed in one or two rows, depending on widget settings (see below), and may change position depending on the current width of the window. If the window is not wide enough to display all requested widgets, then the last few widgets will not appear. The following sections describe the function of the various widgets and how the widget layout can be changed.

Note that if a widget is not displayed (for space reasons, because the particular tab has that widget disabled, or because all widgets are hidden) then the widget will still act as if it was there with its current settings being used in the plan document.

11.2.1 Telescope widget

The **Telescope** widget specifies the telescope currently in use. The popup menu contains all enabled telescopes available at the currently selected site (if applicable). If the telescope has a GoTo or DSC (digital setting circle) type computerised mount, then the **Connect to telescope** checkbox is enabled. (see Chapter 13 on page 219 for more details)

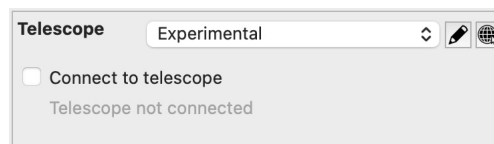


Figure 130: Telescope widget (telescope **not** connected)

If you check the **Connect to telescope** checkbox than the application will attempt to connect to the mount. If successful the checkbox caption changes to **Connected to telescope** and the **Slew to Object** and **Sync to Object** buttons become visible (the latter only if the mount allows syncing after

slewing). If a single object is selected in the plan window, and that object is above the horizon, the the **Slew to Object** button is enabled and a caption informs you of the angular distance the telescope will have to slew.

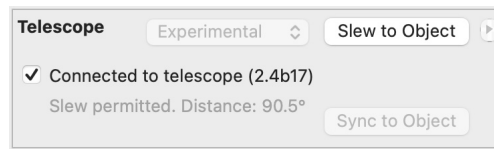


Figure 131: Telescope widget (goto telescope connected)

Clicking the **Slew to Object** button will cause the telescope mount to slew to the designated target object. The button changes its caption to Abort Slew. Clicking this button during the slew will command the mount to stop slewing immediately.

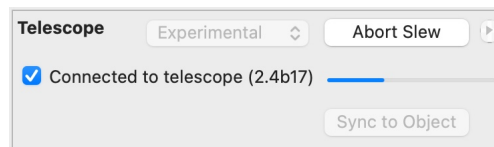


Figure 132: Telescope widget (goto telescope slewing)

After slewing has completed the **Sync to Object** button can be used (where applicable) after manually centering the object in the telescope's field of view.

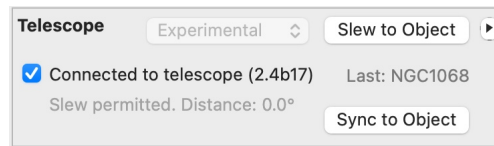


Figure 133: Telescope widget (goto telescope slewing)

Unchecking the **Connected to telescope** checkbox will disconnect the application from the telescope mount.

If a DSC (digital setting circle) type mount is used, the same procedure is used to connect to the telescope mount, but once connected a different user interface is presented.

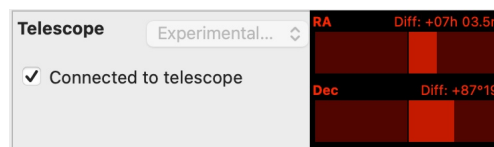


Figure 134: Telescope widget (DSC-type telescope connected)

Depending on settings (Polar or Alt/Az mount) the current readings from the telescope are displayed as red bars showing the difference in RA/Dec or Alt/Az between the current mount reading and the target object's coordinates. It is then up to you to physically move the telescope to the correct place in the sky. When this is done the red bars will be thin red lines.

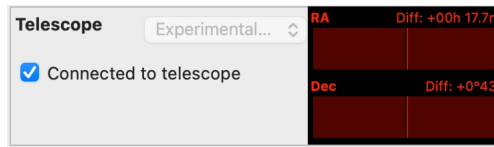


Figure 135: Telescope widget (DSC-type telescope pointing at target)

Since this display is quite small, you can click on the bars to reveal a bigger version in a separate window that might be better for in-the-field use.

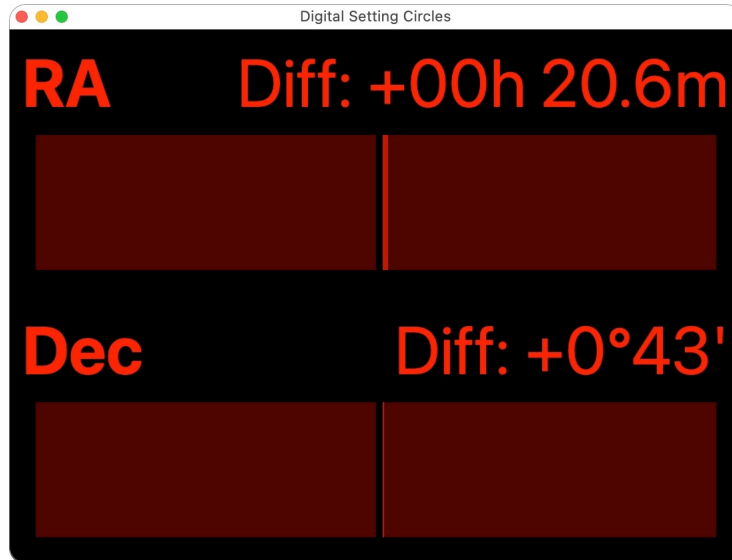


Figure 136: Telescope widget (DSC-type telescope enlarged window)

11.2.2 Site & Highlighting widget

The **Site & Highlighting** widget contains controls pertaining to the current observing site and highlighting features.

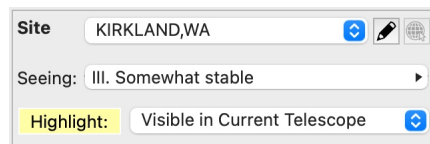


Figure 137: Site & Highlighting widget

The **Site** popup defines the current observing site. This determines many aspects of the objects' visibility, since the site location and GMT offset determine the current positions of objects in the local sky.

The **Seeing** popup should be set to the current seeing conditions. This value is not used elsewhere so you can largely ignore this setting. You can also change the seeing scale between Antoniadi, Pickering or Danjon scales, or set up a custom scale of your own.

The **Highlight** popup determines how the object list is highlighted. See Section 18.1 on page 298 for more information.

11.2.3 Date/Time widget

This widget displays and controls the date and time used in the plan document to determine object positions in the sky. It also incorporates a calendar function that displays various astronomical (solar system) phenomena in the form of a calendar.

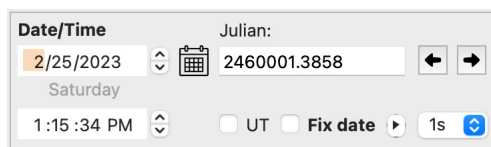


Figure 138: Date/Time widget

Date and time settings

The date and time fields automatically update with the computer clock. If you change any of the fields then the clock is effectively fixed at that point, and the **Fix date** checkbox is checked. Unchecking the checkbox will start the time running again.

The **UT** (Universal Time) checkbox will change the fields so that they display the current date/time at Greenwich (0° longitude).

The popup widget to the right of the **Fix date** checkbox contains a number of preset times of interest that can be applied.

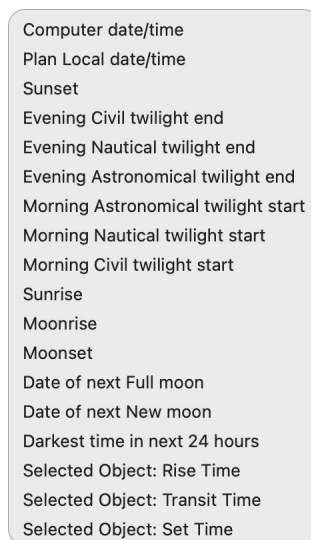


Figure 139: Preset time popup

You can use the arrow buttons on the right to step the time backwards or forwards by the amount specified in the popup below the arrow buttons.

Event calendar

The calendar icon button between the date and Julian time values is used to display the event calendar.

The calendar is displayed like a normal calendar with one month (or more correctly 6 weeks) per page. You use the arrow buttons at the top left and right to progress through the months. The up/down arrow buttons in the middle move through the years, and the Now button reverts back to the current month.

Each day contains information pertaining to that day (depending on the calendar settings: see below), including:

- Day of the month (circled in red for the current day).
- Phase of the moon, with full moon (F), new moon (N), 1st quarter (1Q), and 3rd quarter (3Q) suitably marked.
- Solar system events (which are shown with small green symbols and listed at the bottom of the window), such as planetary conjunctions, elongations, etc.
- Dark time information, including the start time of total darkness, number of evening hours of darkness (i.e. before 00:00 local time), and number of hours of morning darkness (i.e. after 00:00 local time).
- Meteor shower information showing the dates the shower is (theoretically) visible.

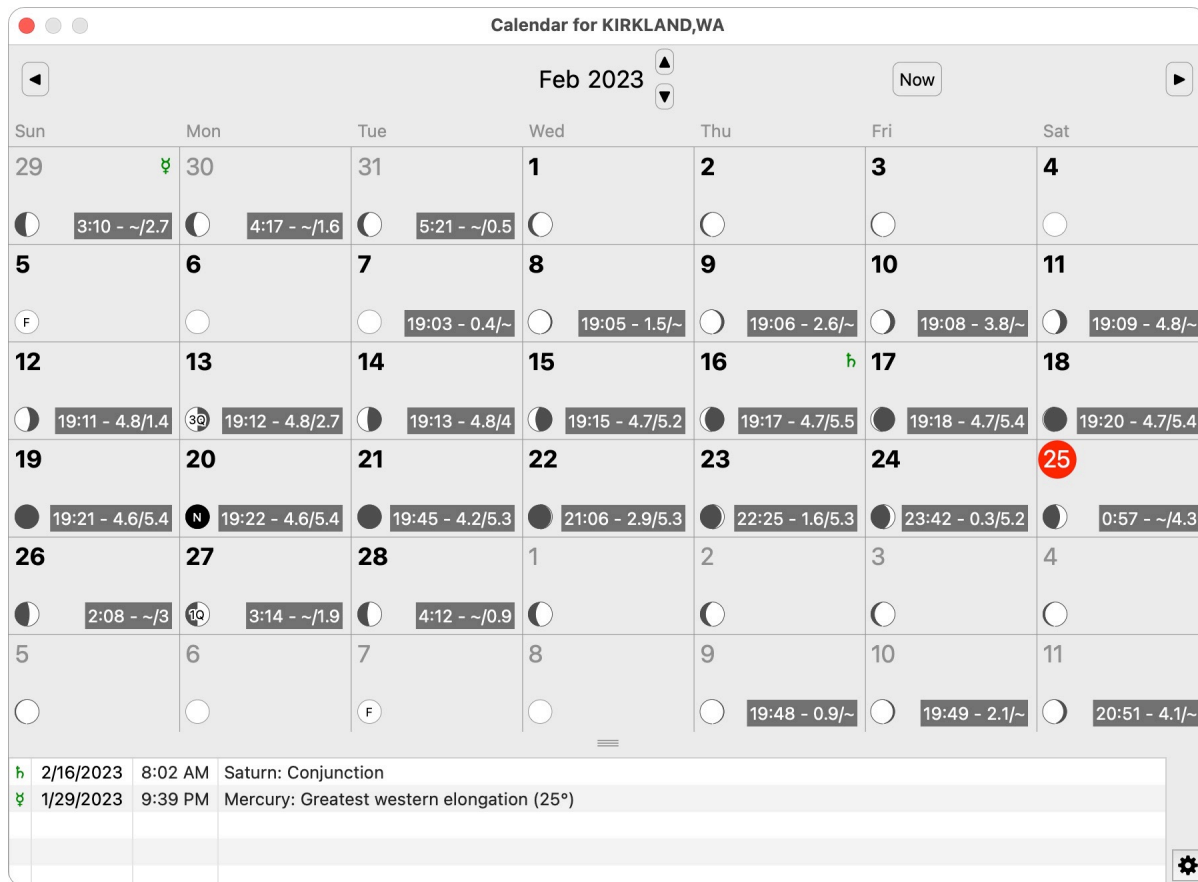


Figure 140: Event calendar

Meteor shower information is shown as a teal-coloured band stretching across several days. The left end has the start date, the right end contains the end date, and the centre shows the shower name (if one is known).

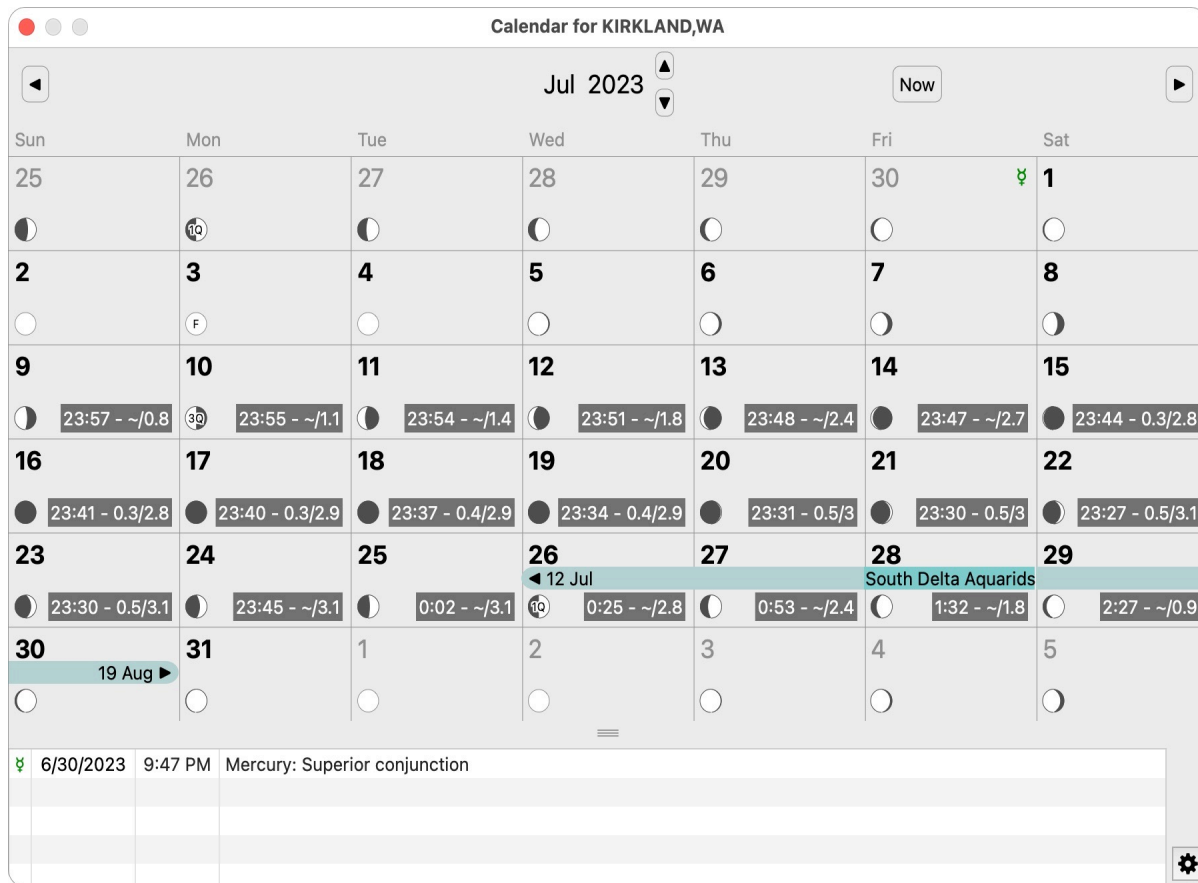


Figure 141: Event calendar showing a meteor shower

Event calendar settings

The small "gear" button at the bottom right brings up the calendar settings dialog. This lets you customise what is shown in the calendar. You can switch the moon phase, meteor shower, dark time and planetary information on and off.

You can also specify what happens when you click on a particular day in the calendar (e.g. set the plan document's date/time to 00:00 on that day, etc.)

You can also define a text file with events to be displayed in the calendar (e.g. perhaps you are interested in occultations, in which case you might want to create a set of date/times when such occultations occur). You can select or create such a text file, and after doing so you can examine/edit the contents conveniently via the Edit... button.

Calendar Settings

☒ Show Moon Phase information *

☒ Show Meteor Shower information

☒ Compute Dark Time information (evening/morning in hours) *

Minimum evening dark time to display: hours

Minimum morning dark time to display: hours


☐ Only consider moon if it is above the Site horizon

Show ☒ Start time ☒ Evening hours ☒ Morning hours

Show Planetary Orbit information

Planet	Conjunctions	Elongations	Oppositions
Mercury	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Venus	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	
Mars	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Jupiter	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Saturn	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Uranus	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>
Neptune	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>

Clicking a day sets plan document date/time to:



☐ Show events from text file:

<none> Select...

Each line of the file: Date/time <tab> Event message
where Date/time is a date or date/time that can be
recognised by AstroPlanner. Create...

Edit...

* only shown if Site is defined Cancel OK

Figure 142: Event calendar settings dialog

11.2.4 Sun/Twilight information widget

This widget shows the current sun and twilight status, including:

- Current Altitude and Azimuth.
- Set time and rise time.
- Time of the start of the next civil, nautical, and astronomical twilight.
- Time of the end of the next astronomical, nautical, and civil twilight.

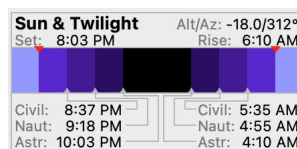


Figure 143: Sun/twilight information widget

The right-click menu allows you add a Sun object to the current plan document, and to start/stop showing the twilight graphic.

SUN	Alt/Az: -18.0/312°
Ends	Starts
Set: 8:03 PM	Astr: 4:10 AM
Civil: 8:37 PM	Naut: 4:55 AM
Naut: 9:18 PM	Civil: 5:35 AM
Astr: 10:03 PM	Rise: 6:10 AM

Figure 144: Sun/twilight information widget without the graphic

Hover the cursor over the widget for more information.

Sun & Twilight	Alt/Az: -44.7/331°
Set: 5:56 PM	Rise: 6:41 AM
RA: 23h 06m 23s	Dec: -05°44.2'
Altitude: -44.7°	Azimuth: 331.3°
Constellation: Aquarius	
Naut: 7:06 PM	Naut: 5:32 AM
Astr: 7:41 PM	Astr: 4:57 AM

Figure 145: Additional Sun information

11.2.5 Moon information widget

This widget shows the current status of the moon, including:

- Current Altitude and Azimuth.
- Next set time and rise time.
- Age of the moon (in days) and whether it is waxing or waning.
- Current phase of the moon.
- Percentage of the moon's surface that is illuminated.
- A graphical representation of the moon and its current phase.

Moon	Next Rise: 10:23 AM (49 min)
	Next Set: 3:14 AM (17.7 hr)
	Age: 7.8 d (Waxing)
	Phase: 1st Q
	Illum: 54.1%
	Alt/Az: -5.8/43°

Figure 146: Moon information widget

The right-click menu allows you add a Moon object or a lunar feature object to the current plan document.

Hover the cursor over the widget for more information.


Moon	Next Set: 6:47 AM (7.8 hr)
	Next Rise: 5:19 PM (18.3 hr)
	Age: 7.8 d (Waxing)
	Phase: 1st Q
	Illum: 54.1%
	Alt/Az: 55.8/164°
	RA: 10h 22m 21s
	Dec: +14°31.1'
	Altitude: 55.8°
	Azimuth: 163.7°
	Constellation: Leo

Figure 147: Additional Moon information

11.2.6 Short-term visibility widget

This widget shows, for the currently-selected object in the object list, the visibility of that object over a time period of between 6 and 24 hours. the horizontal axis represents the time and the vertical axis represents the altitude of the object above the theoretical horizon (0°) with the top of the widget representing the zenith (90° altitude).

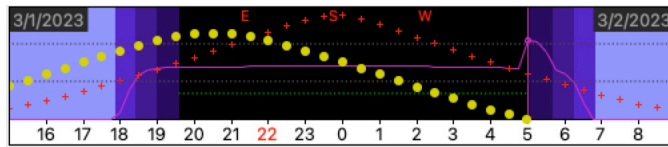


Figure 148: Short-term visibility widget

The widget includes the following (some of which can be customised. See below):

- **Time of day.** The local time of day is shown in 24-hour clock format along the bottom. The dates of the left and right ends of the widget are shown at the top left and right. The time of day of the long-term visibility widget (see below) is shown in red on the horizontal time axis. The effective azimuth of the object over the time period is shown at the top in red (E, W, S, N). The current time is also shown by a vertical white line (where applicable).
- **Darkness.** The widget background colour represents the progression of sky darkness from daylight (light blue) through civil, nautical, and astronomical twilight, to total darkness (black).
- **Object path.** The path of the selected object in the sky is shown as red + symbols (black if hidden by the user-defined horizon).
- **Moon path.** The path of the moon is shown by yellow-filled circles, the brightness of which depends on the percentage illumination of the moon's surface.
- **Observability.** The Observability value for the object is shown as a purple line. This value varies between 0 (not observable) and 100 (perfect time to observe) and depends on the object's altitude, distance from moon and sun, moon phase and sky position, position w.r.t. the meridian, etc. The best time to observe is marked with a purple dot and a vertical line.
- **Dark time elevation.** The dark time elevation (where applicable) is shown as a horizontal dotted green line extending over the period of astronomical darkness. An object's Dark Time is defined to be the period during astronomical darkness when the object's altitude is above this elevation. The value is set in the Object List preferences.
- **User-defined horizon.** If the currently-selected site has an associated user-defined horizon, then it will appear on the short-term visibility widget as a green area at the bottom of the graphic. If the object is below the top of the horizon at a particular time then it will not be visible from the site, even if its altitude is greater than 0°.

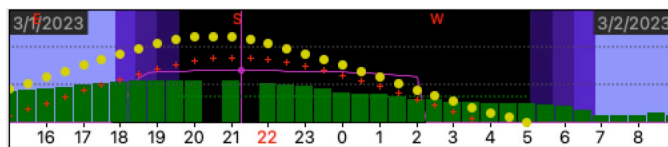


Figure 149: Short-term visibility widget with user-defined horizon

- **Slew altitude limits.** If this feature is selected (see below) then any telescope slew limits for the currently-selected telescope mount will be shown as red bars. In the example shown below, the telescope has a slew limit of 70° altitude. i.e. the telescope cannot slew higher than 70° in altitude/elevation.

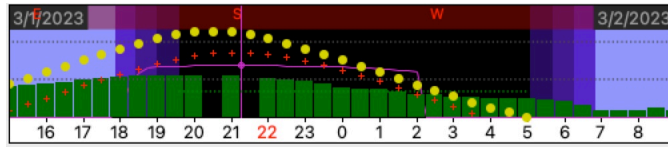


Figure 150: Short-term visibility widget with telescope slew limits shown

- **Apparent magnitude.** If you hover the cursor over the graphic, the apparent magnitude of the object is displayed.

There are some options available in the right-click contextual menu for this widget:



Figure 151: Short-term visibility widget contextual menu

- **Fix Date/Time.** Fix the plan's local date/time to the time in the graphic where the mouse cursor was situated when the right-click was performed.
- **Show Observability.** Toggle the display of the observability line (purple) on the graphic.
- **Show Dark Time Elevation.** Toggle the display of the dark time elevation line (dotted green) on the graphic.
- **Show Slew Altitude Limits.** Toggle the display of the telescope mount slew limits (red area) on the graphic.
- **Chart Start Time.** Specify the start time of the left side of the graphic in increments of an hour.
- **Chart Period.** Specify the width of the graphic in hours (from 6 to 24 hours).

11.2.7 Long-term visibility widget

This widget shows the visibility of the selected object over a longer period (30 days to a year). This can help with forward planning to find the best time of year to observe the object.

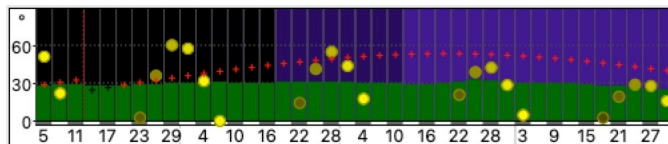


Figure 152: Long-term visibility widget (Altitude over 120 days)

The chart typically shows the date on the horizontal axis and the altitude of the object on the vertical axis in degrees. The horizontal axis is divided into "slots", each slot representing the object's elevation at a particular time on those dates (shown as a red +). The moon's altitude can be shown as well. Note that, if the red + coincides with the moon symbol, this does not necessarily mean the moon is occulting the object, it just means that both are at the same altitude in the sky at the given time.

The background colour represents the twilight status on each slot at the given (local) time. If the current site has a user-defined horizon, it is shown in green. Daylight saving change dates are shown with a vertical red dotted line. Telescope mount altitude slew limits are also shown in red.

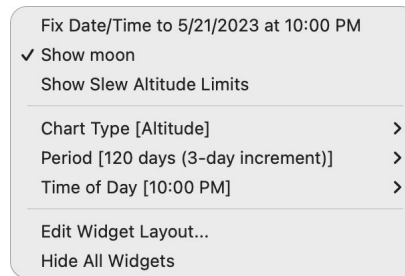


Figure 153: Long-term visibility widget contextual menu

The contextual menu allows you to change what is charted:

- **Fix Date/Time.** Fix the plan's local date/time to the time in the graphic where the mouse cursor was situated when the right-click was performed.
- **Show moon.** Toggle showing the moon's altitude on the chart.
- **Show Slew Altitude Limits.** Toggle showing the current telescope's altitude slew limits (where applicable) on the chart.
- **Chart Type.** Either the chart's vertical (Y) axis is altitude (0° to 90°), or the axis is time of night (16h00 - 08h00). See below for the latter choice.
- **Period.** The period over which the horizontal axis extends: 1 year (each slot is 7 days), 30 days (each slot is 1 day), 60 days (each slot is 2 days), or 120 days (each slot is 3 days).
- **Day of Week.** What day of the week is used for each slot. Only applies for the 1 year period.
- **Time of Day.** What local time of the day is used for each slot.

In the case of the settings shown above, the chart shows 3-day wide slots for the next 120 days, with the object and moon altitudes shown for 10pm.

The other long-term visibility chart type does the same thing on the horizontal axis, but plots the moon and object visibility during a time period (16h00 through 08h00 the following day).

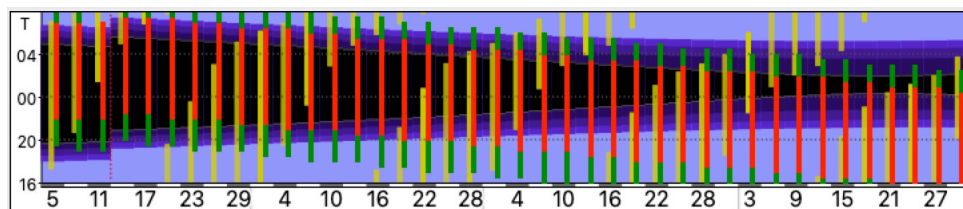


Figure 154: Long-term visibility widget (Time of night over a 120 day period)

Note that the above widget is shown in the "Larger" size for clarity.

In this case the visibility of the object is shown over the period 16h00 (at the bottom of the chart) through 08h00 the following day at the top. The yellow line line, if present, shows when the moon is above the horizon (0°), the red line shows when the object is above the user-horizon (if one was specified for the site), and the green is when the object is above 0° altitude, but hidden by the user horizon.

As can be seen in the above chart, the nights are becoming shorter as the time progresses into the spring and summer months.

11.2.8 Alt/Az indicator widget

This widget shows the current azimuth and altitude of the selected object in a graphical form.



Figure 155: Alt/Az widget for a currently-visible object

The indicator shows the current azimuth of the selected object on the left, and the altitude on the right. If the arrows are grey, it means the object is currently visible. If the arrows are red it means the object is below the true horizon, or hidden behind the user-defined site horizon. The numeric values of azimuth and altitude are also shown. The altitude graphic also shows the transit altitude of the object (the highest altitude it ever achieves at the current site) as an orange dotted line with an arrow pointer.

The circle with an **S** represents the sun. If it is Filled with black, then the sun has set. If it is white the sun is above the horizon. The number associated with it represents the angular distance from the selected object to the sun.

Similarly the circle with an **M** represents the moon.

The right click contextual menu allows you to Flip the azimuth cardinal points vertically and/or horizontally, and you can rotate the cardinal points by 90°.

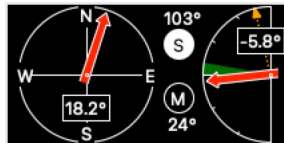


Figure 156: Alt/Az widget for an object that is not currently visible

11.2.9 Constellation indicator widget

This widget shows a small constellation chart for the constellation containing the selected object, with the position of the object within the constellation marked with a small red ring. If multiple objects are selected and they all are in the same constellation then the chart is shown with multiple red rings showing the positions of the selected objects.



Figure 157: Constellation indicator widget

Right-clicking provides a contextual menu that lets you flip the chart horizontally or vertically.

11.2.10 Site data panel widget

This widget displays various data values pertaining to the currently-selected site.

Latitude 47°41'00" N	Local Date 3/1/2023	Julian Date 2,460,005.20700	Computer Date 3/1/2023
Longitude 122°13'00" W	Local Time 08:58:05	Local Sidereal 19:26:11	Computer Time 08:58:05
GMT Offset -8 hr	GMT 16:58:05	GMST 03:35:03	Local - Computer 0 hr

Figure 158: Site data panel widget

Items that are displayed:

- **Latitude.** Latitude of the current site.
- **Longitude.** Longitude of the current site.
- **GMT Offset.** Offset (in hours) of the current site, with respect to GMT.
- **Local Date.** The local date at the site. Typically this is your computer's clock date, unless your site has defined a clock offset (i.e. a remote site), or you have "fixed" the date/time.
- **Local Time.** The local time at the site. Typically this is your computer's clock time, unless your site has defined a clock offset (i.e. a remote site), or you have "fixed" the date/time.
- **Local Sidereal.** The local sidereal time (LST) for the site.
- **Julian Date.** The Julian date.
- **GMT.** Greenwich mean time/Universal time. This is (effectively) the time at Greenwich (0° longitude), without taking into account any daylight saving time adjustments.
- **GMST.** Greenwich Mean Sidereal Time. The Local sidereal time at Greenwich (0° longitude).
- **Computer Date.** The date set on your computer. This will typically be the same as your Local Date, unless your current site has a clock offset (if it's a remote site), in which case the Local Date might be different if the remote site is in a different time zone.
- **Computer Time.** The time set on your computer. This will typically be the same as your Local Time, unless your current site has a clock offset (if it's a remote site), in which case the Local Time might be different if the remote site is in a different time zone.
- **Local - Computer.** The difference in time between the Local Date/Time and the Computer Date/Time. This will typically be 0 hours, unless your current site has a clock offset (if it's a remote site), in which case the difference will be the number of hours between your time zone and the remote site's time zone.

11.2.11 Telescope data panel widget

This widget only appears if a telescope is connected.

Telescope RA 16h 45m 44s	Telescope Alt 37.8°
Telescope Dec +08°55'40"	Telescope Az 235.9°
Telescope HJD 2,460,005.21093	

Figure 159: Telescope data panel widget

Items that are displayed:

- **Telescope RA.** The current pointing RA of the telescope mount.
- **Telescope Dec.** The current pointing declination of the telescope mount.

- **Telescope Az.** The current pointing azimuth of the telescope mount.
- **Telescope Alt.** The current pointing altitude of the telescope mount.
- **Telescope HJD.** The current Heliocentric Julian Date of the telescope mount's pointing coordinates.

11.2.12 Widget layout settings

You can invoke the widget layout editor by doing one of the following:

- Right-click a widget and select **Edit Widget Layout...** from the contextual menu.
- Right-click the background area containing the widgets (if available) and select **Edit Widget Layout...** from the contextual menu.
- Right-click the Widgets toolbar item (at the right side of the toolbar) and select **Edit Widget Layout...** from the contextual menu.

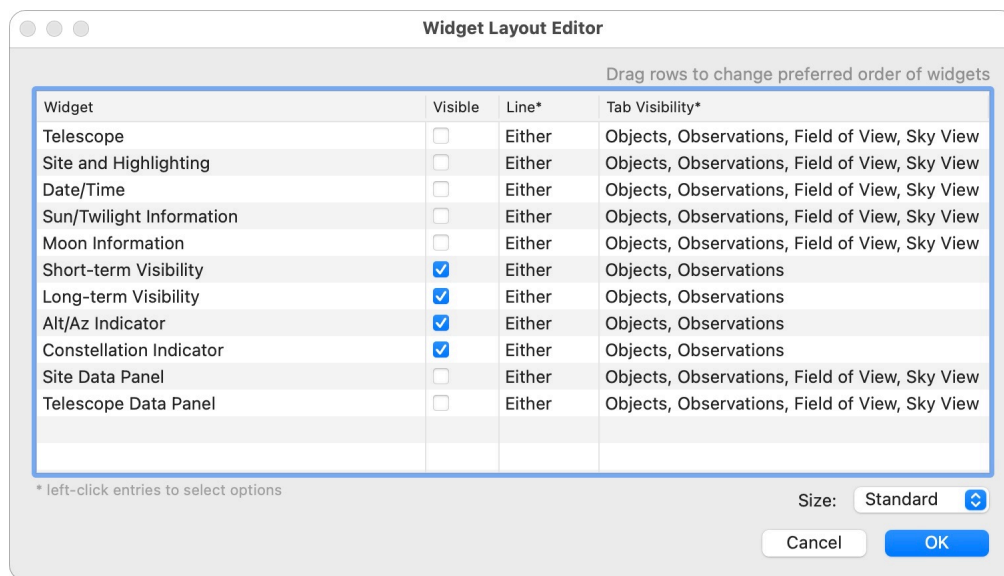


Figure 160: Widget layout editor

The layout editor dialog displays a list of available widgets in the order in which you want them to be displayed on the plan window (noting that if they don't all fit in the window they might not appear until you enlarge the width of the window). You can change the order of the widgets by clicking and dragging rows in the list.

The **Visible** column contains checkboxes that if not checked will cause the associated widget never to be displayed.

The **Line** column specifies which of the two lines/rows the widget will always appear on. *Left-clicking* the entry brings up a contextual menu with the choices: **Either** (the widget will appear on either the first or second line, depending on the widget ordering. This is the default), **1st Only** (the widget will only ever appear on the first line), and **2nd Only** (the widget will only ever appear on the second line).

This setting allows you to, say, force all widgets to appear on the first line to avoid two lines of widgets, or you could force certain important widgets to appear on the 1st line and other less important ones on the second line.

The **Tab Visibility** column specifies which tabs contain the specified widget. For example, you might not want the short- or long-term visibility widgets to appear in the Field of View or Sky View tabs, since they are of little use there. *Left-clicking* the entry brings up a contextual menu with the tab names, selecting a particular tab either checks it, or unchecks it.

The **Size** setting under the list of widgets allows you to select the size of the widgets (Standard, Larger, Largest). The larger sizes might be better if you are using the computer at the telescope, or if you have a large screen with high-density pixels. Naturally, larger widget sizes require more screen space. Below are shown a widget in three sizes for comparison.

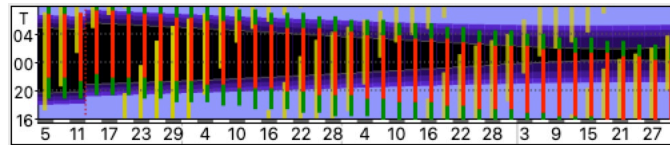


Figure 161: Long-Term Visibility widget (Standard size)

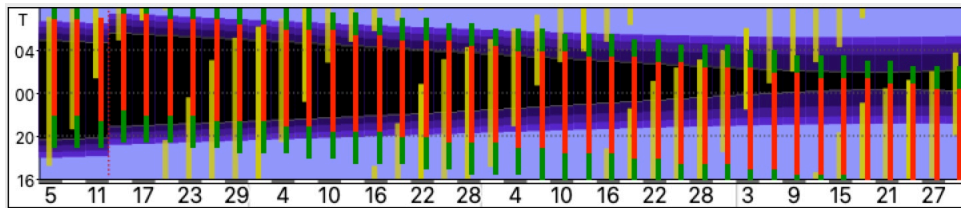


Figure 162: Long-Term Visibility widget (Larger size)

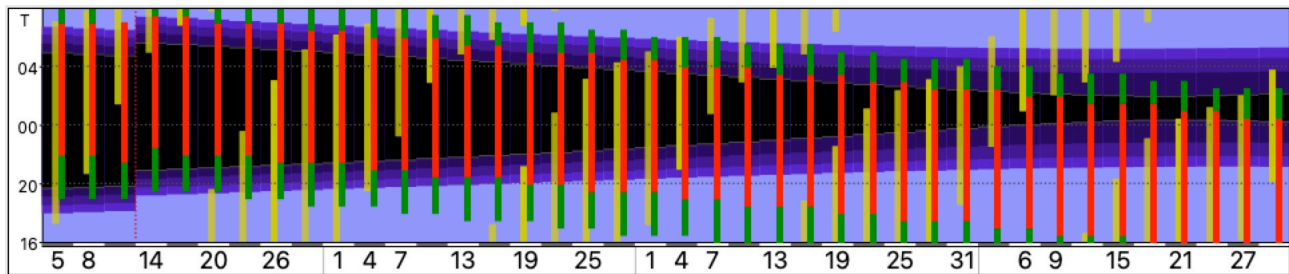


Figure 163: Long-Term Visibility widget (Largest size)

11.3 Objects tab

The Objects tab contains the list of objects to be observed, a means to create and edit them, and various (optional) graphical widgets to help with visualisation.

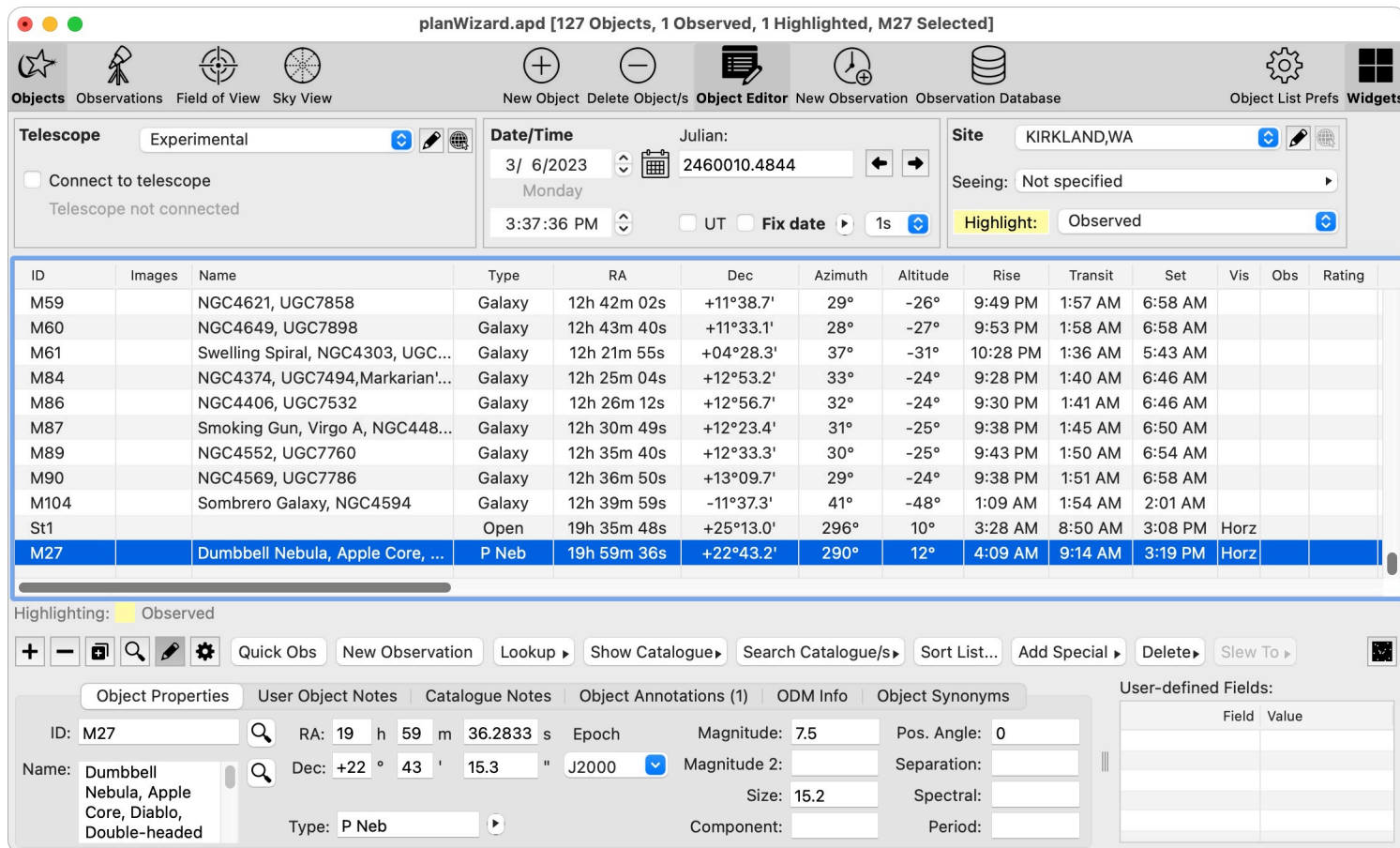


Figure 164: Objects tab

11.3.1 Object list

The object list is a table with one row per object in the plan. Each column represents a particular attribute of the object which can be one of three types:

- An attribute that is fixed for that object (e.g. ID, RA, Dec, Magnitude, etc.)
- An attribute that is computed from the fixed attributes (e.g. Surface Brightness, etc.)
- An attribute that is computed from the fixed attributes and external conditions such as date/time and site (e.g. Visibility, Altitude, Azimuth, Air Mass, etc.)

A description of the particular column attribute can be displayed by hovering the cursor over the heading for a column (or just below the heading).

You can select one or more rows of the object list by clicking on the first row and then shift-clicking the last row to select all rows in between, or Ctrl-clicking (Cmd-clicking on Macintosh) to select individual rows.

You can sort the object list by clicking on a column heading cell. Click again to reverse the order. You can also sort on multiple columns using the Sort Objects feature. See Section 11.3.9 on page 120 for details.

Note: The **Obs** column (if visible) displays the number of observations of that object (e.g. M51 in Figure 166). If it is blank, it implies that no observations have been made (e.g. M52 in Figure 166). Also, if at least one observation was made from this plan document, then the number is circled (e.g.

M55 in Figure 166). Also if one or more of those observations were made in the past 12 hours, the circled number is inverted (e.g. M53 in Figure 166). This is a way to track which observations you have made in the current observing session. If the date/time is fixed, the the inversion is done if any observations were made since the fixed date/time.

Altitude	Rise	Transit	Set
-26°	9:49 PM	1:57 AM	6:58 AM
Altitude is the angular distance between the object being observed and the theoretical horizon. 0.0 is horizontal, 90.0 is straight up (the zenith), and -90.0 is straight down (the nadir).			
Depends on: RA Declination Site Latitude, Longitude, GMT Offset Local Date/Time			
77°	1:50 AM	1:57 AM	2:03 AM
10°	3:28 AM	8:50 AM	3:08 PM
12°	4:09 AM	9:14 AM	3:19 PM

Figure 165: Hovering cursor over object list heading

ID ^	Name	Type	RA	Dec	Obs
M51	Whirlpool Galaxy, Question Mar...	Galaxy	13h 29m 52s	+47°11.7'	1
M52	The Scorpion, NGC7654,Cassio...	Open	23h 24m 48s	+61°35.6'	
M53	NGC5024	Globular	13h 12m 55s	+18°10.1'	1
M54	NGC6715	Globular	18h 55m 03s	-30°28.7'	
M55	NGC6809	Globular	19h 40m 00s	-30°57.7'	1
M56	NGC6779	Globular	19h 16m 36s	+30°11.0'	
M57	Ring Nebula, NGC6720	P Neb	18h 53m 35s	+33°01.7'	

Figure 166: Obs column

11.3.2 Object list columns

Heading	Name	Description	Dependent on
Air Mass	Air Mass	The Air Mass of an object is the relative thickness of atmosphere between the observer and the object being observed, with 1.0 being the minimum (i.e. looking straight up). This will increase with decreasing Altitude.	Altitude
Altitude	Altitude	Altitude is the angular distance between the object being observed and the theoretical horizon. 0.0 is horizontal, 90.0 is straight up (the zenith), and -90.0 is straight down (the nadir).	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
App Mag	Apparent Magnitude	Apparent Magnitude is the Magnitude (brightness) of the object, but taking into account the effects of atmospheric extinction, especially near the horizon. It is directly dependent on object Altitude. It is also dependent of site altitude above sea level and season of the year.	Magnitude; Extinction
App Mag 2	Apparent Magnitude 2	Same as Apparent Magnitude, but pertaining to Magnitude 2, in the case of double stars or variable stars.	Magnitude 2; Extinction
Azimuth	Azimuth	Azimuth is the angular distance between the object being observed and True North. 0.0 is due North, 90.0 is due East, 180.0 is due South, and 270.0 is due West.	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
Best AMag	Apparent Magnitude at Best Time	The Apparent Magnitude (see above) of the object at the Best Time (see below).	RA, Declination, Magnitude, Extinction; Site Latitude, Longitude, GMTOffset; Local Date/Time
Best AMag 2	Apparent Magnitude 2 at Best Time	Same as Apparent Magnitude at Best Time above, but pertaining to Magnitude 2, in the case of double stars or variable stars.	RA, Declination, Magnitude 2, Extinction; Site Latitude, Longitude, GMTOffset; Local Date/Time

Best Obsvty	Observability value at the Best Time	The actual maximum Observability value at the Best Time of the night (0.0 through 100.0)	RA, Declination; Site Latitude, Longitude, GMTOffset; Local Date/Time
Best EP	Best Eyepiece	The best eyepiece required to detect the object using the given telescope at the given site.	Magnitude; Separation; Size; Site; Telescope
Best Mag	Best Magnification	The best magnification required to detect the object using the given telescope at the given site.	Magnitude; Separation; Size; Site; Telescope
Best Time	Best Time	The local time in the next 24 hours (to the nearest 15 minutes) that the object is best observed (based on its maximum Observability value during that period). If the Best Time is less than the current local time, then it refers to the next evening.	RA, Declination; Site Latitude, Longitude, GMTOffset; Local Date/Time
Catalogue	Catalogue	The Catalogue from which this object was originally extracted.	
Catalogue Notes	Catalogue Notes	Notes derived from the catalogue entry for this object (where applicable)	
Chart#	Chart Number	The Chart number or atlas page number that contains this object. The charts/atlas in use are defined in the object list preferences.	RA, Declination
Comp	Components	Components of a double/multiple star entry (e.g. "AB")	
Const	Constellation	The Constellation that this object resides in. This is fixed for deep sky and stellar objects, but will change for solar system objects which move in the sky over time.	RA, Declination
Dec	Declination	The Declination of the object (similar to Latitude on earth maps). This is fixed for stellar and deep-sky objects, but will change over time for solar system objects. Has values from -90° at the south celestial pole to +90° at the north celestial pole.	
Diff Idx	Difficulty Index	The Difficulty Index for double stars. This is a number between 0 (easy) and 100 (extremely difficult) that gives an indication of how difficult a double star will be to split.	Magnitude; Magnitude2; Separation

Dk Start	Dark Time Start	The start time of the next time the object is in complete astronomical darkness, and is above the elevation specified in the object list preferences (and is also above the user-defined horizon if one has been specified for the given site). This will be the current time if the object is currently in this condition. If the object is not in this condition in the next 24 hours, the column will be blank.	Site; RA, Declination; Date/Time
Dk End	Dark Time End	The end time of the next time the object is in complete astronomical darkness, and is above the elevation specified in the object list preferences (and is also above the user-defined horizon if one has been specified for the given site). If the object is not in this condition in the next 24 hours, the column will be blank.	Site; RA, Declination; Date/Time
Dk Dur	Dark Time Duration	The duration (in hours) of the next time the object is in complete astronomical darkness, and is above the elevation specified in the object list preferences (and is also above the user-defined horizon if one has been specified for the given site).	Site; RA, Declination; Date/Time
E.Lat	Ecliptic Latitude	The ecliptic latitude of the object. This varies between -90 and +90 degrees, with 0 being on the ecliptic (passing through the plane of the solar system). +ve north of the ecliptic, -ve south.	RA, Declination
E.Long	Ecliptic Longitude	The ecliptic longitude of the object. This varies between 0 and 360 degrees along the ecliptic (passing through the plane of the solar system). Measured from the vernal equinox.	RA, Declination
Extinct	Extinction	Atmospheric Extinction. This is the effect the atmosphere has, at the given altitude, on the object in terms of magnitude. It will be 0 if the object is at the zenith, and increases as the object gets closer to the horizon. e.g. the value 1.5 means that the object will appear 1.5 magnitudes dimmer than the given Magnitude.	Altitude; Site; Date
Found	Object Found	True if at least one observation for this object has its Found status set to true. False if there are no observations of the object, or if all observations have a Found value of false.	ID

G.Lat	Galactic Latitude	The galactic latitude of the object. This varies between -90 and +90 degrees, with 0 being on the galactic equator (passing through the plane of the Milky Way).	RA, Declination
G.Long	Galactic Longitude	The galactic longitude of the object. This varies between 0 and 360 degrees along the galactic equator (passing through the plane of the Milky Way).	RA, Declination
Hr Angle	Hour Angle	The Hour Angle is the difference between the object's current right ascension (RA) and the right ascension of the meridian. It varies between -12 hours and +12 hours and will be zero when the object transits. It also represents the time since the object passed the meridian (e.g. -2.5 hours means the object will reach the meridian in 2.5 hours), assuming the object is a DSO or a slow-moving solar system object.	RA; Local Sidereal Time
HJD	Heliocentric Julian Date	The Heliocentric Julian Date is the Julian Date taking into account light travel time from the Sun. This date is used when measuring photometric magnitudes of variable stars in order to make sure all readings are standardized to the same time scale, regardless of time of year.	RA, Declination; Julian Date
ID	Object ID	The primary ID for the object.	
Images	Images	If the object has associated Images in the image database, this column will contain an entry.	
Level	Plan Creation Wizard Difficulty Level	The Plan Creation Wizard difficulty level, 1 (easy) through 5 (difficult), that the object would be if it was in the Plan Creation Wizard database, where applicable.	Type; Magnitude/s; Size; Period; Separation; Plan Creation Wizard criteria.
LOC	Log Object Contrast	Log Object Contrast (LOC) is a measure of the contrast of the (deep-sky) object against the background sky. It depends on the brightness and size of the object, and the brightness of the sky.	Magnitude; Size; Sky Brightness
M Avoid	Moon-Avoidance	This implements Lorentzian Moon-Avoidance, as formulated by the Berkeley Automated Imaging Telescope folks. This is based on angular distance from and phase of the moon. It will show "Avoid" if the object is too close to the moon. The two parameters to characterize this formula can be found in the Object List Preferences.	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time

Mag	Magnitude	The Magnitude of the object. This is fixed for stellar and deep-sky objects, but typically varies for solar system objects. For variable stars this represents the maximum brightness of the star. For double stars, it's the magnitude of the primary star.	
Mag 2	Secondary Magnitude	The Magnitude of the secondary star, for double star objects. For variable stars this represents the minimum brightness of the star.	
Moon	Angular Distance to Moon	The current angular distance between this object and the position of the Moon. Values from 0 (the object is at the same coordinates as the Moon) to 180 (the object is on the far side of the sky from the Moon).	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
Name	Name/s	Additional Name or names for the object.	
Obs	Number of Observations	The number of observations of this object resident in the observation database. This includes any synonyms of the object.	ID
Obsvbtty	Observability	The Observability value for the object at the current local date/time. This value varies between 0 (not observable) and 100 (perfect time to observe) and depends on the object's altitude, distance from moon and sun, moon phase and sky position, position w.r.t. the meridian, etc.	RA, Declination; Site Latitude, Longitude, GMTOffset; Local Date/Time
ODM	Optimum Detection Magnification	The Optimum Detection Magnification of the (deep-sky) object for the currently selected telescope. It will be displayed for any object that has both magnitude and size (i.e. has a computable surface brightness). The value represents the best magnification to use with the selected telescope in order to detect the object.	Magnitude; Size; Sky Brightness; Telescope
Opposition	Date of Opposition	The date at which the object will be at opposition (closest to the meridian at local midnight).	RA, Declination; Site
Par Angle	Parallactic Angle	The Parallactic Angle of the object at the current local (sidereal) time. This is the angle between the great circle passing through the object and the zenith point, and the great circle passing through the object and the celestial poles. The angle is zero when the object crosses the meridian. Often used by field rotators.	RA, Declination; Local Sidereal Time; Site Latitude

Period	Period	The Period of the object. This is generally understood to be the light curve period (in days) for a variable star.	
PosAngle	Position Angle	Position Angle of the object with respect to north. This refers to the secondary component of a double star with respect to the primary component, or the angle of the longer (major) axis for a galaxy. It has a value of 0 through 360 degrees, with 90 being due East.	
Prob	Probability of Detection	Probability of visual detection of a star of given Magnitude in the currently selected telescope. e.g. if the probability is 60% then the star will be detectable 60% of the time under ideal conditions.	Magnitude; Telescope
Prob 2	Probability of Detection	Probability of visual detection of a star of given Magnitude 2 in the currently selected telescope. e.g. if the probability is 60% then the star will be detectable 60% of the time under ideal conditions.	Magnitude2; Telescope
RA	Right Ascension	The Right Ascension of the object (similar to Longitude on earth maps, but runs from 0 to 24 hours). This is fixed for stellar and deep-sky objects, but will change over time for solar system objects.	
Rating	Rating	The average Rating for this object. The rating is computed from rating values in observations of the object. Defined in the object list preferences.	ID
Rise	Time of Object Rising	Rise time of the object. This is the time of the current day when the object rises above the (theoretical) horizon.	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
SB	Surface Brightness	Surface Brightness of the (deep-sky) object, in magnitudes per square arcsecond.	Magnitude; Size
Sep	Separation	The object Separation. This is for double star objects. The value is expressed in arcseconds (3600 arcsec = 1 degree).	
Set	Time of Object Setting	Set time of the object. This is the time of the current day when the object sets below the (theoretical) horizon.	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time

Size	Angular Size	The angular Size of a deep-sky object. Unless otherwise shown the size is expressed in minutes of arc (60 minutes = 1 degree). If the object is non-circular then the size is given as AxB where A is the angular size of the longer axis, and B is the angular size of the shorter axis.	
Spect	Spectral Information	Spectral information pertaining to the object.	
Split	Splitability	The "splitability" of a double star when viewed through the currently-selected telescope under ideal conditions. "Yes"=splittable, "???"=possible but difficult, "No"=not splittable.	Magnitude; Magnitude2; Separation; Telescope Aperture; Telescope Obstruction; Site Sky Brightness
Split mm	Splitability Aperture	The telescope aperture required to split a double star with a 50% chance of success, when viewed through the currently-selected telescope under ideal conditions.	Magnitude; Magnitude2; Separation; Telescope Aperture; Telescope Obstruction; Site Sky Brightness
Sun	Angular Distance to Sun	The current angular distance between this object and the position of the Moon. Values from 0 (the object is at the same coordinates as the Moon) to 180 (the object is on the far side of the sky from the Moon).	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
TDist	Telescope Distance	When a telescope is connected and supplying its current pointing coordinates, this is the angular distance of the object from those coordinates in degrees. Values from 0 (the telescope is pointing at the object) to 180 (the telescope is pointing directly away from the object).	RA, Declination; Telescope RA/Dec coordinates
Transit	Time of Object Transit	The time of the current day when the object transits (reaches its highest altitude; crosses the meridian).	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
Transit Alt	Transit Altitude	The altitude of the object when it transits (reaches its highest altitude; crosses the meridian).	Declination; Site Latitude

Transit Date	Transit Date	The date of the year (in the future) when the object transits (reaches its highest altitude; crosses the meridian) with the greatest altitude, at a specified time of the day/night (default = midnight) ¹ .	RA, Declination; Site Latitude, Longitude, GMT Offset; Local Date/Time
Type	Object Type	The Type of the object (e.g. Star, Galaxy, etc.). If the object falls into more than one category then the types will be separated by "+".	
User Notes	User Notes	User Notes for the object.	
Vis	Visibility	<p>The Visibility of the object at the given site and date/time. This takes on the following possible values:</p> <p>blank - the object is currently not visible.</p> <p>Yes - the object is visible.</p> <p>Horz - the object is behind the user-defined horizon for the site.</p> <p>Light - the object is in the user-defined light dome for the site.</p> <p>Limit - the object is outside the slewing limits of the telescope.</p>	RA, Declination; Site Latitude, Longitude, GMT Offset, Horizon; Local Date/Time

11.3.3 Object image and constellation map

If you select a single object in the object list, and that object has images associated with it (See Chapter 17 on page 280), then those images are displayed to the right of the object list (the object list being resized to fit the image). A popup menu below the image shows a description of the currently-displayed image and allows to select other images where applicable.

For DSS images, moving the cursor over the image displays the cursor's RA/Dec coordinates.

The image display feature can be toggled on and off by clicking the image button below the image (circled in red in Figure 167).

Further features are described in Section 17.2 on page 285.

1. This default value can be changed using Edit > List Columns...

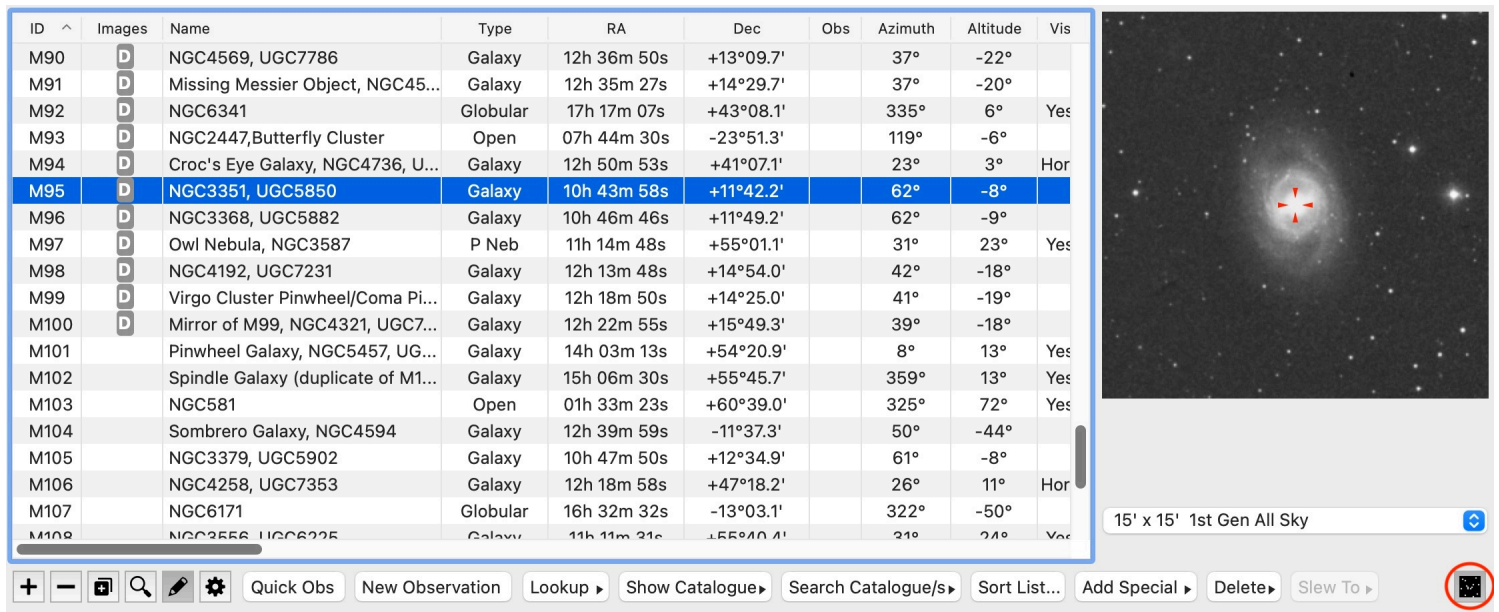


Figure 167: Object list image

Also (if you have the option turned on, which it is by default - Section 20.6.3 on page 322) you will see a constellation map of the constellation containing the object. The object's location within the constellation will be shown with a red circle. Any other objects in the plan that are in that constellation will be shown with grey circles. See Figure 168.

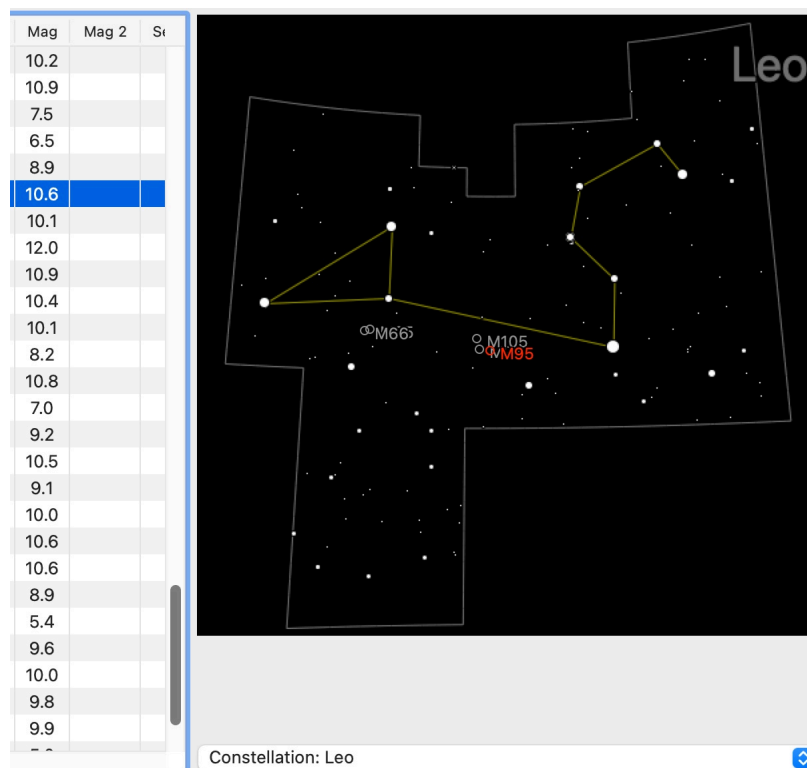


Figure 168: Constellation map for M95 (in Leo)

For Jupiter and Saturn, a diagram showing the current positions of the planet's satellites is displayed.

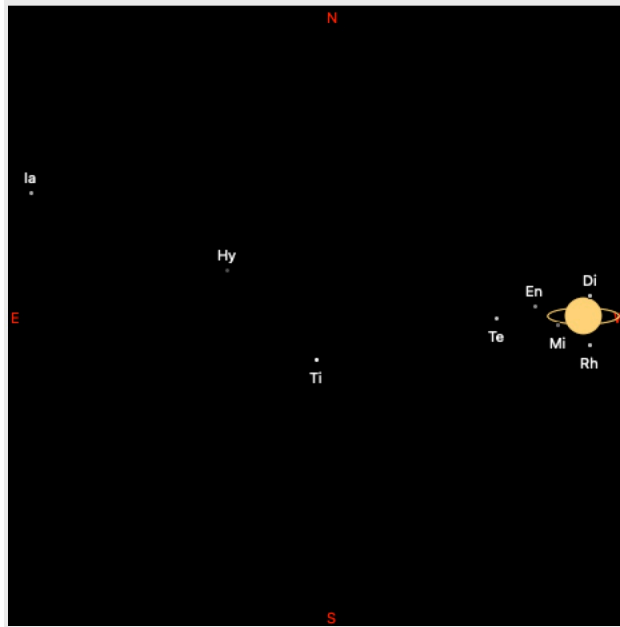


Figure 169: Saturn satellites

For a constellation object, a chart of the constellation is shown. Any plan objects that are in that constellation will be shown with their associated ID.

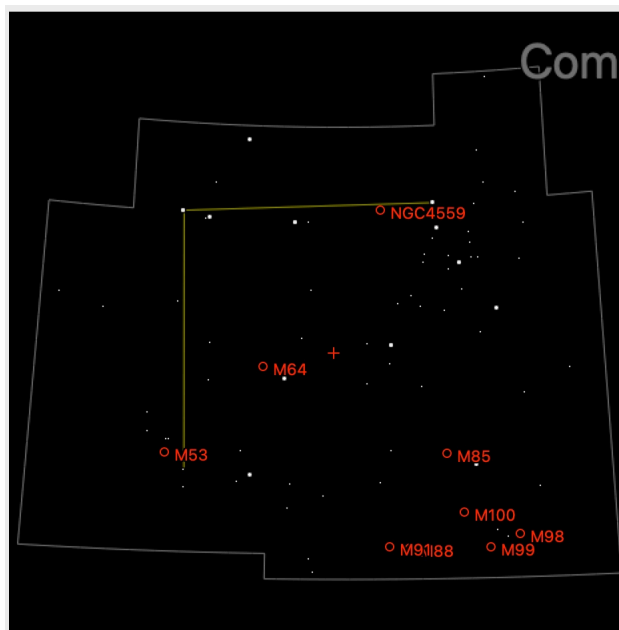


Figure 170: Constellation chart for a constellation object

11.3.4 Object editing fields

(See Section 10.4.1 on page 90 for more details) If revealed, these fields allow the attributes of the selected object to be edited (e.g. ID, RA, Dec, Notes, etc.). The fields appear below the object list.

11.3.5 New Observation

Clicking the **New Observation** button is a shortcut to create a new observation for the selected object (rather than switching manually to the observation tab and clicking the + button under the list

of observations). Note that you can't make observations on an untitled plan document - it must be saved first.

11.3.6 Lookup

The **Lookup** popup button allows you to do a catalogue search on either the selected object's ID or Name field. If no object is selected, you can enter text for the search. Note that this command will de-select any selected object/s before beginning the search.

11.3.7 Show Catalogue

The **Show Catalogue** popup button lets you open a window, for a selected catalogue, that shows all the objects in that catalogue, allows you to add catalogues objects to your plan, etc.

See Section 23.6 on page 360 for more details.

11.3.8 Search Catalogue/s

The Search Catalogue/s popup button lets you search one or more catalogues based on various criteria that you specify.

See Section 10.1.3 on page 79 for more details.

11.3.9 Sort List

The **Sort List** popup button allows you to sort the object list by multiple columns, and save those "sorts" for future use.

Sort List > Sort By... (the same as **Object > Sort Objects...**) sets up a multiple column sort. You can sort by up to three columns in ascending or descending order.

If a column is time-related (e.g. rise time) then you can also specify an offset to use as the lowest time for sorting purposes.

Once set up, you can add this sort to the Sort List popup menu as a "pre-defined" sort by checking the **Add to Sort List popup** checkbox.

You can also specify that this sort order be used as the default sort order whenever you open a plan document, using the **Use as default** checkbox. You can subsequently remove this default sort order by using the **Clear** button.

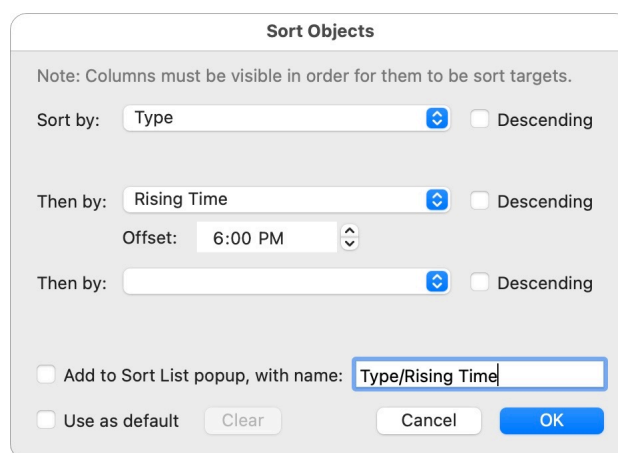


Figure 171: Sort Objects dialog

You can edit any predefined sorts added to the Sort List menu by using **Sort List > Edit...**

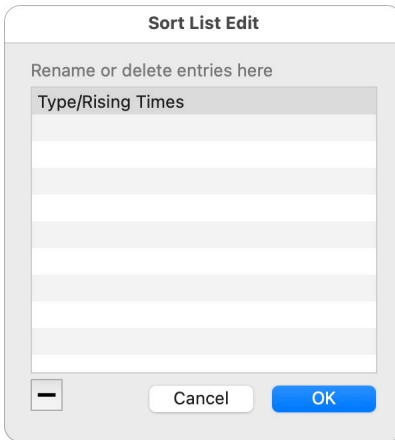


Figure 172: Sort List Edit dialog

You can delete or rename any entries.

11.3.10 Add Special

The **Add Special** popup button allows you to add various "special" objects to your plan. See Section 10.1.4 on page 82 for details.

11.3.11 Delete

The **Delete** popup button gives you various ways of deleting multiple objects from the object list.

The **Delete CONDITIONALLY** entry allows you to specify criteria for deleting objects from the object list. You can specify up to three columns/attributes to match on, and you can choose to match on all attributes (AND) or on any of the attributes (OR).



Figure 173: Delete popup menu

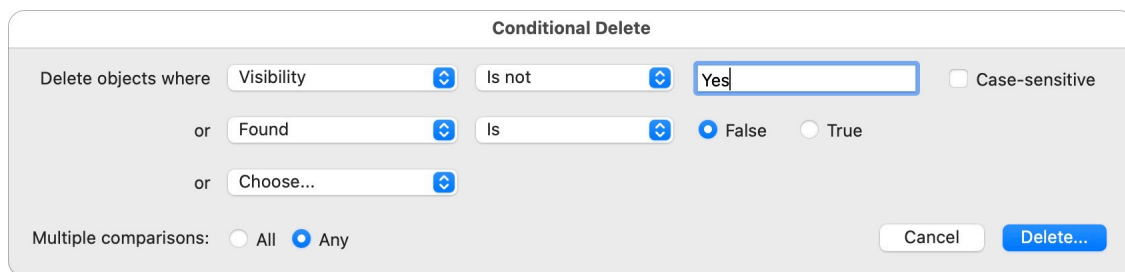


Figure 174: Conditional delete dialog

11.3.12 Slew To

If a telescope with Go-to capabilities is connected, then the **Slew To** popup button is enabled and allows a quick slew to common objects. You can also slew to specified coordinates using the **RA/Dec...** item, or to the centre of a specified constellation using the **Centre of Constellation...** item.

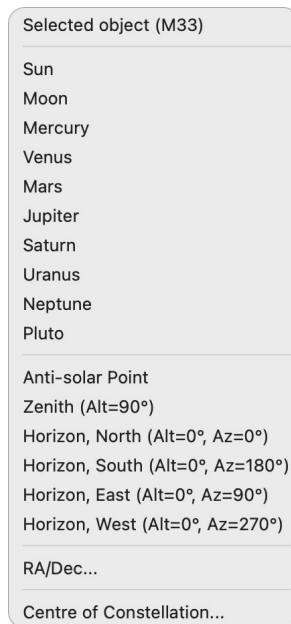


Figure 175: Slew To popup menu

11.3.13 Customising object list columns

To customise the object list columns (ordering, formatting, visibility, etc.), use the **Edit > List Columns...** menu command.

The editing dialog consists of a list with one row per column in the list. You can rearrange the ordering of the list columns by dragging the rows in the dialog.

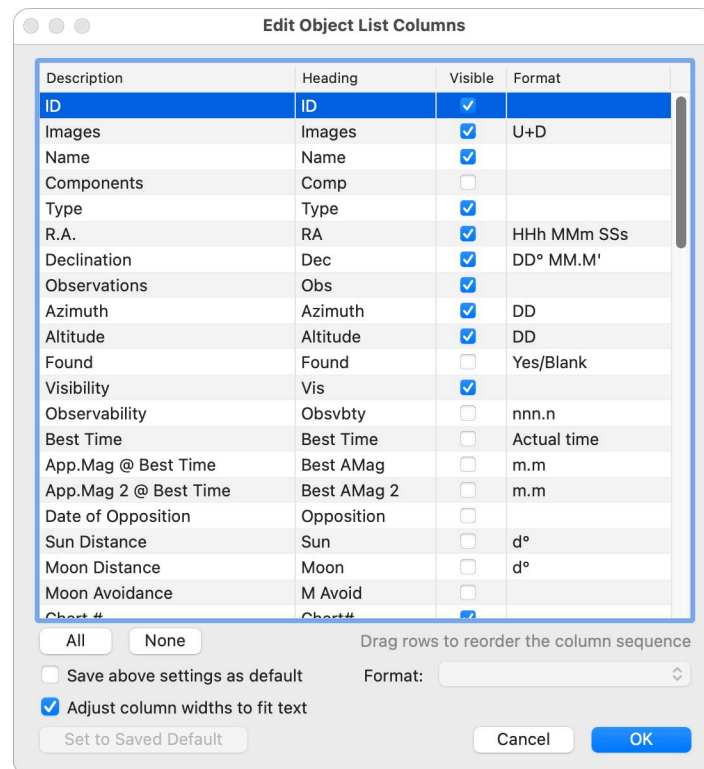


Figure 176: Editing object list columns

The checkbox in the Visible column determines whether or not the column is visible in the object list.

If a column contains values that can have different formats, then the current format is shown in the Format column, and the Format popup under the list is enabled to allow changes if such a row is selected.

If you check the **Save above settings as default** checkbox, then when you click **OK** the settings are saved as the default for any new plan windows that are opened. If you edit the columns of an object list after doing that, you can use the **Set to Saved Default** button to revert the settings to the previously-saved default.

If the **Adjust column widths to fit text** checkbox is checked then after you exit the dialog, the column widths of the object list will be adjusted to fit the headings and text in the list. This can also be done at any time using the **Edit > Adjust List Columns to Fit Text** menu command.

11.4 Observations tab

The Observations tab is where you can examine and/or make observations for objects in the object list.

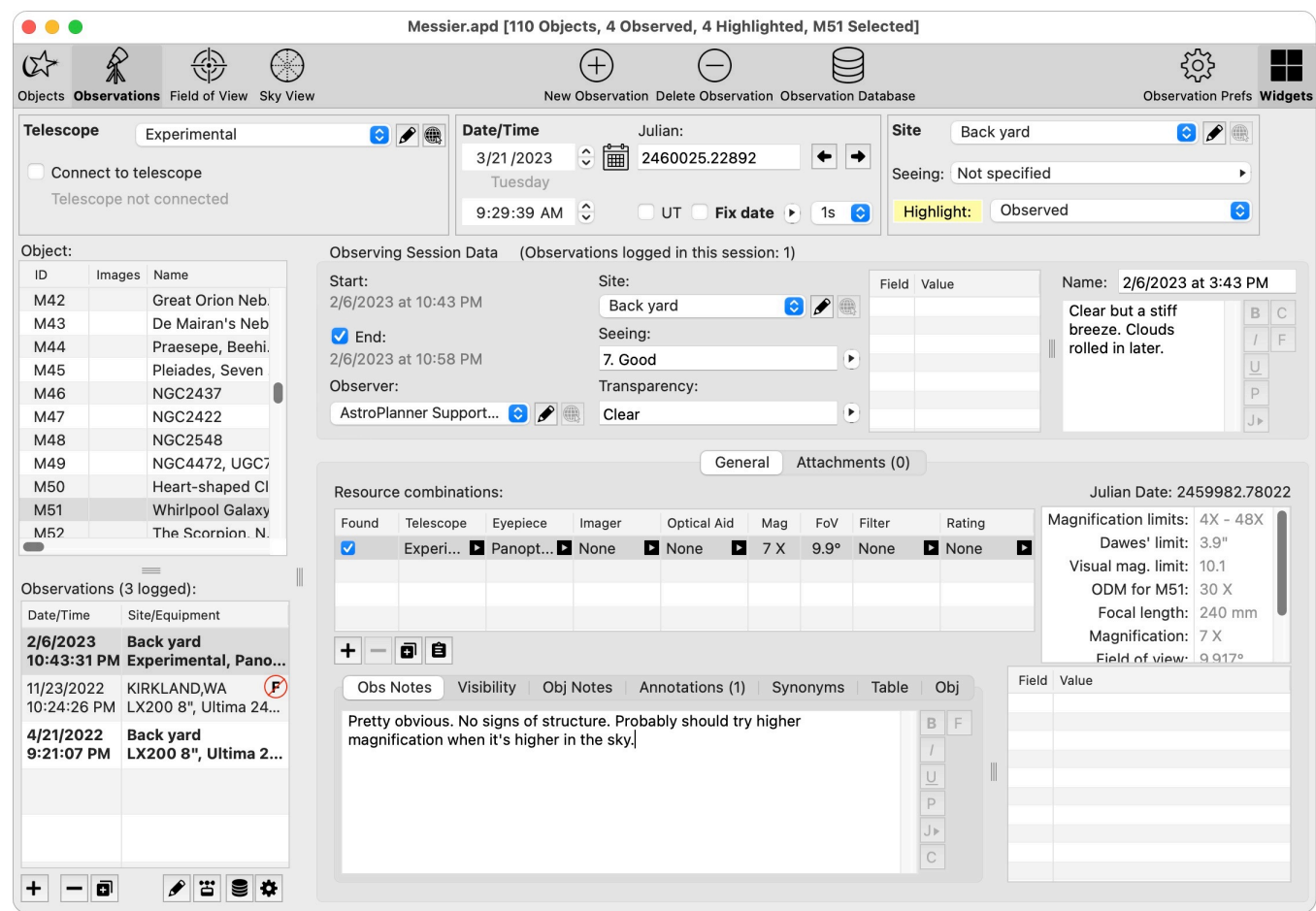


Figure 177: Observations tab

11.4.1 Object list

The object list also appears on the left side of the window in this tab, mainly so that you can select the relevant object to see its observations, or to make a new observation. The window splitting controls below the list and to the right of the list allow you to resize the list (at the expense of other items on the tab).

11.4.2 Observations list

The Observations list below the object list shows all observations of the currently-selected object. They are typically in descending order of date/time. Unless appended by "UT", the dates and times represent local time at the observing site.



Date/Time	Site/Equipment
2/6/2023 10:43:31 PM	Back yard Experimental, Pano...
11/23/2022 10:24:26 PM	KIRKLAND,WA LX200 8", Ultima 24...
4/21/2022 9:21:07 PM	Back yard LX200 8", Ultima 2...

Figure 178: Observation list

If the entry is **bold** then that observation was made from the currently open plan document (e.g. the 2/6/2023 observation in the above example). If it is not bold (e.g. the 11/23/2022 observation above), then it was made from another plan document.

If the observation was not "found" (i.e. the observer was not able to detect the object and did not check the Found checkbox in any of the resource combinations for the observation), then a "not found" icon is appended at the right (e.g. the observation for 11/23/2022 above).

Under the Observations list are seven buttons. The function of these buttons, from left to right are:

- **Add new observation.** Create a new observation and add it to the list. The contents of the new observation are shown on the right side of the window and can be edited there. Depending on observation preference settings, the date/time of the observation will either be the current date/time, or you will be asked for the observation's date/time via a dialog. See Section 12.1 on page 198 for more details.
- **Delete selected observation.** The selected observation is deleted from the database. If that observation is the last observation in the observing session, you'll be given the choice to retain or delete the session record.
- **Duplicate selected observation.** Make a copy of the selected observation. You will be asked via a dialog for that duplicate observation's date/time.
- **Edit the date/time of the selected observation.** Uses the same dialog as above to change the date/time of the selected observation.

- **Set conditions for the selected observation.** Sets the Site, Date, Time, etc. to replicate the observing conditions when the observation was made. This can be useful to see the Sky chart for the event, and to examine other attributes, such as Altitude, etc.
- **Show the observation database.** Display the observation database window. See Section 12.2 on page 199 for more details.
- **Show the observation preferences.** Show the Observation preferences window. See Section 20.10 on page 339 for more details.

11.4.3 Observing session data

Figure 179: Observing session data

The Observing session data contains information pertaining to the current observing session, namely:

- **Start/End.** The Start date and time is computed from the time of the first observation made in the session (minus a suitable "set-up" time specified in the Observation preferences). The End date and time is computed from the time of the last observation made in the session (plus a suitable "break-down" time specified in the Observation preferences). The checkbox is checked when the session is over (this is largely automatic).
- **Observer.** The observer (resource) for the observer making the observations.
- **Site.** The site (resource) where the session occurred.
- **Seeing.** An arbitrary string describing the Seeing for the session. The popup menu on the right of the field allows you to choose predefined strings from the Pickering, Antoniadi, or Danjon standard scales, or you can define your own custom scale (Figure 180).
- **Transparency.** An arbitrary string describing the atmospheric Transparency for the session. The popup menu on the right of the field allows you to choose predefined strings, which can be set up as you wish.
- **User-defined fields.** User-defined fields common to all sessions. User-defined fields are described in detail in Chapter 19 on page 304.
- **Name.** A name field for the session. The default name is the start date and time, but can be changed to something more meaningful to you if required.
- **Notes.** Arbitrary notes about the observing session.

Unknown

1. Extremely poor
2. Very poor
3. Poor to very poor
4. Poor
5. Fair
6. Fair to good
7. Good
8. Good to excellent
9. Excellent
10. Excellent/Perfect

Change to Antoniadi scale

Change to Danjon scale

Change to Custom scale

Figure 180: Seeing popup

11.4.4 General observation fields

Resource combinations

Resource combinations:										Julian Date: 2459691.72300	
Found	Telescope	Eyepiece	Imager	Optical Aid	Mag	FoV	Filter	Rating		Magnification limits: 27X - 322X Dawes' limit: 0.6" Visual mag. limit: 14.2 ODM for M51: 28 X Focal length: 2010 mm Magnification: 251 X Field of view: 0° 2' 38.8"	
<input checked="" type="checkbox"/>	LX200 8"	<input type="checkbox"/> Ultima 24...	<input type="checkbox"/> None	<input type="checkbox"/> None	<input type="checkbox"/> 84 X	36.5'	None	<input type="checkbox"/> 2	[2]		
<input checked="" type="checkbox"/>	LX200 8"	<input type="checkbox"/> 8mm	<input type="checkbox"/> None	<input type="checkbox"/> None	<input type="checkbox"/> 251 X	2.39'	None	<input type="checkbox"/> 4	[4]		

Figure 181: Resource combination list

This is a list of combinations of observing resources and the results of using them. Each observation has at least one combination, defining what telescope and eyepiece or imager was used, whether the object was found, and a rating of the observation.

The columns have popup menus to the right of each entry allowing you to choose from your resource database. Where relevant, the magnification and the actual FoV are computed and displayed. Also, some computed parameters are displayed to the right of the list for the currently-selected combination.

The buttons below the list on the left allow you to add a new entry, delete an entry, or duplicate an entry. The fourth button copies the relevant details from the selected row onto the clipboard.

Observation notes

These are arbitrary notes that can be logged for the observation.

Visibility

A graphic is displayed that shows the altitude and azimuth of the object at the time of the observation (as well as the distance from the sun and moon). Also shown is a constellation graphic, showing the position of the object at the time of the observation.



Figure 182: Object Visibility

Object notes

A copy of the notes associated with the object, as well as Catalogue notes and ODM info where applicable. This is read-only (i.e. you can't change this field, although you can in the Objects tab).

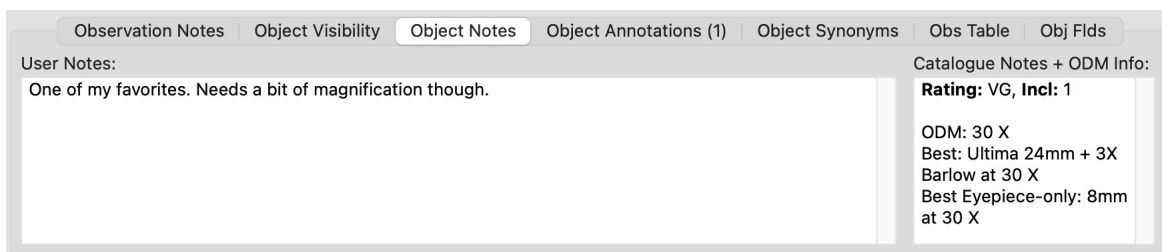


Figure 183: Object Notes

Object annotations

Displays any catalogue annotations associated with the object. See Section 23.7 on page 363 for details.

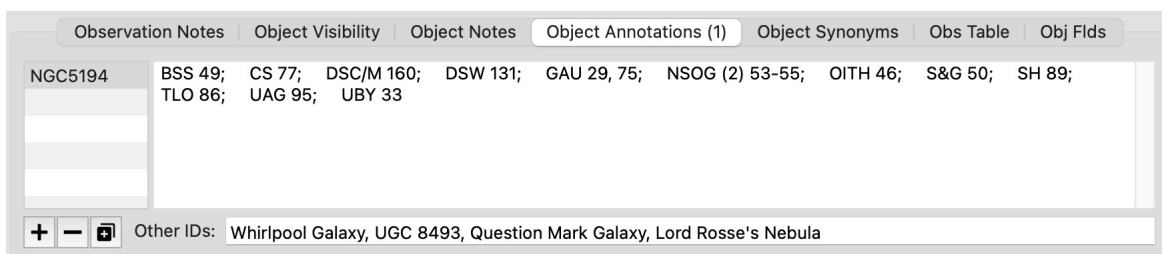


Figure 184: Object Annotations

Object Synonyms

Displays all the found catalogue IDs that are synonyms of the selected object.

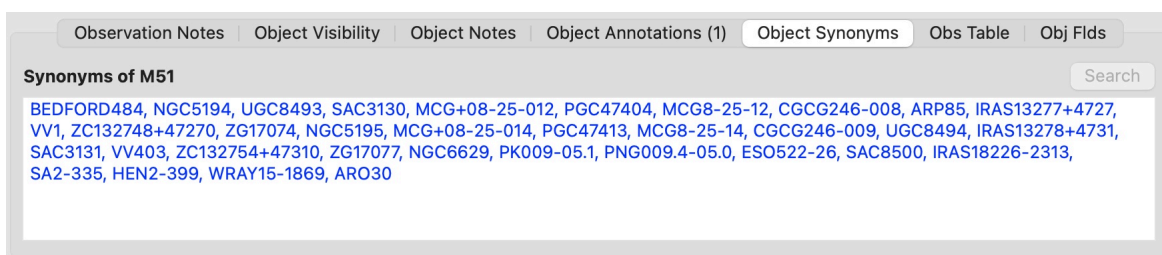
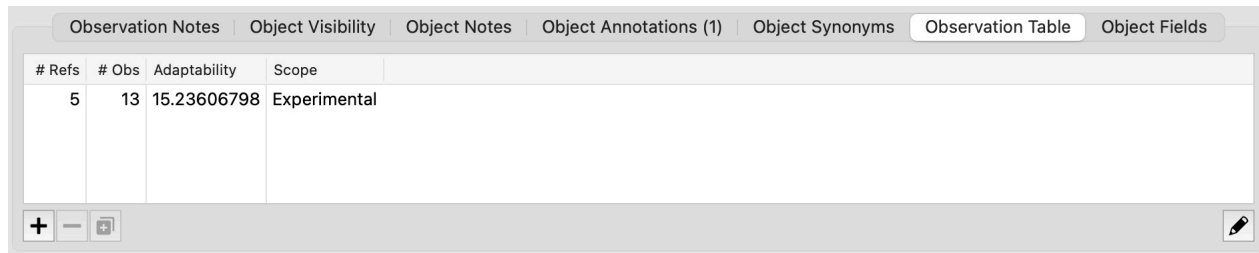


Figure 185: Object Synonyms

Observation Table

Displays any observation table entries for the selected observation. This feature is explained in Section 12.9 on page 208.



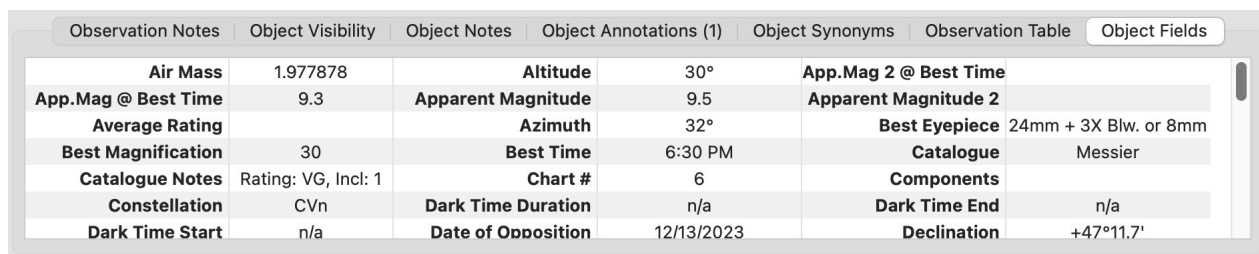
The screenshot shows the 'Observation Table' tab selected in a software interface. The table has four columns: '# Refs', '# Obs', 'Adaptability', and 'Scope'. There is one data row with the following values: '# Refs' is 5, '# Obs' is 13, 'Adaptability' is 15.23606798, and 'Scope' is Experimental. Below the table are three buttons: a plus sign, a minus sign, and a square with a plus sign. A pencil icon is in the bottom right corner.

# Refs	# Obs	Adaptability	Scope
5	13	15.23606798	Experimental

Figure 186: Observation Table

Object Fields

Displays the value of various fields and values associated with the observed object.



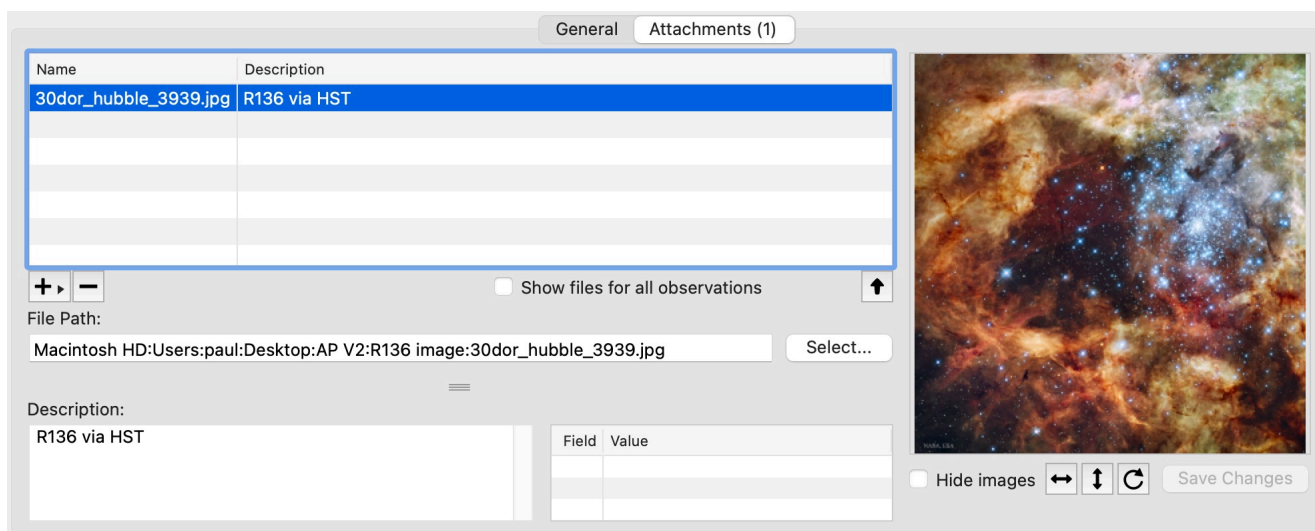
The screenshot shows the 'Object Fields' tab selected in a software interface. It displays a table of object properties. The table is organized into two main sections. The first section contains: Air Mass (1.977878), Altitude (30°), App.Mag 2 @ Best Time (9.3), Apparent Magnitude (9.5), Average Rating (30), Azimuth (32°), Best Magnification (30), Best Time (6:30 PM), Catalogue Notes (Rating: VG, Incl: 1), Chart # (6), Constellation (CVn), Dark Time Duration (n/a), Dark Time Start (n/a), Date of Opposition (12/13/2023), App.Mag 2 @ Best Time (9.3), Apparent Magnitude 2 (9.5), Best Eyepiece (24mm + 3X Blw. or 8mm), Catalogue (Messier), Components, Dark Time End (n/a), and Declination (+47°11.7').

Air Mass	1.977878	Altitude	30°	App.Mag 2 @ Best Time	9.3
App.Mag @ Best Time	9.3	Apparent Magnitude	9.5	Apparent Magnitude 2	9.5
Average Rating	30	Azimuth	32°	Best Eyepiece	24mm + 3X Blw. or 8mm
Best Magnification	30	Best Time	6:30 PM	Catalogue	Messier
Catalogue Notes	Rating: VG, Incl: 1	Chart #	6	Components	
Constellation	CVn	Dark Time Duration	n/a	Dark Time End	n/a
Dark Time Start	n/a	Date of Opposition	12/13/2023	Declination	+47°11.7'

Figure 187: Object Fields

11.4.5 Observation attachments

You can attach files of various kinds to an observation. With the relevant observation selected in the observation list, select the Attachments tab (the number in parentheses is the number of attachments for that observation).



The screenshot shows the 'Attachments (1)' tab selected in a software interface. It displays a table of attached files. The table has two columns: 'Name' and 'Description'. There is one data row with the following values: 'Name' is 30dor_hubble_3939.jpg and 'Description' is R136 via HST. Below the table are three buttons: a plus sign, a minus sign, and a square with a plus sign. A checkbox labeled 'Show files for all observations' is also present. Below the checkbox is a 'File Path:' label and a text box containing 'Macintosh HD/Users:paul:Desktop:AP V2:R136 image:30dor_hubble_3939.jpg'. To the right of the text box is a 'Select...' button. Below the text box is a 'Description:' label and a text box containing 'R136 via HST'. To the right of the text box is a table with two columns: 'Field' and 'Value'. Below the table is a 'Save Changes' button. To the right of the 'Save Changes' button is a 'Hide images' checkbox and three icons: a left arrow, a right arrow, and a circular arrow.

Name	Description
30dor_hubble_3939.jpg	R136 via HST

File Path: Macintosh HD/Users:paul:Desktop:AP V2:R136 image:30dor_hubble_3939.jpg

Description: R136 via HST

Field	Value

Figure 188: Observation attachments tab

At the top left is a list of attached files, showing the file name and the first part of an arbitrary description assigned to the attached file.

If you select an entry, the file contents (where possible) is displayed on the right, and the file path, optional description, and optional user-defined values displayed below the list.

To add a new file as an attachment, use one the following techniques:

- Drag the file from the Finder (Mac) or Windows Explorer (Windows) to the drop area on the right (where file contents are also displayed). You will be asked via a dialog whether you want to **link to the existing file** (which will save space, but will no longer be valid if the original file is deleted or moved), or **copy the file to the database** (in which case a copy is made into a special folder, and the original file can be subsequently moved or deleted without issue).

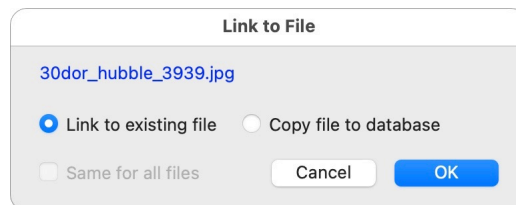


Figure 189: Link to file dialog

- Use the **+** button under the list. The menu gives you three options: **link to an existing file** (which will save space, but will no longer be valid if the original file is deleted or moved), **copy an existing file to the attachment database** (in which case a copy is made into a special folder, and the original file can be subsequently moved or deleted without issue), or **copy an existing object image** (if one exists) to the attachment database.

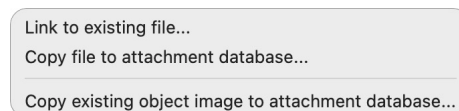


Figure 190: + button menu

If you use the third option, you'll be given a list of object images for the current object.

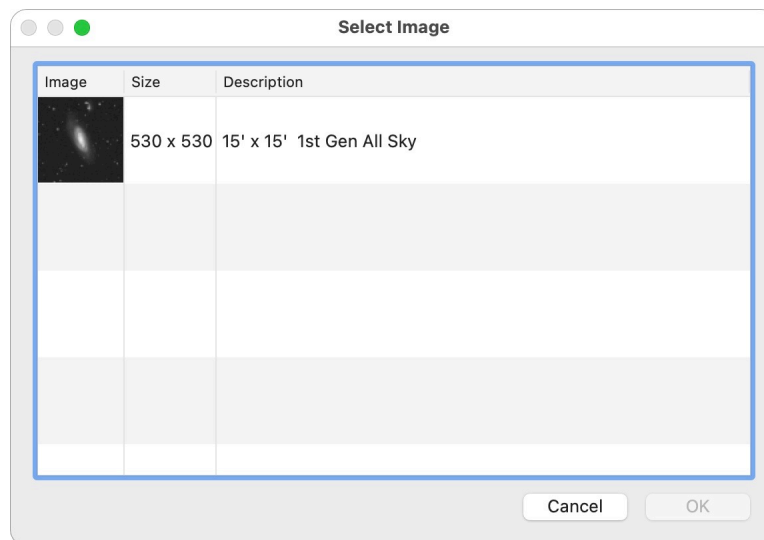


Figure 191: Select image dialog

The **Show files for all observations** checkbox, when checked, will list all attached files for all observations of the current object.

The button at the bottom right of the list of attachments will open the selected file attachment with an appropriate third-party application (where possible). e.g. if the attached file is an HTML file, then it will be opened in your browser, etc.

If you have an image file selected, the image will be displayed on the right, and the buttons underneath the image can be used to flip and/or rotate the image. You can also right-click the image and elect to open it with an external application, open it in a separate document window, or reveal it in the Finder (Mac) or Windows Explorer (Windows).

11.4.6 Observation functions

Clear-Sky chart

Observation > Forecasts > Clear-Sky Chart provides a chart from the Clear-Sky Chart site. The latitude and longitude of your currently-selected site is used to find the closest Clear-Sky site to that site, and displays its data (the distance to the site is shown in the title bar of the window). Clicking on the chart will take you to the website in your browser (if you have an Internet connection). This is only available for North American sites.

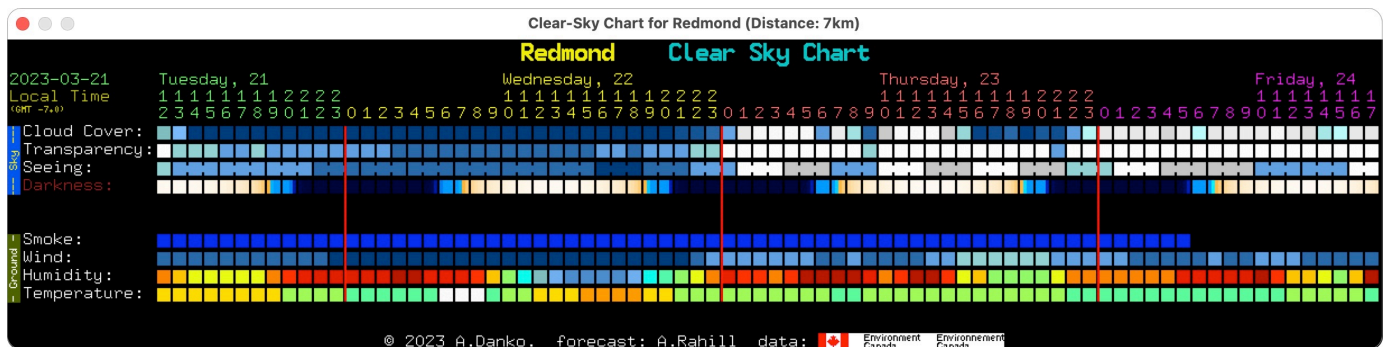


Figure 192: Clear-sky chart

7Timer chart

Observation > Forecasts > 7Timer Chart provides a chart from the 7Timer.com site. The latitude and longitude of your currently-selected site is used to find the observing conditions. Clicking on the chart will take you to the website in your browser (if you have an Internet connection).

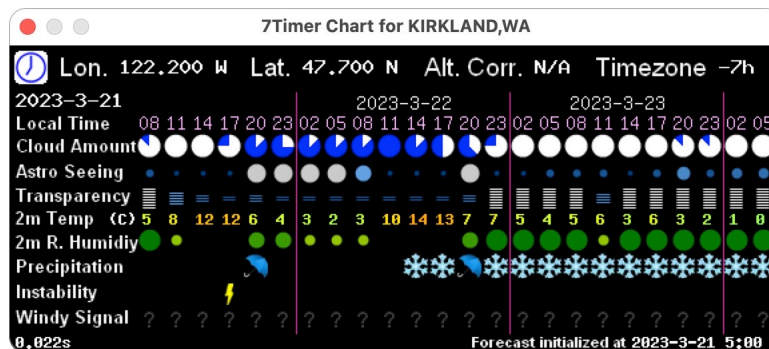


Figure 193: 7Timer chart

Site status

The Site status feature (**Observation > Site Status**) shows you a list of all your defined sites with their current status with respect to your local site (chosen via the popup menu at the upper left). Additionally, clicking the "Site:" label next to the current site popup on the plan document window will open the Site Status window.

The columns are:

- **Site.** The name of the site. If the site resource defines an URL, then it will be displayed in blue with underlining. The local site is shown with bold text.
- **Local Date/Time.** The local time at that site.
- **Offset.** The offset in hours of the site from the local site.
- **Darkness.** The current state of darkness or twilight at the site. Can be "Dark", "Astronomical", "Nautical", "Civil", or "Daylight".
- **Next.** The time of the next "darkness" transition (e.g. Daylight to Sunset, Dark to Astronomical) and how long it will be.
- **Moonrise.** Time of moonrise.
- **Moonset.** Time of moonset.

The world map at the bottom left shows the positions of your local site and the selected site (where applicable). If the selected site has a valid URL specified in the site resource, and the Internet is currently available, then it will be displayed at the bottom right, and you can open it in your browser using the **Show in Browser** button.

You can use your computer clock as the current local date/time, or use an arbitrary date/time using the settings at the top right.

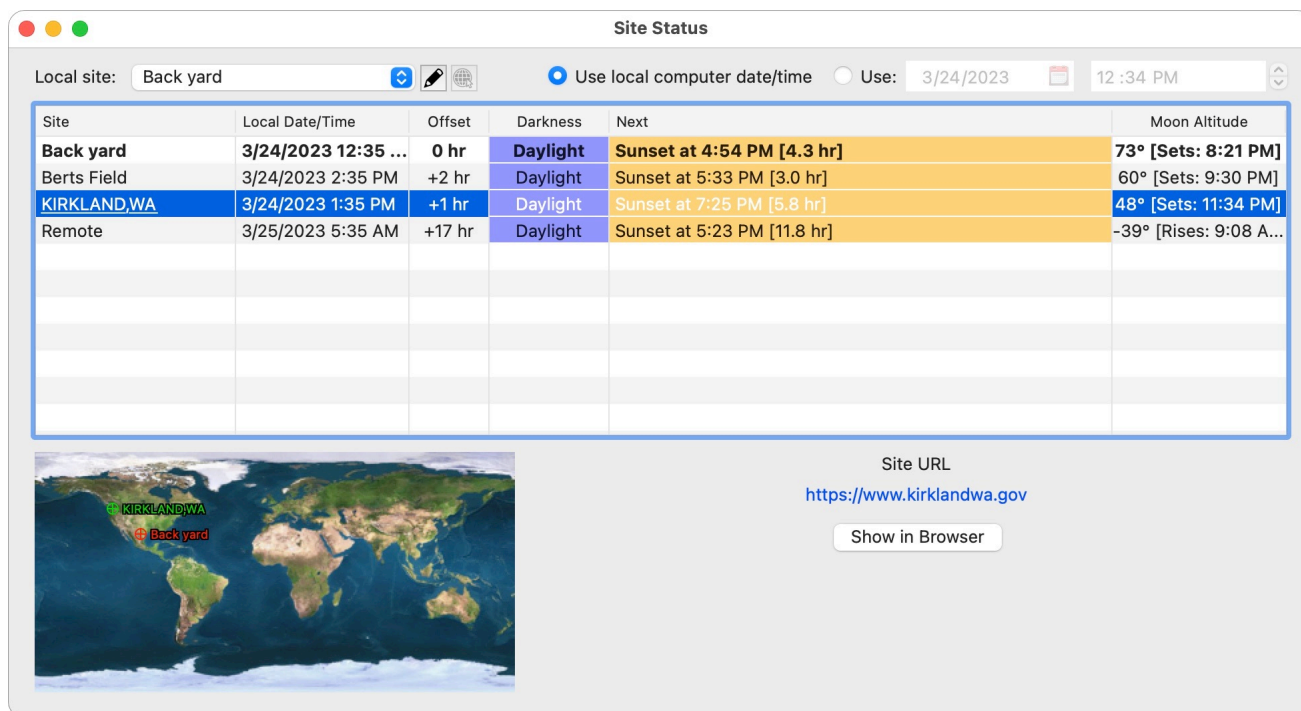


Figure 194: Site status window

Night Vision Mode

Observation > Night Vision Mode toggles this mode on and off. This causes the entire screen to be rendered in red (or green or grey) tones to help when you are using the computer in the field. This works pretty well on Mac computers. Unfortunately this is not the case on Windows.

On Windows the application attempts to colour as much of the interface as it can, but does not do a good job on some widgets. The work-around is to select the Windows Classic theme from the Display control panel. The UI is not quite as fancy as the standard themes, but night vision mode works a lot better.

In general, you are probably a lot better off using a physical screen cover (made of red plexiglass, etc.)

You have quite a lot of control over the colours and darkness of the screen via the Night Vision preferences (see Section 20.1.2 on page 312).

11.5 Field of View tab

The Field of View tab is designed to show a chart that represents a visualisation of what you are going to see through your telescope.

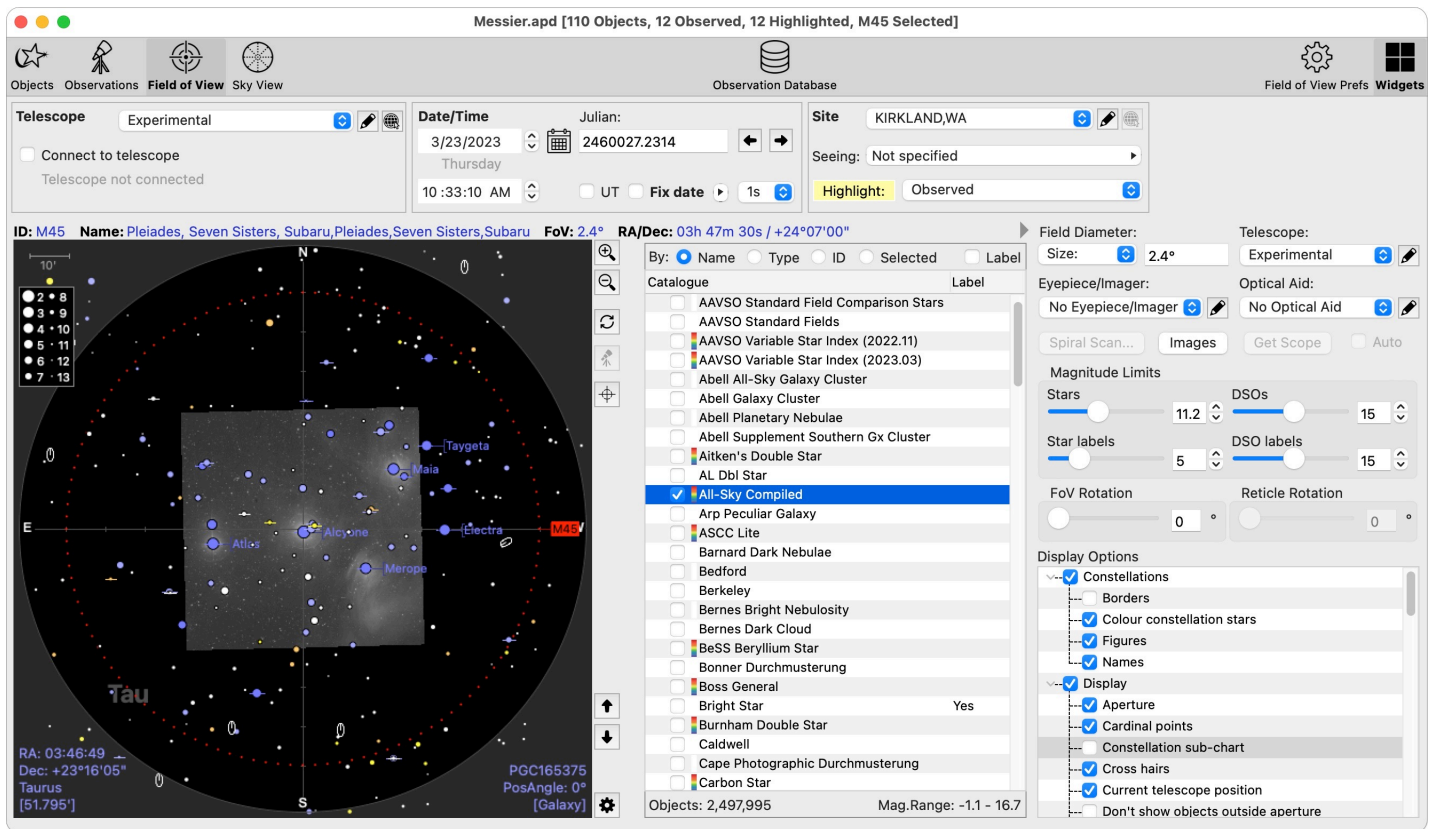


Figure 195: Field of View tab

11.5.1 Field of View chart

The chart is displayed on the left side of the tab (with all the associated controls and options on the right). The default chart shows a round "aperture" that represents the actual field of view of the telescope/eyepiece/optical aid combination.

It will display objects from the catalogues you select on the right, together with images, constellations, objects in your plan document object list, etc. Moving the cursor around on the chart will show (at the bottom of the chart) the coordinates of the mouse cursor, and information about objects you are pointing at where applicable.

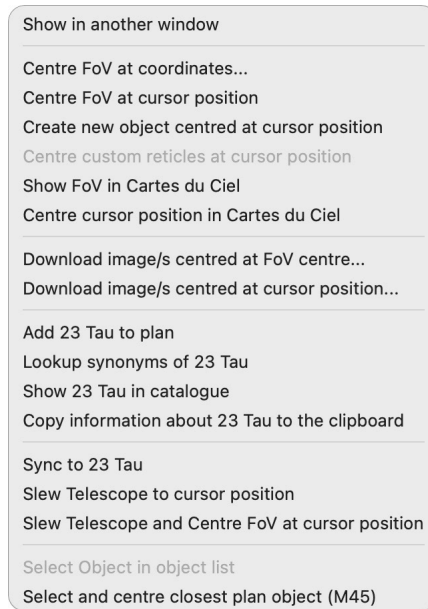


Figure 196: Field of view chart right-click menu

Right-clicking the mouse on the chart allows several operations:

- **Show in another window.** Creates a new window containing a copy of the current chart. That chart will remain static and will not change when the actual field of view chart is modified.
- **Centre FoV at coordinates....** Re-centre the field of view chart at given coordinates. A dialog is presented to enter the RA/Dec coordinates.

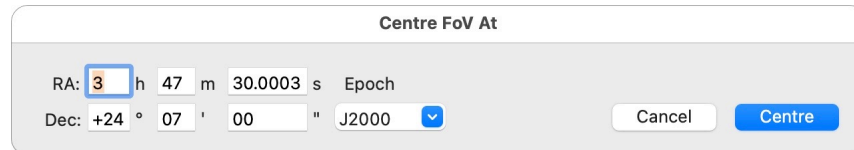


Figure 197: Re-centre at coordinates dialog

- **Centre FoV at cursor position.** Re-centre the field of view chart at the mouse cursor coordinates (where the right-click took place).
- **Create new object centred at cursor position.** Add a new object to the object list with the coordinates of the cursor on the chart (where the right-click took place).
- **Centre custom reticles at cursor position.** Centre the custom reticle/s at the mouse cursor coordinates (where the right-click took place).
- **Download image/s centred at FoV centre....** Request the image download manager to download one or more images from online data sources, centred on the chart's centre coordinates.
- **Download image/s centred at cursor position....** Request the image download manager to download one or more images from online data sources, centred at the mouse cursor coordinates (where the right-click took place).
- **Show FoV in {External Application}.** Show the current field of view in the specified external planetarium application. i.e. the external application should centre itself to the same coordinates as the centre of the chart.

- **Centre cursor position in {External Application}.** Centre the specified external planetarium chart at the coordinates of the mouse cursor (where the right-click took place).
- **Add {catalogue object} to plan.** Enabled if the mouse cursor (where the right-click took place) is over or close to a displayed catalogue object. This will add that catalogue object to the plan as a plan object.
- **Lookup synonyms of {catalogue object}.** Enabled if the mouse cursor (where the right-click took place) is over or close to a displayed catalogue object. This will search for all synonyms of the catalogue object and display them in a results window.
- **Show {catalogue object} in catalogue.** Enabled if the mouse cursor (where the right-click took place) is over or close to a displayed catalogue object. This will open a window displaying the object in its originating catalogue.
- **Copy information about {catalogue object} to the clipboard.** Enabled if the mouse cursor (where the right-click took place) is over or close to a displayed catalogue object. This will copy text information about that catalogue object onto the clipboard (name, ID/s, coordinates, etc.).
- **Sync to {catalogue object}.** Enabled if the mouse cursor (where the right-click took place) is over or close to a displayed catalogue object, and if a go-to telescope mount is connected and has the capability of syncing. The telescope mount will be synced to the coordinates of the object.
- **Slew telescope to cursor position.** Enabled if a go-to telescope mount is connected. Slews the telescope to the coordinates of the mouse cursor (where the right-click took place).
- **Slew telescope and Centre FoV at cursor position.** Enabled if a go-to telescope mount is connected. Slews the telescope to the coordinates of the mouse cursor (where the right-click took place), and re-centres the chart at that position.
- **Select Object in object list.** Enabled if the mouse cursor (where the right-click took place) is over or close to a displayed plan object. If so, that object will be selected in the object list.
- **Select and centre closest plan object.** Find the plan object closest to the mouse coordinates (where the right-click took place) and centre the chart there.

11.5.2 Catalogue selection

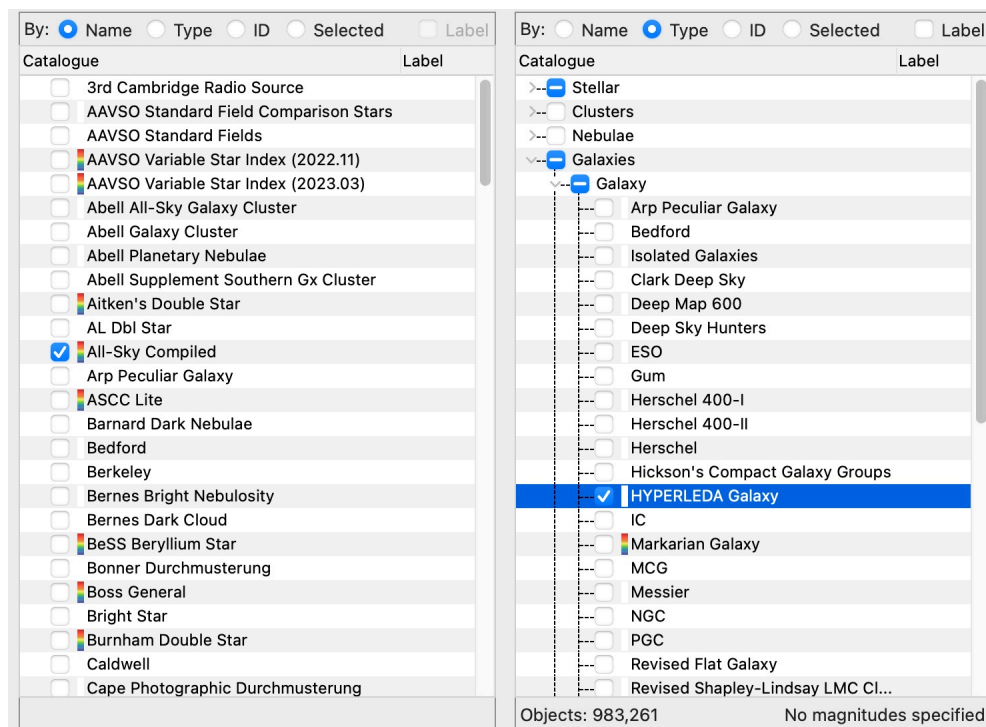


Figure 198: Catalogue selection by Name and by Type

The catalogue selector is a list of installed catalogues and external catalogues that can be displayed in the field of view chart. Each catalogue has a checkbox that determines if it will be included in the chart. The list of catalogues can be displayed in any of four modes, determined by the radio buttons along the top (illustrated in Figure 198 and Figure 199):

- By **Name**. An alphabetical list of installed catalogues, by name.
- By **Type**. A hierarchical list of installed catalogues, ordered by the types of objects in the catalogues. e.g. **Clusters** > **Globular Cluster** will list all catalogues containing at least one globular cluster object. Note that this means that a catalogue might appear at several places in the hierarchy, depending on what kinds of objects it contains.
- By **ID**. An alphabetic list of IDs. Each ID category contains a list of installed catalogues containing objects with that ID.
- By **Selected**. Shows a list of the currently-selected installed catalogues.

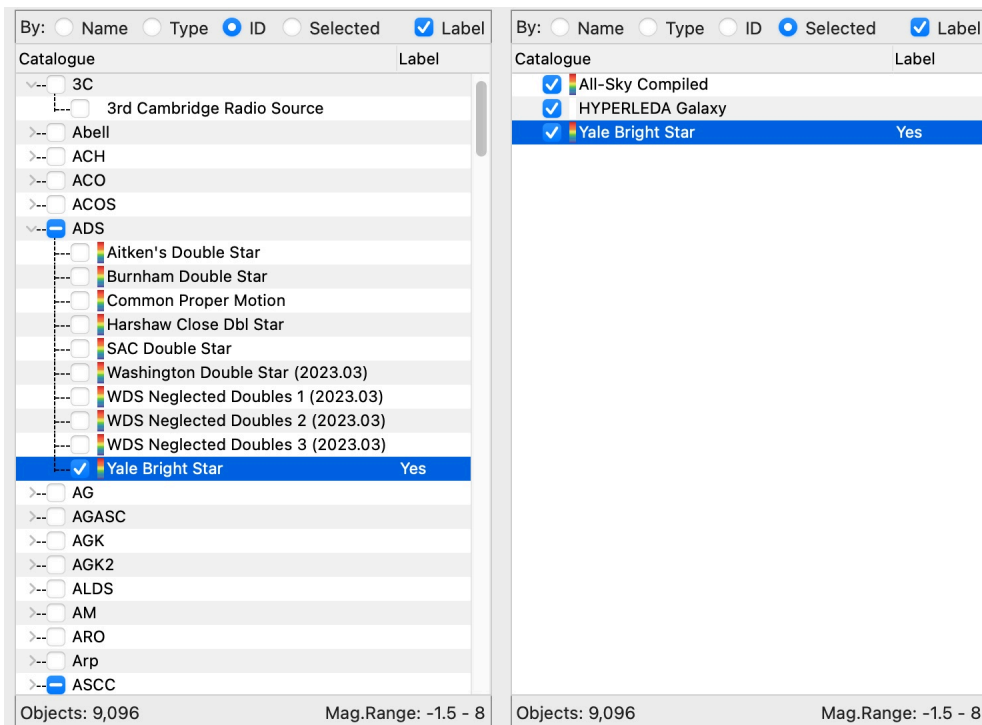


Figure 199: Catalogue selection by ID and by Selected

If you have any external catalogues defined and enabled (see Section 20.7.16 on page 331 for more details), then these will be listed after the installed catalogues, in a separate **External Catalogues** section.

When you select a catalogue (by clicking on its entry) you can toggle the **Label** column by either double-clicking that column for the catalogue, or by using the **Label** checkbox at the top right. If the Label is enabled for a catalogue then objects from that catalogue will be labelled if the object's magnitude is brighter than the label magnitude settings (see Section 11.5.9 on page 155).

Basic information for a selected catalogue also appears at the bottom of the list.

11.5.3 Display Options

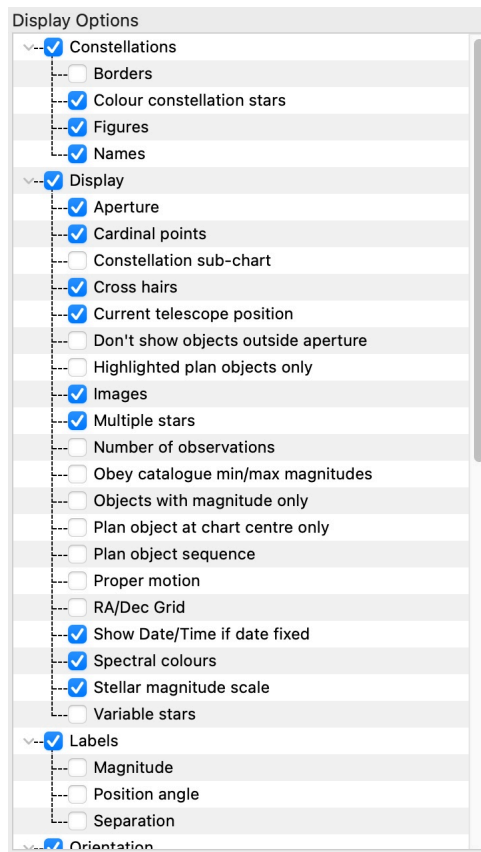


Figure 200: FoV display options

The Display Options are a list of options for displaying the chart. Switch them on/off via the checkbox. They are defined as follows:

Constellations

These options define if and how constellations are displayed in the field of view chart.

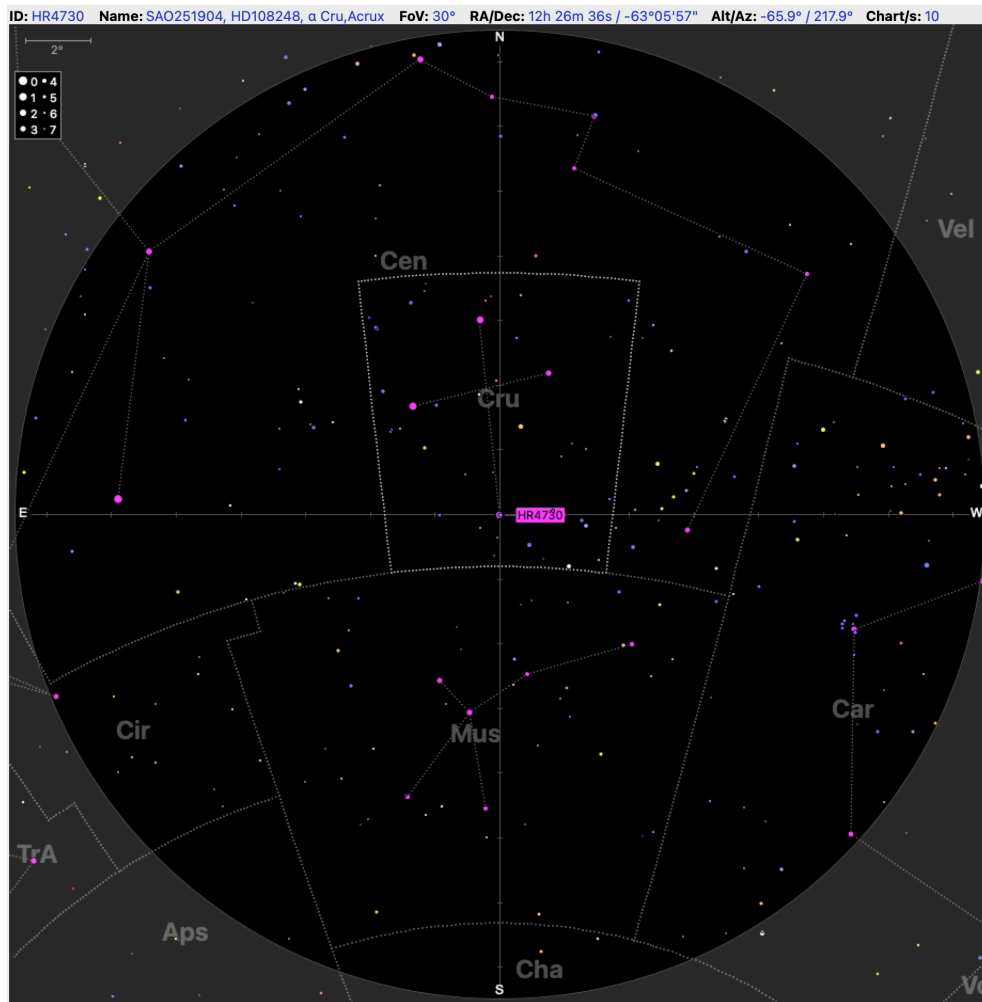


Figure 201: Constellation display options at work

- **Borders.** Draw the borders of each constellation present in the chart, using a grey dotted line. The central constellation is shown with a lighter dotted line.
- **Colour constellation stars.** Give the stars that define the constellation "figure" a distinctive colour (default: magenta, can be changed via the Field of View preferences. See Section 20.7 on page 327).
- **Figures.** Draw the figure of each constellation present in the chart, using a grey dotted line. The figure is a collection of lines joining the main stars that represent the constellation.
- **Names.** Draw the 3-character abbreviated constellation names, in grey.

Display

Change various visual aspects of the chart.

- **Aperture.** Draws a circular aperture on the chart showing the extent of the field of view.
- **Cardinal points.** Draws the cardinal points (NSEW) on the chart.
- **Constellation sub-chart.** Superimpose a small constellation chart at the top right of the main chart, showing the constellation containing the centre coordinates of the main chart. The main chart centre is shown as a small red ring. See Figure 208.

- **Cross hairs.** Draws crosshairs centred on the field of view, with tick marks at regular intervals. The tick mark interval is given at the top left.

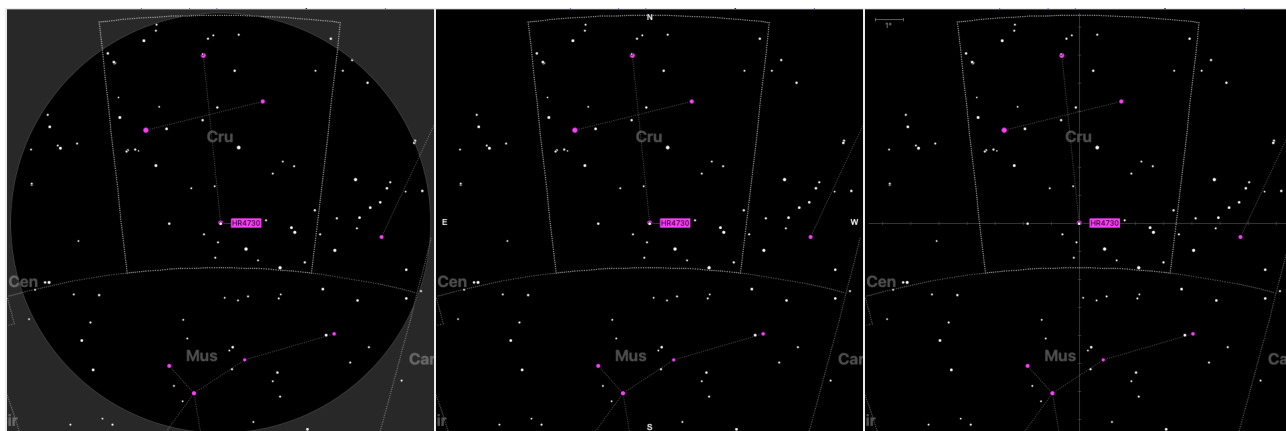


Figure 202: Aperture (*left*), Cardinal points (*centre*), Crosshairs (*right*)

- **Current telescope position.** Turns on/off the ability to display the current pointing coordinates of the connected telescope (where applicable).
- **Don't show objects outside aperture.** If you don't wish to see any objects outside of the circular aperture, use this option.
- **Highlighted plan objects only.** Only show plan objects that are currently highlighted.
- **Images.** Show any DSS/SDSS images that overlap the field of view. See Figure 208 for an example.

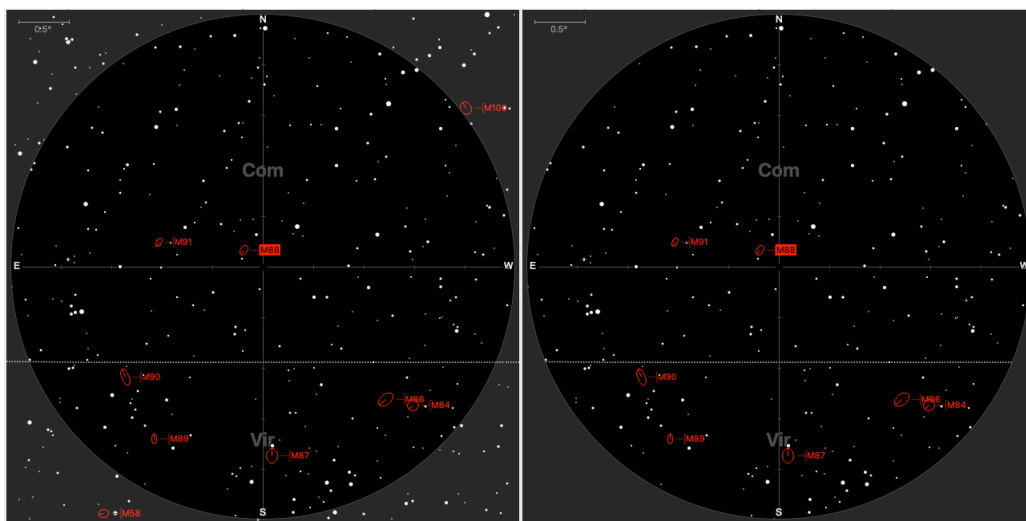


Figure 203: Don't show objects outside aperture. Off (*left*) and On (*right*)

- **Multiple stars.** Show stars with multiple components with a horizontal bar.

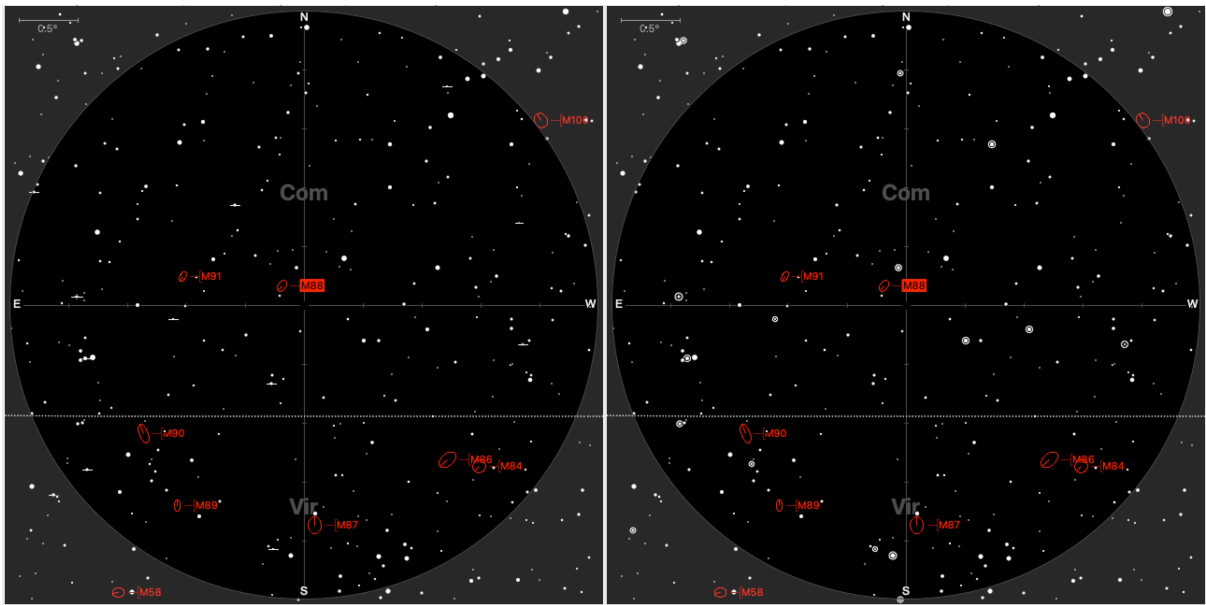


Figure 204: Multiple stars (*left*), Variable stars (*right*)

- **Number of observations.** For plan objects, show number of observations made, where applicable.

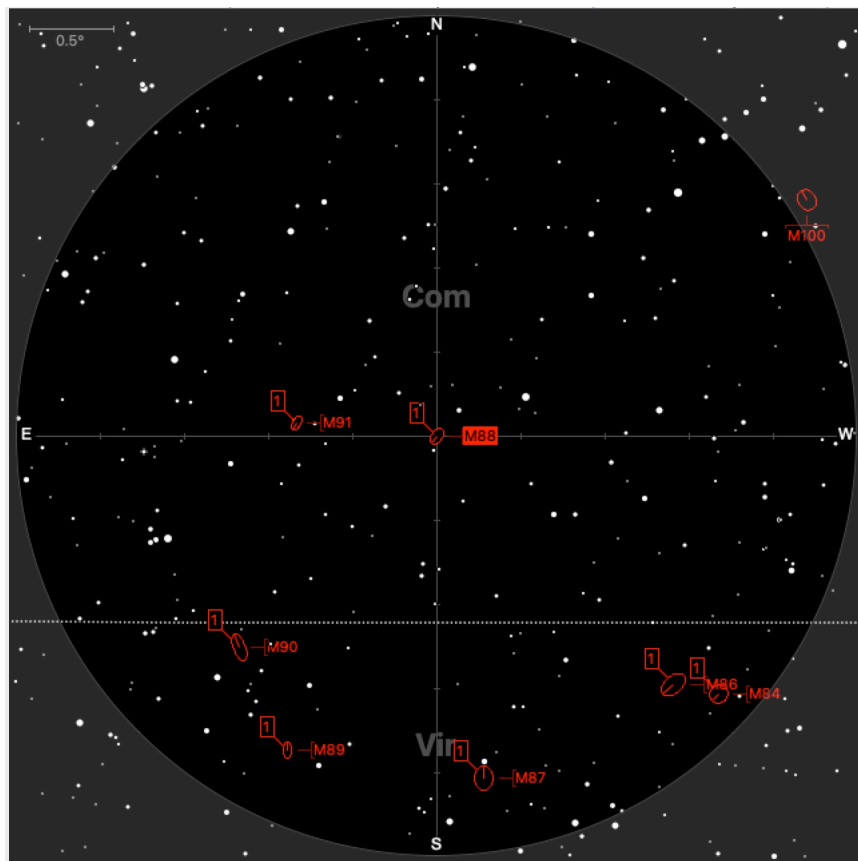


Figure 205: Number of observations

- **Objects with magnitude only.** Show only catalogue objects that have an associated magnitude.

- **Obey catalogue min/max magnitudes.** If any displayed catalogues have a minimum and/or maximum magnitude restriction (See File > Catalogue Manager > Coverage and Settings), then those restrictions will be obeyed and any catalogue objects that have a magnitude outside the restricted range will not appear in the chart.
- **Plan object at chart centre only.** If this option is on then any plan objects that are in the field of view, but not at the centre coordinates of the field of view, will not be displayed.
- **Plan object sequence.** Show the sequence of plan objects in the FoV with green dotted lines.

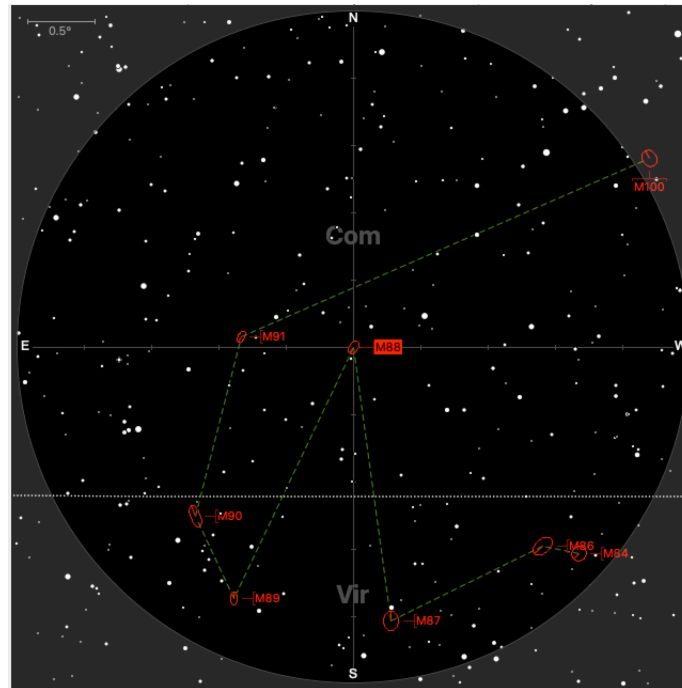


Figure 206: Plan object sequence

Proper motion. Show the proper motion direction of stars by adding a short grey line pointing in the direction of the proper motion, with its length proportional to the magnitude of that motion. Useful for looking for associated cluster stars, for example. Note that this is only applicable to stellar catalogues that include proper motion. Note that when this option is on, appropriate catalogues (those containing proper motion data) in the catalogue list are marked with a small double-headed arrow icon.

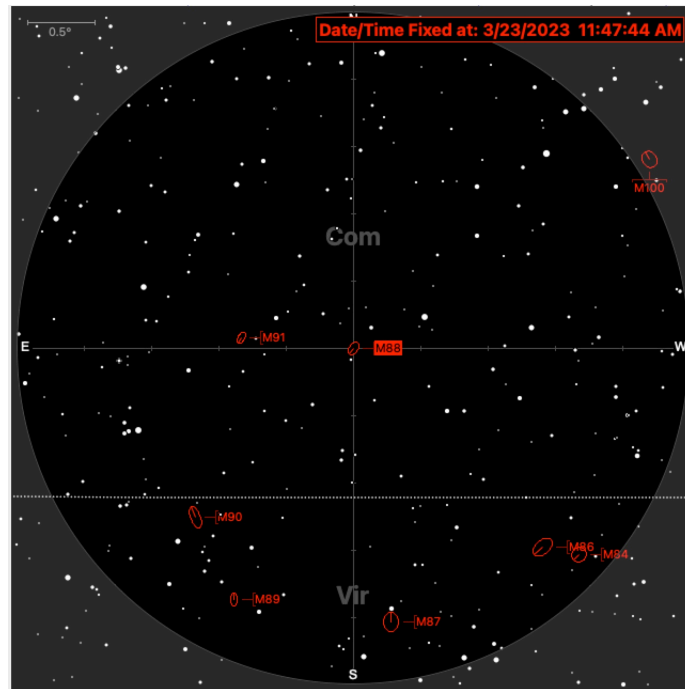


Figure 207: Show Date/Time if date fixed

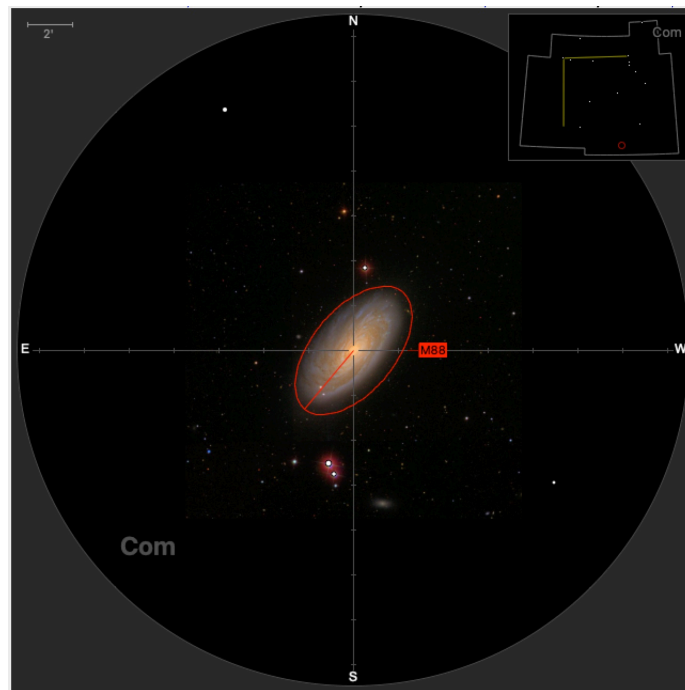


Figure 208: Constellation sub-chart and image display

- **RA/Dec grid.** Show a grid with RA and Dec values.
- **Show Date/Time if date fixed.** If the date/time is currently fixed and this option is enabled, the current date/time will be displayed at the bottom of the chart as a warning. See Figure 207.
- **Spectral colours.** Show the stellar spectral class by colouring stars in an appropriate colour. This only applies to catalogue stars that have an associated spectral class. Note that when this

option is on, appropriate catalogues (those containing spectral data) in the catalogue list are marked with a small "spectrum" icon.

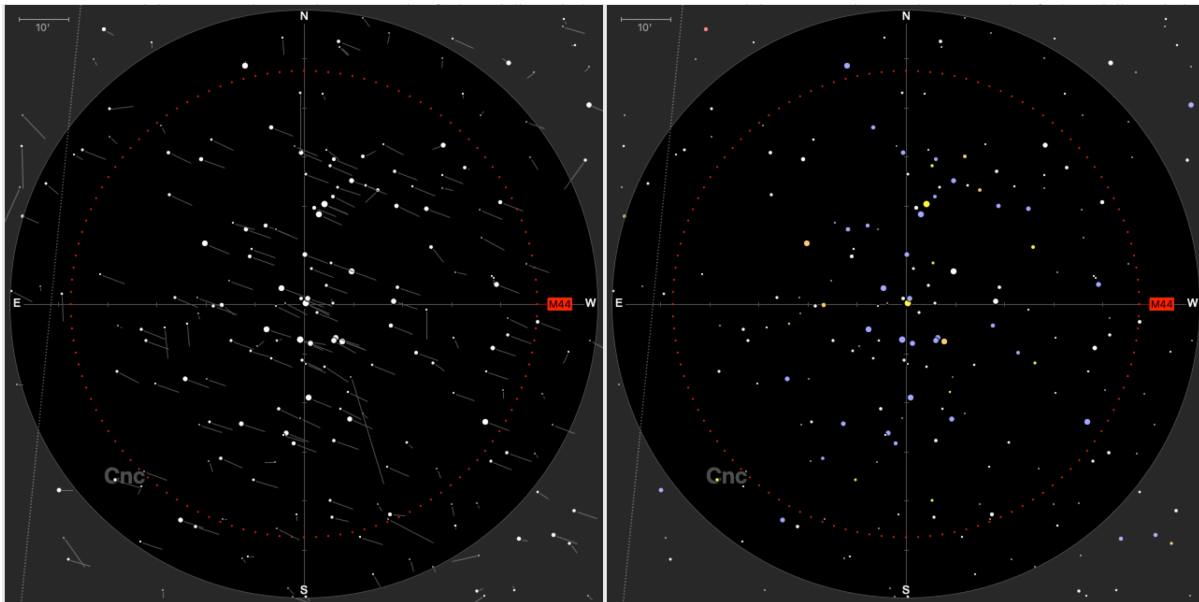


Figure 209: Proper motion (left), Spectral colours (right)

- **Stellar magnitude scale.** Show the stellar magnitude scale at the bottom left of the chart.

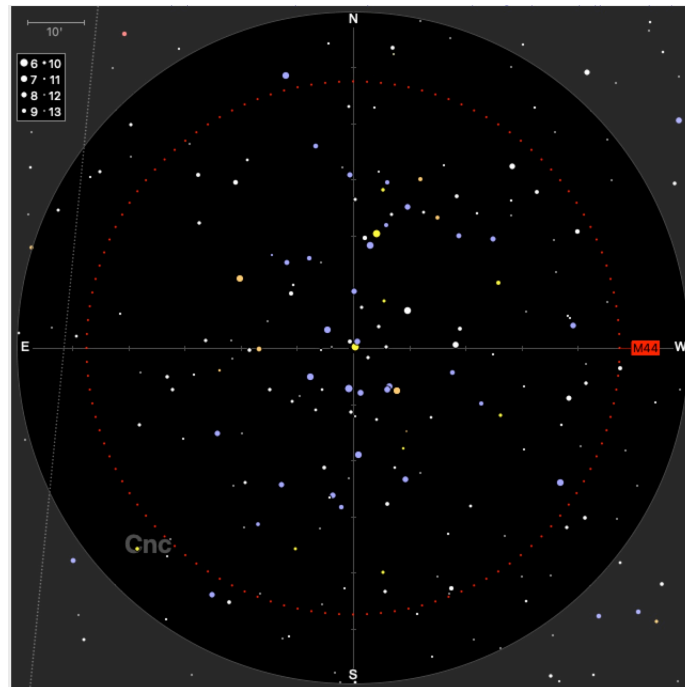


Figure 210: Stellar magnitude scale

- **Variable stars.** Show any variable stars with a circle around them.

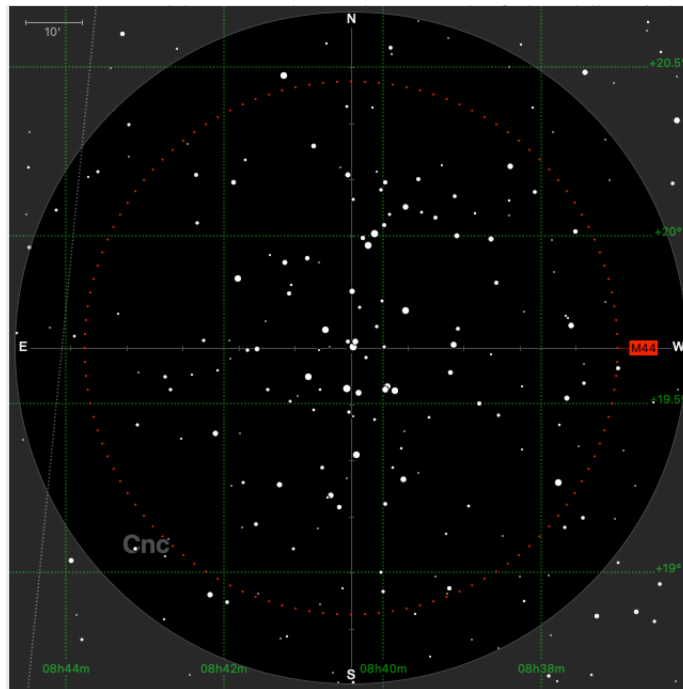


Figure 211: RA/Dec grid

Labels

These are labels on any plan or catalogue objects, where applicable.

- **Magnitude.** Show the magnitude of objects in the chart, assuming that they have an associated magnitude and that magnitude is within the magnitude limits for labels.
- **Position angle.** Show the position angle for objects in the chart (double stars, galaxies, etc.), assuming that they have an associated position angle and the object magnitude is within the magnitude limits for labels.
- **Separation.** Show the separation for objects in the chart (double stars, etc.), assuming that they have an associated separation and the object magnitude is within the magnitude limits for labels.

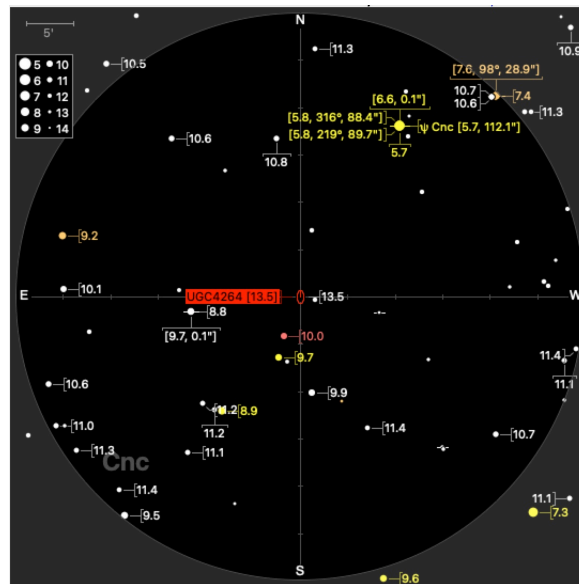


Figure 212: Labels, showing magnitude, position angle, separation

Orientation

- **Alt/Az rotation.** The field of view is rotated to show the field as would be seen by an alt/az-mounted telescope, or a binocular, pointed at the field at the current date/time from the current site.

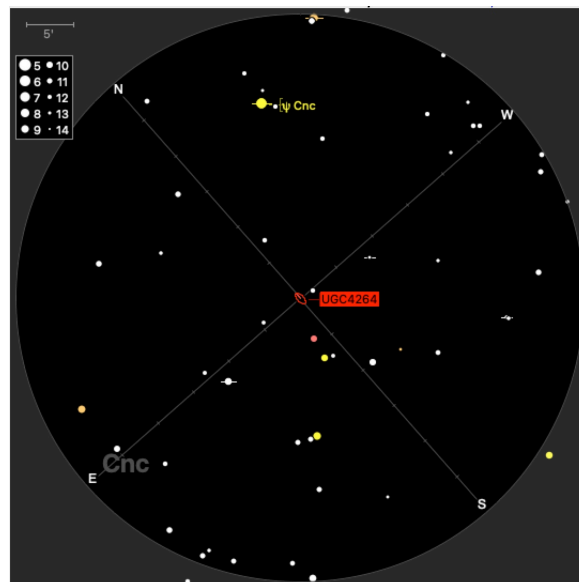


Figure 213: Alt-Az rotation

- **Flip horizontal.** Flip the field horizontally.
- **Flip vertical.** Flip the field vertically.

Other

- **Ignore imager guide sensor.** If you are sizing the field of view chart to fit an imager, and the imager has a integral off-axis guide sensor, then the field of view is sized to fit the track of the guide sensor. If this option is checked, the guide sensor is ignored and the field of view is sized to fit the main sensor only.

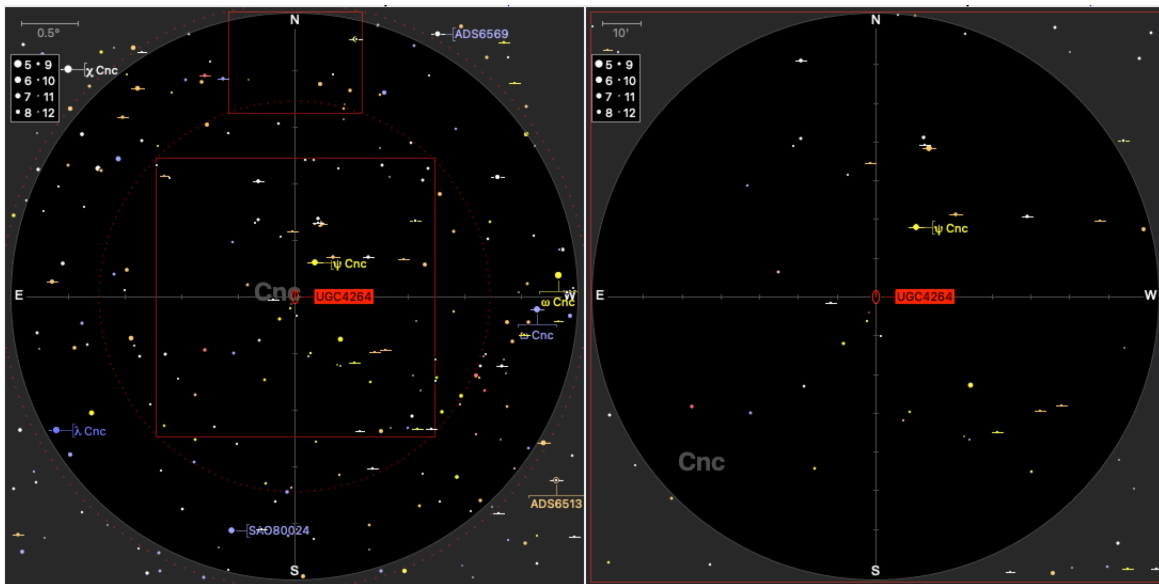


Figure 214: Ignore imager guide sensor option off (*left*) and on (*right*)

- **Legend.** Displays a floating window with a legend for star magnitudes and DSOs. If spectral star colours are being displayed, a spectral colour legend is included.

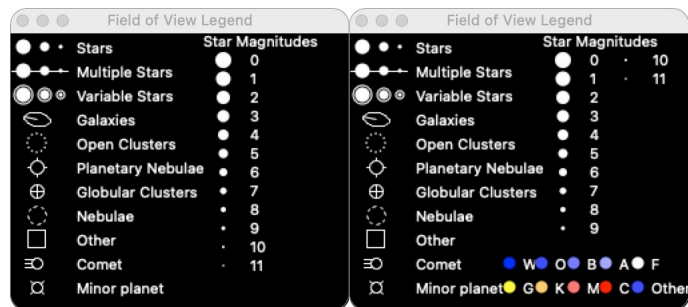


Figure 215: Field of view floating legend

- **Show object notes.** Show the object notes, for the object being pointed at by the mouse cursor, in a floating window.

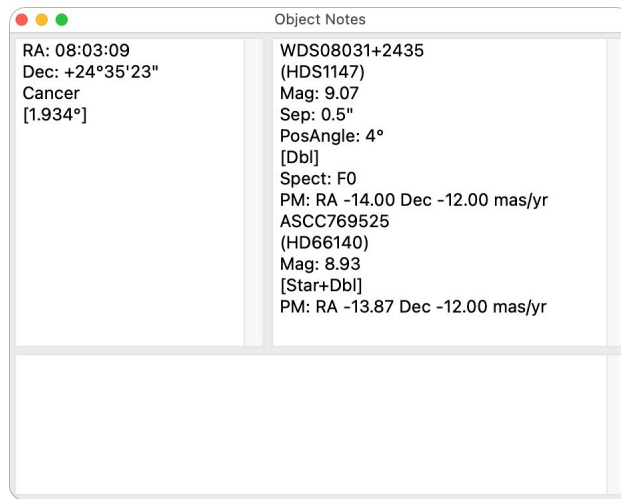


Figure 216: Object notes floating window

Reticles/FoVs

Controls the display of reticles and field-of-view outlines for eyepieces, etc.

- **All binocular FoVs.** Display circular reticles for all active "binocular" telescope resources in your resource database.

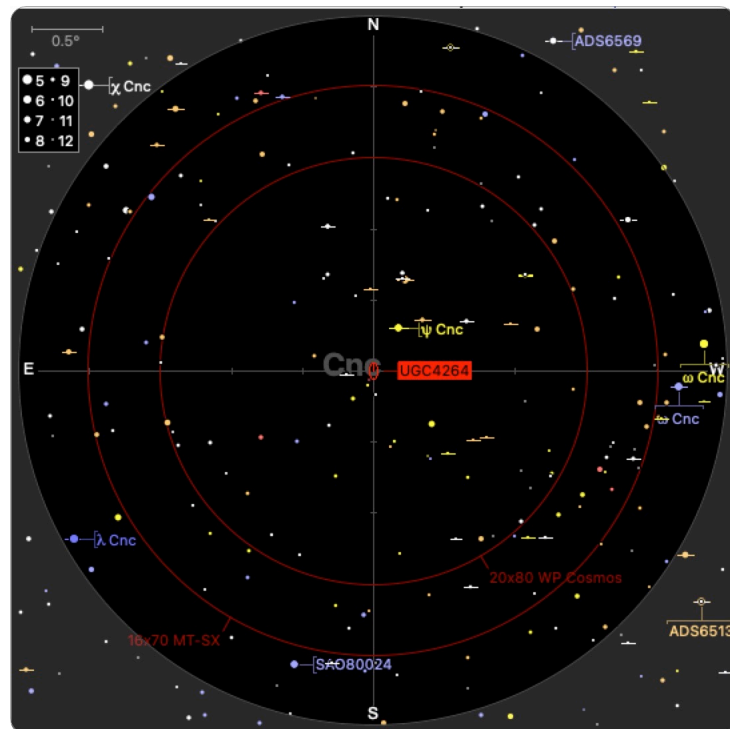


Figure 217: All binocular FoVs

- **All eyepiece FoVs.** Display circular reticles for all active eyepieces resources in your resource database. The diameter of the FoV reticles will depend upon the selected telescope resource.

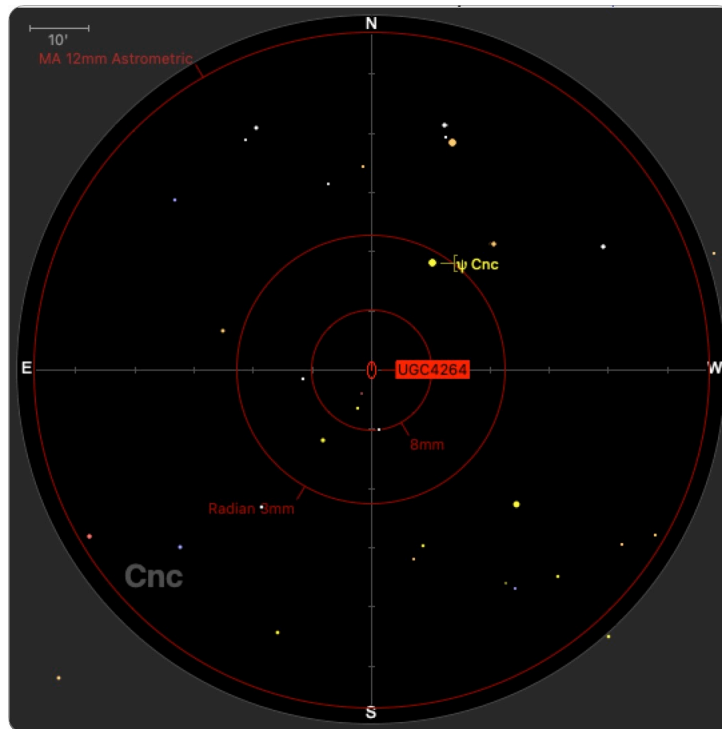


Figure 218: All eyepiece FoVs

- **Binocular FoV.** Display the binocular FoV extent, if the currently selected telescope resource is a binocular.

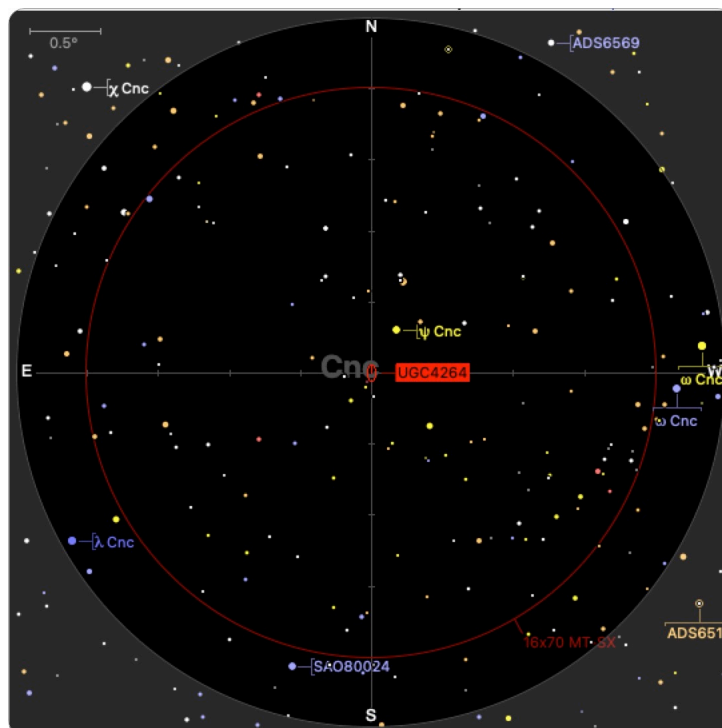


Figure 219: Binocular FoV

- **Crosshairs/Grid....** Display either crosshairs or a grid of red dotted lines over the FoV. Double-click the entry to bring up a choice dialog. You can specify the spacing of the grid lines.

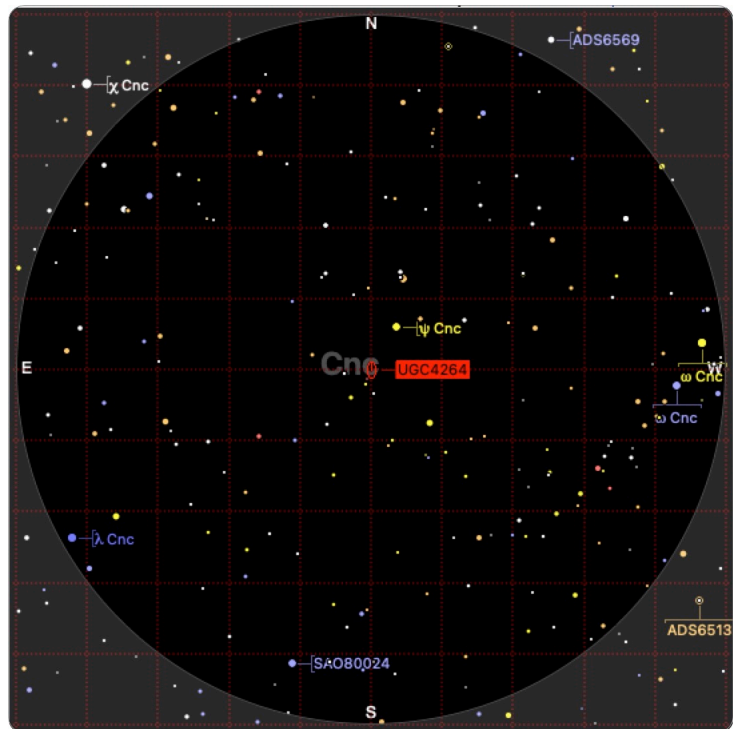


Figure 220: Crosshairs/Grid, showing a 30' grid on a 5° FoV



Figure 221: Crosshairs/grid choice dialog

- **Custom reticles.** Display any active custom reticles (see Section 11.5.13 on page 157).

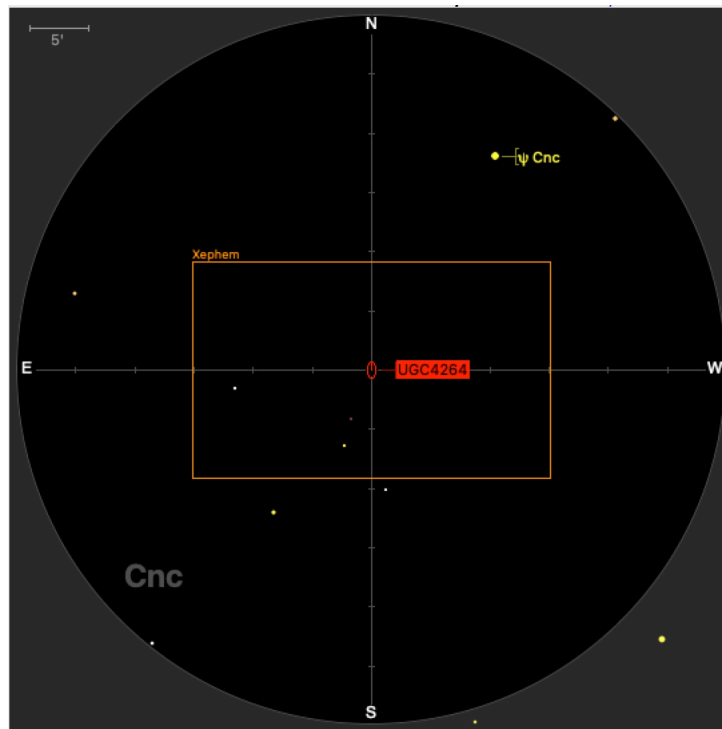


Figure 222: Custom reticles

- **Eyepiece FoV.** Display the eyepiece FoV extent, if an eyepiece resource and telescope resource are currently selected.

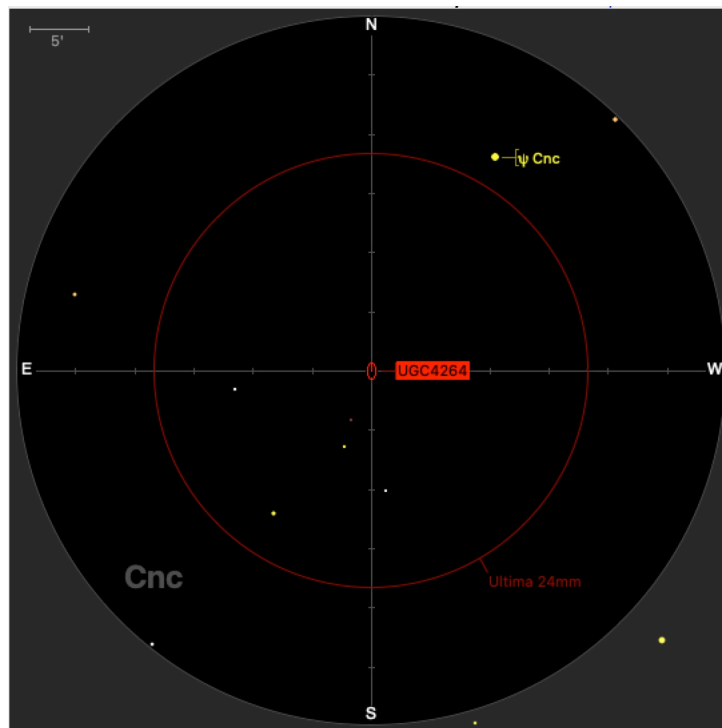


Figure 223: Eyepiece FoV

- **Fit imager to FoV aperture.** When sizing the field of view to fit an imager, then this option will size the chart so that the imager fits inside the circular aperture.

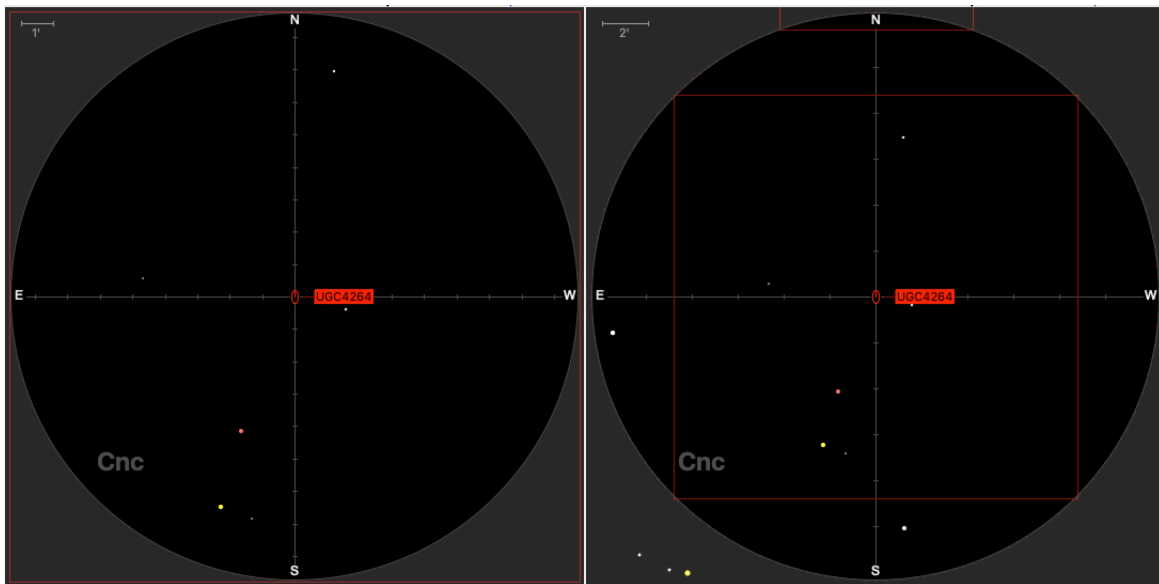


Figure 224: Fit imager to FoV aperture: off (*left*) and on (*right*)

- **Fix an imager FoV to all plan objects.** Centre an imager FoV on every plan object in or around the FoV chart. This might be useful when planning mosaics, for example, to show image overlap. Note that this option only works in the **Imager FoV** option is also turned on.

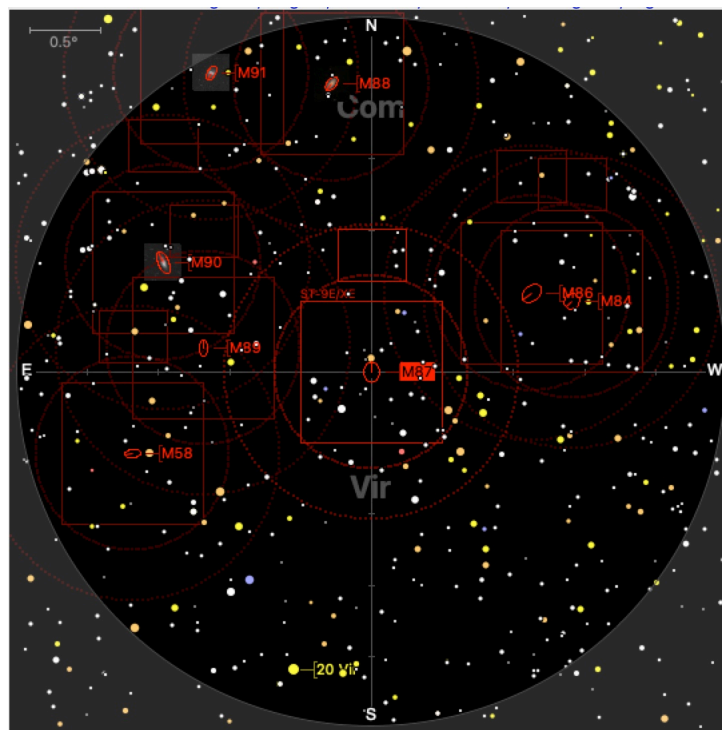


Figure 225: Fix an imager FoV to all plan objects

- **Hide eyepiece reticle.** If the currently-selected eyepiece resource has a reticle, then this option will hide that reticle.

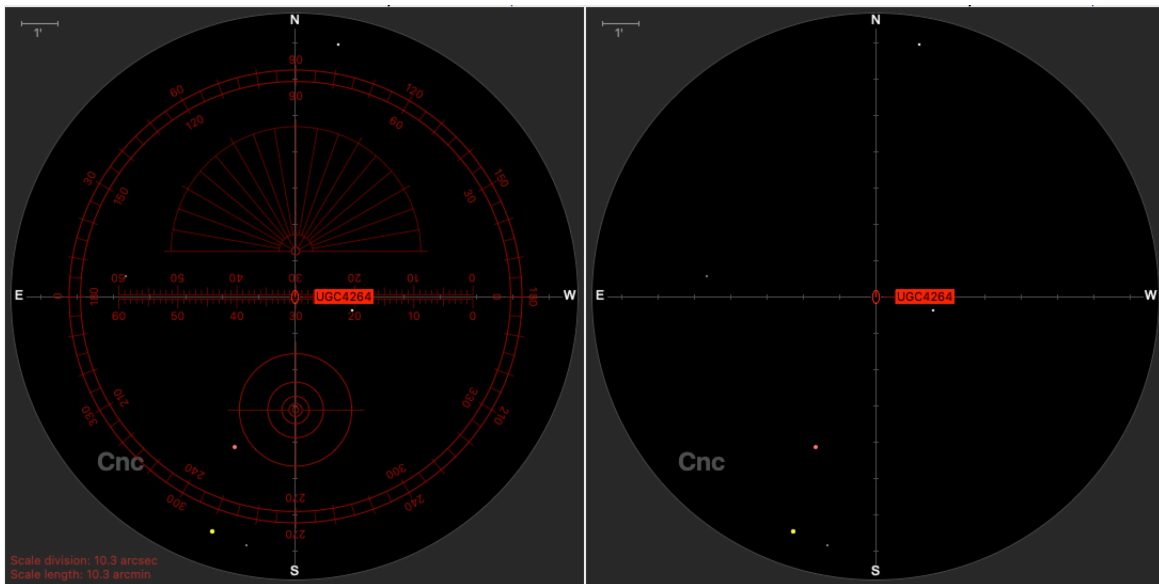


Figure 226: Hide eyepiece reticle: off (*left*) and on (*right*)

- **Imager FoV.** If this option is on, and an imager is selected, then display that imager's FoV.
- **Rigel QuickFinder.** Display a reticle for the Rigel QuickFinder, which projects circles of diameter 0.5° and 2° onto the sky.
- **Telrad.** Display a reticle for the Telrad, which projects circles of diameter 0.5° , 2° and 4° onto the sky.

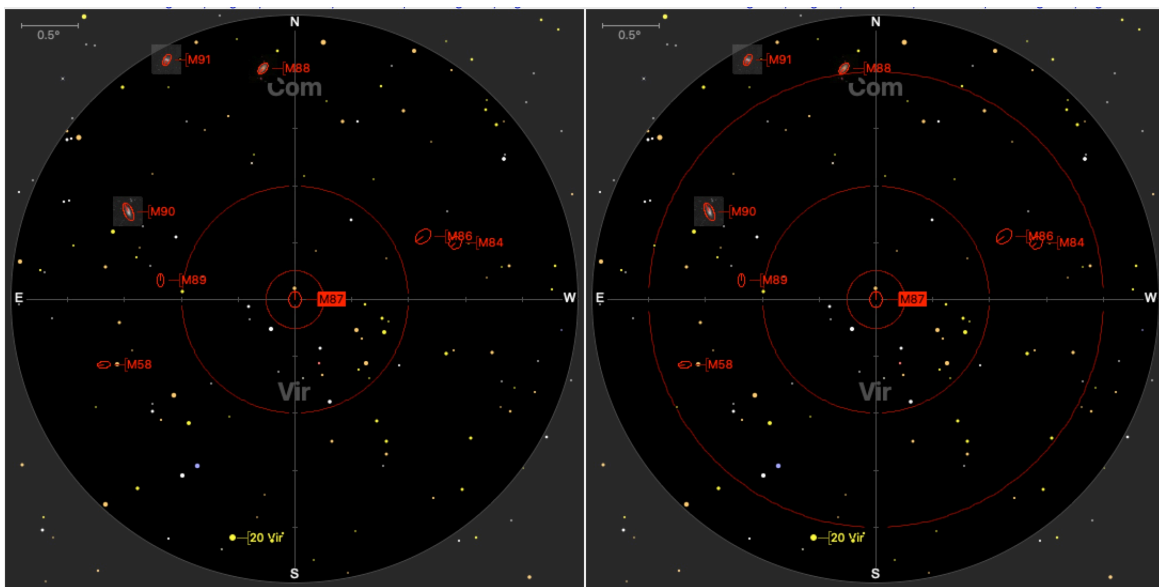


Figure 227: Rigel QuickFinder reticle (*left*) and Telrad reticle (*right*)

Solar System

Turn on/off the display of various solar system objects.

- **Show Comets.** Show/hide any comets that appear in the plan document object list.
- **Show Minor Planets.** Show/hide any minor planets that appear in the plan document object list.

- **Show Moon.** Show/hide the moon (whether or not it's a plan object).
- **Show Planets.** Show/hide the planets (whether or not they are plan objects).
- **Show Sun.** Show/hide the sun (whether or not it's a plan object).

11.5.4 Field diameter

The **Field Diameter** specifies the angular size of the field of view chart.

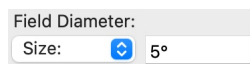


Figure 228: Field diameter

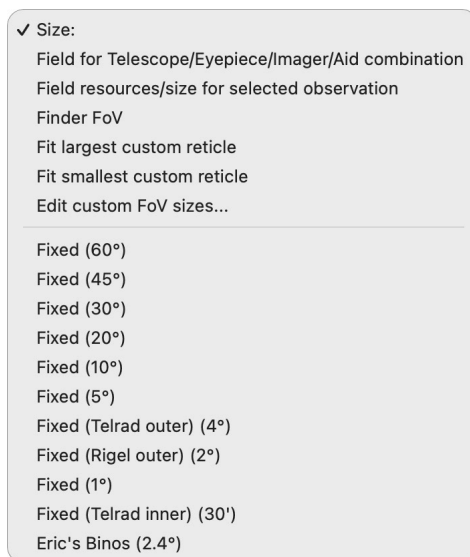


Figure 229: Field diameter popup menu

The popup menu determines how this is calculated:

- **Size.** Specify the field of view diameter (in degrees) by manually entering the diameter in the text field. Note that you can enter the size in arcminutes by appending ' to number, or arcseconds by appending ''.
- **Field for Telescope/Eyepiece/Imager/Aid combination.** Computes the FoV diameter by taking into account the telescope and eyepiece/imager selection (and optical aid if specified).
- **Finder FoV.** If a telescope is specified, and that telescope resource has a Finder scope specified, then the field of view diameter is set to the finder scope's FoV.
- **Fit largest custom reticle.** Change the diameter to fit the largest active custom reticle.
- **Fit smallest custom reticle.** Change the diameter to fit the smallest active custom reticle.
- **Edit custom FoV sizes...** Allows adding and removing additional fixed diameter entries to the popup menu. The window allows you to select and remove an entry, add a new entry to the list, or reorder the entries.
- The items below the separator in the menu are all custom entries. They can be edited as mentioned above.

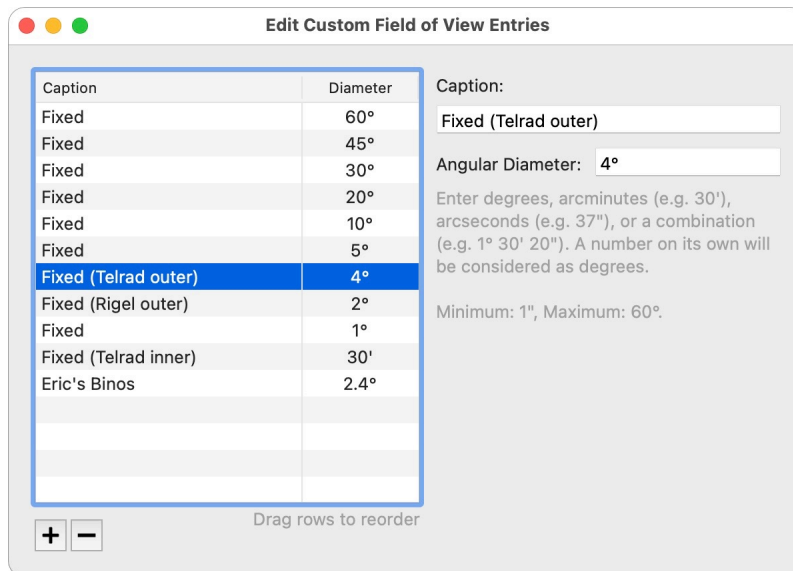


Figure 230: Custom FoV Entries window

11.5.5 Telescope/Eyepiece/Imager/Optical Aid

These specify the resources to be used to compute the diameter of the field of view chart (unless the **Field Diameter** is set to a choice other than *Size*:).

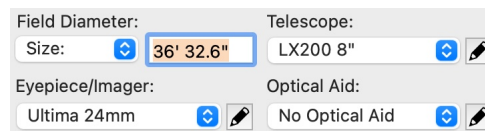


Figure 231: FoV resource selectors

11.5.6 Spiral Scan

Starts or continues a telescope spiral scan, assuming a go-to-controllable telescope mount is connected. See Section 13.10 on page 234 for more details.

11.5.7 Images

Opens the Images window, showing images for the current field of view chart where applicable.

11.5.8 Get Scope

If a computerised telescope is connected, then the **Get Scope** button is enabled. Clicking the button will get the telescope's current pointing coordinates and centre the field of view chart there. If the **Auto** checkbox is checked, then this will be done automatically at regular intervals and the chart updated if the coordinates have changed.

11.5.9 Magnitude limits

These slider controls specify the magnitude limits for stars and DSOs (non-stellar deep-sky objects) in the field of view chart. e.g. in Figure 232, stars down to magnitude 14.2 will be plotted, with labels shown for those stars of magnitude 11.5 or brighter (if the catalogue containing the star has its Label flag enabled). Similarly, DSOs of magnitude 14.2 or brighter will be plotted, with labels on any with magnitude 15.0 or brighter.

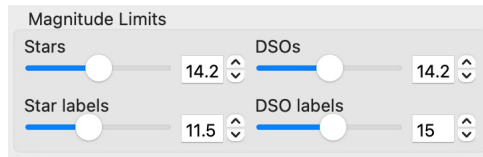


Figure 232: Field of view magnitude limits

Note that the Star/DSO magnitude sliders will be automatically set to the selected telescope's visible magnitude limit whenever that telescope is changed (assuming that the Default Limiting Magnitude option in the Field of View preferences is set. See Section 20.7.11 on page 330).

11.5.10 FoV rotation

Rotate the field of view chart by the selected angle (either use the slider or enter the angle manually). This option will be disabled if you are using the Alt/Az Rotation display option.

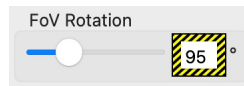


Figure 233: FoV Rotation slider

The numerical angle field is surrounded by a "warning" frame if the angle is non-zero to remind you that the field is rotated.

11.5.11 Reticle rotation

Rotate the imager reticle or custom reticle/s by the selected angle independently of the field of view (either use the slider or enter the angle manually). This option will be disabled if you are not displaying an imager or custom reticle.

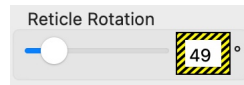


Figure 234: Reticle Rotation slider

The numerical angle field is surrounded by a "warning" frame if the angle is non-zero to remind you that the reticle/s is/are rotated.

11.5.12 Field of View chart buttons

These small buttons appear along the right side of the field of view chart.

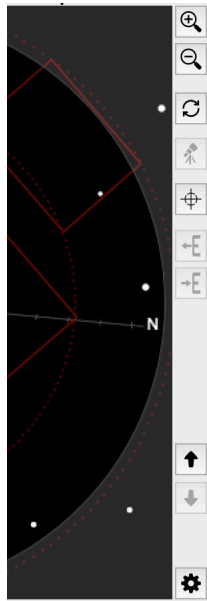


Figure 235: Field of view chart buttons

From top to bottom, these buttons are:

- **Zoom In.** Zoom in by a factor of 2 (i.e. halve the diameter of the chart), where possible.
- **Zoom Out.** Zoom out by a factor of 2 (i.e. double the diameter of the chart), where possible.
- **Refresh.** Force a refresh of the chart. This is rarely necessary.
- **Slew telescope.** If a telescope with a go-to mount is currently connected, slew the telescope to the coordinates of the centre of the chart.
- **Edit custom reticles.** Edit the custom reticles (see Section 11.5.13 on page 157).
- **Make the chart field the same as the external application's field.** If an external application has been specified, request the size and central coordinates of the application's chart field and, if successful, set the field of view chart to the same coordinates and size.
- **Make the external application's field the same as the chart field.** If an external application has been specified, request that the application set the size and central coordinates of its chart field to the same coordinates and size as the field of view chart.
- **Move UP the object list.** Select the previous object in the object list. If no object is currently selected, or the first object in the list is selected, then this button will be disabled. Clicking the button will select the previous object and redraw the chart.
- **Move DOWN the object list.** Select the next object in the object list. If no object is currently selected, or the last object in the list is selected, then this button will be disabled. Clicking the button will select the next object and redraw the chart.
- **Show the field of view preferences.** Show the field of view preferences (see Section 20.7 on page 327).

11.5.13 Custom reticles

Custom reticles are user-defined reticles that can be superimposed on the field of view chart, using the **Custom reticles** display option (see Reticles/FoVs on page 148). All editing of the custom reti-

cles is done via the Custom Reticles dialog. This is displayed via the **Edit custom reticles** button to the right of the field of view chart (see above).

The Custom Reticles dialog contains a list of defined reticles, each of which can be active or inactive via the associated checkbox (only active reticles will be displayed). Buttons underneath the list allow you to create new reticles, and delete or duplicate existing reticles.

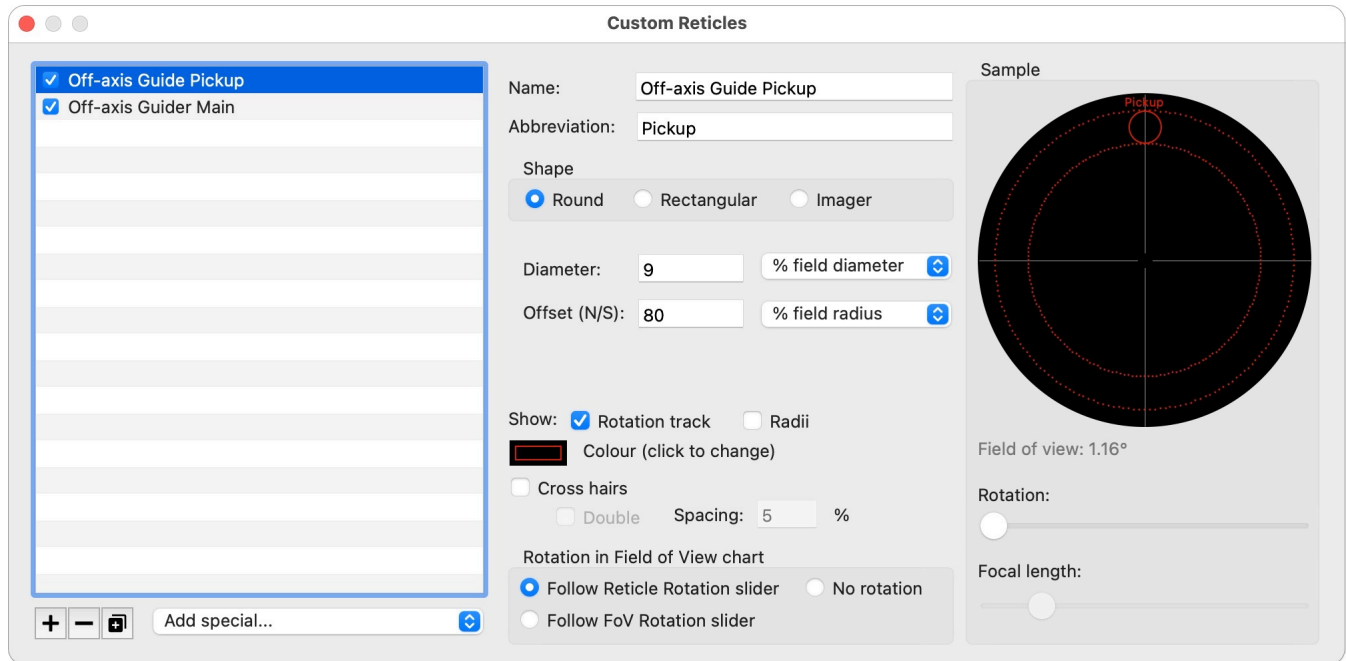


Figure 236: Edit a Round custom reticle

Custom reticles can be one of three types: Round, Rectangular, and Imager.

A **Round** reticle is defined by its angular diameter, or as a percentage of the field diameter or radius (Figure 236). It also has an optional offset from the centre of the field. These can be put to use as simple circular reticles, or as offset reticles (such as off-axis guider fields).

A **Rectangular** reticle is defined by its angular width and height (Figure 237). It also has an optional offset from the field of view centre.

An **Imager** reticle is defined by the physical width and height of the imager's sensor (in mm) (Figure 238). It also has an optional offset from the field of view centre. If an offset is specified it is assumed that the sensor is an off-axis star tracker and you can elect to show the track of the off-axis tracker when it is rotated, and the radii of the limits of the track (Figure 239). You can specify a telescope to determine the actual size of the reticle when drawn (it will be sized as if the imager sensor was placed at prime focus of that telescope). If you specify FoV Default then the reticle will be resized to match whatever telescope is currently selected for the field of view chart.

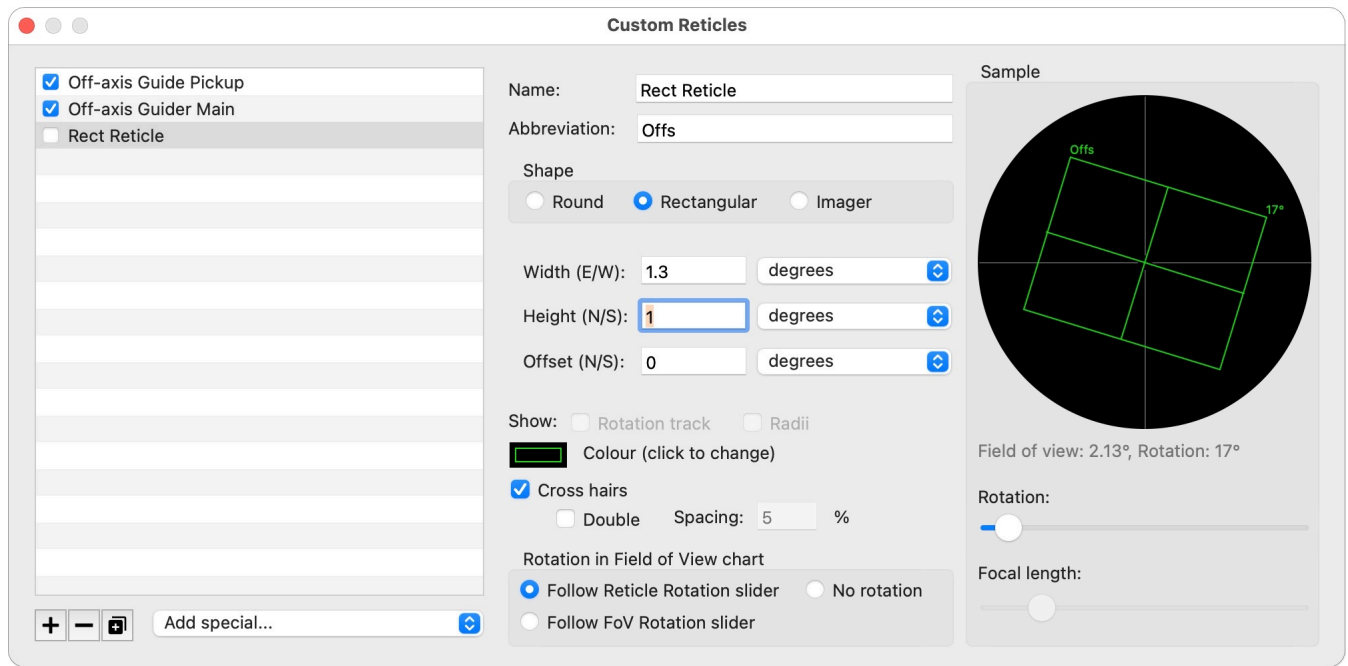


Figure 237: Edit a Rectangular custom reticle

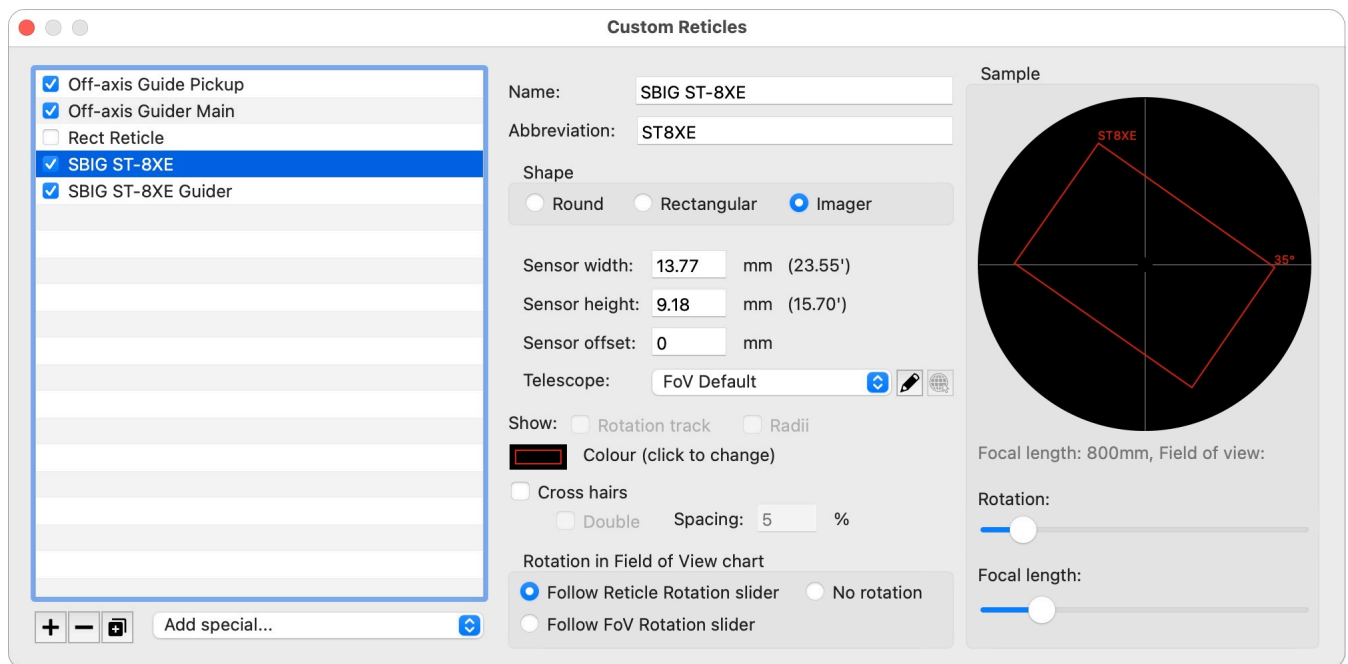


Figure 238: Edit an Imager custom reticle

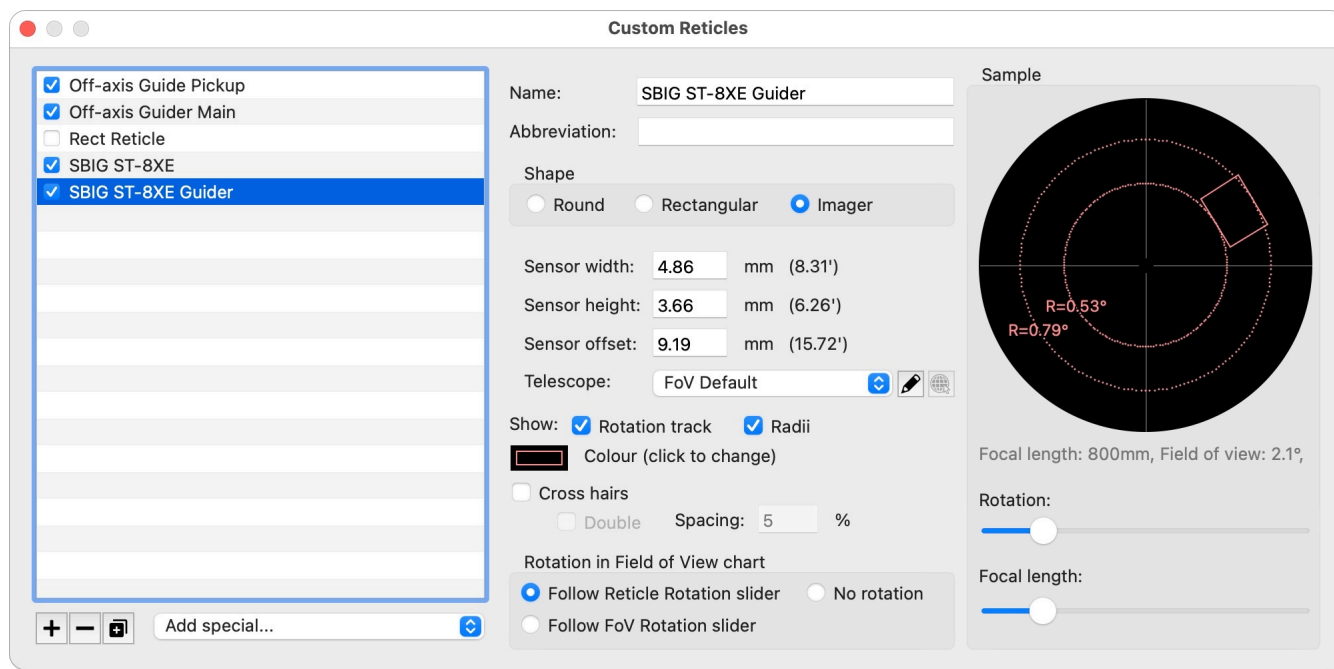


Figure 239: Offset image sensor example

Common items for all reticle types are:

- **Name.** Reticle name to be displayed in the list.
- **Abbreviation.** Abbreviated name to be displayed next to the reticle on the field of view chart.
- **Show: Rotation track.** Show the track an offset reticle will make when rotated around the centre of the field (Figure 239).
- **Show: Radii.** If a rotation track is shown, annotate it with the angular radii of the inside and outside of the track.
- **Colour.** The colour to be used to display the reticle in the field of view chart.
- **Cross hairs.** Check this if the reticle has cross hairs. If the cross hairs are double, then check the **Double** checkbox and enter the spacing of the hairs as a percentage of the reticle size.
- **Rotation in Field of View chart.** Custom reticles have three choices for rotation: Rotate with the Reticle Rotation slider, rotate with the FoV Angle slider, or no rotation. This is useful for, say, off-axis guiders where the pickoff mirror rotates separately from the main sensor/reticle. If you make your main imager reticle have "No rotation" and the pickoff mirror reticle have "Reticle rotation" then the pickoff mirror will be adjusted w.r.t. the imager using the Reticle Rotation slider. The FoV Rotation slider can be used to rotate the FoV under the main imager reticle for framing.
- **Add special.** A popup menu that allows you to add a new custom reticle based on any Imager resources, or a list of common Imager types (Figure 240).

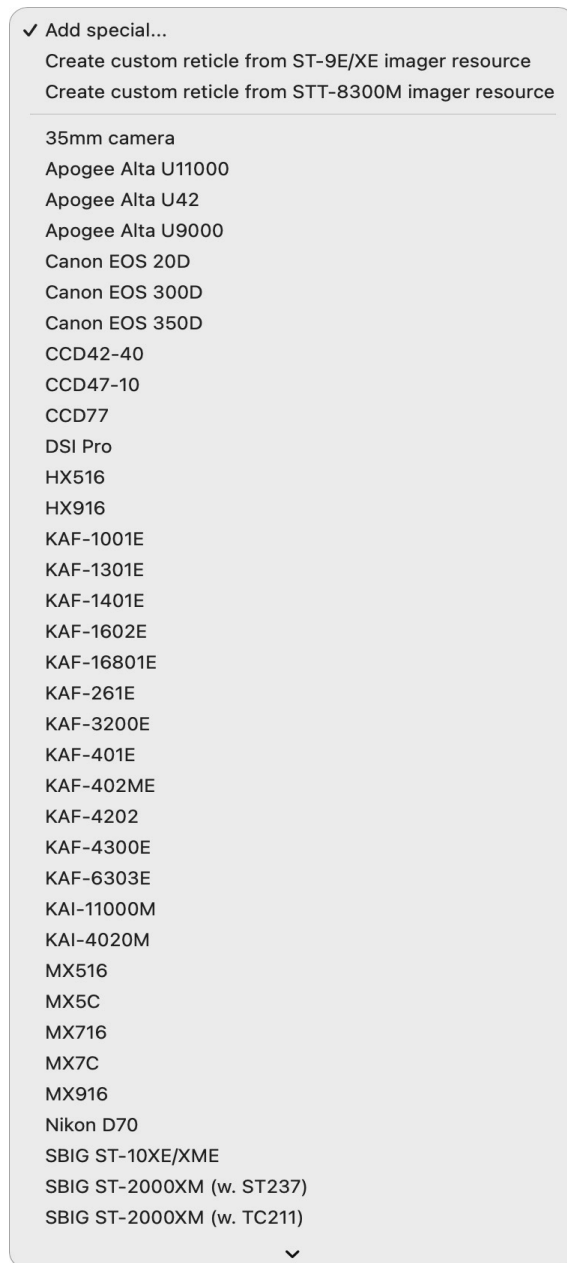


Figure 240: Pre-defined reticle list

11.6 Sky tab

The Sky tab displays an all-sky chart for the current local date/time at the current site.

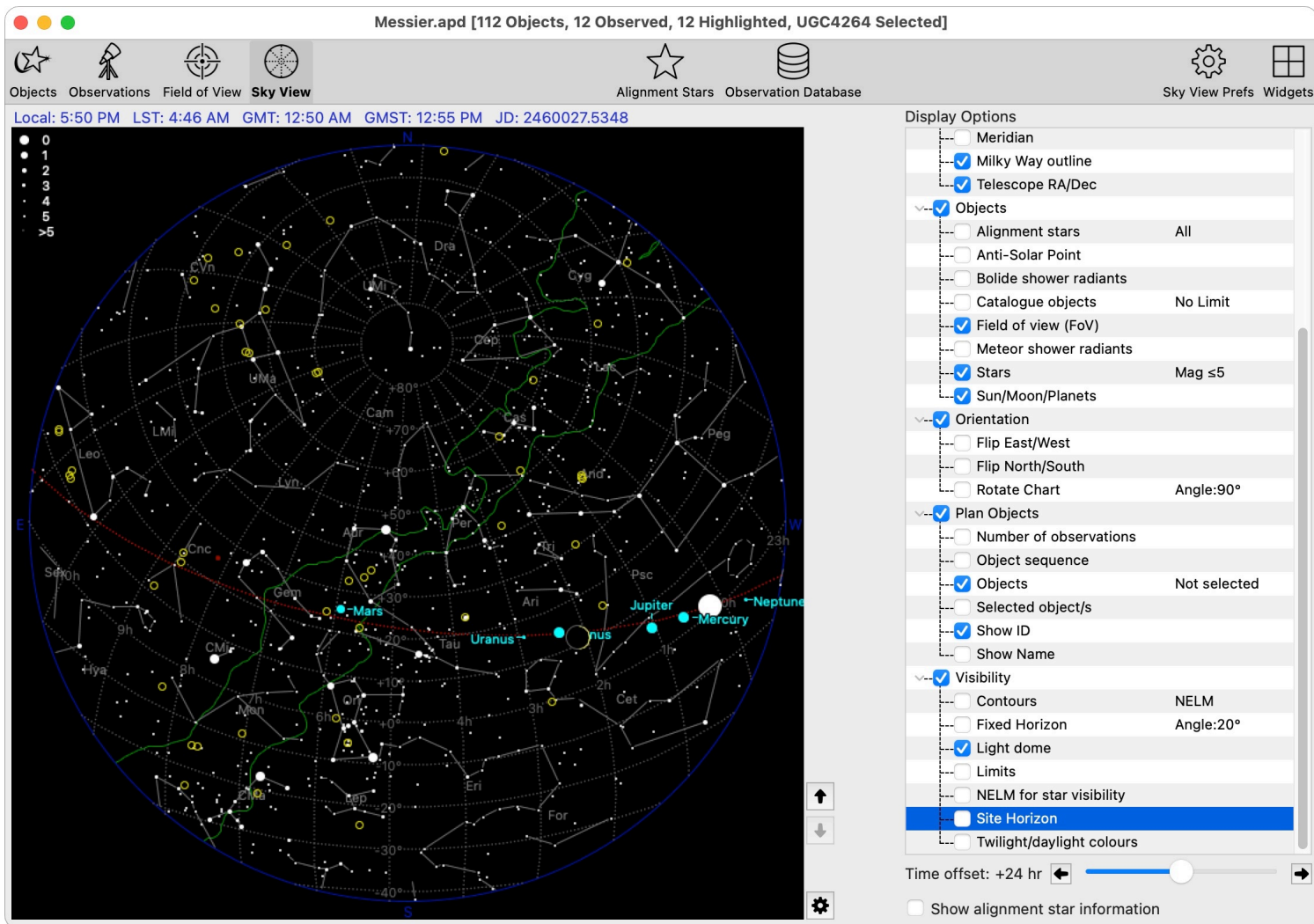


Figure 241: Sky tab

11.6.1 Sky chart

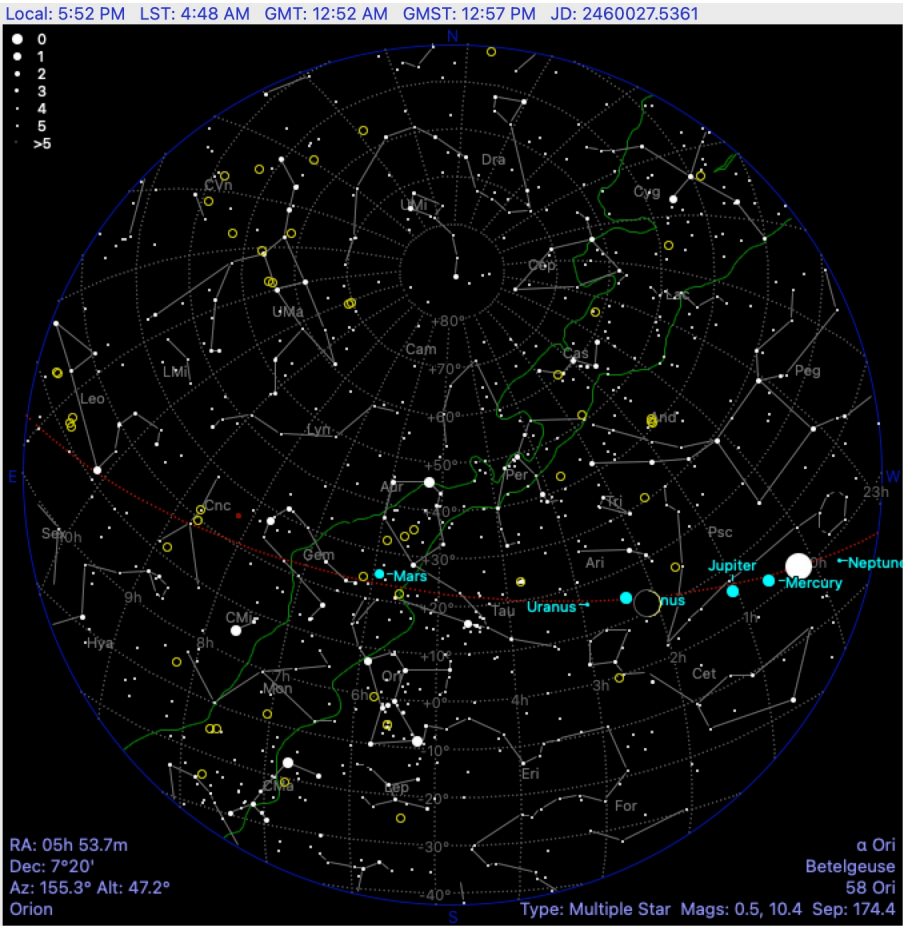


Figure 242: Sky chart

11.6.2 Display options

Display Options

☒ Constellations

☐ Borders

☒ Figures

☒ Names

☒ Lines

☐ Air Mass2

☐ Alt-Azimuth grid

☒ Ecliptic

☒ Equatorial grid

☐ Fixed AltitudeAngle:30°

☐ Galactic equator

☐ Meridian

☒ Milky Way outline

☒ Telescope RA/Dec

☒ Objects

☐ Alignment starsAll

☐ Anti-Solar Point

☐ Bolide shower radiants

☐ Catalogue objectsNo Limit

☒ Field of view (FoV)

☐ Meteor shower radiants

☒ StarsMag ≤5

☒ Sun/Moon/Planets

☒ Orientation

☐ Flip East/West

☐ Flip North/South

☐ Rotate ChartAngle:90°

☒ Plan Objects

☐ Number of observations

☐ Object sequence

☒ ObjectsNot selected

☐ Selected object/s

☒ Show ID

☐ Show Name

☒ Visibility

☐ ContoursNELM

☐ Fixed HorizonAngle:20°

☒ Light dome

☐ Limits

☐ NELM for star visibility

☐ Site Horizon

☐ Twilight/daylight colours

Figure 243: Display options

☒ Visibility

☐ ContoursNELM

☐ Fixed HorizonAngle:20°

☒ Light dome

☐ Limits

☐ NELM for star visibility

☐ Site Horizon

Angle for Fixed Horizon: 20

Figure 244: Select display option with associated value

Constellations

- **Borders.** Show the official constellation borders with grey dotted lines.
- **Figures.** Show the constellation figures (lines joining principal stars) using solid grey lines.

- **Names.** Show the constellation name 3-letter abbreviations.

External Catalogues

- **xxx cache coverage.** If you have one or more external catalogues with caching enabled (see Section 20.7.16 on page 331) then there will be an entry for each of those catalogues, with "xxx" replaced by the catalogue name. Using this option will show what parts of the sky are covered by cached data.

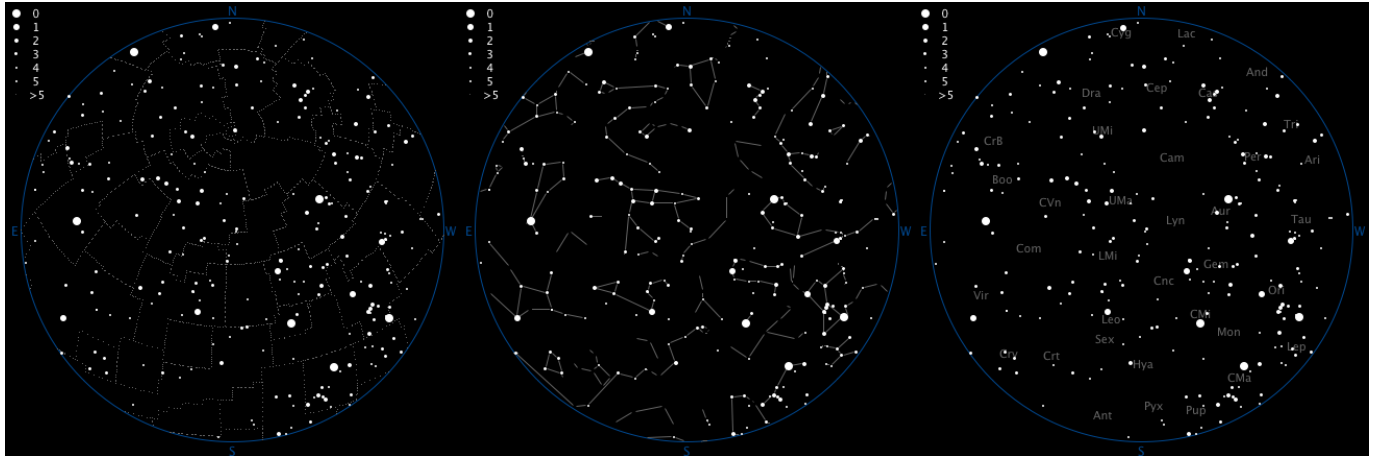


Figure 245: Constellations: Borders (left), Figures (middle), Names (right)

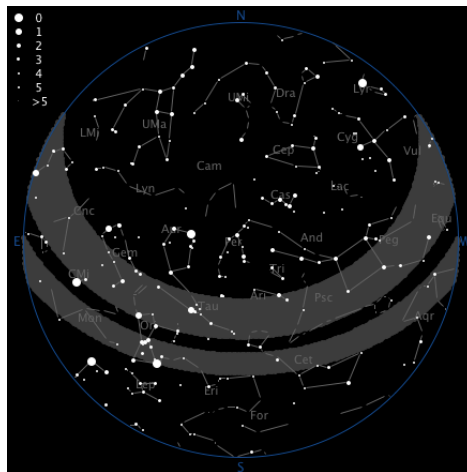


Figure 246: External catalogue cache coverage

Lines

- **Air Mass.** This option draws a dotted line at the altitude representing the given Air Mass. Select the entry and you can change the value just below the Display Options.
- **Alt-Azimuth grid.** Draws an alt-azimuth grid (i.e. grid of horizon coordinates)
- **Ecliptic.** This option draws a dotted line along the ecliptic (the plane of the Earth's orbit).

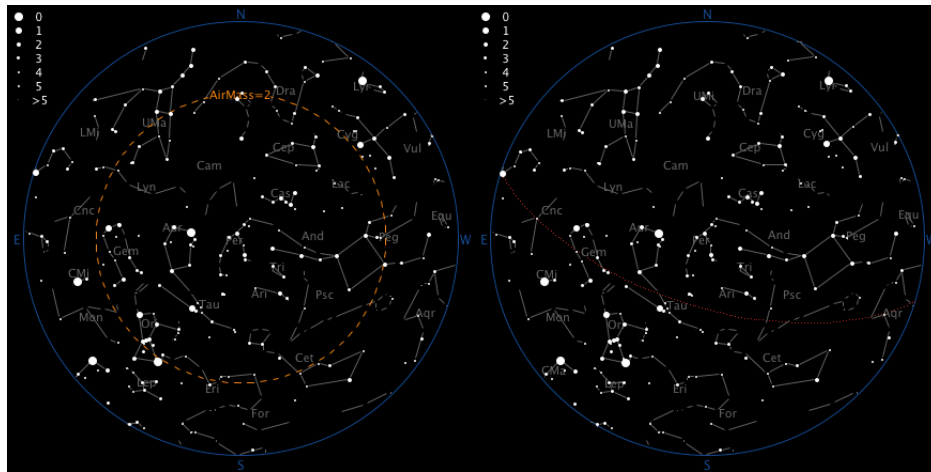


Figure 247: Air Mass line (left), and Ecliptic (right)

- **Equatorial grid.** Draws an equatorial grid (i.e. grid of equatorial coordinates: R.A. and Declination).

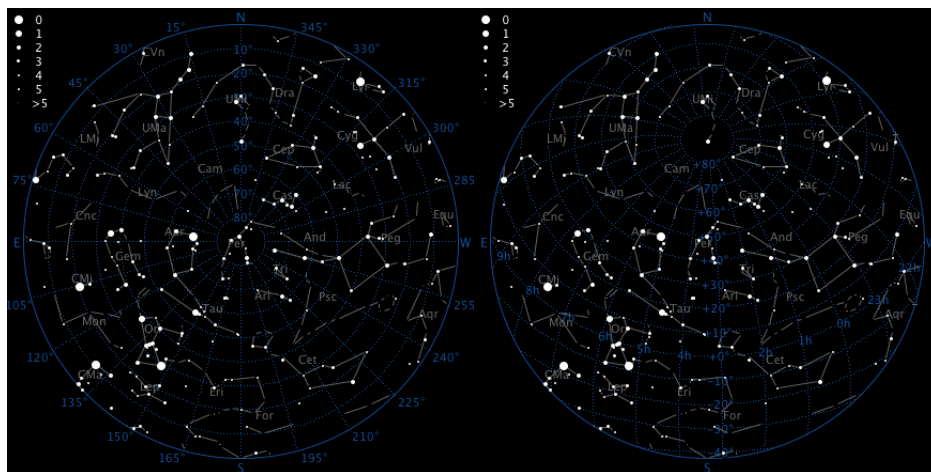


Figure 248: Alt-Azimuth grid (left), equatorial grid (right)

- **Fixed Altitude.** Draw a line at a given fixed altitude. Select the entry and you can change the value just below the Display Options.
- **Galactic equator.** Draw a dotted line showing the Milky Way galactic equator.
- **Meridian.** Draw a dashed line on the meridian (the great circle passing through both celestial poles).
- **Milky Way outline.** Draw solid lines showing the extent of the Milky Way.
- **Telescope RA/Dec.** Draw a small "gun sight" icon at the current pointing coordinates of your computerised telescope (assuming one is connected). If such a telescope is not connected, or is pointing below the horizon, then the icon is not displayed.

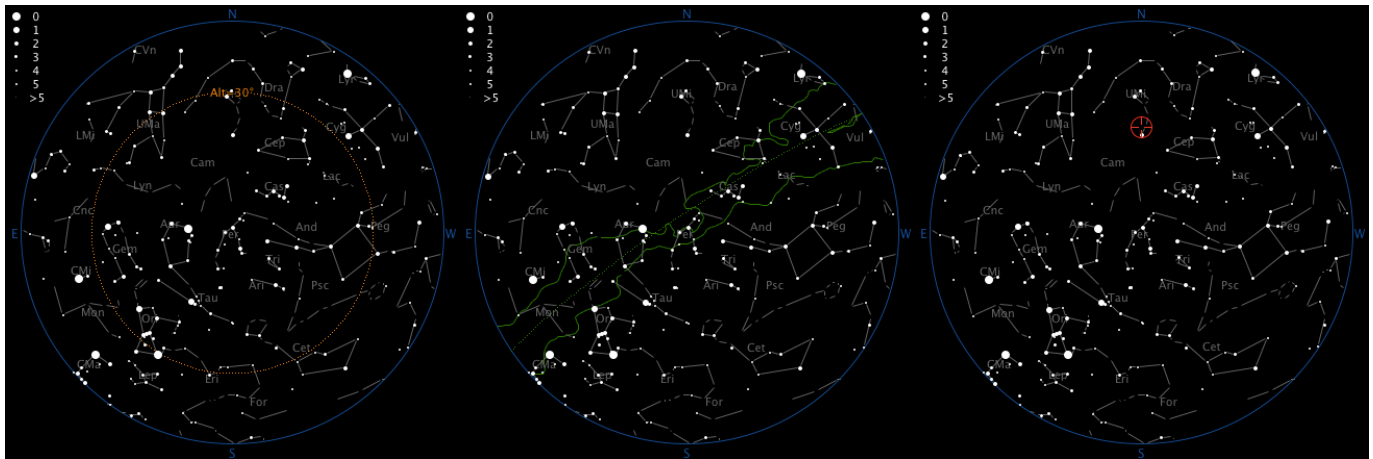


Figure 249: Fixed altitude (*left*), Milky Way outline and galactic equator (*centre*), Telescope RA/Dec (*right*)

Objects

- **Alignment stars.** Shows the alignment stars for the currently selected computerised telescope (where applicable). See Section 11.6.4 on page 171 for more information.
- **Bolide shower radiants.** Show the location of possible bolide showers using random lines emanating from the radiant coordinates.
- **Catalogue objects.** Show the position of selected catalogue objects on the chart (as small squares). All catalogues that have been marked as being displayable in the sky chart will be shown (see Section 23.3 on page 355 for details). The option has a magnitude limit value associated with it, and only catalogue objects brighter than that value will be selected for display. Select the entry and you can change the value just below the Display Options. **WARNING:** selecting catalogues with lots of objects might make this option take a *long* time to redraw.
- **Field of view (FoV).** Draw a circle showing the size and location of the Field of View chart if it is above the horizon. This might be virtually invisible if the Field of View is small.
- **Meteor shower radiants.** Show the location of possible meteor showers using random lines emanating from the radiant coordinates.

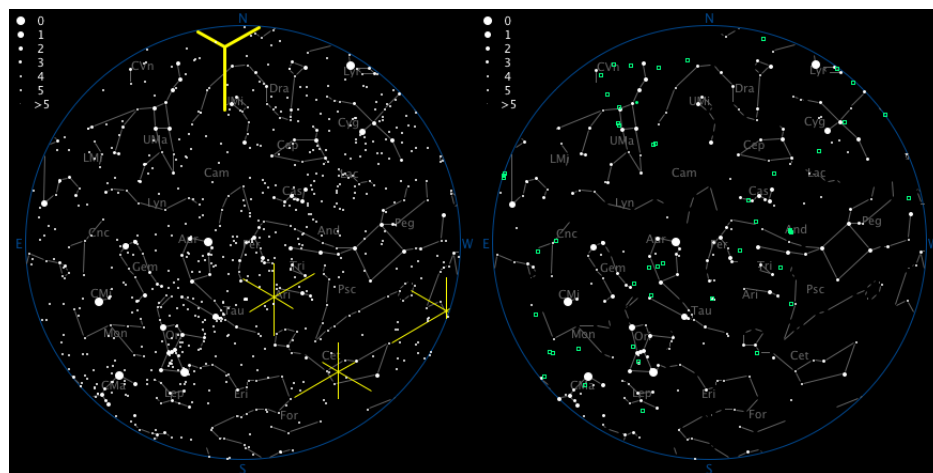


Figure 250: Bolide and meteor shower radiants (*left*), and Catalogue objects (Messier) (*right*)

- **Stars.** Switches on the display of stars (typically this will always be on). The catalogue used is the Bright Star catalogue, which includes stars down to about magnitude 6.5. The option includes a magnitude limit parameter. Only stars brighter than that value will be displayed. Select the entry and you can change the value just below the Display Options.
- **Sun/Moon/Planets.** Display the positions of the Sun, the Moon, and any visible planets.

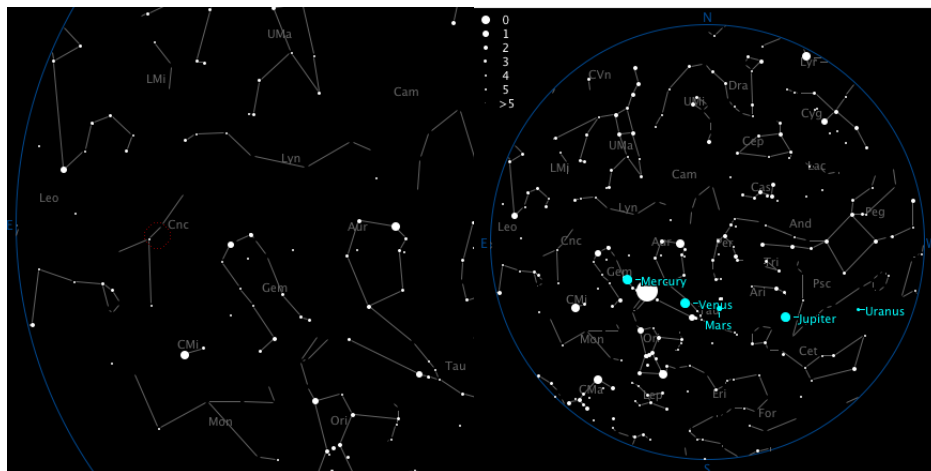


Figure 251: Field of view (5° around M44 in CnC here) (*left*), Sun/Moon/Planets (*right*)

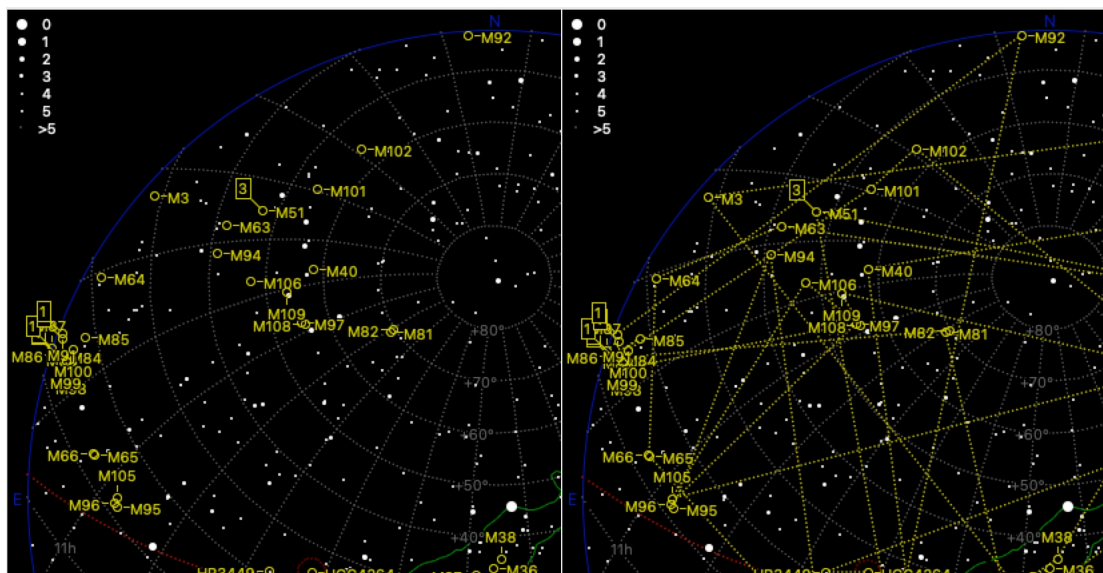
Orientation

- **Flip East/West.** Flip the chart horizontally.
- **Flip North/South.** Flip the chart vertically.
- **Rotate Chart.** Rotate the chart by an arbitrary amount. Useful if you, say, visualise the sky at 90° to the meridian (looking east or west) while observing.

Plan Objects

These options control the display of objects in the current plan.

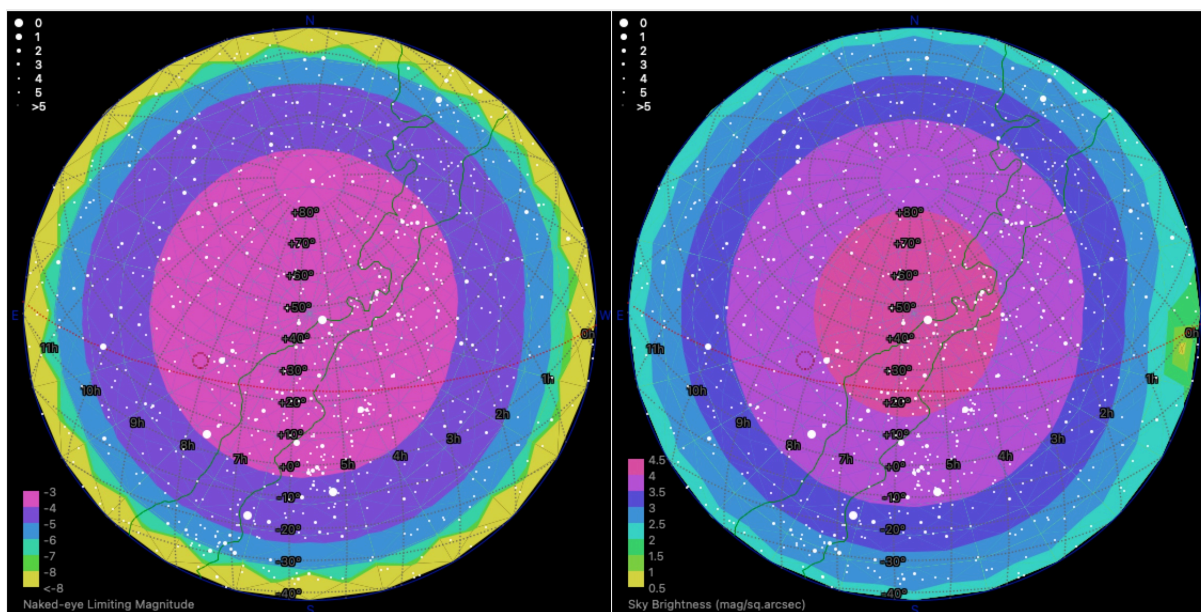
- **Number of observations.** If an object has associated observations then show the number of observations next to the object.
- **Object sequence.** Show the sequence of objects in the Object List by drawing a dotted line between each object in succession. This is mainly useful if you have sorted the objects using, say, a minimum slew sort, giving an idea of where you will be slewing the telescope.
- **Objects.** Show the plan objects as small open circles. If one or more objects are selected in the Object List, then they are shown as a filled circle with another circle surrounding each one. There is also a parameter allowing you to restrict the objects only to those that are selected, highlighted, observed, or not observed. Select the entry and you can change the value just below the Display Options.
- **Selected object/s.** If any objects are selected in the object list (in the Objects tab) then they are displayed in a magenta colour (by default).
- **Show ID.** Show the object ID next to the object.
- **Show Name.** Show the object Name next to the object.



Visibility

Visibility-related options for the Sky chart.

- **Contours.** Overlay contours on the sky chart showing current sky brightness conditions over the sky. The parameter allows displaying the brightness in terms of NELM (naked-eye limiting magnitude) or SB (sky brightness in nL or magnitudes/square arcsec). Select the entry and you can change the value just below the Display Options.



- **Fixed horizon.** Draw a fixed horizon (i.e. an area coloured up to the specified altitude). Select the entry and you can change the value just below the Display Options.
- **Light dome.** Show the current site's defined light dome/s (where applicable).

- **Limits.** If the currently-selected telescope has a computerised mount with defined slewing limits, colour the out-of-limit areas.
- **NELM for star visibility.** Use the NELM (naked-eye limiting magnitude) algorithm to determine which stars will be visible to the naked eye. i.e. none during daylight, some during twilight, most during complete darkness. Takes into effect horizon and moon conditions.

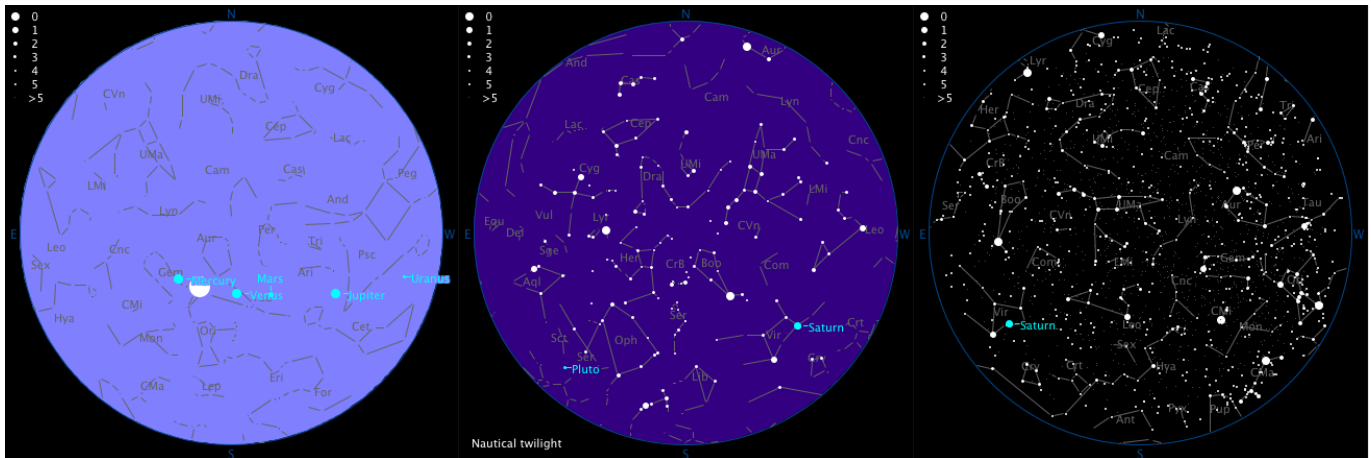


Figure 254: Using NELM for star visibility: daytime (*left*), nautical twilight (*centre*), total darkness with no moon (*right*)

- **Site horizon.** Show the current site's defined upper and lower horizons (where applicable).

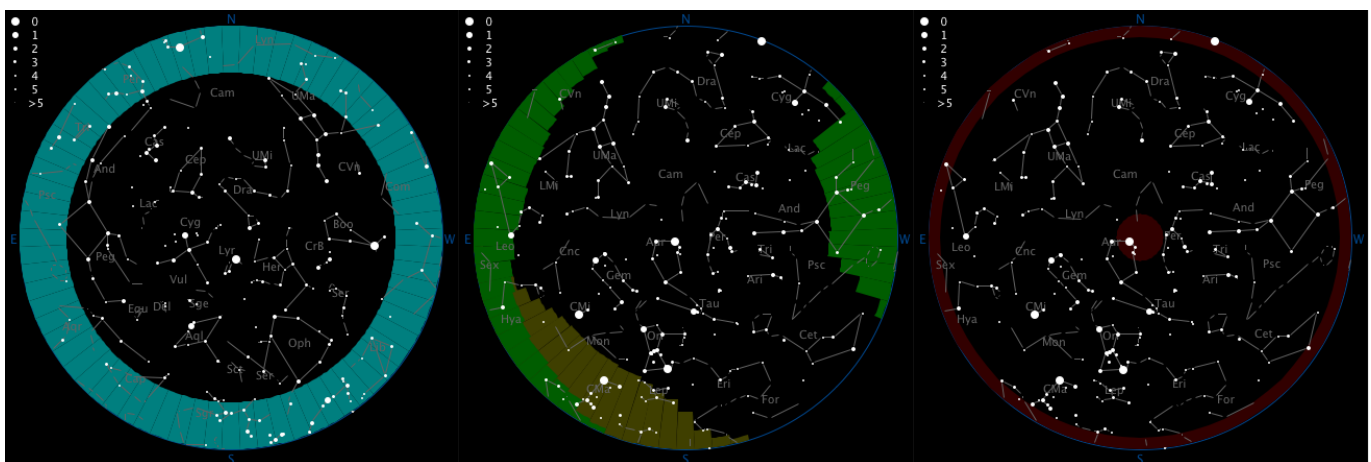


Figure 255: Fixed altitude (20°) (*left*), site horizon and light dome (*centre*), slewing limits (between 5° and 80° altitude) (*right*)

- **Twilight/daylight colours.** Colour the chart background with a colour representing the current time of day (i.e. day time, civil/nautical/astronomical twilight, and complete darkness).

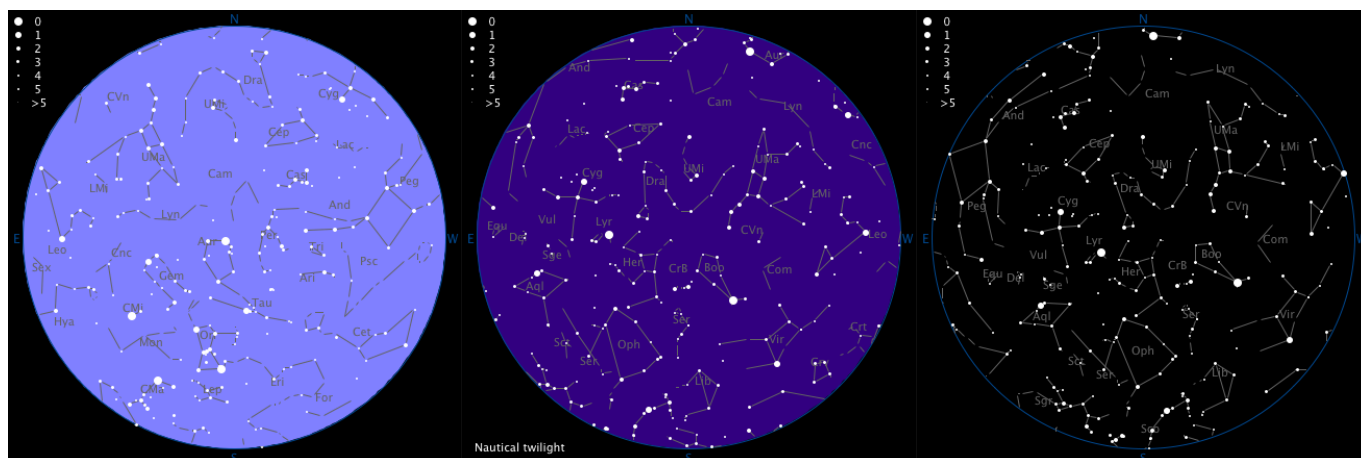


Figure 256: Using twilight/daylight colours: daytime (*left*), nautical twilight (*centre*), total darkness (*right*)

11.6.3 Time offset

The time offset slider allows you to select a time offset from the current local time (by up to 24 hours in either direction). This allows you to, for example, see the effects as the sun sets, moon rises, etc. without having to use the Fix Date feature.

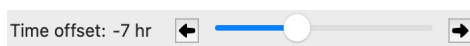


Figure 257: Time offset slider

11.6.4 Alignment stars

If you have selected a telescope, and that telescope has a computerised mount that defines a set of alignment stars ("standard" stars used by the telescope to perform initial alignment), then you can show those stars in the Sky tab, in both tabular form and on the chart if required.

Alignment star list

Use the **Show alignment star information** checkbox to display a table of the alignment stars for the telescope mount. This includes columns:

- **Name.** The common name of the alignment star.
- **Magnitude.** The magnitude of the alignment star.
- **Visible.** "Yes" if the star is currently above the horizon.
- **Reject.** Status of the star for inclusion as a candidate for use to perform an alignment. *Blank* if the star is not visible (and hence automatically rejected), **"Alt"** if the star is rejected because its altitude is too low or too high (as defined in the Sky preferences), **"Lim"** if the star is rejected because the telescope cannot slew to that position, **"Mag"** if the star is rejected because it is too dim (as defined in the Sky preferences), or **"Hor"** if the star is hidden by the site horizon. Otherwise a checkbox is included, and the star is not rejected unless that checkbox is checked.
- **Always.** Contains a checkbox that, if checked, will always reject that particular star.

Stars that are not visible, or are rejected are shown in a grey colour.

The **Show FoV** button is enabled if a row is selected. If clicked it will change to the Field of View tab and move the centre of the chart to the coordinates of the selected star.

The **Slew to Star** button is enabled if a row is selected, the selected star is visible, and a telescope with a Go-to mount is currently connected. If clicked it will slew the telescope to the coordinates of the selected star.

If you right-click the list, you can select **Add alignment stars to plan...** This lets you create a plan consisting of alignment star objects. You can specify what is placed in the ID and Name fields of the plan objects so created.

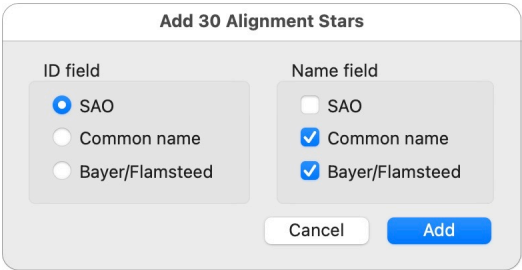


Figure 258: Add alignment stars to plan

Sky chart option

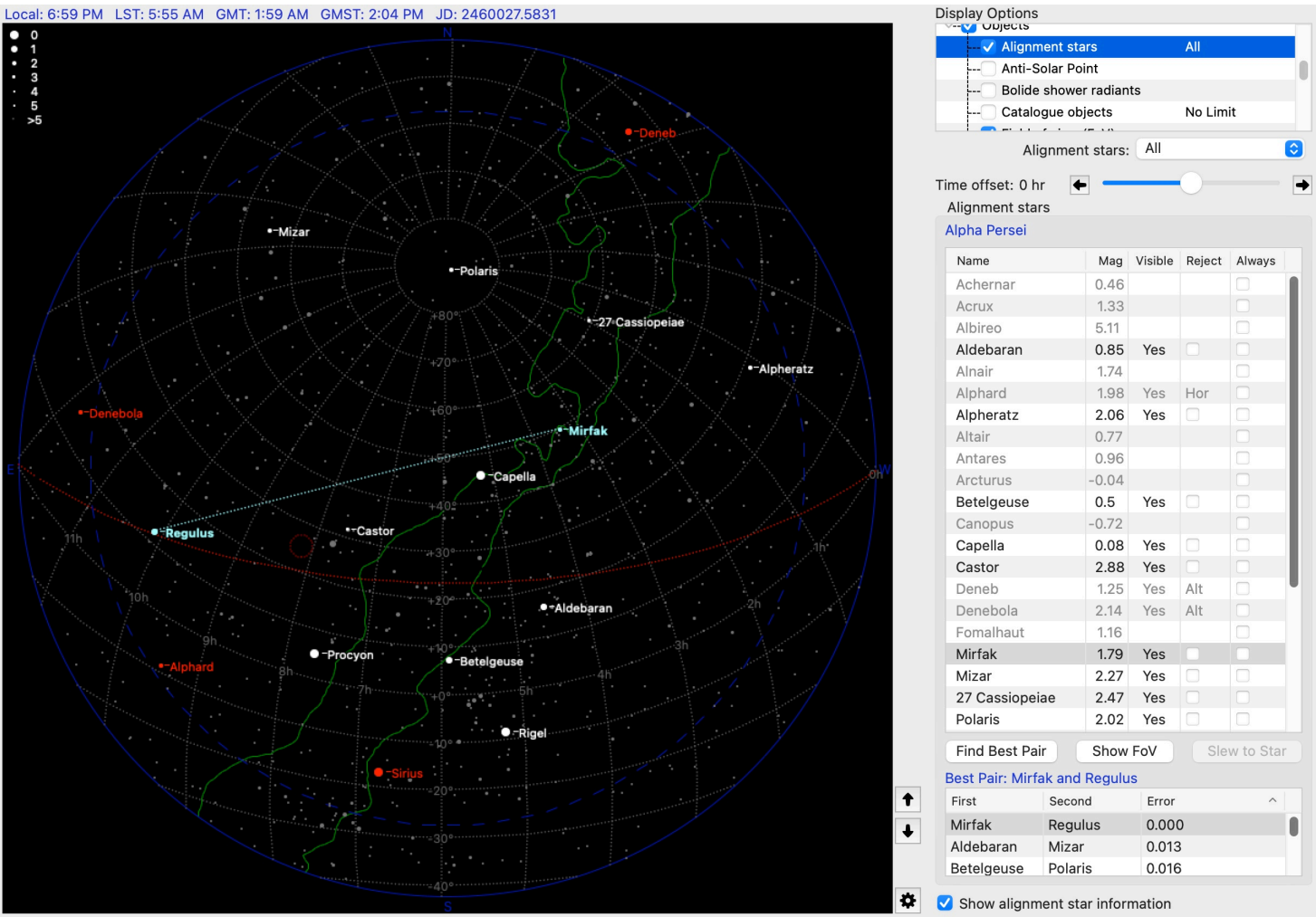


Figure 259: Alignment stars

If the **Display Options > Objects > Alignment stars** option is checked then:

- All stars except for the known alignment stars are dimmed.
- Lower and upper altitude limits (where applicable) for alignment stars are drawn.
- Any rejected alignment stars are displayed in red.
- If the alignment star selection algorithm has been used then the two stars selected in the best pair list are joined by a dotted line.

Alignment star selection

The button below the alignment star list to perform alignment star selection is labelled as **Find Best Pair**, **Find Pairs**, or **Find Triples**, depending on the type of algorithm selected in the Sky preferences. Clicking that button will run an algorithm to determine the best pairs or triples of alignment stars to use.

Once the algorithm has finished running, the results are displayed in the lower list, typically in descending order of "bestness".

Why not trust your telescope controller to make the choice?

In the case of the Meade LX200 (Classic) Alt-Az-mounted telescope (for which the Best Pair algorithm was specifically developed) the answer to this question is two-fold.

Firstly, the LX200 Classic controller makes you choose two stars from a list, and does not make any suggestions as to which pair will be the best candidates.

Secondly, the Meade engineers "forgot" to take into account atmospheric refraction for low-altitude stars, so it is best to avoid these.

For other telescope types, the need is not so clear. The controllers typically will make a choice of stars for you, and in most cases they are pretty good. However, empirical evidence seems to show that the Best Pair algorithm works even better at choosing optimum pairs of stars. The author has found that the following precautions are just as important to a good alignment than choosing the optimal pair of stars:

- Make sure the telescope mount is initially level (i.e. the top of the tripod is level) and the RA axis of the mount is pointing directly at the zenith. A bubble level will help.
- Make sure the scope optical tube is exactly level and pointing north (or south in the case of the LX200 Classic) before switching on.
- While aligning, make sure the alignment stars are exactly in the centre of the eyepiece field-of-view. Using a reticle eyepiece or defocussing the stars might help here.
- Choose alignment stars that are more than 90° apart wherever possible.

Rejecting potential star candidates

Each telescope controller has a list of preselected alignment stars it can use for alignments. These are typically (a) bright and (b) evenly spaced over the sky. However, some of these stars are better than others for various reasons. For the Best Pair algorithm to work to your best advantage you should arrange for some stars to be "rejected". Such stars fall into six categories:

1. **Non-visible stars.** These are rejected automatically by the algorithm since there is no way you can align on a star below the horizon.
2. **Low altitude stars.** Low altitude stars are typically non-optimal because of atmospheric refraction effects. These stars can be rejected automatically by setting the "Reject stars with al-

titude less than" check box in the Sky chart preferences. The default value of 15° will reject all stars with current altitudes less than that angle. This is optional.

3. **High altitude stars.** High altitude stars may not be reachable owing to mount limitations, etc. These stars can be rejected automatically by setting the "Reject stars with altitude greater than" check box in the Sky chart preferences. The default value of 75° will reject all stars with current altitudes greater than that angle. This is optional.
4. **Dim stars.** Dim alignment stars, especially at a light-polluted site, can be problematical. These stars can be rejected automatically by setting the "Reject stars with magnitude greater than" check box in the Sky chart preferences. This is optional.
5. **Slewing limitations.** Any stars that fall outside the slewing limits defined for the telescope mount will automatically be rejected.
6. **Non-optimally placed stars.** Some stars are not optimally placed. For example, Polaris can cause cord-wrapping problems if you slew to it from the wrong side in the case of the LX200 (Classic) telescope. Other stars might be temporarily hidden by a cloud or tree. These can be rejected by using the checkboxes in the alignment star list.

2- and 3-Star Polar Alignment

The algorithm used for two-star selection¹ is:

- *Choose two stars that are on the same side of the meridian, and at least 3 hours apart in RA and between 3° and 60° apart in Declination.*

For three-star selection:

- *For the first two alignment stars, follow the same guideline as choosing for the two- star alignment.*
- *For the third star, choose a star that is on the opposite side of the meridian from the first two stars. Both first alignment star and third alignment star should have an absolute value of 30° to 70° in Declination. If the first chosen star has a small Declination (< 30°), the Declination of the third star should be at least 50°.*

The algorithm does not find optimal pairs or triples, but merely those that fit the criteria above.

11.6.5 Sky chart buttons

These small buttons appear along the right side of the sky chart.



Figure 260: Sky chart buttons

From top to bottom, these buttons are:

1. Taken from the SynScan handbook

- **Move UP the object list.** Select the previous object in the object list. If no object is currently selected, or the first object in the list is selected, then this button will be disabled. Clicking the button will select the previous object and redraw the chart.
- **Move DOWN the object list.** Select the next object in the object list. If no object is currently selected, or the last object in the list is selected, then this button will be disabled. Clicking the button will select the next object and redraw the chart.
- **Sky chart preferences.** Show the sky chart preferences (see Section 20.8 on page 334).

11.7 Object list functions

Most of the functions that act on the object list, or on objects in that list, exist in the **Object** menu.

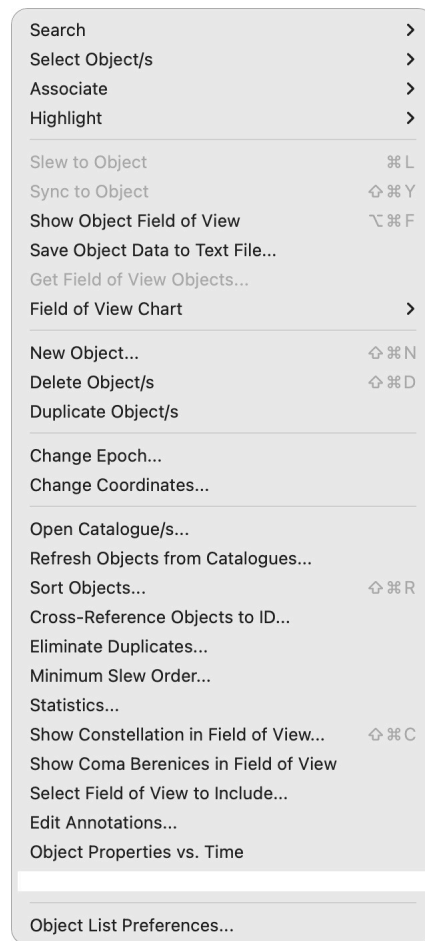


Figure 261: Object menu

11.7.1 Search

The **Search** submenu includes commands that search for object information.

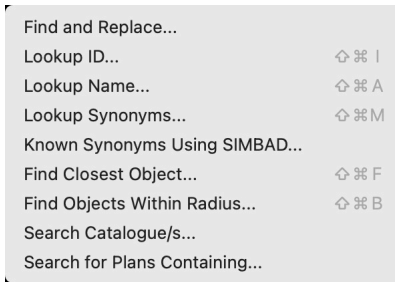


Figure 262: Object > Search menu

Find and Replace

This allows you to perform find and replace operations on the objects in your plan document.

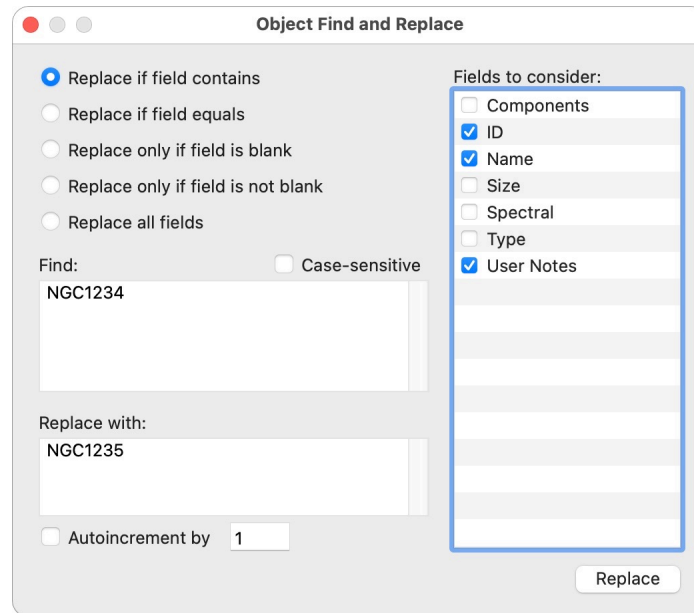


Figure 263: Find and Replace

The options are:

- **Replace if field contains.** This is the standard find and replace. If the field/s specified *contain* the **Find** field value within them, then that field is modified to contain the **Replace with** field value. If the **Case-sensitive** option is used the **Find** field must also match the case.
- **Replace if field equals.** If the entire field/s specified *equals* the **Find** field value, then that field is replaced with the **Replace with** field value. If the **Case-sensitive** option is used the **Find** field must also match the case.
- **Replace only if field is blank.** If the specified field/s are blank, then replace the field value with the **Replace with** field value. The **Find** field is ignored (and hidden).
- **Replace only if field is not blank.** If the specified field/s are not blank, then replace the field value with the **Replace with** field value. The **Find** field is ignored (and hidden).
- **Replace all fields.** All the specified field values are replaced with the **Replace with** field value. The **Find** field is ignored (and hidden).

If the **Replace with** field value ends with a digit or integer value, the the **Autoincrement** option is available. When this is used, each time an object's field value/s are replaced, the item in the **Replace with** field is incremented by the specified value before its next use.

Lookup ID

Lookup Name

Lookup the ID/Name of the selected object (in the object list) in the installed catalogues.

Firstly you are asked to select which catalogues to search (see Figure 264). The initial selection is all installed catalogues (apart from those that are marked as not searchable in the Catalogue Manager - see Section 23.3 on page 355). The buttons and popup menu underneath the list of catalogues allow you to select specific catalogues.

You can also specify to stop the search when the first match is found, or to continue looking for all matches.

If you are connected to the Internet, you can also elect to lookup the object using the SIMBAD astronomical database, by clicking the **SIMBAD** button. In this case, the installed catalogues will be ignored.

The **Cross-index ID fields** option, if checked, will recursively check all synonym IDs found during the initial search, all synonyms found during the subsequent search, etc., until all synonyms have been found. This is an exhaustive search, but you need to be aware that it can (a) take time to complete, and (b) produce "false positives".

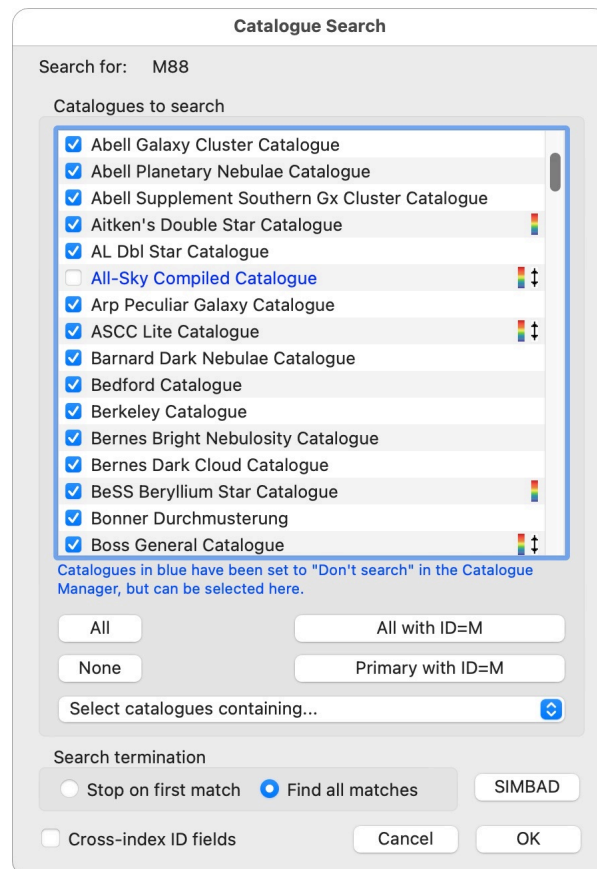


Figure 264: Catalogue selection for Lookup

If no object was selected, or if the ID field of the selected object is empty, you are prompted to enter text for the search (Figure 265). You can type one or more search terms, separated by commas on the same line, or using multiple lines. Ranges of IDs can be specified using "...", e.g. the term "M56...71" will search for M56, M57, M58,..., M70, M71.

If you define a Prefix, then that will be prefixed to each search item (e.g. if you are searching for a lot of NGC objects, just enter the object numbers and make the prefix "NGC"). Similarly for the Suffix.

The **Recall Last** button will set the text to the last lookup you performed, if applicable.

The **Double Star IDs** button displays a list of well-known and historical double star observer IDs, and also shows the availability of double star observations in the Washington Double Star (WDS) catalogue for each observer.

The results of any search is displayed in the search results window

Lookup Items

Paste or type item/s, separated by new lines, tabs, and/or commas. Ranges of integers permitted using "...", e.g. NGC1350...1375

m32
M33
M56...71

Prefix: Prefix and suffix are added to beginning and end of each item above

☐ Only on numeric items

Suffix:

☐ Only on numeric items

> Guides

Double Star IDs Recall Last Cancel OK

Figure 265: Item selection for blank/unselected Lookup

Double Star IDs

Last updated: 2021-12-23 11:50:15

WDS ID	Name	WDS Availability	Entries
DOM	Dommanget, J.	DOM1 to DOM2	2
DON	Donner, H.F.	DON1 to DON999	1,024
DOO	Doolittle, E.	DOO1 to DOO95	105
DOR	Dorpat Obs. (from additional DD list)	DOR1 to DOR66	3
DOU	Doubiago, D.		
DOW	Downing, A.M.W.		
DQE	Duque, J.		
DRD	Durand, P.	DRD1 to DRD2	2
DRE	Dressing, C.D., Adams, E.R., Dupree, A.K., Kulesa, C., & ...		
DRK	Darling, K., Santo, T., Veloz, M., Walker, D. & Harshaw, R.		
DRN	Da Rio, N., Robberto, M., Soderblom, D.R., Panagia, N., H...	DRN1 to DRN4	4
DRS	De Rosa, R.J., Bulger, J., Patience, J., Leland, B., Macinto...	DRS1 to DRS71	76
DRU	Drummond, J.D., Christou, J.C., & Fugate, R.Q.		
DSC	Demetrescu, G.		
DSG	DSSI-Gemini (see Hor2012b)	DSG1 to DSG20	21
DSH	Hall, D.S., Barksdale, W.S., Currott, D.R., Diethelm-Sutter, ...		
DSL	da Silva, A.		
DTR	Detre, L.		

Figure 266: Double Star IDs

The **Guides** widget can be toggled to display some useful aids to entering ID data (Figure 267). The left hand table contains the symbols of the Greek alphabet. Clicking on a symbol enters the 2- or 3-character abbreviation for that symbol. The centre table lists some common double-star discoverer IDs. Clicking an ID will enter the correct alphabetic prefix as used in the WDS catalogue name field.

The **Constellation abbreviation** popup inserts the three-character abbreviation for the selected constellation. **Common stars** lists common names of stars, and when selected will insert the Bayer ID or SAO ID into the ID field. **Common deep-sky objects** lists common names of deep-sky objects and asterisms, and when selected will insert a suitable ID for searching into the ID field.

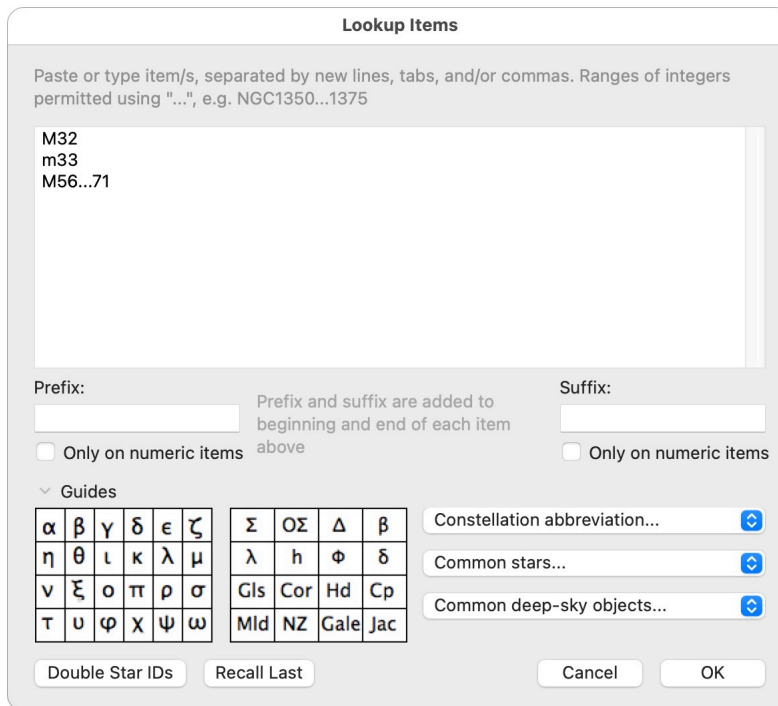


Figure 267: Dialog with Guides revealed

Lookup Synonyms

This feature searches all installed catalogues to find all objects at, or very close to, the RA/Dec coordinates of the selected object. Section 20.1.7 on page 314 describes the preference to determine how close an object must be to the RA/Dec coordinates for it to be considered synonymous.

Note that this feature ignores the ID or Type of the object.

This is a convenient way to find a catalogue object if you don't know the ID.

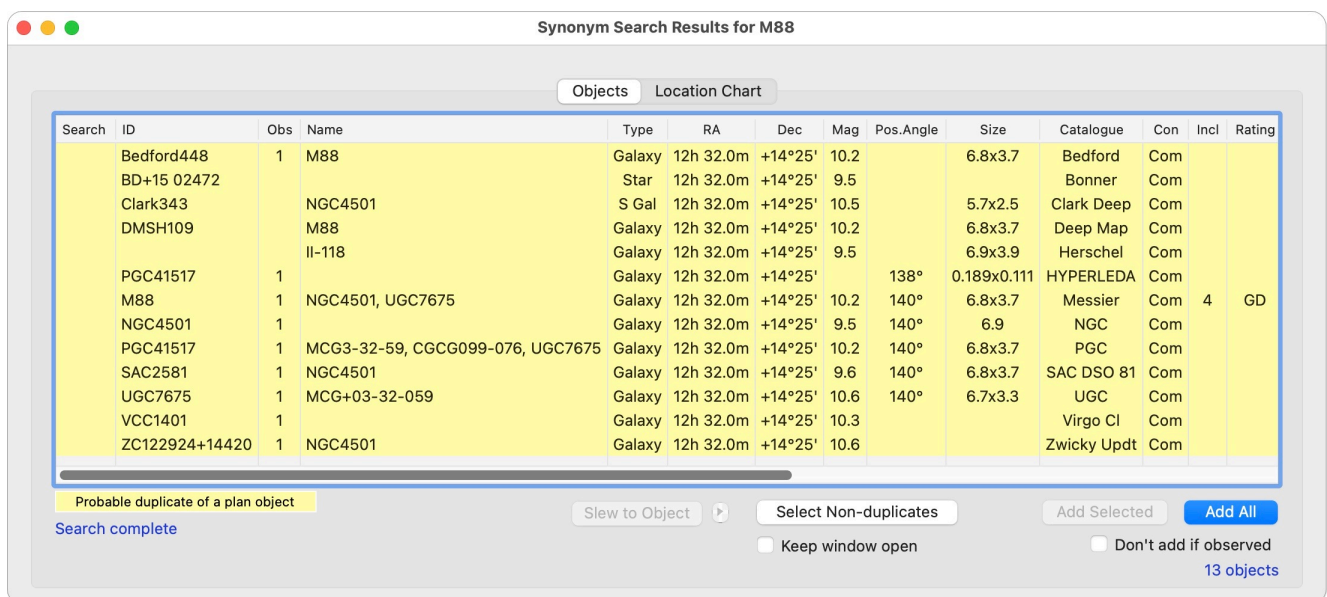


Figure 268: Lookup Synonyms results (for M88)

Known synonyms using SIMBAD

A dialog will appear showing the known synonyms for the selected object. This feature looks up the ID in the on-line SIMBAD database. It requires on-line Internet access.

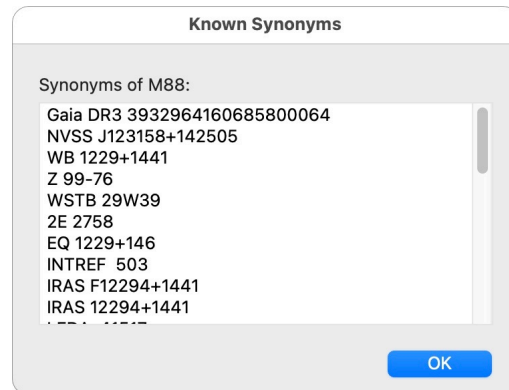


Figure 269: Known synonyms (of M88) using SIMBAD

Find Closest Object

Find the closest object to the selected object in the object list, in a selected catalogue or catalogues. To be considered, any found object must be within the specified **Search radius** (default 0.5°) from the selected object. If the Include plan objects option is used then the other objects in the plan will be considered as well as those in the selected catalogues.

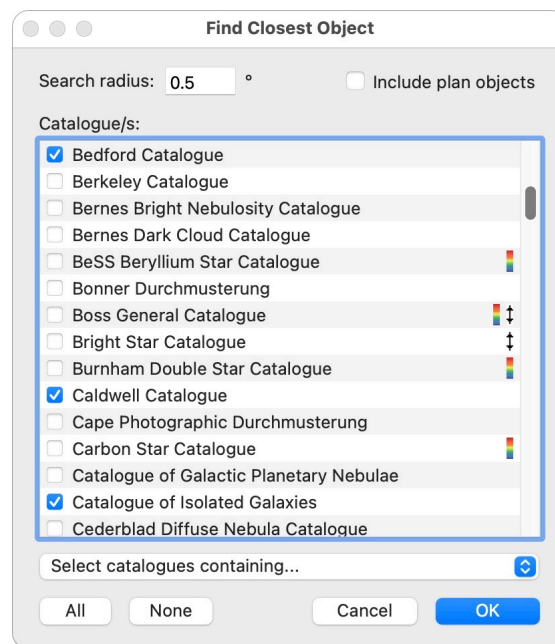


Figure 270: Find Closest Object

Find Objects within Radius

Searches selected catalogues for *all* objects within a given angular radius of the selected object. The user interface is identical to the **Find Closest Object** feature above.

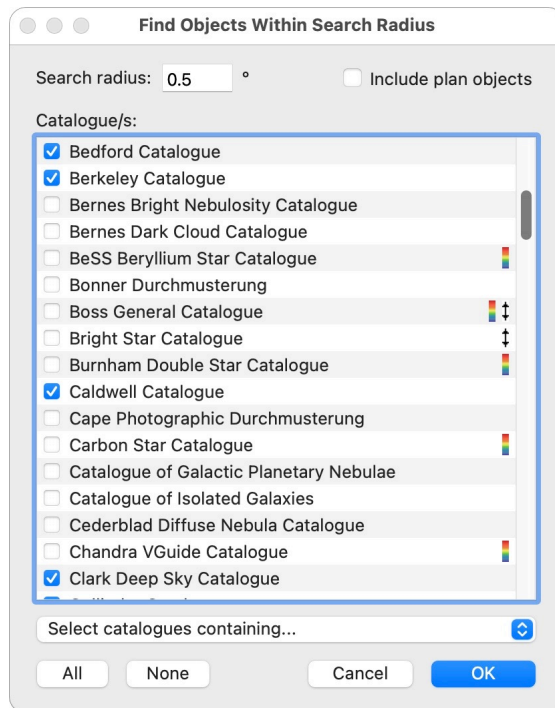


Figure 271: Find objects within radius

Search Catalogue/s

This performs the same catalogue search described in Section 10.1.3 on page 79.

Search for Plans Containing

This searches a given folder hierarchy for all plan documents that contain a given search term.

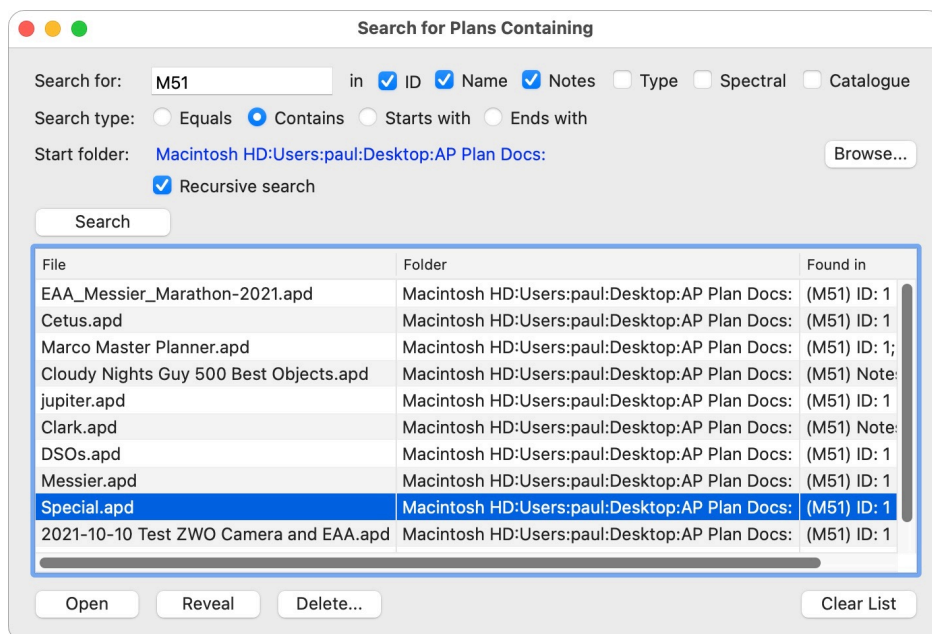


Figure 272: Search for plans containing M51

You specify the search term to look for in a plan document (in the example here it is "M51")

You can specify which plan document fields to search (in the example here the ID, Name and Notes fields are considered).

You can specify whether the search term has to match the field exactly, is contained in the field, etc.

You specify the root folder to start the search in. If you check the **Recursive search** checkbox then the folder and all of its sub-folders will be searched.

Click the **Search** button to start the search. While the search proceeds, any plan documents found that meet the search criteria will be added to the list.

Once the search is complete, you can select a plan and open it (**Open** button), reveal it in the Finder (Mac) or Windows Explorer (Windows) using the **Reveal** button, or delete the document from disk using the **Delete...** button. The **Clear List** button will remove all the list entries if you want to do another search.

11.7.2 Select Object

These are menu items to navigate through the object list. You'll probably never use them (since clicking with a mouse or using the arrow keys is easier), but they are there with their corresponding keyboard shortcuts which might prove useful.

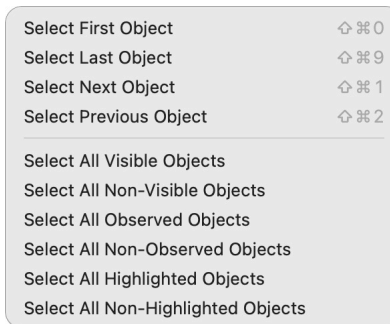


Figure 273: Object > Select Object menu

Select First Object

Select the first object in the object list.

Select Last Object

Select the last object in the object list.

Select Next Object

Select the next object in the object list, unless you are at the last object.

Select Previous Object

Select the previous object in the object list, unless you are at the first object.

Select All Visible Objects

Select all objects in the object list that are currently visible.

Select All Non-Visible Objects

Select all objects in the object list that are currently *not* visible.

Select All Observed Objects

Select all objects in the object list that have at least one associated observation logged.

Select All Non-Observed Objects

Select all objects in the object list that have not yet been observed (i.e. have no logged observations).

Select All Highlighted Objects

Select all objects in the object list that are currently highlighted.

Select All Non-Highlighted Objects

Select all objects in the object list that are currently *not* highlighted.

11.7.3 Associate

This submenu deals with object associations. This process is explained in detail in Section 18.2 on page 302.



Associate Selected Objects
Disassociate Selected Object/s

Figure 274: Object > Associate menu

Associate Selected Objects

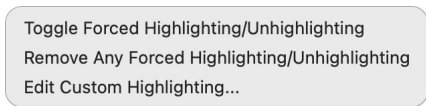
If more than one object is selected, then associate those objects together.

Disassociate Selected Object/s

If one or more objects are selected and one or more of them is part of an association, then remove those objects from any associations.

11.7.4 Highlight

This submenu deals with object highlighting. This process is explained in detail in Section 18.1 on page 298.



Toggle Forced Highlighting/Unhighlighting
Remove Any Forced Highlighting/Unhighlighting
Edit Custom Highlighting...

Figure 275: Object > Highlight menu

Toggle Forced Highlighting/Unhighlighting

If the selected object is not highlighted, then it will be Force Highlighted. If it is Force Highlighted then that will be removed.

If the selected object is highlighted, then it will be Force Unhighlighted. If it is Force Unhighlighted then that will be removed (and it will revert to being highlighted).

Remove Any Forced Highlighting/Unhighlighting

Any selected objects that are either Force Highlighted or Force Unhighlighted will have that status removed.

Edit Custom Highlighting...

Allows you to edit the custom highlighting rules. See Section 18.1.3 on page 299 for more details.

11.7.5 Slew to Object

If the selected object is visible (i.e. not below the horizon), a go-to telescope is connected, and the object coordinates are within the mount's set limits (where applicable), then this will slew the telescope to the object's coordinates. Performs the same action as the ***Slew to Object*** button.

11.7.6 Sync to Object

If the selected object was slewed to, this will sync the mount to the object's coordinates. Performs the same action as the *Sync to Object* button.

11.7.7 Show Object Field of View

Switches to the Field of View tab, and redraws the chart with the selected object centred. Performs the same action as clicking to select the Field of View tab using the mouse.

11.7.8 Save Object Data to Text File

Saves the text from the the selected object to a text file. The file consists of one line per column, with the column heading and the value separated by a comma. e.g.

```
ID, M88
Images, D
Name, NGC4501, UGC7675
Type, Galaxy
RA, 12h 31m 59s
Dec, +14°25.2'
Azimuth, 311°
Altitude, -14°
Rise, 9:15 PM
Transit, 1:32 AM
Set, 6:58 AM
Obs, 1
ODM, 32x
Mag, 10.2
Size, 6.8x3.7
Const, Com
Catalogue, Messier
HJD, +0.00553
Hr Angle, 08:43 W
Chart#, 6
SB, 22.3
PosAngle, 140
LOC, 0.8
Transit Date, 4/17/2023
Moon, 124°
Sun, 163°
Transit Alt, 57°
Found, Yes
Prob, > 98%
Par Angle, 31.7°
Level, 2
Obsvbty, 0.0
Best Time, 1:30 AM
G.Lat, 77°
G.Long, 282°
E.Lat, 16°
E.Long, 181°
Best EP, 12.5mm + CCDT67 Telecompressor or 24mm
Best Mag, 32
Dk Start, 9:14 PM
Dk End, 4:59 AM
Dk Dur, 7.7
Opposition, 4/17/2023
Catalogue Notes, Rating: GD, Incl: 4
Best AMag, 10.5
```

11.7.9 Field of View Chart sub-menu

Valid if the Field of View tab is selected. This sub-menu contains Zoom In and Zoom Out menu commands (and associated keyboard equivalents). The commands perform the same function as the zoom buttons at the top right of the Field of View chart.

11.7.10 New Object...

Creates a new object in the object list. Operates the same as clicking the button under the object list. See Section 10.1.1 on page 75 for details.

11.7.11 Delete Object/s

Deletes the selected objects from the object list.

11.7.12 Duplicate Object/s

Makes duplicates of the selected object or objects. You can then edit those duplicate entries manually.

11.7.13 Change Epoch

All AstroPlanner objects are assumed to be in Epoch J2000.0 RA/Dec coordinates. i.e. the coordinates that they would have had on 1/1/2000. This is a common epoch and you'll find that the coordinates of most object data that you'll find on-line or in books are from this epoch. However, occasionally you'll find older data that are in the coordinate system from another epoch (B1950 is relatively common) or the current epoch (JNow). In order to match up the coordinates, they need to be precessed to the J2000.0 epoch. This command will allow you to do that.

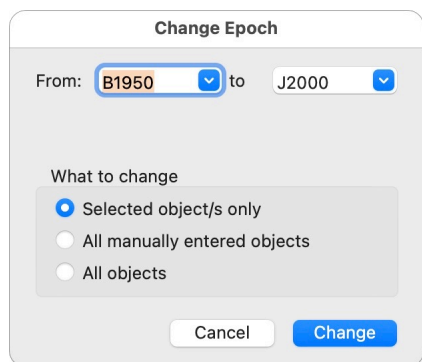
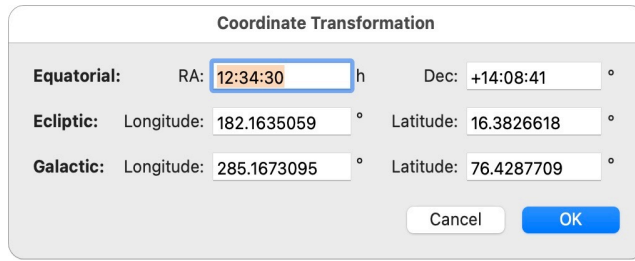


Figure 276: Change Epoch dialog

You can choose to change the epoch for the selected objects or all objects. You can also specify to change the epoch for manually entered objects only (all objects in AstroPlanner catalogues are J2000.0, and so should **never** need precessing to J2000.0).

11.7.14 Change Coordinates

If you want to change the RA/Dec (Equatorial) coordinates of an object, you just edit in the new ones. However, if you have coordinates for the object in Ecliptic or Galactic coordinates, you can use this convenient feature to convert the coordinates to equatorial.



Coordinate Transformation

Equatorial: RA: 12:34:30 h Dec: +14:08:41 °

Ecliptic: Longitude: 182.1635059 ° Latitude: 16.3826618 °

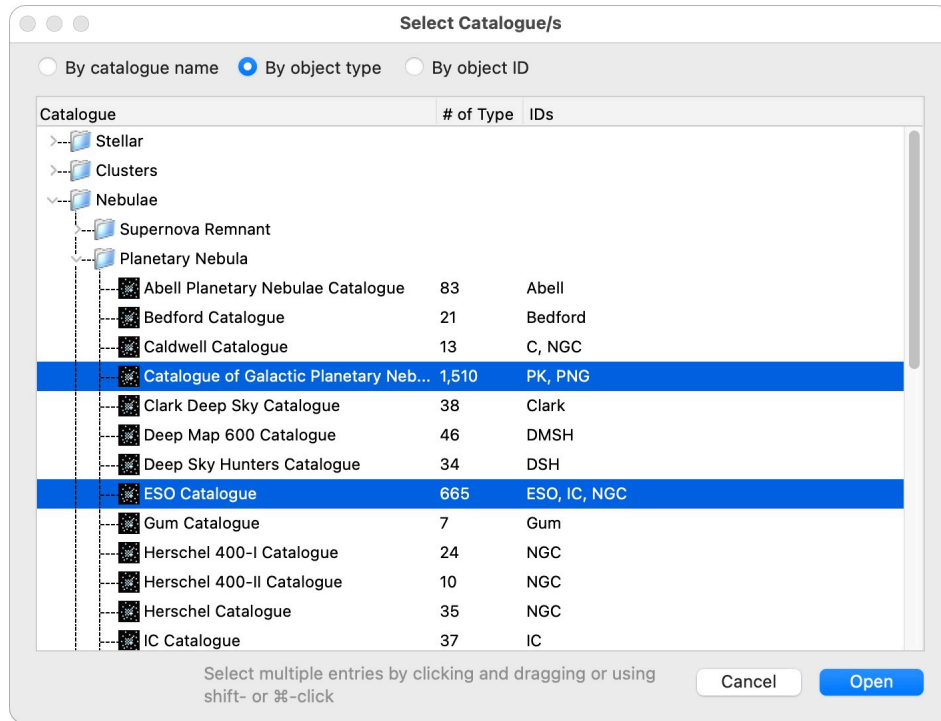
Galactic: Longitude: 285.1673095 ° Latitude: 76.4287709 °

Cancel OK

Figure 277: Change coordinates dialog

11.7.15 Open Catalogue/s...

Open one or more Catalogue windows, using the catalogue chooser dialog. This is the same as using the **Show Catalogue** button under the object list and selecting **Choose from a list...**



Select Catalogue/s

☐ By catalogue name ☒ By object type ☐ By object ID

Catalogue	# of Type	IDs
Stellar		
Clusters		
Nebulae		
Supernova Remnant		
Planetary Nebula		
Abell Planetary Nebulae Catalogue	83	Abell
Bedford Catalogue	21	Bedford
Caldwell Catalogue	13	C, NGC
Catalogue of Galactic Planetary Neb...	1,510	PK, PNG
Clark Deep Sky Catalogue	38	Clark
Deep Map 600 Catalogue	46	DMSH
Deep Sky Hunters Catalogue	34	DSH
ESO Catalogue	665	ESO, IC, NGC
Gum Catalogue	7	Gum
Herschel 400-I Catalogue	24	NGC
Herschel 400-II Catalogue	10	NGC
Herschel Catalogue	35	NGC
IC Catalogue	37	IC

Select multiple entries by clicking and dragging or using shift- or ⌘-click

Cancel Open

Figure 278: Open Catalogue/s

11.7.16 Refresh Objects from Catalogues

If you create plan objects and modify them, you might at a later stage wish to restore one or more of the modified fields from the original catalogue entries. If you have comet or minor planet objects in your plan, you might wish to update their orbital elements from the latest catalogues.

Object > Refresh Objects from Catalogues... allows you to select which objects you want to update in the plan document and which fields are to be updated/restored to the catalogue values.

In the event that the original catalogue is no longer available, or the object was originally added manually, you can also specify what to do: ignore the object, find a catalogue containing the ID of the object and use that, or use a specific catalogue to lookup the ID.

You can also specify if you want to update any comet or minor planet objects found in the plan.

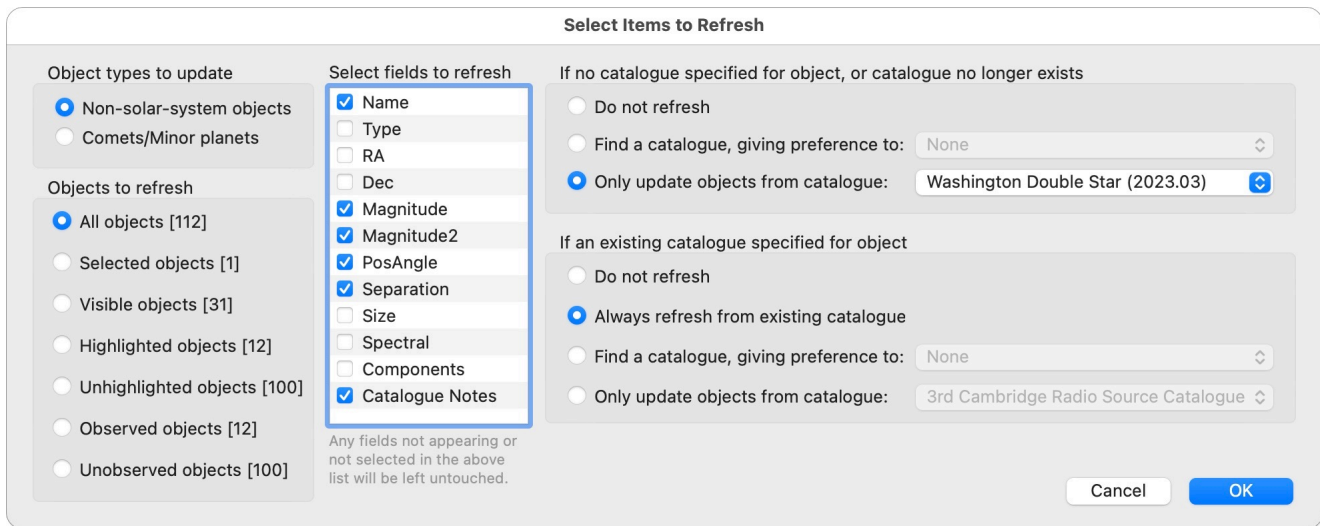


Figure 279: Refresh objects from catalogues

11.7.17 Sort Objects

This has the same function as the **Sort List** popup (see Section 11.3.9 on page 120).

11.7.18 Cross-Reference Objects to ID

The **Object > Cross-Reference Objects to ID** feature allows you to match plan objects to objects in a specified catalogue, and to replace or modify one or more fields of the plan object if a match is found. This feature is useful if you have input a number of objects where you only know the ID or the RA/Dec coordinates, and would like to replace these objects with "official" ones from an installed catalogue. The dialog (Figure 280) allows control over this process using the following options:

- **Objects to process.** Select the objects in the plan to which you would like to apply this process.
- **ID to cross-reference.** Select the object ID that you would like to cross-reference against. The popup menu contains all known IDs in the installed catalogues. Then select the particular catalogue you would like to compare against (containing the ID).
- **Where to add matched ID.** When a match is found, this identifies the object field where the catalogue object ID should be placed.
- **Method of adding matched ID to existing entry.** This is how to treat that catalogue object ID. You can replace the existing field, or prepend/append the ID to it.
- **Assume same object if.** How to match the plan objects with the catalogue objects. This is either by position (coordinate matching), or by comparing the IDs.
- **Also replace these fields.** You can additionally elect to replace these fields of the plan object with the same fields from the matched catalogue object.

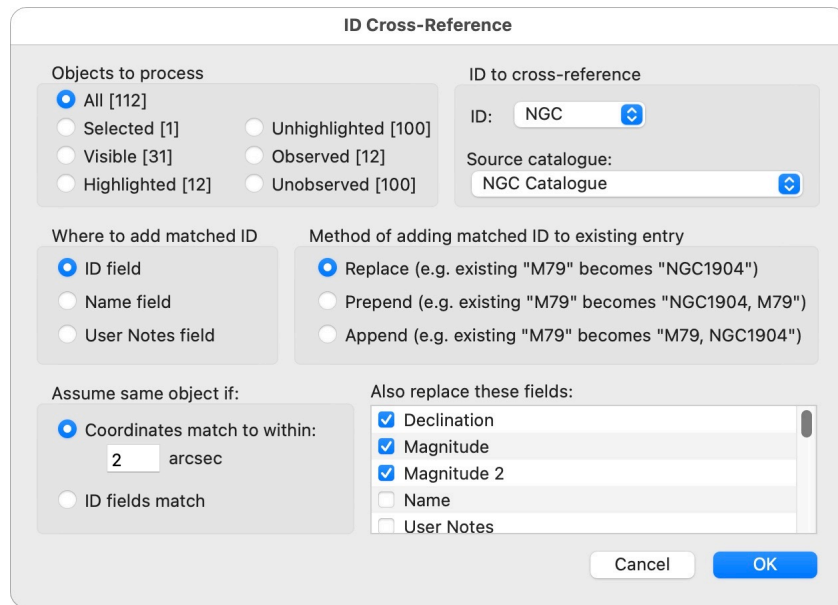


Figure 280: Cross-reference Objects to ID dialog

11.7.19 Eliminate Duplicates

The **Object > Eliminate Duplicates** feature looks for potential duplicate pairs of plan objects and allows you to choose which ones to delete. The dialog specifies a minimum separation value. Any pair of plan objects whose coordinates are within this separation distance are considered as candidates and are listed in the dialog, together with their actual separation distance.

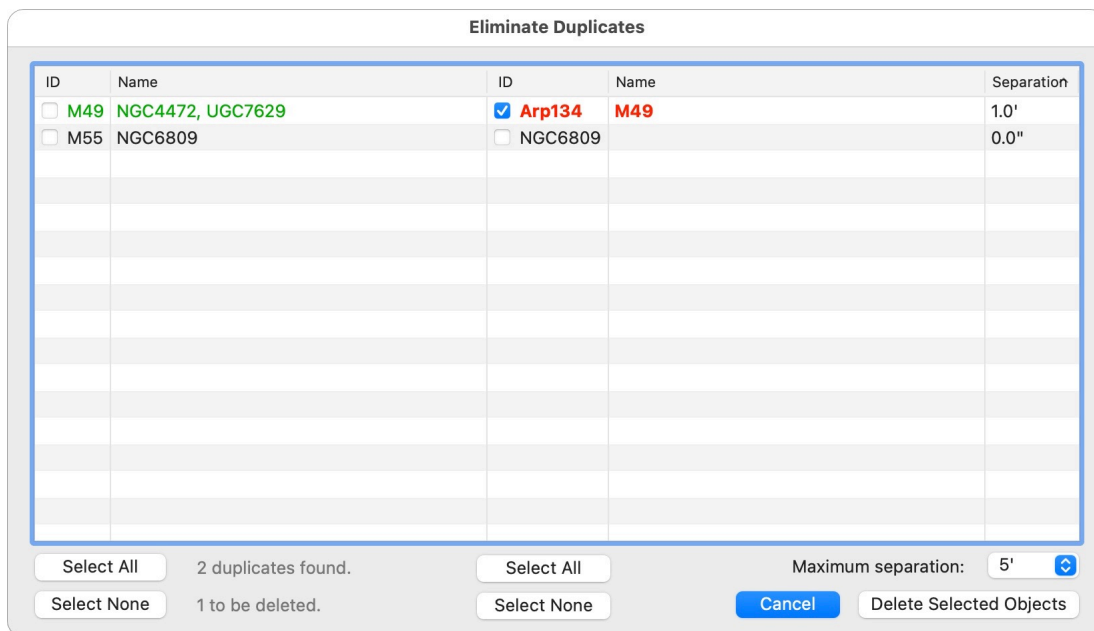


Figure 281: Eliminate duplicates dialog

Each object (listed by its ID and Name) has a checkbox next to it. Checking that checkbox flags the object for deletion (and its text colour is set to red). Clicking the **Delete Selected Objects** button will delete any checked objects.

Note that if you have three or more duplicate objects, you might have to use this feature more than once to eliminate all of the duplicates.

11.7.20 Minimum Slew Order

Sort the object list in such an order as to minimise the total slewing distance to visit each object in turn. If an object is selected in the list, it will be considered to be the first in the sequence. This algorithm is an approximation of the optimum algorithm (known as the Travelling Salesman Problem)¹, and is guaranteed to produce a sequence that is 2X the optimum slewing distance or less.

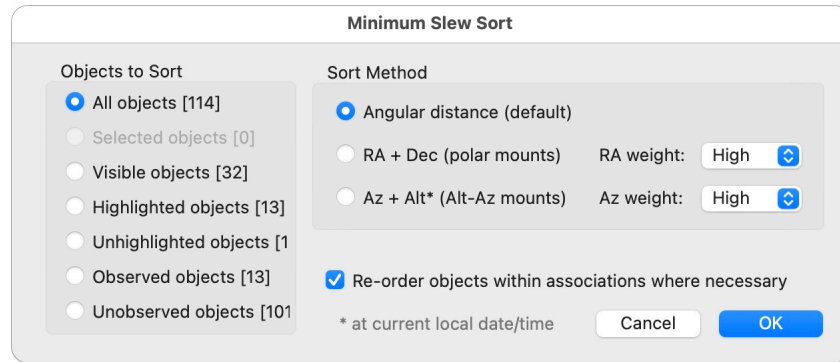


Figure 282: Minimum slew order

The dialog allows you to select the objects to include in the sorted sequence, the sort method (which differs for different mount types), and whether or not to reorder objects within any associations (see Section 18.2 on page 302) if necessary.

11.7.21 Statistics

Display statistical and tabular information regarding the objects in your plan document.

1. The Travelling Salesman Problem is an "exponential time" algorithm, and with anything less than a trivial number of objects would take a long time. Hence the 2X compromise algorithm used here, which is *much* faster.

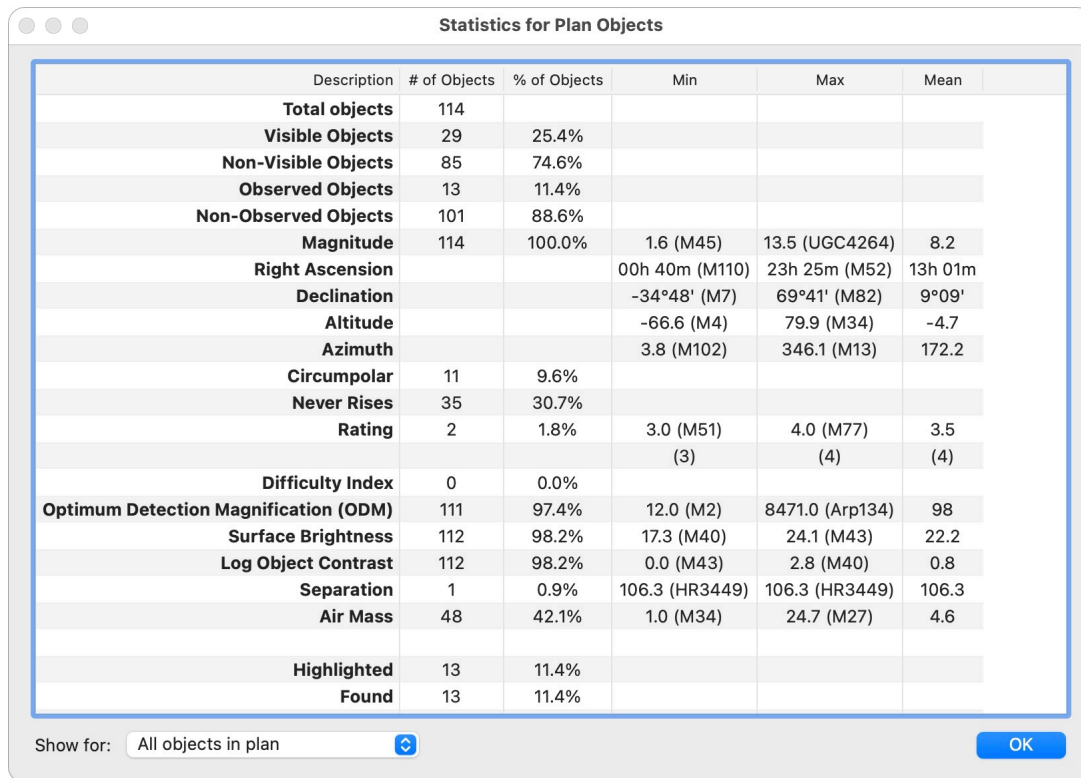


Figure 283: Statistics

11.7.22 Object Properties vs. Time

This feature lets you examine various dynamic properties of an object over a period of time, in both chart and tabular form.

To get these charts/data, select one or more objects in the object list, and choose **Object > Object Properties vs. Time** (also available in the object list right-click menu). This opens a window and allows you to chart and tabulate data for the selected object/s.

The properties are all "dynamic" and change with time. You can choose one or more of these properties using the check list at the top left of the window. Currently, these properties include:

- Air Mass
- Altitude
- Apparent Magnitude
- Azimuth
- Extinction
- Heliocentric Julian Date
- Hour Angle
- Moon Distance
- Observability
- Parallax Angle
- Sun Distance

- Visibility

Additionally, if any of the objects are solar system objects (e.g. planets, comets, etc.) then the following properties are also available:

- Right Ascension
- Declination
- Magnitude
- Ecliptic Latitude
- Ecliptic Longitude

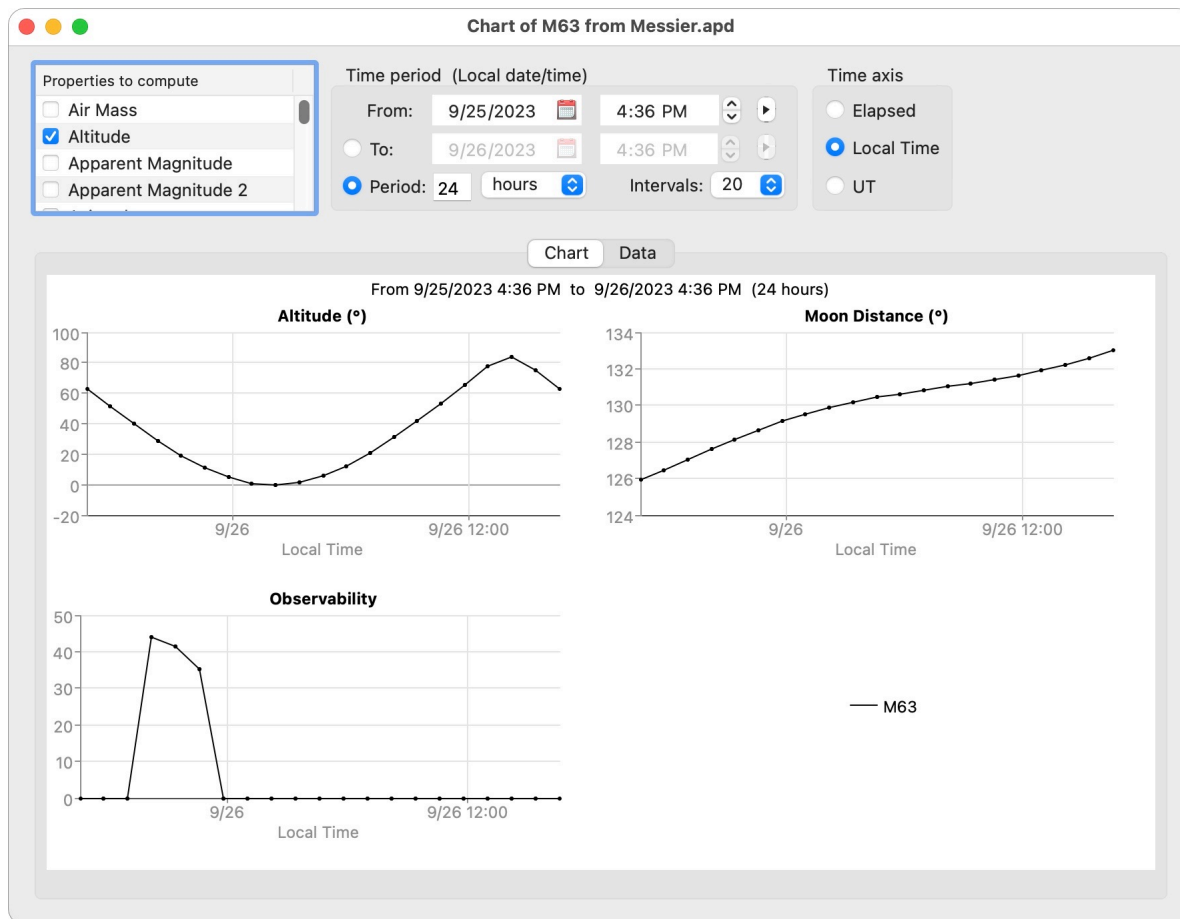


Figure 284: Object properties vs. time charts, for a single object

You can specify a time period from a start local date/time to an end local date/time, or from a start local date/time for a given period in seconds, minutes, hours, or days. Specify the number of intervals you desire and they will be uniformly spread over the specified time period. You can also specify the units in the time (horizontal) axis.

For each checked property, a small chart of that property over time will be displayed (Figure 284). Moving the cursor over a chart will display the value of the property at the pointed-to time, at the bottom of the window.

These charts can be printed (**File > Print...**).

The tabular data can be displayed in the Data tab (Figure 285). Select the property you want to tabulate using the **Property** popup. You can also show a differences (Δ) column using the **Show differences** checkbox. This shows the difference in values between each row and row before it.

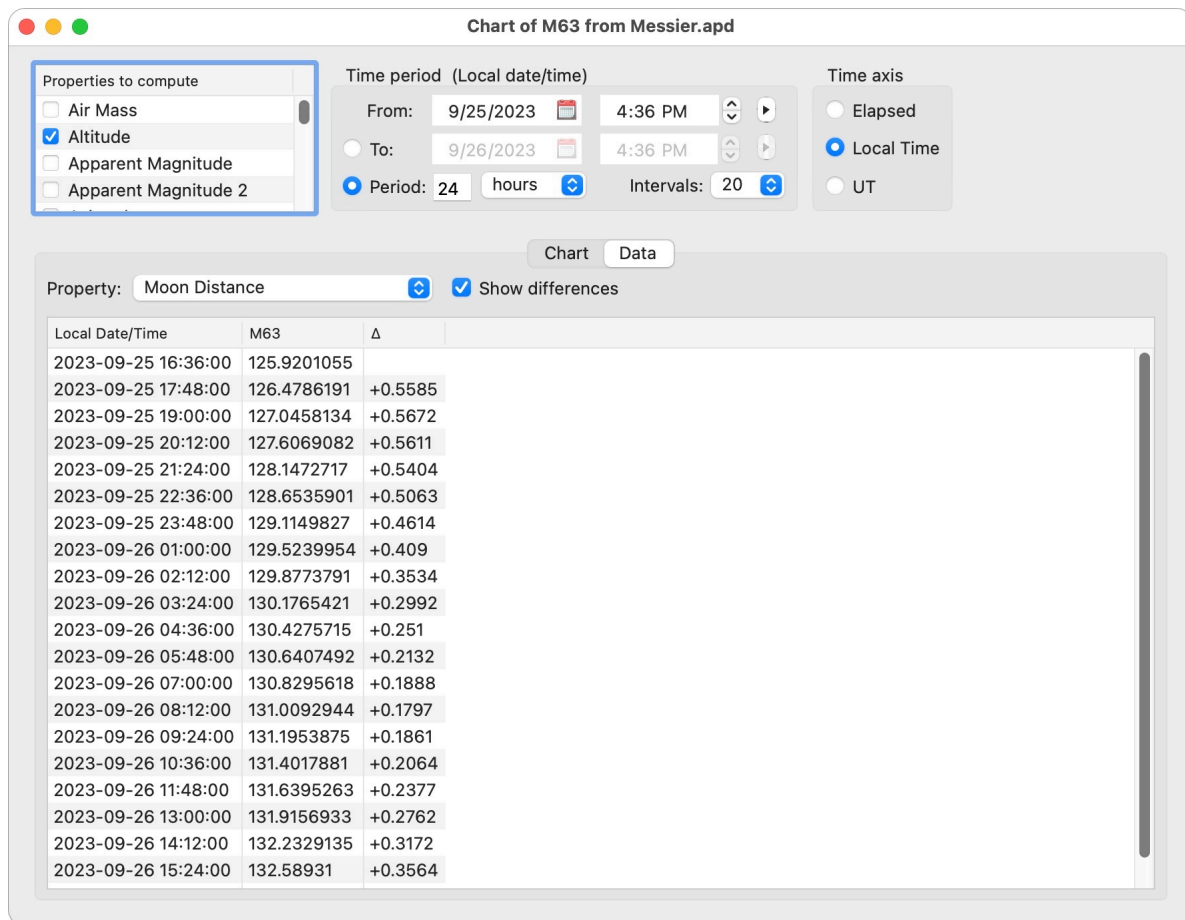


Figure 285: Object properties vs. time data, for a single object

If more than one object is selected, there will be multiple lines on each chart, one for each object, together with a suitable legend. Similarly, the tabular data will have one column for each object. See figures below.

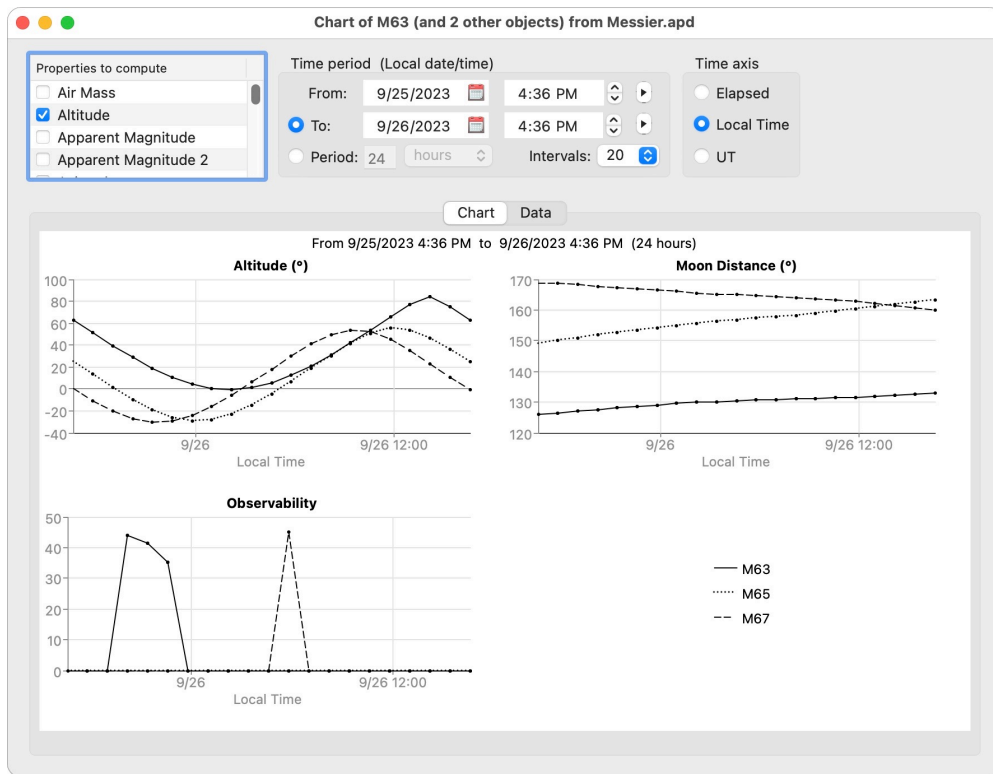


Figure 286: Object properties vs. time charts, for multiple objects

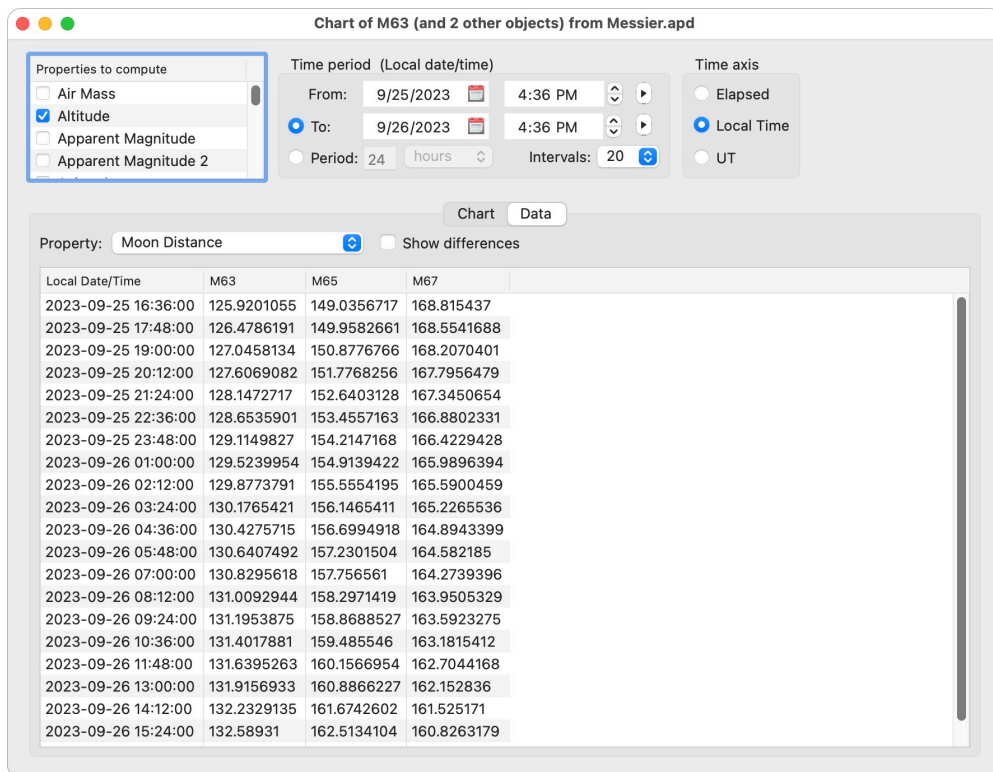


Figure 287: Object properties vs. time data, for multiple objects

11.7.23 Copy IDs

Edit > Copy IDs copies the ID column of the object list to the clipboard. You can then paste it into a text file of your own choosing.

11.7.24 Add User Image

You can use the **Image > Add User Image...** command to associate an arbitrary image with the selected object in the object list. If you know the image centre coordinates, orientation, and the scale of the image, then entering those values will allow the image to be displayed in the field of view chart.

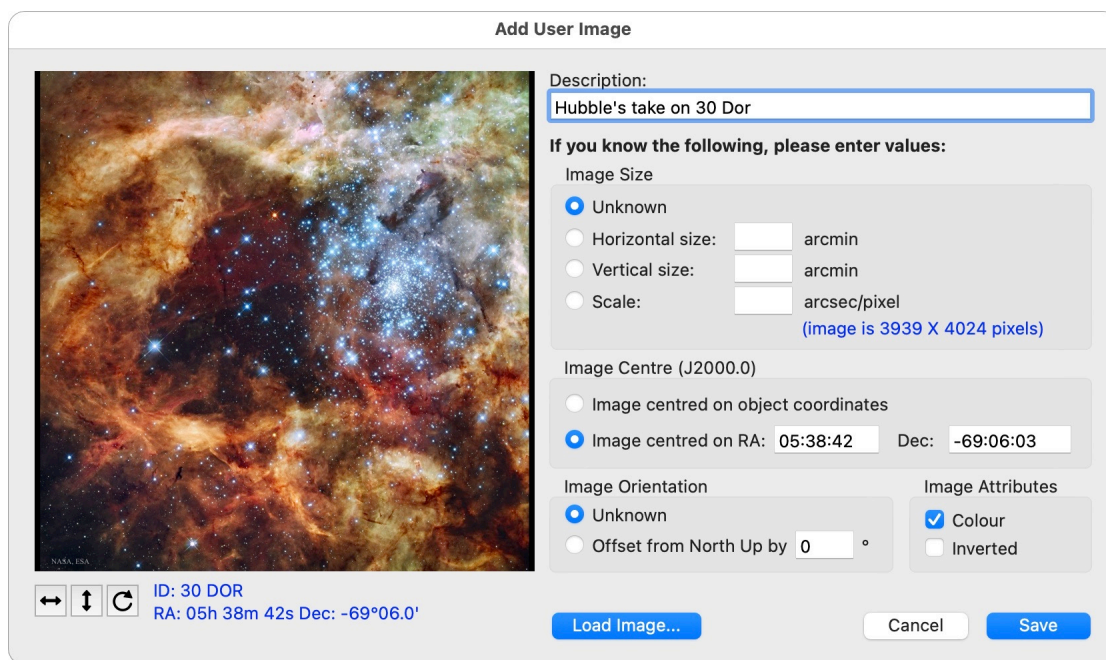


Figure 288: Add User Image

11.8 Field of View functions

These are functions that act on the Field of View chart

11.8.1 Get Field of View Objects...

Valid if the Field of View tab is selected. This feature will place all the catalogue objects displayed in the Field of View chart into a Results window. e.g.

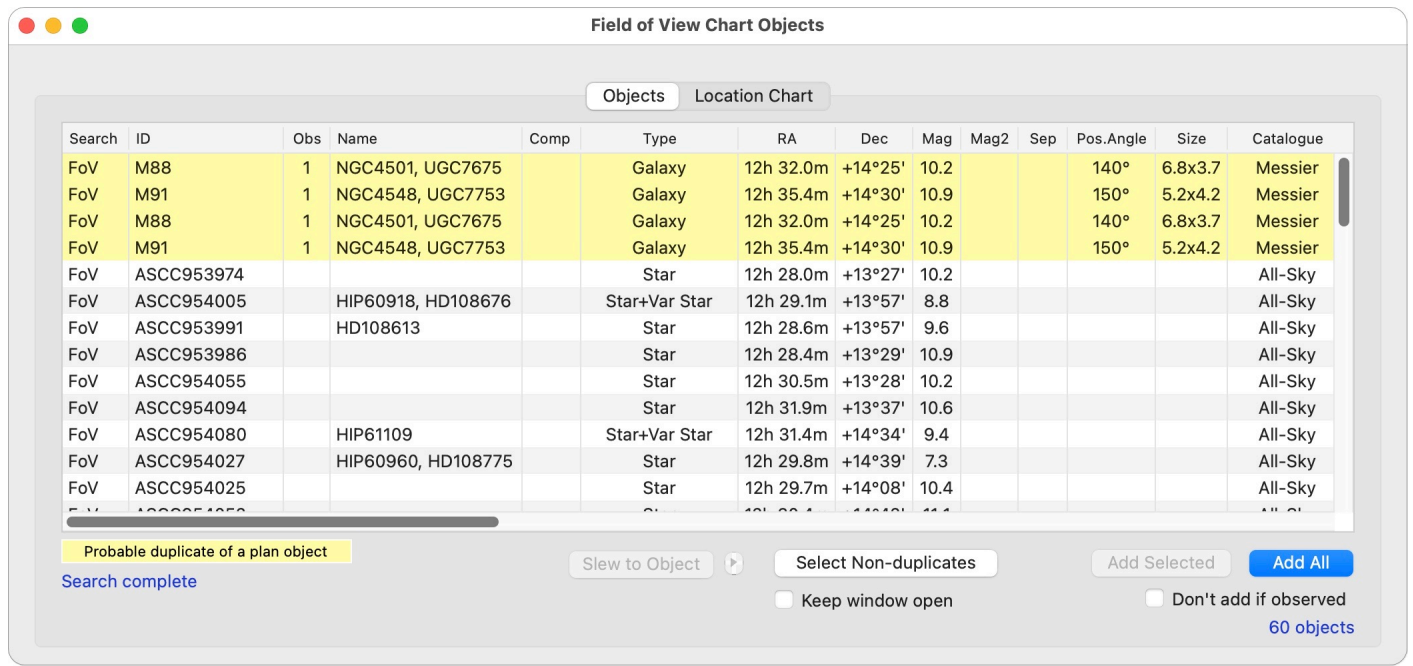


Figure 289: Get Field of View Objects

11.8.2 Show Constellation in Field of View

Set the Field of View chart to show the selected constellation in its entirety. Also sets the stellar magnitude to a suitable "naked eye" limit to avoid showing too many stars.

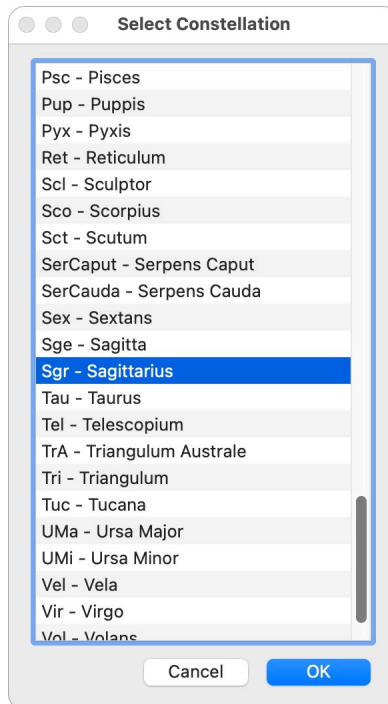


Figure 290: Show Constellation in Field of View

11.8.3 Show XXX in Field of View

XXX is the selected object's constellation. Set the Field of View chart to show that constellation in its entirety. Also sets the stellar magnitude to a suitable "naked eye" limit to avoid showing too many stars.

11.8.4 Select Field of View to Include

Object > Select Field of View to Include selects a field of view size and centre coordinates to include the selected objects. If the required field of view required is greater than 60° then this feature will not work (and show an error at the bottom of the dialog).

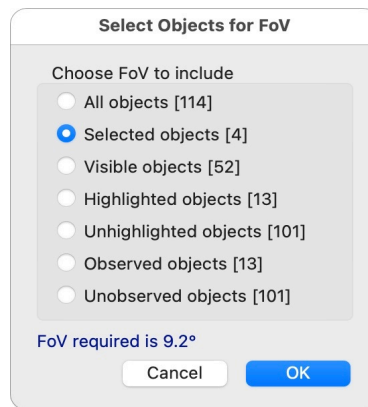


Figure 291: Select field of view to include

12 Observations

12.1 Logging observations

Observations are logged from the Observations tab on the plan document window. This is described in Section 11.4 on page 123.

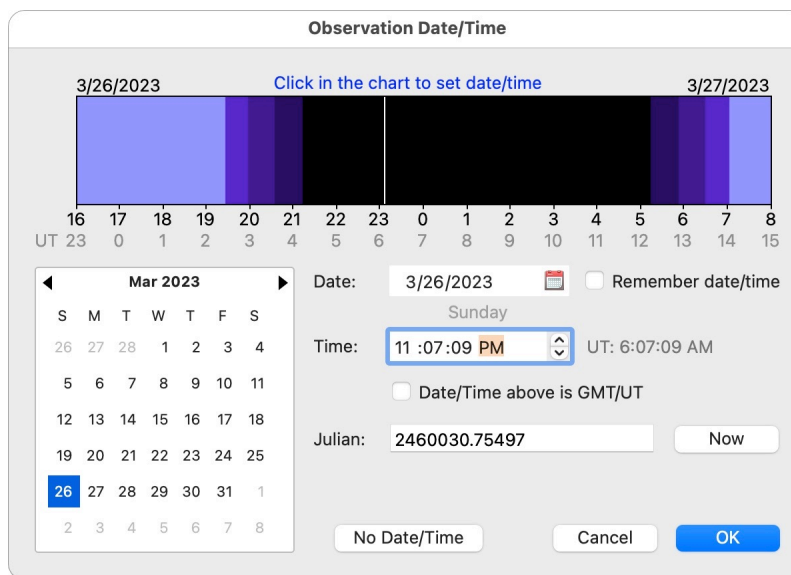
In order to create a new observation, you must have an object selected in the object list (on the Objects or Observations tab). That selected object will be the one for which the observation will be logged. To create a new observation, use *one* of the following methods:

- Click the **New Observation** button under the object list on the Objects tab. This switches you to the Observations tab and creates a new observation.
- Click the **+** button under the Observations list at the bottom left of the Observations tab.
- Right-click the object in the object list and select **New Observation**.
- Use the **Observation > New Observation** menu command.

What happens next depends on the **New observation date/time source** setting in Observation preferences (Section 20.10.1 on page 339).

If the setting is **Computer** (or **Telescope**), then the logged date/time of the observation is set to the computer's clock (or the telescope - if one is connected and the date/time can be retrieved from it). This is only really useful if you are logging observations in "real time" while you are actually observing.

If the setting is **Ask User**, then you are asked to enter the date/time of the observation via a dialog.



The dialog box is titled "Observation Date/Time". At the top, there is a horizontal bar representing a 24-hour cycle. The left side is labeled "3/26/2023" and the right side "3/27/2023". Below the bar is a timeline with numbers 16 through 15, representing hours in UT. A blue bar highlights the period from 16 to 20. A text label "Click in the chart to set date/time" points to the bar. Below the timeline is a calendar for March 2023. The date 26 is highlighted. To the right of the calendar, there are input fields for "Date:" (3/26/2023), "Time:" (11:07:09 PM), and "Julian:" (2460030.75497). There are checkboxes for "Remember date/time", "Date/Time above is GMT/UT", and a "Now" button. At the bottom, there are buttons for "No Date/Time", "Cancel", and "OK".

Figure 292: Observation date/time dialog

You can enter the local date/time, GMT/UT (using the checkbox), or Julian date. You can also click the mouse on the chart at the top of the dialog to enter an approximate time.

If you don't have a date/time for the observation (e.g. it's an old observation from the days before you logged that information), you can click the **No Date/Time** button to mark the observation as such.

The observation is logged, added to the Observations list, and you can now add the details in the fields on the right side of the Observations tab, or change them there at any time in the future.

If you need to change the date and/or time of the observation in the future, you can do it by:

- Select the observation in the Observations list and use the **Observation > Change Observation Date/Time...** menu command.
- Right-click the observation in the Observations list and use the **Edit date/time of selected observation** menu command.

The dialog shown above is presented and you can change the observation's date and/or time.

12.1.1 Quick observations

Sometimes you just want to log that an observation was made on an object, without worrying about making notes, selecting the date/time, noting what telescope you used, etc. This is a "quick observation", and consists of a normal observation, using the current local time, and with no other input. You can edit the other stuff in later if you wish.

To make a quick observation, select an object (or more than one) in the object list and click the **Quick Obs** button under the object list. Alternatively you can use the **Observation > New Quick Observation** menu command, or right-click the object list and use **Make Quick Observation**.

Once you have made a quick observation, the **Quick Obs** button changes its caption to **Delete Obs**, which offers a convenient way to delete the last quick observation. However, after two minutes it reverts back to **Quick Obs**. You can also use **Observation > Delete Last Quick Observation** to delete the last quick observation you made on the selected object (this menu command does not have a 2 minute time window).

12.2 Observation database

All observations and observing session data are kept in a central observation database. You can view and manipulate this data from the Observation Database window. This is accessed by one of the following methods:

- Click the **Observation Database** icon in the toolbar (available in all tabs).
- Use the **Observation > Show Observation Database** menu command.
- Click the **Show Observation Database** button under the Observations list on the Observations tab of a plan document window (the second button from the right).

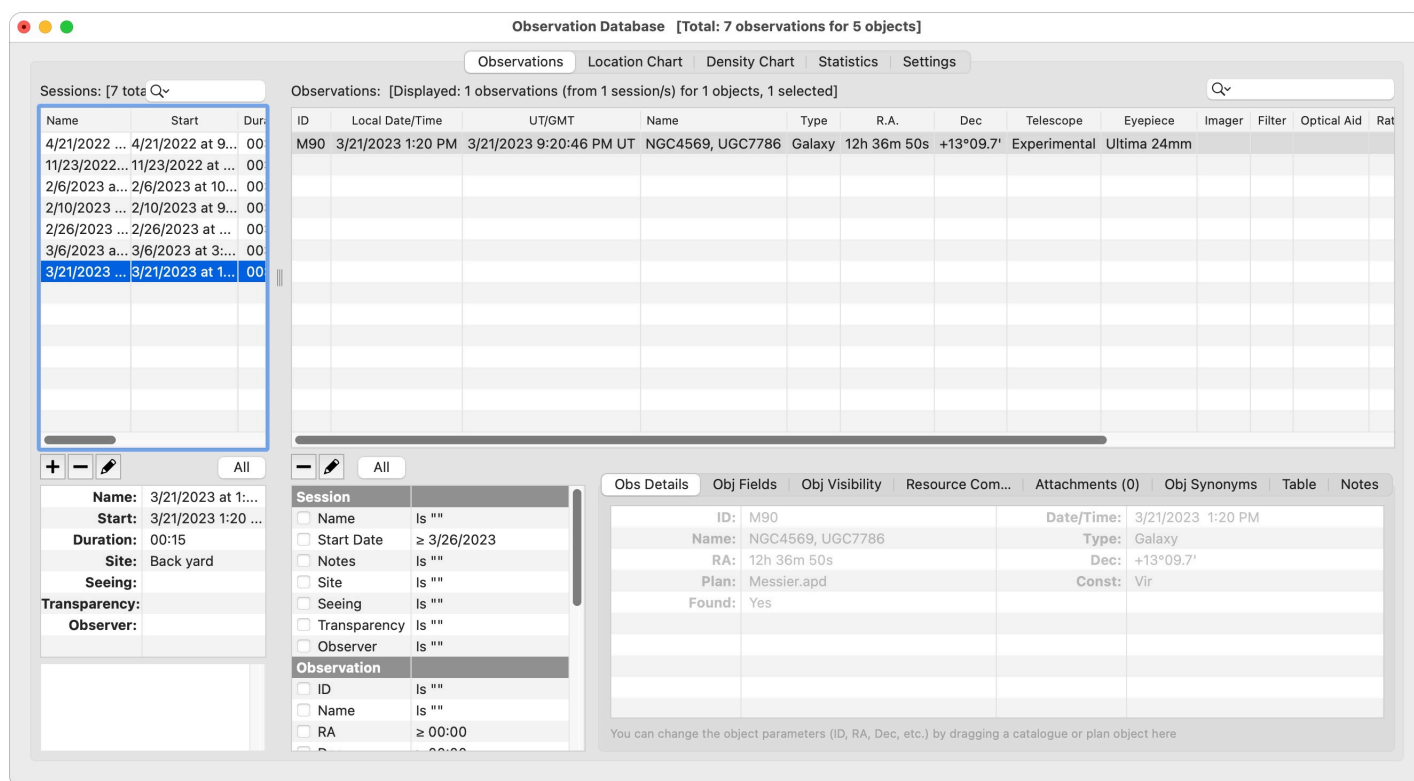


Figure 293: Observation database window

The following sections describe the functionality of this window.

12.2.1 Sessions list

The left side of the database window contains the Session data. At the top left is the Sessions list, which contains a list of observing sessions in the database. The columns in this list can include¹:

- **Name.** The name given to the session. The default name given to a newly-created session is "ddddd at tttt" where dddd is the date and tttt is the time of the start of the session. You can, however, name your sessions manually as you please (e.g. "Vacaville, Aug 23, 2022").
- **Start.** The start date/time of the session.
- **Duration.** The duration of the session in hours and minutes.
- **Obs.** The number of observations made in the session.
- **Site.** The observing site name.
- **User.** User-defined field values, where applicable.
- **Observer.** The observer name.
- **Transparency.** The Transparency value for the session.
- **Seeing.** The Seeing value for the session.
- **Plan/s.** The plan document/s used to make the observations.

1. See Section 12.2.19 on page 217 for details on how to select and order these columns.

- **Notes.** The observing notes for the session.

Sessions: [7 total, 1 selected] Q

Name	Start	Duration	Obs	Site	Observer	Seeing	Transparency	Plan/s	Notes
4/21/2022 at 9:21 PM	4/21/2022 at 9:21 PM	00:15	1	Back yard				Messier.apd	
11/23/2022 at 10:24 PM	11/23/2022 at 10:24 PM	00:15	1	KIRKLAND,WA				planWizard.apd	
2/6/2023 at 3:43 PM	2/6/2023 at 10:43 PM	00:15	1	Back yard	AstroPlanner Support Person	7. Good	Clear	Messier.apd	Clear but a stiff breeze.
2/10/2023 at 9:08 PM	2/10/2023 at 9:08 PM	00:15	1	KIRKLAND,WA	No Observer specified	II. Mostly stable	Clear	planWizard.apd	
2/26/2023 at 3:45 PM	2/26/2023 at 3:45 PM	00:15	1	KIRKLAND,WA				planWizard.apd	
3/6/2023 at 3:44 PM	3/6/2023 at 3:44 PM	00:15	1	KIRKLAND,WA				planWizard.apd	
3/21/2023 at 1:20 PM	3/21/2023 at 1:20 PM	00:15	1	Back yard				Messier.apd	

Figure 294: Sessions list

The **+** button under the list creates a new session manually (normally this is done for you automatically when you create a new observation that isn't in an existing session).

Create Observing Session

Site: Back yard ⌵

Observer: No Observer specified ⌵

Start: 3/26/2023 📅 11 :17 PM ⌵

Finish: 3/27 /2023 📅 2:32 AM ⌵

Time: ☒ Local time at Site ☐ UT/GMT

Cancel
OK

Figure 295: Create observing session dialog

A new session is created with no associated observations.

The **–** button deletes the selected session/s, and all associated observations. You might want to think twice before clicking **Yes** in the subsequent alert dialog.

Are you sure you want to delete the selected session/s and associated observations? This is not undoable.

☐ Don't show this again

No
Yes

Figure 296: Session deletion

The third button under the list edits the selected session. See Section 12.2.3 on page 202 for more information.

The **All** button selects all of the sessions in the list (and displays all of the associated observations for those sessions on the right).

The **Find** field above the list limits the visible sessions only to those containing the given search string in one of the fields.

Note that sessions list may not contain *all* sessions in the database if there are session restrictions in effect (see Section 12.2.15 on page 213).

12.2.2 Session data

When a single session is selected in the list, its data are summarised in the fields below the list. Note that you are not able to edit these values directly - see the section below on how to edit a session's data.

Name:	2/6/2023 at 3:43 PM
Start:	2/6/2023 10:43 PM
Duration:	00:15
Site:	Back yard
Seeing:	7. Good
Transparency:	Clear
Observer:	AstroPlanner Support Person
Clear but a stiff breeze. Clouds rolled in later.	

Figure 297: Session data

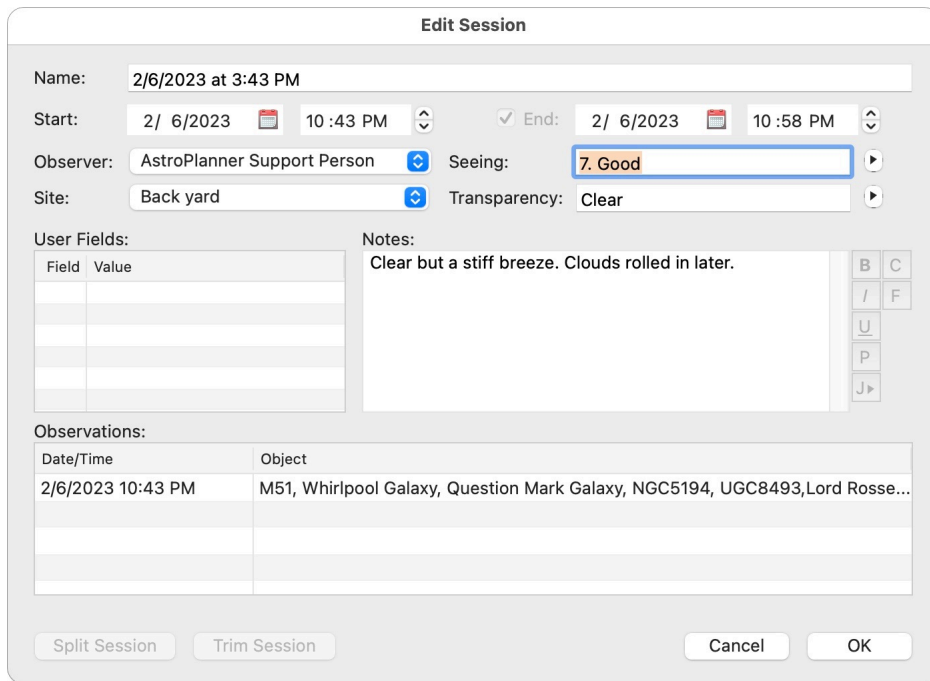
12.2.3 Editing session data

To edit an observation session's data, select the session in the sessions list, and either

- Right-click the session entry in the list and choose ***Edit selected session*** item, or
- Click the edit button under the list (third from the left).
- Double-click the session entry in the list.

The session edit dialog allows you to change various data for that session. Any changes are saved when the **OK** button is clicked. If the session is longer than it should be (i.e. has excess time before the first observation, or after the last observation, the **Trim Session** button is enabled, and using it will trim off that excess time.

If you choose an observation other than the first or last in the list of observations, you can use the **Split Session** button to split the session into two separate sessions at that observation time.



Edit Session

Name: 2/6/2023 at 3:43 PM

Start: 2/ 6/2023 10:43 PM End: 2/ 6/2023 10:58 PM

Observer: AstroPlanner Support Person Seeing: 7. Good

Site: Back yard Transparency: Clear

User Fields:

Field	Value

Notes:

Clear but a stiff breeze. Clouds rolled in later.

Observations:

Date/Time	Object
2/6/2023 10:43 PM	M51, Whirlpool Galaxy, Question Mark Galaxy, NGC5194, UGC8493, Lord Rosse...

Buttons: Split Session, Trim Session, Cancel, OK

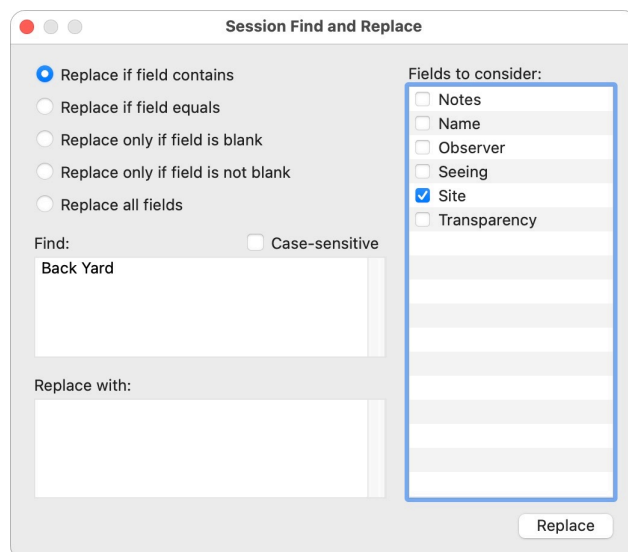
Figure 298: Session edit dialog

12.2.4 Merging sessions

If you select two adjacent¹ sessions in the sessions list, you can merge those two sessions together into a single session, by right-clicking and choosing the **Merge Sessions** menu item.

12.2.5 Session find-and-replace

Right-clicking the sessions list and choosing **Find and Replace...** allows you to find and replace a given string in all sessions currently displayed in the sessions list. This will only take place in the session fields that you specify.



Session Find and Replace

☒ Replace if field contains
☐ Replace if field equals
☐ Replace only if field is blank
☐ Replace only if field is not blank
☐ Replace all fields

Find: Back Yard Case-sensitive ☐

Replace with:

Fields to consider:

- ☐ Notes
- ☐ Name
- ☐ Observer
- ☐ Seeing
- ☒ Site
- ☐ Transparency

Replace

Figure 299: Session find-and-replace dialog

1. adjacent in so much as that no other session falls between them in time.

12.2.6 Observations list

Observations: [Displayed: 7 observations (from 7 session/s) for 5 objects, 1 selected]

ID	Local Date/Time	UT/GMT	Name	Type	R.A.	Dec	Telescope	Eyepiece	Imager	Filter
M51	4/21/2022 9:21 PM	4/22/2022 5:21:07 AM UT	Whirlpool Galaxy, Question Mark Galaxy,...	Galaxy	13h 29m 52s	+47°11.7'	LX200 8"	Ultima 24mm		
M51	11/23/2022 10:24 PM	11/24/2022 6:24:26 AM UT	Whirlpool Galaxy, Question Mark Galaxy,...	Galaxy	13h 29m 52s	+47°11.7'	LX200 8"	Ultima 24mm		
M51	2/6/2023 10:43 PM	2/7/2023 6:43:31 AM UT	Whirlpool Galaxy, Question Mark Galaxy,...	Galaxy	13h 29m 52s	+47°11.7'	Experimental	Panoptic 35mm		
NGC1068	2/10/2023 9:08 PM	2/11/2023 5:08:32 AM UT	MCG+00-07-083,Cetus A	Galaxy	02h 42m 28s	-00°00.2'	Experimental DSC	Panoptic 35mm		
M55	2/26/2023 3:45 PM	2/26/2023 11:45:40 PM UT	NGC6809	Globular	19h 40m 00s	-30°57.7'	Experimental	Panoptic 35mm		
M53	3/6/2023 3:44 PM	3/6/2023 11:44:46 PM UT	NGC5024	Globular	13h 12m 55s	+18°10.1'	Experimental	Panoptic 35mm		
M90	3/21/2023 1:20 PM	3/21/2023 9:20:46 PM UT	NGC4569, UGC7786	Galaxy	12h 36m 50s	+13°09.7'	Experimental	Ultima 24mm		

Figure 300: Observations list

The observations list displays observations contained in whatever sessions are currently selected in the sessions list.

Note that sessions list may not contain *all* sessions in the database if there are session restrictions in effect (see Section 12.2.15 on page 213).

The columns in this list can include¹:

- **ID.** Object ID.
- **Local Date/Time.** Local date and time the observation was made.
- **UT/GMT.** The UT date and time the observation was made.
- **Name.** Object name.
- **Type.** Object type.
- **R.A.** Object right ascension.
- **Dec.** Object declination.
- **Telescope.** The first resource combination Telescope entry.
- **Eyepiece.** The first resource combination Eyepiece entry (if applicable).
- **Imager.** The first resource combination Imager entry (if applicable).
- **Filter.** The first resource combination Filter entry (if applicable).
- **Optical Aid.** The first resource combination Optical Aid entry (if applicable).
- **Rating.** The first resource combination Rating entry (if applicable).
- **Plan.** The originating plan document from whence this observation was made.
- **Const.** The constellation containing the object.
- **# Combos.** Number of resource combinations used in the observation.
- **Found.** Whether or not the object was found during the observation.
- **Notes.** Observation notes.

1. See Section 12.2.19 on page 217 for details on how to select and order these columns.

- ### 12.2.7 Observation data

Figure 301: Observation data

The tabs¹ are:

Object Fields. Various parameter values for the object at the date, time and site of the observation.

Figure 302: Object fields

Object Visibility. An alt/az widget showing the position of the object at the time of the observation.

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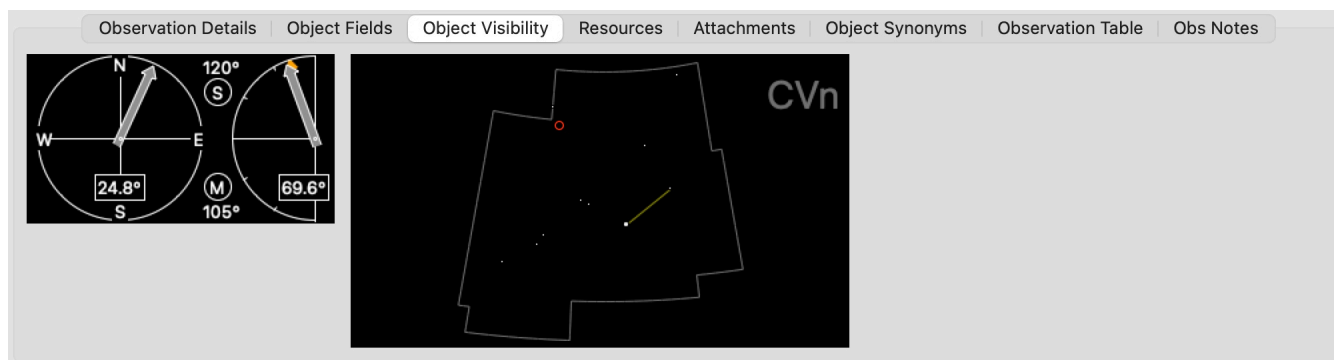


Figure 303: Object Visibility

Resource Combinations. Shows the resource combination/s used for this observation.

Found	Telescope	Eyepiece	Imager	Optical Aid	Filter	Rating	Mag	FoV
Yes	Experimental	Panoptic 35mm					7 X	9.9°

Figure 304: Resource Combination/s

Attachments. List of attachments associated with this observation.

Found	Telescope	Eyepiece	Imager	Optical Aid	Filter	Rating	Mag	FoV
Yes	Experimental	Panoptic 35mm					7 X	9.9°

Figure 305: Attachments

Object Synonyms. List of ID synonyms for the observed object.

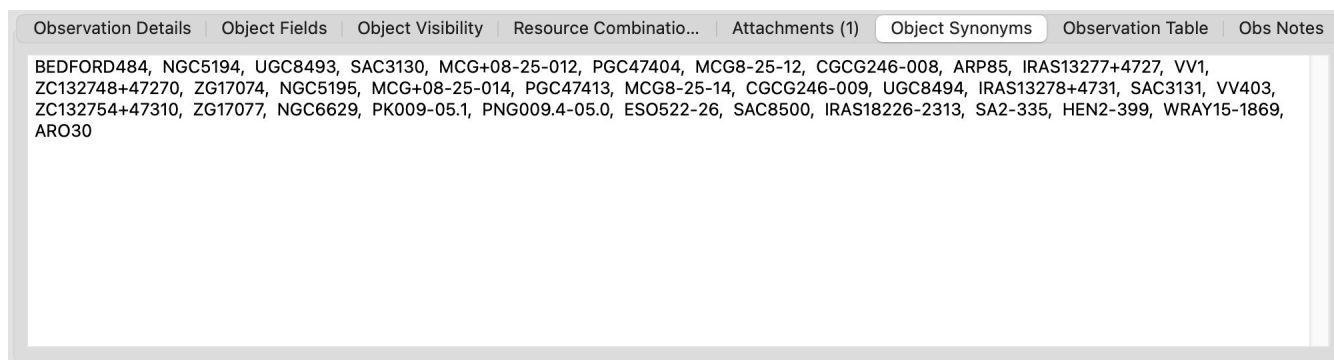


Figure 306: Synonyms

Observation Table. Displays any observation table entries for the selected observation. This feature is explained in Section 12.9 on page 208.

# Refs	# Obs	Adaptability	Scope
5	13	15.23606798	Experimental

Figure 307: Observation Table

Observation Notes. Any notes made for the observation.

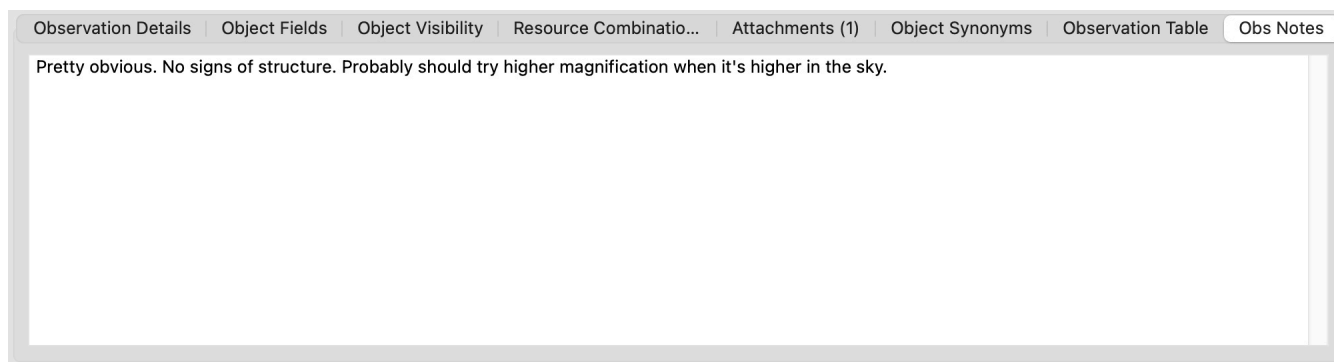


Figure 308: Observation Notes

12.2.8 Editing observation data

Edit an observation by:

- Selecting it in the observations list, right-clicking, and selecting **Edit selected observation**.
- Clicking the edit button under the observations list (second from left).
- Double-clicking the entry in the observations list.

The dialog lets you edit most aspects of the observation, including the date/time.

Edit Observation

ID: Date: Time: ☐ No Date/Time ☐ GMT/UT

RA: h m s Epoch

Dec: ° ' " J2000 Constellation: CVn Name: Type:

Note that you can also change the object parameters (ID, RA, Dec, etc.) by dragging an item from the catalogue, object list, or results window onto the Observation Details tab in the observation database window when an observation is selected.

Found	Telescope	Eyepiece	Imager	Optical Aid	Mag	FoV	Filter	Rating
<input checked="" type="checkbox"/>	Experimental	<input checked="" type="checkbox"/> Panoptic 3...	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> 7 X	<input checked="" type="checkbox"/> 9.9°	<input checked="" type="checkbox"/> None	<input checked="" type="checkbox"/> None

Notes Attachments Object

Pretty obvious. No signs of structure. Probably should try higher magnification when it's higher in the sky.

Field	Value

Magnification limits: 4X - 48X
 Dawes' limit: 3.9"
 Visual mag. limit: 10.1
 Focal length: 240 mm
 Magnification: 7 X
 Field of view: 9.917°
 Exit pupil: 4.4 mm

Figure 309: Observation editing dialog

12.2.9 Observation Tabular Data

A table of data can be attached to each observation. Such tables are viewed and edited in the Table tab below the observation list. The tables can have as many columns and rows as you like (within reason). This feature is designed for more advanced applications, and has full scripting support. Initially the tables are undefined. You must define at least one table column. All observation tables share the same columns, but each observation's table row data is unique to that observation.

Details Visibility Resource Combinations (1) Attachments (0) Table Notes

Empty

You need at least one column defined ➔

Figure 310: Empty observation table

Edit the column definitions by clicking on the edit button at the bottom right.

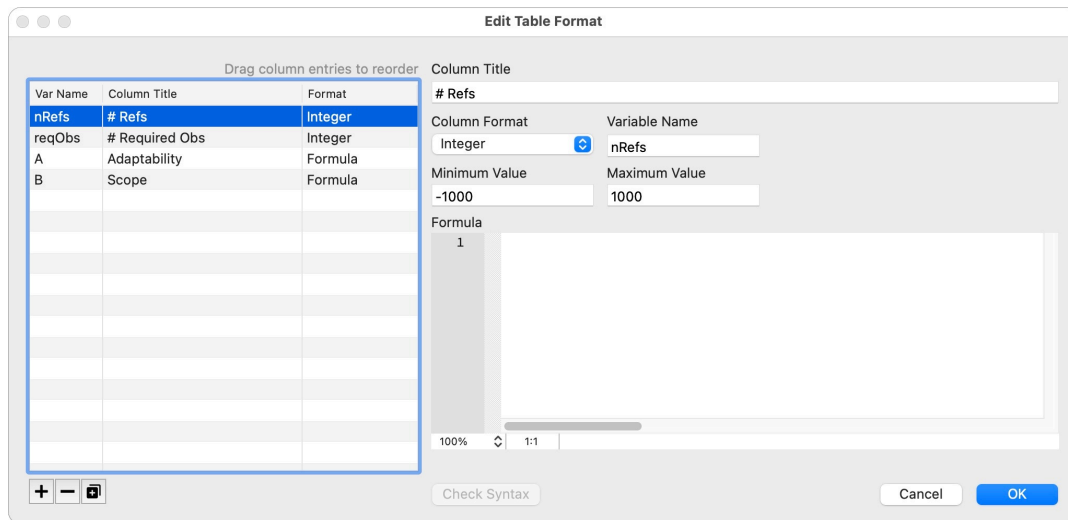


Figure 311: Edit table columns

You specify the column title, the type of data, and its range of values (if appropriate). If you are using a column value in a formula (see below) then you define a Variable Name for that column in order to use it in a formula.

Once you've set up the columns, you can use the + button to add rows to the table (or use scripting to do the job).

# Refs	# Required Obs	Adaptability	Scope
5	13	15.23606798	Experimental
6	5	7.44948974	Experimental
4			

Figure 312: Adding data to an observation table

You can also define a column to be a formula, based on other column values or observation field values, etc. You can make this as simple or as complex as you like (see the Scripting chapter for more details on the scripting language). The basic principle is to use variable values from other columns (including any Formula columns that are to the left of the current column), and assign the result to the "result" variable. This *result* is then displayed in the table column.

In the example below the *Adaptability* column computes the square root of the *# Refs* column value, adds the *# Required Obs* column value and posts the result. Whenever the values in either of the first two columns is changed, the *Adaptability* column value is recomputed.

You can check the syntax of the formula using the **Check Syntax** button.

There are other items you can use in your Formula script. Right-click the formula editor and choose **Show Formula Framework** to show help for this.

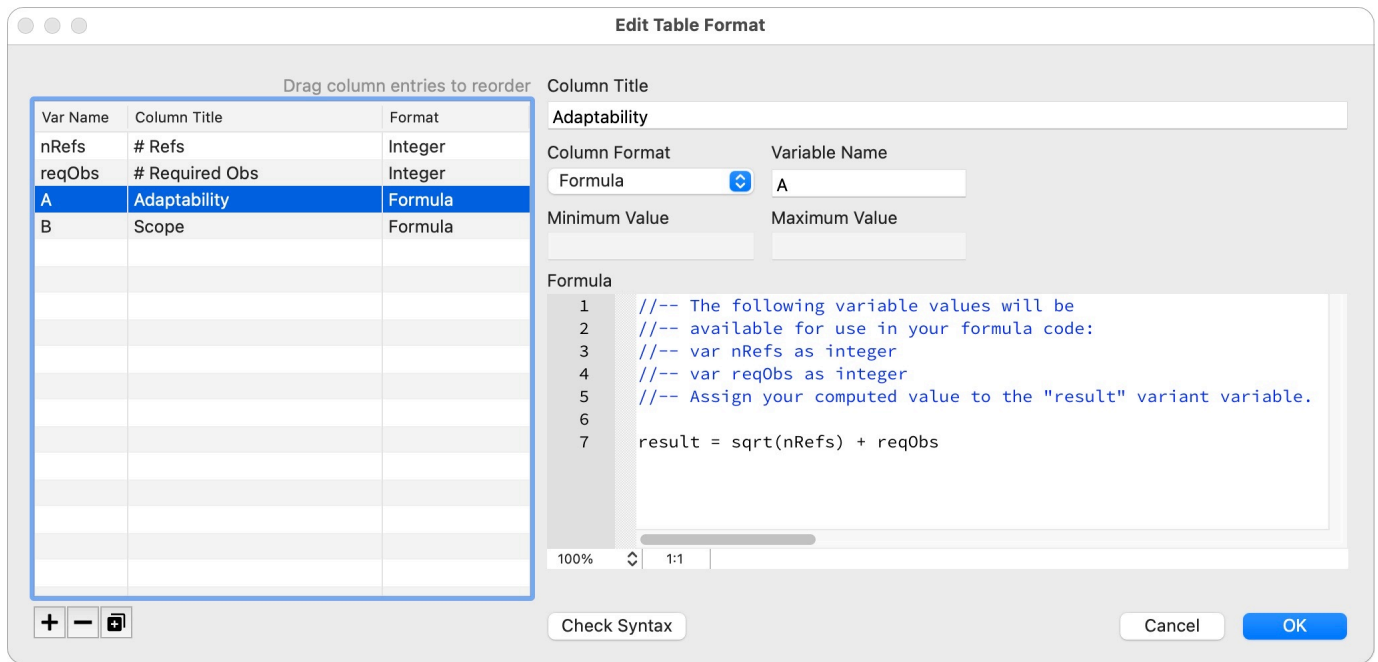


Figure 313: Creating a Formula column

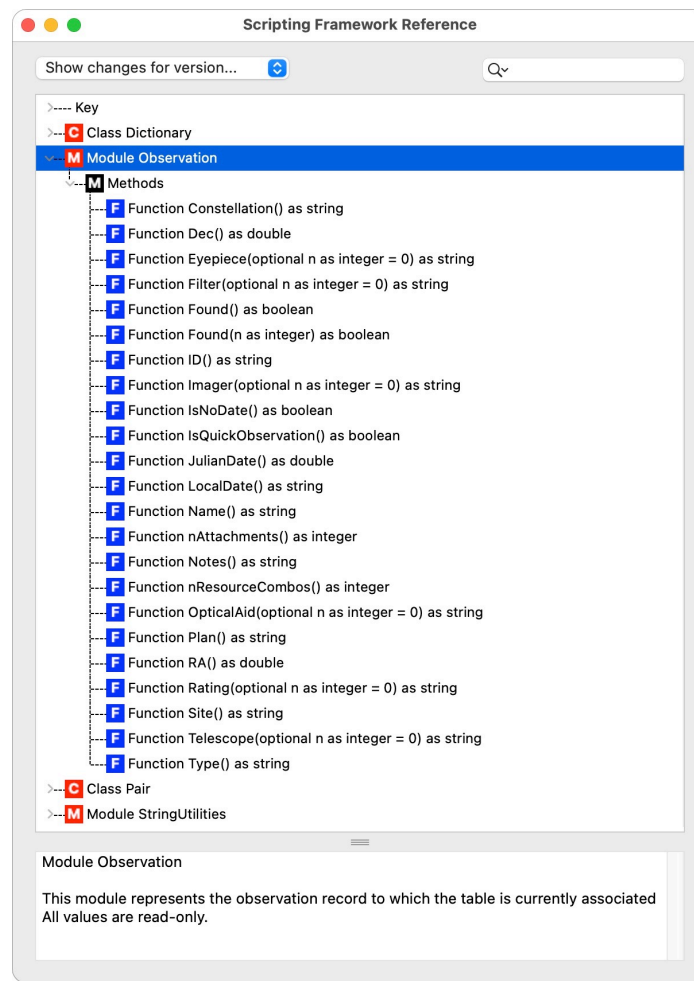


Figure 314: Formula framework

12.2.10 Select session

If you have multiple sessions selected, then the observations list will contain the observations associated with those selected sessions. If you select an observation, right-click, and select **Select session for selected observation**, then only the session that contains that observation will be selected in the sessions list.

12.2.11 Known synonyms

The observation database keeps a list of synonyms for each observed object. If you select an observation, right-click and select **Known synonyms...**, a dialog will appear showing the known¹ synonyms for that observed object.

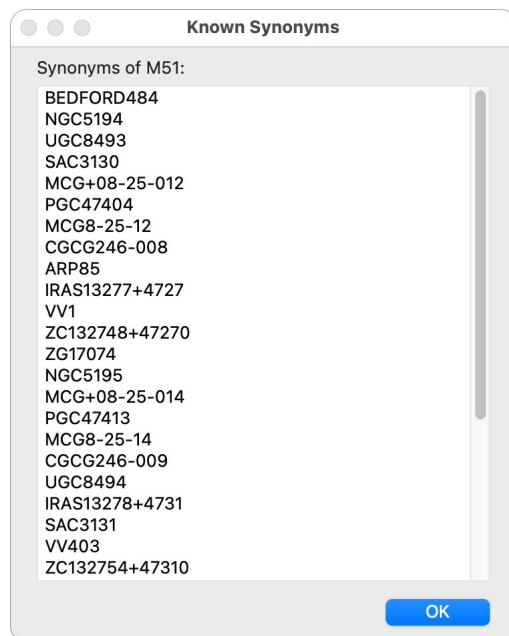


Figure 315: Known synonyms

12.2.12 Known synonyms using SIMBAD

If you select an observation, right-click and select **Known synonyms using SIMBAD...**, a dialog will appear showing the known synonyms for that observed object. This feature looks up the ID in the on-line SIMBAD database, and hence gives a better coverage of synonyms than the above feature. It requires on-line Internet access.

1. The set of known synonyms is dependent on the installed set of catalogues. More installed catalogues will give a wider set of synonyms.

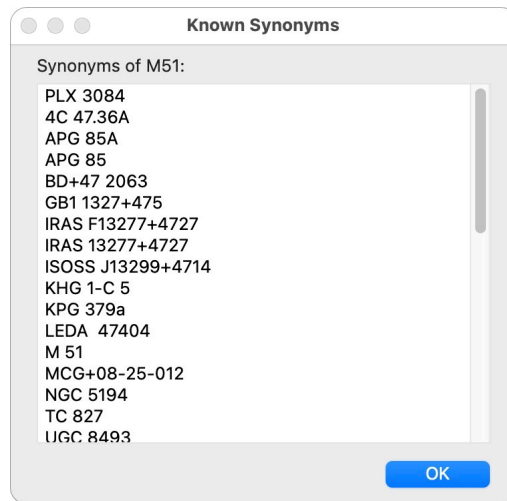


Figure 316: Known synonyms using SIMBAD

12.2.13 Merge selected observations of xxx

If more than one observation is selected in the observations list, and if in those selected observations, two or more observations of the same ID in the same session exist, then you will be given the opportunity of merging those observations into a single observation.

This can be useful for observations made using AstroPlanner V1, where the lack of multiple resource combinations meant multiple observations of an object were required if more than one eyepiece, telescope, etc. was used.

12.2.14 Observation find-and-replace

Right-clicking the observations list and choosing *Find and Replace...* allows you to find and replace a given string in all observations currently displayed in the observations list. This will only take place in the observation fields that you specify.

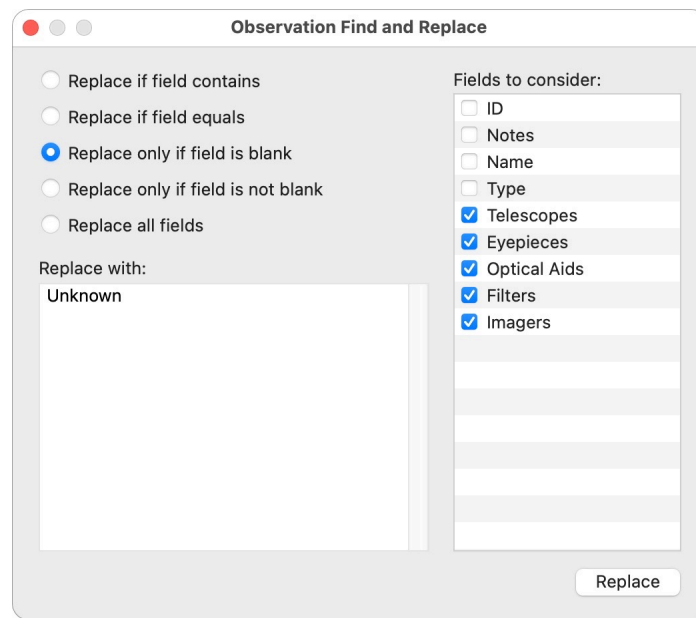
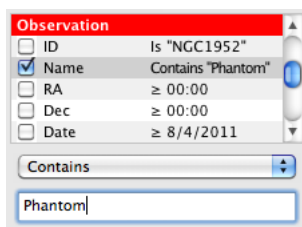


Figure 317: Observation find-and-replace dialog

12.2.15 List restrictions

Normally, the sessions list displays all the sessions present in the database, and the observations list displays all the observations associated with selected sessions. You can use the restrictions widget below the observations list to restrict what sessions and/or observations are shown.



Observation	
<input type="checkbox"/> ID	Is "NGC1952"
<input checked="" type="checkbox"/> Name	Contains "Phantom"
<input type="checkbox"/> RA	≥ 00:00
<input type="checkbox"/> Dec	≥ 00:00
<input type="checkbox"/> Date	≥ 8/4/2011

Contains

Phantom

Figure 318: List restrictions

The widget is divided into two sections, one for Sessions and the other for Observations. If the checkbox next to any restriction is checked then displayed sessions/observations will be limited to those that pass the checked restrictions.

For example, in Figure 318, only observations that contain "Phantom" in their Name field will be displayed.

Note that the heading of each section is highlighted in red if any restrictions are checked as a warning (so that you don't think that observations have mysteriously gone missing when they are just not being displayed).

12.2.16 Location chart

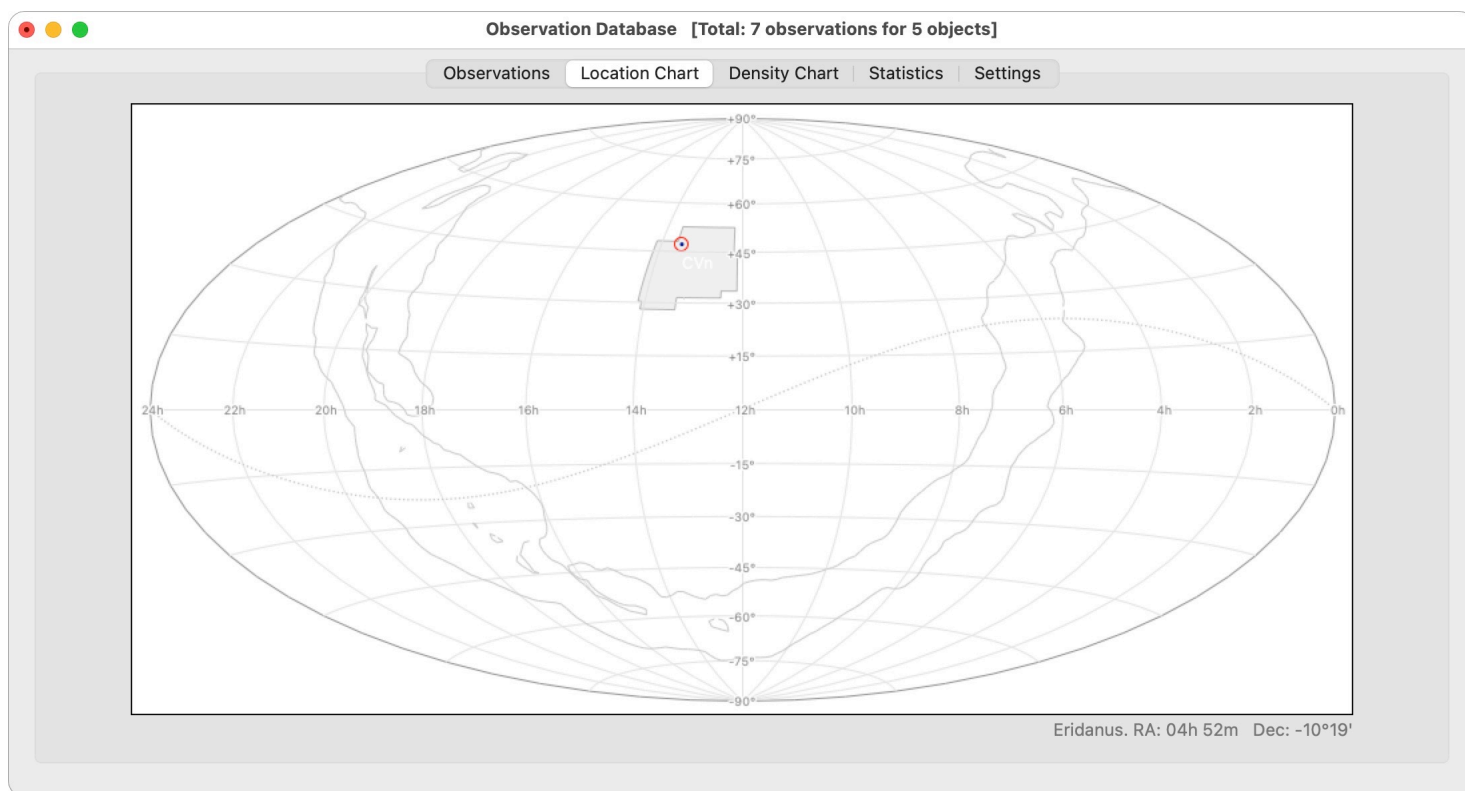


Figure 319: Observation database window Location Chart

The Location chart is located on a separate tab of the database window. It shows the location of the displayed observations on a whole-sky map. Additionally, any selected observations are circled in red. You can double-click an observed object on the chart and the associated record will be selected in the observations list.

12.2.17 Density Chart

The Density Chart tab shows a whole-sky map with the density of observations shown for the entire observation database. You can group the observation density values in different ways, and show the density values in different ways. As shown here, for example, there are 3 observations made in CVn (Canes Venatici).

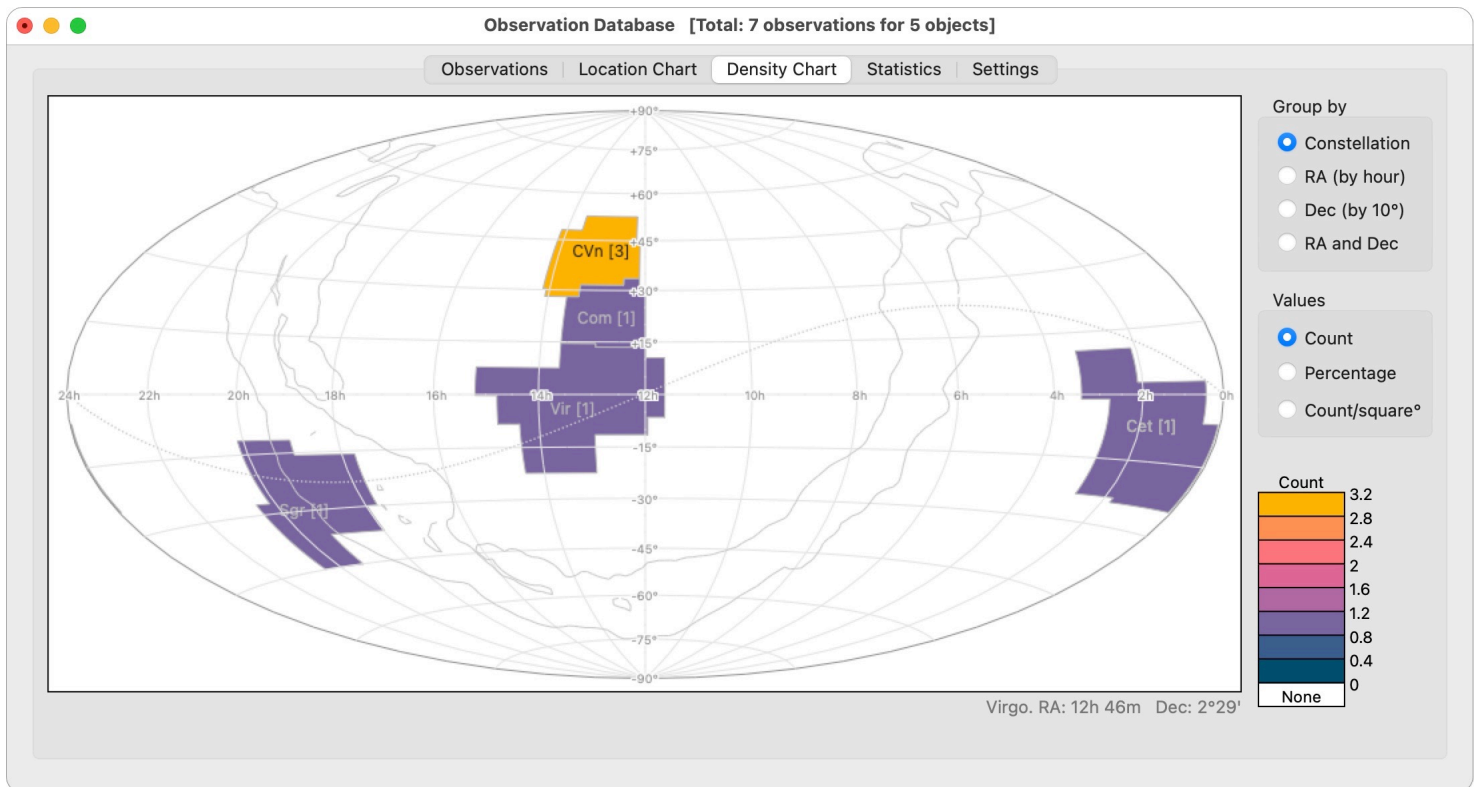


Figure 320: Observation database window Location Chart

12.2.18 Statistics

The Statistics tab shows one or more tables and pie charts of statistics related to the observations in your observation database. The window can have up to 3 x 3 independent table/charts, automatically determined by the size of the window (Figure 322).

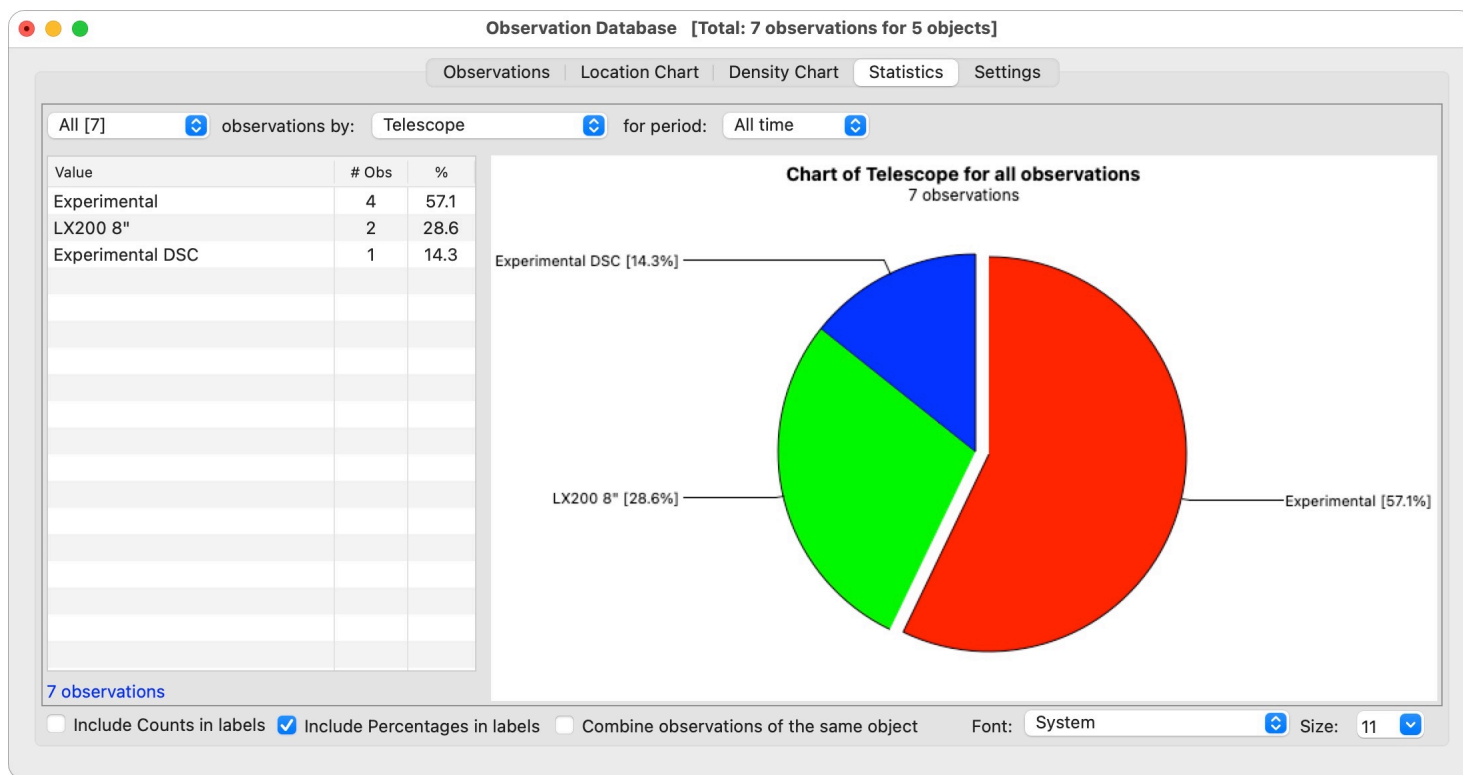


Figure 321: Statistics tab

Above each table/chart are three popup menus that control what is displayed. The first determines what observations are to be used:

- **All.** All observations in the database.
- **Displayed.** Only the observations currently being displayed in the Observations tab.
- **Selected.** Only the observations currently selected in the list in the Observations tab.

The second popup determines the observation parameter to use to summarise the statistics values:

- Constellation.
- Day of Week.
- Eyepiece.
- Filter.
- Found.
- Hour of Day.
- ID.
- Imager.
- Month.
- Object Type.
- Observer.
- Optical Aid.

- Plan File.
- Rating.
- Seeing.
- Site.
- Telescope.
- Transparency.
- Year.

The third popup determines the period over which observations are to be included:

- All time.
- This year.
- Last year.
- This month.
- Last month.
- xxxx, where xxxx is each year for which observations were made. e.g. 2000, 2001, etc.

The tables represent the different values of the parameter, the number of observations, and the percentage of the total, in descending order.

The pie chart is a graphical depiction of the first 12 rows of the table, and a 13th "slice" representing the rest of the table's rows combined.

At the bottom of the tab are some settings that alter the table contents and/or the pie charts:

- **Include Counts in labels.** The contents of the # *Obs* column is included in the pie "slice" labels.
- **Include Percentages in labels.** The contents of the % column is included in the pie "slice" labels.
- **Combine observations of the same object.** Observations of the same object are counted as one.
- **Font.** Customise the font and size used in the pie charts.

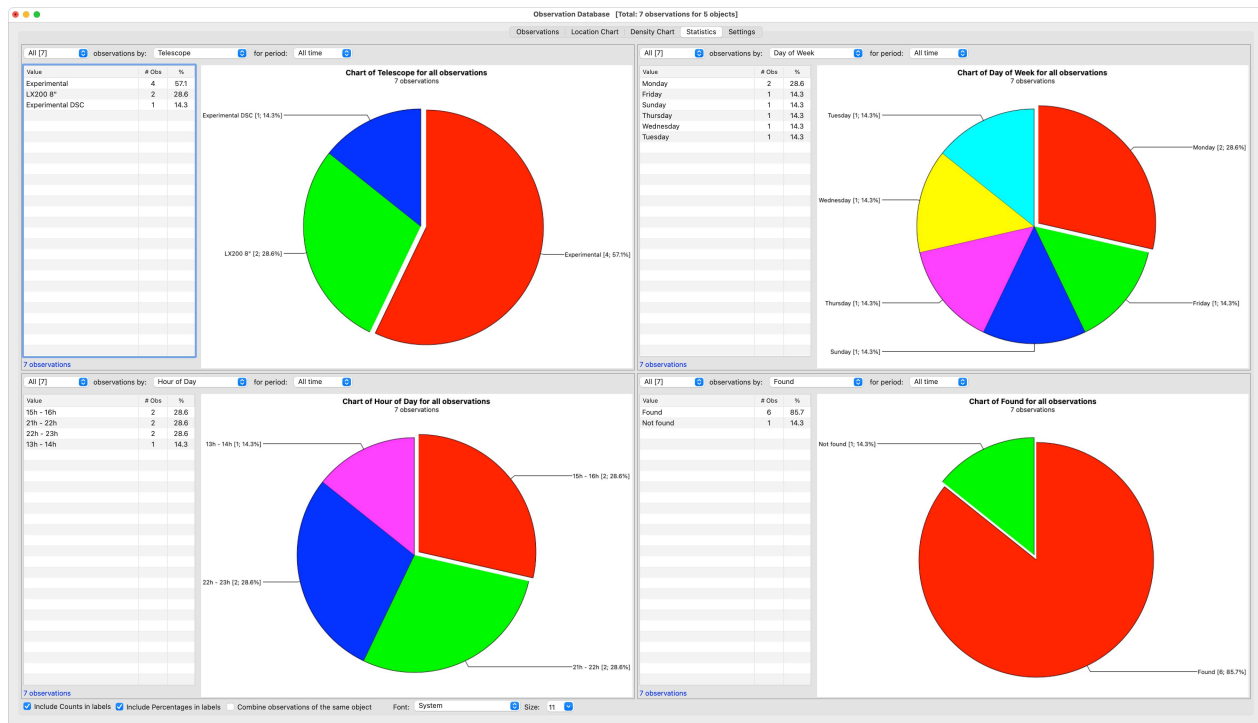


Figure 322: Statistics tab in a larger window, show 2 x 2 table/charts

12.2.19 Settings

The Settings tab allows you to set up some observation database options.

Sessions List Columns

Choose what columns you want to see in the Sessions list (by checking or unchecking the checkboxes), and drag the entries to determine the order of the columns. Note that the "User-Defined Fields" entry represents any user-defined session fields (and hence might consist of zero or more columns).

Observations List Columns

Choose what columns you want to see in the Observations list (by checking or unchecking the checkboxes), and drag the entries to determine the order of the columns. Note that the "User-Defined Fields" entry represents any user-defined observation fields (and hence might consist of zero or more columns).

Custom Synonym Rules

Sometimes the application fails to realise that two IDs are in fact synonymous (i.e. they represent the same object in two different catalogues), or that two IDs that the application considers synonymous are in fact not. You can "force" two IDs to be synonymous, or not synonymous by adding a rule in this list. You can also specify that an ID is contained in another ID here.

Synonym Manager

The observation database keeps a table of synonyms for each observed object, and looks up such synonyms from the catalogue collection where necessary. If it happens to be busy looking up synonyms, they will appear in this list. This is a feature that is not really useful, but is used by the developer when there's an issue. However, you can look up a synonym for an arbitrary ID by entering the ID in the field and clicking **Lookup Synonyms**.

All of the mounts listed are supported on both Mac and Windows (apart from ASCOM, which will only appear in Windows). Of special interest are the two AstroPlanner Emulated mounts, which control internally "simulated" telescopes, and which can be used for testing or practice purposes if a real mount is not available (see Section 13.11 on page 235).

At the bottom of the menu is **Auto-Detect....** This option can be used to find any connected telescopes and attempt to determine what kind of mount is connected. This is done by scanning each known serial port and attempting to get an expected response for each type of known telescope mount (not for ASCOM however).

The Auto-Detect dialog allows you to select the serial ports (and/or SkyFi/StarSeek adapter) to scan, and the expected type/s of telescope to check for. If you're not sure, check as many as you like, understanding that it might take a while to check for and find the correct one.

Note: If you plug in a USB-to-serial adapter then you might have to use the Refresh button (just to the right of the Serial ports checkbox) in order to find the serial port.

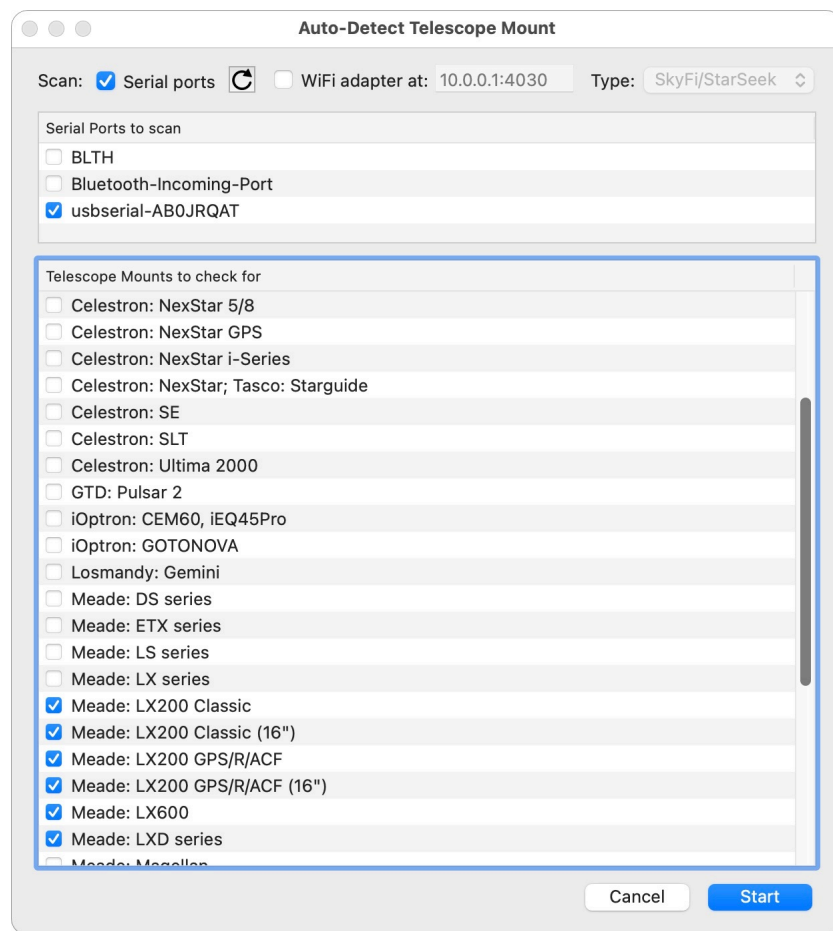


Figure 325: Auto-Detect dialog

The application scans the specified serial ports until a telescope mount responds correctly. The telescope mount type (or types if the algorithm cannot disambiguate more than one possible mount type) is displayed in a dialog (e.g. Figure 326), and lets you choose. If the chosen mount (or mounts) is incorrect, you can click the **Ignore and Keep Looking** button to continue scanning and checking for other mounts and/or other serial ports.

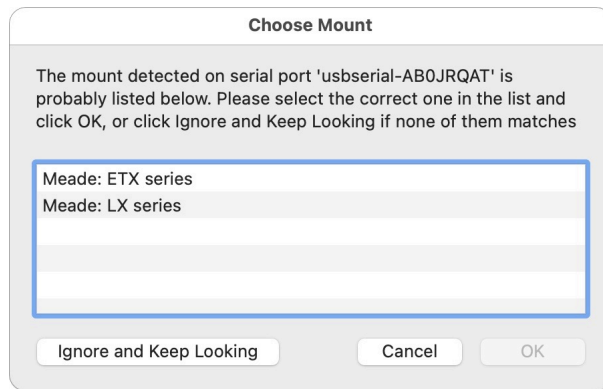


Figure 326: Choose mount dialog

13.2 Configuration

Once the mount type is selected, you will need to configure the software for your particular mount. This is done by clicking the **Edit...** button next to the Computerised Mount popup for the Telescope resource.

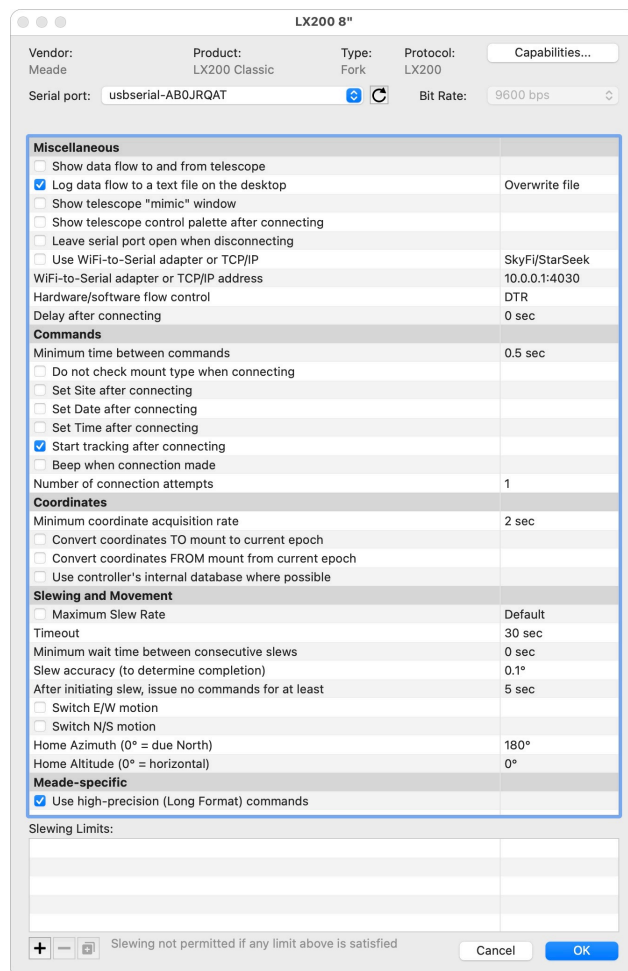


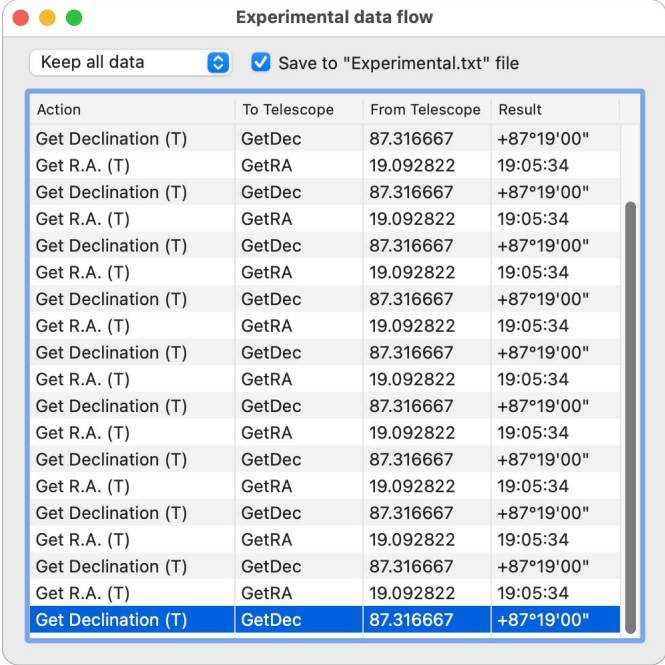
Figure 327: Mount parameters edit dialog

For most mounts, a serial port is required, and that is selected via the **Serial port** popup at the top left. If a choice of bit rates is allowed, the **Bit Rate** popup will be enabled.

The list below contains a number of configurable parameters. Some of those common to most mount types are listed below. Clicking/selecting a parameter allows you to edit its value, where applicable.

13.2.1 Miscellaneous

- **Show data flow to and from telescope.** When you connect a telescope, a window opens and shows all the data traffic to and from the mount. This is often useful for troubleshooting connections. The window is closed when you disconnect. The window has a checkbox which, when checked, will log the window's data and any subsequent data to a log file. The **Action** column is the action requested by the computer. The **To Telescope** column is the actual text command sent to the telescope mount. The **From Telescope** column is the actual response text received back from the mount (where applicable). The **Result** column is the interpreted value or meaning of the response from the mount (where applicable).



The screenshot shows a window titled "Experimental data flow" with a toolbar containing "Keep all data" and "Save to 'Experimental.txt' file" (checked). Below is a table with four columns: Action, To Telescope, From Telescope, and Result. The table contains 18 rows of data, alternating between "Get Declination (T)" and "Get R.A. (T)" actions. The "To Telescope" column shows commands like "GetDec" and "GetRA". The "From Telescope" column shows raw response data like "87.316667" and "19.092822". The "Result" column shows interpreted values like "+87°19'00\"" and "19:05:34". The last row is highlighted in blue.

Action	To Telescope	From Telescope	Result
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"
Get R.A. (T)	GetRA	19.092822	19:05:34
Get Declination (T)	GetDec	87.316667	+87°19'00"

Figure 328: Data flow window

- **Log data flow to a text file on the desktop.** Similar to the above, but the traffic data is automatically logged to a text file on your desktop (with the same name as your telescope resource). You can choose to overwrite any existing log file, append to the existing log file, or create a new file each time you connect (in which case, the files will be numbered).
- **Show telescope "mimic" window.** Displays a small window (Figure 329) that shows the current pointing coordinates of the telescope. Useful if your telescope is remote from your computer. Emulated mounts also display this window. If your current Site has a user horizon defined, it will be displayed.

- **Show telescope control palette after connecting.** Shows the telescope control palette (see Section 13.8 on page 228) when you connect. Otherwise the control palette remains hidden until requested (*Telescope > Telescope Control Palette*).
- **Leave serial port open when disconnecting.** Normally, when the telescope is disconnected, the serial port is closed. This option allows the serial port to remain open when the telescope is disconnected, and re-used when the telescope is reconnected. This might avoid some delays with certain serial ports (e.g. Bluetooth) that take some time to connect and open each time.
- **Use WiFi-to-Serial adapter.** If you are using a SkyFi, StarSeek, Nexus, or other WiFi-to-Serial adapter, then select this option. If the IP#/port for the unit has been changed from the default, you can specify it here.
- **WiFi-to-Serial adapter address.** The IP number and port for the WiFi-to-Serial adapter.
- **Hardware/software flow control.** You can choose XON/XOFF and/or Data Terminal Ready (DTR) flow control if your telescope mount demands it (this will rarely be required).

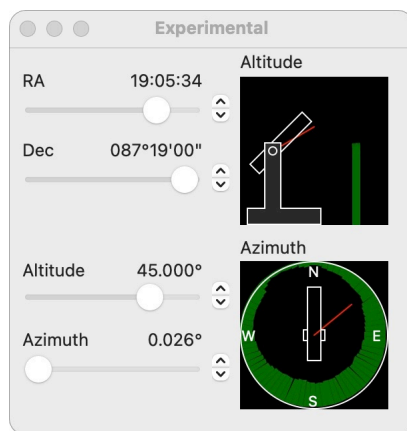


Figure 329: Telescope "mimic" window

13.2.2 Commands

- **Minimum time between commands.** The computer issues various commands to the mount. Some mounts cannot take more than a maximum number of commands per second. This setting allows you to specify a minimum time to wait between issuing commands.
- **Do not check mount type when connecting.** The computer typically checks to make sure that the correct type of mount is connected before continuing on and communicating with it. This option will avoid doing that check and assume that the mount is correct. This can be of use if you are, say, using the LX200 Classic mount protocol with a non-LX200 Classic mount, that might not support the commands that the LX200 mount driver uses for recognition.
- **Set Site after connecting.** After connecting the telescope, send the site information for the current site (latitude, longitude, GMT offset) to the telescope mount, if supported.
- **Set Date after connecting.** After connecting the telescope, send the local date to the telescope mount, if supported.
- **Set Time after connecting.** After connecting the telescope, send the local time to the telescope mount, if supported.

- **Start tracking after connecting.** If the mount allows tracking to be set on and off, this will force the mount to start tracking when you connect.
- **Beep when connection made.** Beep the computer when connection is made.
- **Number of connection attempts.** Sometimes it might require more than one attempt to connect to the telescope mount. This specifies the maximum number of attempts to make before giving up.

13.2.3 Coordinates

- **Minimum coordinate acquisition rate.** Minimum time between asking the mount for its current RA/Dec coordinates. The lower this value, the more often the mount is interrogated, which can slow down operation of the application.
- **Convert coordinates TO mount to current epoch.** Normally the computer assumes the telescope uses epoch J2000.0 coordinates. If your telescope requires coordinates in the current epoch (JNow), then use this option. Very few telescopes have accurate enough pointing that this makes much difference in practice.
- **Convert coordinates FROM mount from current epoch.** Normally the computer assumes the telescope uses epoch J2000.0 coordinates. If your telescope provides coordinates in the current epoch (JNow), then use this option and the telescope coordinates will be converted to J2000.0.
- **Use controller's internal database where possible.** Some mounts have an internal database of objects that can be accessed via the computer. If so, use this option. It is recommended that you *don't* use this option.

13.2.4 Slewing and Movement

- **Maximum Slew Rate.** If your mount allows, you can set the maximum slew rate ($^{\circ}$ /sec) for Go-to operations.
- **Timeout.** When slewing, if the mount does not report back that it has completed the slew within this time, it will report a timeout error. For mounts with slow slewing, you might need to bump this up.
- **Minimum wait time between consecutive slews.** Some mounts can get confused, or even damaged, if a slew is started before the current slew has completed, or for a short settling time afterwards. This option sets that required settling time.
- **Slew accuracy (to determine completion).** Some mounts report when a slew is complete and some do not. In order to ascertain that the slew has completed, the computer asks the mount for its current pointing coordinates, and if they are within this angular distance of the target, the slew is assumed to have finished.
- **After initiating slew, issue no commands for at least n seconds.** Some mounts do not like any commands to be issued after a slew has started. This will make sure that no commands are issued before a specified time has passed.
- **Switch E/W motion.** When using the E/W movement buttons in the control palette, this option swaps the button actions around.
- **Switch N/S motion.** When using the N/S movement buttons in the control palette, this option swaps the button actions around.
- **Home Azimuth.** Specifies the azimuth of the Home position for the mount.

- **Home Altitude.** Specifies the altitude of the Home position for the mount.

13.2.5 Digital Setting Circles

- **Mount Type.** For digital setting circle (DSC) mount controllers, this specifies the type of mount in use.

13.3 ASCOM configuration

(*Windows only*) If you want to use an ASCOM driver to control your telescope mount, choose "ASCOM: ASCOM Driver" as your Computerised Mount type. Edit the mount (**Edit...** button).

Click the **ASCOM Configure...** button to select the particular driver you want to use, and configure its properties (serial port, etc.).

80ED Pro

Vendor: ASCOM Product: ASCOM Driver Type: Protocol: ASCOM Capabilities...

ASCOM Mount Type: <Unknown> ASCOM Configure...

Miscellaneous

☐ Show data flow to and from telescope

☒ Log data flow to a text file on the desktop Overwrite file

☐ Show telescope "mimic" window

Commands

Minimum time between commands 0.5 sec

☐ Beep when connection made

Number of connection attempts 1

Coordinates

Minimum coordinate acquisition rate 1 sec

☐ Convert coordinates between J2000.0 and current epoch

Digital Setting Circles

Mount Type Polar (clock drive)

ASCOM-specific

Computerised mount being controlled Unknown

☐ Set site latitude/longitude after connecting

☐ Set date/time after connecting

Slewing Limits:

Slewing not permitted if any limit above is satisfied

OK Cancel

Figure 330: ASCOM mount - before selecting driver type

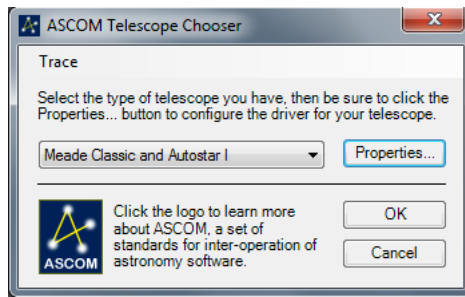


Figure 331: Selecting the ASCOM telescope type

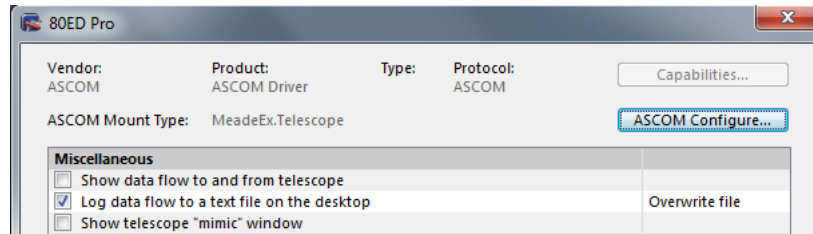


Figure 332: ASCOM Mount - after selecting driver type

You can also use the **Capabilities...** button to examine the capabilities available for that mount (not all of which might be available to you in AstroPlanner).

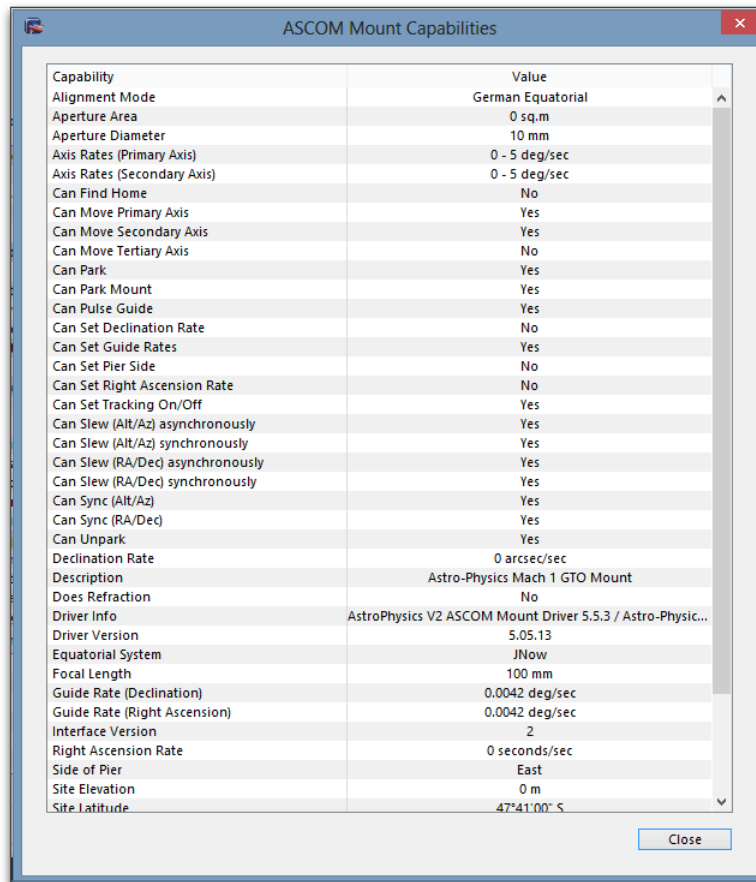


Figure 333: ASCOM Capabilities

NOTE: It would seem that in order to connect AstroPlanner to a shared ASCOM mount via the ASCOM POTH feature, AstroPlanner must be run in Administrator mode. To do this, right-click on the application icon, or a shortcut to the application, and choose **Run as administrator**. You may only have to do this once.

13.4 Connecting & disconnecting

To connect to a telescope, use the **Connect to telescope** checkbox in the Telescope widget.

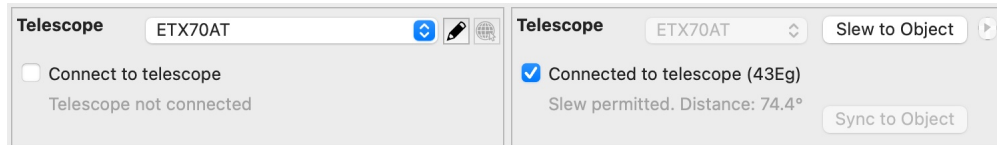


Figure 334: Telescope: disconnected (*left*), connected (*right*)

If another plan window is connected to the same telescope, the two windows will share the connection.

Uncheck the **Connected to telescope** checkbox to disconnect.

13.5 Slewing

In order to slew the connected go-to telescope to a target, that target must be above the (theoretical) horizon (i.e. have an altitude > 0°), and must be within any set slewing limits for that telescope mount.

Slewing to a given target can be done from various places in the application:

- **Slew to Object** button on the Telescope widget.
- **Object > Slew to Object** menu command.
- Right-click object list and use **Slew to Object**.
- Right-click field of view chart and use **Slew to cursor position**.
- Right-click sky chart and use **Slew to...**
- Choose a visible alignment star in the list on the Sky tab and click **Slew to Star**.
- Use the **Slew To** popup underneath the object list.
- **Slew to Object** button in a catalogue display window.
- **Slew to Object** button in a search results window.

Typically, there is a progress bar on the Telescope widget that shows you how far the slew has progressed, and the **Slew To** button typically changes to an **Abort Slew** button while the slew is taking place (if the telescope allows for the aborting of a slew operation).

After slewing, the ID of the object that was the target of the slew is reported just below the **Slew** button on the Telescope widget.

13.6 Syncing

Some telescope mounts allow you to "sync" the controller of a go-to telescope mount to the current position. i.e. you slew to a known position, but the mount needs to be moved slightly using arrow

buttons to line up the known object position with the centre of the field of view. The sync operation will tell the controller to adjust its alignment parameters to match the coordinates. This typically makes slewing more accurate, at least in the vicinity of the sync coordinates.

In AstroPlanner, there is a ***Sync to Object*** button in the Telescope widget. After slewing, and adjusting the pointing of the telescope with the hand controller, you can click the button to perform the sync operation.

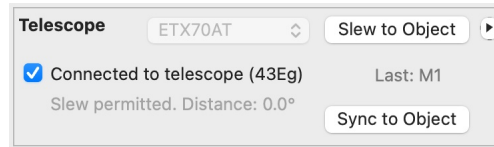


Figure 335: Sync to Object

Syncing is also used in other telescope-related features such as high-precision slewing (Section 13.9 on page 232), iterative polar alignment (Section 14.1 on page 244), and in the telescope control palette (Section 13.8.1 on page 228).

13.7 Tracking

If the telescope mount allows you to turn tracking on and off, then you can toggle this using **Telescope > Toggle Tracking**.

13.8 Control palette

The telescope control palette is a small floating window that allows direct control over several go-to telescope mount features (if they are implemented by the telescope mount and its associated protocol). The palette is available when the telescope is connected via the **Telescope > Telescope Control Palette** menu command. It can also be automatically opened via the appropriate mount option (see Section 13.2.1 on page 222). The palette closes automatically when the telescope is disconnected.

The palette window has multiple tabs, each one covering various features of the telescope.

13.8.1 Motion

This tab contains controls pertaining to telescope motion and slewing.

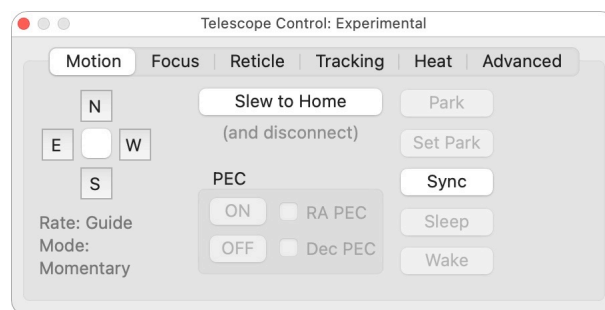


Figure 336: Telescope control palette: Motion

The N, E, W, S buttons allow the mount to be moved in the four directions. The round button in the centre reveals a popup menu when clicked. This menu allows you to select the rate of motion when the direction buttons are used (which is mount-dependent, but is typically guide speed (2x sidereal), centre speed, find speed, and slew speed). You can also set how the direction buttons operate:

- **Momentary.** The motion occurs as long as the button is held down.
- **Toggle on/off.** One click of the button starts the motion. A second click stops the motion.
- **Fixed duration.** Clicking a direction button starts motion in the given direction for a fixed amount of time, after which the motion stops. The **Option...** menu entry allows you to change the duration.

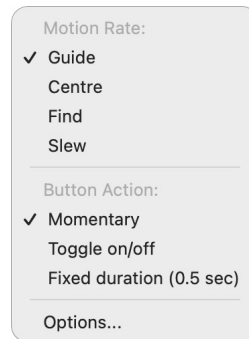


Figure 337: Motion popup menu

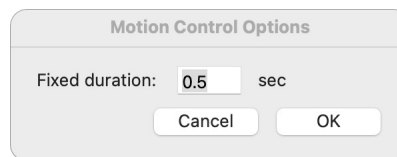


Figure 338: Motion control options

The **Slew to Home** button will slew the telescope to the home position (either specified as a mount option, or fixed for the mount type) and disconnects the telescope from AstroPlanner.

The **Park** button, if implemented, will park the telescope. The **Set Park** button will set the park position to the current Alt/Az position of the telescope.

The **Sync** button does a sync operation.

The **Sleep** button puts the scope to sleep (typically this puts the mount in a low- or no-power mode from which it can be woken without losing its alignment). The **Wake** button wakes up a previously-sleeping mount.

The **PEC** (Periodic Error Correction) controls allow you switch PEC on or off, and where applicable, to select whether RA PEC, Dec PEC, or both are enabled.

13.8.2 Focus

This tab contains controls pertaining to telescope focusing (some mounts allow you to plug in an electronic focuser, or have one built-in as part of the mount/OTA).

The **In** and **Out** buttons control the focuser, moving the focus either in or out. This motion is controlled by the popup to the right:

- **Momentary.** The focus motion occurs as long as the **In** or **Out** button is held down.
- **Toggle on/off.** One click of the **In** or **Out** button starts the motion. A second click stops the motion.

- **Fixed duration.** Clicking the *In* or *Out* button starts motion in the given direction for a specified fixed amount of time, after which the motion stops.

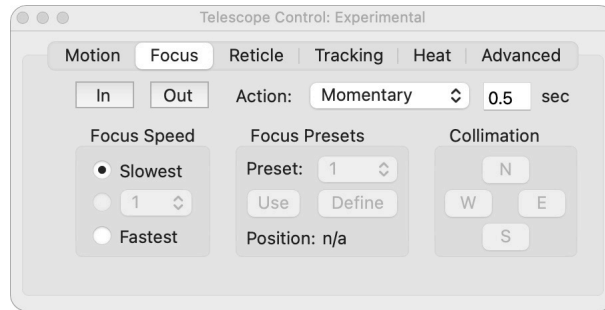


Figure 339: Telescope control palette: Focus

The **Focus Speed** (where applicable) allows you to select the speed of the focuser motor.

If your mount allows it, you can use the **Focus Presets** controls to set one or more preset focuser positions. You set a preset by selecting the preset number in the **Preset** popup and clicking the **Define** button. To move the focus to a preset position select the preset number in the **Preset** popup and click the **Use** button.

The **Collimation** buttons, where applicable will move the collimation motors for the specified sector.

13.8.3 Reticle

This tab contains controls pertaining to illuminated reticle eyepiece control (some mounts allow you to plug in an eyepiece with an externally-powered illuminated reticle).

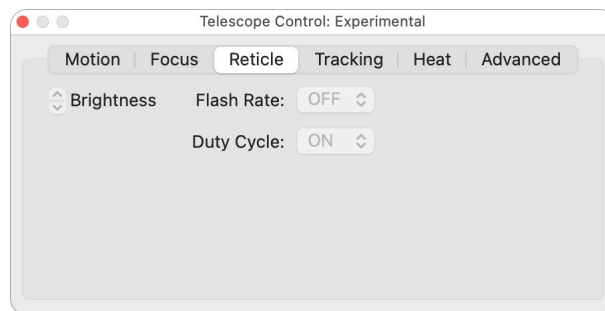


Figure 340: Telescope control palette: Reticle

The **Brightness** control adjusts the reticle illumination up or down. The **Flash Rate** allows you to specify the rate at which the illumination LEDs are turned on and off. The **Duty Cycle** adjusts the proportional on/off time of the illuminator.

13.8.4 Tracking

This tab contains controls pertaining to telescope mount tracking (the motion used to track the stars, etc. when the telescope is not slewing).

Where applicable, the tracking can be turned *On* or *Off*. The **Tracking Rate** allows you to specify the rate at which the tracking motion occurs:

- **Sidereal.** The tracking rate to keep the stars stationary.

- **Solar.** The tracking rate to keep the sun stationary.
- **Lunar.** The tracking rate to keep the moon stationary.
- **Manually increment.** Increment/decrement the current rate.
- **Manual rate.** Set the current rate to a fixed value. The rate is measured in Hz. 60Hz will move the scope such that it makes one complete revolution of the sky in 24 hours. Sidereal rate is slightly fast (typically 60.1Hz).

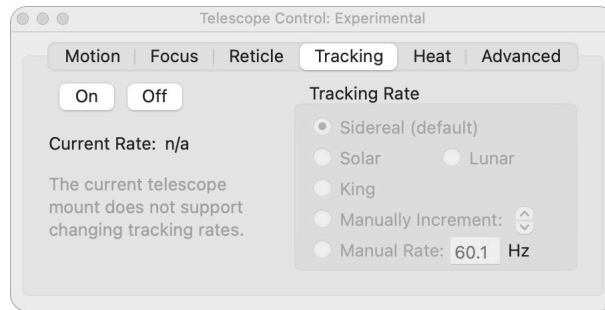


Figure 341: Telescope control palette: Tracking

13.8.5 Heat

This tab contains controls pertaining to controlling telescope heaters, where applicable.

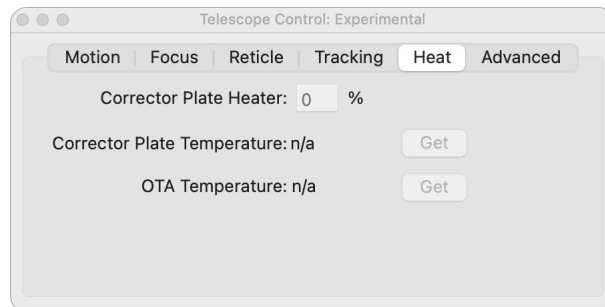


Figure 342: Telescope control palette: Heat

The **Corrector Plate Heater** setting specifies the amount of heating (as a percentage of full power) to apply to the corrector plate on Schmidt- or Maksutov-type telescopes.

The **Corrector Plate Temperature** and **OTA Temperature** can be measured and displayed by clicking the relevant **Get** button.

13.8.6 Advanced

This tab contains controls pertaining to controlling advanced telescope features, available on some mounts.

The telescope **Tube exhaust fan** can be turned **On** or **Off**.

The **De-rotator** on some Alt/Az mounted telescopes can be turned **On** or **Off**.

Power Reset will (effectively) cycle the power to the mount, causing it to restart.

Start Alignment will start or restart the telescope alignment procedure.

The **Anti-backlash** settings can be changed for the two rotational axes.

12V Panel Power (for accessories) can be switched *On* or *Off*.

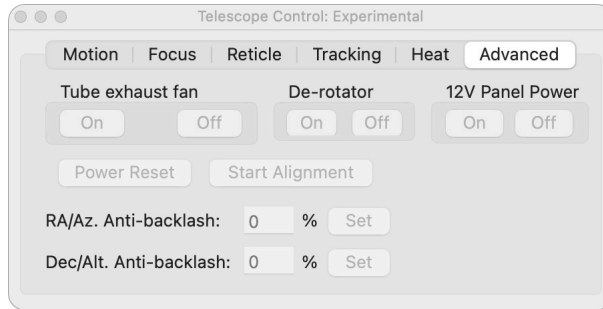


Figure 343: Telescope control palette: Advanced

13.9 High-precision slewing

When you slew a go-to telescope to given coordinates, the precision of that slew to the actual sky coordinates is dependent on how well the mount was aligned initially, the orthogonality of the mount axes, and several other parameters. Typically, the alignment algorithm is accurate only for small angular distances across the sky. If you make a large slew, the precision of the slew drops off.

This can be a problem if you are, for example, slewing to a dim object which might be difficult to find unless the slew is spot on. If you are slewing remotely, with an imager attached to the telescope, this can also be problematic.

However, some mounts allow a *sync* operation that corrects the local alignment (in and around the current pointing coordinates). This can be used to improve the precision of a slew by doing the following:

- Slew to a known bright object (a bright star) fairly close to the target object.
- Centre the bright object in the eyepiece (or imager) using movement commands.
- Do a sync operation to improve the slew precision in the vicinity of the bright object.
- Do a slew to the target object, which should then be pretty close to the centre of the eyepiece/imager.

This can also be improved for very long slews (from one side of the sky to the other), by repeating the first three steps with smaller slews (say 10° at a time) until you're close enough to the target, and then do the final step.

The high-precision slew feature of AstroPlanner allows you to automate this procedure whenever you do a slew.

The feature is toggled on and off via the **Telescope > High-Precision Slewing** menu command.

If the feature is on and you start a slew, then the High-Precision Slewing floating window is displayed.

At any time you can abandon this procedure and just slew straight to the target by clicking the **Slew to target** button, or cancel the slew altogether with the **Cancel** button.

At the top of the window is a list of bright stars close to the target, in decreasing order of their distance to the target. Pick one of these stars you know, and click the **Slew to Star** button.

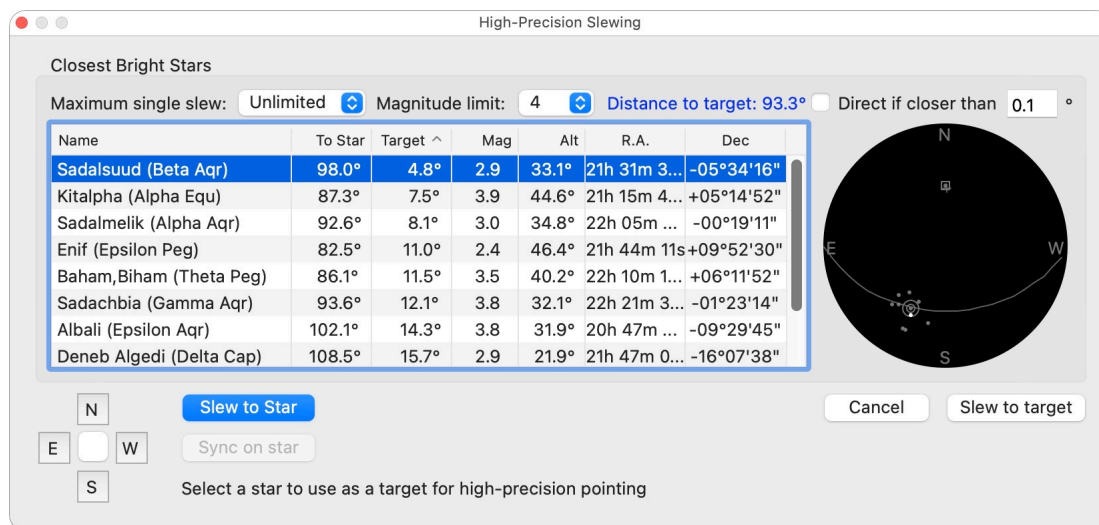


Figure 344: High-precision slewing window

The window shrinks down (since the star list is no longer required), and the slew to the bright star begins. You can abort the slew if necessary using the **Abort Slew** button.



Figure 345: Slewing to a bright star

Once the slew has completed, centre the bright star in the eyepiece/imager using the telescope hand controller or the direction motion buttons on the window, and then click the **Sync on star** button. Then click the **Slew to target** button to complete the slew.

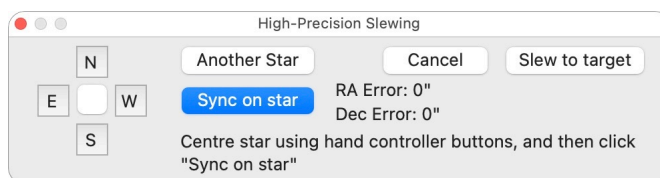


Figure 346: Ready to slew to target

There are some controls to customise this procedure:

- **Maximum single slew.** By default this is set to *Unlimited*, which means all slews will consist of a single slew to a bright star near the target, followed by a slew to the target. This could be problematic for long slews since the bright star might be outside of the eyepiece/imager field of view. You can also specify a maximum angular distance for a single slew. For example, if you set this to 20° and the target is 47° away, then the operation will hop to at least three bright stars en-route to the target, improving the chances that each bright star will be in the field of view after each sub-slew.
- **Magnitude limit.** Limits the list of stars to those brighter than this magnitude setting.
- **Direct if closer than x°.** If the target is less than x° away then just do a direct slew.

13.10 Spiral Scan

The spiral scan mechanism allows you to conduct a search starting at your telescope's current pointing coordinates, in an overlapping "spiral" path. This is useful if you are looking for an object but only have rough coordinates.

The spiral scan requires a go-to telescope to be connected. Start the scan using the ***Spiral Scan...*** button on the Field of View tab, or by using the ***Telescope > Start Spiral Scan...*** menu item. This displays the spiral scan dialog.

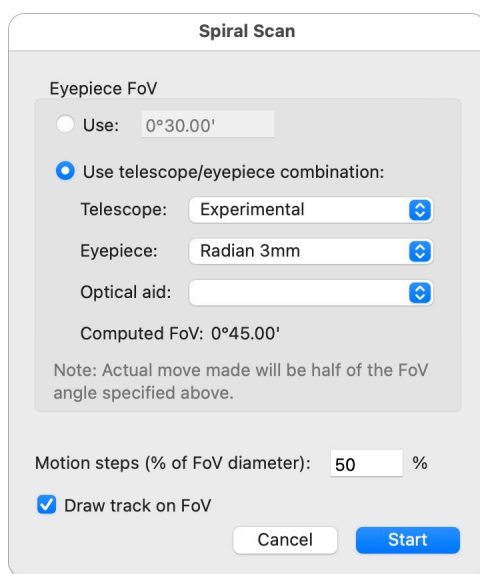


Figure 347: Spiral scan dialog

The dialog allows you to specify the field of view of the eyepiece (or imager) you are using. Either you can specify a fixed field of view, or you can specify the telescope/eyepiece/optical aid and let the application work it out.

You also specify the motion steps as a percentage of the field of view diameter. e.g. 50% implies a 50% overlap.

The **Draw track on FoV** option draws the track of the "spiral" path on the field of view chart, as shown in the figure below.

Clicking the **Start** button moves the telescope to the coordinates of the first step of the path.

To move to the next step of the path, click the ***Spiral Scan*** button on the Field of View tab, or use the ***Telescope > Continue Spiral Scan*** menu command.

To end the spiral scan process, **Shift-click** the ***Spiral Scan*** button on the Field of View tab, or use the ***Telescope > Stop Spiral Scan*** menu command.

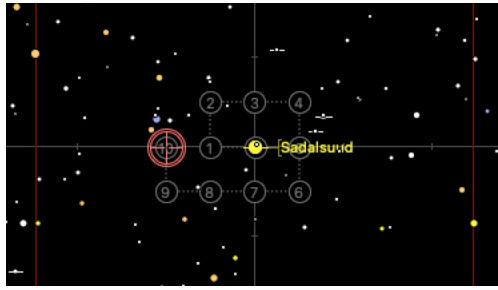


Figure 348: Spiral scan progress shown on field of view chart

13.11 Emulated mounts

For testing purposes, and to allow you to get a feel for how a telescope connects and is used without actual hardware connected, AstroPlanner defines two special computerised mounts:

- **AstroPlanner Emulated Go-to.** This emulates a go-to telescope that allows slewing, syncing, etc.
- **AstroPlanner Emulated DSC.** This emulates digital setting circles on a "push-to" telescope, that can only display the current pointing coordinates.

To emulate these mounts, a telescope "mimic" window is displayed, showing the current pointing coordinates (RA/Dec and Alt/Az).

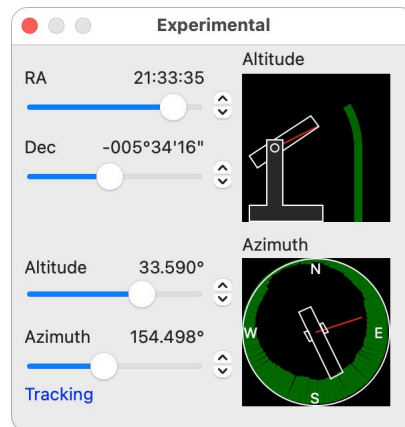


Figure 349: Emulated go-to telescope mimic window

13.12 Other features

13.12.1 Test telescope communication

This feature can be used to check your telescope mount communication manually, if you have an understanding of the serial commands used for communication. This can only be used if the telescope is currently disconnected from the application. It can also only be used for wired serial port communication, or communication that appears as a serial/COM port to the application. i.e. it won't work for Ethernet (e.g. Vixen Star Book), direct USB connections, or SkyFi-type device communications. It also assumes 8-bit, no parity, 1 stop bit settings.

In the window you need to set up the serial port you will be using and the bit rate to use. You can also slow down communication (to the mount) by using the **Delay between characters** option, and also elect to add a carriage return character (\$0D) at the end of each transmitted command.

Enter the text you wish to send into the Input command field and click **Send** to transmit it to the mount. If every command you send has an identical prefix and/or suffix, then you can set those fields up too. e.g. in the illustration below, clicking **Send** will transmit #:GZ# to the mount (this is the Meade command to return the current telescope azimuth).

The Telescope response field lists any characters returned from the telescope mount.

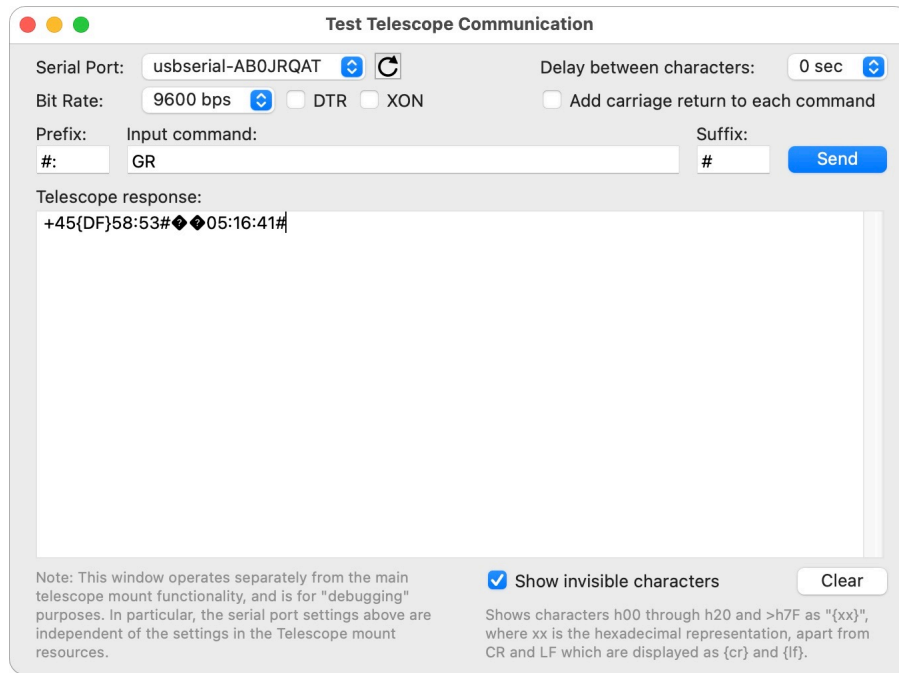


Figure 350: Test Telescope Communication window

13.12.2 Synchronise telescope to computer clock

If your telescope mount supports it, this command will send your computer's current date and/or time values to your telescope mount so that the telescope will be synchronised with the computer (to within a few seconds, since there might be a time lag).

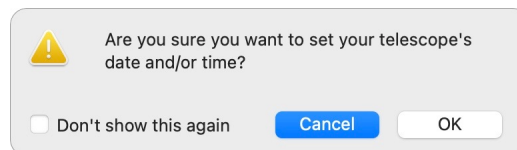


Figure 351: Synchronising telescope date/time

13.12.3 Compare computer-telescope settings

This feature will compare equivalent settings between what AstroPlanner knows or computes and what the telescope mount knows or computes. If the settings differ widely between the two, then it could cause issues with slewing (the computer tries to slew to an object that the mount thinks is below the horizon, for example).

Setting	Computer	Telescope	Difference	Raw Data	Using
Latitude	+47°41'00"	+47°41'00"	0°	47.683333<CR>	Computer
Longitude	-122°13'00"	-122°13'00"	0°	-122.216667<CR>	Computer
GMT Offset*	-8 hr	-8 hr	0 hr	-8.000000<CR>	Computer
Local Date	3/28/2023	n/a	n/a	n/a	Computer
Local Time	10h 35m 46s	n/a	n/a	n/a	Computer
Daylight Savings	True	n/a	n/a	n/a	Computer
Local Sidereal Time**	21h 50m 25s	n/a	n/a	n/a	Computer
Right Ascension	n/a	09h 50m 02s	n/a	9.833904<CR>	Telescope
Declination	n/a	+87°19'00"	n/a	87.316667<CR>	Telescope
Altitude***	45.0°	45.0°	0°	45.000002<CR>	Computer
Azimuth	0.0°	0.0°	0°	0.004979<CR>	Computer

Please allow a short time for the readings to stabilise. This might take as long as 15-30 seconds.
 * Standard Time offset. For Autostar, the Computer/Telescope values might differ by an hour.
 ** If the Computer/Telescope values agree, then your settings are probably OK.

OK

Figure 352: Compare computer-telescope settings

Note that not all mounts will be able to compare all settings.

The **Computer** and **Telescope** columns show the values being compared. The **Difference** column shows the difference between the two. If the value is coloured green it means that the values are within acceptable bounds. If the text is coloured red, it means that there is a substantial difference between the two that should be investigated.

13.12.4 Display OTA temperature

Some telescopes are capable of measuring the temperature of their OTA (optical tube assembly). This information can be collected and displayed. If the telescope mount can collect this information, and if the collection of temperature is switched on in the mount options, then the ongoing temperature can be displayed via the **Telescope > Display OTA Temperature** menu command.

The information is displayed in both tabular and graphical form.

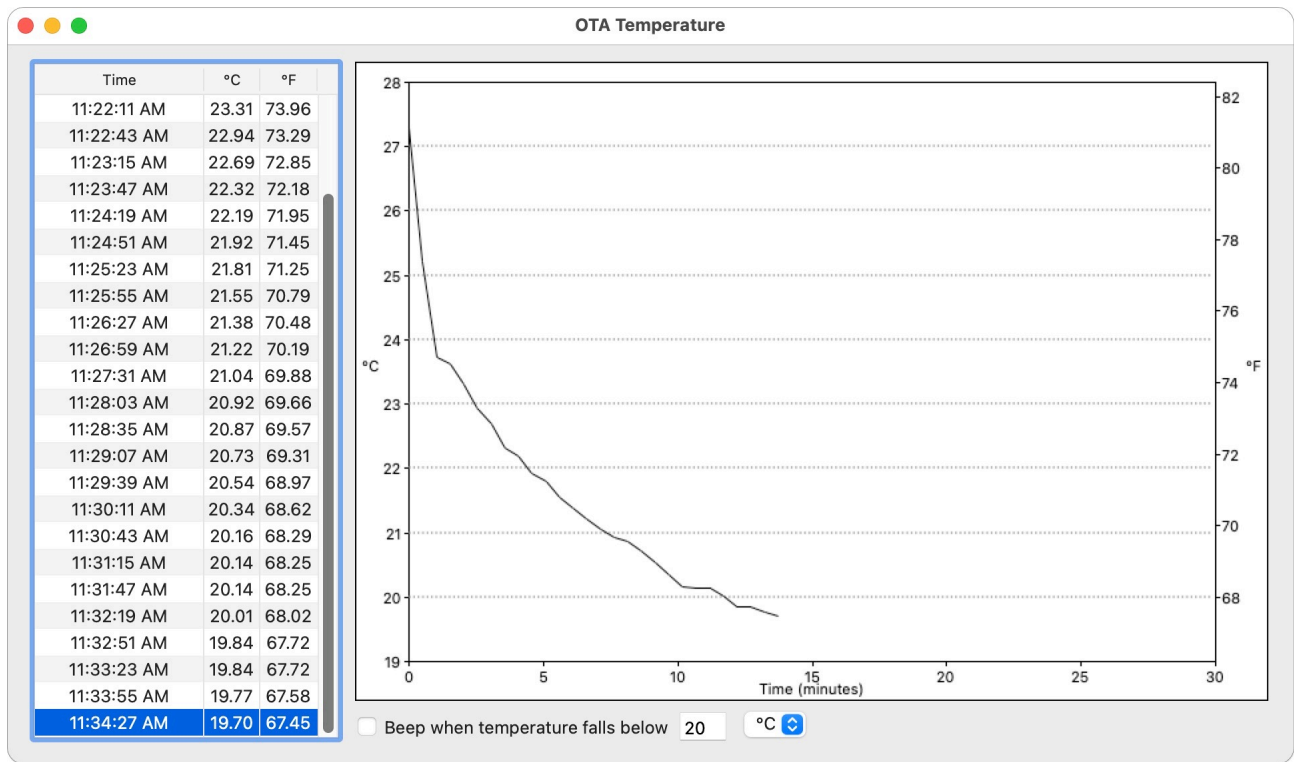


Figure 353: Display OTA temperature window

There is also an option to beep when the temperature falls below a given temperature.

13.12.5 Go to

The **Telescope > Go To...** menu command allows a slew to specified RA/Dec coordinates (assuming they are above the horizon).

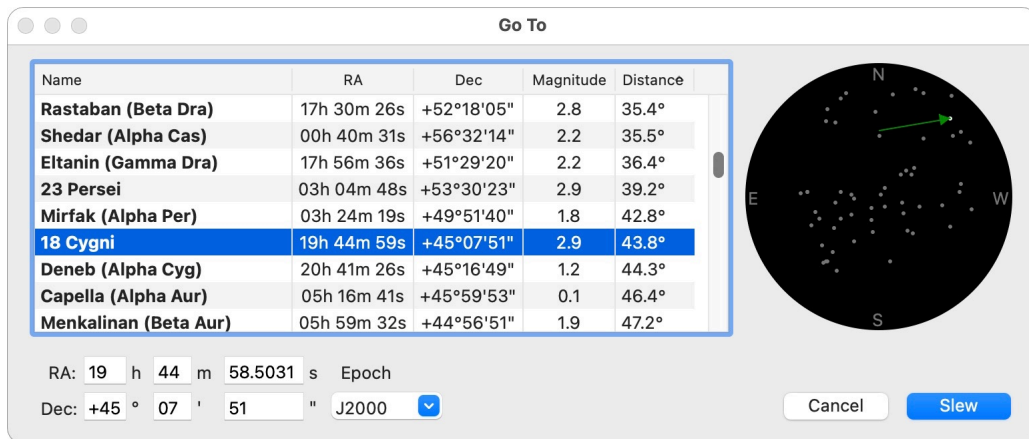


Figure 354: Go to dialog

The dialog includes a list of bright stars. Clicking on a star entry will insert its coordinates into the RA/Dec fields. The mini-sky chart on the right shows the visible stars in the list, and a green arrow shows the extent of the slew from the telescope's current pointing coordinates to the target.

13.12.6 Sync to

The **Telescope > Sync To...** menu command allows a sync to specified RA/Dec coordinates. This might be useful to do a simple one-star alignment of a polar-mounted go-to telescope.

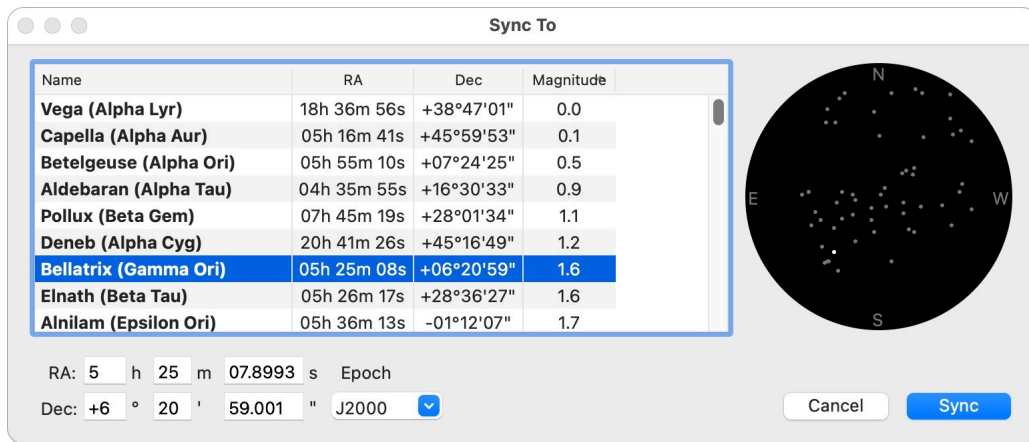


Figure 355: Sync to dialog

The dialog includes a list of bright stars. Clicking on a star entry will insert its coordinates into the RA/Dec fields.

13.12.7 Set telescope location/date/time

If it is possible to set your telescope mount's location (latitude, longitude, GMT offset) and its local date and time, then the **Telescope > Set Telescope Location/Date/Time** menu command will do just that.

13.12.8 Add alignment stars to plan

If your telescope mount includes a list of alignment stars, then the **Telescope > Add Alignment Stars to Plan...** menu command will add all of those stars to the current plan document as plan objects. The dialog allows you to specify what appears in the ID and Name fields for each object.

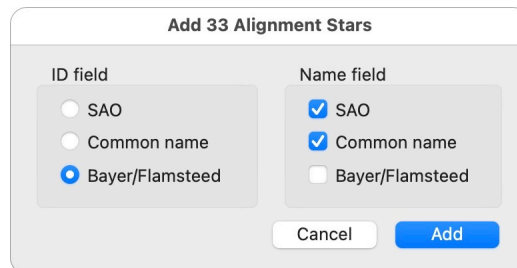


Figure 356: Add alignment stars dialog

13.12.9 Slew telescope to home

Use the **Telescope > Slew Telescope to Home** menu command to slew the telescope to the home position specified in the mount options.

13.12.10 Slew to Sky Flat Position...

When taking sky flats for astrophotography one needs to point the telescope towards the zenith, or close to the zenith (if, say, a dome slit or mount doesn't allow slewing to the zenith), with the azimuth opposite to the sun's azimuth.

This command slews the telescope to such a position, based on the sun's current position and an altitude specified by the user.

Slew to Sky Flat Position

Current Sun Position		Sky Flat Position	
RA: 00h 28m 16s	Alt: 30.3°	Alt: <input type="text" value="85"/> °	RA: 03h 59m 15s
Dec: +03°03.1'	Az: 236.6°	Az: 56.6°	Dec: +50°15.3'

Cancel Slew

Figure 357: Slew to Sky Flat Position

13.13 Vendor-specific features

13.13.1 Argo Navis

The Argo Navis controller is a sophisticated digital setting circle device (i.e. not a go-to controller).

Download plan to Argo Navis

It is possible to download a list of target objects to the controller. Using the **Telescope > Download Plan to Argo Navis...** menu command, *when the mount is connected*, displays the download dialog (after a short pause while information is requested from the Argo Navis controller).

Argo Navis Download

Objects to download

- ☐ All [115]
- ☐ Selected [1]
- ☐ Visible [33]
- ☒ Highlighted [13]
- ☐ Unhighlighted [102]
- ☐ Observed [13]
- ☐ Unobserved [102]

13 stars/DSOs

Argo Navis Status

Item	Value
Julian Date	2460032.49439 Julian
Local Date	16:51:56 TUE 28 MAR 2023 Local
UTC Date	23:51:57 TUE 28 MAR 2023 UTC
RA/Dec	11:50:31 +90:00:00
Temperature	21.3530C / 70.4962F
Free Space	124912
Asteroids	0
Comets	0
User Objects	13

Stars/DSOs: Prefix ID with*:

Asteroids:

Comets:

* use [c] for constellation, [n] for 3-digit sequence # in plan, [a] for 2-character item position in plan, [k] for source catalogue, [t] for object type. See manual for details.

Also modify plan field with the prefix, or prefixed ID**

- ☐ None
- ☐ ID
- ☒ Name
- ☐ Notes
- ☐ A new user field called "Argo Navis"

How to modify plan field contents (if necessary)

- ☒ Replace field contents with the prefix
- ☐ Add the prefix to beginning of field contents
- ☐ Add the prefix to end of field contents
- ☐ Replace field contents with the Prefixed ID
- ☐ Add the Prefixed ID to beginning of field contents
- ☐ Add the Prefixed ID to end of field contents

** Stars/DSOs only. Not for solar system objects.

Close

Figure 358: Argo Navis download dialog

Note that the Argo Navis unit must be in “navis” mode in order to be seen by AstroPlanner. You must put the Argo Navis into SETUP LOAD CAT mode prior to connecting. On the Argo Navis unit: Dial up MODE SETUP, SETUP LOAD CAT and press ENTER.

When you open the dialog via the menu command, AstroPlanner connects to the Argo Navis unit and retrieves its current status. Since user objects, comets and minor planets (asteroids) are treated separately, there are controls for each type.

The **Purge** buttons will send commands to the Argo Navis unit to eliminate all objects of the given type. **Download** will download the objects of the given type in your plan document to the Argo Navis unit.

There is a **Prefix ID with** field associated with each object type. The text will be prefixed to the ID before each object is downloaded. This can help keep plan objects together when listed on the Argo Navis screen. Some special text items can be used in these prefixes to help order the items in the Argo Navis unit. These text items are:

[c] Replace with the three-character constellation for the object (e.g. UMA, CEN).

[n] Replace with a three-digit number specifying the order in which the plan is sorted. (e.g. 020, 021).

[a] Replace with a two-character identifier specifying the order in which the plan is sorted i.e. AA, AB, AC,... ZZ.

[k] Replace with the catalogue from whence the object came (if applicable).

[t] Replace with the object type.

In addition to adding a prefix to the downloaded objects, you can also modify the plan document to match those downloaded objects. You specify which field is to be modified (ID, Name, etc.) and how it will be modified.

13.13.2 Sky Commander

The Sky Commander controller is a digital setting circle device (i.e. not a go-to controller).

Download plan to Sky Commander

The **Telescope > Download Plan to Sky Commander...** menu command will download the plan object RA/Dec parameters to the Sky Commander (or Sky Tracker) controller, starting at object 0. If there are more than 59 objects (the maximum allowable), then the first 59 will be transferred. *Note that the controller must be connected for this to work.*



Figure 359: Download plan to Sky Commander dialog

Send object coordinates to Sky Commander

The **Telescope > Send Object Coordinates to Sky Commander** menu command is enabled if you are connected to a Sky Commander and an object is selected in the object list. It will place that object's RA/Dec coordinates directly into object #99, allowing the user to then use the Sky Commander to “zero” that object on the DSCs.

13.13.3 Orion IntelliScope

AstroPlanner supports the Orion IntelliScope Computerized Object Locator (COL). This is a digital setting circle system based on the Tangent BBox design. Since the IntelliScope system returns Azimuth and Altitude readings only, this system works a little differently from other controllers supported by AstroPlanner.

In particular, it is important that the following parameters be set correctly, in order that AstroPlanner can convert the Alt-Azimuth readings to correct RA/Dec readings:

- Local Date and Time
- Site Latitude and Longitude
- Site offset from GMT

After alignment, the IntelliScope Computerized Object Locator returns an Azimuth reading with respect to the azimuth when the system was powered-up. For this reason it is necessary to calibrate the azimuth with a known star. Each time you connect, a calibration dialog appears.

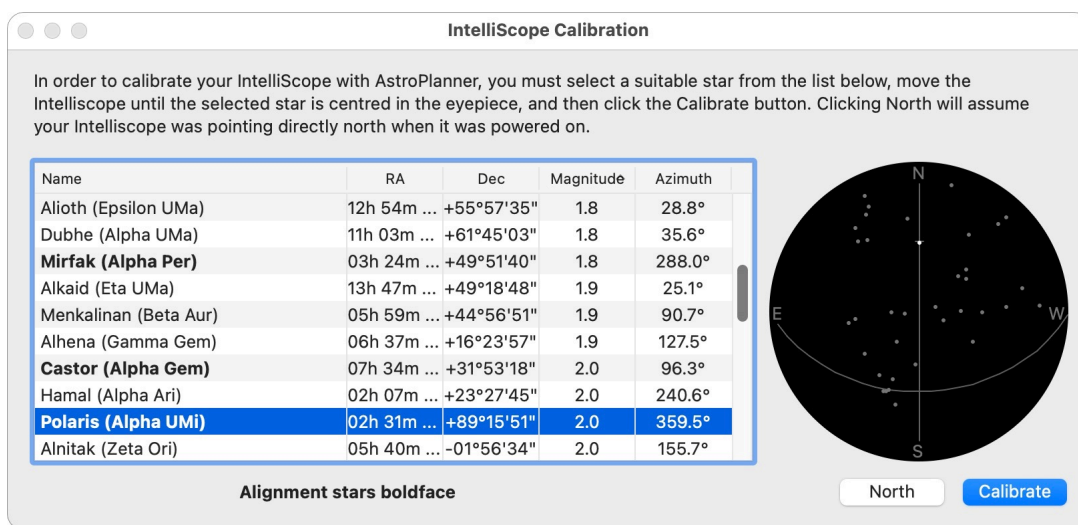


Figure 360: IntelliScope calibration dialog

The sky chart shows the location of the stars in grey, with the selected one in white. The meridian, equator and user site horizon (if defined) are also displayed.

Select a star from the list, point the telescope at the selected star and click the **Calibrate** button. If you pointed the telescope exactly at North (0°) before power-up, you can click the **North** button instead. The calibration star method is probably the more accurate of the two.

The second and subsequent times you connect, an **Already Calibrated** button appears. If you have not changed the alignment of the IntelliScope Computerized Object Locator, or powered it down and up again, you can bypass the calibration step by clicking this button.

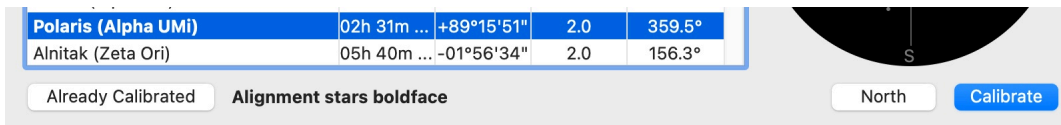


Figure 361: Intelliscope calibration dialog on subsequent connection

14 Telescope alignment

AstroPlanner includes various methods to help with polar-mounted telescope alignment (i.e. aligning the polar or R.A. axis with the celestial pole so that the telescope only has to be driven in R.A. and the Declination remains constant. Some of these require a computerised Go-to mount with applicable functionality.

14.1 Iterative polar alignment

This procedure helps you through an iterative polar alignment process for your computerised mount. It's especially useful if your telescope mount is mounted on a wedge. It assumes that before you start you have already polar mounted your telescope, done a rough polar alignment on your pole star (Polaris or Sigma Octantis), and done a one-star polar alignment.

Iterative Polar Alignment

Pole star: Polaris (Alp UMi) at RA: 02:31:48.70 Dec: +89°15'51.0"
Choose...

Select suitable non-polar alignment star (lower rating is better, but all are suitable)

Name	Mag	R.A.	Dec	Az	Alt	Distance	Rating^
54 Geminorum	3.6	07h 18m 06s	+16°32'25"	117°	44°	73°	2.3
77 Geminorum	3.6	07h 44m 27s	+24°23'53"	104°	45°	65°	2.4
Alzirr (Xi Gem)	3.4	06h 45m 17s	+12°53'44"	129°	45°	77°	2.6
Pollux (Beta Gem)	1.1	07h 45m 19s	+28°01'34"	100°	48°	62°	2.6
Wasat (Delta Gem)	3.5	07h 20m 07s	+21°58'56"	112°	47°	68°	2.7
Mekbuda (Zeta Gem)	3.8	07h 04m 07s	+20°34'13"	118°	49°	69°	2.8
60 Geminorum	3.8	07h 25m 4...	+27°47'53"	104°	51°	62°	3.0
Alhena (Gamma Gem)	1.9	06h 37m 4...	+16°23'57"	129°	49°	73°	3.0
Mintaka (Delta Ori)	2.2	05h 32m 0...	-00°17'57"	159°	40°	90°	3.0
Betelgeuse (Alpha Ori)	0.5	05h 55m 10s	+07°24'25"	149°	46°	82°	3.1
SAO 42642	4.0	09h 00m 3	+11°46'58"	71°	43°	48°	3.3

Step 1: Slew to alignment star

Step 2: Centre alignment star in eyepiece using hand controller. Then click: Sync star

Step 3: Abort Slew

Slewing to 02h 31m 49s +89°15'51"

Step 4: Centre pole star in eyepiece using wedge adjustments only. Then click: Centred

Repeat Steps 1 through 4 until desired accuracy is achieved. Then click: Finished

Wait for slewing to complete (and telescope to indicate completion)

Alignment error

Cycle	Error	Change
1	0 arcsec	n/a

Clear

Figure 362: Iterative polar alignment dialog

AstroPlanner produces a list of suitable non-polar alignment stars. These stars are chosen according to the criteria:

- Magnitude 4.0 or brighter.
- Altitude more than 40° above horizon (and not hidden by obstacles).
- More than 30° from the pole.
- Not close to the same RA as the pole star, or the pole star's RA + 12 hours.

A **Rating** column shows how "ideal" the star is. The lower the number, the better the star will be for the polar alignment process.

The sky chart at the right shows the pole star and the selected star in white, and other suitable stars in grey. The 40° altitude is marked by a dashed circle. The user horizon is shown.

If you have a telescope capable of performing the Sync operation programmatically then you can use this dialog to do all the slewing back and forth to the stars for you.

The method used is this:

Step 1: Click the button to slew the telescope to the chosen alignment star.

Step 2: Use the telescope hand controller *only* to centre the alignment star in the eyepiece (a reticle eyepiece might help here). Once you've done that, click on the **Sync Star** button. The amount of the error is displayed in the list on the right.

Step 3: Click the button to slew the telescope to the pole star.

Step 4: Now use your wedge physical adjustments *only* to centre the star in the eyepiece. In fact it is safer to adjust halfway to the pole star, and not all the way. **Do not** use the hand controller. Click the **Centred** button when you've done that.

Now repeat steps 1 through 4 until the error displayed in the list on the right is minimal. Click the **Finish** button whenever you're happy.

Warning. This procedure is only as accurate as your telescope's encoder accuracy, so don't expect to get much better than 1 minute of arc accuracy in your alignment, and probably less with a less capable telescope.

You can use the **Choose...** button to select a suitable pole star if the default one is unacceptable. Note: only visible stars, and those that are not outside telescope limits, are shown.

Select Pole Star

Select Pole Star for Iterative Alignment

Show stars brighter than magnitude 5 within 5° of the celestial pole

Name	Mag	R.A.	Dec	Az	Alt	Distance from pole^
Polaris (Alpha UMi)	2.0	02h 31m 49s	+89°15'51"	359°	48°	0.74°
Yildun (Delta UMi)	4.4	17h 32m 13s	+86°35'11"	359°	44°	3.41°
SAO 181	4.2	01h 08m 45s	+86°15'25"	355°	50°	3.74°

Note: the further from the pole the star is, the less likely you are to get an accurate polar alignment.

Cancel OK

Figure 363: Select the pole star

14.2 Polar drift alignment

In order best to utilise the method of polar drift alignment, you need to pick two stars to test drift on:

- A star close to the meridian (the great circle passing through the poles and the zenith) and near the celestial equator (Declination 0°)
- A star above the eastern horizon (there's also a "Western horizon" option for those who can't see the eastern horizon) and near the celestial equator.

The polar drift alignment helper locates such stars for you and allows you to slew your telescope to those stars. Use **Telescope > Polar Drift Alignment Helper**.

Drift Alignment Helper

Stars at the meridian

Show stars brighter than magnitude within of current meridian and equator

Name	Mag	R.A.	Dec	Az	Alt	Time
8 Orionis	3.7	04h 54m 15s	+02°26'26"	176°	45°	10.7m
10 Orionis	4.5	04h 58m 33s	+01°42'51"	175°	44°	15.0m
65 Eridani	4.8	05h 01m 26s	-07°10'26"	175°	35°	17.9m
Cursa (Beta Eri)	2.8	05h 07m 51s	-05°05'11"	172°	37°	24.3m
17 Orionis	4.5	05h 13m 17s	+02°51'40"	170°	45°	29.8m
22 Orionis	4.7	05h 21m 46s	-00°22'57"	167°	41°	38.2m

Slew to selected star

Stars on the eastern horizon

Show stars brighter than magnitude within of altitude and the celestial equator

Name	Mag	R.A.	Dec	Az	Alt	Distance
Procyon (Alpha CMi)	0.4	07h 39m 18s	+05°13'30"	124°	33°	5.37°
Gomeisa (Beta CMi)	2.9	07h 27m 09s	+08°17'22"	125°	38°	8.48°
26 Monocerotis	3.9	07h 41m 15s	-09°33'04"	133°	21°	9.70°
22 Monocerotis	4.2	07h 11m 52s	-00°29'34"	135°	32°	5.66°
4 Canis Minoris	4.3	07h 28m 10s	+08°55'32"	125°	38°	9.06°
29 Monocerotis	4.3	08h 08m 36s	-02°59'02"	123°	23°	9.05°
SAO 116260	4.4	08h 02m 16s	+02°20'04"	121°	28°	7.34°

Slew to selected star

☐ Western horizon

Recompute star lists Countdown from... ☐ Sound at end Finished

Figure 364: Polar drift alignment dialog

The dialog presents you with two lists of stars based on the two criteria above. Above each list are popup menus that allow you to adjust constraints on the stars in the list.

If no stars appear in the lists, it means that the specified restraints are too tight, or perhaps you have an obstacle defined for your eastern/western horizon. Try expanding the criteria using the popup menus.

Since the current meridian moves at a sidereal rate, you might want to click the **Recompute star lists** button occasionally.

There is a built-in timer to remind you to check the alignment when a fixed time is up. Selecting the time from the popup menu at bottom centre will start the timer counting down. The **Sound at end** checkbox will beep the computer after the period is over.

The sky charts show the selected star in white, and other suitable stars in grey. The equator, meridian and altitude lines are marked. The user horizon is shown.

14.3 Polar alignment scope tool

With a suitable plan document at the front, choose **Telescope > Polar Alignment Scope View** to display a window showing the view you would hope to see through a polar alignment scope at the current local date/time and the currently-selected site. A polar alignment scope is a small telescope that sits inside, or parallel to, the R.A. axis tube of a polar mount (typically a German equatorial mount). The scope has a reticle that is designed specifically to align on the pole star (Polaris in the northern hemisphere, Sigma Octantis in the southern hemisphere). If the pole star is placed at a particular spot on the reticle, the mount should (theoretically) be aligned with the celestial pole.

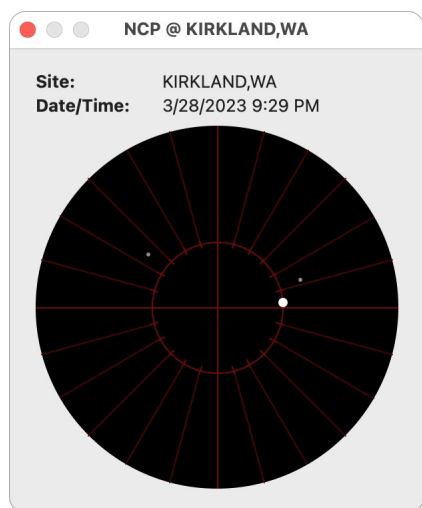


Figure 365: Polar alignment scope view

The view shows the pole star and some brighter stars near it that should be visible through the scope. The chart can be customised by right-clicking. The popup menu allows you to select the field of view of your polar scope (in degrees), whether the reticle is sized for Polaris (Alpha UMi) or Sigma Oct, and how the scope inverts the view.

14.4 1-star polar alignment

If you have a polar-mounted telescope with a computerised mount that allows syncing to given RA/Dec coordinates, then you can use this feature to do a 1-star alignment. Use **Telescope > 1-star Polar Alignment...** and select a suitable star to align to (the list should contain all visible stars down to about magnitude 3). Move your telescope until the selected star is centred in the eyepiece and click the **Sync** button. The telescope will be commanded to sync the mount to the coordinates of star.

This alignment procedure assumes that your telescope mount is exactly aligned with the celestial pole.

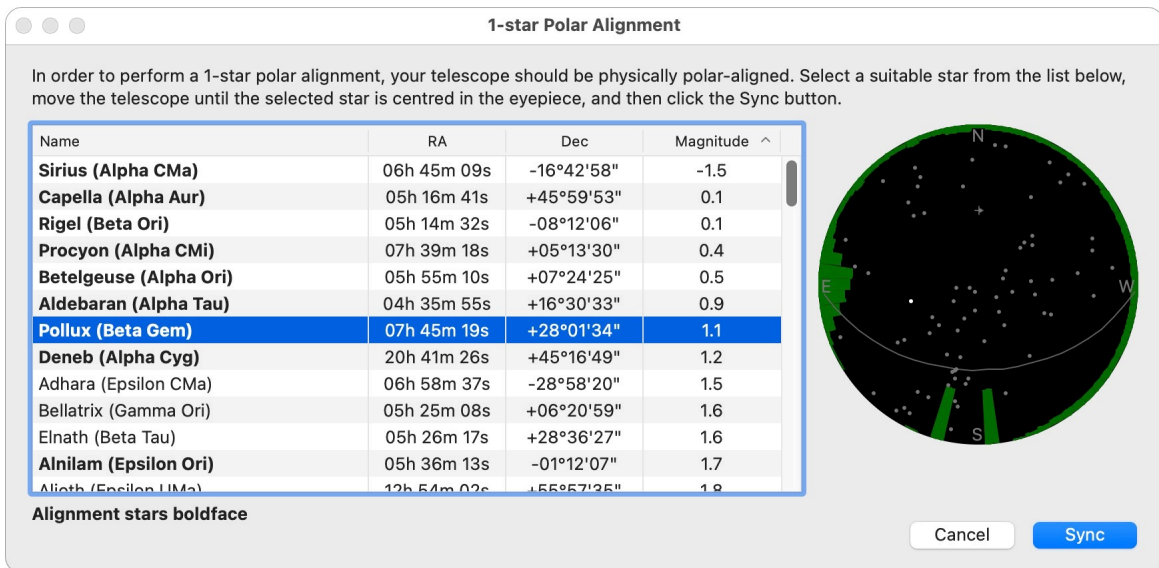


Figure 366: 1-star polar alignment dialog

15 Printing

Printing is typically instigated by using **File > Print...** If it is the first time you are using that menu command during the application run, then the Page Setup dialog¹ will appear before the Print dialog. You can also manually display the Page Setup dialog using **File > Page Setup...**

15.1 Sky and Field of View Charts

If you are viewing a chart on the **Sky** or **Field of View** tabs of the plan document window, then choosing **File > Print...** will print that chart on a single printer page. A chart printing dialog is displayed before the standard system Print dialog.

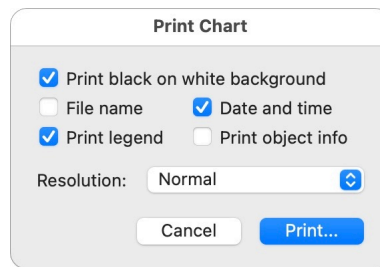


Figure 367: Chart printing dialog

- **Print black on white background.** Print the chart in black (stars, lines, etc.) with a white background. This is typically always on, unless you own a printer ink/toner cartridge company.
- **File name.** Print the plan file name in the page footer.
- **Date and time.** Print the current plan local date and time in the page footer. If the date/time is fixed, that value will be printed. This could be useful to determine the date/time for which the chart was printed, when viewed at a later date.
- **Print legend.** (*Field of View only*) Print a legend for the various types of objects and star sizes printed.
- **Print object info.** (*Field of View only*) Print information about the central object.
- **Resolution.** Normal resolution prints the chart scaled so that it is roughly WYSIWYG (What You See Is What You Get). You can also elect to increase the "resolution" (to 150%, 200%, 300%, 500%, or Highest). This will decrease the size of objects and text correspondingly. This might look better on your printer, but also might require a magnifying glass to read.

15.2 Objects

When the **Objects** tab of the plan document window is foremost, you can use **File > Print...** to print a list of those objects present in the plan.

The printing dialog prints to a "preview" window, allowing the report to be examined before it is printed.

1. The Page Setup dialog allows you to set up a number of printer-specific parameters, such as margins, portrait vs. landscape printing, page size, scale factor, and so on. These settings stay in effect for the rest of the application run, unless modified via **File > Page Setup...**

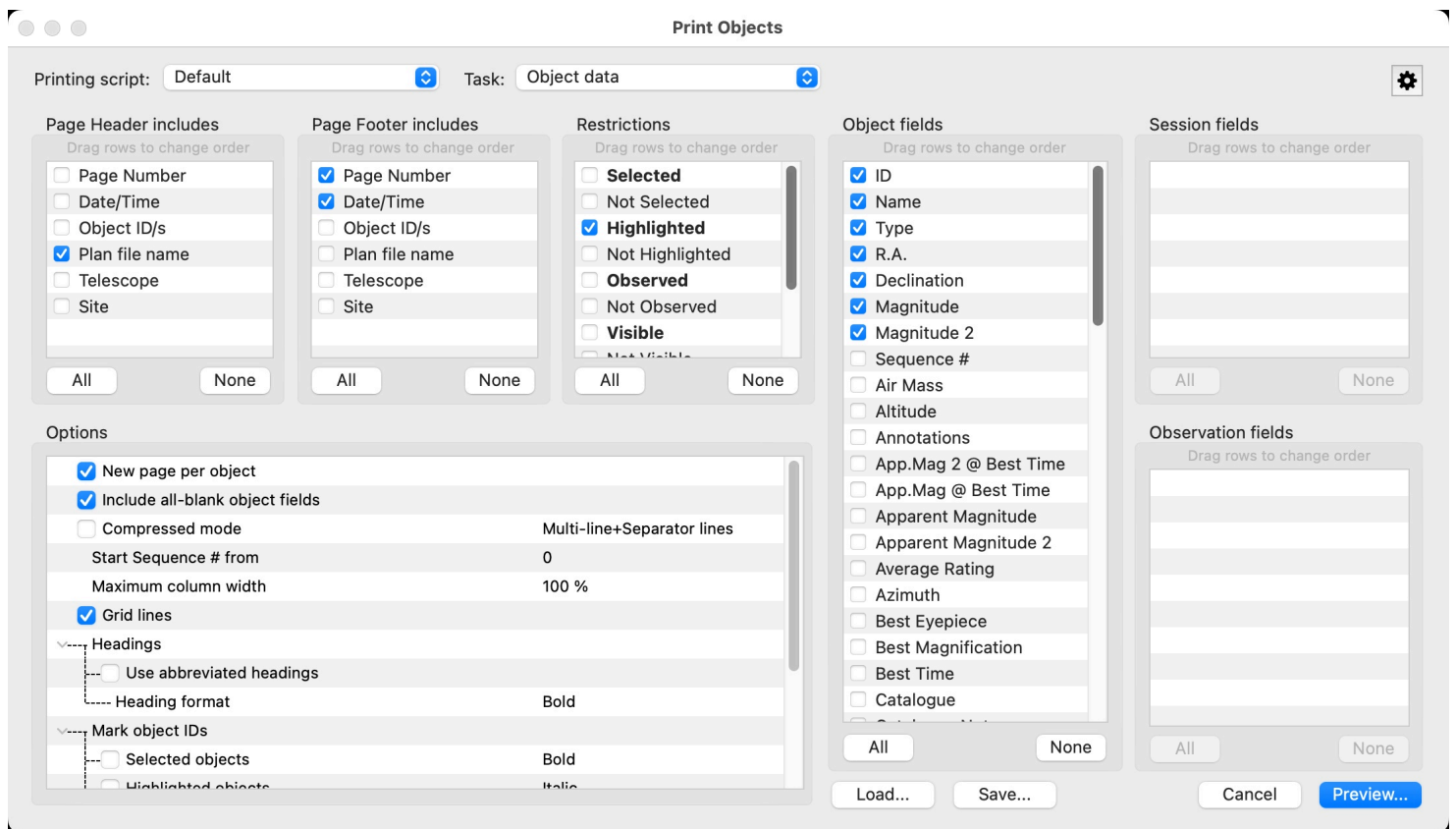


Figure 368: Print Objects dialog

Printing of objects (and observations) is done via a script. This script is selected in the **Printing script** popup menu at the top left. Unless you have downloaded an alternative user-contributed printing script, this menu will only contain the built-in **Default** script. The **Task** popup menu contains a list of the various printing tasks you can perform. For this section, we are only concerned with the **Object data** task. The other lists and options pertain to the task at hand (where applicable).

- **Page header includes.** These are items that can be included in the page header area for each printed page.
- **Page Footer includes.** These are items that can be included in the page footer area for each printed page.
- **Restrictions.** These are restrictions on which objects are to be included in the printed report. If *no* checkboxes are checked, all objects in the list will be included. If any checkboxes are checked, then only those objects that fall into that category will be included (e.g. if **Not Observed** and **Visible** are checked, then only those objects that are currently above the horizon *and* haven't been observed will be included).
- **Object fields.** A list of object fields to be included in the printed report for each object. Checking an entry includes it. Dragging the entries with the mouse allows them to be ordered. All the fields are data fields, computed fields, or user-defined fields for the object. The **Sequence #** field prints a number, representing the order of the objects in the object list.
- **Options.** Various formatting options for the printed report. These are currently listed below.

- **Load & Save.** Any option or field settings you make are saved with the plan document. You can also use the **Save...** and **Load...** buttons to save those settings in a separate settings file. This is useful to transfer settings between plan documents, for example.

15.2.1 Object options

Options	
<input checked="" type="checkbox"/> New page per object	
<input checked="" type="checkbox"/> Include all-blank object fields	
<input type="checkbox"/> Compressed mode	Multi-line+Separator lines
Start Sequence # from	0
Maximum column width	100 %
<input checked="" type="checkbox"/> Grid lines	
Headings	
<input type="checkbox"/> Use abbreviated headings	
Heading format	Bold
Mark object IDs	
<input type="checkbox"/> Selected objects	Bold
<input type="checkbox"/> Highlighted objects	Italic
Images and Charts	
<input type="checkbox"/> Object images	
<input type="checkbox"/> Jupiter/Saturn satellite graphic where applicable	
<input type="checkbox"/> Constellation chart	
Images/charts per row	3

Figure 369: Object printing options

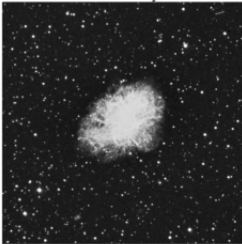
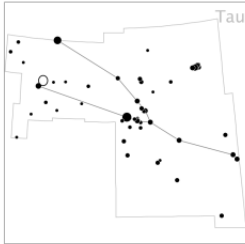
- **New page per object.** Start a new page for each object.
- **Include all-blank object fields.** If a particular object field (e.g. Size) is blank for all relevant objects, then this option will stop that field from being printed.
- **Compressed mode.** Print a single line for each object, field headings at the top of each page. There are two checkbox options associated with this mode: **Multi-line** - allow the object fields to be printed over several lines (to avoid truncation on a single line). **Separator lines** - draw a horizontal line between each object entry.
- **Start sequence # from.** An integer number to start the first Sequence # entry. i.e. the first object in the list will be printed with this number, which will be incremented for the second object, etc.
- **Maximum column width.** The maximum width of a column as a percentage of page width.
- **Grid lines.** Draw grid lines around the text.
- **Headings > Use abbreviated headings.** Use shortened forms of headings (e.g. "Dec" instead of "Declination").
- **Headings > Heading format.** Whether the heading is printed using a bold, italic or underlined font, whether it is inverted (black background with white text), etc.
- **Mark object IDs > Selected objects.** How to print object IDs for *selected* objects in the list, using a bold, italic or underlined font, inverted (black background with white text), etc.
- **Mark object IDs > Highlighted objects.** How to print object IDs for *highlighted* objects in the list, using a bold, italic or underlined font, inverted (black background with white text), etc.

- **Images and Charts > Object images.** Display any images associated with the object, and how to print those images (inverted colours, E/W flipped, etc.).
- **Images and Charts > Jupiter/Saturn satellite graphic.** If the object is Jupiter or Saturn, print a graphic showing the current positions of the satellites.
- **Images and Charts > Constellation chart.** Print a graphic showing the constellation containing the graphic, and a small circle showing the object's position within the constellation.
- **Images and Charts > Images/charts per row.** The number of charts to space across the page width.

15.2.2 Examples

M1,2

ID	Found	Name	Constellation	Type	R.A.	Declination	Magnitude	Pos. Angle	Chart #
M1	Yes	Crab Nebula, Taurus A	Tau	SNR	05h 34m 32s	+22° 00.8'	8.40	0	CDSA: 7a, MSA: V1-158
Moon Distance									
153°									
15' x 15' 1st Gen All Sky									

ID	Found	Name	Constellation	Type	R.A.	Declination	Magnitude	Pos. Angle	Chart #
M2	Yes	M2,NGC7089	Aqr	Globular	21h 33m 27s	-00° 49.3'	7.50	0	CDSA: 19a, MSA: V3-1286
Moon Distance									
89°									
16' x 16' SDSS									

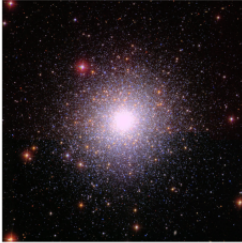
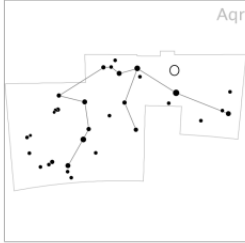



Figure 370: Standard-mode object report with images and constellation charts

M1,2,3,4,5,6,7,8,9,10,11,12,13,14,15,16,17,18,19,20,21,22,23,24,25,26,27,28,29,30,31,32,33,35,36

ID	Found	Name	Constellation	Type	R.A.	Declination	Magnitude	Pos. Angle
M1	Yes	Crab Nebula, Taurus A	Tau	SNR	05h 34m 32s	+22° 00.8'	8.40	0
M2	Yes	M2,NGC7089	Aqr	Globular	21h 33m 27s	-00° 49.3'	7.50	0
M3	Yes	M3,NGC5272	CVn	Globular	13h 42m 11s	+28° 22.5'	7.00	0
M4	Yes	Car's Eye	Sco	Globular	16h 23m 35s	-26° 31.5'	7.50	0
M5	Yes	M5,NGC5904	Ser	Globular	15h 18m 33s	+02° 04.9'	7.00	0
M6	Yes	Butterfly Cluster	Sco	Open	17h 40m 20s	-32° 15.2'	4.50	0
M7		Scorpion's Tail, Ptolemy's Cluster	Sco	Open	17h 53m 51s	-34° 47.6'	3.50	0
M8	Yes	Lagoon Nebula, Dragon Nebula	Sgr	Open+D Neb	18h 03m 41s	-24° 22.7'	5.00	0
M9	Yes	M9,NGC6333	Oph	Globular	17h 19m 12s	-18° 31.0'	9.00	0
M10	Yes	M10,NGC6254	Oph	Globular	16h 57m 09s	-04° 05.9'	7.50	0
M11	Yes		Sct	Open	18h 51m 05s	-06° 16.2'	7.00	0
M12	Yes	Gumball Globular	Oph	Globular	16h 47m 14s	-01° 56.8'	8.00	0
M13	Yes		Her	Globular	16h 41m 41s	+36° 27.5'	7.00	0
M14	Yes	M14,NGC6402	Oph	Globular	17h 37m 36s	-03° 14.7'	9.50	0
M15	Yes	Great Pegasus Cluster	Peg	Globular	21h 29m 58s	+12° 10.0'	7.50	0
M16	Yes		Ser	Open+D Neb	18h 18m 48s	-13° 48.3'	6.50	0
M17	Yes		Sgr	Open+D Neb	18h 20m 47s	-16° 10.3'	7.00	0
M18	Yes	Black Swan	Sgr	Open	18h 19m 58s	-17° 06.1'	8.00	0
M19	Yes	M19,NGC6273	Oph	Globular	17h 02m 38s	-26° 16.0'	8.50	0
M20	Yes	Trifid Nebula, The Clover	Sgr	Open+D Neb	18h 02m 42s	-22° 58.2'	5.00	0
M21	Yes	M21,NGC6531	Sgr	Open	18h 04m 13s	-22° 29.3'	7.00	0
M22	Yes		Sgr	Globular	18h 36m 24s	-23° 54.2'	6.50	0
M23	Yes	M23,NGC6494	Sgr	Open	17h 57m 04s	-18° 59.1'	6.00	0
M24	Yes	Small Sagittarius Star Cloud	Sgr	Open	18h 18m 26s	-18° 24.3'	4.50	0
M25	Yes	M25	Sgr	Open	18h 31m 42s	-19° 07.0'	6.50	0
M26	Yes	M26,NGC6694	Sct	Open	18h 45m 18s	-09° 23.0'	9.50	0
M27	Yes		Vul	P Neb	19h 59m 36s	+22° 43.2'	7.50	0
M28	Yes	M28,NGC6626	Sgr	Globular	18h 24m 33s	-24° 52.1'	8.50	0
M29	Yes	Cooling Tower	Cyg	Open	20h 23m 57s	+38° 30.5'	9.00	0
M30	Yes	M30,NGC7099	Cap	Globular	21h 40m 22s	-23° 10.7'	8.50	0
M31	Yes	Andromeda Galaxy	And	Galaxy	00h 42m 44s	+41° 16.1'	4.30	35
M32	Yes	Satellite Of Andromeda Galaxy	And	Galaxy	00h 42m 42s	+40° 51.9'	9.10	170
M33	Yes		Tri	Galaxy	01h 33m 51s	+30° 39.6'	6.20	23
M35	Yes	M35,NGC2168	Gem	Open	06h 09m 00s	+24° 21.0'	5.50	0
M36	Yes	Pinwheel Cluster	Aur	Open	05h 36m 18s	+34° 08.3'	6.50	0

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Figure 371: Compressed-mode object report

15.3 Objects & observations

When the **Objects** tab of the plan document window is foremost, you can use **File > Print...** to print a list of those objects present in the plan, together with observations associated with those objects.

Print Objects

Printing script: **Default** Task: **Observation data**

Page Header includes

Drag rows to change order

- ☐ Page Number
- ☐ Date/Time
- ☐ Object ID/s
- ☒ Plan file name
- ☐ Telescope
- ☐ Site

All None

Page Footer includes

Drag rows to change order

- ☒ Page Number
- ☒ Date/Time
- ☐ Object ID/s
- ☐ Plan file name
- ☐ Telescope
- ☐ Site

All None

Restrictions

Drag rows to change order

- ☐ Selected
- ☐ Not Selected
- ☐ Highlighted
- ☐ Not Highlighted
- ☒ Observed
- ☐ Not Observed
- ☐ Visible
- ☐ Not Visible

All None

Object fields

Drag rows to change order

- ☒ ID
- ☒ Name
- ☒ Type
- ☒ R.A.
- ☒ Declination
- ☒ Magnitude
- ☒ Magnitude 2
- ☒ Size
- ☒ Chart #
- ☐ Sequence #
- ☐ Air Mass
- ☐ Altitude
- ☐ Annotations
- ☐ App.Mag 2 @ Best Time
- ☐ App.Mag @ Best Time
- ☐ Apparent Magnitude
- ☐ Apparent Magnitude 2
- ☐ Average Rating
- ☐ Azimuth
- ☐ Best Viewing

All None

Session fields

Drag rows to change order

- ☒ Name
- ☒ Start
- ☒ Duration
- ☐ Finish
- ☐ Observer
- ☐ Seeing
- ☐ Site
- ☐ Telescope

All None

Options

- ☐ Selected observation only
- ☒ New page per object
- ☒ Include all-blank object fields
- ☒ Include all-blank session/observation fields
- Start Sequence # from: 0
- Maximum column width: 100 %
- ☒ Grid lines
- Headings**
- ☐ Use abbreviated headings
- Object heading format: Bold

Load... Save... Cancel Preview...

Figure 372: Print Objects & Observations

The operation is almost identical to that described in Section 15.2 on page 249, except that you use the **Observation data** task, and with the addition of session and observation fields and some additional options. Those additional items are described below.

- **Session fields.** A list of observing session fields to be (optionally) included in the printed report for each object. Checking an entry includes it. Dragging the entries with the mouse allows them to be ordered. All the fields are data fields, computed fields, or user-defined fields for the session.
- **Observation fields.** A list of observation fields to be included in the printed report for each object. Checking an entry includes it. Dragging the entries with the mouse allows them to be ordered. All the fields are data fields, computed fields, or user-defined fields for the observation.

15.3.1 Object + Observation options

Options	
<input type="checkbox"/> Selected observation only	
<input checked="" type="checkbox"/> New page per object	
<input checked="" type="checkbox"/> Include all-blank object fields	
<input checked="" type="checkbox"/> Include all-blank session/observation fields	
Start Sequence # from	0
Maximum column width	100 %
<input checked="" type="checkbox"/> Grid lines	
▼ Headings	
<input type="checkbox"/> Use abbreviated headings	
Object heading format	Bold
Session heading format	Bold+Italic
Observation heading format	Bold
▼ Mark object IDs	
<input type="checkbox"/> Selected objects	Bold
<input type="checkbox"/> Highlighted objects	Italic
▼ Images and Charts	
<input type="checkbox"/> Object images	
<input type="checkbox"/> Jupiter/Saturn satellite graphic where applicable	
<input type="checkbox"/> Constellation chart	
<input type="checkbox"/> Attached observation images	
Images/charts per row	3

Figure 373: Object + Observation printing options

Similar to Object options above, with the following differences:

- **Include all-blank session/observation fields.** If a particular session or observation field (e.g. Name) is blank for all relevant sessions/observations, then this option will stop that field from being printed.
- **Headings > Object heading format.** Whether the headings for object fields are printed using a bold, italic or underlined font, whether they are inverted (black background with white text), etc.
- **Headings > Session heading format.** Whether the headings for session fields are printed using a bold, italic or underlined font, whether they are inverted (black background with white text), etc.
- **Headings > Observation heading format.** Whether the headings for observation fields are printed using a bold, italic or underlined font, whether they are inverted (black background with white text), etc.

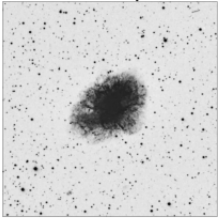
- **Images and Charts > Attached observation images.** Display any images attached to the object's observations, and how to print those images (inverted colours, E/W flipped, etc.).

15.3.2 Examples

M1

ID	Name	Found	Magnitude
M1	Crab Nebula, Taurus A	Yes	8.40

15' x 15' 1st Gen All Sky



Site	Start	Duration	Finish	Seeing
Bickleton Property	9/17/2009 11:42 PM	05h 18m	9/18/2009 5:00 AM	II. Mostly stable

ID	Name
NGC1952	Crab Nebula

Found	Julian Date	Local Date	Telescope	Eyepiece
True	2,455,092.91528	9/18/2009	Obsession 20" f/5	TeleVue Nagler 12mm

Notes
Unbelievable view. Huge, very bright. Obvious mottled texture throughout. Central star not visible. Gray color. Elongated. With the OIII, I was able to see an elongated, slightly curving strand of thickened gas towards the center of the nebula. The overall density of the gas cloud was enhanced with the OIII as well, and I continued to see mottling.

Site	Start	Duration	Finish	Seeing
Tiger Mountain, WA	12/8/2007 6:46 PM	04h 29m	12/8/2007 11:15 PM	III. Somewhat stable

ID	Name
NGC1952	Crab Nebula

Found	Julian Date	Local Date	Telescope	Eyepiece
True	2,454,443.77431	12/8/2007	Obsession 20" f/5	TeleVue Panoptic 24mm

Notes
I was able to see this without the OIII filter, but this object definitely responded well to the filter. With filter, I saw a large, elongated oval shape, with some condensation in the center. I was able to see mottling in the cloud, so there was a sense of structure to the gas cloud. I was not able to see the central star.

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Figure 374: Object+Observation example

15.4 Observing forms

When the **Objects** tab of the plan document window is foremost, you can use **File > Print...** to print a list of those objects present in the plan, together with observation templates (empty observation fields, sketching templates, etc.). This form is designed to be printed out and filled in at the telescope with a pencil or pen.

The operation is almost identical to that described in Section 15.2 on page 249, except that you use the **Observing forms** task, and with the addition of session and observation fields and some additional options. Those additional items are described below.

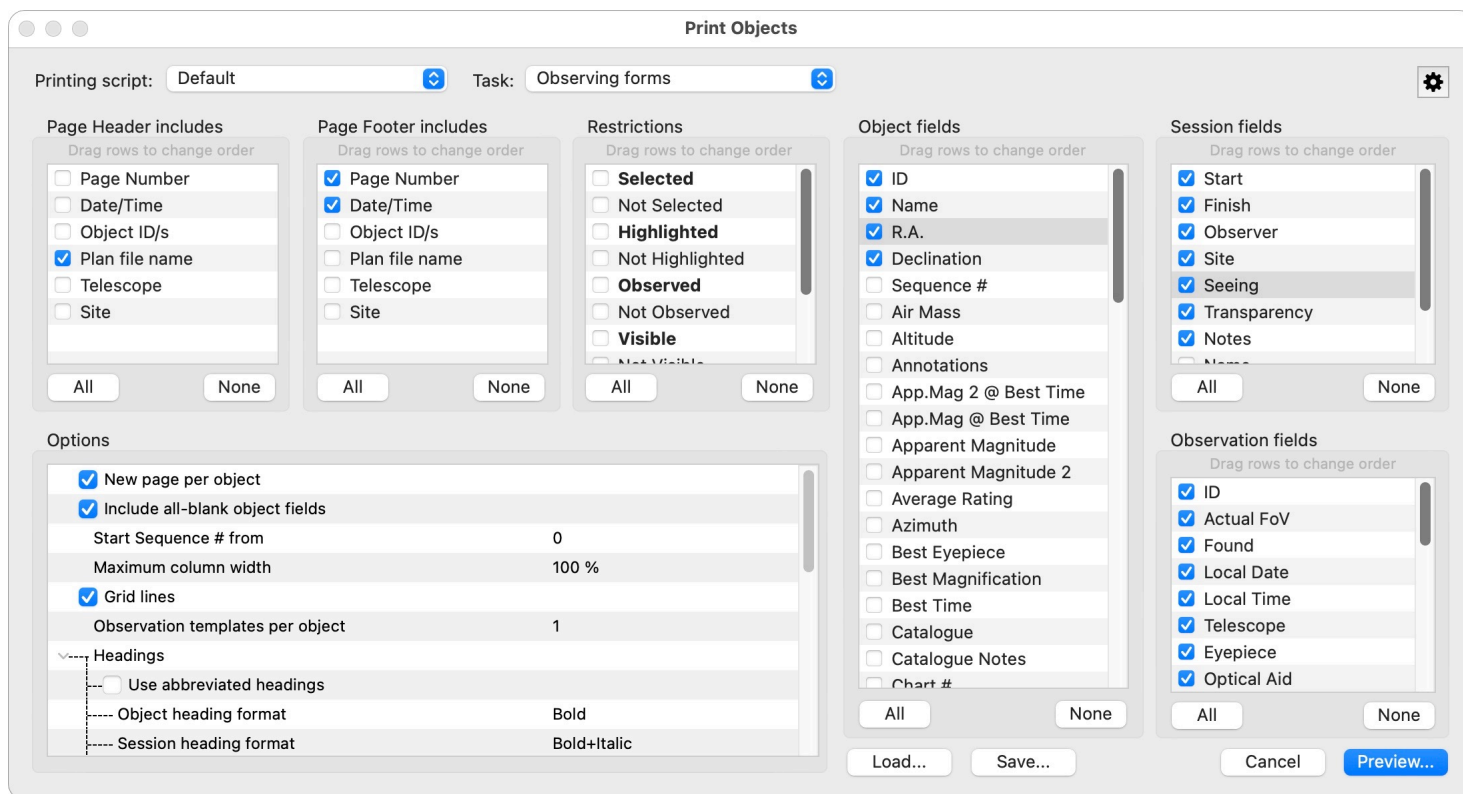


Figure 375: Printing observing forms

- **Session fields.** A list of observing session fields to be (optionally) included in the printed report for each object. Checking an entry includes it. Dragging the entries with the mouse allows them to be ordered. All the fields are data fields, computed fields, or user-defined fields for the session. The fields will all be empty of data so that they can be manually entered in the field.
- **Observation fields.** A list of observation fields to be included in the printed report for each object. Checking an entry includes it. Dragging the entries with the mouse allows them to be ordered. All the fields are data fields, computed fields, or user-defined fields for the observation. The fields will all be empty of data so that they can be manually entered in the field.

15.4.1 Observing form options

Similar to Object options above, with the following differences:

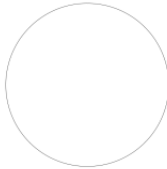
- **Observation templates per object.** How many observation templates to draw for each object. Set to 1 if you only plan to make a single observation of each object.
- **Headings > Object heading format.** Whether the headings for object fields are printed using a bold, italic or underlined font, whether they are inverted (black background with white text), etc.
- **Headings > Session heading format.** Whether the headings for session fields are printed using a bold, italic or underlined font, whether they are inverted (black background with white text), etc.
- **Headings > Observation heading format.** Whether the headings for observation fields are printed using a bold, italic or underlined font, whether they are inverted (black background with white text), etc.

- **Images and Charts > Number of attached images per row.** How many images should be printed across the width of the page.
- **Sketching templates.** Include circular sketching templates for sketching the field of view at the telescope.
- **Sketching templates > Template diameter.** The diameter of the circles, in cm.
- **Sketching templates > Template background.** The colour to use outside the circles, to improve contrast (white (none), black, or grey).
- **Data from previous observations > Include observation data.** You can also include data from previously-logged observations for comparison reasons, if you wish, using this option.
- **Data from previous observations > Show attached observation images.** Include any images attached to previously-logged observations.

Options	
<input checked="" type="checkbox"/>	New page per object
<input checked="" type="checkbox"/>	Include all-blank object fields
	Start Sequence # from 0
	Maximum column width 100 %
<input checked="" type="checkbox"/>	Grid lines
	Observation templates per object 1
▼	Headings
<input type="checkbox"/>	Use abbreviated headings
	Object heading format Bold
	Session heading format Bold+Italic
	Observation heading format Bold
▼	Mark object IDs
<input type="checkbox"/>	Selected objects Bold
<input type="checkbox"/>	Highlighted objects Italic
▼	Images and Charts
<input type="checkbox"/>	Object images
<input type="checkbox"/>	Jupiter/Saturn satellite graphic where applicable
<input type="checkbox"/>	Constellation chart
	Images/charts per row 3
▼	Sketching templates
	Template diameter 5 cm
	Template background None
▼	Data from previous observations
<input type="checkbox"/>	Include observation data 5 max
<input type="checkbox"/>	Show attached observation images

Figure 376: Observing form options

15.4.2 Examples

ID	Name	R.A.	Declination	Altitude	Azimuth	Air Mass	Chart #
M1	Crab Nebula, Taurus A	05h 34m 32s	+22° 00.8'	61.8°	150.2°	1.1	CDSA: 7a, MSA: V1-158
Constellation							
Tau							
Site		Start		Finish		Duration	
Seeing				Transparency			
ID		Local Date		Local Time			
Telescope	Eyeiece	Optical Aid		Filter	Rating		
Notes							
<div style="display: flex; justify-content: space-around; align-items: center;">    </div>							
Site		Start		Finish		Duration	
Bickleton Property		9/17/2009 11:42 PM		9/18/2009 5:00 AM		05h 18m	
Seeing		II. Mostly stable					
Transparency							
7. Extremely Clear, M33 or M81 visible							
ID		Local Date		Local Time			
NGC1952		9/18/2009		2:58:00 AM			
Telescope	Eyeiece	Optical Aid		Filter	Rating		
Obsession 20" f/5	TeleVue Nagler 12mm			Lumicon OIII			
Notes							
Unbelievable view. Huge, very bright. Obvious mottled texture throughout. Central star not visible. Gray color. Elongated. With the OIII, I was able to see an elongated, slightly curving strand of thickened gas towards the center of the nebula. The overall density of the gas cloud was enhanced with the OIII as well, and I continued to see mottling.							

1

4/20/2011 3:49 PM

Figure 377: Observing form example

15.5 Finder charts

When the **Objects** tab of the plan document window is foremost, you can use **File > Print...** to print finder charts for those objects present in the plan, together with object information, images, and sketching templates, etc. This report is designed to be used in the field to determine where to look in the sky for the object/s.

The operation is almost identical to that described in Section 15.2 on page 249, except that you use the **Finder charts** task, with the addition of additional options. Those additional items are described below.

Note that there are *many* options to customise this report to your liking. Try the defaults first, and then start fiddling with the options until you get what you want.

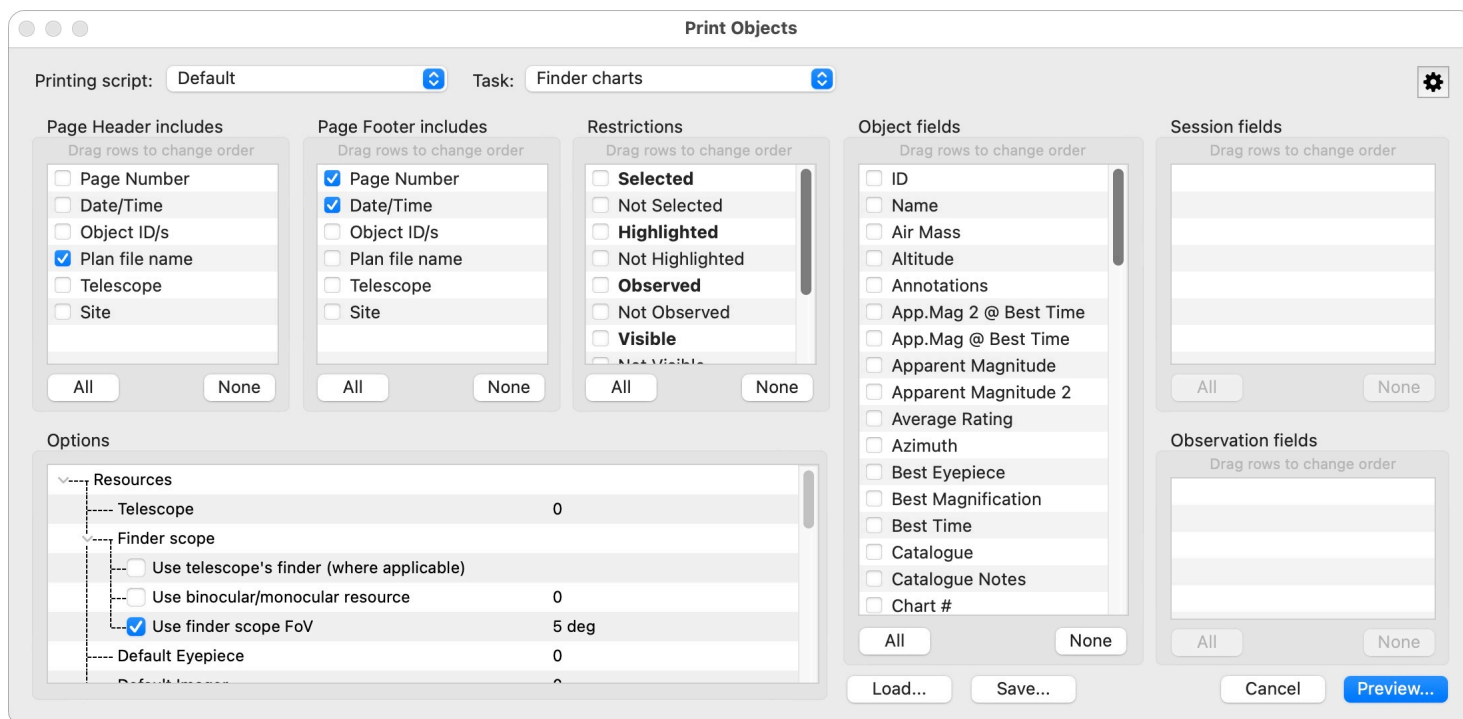


Figure 378: Printing Finder charts

15.5.1 Finder chart options

The options have been broken into sections here for convenience.

Resources

This section describes the resources you will be observing with.

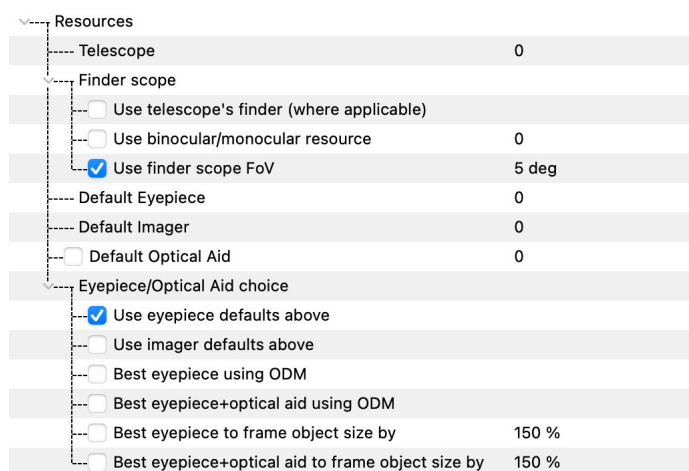


Figure 379: Finder chart options: Resources

- **Resources: Telescope.** The telescope (resource) you will be observing with.
- **Resources: Finder scope.** The telescope finder scope to be used for the Finder scope chart (where applicable). This can be one of:

Use the telescope's finder. The Telescope resource is assumed to define a finder scope, and that scope's FoV will be used.

Use binocular/monocular resource. Select and use a binocular/monocular type Telescope resource as the finder.

Use finder scope FoV. Specify a finder scope field of view in degrees.

- **Default Eyepiece.** The default Eyepiece to use for the Eyepiece/imager chart. This might not get used, depending on the value of the Choice option below.
- **Default Imager.** The default Imager to use for the Eyepiece/imager chart. This might not get used, depending on the value of the Choice option below.
- **Default Optical Aid.** The default Optical Aid resource to be used. If the checkbox is checked then it will be used together with the chosen eyepiece or imager.
- **Eyepiece/Optical Aid choice.** How to choose what eyepiece or imager is used for the Eyepiece/imager chart. The choice will be one of the following:

Use eyepiece defaults above. The Eyepiece/imager chart will use the specified default eyepiece and (optionally) the specified default optical aid.

Use imager defaults above. The Eyepiece/imager chart will use the specified default imager and (optionally) the specified default optical aid.

Best eyepiece using ODM. The Eyepiece/imager chart will use an eyepiece which will be chosen by the ODM computation to determine the best magnification to detect the object.

Best eyepiece+optical aid using ODM. The Eyepiece/imager chart will use an eyepiece and possibly an optical aid which will be chosen by the ODM computation to determine the best magnification to detect the object.

Best eyepiece to frame object size by. The Eyepiece/imager chart will use an eyepiece which will be chosen to frame the object by a factor specified. e.g. if the factor is 200%, the eyepiece will be chosen to get a field of view twice the diameter of the object's size.

Best eyepiece+optical aid to frame object size by. The Eyepiece/imager chart will use an eyepiece and possibly an optical aid which will be chosen to frame the object by a factor specified. e.g. if the factor is 200%, the eyepiece/optical aid will be chosen to get a field of view twice the diameter of the object's size.

Charts: All-sky & Naked-eye

Charts

☒ All-sky chart

☐ Main chart (if 3 charts are being displayed)

Magnitude limit 4

☐ Flip E/W orientation

☐ Flip N/S orientation

Display Options

☒ Constellation figures

☐ Alt/Az grid

☐ Equatorial grid

☐ Ecliptic

☒ Milky Way

☐ Alignment stars

☒ Sun/Moon/planets

☐ Plan objects Selected

☐ Site horizon

☒ Naked-eye chart

☐ Main chart (if 3 charts are being displayed)

Field of view 60 deg

Magnitude limit 4

☐ Flip E/W orientation

☐ Flip N/S orientation

☐ Orientate for Alt-Az mount

Star label density 45 %

☐ Also show objects from catalogue Messier Catalogue

Display Options

☒ Constellations

☐ Images

☐ Rigel QuickFinder reticle

☐ Telrad reticle

☒ Stellar magnitude scale

☐ Do not show other plan objects

Solar System Objects

☐ Show Sun

☒ Show Moon

☒ Show Planets

☒ Show Comets

☒ Show Minor Planets

Figure 380: Finder chart options: All-sky and Naked-eye charts

- **All-sky chart.** Check this to include an all-sky chart (same as that found in the Sky tab of the plan document window).
- **All-sky chart > Main chart.** If you are displaying three charts, the third chart is typically sized larger than the other two. Check this option if you want the All-sky chart to be the third chart.
- **All-sky chart > Magnitude limit.** Magnitude limit for stars in the chart.
- **All-sky chart > Flip E/W orientation.** Flip the East/West orientation of the chart.
- **All-sky chart > Flip N/S orientation.** Flip the North/South orientation of the chart.
- **All-sky chart > Display options.** These options are a subset of those found in the Display Options for the Sky chart.

- **Naked-eye chart.** Check this to include a naked-eye chart. This is a wide-angle view of the sky, up to 60 degrees across.
- **Naked-eye chart > Main chart.** If you are displaying three charts, the third chart is typically sized larger than the other two. Check this option if you want the Naked-eye chart to be the third chart.
- **Naked-eye chart > Field of view.** The field of view (in degrees) of the chart.
- **Naked-eye chart > Magnitude limit.** Magnitude limit for stars in the chart.
- **Naked-eye chart > Flip E/W orientation.** Flip the East/West orientation of the chart.
- **Naked-eye chart > Flip N/S orientation.** Flip the North/South orientation of the chart.
- **Naked-eye chart > Orientate for Alt-Az mount.** Orientate the chart as it would be seen through an alt-az mounted scope, or indeed, by the naked eye with respect to the horizon.
- **Naked-eye chart > Star label density.** The density of stars with labels (a lower percentage will label only brighter stars).
- **Naked-eye chart > Also show objects from catalogue.** Show objects from another non-stellar catalogue on the chart. You can also specify whether to show labels (IDs) and magnitudes for those catalogue objects.
- **Naked-eye chart > Display options.** These options are a subset of those found in the Display Options for the Field of View chart.

Charts: Finder scope and Eyepiece/imager

<input checked="" type="checkbox"/>	Finder scope chart	
<input type="checkbox"/>	Main chart (if 3 charts are being displayed)	
<input type="checkbox"/>	Magnitude limit	
<input type="checkbox"/>	Compute for aperture	50 mm
<input checked="" type="checkbox"/>	Specify	8
<input type="checkbox"/>	Stellar catalogue	ASCC Lite Catalogue
<input type="checkbox"/>	Flip E/W orientation	
<input type="checkbox"/>	Flip N/S orientation	
<input type="checkbox"/>	Orientate for Alt-Az mount	
<input type="checkbox"/>	Star label density	50 %
<input type="checkbox"/>	Zoom factor	100 %
<input type="checkbox"/>	Also show objects from catalogue	Messier Catalogue
<input checked="" type="checkbox"/>	Show object labels	
<input type="checkbox"/>	Show object magnitudes	
<input type="checkbox"/>	Display Options	
<input type="checkbox"/>	Constellations	
<input type="checkbox"/>	Images	
<input type="checkbox"/>	Rigel QuickFinder reticle	
<input type="checkbox"/>	Telrad reticle	
<input checked="" type="checkbox"/>	Stellar magnitude scale	
<input checked="" type="checkbox"/>	Show aperture	
<input type="checkbox"/>	Do not show other plan objects	
<input type="checkbox"/>	Solar System Objects	
<input type="checkbox"/>	Show Sun	
<input type="checkbox"/>	Show Moon	
<input type="checkbox"/>	Show Planets	
<input checked="" type="checkbox"/>	Show Comets	
<input checked="" type="checkbox"/>	Show Minor Planets	

Figure 381: Finder chart options: Finder scope chart

- **Finder scope chart.** Check this to include a finder scope chart.
- **Finder scope chart > Main chart.** If you are displaying three charts, the third chart is typically sized larger than the other two. Check this option if you want the finder scope chart to be the third chart.
- **Finder scope chart > Magnitude limit.** Magnitude limit for stars in the chart. Can be either of:
 Compute for aperture. Compute the theoretical magnitude limit for the specified aperture.
 Specify. Specify the magnitude limit.
- **Finder scope chart > Stellar catalogue.** Specify the stellar catalogue to use to plot stars. Make sure it contains stars down to the magnitude limit specified above.
- **Finder scope chart > Flip E/W orientation.** Flip the East/West orientation of the chart.
- **Finder scope chart > Flip N/S orientation.** Flip the North/South orientation of the chart.
- **Finder scope chart > Orientate for Alt-Az mount.** Orientate the chart as it would be seen through an alt-az mounted scope.
- **Finder scope chart > Star label density.** The density of stars with labels (a lower percentage will label only brighter stars).
- **Finder scope chart > Zoom factor.** The chart will, by default, show a field of view of 100% of the actual finder FoV. You can increase this, in which case the finder FoV will be shown as a circle on the chart.
- **Finder scope chart > Also show objects from catalogue.** Show objects from another non-stellar catalogue on the chart. You can also specify whether to show labels (IDs) and magnitudes for those catalogue objects.
- **Finder scope chart > Display options.** These options are a subset of those found in the Display Options for the Field of View chart.

☒ Eyepiece/Imager chart

☐ Main chart (if 3 charts are being displayed)

Magnitude limit

☒ For telescope

☐ Specify 12

Stellar catalogue All-Sky Compiled Catalog

☐ Flip E/W orientation

☐ Flip N/S orientation

☐ Orientate for Alt-Az mount

Star label density 50 %

Zoom factor 100 %

☐ Also show objects from catalogue Messier Catalogue

☒ Show object labels

☐ Show object magnitudes

Display Options

☐ Images

☒ Show imager main sensor

☒ Show imager guide sensor

☒ Show imager guide sensor track

☒ Stellar magnitude scale

☒ Show aperture

☐ Show magnitude labels

☐ Show separation labels

☐ Show position angle labels

☐ Do not show other plan objects

Solar System Objects

☐ Show Sun

☒ Show Moon

☒ Show Planets

☒ Show Comets

☒ Show Minor Planets

Figure 382: Finder chart options: Imager/eyepiece chart

- **Eyepiece/imager chart.** Check this to include a finder scope chart.
- **Eyepiece/imager chart > Main chart.** If you are displaying three charts, the third chart is typically sized larger than the other two. Check this option if you want the eyepiece/imager chart to be the third chart.
- **Eyepiece/imager chart > Magnitude limit.** Magnitude limit for stars in the chart. Can be either of:
 - For telescope.* Use the telescope resource's magnitude limit.
 - Specify.* Specify the magnitude limit.
- **Eyepiece/imager chart > Stellar catalogue.** Specify the stellar catalogue to use to plot stars. Make sure it contains stars down to the magnitude limit specified above.
- **Eyepiece/imager chart > Flip E/W orientation.** Flip the East/West orientation of the chart.
- **Eyepiece/imager chart > Flip N/S orientation.** Flip the North/South orientation of the chart.
- **Finder scope chart > Orientate for Alt-Az mount.** Orientate the chart as it would be seen through an alt-az mounted scope.
- **Eyepiece/imager chart > Star label density.** The density of stars with labels (a lower percentage will label only brighter stars).
- **Eyepiece/imager chart > Zoom factor.** The chart will, by default, show a field of view of 100% of the actual FoV. You can increase this, in which case the finder FoV will be shown as a circle on the chart.

- **Eyepiece/imager chart > Also show objects from catalogue.** Show objects from another non-stellar catalogue on the chart. You can also specify whether to show labels (IDs) and magnitudes for those catalogue objects.
- **Eyepiece/imager chart > Display options.** These options are a subset of those found in the Display Options for the Field of View chart.

Other options

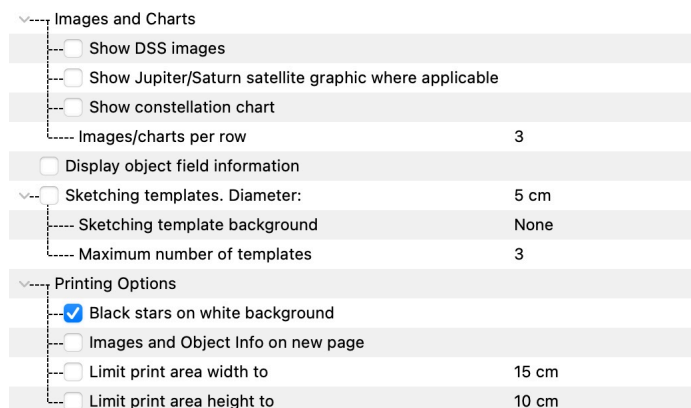


Figure 383: Finder chart options: Other options

- **Images and Charts.** Additional charts and images to add (assuming there's space on the page).

Show DSS images. Show any cached DSS images of the object.

Show Jupiter/Saturn satellite graphic. If the object is Jupiter or Saturn, show a chart of the satellite positions.

Show constellation chart. Show a chart of the constellation containing the object.

Number of images per row. How many images across the space used for images.

- **Display object field information.** Include a table of useful object data fields.

- **Sketching templates. Diameter.** Include sketching templates, with the specified diameter.

Sketching template background. Specify the template sketching area background (the area outside the circle).

Maximum number of templates. Maximum number of sketching templates to include.

- **Printing options.**

Black stars on white background. Unless you have a lot of ink, keep this switched on.

Images and object info on new page. If there isn't enough space for images, etc., they can be placed on a second page using this option.

Limit print area width to.

Limit print area height to. Limit the area on the page used for printing to a specified size. This is useful if you are, say, printing 4 x 6 index cards.

15.5.2 Examples

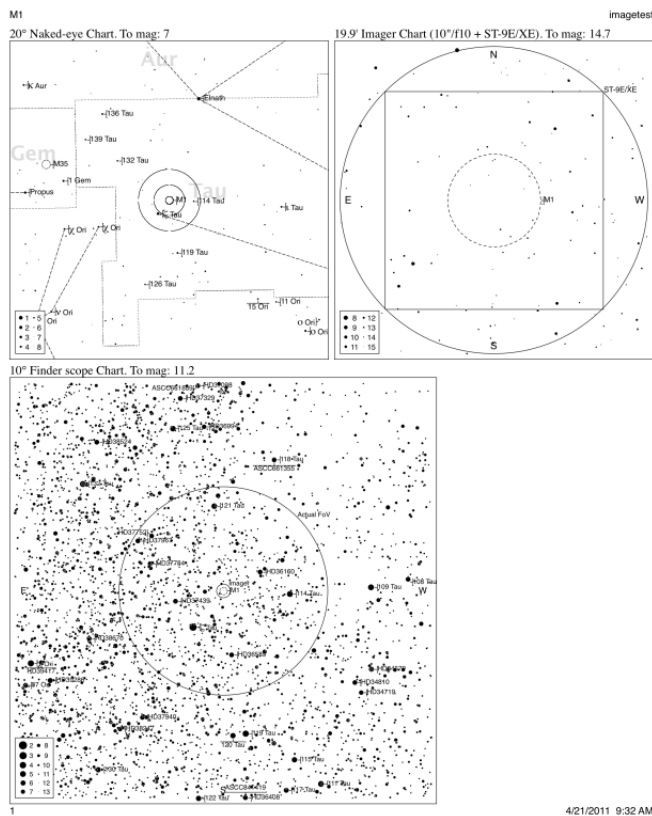


Figure 384: Finder charts - Page 1

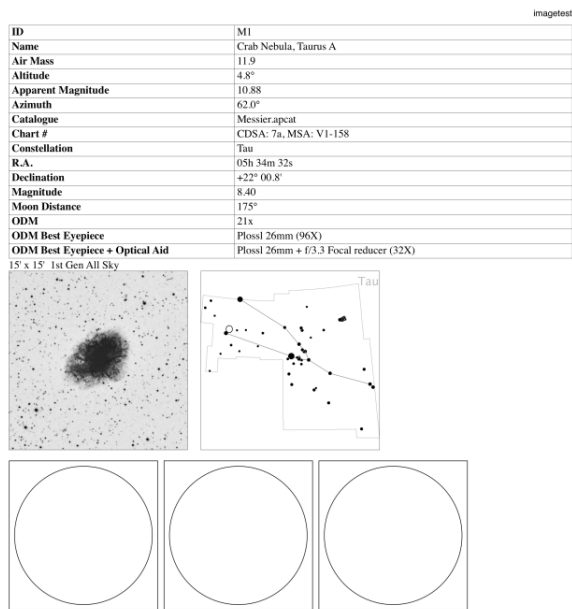


Figure 385: Finder charts - Page 2

15.6 Observing sessions & observations

Observation and session data can also be printed from the Observation database window (*Observation > Show Observation Database*) via *File > Print...*

15.6.1 Print session data only

Select the **Session data only** task. Select the session fields you wish to print in the **Session fields** list. Reorder the fields by dragging the entries.

Print Observations

Printing script: Default Task: Session data only

Page Header includes
Drag rows to change order

- ☐ Page Number
- ☐ Date/Time
- ☐ Session Name/s
- ☒ Session Start Date/s
- ☐ Session Start Date-Ti...

All None

Page Footer includes
Drag rows to change order

- ☒ Page Number
- ☒ Date/Time
- ☐ Session Name/s
- ☐ Session Start Date/s
- ☐ Session Start Date-Ti...

All None

Restrictions
Drag rows to change order

- ☐ Session Selected
- ☐ Session Not Selected
- ☐ Session Displayed
- ☐ Session Not Displayed

All None

Object fields
Drag rows to change order

All None

Session fields
Drag rows to change order

- ☐ Name
- ☐ Duration
- ☐ Finish
- ☐ Observer
- ☐ Seeing
- ☐ Site
- ☐ Start

All None

Options

- ☐ Session statistics
- ☒ New page per session
- ☒ Include all-blank session fields
- ☐ Compressed mode
- Multi-line+Separator lines
- Headings
 - ☐ Use abbreviated headings
- Session heading format
- Maximum column width
- Mark selected session Names
- ☒ Grid lines

Load... Save... Cancel Preview...

Observation fields
Drag rows to change order

All None

Figure 386: Print session data only

Page header and footer options

- **Page Number.** Page number starting at 1.
- **Date/Time.** The current local date/time.
- **Session Name/s.** The session Name field data.
- **Session Start Date/s.** The session start date.
- **Session Start Date-Time/s.** The session start date and time.

Restrictions

The Restrictions list specifies which sessions to include in the report. If all the entries are unchecked, all sessions in the database will be printed. Restrictions are:

- **Session Selected.** Report includes only those sessions *selected* in the database window sessions list.

- **Session not Selected.** Report includes only those sessions *not selected* in the database window sessions list.
- **Session Displayed.** Report includes only those sessions *displayed* in the database window sessions list. i.e. if you have used the display restrictions underneath the observations list in the database window to eliminate some sessions from the list, then these will not be included in the report.
- **Session not Displayed.** Report includes only those sessions *not displayed* in the database window sessions list. i.e. if you have used the display restrictions underneath the observations list in the database window to eliminate some sessions from the list, then these will be included in the report.

Options

- **Session statistics.** Print a summary of the printed sessions at the end of the report.
- **New page per session.** Start a new page for each session.
- **Include all-blank session fields.** If a particular session field (e.g. Observer) is blank for all relevant sessions, then this option will stop that field from being printed.
- **Compressed mode.** Print a single line for each session, with field headings at the top of each page. There are two checkbox options associated with this mode: **Multi-line** - allow the session fields to be printed over several lines (to avoid truncation on a single line). **Separator lines** - draw a horizontal line between each session entry.
- **Headings > Use abbreviated headings.** Use shortened forms of headings (e.g. "Start" instead of "Start Date").
- **Headings > Session heading format.** Whether the heading is printed using a bold, italic or underlined font, whether it is inverted (black background with white text), etc.
- **Maximum column width.** The maximum width of a column as a percentage of page width.
- **Mark selected session Names.** How to print session Names for *selected* sessions in the list, using a bold, italic or underlined font, inverted (black background with white text), etc.
- **Grid lines.** Draw grid lines around the text.

Options	
<input type="checkbox"/> Session statistics	
<input checked="" type="checkbox"/> New page per session	
<input checked="" type="checkbox"/> Include all-blank session fields	
<input type="checkbox"/> Compressed mode	Multi-line+Separator lines
Headings	
<input type="checkbox"/> Use abbreviated headings	
Session heading format	Bold
Maximum column width	100 %
<input type="checkbox"/> Mark selected session Names	Bold
<input checked="" type="checkbox"/> Grid lines	

Figure 387: Session data print options

Examples

4/23/1988; 4/29/1989; 9/22/1989; 9/22/1989; 9/27/2005; 10/8/2005; 3/17/2006; 3/18/2006; 3/22/2006; 3/23/2006; ...; 12/8/2007

Site	Start	Duration	Finish
Rattlesnake Lake, WA	4/23/1988 9:55 PM	00h 34m	4/23/1988 10:29 PM
YAKIMA,WA	4/29/1989 10:20 PM	00h 42m	4/29/1989 11:02 PM
YAKIMA,WA	9/22/1989 12:20 PM	00h 25m	9/22/1989 12:45 PM
YAKIMA,WA	9/22/1989 10:00 PM	01h 54m	9/22/1989 11:54 PM
Lake Louise, Canada	9/27/2005 8:50 PM	00h 40m	9/27/2005 9:30 PM
Star Hill Inn, New Mexico	10/8/2005 9:05 PM	00h 54m	10/8/2005 9:59 PM
New Plymouth, NZ	3/17/2006 8:50 PM	00h 42m	3/17/2006 9:32 PM
New Plymouth, NZ	3/18/2006 8:20 PM	00h 35m	3/18/2006 8:55 PM
Hokitika, NZ	3/22/2006 7:50 PM	02h 25m	3/22/2006 10:15 PM
Hokitika, NZ	3/23/2006 8:50 PM	01h 16m	3/23/2006 10:06 PM
Hokitika, NZ	3/24/2006 8:37 PM	01h 10m	3/24/2006 9:47 PM
Lake Tekapo, NZ	3/28/2006 8:50 PM	00h 33m	3/28/2006 9:23 PM
Lake Tekapo, NZ	3/29/2006 8:50 PM	01h 11m	3/29/2006 10:01 PM
Home: Burien, WA	4/22/2006 10:20 PM	01h 25m	4/22/2006 11:45 PM
Home: Burien, WA	4/27/2006 10:50 PM	00h 55m	4/27/2006 11:45 PM
Home: Burien, WA	5/2/2006 9:40 PM	03h 10m	5/3/2006 12:50 AM
Home: Burien, WA	5/16/2006 10:18 PM	03h 12m	5/17/2006 1:30 AM
Home: Burien, WA	5/29/2006 11:20 PM	02h 48m	5/30/2006 2:08 AM
Home: Burien, WA	6/16/2006 11:45 PM	01h 50m	6/17/2006 1:35 AM
Tiger Mountain, WA	6/24/2006 10:30 PM	03h 38m	6/25/2006 2:08 AM
Home: Burien, WA	6/30/2006 11:40 PM	02h 35m	7/1/2006 2:15 AM
Rattlesnake Lake, WA	7/15/2006 10:35 PM	02h 40m	7/16/2006 1:15 AM
Rattlesnake Lake, WA	7/23/2006 10:30 PM	02h 55m	7/24/2006 1:25 AM
Rattlesnake Lake, WA	7/26/2006 10:10 PM	02h 47m	7/27/2006 12:57 AM
Home: Burien, WA	8/16/2006 10:40 PM	01h 20m	8/17/2006 12:00 AM
Home: Burien, WA	9/11/2006 9:35 PM	01h 25m	9/11/2006 11:00 PM
Lake Louise, Canada	9/23/2006 8:52 PM	00h 53m	9/23/2006 9:45 PM
Rattlesnake Lake, WA	10/11/2006 7:35 PM	02h 16m	10/11/2006 9:51 PM
Rattlesnake Lake, WA	10/21/2006 8:05 PM	01h 30m	10/21/2006 9:35 PM
Home: Burien, WA	1/11/2007 6:55 PM	01h 35m	1/11/2007 8:30 PM
Home: Burien, WA	1/30/2007 6:34 PM	00h 33m	1/30/2007 7:07 PM
Home: Burien, WA	3/14/2007 8:57 AM	01h 06m	3/14/2007 10:03 AM
Home: Burien, WA	3/14/2007 8:45 PM	00h 30m	3/14/2007 9:15 PM
Home: Burien, WA	3/16/2007 10:05 PM	02h 09m	3/17/2007 12:14 AM
Rattlesnake Lake, WA	4/6/2007 9:20 PM	02h 31m	4/6/2007 11:51 PM
Home: Burien, WA	5/7/2007 10:50 PM	02h 04m	5/8/2007 12:54 AM
Rattlesnake Lake, WA	5/9/2007 10:05 PM	02h 49m	5/10/2007 12:54 AM
Table Mountain, WA	7/7/2007 10:45 PM	03h 35m	7/8/2007 2:20 AM
Home: Burien, WA	8/1/2007 11:13 PM	01h 37m	8/2/2007 12:50 AM
Table Mountain, WA	8/10/2007 10:00 PM	04h 10m	8/11/2007 2:10 AM
Rattlesnake Lake, WA	8/14/2007 11:25 PM	01h 14m	8/15/2007 12:40 AM
Table Mountain, WA	9/8/2007 8:50 PM	03h 15m	9/9/2007 12:05 AM
Tiger Mountain, WA	10/13/2007 8:11 PM	03h 09m	10/13/2007 11:20 PM
Home: Burien, WA	10/25/2007 8:20 PM	00h 25m	10/25/2007 8:45 PM
Home: Burien, WA	10/26/2007 8:05 PM	00h 25m	10/26/2007 8:30 PM
Tiger Mountain, WA	12/8/2007 6:46 PM	04h 29m	12/8/2007 11:15 PM

1 4/21/2011 10:23 AM

Figure 388: Session data example


Session Statistics		# of Observations	% of Observations
Total sessions		105	
Total observations		1,065	
Observing Site			
	Bickleton Property	507	47.6
	Hokitika, NZ	21	2.0
	Home: Burien, WA	185	17.4
	Jerry Kuch House	7	0.7
	Jon Bearscove House, Auburn, WA	3	0.3
	KIRKLAND, WA	2	0.2
	Lake Louise, Canada	9	0.8
	Lake Tekapo, NZ	9	0.8
	New Plymouth, NZ	7	0.7
	No Site specified	1	0.1
	Rattlesnake Lake, WA	166	15.6
	Star Hill Inn, New Mexico	5	0.5
	Table Mountain, WA	32	3.0
	Tiger Mountain, WA	56	5.3
	Unknown	16	1.5
	YAKIMA, WA	39	3.7
Year			
	1988	3	0.3
	1989	22	2.1
	2005	10	0.9
	2006	199	18.7
	2007	144	13.5
	2008	159	14.9
	2009	194	18.2
	2010	315	29.6
	2011	2	0.2
	2088	1	0.1
	2089	16	1.5
Observer			
		1,043	97.9
	Joe	2	0.2
	Unknown	20	1.9
Seeing			
	I. Perfectly stable	60	5.6
	II. Mostly stable	639	60.0
	III. Somewhat stable	276	25.9

Figure 389: Session statistics example¹

15.6.2 Print observation data only

Select the **Observation data only** task. Select the session fields you wish to print in the **Observation fields** list. Reorder the fields by dragging the entries.

Page header and footer options

- **Page Number.** Page number starting at 1.
- **Date/Time.** The current local date/time.
- **Observation ID/s.** The ID fields for observations displayed on the page.

Restrictions

The Restrictions list specifies which observations to include in the report. If all the entries are unchecked, all observations in the database will be printed. Restrictions are:

- **Observation Selected.** Report includes only those observations *selected* in the database window observations list.
- **Observation not Selected.** Report includes only those observations *not selected* in the database window observations list.
- **Observation Found.** Report includes only those observations marked as having been found.
- **Observation not Found.** Report includes only those observations not marked as being found.
- **Observation Displayed.** Report includes only those observations *displayed* in the database window observations list. i.e. if you have used the display restrictions underneath the observations

1. The black "bar" is redacted information (the observation database used for illustration contains real third-party data).

list in the database window to eliminate some observations from the list, then these will not be included in the report.

- **Observation not Displayed.** Report includes only those observations *not displayed* in the database window observations list. i.e. if you have used the display restrictions underneath the observations list in the database window to eliminate some observations from the list, then these will be included in the report.

The screenshot shows the 'Print Observations' dialog box with the following settings:

- Printing script:** Default
- Task:** Observation data only
- Page Header includes:** Observation ID/s (checked)
- Page Footer includes:** Page Number (checked), Date/Time (checked)
- Restrictions:** Observation Not Displayed (checked)
- Options:**
 - Include all-blank observation fields (checked)
 - Maximum column width: 100 %

Figure 390: Print observation data only

Options

- **Observation statistics.** Print a summary of the printed observations at the end of the report.
- **New page per observation.** Start a new page for each observation.
- **Include all-blank observation fields.** If a particular observation field (e.g. Name) is blank for all relevant observations, then this option will stop that field from being printed.
- **Compressed mode.** Print a single line for each observation, with field headings at the top of each page. There are two checkbox options associated with this mode: **Multi-line** - allow the observation fields to be printed over several lines (to avoid truncation on a single line). **Separator lines** - draw a horizontal line between each observation entry.
- **Headings > Use abbreviated headings.** Use shortened forms of headings (e.g. "Julian" instead of "Julian Date").
- **Headings > Observation heading format.** Whether the heading is printed using a bold, italic or underlined font, whether it is inverted (black background with white text), etc.
- **Maximum column width.** The maximum width of a column as a percentage of page width.
- **Mark selected observation IDs.** How to print observation IDs for *selected* observations in the list, using a bold, italic or underlined font, inverted (black background with white text), etc.

- **Grid lines.** Draw grid lines around the text.
- **Images and Charts > Show attached observation images.** Display any images attached to the observations, and how to print those images (inverted colours, E/W flipped, etc.).
- **Images and Charts > Number of attached images per row.** How many images should be printed across the width of the page.
- **Images and Charts > Show constellation chart.** Display a constellation chart showing the constellation containing the observed object.

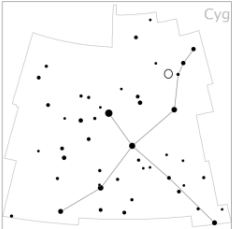
Options	
<input type="checkbox"/>	Observation statistics
<input type="checkbox"/>	New page per observation
<input checked="" type="checkbox"/>	Include all-blank observation fields
<input type="checkbox"/>	Compressed mode
	Multi-line+Separator lines
	Maximum column width
	100 %
▼	Headings
<input type="checkbox"/>	Use abbreviated headings
	Observation heading format
	Bold
<input type="checkbox"/>	Mark selected observation IDs
	Bold
<input checked="" type="checkbox"/>	Grid lines
▼	Images and Charts
<input type="checkbox"/>	Show attached observation images
	Number of attached images per row
	3
<input type="checkbox"/>	Show constellation chart

Figure 391: Observation data print options

Examples

NGC6826,7016

ID	Name	Type	RA	Dec	Constellation	Julian Date
NGC6826	Blinking Nebula	Planetary Nebula	19:44:48	+50° 31' 30"	Cyg	2,455,422.81111
Local Date			Local Time			
8/14/2010			12:28:00 AM			
Found	Telescope	Eyepiece	Optical Aid	Filter	Actual FoV	Magnification
True	Obsession 20" f/5	Pentax XW 7mm		Lumicon OIII	n/a	n/a
Notes						
The wind was blowing and shaking the scope. At 363x, this is a bright, and beautiful blue-gray disk. Central star was bright and obvious. Moderate size. The blinking effect is confirmed, as focusing on central star causes the gas to become subdued - it did not disappear altogether, but it did weaken. I do not see the dark lane or spot mentioned in my notes. With an OIII filter, the central star disappeared and the halo became more extended and with a filmy perimeter; also, it was no longer circular, as there were now bulges evident in varying directions.						



ID	Name	Type	RA	Dec	Constellation	Julian Date
NGC7016	NGC7016	Galaxy	21:07:16	-25° 28' 09"	Cap	2,455,422.82431
Local Date			Local Time			
8/14/2010			12:47:00 AM			
Found	Telescope	Eyepiece	Optical Aid	Filter	Actual FoV	Magnification
True	Obsession 20" f/5	Pentax XW 7mm			n/a	n/a
Notes						
Very low altitude view; approximately 17-18 degrees altitude, so a dim view. I saw all three galaxies in the field of view at 363x, and they formed a sort of crooked isosceles triangle. All were visible with direct vision, but barely so. Little detail evident. The brightest member seemed to be NGC7018; it also seemed a little larger and had a slightly elongated halo. The other two galaxies were side-by-side, SW of NGC7018. NGC7016 is the westernmost of the pair, and seemed a hair brighter and larger than NGC7017. However with averted vision they both seemed about the same brightness. No detail evident, as both were faint smudges. Other galaxies in the field were not visible.						

Figure 392: Observations only example

Observation Statistics	# of Observations	% of Observations
Total observations	58	
Object Type		
Galaxy	38	65.5
Globular Cluster	2	3.4
Knot	4	6.9
Normal Spiral Galaxy	1	1.7
Open Cluster	3	5.2
P Neb	3	5.2
Planetary Nebula	4	6.9
Triple	1	1.7
Unknown	2	3.4
Rating		
None	58	100.0
Telescope		
Obsession 20" f/5	58	100.0
Eyepiece		
Pentax XW 7mm	33	56.9
TeleVue Nagler 12mm	20	34.5
TeleVue Nagler 26mm	5	8.6
Imager		
None	58	100.0
Optical Aid		
None	58	100.0
Filter		
Lumicon OIII	4	6.9
Lumicon UHC	1	1.7
None	53	91.4

Figure 393: Observation statistics example

15.6.3 Print session & observation data

Printing script: Default Task: Session and Observation data

Page Header includes
Drag rows to change order

- ☐ Page Number
- ☐ Date/Time
- ☐ Session Name/s
- ☒ Session Start Date/s
- ☐ Session Start Date-Ti...
- ☐ Observation ID/s

All None

Page Footer includes
Drag rows to change order

- ☒ Page Number
- ☒ Date/Time
- ☐ Session Name/s
- ☐ Session Start Date/s
- ☐ Session Start Date-Ti...
- ☐ Observation ID/s

All None

Restrictions
Drag rows to change order

- ☐ Session Selected
- ☐ Session Not Selected
- ☐ Session Displayed
- ☐ Session Not Display...
- ☐ Observation Selec...
- ☐ Observation Not Sel...
- ☐ Observation Found

All None

Object fields
Drag rows to change order

All None

Session fields
Drag rows to change order

- ☐ Name
- ☐ Duration
- ☐ Finish
- ☐ Observer
- ☐ Seeing
- ☐ Site
- ☐ Start
- ☐ Temperature

All None

Options

Sessions

- ☐ Session statistics
- ☒ New page per session
- ☒ Include all-blank session fields
- ☒ Ignore sessions with no observations to print
- ☐ Mark selected session Names Bold
- ☐ Session heading format Bold

Observations

- ☐ Observation statistics
- ☐ First observation of a session on a new page
- ☐ New page per observation
- ☒ Include all-blank observation fields
- ☐ Observation heading format Bold
- ☐ Use abbreviated headings

Load... Save... Cancel Preview...

Figure 394: Print session and observation data

This is a combination of the above two report types. For each session, the session data is printed, followed by observations made in that session. See above for definition of the options, etc.

Options

Sessions

☐ Session statistics
 ☒ New page per session
 ☒ Include all-blank session fields
 ☒ Ignore sessions with no observations to print
 ☐ Mark selected session Names **Bold**

Session heading format

Bold

Observations

☐ Observation statistics
 ☐ First observation of a session on a new page
 ☐ New page per observation
 ☒ Include all-blank observation fields
 ☐ Use abbreviated headings

Observation heading format

Bold

Maximum column width

100 %

☒ Grid lines

Images and Charts

☐ Show attached observation images
 ☐ Show constellation chart

Number of attached images per row

3

Figure 395: Session and observation print options

Examples

8/14/2010				
Site	Start	Finish	Duration	Seeing
Bickleton Property	8/14/2010 12:18 AM	8/14/2010 4:13 AM	03h 55m	III. Somewhat stable
Transparency				
7. Extremely Clear, M33 or M81 visible				
ID	Name			Constellation
NGC6826	Blinking Nebula			Cyg
Local Date		Local Time		
8/14/2010		12:28:00 AM		
Telescope		Eyepiece		Rating
Obsession 20" f/5		Pentax XW 7mm		
ID	Name			Constellation
NGC7016	NGC7016			Cap
Local Date		Local Time		
8/14/2010		12:47:00 AM		
Telescope		Eyepiece		Rating
Obsession 20" f/5		Pentax XW 7mm		
ID	Name			Constellation
NGC7017	NGC7017			Cap
Local Date		Local Time		
8/14/2010		12:47:01 AM		
Telescope		Eyepiece		Rating
Obsession 20" f/5		Pentax XW 7mm		
ID	Name			Constellation
NGC7018	NGC7018			Cap
Local Date		Local Time		
8/14/2010		12:47:02 AM		
Telescope		Eyepiece		Rating
Obsession 20" f/5		Pentax XW 7mm		
ID	Name			Constellation
NGC6607	NGC6607			Dra
Local Date		Local Time		
8/14/2010		1:05:00 AM		
Telescope		Eyepiece		Rating
Obsession 20" f/5		Pentax XW 7mm		
ID	Name			Constellation
NGC6608	NGC6608			Dra
Local Date		Local Time		
8/14/2010		1:05:01 AM		
Telescope		Eyepiece		Rating
Obsession 20" f/5		Pentax XW 7mm		

1

4/21/2011 12:51 PM

Figure 396: Session+observations example

16 Journal

The journal feature (**Observation > Journal**) is a convenient place to keep bits of textual information, stories, observing reports, etc. It consists of a linear collection of entries, each entry having a date, a subject, and some associated notes.

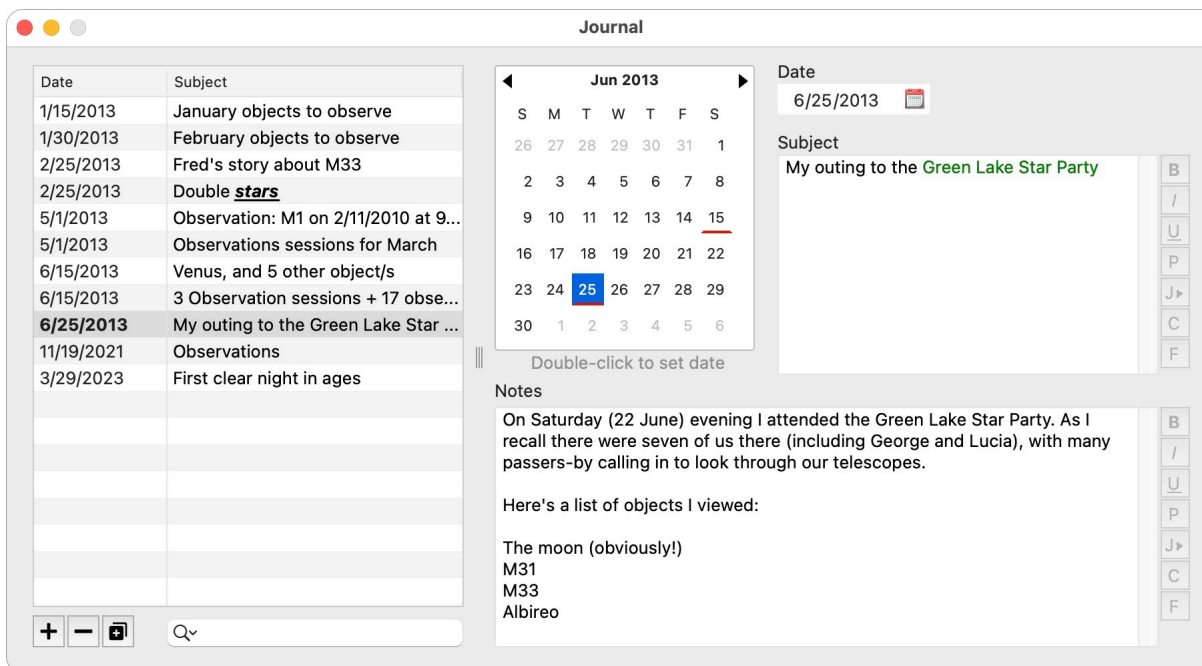


Figure 397: Journal window

The list of journal entries on the left can be sorted (by clicking the column headings). Buttons beneath the list allow you to add a new journal entry, delete an existing journal entry, or duplicate an existing entry.

If a journal entry is selected in the list, the entry and all others on the same date are displayed in a bold face.

The date of a journal entry can be changed, either by using the Date selector, or by double-clicking the appropriate day on the mini-calendar widget.

The mini-calendar highlights the date of the currently-selected entry. Additionally any dates in the displayed month that have one or more entries will be underlined in red. Single-clicking a date will select and display the first journal entry for that date.

The find widget under the list of entries can be used to search all journal entries and display only those entries containing the search text in either the subject or notes part.

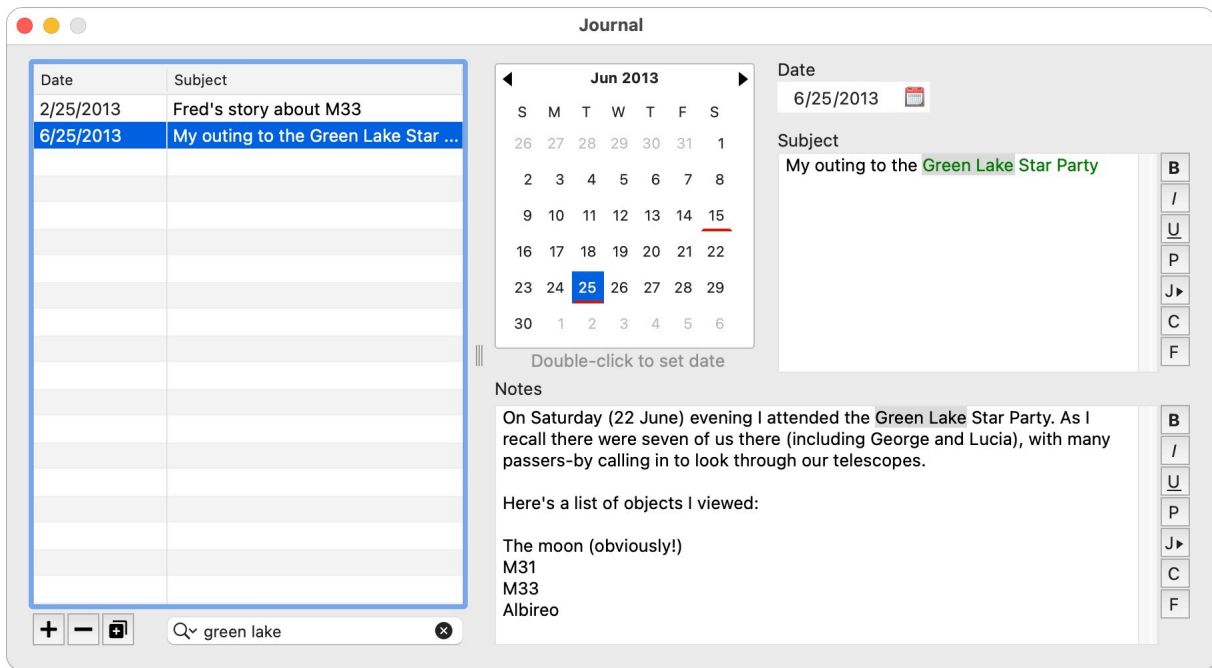


Figure 398: Searching the journal

It is possible to create journal entries from various places in the application:

- Text fields have a **Create New Journal Entry from Text** entry in their right-click menu.
- Right-clicking the list of observations allows you to create a new journal entry containing a text summary of the observation.
- Right-clicking the list of observation sessions allows you to create a new journal entry containing a text summary of the selected session/s and observations.

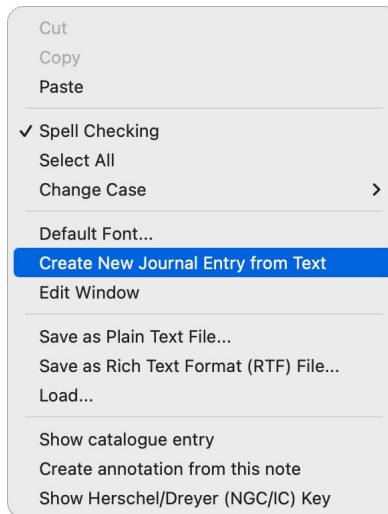


Figure 399: Create journal entry from a text field

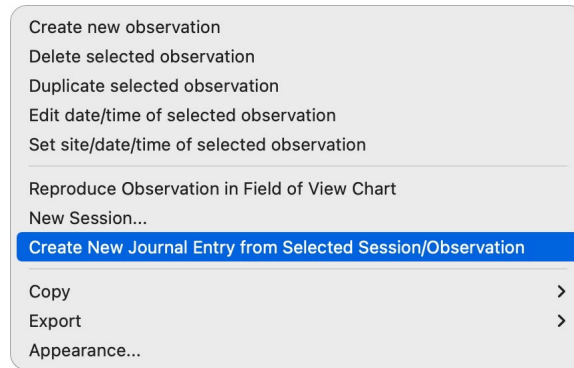


Figure 400: Create journal entry from an observation list entry

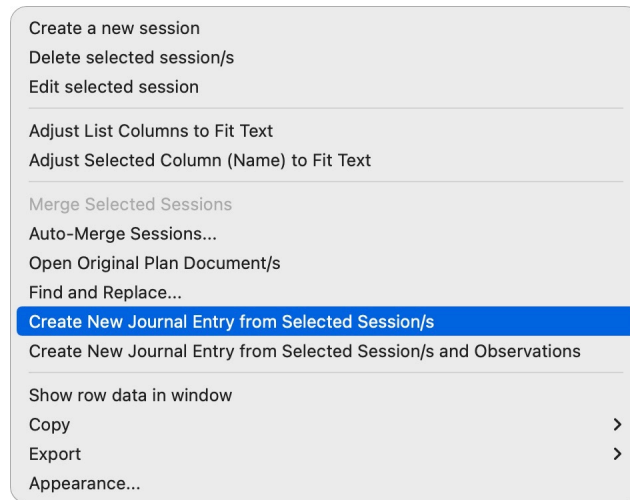


Figure 401: Create journal entry from a session list entry

17 Downloading and using sky images

AstroPlanner has the ability to download images of your plan objects, which can be used for pre-visualization of the objects before observing or imaging them, or comparing what you imaged or observed through the telescope with a “standard” image.

The images are downloaded from a number of on-line sky survey databases. These are primarily monochrome images from the first or second generation Palomar Digital Sky Survey (DSS) or colour images from the Sloan Digital Sky Survey (SDSS)¹.

See Figure 402 through Figure 404 for some examples.

1. Note the SDSS currently only includes coverage of part of the northern sky.

The images are stored in a database and are typically accessed via their associated ID and/or coordinates of the centre of the image. You can download images in different angular sizes. The downloaded images are all square (i.e. the same angular size vertically and horizontally).

Note: for DSS (POSS) images, the downloaded images are stored at full resolution. This means that the larger the angular size of the image, the greater the amount of disk space required to store them, and the slower they will be to download and to retrieve from the database.

Image preferences can be changed to suit the user. They are described in detail on page 342.

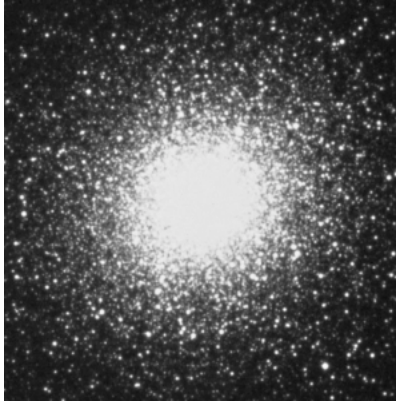


Figure 402: DSS Image (POSS 1G Red) of M13

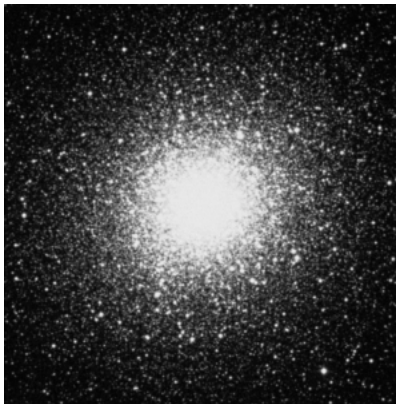


Figure 403: DSS Image (POSS 2G Red) of M13



Figure 404: SDSS Image of M13

17.1 Downloading

Downloading is typically done manually, as described below. You can also set up preferences to download images automatically (where possible). See Image preferences (page 342) for details on setting this up.

17.1.1 Opening the download window

In order to download images, you must have a plan document open and it must contain at least one object. To download images for one or more of the objects in the plan, use the **Image > Download images...** menu command. Alternatively, select one or more objects in the plan's object list, right-click and choose **Other > Download images...**

If you are viewing the Field of View chart, you can also download an image centred on the current Field of View coordinates by clicking the **Images** button to the right of the chart. When the Field of View Images window opens, select the Download tab.

Note that the left hand pane of the window might show existing images of the object where applicable.

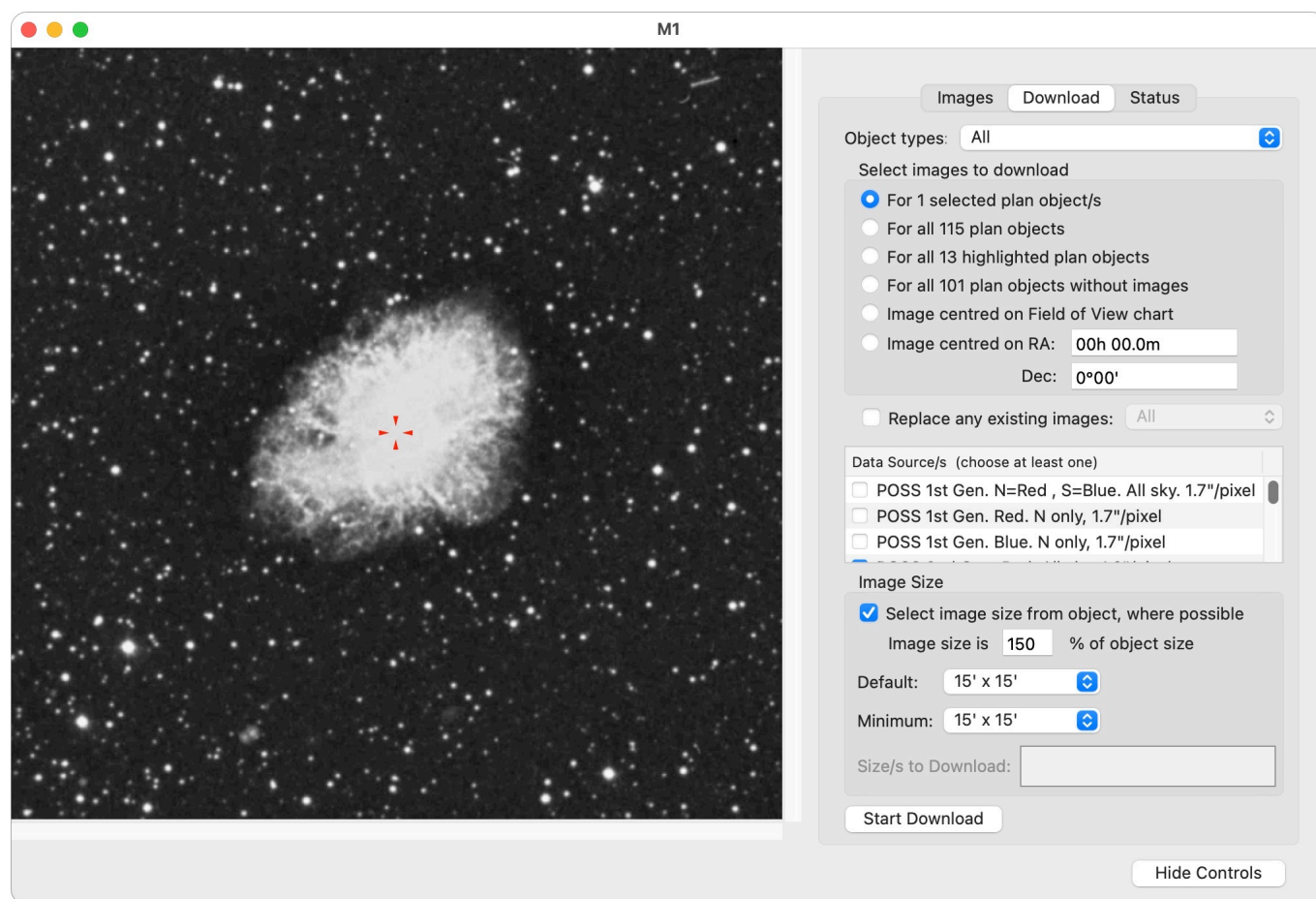


Figure 405: Image download window

17.1.2 Image download options

Select images to download: Select which of the plan objects you want to download images for. This can be the currently selected object/s in the plan, all of the objects in the plan, the highlighted ob-

jects, all the objects in the plan that currently have no images associated with them or, in the case of the Field of View chart, images centred on that chart. There is also an option to download an image centred on specified RA/Dec coordinates.

Replace any existing images: If this option is checked, then any existing images of the same size and data source will be replaced by newly-downloaded copies. You can also select to replace only the newest or oldest image if there are multiple copies.

Data source/s: You need to check at least one data source (sky survey) from whence the image/s will be downloaded. If you check more than one, the same image (i.e. the same size and centre coordinates) will be downloaded from each data source. This is useful if, say, you always want a red and blue image, and possibly a colour SDSS image where applicable.

Image Size > Select image size from object, where possible: If the object being targeted for an image download has a defined size (e.g. 15'x10'), then this option (if checked) will use that object size to determine the angular size of the downloaded image/s. The image size is then specified as a percentage of the object size (in order to allow a gap around the object). If the object does not define a size, the the default image size is used (see below).

Default image size: This is the size of image that will be downloaded. If the **Select image size from object, where possible** setting is checked then this size will be used if the object does not have a specified size.

Minimum image size: If the **Select image size from object, where possible** setting is used, then this represents the minimum size of image that will be downloaded.

If you turn off the **Select image size from object, where possible** option, then you can choose one or more sizes to download, by clicking on the **Size/s to Download** item.

17.1.3 Starting and monitoring image downloads

Click the **Start Download** button to queue up the specified image downloads. The specified images are added to the download queue, and if the queue was previously empty, downloading begins. All downloading, decompressing, decoding, etc. takes place in a background thread and you can continue working.

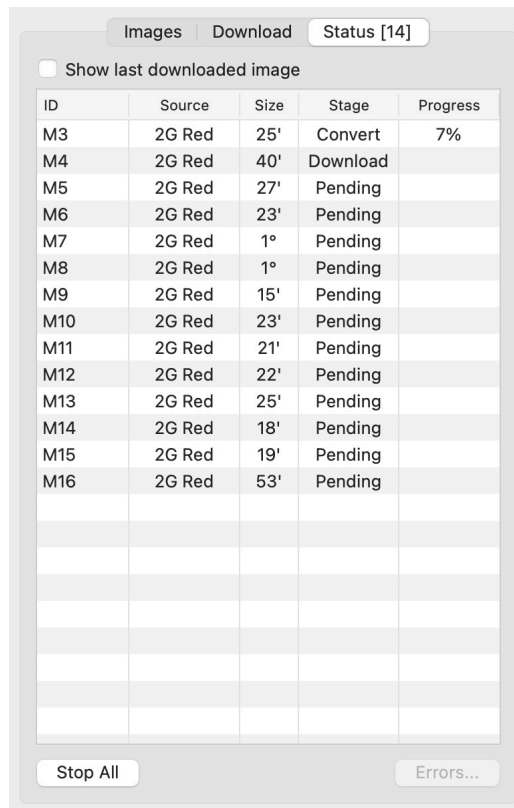


Figure 406: Image download queue

The queue in the Status tab shows the list of images being downloaded (object ID, the source chosen, the image size to be downloaded, the stage of the download (e.g. download, decompress, convert, etc.), and the progress of the current stage as a percentage.

The **Stop All** button is used to abandon all downloads currently in the queue. If an error is detected while downloading or converting an image, an error is logged, and the next image in the queue is downloaded. If there are errors, the **Errors...** button is enabled and can be used to get a summary of the errors.

The **Show last downloaded image** checkbox can be used to show a preview of the last image to be downloaded (see Figure 407).

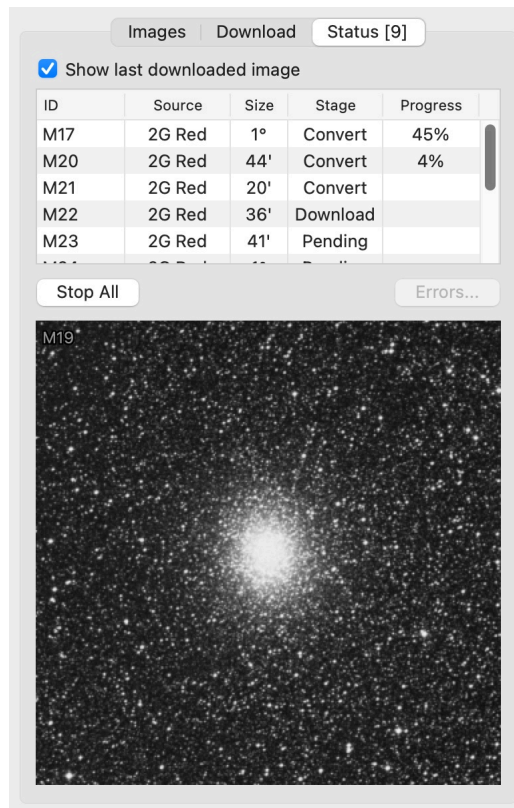


Figure 407: Showing last downloaded image

17.2 Object list

You can show any images associated with an object in the object list by clicking on and selecting that object. If the selected object has any images (i.e. any images in the database that contain the coordinates of the object) then they will be displayed to the right of the object list.

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise
M10		NGC6254	Globular	16h 57m 09s	-04°05.9'	49°	-36°	12:34 AM
M11		Wild Duck Cluster, Scutum Salt-and-Pepp...	Open	18h 51m 05s	-06°16.1'	14°	-48°	2:39 AM
M12		Gumball Globular, NGC6218	Globular	16h 47m 14s	-01°56.8'	50°	-32°	12:30 AM
M13		Hercules Globular Cluster, Great Hercules...	Globular	16h 41m 41s	+36°27.5'	33°	2°	8:23 PM
M14		NGC6402	Globular	17h 37m 36s	-03°14.7'	37°	-39°	1:16 AM
M15		Great Pegasus Cluster, NGC7078	Globular	21h 29m 58s	+12°10.0'	327°	-24°	5:05 AM
M16		Eagle Nebula, Star Queen Nebula, The Gh...	Open+D Neb	18h 18m 48s	-13°48.3'	29°	-53°	2:13 AM
M17		Omega Nebula, Swan Nebula, Horseshoe ...	Open+D Neb	18h 20m 47s	-16°10.3'	30°	-55°	2:24 AM
M18		Black Swan, NGC6613	Open	18h 19m 58s	-17°06.1'	31°	-56°	2:28 AM
M19		NGC6273	Globular	17h 02m 38s	-26°16.0'	66°	-54°	1:58 AM
M20		Trifid Nebula, The Clover, NGC6514	Open+D Neb	18h 02m 42s	-22°58.2'	43°	-60°	2:35 AM
M21		NGC6531	Open	18h 04m 13s	-22°29.3'	42°	-60°	2:35 AM
M22		Great Sagittarius Cluster, Crackerjack Clu...	Globular	18h 36m 24s	-23°54.2'	29°	-64°	3:16 AM
M23		NGC6494	Open	17h 57m 04s	-18°59.1'	41°	-56°	2:16 AM
M24		Small Sagittarius Star Cloud, NGC6603,D...	Open	18h 18m 26s	-18°24.3'	32°	-57°	2:31 AM
M25			Open	18h 31m 42s	-19°07.0'	27°	-59°	2:50 AM
M26		NGC6694	Open	18h 45m 18s	-09°23.0'	17°	-51°	2:28 AM
M27		Dumbbell Nebula, Apple Core, Diablo, Do...	P Neb	19h 59m 36s	+22°43.2'	353°	-19°	1:13 AM
M28		NGC6626	Globular	18h 24m 33s	-24°52.1'	35°	-64°	3:09 AM
M29		Cooling Tower, NGC6913	Open	20h 23m 57s	+38°30.5'	349°	-3°	11:43 PM
M30		NGC7099	Globular	21h 40m 22s	-23°10.7'	302°	-54°	6:13 AM

23' x 23' 2nd Gen All Sky Red

Highlighting: Observed

[Quick Obs](#)
[New Observation](#)
[Lookup](#)
[Show Catalogue](#)
[Search Catalogue/s](#)
[Sort List](#)
[Add Special](#)
[Delete](#)
[Slew To](#)

Figure 408: Images associated with selected objects

The popup menu underneath the image contains a list of all known images of that object. Selecting any entry in the menu will display the applicable image.

This display of images can be turned on and off by toggling the small square button to the lower right of the image display, to the right of the ***Slew To*** popup button.

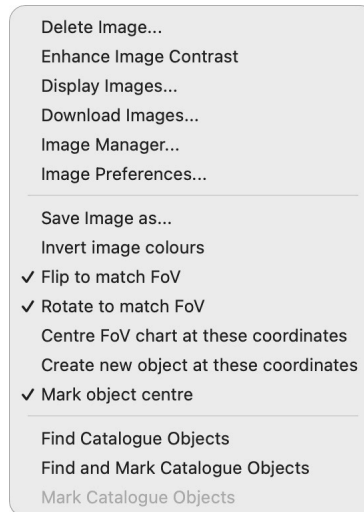


Figure 409: Right-click image menu

Right-clicking the image displays a popup menu with various options (not all of which are necessarily enabled):

- **Delete Image.** Delete the currently-displayed image from the image database.
- **Enhance Image Contrast.** Enhance the contrast of the currently-displayed image. This will darken the background sky, possibly at the expense of subtle detail. Since this operates on the image itself, it cannot be undone.
- **Display Images.** Open the image display window for the selected object (see Section 17.4 on page 289).
- **Download Images.** Opens the image download window ready to download images for the selected object (see Section 17.1.1 on page 282).
- **Image Manager.** Open the Image Manager (see Section 17.5 on page 292).
- **Image Preferences.** Open the Image Preferences window (see Section 20.11 on page 342).
- **Save Image As.** Opens a dialog that lets you save the currently-displayed image as an image file in one of several formats (Figure 410). Some file formats might not be available depending on your OS platform and/or installed software. You can choose to save the image as its original size (default) or you can change the size settings to suit. The JPEG file format also allows you to specify quality, etc.
- **Invert image colours.** This toggles the display of images with either a white or black sky background.
- **Flip to match FoV.** This toggles the display of images to match the orientation of the field of view chart (i.e. the N,S,E,W cardinal points).

- **Rotate to match FoV.** This toggles the display of images to match the rotation angle of the field of view chart.
- **Centre FoV chart at these coordinates.** The field of view chart will be redrawn, centred at the coordinates of the point where the mouse was right-clicked.
- **Create new object at these coordinates.** A new object will be created in the plan, with the coordinates of the point where the mouse was right-clicked.
- **Mark object centre.** This toggles the display of red cross hairs on the image marking the coordinates of the selected object.
- **Find Catalogue Objects.** Search the installed catalogues for any objects that appear in the displayed image. Once that is done, hovering the cursor over such an object in the image will display the ID of the object below the image (Figure 411).
- **Find and Mark Catalogue Objects.** Does the same as Find Catalogue Objects, but also circles the found objects in red on the image (Figure 412).
- **Mark Catalogue Objects.** After doing a Find Catalogue Objects, this will then mark the objects in red.
- **Unmark Catalogue Objects.** Removes the marked objects added as described above.
- **Show Catalogue Entry.** Displays a sub-menu containing the catalogue entries for marked objects as described above. Selecting an object will open the relevant catalogue and display the object.

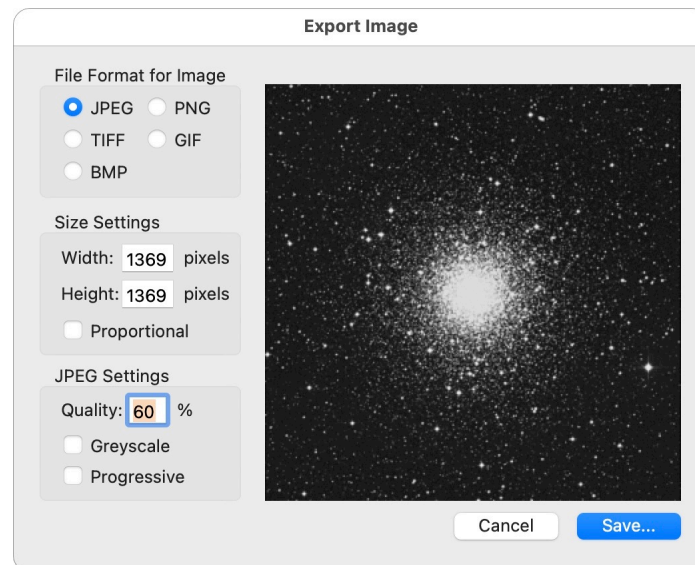


Figure 410: Save Image As dialog

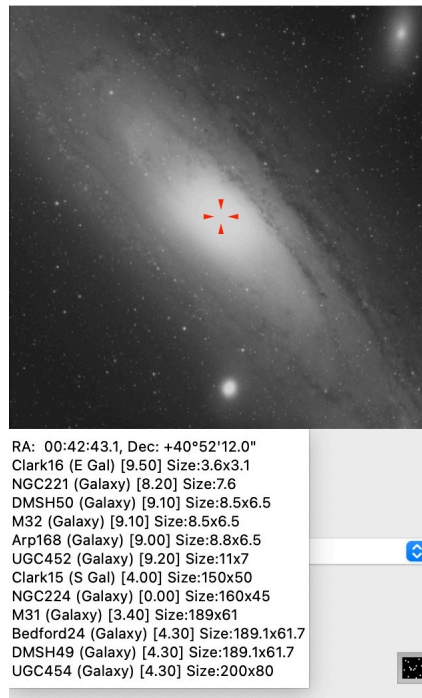


Figure 411: After Find Catalogue Objects

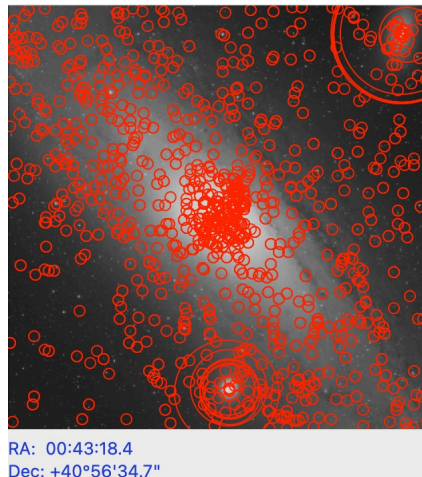


Figure 412: Find and Mark Catalogue Objects

17.3 Field of View chart

It is possible to include images in the field of view chart. Any images that overlap the current field of view will be displayed (by default).

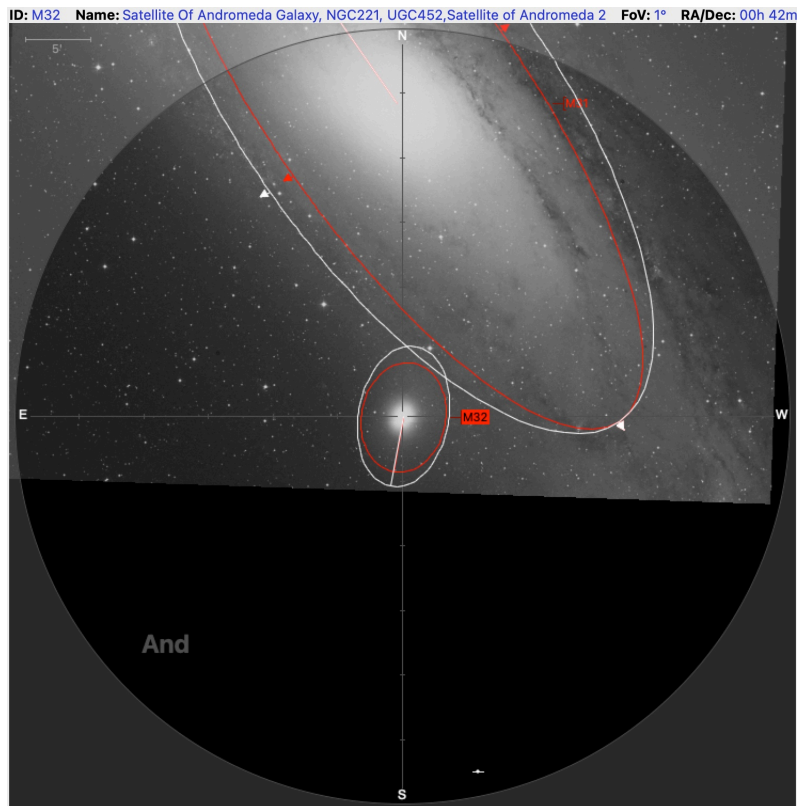


Figure 413: Images displayed in the field of view chart

This feature is enabled by using the **Display > Images** option in the Display Options panel.

17.4 Images window

To display images of an object in a separate window, select the object in the object list and choose **Image > Display Images...**, or right-click and choose **Display Images**.

The images are displayed in a panel with controls on the right. You can hide the controls by clicking the **Hide Controls** button (which changes to **Show Controls**).

The controls in the **Images** tab allow you to select the image being displayed (if the object has more than one image associated with it). There's also a popup menu that contains a list of objects (**Other IDs**) in the current plan document that also have associated images. Choosing from this list allows you to display images from other objects.

The **FoV Overlay** tab will overlay the image with one or more circular field of view reticles, centred on the image. These can be of fixed size, or computed from the telescope/eyepiece/imager/optical aid resources selected (see Figure 415). Similarly for custom reticles.

The **Fit to Window** checkbox, when checked, will resize the image to fit into the given space. Otherwise, the image is displayed at full resolution, and scroll bars provided where necessary so that you can navigate around the image.

The **Custom Reticles** tab does the same thing with any custom reticles you might have defined.

The **Angle** slider allows you to rotate (non-circular) reticles on the image in order to frame the image, where necessary.

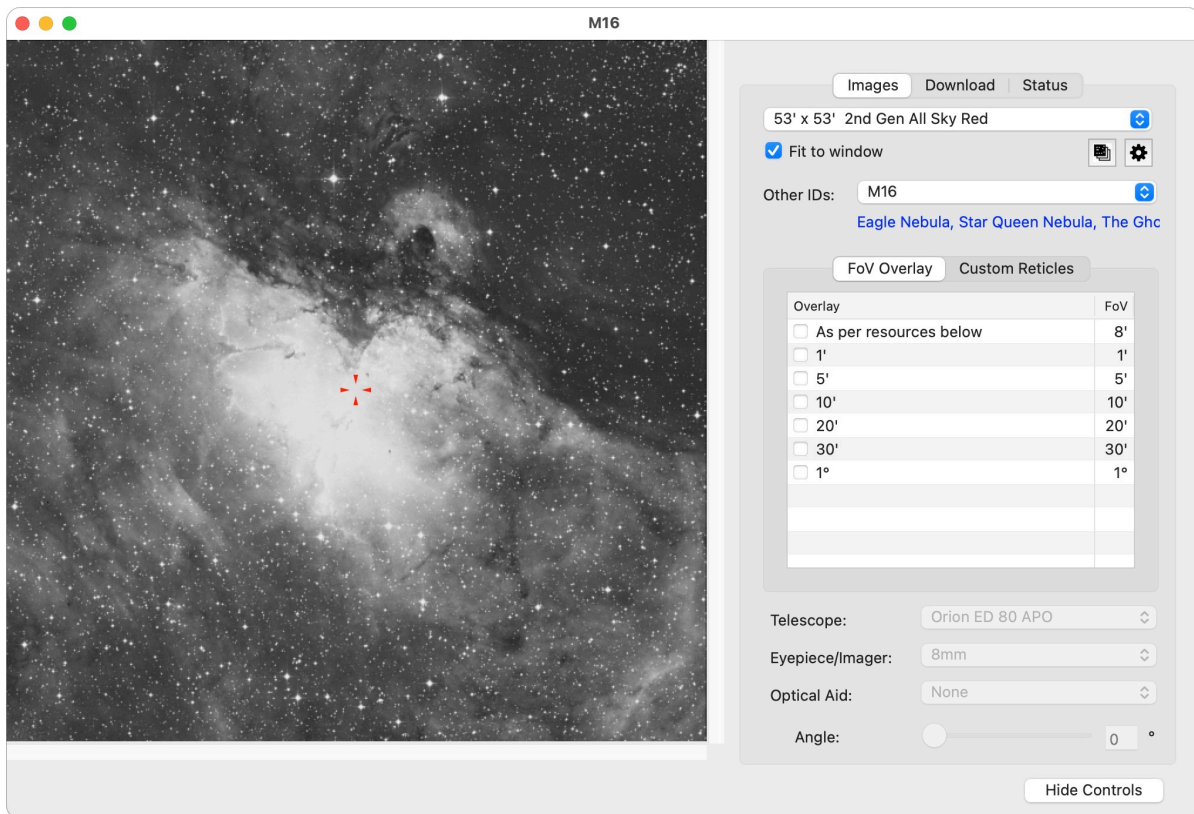


Figure 414: Image display window

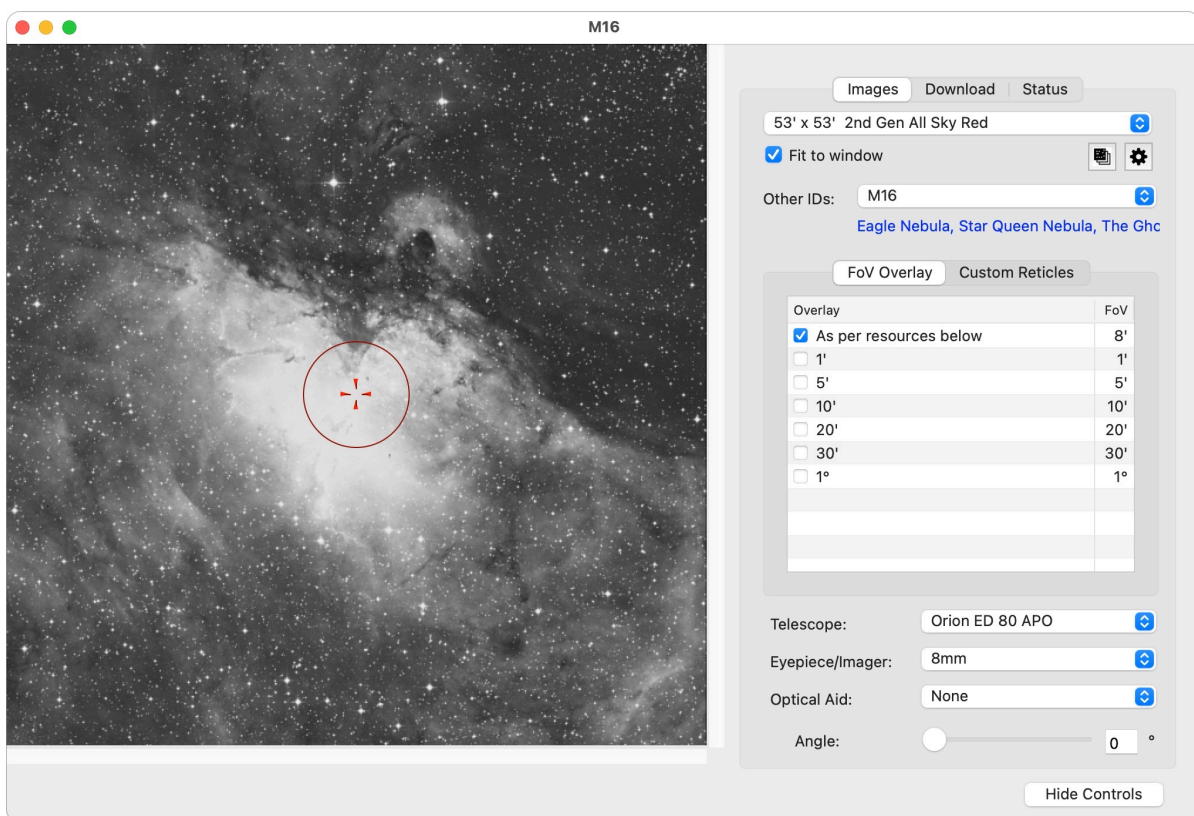


Figure 415: Field of view overlay

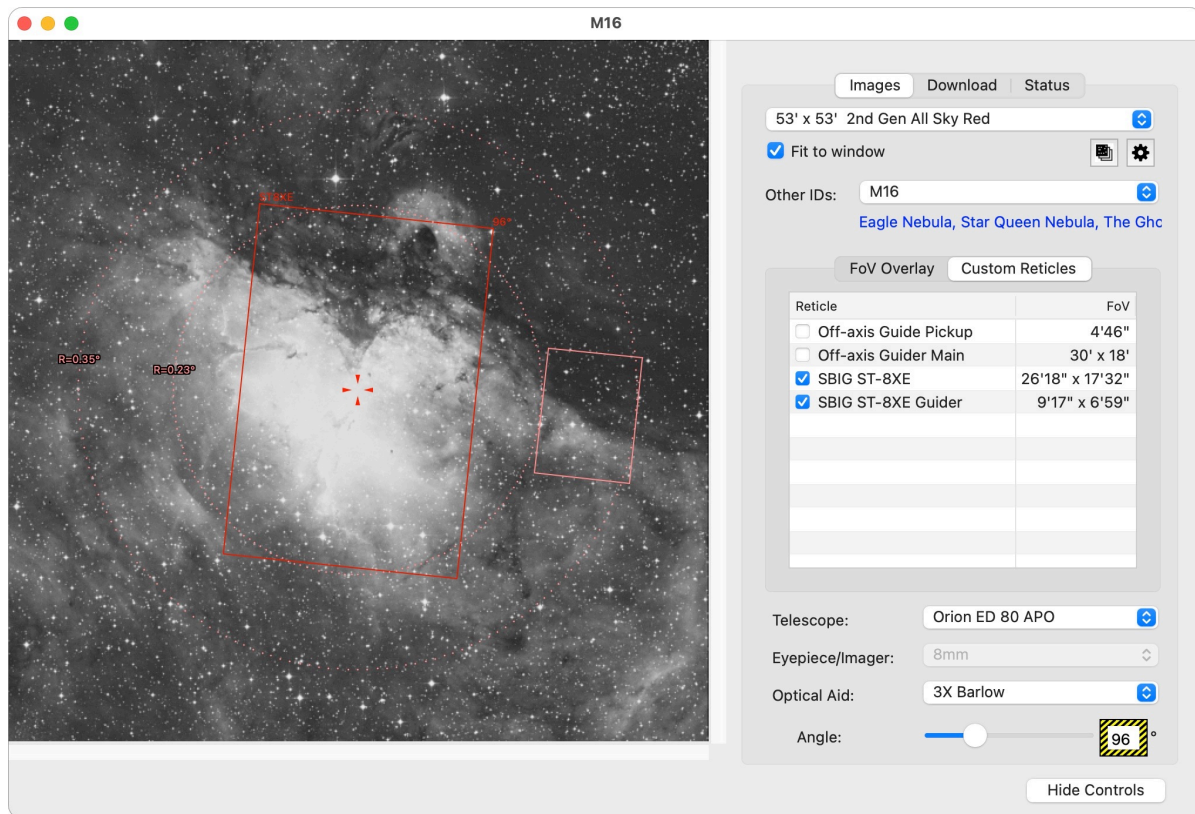


Figure 416: Custom reticle overlay

Right-clicking an image offers a number of options:

Delete Image. Deletes the currently-displayed image from the image database (and displays another image associated with the current object if possible).

Enhance Image Contrast. Enhances the current image's contrast. This will only work if the contrast has not yet been enhanced for the current image.

Centre FoV/Imager/Reticle here.

Centre the FoV overlay or custom reticle overlays at the point where the cursor was when you right-clicked. Useful for experimenting with imager framing, etc.

Save Image as.... Save the currently-displayed image to an external file in a common format (e.g. JPEG, PNG, etc.)

Invert image colours. This setting toggles on and off. When on, the image colours will be inverted. In particular, if the image is white on black (the default) then the image will be displayed as black on white. Note that this does not affect the image in the database.

Flip to match FoV. This setting toggles on and off. When on, the image will be inverted horizontally and/or vertically to match the settings for the plan document's field of view chart. Note that this does not affect the image in the database.

Rotate to match FoV. This setting toggles on and off. When on, the image will be rotated to match the orientation of the plan document's field of view chart. Note that this does not affect the image in the database.

Centre FoV chart at these coordinates. Centre the plan document's field of view chart at the point where the cursor was when you right-clicked.

Create new object at these coordinates. Create a new object in the plan document, with RA/Dec coordinates at the point where the cursor was when you right-clicked.

Mark object centre. This setting toggles on and off. When on, small red cross-hairs will mark the centre of the underlying object in the image. This might not be at the centre of the image itself.

Find Catalogue Objects. Searches your collection of catalogues and finds any objects that exist within the bounds of the displayed image. Once this has completed, you can move the cursor around inside the image and any known objects will be displayed in a help tag.

Find and Mark Catalogue Objects. Same as for ***Find Catalogue Objects***, but the objects are also marked with a red circle on the image.

Mark Catalogue Objects. If ***Find Catalogue Objects*** was previously used, the objects are marked with a red circle on the image.

Show Catalogue Entry. If the cursor is over a known object, a hierarchical list of catalogue entries is shown. Selecting one of them will open the relevant catalogue and display the object entry.

17.5 Image Manager

The image manager is a feature that allows you to examine the contents of your image database in a structured fashion. Access to the manager window is via the ***Image > Image Manager...*** menu command, and is also available via right-clicking any image being displayed from the database and choosing the ***Image Manager...*** entry.

The Image Manager window consists of a hierarchical list of images (in various subcategories) on the left side, and an image display area on the right side where any images you select are displayed.

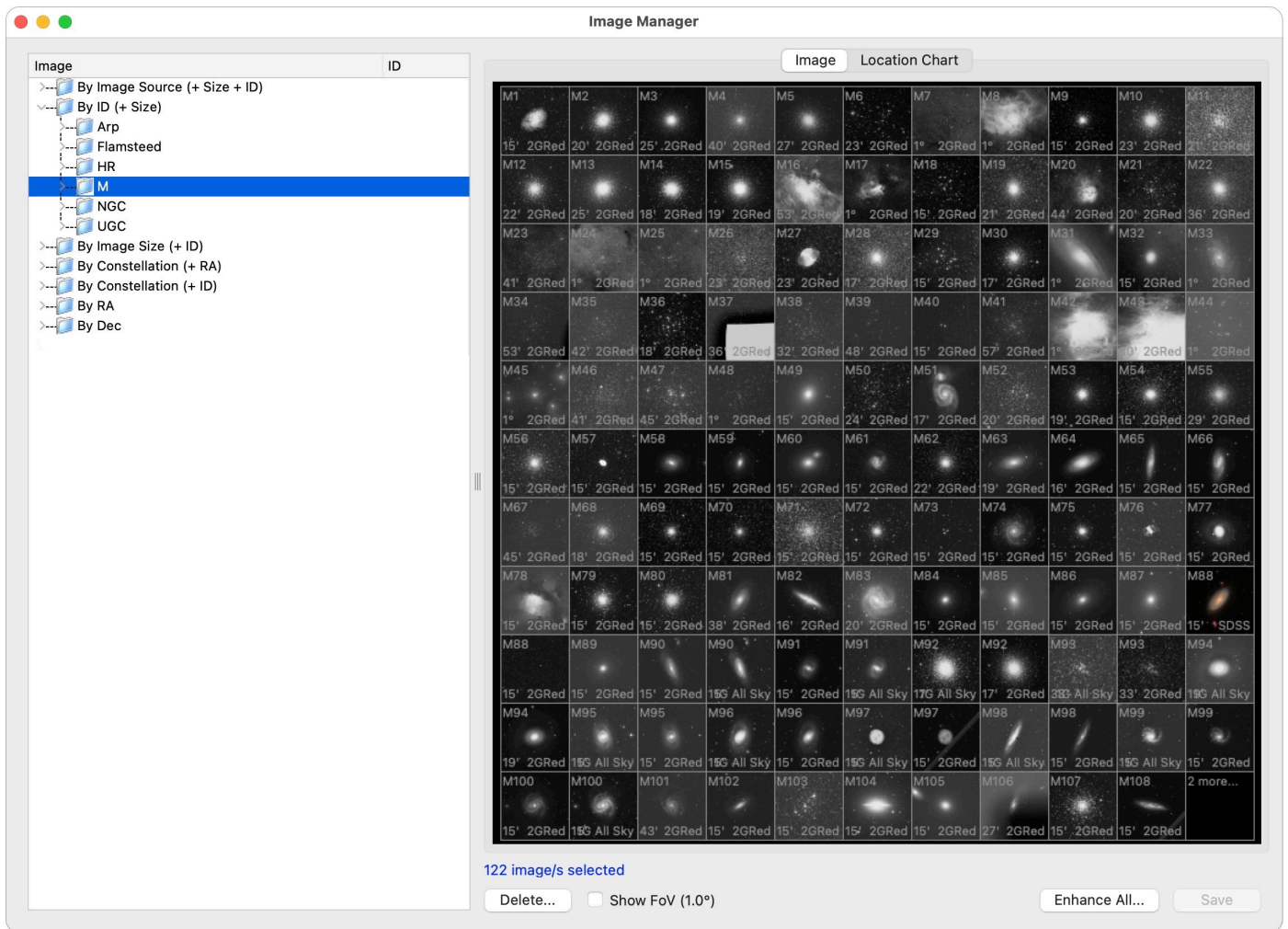


Figure 417: Image Manager window

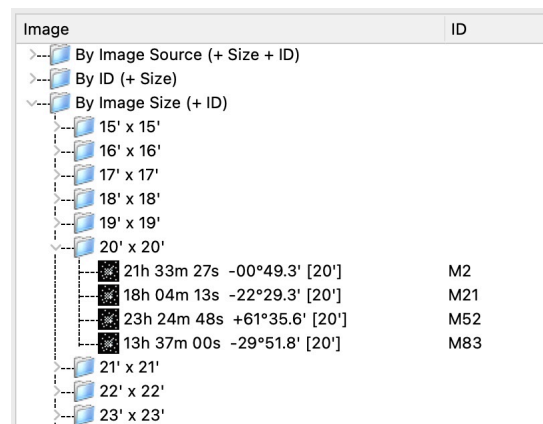


Figure 418: Hierarchical image list

The image list splits the database images into various categories:

- **By Image Source.** The source data set from where the image was downloaded (e.g. SDSS).
- **By ID.** The ID of the image object, where applicable (e.g. all Messier object images would be in the "M" category).

- **By Image Size.** Each different image size has a category (e.g. 15' X 15').
- **By Constellation.** Images are sorted into categories by constellation (e.g. Cepheus). These are either arranged by ID (within constellation) or by RA.
- **By RA.** Images are sorted into category by right ascension hour (i.e. 00h, 01h, ... ,23h).
- **By Dec.** Images are sorted into category by declination in 10° steps (i.e. -90° to -80°, ... , +80° to +90°).

Selecting a single image displays that image on the right side of the window. Selecting more than one image tiles the images. You can also select a category (a node in the hierarchy with a folder icon) and all images within that category will be displayed (with an upper limit of 120 images).

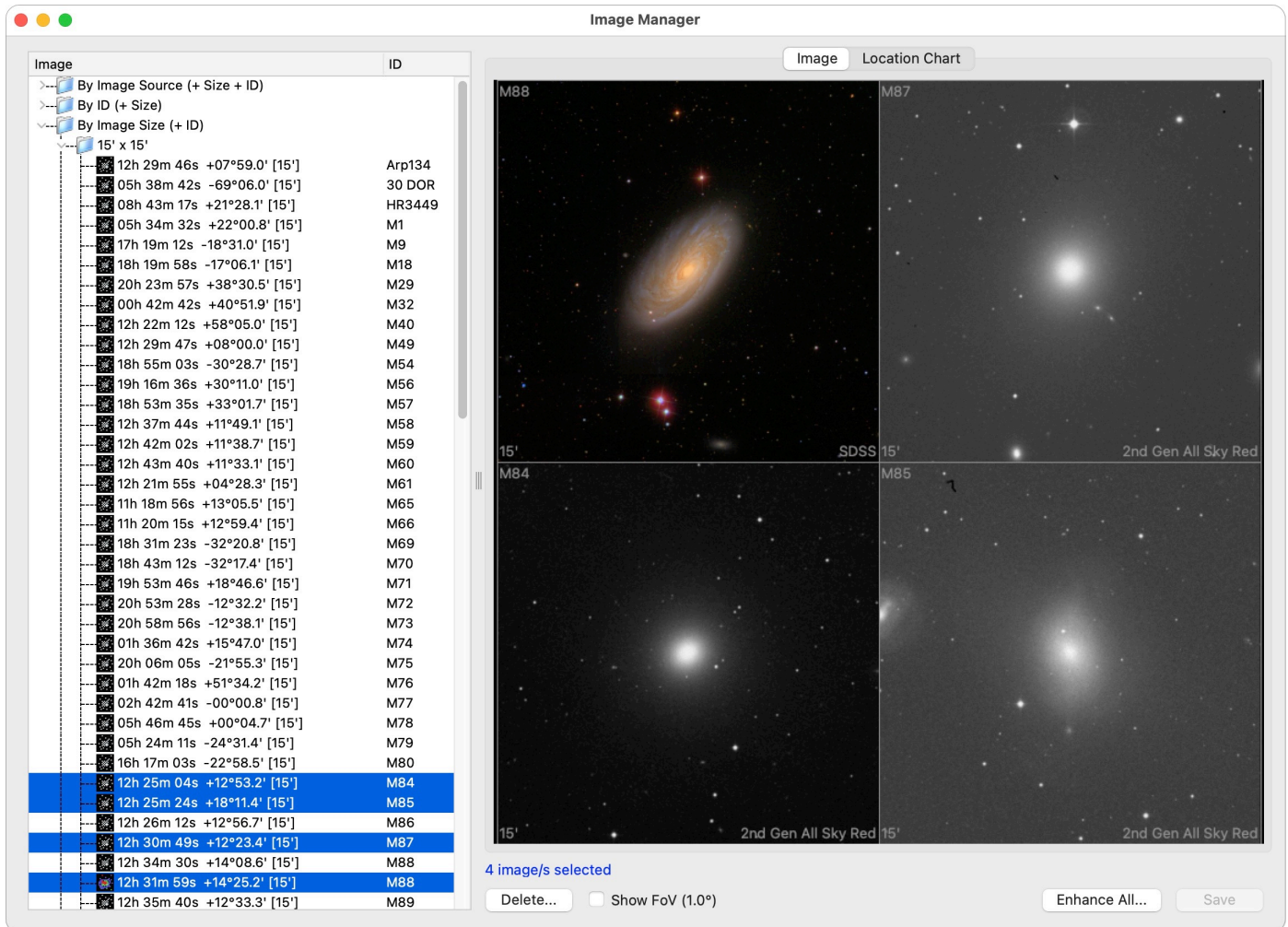


Figure 419: Image display

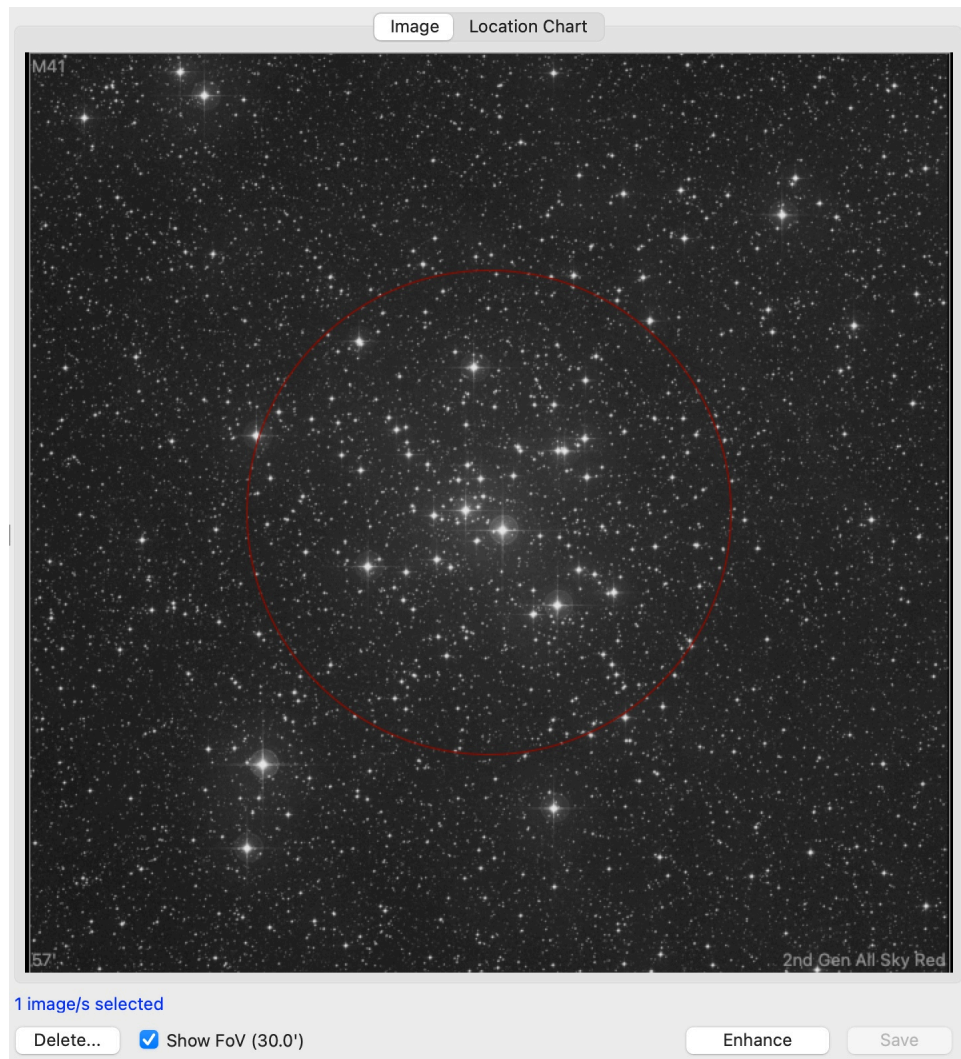


Figure 421: FoV on image

If the selected image is a User Image (one added via the **Image > Add User Image...** feature, see Section 11.7.24 on page 195), the an Edit... button appears under the image and the parameters of that user image can be changed.

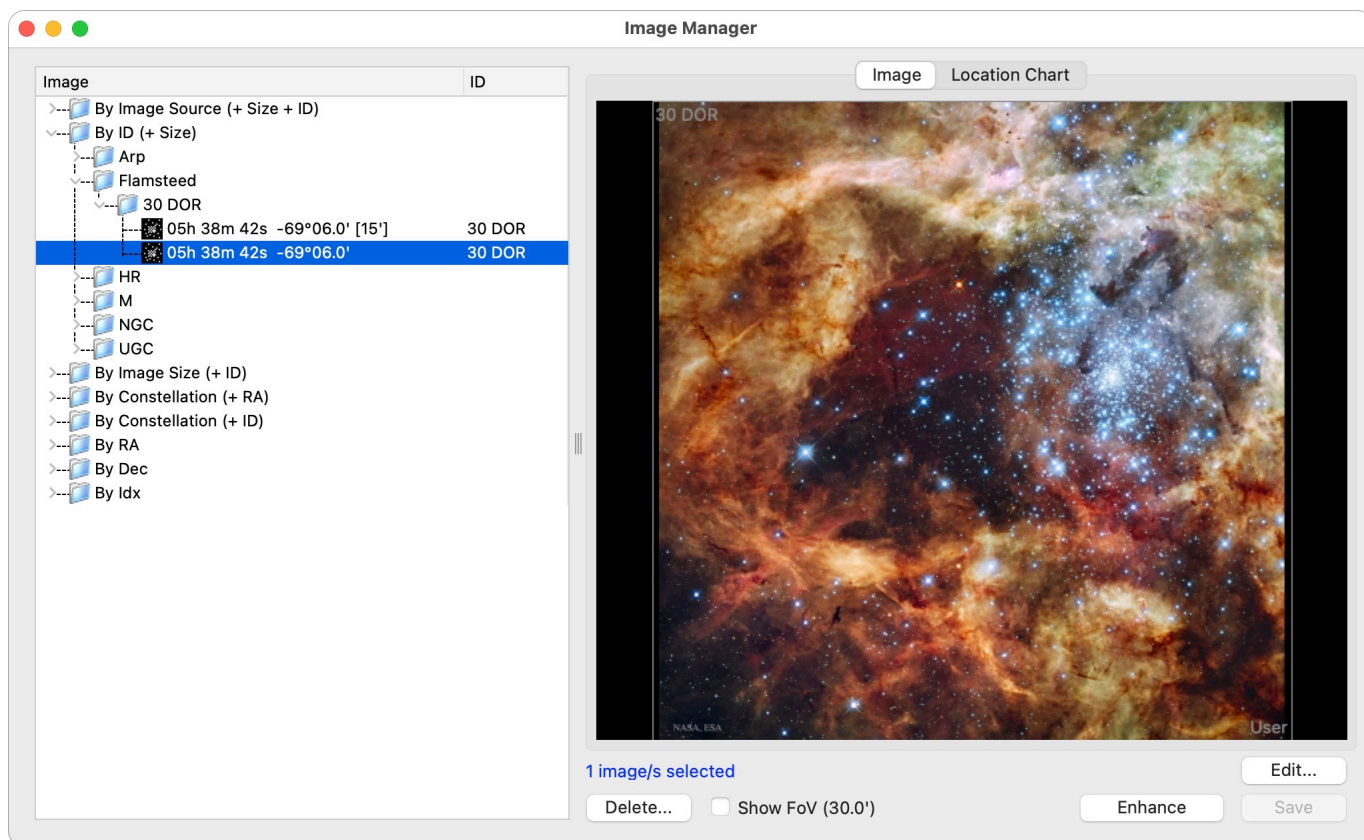


Figure 422: Editing a User Image (Edit... button)

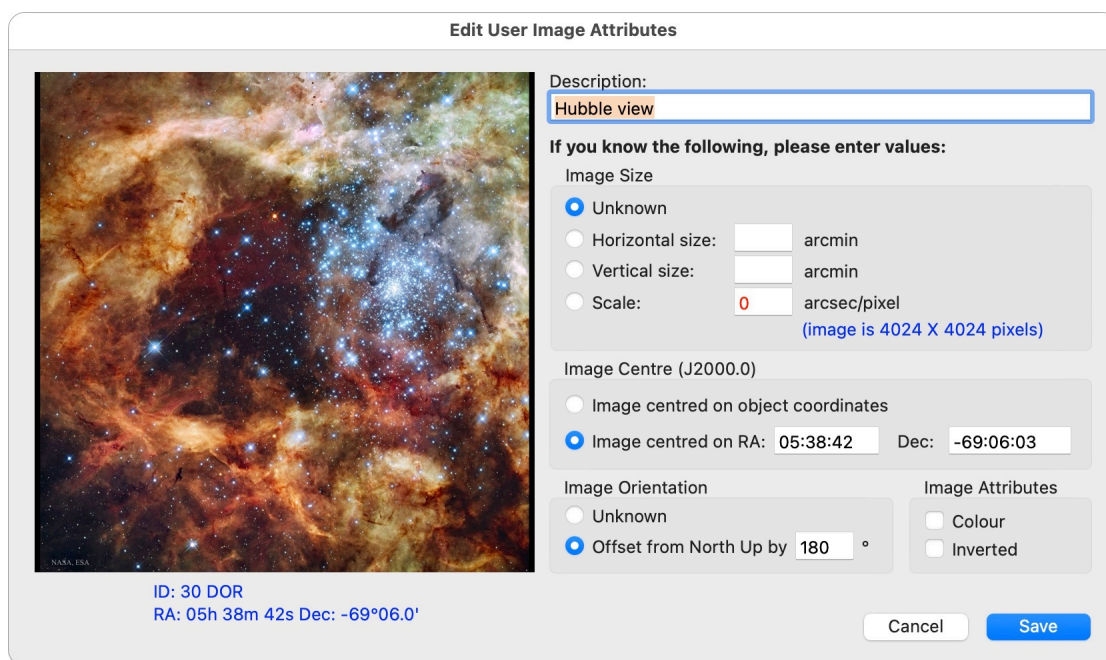


Figure 423: Editing a User Image

18 Highlighting & Associating list objects

18.1 Highlighting objects

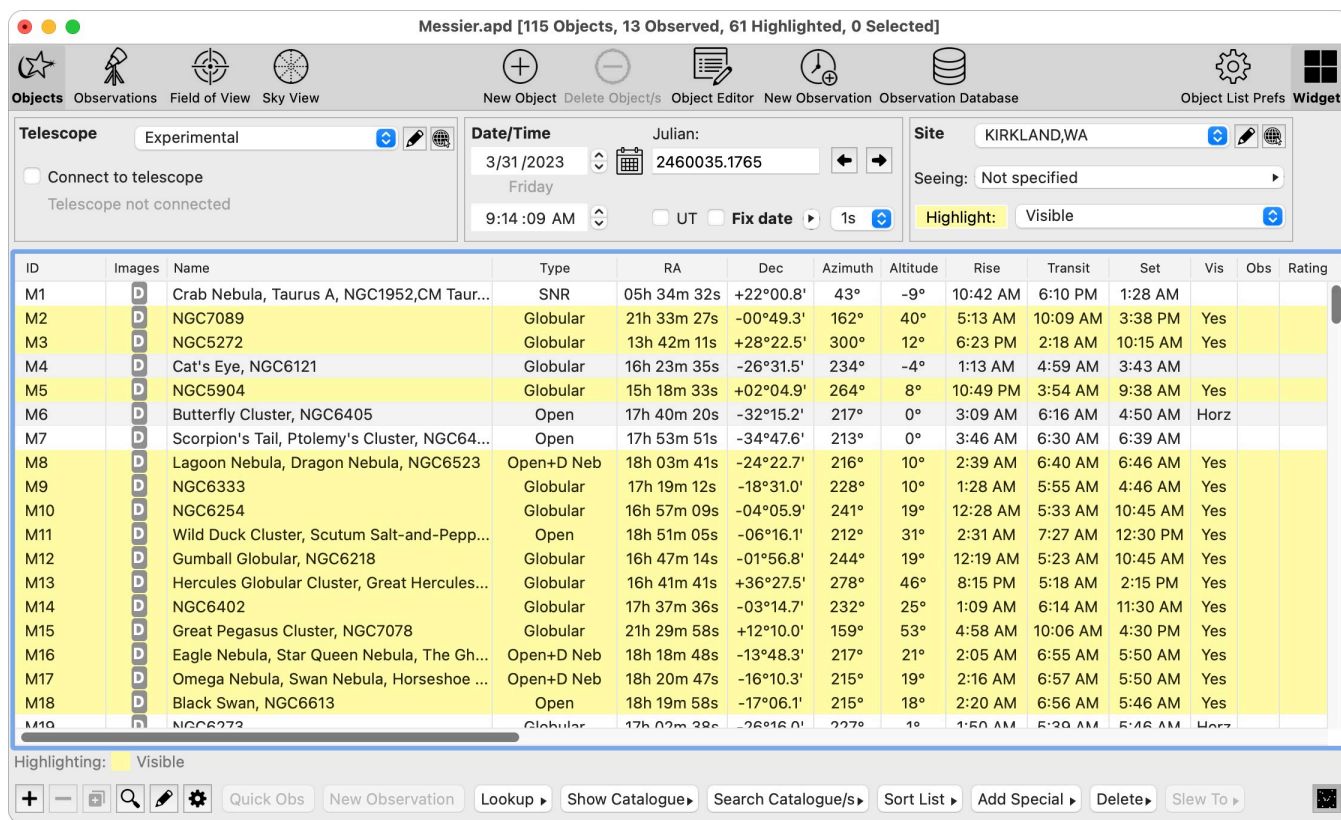
Highlighting is the act of changing the background colour of objects in the object list based on some rules. Note that this is different from the act of *selecting* one or more objects in the list using the mouse.

Many actions and scripts can operate on highlighted objects only. so this can be useful to narrow down objects to process.

Highlighting can change over time. For example, if the highlighting rule is true if the object is Visible, then the highlighting status will change if the object drops below or rises above the horizon.

18.1.1 Simple highlighting

There are some simple highlighting *scenarios* that cover most users' needs. You select the highlighting scenario via the **Highlight** popup in the Site widget. In Figure 424 the scenario is "Visible". This will highlight any object that is currently visible (i.e. the Vis column is "Yes").



The screenshot shows the Messier.apd software interface. The title bar indicates "Messier.apd [115 Objects, 13 Observed, 61 Highlighted, 0 Selected]". The interface includes a toolbar with icons for Objects, Observations, Field of View, Sky View, New Object, Delete Object/s, Object Editor, New Observation, Observation Database, Object List Prefs, and Widgets. The main panel displays a table of objects with columns: ID, Images, Name, Type, RA, Dec, Azimuth, Altitude, Rise, Transit, Set, Vis, Obs, and Rating. The 'Vis' column is highlighted in yellow for all objects, indicating they are currently visible. The 'Obs' column is empty for all objects. The 'Rating' column is also empty. The 'Highlight' dropdown menu is set to 'Visible'.

ID	Images	Name	Type	RA	Dec	Azimuth	Altitude	Rise	Transit	Set	Vis	Obs	Rating
M1	D	Crab Nebula, Taurus A, NGC1952,CM Taur...	SNR	05h 34m 32s	+22°00.8'	43°	-9°	10:42 AM	6:10 PM	1:28 AM			
M2	D	NGC7089	Globular	21h 33m 27s	-00°49.3'	162°	40°	5:13 AM	10:09 AM	3:38 PM	Yes		
M3	D	NGC5272	Globular	13h 42m 11s	+28°22.5'	300°	12°	6:23 PM	2:18 AM	10:15 AM	Yes		
M4	D	Cat's Eye, NGC6121	Globular	16h 23m 35s	-26°31.5'	234°	-4°	1:13 AM	4:59 AM	3:43 AM			
M5	D	NGC5904	Globular	15h 18m 33s	+02°04.9'	264°	8°	10:49 PM	3:54 AM	9:38 AM	Yes		
M6	D	Butterfly Cluster, NGC6405	Open	17h 40m 20s	-32°15.2'	217°	0°	3:09 AM	6:16 AM	4:50 AM	Horz		
M7	D	Scorpion's Tail, Ptolemy's Cluster, NGC64...	Open	17h 53m 51s	-34°47.6'	213°	0°	3:46 AM	6:30 AM	6:39 AM			
M8	D	Lagoon Nebula, Dragon Nebula, NGC6523	Open+D Neb	18h 03m 41s	-24°22.7'	216°	10°	2:39 AM	6:40 AM	6:46 AM	Yes		
M9	D	NGC6333	Globular	17h 19m 12s	-18°31.0'	228°	10°	1:28 AM	5:55 AM	4:46 AM	Yes		
M10	D	NGC6254	Globular	16h 57m 09s	-04°05.9'	241°	19°	12:28 AM	5:33 AM	10:45 AM	Yes		
M11	D	Wild Duck Cluster, Scutum Salt-and-Pepp...	Open	18h 51m 05s	-06°16.1'	212°	31°	2:31 AM	7:27 AM	12:30 PM	Yes		
M12	D	Gumball Globular, NGC6218	Globular	16h 47m 14s	-01°56.8'	244°	19°	12:19 AM	5:23 AM	10:45 AM	Yes		
M13	D	Hercules Globular Cluster, Great Hercules...	Globular	16h 41m 41s	+36°27.5'	278°	46°	8:15 PM	5:18 AM	2:15 PM	Yes		
M14	D	NGC6402	Globular	17h 37m 36s	-03°14.7'	232°	25°	1:09 AM	6:14 AM	11:30 AM	Yes		
M15	D	Great Pegasus Cluster, NGC7078	Globular	21h 29m 58s	+12°10.0'	159°	53°	4:58 AM	10:06 AM	4:30 PM	Yes		
M16	D	Eagle Nebula, Star Queen Nebula, The Gh...	Open+D Neb	18h 18m 48s	-13°48.3'	217°	21°	2:05 AM	6:55 AM	5:50 AM	Yes		
M17	D	Omega Nebula, Swan Nebula, Horseshoe ...	Open+D Neb	18h 20m 47s	-16°10.3'	215°	19°	2:16 AM	6:57 AM	5:50 AM	Yes		
M18	D	Black Swan, NGC6613	Open	18h 19m 58s	-17°06.1'	215°	18°	2:20 AM	6:56 AM	5:46 AM	Yes		
M19	D	NGC6723	Globular	17h 02m 38s	-26°16.0'	227°	1°	1:50 AM	5:39 AM	5:46 AM	Horz		

Figure 424: Simple highlighting

The available simple highlighting scenarios are:

- **Observed.** Highlighted if at least one observation of the object has been made previously (i.e. the Obs column value is greater than zero).

- **Not Observed.** Highlighted if no observations of the object have been made previously (i.e. the Obs column value is blank/zero).
- **Visible.** Highlighted if the object is currently visible (i.e. the Vis column is "Yes").
- **Not Visible.** Highlighted if the object is not currently visible (i.e. the Vis column is not "Yes").
- **Visible and not Observed.** Highlighted if the object is currently visible (i.e. the Vis column is "Yes") *and* no observations of the object have been made previously (i.e. the Obs column value is blank/zero).
- **Visible in Current Telescope.** Highlighted if a telescope is selected and if the object's magnitude is brighter than the limiting magnitude for that telescope (i.e. it is theoretically visible).
- **Not Visible in Current Telescope.** Highlighted if a telescope is selected and if the object's magnitude is dimmer than the limiting magnitude for that telescope (i.e. it is not theoretically visible).

You can change the default highlight background colour via the Object List preferences. See Section 20.6.9 on page 324.

18.1.2 Forced highlighting & unhighlighting

You can "force" an object to be highlighted if it is currently not highlighted. Similarly, you can "force" an object which is currently highlighted to be unhighlighted.

Use **Object > Highlight > Toggle Forced Highlighting/Unhighlighting** to change the status of selected object/s (or right-click and use **Toggle Forced Highlighting/Unhighlighting**).

You can also remove this "forced" status from selected objects. Use **Object > Highlight > Remove Any Forced Highlighting/Unhighlighting** (or right-click and use **Remove Any Forced Highlighting/Unhighlighting**).

The Forced status is represented by special colours. You can change those default background colours via the Object List preferences. See Section 20.6.9 on page 324.

18.1.3 Custom highlighting

For more complex highlighting situations, you can create your own custom highlighting scenarios.

A custom *scenario* consists of between one and four *rule sets*. Each rule set consists of a number of *rules*. For an object to be highlighted, at least one (or perhaps all) of the rule sets must be triggered. For a rule set to be triggered, the object must satisfy at least one (or perhaps all) of the rules in the rule set.

The various rules that are triggered are summarised underneath the object list in the Objects tab of the plan document window. If more than one rule set is triggered for an object, the object entry is striped with the relevant colours. For example, in Figure 425 two rule sets are active. The first, in yellow, is triggered if the object's altitude is greater than 30°. The second, in pink, is triggered if the ID starts with "M". M13 and M15 trigger both rule sets. The others trigger only the second rule set.

M13		Hercules Globular Cluster, Great Hercules...	Globular	16h 41m 41s	+36°27.5'	279°	44°
M14		NGC6402	Globular	17h 37m 36s	-03°14.7'	234°	24°
M15		Great Pegasus Cluster, NGC7078	Globular	21h 29m 58s	+12°10.0'	162°	53°
M16		Eagle Nebula, Star Queen Nebula, The Gh...	Open+D Neb	18h 18m 48s	-13°48.3'	219°	20°
M17		Omega Nebula, Swan Nebula, Horseshoe ...	Open+D Neb	18h 20m 47s	-16°10.3'	217°	18°
M18		Black Swan, NGC6613	Open	18h 19m 58s	-17°06.1'	217°	17°
M19		NGC6272	Globular	17h 02m 38s	-26°16.0'	228°	0°

Highlighting: Altitude Is greater than 30° ID Starts with "M"

Figure 425: Custom highlighting with multiple rule sets

To create or edit custom highlighting scenarios, choose **Edit Custom Highlighting...** from the Highlighting popup, or use **Object > Highlight > Edit Custom Highlighting...**

The editing dialog (Figure 426) edits various predefined scenarios you have created (in the list at the lower right of the dialog window). The Custom Default is always present and cannot be re-named. To create a new scenario, click the + button. To delete an existing scenario (apart from the Custom Default), use the - button. The scenario selected in the list is the one being edited. If you use the + button to create a new scenario, it will duplicate the settings of the currently selected scenario.

A scenario consists of one to four rule sets, listed along the top of the window. Use the radio button next to each rule set to choose that set for editing. The colour used for highlighting a particular rule set is shown and can be changed by clicking. A rule set is active only if it has one or more rules selected. In the example in Figure 426 only Rule Set #1 and #2 would be active.

You can specify an optional description for each rule set. That description is then used in the highlighting "legend" below the object list.

For each rule set you specify which (selected) rules are used to determine whether the rule set is triggered. The popup for this function can be:

- **All rules true.** Effectively a logical AND of all the selected rules (i.e. all selected rules must be *true* in order for the rule set to be *true*).
- **Any rule true.** Effectively a logical OR of all the selected rules (i.e. one or more of the selected rules must be *true* in order for the rule set to be *true*).
- **All rules false.** Effectively a logical NOR of all the selected rules (i.e. all selected rules must be *false* in order for the rule set to be *true*).
- **Any rule false.** Effectively a logical NAND of all the selected rules (i.e. one or more of the selected rules must be *false* in order for the rule set to be *true*).
- **Ignore all rules.** Effectively disables this rule set. Useful for temporarily disabling the rule set.

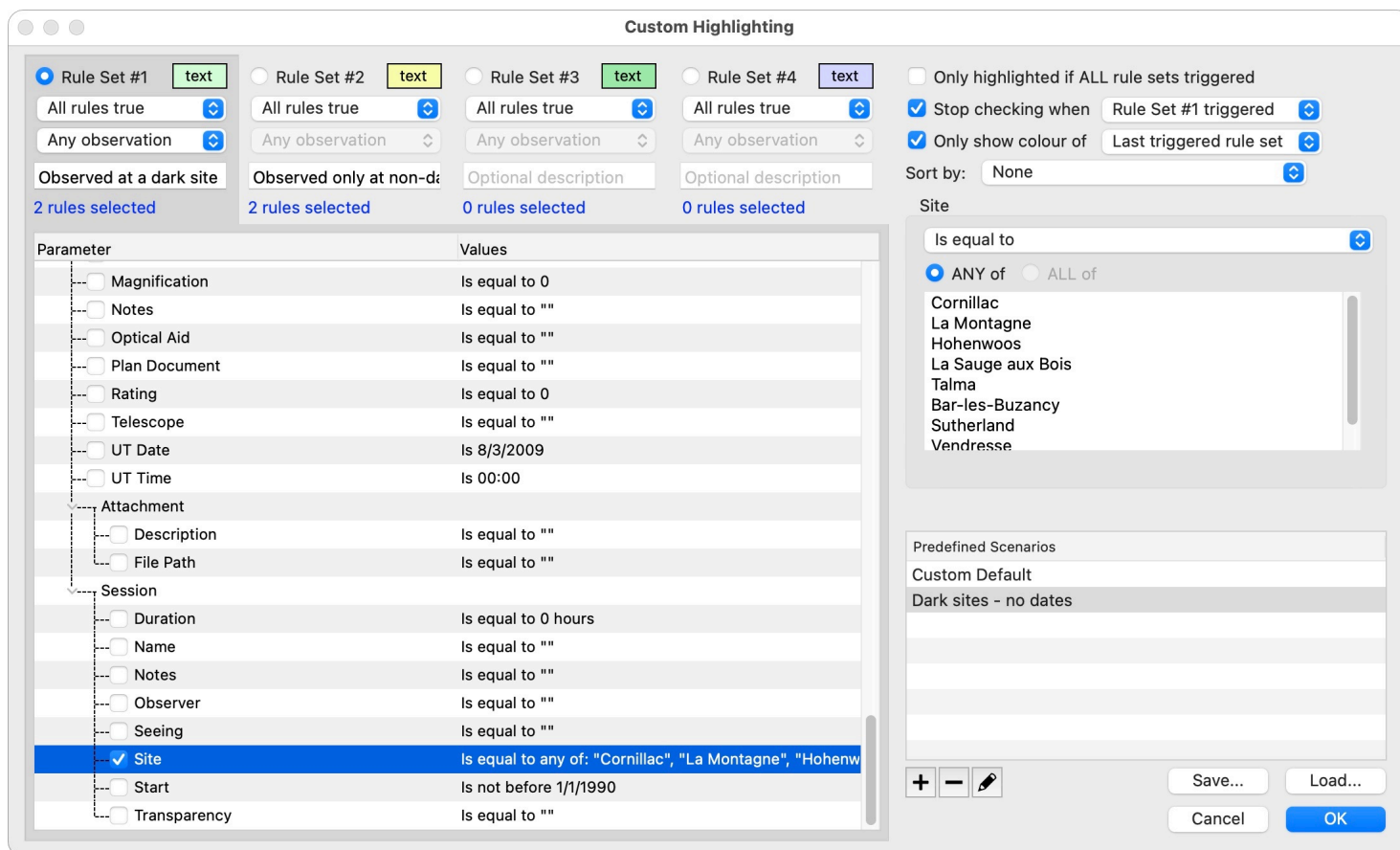


Figure 426: Custom highlighting editor dialog

If you specify a rule on an Observation, Observation attachment, or Observing Session, then for any object, each associated observation is considered. The popup at the top then specifies which observations the rule is applicable to:

- **Any observation.** The rule is true if any associated observation matches the rule condition.
- **All observations.** The rule is true if all associated observations match the rule condition.
- **Oldest observation.** The rule is true if the oldest associated observation matches the rule condition.
- **Latest observation.** The rule is true if the latest associated observation matches the rule condition.

For example, in Figure 427 highlighting of an object will occur only if (a) at least one observation was made of the object, (b) the object type is a Galaxy, and (c) at least one observation of that object was made using a Plössl eyepiece.

Editing of rules is done by selecting the rule in the hierarchical list at the lower left of the window. An editing pane for that rule appears on the right and allows editing of the conditional part of the rule.

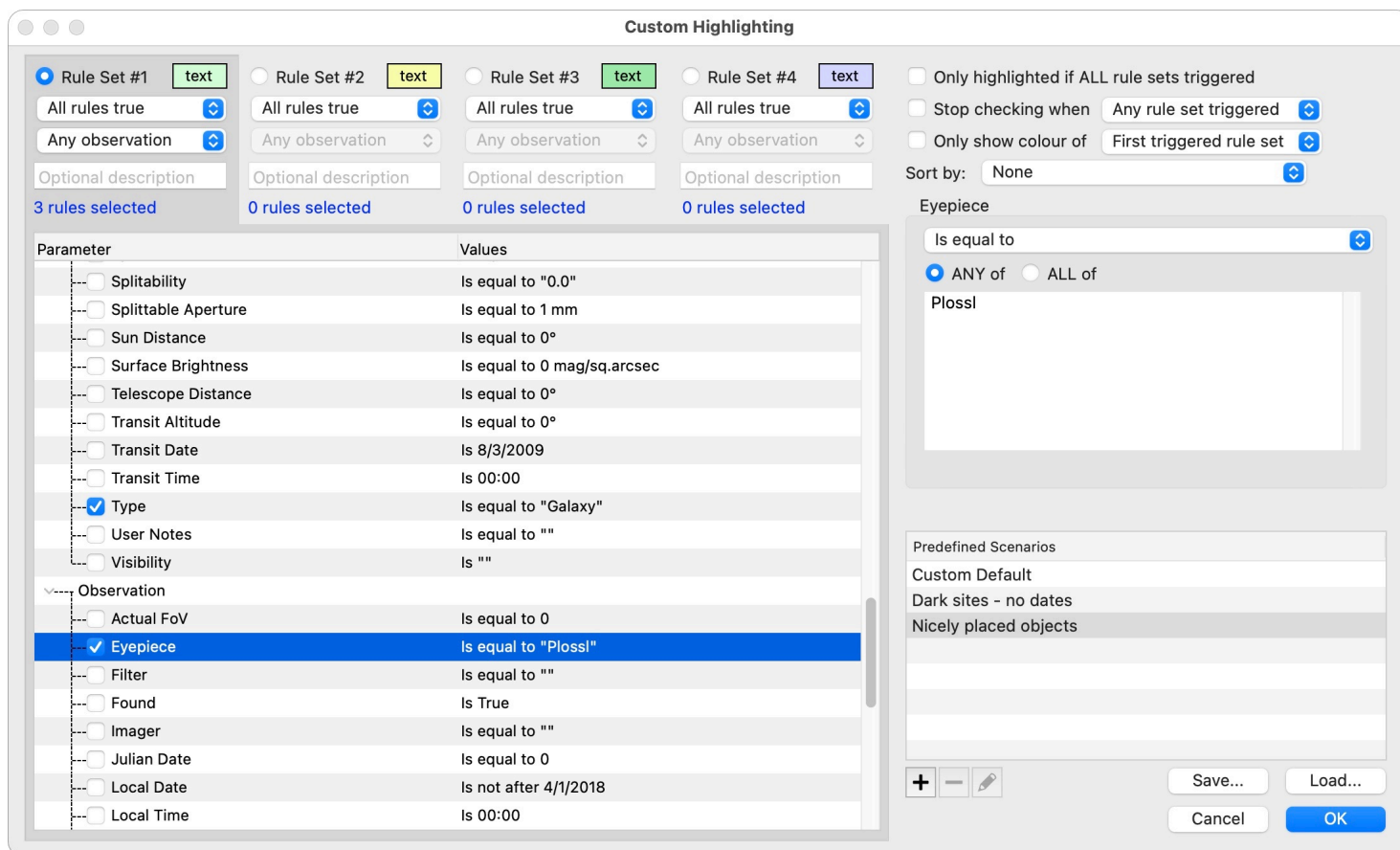


Figure 427: Custom highlighting with observation rule

Options at the top right are:

Only highlighted if ALL rule sets triggered. If this is unchecked (default), the highlighting will occur if *any* rule set is triggered. If it is checked then *all* (active) rule sets must be triggered for highlighting to occur.

Stop checking when rule set triggered. Stop the rule-testing as soon as the specified rule set is triggered.

Only show colour of first/last triggered set. If multiple rule sets were triggered, only show the colour for the first or last one triggered.

Sort by. Also sort the object list by the selected sort order when this scenario is selected for use. Sort orders are created using the **Sort List** popup under the object list (see Section 11.3.9 on page 120).

Saving and loading the contents of the custom rule sets can be done using the **Save...** and **Load...** buttons. This is convenient for transferring custom scenarios between plan documents.

18.2 Associating objects

Sometimes it is convenient to associate two or more objects as being, say, part of a larger entity or *association*. For example, you might want to associate a number of galaxy objects as being part of a cluster (e.g. Virgo cluster). When these objects are associated they should always remain together in the object list, in the same original order, regardless of the sort ordering of the rest of the object list.

If a sort order is chosen for the list, then the objects will be not be sorted within the association, but will be ordered within the whole object list by the first object in the association.

For example, Figure 428 shows a number of associated galaxies (M58, 59, 60, 84, 86, 87, 89, and 90) that have been associated. The list has been sorted by Declination, but the associated galaxies stay in ID order within the association.

ID	Object	Type	RA	Dec	Mag	Filter
NGC6809		Globular	19h 40m 00s	-30°57.7'	222°	-1°
M54	NGC6715	Globular	18h 55m 03s	-30°28.7'	230°	-6°
M62	Flickering Globular, NGC6266	Globular	17h 01m 13s	-30°06.7'	249°	-22°
M83	Southern Pinwheel Galaxy, NGC5236	Galaxy	13h 37m 00s	-29°51.8'	287°	-56°
M68	NGC4590	Globular	12h 39m 28s	-26°44.5'	310°	-62°
M4	Cat's Eye, NGC6121	Globular	16h 23m 35s	-26°31.5'	258°	-26°
M19	NGC6273	Globular	17h 02m 38s	-26°16.0'	252°	-19°
M28	NGC6626	Globular	18h 24m 33s	-24°52.1'	239°	-6°

Figure 428: Associated objects

Associated objects are displayed with connecting lines on the left side of the ID column.

You initially **create** an association by selecting two or more objects in the object list. Then associate them by choosing **Object > Associate > Associate Selected Objects** (or right-clicking and choosing **Associate selected objects**).

You can **add** additional objects to the association by dragging the entry in the object list onto the objects currently associated.

You can **reorder** the objects within the association by dragging the member objects up or down with the mouse.

To **remove** one or more objects from an association, use one of these methods:

- Drag the object/s to a point outside of the association.
- Select the object/s and use **Object > Associate > Disassociate Selected Object/s**.
- Select the object/s, right-click and use **Disassociate selected object/s**.

Object associations are stored with the object data in the plan document.

19 User-defined fields

For many items that are handled by the application, you can add your own user-defined fields. In particular, you can define user-defined fields for:

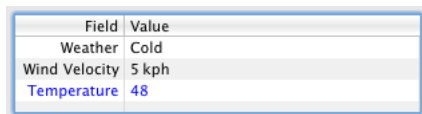
- Objects
- Observations
- Observation sessions
- Observation attachments
- Resources
- Plan documents

All of these user-defined fields are globally applicable to the items for which they are defined, apart from the Object user-defined fields, which are local to the plan document in which they are defined.

There is no limit to the number of user-defined fields you can define (within reason).

Some examples: you might want to add a Weight field to Telescope resources, a Quantum Efficiency field to Imager resources, a Weather or Temperature field to observation sessions, etc.

The fields are typically displayed in a two-column list (Figure 429). You can edit the values by clicking on the entry in the right-hand column.



Field	Value
Weather	Cold
Wind Velocity	5 kph
Temperature	48

Figure 429: User-defined field list

19.1 Field values vs. field definitions

Each user-defined field entry or *value* attached to an item has two parts: a field name and a corresponding value (e.g. "Temperature" and "48"). Both are stored as strings.

Additionally, there should also be a user-defined field *definition* corresponding to the field name. This definition contains information pertaining to then type of the field (number, string, etc.), how the field value should be displayed, units, range of valid values, etc.

You can delete a field definition without deleting the underlying values. In this case, the entries will be displayed in a blue colour (e.g. Temperature in Figure 429) and will be treated as simple character strings (i.e. no range checking, etc. will be done if the value is edited).

19.2 Field types

Each user-defined field is defined to be one of several possible types.


Field	Value
Boolean	<input checked="" type="checkbox"/>
Character String	Hello world!
Choice	2nd
Colour	
Date	3/31/2023
Time	4:34:23 PM
Date/Time	3/31/2023 4:34:27 PM
File Reference	hp16c.pdf Open
Floating-Point	23.7 °C
Folder Reference	Desktop Reveal
Integer	4712
URL	https://astroplanner.net Show

Figure 430: User-defined field types

19.2.1 Boolean value

This is a field that can only have two states: on/off, yes/no, true/false, etc. A checkbox is displayed in the value column.

19.2.2 Character string

This is the default. Any string of characters is valid.

19.2.3 Choice

Choose one of several fixed values. e.g. an "OTA" field for telescope resources might have the choices: "Metal tube", "Truss", "Carbon fibre tube", "Cardboard tube". The values are selected by a popup menu containing the choices.

19.2.4 Colour

A particular colour, displayed as a small coloured square in the value field. Clicking the value field brings up a colour picker that lets you select a colour.

19.2.5 Date/Time

A date/time value. Can be date-only, time-only, or both.

19.2.6 File reference

A reference to a file on your hard disk. Clicking the value field allows you to select a file. The file name is displayed, and an Open button shown. Clicking that button will open the file with an appropriate application.

19.2.7 Floating-point number

A floating-point number. You can specify range of valid values, decimal places to display, etc.

19.2.8 Folder reference

A reference to a folder on your hard disk. Clicking the value field allows you to select a folder. The folder name is displayed, and an Reveal button shown. Clicking that button will reveal the folder in the Finder (Mac) or Windows Explorer (Windows).

19.2.9 Integer number

An integer number. You can specify range of valid values, etc.

19.2.10 Internet URL

A valid URL can be put in this field. A Show button is displayed. Clicking Show will load the page into your browser.

19.2.11 Script

The value is computed by means of a script.

19.3 Creating and editing a user-defined field

Right-click the user-defined field list and choose **Edit User-defined Fields...**. The user-defined field editor (See Figure 432 for example) has a list of fields on the left. Click the **+** button to create a new user-field definition. Give the field a *title* (this appears on the left side of the user-defined field list), and choose a field *type*. Different types might have additional fields.

You can select a non-standard text colour and background colour, by using the colour checkboxes and clicking the colour swatches to choose an appropriate colour. You can also specify the style of the displayed text (**bold**, *italic* and/or underline).

If you want a tooltip to appear when you hover the mouse cursor over the field, you can enter it here. This might be useful as a memory device if the field can contain certain values.

The **Load...** and **Save...** buttons allow you transfer the set of definitions between computers, or between plan documents (plan documents each define their own set of user-defined fields).

19.3.1 Boolean value

In addition to the common fields, you need to specify the following:

- **Text.** This is the text that appears in, for example, the object list to show the value of the field. e.g. Yes/No, True/False, On/Off, etc. Note that if the value has not yet been selected (see below), the displayed text will be blank.
- **First click.** If the value of a boolean user-defined field has not yet been set, the checkbox is shown in an "indeterminate" state. To enter a value, you click the checkbox. The first time you do that, this setting determines which state the checkbox takes on.

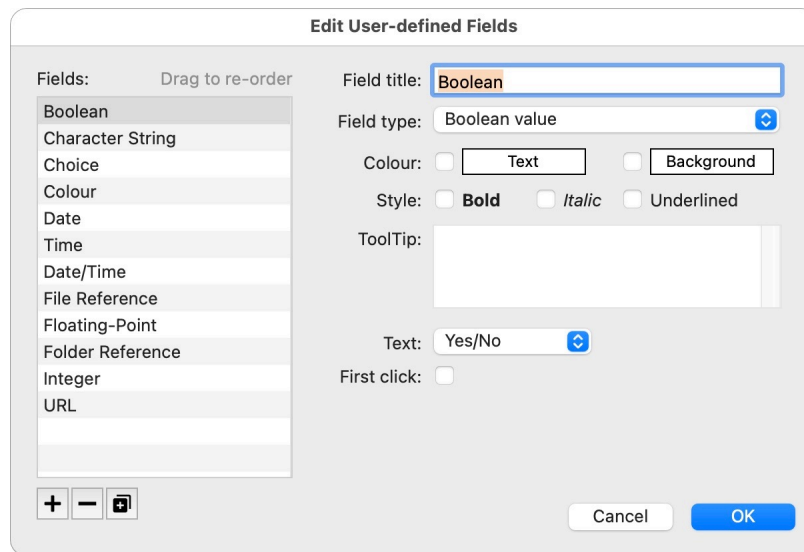


Figure 431: Edit boolean user-defined field

19.3.2 Character string

There are no additional values to enter here.

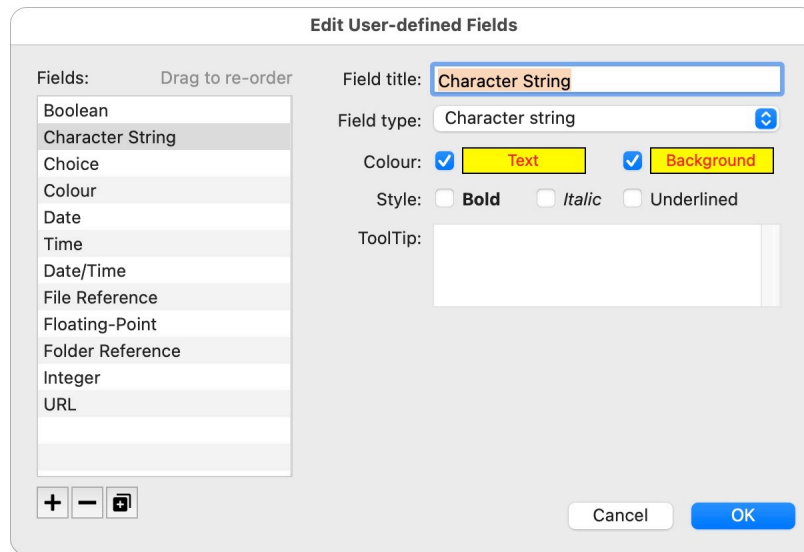


Figure 432: Edit character string user-defined field

19.3.3 Choice

In addition to the common fields, you need to specify the following:

- **Choices.** These are the values that will appear in the popup menu, one choice per line.

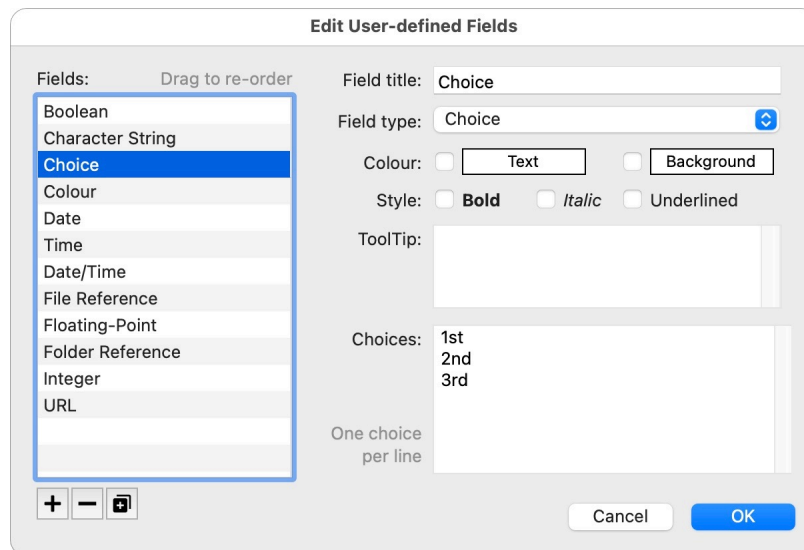


Figure 433: Edit choice user-defined field

19.3.4 Choice

In addition to the common fields, you need to specify the following:

- **Choices.** These are the values that will appear in the popup menu, one choice per line.

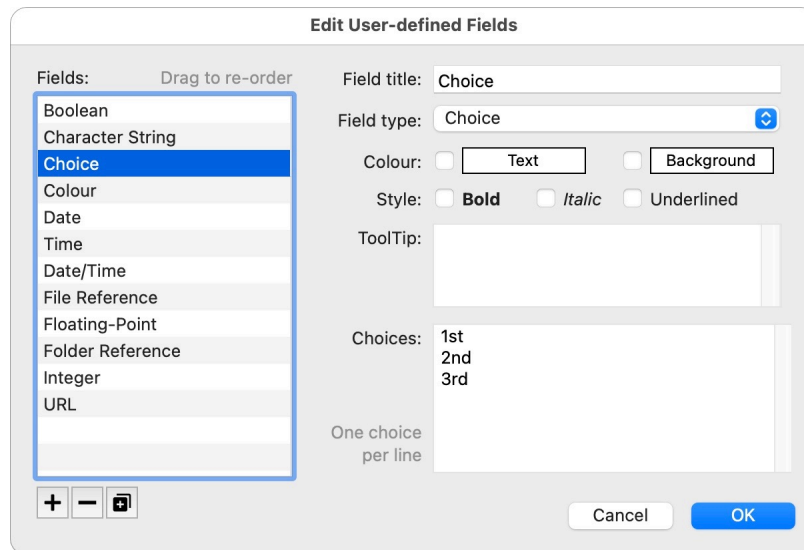


Figure 434: Edit choice user-defined field

19.3.5 Colour

There are no additional values to enter here.

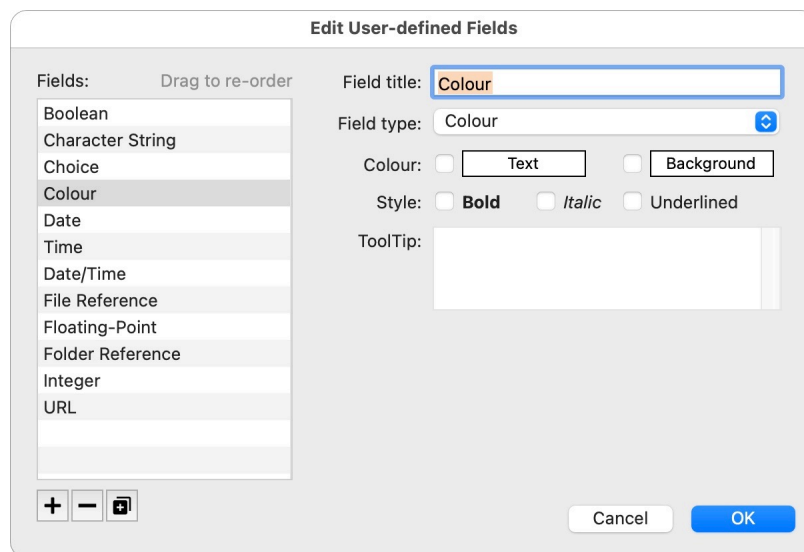


Figure 435: Edit colour user-defined field

19.3.6 Date/Time

In addition to the common fields, you need to specify the following:

- **Date type.** Specify whether you are collecting just a date, just the time, or both.

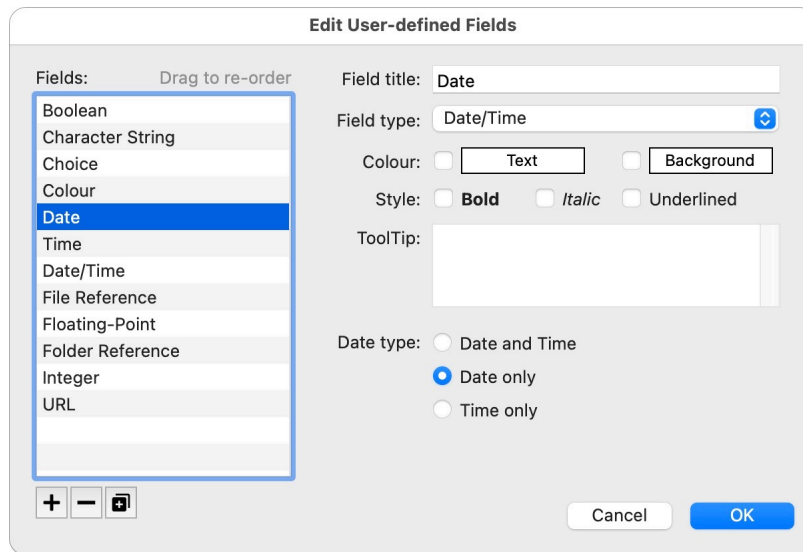


Figure 436: Edit date/time user-defined field

19.3.7 File reference

There are no additional values to enter here.

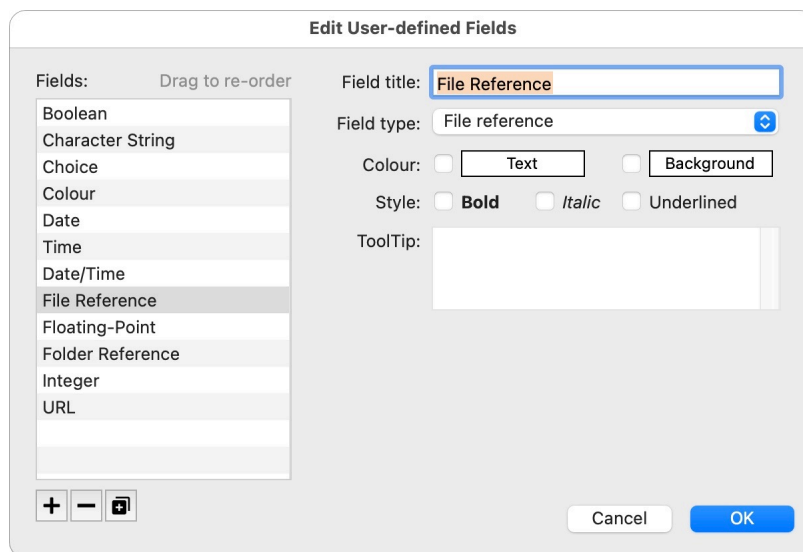


Figure 437: Edit file reference user-defined field

19.3.8 Floating-point number

In addition to the common fields, you need to specify the following:

- **Units.** If your numbers have units (e.g. °F, kph, arcsec, etc.) then this string will be displayed after the number in the list. It will not appear when you edit the number value however.
- **Decimals.** The number of decimal places to display after the decimal point. A negative number specifies the *maximum* number of decimal places. e.g. if Decimals = 3 and the value is 123.4, then 123.400 will be displayed. If Decimals = -3 and the value is 123.4, then 123.4 will be displayed.
- **Range.** You can specify lower and/or upper bounds for the numbers you enter. If the numbers are outside these bounds, they will be displayed in red.

The dialog box is titled "Edit User-defined Fields". On the left, a list of field types is shown: Boolean, Character String, Choice, Colour, Date, Time, Date/Time, File Reference, Floating-Point (highlighted), Folder Reference, Integer, and URL. Below this list are buttons for adding (+), removing (-), and resetting (circular arrow). On the right, the "Field title" is "Floating-Point" and the "Field type" is "Floating-point number". There are checkboxes for "Colour" (Text and Background), "Style" (Bold, Italic, Underlined), and "ToolTip". The "Units" field is "°C" and "Decimals*" is "-1". The "Range" is set from "-50" to "100" with checkboxes, and a note says "Valid: Between -50 and 100". A footnote states "* positive for exact places, negative for maximum places." At the bottom right are "Cancel" and "OK" buttons.

Figure 438: Edit floating-point number user-defined field

19.3.9 Folder reference

There are no additional values to enter here.

The dialog box is titled "Edit User-defined Fields". On the left, the same list of field types is shown, but "Folder Reference" is now highlighted. On the right, the "Field title" is "Folder Reference" and the "Field type" is "Folder reference". The "Colour" and "Style" options are the same as in Figure 438. The "ToolTip" field is empty. At the bottom right are "Cancel" and "OK" buttons.

Figure 439: Edit folder reference user-defined field

19.3.10 Integer number

In addition to the common fields, you need to specify the following:

- **Units.** If your numbers have units (e.g. °F, kph, days, etc.) then this string will be displayed after the number in the list. It will not appear when you edit the number value however.
- **Range.** You can specify lower and/or upper bounds for the numbers you enter. If the numbers are outside these bounds, they will be displayed in red.

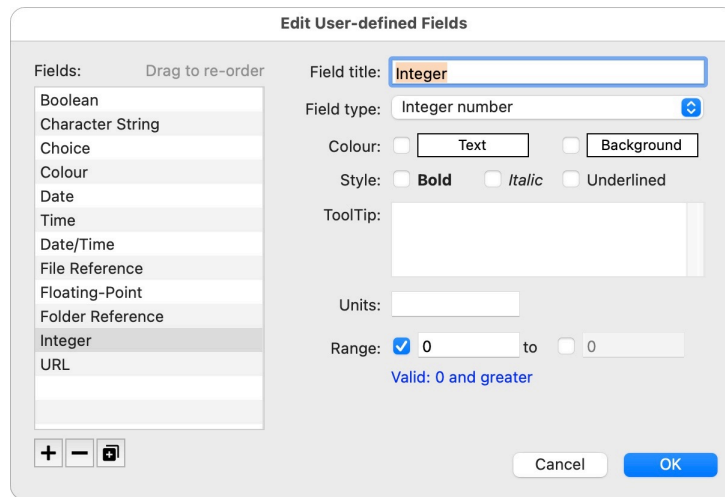


Figure 440: Edit integer number user-defined field

19.3.11 Internet URL

There are no additional values to enter here.

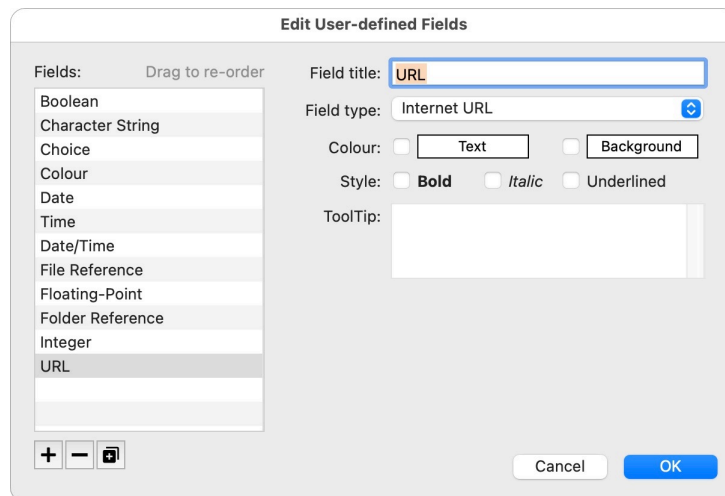


Figure 441: Edit Internet URL user-defined field

19.4 Deleting a user-defined field & values

A user-defined field definition can be deleted from the editor dialog as shown above. Although the definition is then deleted, the underlying values are not automatically deleted. If such values exist, they will be displayed in a blue colour after any fields with corresponding definitions. You can delete the values by right-clicking and using **Delete xxx value** or **Delete all xxx values**, where xxx is the user-defined field name.

19.5 Object list user-defined fields

Right-clicking the object list user-defined fields listbox shows **Show Column: xxxx** or **Hide Column: xxxx** (for defined fields xxxx). Selecting one of these toggles the column's visibility in the object list. Note that it doesn't change the position of the column - to do that you'll still need to go to **Edit > List Columns...**

20 Preferences

20.1 General preferences

General preferences refer to settings that do not fall into any specific area covered by the other preferences listed below. They are accessed by the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), and selecting the **General** tab.

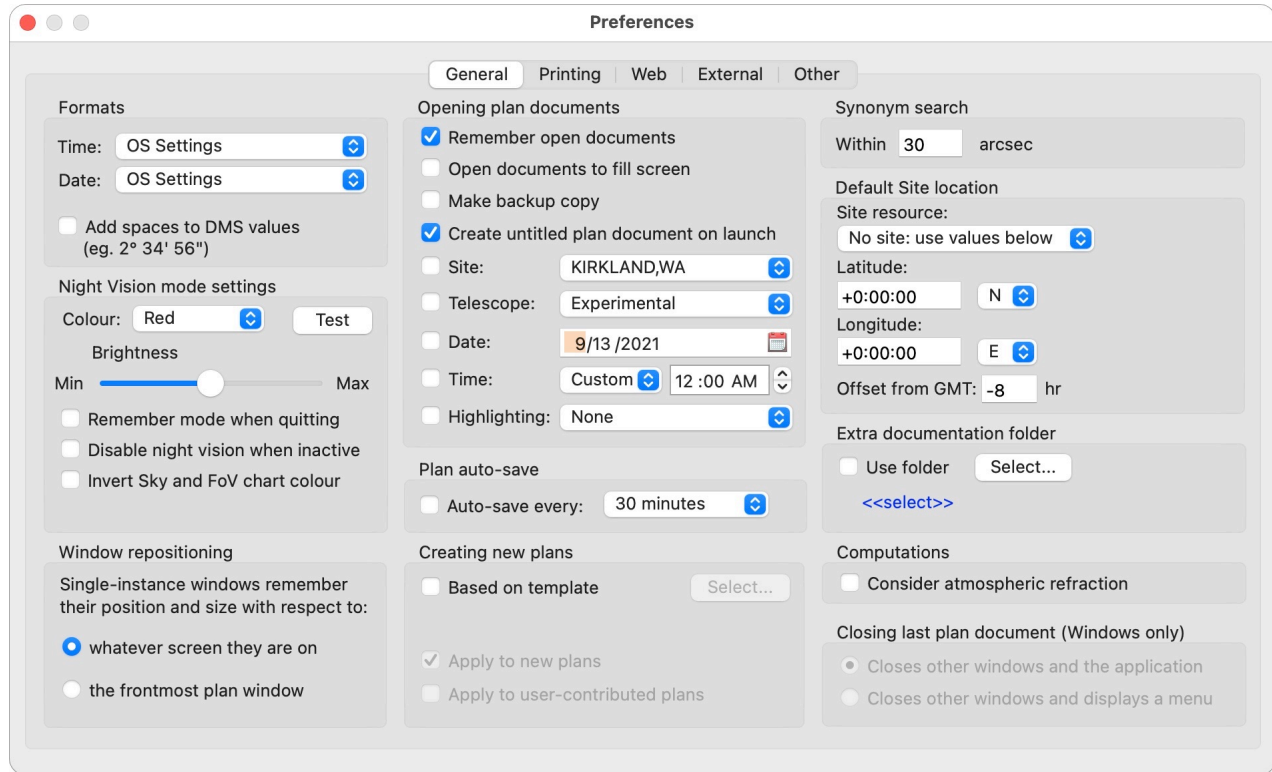


Figure 442: General preferences

20.1.1 Formats

Time. The default time display format. If you choose OS Settings then time will be displayed the same way as it is set in your operating system Date/Time control panel or System Preferences. Other you can set the application to force a 24 hour clock (i.e. 3:15pm would be displayed as 15:15).

Date. The default date display format. If you choose OS Settings then dates will be displayed the same way as it is set in your operating system Date/Time control panel or System Preferences. Other you can set the application to force various date formats.

Add spaces to DMS values. When angular values are displayed, they are typically displayed without spaces (e.g. 123°45'12"). If this option is selected, spaces are added for readability (e.g. 123° 45' 12").

20.1.2 Night Vision mode settings

Colour. The fundamental colour to use. Red (traditional), Green (preferred by some since green is more visible at low light intensities than red), and Grey.

Brightness. This slider changes the maximum colour intensity.

Remember mode when quitting. Remember if you were in night vision mode when you quit, and re-instate that mode next time you run AstroPlanner.

Disable night vision when inactive. Disable night vision when another application is brought to the front.

Invert Sky and FoV chart colour. Change the Sky and Field of View charts to display black stars on a red/green/grey background.

Also attempt gamma colour control. *Windows only.* It is theoretically possible to adjust the video gamma to display tones of red/green/grey on Windows. In reality, only some Windows graphics cards allow this, and even then it's not particularly effective. Try this option and see what happens.

Test. Tests the night vision mode for 5 seconds and then switches back to normal (in case you can't see what you're doing when everything goes dim).

20.1.3 Window repositioning

Single-instance windows (i.e. dialogs and windows that only ever have one instance open) remember where they were previously opened on the screen or screens, and their previous size. You can choose here whether the position is always the same (at the same position on the same screen), or relative to the frontmost (active) plan document window. The latter setting might be useful if you have more than one plan document open on multiple screens.

20.1.4 Opening plan documents

Remember open documents. If any (non-untitled) plan documents are open when you quit AstroPlanner, then this option makes sure they are remembered, and next time you run the AstroPlanner application those documents will be re-opened automatically (assuming they were not subsequently moved or deleted).

Note: (*Windows only*) If you close the last plan document and that in turn closes the application, that last plan document will be remembered.

Open documents to fill screen. Normally, the size and position of plan document windows are remembered when they are closed and restored when the document is reopened. This setting will always open a document to fill the screen.

Make backup copy. Whenever you open a document, a backup copy is made in the same folder as the original, but with "_Backup" appended to the name. If such a file already exists it will be overwritten. This is useful if you make changes to the document, and then decide you didn't want to do that.

Create untitled plan document on launch. (*Macintosh only*) The normal behaviour when an application is started is to open an untitled, empty document if no other documents were opened. This option allows you to disable that behaviour and not create an empty document.

Site. If this option is selected then whenever a plan document is opened, the Site will be set to the selected value (overriding whatever value was previously saved with the document).

Telescope. If this option is selected then whenever a plan document is opened, the Telescope will be set to the selected value (overriding whatever value was previously saved with the document).

Date. If this option is selected then whenever a plan document is opened, the date will be set/fixed to the selected value (overriding whatever value was previously saved with the document).

Time. If this option is selected then whenever a plan document is opened, the time will be set/fixed to the selected value (overriding whatever value was previously saved with the document). This can be either a custom value (e.g. 12:00am), or you can pick from the drop-down menu (e.g. evening astronomical twilight end).

Highlighting. If this option is selected then whenever a plan document is opened, the highlighting will be set to the selected value (overriding whatever value was previously saved with the document).

20.1.5 Plan auto-save

Automatically save the open plan document to disk periodically (if any changes have been made).

20.1.6 Creating new plans

Normally a new untitled plan document is opened with default settings. You can use the **Based on template** option to base the new document on the settings found in an existing plan document (which you specify). Settings include object list column settings, field of view and sky chart settings, etc. You can apply this template to new plans, and/or downloaded user-contributed plans.

20.1.7 Synonym search

When you do synonym searches (e.g. *Object > Search > Lookup Synonyms...*), this setting specifies how close a plan object needs to be from a catalogue object (in arcseconds) for those objects to be considered (potential) synonyms.

20.1.8 Default site location

If you don't set the Site for a plan document, this setting specifies a default site to use (to compute visibility of objects, etc.). You can select an existing site resource, or you can select "*No site. Use values below*" and enter the latitude, longitude and GMT offset manually.

20.1.9 Extra documentation folder

If you have extra documentation (HTML and PDF documents) that you might access while using AstroPlanner, you can use this option to define a folder that contains those documents. Any relevant documents found in that folder will be added to the end of the *Help* menu.

20.1.10 Computations

Consider atmospheric refraction. Take into account the effects of atmospheric refraction when computing object altitude above the horizon. This can increase the amount of computation needed, but gives better results for objects close to the horizon.

20.1.11 Closing last plan document

(*Windows only*) What to do when you close the only remaining plan document window. Typically this will cause the application to quit, but another option is to display an empty background window with a menu that allows you to open another plan document without quitting.

20.2 Printing preferences

Printing preferences are settings applicable to any printing done from AstroPlanner. They are accessed by the *AstroPlanner > Preferences* menu command (Macintosh) or *Edit > Preferences* menu command (Windows), and selecting the *Printing* tab.

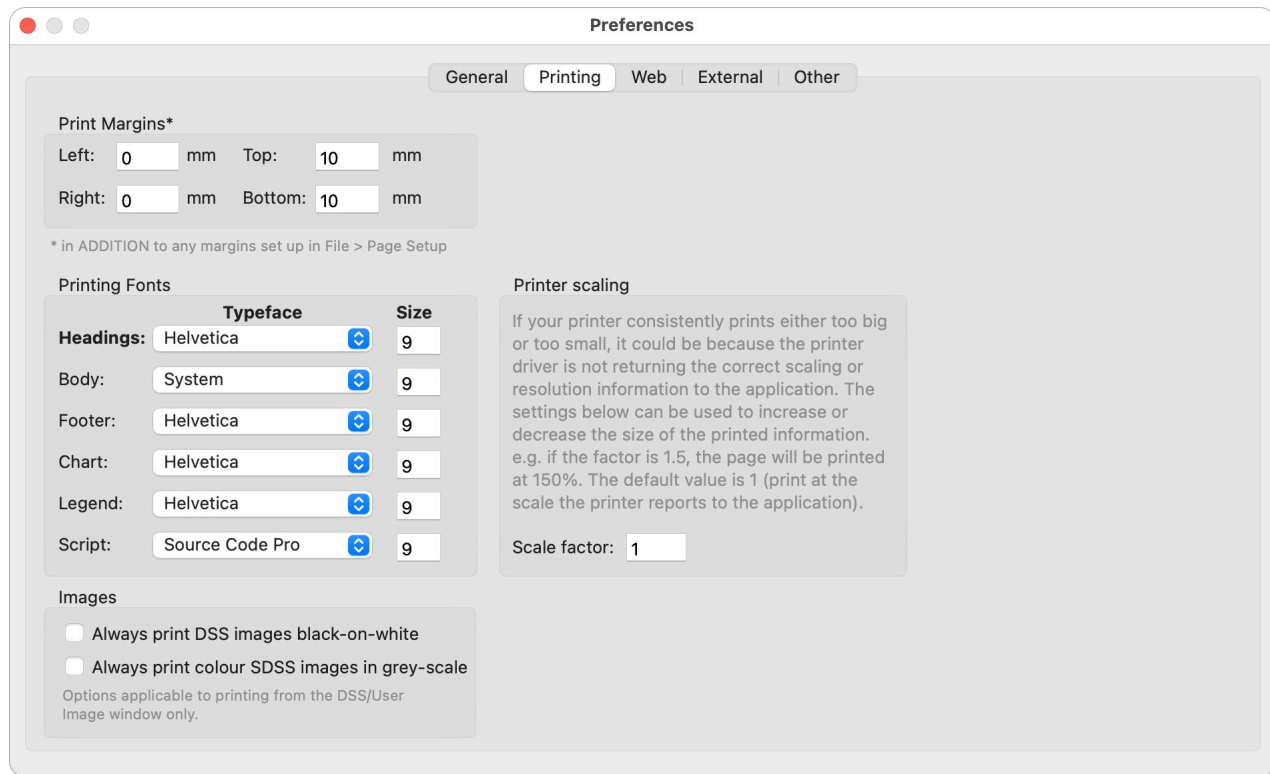


Figure 443: Printing preferences

20.2.1 Print margins

These represent margins (measured in mm) to be used on each printed page. Note that these margins are in addition to any margins you define in **File > Page Setup...**

20.2.2 Printing fonts

These are fonts and sizes used (by default) when print charts and reports. Headings, Body and Footer refer to printed reports (objects and observations), Chart and Legend to printed field of view or sky charts, and Script to any tables or text created by a script.

20.2.3 Images

Always print DSS images black-on-white. Whenever a DSS image is printed from the image display window, invert the grey-scale so that stars are printed black and the background sky in white. Apart from saving ink, such printed images might be easier to view under low light.

Always print colour SDSS images in grey-scale. Whenever a colour SDSS image is printed from the image display window, convert the colours to monochrome.

20.2.4 Printer scaling

If your printer consistently prints either too big or too small, it could be because the printer driver is not returning the correct scaling or resolution information to the application. The printer scaling value can be used to increase or decrease the size of the printed information. e.g. if the factor is 1.5, the page will be printed at 150%. The default value is 1 (print at the scale the printer reports to the application).

20.3 Web preferences

Web preferences are settings applicable to any Internet access from AstroPlanner. They are accessed by the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), and selecting the **Web** tab.

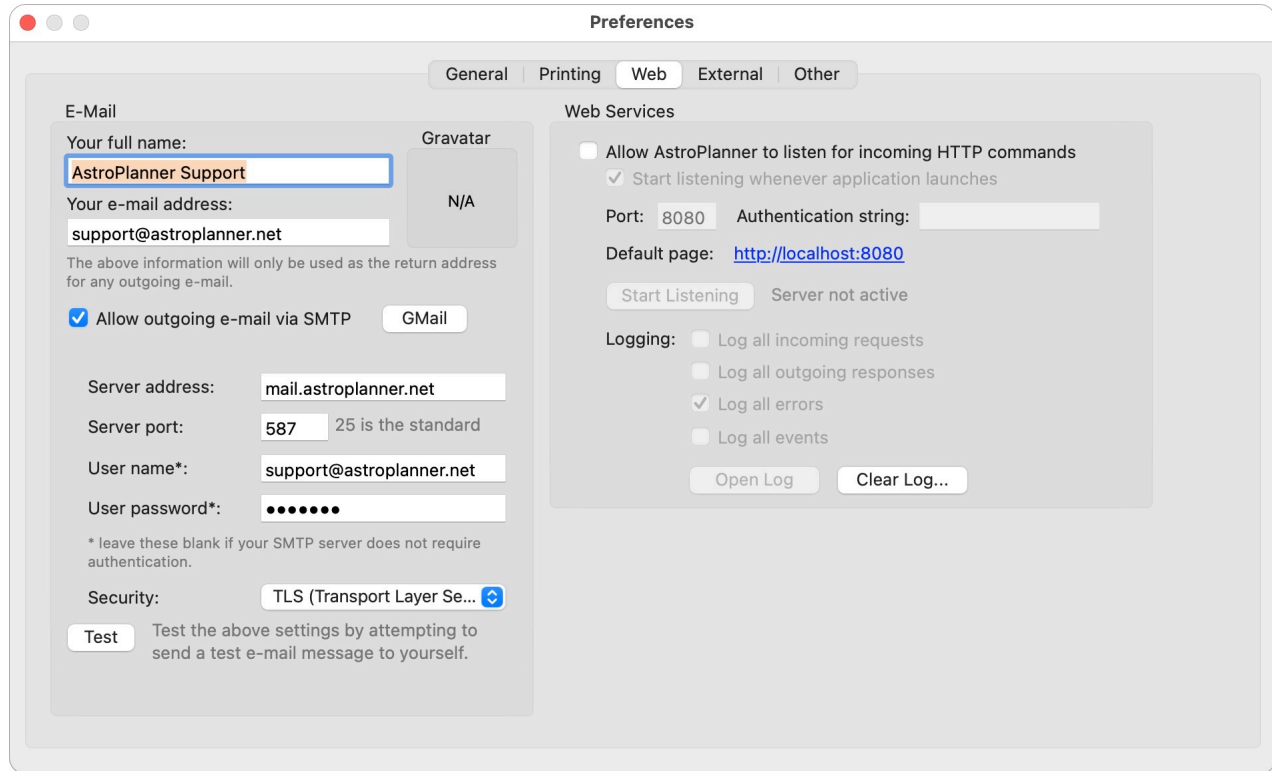


Figure 444: Web preferences

20.3.1 E-Mail

Your full name and address. These settings will be used to create an e-mail return address for any outgoing e-mail messages.

Allow outgoing e-mail via SMTP.

If you are able to send e-mail from your computer via SMTP (the most common e-mail protocol), then select this option and fill in the settings below it. If you don't select this option you will still be able to send bug reports, but will be unable to attach any files, screenshots, etc.

GMail. If you are using a GMail address (@gmail.com) then this button will set the correct settings for you (apart from your password).

Server address & port. The SMTP server address and port number. Typically, if your e-mail address is xxxxx@yyyyy, then the server address will be mail.yyyy or smtp.yyyy, but this varies with Internet providers.

User name & password. If your SMTP server requires a login (most do) then this will be your user ID and password (typically this is the same as the ID and password you use for checking for incoming e-mail).

Security. The kind of secure connection to use. If in doubt, use None.

Test. Clicking this attempts to send a brief test e-mail message to yourself to see if the settings work.

20.3.2 Web Services

This (somewhat specialised) feature causes the AstroPlanner application to act as a web (HTTP) client, and it can listen for and react to certain commands sent from another application, browser, or another instance of AstroPlanner on another computer. You can specify the port number to listen on, and you can log transactions to a file. The **Authentication string**, if present, is required to be passed in incoming messages. Such messages will be ignored if the authentication string does not match.

Currently all operations are script-based (e.g. running a script on the computer, etc.). If you click the **Start Listening** button and then click the **Default page** link, your browser should show a list of commands and the command format, including links to test the functionality.

The commands and responses are all JSON encoded.

20.4 External applications preferences

External applications preferences are settings applicable to selected applications that can be accessed or controlled from AstroPlanner. The preferences are accessed by the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), and selecting the **External** tab.

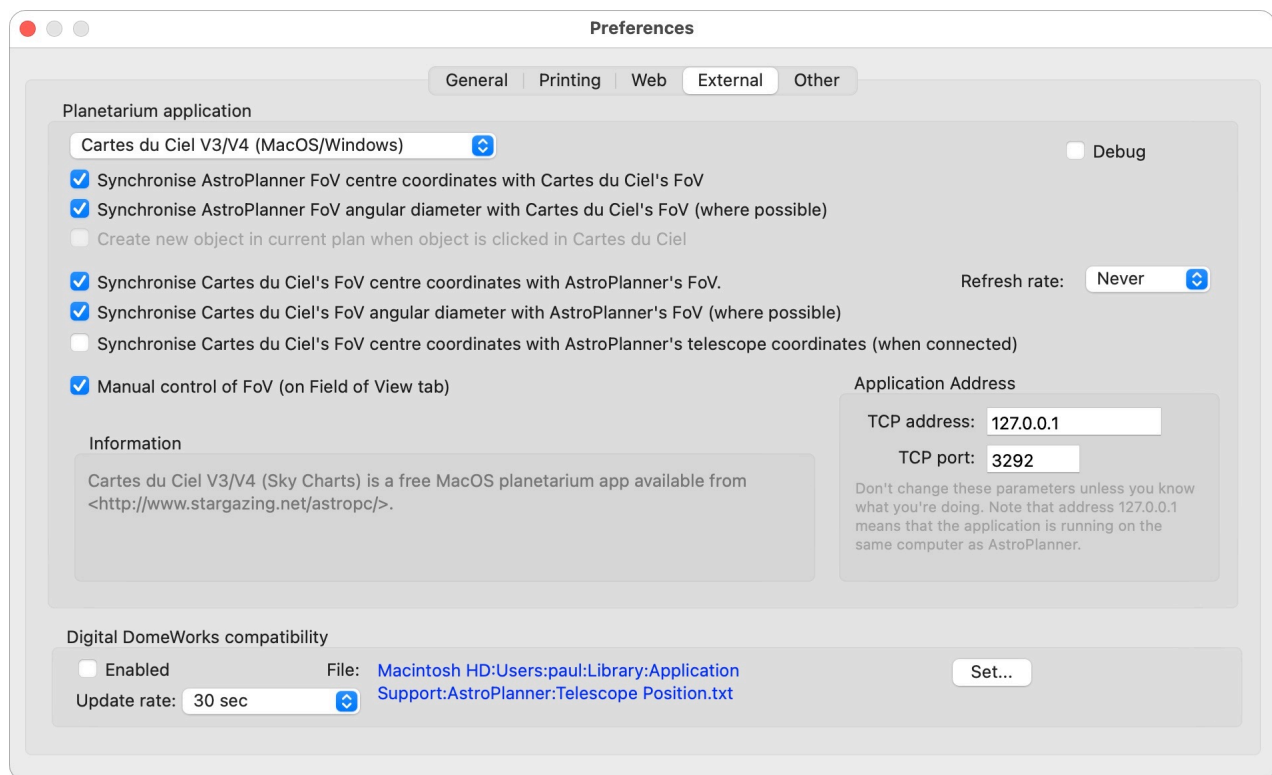


Figure 445: External applications preferences

20.4.1 Planetary application

AstroPlanner is able to communicate with selected 3rd-party planetarium applications (see Section 21.2 on page 348). These settings let you choose the planetarium application you wish to use, and how you want to communicate with it.

The popup menu lists all possible applications. These are, currently:

- Cartes du Ciel (Sky Charts) V3/4 (Macintosh & Windows)
- C2A (Windows-only)
- Stellarium (Macintosh & Windows)

Others might be introduced in future releases.

There are a number of checkboxes to enable communication features (where applicable). **xxx** represents the name of the planetarium application:

- **Synchronise AstroPlanner FoV centre coordinates with xxx's FoV.** Asks the planetarium application for the current coordinates of the field of view being shown, and changes AstroPlanner's field of view chart to be centred at the same coordinates.
- **Synchronise AstroPlanner FoV angular diameter with xxx's FoV.** Asks the planetarium application for the current size of the field of view being shown, and changes AstroPlanner's field of view chart to be the same size (where possible¹).
- **Create new object in current plan when object is clicked in xxx.** This is a way to identify objects in the planetarium application, and AstroPlanner will create a new object in the plan's object list. Note that "clicking" might be qualified in the planetarium application, e.g. control-clicking, shift-clicking, etc.
- **Synchronise xxx's FoV centre coordinates with AstroPlanner's FoV.** Whenever AstroPlanner's field of view chart changes its centre coordinates, the planetarium application is asked to change its centre to the same coordinates.
- **Synchronise xxx's FoV angular diameter with AstroPlanner's FoV.** Whenever AstroPlanner's field of view chart changes its diameter, the planetarium application is asked to change its diameter to the same size.
- **Synchronise xxx's FoV centre coordinates with AstroPlanner's telescope coordinates.** If AstroPlanner has a computerised telescope connected, then whenever the telescope pointing coordinates change, the planetarium application is asked to change its centre to the same coordinates.
- **Manual control of FoV.** If this is checked then the "→E" and "←E" buttons next to the field of view chart are enabled, allowing manual control of the above features.
- **Refresh rate.** The rate at which the above synchronisations are done automatically. If this setting is "Never" (recommended), then the manual control option should be checked.
- **Debug.** If this setting is checked, debugging information is output to a debug window. This is only really necessary if you are not getting a response from the planetarium application.
- **Application address.** The TCP address and port number that the external application is providing its services from. Typically the external application is running on the same computer as AstroPlanner, in which case the address will always be 127.0.0.1. However, if you are running it on a second computer, you can enter its IP number. The port number is the standard port number

1. AstroPlanner has a maximum field of view chart diameter of 60°. Most planetarium applications allow larger values than this.

used by the external application, but some applications (e.g. Cartes du Ciel) allow this to be changed. *When in doubt, leave these values alone.*

20.4.2 Digital DomeWorks compatibility

The Digital DomeWorks control software can check a text file for new pointing coordinates in order to rotate a dome to reflect the current telescope pointing coordinates. These settings enable this option, specify the name and path of the file on your disk, and specify how often to change the text file.

20.5 Other preferences

Other preferences consist of some shortcuts to get to the various preferences windows, as well as a way to move your application support location to a non-standard location. They are accessed by the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), and selecting the **Other** tab.

Clicking the **Open** button for any of the listed preferences will open the corresponding preferences editing window.

Use alternate application support data path. Normally all the common support files (observation database, catalogues, etc.) for AstroPlanner reside in a folder in your Application Support folder. This setting allows you to select an alternative location for this folder if you so desire (perhaps for sharing purposes across computers). You'll also be given the chance to copy existing files across where applicable. *It is recommended that you use this setting only if you **really** need to.*

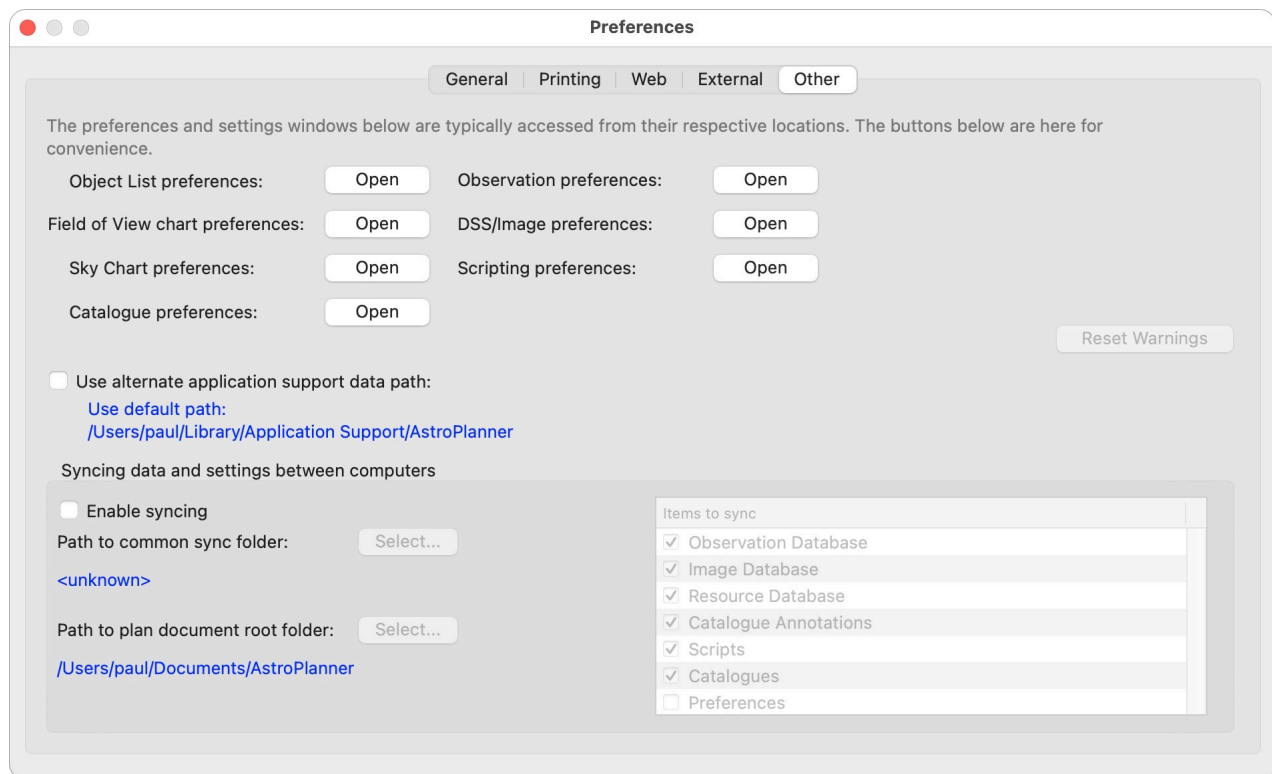


Figure 446: Other preferences

Syncing data and settings between computers. This feature, if enabled, will sync data and settings between AstroPlanner running on two or more computers. *It is assumed that you are not running AstroPlanner on more than one of those computers at any one time.*

The feature uses a folder that is common to all the computers to be synced. This might be a folder synced by a service such as DropBox or iCloud, a common networked drive, or a NAS drive on your local network.

On each synced copy of AstroPlanner, you select the path to the common sync folder (which must be the same synced folder on each). Then choose the items you want to sync (noting that some of these might be quite large (e.g. Catalogues and Image Database). You can also sync plan documents in a folder and all its subfolders (by specifying the root folder containing the plan documents).

Once this is enabled, the following happens:

- When you quit from AstroPlanner, it compares the files you asked to be synced with the copies in the common sync folder. If the files don't exist or have been changed during the current run of AstroPlanner, then they are copied to the sync folder. This is done automatically and requires no intervention.
- When you start AstroPlanner, the first thing it does (if syncing is enabled) is compare the chosen files with those in the sync folder. If the synced files are newer then it will list any new files and ask if you want to refresh the older files before continuing.

Note:

- The mechanism does not handle file deletion. i.e. if you, say, delete a file on computer A, it will not automatically be deleted on computer B. This will need to be done manually.
- Make sure, if you're using a service such as DropBox that syncs over the Internet, that the files have had a chance to permeate to your computer before you fire up AstroPlanner.

20.6 Object list preferences

Object list preferences can be accessed from:

- In the **Objects** tab, clicking the **Object List Prefs** icon in the toolbar.
- Main menu: **Object > Object List Preferences...**
- Right-clicking the object list and choosing **Other > Object List Preferences...** from the popup menu.
- By clicking the preferences button under the object list in the Objects tab of a plan document window (marked in Figure 447).
- Using the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), selecting the **Other** tab, and clicking the relevant **Open** button.

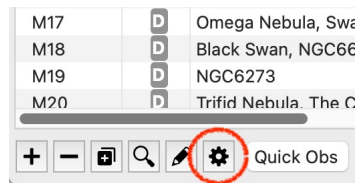


Figure 447: Object List Preferences button

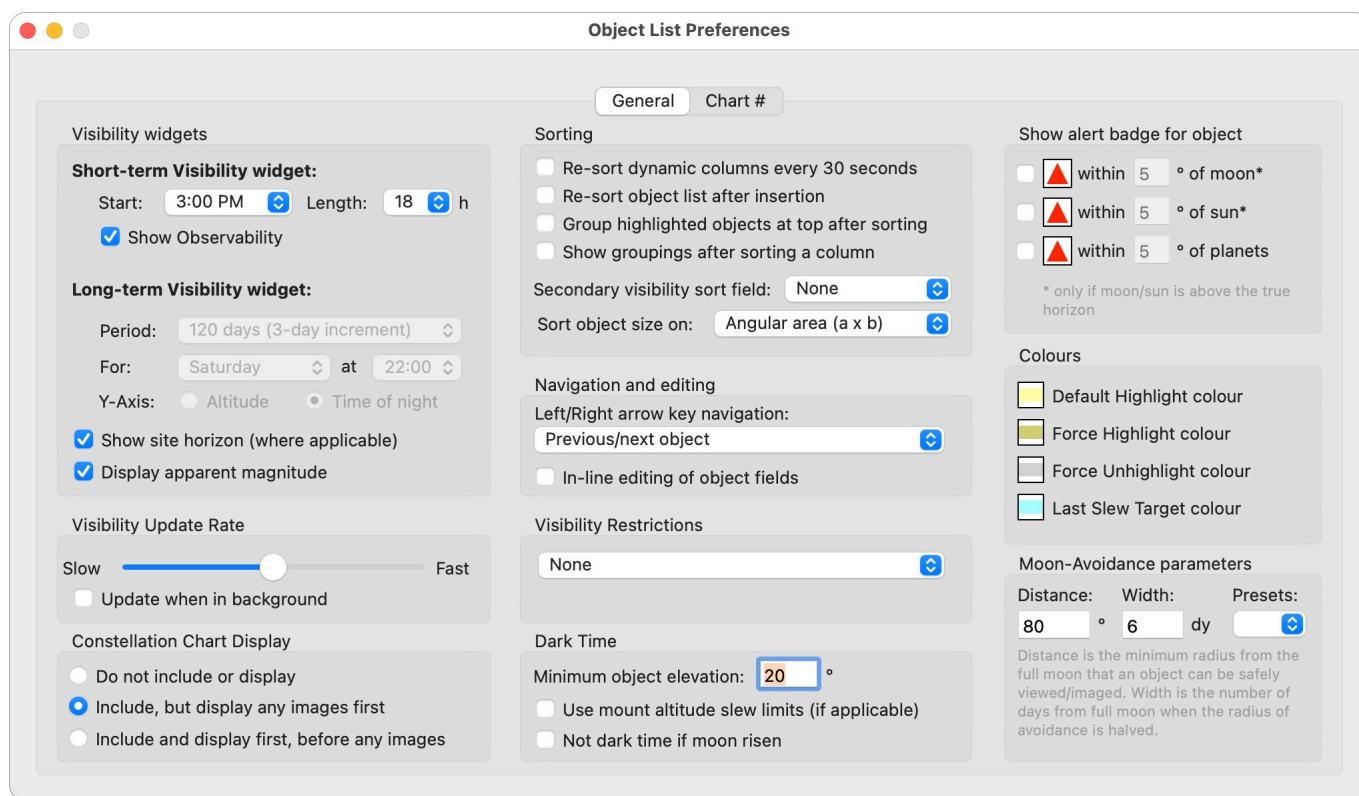


Figure 448: Object List preferences window

20.6.1 Visibility widgets

The short- and long-term visibility widgets are (optionally) displayed below the tool bar. They have several customisable parameters, shown here. Note that you can also change these by right-clicking the widgets.

Short-term visibility widget. The widget shows the altitude of the selected object over a short period (≤ 24 hours). The **Start** and **Length** values determine the start time of the chart and the number of hours duration, and **Show Observability** shows the time-related observability value on the widget.

Long-term visibility widget. The widget shows the altitude of the selected object over a long period (≤ 12 months, determined by the **Period** value). The altitude is shown for a particular day of the week and time (the **For** values). The widget y-axis can either show altitude above the horizon (marked by a red cross), or a time-of-night indication of when the object is above the horizon (shown as a vertical yellow line).

Show site horizon. Show the user-defined site horizon (if available) in applicable widgets (short- and long-term visibility, and alt/az).

Display apparent magnitude. Display the apparent magnitude of the object in the short- and long-term visibility widgets. If the cursor is moved over the widgets, the apparent magnitude of the object is displayed for the time given by the x-axis.

20.6.2 Visibility update rate

This slider controls how often the visibility is recalculated for objects in the object list. Faster calculation will improve the accuracy of the altitude/azimuth and visibility, at the expense of slowing down overall response and possible flickering effects.

Update when in background. When another application is brought to the front, visibility calculations are typically suspended until AstroPlanner is once more the active application. This checkbox allows visibility calculations to continue while the application is deactivated. This might affect other applications, and laptop battery life.

20.6.3 Constellation chart display

Display constellation charts for objects. This is on by default and determines if a constellation chart is generated and displayed when an object is selected. If the **Include, but display any images first** is selected then any downloaded or user images will be displayed, and you'll need to use the popup menu below the chart to see the constellation chart. If the **Include and display first, before any images** option is selected, then the chart will be initially displayed in front of any images associated with the object.

20.6.4 Sorting

Re-sort dynamic columns every 30 seconds. If this option is checked, then if you have sorted on a dynamic column (i.e. one containing an object parameter that can change over time, such as altitude, visibility, etc.), that column will be sorted again automatically every 30 seconds.

Re-sort object list after insertion. If an object is inserted at the end of the list, it could affect the sort order of the list. If this option is checked then the list will be re-sorted after such an insertion, where necessary.

Group highlighted objects at top after sorting. When this option is checked, every time the list is sorted, all highlighted objects (where applicable) will appear before all unhighlighted objects.

Show groupings after sorting a column. If this option is set then whenever you sort the object list, a black line will appear between groupings (e.g. sort on Constellation - the line appears between constellation changes; sort on R.A. - the line appears on every hour change, etc.). See Figure 449 for an example.

ID	Comp	Type	Const	Images	Vis	RA	Dec	Azimuth	Altitude	One
M68		Globular	Hya	D	Yes	12h 39m 28.2s	-26°44'31.7"	106°	47°	
M83		Galaxy	Hya	D	Yes	13h 37m 00.3s	-29°51'51.3"	112°	35°	
M113		Globular	Her	D		16h 41m 41.2s	+36°27'35.3"	59°	-27°	
M92		Globular	Her	D		17h 17m 07.4s	+43°08'11.4"	52°	-34°	
M35		Open	Gem	D	Horz	06h 09m 00.0s	+24°21'00.0"	311°	23°	
M102		Galaxy	Dra	D		15h 06m 29.6s	+55°45'47.1"	35°	-15°	
M39		Open	Cyg	D		21h 31m 42.0s	+48°25'00.0"	359°	-64°	
M29		Open	Cyg	D		20h 23m 57.0s	+38°30'30.0"	37°	-68°	
M63		Galaxy	CVn	D	Horz	13h 15m 49.2s	+42°01'46.0"	39°	7°	
M94		Galaxy	CVn	D	Horz	12h 50m 53.1s	+41°07'12.0"	36°	11°	
M51		Galaxy	CVn	D	Horz	13h 29m 52.5s	+47°11'44.5"	36°	2°	
M3		Globular	CVn	D	Horz	13h 42m 11.3s	+28°22'35.0"	53°	11°	
M106		Galaxy	CVn	D	Horz	12h 18m 57.6s	+47°18'16.0"	28°	11°	
M98		Galaxy	Com	D	Yes	12h 13m 48.3s	+14°54'00.7"	51°	35°	
M99		Galaxy	Com	D	Yes	12h 18m 49.5s	+14°25'01.1"	52°	35°	
M100		Galaxy	Com	D	Yes	12h 22m 55.0s	+15°49'21.3"	52°	33°	
M85		Galaxy	Com	D	Yes	12h 25m 24.1s	+18°11'26.9"	50°	31°	
M88		Galaxy	Com	D	Yes	12h 31m 59.2s	+14°25'12.3"	55°	32°	
M91		Galaxy	Com	D	Yes	12h 35m 26.5s	+14°29'47.0"	55°	32°	
M64		Galaxy	Com	D	Yes	12h 56m 43.7s	+21°40'57.6"	53°	23°	
M53		Globular	Com	D	Yes	13h 12m 55.3s	+18°10'07.2"	58°	22°	
M44		Open	Cnc	D	Yes	08h 40m 24.0s	+19°40'00.0"	343°	46°	
M67		Open	Cnc	D	Yes	08h 51m 18.0s	+11°48'00.0"	344°	55°	

Figure 449: Object list sorted by constellation

Secondary visibility sort field. When sorting on the Visibility (Vis) column, this setting chooses a secondary parameter/column to sort on if the Visibility values are the same: Altitude, Azimuth, R.A., Declination, Rise time, Transit time, or Set time.

Sort object size on. When sorting the Size column, you can choose to sort an object with Size = $a \times b$ on angular area (a multiplied by b), longest dimension (a), or shortest dimension (b). If the size is given as a single dimension, A , then both dimensions are considered to be equal to A .

20.6.5 Navigation and editing

Left/Right arrow key navigation. This option determines what effect the left- and right-arrow keys have when navigating the object list:

- **None.** No effect.
- **Previous/next object.** Left-arrow moves to the previous object in the list; right-arrow moves to the next object in the list.
- **Previous/next highlighted object.** Left-arrow moves to the previous highlighted object in the list; right-arrow moves to the next highlighted object in the list.
- **Previous/next observed object.** Left-arrow moves to the previous object with associated observations in the list; right-arrow moves to the next object with associated observations in the list.
- **Previous/next non-observed object.** Left-arrow moves to the previous object with no associated observations in the list; right-arrow moves to the next object with no associated observations in the list.
- **Previous/next visible object.** Left-arrow moves to the previous currently-visible object in the list (i.e. Vis = Yes); right-arrow moves to the next currently-visible object in the list.
- **Previous/next object with images.** Left-arrow moves to the previous object with associated images in the list; right-arrow moves to the next object with associated images in the list.
- **Previous/next object of the same type.** Left-arrow moves to the previous object with the same Type in the list; right-arrow moves to the next object with the same Type in the list.

In-line editing of object fields. When this option is checked, in-line editing of object fields in the object list is permitted (i.e. clicking on an editable column will allow instant editing of the object value).

20.6.6 Visibility restrictions

When computing the current visibility of an object, this setting allows you to consider an object non-visible based on sky darkness:

- **None.** Sky darkness is not considered (i.e. if the object is above the horizon, it is considered visible).
- **Civil Twilight.** During the daytime (between sunrise and sunset), all objects are considered invisible.
- **Nautical Twilight.** Objects are considered invisible before the start of nautical twilight in the evening and after the end of nautical twilight in the morning.
- **Astronomical Twilight.** Objects are considered invisible before the start of astronomical twilight in the evening and after the end of astronomical twilight in the morning.

- **Full Darkness.** Objects are considered visible only after the end of astronomical twilight in the evening and before the start of astronomical twilight in the morning.

20.6.7 Dark Time

The **minimum object elevation** setting specifies the minimum altitude that an object can have during astronomical darkness in order for it to be considered in Dark Time. This is used by the Dark Start, Dark End, and Dark Duration object list columns (page 112).

If your telescope mount has altitude slew limits, then dark time will only be considered if the object coordinates are within the slew limits (if the **Use mount altitude slew limits** option is used).

If the **Not dark time if moon risen** option is used then dark time will only be considered if the moon is below the horizon.

20.6.8 Show alert badge for object

These items define alert "badges" to be displayed in the ID column of the object list if an object is within the given angular distance of the sun, the moon, or a bright planet (Mercury through Saturn).

ID	Name	RA	Dec	Images
M94	Croc's Eye Galaxy	12h 50m 53s	+41° 07.1'	15'
M95	▲ NGC3351, UGC5850	10h 43m 58s	+11° 42.2'	15'
M96	▲ NGC3368, UGC5882	10h 46m 46s	+11° 49.2'	10' 15'
M97	Owl Nebula	11h 14m 48s	+55° 01.1'	15'

Figure 450: Alert badges in ID column

20.6.9 Colours

These colours are used to shade the background of a row in the object list. Clicking the colour swatch allows the colour to be changed.

Default Highlight colour. If an object is highlighted (but not Custom highlighted), this colour is used.

Force Highlight colour. If an object has been Force Highlighted, this colour is used.

Force Unhighlight colour. If an object has been Force Unhighlighted, this colour is used.

Last Slew Target colour. If an object was the target of the last telescope slew, this colour is used.

20.6.10 Moon-Avoidance parameters

The Moon-Avoidance (M Avoid) column in the object list implements Lorentzian Moon-Avoidance, as formulated by the Berkeley Automated Imaging Telescope folks. The algorithm uses two parameters, **Distance** (the minimum angular radius an object must be from the full moon for it to be viewed/imaged safely), and **Width** (the number of days from time of full moon when the radius of avoidance is halved). The **Presets** are some presets for common filters.

20.6.11 Charts/Atlases for Chart# column

This is found in the Chart # tab of the preferences window.

This is a list of supported charts/atlasses. By checking one or more of these entries, the relevant chart number/s for an object will be displayed in the Chart # column.

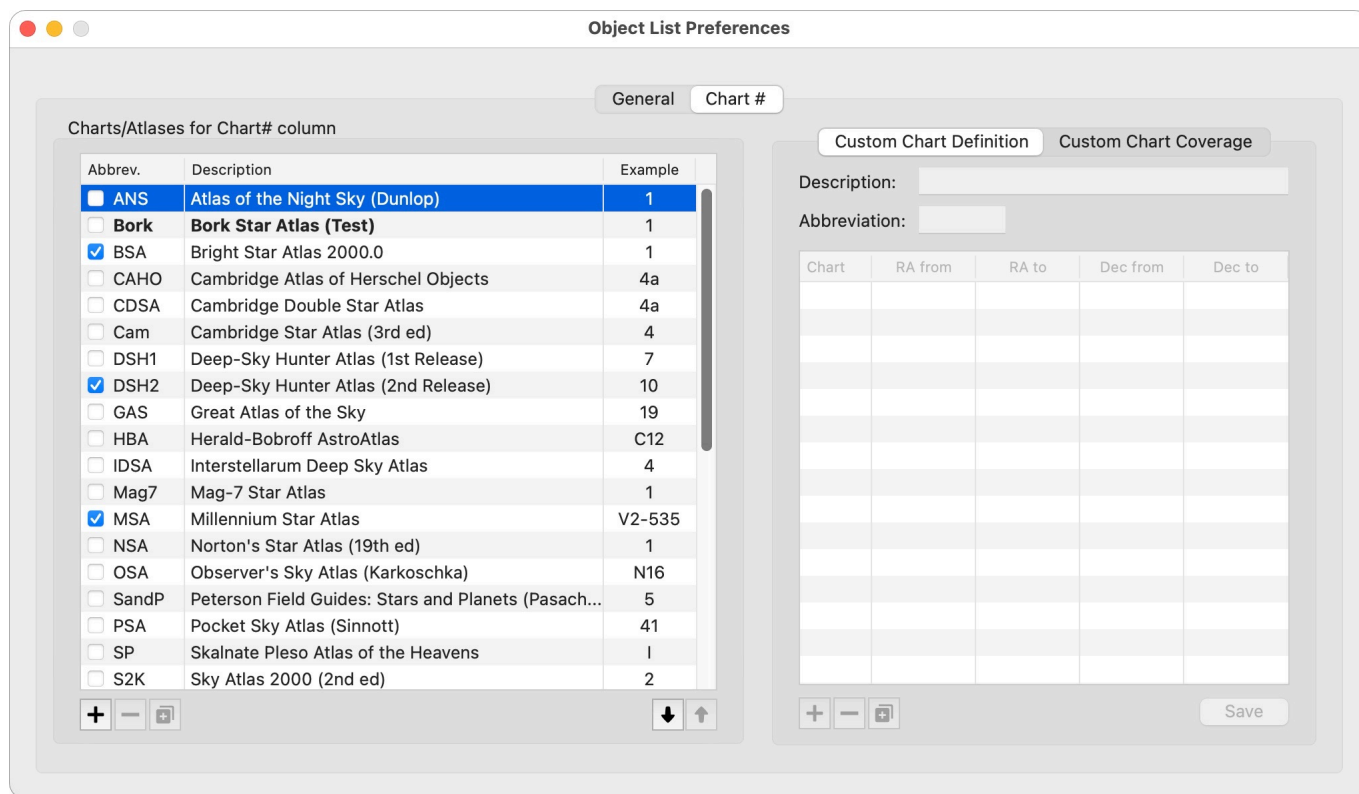


Figure 451: Chart # atlas list

The default is to show all of the chart numbers for each selected chart/atlas, separated by commas. However, if you right-click the object list and choose the Chart/s submenu, you can elect just to show the chart numbers for one of them. This is useful if you own and use more than one atlas.

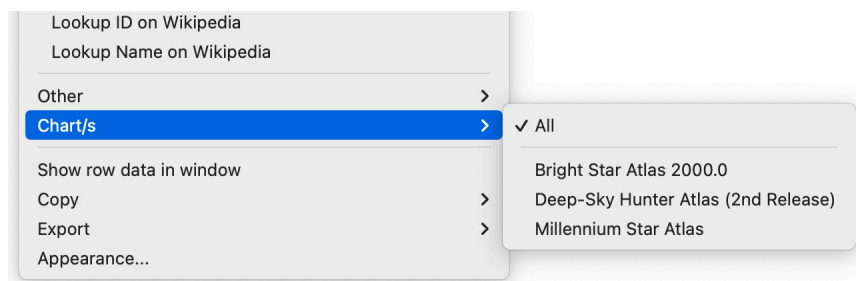


Figure 452: Chart/s submenu

Creating a custom chart definition

If you have a set of charts or an atlas that is not built-in to the application, you can create your own custom definition. Use the "+" button under the list of charts to create a new definition. This creates a new definition and displays the definition on the right of the window.

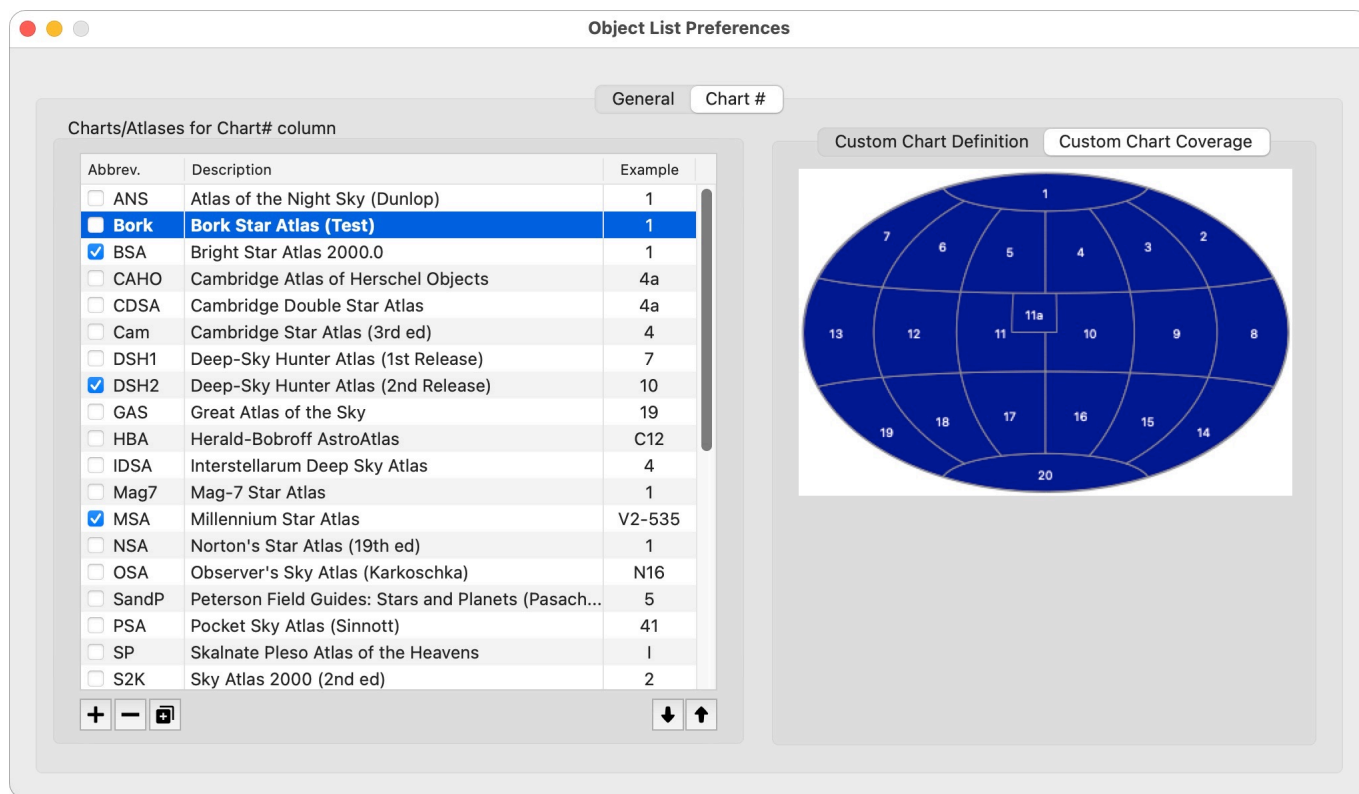


Figure 454: Custom Chart Coverage

User-contributed custom chart definitions

You can use the down-arrow button under the list of chart definitions to download user-contributed chart definitions (and delete any you might've previously uploaded), and the up-arrow button to upload your own definitions.

20.7 Field of View chart preferences

Field of view chart preferences can be accessed by:

- In the **Field of View** tab, clicking the **Field of View Prefs** icon in the toolbar.
- Clicking the preferences button at the bottom-right of the chart in the Field of View tab of a plan document window (marked in Figure 455).
- Using the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), selecting the **Other** tab, and clicking the relevant **Open** button.



Figure 455: Field of View chart preferences button

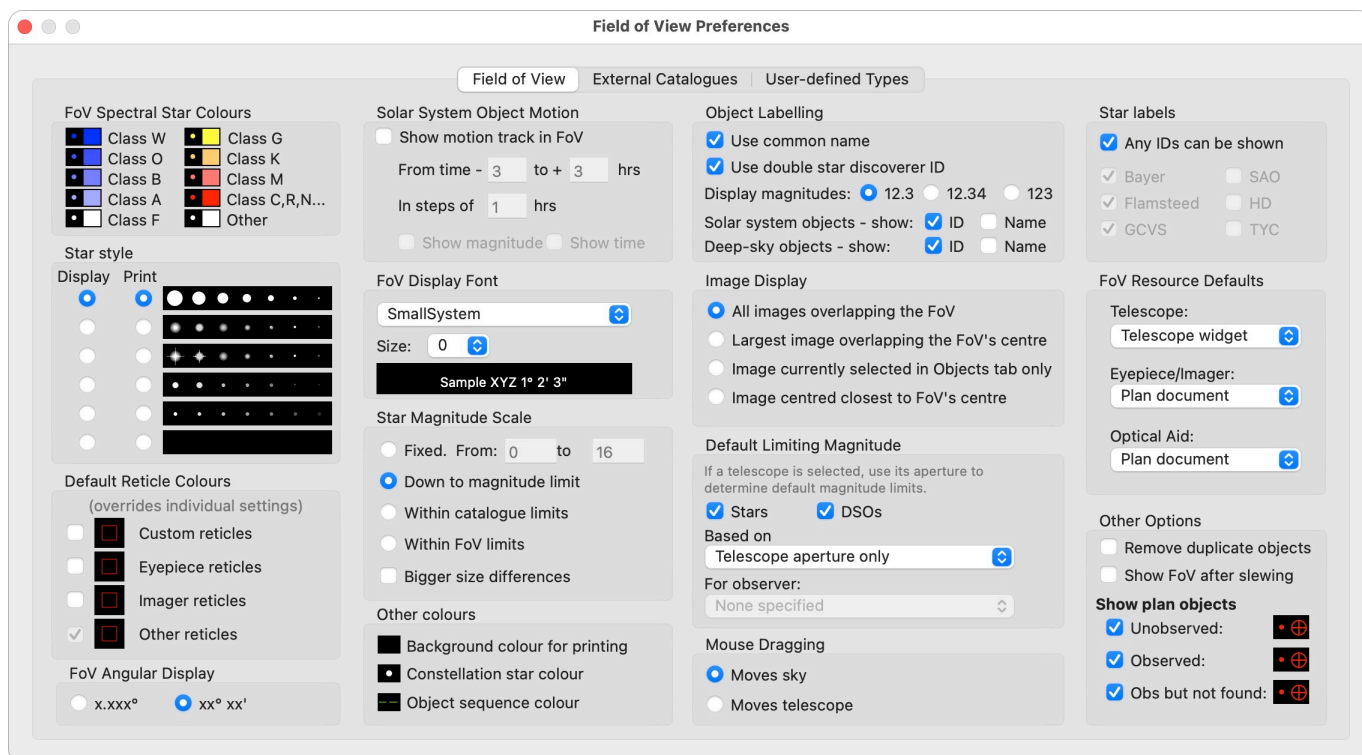


Figure 456: Field of View chart preferences

20.7.1 FoV Spectral Star Colours

These are the colours used to show catalogue stars in the chart if such stars include spectral class information and if the *Display > Spectral Colours* option is selected in the *Display Options* for the chart. Clicking the colour swatches allows changing the colour.

20.7.2 Star style

This option defines how stars are drawn in the chart. There's a separate option for printing.

20.7.3 Default Reticle Colours

Defines colours that are used for various reticle types. If checked, these will override the colours individually assigned to the reticles. Clicking the colour swatches allows changing the colour.

20.7.4 FoV Angular Display

When you option-drag (Macintosh) or Alt-drag (Windows) on the chart, the angular distance you have dragged (as well as the angle w.r.t. north) is displayed. This setting determines whether the distance is displayed in decimal degrees, or degrees/minutes/seconds.

20.7.5 Solar System Object Motion

If the Show motion track in FoV option is selected, then any solar system object (planets, comets and minor planets) will show a track of its motion in time across the sky. The time span is specified in hours, with a step interval. The **Show magnitude** option will show the object's magnitude at each step. The **Show time** option will show the relative time in hours at each step. Figure 457 shows the motion track of a comet over 48 hours (from -24 to +24 hours in steps of 6 hours), with the **Show time** option used.

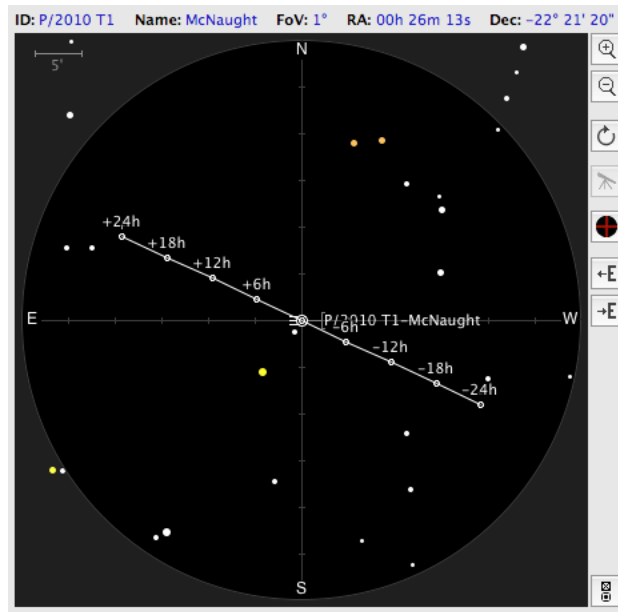


Figure 457: Motion track in field of view chart

20.7.6 FoV Display Font

Select the font and size used to display text in the chart. Default is Small System 0.

20.7.7 Star Magnitude Scale

This option allows selection of how the stars in the FoV are scaled:

- **Fixed.** Always scale stars on a fixed scale. This might be useful to compare charts across multiple telescopes, parts of the sky, etc.
- **Down to magnitude limit.** This is the default. Assume the magnitude limit (determined by the slider to the right of the chart) determines the smallest stars to show on the chart. This generally renders a chart that is close to reality for a given telescope (assuming the magnitude limit is that of the selected telescope).
- **Within catalogue limits.** Determine the magnitude limits by the dimmest/brightest stars in the catalogues being displayed.
- **Within FoV limits.** Determine the magnitude limits by the dimmest/brightest stars in the displayed field of view chart.

Bigger size differences. Make the differences between star sizes for different magnitudes larger.

20.7.8 Other colours

Background colour for printing. This is the colour used to print the background sky (unless you are printing black-on-white). You can choose a suitable colour to, for example, save on ink cartridges. Click the colour swatch to choose the colour.

Constellation star colour. If you are displaying constellation figures in the chart (by way of the Display Options), then this colour defines the colour for stars considered part of the "standard" constellation. Click the colour swatch to choose the colour.

Object sequence colour. If you have the display option to show object sequence in the chart, this is the colour of the line that joins the plan objects.

20.7.9 Object Labelling

Use common name. If a star has a known common name, then display that rather than the stars ID (e.g. display "Polaris" rather than " α UMi").

Use double star discoverer ID. When labelling double stars, use the discoverer ID rather than the catalogue ID (e.g. HJ2414 rather than WDS07459+2000).

Display magnitudes. How to display magnitudes in the chart. Either one decimal place, two decimal places, or one decimal place without the decimal point (some like to do this to avoid the decimal point being mistaken for a star).

Solar system objects. For any displayed solar system objects, you can elect to display the ID or the Name, or both.

Deep-sky objects. For any displayed non-solar-system objects, you can elect to display the ID or the Name, or both.

20.7.10 Image Display

How to handle multiple images in the field of view chart:

- **All images overlapping the FoV.** Default. Any and all images that overlap the chart will be displayed.
- **Largest image overlapping the FoV's centre.** Only the largest image, containing the coordinates of the chart's centre, will be displayed.
- **Image currently selected in Objects tab only.** Only the image currently being displayed next to the object list (i.e. for the selected object) will be displayed.
- **Image centred closest to FoV's centre.** Only show the image whose centre coordinates are closest to the FoV's centre coordinates.

20.7.11 Default Limiting Magnitude

How to determine the initial settings for the Star and DSO magnitude limits for the field of view chart. If **Stars** and/or **DSOs** are checked then the corresponding magnitude limit sliders will be set **Based on**:

- **Telescope aperture only.** Uses the computed (or manually set) magnitude limit value for the selected Telescope resource.
- **Telescope + Eyepiece + Aid.** Bases the magnitude limit on a formula that is dependent on magnification (or defaults to the above if an eyepiece isn't specified).
- **Schaefer's Algorithm.** Uses Schaefer's comprehensive algorithm to determine actual magnitude limit, which also takes into account the observer's age, eyesight, etc. (specified as an Observer resource).

20.7.12 Mouse Dragging

What happens when you (left) click and drag the mouse with the cursor in the chart:

- **Moves sky.** The background sky is effectively dragged. i.e. if you drag from left to right, the coordinates of the centre of the chart will move to the left.
- **Moves telescope.** The telescope or chart centre is effectively dragged. i.e. if you drag from left to right, the coordinates of the centre of the chart will move to the right.

20.7.13 Star labels

Determines which IDs are used for labelling stars. If **Any IDs can be shown** is selected, then the chart will use any ID available. Otherwise you can choose one or more of the specified ID types. If the star has one or more of the selected IDs, a label will be shown, otherwise it won't.

20.7.14 FoV Resource Defaults

When you select an object in the object list and switch to the **Field of View** tab, these options determine what resources are to be used to compute the field of view angular diameter. You can choose:

- **Telescope widget.** (for the Telescope resource only) Use the telescope resource in the Telescope widget (whether or not it is currently displayed).
- **Plan document.** Use the previously selected resource in this plan document. Selecting another resource will then make it the new default (for the current plan document only).
- **Global preference.** Use the previously selected resource. This will be used over all plan documents and is saved between runs. Selecting another resource will then make it the new global default.
- **None.** Do not save the resource.

20.7.15 Other Options

Remove duplicate objects. If duplicate catalogue objects are found (if more than one stellar catalogue is being displayed), then this option will find any duplicate objects and remove them. Objects from larger catalogues will be preferentially removed. e.g. If you display the Bright Star catalogue as well as the Hubble GSC catalogue, then the Bright Star objects will be preferred over any equivalent Hubble objects. The downside is that this can take some computation if many objects are being displayed.

Show FoV after slewing. When telescope slewing is instigated from the plan document, automatically switch to the Field of View tab after slewing.

Show plan objects. Determines if plan objects are displayed in the chart, and if so, in what colour. You can select different colours for objects that have no associated observations (**Unobserved**), objects that have one or more associated observations logged (**Observed**), and those objects that have observations logged, but which were not found in any of the observations (**Obs but not found**). Click the colour swatches to change colours.

20.7.16 External Catalogues

External catalogues are non-AstroPlanner stellar catalogues that might be available to the user. The contents of these catalogues can be displayed in the field of view chart, but not searched or used elsewhere. They are also not available to unregistered users.

These catalogues are typically available on CD-ROM, DVD-ROM, or on-line via the Internet. There is a tab for each available catalogue type. Currently these are:

- **USNO A2.0.** The USNO A2.0 Stellar Catalog, is a catalogue of 526,280,881 stars covering the entire sky, with coverage down to magnitude 19+. It is available as a set of 11 CD-ROMs or 2 DVD-ROMs.
- **USNO SA2.0.** The USNO SA2.0 is a catalogue of 55,368,239 stars intended to provide a grid of astrometric reference stars covering the whole sky. It is a spatially sub-sampled version of the full

USNO A2.0 catalogue, designed for folk who are doing astrometric work. It is available on a single CD-ROM.

- **USNO B1.0.** The USNO B1.0 catalogue is an all-sky catalogue that presents positions, proper motions, magnitudes in various optical passbands, and star/galaxy estimators for 1,042,618,261 objects. The catalogue is believed to be complete down to magnitude 21. Currently it is available either on-line or accessed directly from hard disk (80GB+).
- **UCAC2.** The UCAC2 or Second U.S. Naval Observatory CCD Astrograph Catalog, is a catalogue of 48,330,571 stars covering the sky from -90 to +40 degrees in declination and going up to +52 degrees in some areas. It covers magnitudes down to 17+. It is available on 3 CD-ROMs.
- **UCAC3.** The UCAC3 or Third U.S. Naval Observatory CCD Astrograph Catalog, is a catalogue of 100,766,420 stars covering the sky from -90 to +90 degrees in declination. It covers magnitudes down to 17+. It is available on a double-sided DVD-ROM.
- **UCAC4.** The UCAC4 or Fourth U.S. Naval Observatory CCD Astrograph Catalog, is a catalogue of 113,780,093 stars covering the sky from -90 to +90 degrees in declination. It covers magnitudes down to 16+. It is available on a double-sided DVD-ROM. It corrects many errors in UCAC3.
- **NOMAD.** The Naval Observatory Merged Astrometric Dataset (NOMAD) catalogue is an all-sky catalogue that presents positions, proper motions, magnitudes in various optical passbands, and star/galaxy estimators for over a billion objects. All bright stars are included. Only available on-line. It is a combination of objects derived from the following catalogues:
 1. Hipparcos Catalogue, else
 2. UCAC2 catalog (for stars of magnitude 10 or fainter), else
 3. Tycho-2 Catalogue, else
 4. USNO-B1.0 catalog.

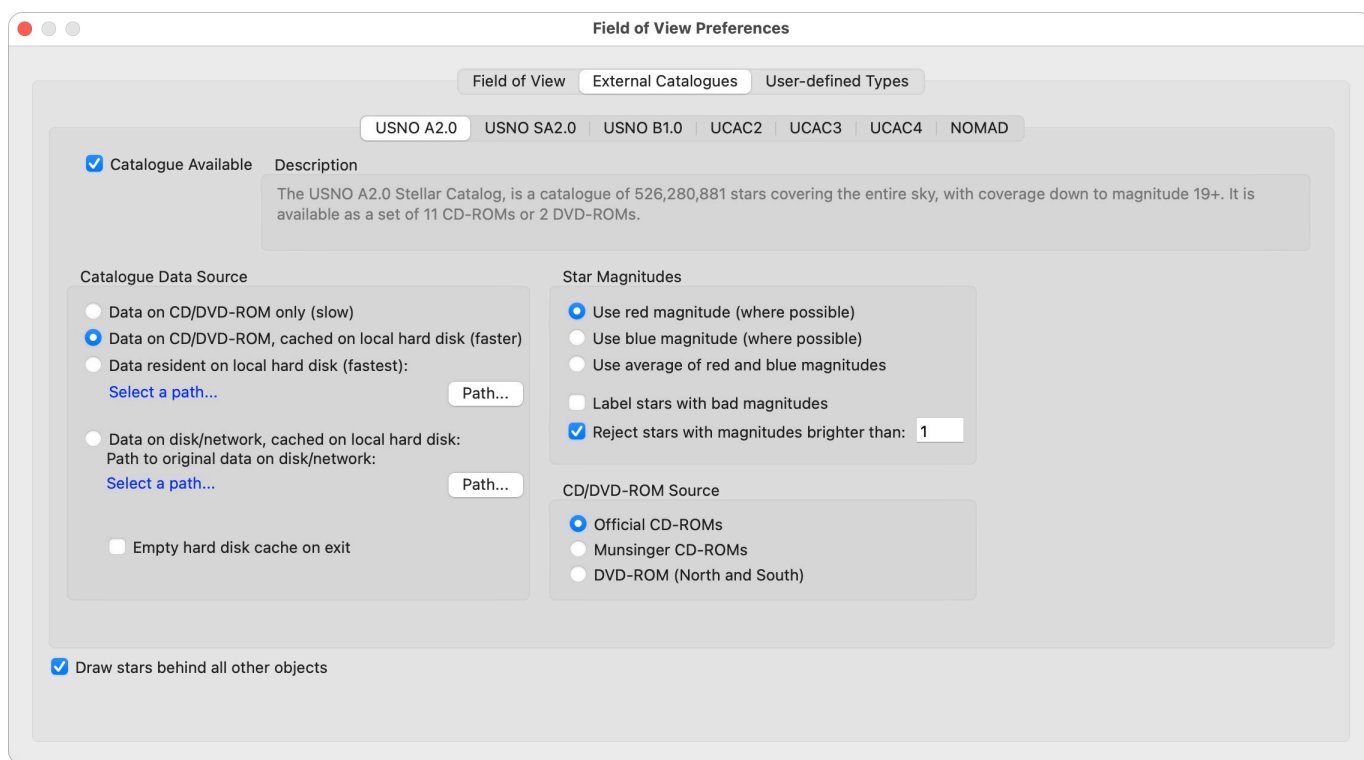


Figure 458: External Catalogues preferences

In order to enable an external catalogue for display, you need to check the **Catalogue Available** checkbox. Once this is done, the catalogue/s will appear at the end of the list of AstroPlanner catalogues on the Field of View tab (in the External Catalogues section).

Each catalogue type has a number of settings, typically specifying where the catalogue is stored, how to interpret the magnitude data, and what kind of media is being used.

20.7.17 User-defined Types

When an object is displayed in the field of view chart, the symbol used depends on the **Type** field of the object being displayed. Most common types are displayed with suitable symbols, but those objects with an unsupported type (such as those you define yourself) are shown as a generic square symbol.

You can specify a number of other symbols here to be shown in the chart when the object has a user-defined type. e.g. in the example shown below, Pulsars will be shown with a cross, and Pseudo objects with a double circle.

You can also specify if the user-defined object type represents a DSO, a stellar object, or a solar system object. This is then used with the magnitude limits for the field of view, etc.

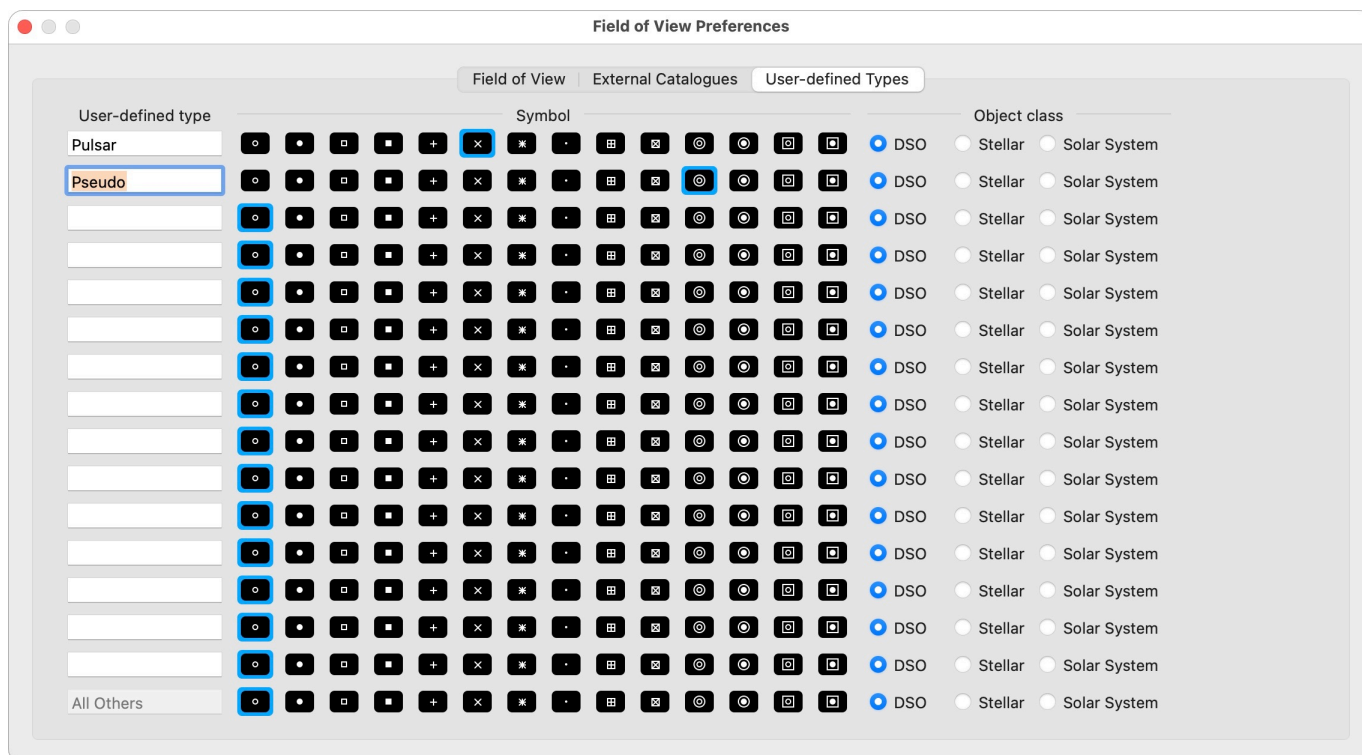


Figure 459: User-defined Types preferences

20.8 Sky chart preferences

Sky chart preferences can be accessed by:

- In the **Sky View** tab, clicking the **Sky View Prefs** icon in the toolbar.
- Clicking the preferences button at the bottom-right of the chart in the Sky tab of a plan document window (marked in Figure 460).
- Using the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), selecting the **Other** tab, and clicking the relevant **Open** button.

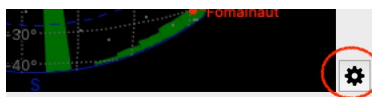


Figure 460: Sky preferences button

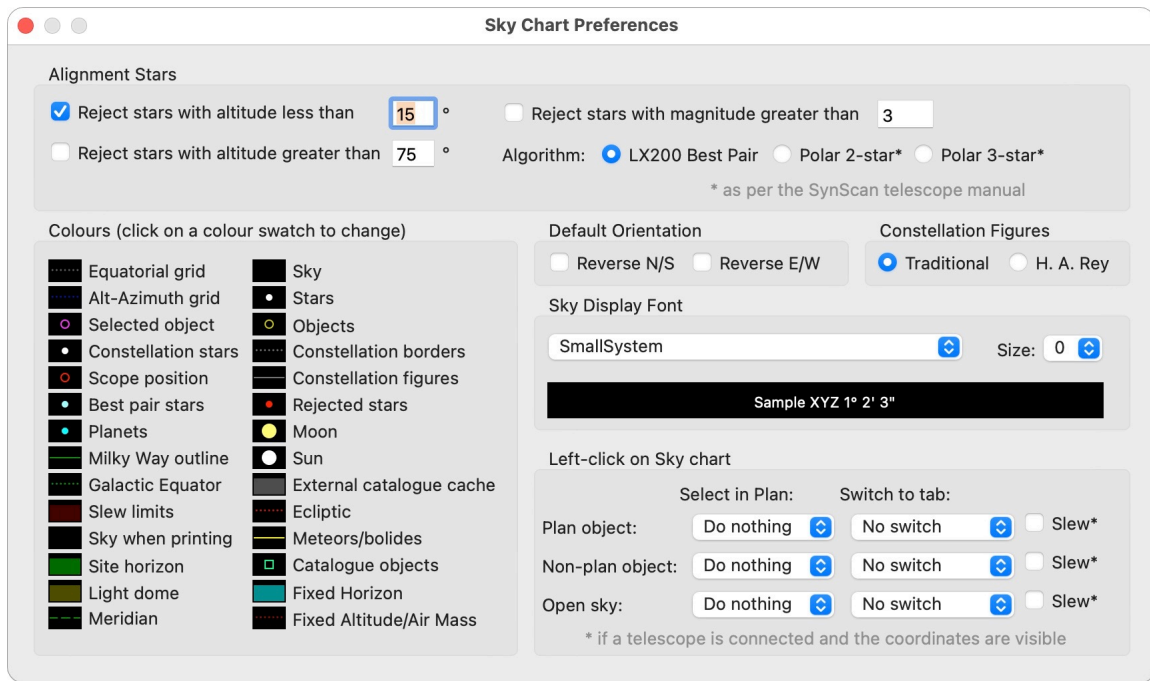


Figure 461: Sky preferences window

20.8.1 Alignment Stars

Reject stars with altitude less than/greater than. These settings will ensure that alignment stars that are too close to the horizon, or too close to the zenith, will be marked as "rejected" and shown in red on the Sky chart (when alignment stars are selected in the Display Options).

Reject stars with magnitude greater than. Similarly, stars that are too dim can be rejected. Useful if you are in a particularly bright sky situation, or are unfamiliar with the dimmer stars.

Algorithm. This is the algorithm used to determine the "optimum" pairs or triples of alignment stars. The **LX200 Best Pair** algorithm was designed specifically for the LX200 Classic telescope, but some folk believe that it works well for any alt-az telescope mount that needs a 2-star alignment. The **Polar 2-star** and **Polar 3-star** algorithms are simplified algorithms for alignment of polar mounts based on the SynScan mount controller.

20.8.2 Colours

These colour swatches can be used to customise all the colours used in the Sky chart. Click on any swatch to change the colour.

20.8.3 Default Orientation

Set the default orientation of the chart. This orientation is the one used to display the chart in any plan document by default. You can subsequently invert E/W or N/S via the Display options if necessary.

20.8.4 Constellation Figures

Choose between traditional constellation "stick figures", and those used by H. A. Rey in his book: *The Stars: A New Way to See Them* (<http://www.amazon.com/exec/obidos/tg/detail/-/0395248302/>)

20.8.5 Sky Display Font

Select the font and size used in the Sky chart.

20.8.6 Left-click on Sky chart

Specify what happens when you (left) click on the Sky chart. If you click on a displayed plan object, a non-plan object (e.g. a star or catalogue object), or open sky, you can specify what to select in the plan object list, which tab to change to, and whether to slew the telescope to the object in question.

You can choose to select the plan object (if a plan object was clicked on) or closest plan object.

For example, in Figure 461, if you click on a plan object in the sky chart, that object will be selected and you will change to the Observations tab. If you click on a non-plan object in the chart, the closest plan object will be selected, and its field of view chart displayed. If you click open sky in the chart, the telescope will slew to the cursor position (assuming a suitable telescope is currently connected).

20.9 Catalogue preferences

Catalogue preferences can be accessed by:

- Using the **File > Catalogue Manager...** menu command and choosing the **Preferences** tab.
- Using the **AstroPlanner > Preferences** menu command (Macintosh) or **Edit > Preferences** menu command (Windows), selecting the **Other** tab, and clicking the relevant **Open** button.

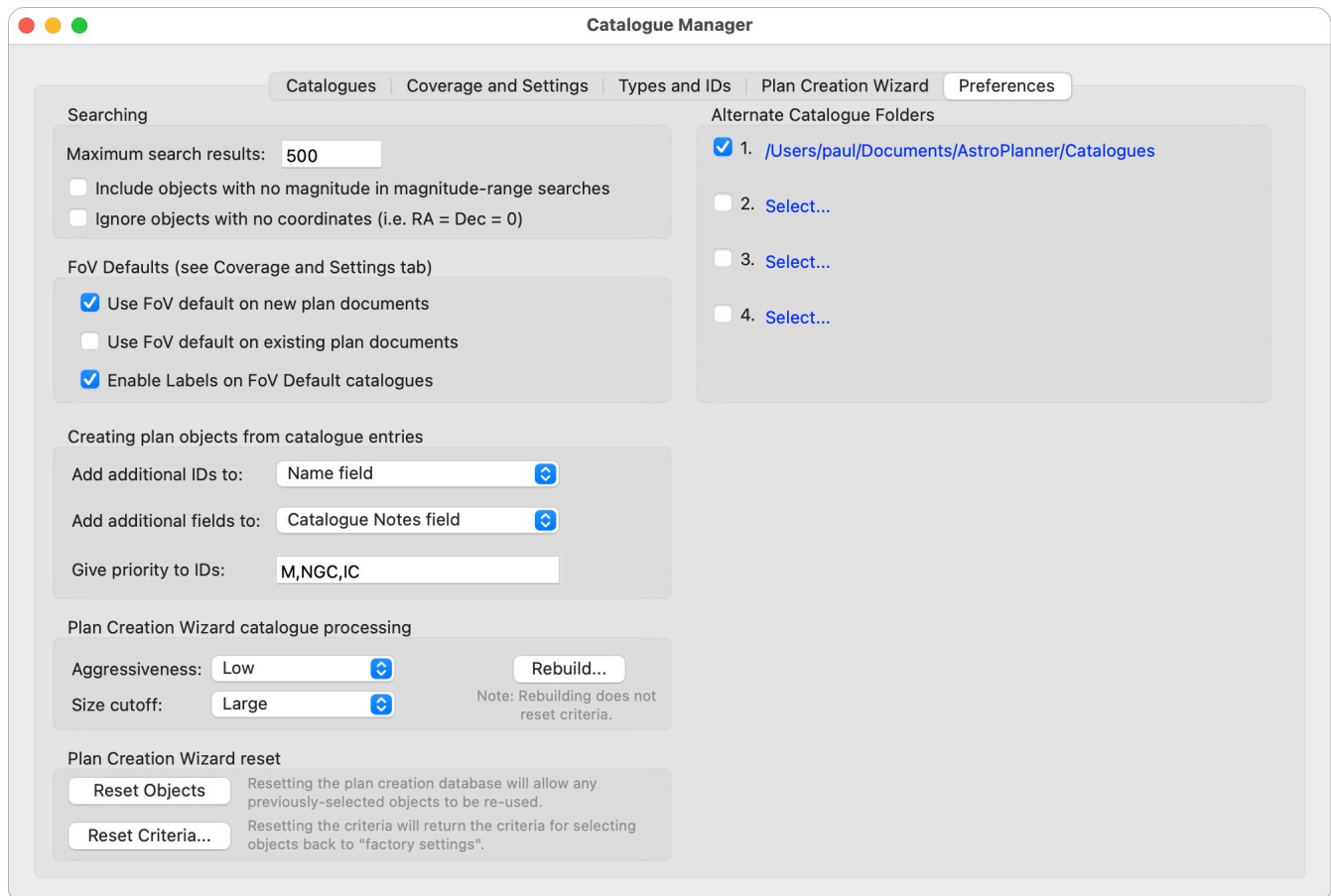


Figure 462: Catalogue preferences

20.9.1 Maximum search results

When searching catalogues for matching objects, this is the maximum number of hits that will be processed. If the limit is exceeded, a warning is displayed and you can choose to continue the search or abandon it.

20.9.2 Include objects with no magnitude in magnitude-range searches

When searching catalogues using a magnitude range as part of the search terms, this option will also include objects that have no defined magnitude, but that would otherwise satisfy the search terms.

20.9.3 Ignore objects with no coordinates (i.e. RA = Dec = 0)

Some catalogues contain the occasional object that has no coordinates (RA = Dec = 0). Generally you would want to ignore these when searching, but turning off this option will include them in any searches.

20.9.4 FoV Defaults

Each catalogue has an associated **FoV Default** flag that can be set (see the **Coverage and Settings** tab of the Catalogue Manager window). This section defines when and how that flag is used.

Use FoV Default on new plan documents. For any *new* plan document, select all catalogues for the Field of View chart that have the FoV Default set.

Use FoV Default on existing plan documents. When opening any *existing* plan document, select all catalogues for the Field of View chart that have the FoV Default set.

Enable Labels on FoV Default catalogues. In addition to selecting catalogues above, also set the Label flag for those catalogues, so that labels are displayed in the field of view chart.

20.9.5 Creating plan objects from catalogue entries

Add additional IDs to. When a catalogue entry/object is added to a plan, and it has more than one associated ID, this setting allows you (optionally) to add those additional IDs to the object Name field, the object Notes field, or a User-defined field called "More IDs".

Add additional fields to. When a catalogue entry/object is added to a plan, and it has field items that do not correspond to columns in the object list (e.g. proper motion, etc.), this setting allows you (optionally) to add those additional fields to the object Name field, the object Notes field, or User-defined fields with appropriate names.

Give priority to IDs. When a catalogue entry/object is added to a plan, and it has more than one associated ID, this setting allows you to give priority to certain selected IDs. e.g. "M, NGC, IC" would use the Messier (M) ID as the primary ID if present, NGC otherwise, or IC otherwise. If none of those IDs are present, then the first available ID is used (typically the primary ID for the catalogue).

20.9.6 Plan Creation Wizard catalogue processing

The Plan Creation Wizard creates its own database based on the catalogues you have installed. It uses a background thread to create the database (when you first run the application after installation, or whenever you add, delete or update a catalogue). This thread can take a while to process catalogues, and during that time the application can become unresponsive, especially on Windows. This settings allow you to change how this process is done.

Aggressiveness. The more aggressive the setting, the faster the background thread will process catalogues, at the expense of application responsiveness.

Size cutoff. This determines what catalogues are included. Typically only catalogues with fewer than a few hundred thousand relevant objects are processed. You can adjust this maximum, at the expense of potentially missing out on some objects for the database.

Rebuild.... Rebuild the Plan Creation Wizard database from scratch. This is not typically necessary, but you never know... This does not reset the criteria. See below if you need to reset the criteria.

20.9.7 Plan Creation Wizard reset

Reset Objects. As the plan creation wizard is used, it marks any objects it retrieves from its database as "used" so that they will not get retrieved a second time. Using this Reset button will mark all objects in the plan creation wizard's database as "unused".

Reset Criteria. Resetting the criteria will return the criteria for selecting objects back to "factory settings".

20.9.8 Alternate Catalogue Folders

Catalogues are generally kept in a special location on your hard disk (you can use *Help > Where's My Stuff?* to find out where). You can also specify up to four additional/alternate folders containing catalogue files. This is useful if you're sharing catalogues from an older version of AstroPlanner, or if you want to install a larger catalogue (e.g. USNO A2.0) on another disk, etc.

20.10 Observation preferences

Observation preferences can be accessed by:

- In the **Observations** tab, clicking the **Observation Prefs** icon in the toolbar.
- In the **Observations** tab, clicking the rightmost button under the Observations list.
- Using the ***Observation > Observation Preferences...*** menu command.

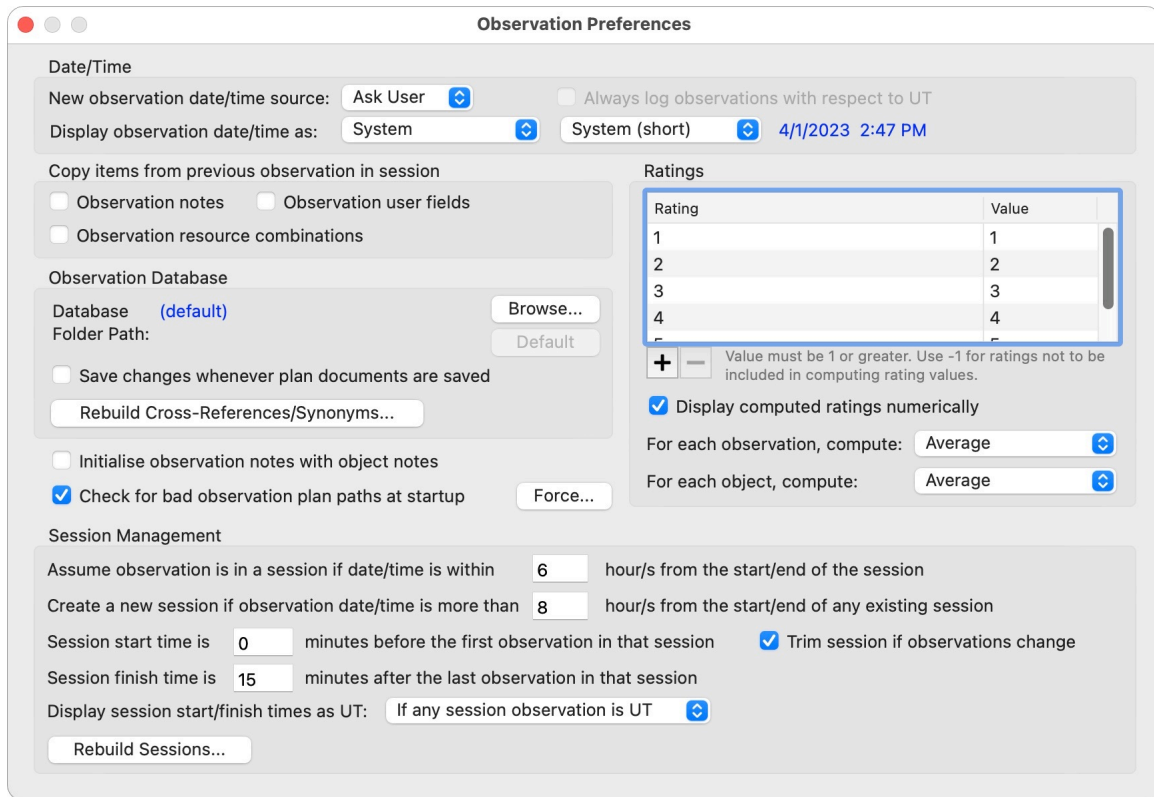


Figure 463: Observation preferences window

20.10.1 Date/Time

New observation date/time source. When you create a new observation, the source of that date and time is determined by this setting.

- **Computer.** The current local date/time is used.
- **Telescope.** If a telescope is connected, and has the capability of being interrogated for its date/time, then that is used. If not, the current local date/time is used.
- **Ask user.** The user is asked to supply the current date/time via a dialog.

Always log observations with respect to UT. If the above setting is **Computer** or **Telescope**, this option, if checked, will make the observation with respect to UT (Universal Time or GMT).

Display observation date/time as. Whenever an observation date and/or time is displayed, these settings are used to determine the format. The current date and time is displayed in the selected format at the right. The date can be:

- **System.** Use the operating system settings to display the date.

- **Fixed: YYYY/MM/DD.** Always show the date as YYYY/MM/DD.
- **Fixed: YYYY.YYY.** Show the date as the year and fraction of the year.
- **Fixed: YYYY-MM-DD.** Always show the date as YYYY-MM-DD.

The time can be:

- **System (short).** Use the operating system settings to display the time in short format (hours and minutes).
- **System (long).** Use the operating system settings to display the time in long format (hours, minutes and seconds).
- **Fixed: HH:MM.** Display hours and minutes. 24-hour clock.
- **Fixed: HH:MM.M.** Display hours and minutes+fraction. 24-hour clock.
- **Fixed: HH:MM:SS.** Display hours, minutes and seconds. 24-hour clock.

20.10.2 Copy items from previous observation in session

When you create a new observation, this setting gives you the option of copying data from the previous observation in the current session into the new observation. You choose one or more of: Notes, any user-defined field values (where applicable), and/or resource combinations.

20.10.3 Observation Database

Database File Path. If you wish to use a database located somewhere other than the standard folder location, you can use this setting to do so. Use the **Default** button to reset this to the default location.

Save changes whenever plan documents are saved. When you start up the application, the observation database is copied to a temporary location. When the application is quit, the temporary database automatically overwrites the existing one (if changes were made). The setting will also do the overwrite operation every time a plan document is saved.

Rebuild Cross References/Synonyms.... The observation database maintains a list of cross-references between IDs of *observed* objects. If you add additional catalogues, the list might be incomplete. This button allows you to rebuild the cross-reference list, using all available catalogues. Warning: this might take a while if you have lots of observations. Be prepared to take a coffee break.

20.10.4 Initialise observation notes with object notes

When creating a new observation, this option will initialise the observation notes with the contents of the Notes field for the observed object, where applicable.

20.10.5 Check for bad observation plan paths at startup

The observation database is (by default) checked at startup for any observations that are associated with a plan document that is no longer available at the previously-defined path. You are given the choice to re-attach a plan document, etc. You are also given the choice never to see that irritating dialog again. This option re-enables the path checking at startup.

20.10.6 Session Management

Assume observation is in a session. If a new observation is created that has a date/time that is later than the specified time before the current beginning of a session, and earlier than the specified time after the current end of the session, then that observation is assumed to be in that session. The session start or end time will be adjusted to include the observation date/time.

Create a new session. If a new observation is created that has a date/time that is earlier than the specified time before any existing session, and later than the specified time after the current end of any existing session, then a new session is started. The session start or end time will be adjusted to include the observation date/time. If the date/time falls between the above limits, the user is asked via a dialog whether a new session should be started, or whether an existing one should be extended.

Session start time/session finish time. These values are added to the beginning or end of a session (i.e. the date/time of the first and last observation. This could be construed as the time required to set up the telescope, break it down, etc.

Trim session if observations change. If you delete the first or last observation in a session, this option will trim the session start or finish time to compensate.

Display session start/finish times as UT. Determines if the session date/times should displayed as UT (Universal Time/GMT), based on the session's observations. The choices are:

- Never
- Always
- If any session observation is UT
- If all session observations are UT

Rebuild Sessions.... If the need arises, this button will delete all existing sessions and rebuild them based on the underlying observations. It will attempt to keep any observation names, notes, and/or user-defined field values, but this is not guaranteed in all cases.

20.10.7 Ratings

The Ratings field can have multiple numeric values, starting at 1. These settings allow you to set up the values that are valid, and an alphanumeric rating to go with each numeric value. Use the **+** button to add a new entry, and **-** to delete. Click on the entries to edit. If you want to include values that shouldn't be included in computing rating values (e.g. "Was not observed", "Seeing not adequate", etc.), then assign a value of -1.

Display computed ratings numerically. If a computed rating (e.g. average rating for a given object) is displayed, then it can be displayed numerically (e.g. 3.5) or alphanumerically (e.g. "Nice") - in which case the numeric value will be rounded.

For each observation, compute. When displaying the rating for an observation, the individual ratings logged for each resource combination (e.g. eyepiece/telescope combination) is computed as one of:

- Average
- Minimum
- Maximum
- Median

For each object, compute. When displaying the rating for an object, the individual ratings logged for each resource combination (e.g. eyepiece/telescope combination) of each observation for that object is computed as one of:

- Average

- Minimum
- Maximum
- Median

20.11 Image preferences

Image preferences can be accessed from various places:

- Via main menu: **Image > Image Preferences...**
- Right-clicking an image and choosing **Image Preferences...** from the popup menu.
- By clicking the preferences button in the Images display window (marked in Figure 464).

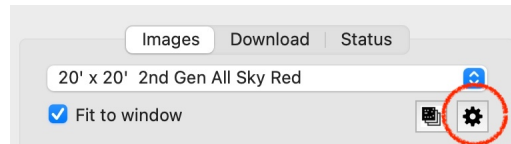


Figure 464: Image preferences button

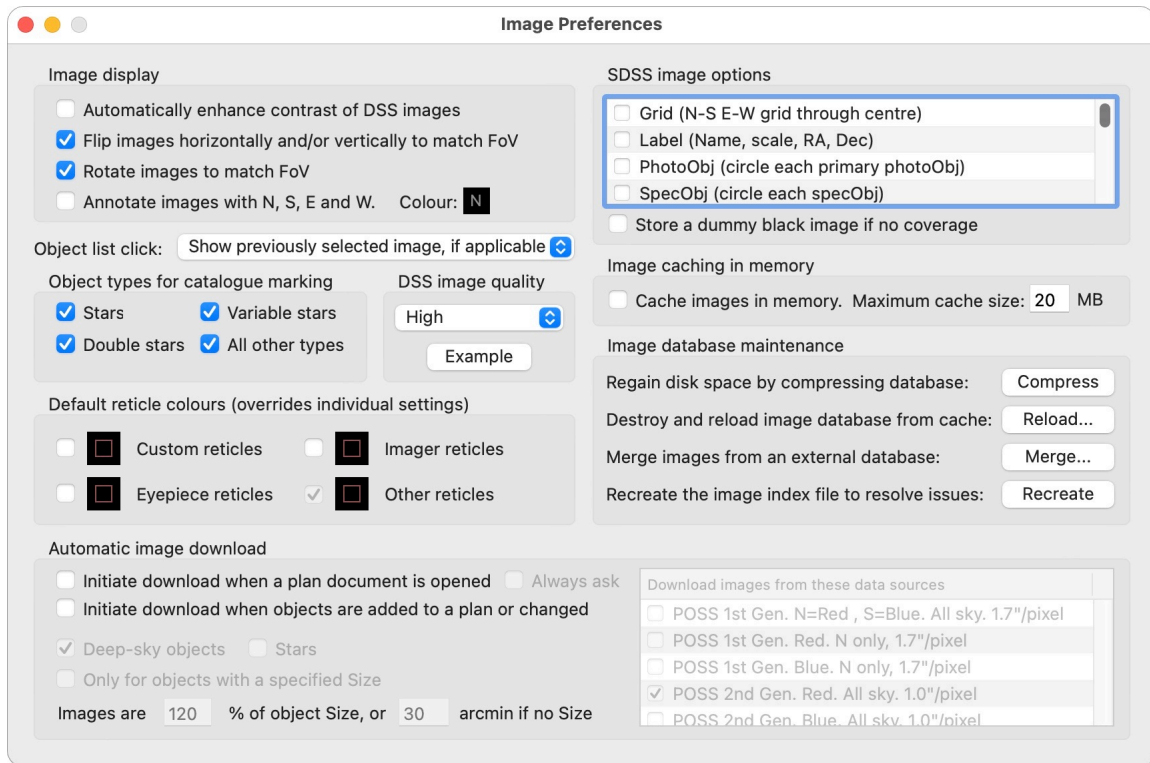


Figure 465: Image Preferences window

20.11.1 Image display

Automatically enhance contrast of DSS images. When DSS images are downloaded the contrast might be such that the background sky is not black when it should be. This option automatically adjusts the contrast of images so that the sky background is black. Note that this might cause loss of any faint detail in the image.

Flip images horizontally and/or vertically to match FoV. The images are flipped to match the E/W and N/S orientation of the plan document's field of view chart.

Rotate images to match FoV. The displayed images are rotated to match the rotational orientation of the plan document's field of view chart, where applicable.

Annotate images with N, S, E and W. Annotate the edges of the images to indicate the cardinal directions. Click the colour swatch to change the text colour.

20.11.2 Object list click

When you select an object in the plan document's object list, and it has more than one associated image, this setting determines which of those images is displayed by preference:

- Don't show cached images
- Show previously selected image, if applicable
- Show 5' x 5' image, if applicable
- Show 10' x 10' image, if applicable
- Show 30' x 30' image, if applicable
- Show 1° x 1° image, if applicable
- Show 2° x 2° image, if applicable
- Smallest size image
- Largest size image
- Smallest size image \geq object size, if applicable
- Colour image, if applicable

20.11.3 Object types for catalogue marking

The types of objects that will show an image "badge" when you display a catalogue. This allows you to ignore, say, stars (that appear in many images and can slow down catalogue display if enabled).

20.11.4 DSS image quality

DSS images are downloaded and saved as JPEG images. This setting defines the quality of those saved images. Since JPEG images utilise "lossy" compression, lower quality images take up a *lot* less space on hard disk. To see the effects of changing image quality, click the **Example** button.

The example window shows an original image on the left, and a modified quality image on the right. Use the Zoom slider to zoom in, and use the Quality popup to show the effect of making the image quality a particular value. You'll see that the quality of the image doesn't change much as you decrease its value below Maximum, but once you get below Minimum the artifacts become more apparent.

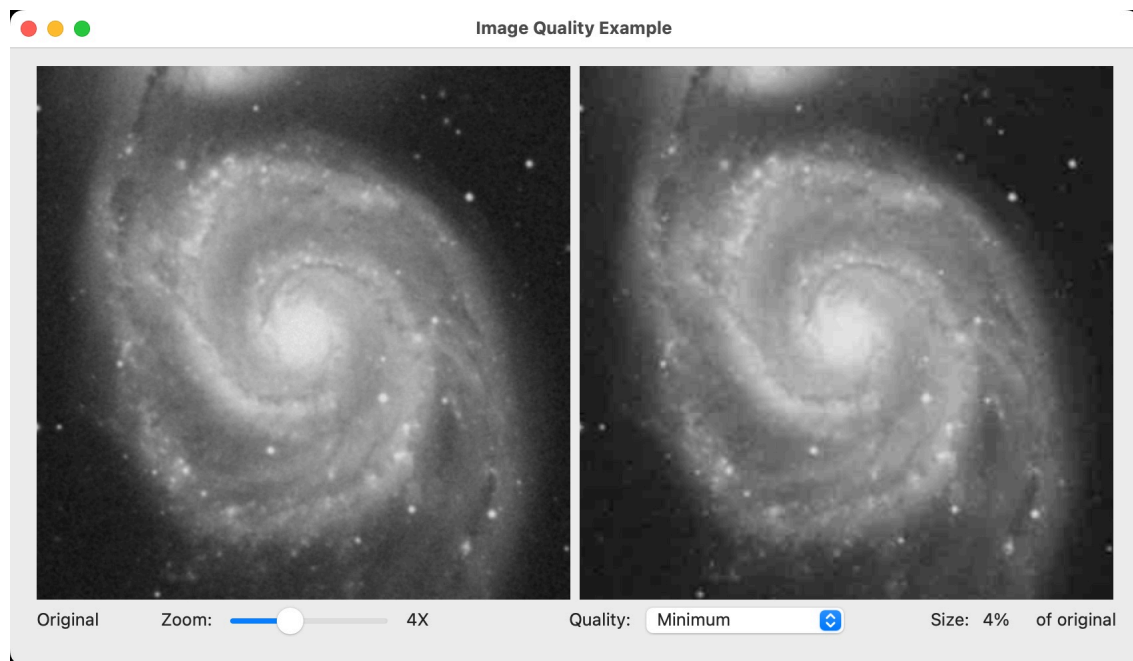


Figure 466: Image quality example window

20.11.5 Default reticle colours

These settings allow you to override the colour that the various reticle types use by default. Select the checkbox to override the colours (note that the Other category is *always* overridden). Click the colour swatches to edit the colours.

20.11.6 SDSS image options

These are options for SDSS colour images only. The list of checkboxes offers several options available for the downloaded images from the SDSS web site. Typically they will all be off, unless you have a specific need.

Store a dummy black image if no coverage. SDSS currently only covers part of the northern sky. If you try and retrieve an SDSS image from a non-covered part of the sky, you typically get an error and no image is stored. This setting will store a special (and small) all-black image. This has the advantage that the application will not try and re-download the same SDSS image again (assuming you have that option set when downloading).

20.11.7 Image caching in memory

Images are stored in a disk-based database. If you are flipping between a few images this can cause delays while the image is retrieved from the database. This is particularly noticeable for large angular size images. This setting will cache those retrieved images in memory, on a first-come-first-served basis which will improve access and display time.

20.11.8 Image database maintenance

These are actions that you can use where necessary to maintain the database. Typically you would only use these if a problem exists.

Regain disk space by compressing database. Over time, if images are deleted, the database does not automatically re-use that space for new images, since retrieving the space takes a non-trivial amount of time. If you have that time to spare, use this action. It has no effect on the database contents apart from doing an internal reshuffling, and is safe to do whenever you like.

Destroy and reload image database from cache. When you move from AstroPlanner V1 to AstroPlanner V2 and beyond, the image database is built from the old image caching technique used in the older versions. If you want to start again and rebuild the database from the older cache, use this action. Warning: it will destroy all images and image data in the current database.

Merge images from an external database. If you are operating AstroPlanner on more than one computer and you want to merge new images from another image database, you can use this action. Use *Help > Where's My Stuff?* on the secondary computer to locate the image database that you want to merge.

Recreate the image index file to resolve issues. To speed up image access, a cache file is created. This can, on occasion get out of sync with the database. This option will recreate the file. It should have no adverse effects.

20.11.9 Automatic image download

Normally, image downloading is done manually upon request, but these options allow for automatic download of objects in the background (assuming suitable Internet access is available). Note that these settings only apply to non-solar-system objects (i.e. stars and DSOs)

Initiate download when a plan document is opened. Whenever you open a plan document, and objects exist in that document without associated images in the database, then images will be downloaded for those objects. This will be done silently, unless the **Always ask** checkbox is checked, in which case you'll be asked if you want to proceed with the download.

Initiate download when objects are added to a plan or changed. When an object is added to an open plan document, or an object in that plan is changed (its coordinates are changed), start an automatic download for that object.

Deep-sky objects/Stars. Specifies what kind of objects will have images downloaded. Typically you would probably only want images of DSOs. However, double star observers might disagree.

Images are xxx % of object Size, or yyy arcmin if no Size. If the object has a defined size (e.g. 15 x 10), then the downloaded image will be xxx % of the largest dimension of that size. If the object does not have a defined size, then the image will default to being yyy' X yyy'.

20.12 Scripting preferences

Scripting preferences can be accessed from various places:

- Via main menu: *Script > Script Preferences...*
- By clicking the preferences button in the script editor window (marked in Figure 467).

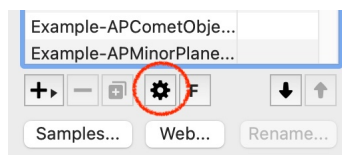


Figure 467: Script preferences button

20.12.1 Editor Settings

These are settings that influence how the dedicated script editor behaves.

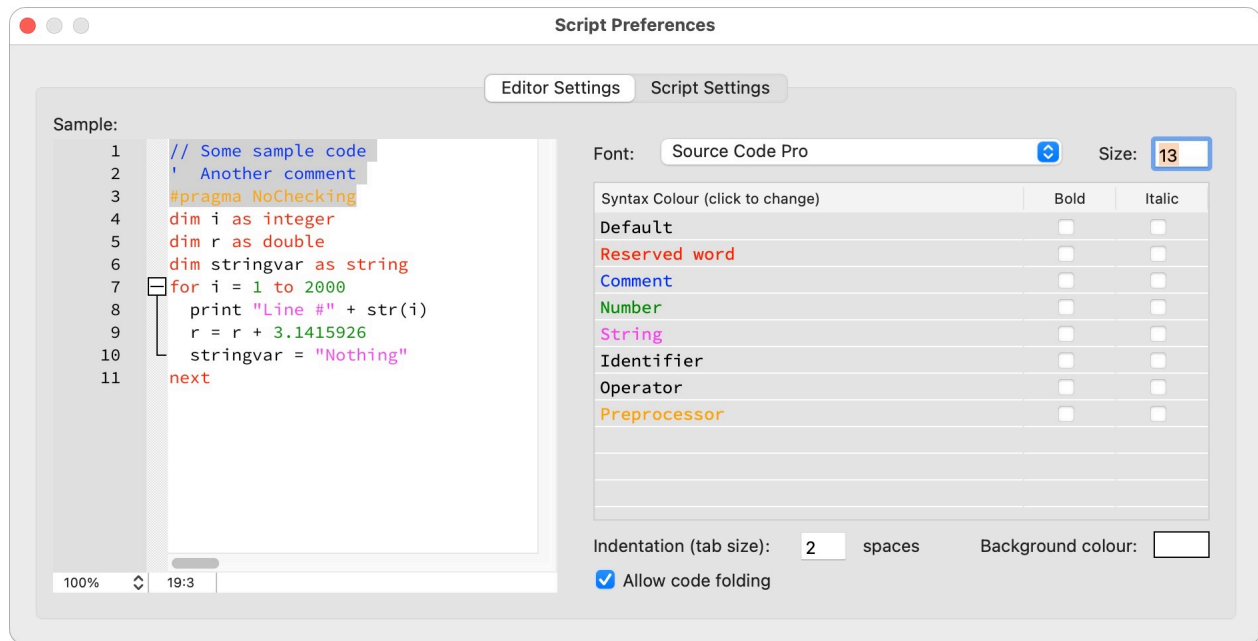


Figure 468: Script preferences window - Editor Settings

The **Sample** is a mini-editor that reflects any changes you make to the settings, so that you can see the effects of doing so.

Font. Specify the font and size to use in the editor. You probably want to choose a fixed character width font (e.g. Monaco or Courier). The AstroPlanner developer prefers Source Code Pro (a freely available Google font for all platforms).

Syntax Colour. A list of syntactical elements, and what colour to use for each (click the name to change colour). You can also specify bold or italic.

Indentation tab size. the editor auto-formats your code, using tabs. This setting specifies how many space characters per tab to use.

Background colour. If you long for the days of DOS or like coding in the dark, you can change the background colour of the editor by clicking on the colour swatch.

Allow code folding. The editor allows you to "fold up" blocks (e.g. the lines of code in a FOR loop). This settings shows folding graphics in the left gutter and lets you fold/unfold code until the cows come home.

20.12.2 Script Settings

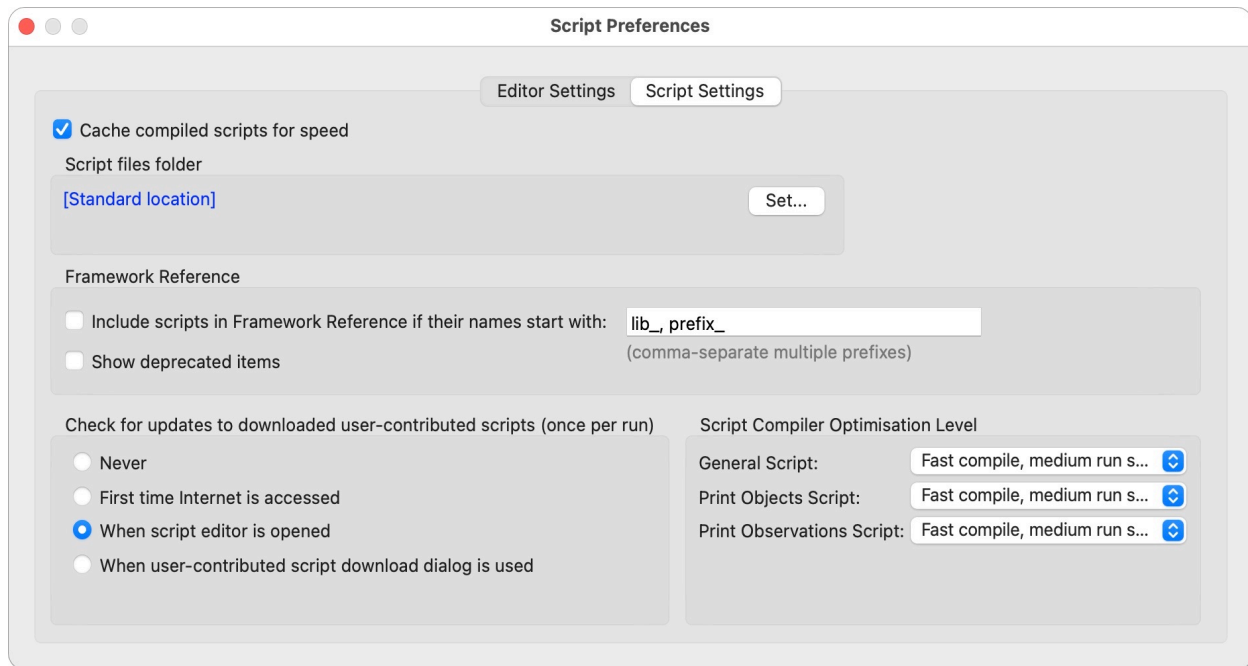


Figure 469: Script preferences window - Script Settings

Cache compiled scripts for speed. When this option is selected, a script is pre-compiled the first time it is used, but not thereafter (unless a change is made to the script). If the option is not selected, the script is compiled every time it is run. This can add significant delays to each run.

Script files folder. The standard location for scripts is in the Application Support folder. This setting lets you select another folder to use. This can be useful if you want to share a scripting folder with another editing application, etc.

Include scripts in Framework Reference. You can add your own script files to the Framework Reference window if this option is selected. Only scripts that start with the given prefixes will be included.

Show deprecated items. If this is switched on then each time you compile any deprecated (i.e. out of date) framework calls will be reported.

Check for updates to downloaded user-contributed scripts. If you download a user-contributed script, there's a chance that it will be updated. This setting allows you to check the on-line inventory to see if there's a more recent version of any script you previously downloaded. The choices specify when this check is done.

Script Compiler Optimisation Level. For the various types of scripts, these settings specify the compiler optimisation level to use. The more optimisations used, the slower the initial compile, but the faster the script running speed. Typically a fast compile is more desirable than a (relatively small) increase in run speed - unless you have a very compute-intensive script.

21 Communicating with other applications

There are various ways you can communicate with applications other than AstroPlanner itself.

21.1 Importing & exporting data

You can import data from other applications by importing that data from within AstroPlanner itself (see Section 26.1 on page 378 for more details).

Other applications might be able to accept data in a format exportable by AstroPlanner (see Section 26.2 on page 386 for more details).

21.2 Direct control

AstroPlanner allows direct control of, and by, selected external applications (primarily planetarium-style applications). In order for such an external application to be supported it must have a means of communicating with it from AstroPlanner, via various technologies such as TCP/IP, AppleScript, etc. Also, the protocol for doing so must be published by the authors of those external applications.

You can support one of these applications at a time. The application is chosen in the External preferences (see Section 20.4 on page 317)

Currently, the following external applications are supported by AstroPlanner.

21.2.1 Cartes du Ciel (SkyChart)

<https://www.ap-i.net/skychart/>

This is a freeware planetarium application. AstroPlanner supports both V3 and V4 (Windows and Macintosh).

AstroPlanner can control the pointing of the field of view in Cartes du Ciel, and vice versa.

21.2.2 C2A

<https://www.astrosurf.com/c2a/english/>

This is a planetarium application (Windows-only).

AstroPlanner can control the pointing of the field of view in C2A, and vice versa.

21.2.3 Stellarium

<https://stellarium.org>

This is a freeware planetarium application. AstroPlanner supports the latest versions (Windows and Macintosh).

AstroPlanner can control the pointing of the field of view in Stellarium, and vice versa.

22 User-contributed observing plans

As well as creating your own observing plans, you can also benefit from the efforts of other users and download ready-to-use plan documents that have been uploaded to an online database by others. This database is common to all registered users, and you are free to upload your own plans to this database to benefit others. Obviously this feature requires a live connection to the Internet.

22.1 Downloading plans

Use the **File > User-Contributed Plans > Download...** menu command to bring up a window showing the inventory of available plans.

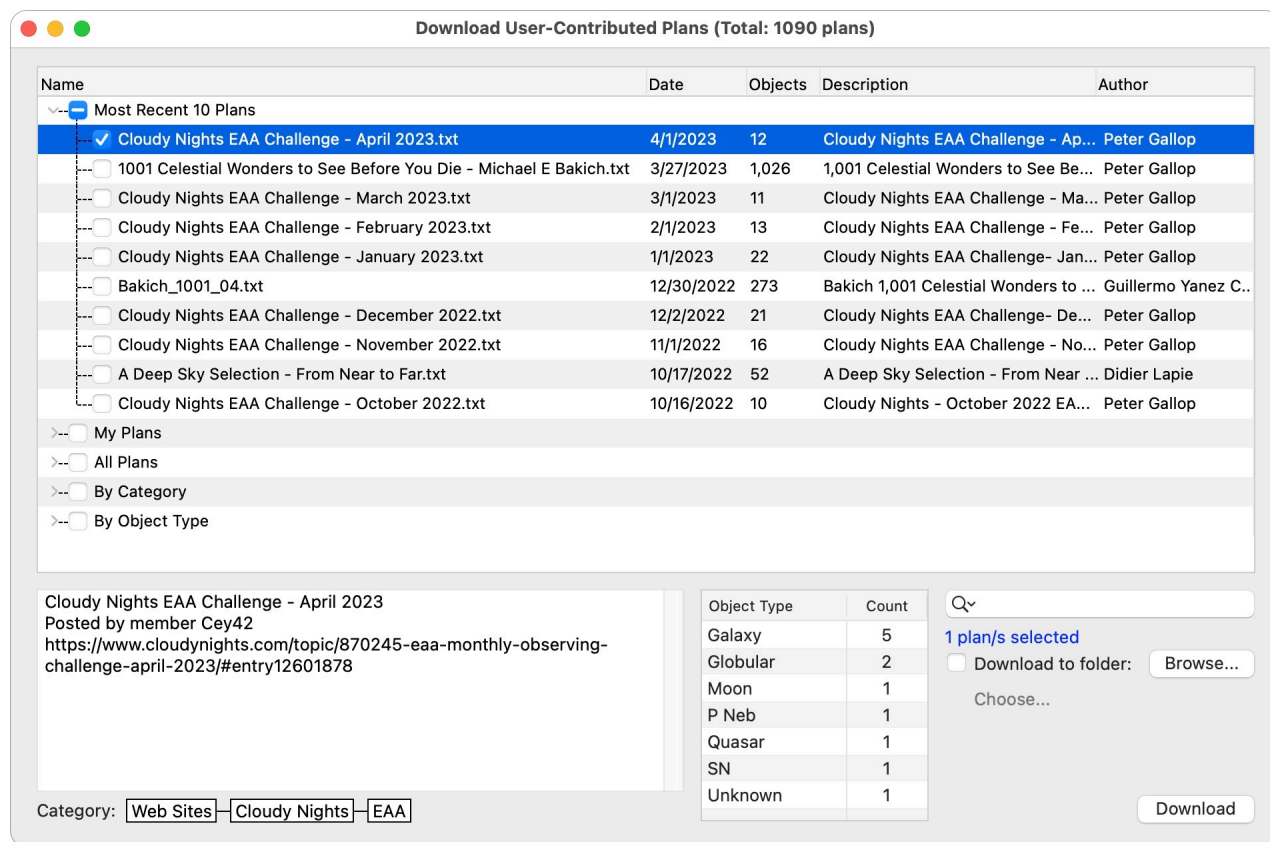


Figure 470: User-contributed plan download window

The ten most recently uploaded plans are displayed first, since these are the most commonly downloaded plans. The inventory of available plans can be displayed in various orders in a hierarchical fashion. In particular:

- **My Plans.** A list of all plans that were uploaded by you. Only you can delete or replace these plans (see below).
- **All Plans.** Can be displayed **By Date** (by year of submission), **By File Name** (alphabetically), **By Number of Objects** (number of objects in the plan document), or **By Author** (the person originally submitting the plan).

- **By Category.** Plans are stored by category and sub-category. e.g. there's a **Magazines** category that contains plans derived from magazine articles. That category has sub-categories for **Sky & Telescope**, **Astronomy**, **Sky at Night**, etc. You can "drill down" until you find the plan you want.
- **By Object Type.** A list of object types (e.g. galaxies) and which plans contain those types of objects.

Each plan entry includes the file name, the date of submission, the number of objects in the plan, (part of) the description, and the author.

Clicking on a particular plan entry displays the complete description, the category, and a list of object types present in that plan document.

You can also search for particular plan documents by typing a search string into the Find field and clicking the **Find** button.

Selecting a plan for download consists of checking the checkbox to the left of the plan file name. You can select more than one plan to download.

Clicking the **Download** button starts the download process for each selected plan. Each plan is opened into a separate plan document window. It will then be up to you to save the plan somewhere convenient.

You can also elect to download the plan documents directly to a specified folder (select the **Download to folder** checkbox, and use the **Browse...** button to choose a suitable folder). The plans will be downloaded directly to files in the specified folder, with the same name as the original plan. This is a lot quicker than the first method, especially if you are downloading several plan documents at once.

22.2 Uploading a plan

You can upload the frontmost plan document by using the **File > User-Contributed Plans > Upload...** menu command.

Upload Plan

Description

A new look at planetary nebulae.

Creator's Name: Paul Rodman ☐ Anonymous

Category*: Catalogues

Planetary Nebula

* use the given pre-defined values where possible

File Name: planetarynew.txt Must be a valid file name, 6 or more characters in length, and end in ".txt".

☐ Announce availability to AstroPlanner groups.io Group

Cancel Upload

Figure 471: User-contributed plan upload dialog

You will need to enter a description and select a category for the plan document (this information comes from the plan document information (Section #.# on page #) and might already be set up.

The document will be uploaded under your registered name. You can use the **Anonymous** checkbox to ensure your identity remains hidden from other users (your plan will have the author set to "Anon." or "Anonymous").

You also need to give the plan a file name. This should be unique. If it is already in use by another user, then you'll be asked to choose another name. If it is the same name as one of your uploaded plans, then you'll be given the option to overwrite the previously-uploaded plan.

Finally, you can use the **Announce plan availability to AstroPlanner Discussion Group** checkbox to send an automated e-mail message to the user's group to let them know of the upload.

22.3 Deleting a plan

You can delete any plan document you previously uploaded by using the **File > User-Contributed Plans > Delete...** menu command. Select the plans scheduled for deletion with the checkboxes, click **Delete**, and they will be permanently removed from the on-line database.

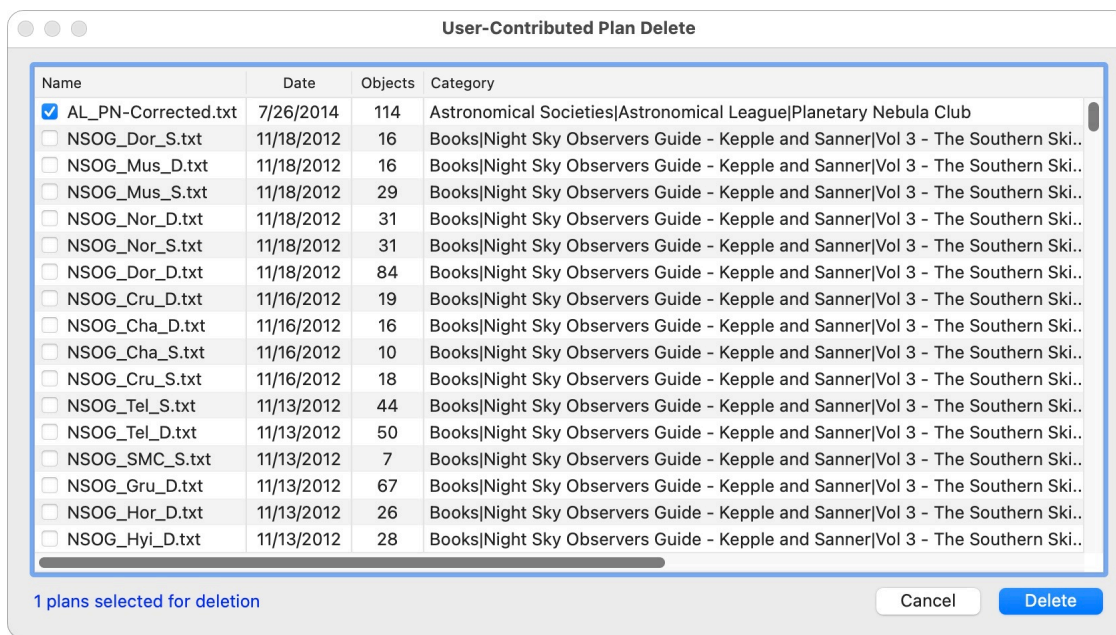


Figure 472: User-contributed plan deletion dialog

23 Managing catalogues

Catalogues are files containing collections of objects that are typically related. Most of the catalogues available for AstroPlanner are derived from professional astronomical catalogue data. This chapter is about managing these catalogues.

You always have at least one catalogue (Bright Star Catalogue) in your application's catalogue *collection*. Additionally, you might have a CD/DVD-ROM or USB flash drive from the vendor containing AstroPlanner catalogues. Most of the catalogues (apart from the bigger ones) are also available on-line and can be downloaded from the repository there.

23.1 Using the Setup Wizard

The simplest way to manage catalogues is with the Setup Wizard (**File > Setup Wizard...**), although you are pretty much limited to adding catalogues to your collection, either from a CD- or DVD-ROM, or by downloading them from the on-line repository.

The wizard dialog appears the first time you run AstroPlanner, but can be used any time to add more catalogues. Click the **Next** button until the **Catalogues** page appears (Figure 474). You will be asked if you want to install catalogues from a CD/DVD-ROM or USB flash drive, and to mount that disk/drive if necessary.



Figure 473: CD/DVD-ROM/USB flash drive warning

The available catalogues are listed in the Suggested Catalogues list. You can select any catalogues you like from the list using the checkbox next to each one (already-installed catalogues excepted). You can also use the User Survey check list on the left and let AstroPlanner make suggestions (in green) for you. Once you've made your selection, click the **Finish** button. The catalogues will then be installed into your collection.

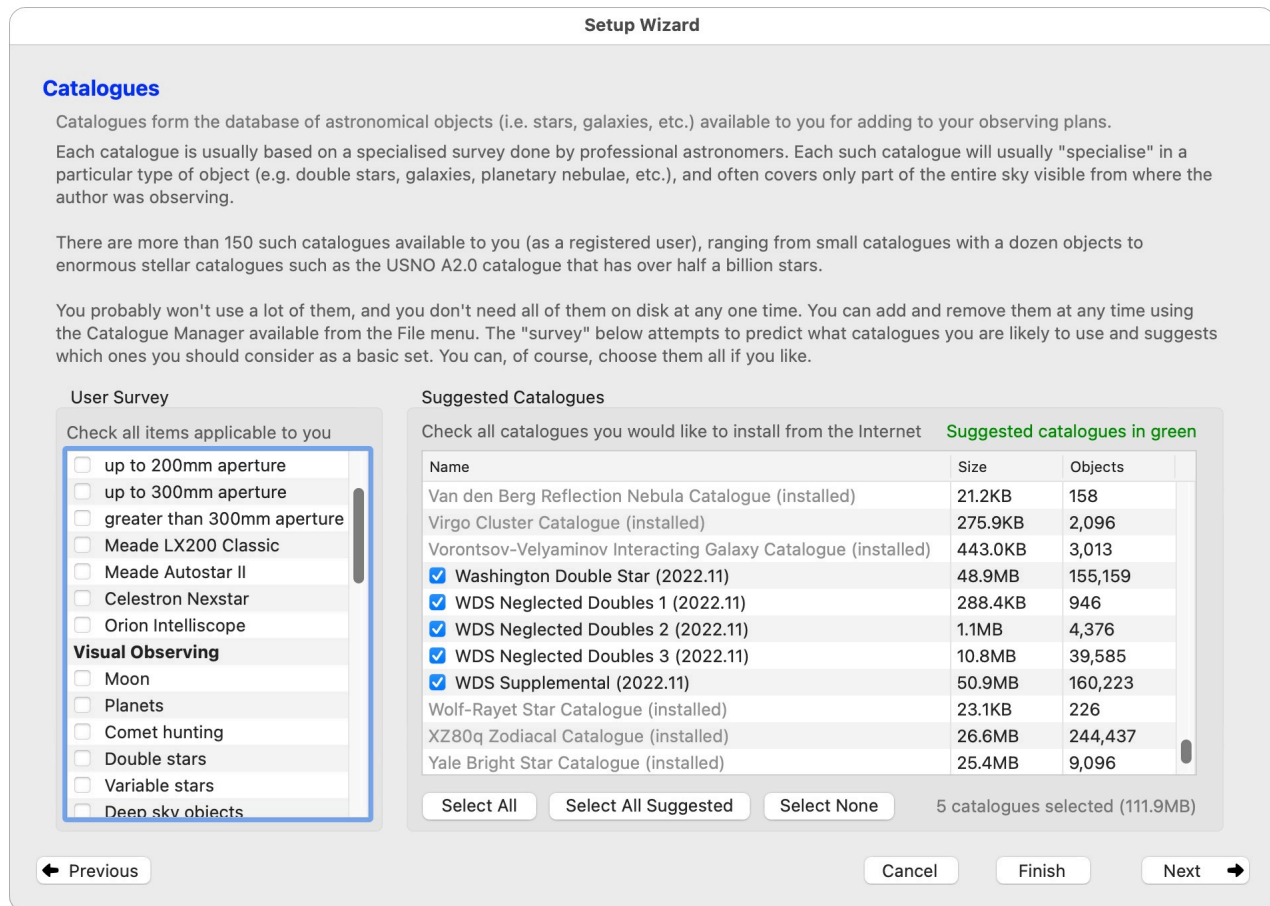


Figure 474: Setup Wizard Catalogues page

23.2 Installing, updating and removing catalogues

The most flexible way to manage your catalogue collection is by using the Catalogue Manager (**File > Catalogue Manager...**). The manager window lists all available catalogues in a list. The first column is the current **Status** and can be:

- **Not installed.** The catalogue is not currently installed in your collection, and can be installed if desired using the **Install** checkbox in the **Action** column.
- **Installed.** The catalogue is currently installed in your collection, and can be removed if desired using the **Remove** checkbox in the **Action** column.

Additionally, if the source is the on-line repository, the **Status** can also be:

- **New.** This is a new catalogue created since the last time you used the Catalogue Manager, and can be installed if desired using the **Install** checkbox in the **Action** column.

- **Deprecated.** This is a catalogue that exists in your collection, but that has been deprecated (made redundant or replaced by another catalogue)¹ since you installed it. It can be removed if desired using the **Discard** checkbox in the **Action** column.
- **Updated.** This is a catalogue that exists in your collection, but that has been updated or revised since you installed it. It can be updated if desired using the **Update** checkbox in the **Action** column.

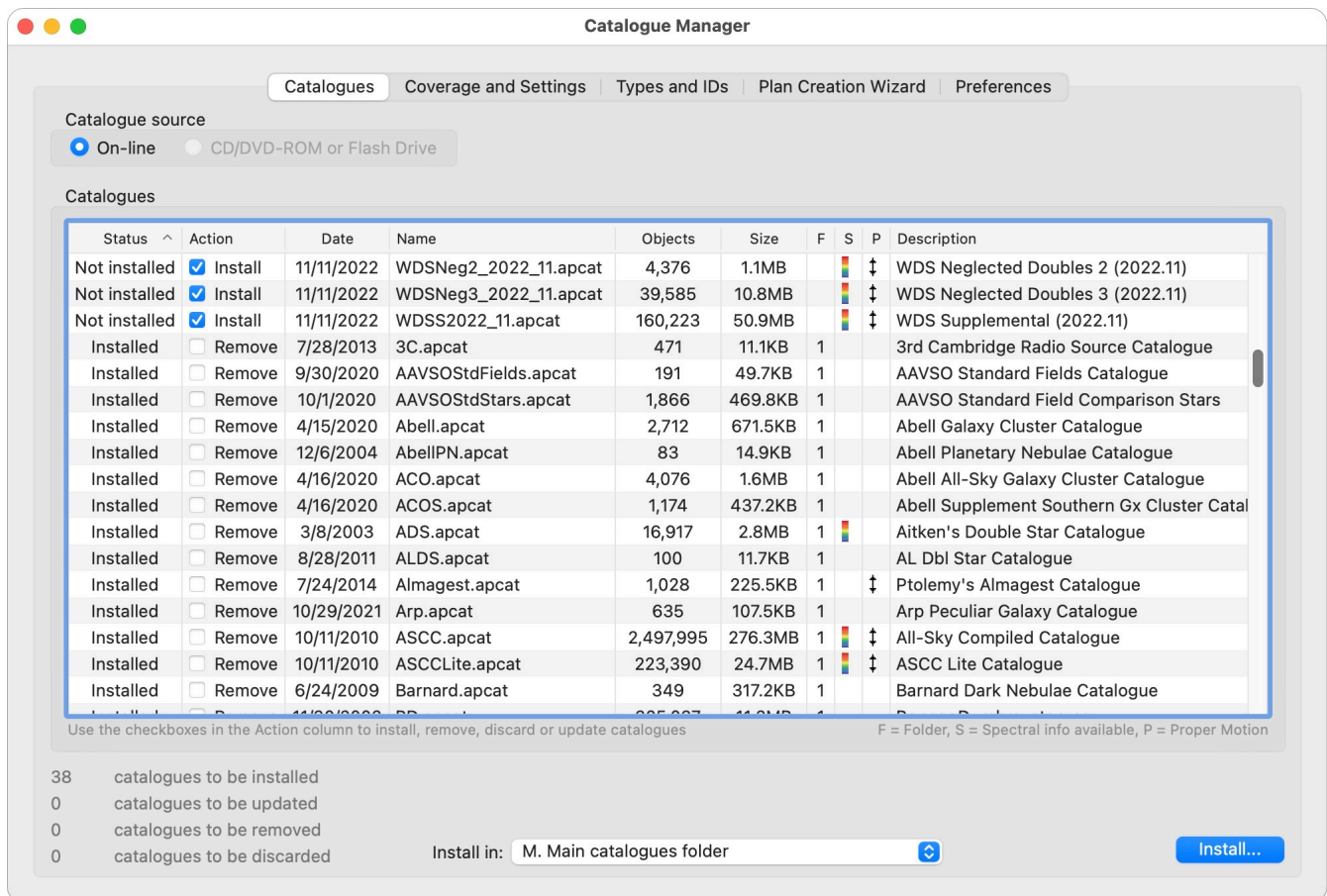


Figure 475: Catalogue manager with catalogue list

If you check any of the checkboxes in the **Action** column then the button at the lower right will be enabled. If you have multiple catalogue folders (see below) then you will need to select the folder that you wish to install to, using the **Install in** popup. The button at the lower right will change its caption to reflect what you want to do (e.g. Install, Remove, Process, etc.). Clicking it will start the installation/update/removal process.

The **F** column specifies what folder the catalogue is installed into (useful if you have alternate catalogue folders). The **S** column contains an entry if the catalogue includes spectral information for the contained objects. The **P** column contains an entry if the catalogue includes proper motion information for the contained stellar objects.

1. This often happens with some older catalogues that are found to be too full of bugs or inconsistencies. Such catalogues are no longer supported by the vendor. You don't have to remove them, but you will no longer be able to download them from the on-line repository. i.e. when they're gone, they're gone.

Right-clicking the list of catalogues gives you some options for selecting catalogues (i.e. turning on the checkbox in the Action column). You can select all installed catalogues, all deprecated catalogues, etc.

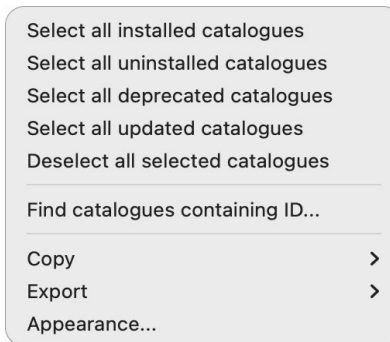


Figure 476: Catalogue Manager list options

The **Find catalogues containing ID...** item allows you to enter an object prefix, and it will list any available catalogues that have that ID prefix as a primary ID (i.e. catalogues that probably have all objects with that ID prefix), or as a secondary ID (i.e. catalogues that have at least some of the objects with that ID prefix). If the catalogues are not installed, you can then select one or more of them for installation.

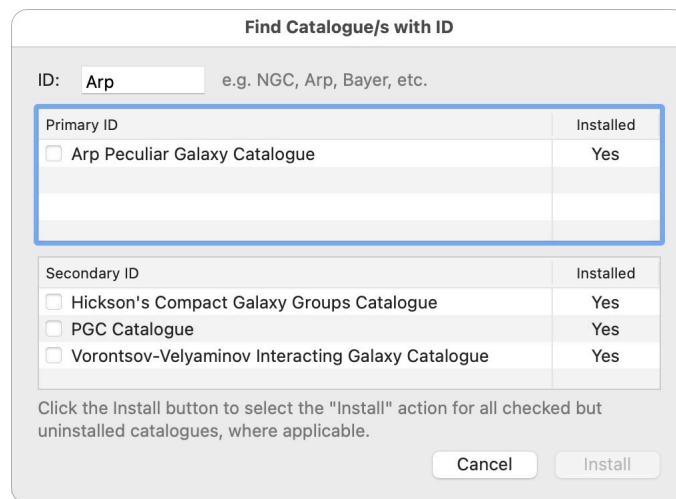


Figure 477: Find catalogues containing ID

23.3 Catalogue settings and coverage

The **Coverage and Settings** tab of the Catalogue Manager lets you set some flags on the catalogues, and also show the sky coverage of each catalogue on an all-sky map. The list contains an entry for each installed catalogue in your collection. Clicking on a catalogue entry shows the sky coverage. It also allows you to set the following flags on each catalogue:

- **Preferred (P)**. When catalogues are searched, those marked as **Preferred** are searched first.
- **Don't search (D)**. When catalogues are searched, those marked **Don't search** are skipped.

- **FoV default (F).** When a new plan window is created, each catalogue marked as **FoV default** will be switched on in the Field of View chart catalogue list¹. This is only done initially, and any such selected catalogues can be switched off thereafter.
- **Sky chart (S).** Any catalogue marked as **Sky chart** will be displayed in the Sky chart if the **Objects > Catalogue objects** display option is used.
- **Use Name (N).** Use the Name field of the catalogue entry instead of the ID when displaying objects in the Field of View chart (if the Name is non-blank). This is useful if the catalogue Name is more “meaningful” than the primary ID. e.g. the SAC DSO catalogue: NGC20 (Name) is better than SAC6 (ID).
- **Show Label (L).** If the catalogue is displayed in the Field of View chart, the Label column for that catalogue will be automatically set to "Yes" by default, and labels will be shown.
- **FoV Min and FoV Max.** The minimum and/or maximum magnitudes to be used to limit which objects in the catalogue are displayed in the field of view chart.

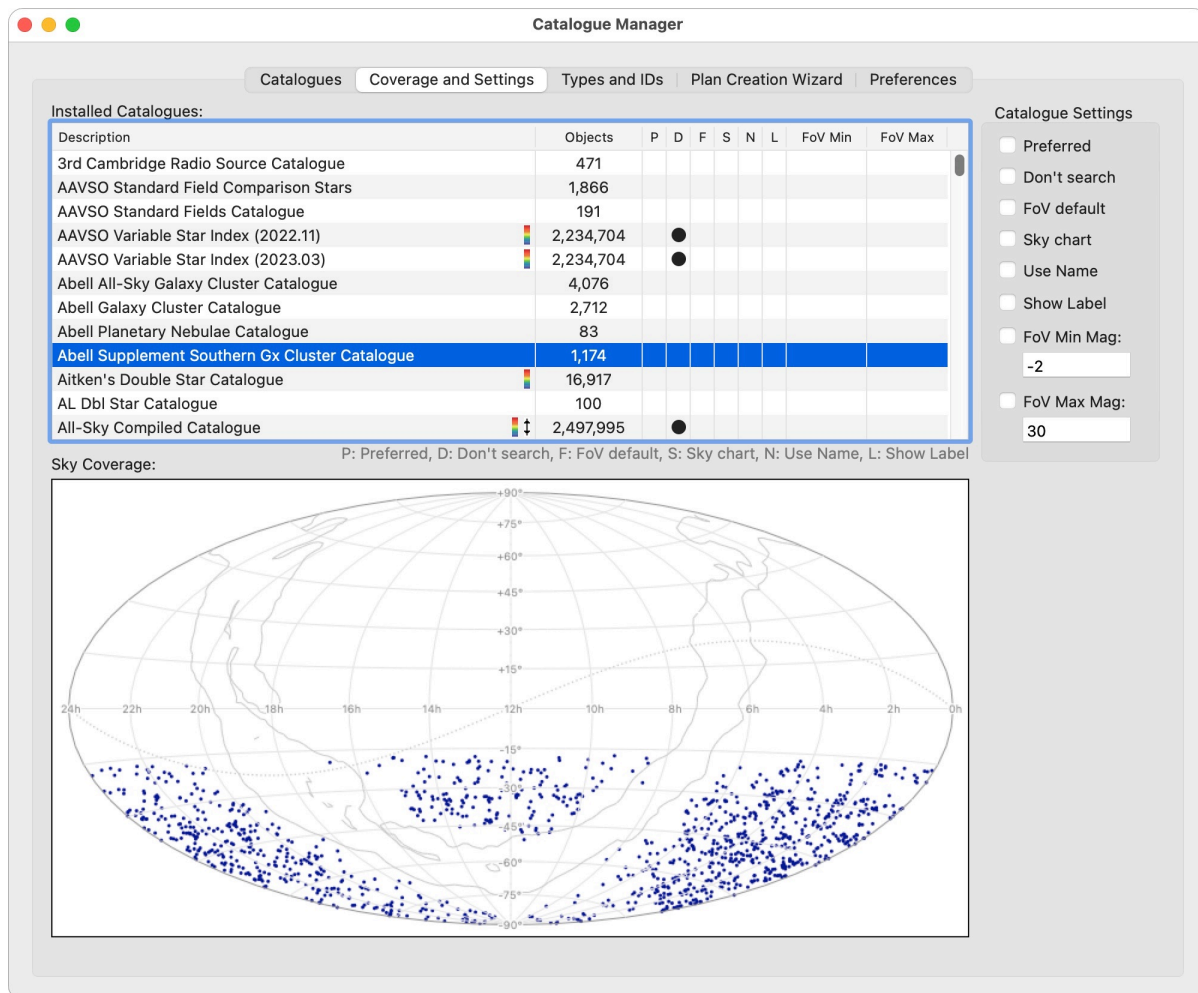


Figure 478: Catalogue coverage and settings

1. If you create a new plan using another plan document as a template, this setting will be ignored.

23.4 Catalogue Types & IDs

The **Types and IDs** tab of the Catalogue Manager displays information about what IDs are supported by what catalogues, and what object types are present in the catalogues, together with their magnitude range (where applicable). The displayed information is selected by the radio buttons at the top.

- **Catalogue vs. ID.** For each catalogue there's a matrix of IDs with a bullet where an ID is supported by the catalogue.
- **Catalogue + ID.** For each catalogue there's a list of IDs supported by the catalogue.
- **Catalogue vs. Types.** For each catalogue there's a matrix of Types with a bullet where a catalogue contains objects of that type.
- **Catalogue + Types.** For each catalogue there's a list of Types contained in that catalogue.

Catalogue	Objects	000-	3C	Abell	ACO	ACOS	ADS	AGASC	AGK2	ALDS	Arp	ASCC	B	Barnard
3rd Cambridge Radio Source Catalogue	471		●											
AAVSO Standard Field Comparison Stars	1,866	●												
AAVSO Standard Fields Catalogue	191													
AAVSO Variable Star Index (2022.11)	2,234,704													
AAVSO Variable Star Index (2023.03)	2,234,704													
Abell All-Sky Galaxy Cluster Catalogue	4,076			●	●									
Abell Galaxy Cluster Catalogue	2,712			●										
Abell Planetary Nebulae Catalogue	83			●										
Abell Supplement Southern Gx Cluster Catalogue	1,174					●								
Aitken's Double Star Catalogue	16,917						●							
AL Dbl Star Catalogue	100									●				
All-Sky Compiled Catalogue	2,497,995											●		
Arp Peculiar Galaxy Catalogue	635										●			
ASCC Lite Catalogue	223,390											●		
Barnard Dark Nebulae Catalogue	349												●	●
Bedford Catalogue	879													
Berkeley Catalogue	104													
Bernes Bright Nebulosity Catalogue	160													
Bernes Dark Cloud Catalogue	160													
BeSS Beryllium Star Catalogue	2,021													
Bonner Durchmusterung	325,037													
Boss General Catalogue	33,342													
Bright Star Catalogue	9,110													
Burnham Double Star Catalogue	2,202						●							
Caldwell Catalogue	109													

Figure 479: Catalogue vs. ID

Catalogue Manager		
Catalogues Coverage and Settings Types and IDs Plan Creation Wizard Preferences		
<input type="radio"/> Catalogue vs. ID <input checked="" type="radio"/> Catalogue + ID <input type="radio"/> Catalogue vs. Types <input type="radio"/> Catalogue + Types		
Catalogue	Objects	IDs
3rd Cambridge Radio Source Catalogue	471	3C
AAVSO Standard Field Comparison Stars	1,866	000-
AAVSO Standard Fields Catalogue	191	Field-
AAVSO Variable Star Index (2022.11)	2,234,704	VSX, [GCVS]
AAVSO Variable Star Index (2023.03)	2,234,704	VSX, [GCVS]
Abell All-Sky Galaxy Cluster Catalogue	4,076	Abell, ACO
Abell Galaxy Cluster Catalogue	2,712	Abell
Abell Planetary Nebulae Catalogue	83	Abell
Abell Supplement Southern Gx Cluster Catalogue	1,174	ACOS
Aitken's Double Star Catalogue	16,917	ADS, WDS
AL Dbl Star Catalogue	100	ALDS, [Bayer], [Flamsteed]
All-Sky Compiled Catalogue	2,497,995	ASCC, HD, HIP, [Bayer], [Flamsteed]
Arp Peculiar Galaxy Catalogue	635	Arp, IC, MCG, NGC, UGC
ASCC Lite Catalogue	223,390	ASCC, HD, HIP, [Bayer], [Flamsteed]
Barnard Dark Nebulae Catalogue	349	B, Barnard
Bedford Catalogue	879	Bedford
Berkeley Catalogue	104	Berk
Bernes Bright Nebulosity Catalogue	160	Be, DG, HH, IC, NGC, vdB
Bernes Dark Cloud Catalogue	160	Be, L
BeSS Beryllium Star Catalogue	2,021	BD, BeSS, HD, [Bayer], [Flamsteed], [GCVS]
Bonner Durchmusterung	325,037	BD
Boss General Catalogue	33,342	BD, CD, CP, GC, HD
Bright Star Catalogue	9,110	HD, HR, SAO, [Bayer], [Flamsteed]
Burnham Double Star Catalogue	2,202	ADS, BD, BU, CD, CP, WDS
Caldwell Catalogue	109	C, NGC
Cape Photographic Durchmusterung	454,877	CP

Figure 480: Catalogue + ID

Catalogue Manager

Catalogues

Coverage and Settings

Types and IDs

Plan Creation Wizard

Preferences

☐ Catalogue vs. ID

☐ Catalogue + ID

☒ Catalogue vs. Types

☐ Catalogue + Types

☐ Show magnitudes

Catalogue	Objects	Star	Double Star	Open Cluster	Galaxy	Globular Cluster	Variable Star	Planet
3rd Cambridge Radio Source Catalogue	471							
AAVSO Standard Field Comparison Stars	1,866	1,866						
AAVSO Standard Fields Catalogue	191							
AAVSO Variable Star Index (2022.11)	<div><div></div><div></div><div></div></div> 2,234,704						2,234,704	
AAVSO Variable Star Index (2023.03)	<div><div></div><div></div><div></div></div> 2,234,704						2,234,704	
Abell All-Sky Galaxy Cluster Catalogue	4,076							
Abell Galaxy Cluster Catalogue	2,712							
Abell Planetary Nebulae Catalogue	83							
Abell Supplement Southern Gx Cluster Catalogue	1,174							
Aitken's Double Star Catalogue	<div><div></div><div></div><div></div></div> 16,917		16,917					
AL Dbl Star Catalogue	100		100					
All-Sky Compiled Catalogue	<div><div></div><div></div><div></div></div> 2,497,995	2,497,995	61,934				129,954	
Arp Peculiar Galaxy Catalogue	635				635			
ASCC Lite Catalogue	<div><div></div><div></div><div></div></div> 223,390	223,390	34,943				52,777	
Barnard Dark Nebulae Catalogue	349							
Bedford Catalogue	879	62	313	57	93	28		
Berkeley Catalogue	104			103		1		
Bernes Bright Nebulosity Catalogue	160							
Bernes Dark Cloud Catalogue	160							
BeSS Beryllium Star Catalogue	<div><div></div><div></div><div></div></div> 2,021	2,021						
Bonner Durchmusterung	325,037	325,037						
Boss General Catalogue	<div><div></div><div></div><div></div></div> 33,342	33,342						
Bright Star Catalogue	<div><div></div><div></div><div></div></div> 9,110	6,218	1,744					
Burnham Double Star Catalogue	<div><div></div><div></div><div></div></div> 2,202		2,202					
Caldwell Catalogue	109			28		18		

Figure 481: Catalogue vs. Types

Catalogue	Objects	Object Types
3rd Cambridge Radio Source Catalogue	471	Radio Source (471)
AAVSO Standard Field Comparison Stars	1,866	Star (1,866)
AAVSO Standard Fields Catalogue	191	Star Field (191)
AAVSO Variable Star Index (2022.11)	2,234,704	Variable Star (2,234,704)
AAVSO Variable Star Index (2023.03)	2,234,704	Variable Star (2,234,704)
Abell All-Sky Galaxy Cluster Catalogue	4,076	Galaxy Cluster (4,076)
Abell Galaxy Cluster Catalogue	2,712	Galaxy Cluster (2,712)
Abell Planetary Nebulae Catalogue	83	Planetary Nebula (83)
Abell Supplement Southern Gx Cluster Catalogue	1,174	Galaxy Cluster (1,174)
Aitken's Double Star Catalogue	16,917	Double Star (16,917)
AL Dbl Star Catalogue	100	Double Star (100)
All-Sky Compiled Catalogue	2,497,995	Star (2,497,995), Double Star (61,934), Variable Star (129,954)
Arp Peculiar Galaxy Catalogue	635	Galaxy (635)
ASCC Lite Catalogue	223,390	Star (223,390), Double Star (34,943), Variable Star (52,777)
Barnard Dark Nebulae Catalogue	349	Dark Nebula (349)
Bedford Catalogue	879	Star (62), Double Star (313), Triple Star (147), Multiple Star (149), Open Cluster ...
Berkeley Catalogue	104	Open Cluster (103), Globular Cluster (1)
Bernes Bright Nebulosity Catalogue	160	Herbig-Haro Object (27), Emission Nebula (20), Nebula (8), Reflection Nebula (...)
Bernes Dark Cloud Catalogue	160	Dark Nebula (160)
BeSS Beryllium Star Catalogue	2,021	Star (2,021)
Bonner Durchmusterung	325,037	Star (325,037)
Boss General Catalogue	33,342	Star (33,342)
Bright Star Catalogue	9,110	Star (6,218), Double Star (1,744), Triple Star (703), Multiple Star (445)
Burnham Double Star Catalogue	2,202	Double Star (2,202)
Caldwell Catalogue	109	Open Cluster (28), Globular Cluster (18), Supernova Remnant (2), Planetary Ne...
Cape Photographic Durchmusterung	454,877	Star (454,877)

Figure 482: Catalogue + Types

23.5 Plan Creation Wizard catalogues

The Plan Creation Wizard tab contains a list of the installed catalogues that contribute to the Plan Creation Wizard's database. The top list shows the installed catalogues and a count of the number of objects they contribute to the database, including a total line at the bottom.

The second list shows uninstalled catalogues that could contribute to the wizard's database. By selecting the checkbox next to those catalogues, you can use the **Install...** button to install them (and thus add the objects to the database).

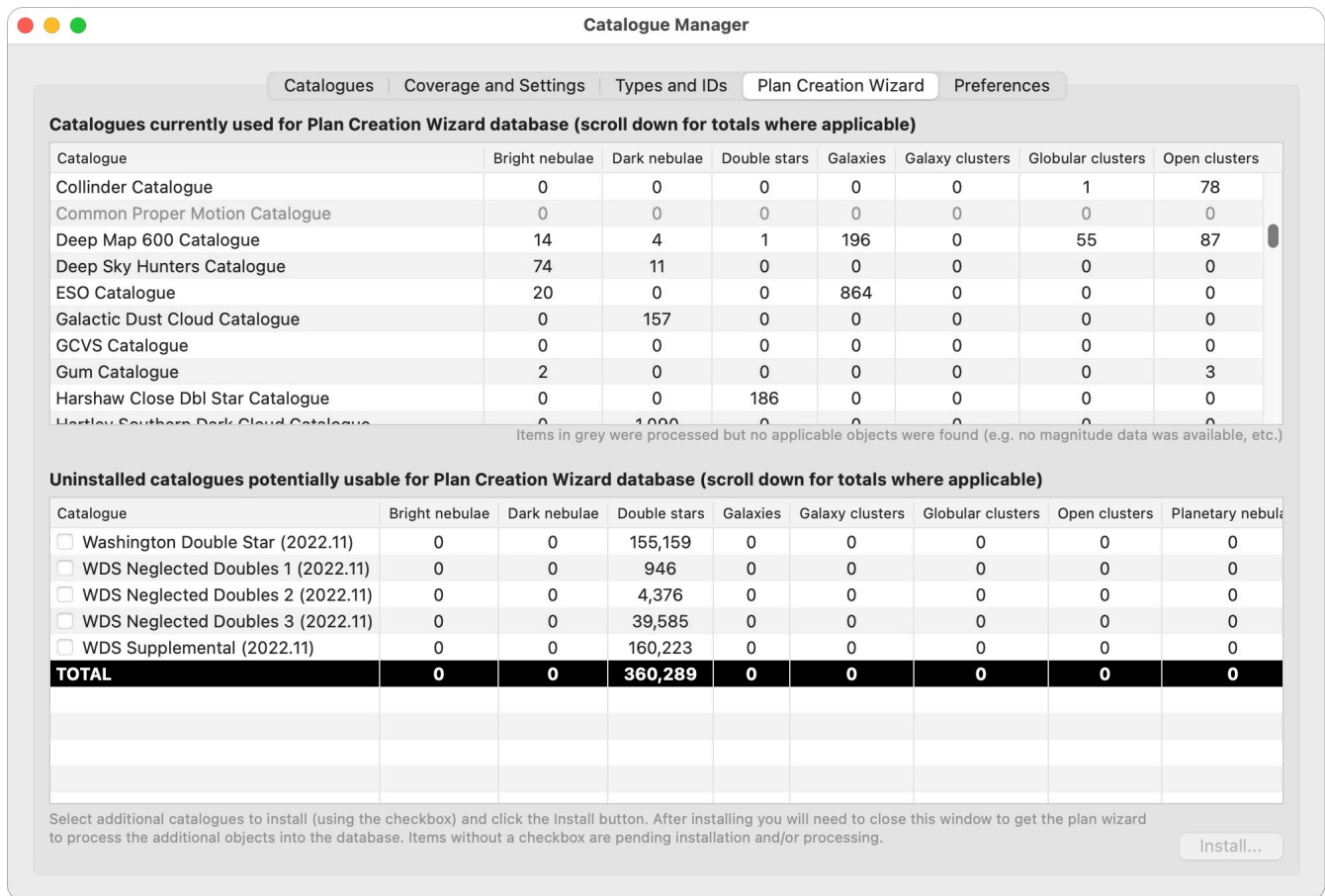


Figure 483: Plan Creation Wizard catalogues

23.6 Displaying catalogue contents

The contents of catalogues can be displayed in a window. There are various ways to do this:

- **Object > Open Catalogue/s.**
- The **Show Catalogue** popup button under the object list.
- Double-clicking a catalogue entry on the Field of View tab.
- Double-clicking an installed catalogue entry in the Catalogue Manager window.

The catalogue display window has two tabs.

The **Catalogue** tab shows all of the objects in a table form.

The **Obs** column reports the number of observations of the associated object in the observation database, and the **Found** column is "Yes" if any of those observations reports that the object was found.

If the image database has any images of the object, an "I" in a grey circle appears after the first ID.

The **Annotations** widget displays any catalogue annotations for the selected object. See Section 23.7 on page 363 for details.

You can find a particular object by typing its ID into the Find field. The popup lists the valid IDs supported by the catalogue.

If a telescope with Go-To capability is currently connected, the **Slew to Object** button will slew the telescope to the selected object (assuming it's visible).

The **Add Selected** button will add the selected object/s to the plan document from whence the window was opened. If the **Don't add if observed** checkbox is checked, then any selected objects that have already been observed will not be added to the plan. Clicking the button will close the window, unless the **Keep window open** checkbox is checked.

Messier Catalogue

Catalogue Coverage Chart

ID (M)	ID (NGC)	ID (UGC)	Obs	Found	Type	Name	RA	Dec	Con	Mag	Angle	Size	Incl	Rating
48	2548				Open		08h 13m 43s	-05°45'00"	Hya	5.5	0	54		EX
49	4472	7629			Galaxy		12h 29m 47s	+08°00'01"	Vir	9.3	155	9.8x...		VG
50	2323				Open	Heart-shaped Cluster	07h 02m 42s	-08°23'00"	Mon	7.0	0	16		GD
51	5194	8493	3	Yes	Galaxy	Whirlpool Galaxy, Question Mark...	13h 29m 52s	+47°11'45"	CVn	8.9	163	10.8...	1	VG
52	7654				Open	The Scorpion	23h 24m 48s	+61°35'36"	Cas	8.0	0	13		EX
53	5024		1	Yes	Globular		13h 12m 55s	+18°10'07"	Com	8.5	0	12.6		VG
54	6715				Globular		18h 55m 03s	-30°28'47"	Sgr	8.5	0	9.1		VG
55	6809		1	Yes	Globular		19h 40m 00s	-30°57'44"	Sgr	7.0	0	19		EX
56	6779				Globular		19h 16m 36s	+30°11'02"	Lyr	9.5	0	7.1		VG
57	6720				P Neb	Ring Nebula	18h 53m 35s	+33°01'44"	Lyr	9.5	0	2.5		VG
58	4579	7796	2	Yes	Galaxy		12h 37m 44s	+11°49'06"	Vir	10.4	95	6x4.8	2	GD
59	4621	7858			Galaxy		12h 42m 02s	+11°38'48"	Vir	10.7	165	5.3x4	1	GD
60	4649	7898			Galaxy		12h 43m 40s	+11°33'08"	Vir	9.8	105	7.6x...		GD

Annotations: **The primary ID according to Catalogue Manager preferences**

NGC5024 CS 80; DSC/M 1667; DSW 136; NSOG (2) 81,103; S&G 141; S&T May 2011; TLO 94; UAG 117; UBY 69

Other IDs:

? Find: M Slew to Object Don't add if observed Keep window open Add Selected

110 objects in catalogue 1 object/s selected

Figure 484: Catalogue display window

The ? button (bottom left) displays information about the catalogue. The various types of objects in the catalogue are enumerated, together with the count and magnitude range. If a description is available for the catalogue, then it is displayed in the bottom half of the window.

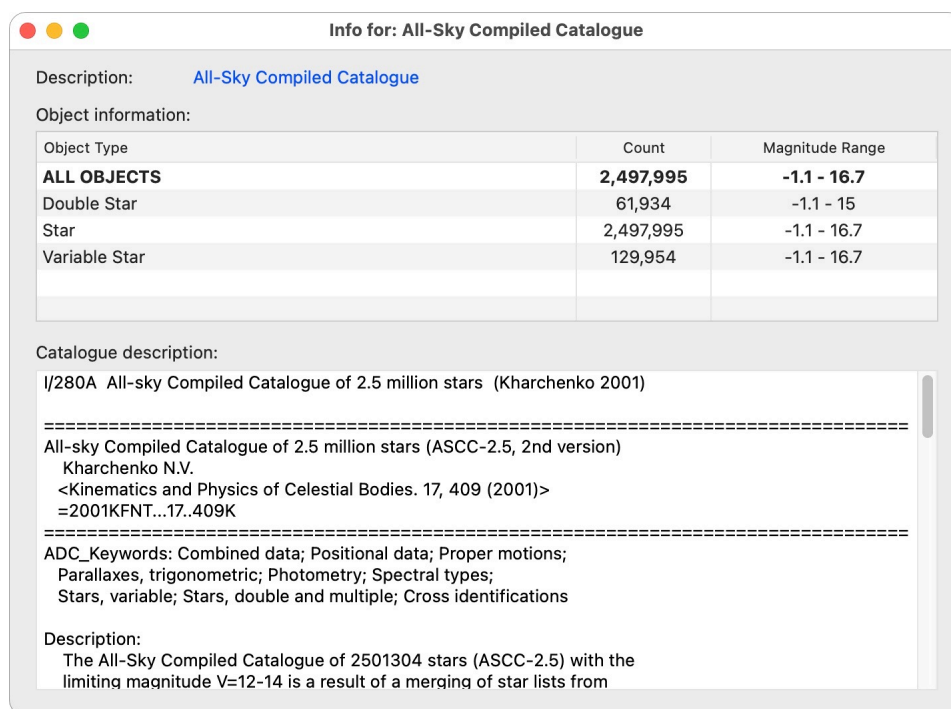


Figure 485: Catalogue information window

The **Coverage Chart** tab shows all of the catalogue objects on an all-sky Aitoff map. If one or more objects are selected in the Catalogue tab, then those objects are circled in red on the map and the constellation boundary for the enclosing constellation is shown.

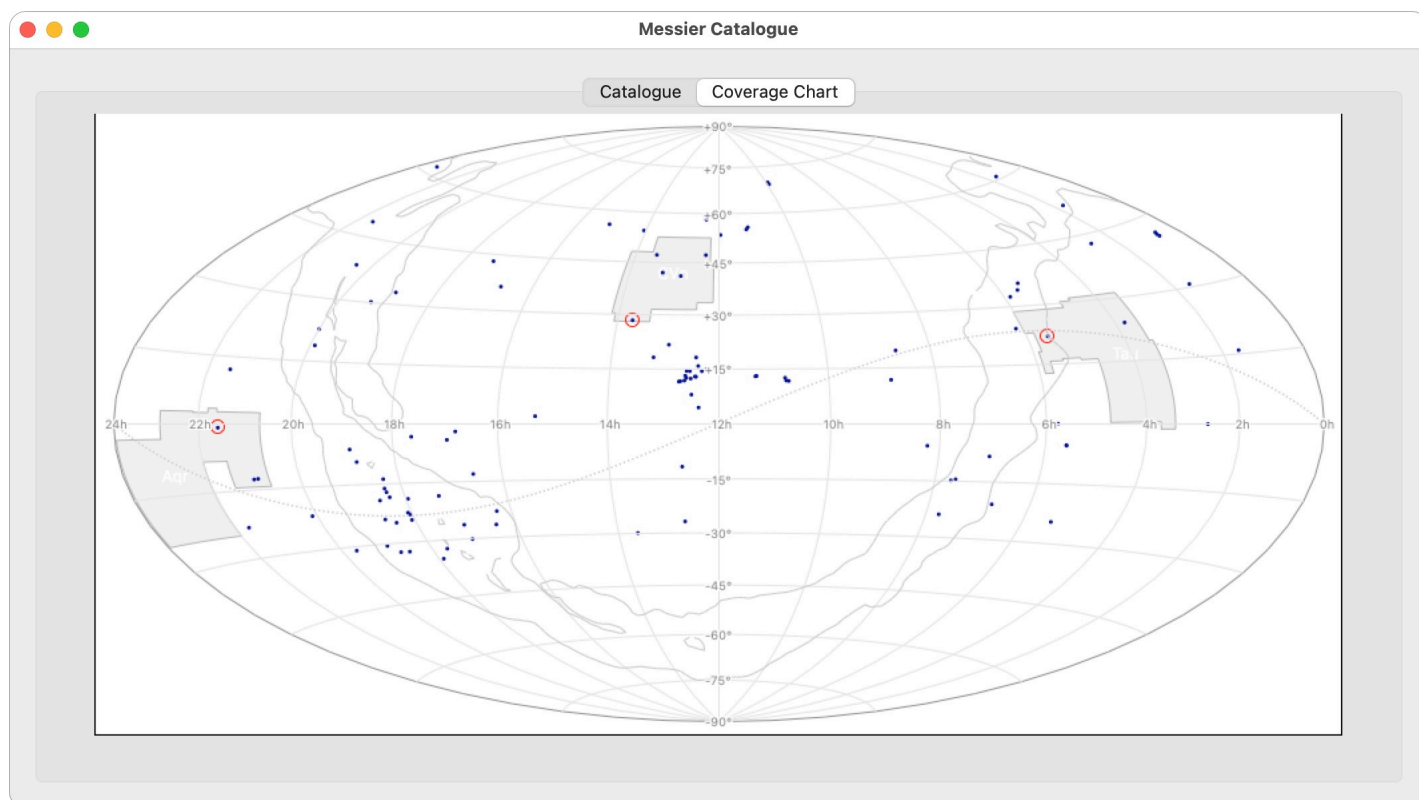


Figure 486: Catalogue coverage sky map

23.7 Catalogue annotations

Catalogue annotations are text that the user can add to specific catalogue entries, by ID. These annotations are kept in a separate database and are displayed in various places. In each place the widget has the same form.

NGC1952 BSS 13; CS 45; DSC/M 39; NSOG -1-375; S&G 166; S&T 2011/60; UAG 12; UBY 170

+ - Other IDs: Crab Nebula, Taurus A, LBN 833

Figure 487: Annotation widget

The annotation widget consists of a list on the left containing the IDs of all relevant objects. Note that synonyms of objects will also be shown. e.g. if the annotations for M1 are being shown, then any annotations for NGC1952 (the same object) will also be shown.

On the right is a text editor field containing the annotation text.

There are buttons for adding a new annotation, deleting the selected annotation/s, and duplicating the selected annotation.

The **Other IDs** field contains any other known IDs for the annotation, separated by commas.

Places the catalogue annotation widget is found:

23.7.1 Catalogue display window

This allows you to edit annotations for the selected catalogue object.

Messier Catalogue

Catalogue Coverage Chart

ID (M)	ID (NGC)	ID (UGC)	Obs	Found	Type	Name	RA	Dec	Con	Ma
21	6531		2	Yes	Open		18h 04m 13s	-22°29'24"	Sgr	7.0
22	6656		4	Yes	Globular	Great Sagittarius Cluster, Crackerjack Cluster	18h 36m 24s	-23°54'17"	Sgr	6.5
23	6494		3	Yes	Open		17h 57m 04s	-18°59'06"	Sgr	6.0
24	6603		1	Yes	Open	Small Sagittarius Star Cloud	18h 18m 26s	-18°24'24"	Sgr	4.5
25			3	Yes	Open		18h 31m 42s	-19°07'00"	Sgr	6.5
26	6694		2	Yes	Open		18h 45m 18s	-09°23'00"	Sct	9.5
27	6853		5	Yes	P Neb	Dumbbell Nebula, Apple Core, Diablo, Double-hea...	19h 59m 36s	+22°43'15"	Vul	7.5
28	6626		4	Yes	Globular		18h 24m 33s	-24°52'07"	Sgr	8.5
29	6913		3	Yes	Open	Cooling Tower	20h 23m 57s	+38°30'30"	Cyg	9.0
30	7099		3	Yes	Globular		21h 40m 22s	-23°10'45"	Cap	8.5
31	224	454	2	Yes	Galaxy	Andromeda Galaxy	00h 42m 44s	+41°16'08"	And	4.3
32	221	452	1	Yes	Galaxy	Satellite Of Andromeda Galaxy	00h 42m 42s	+40°51'54"	And	9.1
33	598	1117	7	Yes	Galaxy	Triangulum Galaxy, Pinwheel Galaxy	01h 33m 51s	+30°39'37"	Tri	6.2

Annotations: The primary ID according to Catalogue Manager preferences

NGC6853 BSS 65; CS 127; DSC/M 102; IGAW p. 505; NSOG (2) 475, 482; S&G 179, 190; SH 122; UAG 163; UBY 82

+ - Other IDs: Dumbbell Nebula, Apple Core, Diablo, Double-headed Shot Nebula

? Find: M Slew to Object Don't add if observed Keep window open Add Selected

110 objects in catalogue 1 object/s selected

Figure 488: Annotation editing: Catalogue display window

23.7.2 Object list editor

When the object editing fields for the object list are being displayed, you can examine and edit annotations for the currently-selected object.

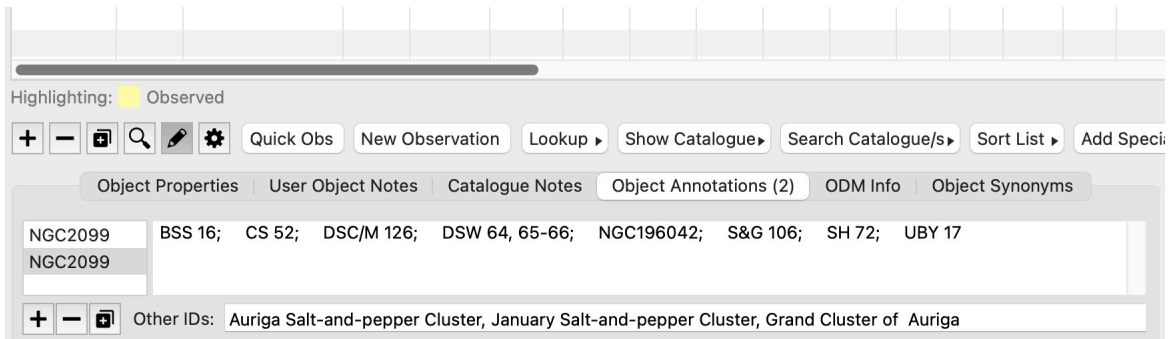


Figure 489: Annotation editing: Object list editor

23.7.3 Observation data entry

When an observation is being entered, the annotations for the selected object are displayed.

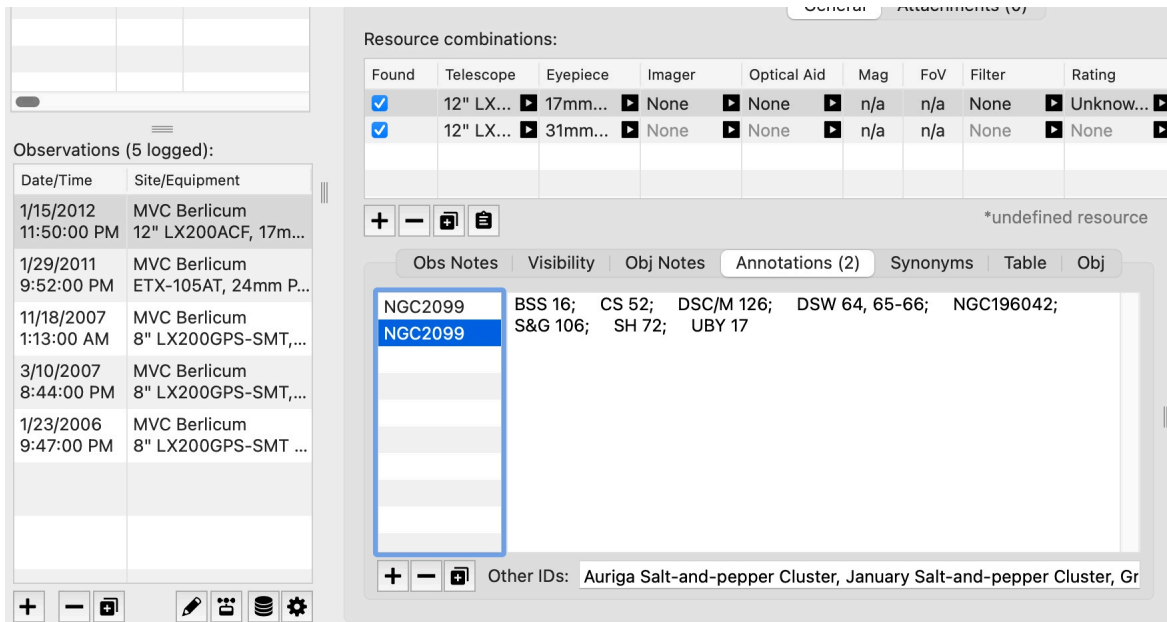


Figure 490: Annotation editing: Observation data entry

23.7.4 Annotation editor

The Annotation editor can be reached via the **Object > Edit Annotations...** menu command. This displays *all* annotations, and is a convenient way to do bulk editing, deleting, etc.

The **Export...** button exports all the annotations in the database to a tab-separated text file.

The **Import...** button imports annotations that were previously exported (perhaps on another computer).

Note that, in the case of the editor only, any changes you make will not be saved back to the annotation database until the **Save** button is used.

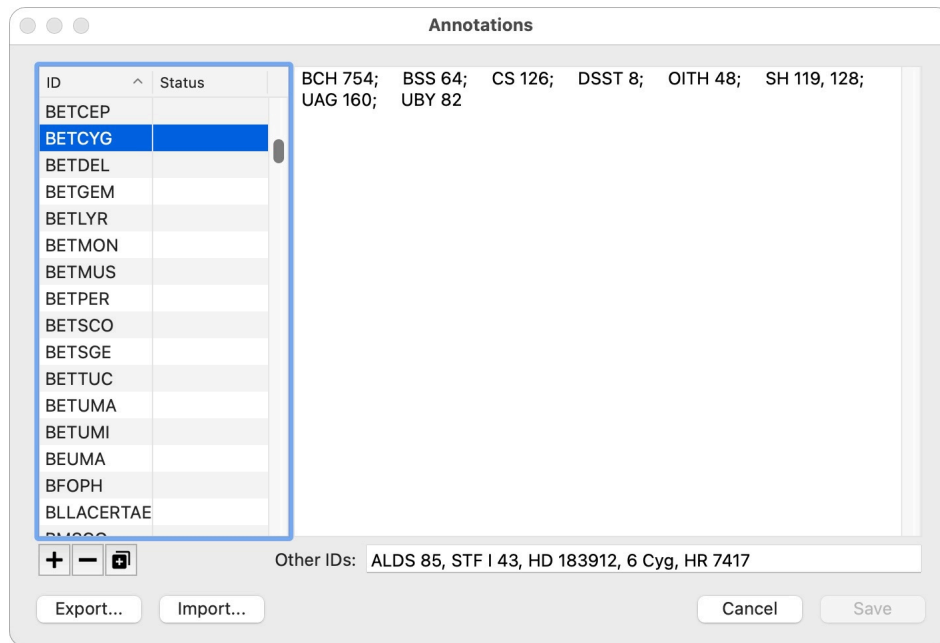


Figure 491: Annotation editing: Annotation editor

24 Comets & Minor Planets

Comets and minor planets, being solar system objects, do not have a fixed position in the sky, and rely on orbital elements (a bunch of weird-sounding numbers that define their orbit) to determine their current position in the sky. Those elements are typically retrieved from an on-line source as explained below. As the orbits for these objects are refined, the elements might also change over time.

24.1 Downloading comet elements

Use the **File > Import > Comet Data...** menu command to retrieve orbital element data. The dialog lets you choose the source of the data to import.

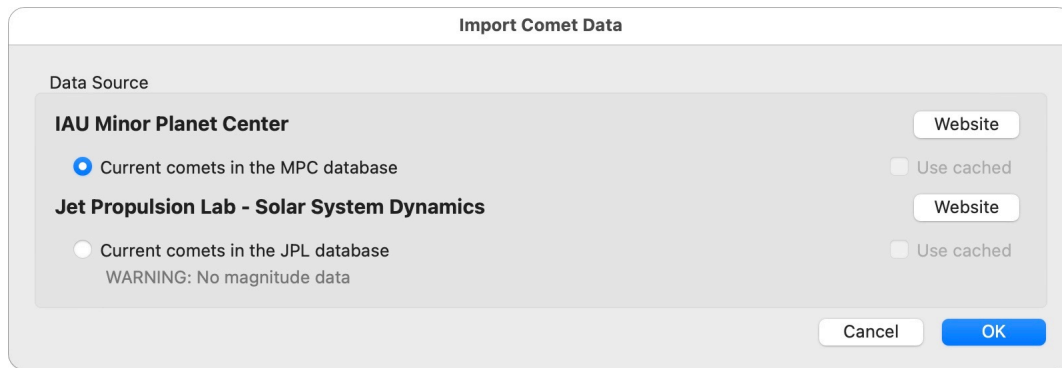


Figure 492: Select comet data source

The two options¹ download the latest data from the Internet (assuming you have a connection). If you have previously downloaded from a source, the **Use cached** checkbox will be enabled. Checking this will use the previously cached copy rather than requiring a download. Hovering the cursor over the checkbox will reveal when the data was downloaded and how many objects are in the cache.

The **Website** button, if enabled, will take you to the website providing the data if you need more information.

Once you've selected the source, and clicked **OK**, you will be presented with a list of comet objects for which elements are available (Figure 493). Select one or more comets to be added to your plan by checking the checkbox to the left of the entry in the list. The **All** and **None** buttons select all displayed comets, or clears all selections, respectively.

The list includes the ID of the comet and some other parameters computed from the comet elements and based on the current local date/time:

- **Magnitude.** The current estimated magnitude of the comet. This is not available in all cases (e.g. the JPL download does not include parameters to compute the magnitude).
- **Motion "/hr.** The current motion per hour of the comet across the sky, in arcseconds.

1. This might change in future versions.

- **Bearing** °. The current bearing of the motion of the comet with respect to north (via east) in degrees.
- **RA**. The current R.A. of the comet.
- **Dec**. The current Declination of the comet.
- **E.Lat** °. The current ecliptic latitude of the comet.
- **E.Long** °. The current ecliptic longitude of the comet.
- **Con**. The current constellation that the comet is travelling through.

ID	Magnitude	Motion "/>hr	Bearing °	RA	Dec	E.Lat °	E.Long °	Con
<input checked="" type="checkbox"/> C/2017 K2 (PANSTARRS)	4.9	102.34	39	03h 51m 08s	-37°23.3'	-55.5	41.5	Eri
<input checked="" type="checkbox"/> C/2020 V2 (ZTF)	8.7	42.36	142	02h 12m 03s	+31°15.6'	16.9	41.5	Tri
<input checked="" type="checkbox"/> C/2019 U5 (PANSTARRS)	8.9	78.92	265	11h 41m 42s	-01°40.0'	-3.4	176.5	Vir
<input type="checkbox"/> 119P/Parker-Hartley	9.1	29.38	98	07h 41m 59s	+25°33.3'	4.1	112.9	Gem
<input type="checkbox"/> 116P/Wild	9.2	36.12	85	19h 40m 11s	-24°56.7'	-3.5	292.6	Sgr
<input type="checkbox"/> 81P/Wild	9.4	29.18	85	17h 41m 47s	-18°51.2'	4.5	265.7	Oph
<input type="checkbox"/> 117P/Helin-Roman-Alu	9.7	51.54	68	23h 10m 40s	-12°49.0'	-6.9	343.7	Aqr
<input type="checkbox"/> C/2022 E3 (ZTF)	9.8	33.09	130	04h 53m 43s	-08°15.2'	-30.6	70.9	Eri
<input type="checkbox"/> C/2020 K1 (PANSTARRS)	9.9	59.84	150	20h 11m 32s	-45°43.2'	-25.1	294.7	Tel
<input type="checkbox"/> 110P/Hartley	10.0	25.18	285	13h 41m 20s	-27°05.7'	-15.4	213.4	Hya
<input type="checkbox"/> C/2021 Y1 (ATLAS)	10.2	51.69	111	03h 59m 54s	-20°36.0'	-40.2	52.2	Eri
<input type="checkbox"/> 126P/IRAS	10.4	87.85	50	23h 21m 28s	-31°45.9'	-25.2	337.9	Scl
<input type="checkbox"/> C/2010 U3 (Boattini)	10.5	10.42	277	14h 18m 49s	+10°22.6'	22.8	208.7	Boo
<input type="checkbox"/> 77P/Longmore	10.7	42.76	226	14h 21m 25s	-26°20.0'	-11.6	221.7	Hya
<input type="checkbox"/> C/2019 L3 (ATLAS)	10.8	11.78	333	09h 01m 46s	-33°21.1'	-47.5	151.8	Pyx
<input type="checkbox"/> C/2019 T4 (ATLAS)	10.9	29.15	345	15h 41m 59s	+13°43.5'	32.4	229.3	Ser
<input type="checkbox"/> 179P/Jedicke	10.9	29.58	69	05h 23m 29s	+16°00.3'	-7.2	81.2	Ori
<input type="checkbox"/> 29P/Schwassmann-Wachm...	11.1	13.34	105	06h 21m 48s	+27°42.0'	4.4	94.8	Gem
<input type="checkbox"/> C/2021 S3 (PANSTARRS)	11.2	27.09	44	05h 22m 22s	-29°25.7'	-52.4	76.5	Col
<input type="checkbox"/> C/2020 R7 (ATLAS)	11.3	60.89	336	17h 58m 51s	+12°54.6'	36.3	269.7	Oph
<input type="checkbox"/> C/2021 T4 (Lemmon)	11.3	12.01	76	00h 30m 51s	-11°00.6'	-13.2	2.6	Cet

Display Restrictions (currently 982 of 982 objects):

Parameter	From	To
<input type="checkbox"/> Magnitude		
<input type="checkbox"/> Motion ("/>hr)		
<input type="checkbox"/> Bearing (° w.r.t. N)		
<input type="checkbox"/> RA		
<input type="checkbox"/> Dec		

Orbital parameters of selected object:

Parameter	Value
Argument Of Perihelion	236.202 °
Date Of Epoch	2023.255
Perihelion Distance	1.796904 AU
Date Of Perihelion Julian	2459933.18
Eccentricity	1.000758
ID	C/2017 K2 (PANS...
Longitude Of Ascending Node	88.2361 °

Buttons: All, None, Cancel, Add

Figure 493: Comet listing dialog

The **Location Map** tab (Figure 494) shows all comets on an all-sky map, with any selected (checked) comets circled in red. Double-clicking a comet on the chart will select that line in the list, and toggle the checkbox next to it.

When a comet entry is selected, the orbital parameters (elements) of the comet is displayed in a table under the list of comets.

By default the list of comets shows all available comets. However, you can use the **Display restrictions** table to select only those comets that obey the restrictions. For example, in Figure 495, the list

has been restricted to comets whose current magnitude is 16 or brighter, and whose declination is -25° or greater. This reduces the list from 982 total down to 151 displayed. Click the **Update** button to refresh the list. Use the **Most recent first** option to sort the list appropriately.

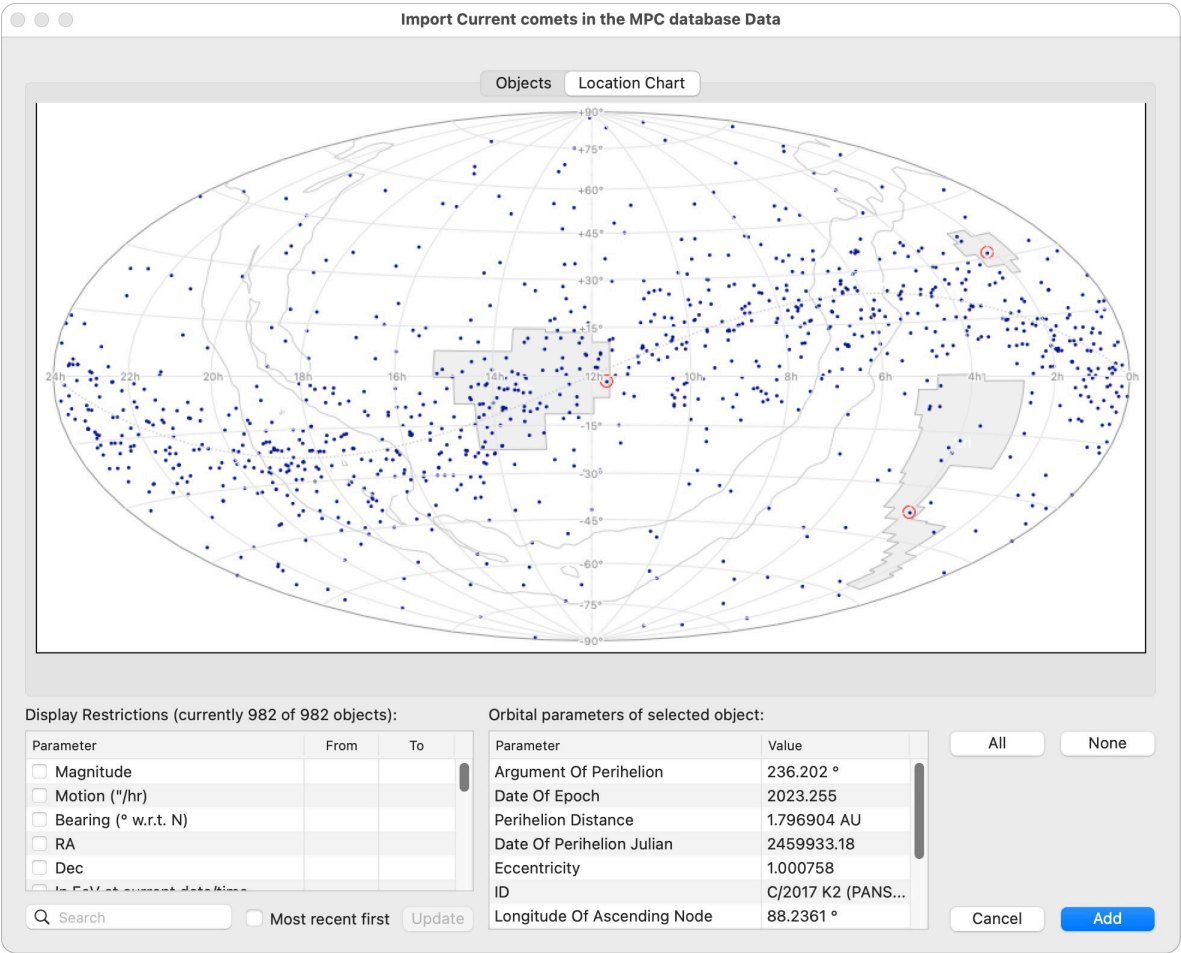


Figure 494: Comet location map

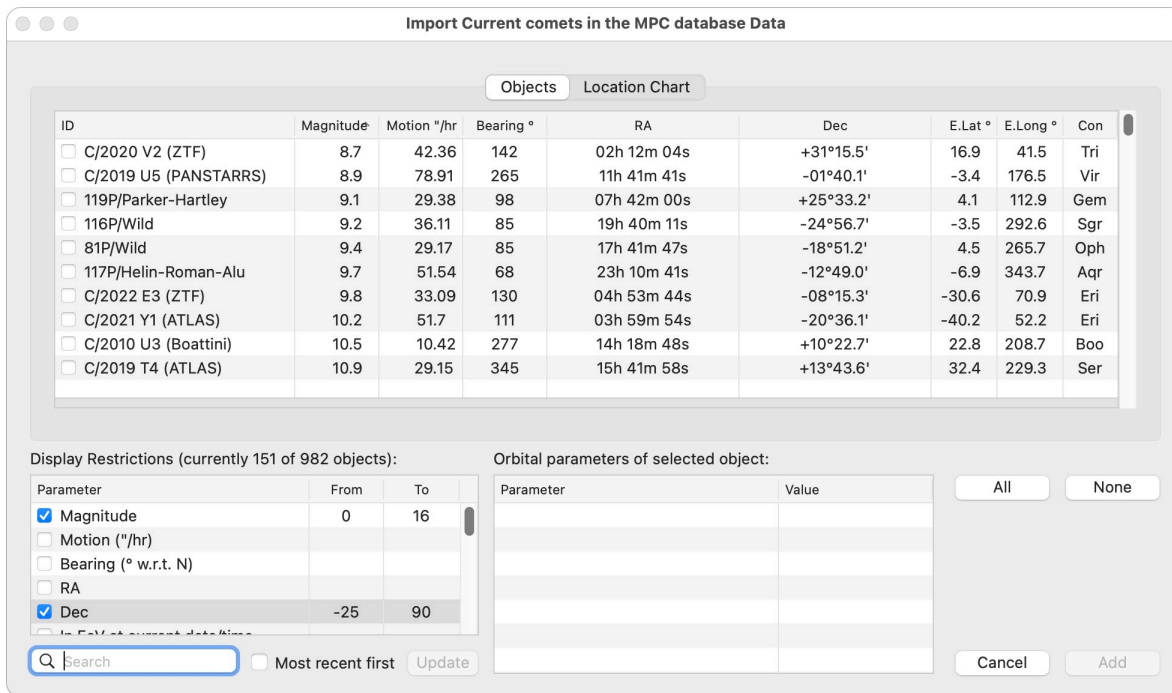


Figure 495: Comet list with display restrictions

24.2 Downloading minor planet elements

Use the **File > Import > Minor Planet Data...** menu command to retrieve orbital element data. The dialog lets you choose the source of the data to import.

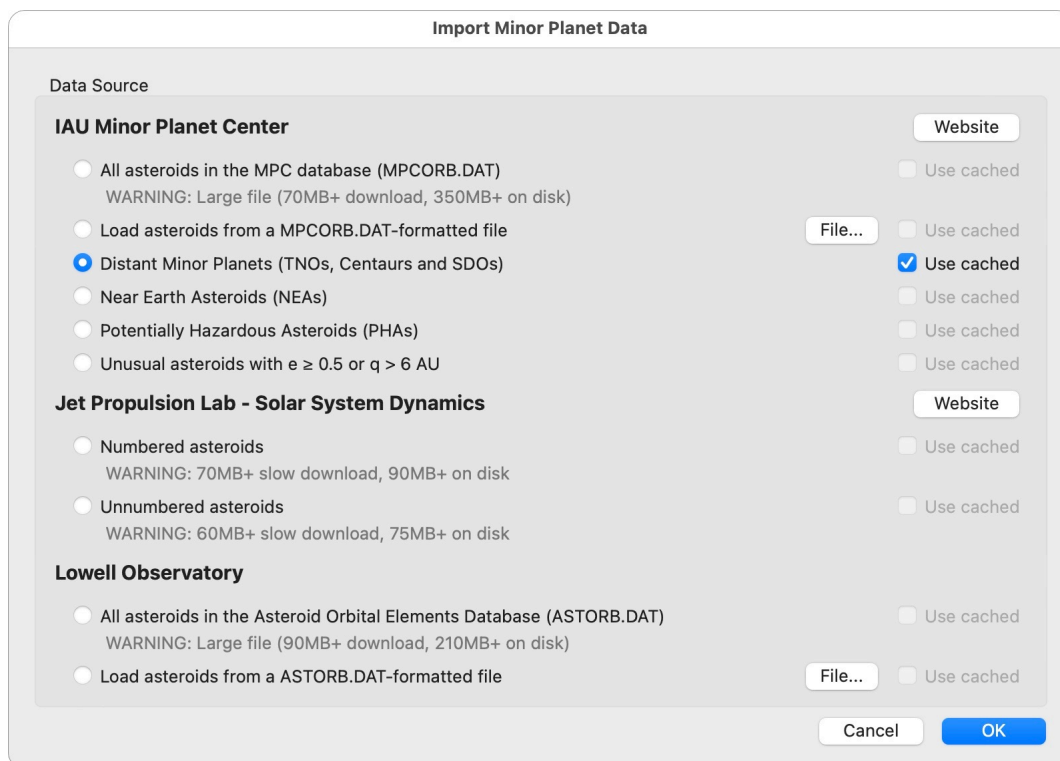


Figure 496: Select minor planet data source

The various options download the latest data from the Internet (assuming you have a connection) or from a suitably formatted text file if available. If you have previously downloaded from a source, the **Use cached** checkbox will be enabled. Checking this will use the cached copy rather than requiring a download. Hovering the cursor over the checkbox will reveal when the data was downloaded and how many objects are in the cache.

The **Website** button, if enabled, will take you to the website providing the data if you need more information.

For the file options, you select your formatted text file via the **File...** button. That file is then imported into the internal cache file. Note that the **Use cached** checkbox is always disabled in this case, but will be checked if the cache is present. In this case if you want to update the cache, use the **File...** button on a new text file.

Once you've selected the source, and clicked **OK**, you will be presented with a list of minor planet objects for which elements are available (Figure 497).

Select one or more minor planets to be added to your plan by checking the checkbox to the left of the entry in the list. The **All** and **None** buttons select all displayed minor planets, or clears all selections, respectively.

The list includes the ID of the minor planet and some other parameters computed from the minor planet elements and based on the current local date/time:

- **Magnitude.** The current estimated magnitude of the minor planet.
- **Motion "/hr.** The current motion per hour of the minor planet across the sky, in arcseconds.
- **Bearing °.** The current bearing of the motion of the minor planet with respect to north (via east) in degrees.
- **RA.** The current R.A. of the minor planet.
- **Dec.** The current Declination of the minor planet.
- **E.Lat °.** The current ecliptic latitude of the minor planet.
- **E.Long °.** The current ecliptic longitude of the minor planet.
- **Con.** The current constellation that the minor planet is travelling through.

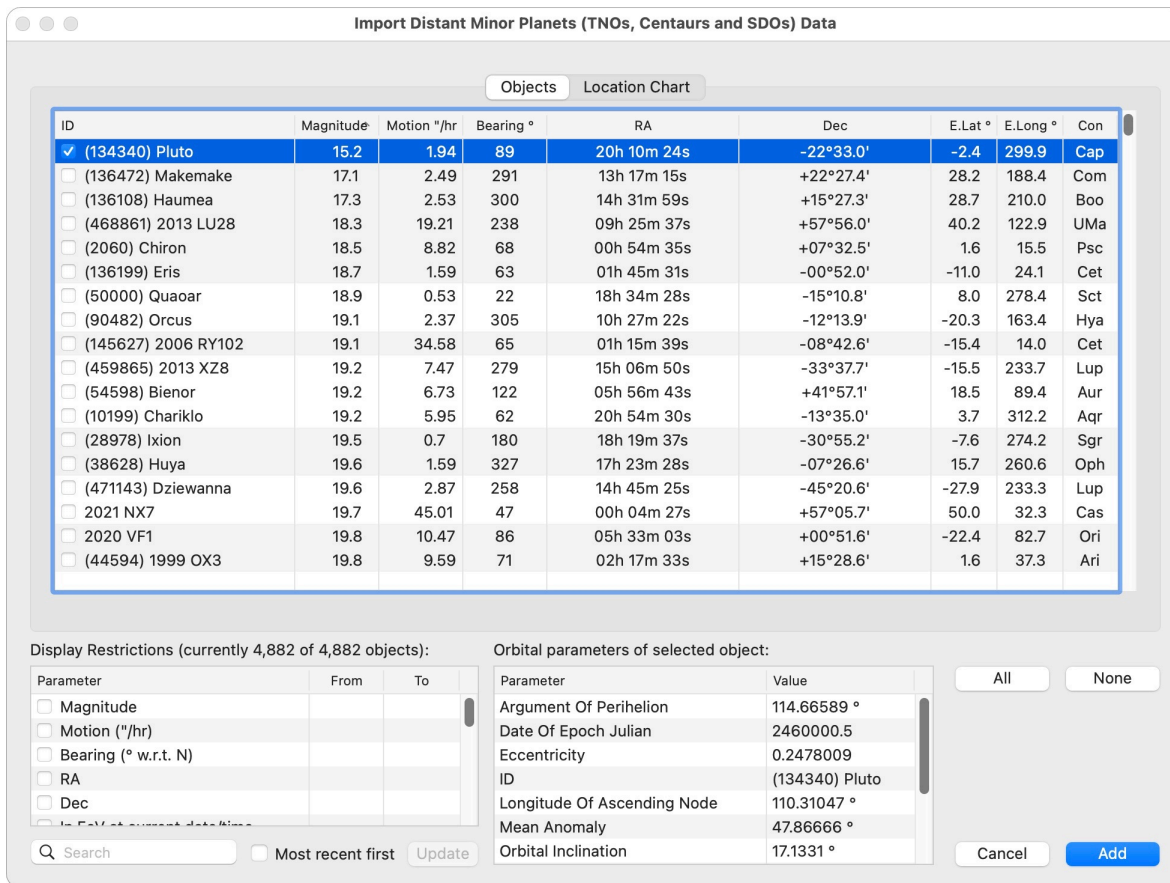


Figure 497: Minor planet listing dialog

The **Location Map** tab shows all minor planets on an all-sky map, with any selected minor planets circled in red. Double-clicking a minor planet on the chart will select that line in the list and toggle the checkbox.

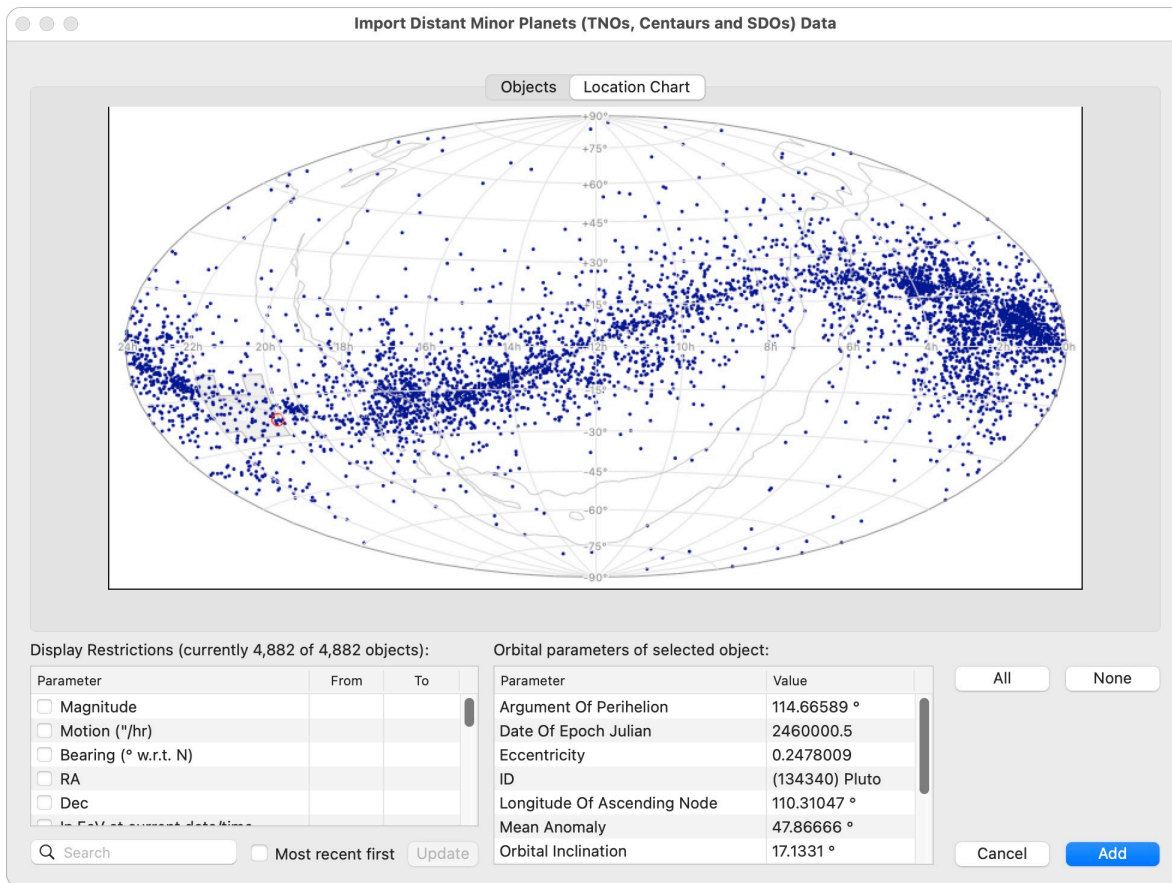


Figure 498: Minor planet location map

When a minor planet entry is selected, the orbital parameters (elements) of the minor planet are displayed in a table under the list of minor planets.

By default the list of minor planets shows all available minor planets. However, you can use the **Display restrictions** table to select only those minor planets that obey the restrictions. For example, in Figure 499, the list has been restricted to minor planets whose current magnitude is 20 or brighter, and whose declination is -30° or greater. This reduces the list from 4882 total down to 9 displayed.

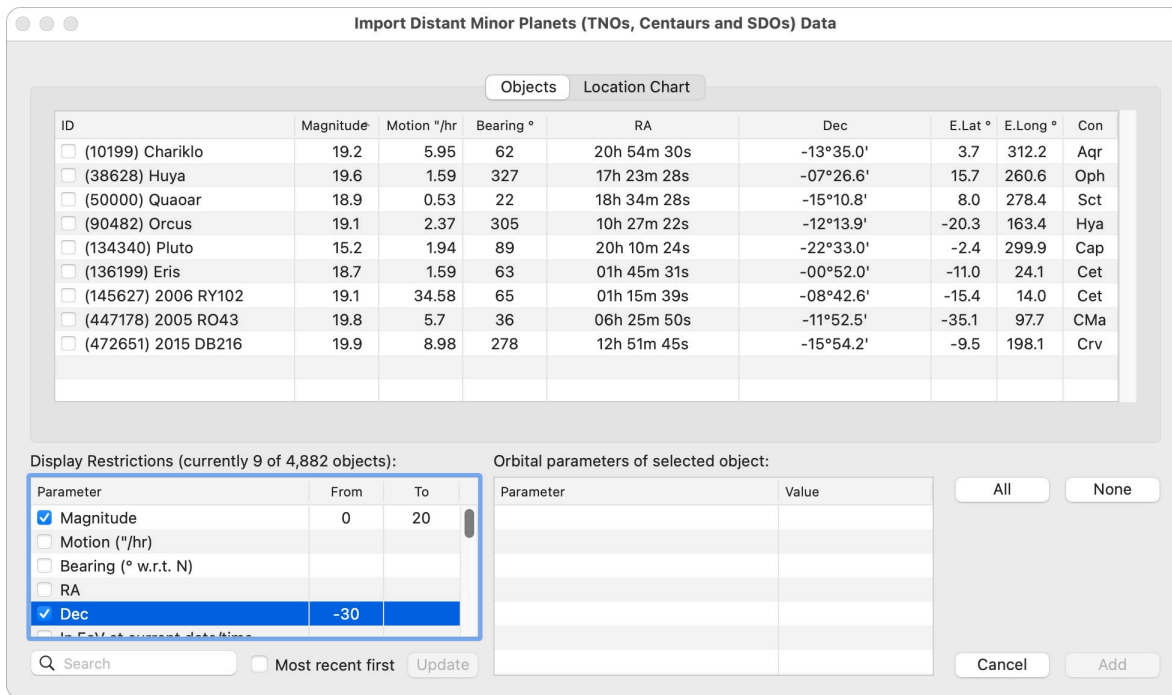


Figure 499: Minor planet list with display restrictions

24.3 Quick insertion of a comet or minor planet

If you have previously downloaded elements for a comet or minor planet (see above), then you can insert a comet/minor planet from the cached elements by using one of the following methods:

- Use the **+** button under the object list. In the New Object dialog, type in the name of the comet or minor planet. Then use the **Lookup...** button to display a list of all cached objects of the required type, with the search field preloaded with the ID.

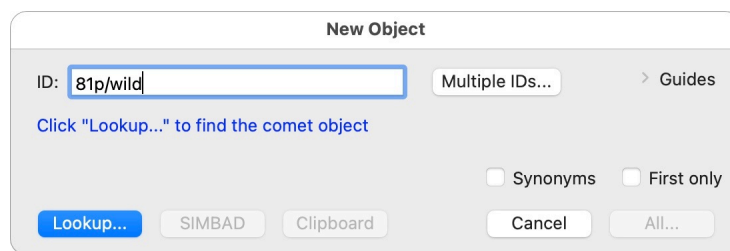


Figure 500: Entering a comet from the New Object dialog

- Use the **Add Special** popup under the object list, and choose **Comet...** or **Minor planet...** to display a list of all cached objects of the required type, with the search field preloaded with the ID.

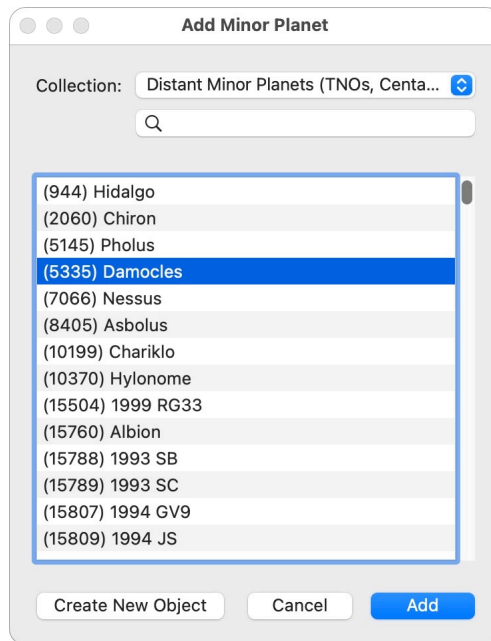


Figure 501: Cached minor planet object dialog

24.4 Creating a comet or minor planet object manually

If you have the elements for a comet or minor planet, you can enter the information manually using one of these techniques:

- Use the **+** button under the object list and click the **Empty** button in the New Object dialog to create an "empty" object in the object list. Select that object, and change its Type to "Comet" or "Minor" in the *Object Properties* tab. Once that is done, click the **Edit Elements...** next to the Type field. Edit the elements.
- Use the **Add Special** popup under the object list, and choose **Comet...** or **Minor planet...** and in the dialog click the **Create New Object** button. Edit the elements.

Minor Planet Orbital Elements	
Eccentricity (e):	0.8658987
Semimajor Axis (a):	11.8698744
Orbital Inclination (i):	61.6843900
Long. of Asc. Node (omega):	314.0645600
Argument of Perihelion (w):	191.1118300
Perihelion Distance (q):	1.591766 AU
Date of Epoch:	2/25/2023
Time of Epoch:	12 :00 AM
Mean Anomaly at Epoch (M):	285.3974100
Abs. Magnitude (H):	13.23
Slope Parameter (G):	0.15
Mean Motion (n):	0.0241010 °/day

Figure 502: Manual editing of minor planet elements

24.5 Updating elements

If you have a plan with comet or minor planet objects and you wish to update the elements for those objects, you can do so by using **Object > Refresh Objects from Catalogues...**. In the dialog, select the **Comets/Minor Planets** option (no other controls need setting) and click **OK**.

Any comet or minor planet objects in the list that were inserted from a downloaded data source will have their elements updated from the cached download (assuming there is one present).

Select Items to Refresh

Object types to update

☐ Non-solar-system objects

☒ Comets/Minor planets

Objects to refresh

☒ All objects [3]

Select fields to refresh

☒ Name

☐ Type

☐ RA

☐ Dec

☒ Magnitude

☒ Magnitude2

☒ PosAngle

☒ Separation

☐ Size

☐ Spectral

☐ Components

☒ Catalogue Notes

Any fields not appearing or not selected in the above list will be left untouched.

If no catalogue specified for object, or catalogue no longer exists

☐ Do not refresh

☐ Find a catalogue, giving preference to:

None

☒ Only update objects from catalogue:

Washington Double Star (2023.03)

If an existing catalogue specified for object

☐ Do not refresh

☒ Always refresh from existing catalogue

☐ Find a catalogue, giving preference to:

None

☐ Only update objects from catalogue:

3rd Cambridge Radio Source Catalogue

Cancel

OK

Figure 503: Refreshing comet/minor planet elements

25 Double Stars

25.1 Double star orbits

Double (or multiple) star systems are not static. The primary and secondary stars typically move with respect to each other. These relative movements can be extremely small (i.e. they don't appear to move over a period of decades or longer), or they might move relatively rapidly (with noticeable relative motion over a period of months or years). The double star catalogues, and in particular the Washington Double Star (WDS) catalogue, typically only show a single instance or snapshot of relative position (separation and position angle) for each object, which might be quite out-of-date (some even 100+ years out of date).

Many such star systems have been observed and the relative positions of the stars noted over an extended period, allowing the actual orbits of the stars to be estimated. A feature in AstroPlanner allows you to see those orbits and estimate the current relative positions of the stars.

The US Naval Observatory, which maintains the WDS, also maintains a [database of orbital elements](#) for a (relatively small) subset of the double stars in the WDS. The AstroPlanner WDS catalogues have been modified to include these data where applicable.

When you open a double-star catalogue (currently it will only be the WDS catalogues), any double star entry that has associated orbit information will be shown with the Separation and Position Angle column entries in orange (See Figure 504). In the example, two objects have orbits (orange text in the **Sep** and **Angle** columns). To see information about the orbits, select the desired object and right-click. Choose then **Show Orbit/s...** menu entry.

Catalogue																			Coverage Chart									
ID (WDS)	ID (IDS)	ID (BDS)	ID (ADS)	ID (BD)	ID (CD)	ID (CP)	Obs	Found	Type	Name	Comp	RA	Dec	Con	Mag	Mag2	Sep	Angle										
00014+3937				+38 05112					Dbl	HLD60	AB	00h 01m 24s	+39°36'38"	And	9.1	9.8	1.4	166										
00014+4758									Dbl	TDS1250	AB	00h 01m 23s	+47°57'55"	And	11.7	12.7	1.1	289										
00014+4828									Dbl	GI112	Aa,Ab	00h 01m 21s	+48°28'24"	And	11.4	11.4	0.1	112										
00014+4828				+47 04359					Dbl	COU1850	AB	00h 01m 21s	+48°28'24"	And	10.6	10.7	0.7	8										
00014+5704				+56 03132					Dbl	TDS1	AB	00h 01m 25s	+57°03'54"	Cas	10.9	11.1	0.9	319										
00014+6347				+62 02347					Dbl	TDS1249	AB	00h 01m 23s	+63°47'06"	Cas	10.5	12.1	1.9	202										
00014-0920									Dbl	TDS1251	AB	00h 01m 25s	-09°20'08"	Cet	12.1	12.1	0.8	106										
00014-2602									Dbl	UC305	AB	00h 01m 26s	-26°02'14"	Scl	14.9	16.4	39.6	198										
00015+3044				+29 05046					Dbl	HO208	AB	00h 01m 29s	+30°44'09"	Peg	8.2	9.8	1.1	186										
00015+4617									Dbl	ES1292	AB	00h 01m 45s	+46°17'10"	And	12.1	12.0	3.4	88										

Figure 504: Double star orbit entries in a catalogue

A window is displayed with the known orbital info for that star system (Figure 505).

The orbit is plotted on axes (scaled in arcseconds from the primary - the red blob). The current position of the secondary is shown in blue, and some future positions are shown in green, with the year. The information above the chart shows that this particular orbit has an estimated period of 649.64 years, and that based on the orbit, the current separation and position angle are 1 arcsec and 184.4° respectively. The fixed separation/position angle refers to the fixed values in the catalogue entry (which as mentioned before might be quite old, and possibly inaccurate).

The Elements tab shows the actual numbers, if you are interested (Figure 506).

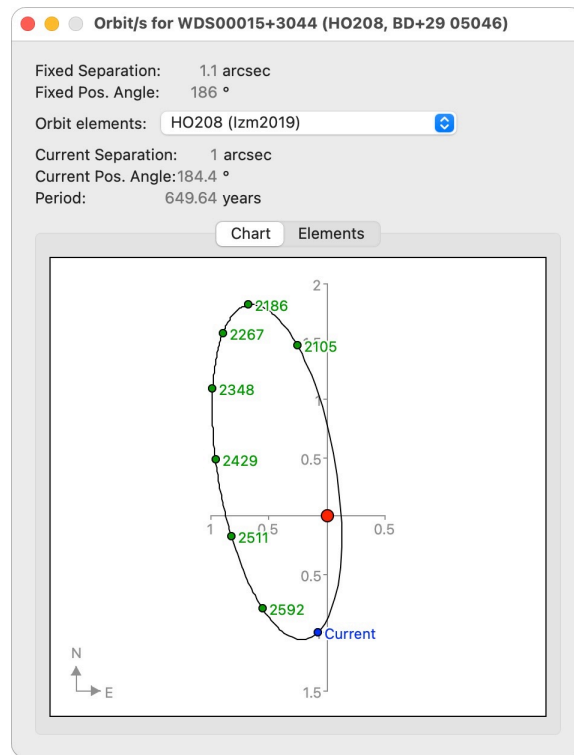


Figure 505: **Double star orbit**

Orbit/s for WDS00015+3044 (HO208, BD+29 05046)

Fixed Separation: 1.1 arcsec
 Fixed Pos. Angle: 186 °
 Orbit elements: HO208 (Izm2019)
 Current Separation: 1 arcsec
 Current Pos. Angle: 184.4 °
 Period: 649.64 years

Chart Elements

Parameter	Value	Units
Period	649.64	years
Time of periastron passage (T0)	2054.83	
Eccentricity	0.77651	
Inclination	103.903	°
Node (Omega)	175.491	°
Longitude of periastron (omega)	76.124	°
Semi-major Axis	2.20987	arcsec

Figure 506: **Double star elements**

The same applies to the object list and the results window (the columns are shown in orange, and there's a right-click **Show Orbit/s...** item). However, in the case of the object list there's also a **Set**

Object button in the Orbit window. Clicking it will replace the "fixed" separation/position angle values for the object with the computed current values, and the Period with the computed period.

26 Import and Export

AstroPlanner has various methods of importing and exporting objects and/or observations. These methods can be useful if you have data from other sources that need to be used by AstroPlanner, or if you wish to save data in a form that can be used by other applications.

26.1 Import

26.1.1 Generic text data files

Import objects into your plan document, or observations/sessions into the observation database, from a plain text file. Use **File > Import > Generic Text File...** to start the import. Note that a plan document must be open to be able to select this option, even if you are importing observation data only.

You will first be asked to locate the text file you want to import.

Then the import dialog appears. The first line to be processed is displayed in the Sample Data Line area. The rest of the parameters define the format of the incoming data.

Generic Text Import from Haas-double.csv

Sample Data

1 10 20 30 40 50 60 69
00046+4206 STT 514 AB 2002 170 5.2 6.16 9.65 000436.60 +420533.2 And

Value	Format	Imported
Object: ID	Default	WDS00046+4206
Object: Name	Default	STT 514
Object: Components	Default	AB
<Ignore>	Default	
Object: Pos.Angle	Default	170
Object: Separation	Default	5.2
Object: Magnitude	Default	6.16
Object: Magnitude2	Default	9.65
Object: Spectral	Default	
Object: RA	HHMMSS.S	000436.6
Object: Dec	DDMMSS	+420533

Field Definitions

Text Format

Import

Settings

Figure 507: Generic text import dialog

The imported text file should have one *line* per imported *entity* (object, etc.). Each line should consist of a fixed number of *fields*, with each field containing the value of some *parameter* of the entity (e.g. ID, RA, Notes, etc.).

- **Field Definitions.** This list contains an entry for each imported field, and the list represents all the fields in a single line of the text data. Entity parameters are imported in the same order as the rows of the list. You can add and delete entries from the list using the **+** and **-** buttons, and the list can be reordered by dragging the rows around. The **Clear All** button deletes all entries, and the **Add All** button adds all possible fields to the list. You can edit a new or existing entry by selecting it and changing the parameters in the **Edit Field Definition Entry** section. The **Value** column contains the entity parameter to be imported; the **Format** column contains the selected format; the **Imported** column shows the value that is imported from the sample data line (the value shown in this column should match the correct value you are trying to import. If it doesn't, then the format is probably incorrect).
- **Edit Field Definition Entry.** This changes the currently-selected entry in the **Field Definitions** list. The **Value** popup is the entity parameter you want to export, and is typically a parameter of an object, session or observation. There's also an *<Ignore>* choice that can be used to ignore an empty or irrelevant field if necessary. The **Format** popup is the way the incoming Value is formatted. Typically you'd use the *Default* format in most cases, but some parameter types specify various formats (e.g. R.A. can be formatted in hours or degrees, as a decimal, or in the form hh:mm:ss, etc.). If you have chosen the **Text Format** to be Formatted then there will also be **Column From** and **Column To** entries. You can use the **Modify Text...** button to modify the incoming text before it is imported (See Figure 508). You can use this feature to add, remove or replace the imported text in various ways.
- **Text Format.** The *Formatted* option allows you to specify the column range for each field (e.g. ID in columns 1 through 6, RA in columns 7 through 15, etc. *Tab-separated*, *Comma-separated*, and arbitrary-character-string-separated options assumes the requisite character string between fields of each input line.
- **Ignore first *n* lines.** Read past the first *n* lines. Useful to ignore column headings, etc.
- **Ignore last *n* lines.** Ignore the last *n* lines. Useful to ignore trailing information, etc.
- **Convert from epoch.** If the object coordinates (RA & Dec) of the input data are of an epoch other than J2000.0, then they should be converted from that epoch to J2000.0.
- **Catalogue lookup.** Lookup the object data in the internal catalogues. You can use ID as the key (if available in the input data), or RA/Dec. This option is useful if you have data that only has IDs, or RA/Dec coordinates. If the **Reject if not found** option is checked, then if the catalogue lookup fails to find a matching object, the input data will be ignored and a new object will not be created using the data.
- **Validate only.** Perform the import without actually creating any object/observation/session data. This is a convenient way of checking the data for errors before committing to the import.
- **Import.** Specifies what is to be imported. **Plan Objects only** will import objects to your object list. **Observations only** will import observations into your observation database. **Observations and Sessions** will import observation data that includes session information in the same line. You can specify a **Default Site** resource to use if that information is not present in the input observation data. You can also specify an associated plan document (which should be open) if you

wish to associate incoming observation data with that plan document. Specify the text **Encoding** of the incoming data if it isn't plain ASCII or UTF-8.

- **Use localised formatting.** If this option is checked, imported date, times and numbers will be assumed to be in the local format as specified by the operating system (e.g. decimal comma in Europe, etc.). If it is unchecked then the standard (U.S.?) formatting is used.
- **Settings.** Once you've set up the dialog, the **Save...** button allows you to save the settings to a file, which can be later retrieved using the **Load...** button. This is useful if you are juggling multiple import formats.

If errors occur, a dialog with a list of those errors is presented (Figure 509), listing the line number, the error type, the field in error if applicable, and the original data. You can edit the data externally with a text editor, or you can click the Edit Text... button and edit the text using the built-in text editor (which conveniently shows the line numbers, and flags the lines in question). See Figure 510.

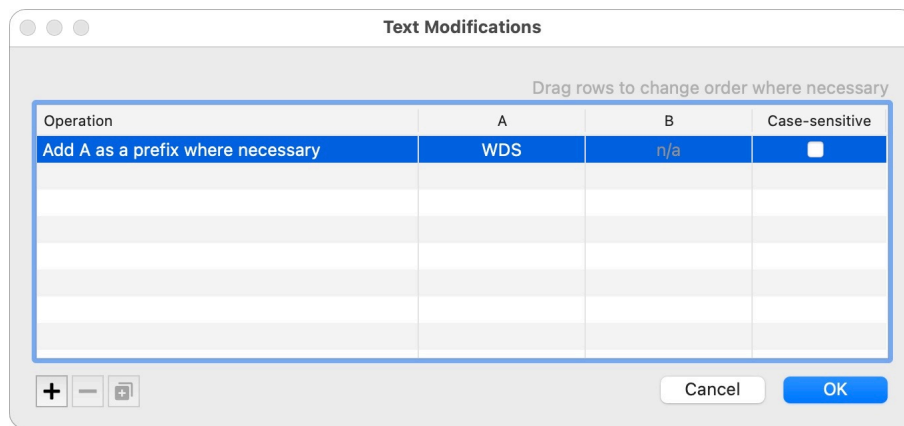


Figure 508: Text Modifications dialog

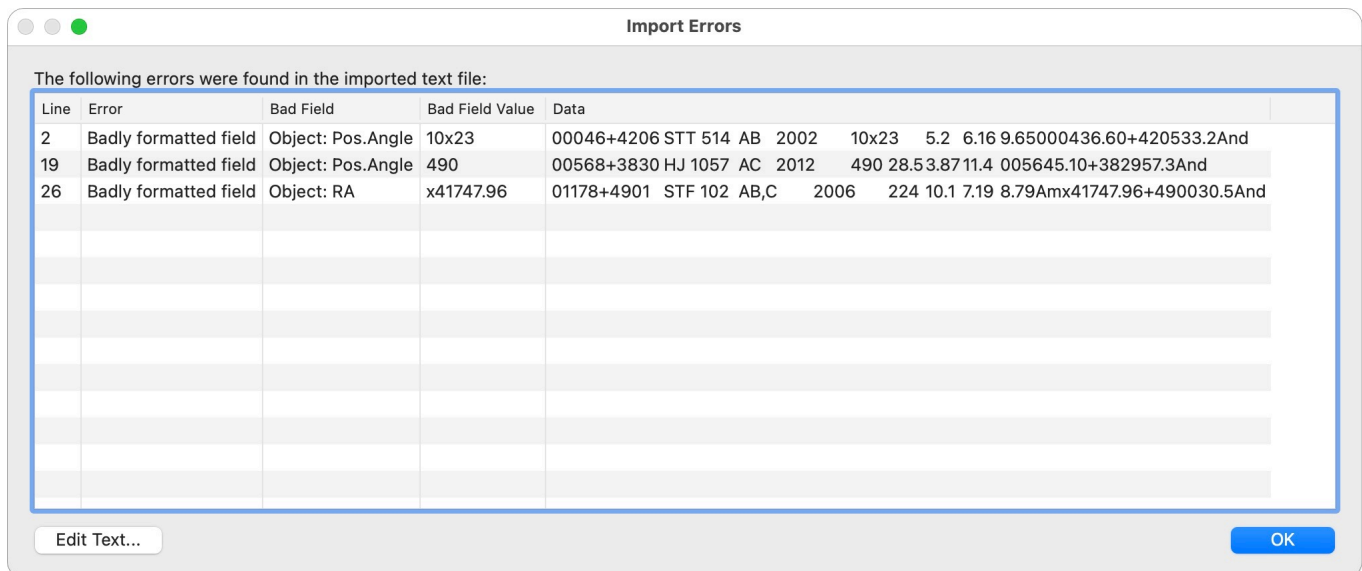


Figure 509: Import error dialog

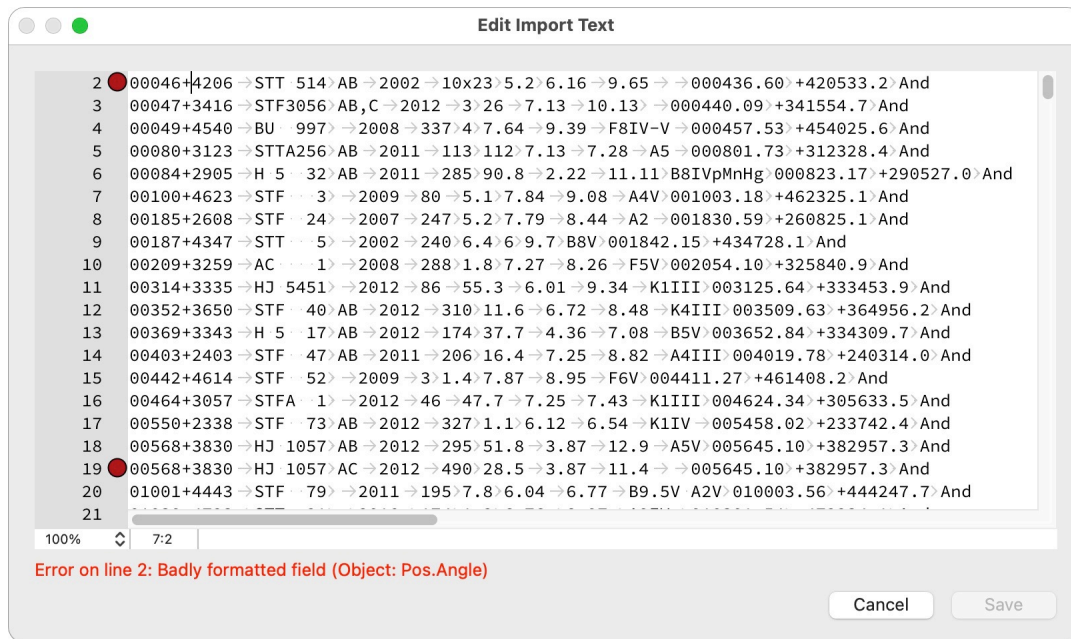


Figure 510: Import data text editor

26.1.2 Comet data

This is covered in detail in Chapter 24 on page 366.

26.1.3 Minor Planet data

This is covered in detail in Chapter 24 on page 366.

26.1.4 Supernova data

Use the **File > Import > Supernova Data...** menu command to retrieve supernova data. The dialog lets you choose the source of the data to import.

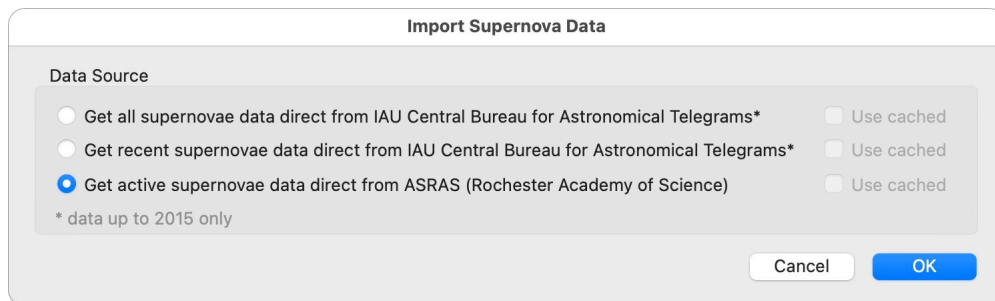


Figure 511: Select supernova data source

Both options download the latest data from the Internet (assuming you have a connection). If you have previously downloaded from a source, the **Use cached** checkbox will be enabled. Checking this will use the cached copy rather than requiring a download.

Once you've selected the source, and clicked **OK**, you will be presented with a list of supernovae (Figure 512). Select one or more supernovae to be added to your plan by checking the checkbox to the left of the entry in the list.

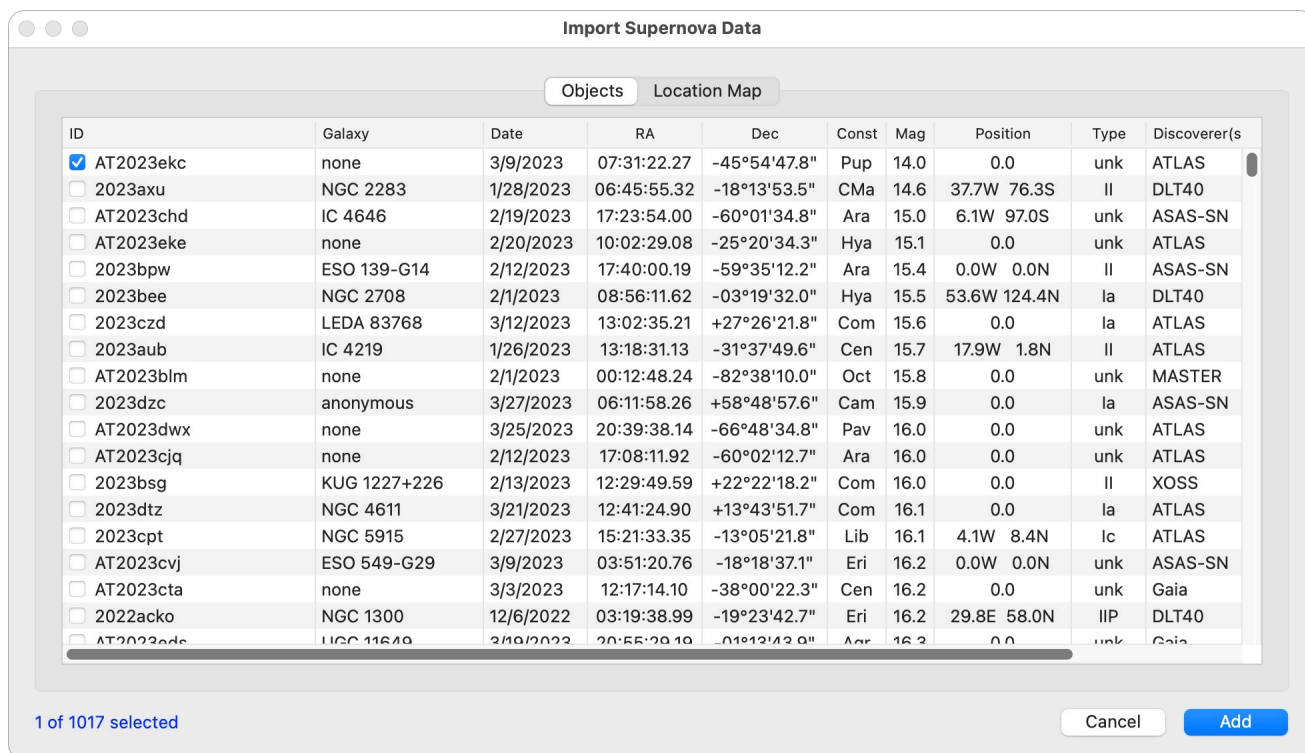


Figure 512: Import supernova data dialog

The **Location Map** tab shows all supernovae on an all-sky map, with any selected supernovae circled in red. Double-clicking a supernova on the chart will select that line in the list.

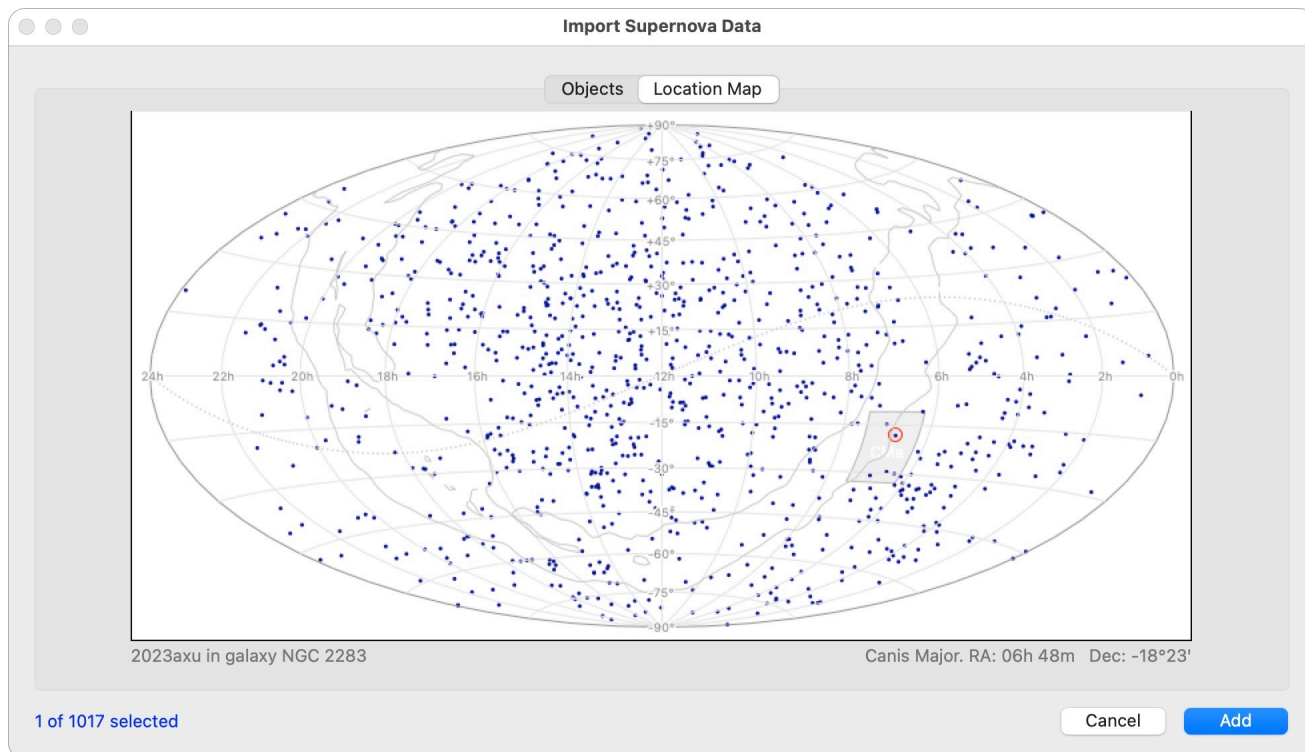


Figure 513: Supernova location map

26.1.5 Gamma Ray Burst (GRB) data

Use the **File > Import > Gamma Ray Burst Data...** menu command to retrieve gamma ray burst data. The dialog lets you choose the source of the data to import (currently only one, and one that isn't being updated any longer).

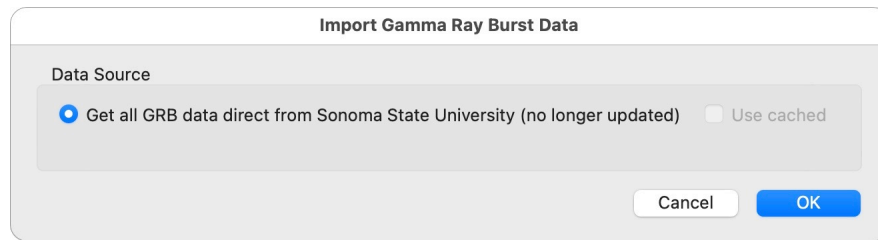


Figure 514: Select GRB data source

The latest data is downloaded from the Internet (assuming you have a connection). If you have previously downloaded from a source, the **Use cached** checkbox will be enabled. Checking this will use the cached copy rather than requiring a download.

Once you've selected the source, and clicked **OK**, you will be presented with a list of gamma ray burst candidates (Figure 515). Select one or more of these to be added to your plan by checking the checkbox to the left of the entry in the list.

New items since the last time you used this feature are marked in red (or green if they are currently visible from your observing site). If the item is *never* visible from your observing site (i.e. always below the theoretical horizon), it is coloured grey.

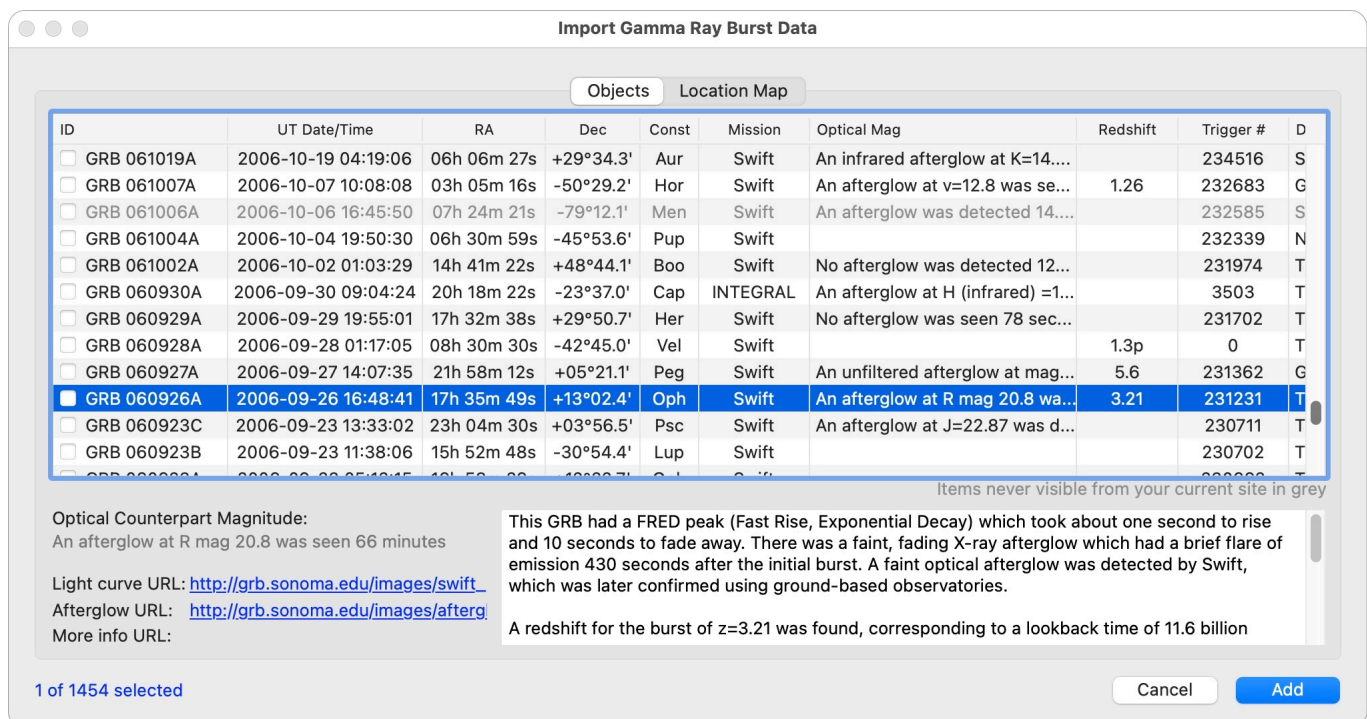


Figure 515: Import GRB data dialog

The **Location Map** tab shows all GRB sources on an all-sky map, with any selected entries circled in red. Double-clicking a GRB source on the chart will select that line in the list.

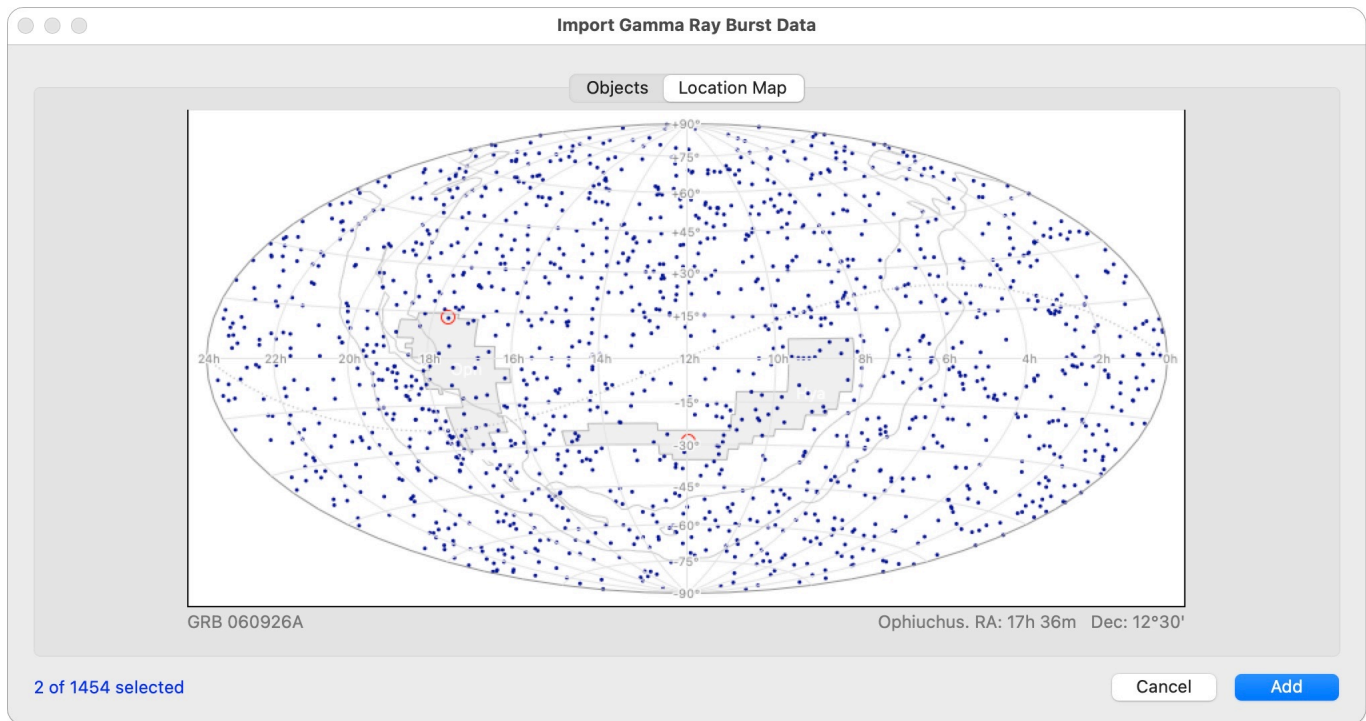


Figure 516: GRB location map

26.1.6 Exoplanet data

Use the **File > Import > Exoplanet Data...** menu command to retrieve exoplanet data. The dialog lets you choose the source of the data to import (currently only one).

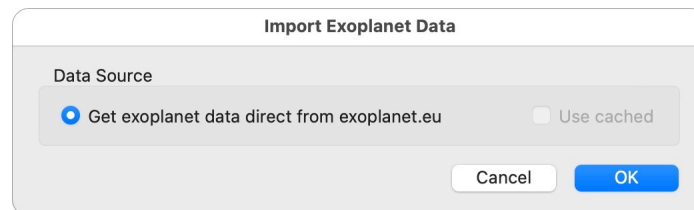


Figure 517: Select exoplanet data source

The latest data is downloaded from the Internet (assuming you have a connection). If you have previously downloaded from a source, the **Use cached** checkbox will be enabled. Checking this will use the cached copy rather than requiring a download.

Once you've selected the source, and clicked **OK**, you will be presented with a list of exoplanet discoveries. Select one or more of these to be added to your plan by checking the checkbox to the left of the entry in the list.

New items since the last time you used this feature are marked in red (or green if they are currently visible from your observing site). If the item is *never* visible from your observing site (i.e. always below the theoretical horizon), it is coloured grey.

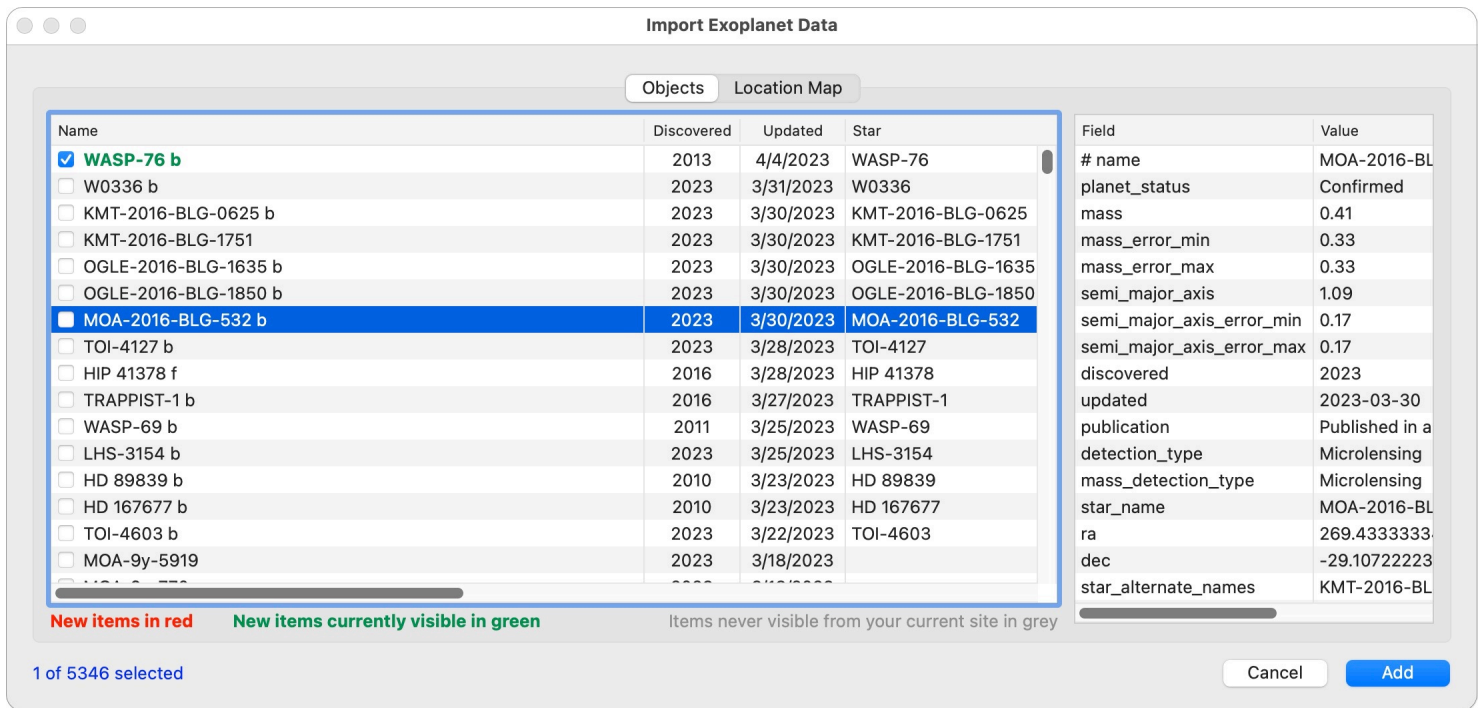


Figure 518: Select exoplanet data

26.1.7 Exoplanet transit data

Use the **File > Import > Exoplanet Transit Data...** menu command to retrieve exoplanet transit data. *This is an unfinished specialist feature and is not discussed here.*

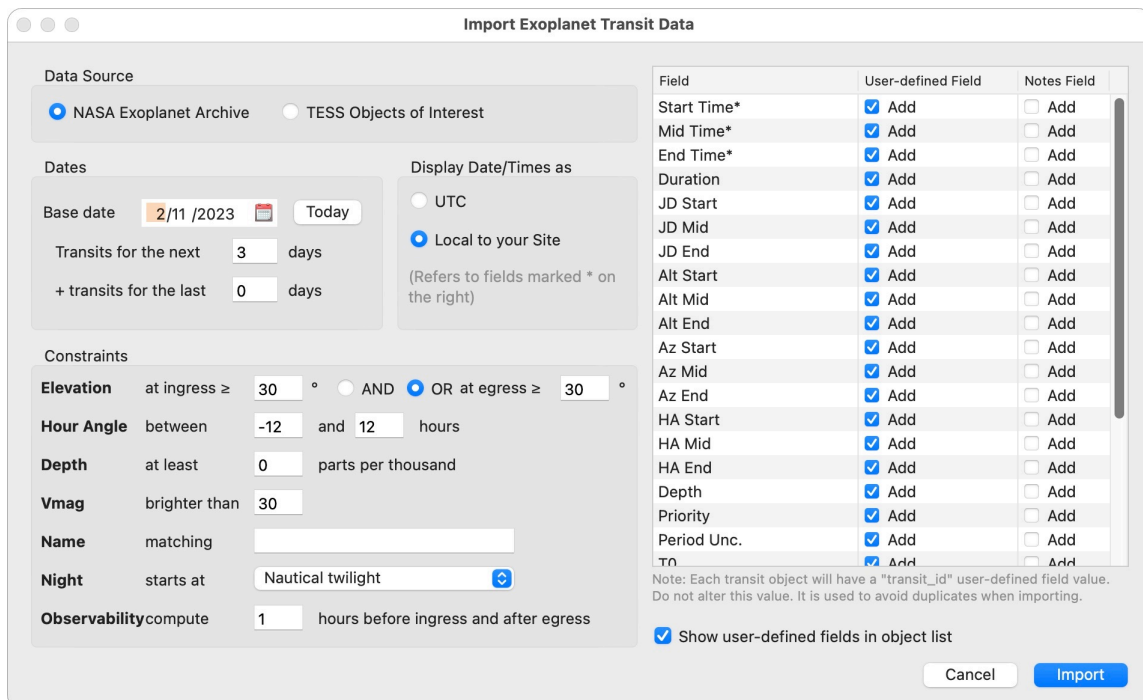


Figure 519: Select exoplanet transit data

26.1.8 Observations/Sessions

Use **File > Import > Observations/Sessions...** to import observations and sessions into the observation database from a file previously exported from another installation of AstroPlanner. This is useful for moving recent observation information from, say, a field laptop to an office desktop computer. See Section 26.2.10 on page 394 for the corresponding exporting information.

26.1.9 Sky Commander catalogues

Use **File > Import > Sky Commander Catalogue...** to import a Sky Commander catalogue file (.s37 extension).

26.1.10 SkySafari observing lists

Use **File > Import > SkySafari observing list...** to import a SkySafari observing list file (.skylist extension). If the list contains observations made in SkySafari, then you'll be prompted to import those observations as well (optionally).

26.1.11 EQTour observing lists

Use **File > Import > EQTour observing list...** to import an EQTour observing list file (.lst extension).

26.1.12 Cartes du Ciel observing lists

Use **File > Import > Cartes du Ciel observing list...** to import an Cartes du Ciel observing list file (.txt extension).

26.1.13 SkyMapPro observation data

Use **File > Import > SkyMapPro Observation Data...** to import a SkyMapPro observing list file (.txt extension).

26.2 Export

26.2.1 Generic text files

AstroPlanner includes a very flexible way to export object and observation data in the form of plain text files. Use **File > Export > Generic Text, Excel, XML or JSON...** to do this.

The exported text file has one *line* per exported *entity* (object, etc.). Each line consists of a fixed number of *fields*, with each field representing the value of some *parameter* of the entity (e.g. ID, RA, Notes, etc.).

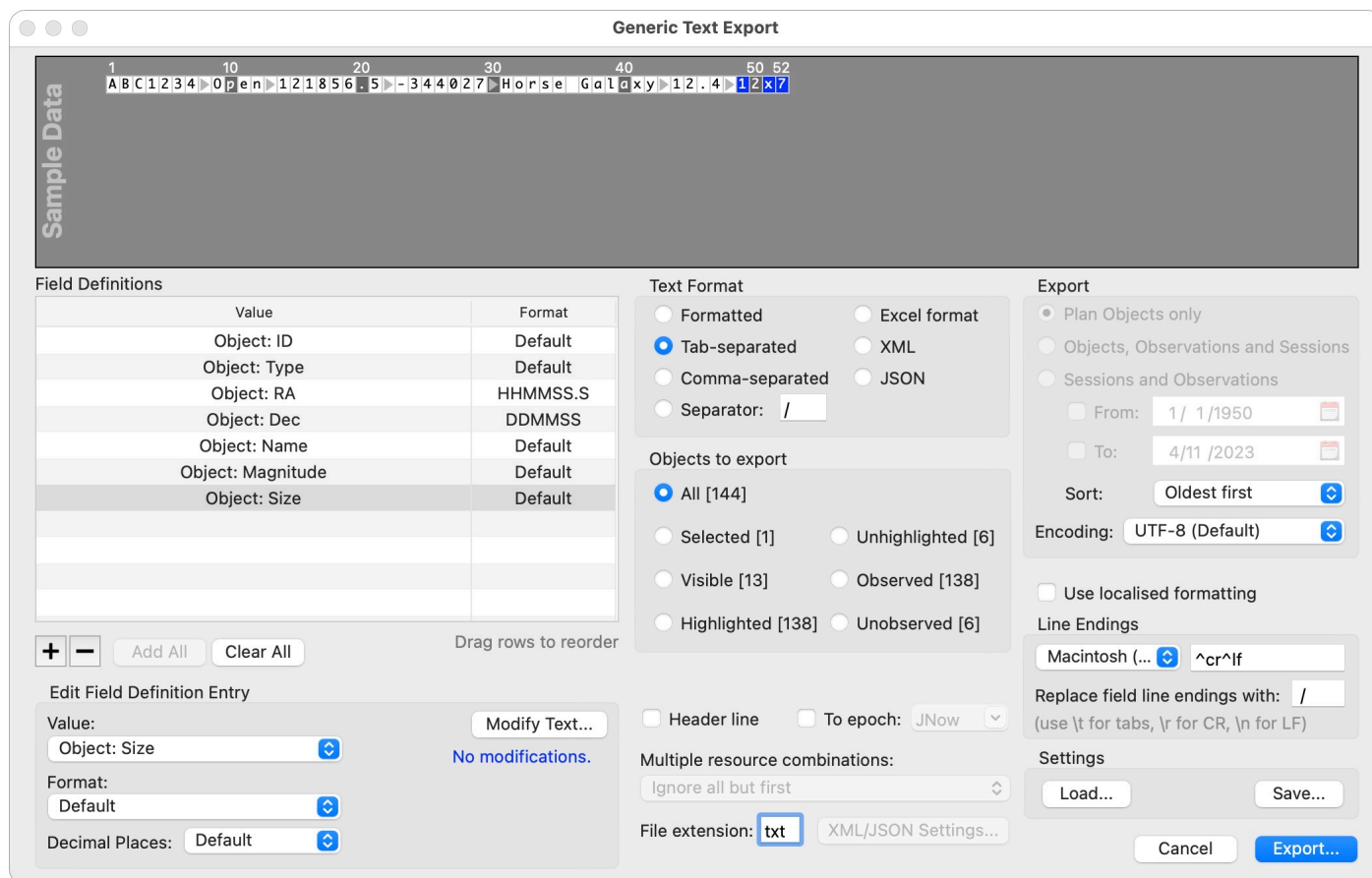


Figure 520: Generic text export dialog

- **Sample Data Line.** This area displays a sample of what will be exported to a line of the text file, and will change as you change the settings within the dialog.
- **Field Definitions.** This list contains an entry for each exported field, and the list represents all the fields in a single line of text data. Entity parameters are exported in the same order as the rows of the list. You can add and delete entries from the list using the **+** and **-** buttons, and the list can be reordered by dragging the rows around. The **Clear All** button deletes all entries, and the **Add All** button adds all possible fields to the list. You can edit a new or existing entry by selecting it and changing the parameters in the **Edit Field Definition Entry** section.
- **Edit Field Definition Entry.** This changes the currently-selected entry in the **Field Definitions** list. The **Value** popup is the entity parameter you want to export, and is typically a parameter of an object, session or observation. There's also an *<empty>* choice that can be used to output an empty field if necessary. The **Format** popup is the way you want to format the Value. Typically you'd use the *Default* format in most cases, but some parameter types specify various formats (e.g. R.A. can be formatted in hours or degrees, as a decimal, or in the form hh:mm:ss, etc.). If you have chosen the **Text Format** to be Formatted then there will also be **Column From** and **Column To** entries. You can also specify text to be prefixed and/or suffixed to the formatted field data, as well as various other text substitutions, etc. by using the **Modify Text...** button.
- **Text Format.** The Formatted option allows you to specify the column range for each field (e.g. ID in columns 1 through 6, RA in columns 7 through 15, etc. Tab-separated, comma-separated and arbitrary-character-string-separated options put the requisite character string between fields of

each output line. The Comma-separated option also makes sure that fields containing commas are enclosed in quotes, etc. Excel, XML and JSON are covered in the next sections.

- **Objects to export.** Specifies which plan objects to export, unless you are exporting Sessions and Observations.
- **Header line.** This option will output a single header line before the data with appropriate field headings, in the same Text Format as the data.
- **To epoch.** The object data is exported with the same epoch as shown in the object list (i.e. J2000.0). This option lets you convert the coordinates to another epoch (in particular, JNow, which represents the epoch of the current date).
- **Multiple resource combinations.** If you are exporting observations, this option specifies what to do with multiple resource combinations (i.e. you made observations with more than one telescope/eyepiece/etc. combination). You can elect to **Ignore all but first** in which case a single observation line is output, using only the first resource combination. Alternatively, **Duplicate record for each** will output a duplicate record/line for each combination (i.e. the lines will be identical except for the resource combination fields - telescope, eyepiece, etc.).
- **File extension.** The file name extension to use by default.
- **Export.** Specifies what is to be exported. **Plan Objects only** will consider only objects in your object list and output a line for each. **Objects, Observations and Sessions** will consider each object in your object list and output a line for each session/observation associated with it. Any object parameters specified will be duplicated in each observation line. **Sessions and Observations** ignores objects and looks at all observation Sessions included in the specified date range, and all observations associated with those sessions. The checkboxes allow you to specify "open-ended" ranges. The **Sort** parameter is for Sessions and Observations and specifies in what order you'd like the exported data in. The **Encoding** parameter specifies the text encoding to use for the output file. Note that as soon as you add a field definition entry these settings are disabled and you can't subsequently change them (i.e. remember to choose this setting first).
- **Use localised formatting.** If this option is checked, date, times and numbers will be exported in the local format as specified by the operating system (e.g. decimal comma in Europe, etc.). If it is unchecked then the standard (U.S.?) formatting is used.
- **Line Endings.** Specify whether each line end with a carriage return (Macintosh), a line feed (Unix), or both (Windows). You can also specify a character string to replace any line endings within a field. This is useful when you export, say, Notes fields with multiple lines/paragraphs.
- **Settings.** Once you've set up the dialog, the **Save...** button allows you to save the settings to a file, which can be later retrieved using the **Load...** button. This is useful if you are juggling multiple export formats.

26.2.2 XML

Largely the same as described in Section 26.2.1 on page 386, with some minor additional features. Choose the XML option under **Text Format**. Some of the items are no longer applicable and are disabled (e.g. line endings, header line, etc.). Export is done to an XML text file, using default XML settings and styles. These can be changed by clicking the **XML/JSON Settings...** button.

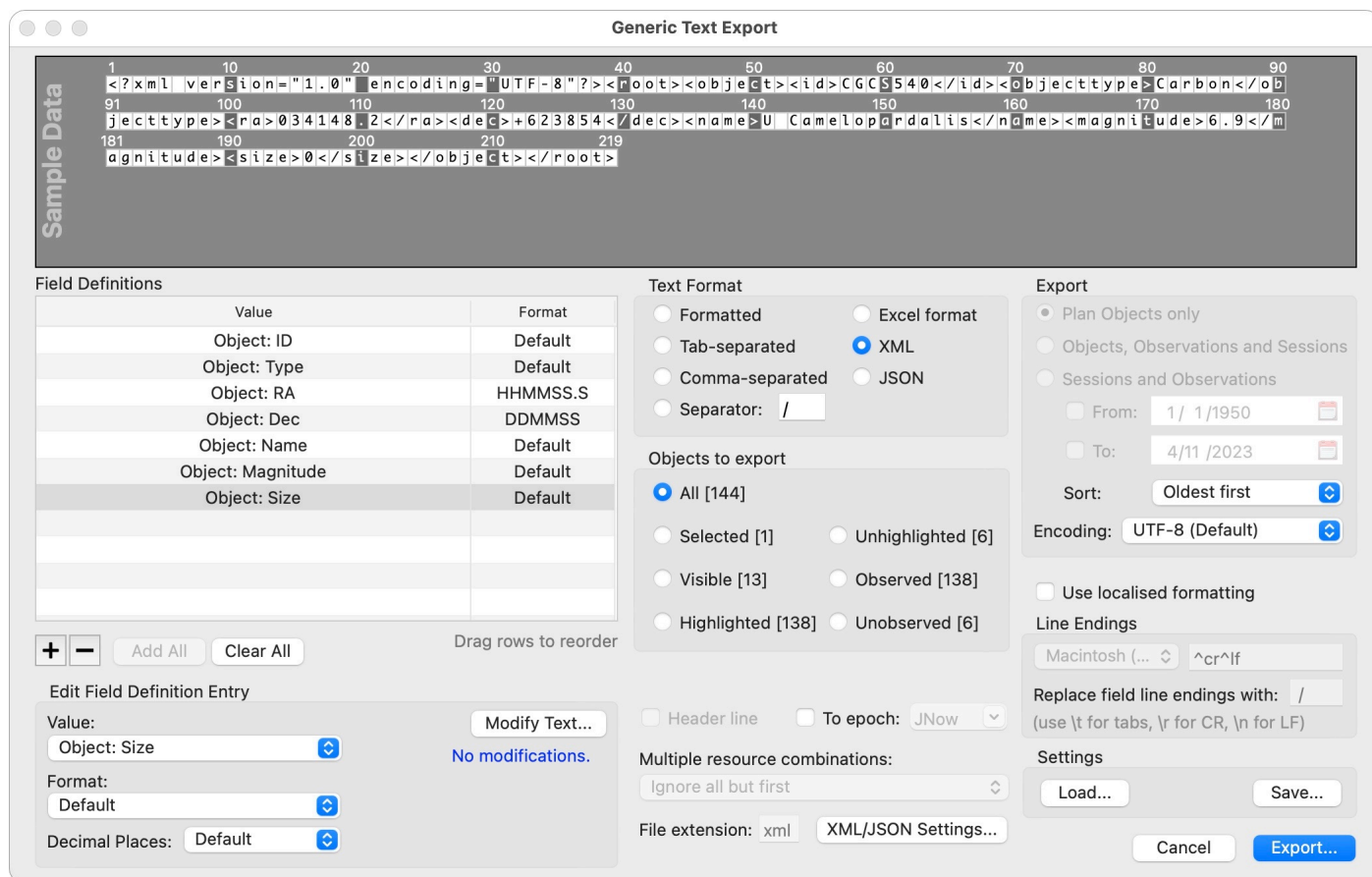


Figure 521: XML option in the Generic text export dialog

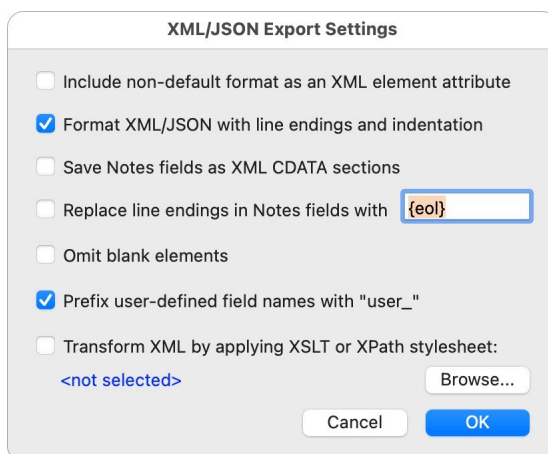


Figure 522: XML/JSON Export Settings dialog

The XML/JSON Settings are:

- **Include non-default format as an XML element attribute.** If a field has a format that is not "Default", then this option adds a "format" attribute for the element. e.g. If the ID file has the "Number only" format, then the field will be exported as <id format="Number only">1234</id>.
- **Format XML/JSON with line endings and indentation.** If this option is unchecked, the XML is output without whitespace or line endings (which are not relevant in XML). If it is checked then

the XML will have line endings and whitespace indentation to make the file more human-readable.

- **Save Notes fields as XML CDATA sections.** This option will save the Notes fields as CDATA (a sort-of encoded format that retains non-ASCII characters, line endings, etc.). However, not all applications reading this data will understand it.
- **Replace line endings in Notes fields with.** If you don't use CDATA for the Notes fields, you can convert any line endings into a short string (otherwise they will be ignored or converted into whitespace).
- **Omit blank elements.** If an element is blank, leave it out. e.g. if an object has no Size parameter, then normally this will be added as <size></size>. Checking this option leaves out the empty element altogether.
- **Prefix user-defined field names with "user_".** Any user-defined field values will have their label prefixed by "user_". This is useful if any user-defined field has the same name as a built-in field.
- **Transform XML by applying XSLT or XPath stylesheet.** If you have an XSLT or XPath stylesheet, you can apply it to the exported XML. Use the ***Browse...*** button to select the file to use.

26.2.3 JSON

Largely the same as XML export. See Section 26.2.2 on page 388 for details. Choose the JSON option under **Text Format**.

26.2.4 Excel

Largely the same as described in Section 26.2.1 on page 386. Choose the Excel option under **Text Format**.

26.2.5 Argo Navis user catalogues

This exports objects from the object list to a text file suitable for downloading to an Argo Navis telescope controller.

You can specify a prefix to be added to the exported object text for reference/sorting purposes. In addition to adding a prefix to the exported objects, you can also modify the source plan document to match those downloaded objects. You specify which field is to be modified (ID, Name, etc.) and how it will be modified.

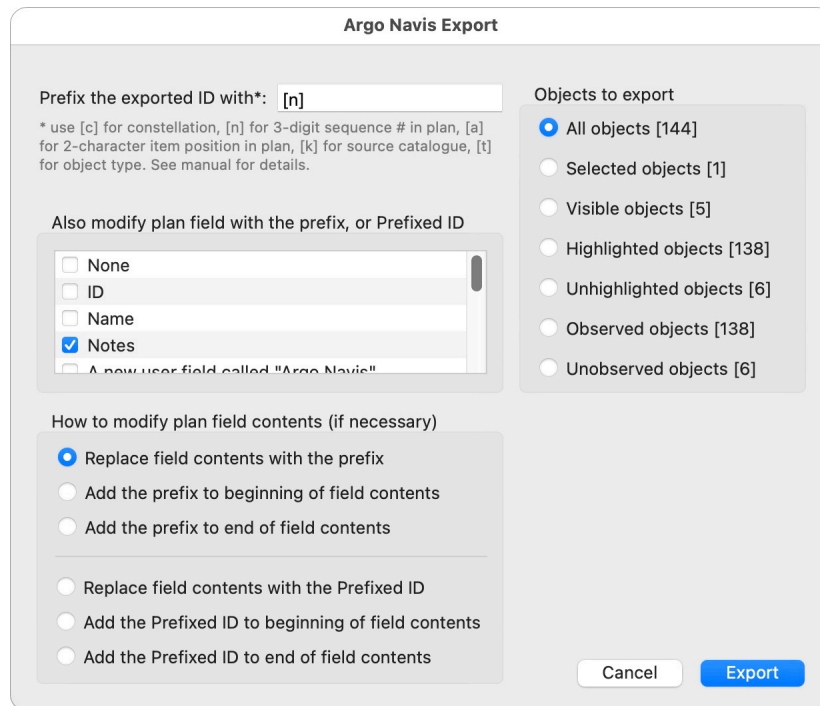


Figure 523: Argo Navis export dialog

26.2.6 Autostar tours

You can export the objects in your object list to a text file in the Meade *Autostar* Tour format. This file can then be uploaded to your *Autostar* controller via the (sadly) Windows-only Meade ASU application.

Use the **File > Export > Autostar Tour...** menu command.

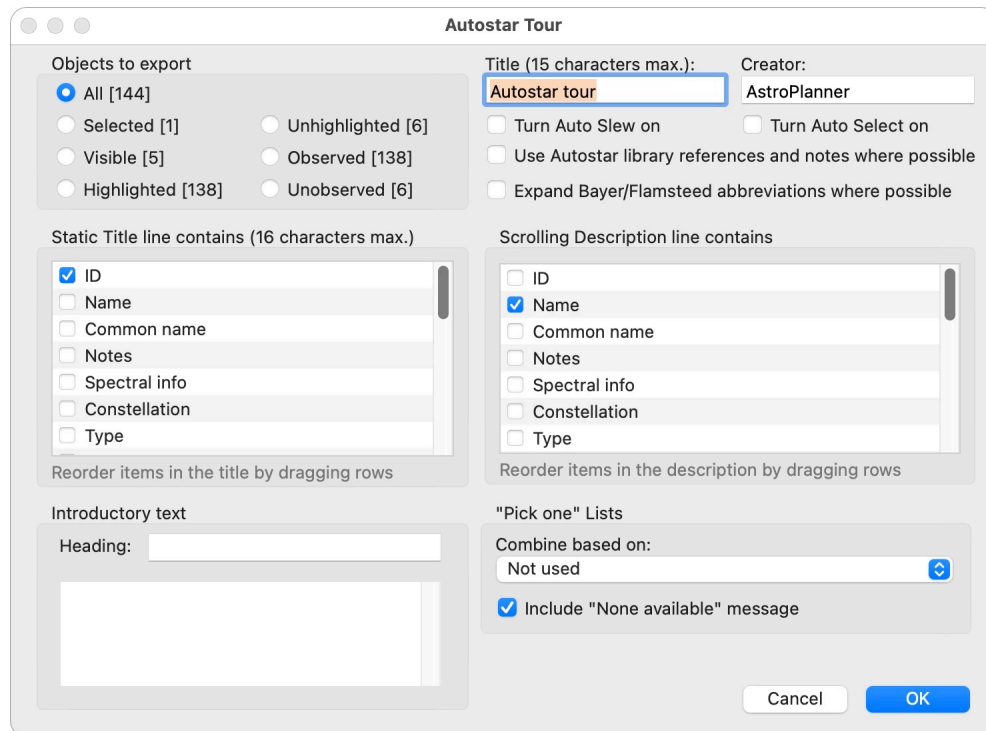


Figure 524: Autostar tour export dialog

The **Turn Auto Slew on** and **Turn Auto Select on** parameters are described in the *Autostar* Tour creation manual, available from the Meade Instruments web site.

The **Use Autostar library references and notes where possible** setting will use the built-in *Autostar* data where possible. If you have an object that should be present in the controller database (e.g. M31, NGC 6177, etc.) then it will be used instead of the data in your plan document.

Expand Bayer/Flamsteed abbreviations where possible will convert abbreviations such as bet UMa to Beta Ursa Major.

The *Autostar* handbox displays two lines of text. Typically the top line (16 characters) remains static, while the bottom line scrolls. The **Static Title line contains** option defines what is shown in the top line of the handbox display. Note that this will be truncated to 16 characters if necessary. The **Scrolling Description line contains** option does the same for the bottom line. e.g. If you are observing double stars you might want magnitude and separation, but not size. You can reorder the lists by dragging their entries if necessary.

If you choose a setting from **"Pick one" Lists** then the objects will be grouped according to the chosen combination. The tour will then let the user select one from each group. If the **Include "None available" message** is set then the user will get a message if none of the objects in a group is visible.

The **Introductory text** is displayed at the start of a tour. Here is a sample listing of a (very short) generated file:

```

////////////////////////////////////
// Tour created: Monday, March 14, 2011 at 10:19:14
// by: AstroPlanner
//
// Generated by AstroPlanner
// http://www.ilangainc.com/astroplanner/
// Copyright (c) 2002-11 iLanga, Inc.

```



```

////////////////////////////////////
TITLE "Autostar tour"
AUTO SLEW ON
AUTO SELECT TEXT "M1" "Crab Nebula"
AUTO SELECT MESSIER 1
AUTO SELECT MESSIER 2
AUTO SELECT MESSIER 3
AUTO SELECT TEXT "M4" "Cat's Eye"
AUTO SELECT MESSIER 4
AUTO SLEW OFF
#END

```

26.2.7 NexRemote tours

Use **File > Export > NexRemote Tour...** is used to export object data into a file suitable for importing into the *NexRemote* application for controlling Celestron telescopes. You get to select which objects get exported. Note that there is a maximum of 200 objects in the exported file.

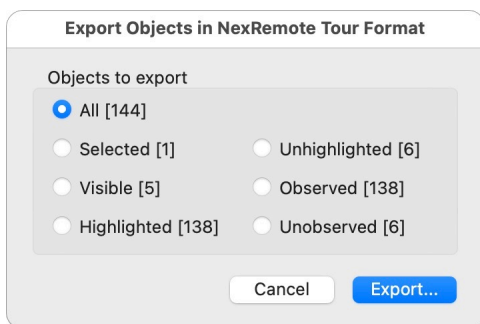


Figure 525: NexRemote tour export dialog

26.2.8 EQTour observing list

Use **File > Export > EQTour Observing List...** is used to export object data into a file suitable for importing into the *EQTour* application for controlling ASCOM telescopes. You get to select which objects get exported.

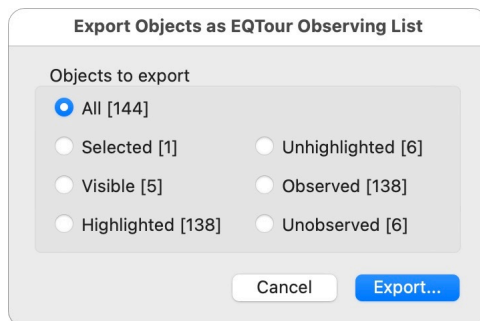


Figure 526: EQTour export dialog

26.2.9 SkySafari observing lists

Use **File > Export > SkySafari Observing List...** is used to export object data into a file suitable for importing into the *SkySafari* planetarium application (Mac and iOS). You get to select which objects get exported. Note that SkySafari may not import all of the exported objects, since it requires them to match up with its own internal catalogues.

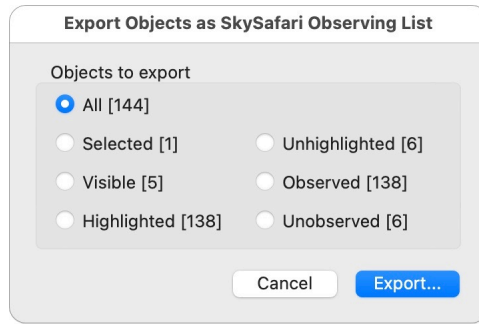


Figure 527: SkySafari observing list export dialog

26.2.10 Observations/Sessions

Use **File > Export > Observations/Sessions...** to export selected observations and sessions from the observation database to a file in a format for re-importation into another installation of AstroPlanner. This is useful for moving recent observation information from, say, a field laptop to an office desktop computer. See Section 26.1.8 on page 386 for the corresponding importing information.

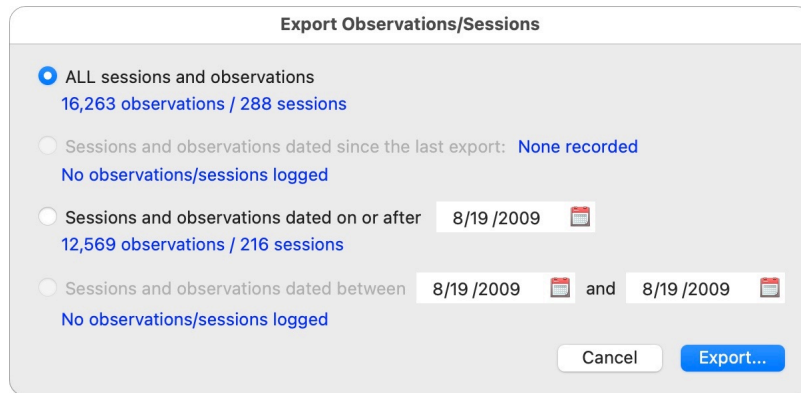


Figure 528: Export Observations/Sessions dialog

You can choose to export all sessions/observations from the database, sessions/observations made since the last export, sessions/observations dated after a given date, or sessions/observations dated in a range. The information will be saved in a file with a .obs extension. Note: if you have a lot of observations, it might take a few seconds to open this dialog.

26.2.11 Sky Commander catalogues

The *Sky Commander XP4* allows catalogues of objects to be added to firmware uploads. AstroPlanner can create such catalogues ready for uploading.

The **File > Export > Sky Commander Catalogue...** command lets you firstly select an AstroPlanner catalogue to convert.

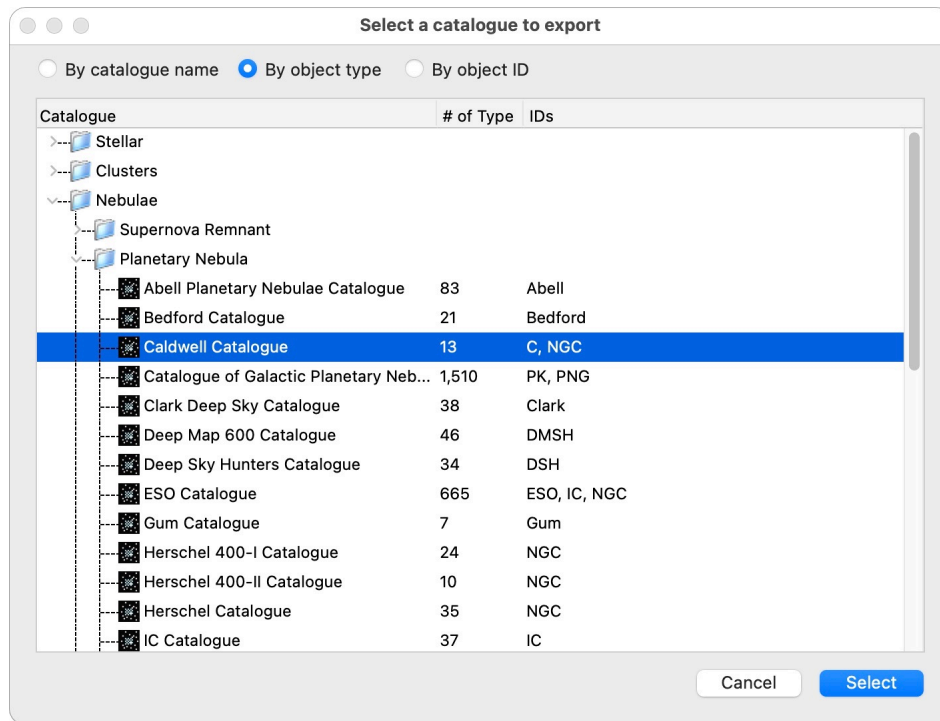


Figure 529: Selecting a catalogue to export

Since many of these catalogues are too large for the *Sky Commander* to handle, a dialog is presented that allows you to control which objects from the catalogue are to be included.

You select which object types, which ID is to be used, and possibly restrict the objects by RA, Dec, Magnitude, Separation (double stars), constellation and/or Spectral type (stars).

You can also specify that the Name field should be used rather than ID (useful for double stars in the WDS, for example).

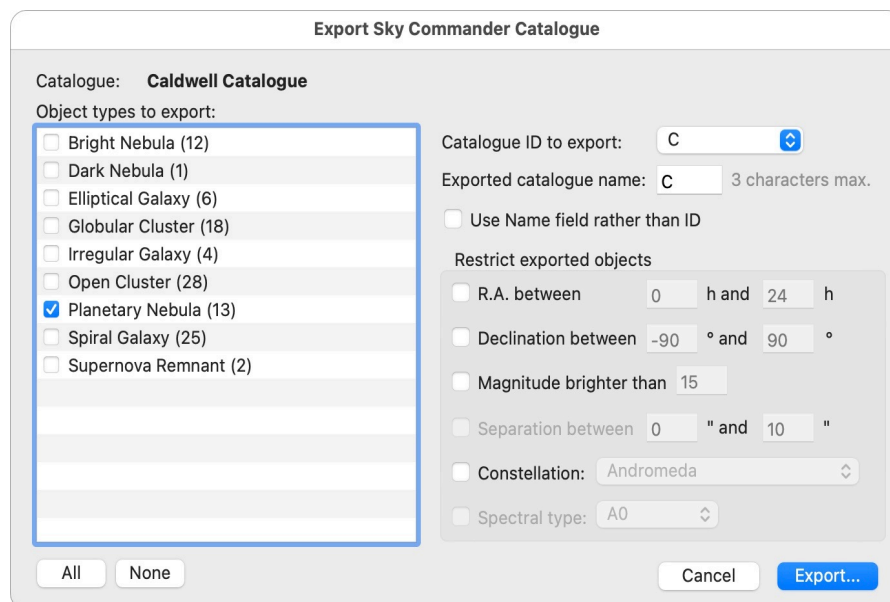


Figure 530: Sky Commander catalogue export dialog

26.2.12 Plan to Sky Commander Catalogue

The **File > Export > Plan to Sky Commander Catalogue...** command will export the current plan document objects as a *Sky Commander* catalogue. You can select whether to use the Name field rather than the ID field.

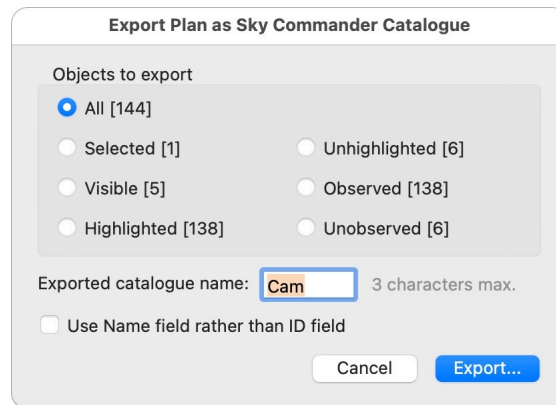


Figure 531: Plan to Sky Commander export dialog

26.2.13 Cartes du Ciel observing lists

Use **File > Export > Cartes du Ciel Observing List...** to export the plan document contents to a file (.txt extension) that can be read by Cartes du Ciel V3.10 or later.

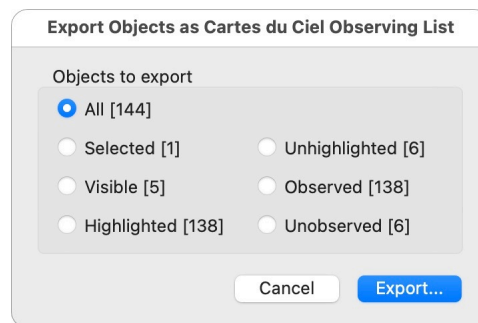


Figure 532: Cartes du Ciel observing list export dialog

26.2.14 Sequence Generator Pro Target List

Use **File > Export > Sequence Generator Pro Target List...** to export the plan document contents to a file that can be read by Sequence Generator Pro.

If you have defined an object user-defined field that contains the field rotation value that is to be used in the target list, you can select that as an option. For solar system objects (i.e. objects whose RA/Dec coordinates vary with date/time), you can specify a date/time user-defined object field that contains the date/time for the RA/Dec computed for the object, or a default date/time otherwise. This is required because Sequence Generator Pro does not compute coordinates for solar system objects, so AstroPlanner has to compute them in advance.

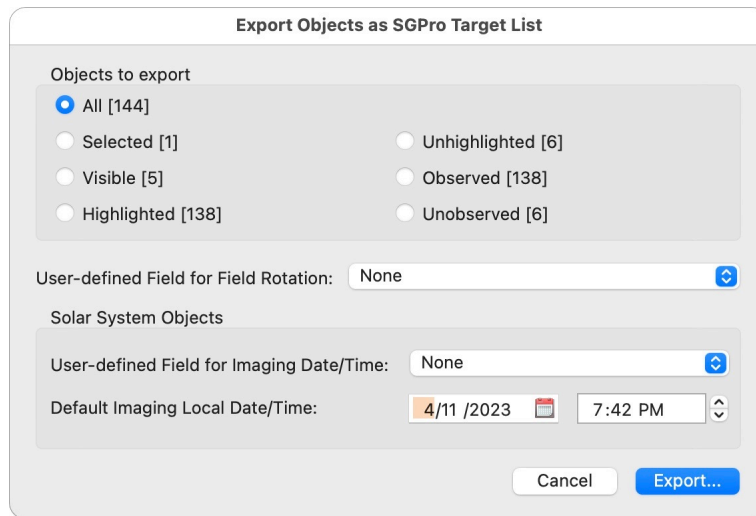


Figure 533: Sequence Generator Pro Target List export dialog

26.2.15 APT Object List

Use **File > Export > APT Object List...** to export the plan document contents to a file that can be read by the APT application.

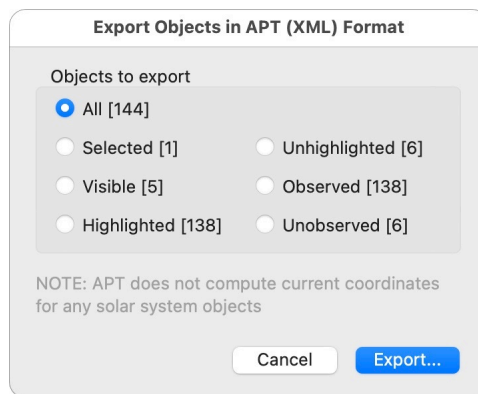


Figure 534: APT Object List dialog

26.3 Scripted solutions

It is possible to write a script to import or export objects, observations, etc. This is covered in more detail in the Scripting manual. You can check the inventory of user-contributed scripts and see if a script exists that will do the job, or that might be modified to fit the bill. See Section 27.2 on page 401 for more details.

27 Scripting

Scripting is a method of extending the capabilities of AstroPlanner using a built-in scripting language (an object-oriented language (Xojo) similar to Visual Basic). In particular it is possible to construct scripts to extend the following application features:

- General scripts that run to perform a single task (e.g. import data, construct an observing calendar, etc.). These are the most common types of scripts.
- Scripts that extend or complement the printing mechanism for printing object or observation lists.

Writing a script does require a moderate understanding of computer programming. However, those folk with such knowledge can also upload their scripts to an on-line repository that's available to all users. Downloading and using a user-contributed script is easy, and does not require any programming ability (unless you want to modify it for your own uses, that is).

The actual scripting language, the software framework that allows you to communicate with the application, and other details (all the geeky stuff) are contained in a separate scripting manual. The rest of this chapter discusses how to use the scripting system, not how to program it.

27.1 Editing and managing scripts

All (or most) script operations occur in the ***Script*** menu. The menu is in two parts.

The first part is a list of scripts that you have specified to appear in the menu (identifiable by the script icon on the left of each item). Selecting any of these scripts will execute the script immediately. Initially there will be no scripts in this menu.

The second part of the menu are various script-related commands.

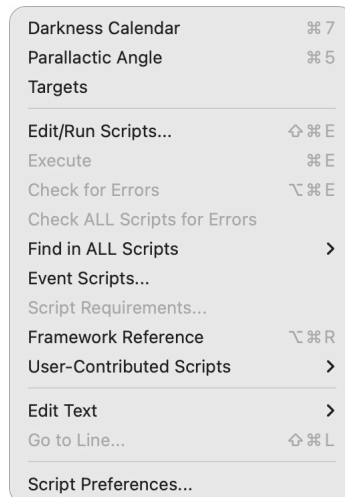


Figure 535: ***Script*** menu

Using the ***Script > Edit/Run Scripts...*** command opens the script editor window. This is where management and editing of scripts is done. On the left side of the window is a list of installed scripts, selecting one of these loads the script into the editor on the right side of the window.

You can then edit the script if desired, save the changes using the **Save** button (or **File > Save**), and execute the script using the **Execute** button (or **Script > Execute**).

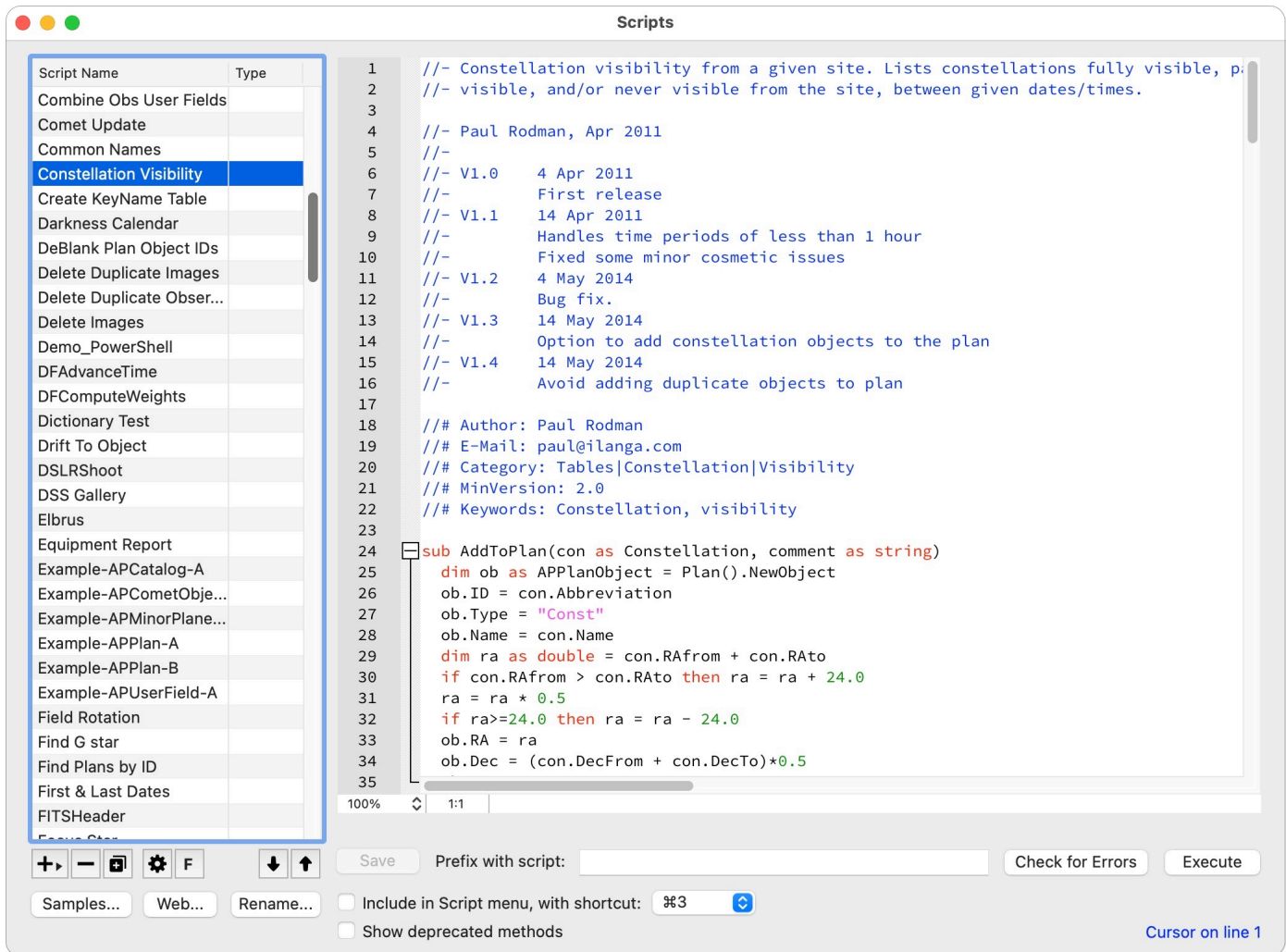


Figure 536: Script editor window

The row of buttons underneath the script list have the following functionality, from left to right:

- **Add new script.** Add a new script to the list. The submenu lists the various types of script that can be created. The most common being the "General" script. A new script file is created given a name you specify (which must be unique).
- **Delete selected script.** Delete the selected script. This cannot be undone.
- **Duplicate selected script.** Make a duplicate copy of the selected script.
- **Open script preferences.** Open the script preferences window (see Section 20.12 on page 345)
- **Open a framework reference window.** Open a new Framework Reference window (see Section 27.5 on page 404).
- **Download user-contributed scripts.** Open the user-contributed script download dialog in order to download a script and add it to your inventory (see Section 27.2 on page 401).

- **Upload a user-contributed script.** Open the user-contributed script upload dialog and prepare to upload the selected script to the on-line inventory (see Section 27.7 on page 407).

You can rename an existing script by selecting it and clicking the **Rename...** button.

You can examine and use various included sample scripts (some of which are mentioned in the scripting manual), by clicking the **Samples...** button. Selecting a sample script will copy it into a new script in your list, which you can then try, edit, etc.

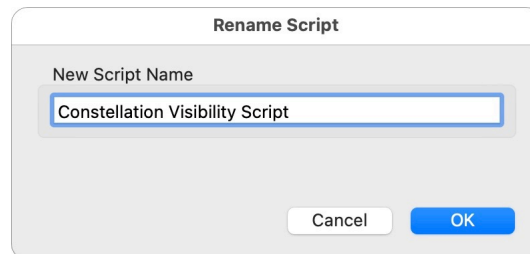


Figure 537: Renaming a script

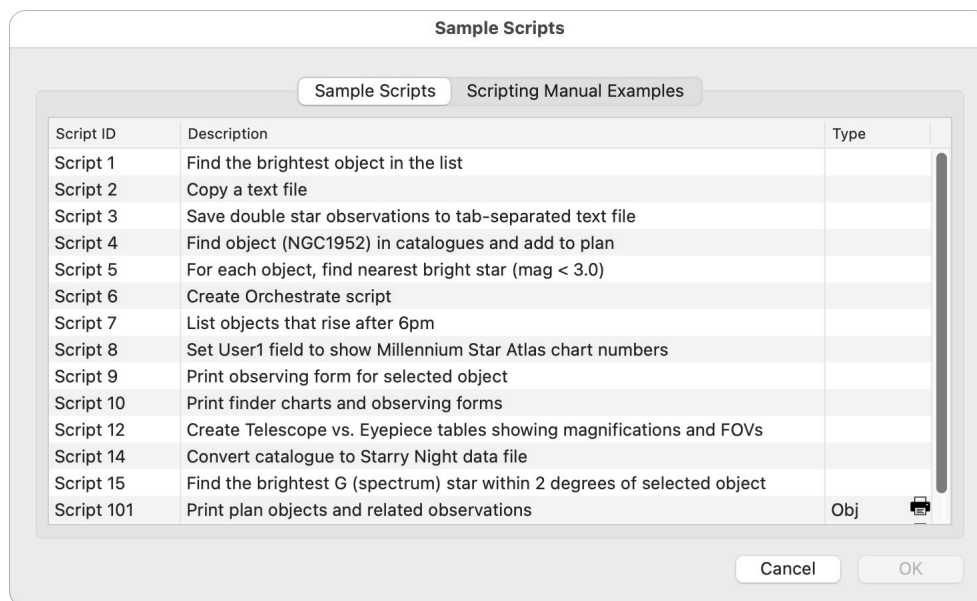


Figure 538: Sample script dialog

The **Check for Errors** button (and **Script > Check for Errors**) compiles and checks your script for syntax errors without actually running it. The **Execute** button compiles the script if necessary (if this is the first time you have used it, or if you have made changes), and executes it.

There is also a **Script > Check ALL Scripts for Errors** menu command. This will run through all scripts in your list and check each one for errors. Note that if a script is compiled and has syntax errors, it is designated by a red dot in the script list.

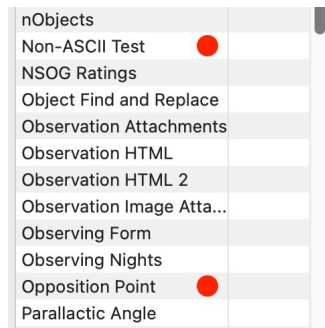


Figure 539: Script list showing script with syntax error

Use the **Include in Script menu** checkbox if you want to include the script at the top of the **Script** menu for faster access. You can also add a keyboard shortcut to that menu item for even faster access.

The **Show deprecated methods** checkbox detects any use of older framework calls from Astro-Planner V1.x that have been deprecated (i.e. replaced by newer methods). It is recommended that you replace any deprecated method calls by their newer replacements, since the older code will probably disappear in future versions of the application. After the script has run, a window containing a list of deprecated method calls and the new method to use, is displayed.

The **Prefix with script** field allows you to prefix your script with the contents of another script file before executing (allowing you to include common libraries, etc.). You can specify several script prefix files by separating their names with semicolons (;).

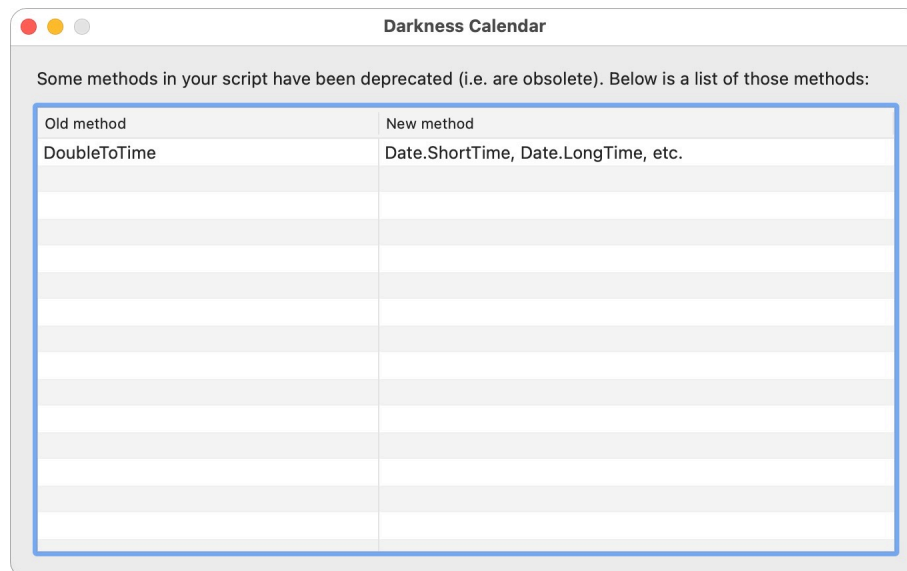


Figure 540: Deprecated methods window

27.2 Downloading a user-contributed script

You download a user-contributed script via the **Script > User-Contributed Scripts > Download...** menu command, or via the download button underneath the script list in the script editor window (see above). This feature is only available if you have an active Internet connection.

The current inventory of user-contributed scripts is downloaded from the Internet and displayed in a hierarchical fashion in a dialog.

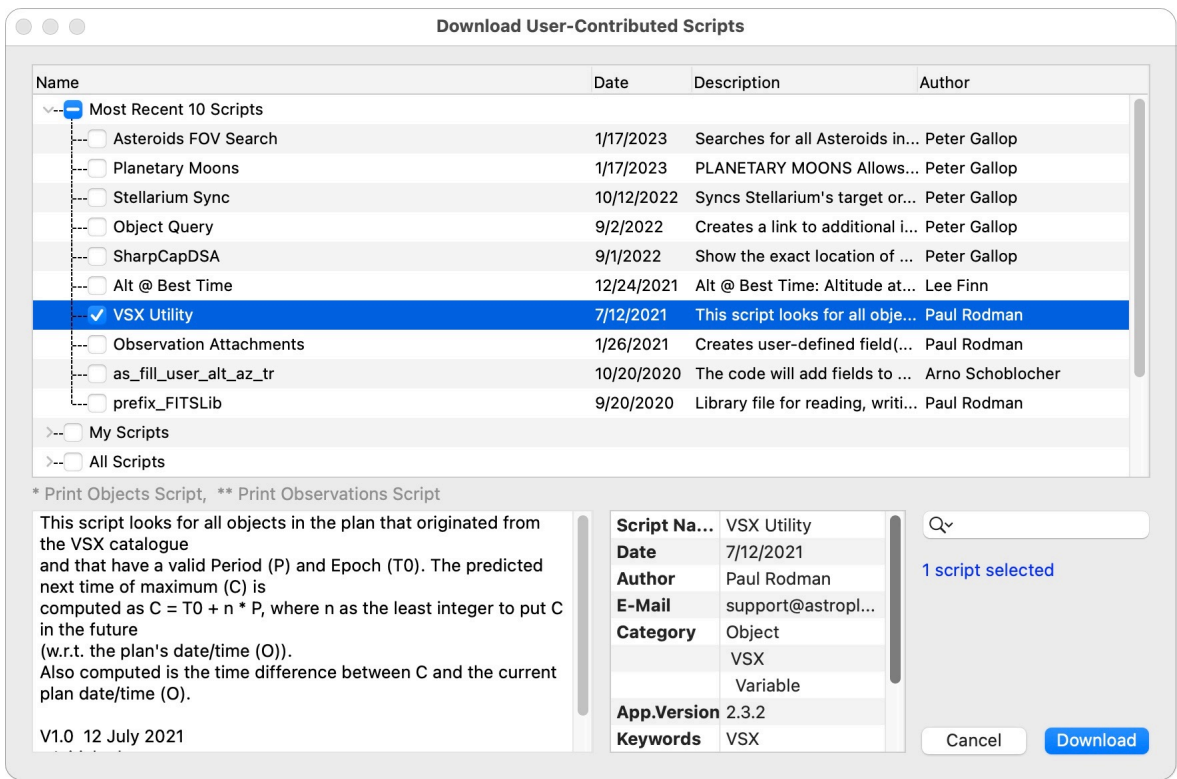


Figure 541: User-contributed scripts download dialog

The dialog displays the available scripts in various ways:

- **Most Recent 10 Scripts.** The ten most-recently uploaded scripts are displayed first. These are usually the ones you will be most interested in.

Name	Date	Description	Author
<input type="checkbox"/> Most Recent 10 Scripts			
<input type="checkbox"/> Asteroids FOV Search	1/17/2023	Searches for all Asteroids in...	Peter Gallop
<input type="checkbox"/> Planetary Moons	1/17/2023	PLANETARY MOONS Allows...	Peter Gallop
<input type="checkbox"/> Stellarium Sync	10/12/2022	Syncs Stellarium's target or...	Peter Gallop
<input type="checkbox"/> Object Query	9/2/2022	Creates a link to additional i...	Peter Gallop
<input type="checkbox"/> SharpCapDSA	9/1/2022	Show the exact location of ...	Peter Gallop
<input type="checkbox"/> Alt @ Best Time	12/24/2021	Alt @ Best Time: Altitude at...	Lee Finn
<input type="checkbox"/> VSX Utility	7/12/2021	This script looks for all obje...	Paul Rodman
<input type="checkbox"/> Observation Attachments	1/26/2021	Creates user-defined field(...	Paul Rodman
<input type="checkbox"/> as_fill_user_alt_az_tr	10/20/2020	The code will add fields to ...	Arno Schoblocher
<input type="checkbox"/> prefix_FITSLib	9/20/2020	Library file for reading, writi...	Paul Rodman

Figure 542: Most recent 10 scripts

- **My Scripts.** All of the scripts created and uploaded by you (if applicable) are listed here.

Name	Date	Description	Author
My Scripts			
<input type="checkbox"/> VSX Utility	7/12/2021	This script looks for all obje...	Paul Rodman
<input type="checkbox"/> Observation Attachments	1/26/2021	Creates user-defined field(...	Paul Rodman
<input type="checkbox"/> SkymapPro Import	4/5/2020	Skymap Pro import script. ...	Paul Rodman
<input type="checkbox"/> DeBlank Plan Object IDs	3/16/2020	This script removes blanks ...	Paul Rodman
<input type="checkbox"/> Test XYChart	11/11/2019	This is a test of the XYChar...	Paul Rodman
<input type="checkbox"/> Test XYChart Scripting	11/11/2019	This script is a simple targe...	Paul Rodman
<input type="checkbox"/> AAVSO Download	11/11/2019	This script downloads the li...	Paul Rodman
<input type="checkbox"/> Field Rotation	11/11/2019	Compute field rotation and ...	Paul Rodman
<input type="checkbox"/> Comet Update	9/17/2019	This script finds all comets i...	Paul Rodman
<input type="checkbox"/> Test Python	3/6/2019	This is a brief test of some ...	Paul Rodman
<input type="checkbox"/> Combine Obs User Fields	2/8/2019	Combine two observation u...	Paul Rodman
<input type="checkbox"/> TestWeb	2/2/2019	Test the Web Services func...	Paul Rodman

Figure 543: My scripts

- **All Scripts.** Lists of all scripts, with subsections by Date, by Name, and By Author.

Name	Date	Description	Author
All Scripts			
<input type="checkbox"/> By Date			
<input type="checkbox"/> By Name			
<input type="checkbox"/> By Author			
<input type="checkbox"/> as_fill_user_alt_az_tr	10/20/2020	The code will add fields to ...	Arno Schoblocher
<input type="checkbox"/> VisList	1/8/2014	Add a boolean userfield na...	I R vd Stadt
<input type="checkbox"/> SSDJPL Links	10/14/2010	Put web links to NASA's JP...	I R vd Stadt
<input type="checkbox"/> SSDJPL Links	7/6/2011	Put web links to NASA's JP...	I R vd Stadt
<input type="checkbox"/> SEDS Links modded	10/1/2010	Put web links to the SEDS d...	I R vd Stadt
<input type="checkbox"/> Print Finder Charts-modd	10/4/2010	Print finder charts By Mich...	I R vd Stadt
<input type="checkbox"/> Object Observation Durati	11/26/2010	V0.3 26 november 2010 Th...	I R vd Stadt
<input type="checkbox"/> Messier45 Links	10/26/2010	Put web links to the Deep S...	I R vd Stadt
<input type="checkbox"/> Guide Stars4Plan	11/24/2014	Find guide stars close to all ...	I R vd Stadt

Figure 544: All scripts

- **Printing Scripts.** All printing-related scripts (if applicable).
- **By Category.** All scripts, by category.
- **By Keyword.** All scripts, by keyword.

27.3 Deleting user-contributed scripts

Once you have uploaded a user-contributed script, only you can delete that script from the server. To delete one or more of your contributed scripts, use **Script > User-Contributed Scripts > Delete...** Select the script/s you want to delete using the checkboxes, and click **Delete** to remove them (sorry, no undo possible).

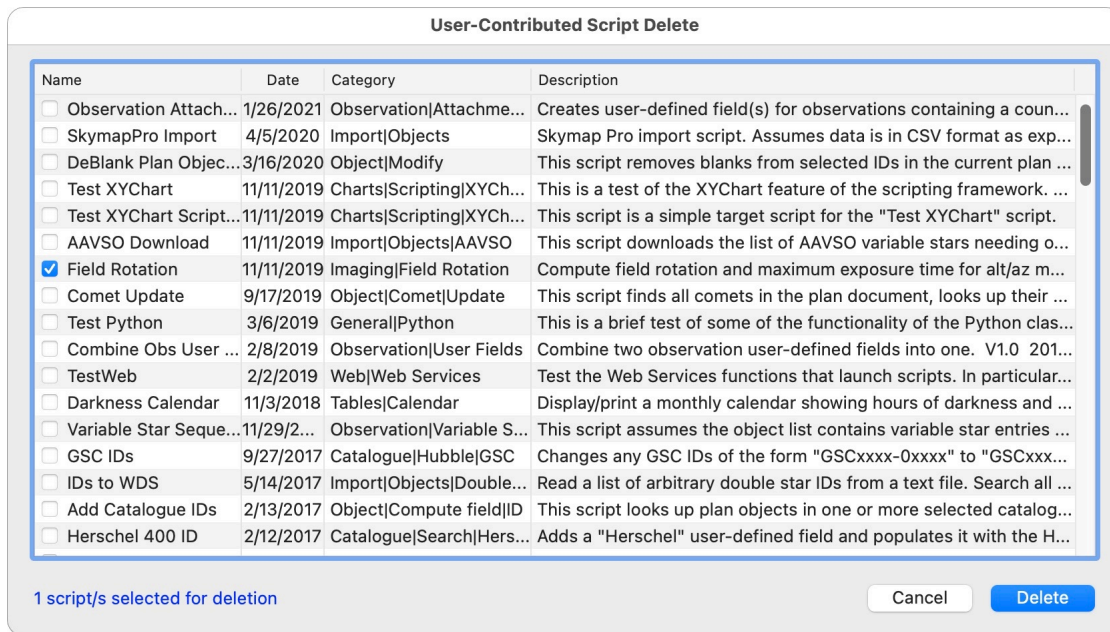


Figure 545: Deleting user-contributed scripts

27.4 Running scripts

Running General scripts is typically done by opening the editor using **Script > Edit/Run Scripts...**, selecting the required script in the list and clicking **Execute**.

If you are running a script regularly you can arrange for the script to appear in the **Script** menu (See page 401) where selecting it will start its execution.

Note that a plan document must be open in order to run a script.

27.5 Using the Framework Reference

There is a built-in feature that displays graphically the contents of the AstroPlanner scripting framework. The scripting framework is a collection of methods, functions and classes that can be used when writing your scripts. The framework reference is designed to be used as a convenient reference while you are constructing scripts or trying to understand existing script code.

To open a new Framework Reference window (you can open as many as you like):

- Use the **Script > Framework Reference** menu command.
- Use the "F" button under the script list in the script editor window.

There is a Key at the top of the hierarchical listing. This defines the meaning of the various coloured icons (Figure 547).

Selecting an entry displays the definition of the item in the bottom pane.

You can use the **Find** field and button to search the framework for a search string. The results are added to the top of the hierarchy (Figure 548). You can clear Find results by right-clicking and selecting **Clear Find results**.

Deprecated items¹ are not shown by default. Right-click and use **Show deprecated items** if you wish to see those items.

The **Show changes for version...** popup adds a section showing what was changed in the framework in a particular version of the application.

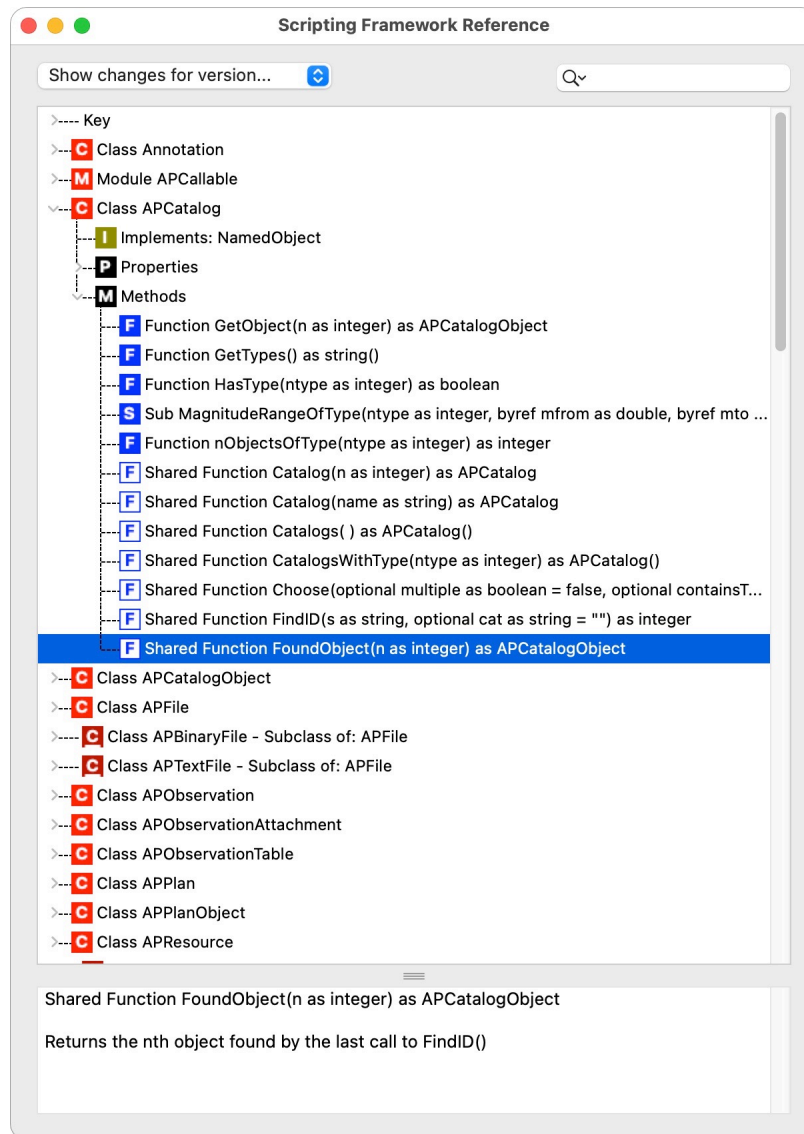


Figure 546: Framework reference window

1. A deprecated item is a class, method call, property, etc. that is no longer necessary, or has been replaced by another item. They are still part of the framework so that older scripts can still function, but will be dropped from the framework at a future time.

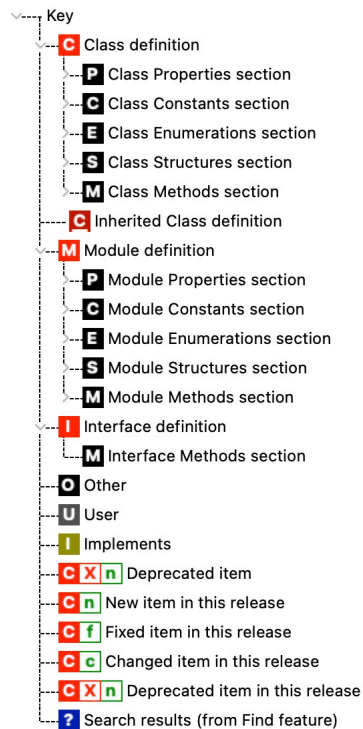


Figure 547: Framework reference key

When the script editor is open, double-clicking an entry will paste a "template" of the method or function into the script editor.

It is possible to add your own entries into the Framework reference. This is detailed in the scripting manual.

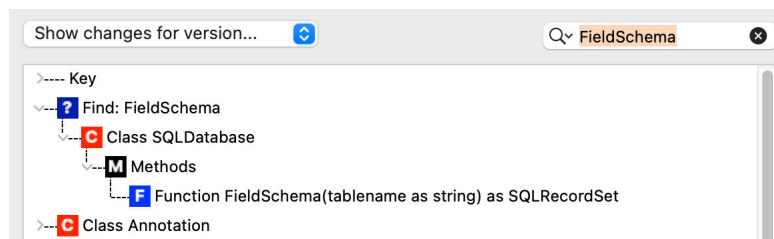


Figure 548: Find results

27.6 Script requirements

Normally a script will run as long as a plan document window is open. However, the script might have certain requirements (e.g. at least one plan object, certain catalogues, installed, etc.). You can check for these items in your script programmatically, e.g.

```
if Plan().nObjects<=0 then
    Print "Must have at least one object in your plan!"
    return
end if
```

However, this is tedious. You can set requirements using **Script > Script Requirements...** with your script selected in the editor. This allows you to specify requirements for the script to be runnable. For example, in Figure 549, the script must have at least 2 plan objects, no plan objects can be dou-

ble stars, the All-Sky Compiled Catalogue must be present, at least 1 telescope resource must be present, and V2.4 of the AstroPlanner application is required.

Script Requirements

Plan document/s

☒ Requires a plan with More than 1 object/s

☐ Requires a plan with More than 0 observation/s

☒ Requires a plan with No objects of type Dbl

☐ Requires a plan with a selected object

☐ Requires a plan with at least one highlighted object

Catalogues

☒ Requires All-Sky Compiled Catalogue

☐ Requires

☐ Requires

Resources (active)

☐ Requires at least 0 site/s

☒ Requires at least 1 telescope/s

☐ Requires at least 0 eyepiece/s

☐ Requires at least 0 optical aid/s

☐ Requires at least 0 filter/s

☐ Requires at least 0 observer/s

☐ Requires at least 0 imager/s

Other

☒ Requires version 2.4

☐ Requires a serial port

☐ Requires an Internet connection

Runs on

☒ macOS

☒ Windows

Cancel

OK

Figure 549: Script requirements dialog

When you run a script with such restrictions, and the script does not comply with a requirement, an alert message is displayed and the script is not run.

Cannot Run Script

Abraham Example 3: Requires a plan with no objects of type 'Dbl'

OK

Figure 550: Script non-compliance message

27.7 Uploading a user-contributed script

Uploading a (user-contributed) script is done from the script editor, using the upload button underneath the script list. The currently-selected script will be uploaded.

The upload dialog is "pre-populated" with data from the script, as much as possible¹.

1. Create a new script in order to see an example of the use of "special" comments to help populate the dialog.

Upload User-Contributed Script

Script Name: Author Name: Author E-Mail Address: Minimum Version Required:

Category*:

* use the given pre-defined values where possible

Documentation (PDF file only):

Author URL:

Keywords (comma-separated):

Description:
 Display/print a monthly calendar showing hours of darkness and moon info
 By Paul Rodman, with modifications by Joe Novak.
 V1.1 4 Nov 2007
 Fixed problem with choosing any year other than "Current"
 V1.2 5 Nov 2007
 Fixed problem with systems not having a font called "Times"
 V1.3 5 Nov 2007
 Fixed problem if no fonts defined, no sites defined, etc.
 V1.3a 6 Nov 2007
 Display version of script in dialog title
 V2.0 14 Mar 2009
 Modified for V2 (requires 2.0b27 or after)
 V2.1 3 May 2009
 Setting to determine date format

Fields marked in blue are required

☐ Announce script availability
 (A posting about the script will be placed on the AstroPlanner groups.io discussion group when the script becomes publicly available)

Prefix scripts:

Library scripts:

Figure 551: Script upload dialog

You can announce the upload on the AstroPlanner discussion group automatically using the checkbox at the lower left. If you have library or prefix scripts defined, you can elect to have them included in the upload.

If you already have a script uploaded with the same name, it will be overwritten by the new upload. If someone else has uploaded a script with the same name, you will not be allowed to upload.

27.8 Event scripts

You can elect to run a General script each time a particular event occurs. To do this, a plan document window must be at the front.

Use **Script > Event Scripts...** to open the event script dialog. The dialog shows a list of possible events. Each event can be enabled Locally (i.e. for the current plan document only) or Globally (for all plan documents). The popup list in the Enabled column lets you choose. The popup list in the Script column lets you choose one of your installed scripts.

In the example shown, when the current plan document is opened in the future, the "Add Sequence Number" script will run (once). For *all* plan documents, just before printing, the "NSOG Ratings" script will be run.

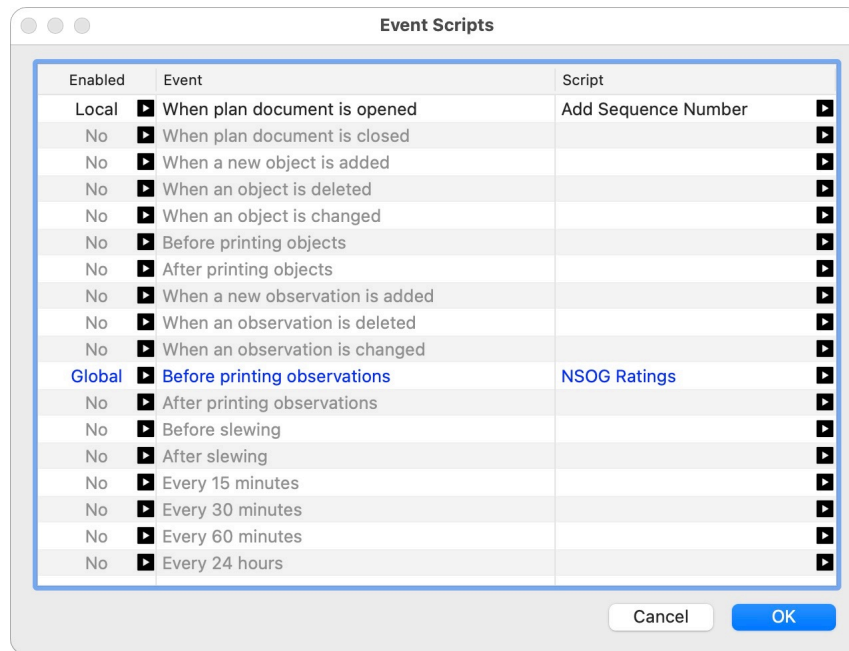


Figure 552: Event Script dialog

27.9 Printing scripts

Printing scripts are special scripts that drive the printing process for the object list and observation database. Creating these is detailed in the scripting manual (and is not for the faint of heart).

When you print from the object list or observation database window, the print dialog has a **Printing script** popup menu that includes the Default printing script (built-in) and any other printing scripts you might have installed.

27.10 Web Services management

WARNING: This feature was added as a special order for a particular user. 99.9% of users will not need to concern themselves with this specialist feature.

The **Web...** button on the script editor window allows you to access a remote or local AstroPlanner application running web services (you can even access this instance of AstroPlanner, for testing purposes, if you have Web Services running. See Web Preferences). You can send commands to the remote AstroPlanner client in order to manage it.

You specify the IP address and port number of the remote AstroPlanner client running Web Services, as well as its authentication string where needed. Then you can perform certain commands from the various tabs on the window (such as sending a local script to the remote client, retrieving a script from the client, getting a list of scripts available on the remote client, etc.).

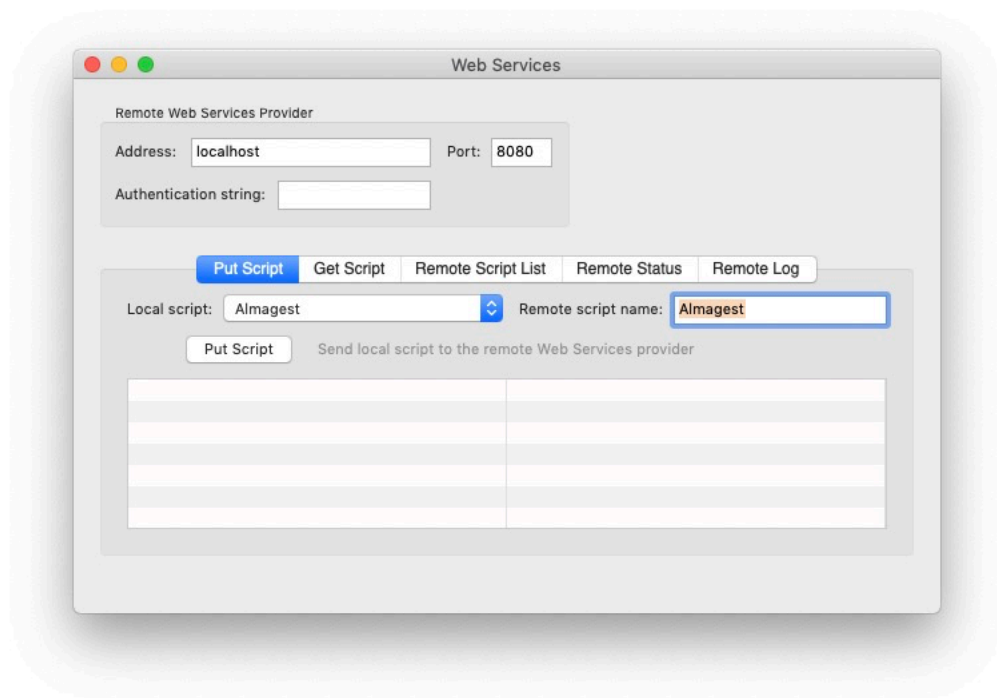


Figure 553: Web services access

28 Troubleshooting

This chapter covers strategies to use when the application crashes, when you don't know why something has happened, or you just wish that AstroPlanner could do something it doesn't.

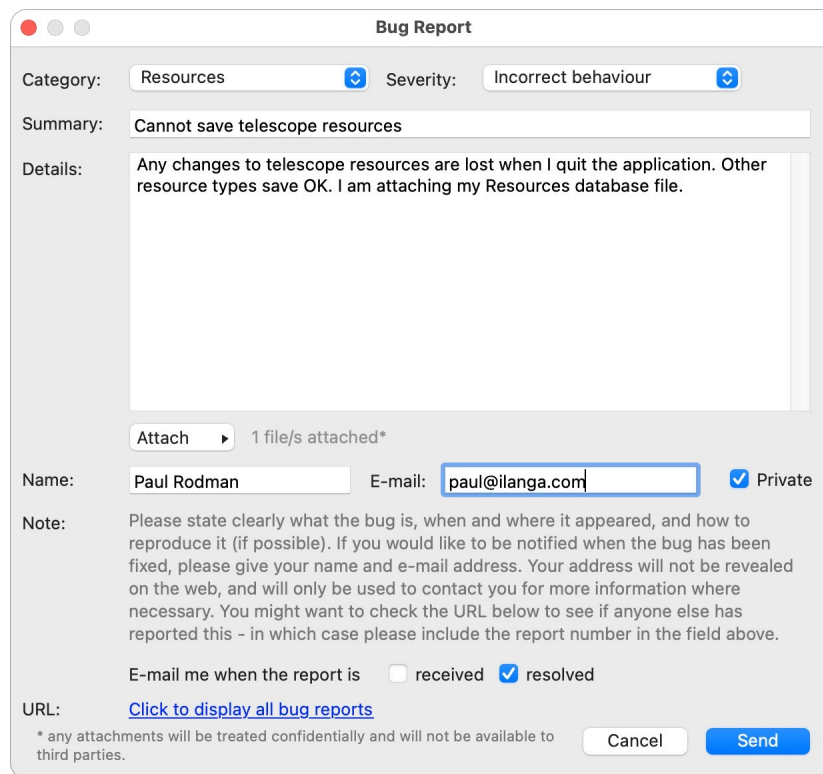
28.1 Getting help

This was covered in Chapter 6 on page 37. You should use the following resources, in order of preference:

- Search the user manual.
- See if the issue appears in the FAQ.
- Search on the AstroPlanner Discussion Group and see if the issue has been raised.
- Contact AstroPlanner support.

28.2 Reporting bugs

The best way to report a bug is to use the built-in bug reporter¹, **Help > Report a Bug...**



The screenshot shows a 'Bug Report' dialog box with the following fields and options:

- Category:** Resources (dropdown menu)
- Severity:** Incorrect behaviour (dropdown menu)
- Summary:** Cannot save telescope resources (text field)
- Details:** Any changes to telescope resources are lost when I quit the application. Other resource types save OK. I am attaching my Resources database file. (text area)
- Attach:** 1 file/s attached* (button)
- Name:** Paul Rodman (text field)
- E-mail:** paul@ilanga.com (text field)
- Private:** ☒ (checkbox)
- Note:** Please state clearly what the bug is, when and where it appeared, and how to reproduce it (if possible). If you would like to be notified when the bug has been fixed, please give your name and e-mail address. Your address will not be revealed on the web, and will only be used to contact you for more information where necessary. You might want to check the URL below to see if anyone else has reported this - in which case please include the report number in the field above.
- E-mail me when the report is:** ☐ received ☒ resolved (radio buttons)
- URL:** [Click to display all bug reports](#) (link)
- Footer:** * any attachments will be treated confidentially and will not be available to third parties. (text)
- Buttons:** Cancel, Send (buttons)

Figure 554: Bug Report dialog

Using this method of reporting bugs has several advantages:

- You can do it directly from the application.

1. Note that this feature requires an Internet connection.

- The bug report goes straight into the bug database and is therefore more likely to get resolved.
- There's a convenient way to attach commonly needed files without having to go looking for them.
- The report will automatically include the application version in use, your platform OS information, screen size, etc.

Of course, if the application will not run, or it crashes before or when (!) you use the bug reporting feature, then you should send an e-mail report of the bug to support@astroplanner.net.

There are some important things to know about reporting bugs. Proper bug reporting is critical to getting the application bug free (or as near to it as is reasonably possible).

28.2.1 Why report bugs?

Surely the person who is developing the application is aware of all the bugs? After all, isn't he/she responsible for all the code?

In a perfect world this would be the case. However, it's not a perfect world. The application is an extremely complex beast with many parts that interact with one another. The bugs often occur in those interactions. For the developer to be aware of all bugs, he would have to test every possible interaction with every possible input data value, on all platforms, with all operating systems, etc. This is not feasible. Hence, you will find bugs that have never been seen before. It's important that the developer is made aware of those problems so that they can be fixed.

28.2.2 What is a bug?

A bug can be any of the following (typically in descending order of nastiness):

- A crashing bug that causes the application to quit unexpectedly.
- An unhandled exception. These are error conditions that are not being handled by the application code, but should be.
- Bad results (e.g. an altitude reported as 95°, an RA of -2.5 hours, 12 items reported deleted when only 11 are in the list, etc.). These do not cause a crash or exception, but are nonetheless incorrect.
- Unexpected side-effects. (e.g. when you open a preferences window another window is resized, etc.)
- Cosmetic problems (e.g. overlapping text, controls that are not redrawn properly, incorrect tabbing order, spelling typos, flickering controls, etc.). These do not affect the operation of the application, but are annoying or irritating.
- Documentation problems (e.g. diagram in manual does not correspond with the actual application, etc.).

28.2.3 When to report bugs

As soon as any bug appears, it should be reported, unless you have already done so for the exact same bug and don't have anything different to say about it. That is the case for any of the above bug types. Anything you consider an anomaly is probably a bug and should be reported. Just because you can work around a bug does not mean it is not worth reporting.

Even if you do something completely outrageous, like pasting the entire works of Shakespeare into an object's Notes field, or making 20,000 observations of NGC1234, it should not cause an exception

or any other kind of bug, but should fail with a suitable error message or warning. If a bug does occur - report it.

28.2.4 What to include in a bug report

The quality of your bug report is critical to getting the bug fixed. A good report should include the following (where applicable):

- The version of the application you are testing (e.g. 2.0b53)¹.
- The platform and operating system you are using (e.g. Windows XP SP3, Mac OS X 10.5.8)¹.
- What you were doing when the bug occurred. Please try and use correct terminology to make your description more understandable. (e.g. **Bad:** "the eyepiece picture isn't always there" vs. **Good:** "The chart on the Field of View tab often doesn't redraw properly when you first select that tab").
- Whether you are able to reproduce to bug when you tried a second time. Reproducible bugs are much easier to find and fix.
- Any error messages reported.
- Attach any error log files from your desktop.
- Attach screen shots (images) showing the bug occurring, if possible. This is *really important and useful* for the developer, especially if English is not your first language. Remember that "a picture is worth a thousand words." I have fixed many bugs almost instantly based on a screenshot, where the user has struggled to describe the problem adequately in words.
- If you wish, you can attach copies of the plan document you were working on when the bug occurred.

28.3 Feature requests

If AstroPlanner does not have a particular feature that you feel would benefit yourself and others, no matter how trivial or major, please feel free to request that it be added. While doing this is no guarantee that it will be implemented in the future, many (if not the majority) of new features in successive releases of AstroPlanner have been requested by users.

The probability of a feature being implemented depends on several factors:

- **Applicability.** If the feature is applicable to AstroPlanner (e.g. better finder charts) then it is more likely to be implemented than a feature that is not (e.g. image acquisition and processing).
- **Generality.** A feature that is likely to appeal to many users (e.g. a built-in star atlas) is more likely to get attention than a feature that is specific to a few users (e.g. a telescope mount driver for the 200" telescope at Mt Palomar).
- **Ease of implementation.** A feature that can be implemented and integrated fairly easily (e.g. a new scripting command, a new catalogue) has a better chance of seeing the light of day than one that requires a lot of developer effort (e.g. built-in 3D planetarium).

1. You don't have to include these if you are using the built-in bug reporter - it will include that information automatically.

- **Developer expertise.** A feature that the developer knows how to implement without too much research is more likely to be implemented than one that the developer would need to spend a lot of time researching.
- **Cost.** A feature that has additional monetary cost associated with it (e.g. licencing fees, software libraries, etc.) would not be implemented unless there is a general desire for it (and possibly an increase in product cost to offset).
- **Popularity.** If multiple users request the same feature, it is more likely to be implemented than one requested by a single user.

All that being said: feel free to request any feature you like. The request will be added to the database. There are currently hundreds of requests - enough for many future revisions of the application.

The best way to file a feature request is to use the built-in request mechanism¹, **Help > File a Feature Request...**

Figure 555: Feature request dialog

28.4 Built-in tools

AstroPlanner has a few built-in tools to help with debugging. Under normal circumstances you won't need to use these, but if you have an issue they might prove handy to have.

1. Note that this feature requires an Internet connection.

28.4.1 Where's my stuff?

AstroPlanner keeps its support files, databases, etc. in places that are "approved" by the operating system. Sometimes these files and folders are difficult to locate. The **Help > Where's my Stuff?** menu command tells you where most of the important files are.

If you select an item in the list, clicking the **Reveal** button will open and show the file/folder in the Finder (Mac OS) or Windows Explorer (Windows).

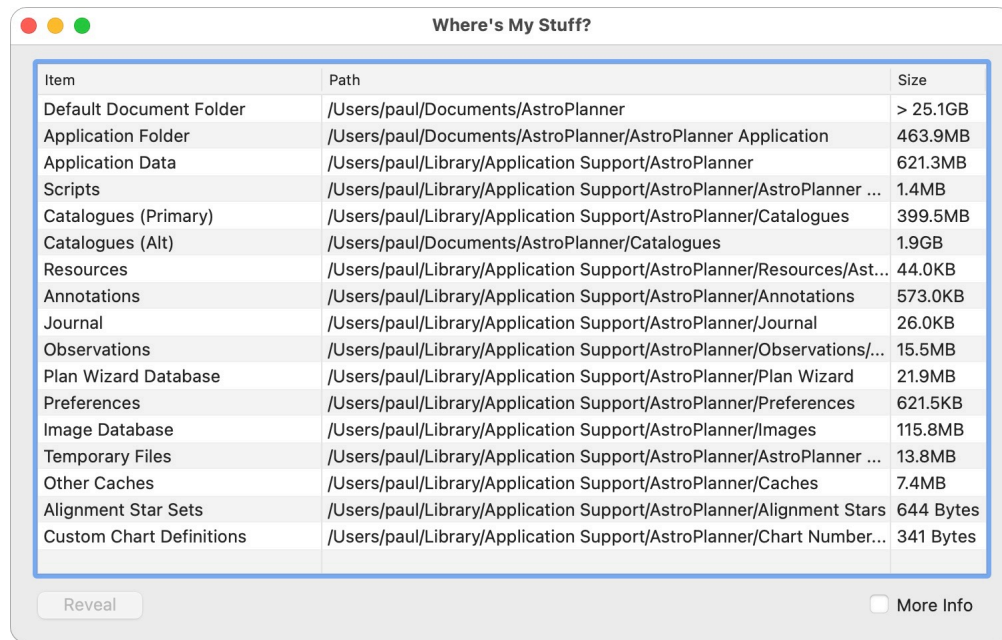


Figure 556: Where's my stuff?

The **More info** checkbox reveals additional information about the items (see Figure 557). The **F** column specifies if the item is a folder (Y) or a file (N). The **E** column specifies whether or not the item exists. The **P** column shows the permissions (octal) for the item. The **R** column specifies if the item is readable, the **W** column specifies if the item is writeable. The **Owner** column shows the owner of the folder/file.

Note that several of these additional columns only apply to Mac OS.

If a particular item is in a problematic state, it will be coloured red.

Item	Path	Size	F	E	P	R	W	Owner
Default Document Folder	/Users/paul/Documents/AstroPlanner	> 25.1GB	Y	Y	777	Y	Y	paul
Application Folder	/Users/paul/Documents/AstroPlanner/AstroPlanner Application	463.9MB	Y	Y	755	Y	Y	paul
Application Data	/Users/paul/Library/Application Support/AstroPlanner	621.3MB	Y	Y	755	Y	Y	paul
Scripts	/Users/paul/Library/Application Support/AstroPlanner/AstroPlan...	1.4MB	Y	Y	755	Y	Y	paul
Catalogues (Primary)	/Users/paul/Library/Application Support/AstroPlanner/Catalogues	399.5MB	Y	Y	755	Y	Y	paul
Catalogues (Alt)	/Users/paul/Documents/AstroPlanner/Catalogues	1.9GB	Y	Y	755	Y	Y	paul
Resources	/Users/paul/Library/Application Support/AstroPlanner/Resource...	44.0KB	N	Y	644	Y	Y	paul
Annotations	/Users/paul/Library/Application Support/AstroPlanner/Annotatio...	573.0KB	Y	Y	755	Y	Y	paul
Journal	/Users/paul/Library/Application Support/AstroPlanner/Journal	26.0KB	Y	Y	755	Y	Y	paul
Observations	/Users/paul/Library/Application Support/AstroPlanner/Observati...	15.5MB	N	Y	644	Y	Y	paul
Plan Wizard Database	/Users/paul/Library/Application Support/AstroPlanner/Plan Wiz...	21.9MB	Y	Y	755	Y	Y	paul
Preferences	/Users/paul/Library/Application Support/AstroPlanner/Preferenc...	621.5KB	Y	Y	755	Y	Y	paul
Image Database	/Users/paul/Library/Application Support/AstroPlanner/Images	115.8MB	Y	Y	755	Y	Y	paul
Temporary Files	/Users/paul/Library/Application Support/AstroPlanner/AstroPlan...	13.8MB	Y	Y	755	Y	Y	paul
Other Caches	/Users/paul/Library/Application Support/AstroPlanner/Caches	7.4MB	Y	Y	755	Y	Y	paul
Alignment Star Sets	/Users/paul/Library/Application Support/AstroPlanner/Alignmen...	644 Bytes	Y	Y	755	Y	Y	paul
Custom Chart Definitions	/Users/paul/Library/Application Support/AstroPlanner/Chart Nu...	341 Bytes	Y	Y	755	Y	Y	paul

Reveal F = Is Folder?, E = Exists?, P = Permissions, R = Readable?, W = Writeable? ☒ More Info

Figure 557: Where's My Stuff? with addition info displayed

28.4.2 Tracking threads

AstroPlanner V2 is a multi-threaded application. A *thread* is a piece of code that runs concurrently with the main application (i.e. runs in the background). This is done to make the application more responsive and to allow tedious processes to run in the background rather than making you have to go and find coffee.

If you find that the application is running sluggishly for no apparent reason, it could be that one of more background threads are causing the issue.

The **Help > Track Threads** menu command opens a window that lets you see what background threads are running.

Note that, if you have a plan document window open there will always be at least one "TimeUpdateThread" and one "Visibility Thread" running (even though they spend most of the time asleep).

Thread Name	Description	Run Time	Priority	Status
TimeUpdateThread	Widget Update	120.23	5	Sleeping
VisibilityThread	Visibility Computation for Untitled-1	120.37	1	No objects

Figure 558: Tracking threads

28.4.3 Forcing plan document closure

Sometimes a bad or corrupted plan document can cause the application to crash or freeze when starting up (since, by default, the application tries to re-open any plan documents that were open when the application last quit). You can force the application to ignore any previously-open plan documents when you start up by holding down the **Ctrl** key as you start the application.

28.4.4 Archiving & resetting preferences

A fairly common problem that causes assorted issues happens when a preference setting gets corrupted. If you suspect that this is the case, or would like to eliminate this suspicion, then you can reset the preferences back to "factory settings".

This is done by restarting the application while holding down the **Shift** key. This causes the Preferences Management dialog to appear.

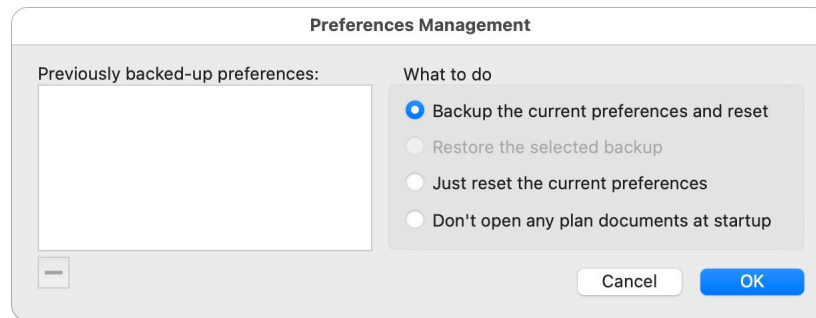


Figure 559: Resetting preferences - the first time

You can choose to backup the current preferences before resetting (a good idea, in case the resetting doesn't resolve the issue and you want to revert back to the old preferences), or you can just reset the preferences without making a backup if you want to live dangerously.

If you backup the preferences and subsequently use this feature again, then you'll be able to choose to restore the backed-up preferences.

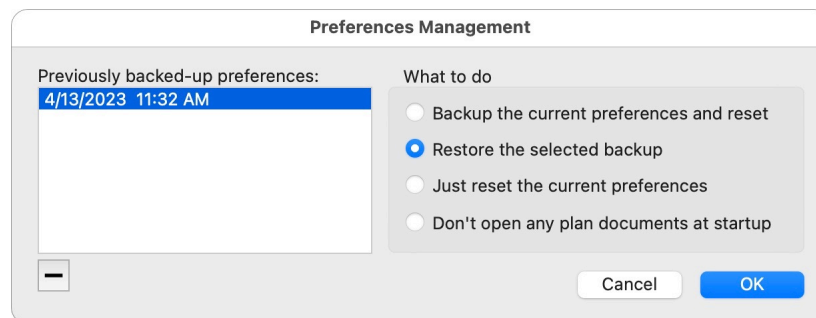


Figure 560: Restoring preferences

You can also use the last option if you suspect one of the plan documents you had open was causing a crash or exception. The application will then just open with a new, untitled plan document. The preferences will not be altered in this case.

28.4.5 Test telescope communication

If your telescope won't connect, and you're sure you have the right cables, etc. Then this feature might prove useful for debugging the connection.

The details are covered in Section 13.12.1 on page 235.

29 Glossary

This chapter defines some terms you might not be familiar with.

Age, Moon. The age of the moon in days from the time of new moon. i.e. New Moon = 0 days, First Quarter = 7 days, Full Moon = 14 days, etc.

Air Mass. A number that represents the thickness of the atmosphere in the direction of the object being observed. At the **zenith** it has the value 1.00 and becomes larger as the object nears the **horizon**. This is of use in determining **atmospheric extinction**.

Alignment, Mount. Computerised telescope mounts, when initialised, need to be calibrated with the sky so that the mount can figure out where it is pointing. This process is called alignment, and typically requires the user to point the telescope at one or more known stars.

Alignment, Polar. A telescope that is polar mounted must be physically aligned so that its main **RA** axis points towards the north or south pole. This is done by using a polar alignment scope, or various other alignment techniques designed to minimise the error.

Alignment Stars. Computerised telescopes generally have a fixed set of bright stars that their software can choose to align the mount.

Alt/Az. This usually refers to a telescope that is mounted so that its main axis points towards the **zenith** point and the other axis is parallel with the **horizon**.

Altitude. The angle of an object above the **horizon**. An object on the horizon would be at 0° altitude and an object at the **zenith** point would be at 90° altitude. Note: in AstroPlanner there is also an altitude setting associated with Site resources - in this case altitude refers to the distance in metres above sea level.

Aperture. The diameter of the main mirror or main lens of a telescope. Typically measured in mm or inches. The larger the aperture of a telescope, the more light is collected (allowing dimmer objects to be seen) and the greater the resolution (objects close together can be differentiated).

Apparent Magnitude. The **magnitude** of an object is specified as if it was at the **zenith** (**air mass** = 1). The apparent magnitude takes into account **atmospheric extinction** as the object is observed close to the **horizon** (the object appears to get dimmer as it approaches the horizon).

Arcminute. An angular measure. One arcminute = 1/60 degree = 60 **arcseconds**

Arcsecond. An angular measure. One arcsecond = 1/60 **arcminute** = 1/3600 degree.

ASCOM. (Astronomy Common Object Model) is a group that supplies an open-source software product that provides a generic method of driving telescope mounts. Currently Windows-only. <http://ascom-standards.org/>

Asterism. A collection of stars that forms a pattern, but the stars that it is composed of are otherwise unrelated (e.g. the Big Dipper in the **constellation** Ursa Major, or Orion's Belt in the constellation Orion).

Asteroid. See **Minor Planet**.

Astrometric. Refers to the exact measurement of star positions, and sometimes the measurement of double star *separation* and *position angle*.

Atmospheric Extinction. The dimming of light by its passing through the atmosphere. At the *zenith* the extinction is minimum, and increases as you approach the *horizon*.

Atmospheric Refraction. The atmosphere acts as a lens, especially near the *horizon*, and can bend incoming light. This leads to the apparent *altitude* of objects near the horizon being greater than expected, and objects appear to rise above the horizon before they physically do so.

Azimuth. The horizontal angle of an object with respect to true north. This is usually measured through east. i.e. North = 0°, East = 90°, South = 180°, West = 270°.

Barlow Lens. A lens that is used between an eyepiece and a telescope to increase the effective *focal length* of the telescope. e.g. if you use a 2X Barlow with a 2000mm focal length telescope, it effectively turns the telescope into a 4000mm focal length telescope.

Best Pair. An algorithm (developed by Jim Burrows) specifically to choose the best *alignment stars* for a Meade LX200 Classic telescope on an *alt/az* mount. Although the algorithm was designed around the shortcomings of the LX200 Classic mount, many have found it works well with other alt-az-mounted telescopes.

Binocular. In AstroPlanner this refers to a binocular or monocular device, and not a device that allows two eyepieces to be used on a telescope. Binoculars are typically defined with the *magnification* and *aperture* (in mm) of the optical system (e.g. 10x70 binoculars have a magnification of 10X and a main objective lens 70mm in diameter).

Bolide. A very large *meteor* that typically leaves a long and bright trail that takes several seconds or more to dissipate.

Bright Star Catalogue. The Yale Bright Star Catalogue is a *catalogue* containing several thousand of the brightest stars in the sky. It is used as a base catalogue by AstroPlanner for many different purposes (e.g. the Sky chart, etc.).

Cardinal Points. The directions of the N-S-E-W points. e.g. the North cardinal point is the direction of the north pole, etc.

Catalogue. A collection of related astronomical objects, usually observed and published by professional astronomers. Probably the most famous (and oldest) is the *Messier catalogue*.

Celestial Equator. An imaginary line on the celestial sphere that is equidistant from the north and south *celestial poles*. It is the line in *equatorial coordinates* with *Declination* = 0°.

Celestial Poles. The points at which the earth's rotational axis intersects the celestial sphere.

Cluster, Open. A cluster of randomly distributed stars that are associated (i.e. they are at a similar distance from the sun, typically share similar properties and typically have similar *proper motions*).

Cluster, Globular. A cluster of associated stars that are collected in a spherical or globular shape by gravity.

Comet. An icy body in the solar system that forms a tail as it approaches the sun. These may pass by the sun once only, or may be periodic (e.g. Halley's comet).

Constellation. A collection of bright stars that cover a region of the sky and purport to form mythical and other figures (e.g. Orion the Hunter, Ursa Major the Great Bear, etc.). The boundaries of

the constellations are accurately defined and any object that falls within that boundary is part of the constellation (e.g. the star Sirius is in the constellation of Canis Major).

Dec. See **Declination**.

Declination. One of the two coordinates (together with **Right Ascension**) used to specify the position of an astronomical object. It is the angular distance north or south of the celestial equator measured in degrees. The north **celestial pole** has Declination $+90^\circ$ and the south celestial pole has Declination -90° . It is similar to latitude on the Earth.

Deep Sky object (DSO). Generally this is any astronomical object outside the solar system. In AstroPlanner this generally means any non-**stellar object** outside the solar system. AstroPlanner does not consider stars to be DSOs.

Difficulty Index. A computed measure for double stars, dependent on their **separation** and relative **magnitude**, that gives an indication of how difficult it would be to "split" the double in a telescope.

Digital Setting Circles (DSC). A computerised mount that only reports the pointing coordinates of the telescope. i.e. does not have a motorised go-to feature. Also known as "push-to" telescope mounts.

Digital Sky Survey (DSS). A photographic survey of the entire sky done at the Palomar Observatory. Two such surveys were done, the 1st generation survey was done at a much lower **resolution** than the 2nd generation survey. Both surveys were done through red and blue **filters**.

Ecliptic. The plane of the earth's orbit around the sun, projected onto the celestial sphere. It is tilted at about 23° with respect to the **celestial equator**. The planets and the moon all revolve in pretty much the same orbit.

Epoch. The earth, as it rotates, acts like a spinning top or gyroscope, and its axis slowly traces a path through the heavens. This means that the north and south **celestial poles** are constantly moving with respect to the celestial sphere. This means that the **equatorial coordinates** of objects are also changing with time. Because of this, one needs to know the epoch or date and time that the coordinates were measured. To avoid confusion, certain standard epochs are used. Epoch B1950.0 concerns coordinates (effectively) measured on 1/1/1950. AstroPlanner, and most other astronomical software assumes coordinates are for Epoch J2000.0 (1/1/2000). AstroPlanner has features to convert coordinates between coordinate epochs.

Equatorial Coordinates. The **Right Ascension** and **Declination** of an object. This is a fixed position with respect to the celestial sphere.

Equatorial Grid. A grid of lines imposed on the celestial sphere showing lines of intersection of **RA** and **Dec**. The lines of RA intersect at the **celestial poles** (*a la* geographical longitude lines), and the lines of Dec are parallel (*a la* geographical latitude lines).

Field of View. What you see when you look through an optical instrument. It can also refer to the angular diameter of that field of view.

Field of View, Apparent. This is a property of an eyepiece and refers to the apparent angular size of the view through the eyepiece. e.g. Televue Nagler eyepieces have an apparent field of view of 82° .

Field of View, Actual. When you attach an eyepiece to a telescope the actual field of view is the **apparent field of view** of the eyepiece divided by the magnification of the system.

Filter. A transparent or partially transparent film of a particular colour that is placed in the optical path of a telescope in order to emphasise aspects of the object being observed.

Focal Length. The distance between the main lens or mirror of a telescope or eyepiece and the point at which it focusses light.

Focal Ratio. The ratio of the *aperture* of a telescope and its *focal length*. Usually designated f/xxx, where xxx is the ratio. e.g. a telescope of aperture 200mm and focal length 2000mm will have a focal ratio of f/10.

Focal Reducer. An optical device that, when placed in the optical path of a telescope, effectively reduces the *focal length* of the telescope.

Galactic Equator. An imaginary line (great circle) that (attempts to) bisect our own galaxy (the *Milky Way*)

Galaxy. A distant collection of (typically) billions of stars that form "island universes" like our own *Milky Way*. They come in various flavours: elliptical, spiral, etc.

GMT Offset. The number of hours **local time** is ahead (+ve) or behind (-ve) **Greenwich Mean Time**.

Greenwich Mean Sidereal Time (GMST). The current (local) **sidereal time** at Greenwich (longitude = 0°). Daylight saving time is not considered.

Greenwich Mean Time (GMT). The standard time at Greenwich (longitude = 0°). Daylight saving time is not considered.

Heliocentric Julian Date (HJD). The *Julian date* is geocentric (i.e. measured w.r.t the earth). Since the earth revolves around the sun, the distance to an astronomical object differs by up to 16 minutes (light travel time). For this reason, when measuring actual event times the HJD is measured w.r.t. the sun and hence offers an event time that is independent of where the earth is in its orbit.

Horizon. This typically refers to any point on the celestial sphere where the observer is looking exactly horizontally (altitude = 0°).

Hour Angle. The difference between the *RA* of an object and the RA of the *meridian* (or any point on the meridian).

Illumination, Moon. The percentage of the visible moon's surface that is illuminated by the sun. Varies between 0% (new moon) and 100% (full moon).

Imager. A digital camera used for astro-imaging.

Julian Date. A number representing the number of days (and fractions of a day) since January 1, 4713 BCE, at Greenwich. This is often used as a standard way to represent date/time universally (see, however, *Heliocentric Julian Date*)

Light Dome. A dome of light thrown onto the night sky by a distant city or other bright light source.

Local Time. The local clock time at your site. It will differ from *GMT* by the *GMT offset*, and might be further modified by daylight saving time rules.

Local Sidereal Time. See *Sidereal Time*.

Log Object Contrast. A measure of the contrast of a deep-sky object against the background sky.

Lord's Rating. This is a measure applicable only to double star objects and is based on the work of Christopher Lord (see the article "Enjoying Unequal Double Stars" in *Sky and Telescope*, Jan 2002, Page 118-121). The value is based on telescope **aperture**, central obstruction (if any) and **seeing** conditions. The ratings are: "F" = one or both stars are too faint to see through the selected telescope, "UN" = double is unresolvable, "XD" = exceedingly difficult, "ED" = extremely difficult, "VD" = very difficult, "D" = difficult, "MD" = moderately difficult, "ND" = not difficult, "E" = easy.

Magnitude. A number associated with an astronomical object that indicates its relative brightness w.r.t. other objects. The magnitude used in AstroPlanner is usually assumed to be a visual magnitude (as opposed to a photographic magnitude, which depends on filters, etc.).

Meridian. An imaginary line (of **RA**) that passes through the north and south **celestial poles** and the **zenith** point.

Messier Catalogue. A **catalogue** of 110 "fuzzy blobs" that Messier catalogued to avoid them being mistaken for comets. They consist of open and globular clusters, bright galaxies, planetary nebulae, etc.

Meteor Show Radiant. Meteors appear either sporadically (randomly) or as a shower. Such showers appear to arrive from a point in the sky, radiating outwards. The shower radiants are typically named for the constellation from whence they "radiate". e.g. Leonids, Capricornids, Perseids, etc.

Milky Way. Our home galaxy. Appears (in a dark sky) as a bright glow circling the sky.

Minor Planet, Asteroid. A rocky object orbiting the sun that is not otherwise considered a **planet** (e.g. Vesta)

Naked Eye Limiting Magnitude (NELM). The limiting **magnitude** of a star (i.e. the dimmest visible star) as seen by the naked eye. Depends on light pollution, visual acuity, etc.

Observability. This is a computed value that runs from 0 (object is below the horizon) to 100 (absolute best for observing the object, no moon, near the meridian, dark sky, etc.). This doesn't mean that you will be able to observe the object (your telescope might not be up to the task for dim objects, or be able to split double stars, etc.). It just means that the higher the value, the better chance you have of observing or imaging the object.

Optical Aid. AstroPlanner terminology: any optical device used with a telescope that changes the effective **focal length** of the telescope (e.g. a **Barlow lens**, **focal reducer**, etc.)

Optimum Detection Magnification (ODM). A computed magnification required to detect a diffuse **DSO** in a telescope. Depends on the telescope **aperture**, the **surface brightness** of the DSO in question, and the brightness of the background sky.

OTA. Optical Tube Assembly. The part of the telescope containing the optics (i.e. not the mount or tripod).

Period. Usually refers the period over which a variable star pulsates.

Phase, Moon. The relative stage of illumination of the moon. e.g. full, new, crescent, gibbous, etc.

Planet. Major solar system bodies that revolve in orbit around the sun. AstroPlanner still thinks that Pluto is a planet.

Polar. With reference to the *celestial poles*.

Position Angle, Pos. Angle. The angle that the major axis of a *galaxy* makes w.r.t. the north *celestial pole*. Also the angle that the secondary star of a double star system makes with the primary star (w.r.t. the north celestial pole).

Proper Motion. The actual motion of a star against the celestial sphere. This is typically very small and can be ignored. However some closer stars move several *arcseconds* per year.

RA, R.A. See *Right Ascension*.

Resolution. The amount of detail one can see through a telescope. This is usually proportional to the aperture of the telescope.

Reticle, Reticule. Cross hairs, or scales etched onto glass, at the focus of an eyepiece. Sometimes illuminated to make them show up against a dark sky.

Rigel Quickfinder. A unit magnification (i.e. 1x magnification) device like a gun site that effectively projects circular lines onto the sky.

Right Ascension. One of the two coordinates (together with *Declination*) used to specify the position of an astronomical object. It is the angular distance along the celestial equator measured from the *vernal equinox*. It is usually measured in hours (where 1 hour = 15°). It is similar to longitude on the Earth.

Rising Time. The time at which an object rises above the *horizon*.

Seeing. A measure of the stability of atmosphere for observing. Bad seeing implies the atmosphere is causing images to be blurred and in constant motion. Good seeing implies steady and un-blurred images.

Separation. The angular distance between the stars in a double (or multiple) star system. Typically measured in *arcseconds*.

Setting Time. The time at which an object falls below the *horizon*.

Sidereal. Refers to the rotation rate of the earth (23 hours 56 minutes per rotation, give or take. It is the time between transits of the same star on two successive nights).

Sidereal Time. A system of time based on the *hour angle* of the *vernal equinox* (i.e. *RA*=0, *Dec*=0).

Site Horizon. In AstroPlanner this refers to a user-defined horizon (i.e. objects blocking the real horizon such as trees, buildings, etc.).

Size, Angular. The angular size of an object in the sky. Usually measured in arcminutes, it is of the form AxB, where A is the longer dimension, and B the shorter.

Sloan Digital Sky Survey (SDSS). A colour photographic survey of the sky. It only covers part of the sky.

Solar System object. Any object in the solar system (i.e. the sun, the planets and their moons, minor planets and comets).

Spectral (Class). The class into which the object falls, based on its measured spectrum.

Surface Brightness. The overall brightness of a diffuse object measured in magnitudes per square *arcsecond*. Objects with low surface brightness are more difficult to see, especially if there is light pollution.

Stellar object. A star (apart from the sun).

Telrad. A unit magnification (i.e. 1x magnification) device like a gun site that effectively projects circular lines onto the sky.

Transit. When an object reaches its highest *altitude* in the sky during the passage of a day.

Transit Altitude. The highest *altitude* achieved by an object as it *transits*. This depends directly on the object's *declination* and the site's latitude.

Transit Time. The time at which an object *transits*.

Transparency. A measure of the clarity of the atmosphere.

Twilight. The period between sunset and total darkness, and again before the sun rises. When the sun's *altitude* is between 0° and -6°, this is known as Civil twilight. When the sun's *altitude* is between -6° and -12°, this is known as Nautical twilight. When the sun's *altitude* is between -12° and -18°, this is known as Astronomical twilight. When the sun's altitude is below -18°, it is considered to be astronomically dark.

Universal Time (UT). See *Greenwich Mean Time*.

Vernal Equinox. The point where the *ecliptic* crosses the *celestial equator*.

Zenith. The point immediately above the observer's head. equidistant from all points on the *horizon*. It has, by definition, *altitude* = 90°.

30 Revision Notes

30.1 V2.4

V2.4 includes many fixes to problems in V2.3. They are *not* listed here. You can use **Help > Revision Notes** to see details of bug fixes and enhancements.

The following list enumerates all non-trivial changes and improvements between V2.3.2 and V2.4.

- **Updated system requirements.** The Mac app is now a Universal build that runs natively on both Intel-based and Apple Silicon-based Macs. The main Mac application requires MacOS 10.14 or later. The main Windows application requires Windows 8.1 or later. For this release there are also separate special versions that run on older Macs (10.11 through 10.13) and older Windows (Win 7 SP 1 through Win 8). This version also requires a **larger minimum screen size**: 1280 x 720 pixels (2560 x 1440 pixels for Retina/HiDPI).
- **The UI has been completely overhauled.** Standard fonts and sizes are now used. No longer able to customise fonts and sizes (apart from lists, etc.).
- **The plan document window UI has been revised.** The tabs have been replaced by a toolbar at the top of the window. This toolbar can be customised (right-click for options) and contains useful shortcut icons appropriate for each tab. See page 92.
- **Widgets.** The various widgets that appeared at the top of the plan document window are now much more customisable, resizable, and reorderable (for each tab). Can also be hidden if required for more space. Right-click to customise. See page 93.
- **Observation synonym manager and rules.** The synonym mechanism was completely revised and optimised for speed. There's a new interface for modifying the synonym database with rules (See page 217). Synonyms for objects (See page 127) and observations (See page 206) are now displayed.
- **Object, Observation, and Session Find and Replace revision.** Objects: See page 176. Sessions: See page 203. Observations: See page 212.
- **Calendar.** See page 96.
- **Date/time user-defined fields.** See page 305.
- **Observation export order.** See page 388.
- **Handling line endings in export fields.** See page 388.
- **Observation density chart.** See page 214.
- **Comet and minor planet import.** Completely revised. See page 366.
- **Stellarium support.** See page 317.
- **Modify Text for import/export revision.** See page 379.
- **Rich text in notes fields.** See page 42.
- **FoV custom field diameters revision.** See page 154
- **Adaptive eyepiece reticles.** See page 63.
- **Script editor revision.** The script editor has been replaced with a much stabler version. See page 398.

- **RA/Dec entry and epoch conversion.** Where RA/Dec coordinates are entered, you can now enter/display the coordinates in an epoch other than the standard (J2000.0). See Figure 164 on page 108, for example.
- **Add Special menu additions.** Common star/DSO names (See page 84), and lunar features (See page 85)
- **Window position/size.** Most windows and dialogs now remember their previous positions on the screen/s, and (if applicable) their previous size.
- **SkyMapPro observation data import.** See page 386.
- **Observation table formula columns.** See page 208.
- **Lorentzian moon avoidance.** See page 113 and page 324.
- **Field of View custom object types.** See page 333.