CCD-Guide 4.1 Manual

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CCD ccdguide.com

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1. INTRODUCTION

CCD-Guide is a project of Astronomischer Arbeitskreis Salzkammergut (AAS) – Gahberg Observatory (www.astronomie.at). Since 1997, the CCD team of the Gahberg Observatory has published the best astrophotos of the members together with a software as CCD-Guide every year. The total revenue from the sale of CCD-Guide is used to assist the association and delivers a small financial contribution to the current AAS projects.

1.1. Functionality
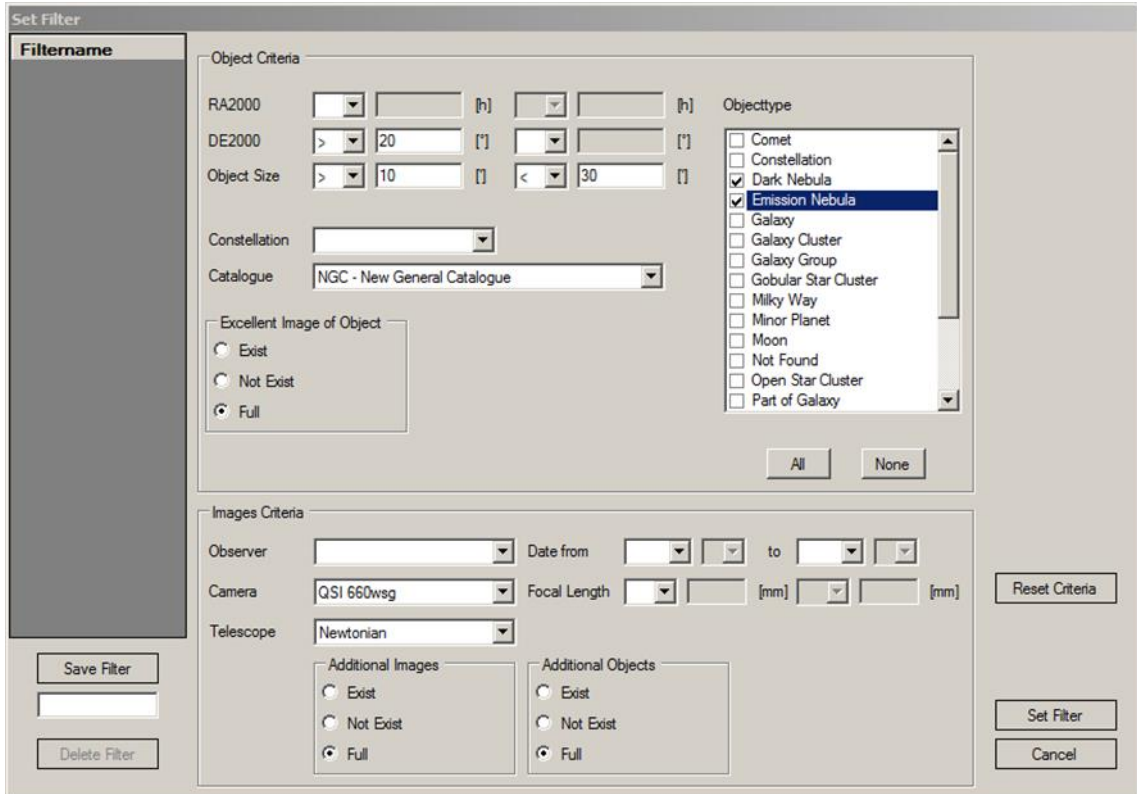
A summary of the new functions of the current release can be found in the appendix (chapter 18). CCD-Guide assists both, the beginner in astrophotography as well as the advanced astrophotographer with the following key features:

- **Image Browser:** You can easily browse through more than 5,000 images. At the same time you can see object data, image data and a preview image. Double-click on the preview image to open the image in a freely selectable image viewer software. The access to additional images (e.g. image with object identification, inverted image,..) is also provided.
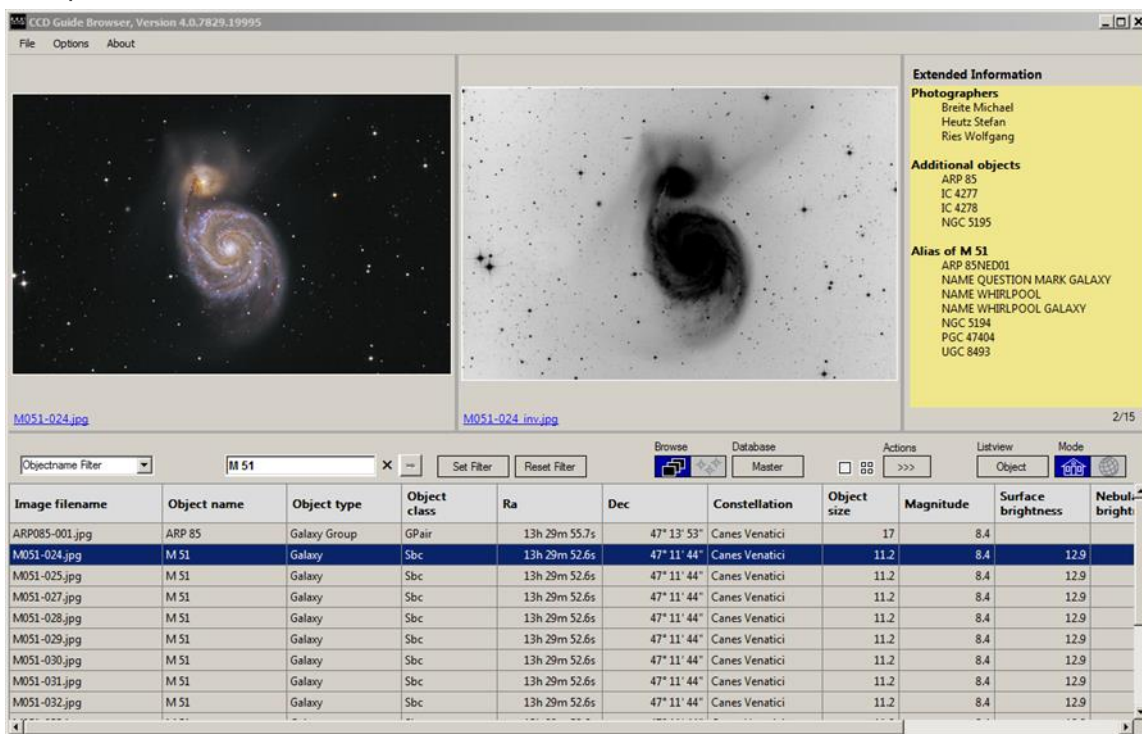
- **Objectname Filter:** If you want to select all images, which show a particular object, simply enter the object name or an alias name of the object name. Proper names or even parts of object names often guide you to the searched images.

- **Quick Filter:** When you enter a search string into the edit field of the QuickFilter, then only those data rows are shown which contain this search string in one of the data fields.

- **Set Filter:** You can easily create a subset of images using many different criteria (e.g. coordinates, object type, object size, constellation, catalogue, observer, camera, telescope, date, …)

- **Slideshow:** After you have defined a particular subset of images using the set filter feature, you can start a slideshow to browse through all images in full screen mode.

- **No software installation necessary:** All functions are available immediately after unpacking the zip file in the case of the download version or after copying from the USB stick to the hard disk in the case of the USB stick version.

- **ObjectBrowser:** CCD-Guide contains a big database of objects including object data. The database contains 30 different catalogues of deep sky objects, which are based on the revised NGCIC catalogue of Wolfgang Steinicke, the nebula database of Eric-Sven Vesting and the NED and Vizier databases. A big advantage of CCD-Guide is that there exists only one data row for one object. Each physical object has a master object name, but you can find this object also with the alias names (entries in other catalogues). With the ObjectBrowser, all object data can be accessed easily and quickly.

- **Input your own objects**: In case that some special objects are missing (e.g. comets), you can input your own objects including object data.

- **Input your own images**: You can input your own images including additional images and additional objects.

- **Planner:** First, you can create different setups (telescope + camera combination). Then you can use the object database to create your planning list for each setup. A very useful feature of the Planner is the possibility to assign a reference image and a field-of-view image to each planning data set.

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- **ObjectTracker:** ObjectTracker answers quickly and easily the question whether a certain object can be photographed at a selected location in a certain night. The ideal time window for observing is calculated taking into account twilight, moon, object altitude and optional horizon. The altitude progression of the object and of the moon is displayed in an intuitive graphic.

- **ObjectMarker & ObjectViewer:** With the ObjectMarker, images can be solved via astrometry.net and then labeled with the objects of the CCD-Guide database as well as with your own texts. With the ObjectViewer the labeled images can be viewed, coordinates can be read out and an internet search can be carried out with SIMBAD, NED or Vizier.

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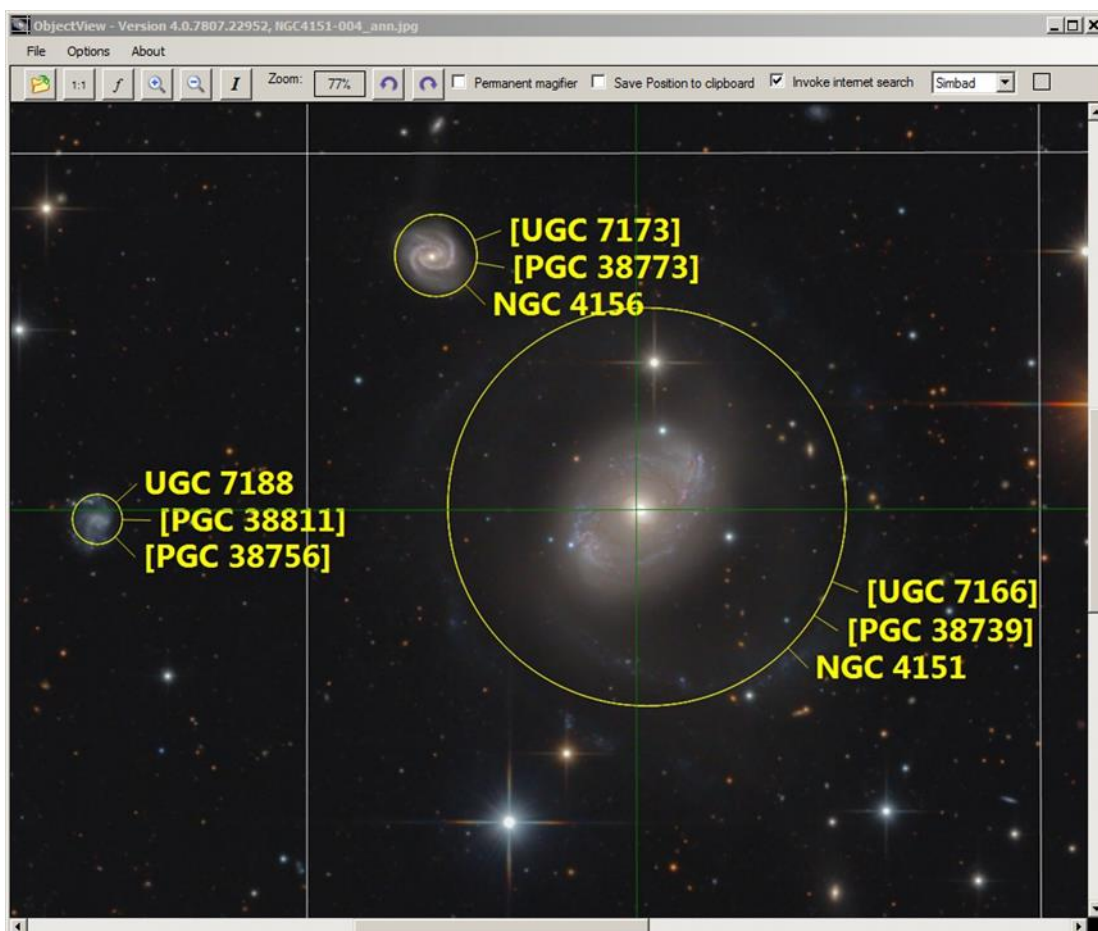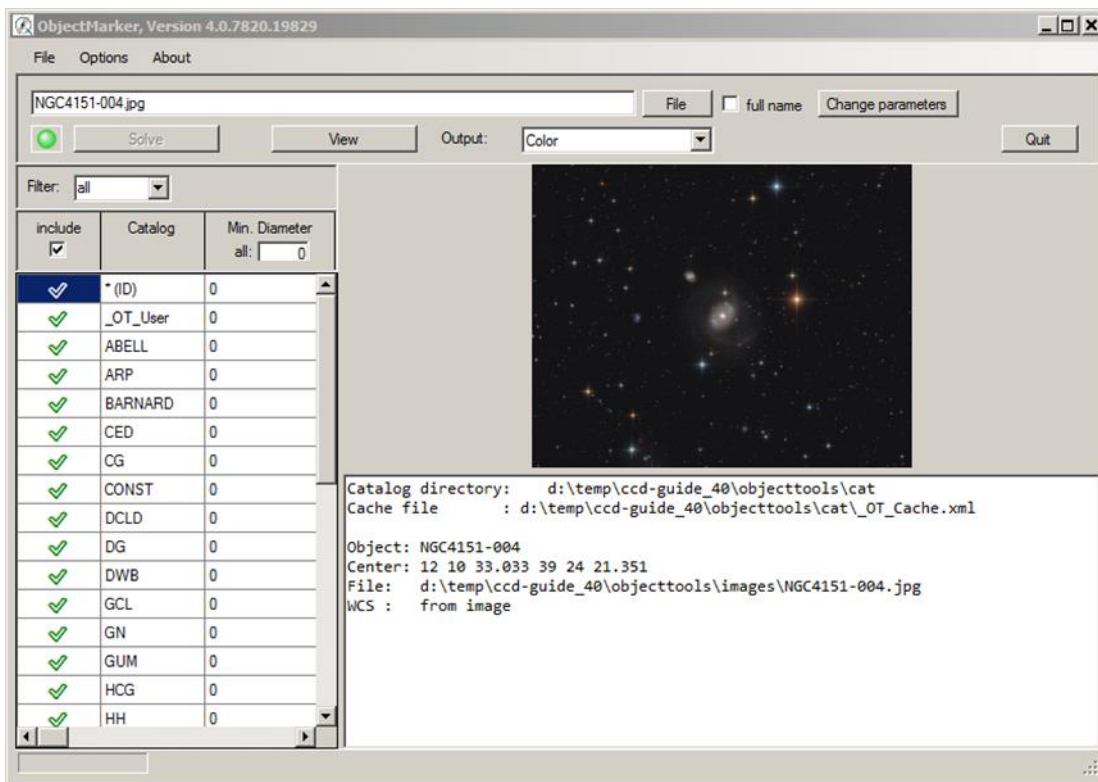
1.2.   CCD_Guide.exe

The CCD_Guide.exe is the central entry point to the CCD-Guide software platform. All programs can be started directly here.

The two most important programs that can be called from the CCD_Guide.exe are:

- Browser (CCD_Guide_Browser.exe): allows access to all images including image data using the ImageBrowser function and easy access to the object database using the ObjectBrowser function.
- Expert (CCD_Guide_Expert.exe): contains the CCD-Guide functions object planning, input of own objects and input of own images.

Furthermore, the CCD_Guide.exe is the central point for help and information (Help button) and it allows direct access to the ObjectTools such as ObjectTracker, ObjectMarker, ObjectViewer and many other useful utilities.

The CCD-Guide window can always be kept in the foreground with "Stay on top" (pin button) and with "Autostart" it can be started automatically when the computer is booted.

Clicking on the small square changes the color scheme for all applications (except Expert) between light and dark.

If a blue info icon appears in the title bar, then a new update is available, which can be downloaded and installed with the Update Utility.

Details on the individual tools of the CCD-Guide software platform can be found in the respective chapters of this manual.

2.   INSTALLATION AND OPTIONS

2.1.   System requirements

- Operating system: Windows 7 or higher
- CLR (Common Library Runtime) .net 4.5.2 or higher

It is recommended to use CCD-Guide on a computer where all operating system updates have been carried out.

2.2.   Installation

Installation of the software:

The installation of the software is very simple for both the download variant and the USB stick variant:

Unzip the zip-file to the desired directory on the internal or external hard disk: e.g. into the directory c:\ccdguide\ or d:\ccdguide\.

Attention: Please, do not copy CCD-Guide into the Windows system folders like c:\Program Files, c:\Program Files (x86) or c:\Windows!

Images on USB stick:

If you have purchased an USB stick, please copy the folder images from the USB stick into the CCD-Guide directory on the hard disk.

Download variant:

If you have purchased the CCD-Guide download version, please start the CCD_Guide.exe and click on the Browser button.

At the same time as the Browser window opens, the image downloader window opens automatically, allowing you to download the images. You can pause the download of the images at any time and continue later. For details, see chapter 3.10.

Attention: If the virus scanner causes problems, please follow the tips in the following pdf document:

https://ccdguide.com/wp-content/uploads/2022/03/VirusScanner_EN.pdf

2.3.   Options

After completing the installation, it is recommended to check some program options and to change them if necessary.

Options in Browser:

First start the Browser by clicking on the button Browser in the CCD_Guide.exe. After the CCD-Guide Browser window has opened, click on the second menu item "Options".
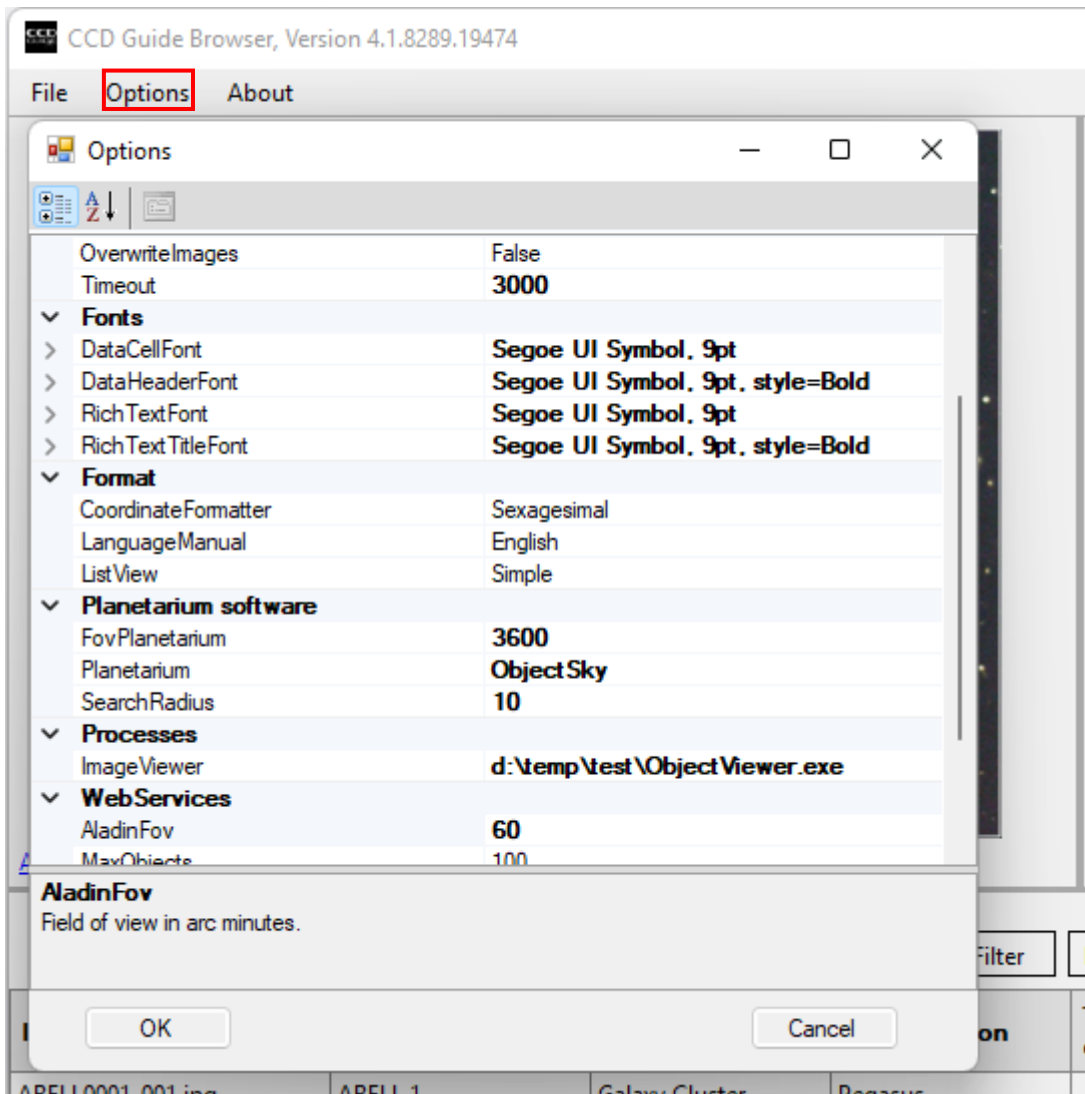
Various settings can be made in the Options window, which are explained in different places in this manual. The default settings make sense for most users and in the first step only the planetarium should be set for the Browser. To do this, use the right scroll bar to get to the section "Planetarium software".
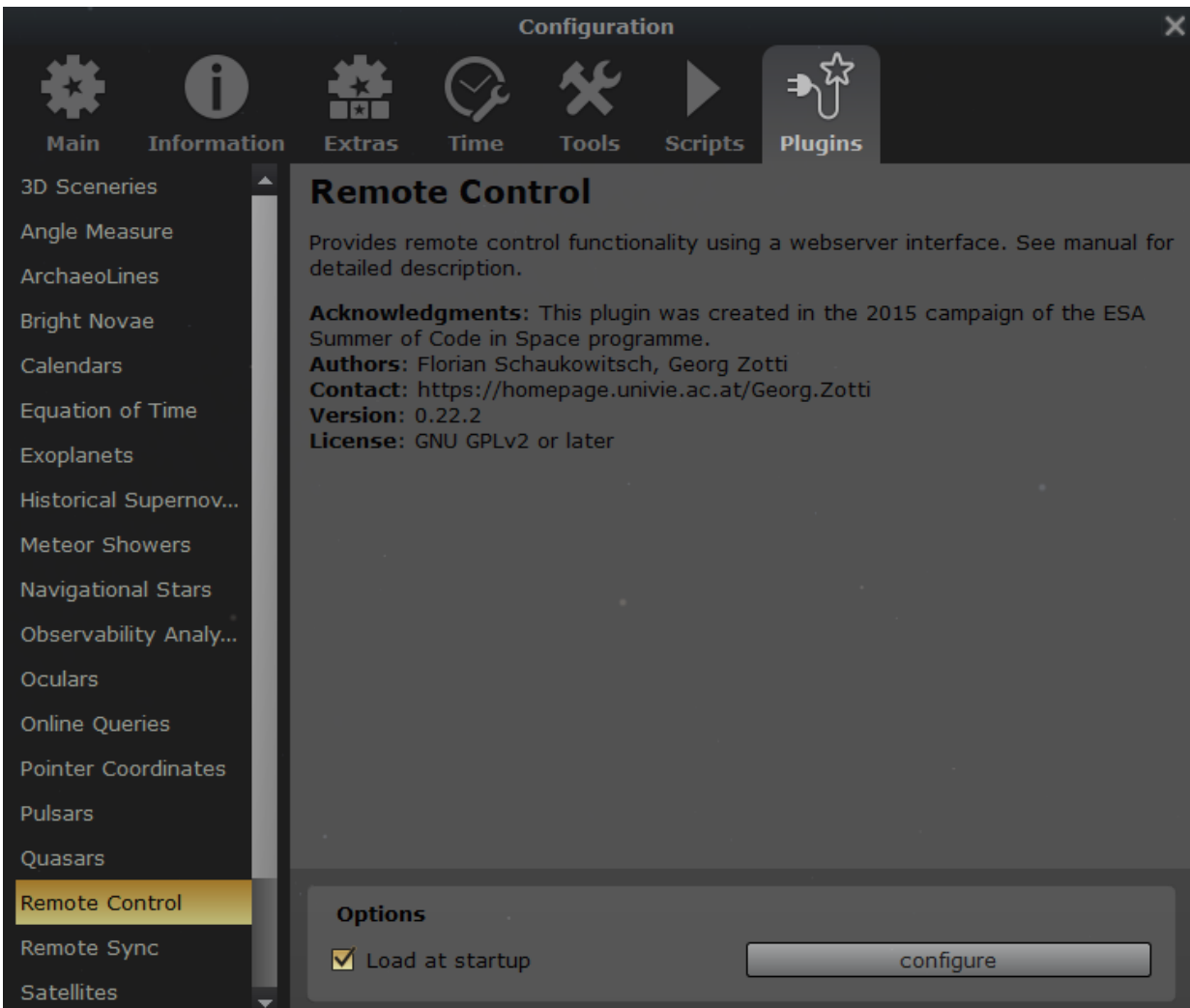
The default setting of Planetarium is "ObjectSky". You can select one of the following planetariums:

- TheSky6
- TheSkyX
- SkyChart (=Cartes du Ciel)
- Guide9
- ObjectSky
- Stellarium

To use The Sky6 or TheSkyX in CCD-Guide, it is necessary to start The Sky once as administrator.

To use Stellarium in CCD-Guide, the following setting is necessary in Stellarium:

Plugins -> Remote control -> Activate checkbox "Load at startup".

Options in Expert:

Please start the Expert by clicking on the Expert button in the CCD_Guide.exe. After the CCD-Guide Expert window has opened, click on the "Options" tab.
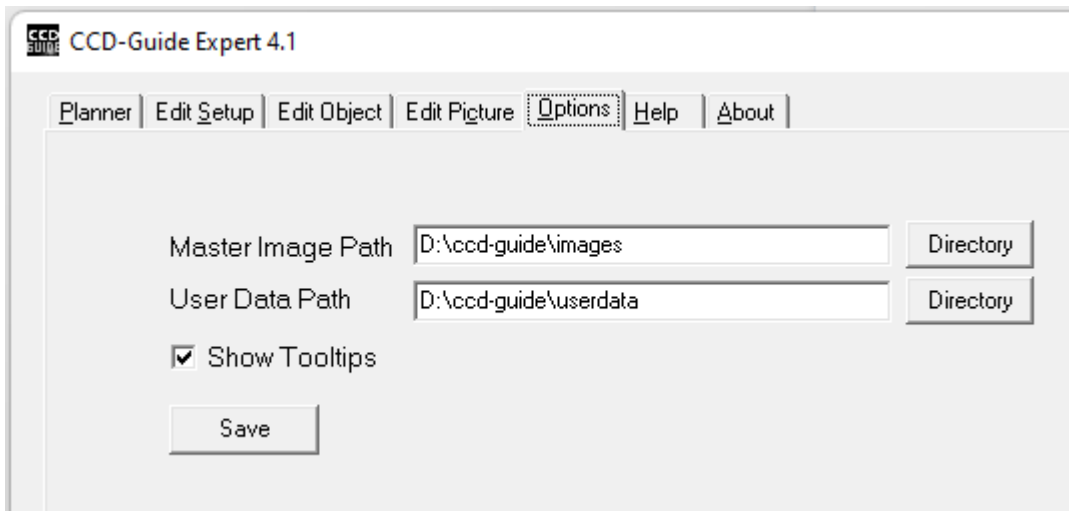
Please, check and modify the following paths:

- Master image path: This folder contains all master images. There is no need to change this path.
- User data path: This folder contains all user data including the user database, the archive of user images and the planner images of the user.

Furthermore, you can activate or deactivate the visibility of tooltips in the Expert with the checkbox "Show Tooltips".

It is necessary to click Save to set any changes in the Options tab.

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2.4. Continuing to use an existing user.mdb

If you are already a CCD-Guide user and if you want to continue using your existing data in the old user.mdb, then proceed as follows, depending on the existing old CCD-Guide release:

Release 3.3 or newer:

- Copy the existing "userdata" directory from the old CCD Guide installation directory to the new CCD Guide installation directory (overwriting the existing user.mdb).
- Update the paths in the Options tab as described above.

Release 3.2 or older:

- Copy your existing user.mdb from the subfolder "database" of the old CCD-Guide installation into the subfolder „userdata" of the new CCD-Guide installation (Overwrite the existing user.mdb).
- Copy your folder with the user images (user_images) and the folder with the planner images (planner_images) from the old CCD-Guide installation into the subfolder "userdata" of the new CCD-Guide installation.
- Update the paths in Options tab.

2.5. Further use of existing ObjectTracker locations and horizon files

If you are already using ObjectTracker and if you want to use your already created locations and horizons, please copy the file Locations.csv and the directory hor from the objecttracker directory of the old CCD-Guide installation into the folder userdata of the new CCD-Guide installation. (Overwrite the existing Locations.csv file).

3. BROWSER (IMAGEBROWSER AND OBJECTBROWSER)

3.1. Browser - overview

The Browser is the core of the CCD Guide software. At the same time you can see object data, image data and a preview image. A double click on the preview image opens the image with the image viewing software that is set in the options of the Browser (default is ObjectViewer).
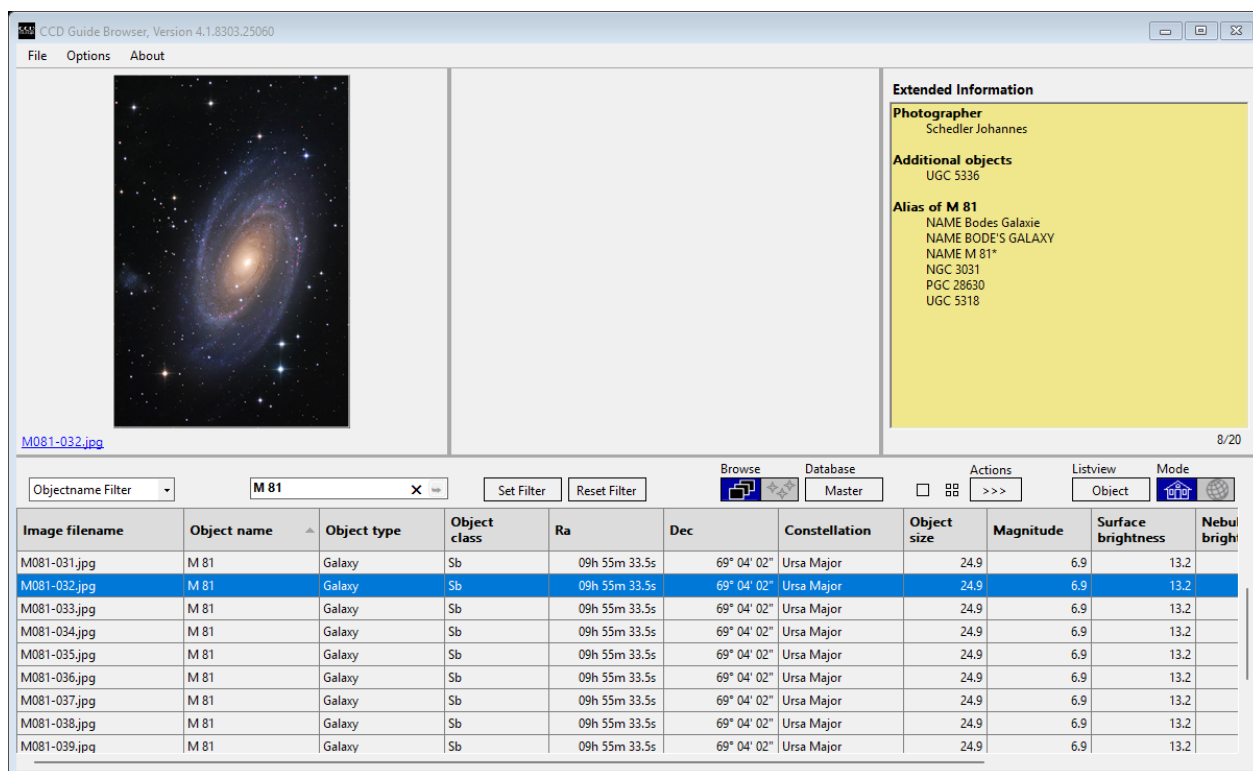
You can use the arrow keys of your keyboard or you can simply click on a data row in the main table of the Browser to change the active data row. The active data row is bluely coloured. The preview image is always connected with the active data row. Also the contents of the Extended Information table near the right top corner are always connected with the blue active data row.

The horizontal control bar in the middle of the Browser window is the central control point of the Browser and offers a number of functions grouped as follows:

- Filter functions (details in chapter 3.6)

- Database access control (details in chapter 3.2)
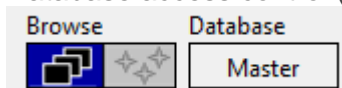
- Actions (details in chapter 3.7)
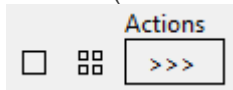
- Change Browser display (details in chapter 3.3 and in chapter 3.9)
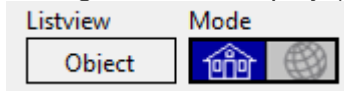
3.2.   Database access control

The Browser can be used in two different Browse modes:

1. **ImageBrowser:** You can browse through all images of the CCD-Guide database.

2. **ObjectBrowser:** gives you the possibility to browse through the object data of all objects of the CCD-Guide database. This mode is very useful for planning.
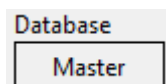
The Database button offers the choice between the following modes:

- **Master:** is the default setting. Images and object data are only read from the CCD-Guide master database.
- **User:** Images and object data are read from the user database. This option is only available if you have entered your own images or your own objects in CCD-Guide Expert.
- **All:** Images and object data are read from both the master database and the user database.

3.3.   Main data table
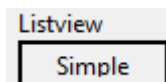
The ListView button (to the right above the main data table) gives you the possibility to change the appearance of the main data table in ImageBrowser mode:

- Simple: Only the most important data columns are visible.
- Image: Image related data columns are visible.
- Object: Object related data columns are visible.
- Full: All data columns are visible.
- User: User defined data columns are visible.
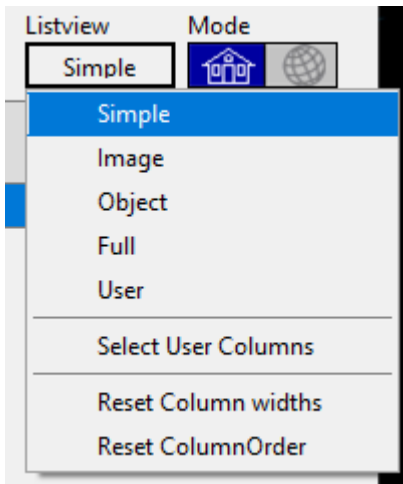
You can modify the user defined data columns (include or remove data fields) by clicking on option "Select User Columns".
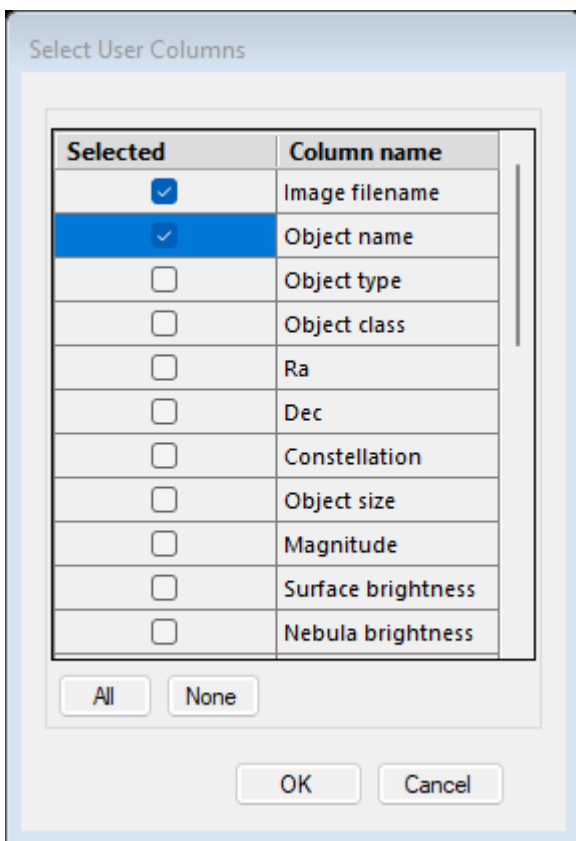
The width of each column can be adjusted and the order of the columns can be changed using "Drag and Drop". With "Reset Column widths" and "Reset ColumnOrder" the original state of the column widths and the original state of the column order can be restored.

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The following table describes each data field of the main data table.

Data field	Description
Image filename	Name of the image
Object name	Name of the main object, which is visible in the image
Object type	Object type (e.g. Galaxy, Emission Nebula,..)
Object class	Classification of the object (e.g Hubble class of a galaxy; Trumpler class of an open star cluster,…)
Ra	Right ascension [h]
Dec	Declination [°]
Constellation	Name of constellation (e.g. Andromeda)
Object size	Object size [arcmin]
Magnitude	Magnitude [mag]
Surface brightness	Surface brightness [mag/arcmin^2]
Nebula brightness	Nebula brightness [1 = very bright; 6 = very faint]
Image SeqNr	Picture sequence number (highest image number in database)
Object comment	Comments concerning the object (e.g. discovered in year 1960)
Exposure	Exposure time [free description]
Total exposure	Total exposure time [min]
Camera	Product name of the camera
Resolution	Resolution mode (e.g. Binning)
Observation date	Observation date
Additional obs. date	Additional observation date
Telescope	Product name of the optics (telescope or photo lens)
Aperture	Aperture [inch]
Focal Length	Focal length [mm]
Setup info	Further information concerning setup (telescope + camera + mount)
Location	Location of image acquisition
Level over sea	Level over sea of location [m]
Filter	Used filters (e.g. Ha, OIII,…)
Mount	Product name of the mount
Image comment	Further comments (e.g. weather conditions)

Only the Object-ListView is available in the ObjectBrowser.

With a simple click on the header of a data field (e.g. Total exposure) you can sort the data rows in alphanumeric order (ascending and descending).

Image filename	Object name	Object type	Constellation	Total exposure	Camera
NGC7129-007.jpg	NGC 7129	Open Star Cluster	Cepheus	4900	Moravian G3-16200
M027-037.jpg	M 27	Planetary Nebula	Vulpecula	4730	FLI ML8300
PN_PuWe_1-002.jpg	PN PuWe 1	Planetary Nebula	Lynx	4570	Moravian G2-8300
UNLISTED_3C_58-001.jpg	UNLISTED 3C 58	Supernova Remnant	Cassiopeia	4460	Apogee Alta U16M
PN_HFG_1-001.jpg	PN HFG 1	Planetary Nebula	Cassiopeia	4380	Moravian G2-8300
SH2-174-002.jpg	SH2- 174	Emission Nebula	Cepheus	3840	Moravian G2-8300
M042-037.jpg	M 42	Emission Nebula	Orion	3655	SBIG STL-11000M
IC5146-029.jpg	IC 5146	Emission Nebula	Cygnus	3480	SBIG STL-11000M
IC1805-025.jpg	IC 1805	Open Star Cluster	Cassiopeia	3340	SBIG STL-11000M
PN_Ju_1-002.jpg	PN Ju 1	Planetary Nebula	Cygnus	3150	Moravian G2-8300

3.4.   Extended Information

The Extended Information table (in the upper right corner of the Browser window) displays the following additional information, if available:

- Photographer(s): Photographer(s) of the active image.
- Additional Objects: Listing of the additional objects in the active image (in the following example, the main object is NGC 7129 and the object NGC 7142 is also included in the image).
- Alias names: Listing of all alternative names (alias) of the main object, which are contained in the database of CCD-Guide.
- Object relation: Listing of all objects contained in the main object.

Extended Information

Photographer
    Henne Thomas

Additional objects
    NGC 7142
    more...

Alias of NGC 7129
    CED 196
    DG 176
    GN 21.41.8.01
    IC 5134
    LBN 497
    NAME NGC 7129 IR CLUSTER
    VDB 146

Object relation to NGC 7129
    IC 5132
    IC 5133

For images with wcs-Info the text "more..." is displayed at Additional objects at the end of the object list. A click on "more..." returns all objects that CCD-Guide knows in the image field.

Extended Information

Photographer
Henne Thomas

Additional objects
GN 21.39.6
IC 5132
IC 5133
LDN 1181
LDN 1183
NGC 7129 (*)
NGC 7142
UNLISTED Variable_Nebula

3.5. Images in Imagebrowser

In some data sets, two preview images appear: A main image on the left and an additional image on the right. Double-clicking on one of the preview images always opens the image viewing software selected in the options (default: ImageViewer = ObjectViewer). The additional images provide supplementary information to the main image: e.g. object identification, an inverted display, ...

If more than one additional image exists, arrow keys appear in the right preview image. With these arrow keys you can navigate through the additional images. The following example shows the galaxy cluster Abell 2218, where two additional images are linked to the main image.

ABELL2218-001.jpg   ABELL2218-001_hst.jpg

If the file name displayed under the preview image is marked blue (as is the case with the image on the left in the example above), this means that the image contains wcs information and that you can start the ObjectMarker directly by clicking on the file name (for details on the ObjectMarker, see Chapter 13).

If you press the right mouse button on a preview image, a context menu with two entries appears:

- Export Image: to export the image
- ObjectMarker: to open the image in ObjectMarker.

3.6. Filter

CCD-Guide offers five different possibilities to filter the main data table (reduce number of visible datasets):

- Objectname Filter
- MasterObject Filter
- Circular Search Radius
- Quick Filter
- Set Filter

The **Objectname Filter** is a very useful feature, if you are interested in all images, which show a particular object. First choose the Objectname Filter, then enter the object name (e.g. M 82) in the white edit field to the right and press the return button on your keyboard.

| Objectname Filter | m 82 | X ⇥ | Set Filter | Reset Filter |

Image filename	Object name ▲	Object type	Object class	Ra
ABELL0001-001.jpg	ABELL 1	Galaxy Cluster	Count= 51	00h 07m 36.0s
ABELL0001-002.jpg	ABELL 1	Galaxy Cluster	Count= 51	00h 07m 36.0s
ABELL0119-001.jpg	ABELL 119	Galaxy Cluster	Count= 69	00h 56m 24.0s

Now the text "M 82" is shown in bold letters, which indicates that the Objectname Filter is active. The main data table contains only those images in which the desired object (e.g. M 82) is visible. There are also some images listed with Object name = M 81. This means that these images contain both objects (M 81 and M 82).

| Objectname Filter | M 82 | X ⇥ | Set Filter | Reset Filter |

Image filename	Object name ▲	Object type	Object class	Ra
M081-037.jpg	M 81	Galaxy	Sb	09h 55m 33.5s
M081-039.jpg	M 81	Galaxy	Sb	09h 55m 33.5s
M081-040.jpg	M 81	Galaxy	Sb	09h 55m 33.5s
M081-043.jpg	M 81	Galaxy	Sb	09h 55m 33.5s
M082-009.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-011.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-012.jpg	M 82	Galaxy	Sd	09h 55m 54.0s

With the Reset Filter button you can reset the filter and all images are visible in the main data table. If you want to learn more about the nomenclature of objects in the database of CCD-Guide and if you want to use the powerful wildcard search then please have a look at chapter 4.

The **MasterObject Filter** is used to list all datasets in which the object you are looking for appears exclusively as the main object. If, for example, we enter the object M 82 in the MasterObject Filter, the main table will show significantly fewer data rows, because only those data rows are displayed in which Object name = M 82.

Image filename	Object name	Object type	Object class	Ra
M082-009.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-011.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-012.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-013.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-015.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-016.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-017.jpg	M 82	Galaxy	Sd	09h 55m 54.0s
M082-018.jpg	M 82	Galaxy	Sd	09h 55m 54.0s

The **Circular Search Radius** filters all objects that are within the radius of a specific reference object. In the following example, all objects are searched that are located within a radius of 300 arc minutes around M 94.

Image filename	Object name	Object type	Object class	Ra
M094-004.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-006.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-009.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-010.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-011.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-012.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-013.jpg	M 94	Galaxy	Sab	12h 50m 53.1s
M094-014.jpg	M 94	Galaxy	Sab	12h 50m 53.1s

The Circular Search Radius Filter can also be used in combination with the planetarium. If one of the planetariums The Sky6/X or SkyChart is set in the options and this planetarium is open, then

the position set in the planetarium can be transferred to the Browser by pressing the key combination Ctrl+P and a Circular Search Radius search is started automatically.

The **Quick Filter** is a very fast and efficient way to reduce the number of data rows in a main data table. When you enter a search string into the edit field of the QuickFilter, then only those data rows are shown which contain this search string in one of the data fields. In the following example all data rows are shown which contain the text "Namibia" in one of the data fields. The search text is shown in bold letters, which indicates that the Quick Filter is active.

Quick Filter ▼	namibia ✕ ⇥		
Image filename	**Object name** ▲	**Object type**	**Ob cla**
ABELL3574-002.jpg	ABELL 3574	Galaxy Cluster	Cou
ARP244-001.jpg	ARP 244	Galaxy Group	GPa
BARNARD100-001.jpg	BARNARD 100	Dark Nebula	Opa
BARNARD142-004.jpg	BARNARD 142	Dark Nebula	Opa

You can also search for several keywords at the same time by linking the search texts with the "|" sign (logical OR) or with the "&" sign (logical AND).

The following example searches all data rows which contain the text "Namibia" or the text "Chile".

Quick Filter ▼	namibia|chile ✕ ⇥

The following example shows an AND search. With an AND search, the number of records found is significantly reduced.

Quick Filter ▼	namibia&chile ✕ ⇥

The **Set Filter** button opens the Set Filter window, a very powerful tool to filter your data rows using many different criteria (e.g. coordinates, object type, object size, constellation, catalogue, observer, camera, telescope, date). Bold characters of the Set Filter button indicate an activated filter. Set Filter is explained in detail in chapter 5.

3.7. Actions
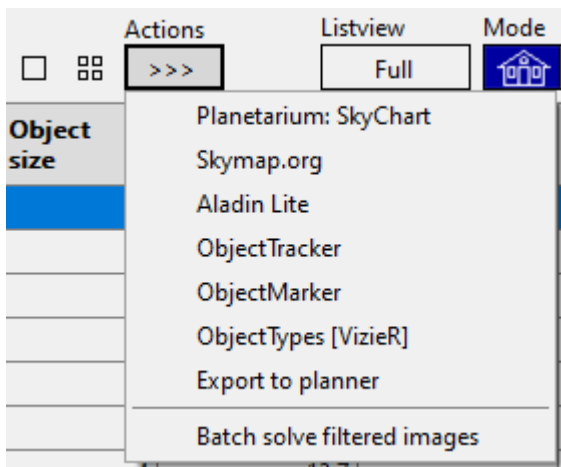
The Slide Show button ☐ creates a slide show of all visible images in the main data table. For example, if M 82 has been filtered, a click on Slide Show starts a slide show with all images of M 82 in full screen mode.

The Preview Panel function 🔲 provides a thumbnail overview of all images in the main table in full screen mode.

The button "\>\>\>" contains functions which are related to the active (blue coloured) data set:

- **Planetarium:** The Planetarium button opens your preferred planetarium software centred on the active object. Use Options to define your preferred planetarium software (chapter 2).
- **Sky-map.org:** When you are connected to the internet then you can use the Sky-map.org button to open sky-map.org centred on the active object.
- **Aladin Lite:** If there is an internet connection, then the Aladin Lite button can be used to open Aladin Lite centred on the active object.
- **ObjectTracker:** The ObjectTracker button starts ObjectTracker with the active object. ObjectTracker answers the question whether and when the selected object can be photographed well. Details on how to use ObjectTracker can be found in chapter 11.
- **ObjectMarker**: The ObjectMarker button copies the currently selected image to the output\markerimages directory and starts the ObjectMarker. With the ObjectMarker the image can be solved if necessary. Then a labelled version of the image can be created in the ObjectMarker. Details on how to use the ObjectMarker can be found in chapter 13.
- **ObjectTypes [Vizier]:** This function can be used to perform a search at Vizier, looking for objects of a certain object type around the selected reference object (active object). The result can then be exported to an ObjectTools catalogue file (cat) if required. In Options, the maximum number of displayed objects can be set in the section "WebServices" with the parameter MaxObjects.
- **Export to Planner:** Use the Export to Planner button to export the active object to the Planner tab of CCD-Guide Expert. The Planner tab is described in detail in chapter 6.

The function "Batch Solve filtered images" is the only function of the button "\>\>\>" that does not refer to the active data set but includes all filtered data sets. As soon as you click on this button,

the BatchSolver opens with all images of all filtered data sets. A description of the BatchSolver can be found in chapter 16.

3.8. ObjectBrowser

If you are already familiar with the ImageBrowser, then the usage of the ObjectBrowser is very easy. The only difference is that now all objects of the database are listed in the main data table regardless of whether images of these objects exist or not exist. If an excellent image of an object is available in the CCD-Guide database, then this image is shown in the preview image. The ObjectBrowser shows always only one image of an object even if more images of this object exist.

3.9. Web-Mode

The area of the two preview images is used by default to display images associated with the active data set. This standard mode (also called Local-Mode) was described in the previous chapters. The Local-Mode is represented by a blue house symbol.
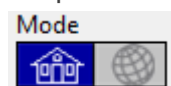
As soon as you click on the mode switch button, the Browser switches to Web-Mode (symbolised by a blue globe).
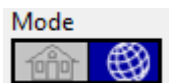
In Web-Mode, the area of the two preview images is used to display information on the selected object from web services such as sky-map.org, Aladin, Simbad or NED.

The WebViewer (sky-map.org or Aladin) is displayed in the left-hand area and the WebDatabase (Simbad or NED) is displayed in the right-hand area.
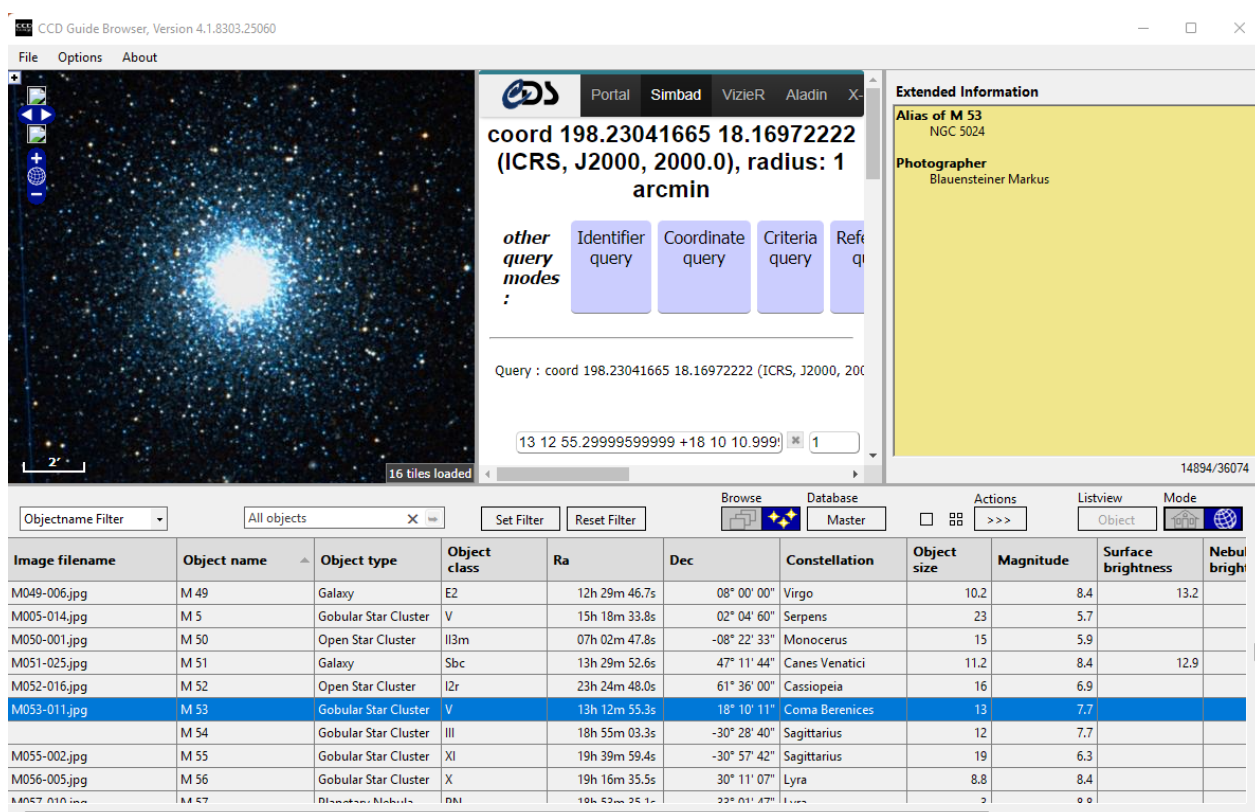
The WebViewer displays the field around the object of the active data set. The WebViewer including the zoom level can be selected in the Options. It is easy to pan and zoom.

The WebDatabase lists all objects found within one arc minute around the object of the active data set. The search radius can be changed at any time and a new search can be started. The WebDatabase can be selected in the Options.

Attention: A change of the WebViewer from sky-map.org (default) to Aladin or a change of the WebDatabase from Simbad (default) to NED requires an installation of Microsoft Edge WebView2.

The Web-Mode is a very useful tool, especially when using the ObjectBrowser, where no images are available for many objects.

3.10. Image downloader

If you have purchased the download version of CCD-Guide, you will find the complete CCD-Guide software including help documents in the downloaded zip file. However, due to the amount of data, all images are missing.

The image downloader allows you to download the images from the CCD-Guide server. When you start the Browser for the first time, the image downloader window opens automatically.

Nr	Filename	State	Length	Date	Path
1	ABELL0001-001.jpg	missing	1243941	5/26/2021 10:19 PM	images
2	ABELL0001-002.jpg	missing	1267422	5/26/2021 8:13 PM	images
3	ABELL0001-002_id.jpg	missing	1294026	5/26/2021 8:13 PM	images
4	ABELL0071-001.jpg	missing	274708	5/26/2021 8:13 PM	images
5	ABELL0071-001_id.jpg	missing	259789	5/26/2021 8:13 PM	images
6	ABELL0119-001.jpg	missing	403503	5/26/2021 10:19 PM	images
7	ABELL0119-001_id.jpg	missing	374659	5/26/2021 8:13 PM	images
8	ABELL0194-001.jpg	missing	417679	5/26/2021 10:18 PM	images
9	ABELL0194-001_id.jpg	missing	345252	5/26/2021 8:13 PM	images
10	ABELL0195-001.jpg	missing	662395	9/29/2021 7:25 PM	images
11	ABELL0262-001.jpg	missing	1471923	5/26/2021 10:19 PM	images
12	ABELL0262-001_id.jpg	missing	1534684	5/26/2021 8:14 PM	images
13	ABELL0347-002.jpg	missing	1713398	5/26/2021 10:18 PM	images
14	ABELL0347-002_id.jpg	missing	1805503	5/26/2021 8:14 PM	images
15	ABELL0347-003.jpg	missing	1413862	11/3/2021 5:54 PM	images
16	ABELL0347-003_id.jpg	missing	1423873	11/3/2021 5:54 PM	images

Counts: 5891 images waiting for download. Total: 8507 MB - press Start

total: 5891   ☑ AutoDownloadCheck

completed: 0   Pause   0%   Start

You can also start the image downloader manually at any time via the menu File -> Start image downloader.

The download of the images is started as soon as you press the Start button. You can pause the download process at any time by pressing the Pause button.

Nr	Filename	State	Length	Date	Path
5	ABELL0071-001_id.jpg	loaded	259789	5/26/2021 8:13 PM	images
6	ABELL0119-001.jpg	loaded	403503	5/26/2021 10:19 PM	images
7	ABELL0119-001_id.jpg	loaded	374659	5/26/2021 8:13 PM	images
8	ABELL0194-001.jpg	loaded	417679	5/26/2021 10:18 PM	images
9	ABELL0194-001_id.jpg	loaded	345252	5/26/2021 8:13 PM	images
10	ABELL0195-001.jpg	loaded	662395	9/29/2021 7:25 PM	images
11	ABELL0262-001.jpg	missing	1471923	5/26/2021 10:19 PM	images
12	ABELL0262-001_id.jpg	missing	1534684	5/26/2021 8:14 PM	images
13	ABELL0347-002.jpg	missing	1713398	5/26/2021 10:18 PM	images
14	ABELL0347-002_id.jpg	missing	1805503	5/26/2021 8:14 PM	images
15	ABELL0347-003.jpg	missing	1413862	11/3/2021 5:54 PM	images
16	ABELL0347-003_id.jpg	missing	1423873	11/3/2021 5:54 PM	images
17	ABELL0370-002.jpg	missing	392758	5/26/2021 8:14 PM	images
18	ABELL0426-006.jpg	missing	1160725	5/26/2021 8:14 PM	images
19	ABELL0426-007.jpg	missing	1428884	5/26/2021 8:14 PM	images
20	ABELL0426-007_crop.jpg	missing	174043	5/26/2021 8:17 PM	images

Counts: 5881 images waiting for download. Total: 8501 MB

total: 5891   ☑ AutoDownloadCheck

completed: 10   Pause   0%   Continue

You can continue the download by pressing the Continue button. If necessary, you can also close the CCD-Guide Browser window and continue downloading the images in another session.

The check mark "AutoDownloadCheck" is activated by default. This means that every time the CCD-Guide Browser is started, it checks whether there are still images to be downloaded. If this is the case, the image downloader window starts automatically when the Browser is started. You can also set the AutoDownloadCheck option in the Browser options.

3.11. Archive images

Via the menu File -> Start archive downloader you also have the possibility to download all archived images. Archive images are older images that have been archived due to their lower quality and are therefore not included in the standard scope of delivery of CCD-Guide.

The download of archive images is similar to the image downloader.

In order to be able to use the archive images in the Browser, a change in the options is necessary:
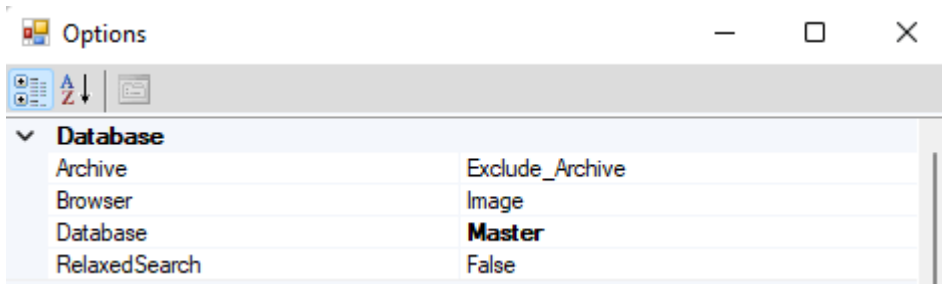
The Database section contains the Archive parameter, which can have three different settings:

- Exclude_Archive (default): Archived data sets are not displayed.
- Only_Archive: Only archived datasets are displayed in the ImageBrowser.
- Include_Archive: All datasets are displayed (both archived and non-archived datasets).

Bernhard Hubl   http://www.ccdguide.com/

4.   OBJECT NAMES IN THE DATABASE

4.1.   Catalogues in the object database

CCD-Guide contains a big database of objects including object data. The database contains 30 different catalogues of deep sky objects, which are based on the revised NGCIC catalogue of Wolfgang Steinicke, the nebula database of Eric-Sven Vesting and the NED and Vizier databases. A big advantage of CCD-Guide is that there exists only one data row for one object. Each physical object has a master object name, but you can find this object also with the alias names (entries in other catalogues).

The following table summarizes the standard catalogues of deep sky objects. You can find one example for an object name in the last column (The catalogue name is always followed by a blank character).

Catalogue	Description	Example
ABELL	Rich Clusters of Galaxies	ABELL 426
ARP	Arp's Peculiar Galaxies	ARP 268
BARNARD	Barnard's Dark Nebulae	BARNARD 72
CED	Cederblad Catalogue of Bright Diffuse Galactic Nebulae	CED 106n
CG	Cometary Globules	CG 4
CONST	Constellation	CONST And
DCLD	Catalogue of Southern Dark Clouds (Hartley+ 1986)	DCLD 247.5-12.3
DG	Dorschner+Gurtler Reflection Nebulae	DG 21
DWB	Dickel, Wendker and Bieritz HII Regions	DWB 111
GN	Atlas of Galactic Nebulae	GN 07.12.8
GUM	Gum's catalogue of southern H-Alpha nebulae	GUM 12
HCG	Hickson Compact Groups of Galaxies	HCG 45
HH	Herbig-Haro Catalogue	HH 46
IC	Index Catalogue	IC 430
LBN	Lynd's Catalogue of Bright Nebulae	LBN 999
LDN	Lynd's Dark Nebulae	LDN 123
M	Messier	M 17
NGC	New General Catalogue	NGC 78A
PGC	Principal Galaxies Catalogue (LEDA)	PGC 10001
PK	Perek and Kohoutek's Planetary Nebulae	PK 130-10.1
RCW	Rodgers, Campbell and Whiteoak southern HII regions	RCW 102
RNO	Red and Nebulous Objects in Dark Clouds (Cohen)	RNO 40
SANDQVIST	Sandqvist + Sandqvist-Lindroos Southern Dark Clouds	SANDQVIST 161
SH2-	Sharpless Catalogue of HII Regions	SH2- 87
UGC	Uppsala General Catalogue of Galaxies	UGC 6514
VDB	Van den Bergh's Reflection Nebulae	VDB 23
VDBH	Van den Bergh + Herbst Reflection Nebulae	VDBH 80

The following table summarizes special catalogues of deep sky objects.

Catalogue	Description	Example
GCL	Globular Star Clusters - Collection of Catalogues	GCL Terzan 9
OCL	Open Star Clusters - Collection of Catalogues	OCL Stock 23
PN	Planetary Nebulae - Collection of Catalogues	PN Abell 4
NAME	Common or historical name	NAME Barnard's Galaxy
UNLISTED	UNLISTED objects are not included in the standard catalogues of CCD-Guide	UNLISTED LMC

The catalogues GCL, OCL and PN are collections of catalogues. GCL is based on the 'Catalog of parameters for Milky Way globular clusters' by William E. Harris and contains for example the globular clusters of the Palomar and Terzan catalogues. OCL is based on 'Optically visible open clusters and Candidates' by Dias+ and contains for example the open star clusters of the Stock, Berkeley and Trumpler catalogues. PN is based on the 'Strasbourg-ESO Catalogue of Galactic Planetary Nebulae' by Acker+ and contains for example the planetary nebulae of the Abell catalogue.

The NAME catalogue is a collection of common or historical names of deep sky objects. The UNLISTED catalogue is a possibility to enter further objects which are not included in the standard catalogues of the CCD-Guide database.

The following table summarizes catalogues of solar system objects.

| Catalogue	Description	Example
COMET	Comets	COMET C/2009 P1
SOLAR	Solar system objects except comets	SOLAR Jupiter

4.2.   Objectname function

The object name function is used to find and to select a specific object with the help of an object name. This function can be found, for example, in the Objectname Filter.

If a correct CCD-Guide designation of the object is known (e.g. VDB 33), then it is sufficient to enter this name in the Objectname field and then to press the return key (ENTER) on the keyboard.
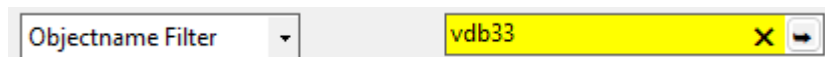
If the objectname is unique and CCD-Guide finds exactly one object that matches the search query, then this object is immediately set in the Objectname field in the Browser. In the example below, only one object was found. VDB 33 is an alias for the object NGC 1788, a reflection nebula in the constellation Orion, and therefore was filtered to the object NGC 1788.
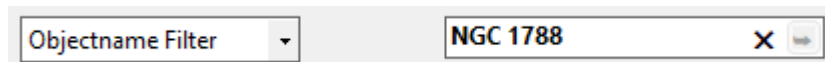
4.3.   Alias names for catalogues

You can search for an object using the 'official' catalogue name or using an alternate name for the catalogue. E.g: The 'official' catalogue name in the CCD-Guide database for Barnard's Dark Nebulae Catalogue is 'BARNARD'. So the object with number 99 in Barnard's Catalogue is named 'BARNARD 99'.   The catalogue name 'B' is an alternative catalogue name for 'BARNARD' in the CCD-Guide database. So, you can use the short form 'B 99' instead of 'BARNARD 99' to find this object.

The following table lists all alias names for catalogues in the first column (Name) and the official catalogue name in the second column (CatType).

Name	CatType
MESSIER	M
ACO	ABELL
N	NGC
I	IC
APG	ARP
HICKSON	HCG
SHARPLESS	SH2-
S	SH2-
CEDERBLAD	CED
COHEN	RNO
B	BARNARD
LEDA	PGC

Examples:

Input the short form 'N 778' for the object name to find 'NGC 778'.

'S 101' is an alternative to the official name 'SH2- 101'.

'B 99' = 'BARNARD 99'.

4.4.   Objectname search with wildcard search

The wildcard search is very powerful and helps you to find an object, when you do not know a correct name of the object in the database of CCD-Guide. If you include one or more * characters in the Find Object text field, then the * character is interpreted as a wildcard character. CCD-Guide substitutes this * wildcard character by any subset of possible characters, when you enter RETURN.

Below you can find some examples for the usage of the wildcard search.

Object search with common names:

Only a common name of the object is known (e.g. Perseus galaxy cluster, Horse head nebula, Comet Holmes, Holmberg IX). The best way is to put an important part of the common name between two * characters. E.g. input *perseus* in the Objectname text field and enter return.

Objectname Filter ▾	*perseus* ✕ ➡
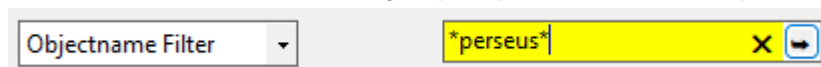
A new window appears which shows you all objects which contain the string 'perseus' in their object name or in their alias object names.

Three objects are listed:

- OCL Melotte 20 = open star cluster Alpha Perseus
- ABELL 426 = Perseus galaxy cluster
- NGC 1275 = galaxy Perseus A

Source ▲	Object alias	Object name	Object type	Object class	Ra	Dec	Constellation	Object size	Magnitude	
master	NAME ALF PERSEUS CLUSTER	OCL Melotte 20	Open Star Cluster		03h 24m 19.0s	49° 51' 42.0"	Perseus	300		
master	NAME PERSEUS A	NGC 1275	Galaxy	S0	03h 19m 48.1s	41° 30' 41.0"	Perseus	2.3	11.9	
master	NAME PERSEUS CLUSTER	ABELL 426	Galaxy Cluster	Count= 88	03h 18m 36.0s	41° 30' 00.0"	Perseus		12.5	

Browser select   1 / 3   Cancel

So, the third entry in the list is our searched object. Click on the data row of ABELL 426 and then push the Browser select button to select ABELL 426.

To find Comet Holmes input *holmes* and you will get the searched comet 17P (Holmes).

To find Holmberg IX input *holmberg* and you will get a list of the nine Holmberg galaxies.

Object search with unknown catalogue name:

You know the object name, but you are not sure about the catalogue name in CCD-Guide (e.g. you are searching for the open star cluster Stock 23 or the planetary nebula Abell 4).

To find Stock 23 input *stock 23 in the Objectname text field and enter return. You will get one object (OCL Stock 23).

To find the planetary nebula Abell 4 input *abell 4 and you will get two possible objects:

- ABELL 4 = galaxy cluster
- PN Abell 4 = our searched planetary nebula

5. SET FILTER

The Set Filter window can be opened by clicking on the Set Filter button in the CCD-Guide Browser or in the following tabs of the CCD-Guide Expert: Planner, Edit Object and Edit Picture.

Objectname Filter ▼	All objects ✕ ➡	Set Filter	Reset Filter

The Set Filter window opens the possibility to set one or more filters on the main data table. The filter criteria are divided in three groups: Object related criteria, image related criteria and planner related criteria. Planning criteria are only available in the Planner of the CCD-Guide Expert (see chapter 6). All filters are combined with a logical AND.

The following screenshot shows the Set Filter window opened inside the ImageBrowser. When you open Set Filter inside the ObjectBrowser, then only the object criteria are relevant and so the images criteria are greyed out.
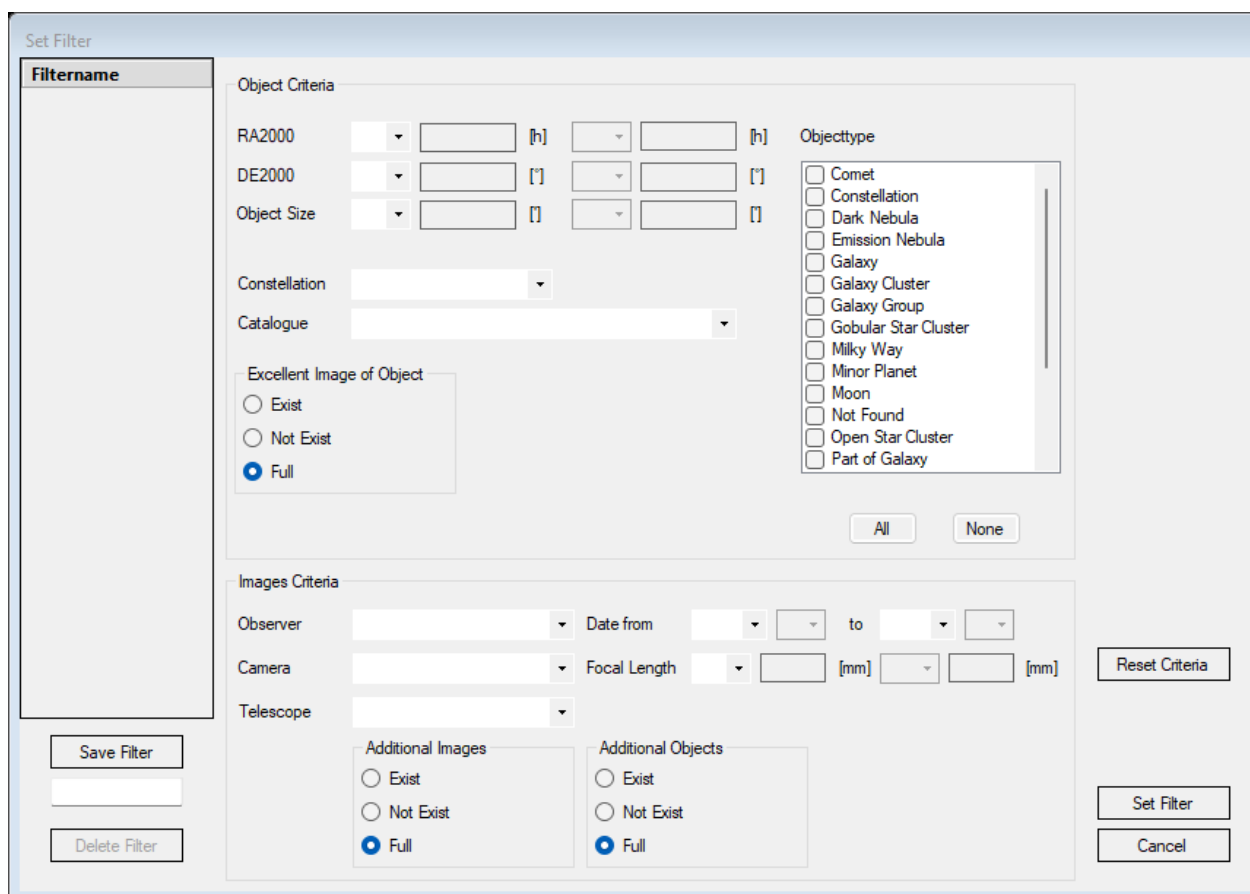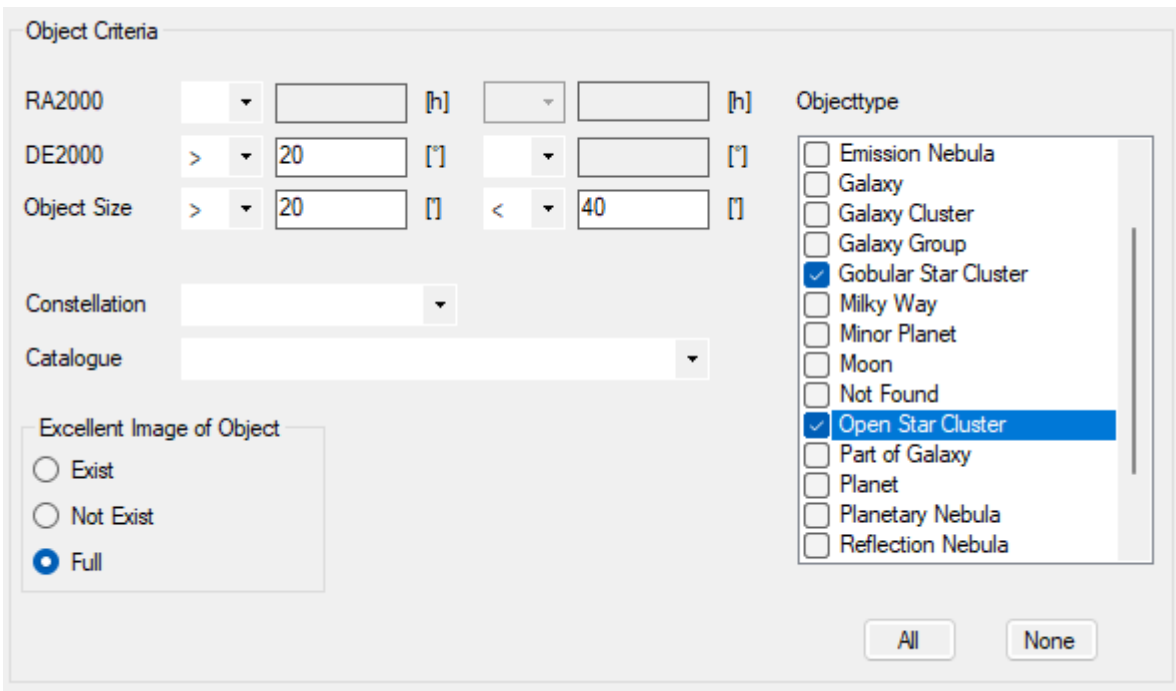
After you have input your desired filter criteria, you activate the filters by pushing the Set Filter button. To reset all filter criteria click Reset Criteria.

You can use the buttons Save Filter and Delete Filter to save and delete filter settings. This is very useful, if you create many complex and powerful filters.

The following screenshot shows an example for object criteria. Those images are filtered whose main object fulfils the following criteria:

- Object type is globular star cluster or open star cluster.
- Declination is larger than 20°.
- Object size is larger than 20 arcmin and smaller than 40 arcmin.
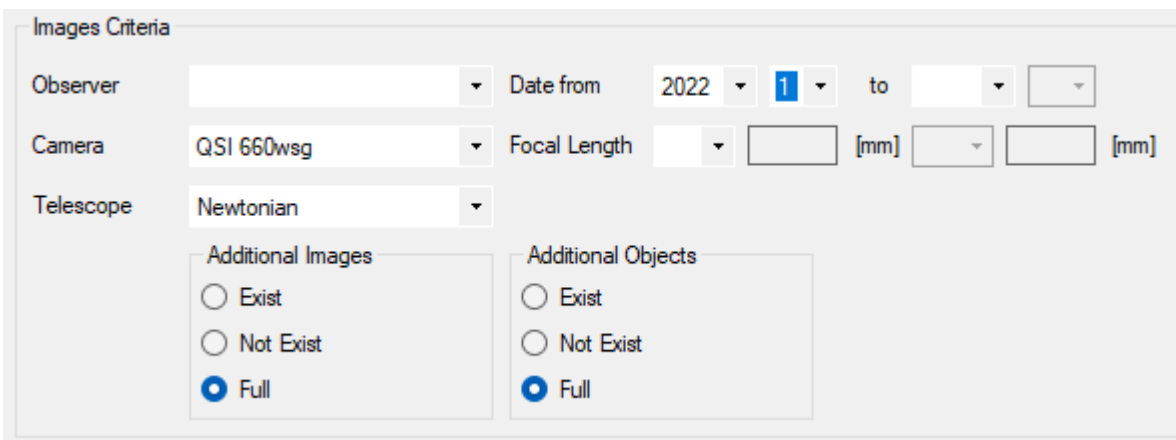
The following screenshot shows an example for images criteria. Those images are filtered which fulfil the following criteria:

- Captured with a Newtonian telescope and with a QSI 660 camera.
- The image is captured after 2022-01-01.

6. CCD-GUIDE EXPERT: PLANNER

6.1. Overview

The Planner tab of CCD-Guide Expert helps you to maintain your todo list of objects. It can help you to answer the question: Which object should I capture tonight? All entries are saved in the user database (user.mdb).

The concept of the planner is based on the idea that you want to capture a particular object with a certain setup of your equipment. In CCD-Guide a setup is a combination of a telescope and a camera using a particular focal length. So, before you can use the planner you have to create your personal setups in the Edit Setup tab of CCD-Guide Expert (for details see Chapter 7).

The Planner tab is divided in three sections:

1. Edit frame (top frame): The edit frame gives you the possibility to edit all data fields including the two optional planner images (FOV Image and Ref Image) of a particular planner data row. To the right of the edit frame the two optional planner images of a planner data row are shown. A double click into the thumbnail image opens the image in IrfanView. The FOV Image shows the field of view and the Ref Image can be used to save a reference image.
2. Filter and info button line: Below the edit frame you find to the left all buttons for searching and filtering the planner data rows (Objectname Filter, Quick Filter and Set Filter) and to the right the Slide Show button and the info button ">>>".
3. Planner data grid (bottom frame): The planner data grid shows all filtered planner data rows. The active planner data row is blue coloured and this data row can be edited in the edit frame.

6.2. Create a new planner data row

First, click New (to the right of the data table). Then all data fields in the edit frame are automatically cleared and you can start with your inputs. All blue coloured fields are must fields, white coloured fields are optional. First choose your desired setup in the dropdown box. After the selection of the setup you can see some details about your setup to the right of the setupname.

The next step is to set the object. To set an object, first enter the object name in the white field to the right of the Set Object button and then click Set Object or enter return. The Set Object function is described in detail in chapter 4.

The state field is the third must field which is necessary to define a planner data row. A planner data row can have seven different states:
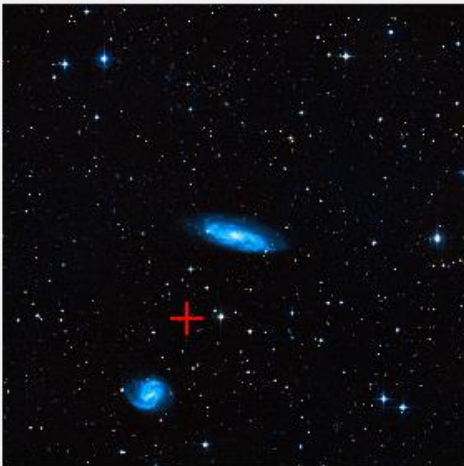
Setting a FOV Image (field of view image) or a Ref Image (reference image) is an optional step, but very useful step. When you push the FOV Image button, then the FOV Image window appears.

On the left side of this window you can find the FOV Image parameters, which are already filled with useful default values. If necessary, then you can modify the centre coordinates of the image, the field of view, the rotation angle of your camera, the height and the width of the FOV image and the server, which is used for downloading the DSS2 image from sky-map.org. When you push the Update button, then the download process is started. The Reset button resets all FOV image parameters to the default values. A red cross indicates the position of the new image centre. You can move the red cross by clicking the right mouse button or by pushing the arrow keys. After having moved the image centre you have to push the Update button to get the updated image. After pushing the Ok button the window is closed and the FOV Image is set. Please, activate the option "Add FOV Image parameters to Planner Comment", if you like to have the centre coordinates inside the Planner Comment. After having closed the FOV Image window by pushing the Ok button, you can see your FOV image in the FOV Image tab. The red coloured text "Image not saved" indicates that you have to push the Save button to save this FOV image in your Planner Image Path.

If you have an image of the desired object of another astrophotographer, which you want to use as a reference, then you can include this image in the planner data row as a Ref Image. After pushing the Ref Image button a window for selecting the image appears. You can find the path of the selected image in the Image From field. Below the Image From field you can find the imagename field. The selected image is copied into the Planner Image Path and renamed, when you click Save. You can change the Planner Image Path in the Options tab.
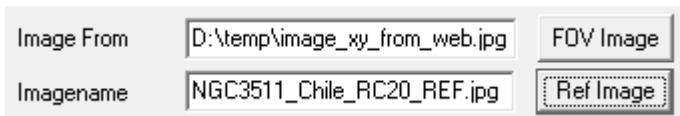
As soon as a reference image exists for a data set, the Ref Image tab is marked with a "[+]".
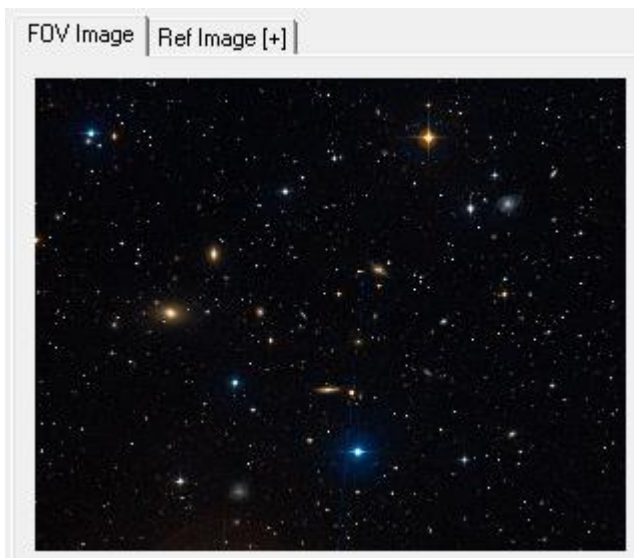
The comment field is helpful for additional information (e.g. filters,..). With a double click into the Comment field you can open a window with a much bigger edit field.

When you are finished with your entries, then click Save to create the data row and to copy the optional FOV Image and the optional Ref Image into the Planner Image Path.

6.3.   Create new planner data rows with ObjectBrowser

If you want to include many objects with particular criteria in your todo list, then you can use the Export to Planner button inside the ObjectBrowser. First switch to the CCD-Guide Browser and select Browse mode ObjectBrowser. Then filter the objects by using the Set Filter function. After you have reduced the number of objects to a manageable number, you can select an object and click the >>> Export to Planner button. The Export to Planner button opens CCD-Guide Expert with the Planner tab and sets the desired object. The following example shows the state of the Planner tab after clicking the Export to Planner button inside the ObjectBrowser (object ABELL 1000 was selected in ObjectBrowser).
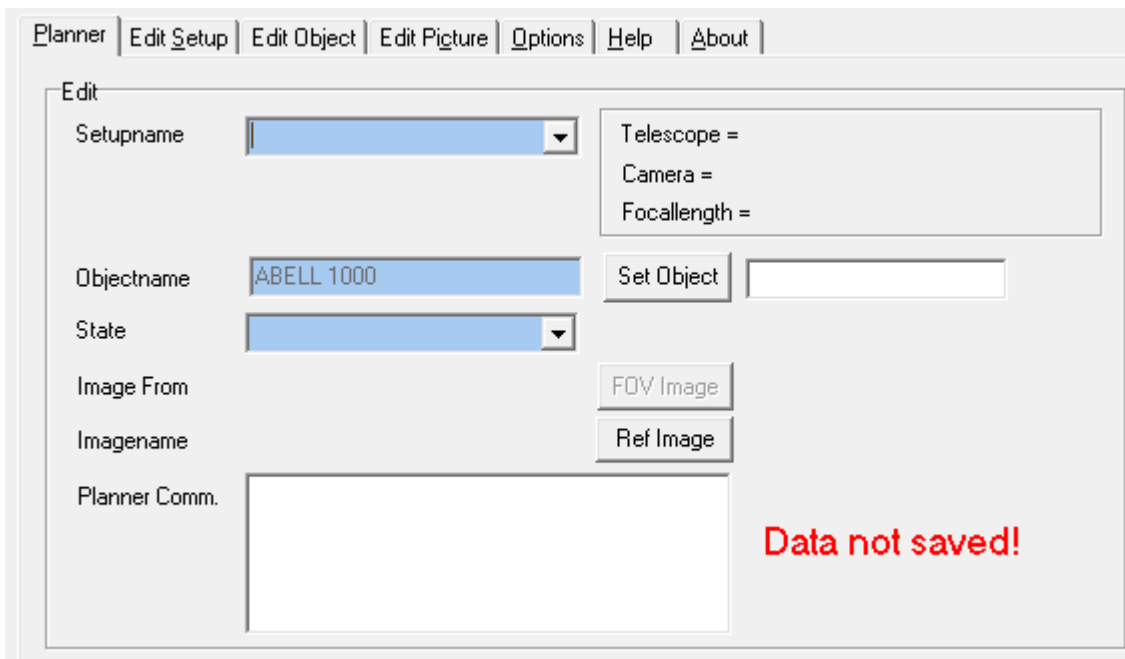
After you have input the missing entries you click save to create the planner data row. Now, you can go back to the ObjectBrowser to export the next object into the Planner.

6.4. Edit and Delete planner data rows

If you want to edit a planner data row, then first activate the desired data row by clicking on the data row or by moving the cursor to the row using the arrow keys. The blue colour always indicates the selected data row. As soon as a data field is changed, a red text "Data not saved!" appears. This is a hint for the user not to forget to press the Save button. After finishing the editing operations, the changes must be saved by pressing the Save button.

If you want to delete a planner data row, then first activate the desired data row. Then click on the Delete button to delete the selected planner data row. The optional planner images connected with the planner data row are also deleted.
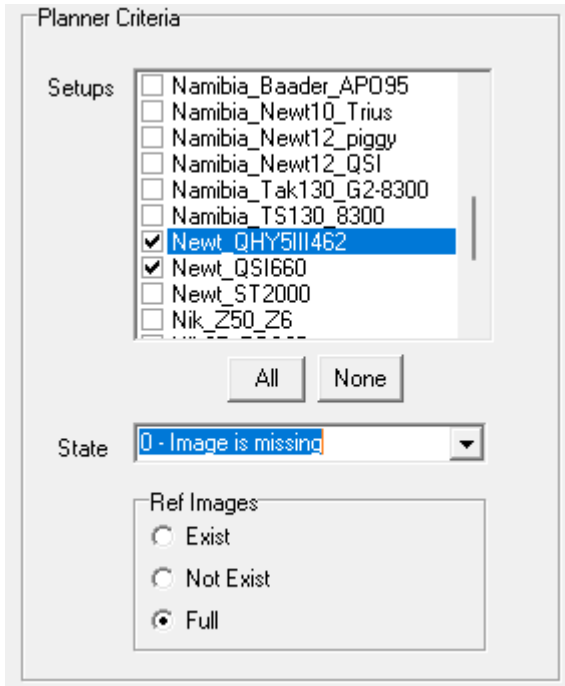
6.5. Filter the planner data rows

If you have a big todo list of objects including many different setups, then it helps to reduce the list using filters. You can use the Objectname Filter, the Quick Filter or the Set Filter button in the same way as used in the CCD-Guide Browser.

When you use the Objectname filter, then all data rows for the selected object are shown. The following screenshot shows the result of an object filter for 'Abell 2151'.
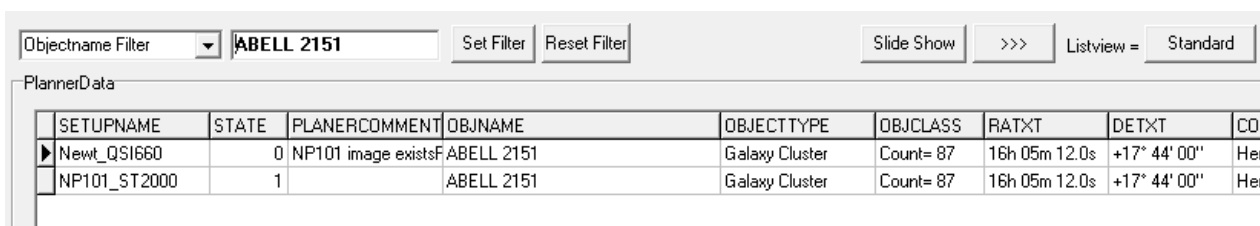
The Set Filter button opens the Set Filter window, where you can set object criteria and planner criteria. The following screenshot shows the planner criteria with two selected setups and a restriction of the state to '0 – Image is missing'. So, all planner data rows with missing images of setups 12"Newton+ST2000 and NP101+ST2000 are shown.

If the number of planner data rows is still too big, then you can set object criteria like coordinates or object type additionally to the planner criteria.

The Quick Filter can be very useful, when you use some keywords in the Planner comment field of important data rows. (E.g. "Prio1").

You can also search for several keywords at the same time by linking the search texts with the "|" sign (logical OR) or with the "&" sign (logical AND).

The following example searches all data rows which contain the text "Namibia" or the text "Chile".

The following example shows an AND search. With an AND search, the number of records found is significantly reduced.

If you click on the header of a data column, then you can sort the list ascending or descending. It makes sense to sort the list by right ascension.

The Reset Filter button deactivates all active filters.

6.6.   Slide Show and '>>>'-Button

The Slide Show, Planetarium, sky-map.org, ObjectTracker and ObjectMarker buttons have the same function as in the CCD-Guide Browser.

The Planetarium button opens your preferred planetarium software centred on the active object.

When you are connected to the internet then you can use the sky-map.org button to open sky-map.org centred on the active object.

The ObjectTracker button starts ObjectTracker with the active object.

The ObjectMarker button is only available, when a FOV image is assigned to the active planning data record. As soon as you click on the ObjectMarker button, ObjectMarker is opened and the FOV image is set.

6.7.   ListView

The ListView button offers you to choose between two possible layouts of the main data table:

Standard and User defined.

6.8.   Export csv and Export OT

- • You can export the main data table into a csv file by clicking on the button "Export".
- • The button "Export OT" exports the objects of the table into the catalog file \userdata\cat_CCD_Planner.cat. How to use the _CCD_Planner.cat file in the ObjectTracker efficiently for planning purposes is described in detail in chapters 11 and 12.
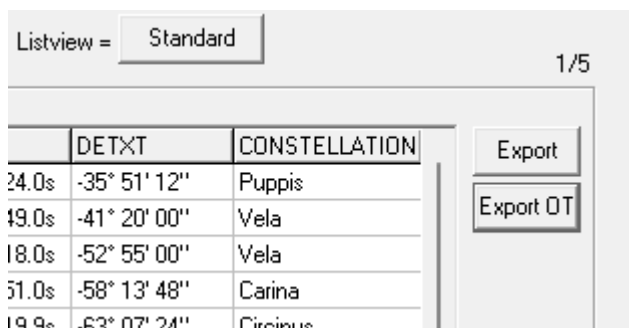
ccdguide.com

7. CCD-GUIDE EXPERT: EDIT SETUP

The Edit Setup tab of CCD-Guide is necessary to create new cameras, new telescopes, new observers and new setups. All entries are saved in the user database (user.mdb).

7.1. Cameras, telescopes and observers

If one of your cameras is missing in the master database, then click New (the button to the right of the camera list). Input the name of the camera in the Key field. Please, use the official name of the manufacturer. The input fields Description, ChipSizeX and ChipSizeY are optional. Then click Save.

If one of your telescopes is missing in the master database, then click New (the button to the right of the telescope list). Input the name of the telescope in the Key field. Please, use the official name of the manufacturer. The input field Description is optional. Then click Save.

Use the same procedure to input a new observer. First, click New, then input all fields, and then click Save.

You are only allowed to edit your own data rows (SOURCE = USER) of the tables cameras, telescopes and observers. First, select your data row (indicated by the blue colour), then edit the input fields, and then click Save.

Tip: It makes sense to mark your own data rows (e.g. use the leading character '_' in your key fields. So, you can easily identify your cameras, telescopes and observers.

You can delete the active data row by clicking on the Delete button. **Be careful with deleting data rows! All images and planner data rows which are connected with the deleted data row are also deleted.**

7.2.   Setups

Setups are needed for the planner. The concept of the planner is based on the idea that you want to capture a particular object with a certain setup of your equipment. In CCD-Guide a setup is a combination of a telescope and a camera using a particular focal length.

To create a new setup click on the New button (the button to the right of the setups list). Now you can enter a name for your setup. (Tip: Use a self-descriptive short name: e.g. 12" Newton+ST2000). Then choose the telescope and the camera in the drop down lists. The focal length is an optional input field. After you have input all data, you can save your setup by clicking on the Save button.

If you want to edit a particular setup, click on the desired setup in the setup data table. This data row will be blue coloured, which indicates that this data row is activated. Now, you can edit all input fields. Click the Save button to save your modifications.

If you want to delete a setup, then click the Delete button after you have activated the desired setup data row. **Be careful with deleting setups! The todo list of objects (planner data rows), which is connected with the deleted setup, is also deleted.**

8. CCD-GUIDE EXPERT: EDIT OBJECT

8.1. Create new object

The Edit Object tab is the fourth tab of CCD-Guide. With this tab you can create new objects which are missing in the master database. These new objects are saved in the user.mdb.

First, click the New button. Then select the catalogue. You have three options:

- COMET: the new object is a comet. Please, enter the name using the nomenclature of the Minor Planet Center (e.g. C/2009 P1, 17P) and the Cometname (e.g. Garradd, Holmes). Then click Save.

- SOLAR: the new object is a minor planet. Please, enter the name of the minor planet (e.g. Vesta). Then click Save.

- UNLISTED: the new object is a deep sky object. Please, enter the name of the object and the object type. All other fields are optional. (Must fields are indicated by the blue colour. Optional fields are white. A detailed explanation for all optional fields can be found in chapter 3.3) Then click Save.

8.2. Edit and delete an existing object

The data table of the Edit Object tab lists all objects of type COMET, SOLAR and UNLISTED which can be found in the master database and the user database. When you are working with the Edit Object tab, then you are automatically in the edit mode of an object data row. The blue colour indicates the active data row. You can change the active data row by clicking with the mouse or by pressing the arrow keys of your keyboard.

You will notice that you cannot edit or delete objects with SOURCE = MASTER. When you activate an object data row with SOURCE = USER, then you can edit the data fields. When you click Save then the modifications of the data fields are saved. When you click Delete, then this data row will be deleted.

9. CCD-GUIDE EXPERT: EDIT PICTURE

9.1. Overview

The Edit Picture tab of CCD-Guide is necessary to create new image data rows. All entries are saved in the user database (user.mdb).

There are two possibilities to create a new picture:

- New button
- Clone button
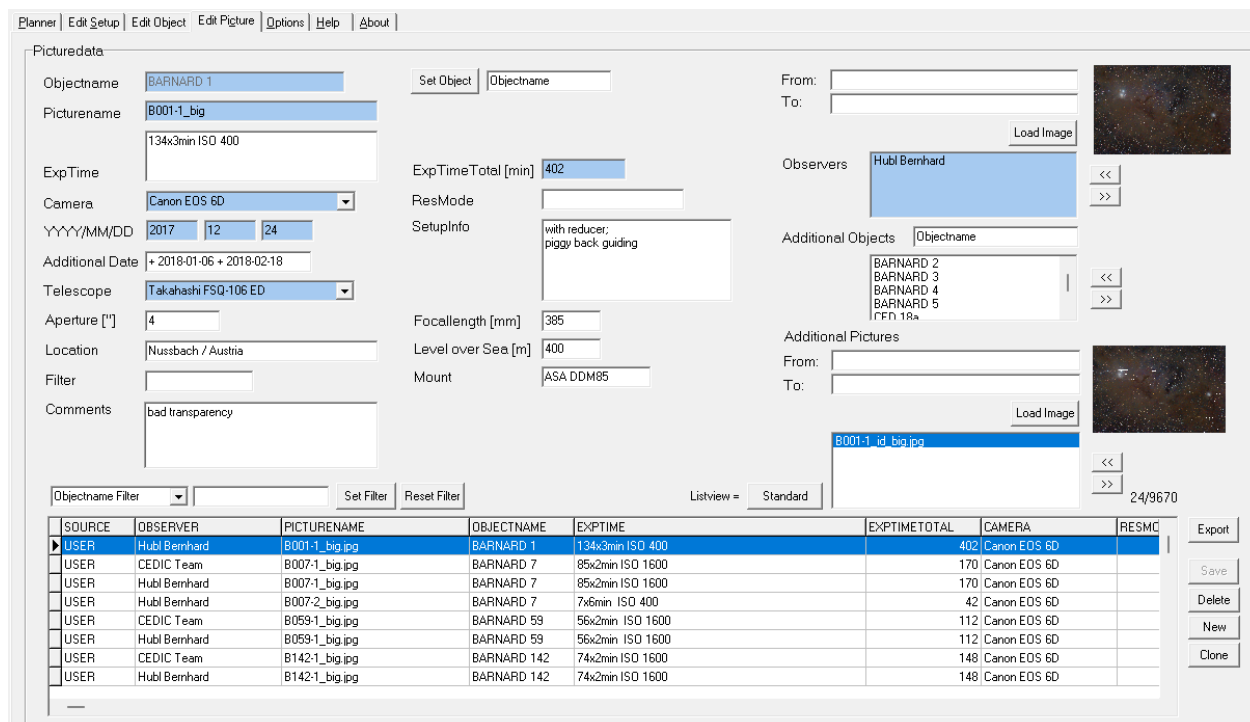
9.2. Create a new picture with New button

First, click New (to the right of the data table). Then all data fields are automatically cleared and you can start with your inputs. All blue coloured fields are must fields, white coloured fields are optional. The best way is to start with the input of the object name. You can see that the Objectname data field (top left corner) is grey, which indicates that direct input is not possible. To set an object, first enter the object name in the white field to the right of the Set Object button and then click Set Object. The Set Object function is described in detail in chapter 4.

E.g.: If you want to enter a picture of NGC 4435, then first click New, then enter 'NGC 4435' in the white Set Object field and push the Set Object button. Now you can see that the object NGC 4435 is selected.

Below the Objectname you can find the Picturename. CCD-Guide suggests 'NGC4435' for the picture name. You can rename the picture name. (E.g. 'NGC4435-1' to indicate that this is the first image, which you have captured of NGC 4435).

The next step is to choose the image. Click Load Image (top right corner) to set the 'From path'. After you have selected the image, you can see that the 'To path' is filled. The image will be copied from the 'From path' to the 'To path', when you click Save. But do not click Save now. First, we have to enter the other fields.

You can find a detailed description of the data fields in chapter 3.2. The following screen shot shows an example for input data.

The last step is to input observers, additional objects and additional pictures.

You have to use the double arrows to the right of the observer table to add or to remove an observer.

With a mouse click on the top double arrow you can add an observer. To remove an observer, first select the observer in the table and then click on the bottom double arrow.

If you want to add an additional object, then first enter the object in the Additional Objects data field, and then press return or click on the top double arrow (to the right of the table).
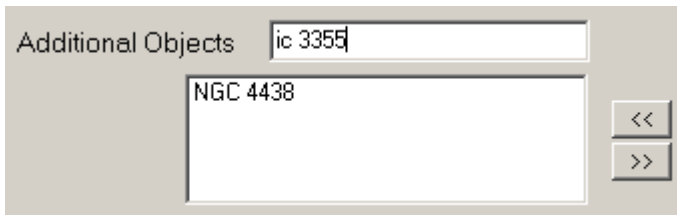
To remove an additional object, first select the object in the table and then click on the bottom double arrow.

Additional pictures are pictures which show additional information (e.g object identification, inverted image, …). To add an additional picture, click on the Load Image button and select the desired additional image. After you have selected the image, you will see that the 'From path' and the 'To field' are filled.
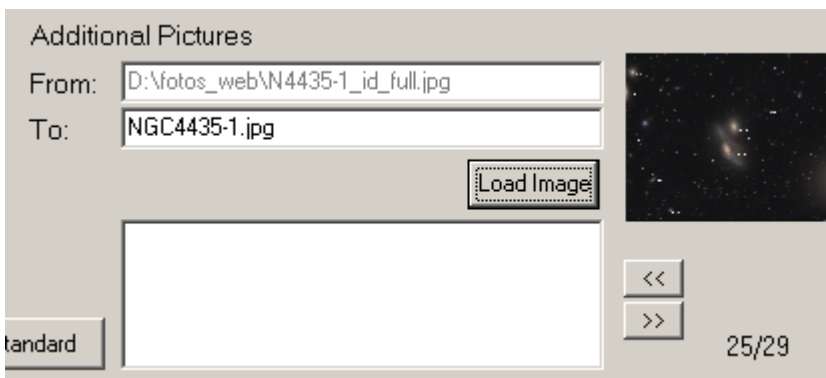
Now, you have to modify the 'To name'. You can enter any image name, but it is a good idea to use the suggested image name as base and to add some characters to indicate the type of the additional image.

If you add an additional image, which shows some object identifications then include the string '_id' in the image name (e.g. NGC4435-1_id.jpg).

If you add an additional image, which shows the image in inverted mode, then include the string '_inv' in the image name (e.g. NGC4435-1_inv.jpg).

After you have entered the desired name for the additional picture, you should click on the top double arrow to include the additional picture in the table.
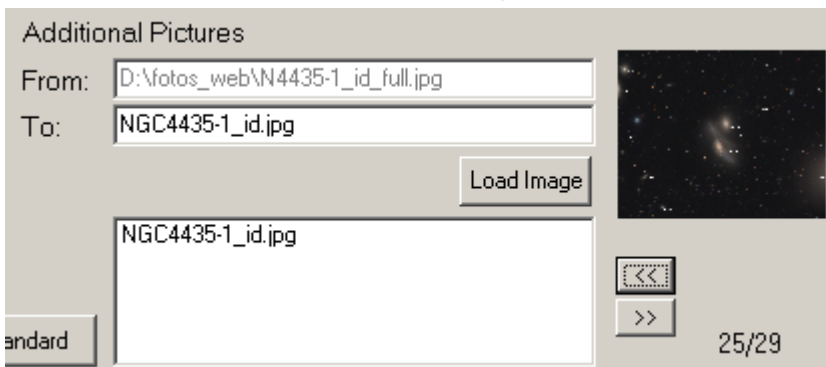
You can add as many additional pictures as you like. The additional pictures are copied from the 'from path' to the User image path and renamed with the 'To name', when you click Save.

Now, you can click Save to save the data row and to copy and rename all pictures.

9.3. Create a new picture with Clone button

The 'Clone method' is a very fast approach to create a new picture data row. The idea is to select a picture data row which is very similar to the picture data row which you want to create. So, you only have to modify the existing data fields, but you do not have to input all data starting with empty fields.

Use the Objectname Filter, the Quick Filter or the Set Filter button to find an appropriate picture data row for cloning.

Objectname Filter ▾	M 1		Set Filter	Reset Filter

	SOURCE	OBSERVER	PICTURENAME	OBJECT
▶	USER	Hubl Bernhard	M001-1.jpg	M 1
	MASTER	Schachtner Hannes	M001-001.jpg	M 1
	MASTER	Strauß Harald	M001-002.jpg	M 1
	MASTER	Schmidt Hannes	M001-003.jpg	M 1

Activate a picture data row in the table (indicated by blue colour) and then click Clone. Now, all data fields except object names and the picture names are filled with default data.

The further procedure is very similar to the 'New method':

- Set the object name using the Set Object button
- Edit the picture name
- Select the image using the Load Image button
- Edit all other data fields
- Observers, additional objects and additional pictures are input in the same way as described with the 'New method'.
- Click Save to save the data row and to copy and rename the pictures.

10. OBJECTTOOLS

10.1. Introduction

The ObjectTools are valuable helpers when planning an observation night (ObjectTracker), when evaluating and labelling astrophotos (ObjectMarker) and when displaying and analysing astrophotos (ObjectViewer).

The ObjectTools are an integral part of CCD-Guide and can be used in interaction with the CCD-Guide Browser or the CCD-Guide Expert as well as stand-alone tools. All ObjectTools are located in the CCD-Guide root directory. Besides the three main applications ObjectTracker, ObjectMarker and ObjectViewer there are also a number of additional applications (such as BatchSolver, JPEGCompress, WCSCopy or WCSList). Detailed descriptions of the individual applications can be found in the following chapters:

- ObjectTracker: Chapter 11
- ObjectMarker: Chapter 13
- ObjectViewer: Chapter 14
- Utilities (BatchSolver, JPEGCompress, WCSCopy, WCSList and Update): Chapter 16

All exe files in the CCD-Guide root folder can be started and used at any time by double-clicking, even without the CCD-Guide application open. However, it is much more convenient for starting ObjectTools applications to use the CCD_Guide.exe.

10.2. Overview of the ObjectTools applications

Below you can find the ObjectTools applications listed alphabetically. Applications important for normal use are marked in bold:
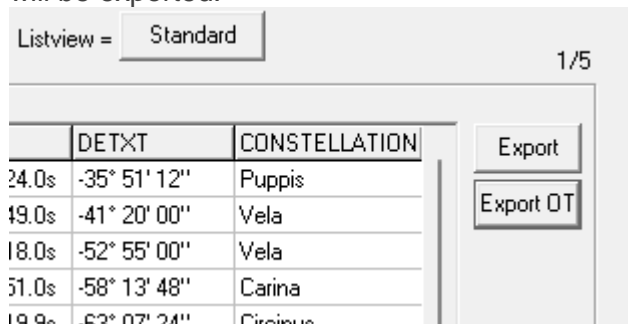
- <u>BatchSolver.exe:</u> is a special application for the simultaneous plate solving of a large number of images. BatchSolver.exe is not required for normal CCD-Guide use.

- <u>JPEGCompress.exe:</u> is a useful tool for compressing a large number of jpg images.

- <u>Locations.exe:</u> is a component of ObjectTracker for editing the table with the observation locations (Locations.csv). Normally there is no need to start the Locations.exe manually.

- **ObjectMarker.exe:** With the ObjectMarker images can be solved via astrometry.net and then labeled with the objects of the CCD-Guide database as well as with own texts. Furthermore, the ObjectViewer can be started to view and analyse the labelled image.

- **ObjectSky.exe:** ObjectSky is a planetarium that works interactively with ObjectTracker.

- **ObjectTracker.exe:** ObjectTracker answers quickly and easily the question whether a certain object can be photographed at a selected location in a certain night. The ideal time window for observing is calculated taking into account twilight, moon, object altitude and optional horizon. The altitude progression of the object and of the moon is displayed in an intuitive graphic.

- **ObjectViewer.exe:** With ObjectViewer you can view the images labelled with the ObjectMarker, read coordinates and perform an internet search with SIMBAD, NED or Vizier.

- WCSCopy.exe: is a special application for the transfer of WCS information (World Coordinate System) from a solved image to a not yet solved image with the same dimensions. WCSCopy.exe is not required for normal CCD-Guide use.

- WCSList.exe: is an application with which complete directories can be searched for images and the status of the wcs-info can be displayed in tabular form. In WCSList, wcs-infos of selected images can also be deleted.

10.3. ObjectTools catalogs

All catalogs stored in the folder \userdata\cat are available in both the ObjectTracker and the ObjectMarker:

- **_CCD_Planner.cat:** This optional catalog file is created when the "Export OT" button is pressed in the Planner tab of CCD-Guide Expert. All objects filtered in the Planner tab will be exported.

- **_CCD_User.cat:** This optional catalog file is created by pressing the "Export OT" button in the Edit Object tab of CCD-Guide Expert. All UNLISTED objects created by the user will be exported.

11.   OBJECTTRACKER

11.1. Introduction

ObjectTracker answers quickly and easily the question whether a certain object at a selected location can be photographed in a certain night. The ideal time window for taking photographs is calculated taking into account twilight, moon, object altitude and optional horizon. The altitude progression of the object and of the moon is displayed in an intuitive graphic.

ObjectTracker can be started from CCD-Guide Browser or CCD-Guide Expert (via the '>>>' button) or alternatively as a stand-alone tool. To start as a stand-alone tool, double-click on the file ObjectTracker.exe in the CCD-Guide root directory or push the ObjectTracker button in CCD_Guide.exe.

In the following, the use as a stand-alone tool is described first and afterwards practical use cases in interaction with CCD-Guide Browser and CCD-Guide Expert are explained.

11.2. ObjectTracker main window

After starting ObjectTracker the following main window appears.
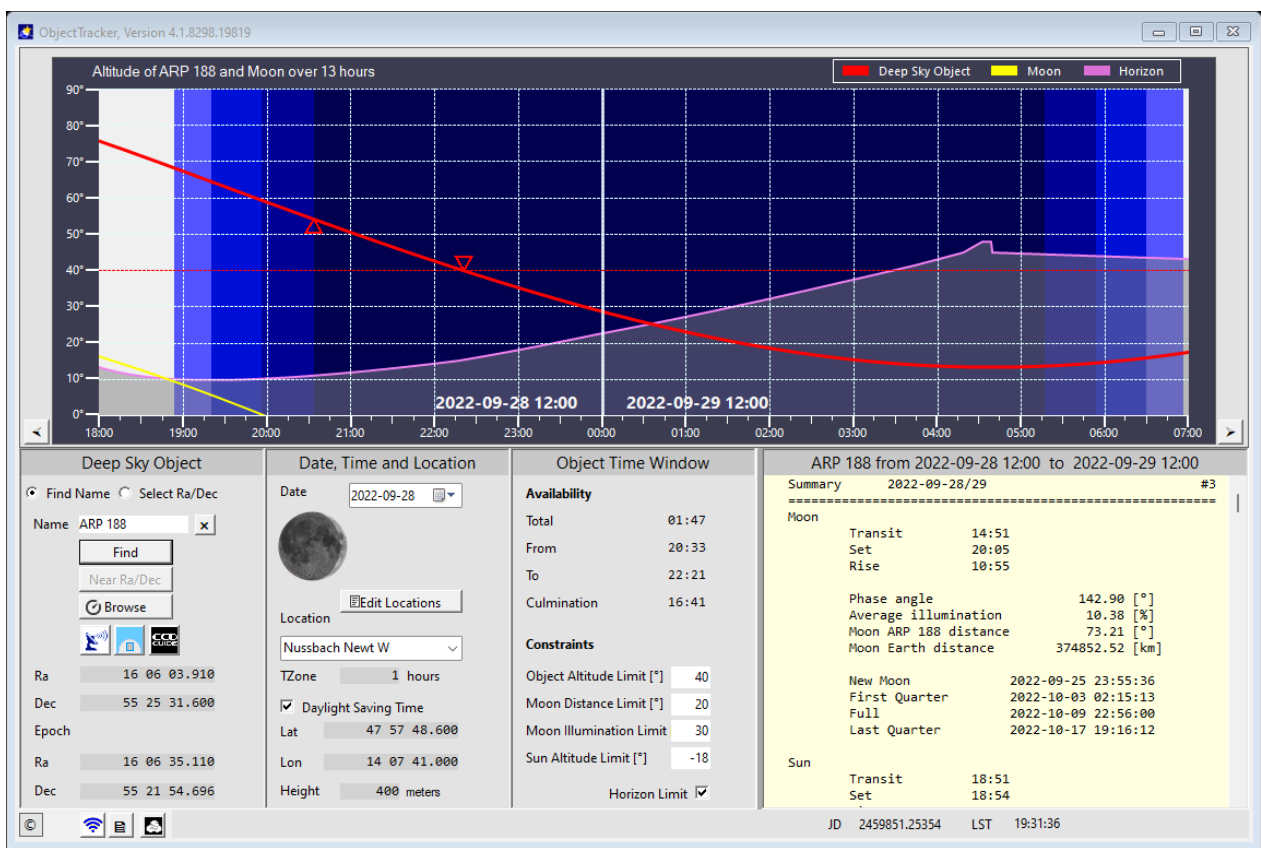
The main window is divided into five areas:

- **Graphics area:** The graphics area is located at the top. For a selected night, twilight, the altitude of the object and of the moon and an optional horizon are displayed here. Red triangles indicate the beginning and the end of the object's visibility window.

- **Input area:** The input area is located at the bottom left and comprises the two areas with the headings "Deep Sky Object" and "Date, Time and Location". Here you can select a specific object and set the desired location and date.
- **Object visibility area:** The object visibility area with the heading "Object Time Window" is located to the right of the input area. Constraints of the visibility window such as object altitude, sun altitude, moon influence or horizon consideration can be set here.
- **Info area:** The info area is located at the bottom right. Various detailed information is displayed here in a scrollable list.
- **Status bar:** This bar is at the bottom. Here, buttons for special applications are available and status indicators are displayed.

By changing any input field, all values and graphics are always completely recalculated.

11.3. Location input
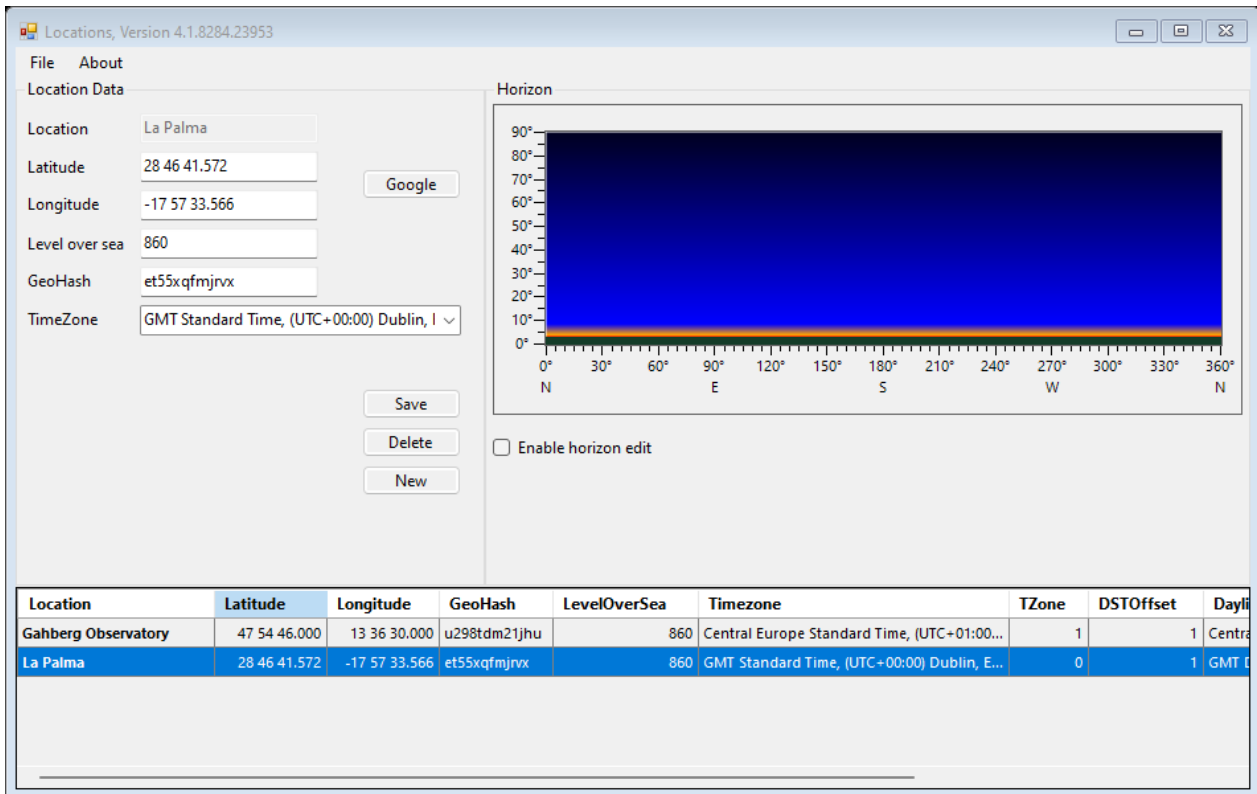
The first step for using ObjectTracker is to enter the desired location. CCD-Guide is delivered with a single location: Gahberg Observatory. If you are not observing at Gahberg Observatory, you should first enter your observation location. Any number of observation locations can be created so that all users who like to make astro-journeys or have access to remote locations can quickly switch between different locations.

Create a new location:

To create a new location, click on the 'Edit Locations …' button in the "Date, Time and Location" area of the ObjectTracker main window. A new window opens, in which the locations are administered. In this window only one line with the location "Gahberg Observatory" is visible at the initial start.
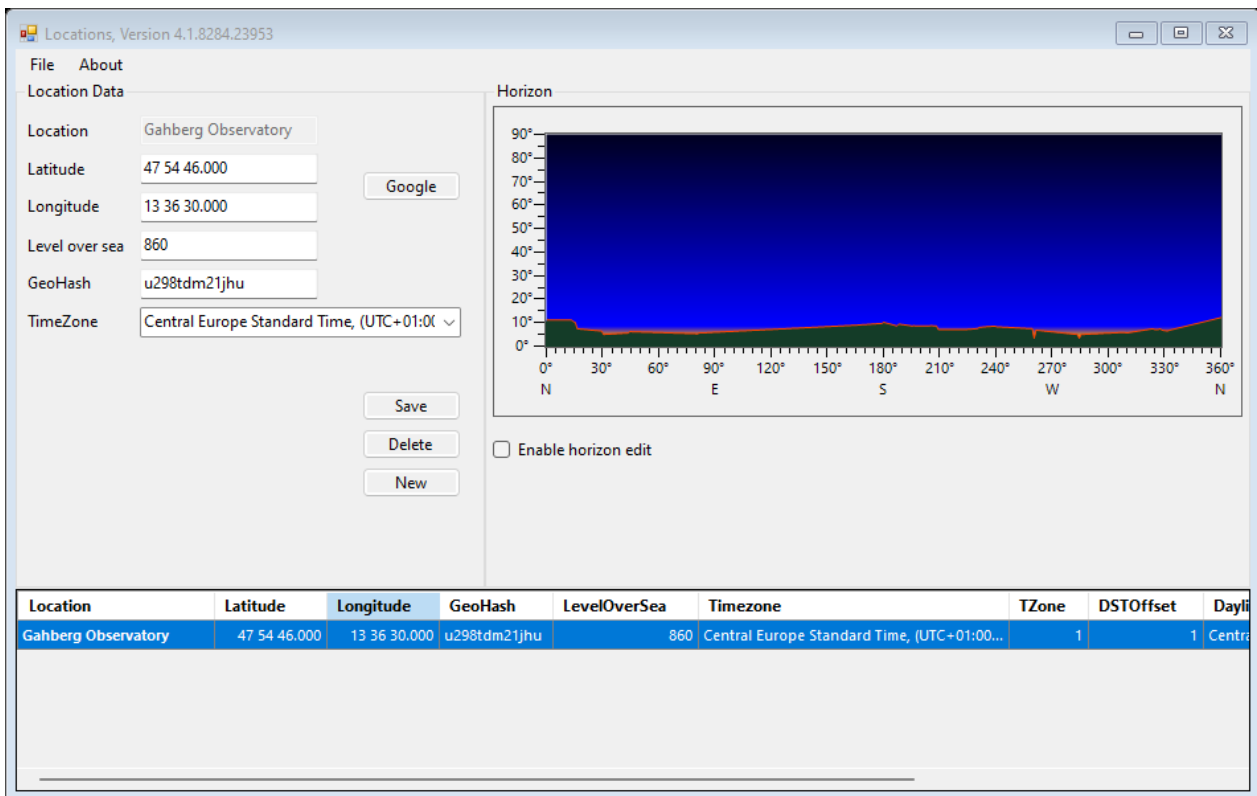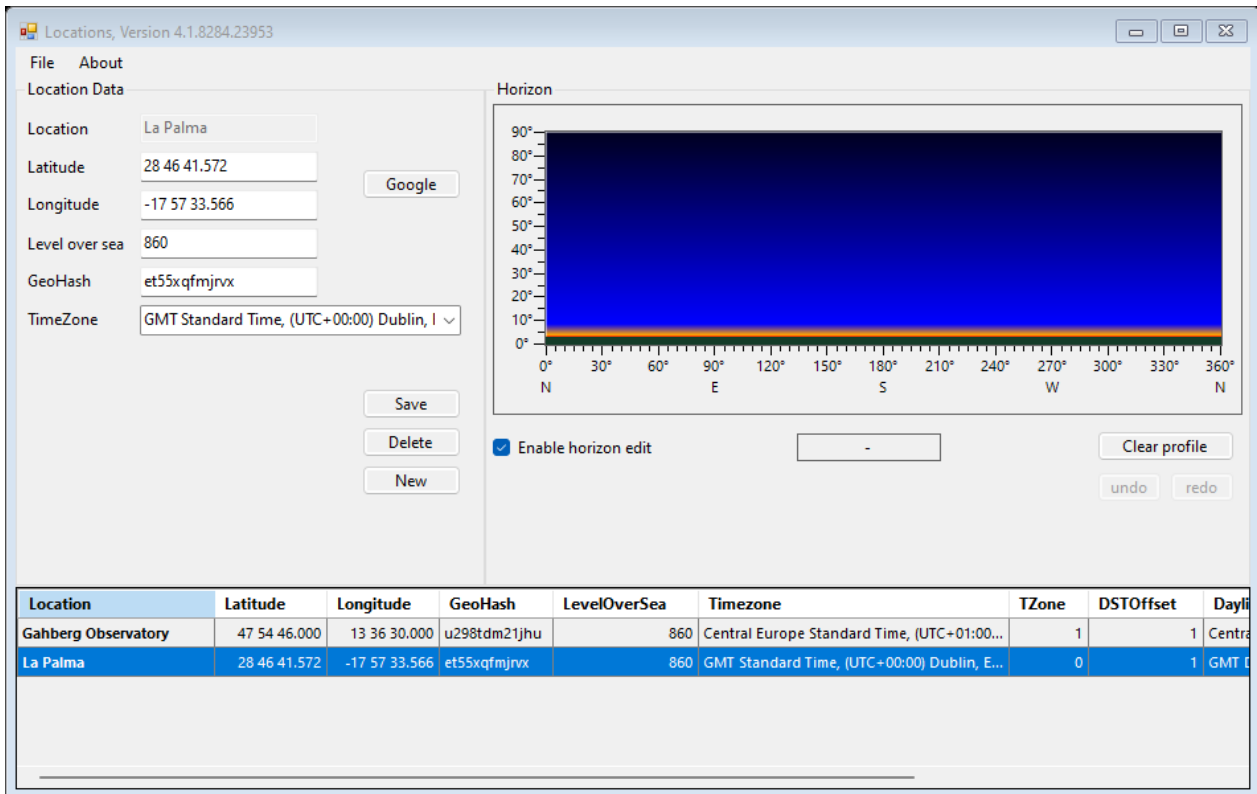
As soon as you click on the "New" button, you can edit the location data fields in the upper left corner. First enter a meaningful name for the location (e.g. "La Palma") in the Location field. The geographic coordinates can be set by directly entering latitude and longitude into the Latitude and Longitude fields. Alternatively, the entry can also be made using a so-called GeoHash code, if this should be known for the new location. By clicking on the "Google" button, the location is opened in Google Maps. Next, the sea level in meters is entered in the LevelOverSea field. It is important to select the correct timezone. For La Palma the timezone "GMT Standard Time" is selected. By this selection the values of TZone, DSTOffset and DaylightName are automatically filled correctly. A horizon filename is not set at first. If you also want to create a horizon for the newly created location, this is done by clicking the Enable horizon edit checkbox. Entering a horizon for a specific location can also be done later. The creation of horizons is described below. To save the new location in the Locations.csv file, click Save. The following screenshot shows the state after creating the new location "La Palma" without using a horizon.

Create a new horizon for a location:

To enter a horizon, first select the location in the table (data set with blue background). By clicking on the checkbox "Enable horizon edit" below the horizon graphic, the horizon can be edited. In the following example, the horizon for the location "La Palma" is created.
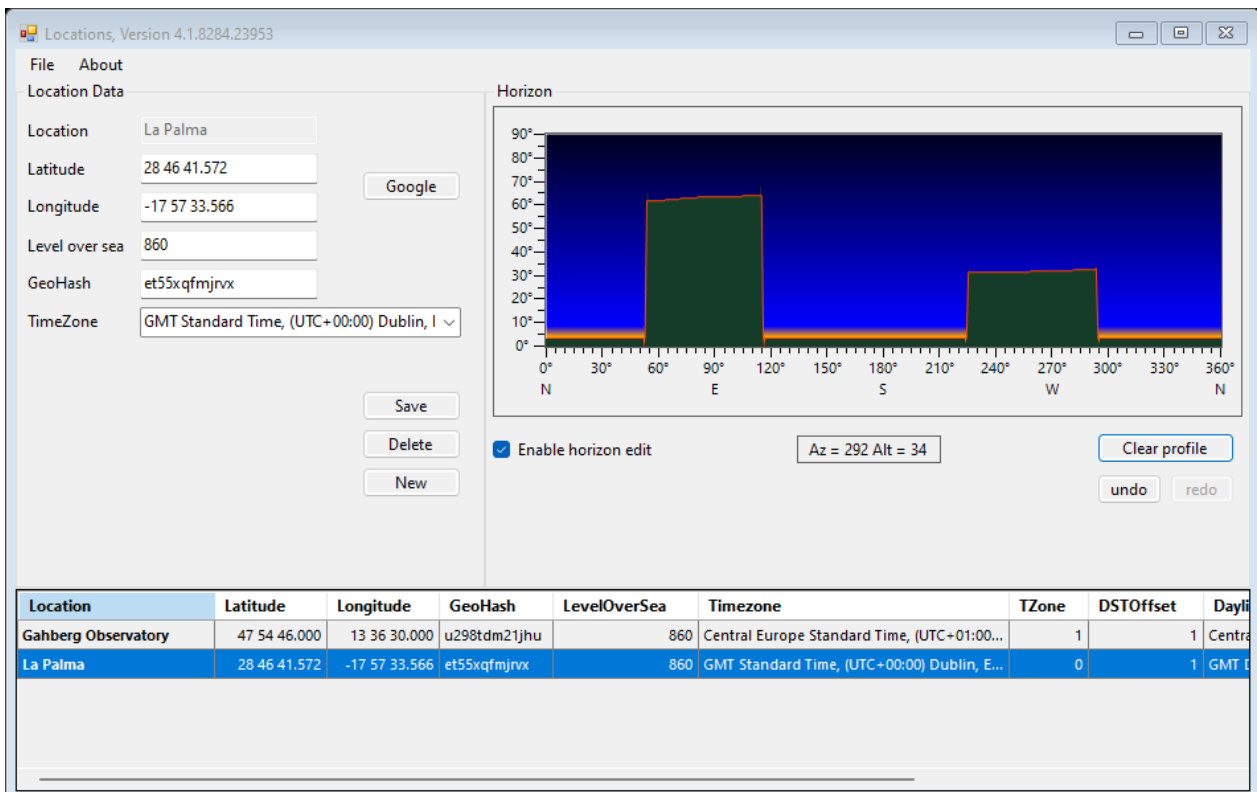
With the pressed left mouse button a horizon can now be "painted". The following example shows an approx. 60° high obstacle on the eastern horizon and an approx. 30° high obstacle on the western horizon.
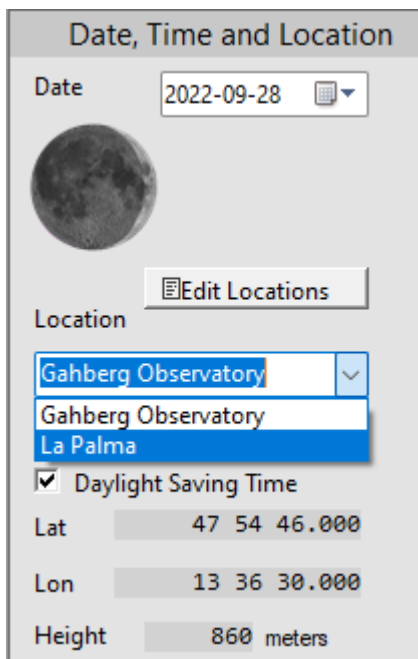
With button Save the horizon file can be saved. As an alternative to the graphical horizon editor, a horizon file can also be created manually by entering exact pairs of values for azimuth and elevation in an ASCII file. The corresponding horizon file is located in the \userdata\hor\ folder.

The creation of the locations is usually a one-time process. When using ObjectTracker on a daily basis, it is not necessary to call up the location management.

11.4. Selection of location and date

When all required locations have already been created, switching between different locations is a very simple process. In the "Date, Time and Location" area, select the desired location in the Location drop-down field and all values of the location (geographical coordinates and time zone) are immediately set correctly.

Attention: The correct setting of daylight saving time / winter time lies in the responsibility of the user. This means that after changing the location selection, always check whether the "Daylight Saving Time" checkbox is selected correctly. As soon as the check mark is activated, this means that daylight saving time is valid. If the check mark is deactivated, ObjectTracker interprets all times as winter time.

When you open ObjectTracker, the date is set to today's date by default. If you want to make the observation planning for another date, then this is done by changing the date field.

11.5. Deep sky object area

To select an object, enter the object name (e.g. "M 16") in the Name field. The entry of the object name should either be completed with a return or the Find button should be pressed. This triggers an object search:

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- ObjectTracker first searches in the CCD-Guide database and in the local catalogs in the subdirectory \userdata\cat\ for the object. If the object is found in a local catalog, the coordinates Ra and Dec are taken from the local catalog file.
- If the object is not found, another search for the object is performed on the internet, provided an internet connection is available. If the internet search is successful, the coordinates are taken over. If the search is unsuccessful, the message "Object not found" appears.

The following illustration shows the status of the text input of "M16" before pressing the Return key or before clicking the Find button. The yellow background colour indicates that the object search has not yet been performed and therefore all output elements have not yet been updated. As soon as the update is done, the yellow colour disappears.

In the Name field, in addition to the objects in the CCD Guide database, you can also search for planets and current comets.
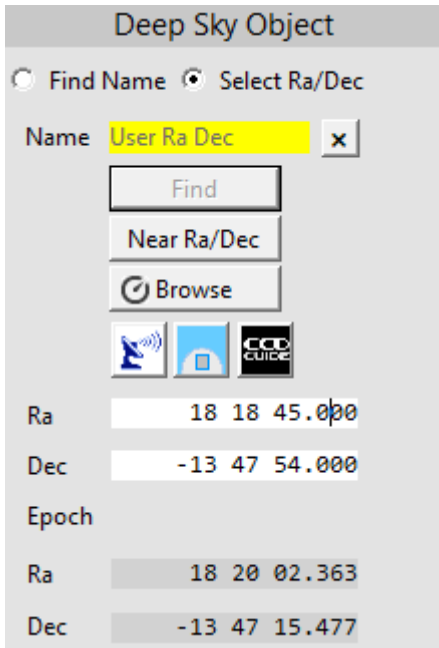
If the object you are looking for is not found, then it is also possible to enter Ra and Dec coordinates directly by changing the input mode from "Find Name" to "Select Ra/Dec". As soon as the option "Select Ra/Dec" is selected, the Ra / Dec fields will appear with a white background colour and a direct input of Ra and Dec coordinates is possible.

The contents of all catalogs can be viewed in the browse window, which appears after pressing the "Browse" button.
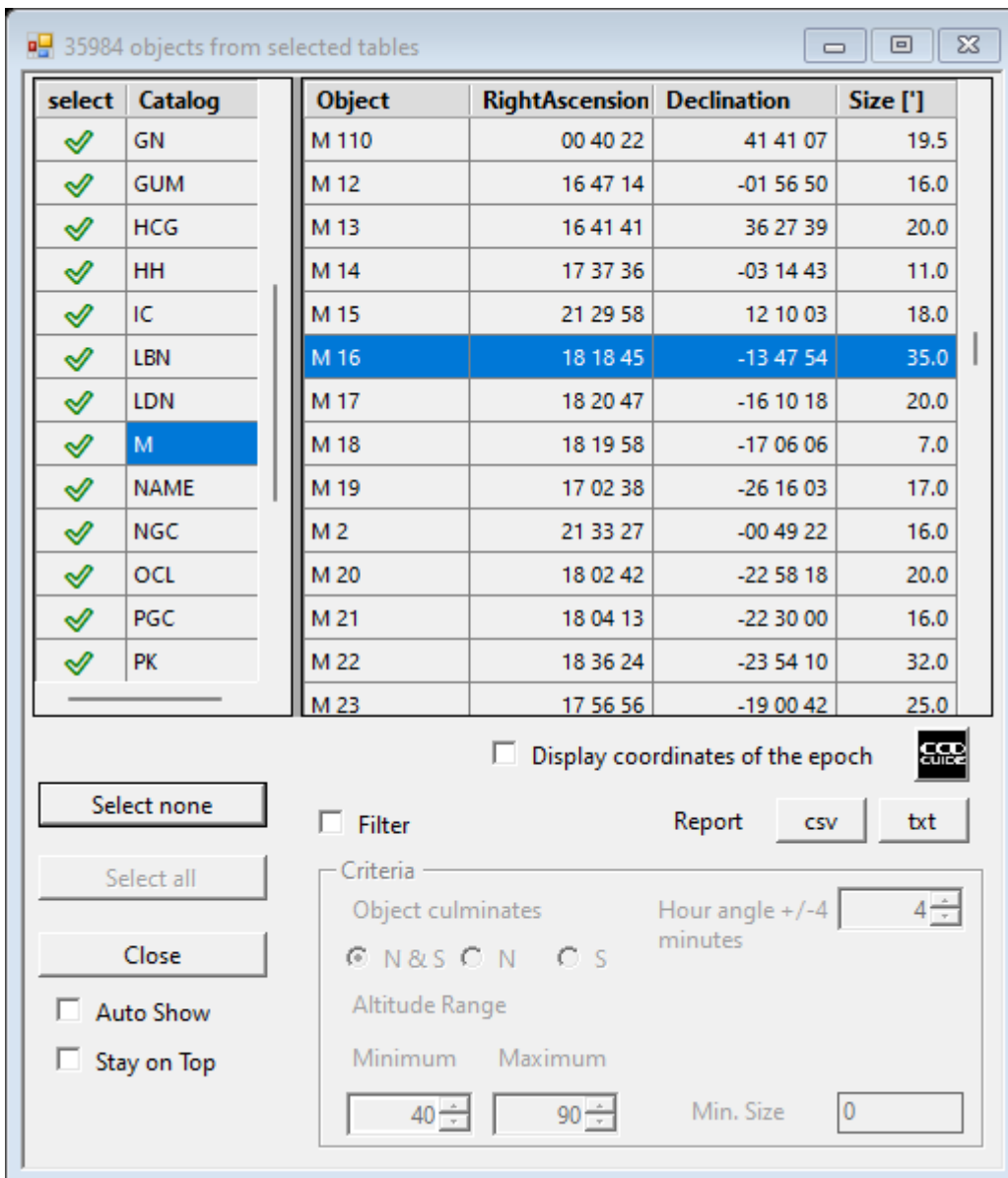
In the browse window shown above, the catalogs in the left area can be selected as desired. The table on the right lists the objects stored in the selected catalogs. As soon as you click with the left mouse button on one of the objects, the ObjectTracker main window is updated with the selected object. With the help of various filter options the selection of visible objects can be further limited.

In the following example, only Messier objects that are near culmination in the middle of the night are filtered.

select	Catalog	Object	RightAscension	Declination	Size [']
	GN	M 110	00 40 22	41 41 07	19.5
	GUM	M 15	21 29 58	12 10 03	18.0
	HCG	M 2	21 33 27	-00 49 22	16.0
	HH	M 31	00 42 44	41 16 08	189.1
	IC	M 32	00 42 42	40 51 57	8.5
	LBN	M 39	21 31 52	48 25 30	31.0
	LDN	M 52	23 24 48	61 36 00	16.0
✓	M				
	NAME				
	NGC				
	OCL				
	PGC				
	PK				
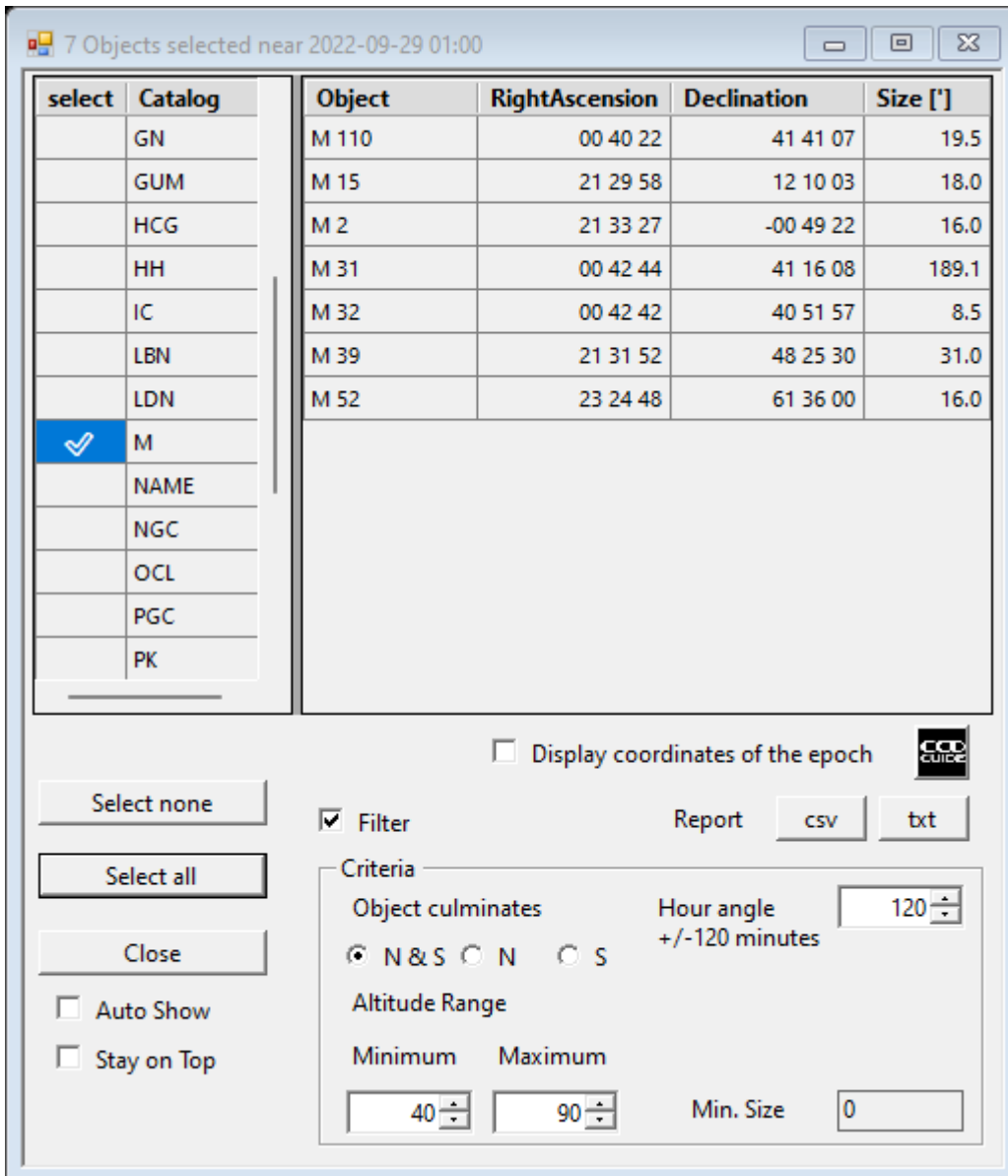
If you click on the report buttons csv or txt, a report in csv or txt format will be created, in which the observation data of all selected objects are displayed in tabular form.

```
Night imaging report for selected objects
=========================================
Date:      09/28/2022
Location:  Gahberg Observatory
Sorted:    Possible exposure, descending
-------------------------------------------------------------------------------------------------
| Nr. | Object Name | Ra       | Dec       | Culmination | Start | Stop  | Total [hrs] | East [hrs] | West [hrs] |
-------------------------------------------------------------------------------------------------
| 1   | M 110       | 00 40 22 | 41 41 07  | 01:16       | 20:35 | 05:18 | 08:42       | 04:40      | 04:01      |
-------------------------------------------------------------------------------------------------
| 4   | M 31        | 00 42 44 | 41 16 08  | 01:19       | 20:35 | 05:18 | 08:42       | 04:43      | 03:59      |
-------------------------------------------------------------------------------------------------
| 5   | M 32        | 00 42 42 | 40 51 57  | 01:19       | 20:35 | 05:18 | 08:42       | 04:43      | 03:59      |
-------------------------------------------------------------------------------------------------
| 7   | M 52        | 23 24 48 | 61 36 00  | 00:01       | 20:35 | 05:18 | 08:42       | 03:25      | 05:17      |
-------------------------------------------------------------------------------------------------
| 6   | M 39        | 21 31 52 | 48 25 30  | 22:08       | 20:35 | 03:22 | 06:46       | 01:32      | 05:14      |
-------------------------------------------------------------------------------------------------
| 2   | M 15        | 21 29 58 | 12 10 03  | 22:06       | 20:35 | 00:55 | 04:19       | 01:30      | 02:48      |
-------------------------------------------------------------------------------------------------
| 3   | M 2         | 21 33 27 | -00 49 22 | 22:10       | 21:16 | 23:03 | 01:47       | 00:53      | 00:53      |
-------------------------------------------------------------------------------------------------
```

In addition to the Deepsky catalogs, the Browse window also contains the "Planets" and "Comets" catalogs. These two catalogs contain the current positions and magnitudes of the planets and the comets.

select	Catalog		Object	RightAscension	Declination	Size [']	Mag
	ABELL		C/2017 K2 (P...	16 02 35	-36 12 33	0.0	8.6
	ARP		C/2022 P1 (...	21 53 55	-41 12 10	0.0	10.4
	BARNARD		C/2019 L3 (A...	09 38 53	-13 40 45	0.0	11.3
	CED		C/2022 E3 (Z...	15 51 42	26 32 05	0.0	11.6
	CG		C/2020 V2 (...	10 52 32	56 07 10	0.0	11.7
✓	Comets		81P/Wild	10 49 30	07 40 15	0.0	12.2
	CONST		C/2022 R2 (...	11 37 53	25 36 45	0.0	12.3
	DCLD		C/2021 P4 (...	12 50 09	-39 02 49	0.0	12.8
	DG		41P/Tuttle-...	14 27 58	-09 13 08	0.0	13.0
	DWB		C/2021 E3 (Z...	10 13 20	-39 48 17	0.0	13.2
	GCL		C/2019 T4 (...	13 41 15	-02 59 13	0.0	13.2
	GN		73P/Schwas...	17 54 55	-35 52 49	0.0	13.3
	GUM		C/2020 K1 (P...	17 19 15	-10 29 40	0.0	13.3
	HCG						

946 objects from selected tables

Let's switch back to the Deep Sky Object area of the ObjectTracker main window. Below the Browse button there are three more buttons, the "AladinLite" button, the "Planetarium" button and the "CCD-Guide Browser" button, which are described in detail below.

11.6. Object visibility settings

After the location, the date and the object have been selected, the constraints for the calculation of the visibility time window can optionally be changed.

Constraints

Object Altitude Limit [°]	40
Moon Distance Limit [°]	30
Moon Illumination Limit	30
Sun Altitude Limit [°]	-18
Horizon Limit	☑

The Object Altitude Limit specifies the minimum object altitude required for the object to be photographed. The standard altitude is 40°.

The Moon Distance Limit specifies the minimum distance between moon and object required for a useful observation.

The Moon Illumination Limit indicates the maximum illuminated part of the moon at which an observation of the object is still possible while the moon is above horizon. If the moon is brighter than the moon illumination limit, an observation of the object is only allowed after moonset or before moonrise. The standard value of 30% can be set much higher at a light-polluted location or in narrow-band photography.

The Sun Altitude Limit indicates the altitude below which the sun must fall for the object to be observed. The default value is -18°, which corresponds to the criterion for astronomical twilight. In the case of narrow-band photography or in the case of a light-polluted location, a larger limit (e.g. -16°) can make sense.

The Horizon Limit checkbox indicates whether the horizon should be considered in the calculation of the object visibility window.

11.7. Graphic area

After all settings have been made, the resulting graphic can be viewed and interpreted. We will look at the following example.
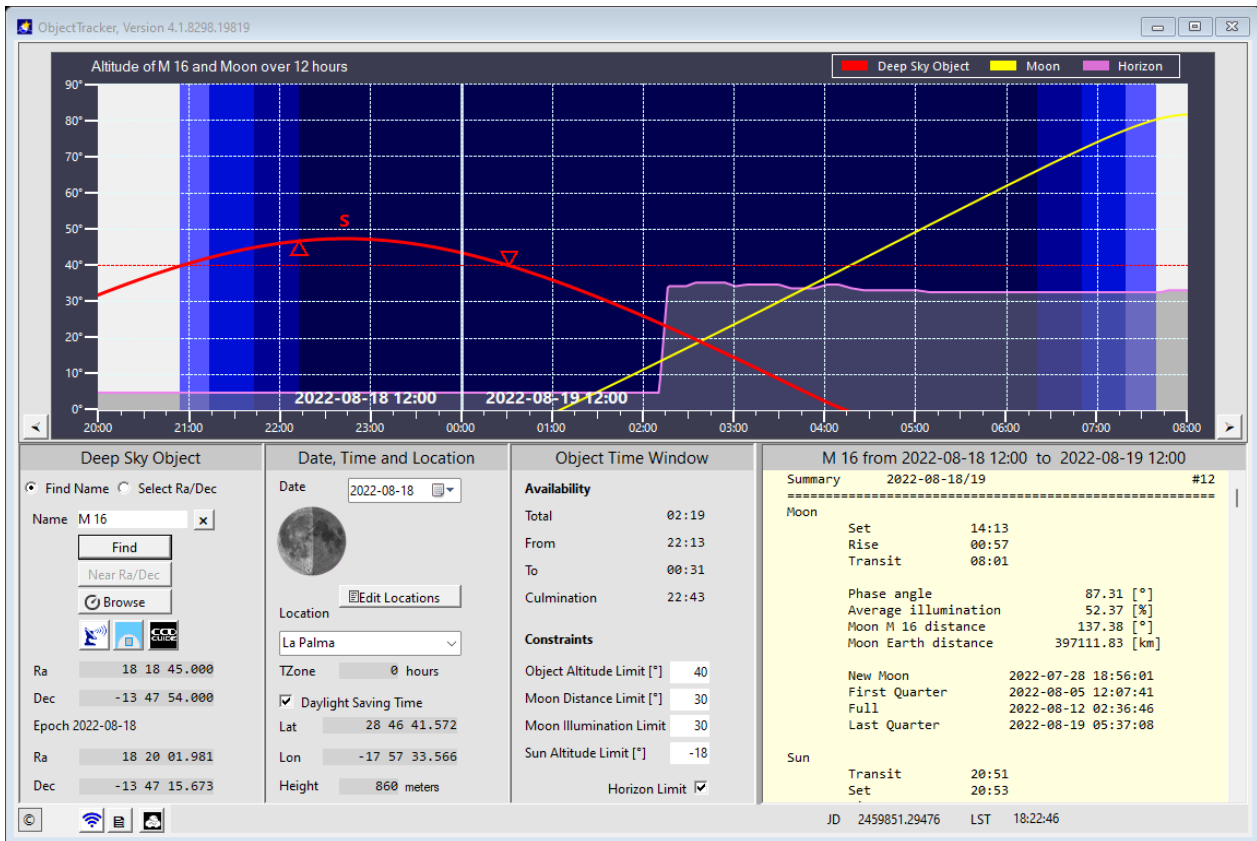
The object M 16 is to be photographed during the night of August 18 to 19, 2022 in La Palma. A horizon progression has been entered for La Palma and the default limits are used for the constraints.

In the graphic, the time from 20:00 in the evening to 8:00 in the morning is shown on the x-axis and the y-axis shows the altitude in degrees.

Twilight is indicated by the background colour of the graphic. Only in the area of the deep blue background the sun has fallen below the Sun Altitude Limit and it is astronomically dark.

Three altitude curves are shown:

- Object altitude (red)
- Moon altitude (yellow)
- Horizon (turquoise)

The dashed red line, which is drawn horizontally at an altitude of 40°, represents the Object Altitude Limit.

The two red triangles indicate the beginning and the end of the object visibility window. M16 can be photographed starting with end of dusk at 22:13. At 22:43 M16 culminates in the south (letter "S" above the red curve). At 00:31 the visibility window ends, because at this time the object height drops below 40°.

In the above example, the observation window is not affected by the turquoise horizon.

The cursor function is particularly useful. If you move the mouse over the graphic area, a green crosshair appears, which follows the altitude curve of the object. The following information of the current crosshair position is displayed in the bottom line (status bar) of the ObjectTracker window: Time, azimuth, altitude and Moon-object distance.
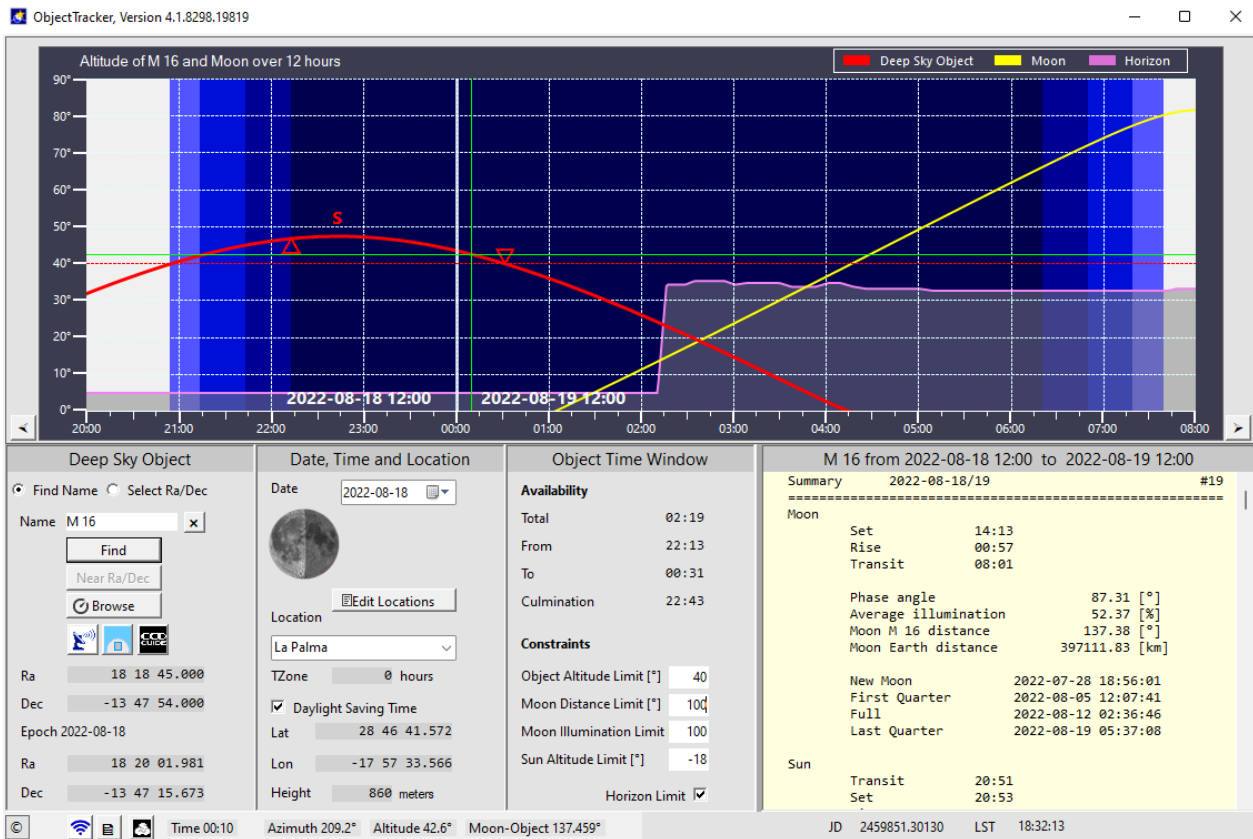
11.8. Info area

The info area contains additional information. Especially useful is for example the distance between moon and object. In the considered example, the Moon M 16 distance is 137°.


```
        M 16 from 2022-08-18 12:00  to  2022-08-19 12:00
 Summary        2022-08-18/19                              #19
 ================================================================
 Moon
         Set              14:13
         Rise             00:57
         Transit          08:01

         Phase angle                       87.31 [°]
         Average illumination              52.37 [%]
         Moon M 16 distance               137.38 [°]
         Moon Earth distance           397111.83 [km]

         New Moon                2022-07-28 18:56:01
         First Quarter           2022-08-05 12:07:41
         Full                    2022-08-12 02:36:46
         Last Quarter            2022-08-19 05:37:08

 Sun
         Transit          20:51
         Set              20:53
```

11.9. Time Series

In the status bar there is a button with a list symbol (Time Series), with which the observation window for the selected object can be calculated and visually displayed not only for one night, but for a long period of time.

After clicking on the Time Series button the following window appears:

In the parameter area the start year and the start month as well as the number of months to be calculated can be selected. It can also be set whether the changeover to daylight saving time should be taken into account in the output and if so, in which period of time daylight saving time is active. Click the Create button to start the output.

Now let's look at the example above (M 16 in La Palma with the standard constraints and active horizon). We choose 2022/08 as start date and let the calculation be output for 12 months. After pressing the Create-button the window looks like this:

The table at the top of the Time Series window lists the observation window and a number of other useful information like moon data in chronological ascending order. In the lower area of the Time Series window, there is a graphic that shows the course of the visibility window at a glance. The example above shows that M16 can be observed for about two hours on nights without a disturbing moon in August. The visibility window shrinks to one hour in September and from October on the season for M16 on La Palma ends with the constraints set by the user. For all observers who prefer to photograph only in a certain telescope position (west or east), the colour of the bars is an interesting additional information: Blue indicates the proportion of the observation window in the eastern sky and orange the proportion of the observation window in the western sky.

If you scroll to the right in the graphic, then you can immediately see when an observation window opens up again in the following season. The example of M16 shows that an observation is worthwhile again from May 2023. If one clicks on a certain day in the diagram (in the example 2023-05-23 shown below), then this day in the diagram is marked with a red dot and at the same time the table focus on this selected day.

Finally, it is also possible to export the complete list to a csv file by clicking the Export button.

11.10. OpenWeatherMap

In the status bar you can find a cloud symbol with which you can display the current weather forecast of OpenWeatherMap for the selected location.

Before you can use OpenWeatherMap it is necessary to get an OpenWeatherAPI key by opening the OpenWeatherMap Options with the context menu (right mouse button) and clicking on the link "Get an API key (APPID)".
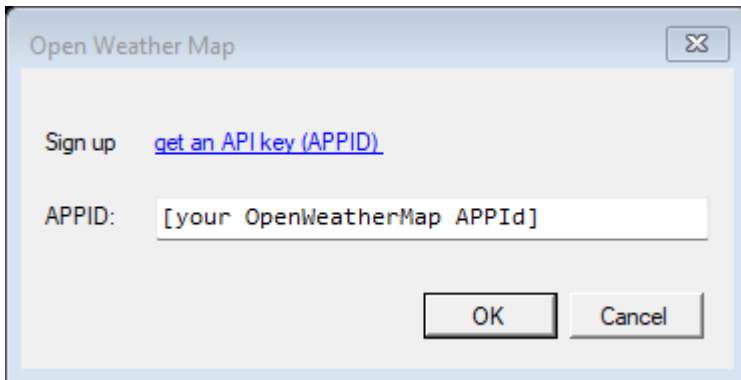
This will open the OpenWeatherMap page in your browser, where the steps to create an account and generate an API key are described in detail. Once the APPID is entered in the OpenWeatherMap options window, the OpenWeatherMap functionality is permanently available in the ObjectTracker.

To display the weather report in the graphic and in the info area, a single click on the clouds button is sufficient.
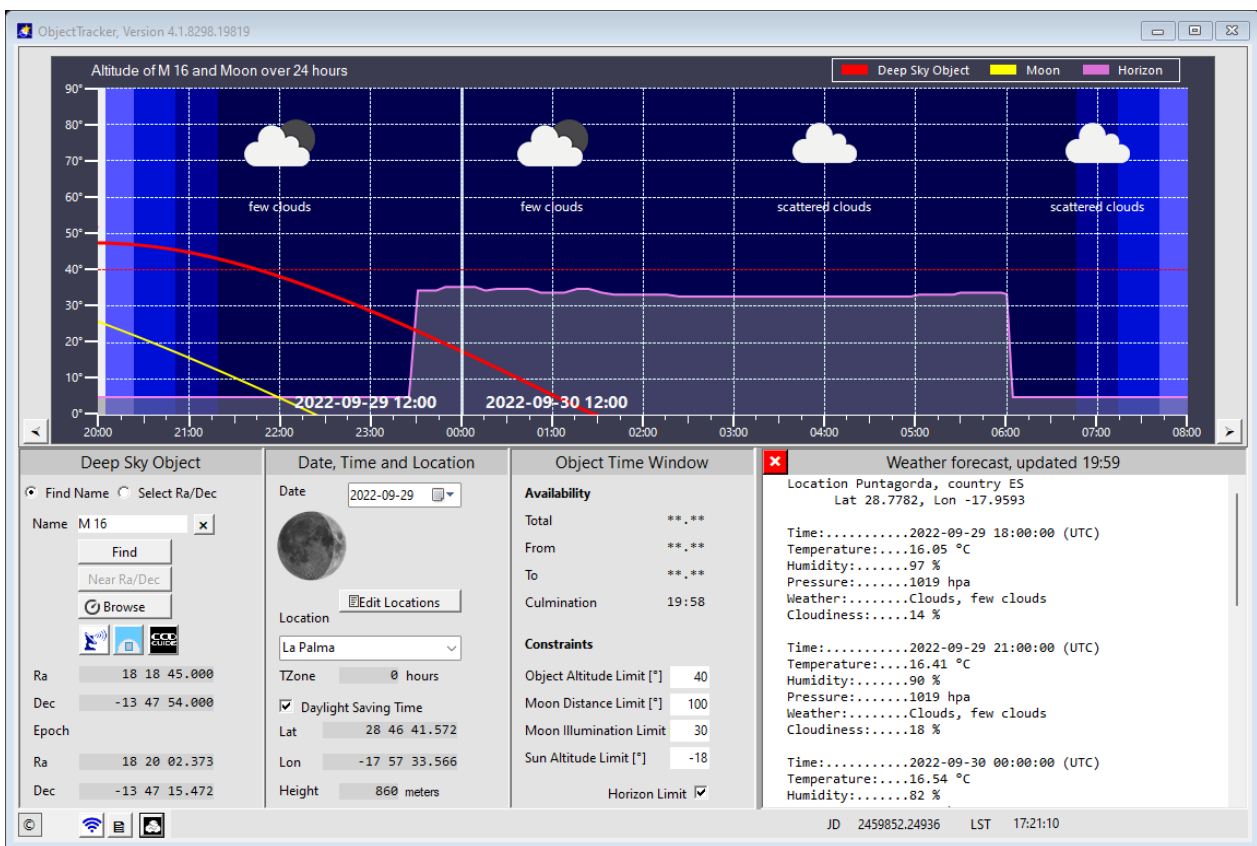
With any update of an ObjectTracker input field the weather report disappears again. With a click on the cloud symbol button the weather report can be shown again at any time.

11.11. AladinLite

In the Deep Sky Object area there is the AladinLite button (button with the satellite dish symbol), with which you can start AladinLite.
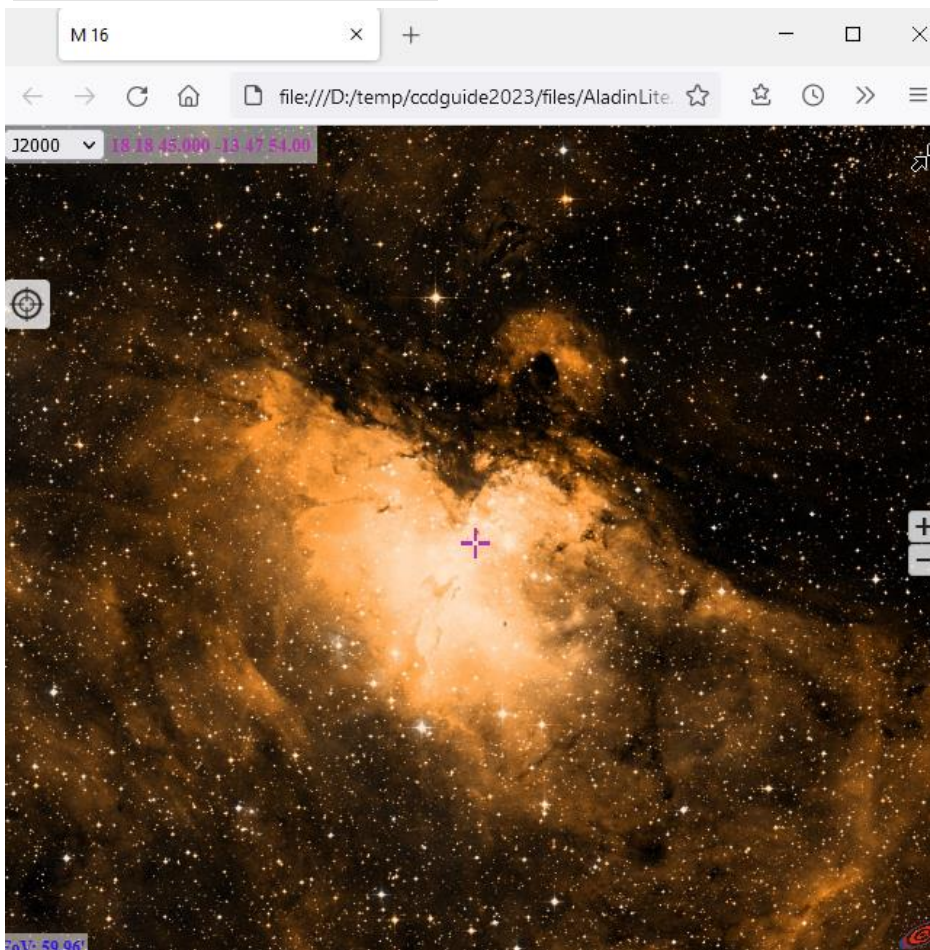
11.12. ObjectSky

In the Deep Sky Object area, next to the AladinLite button is the Planetarium button (symbol with domed building).
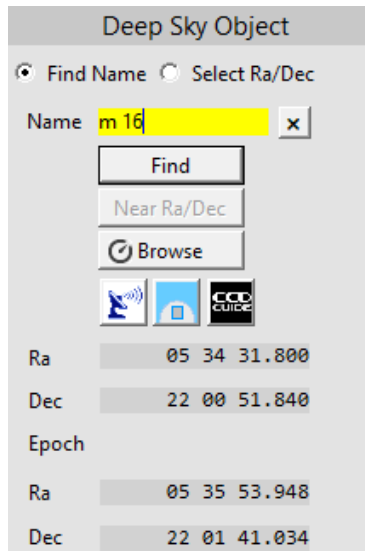
After pressing the Planetarium Button the ObjectSky window opens:
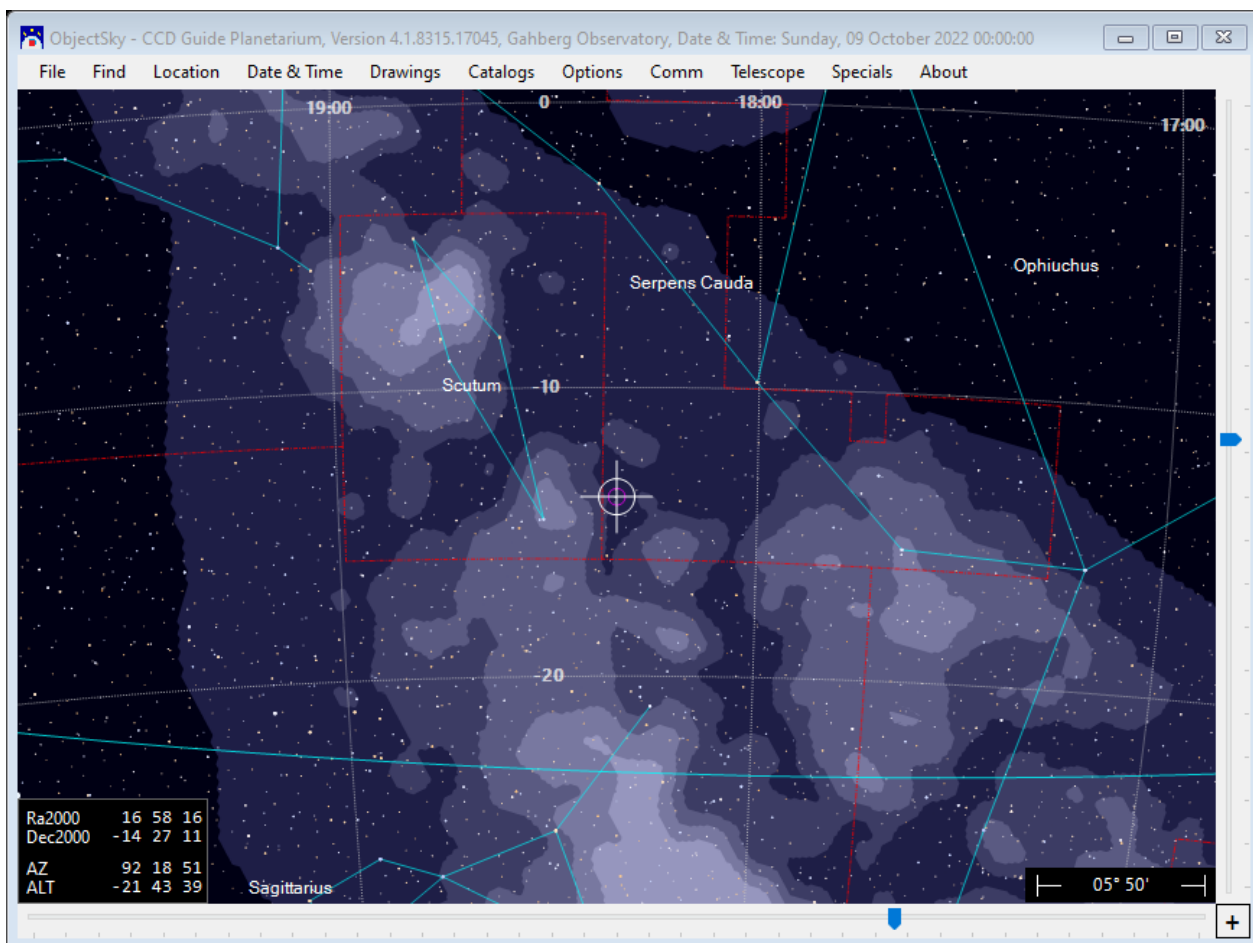
The object selected in the ObjectTracker is centered in the ObjectSky window and displayed with crosshairs. In the example shown above, the object M 16 is marked. The position can be changed with the help of the two sliders. The position can also be changed using the mouse with the middle mouse button pressed. Zooming is also possible with the middle mouse button by using the mouse wheel. Zooming can alternatively be done by using the key combination "Ctrl" + "+-".

Furthermore, the Object Information window appears, in which the data for the object are displayed. With the center button at the bottom left, the object can be centered again if necessary. With the Simbad button the object can be called in Simbad.

Object Information

Name: M 16

Data   Image

Name	Value
Name	M 16
Catalog	M
Object	unknown
Position 2000	Ra: 18 18 45.000 Dec: -13 47 54.000
Position Now	Ra: 18 20 02.387 Dec: -13 47 15.465
Horiz. position	Az: 243.460 Alt:16.528
HourAngle	4.1134
Transit	19:53:11
Sidereal time	22h 26m 51s
Julian date	2459853.458333
Air mass	1.356
Object type	EN (Emission Nebula)

Simbad

If you switch from the Data tab to the Image tab, you have access to all images in the CCD-Guide database. A double click on the preview image or a click on the View button opens the image in the ImageViewer.
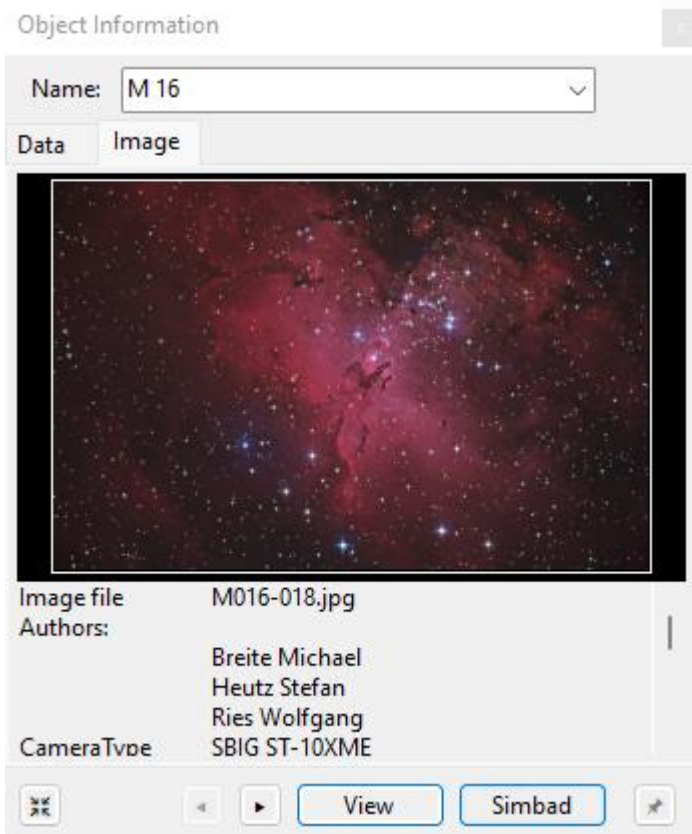
By default, when you open the ObjectSky planetarium, the location is set to the location active in the ObjectTracker and the date is set to the date active in the ObjectTracker (time 00:00). The location and date active in ObjectSky are displayed in the ObjectSky title bar.
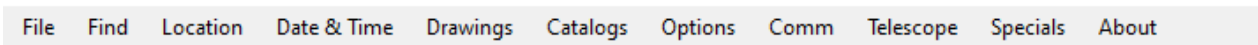
Location, date and time can also be changed in the menu of ObjectSky at any time. By default ObjectTracker is the leading system. When changes are made in ObjectTracker, such as object, date or location, then ObjectSky updates itself automatically. If this interaction between ObjectTracker and ObjectSky is not desired, then this can be set in the Comm menu by unchecking the "Accept objects from other programs" checkbox.

In the menu "Find" you can search for a specific object of the CCD-Guide database, for a planet or for a current comet.
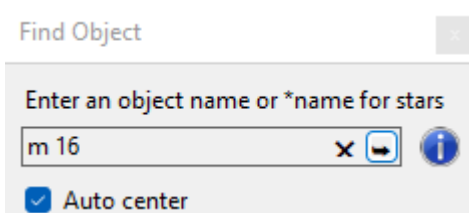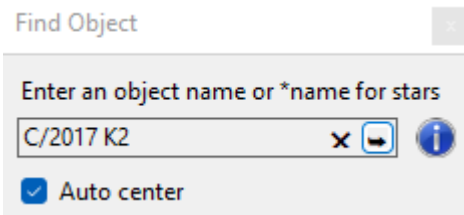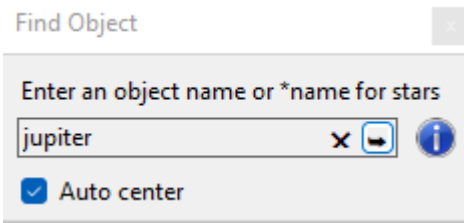
In the menu "Drawings" you can set what should be displayed.
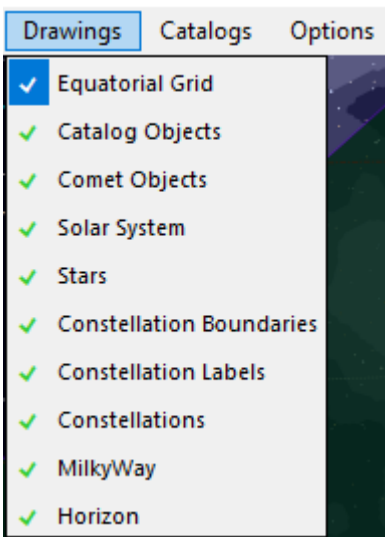
In the "Catalogs" menu, you can set which catalogs are to be displayed. In the following example, the objects of the Messier catalog are always displayed. All other objects are only displayed if the field of view is smaller than 30°.

Bernhard Hubl   http://www.ccdguide.com/
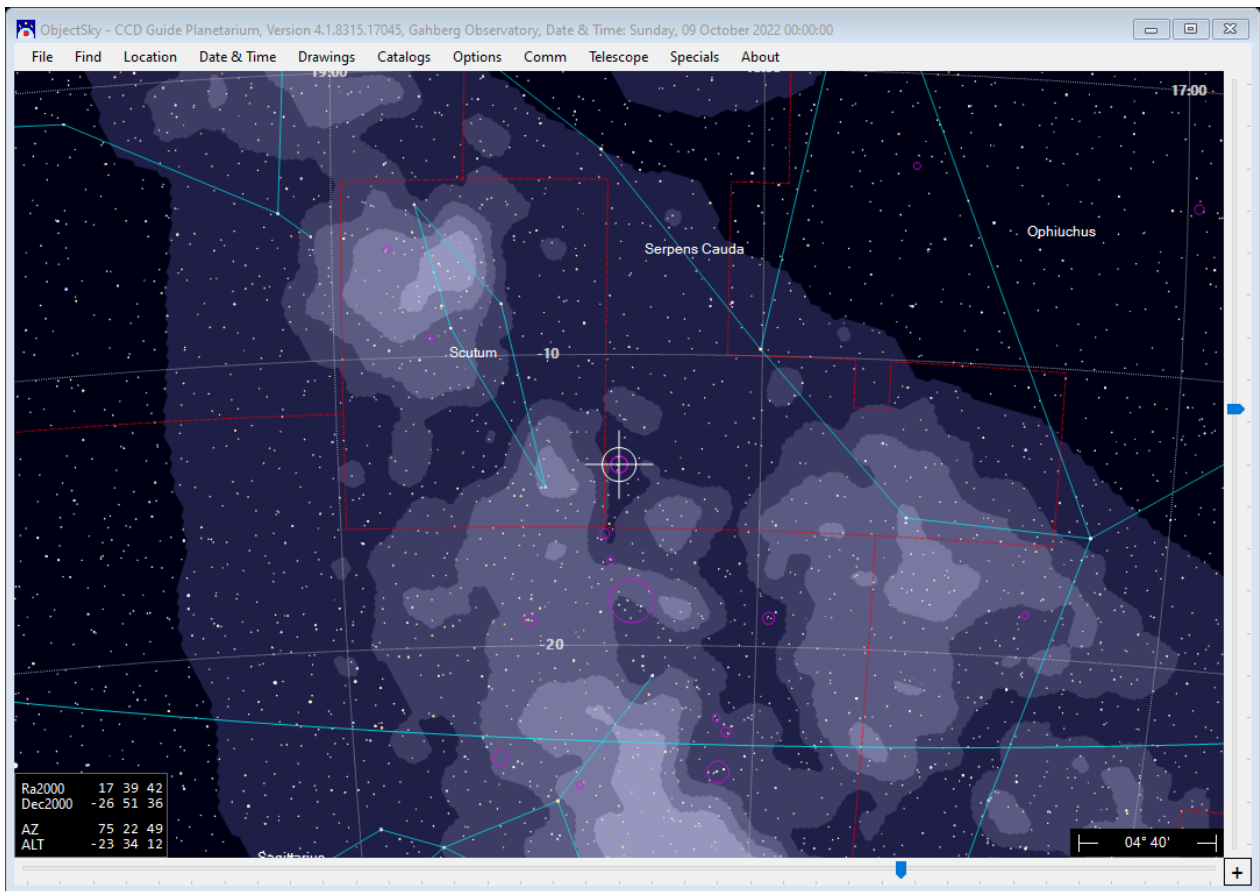
In the Comets section a list of current comets appears after pressing the "List" button. You can select and display a current comet of this list. With the button "Remove" the selected comets are removed again.

Comets

| List | Remove |

Table of comets from MPC
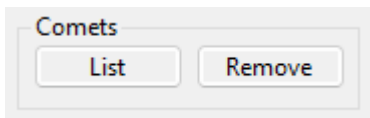
Name	Brightness ▲	Perihelion	Perihelion Dist	Eccentricity	Perihel argument	Node	Inc
C/2017 K2 (PANSTARRS)	4.94	2022-12 19.684	1.796896	1.000807	236.1985	88.2351	87.
107P/Wilson-Harrington	9.46	2022-08 24.6614	0.966634	0.631717	95.4419	266.7746	2.7
C/2022 E3 (ZTF)	10.52	2023-01 12.7852	1.112248	1.000296	145.8146	302.5544	109
C/2020 V2 (ZTF)	10.54	2023-05 8.5499	2.227913	1.000931	162.4248	212.3713	131
81P/Wild	10.96	2022-12 15.6289	1.598427	0.537229	41.6343	136.099	3.2
C/2019 U5 (PANSTARRS)	11.14	2023-03 29.9013	3.624066	1.001462	181.508	2.6371	113
C/2020 R7 (ATLAS)	11.30	2022-09 16.239	2.95598	1.000169	347.838	268.2818	114
119P/Parker-Hartley	11.32	2022-08 12.0059	2.327536	0.388309	322.0646	104.5711	7.3
C/2019 L3 (ATLAS)	11.54	2022-01 9.625	3.554418	1.001869	171.6116	290.7864	48.
C/2020 K1 (PANSTARRS)	11.78	2023-05 9.068	3.073341	0.999979	213.9809	94.3549	89.
C/2021 P4 (ATLAS)	11.79	2022-07 30.3668	1.080446	0.996644	175.8183	348.0943	56.
80P/Peters-Hartley	11.82	2022-12 8.8651	1.61532	0.598593	339.247	259.7971	29.
116P/Wild	11.93	2022-07 16.8927	2.197001	0.37051	173.2825	20.9802	3.6
41P/Tuttle-Giacobini-Kresak	12.04	2022-09 13.4093	1.050149	0.659952	62.2101	140.9887	9.2
C/2019 T4 (ATLAS)	12.12	2022-06 9.0702	4.242346	0.99571	351.1906	199.9389	53.
C/2020 Y2 (ATLAS)	12.20	2022-06 17.7012	3.132541	0.996998	266.1066	26.5152	101
157P/Tritton	12.30	2022-09 9.8038	1.571805	0.556681	155.058	287.5473	12.
C/2021 Y1 (ATLAS)	12.33	2023-04 30.6999	2.032571	1.000819	245.809	244.7698	77.
73P-T/Schwassmann-Wachmann	12.39	2022-08 27.2054	0.972817	0.685537	199.4704	69.6127	11.
73P/Schwassmann-Wachmann	12.44	2022-08 25.7898	0.972963	0.685341	199.49	69.6101	11.
29P/Schwassmann-Wachmann	12.57	2019-04 15.9912	5.77496	0.044803	50.6295	312.3915	9.3
C/2021 E3 (ZTF)	12.62	2022-06 11.9126	1.777394	1.000904	228.8519	104.4703	112

In the "Options" menu, various settings can be made for the display of the objects.

Options Comm Telescope

☑ Show object informatiom
☑ Show coordinates

Drawing

| Colors & Fonts | R |

Catalog object shapes

Circle
none

Min. size [pixel] 12.0
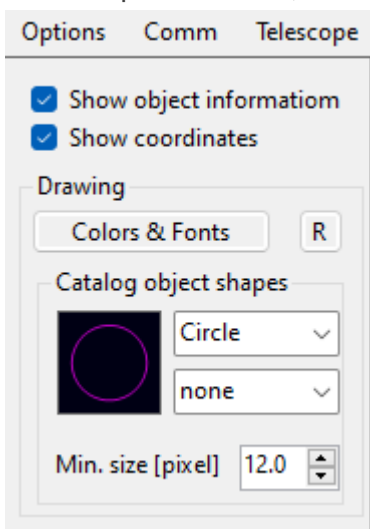
In the "Telescope" menu, the "Show view frame" checkbox can be used to specify the display of the image field of a telescope-camera combination.
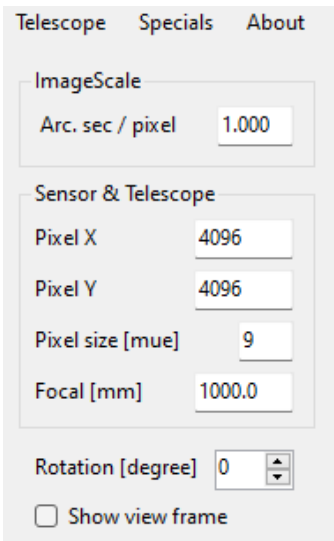
In the menu "Specials" the function "Milky Way Globular Clusters in 3D" can be called, with which a 3D view of all globular clusters of the Milky Way is made available in a separate window.

Bernhard Hubl   http://www.ccdguide.com/
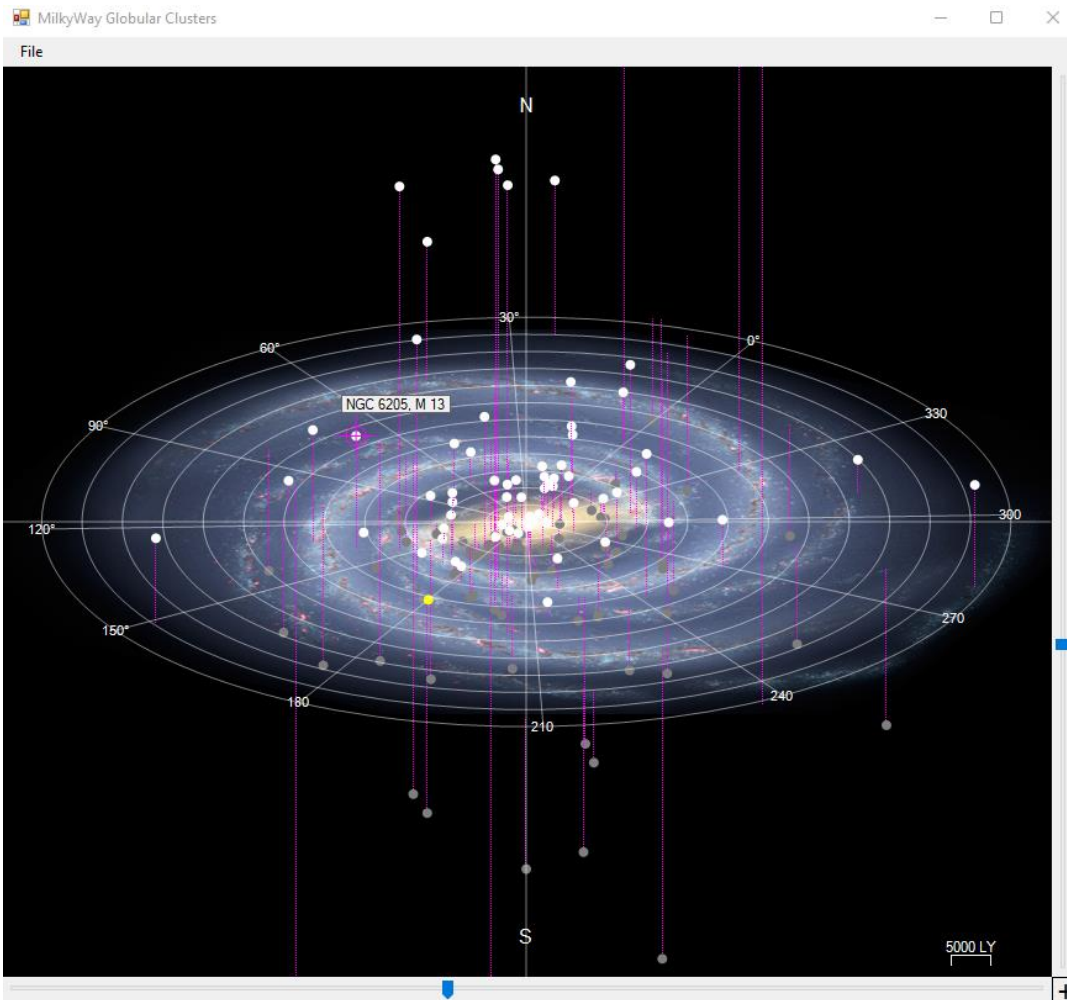
The function "Milky Way Globular Clusters in 3D" is also available in the Object information window once a globular cluster is selected.

Object Information

Name: NGC 6205

Data | Image

Name	Value
Name	NGC 6205
ObjectName	M 13
Catalog	NGC
Globular Cluster	NGC 6205
Name	M 13
Position 2000	Ra: 01 06 46.749 Dec: 36 27 35.500
Position Now	Ra: 01 08 03.227 Dec: 36 34 51.822
Horiz. position	Az: 66.549 Alt:55.714
HourAngle	-2.6868
Transit	2:41:12
Sidereal time	22h 26m 51s
Julian date	2459853.458333

View 3-D | Simbad

If you move the mouse over one of the displayed objects, the object name is shown. If you click with the left mouse button on one of the objects, then this object automatically becomes the active object in the ObjectTracker and all calculations are updated.

12. OBJECTTRACKER IN BROWSER AND IN EXPERT

12.1. ObjectTracker call in CCD-Guide Browser

ObjectTracker can be called up in the CCD-Guide Browser via the ">>>" button.
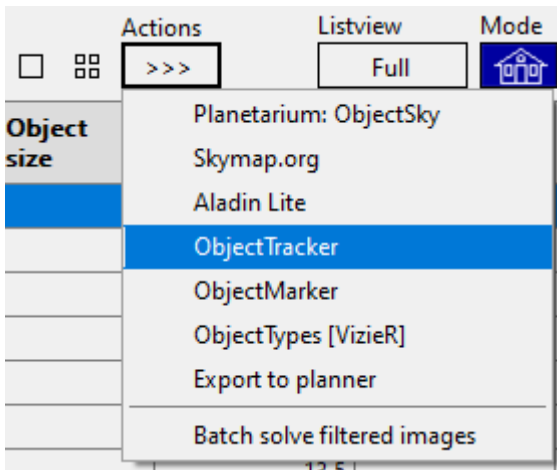
The ObjectTracker object is always set to the object currently active in CCD-Guide Browser. This allows you to quickly get an overview of the visibility conditions of the active object.

12.2. ObjectTracker in CCD-Guide Expert

In the "Planner" tab of the CCD-Guide Expert, the ObjectTracker can be called up via the ">>>" button in a similar way as in the CCD-Guide Browser.

If the CCD-Guide-Planner contains a large number of objects, it makes sense to use the "Export OT" function in the Planner tab, because this allows you to transfer not only a single object but a list of objects of any length to ObjectTracker. A realistic use case looks like this:

First, in the "Planner" tab, the list of objects is reduced to a reasonable number with the help of Set Filter. For example, the RA range could be roughly restricted so that the objects are certainly visible at some time point in the selected night. Further criteria such as object type etc. could be set to make the list even smaller.

The filtered object list of the Planner can then be exported to the ObjectTools catalog file _CCD_Planner.cat, which is located in the subdirectory \objecttools\cat\, by clicking the Export OT button. An already existing file _CCD_Planner.cat is always overwritten.

Next, switch to the ObjectTracker. With the help of the Browse window you have access to all catalogs in the \cat\ folder.

CCD-Guide automatically makes meaningful settings in the Browse window as soon as Export OT is started. These settings are:

1. Select only the catalog _CCD_Planner.cat in the ObjectTracker catalog list.
2. Deactivate the check mark "Filter". This makes all objects in the _CCD_Planner.cat catalog visible in the table on the right. The table now shows the same objects as the filtered table in the planner.

select	Catalog	Object	RightAscension	Declination	Size [']
✓	_CCD_Plann	BARNARD 7	04 17 25	28 33 00	60.0
	ABELL	GUM 19	08 56 28	-43 05 54	2.0
	ARP	IC 405	05 16 29	34 21 22	30.0
	BARNARD	IC 434	05 40 60	-02 27 12	60.0
	CED	IC 1396	21 38 54	57 29 20	170.0
	CG	IC 2177	07 04 25	-10 27 13	20.0
	CONST	LDN 989	21 21 42	47 32 48	70.9
	DCLD	NGC 2163	06 07 49	18 39 27	3.0
	DG	NGC 2264	06 40 58	09 53 44	200.0
	DWB	NGC 6334	17 20 48	-36 06 12	35.0
	GCL	OCL Melotte ...	12 25 06	26 06 00	120.0
	GN				
	GUM				

11 objects from selected tables

☐ Display coordinates of the epoch

Select none

☐ Filter   Report   csv   txt

Select all

Close

— Criteria —
Object culminates   Hour angle +/-4   4   minutes
☑ Auto Show   ● N & S ○ N ○ S
☐ Stay on Top   Altitude Range

Minimum   Maximum
0   90   Min. Size   0

As soon as you click into an object line of the Browse list, this object is set in the ObjectTracker main window. You can now use the arrow keys on the keyboard to quickly move from one object line to the next object line. The ObjectTracker main window is automatically updated with each object change. This allows you to quickly and easily find the most suitable object for observing.

13. OBJECTMARKER

13.1. Introduction

With the ObjectMarker, images can be solved via astrometry.net and then labeled with the objects of the CCD-Guide database as well as with your own texts. Within the ObjectMarker the ObjectViewer can be started, with which a labelled image can be viewed and with which the coordinates of selected positions can be read and an Internet search can be carried out with SIMBAD, NED or VizieR.

ObjectMarker can be started from CCD-Guide Browser or CCD-Guide Expert (via the '>>>' button) or alternatively used as a stand-alone tool. The stand-alone mode can be started by double-clicking on the file ObjectMarker.exe, which is located in the CCD-Guide root directory or by clicking on the ObjectMarker button in CCD_Guide.exe.

In the following, the use as stand-alone tool is described first and later practical applications in interaction with CCD-Guide Browser and CCD-Guide Expert are explained.

For the use of ObjectMarker an internet connection is required.

13.2. ObjectMarker main window

After starting ObjectMarker the following main window appears.
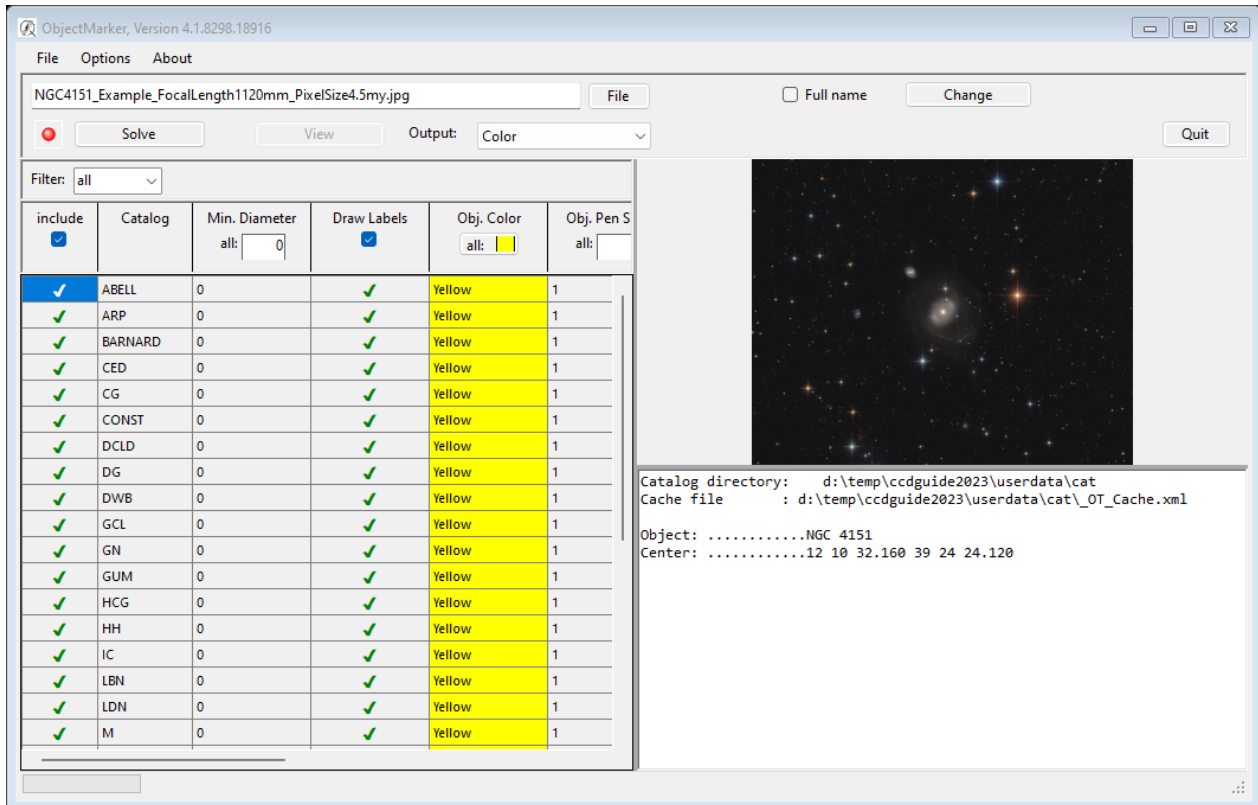
The main window is divided into five areas:

- **Menu:** In the menu, important settings can be made in Options.
- **Action area:** The action area is at the top. The name of the active file is displayed here, to which actions such as Solve (starting a PlateSolve) or View (generating and displaying a labelled image) can be applied. With the button "File" the file name can be changed.
- **Catalog area:** The catalog area is located on the left. Here you can select and deselect catalogues for display and change the appearance of catalogues. In addition, the filter dropdown list can be used to specify whether all object names (all), only the master object names (prim.id) or only the alias names (second.id) should be displayed.
- **Image preview:** A preview image of the image set under File is displayed here.
- **Output area:** In the output area, ObjectMarker displays various status information while an action is being performed.

13.3. First steps

After starting ObjectMarker for the first time an example image of NGC 4151 is loaded. As soon as you click on the button "Solve" the following message appears in the output area:

"A valid APIkey must be set prior to first solve, open Options and follow the link"

Since ObjectMarker uses the service astrometry.net for the PlateSolving and astrometry.net needs an APIKey, you have to get an APIKey from astrometry.net first. This is a one-time step that is only required when ObjectMarker is started for the first time.

To do this, open the Options menu item and the Options window will open, which is described in more detail below. We are currently only interested in the area "WEB Services" on the tab "Astrometry":
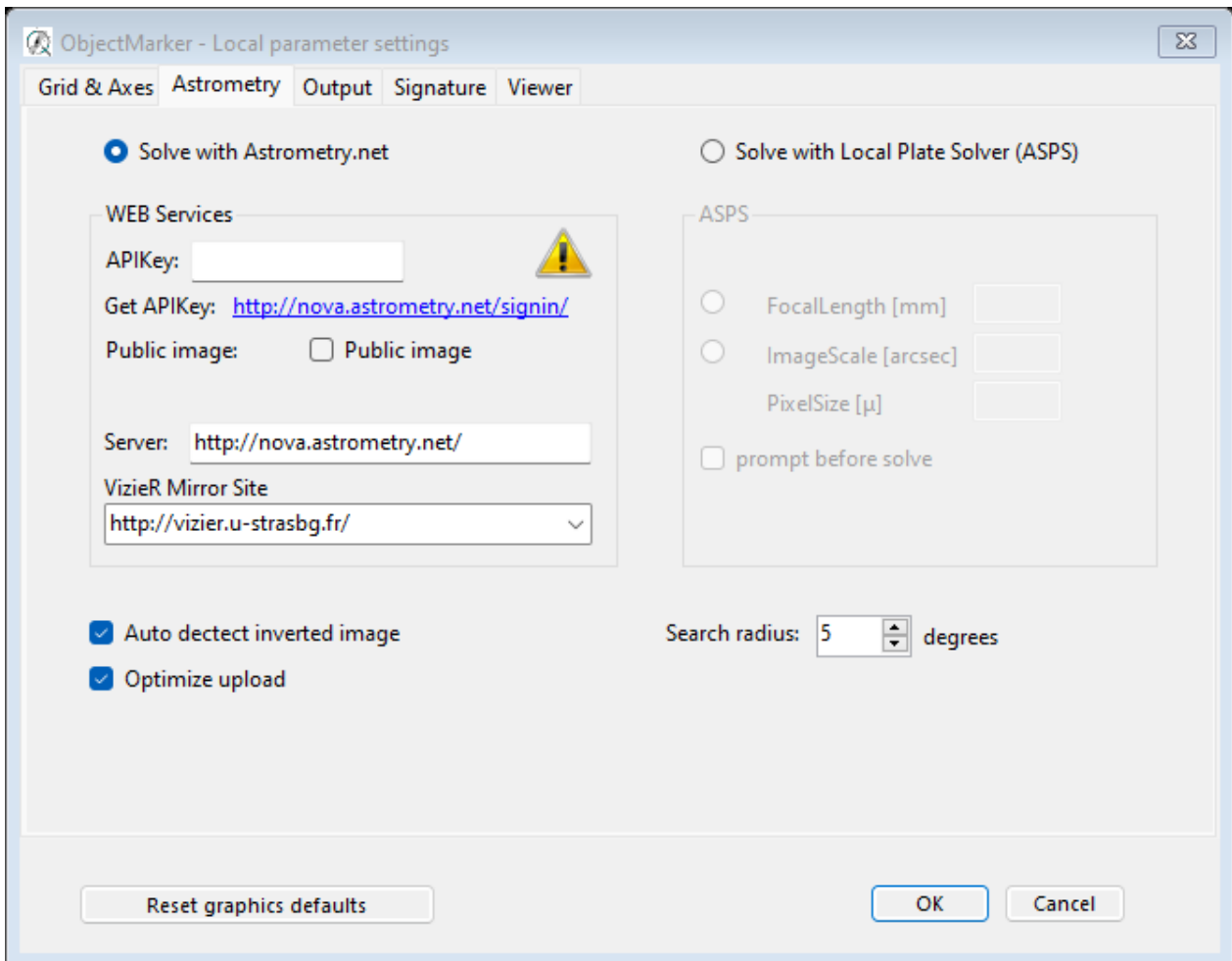
Please click on the link to the right of "Get APIKey:"
http://nova.astrometry.net/signin/

This opens the login page of astrometry.net in the browser.

Please select the method with which you would like to identify yourself at astrometry.net, e.g. via an existing Yahoo account or a Flickr account.

After successful login, select "My Profile" on the dashboard. There you will find a line "my API key: xxxxxx" under Account Info.
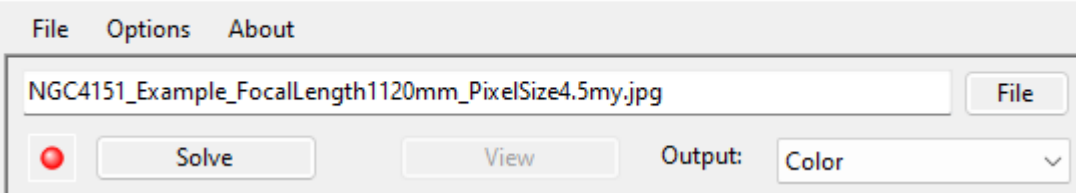
Please copy this API key into the field "APIKey" of the still open Options window of ObjectMarker. Then you can close the Options window with Ok and the unique APIKey process is finished. Now you can use the ObjectMarker function.

To test the ObjectMarker, you can now label the first astrophoto. You can use your own astrophoto or the test image delivered with CCD-Guide:
\output\markerimages\NGC4151_Example_FocalLength1120mm_PixelSize4.5my.jpg

Make sure that the desired image is displayed in the file name field.

If you select a file using the File button, the following query window may appear:
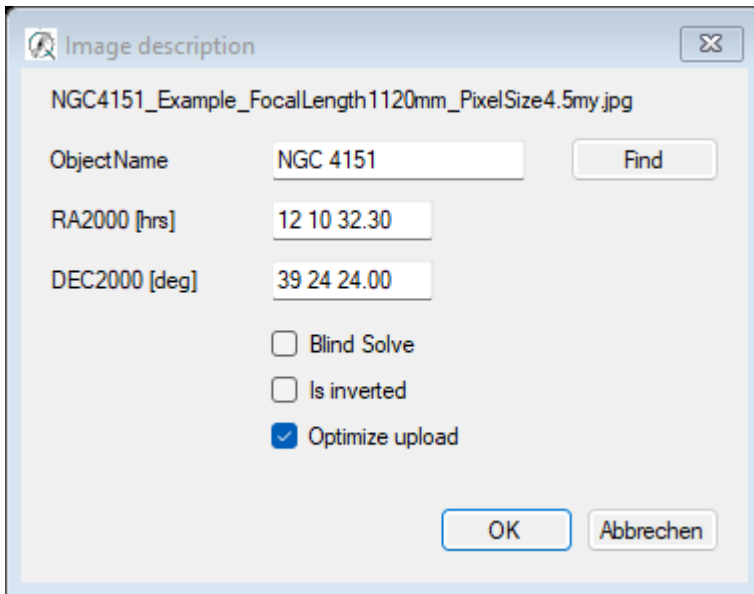
Enter the object name (in our example: NGC 4151). Then click the Enter key or the Find button so that the RA/DE coordinates are filled automatically. After leaving the window with Ok, the following text is shown in the ObjectMarker output area:


```
Object: NGC 4151
Center: 12 10 32.160 39 24 24.120
```

Now you can click on the Solve button. After that you have to be patient. The image will be converted to a grayscale image and uploaded to astrometry.net. Information about the process is displayed in the output window.

```
Object: NGC 4151
Center: 12 10 32.160 39 24 24.120
Input file converted to grayscale:
        File size color:     1239026
        File size grayscale: 100810
Connect to http://nova.astrometry.net/

Plate solving started with Astrometry.net

Login...............http://nova.astrometry.net/
Login status........success
Upload..............grayscale_image_9999999.jpg
Commercial use......n
Allow modifications.n
Center ra...........182.634000°
Center dec.......... 39.406700°
Center pixel........true
Image size..........2758x2208
Is public...........n
Search radius.......5.00000[°]
Session.............2ntlthmfyhqbo39qfvf33jcb7c4kra8k
Upload status.......success
waiting for a job
```

After one to two minutes the image should be solved by astrometry.net. A successful solving process is indicated in the output window with a green text.

```
waiting for a job
job id .............4453942
Job status.........success
Astrometry completed
==================================================
FileName:...........NGC4151_Example_FocalLength1120mm_PixelSize4.5my.jpg
Ra:.................12 10 33.057
Dec:................39 24 21.382
Image width:.......2758
Image height:......2208
FoV:...............38.469' x 30.798'
Image scale:.......0.837 arc seconds
PosAngle:..........270.003°
Rotation:..........-179.997°
WCS stored in:.....D:\temp\ccd-guide\objecttools\images\NGC4151_Example_FocalLength112
SolvedTime:........119.2001674 seconds
```

Please note that the Solve button is now grayed out (Solve is no longer necessary) and the View button is now active because the image now contains valid WCS (World Coordinate System) information.
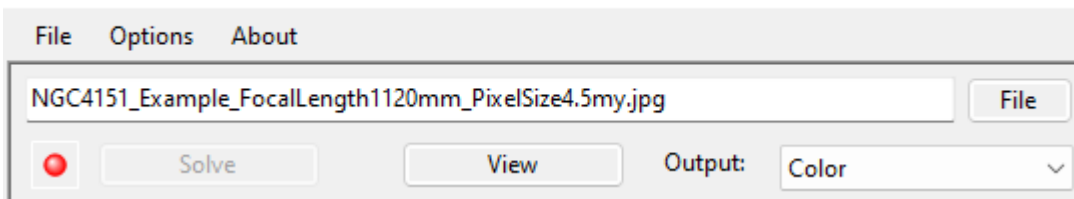
Now we want to label the image by clicking on the View button. A short time later the ObjectViewer opens, which displays the labeled image.
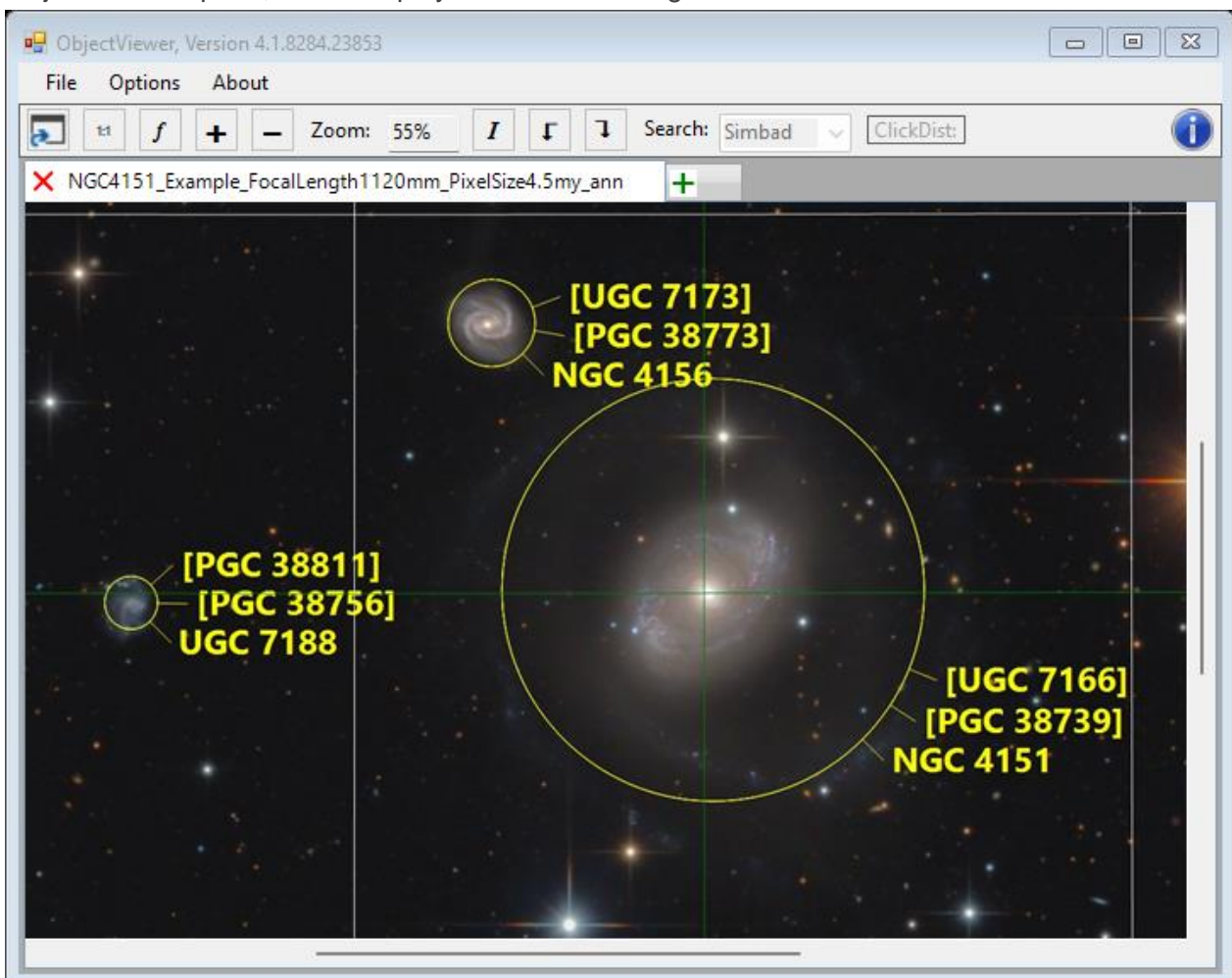
Now you can change the filter from selection "all" to "prim.id" or "second.id" in the filter pane and then click View again to display only the master object names or only the object alias names.

Finally, you can also select or deselect individual catalogs and use the "View" button to update the labels.

You also have the option of generating a labeled black-and-white image instead of a labeled color image by changing the output option.

The labeled image is saved in the folder \output\markerimages with the postfix "_ann.jpg". In addition to the labelled image, other files can also be created depending on the settings in the options (see below for details).

13.4. ObjectMarker action area

In the action area of the ObjectMarker, the name of the active file is displayed to which all actions such as Solve or View are applied. With the button "File" the file name can be changed and with the button "Change" the Solve parameters can be set.
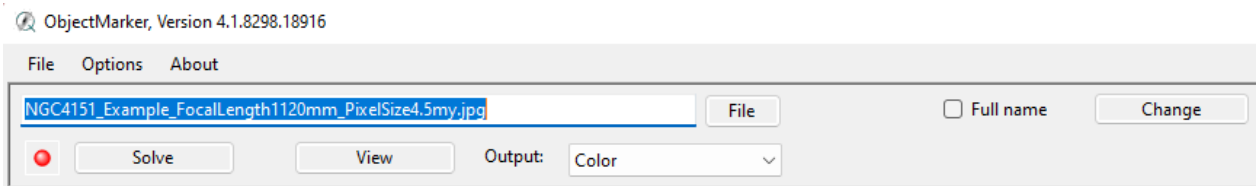
ObjectMarker supports the following image formats: jpg, png and tif.

Solve parameters:

If the button "Change parameters" is pressed, then the Solve parameters can be set in the following window.
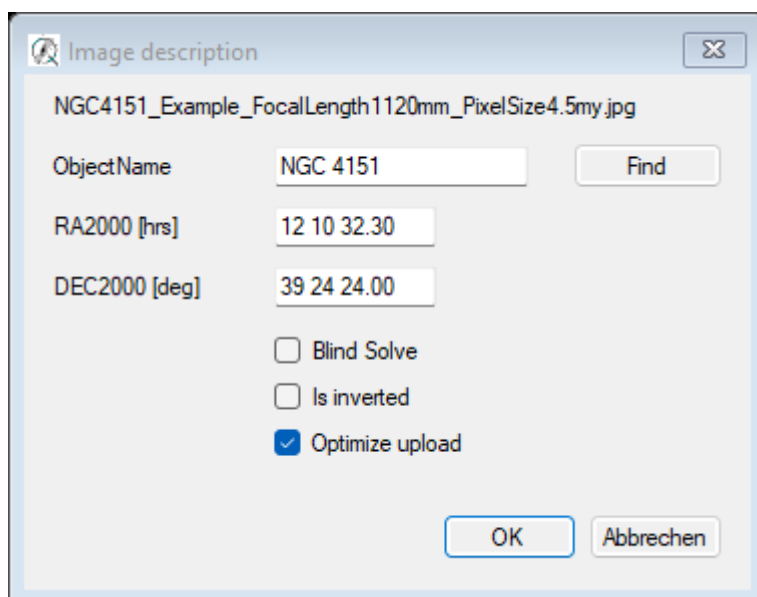
The coordinates of the image center can either be entered manually or set automatically using the Find button.

The option "Blind Solve" is intended for images where no information about the approximate center of the image is available.

The "Is inverted" option must be set if an inverted image is present. Automatic detection of inverted images can be activated in the options and this detection almost always works very well, but occasionally inverted images are not detected and in this case a manual change of this option is necessary.

The "Optimize upload" option is not usually needed but can be helpful if there are problems solving an image.

The "Image description" window shown above is also displayed when an image without wcs information is selected with the File button.

The function of the "Solve" and "View" buttons is described in chapter 13.3.

13.5. ObjectMarker catalog area

ObjectMarker makes all catalogs available which are stored in the CCD-Guide database and in the folder \userdata\cat.

include ☑	Catalog
✓	ABELL
✓	ARP
✓	BARNARD
✓	CED
✓	CG

Filter: all

In the catalog area you will find a number of setting options for each catalog:

include ☑	Catalog	Min. Diameter all: 0	Draw Labels ☑	Obj. Color all:	Obj. Pen Size all: 1	Label Color all:	Label Font Segoe	Line Color all:	Line Pen Size all: 1
✓	* (ID)	0	✓	Yellow	1	Yellow	*	Yellow	1
✓	_CCD_User	0	✓	Yellow	1	Yellow	_CCD_User	Yellow	1
✓	ABELL	0	✓	Yellow	1	Yellow	ABELL	Yellow	1
✓	ARP	0	✓	Yellow	1	Yellow	ARP	Yellow	1
✓	BARNARD	0	✓	Yellow	1	Yellow	BARNARD	Yellow	1
✓	CED	0	✓	Yellow	1	Yellow	CED	Yellow	1
✓	CG	0	✓	Yellow	1	Yellow	CG	Yellow	1
✓	CONST	0	✓	Yellow	1	Yellow	CONST	Yellow	1

In addition to the selection of whether a catalog is to be displayed (green check mark), the following properties can be set:

- Min. Diameter (Default = 0): Minimum diameter of an object in arc minutes so that it is displayed in the labeled image.
- Draw Labels: determines whether the label text is to be displayed.
- Object Color (default = yellow): Color with which the object circle is to be drawn.
- Object Pen Size (Default = 1pix): Line width with which the object circle is to be drawn.
- Label Color (default = yellow): Color of the label text.
- Label Font: Font and font size of the label text.
- Line Color (default = yellow): Color of the line between object circle and label text.
- Line Pen Size (Default = 1pix): Line thickness with which the line between object circle and label text is to be drawn.

All properties can be set individually for each catalog by simply clicking on the relevant field.

If you want to set a certain property (e.g. Object Color) the same for all catalogs, just click on the corresponding column header.

13.6. ObjectMarker options

Grid & Axes tab:
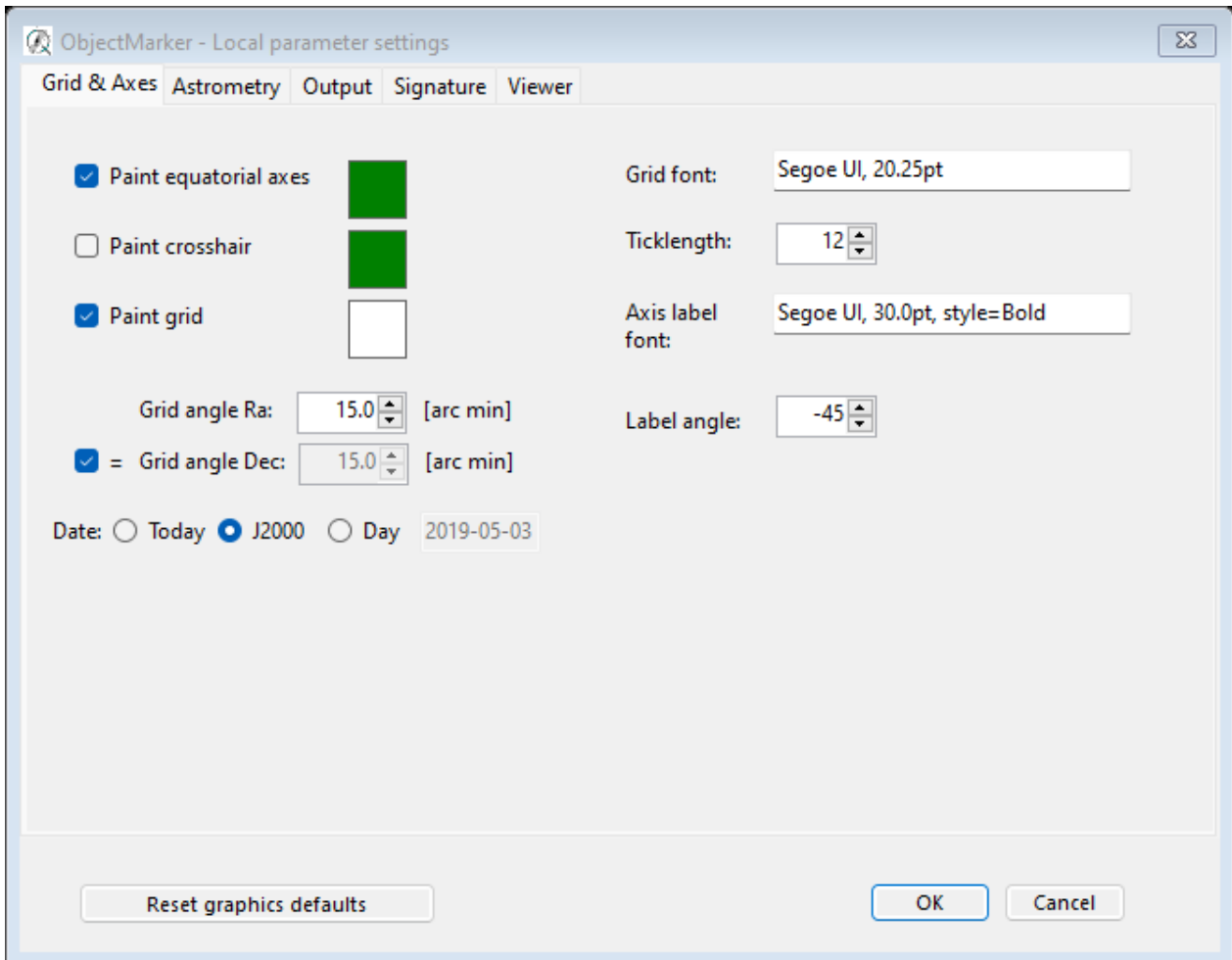
In this tab, settings for the coordinate axes and the grid can be made.

Astrometry tab:
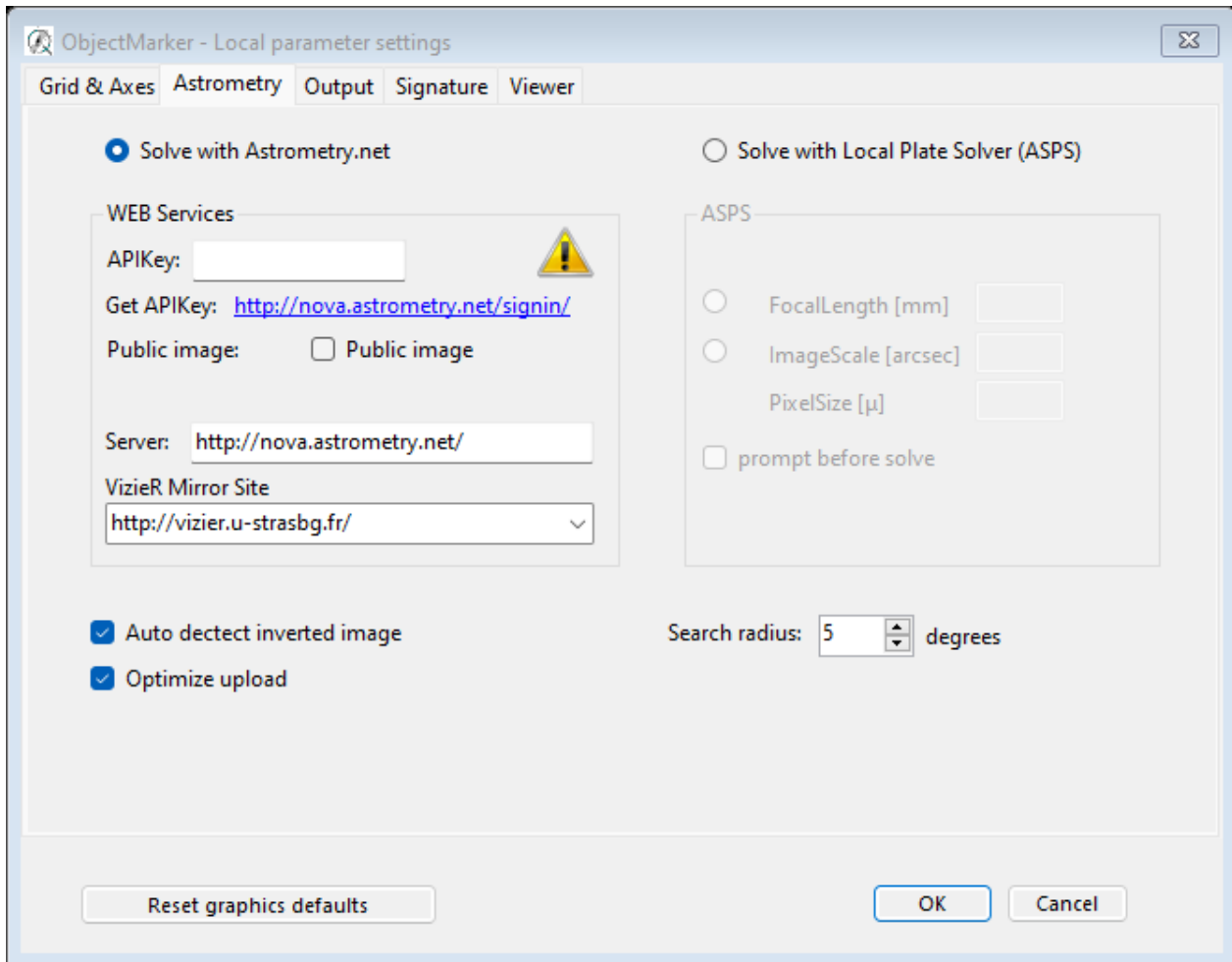
Let's first look at the area WEB Services. In chapter 13.3 we have already discussed the generation of the API key.

The other settings of WEB Services are useful default settings and do not have to be changed:

- Public image (default: OFF): If public image is activated, the image will be published at astrometry.net.
- Server and VizieR Mirror Site: Normally there is no need to change this.

If you want to use a local PlateSolving instead of the standard online PlateSolving via astrometry.net, the installation of the program All Sky Plate Solver (ASPS) by Giovanni Benintende is required.

The following three settings are available for both standard PlateSolving and local PlateSolving and can be left at the default setting:

- Auto detect inverted image (default: ON): This setting is useful if inverted images are to be solved occasionally.
- Optimize upload: Increases the probability for a successful solving (default: ON).

- Search radius (default: 5°): is the accuracy with which the coordinates of the image center are transferred to the PlateSolver. The search radius can be increased for wide-field images if necessary.

Output tab:
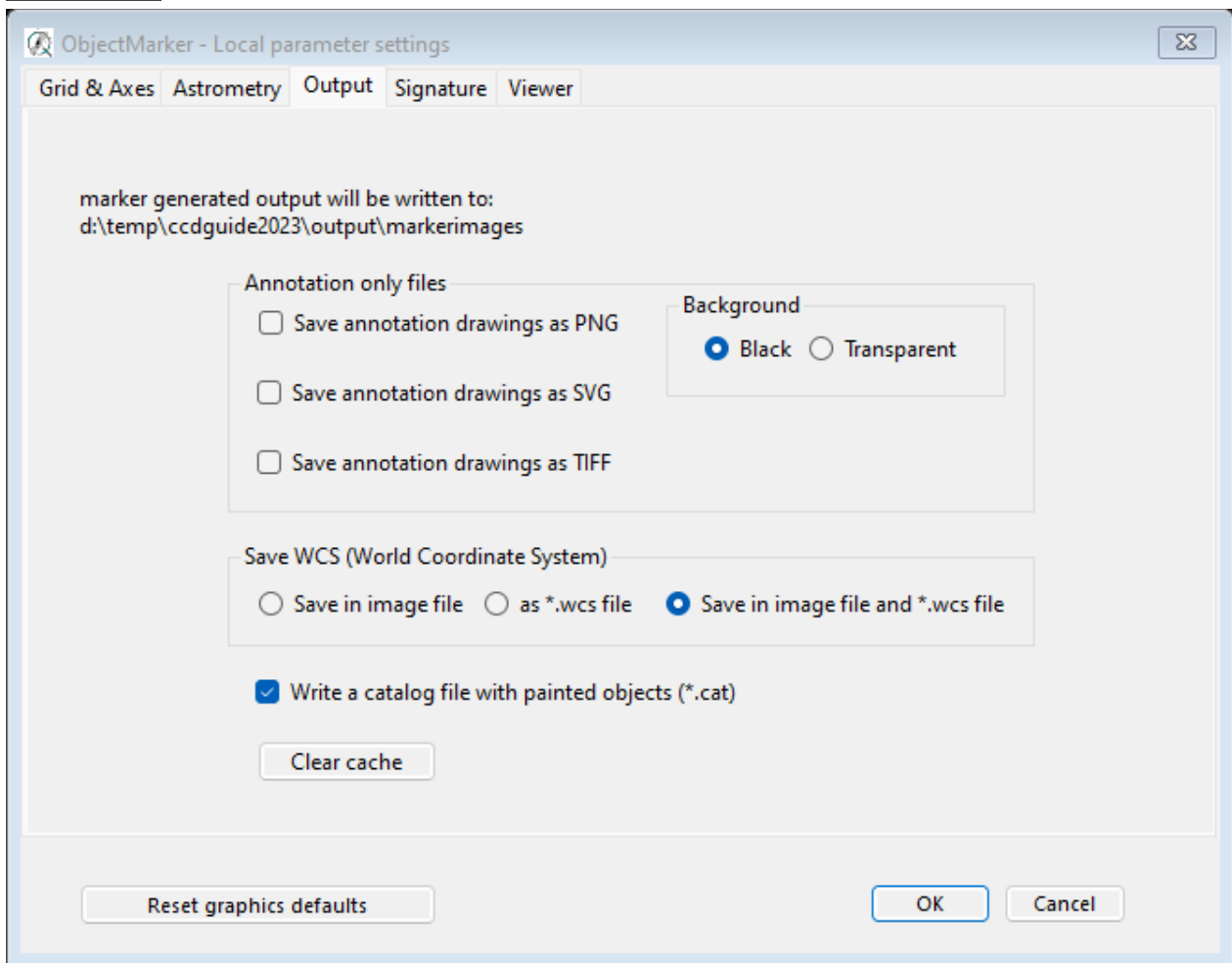
In the Output tab, you can set which additional files are to be created during the Solve or View process.

In the area "Annotation only files" you can select the file formats in which the entire overlay of the ObjectMarker labelling is to be saved as a vector graphic.

In the area "Save WCS (World Coordinate System)" you can determine whether the WCS information is to be written into the image during solving or whether it is to be saved as a separate wcs file. (Default: "Save in image file").

The option "Write a catalog file with painted objects" creates a cat file that contains all objects that have been painted in the labelled image.

Signature tab:
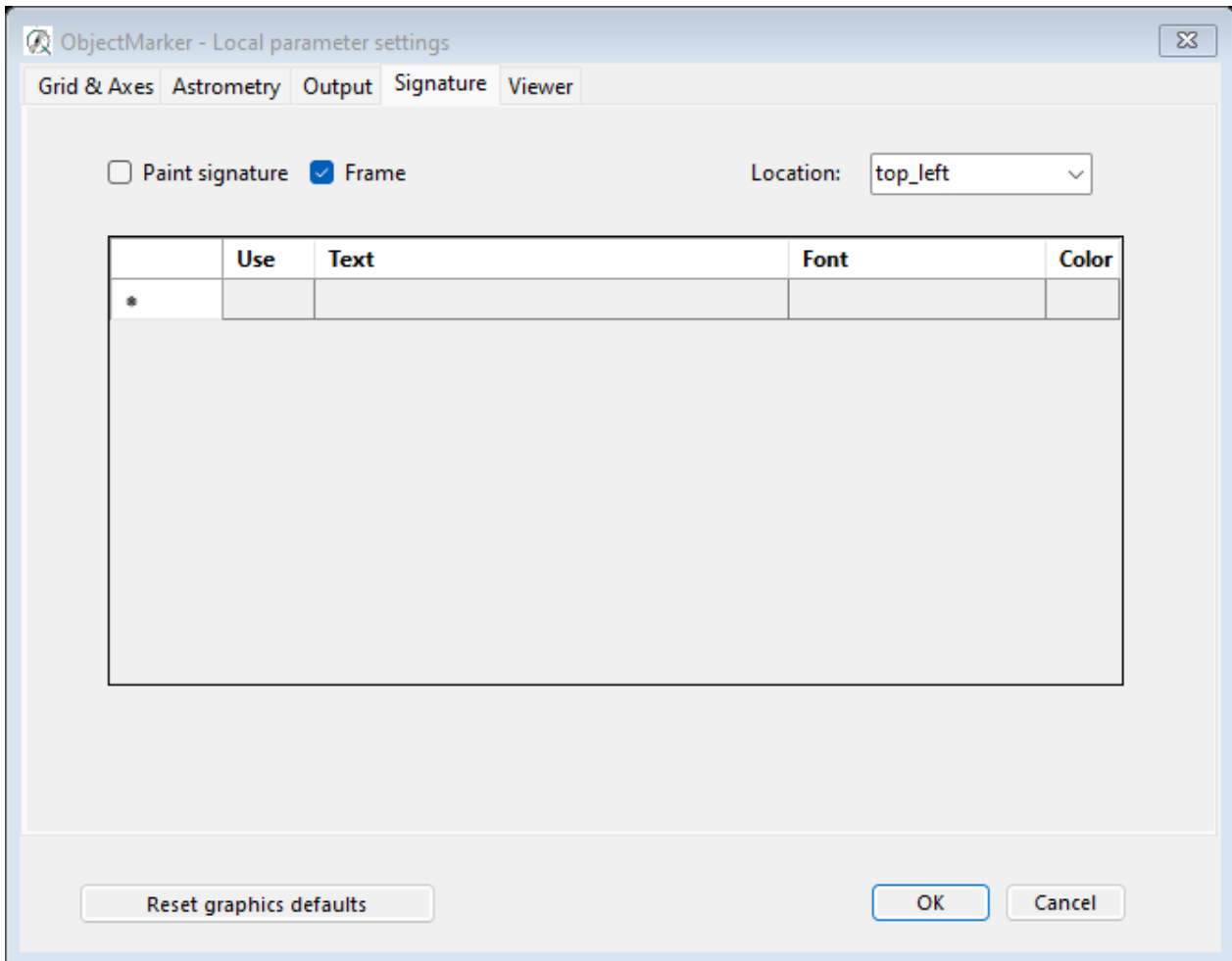
In the Signature tab free texts can be displayed at a certain position of the image.

Viewer tab:

The image viewing software (default = ObjectViewer) can be changed here if required.

13.7. Profiles

Profiles can be saved and loaded in the File menu. This allows you, for example, to store all ObjectMarker settings for wide field in a specific profile and all settings for long focal length in another profile. Switching between the two profiles is easy with File -> Load Profile.
The active profile can be deleted with "Remove Profile".

14.   OBJECTVIEWER

The ObjectViewer can be used to view an image labeled with ObjectMarker. The coordinates for interesting positions in the image can be read out and an internet search can be performed using SIMBAD, NED or VizieR.

ObjectViewer can be started from ObjectMarker or alternatively used as a stand-alone tool by double-clicking on the file ObjectViewer.exe in the CCD-Guide root directory or by pressing the ObjectViewer button in the CCD_Guide.exe.

Changing the image display via the menu band:

In the main window you will find a ribbon below the menu.
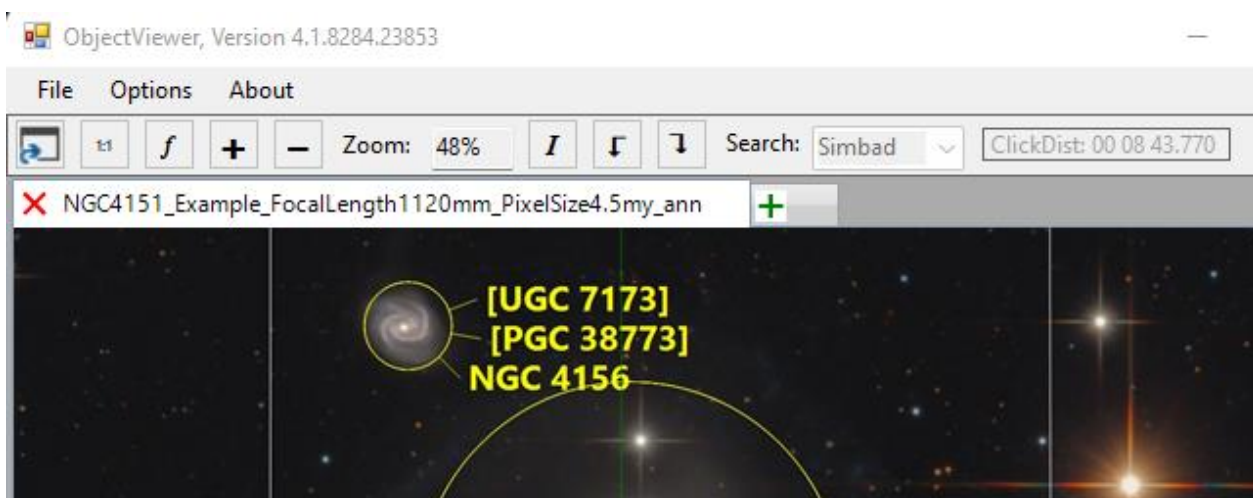
The following functions for changing the image display are available in the menu band:

Open image

Show image in original resolution

Fit image to window

Zoom in

Zoom out

Invert image

⌐ Rotate image left

⌐ Rotate image right

Mouse button and F11 key:

The zoom can be easily changed with the mouse wheel.

By pressing the middle mouse button you can move the image in the window.

With the function key F11 you can switch to the full screen mode.

If you press the left mouse button, an enlarged section of the image will be displayed. Furthermore, the x/y and RA/DE coordinates of the crosshair position are displayed.

With the option "Permanent magnifier", you can determine whether the magnifier is automatically displayed without a mouse click as soon as the mouse is moved over the image.

Coordinates and internet search:

There are three very helpful functions for research questions:

- If the option "Save position on clipboard" is activated, then the coordinates of the click position are saved to the clipboard.
- If the option "Invoke internet search" is activated, then the internet browser is automatically started with the preferred internet object database (NED, Simbad or VizieR) after a 1.5 s mouse click. The preferred object database is defined in the menu ribbon:

Search: Simbad ⌄
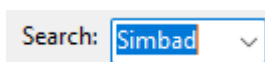
- If the option "Measure distance" is activated, then the distance between two successive mouse clicks with the right mouse button is displayed in the menu ribbon.

ClickDist: 00 01 58.177
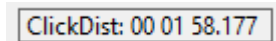
Options:

In the menu you can define useful settings under the menu item Options.
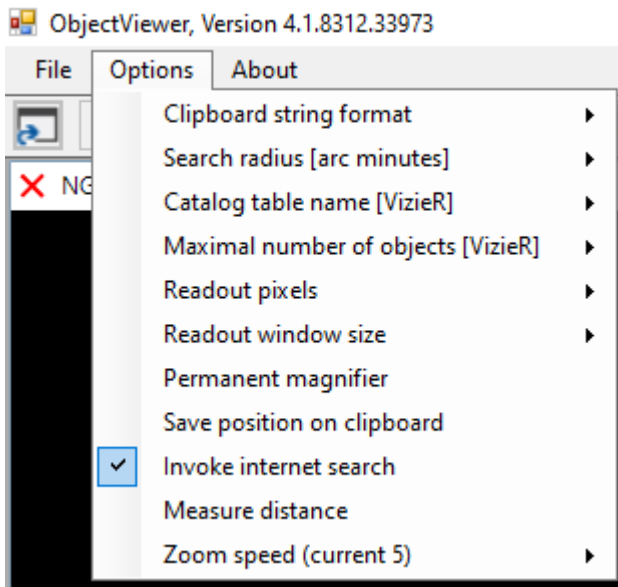
With "Clipboard string format" the output format of the RA/DE coordinates to the clipboard can be defined for a mouse click event.

The "Search radius" specifies the search radius in arc minutes to be used for the internet object database search (NED, Simbad or VizieR).

If the VizieR database is used for the object search, then the "Catalog table name [VizieR]" is very useful. If this field is left empty, then all VizieR catalogs will be searched. If you enter a valid VizieR catalog name (e.g. "VII/244A" = DOBASHI Dark Nebula Catalog), only the objects of the selected catalog are displayed.

The parameter "Maximal number of objects [VizieR]" is another parameter that is only relevant for a VizieR database search. The maximum number of objects to be displayed in a VizieR catalog is specified here.

15. OBJECTMARKER IN BROWSER AND IN EXPERT

Export OT in Planner and in Edit Object of CCD-Guide Expert:

The export of objects from the CCD-Guide database to the ObjectTools catalogs _CCD_Planner.cat ("Export OT" button in the Planner tab) and _CCD_User.cat ("Export OT" button in the Edit Object tab) has already been described in chapter 10.3.

ObjectMarker in CCD-Guide Browser:

The ObjectMarker can be started very comfortably from the Browser. For this purpose, any image dataset can be set active in the Browser. This means: Click on a line so that this line is highlighted in blue. The image data set can be a data set of the master database as well as a user image data set. Then one clicks on the dropdown-button ">>>" and selects the entry ObjectMarker.

In the following, the procedure is shown as an example for the image ABELL2666-002.jpg.

After selecting ObjectMarker, CCD-Guide Browser copies the selected image into the folder \output\markerimages and starts ObjectMarker. If the image does not yet contain any wcs information, click on the Solve button to start the Solve process in the ObjectMarker. After one to two minutes a green text appears in the output area of the ObjectMarker and the View button becomes available.

If the image selected in the CCD-Guide Browser already contains wcs information, then ObjectMarker starts immediately in the state with the Solve button grayed out and the View button available.
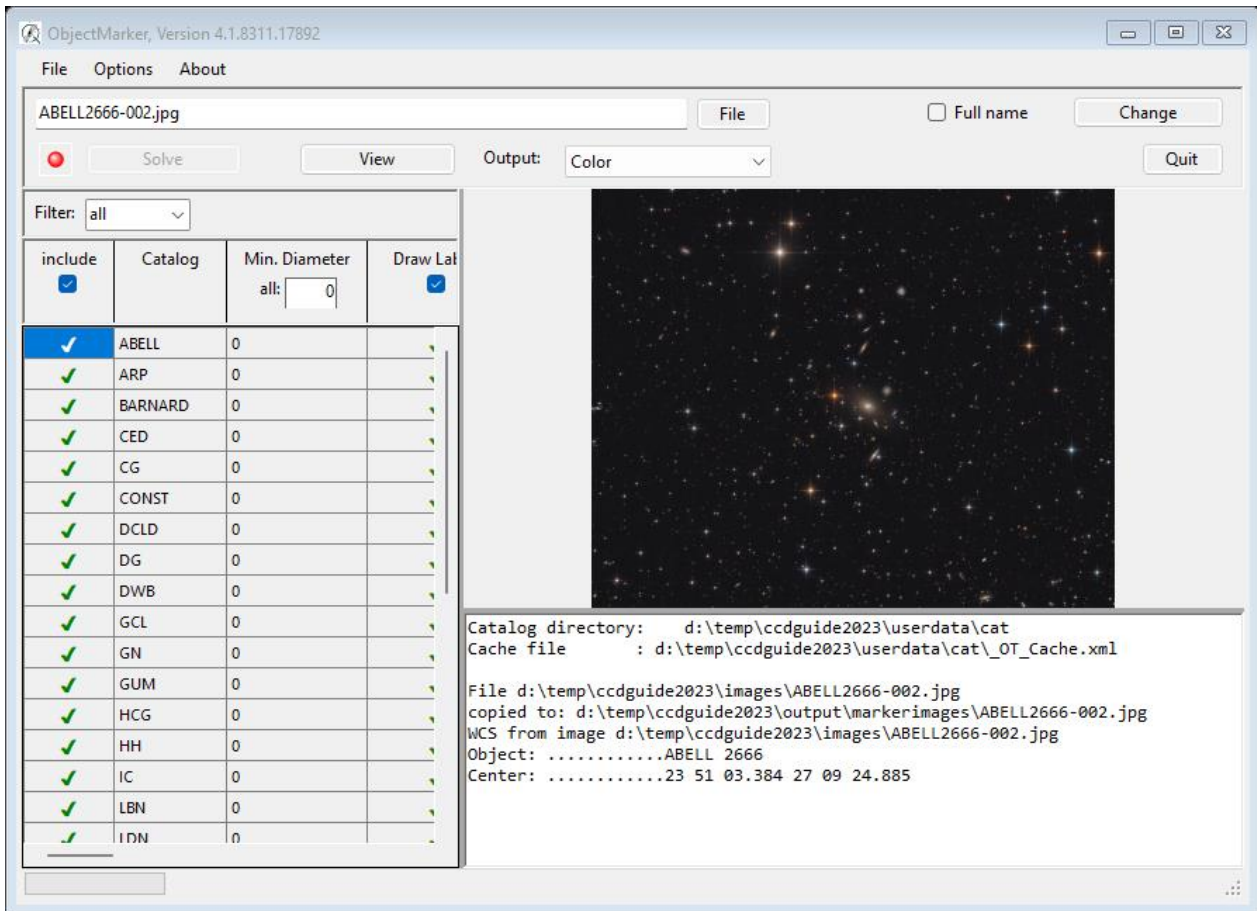
Now the labeled image can be created and displayed by clicking on the View button. The labelled image is saved with the postfix "_ann.jpg" in the folder \output\markerimages\.
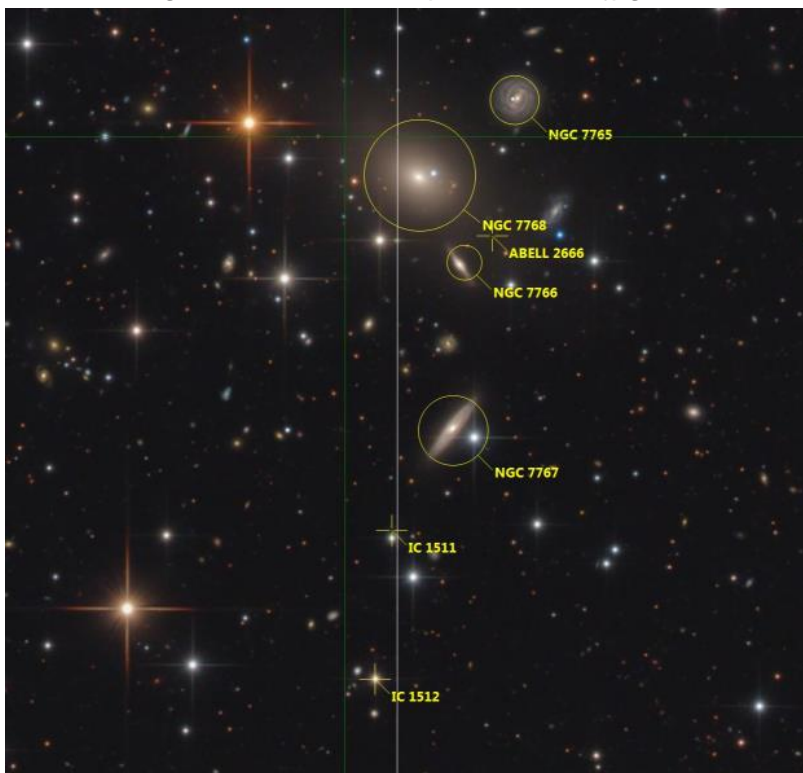
The ObjectMarker can be started in the CCD-Guide-Browser in two additional ways:

1. If a preview image has wcs information, then the file name displayed under the preview image is highlighted in blue (as is the case with the left image in the following example). Clicking on this link starts ObjectMarker.
2. If you press the right mouse button on a preview image, a context menu appears which can always be used to start ObjectMarker, regardless of the availability of the wcs information.

ABELL2218-001.jpg   ABELL2218-001_hst.jpg

ObjectMarker in Planner of CCD-Guide Expert:

The ObjectMarker can be started very comfortably from the Planner, similar to starting ObjectMarker from the Browser. For this purpose, a planning data record have be set active in the Planner. This means: Click on the data row so that the row is highlighted in blue. If the selected planning data record is not currently being edited by the user and a FOV image is assigned to the planning data record, the ObjectMarker is available in the dropdown button ">>>". As soon as you click on the ObjectMarker button, ObjectMarker is opened with the FOV image.

16.   UTILITIES

16.1. BatchSolver

BatchSolver is a special application for the simultaneous plate solving of a large number of images. There are two different ways in which BatchSolver can be used:

1. Manual input of images to be solved
2. Creating the image list from the CCD-Guide Browser

These two types are described in detail below.

Options:

After starting the BatchSolver window, the settings in the Options should be checked first.
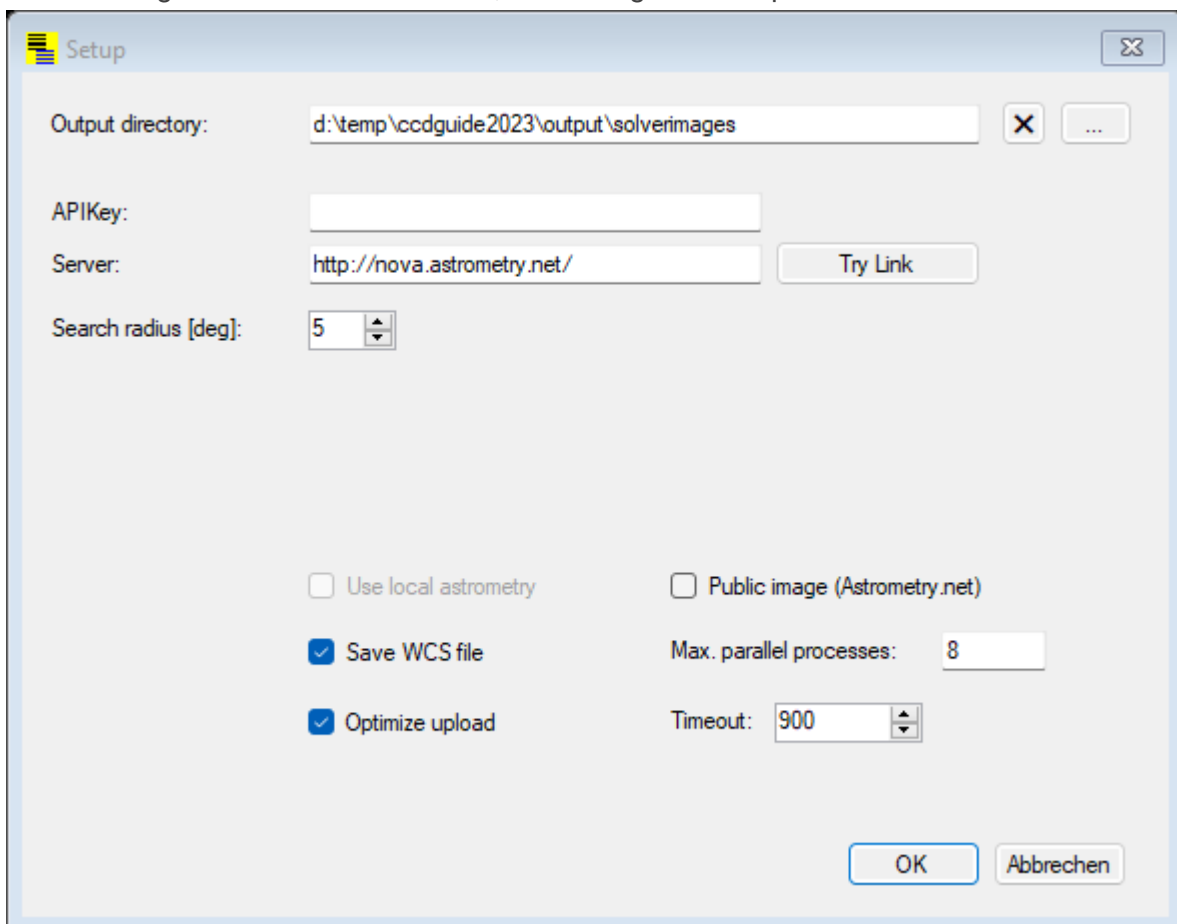
In the setting "Output directory" it is determined where the solved images should be saved. The original images remain untouched.

The settings "APIKey", "Server", "Search radius", "Save WCS file", "Optimize upload" and "Public image" behave the same as in the ObjectMarker (see Chapter 13).

The BatchSolver setting "Max. parallel processes" defines the maximum number of solve processes that may run in parallel and Timeout defines the maximum amount of time a solve process may take.

Manual input:

After starting the BatchSolver window, an empty table is normally displayed.
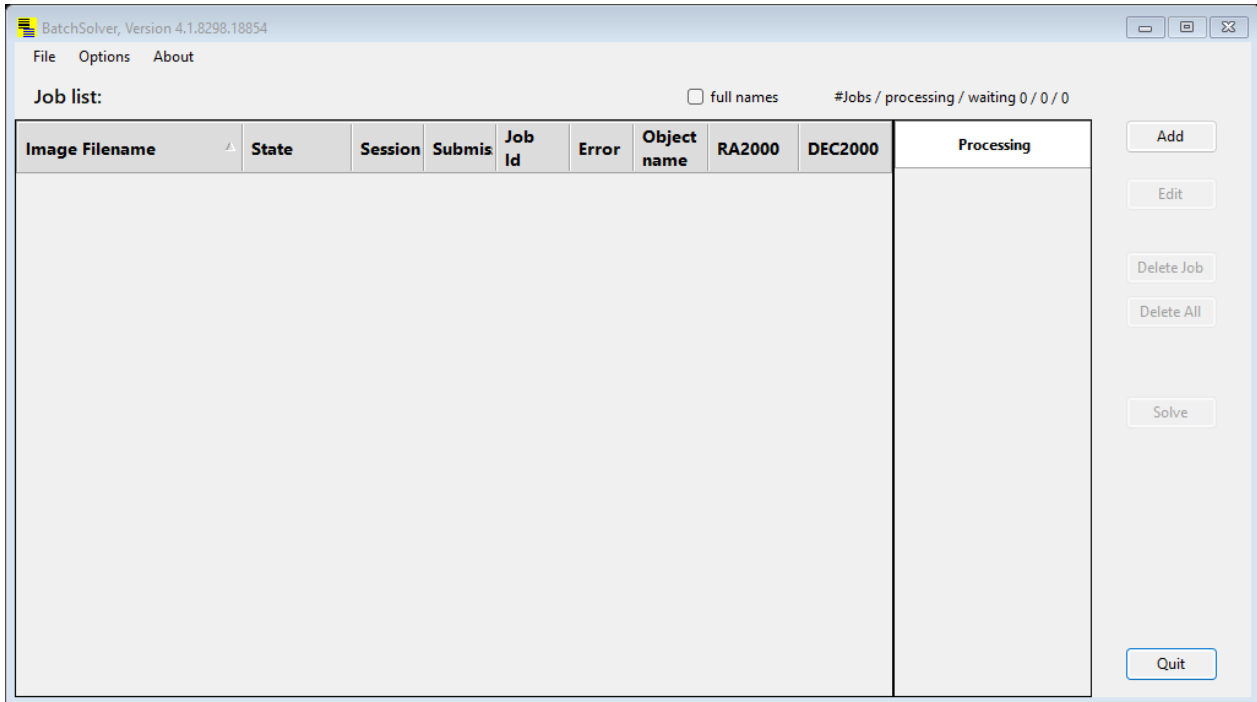
If unwanted entries (jobs) from a previously executed BatchSolver process are still displayed in the table, then the table can be completely cleared with the Delete All button (state as shown above).

With the Add button, a new image can be added to the table. After clicking the Add button, the following window appears.

After selecting the image, the BatchSolver tries to set the correct object name using the image name. The object name can also be entered manually and by pressing the Find button the coordinates are set if the object is found in the CCD-Guide database or in the ObjectTools catalogues. If the object is not found, then the coordinates can also be entered manually. The settings for local astrometry are only available if the All Sky Plate Solver is installed.
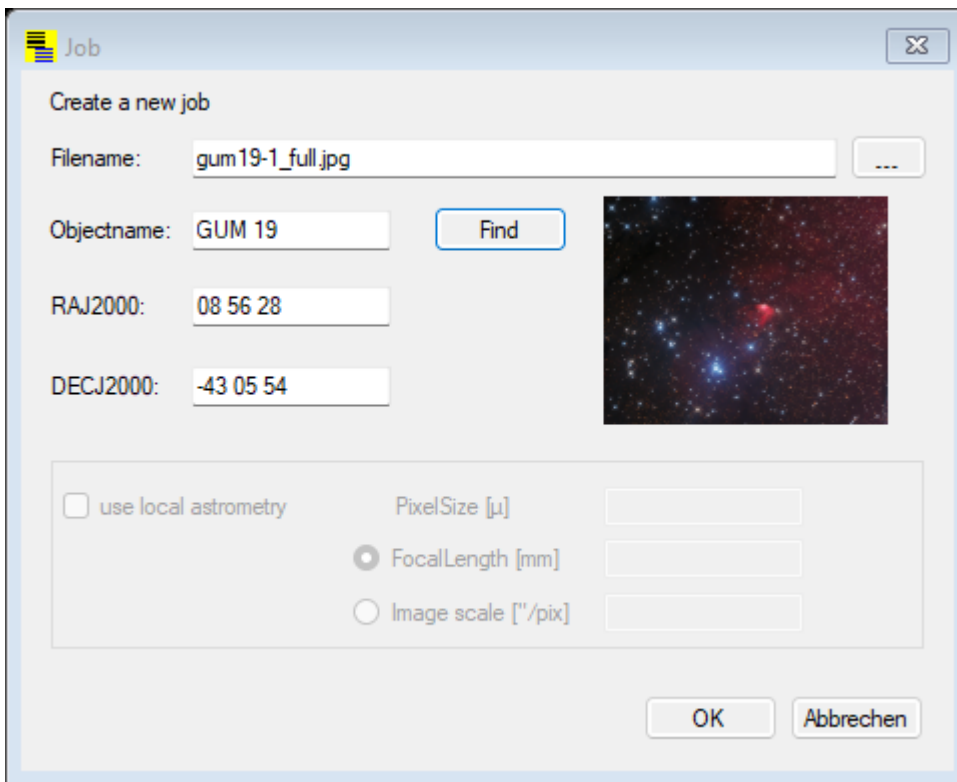
With the OK button a new job line is created in the table. All images to be solved can now be entered in this way.
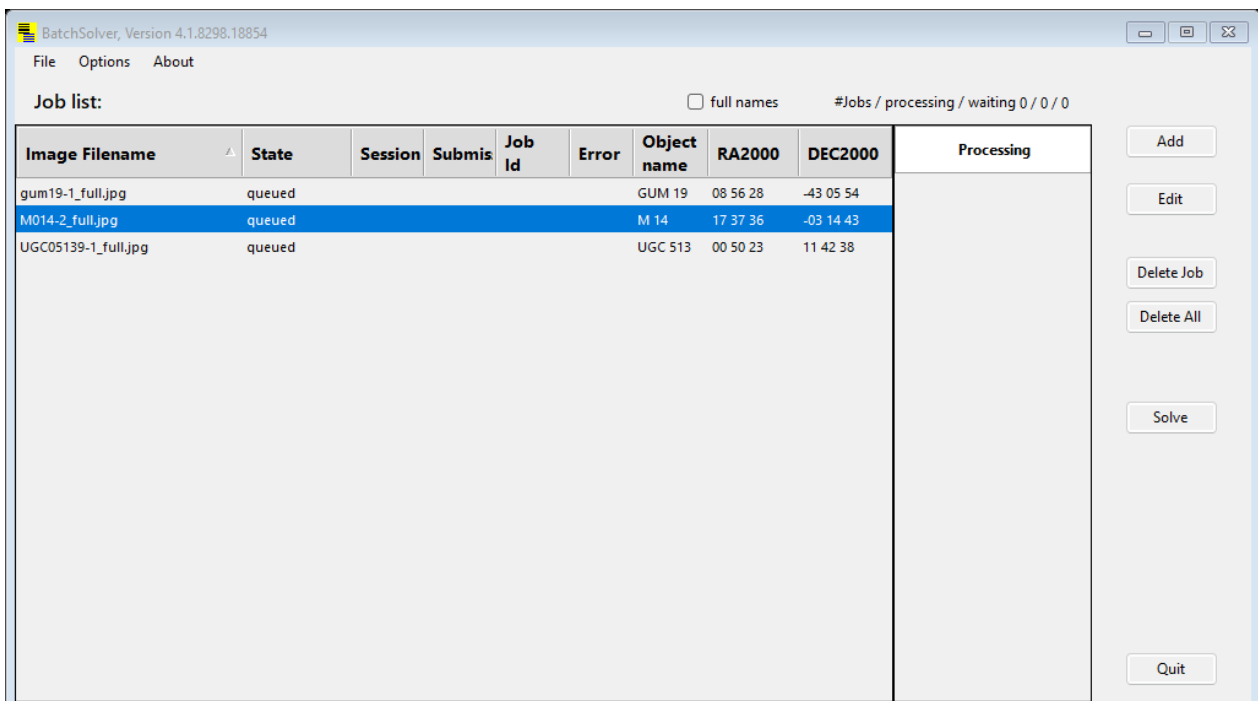
The active-job (marked in blue) can be edited with the "Edit" button and deleted with the "Delete Job" button.

The BatchSolve process is finally started by pressing the "Solve" button.
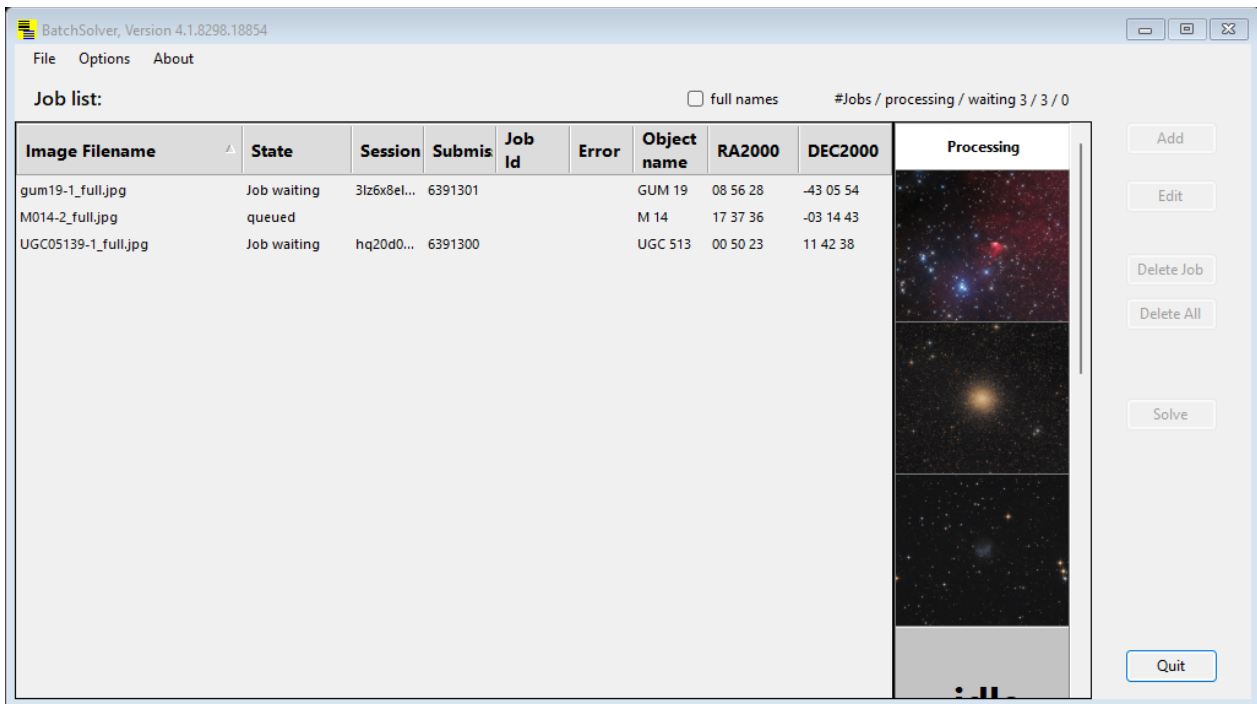
For each job, the current status is shown in the table. After completion of the BatchSolve process, the text "***ready" appears.

Bernhard Hubl   http://www.ccdguide.com/
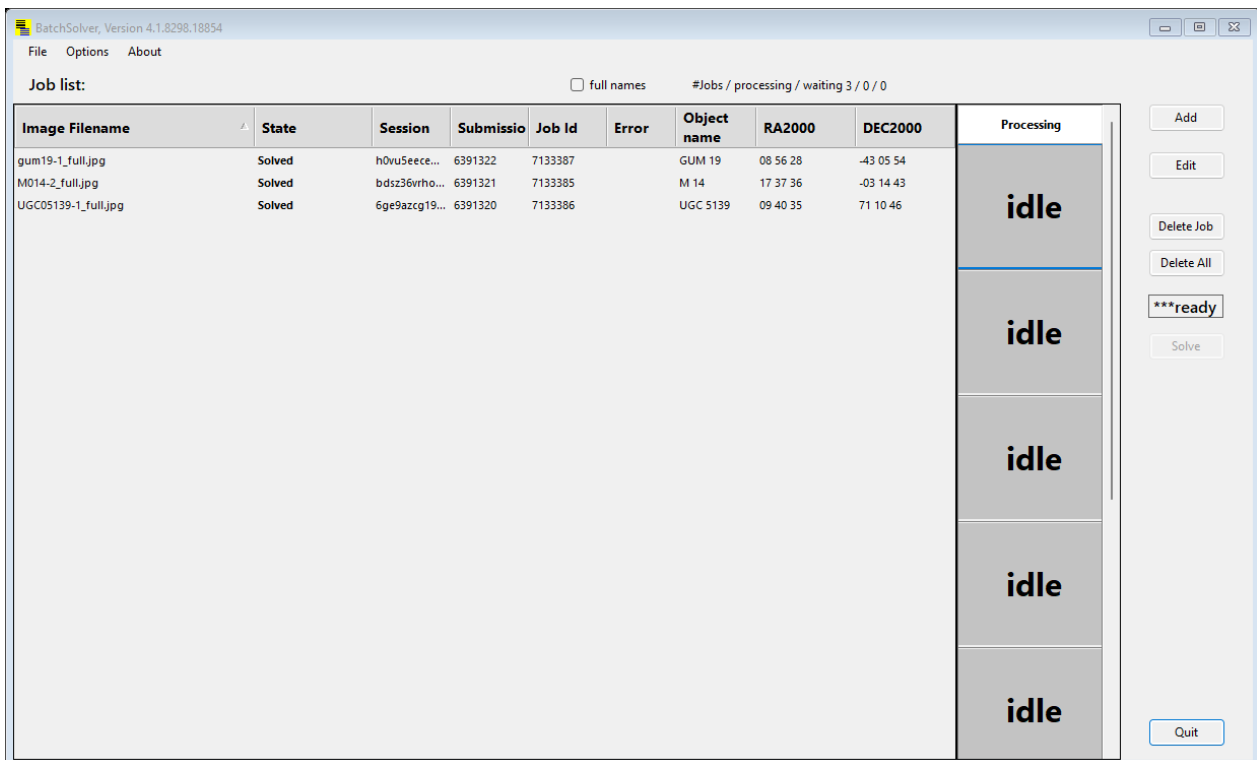
BatchSolver in the CCD-Guide Browser:

If you call the function "Batch Solve filtered images" in the button ">>>" in the CCD-Guide Browser, the BatchSolver window is opened and a job line is created in the BatchSolver for each of the images filtered in the CCD-Guide Browser. Jobs are created not only for all main images but also for all additional images. Images to which no object with coordinates is assigned (e.g. comets) are not taken into account.

16.2. JPEGCompress

JPEGCompress is a useful tool for compressing a large number of jpg images. After starting JPEGCompress the following window appears.
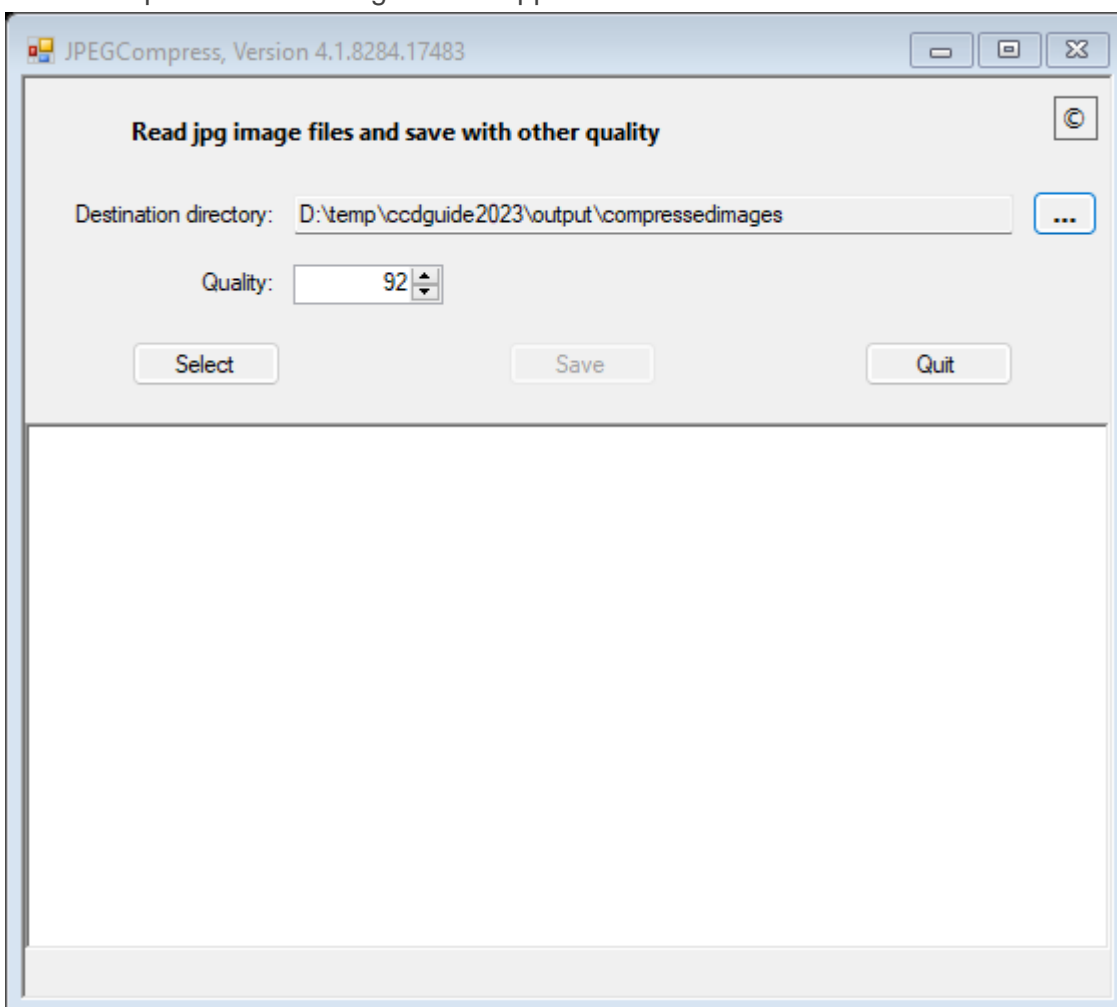
First you define the directory in which the compressed images are to be saved (Destination directory). Then select the desired image quality. Finally, you can select the images to be compressed by clicking on the Select button.

As soon as you click on the Save button, the compressed images are created.

16.3. WCSCopy

WCSCopy is a special application for the transfer of WCS (World Coordinate System) information from a solved image to a not yet solved image with the same dimensions.
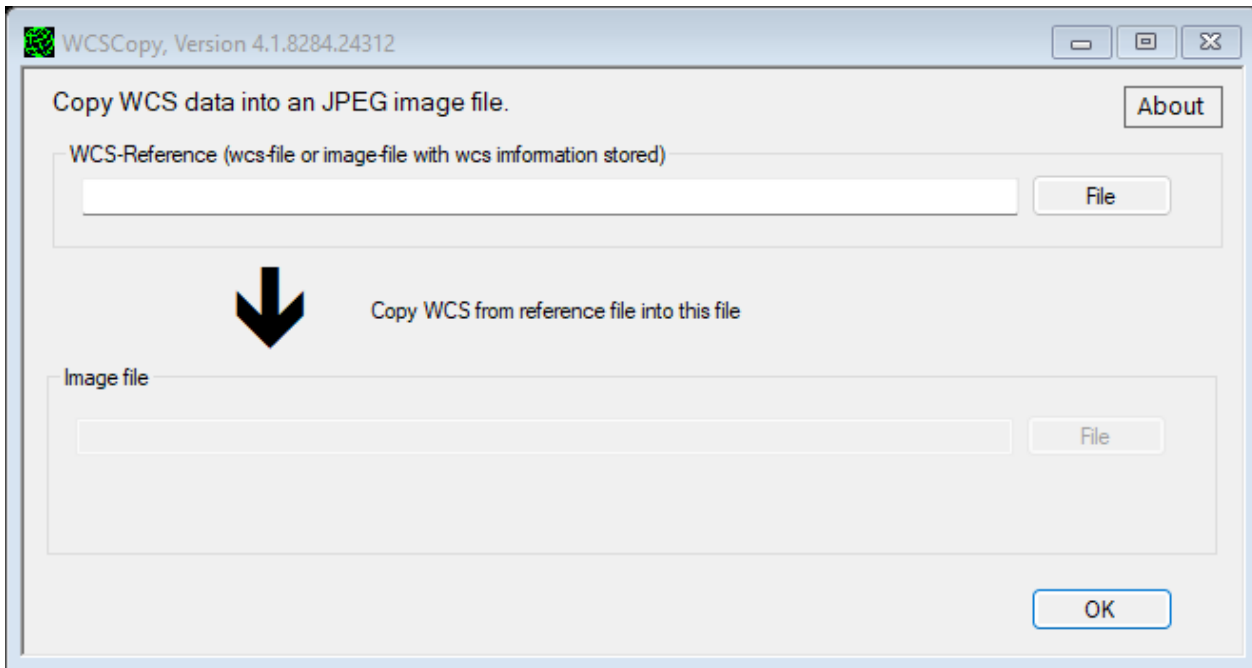
First select the image or the wcs-file containing the wcs-information in the upper input field. Then select the image to which the wcs information is to be transferred in the lower input field.
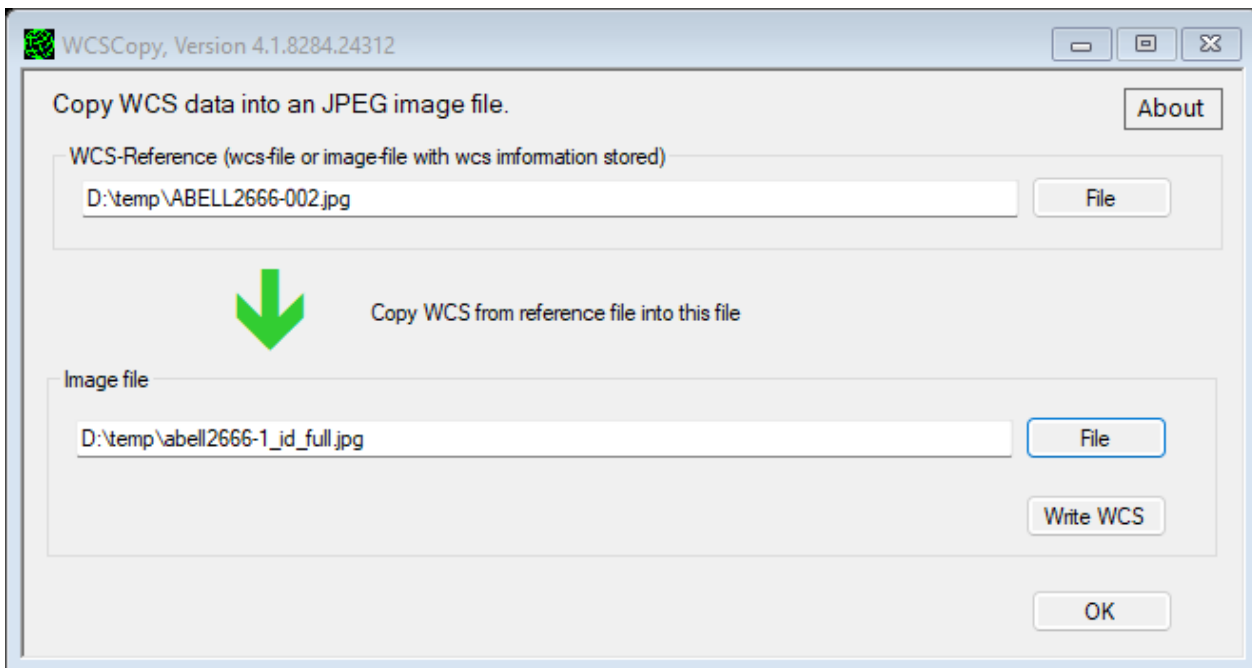
As soon as you click the "Write WCS" button, the wcs information is written to the target image.

16.4. WCSList

WCSList is an application to search complete directories for images and to display the status of the wcs-info in tabular form. WCSList also allows to delete wcs-infos of selected images.
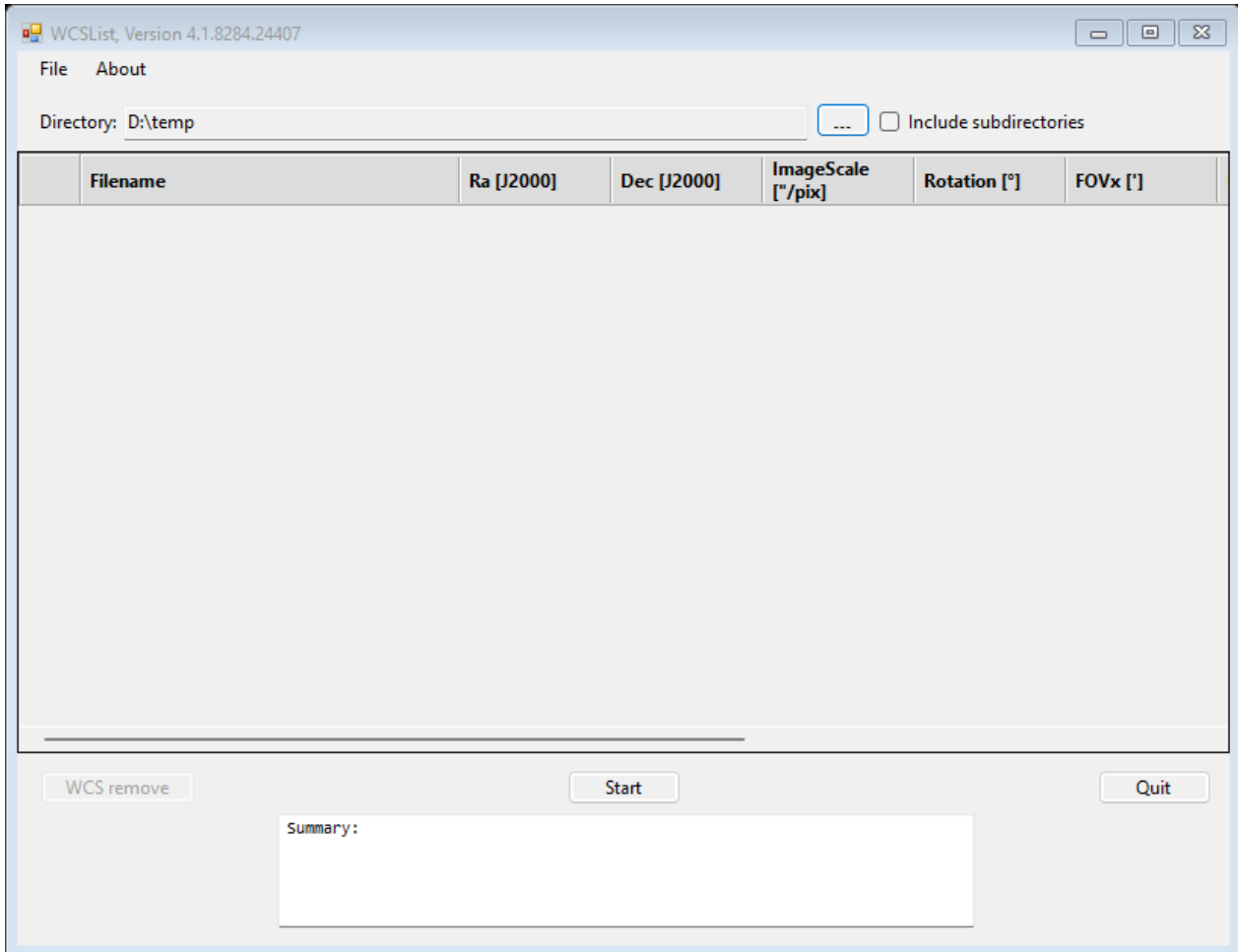
First select the directory to be searched. It is also possible to include all subdirectories in the search (include subdirectories). Then click on the "Start" button.
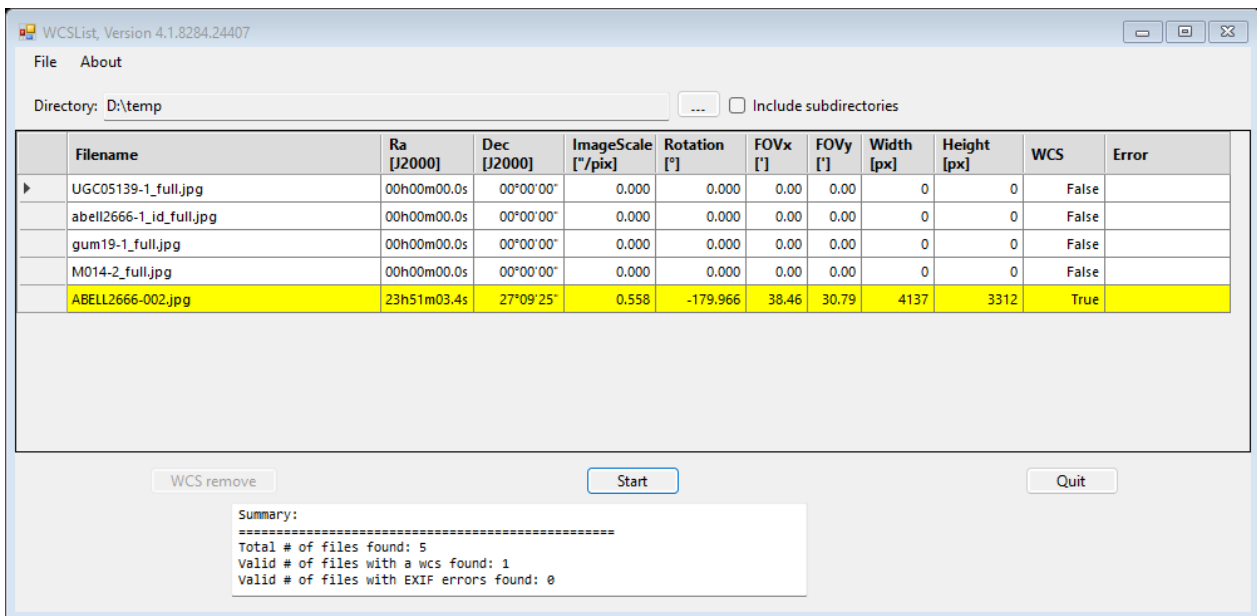
All images with wcs-information are marked yellow and the WCS-info is displayed. If you want to remove the WCS information from certain images, mark these images and then press the button "WCS remove".

16.5. Update

With Update it can be checked if the CCD-Guide version is up to date.
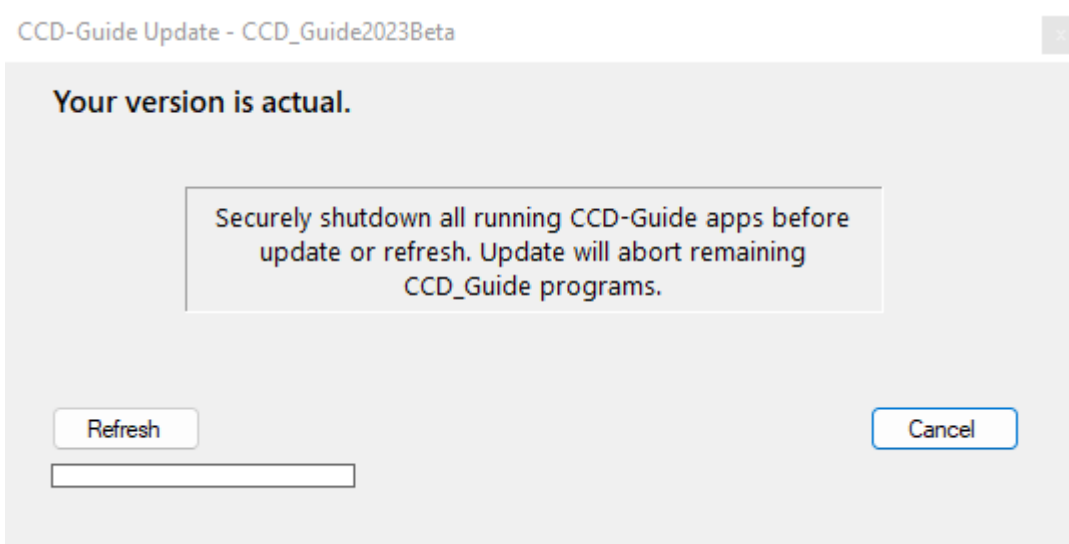
If an update is available, then the update can be performed by pressing the update button.
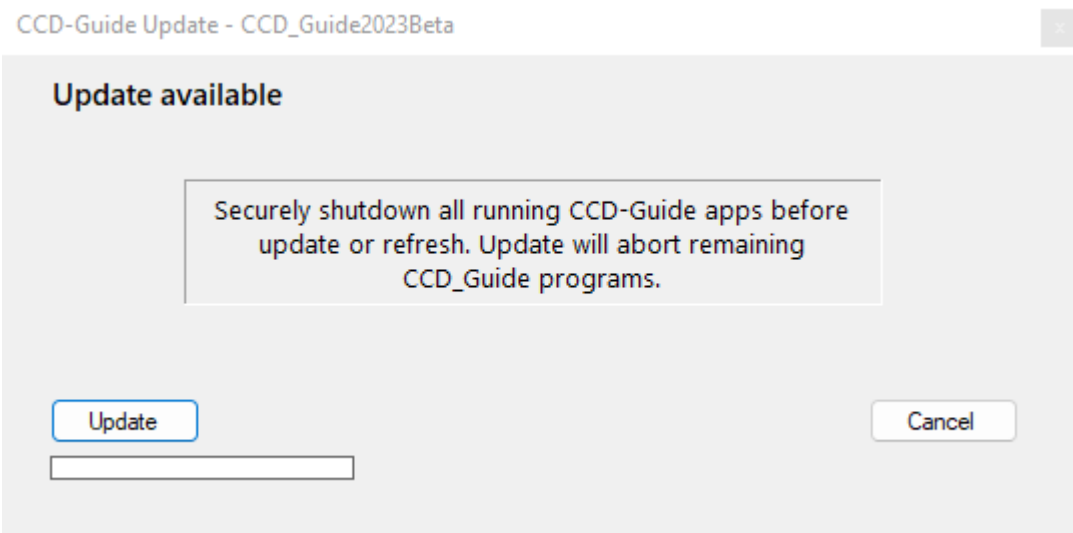
After the successful update, a message window appears.
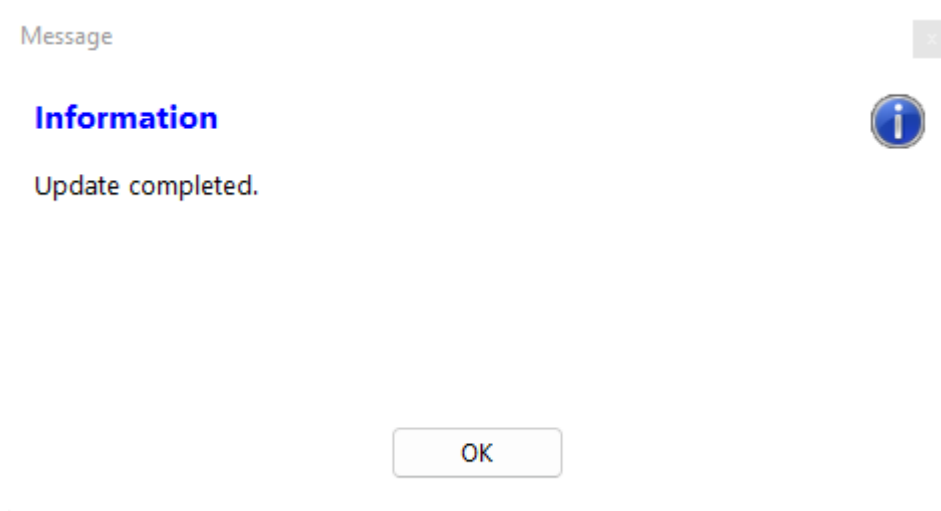
17.   APPENDIX A – THE DATA MODEL

CCD-Guide is working with two databases:

- **master.mdb:** This database can be found in the folder database of the CCD-Guide installation. The master.mdb is write-protected and contains the object data, the setup data and all picture data of pictures of AAS members delivered with CCD-Guide. The master.mdb is updated every year by AAS.

- **user.mdb:** This database can be found in the user data path (default path = subfolder "userdata" of the CCD-Guide installation). The user.mdb contains your own data (object data, setup data, picture data and planner data). It is empty, when you start with your own inputs. CCD-Guide joins the two databases user.mdb and master.mdb with UNION JOIN.

If you want to know more about the data model, then you can open user.mdb with MS Access. Please, do not modify the data using MS Access!

18.   APPENDIX B – WHAT'S NEW?

18.1.   What's new in release 4.1

- **New folder structure:** The new folder structure is simple and makes it easier to switch to a new release. The most important changes are:
    - All user data are now located in the userdata folder: besides the CCD-Guide Expert data (user.mdb with planner_images and user_images), the ObjectTracker data (Locations.csv with horizon files) are now also located here. Furthermore, all cat catalogs created by the user can also be found in the userdata folder. The big advantage for the user is that he only has to copy the userdata folder when switching to a new release.
    - All exe files are now located in the root directory.
    - There is a new output folder: All temporary results are written to the output folder. For example, you can find here images solved and labeled by ObjectMarker, the results of BatchSolver or the images compressed with JPEGCompress. The content of the output folder can be deleted at any time, because it contains only temporary results.
- **CCD Guide:**
    - Central color scheme switching: With one mouse click the color scheme for all applications can be switched between light and dark.
- **CCD-Guide Browser:**
    - Two new connected planetariums:
        - ObjectSky (see below for details)
        - Stellarium
- **ObjectSky:** The newly developed planetarium ObjectSky is an integral part of CCD-Guide and replaces the old Virtual Planetarium of the ObjectTracker. ObjectSky can be started in different ways: either in the ObjectTracker by pressing the Planetarium button or by a click in the Browser or in the Expert. A direct start of ObjectSky.exe in the root directory is also possible. ObjectSky works interactively with ObjectTracker and offers a number of interesting features, such as:
    - Display of all CCD-Guide objects in the planetarium
    - Access to all CCD-Guide images including image data in the planetarium
    - Access to all current comets
- **CCD-Guide Expert:**
    - QuickFilter extension: QuickFilter in Planner, Edit Object and Edit Picture with the operators | and &
    - ObjectViewer as ImageViewer: In the Expert, a double click on an image now opens the ObjectViewer by default instead of IrfanView
    - Error protection during data entry: A red text "Data not saved" appears as soon as a data set is edited. This reminds the user not to forget to press the Save button to complete the saving of the dataset.
    - Marking of Planner datasets with Ref-Image.
- **ObjectTracker:**
    - New, improved Locations Editor
    - Planets and comets available in ObjectTracker
    - Report in Browse window: with one mouse click a report in csv or txt format can be created, in which the observation data of all selected objects are tabulated.
- **ObjectMarker:**
    - Profiles in ObjectMarker: Profiles can be saved and loaded. For example, you can save all settings for wide field images and create another profile with all settings for long focal length.

- o Improved color selection in ObjectMarker
- **ObjectViewer:**
  - o Multiple images: can be opened in parallel in ObjectViewer.
  - o Distance measurement: Using the right mouse button, distances between two positions can be measured comfortably with the "Measure distance" option.

18.2. What's new in release 4.0

- **New software structure:** The new CCD_Guide.exe is the central entry point to the CCD-Guide software platform. All programs can be started directly here. The CCD-Guide window can always be kept in the foreground with "Stay on top" and with "Autostart" automatic starting is possible when the computer is booted. In addition, the new software can be used to call up minor updates during the year if required. The two most important programs of the CCD_Guide.exe are:
    - o Browser (CCD_Guide_Browser.exe): Complete new development of the entire browser functionality with many improved and new functions.
    - o Expert (CCD_Guide_Expert.exe): contains the classic CCD-Guide functions Planner, Edit Object and Edit Picture.
- **CCD-Guide Browser:**
    - o Download function of all images: This allows all images contained in the master database (optionally also all archive images) to be downloaded from the CCD-Guide server.
    - o Dynamic window size: The size of the table and the images changes automatically when the window size is changed.
    - o Performance increase in general and especially when switching between ImageBrowser and ObjectBrowser as well as when changing the database modes (Master / User / All).
    - o Freely selectable ImageViewer: Any image viewing software can be selected in the options. The default ObjectViewer has the great advantage that for images with wcs info, coordinates can be queried with the magnifying glass.
    - o New preview panel: Thumbnails of the filtered images can be viewed in a preview panel. This is a useful addition or alternative to the classic slide show.
    - o Quick filter for an additional object: In the table "Extended Information" all additional information about the data set is displayed. If one clicks on one of the listed objects, the object name filter is applied to this object.
    - o Multiple selection of objects in the object name filter: If several objects are available for selection in the object name filter and the FindObjectData window is therefore displayed, then several objects can also be selected here simultaneously if required.
    - o New filter type "Circular Search Radius": With this filter, all objects can be selected that are located within the radius of a specific object.
    - o QuickSearch operator: can be changed from standard OR to AND.
    - o New >>> function Aladin Lite as alternative to sky.map.org
    - o New >>> function ObjectTypes [Vizier]: This can be used to perform a search on Vizier, looking for objects of a certain object type around the selected reference object.
    - o BatchSolve in Browser: This allows all images filtered in the Browser to be passed to BatchSolver.
    - o New Web-Mode: In the Browser it is possible to switch between the classic Local Mode (behaviour as before) and the new Web-Mode. In Web-Mode, the area of the two preview images is used to display information about the selected object from web services such as sky-map.org, Aladin, Simbad or NED. This is a very useful feature, especially in the ObjectBrowser.
- **CCD-Guide Expert:**
    - o Parallel working with CCD-Guide Browser and CCD-Guide Expert is supported.
- **ObjectMarker:**
    - o The wcs information is written into the image (jpg, tif or png) without touching the image information.

- o ObjectMarker now also supports the possibility of a blind solve (no coordinate input required).
  - o ObjectMarker overlay as vector graphic: Optionally, the entire overlay of the ObjectMarker label can additionally be saved as a vector graphic in the formats svg, png or tif.
  - o ObjectMarker can now also solve inverted images.
- **ObjectTracker:**
  - o Tooltip on red triangles: In the ObjectTracker graphic, a helpful tooltip info is now displayed at the red triangles. This allows you to see the reason why a visibility window is restricted.
- **Utilities of the ObjectTools:**
  - o WCSList is a new application that can be used to search complete directories for images and to display the status of WCS info in tabular form. In WCSList, wcs-info of selected images can also be deleted.
  - o ObjectMarker, ObjectViewer, BatchSolver, WCSList and WCSCopy now uniformly support the formats jpg, tif and png.
  - o JPEGCompress is a new application that can compress a large number of jpg images very effectively and with very high quality.

18.3. What's new in release 3.6

- **ObjectTracker extensions:** The proven ObjectTracker (= tool to answer the question of when an object at a selected location can best be photographed on a certain night) has been significantly improved in terms of performance and calculation accuracy and has been extended by the following points:
  - o With one mouse click, a **weather forecast from OpenWeather** for the coming night can be called up and displayed in the central graphic.
  - o **AladinLite** can be started with one mouse click, whereby the current object is displayed centered with the FOV of the current location.
  - o The handling of the ObjectTracker has been simplified considerably by **omitting the Set button**: All output elements are immediately updated whenever the user changes an input.
  - o A fully integrated **virtual planetarium** in the ObjectTracker supports the planning of observations.
  - o With the new **Export time series** function, the visibility of an object over long periods of time can be assessed both in tabular and graphical form.
- **ObjectMarker extensions:** The proven ObjectMarker (= tool for plate solving of images and subsequent labeling with the objects of the CCD-Guide database) has been extended by the following points:
  - o A **preview image** is displayed.
  - o The options for the **appearance of the catalogues** are now accessible in the main window.
  - o The **ObjectMarker window is dynamic**, so that the window size and the division of the areas can be adjusted as desired.
  - o If the software All Sky Plate Solver by Giovanni Benintende is installed, a **local PlateSolving** instead of a PlateSolve via astrometry.net is possible.
  - o When the View button is pressed a **text file in cat format** is created, which lists all objects, drawn in the annotated image.
  - o In the ObjectViewer the **image can also be inverted**.
- **New filters in CCD-Guide:** Set Filter offers now also the possibility to filter by focal length. In addition to the ObjectName-Filter and the QuickFilter the new ObjectMaster-Filter was developed, with which it is possible to filter those images in which the searched object appears exclusively as main object.
- **Enlarged ExpTime field:** The ExpTime field in Edit Picture has been considerably enlarged so that there are no longer any restrictions when documenting complex exposure series.
- **4 bugs fixed**

18.4. What's new in release 3.5

- **ObjectTools:** CCD-Guide is delivered with the new and very powerful ObjectTools, which were developed by Hartmut Bornemann. The ObjectTracker already developed in the release CCD-Guide 3.4 has been extended and is part of the ObjectTools. The new ObjectTools functions like ObjectMarker, ObjectViewer, BatchSolver or WCSCopy are described in detail below. All ObjectTools can also be used as stand-alone tools.
- **ObjectMarker:** With the ObjectMarker, images can be solved via astrometry.net and then labeled with the objects of the CCD-Guide database as well as with your own texts. Furthermore, the ObjectViewer can be started to view and analyze the labeled image.
- **ObjectViewer:** The ObjectViewer can be used to view images labeled with the ObjectMarker, to read out coordinates and to perform an internet search with SIMBAD, NED or VizieR.
- **BatchSolver:** With the BatchSolver a simultaneous PlateSolve of a large number of images can be performed.
- **WCSCopy:** is a special application for the transfer of the WCS information (World Coordinate System) from a solved image to a not yet solved image with the same dimensions.
- **ObjectTracker extension:** The proven ObjectTracker (= tool to answer the question when a certain object at a selected location can best be photographed on a certain night) was extended by the consideration of the distance between moon and object. Furthermore it is now possible to select the date comfortably with the help of a DatePicker. Because of the integration of the ObjectTracker into the ObjectTools, the ObjectTracker catalog was renamed from "User.cat" to "_OT_User.cat" and is now also available in the ObjectMarker.
- **Extended '>>>' functionality:** In CCD-Guide 3.5 the '>>>' button was extended by the ObjectMarker function. This means that the ObjectMarker can be started with one click with the currently active image of the Browser. The selected image is automatically solved in the ObjectMarker and can then be labeled with the objects of the CCD-Guide database. The ObjectMarker is also available in the '>>>' menu of the Planner to label FOV images.
- **Export OT in Planner:** The filtered object list of the Planner can be exported to the ObjectTools catalog file _CCD_Planner.cat. This means that not only a single object but a list of objects of any length can be transferred from CCD-Guide to ObjectTracker. This is very useful if you want to select the best object to photograph from a large number of possible objects.
- **Export OT in Edit Object:** With the "Export OT" button in Edit Object all UNLISTED objects created by the user can be exported to the ObjectTools catalog _CCD_User.cat.
- **1 Bug fixed**

18.5. What's new in release 3.4

- **ObjectTracker:** CCD-Guide is delivered with the new and very powerful planning tool ObjectTracker, which was developed by Hartmut Bornemann. ObjectTracker can also be used as a stand-alone tool. It quickly and easily answers the question of whether a particular object can be photographed at a selected location on a particular night. The ideal time window for taking photographs is calculated taking into account twilight, moon, object altitude and optional horizon. The altitude progression of the object and of the moon is displayed in an intuitive graphic.
- **Extended '>>>' functionality:** In CCD-Guide 3.4 the '>>>' button was extended by the ObjectTracker function. This means that ObjectTracker can be started with one click with the currently active object of the browser or of the planner.
- **Export OT:** The filtered object list of the Planner can be exported to the ObjectTracker catalog file CCD_Guide.cat. Thus not only a single object can be transferred to ObjectTracker from CCD-Guide but a list of objects of any length. This is very useful when selecting the best object to shoot from a large number of possible objects.

18.6. What's new in release 3.3

- **1 bug fixed**
- **Simplified folder structure:** The new folder structure is based on a clear separation between master data (= all data and all images which are delivered with CCD-Guide) and user data (= all inputs and all images of the user). This separation simplifies the process of creating a backup of your own data, makes an update to future releases of CCD-Guide easier, and offers a convenient possibility to switch between different user databases.
- **Extended '>>>' functionality:** CCD-Guide 3.3 offers the possibility to use the '>>>' functions (Planetarium, Sky-map.org and Export to Planner) also in cases when you have set an Objectname filter, but no datasets were found.

18.7. What's new in release 3.2

- **3 bugs fixed**
- **ListView for Browser improved:** The procedure to change the appearance of the main data table in the tab Browser was significantly improved. It is now very easy to make columns visible or invisible, to change the order and the width of columns and to save all settings.
- **ListView in tabs Planner, EditObject and EditPicture:** The new ListView features for configuring the layout of the main data table are now also available in the Planner tab, in the EditObject tab and in the EditPicture tab.
- **QuickFilter:** Previous releases of CCD-Guide offered two possibilities to filter a main data table: the ObjectnameFilter and the SetFilter. Additional to these two filter types a new type is now introduced, the so called QuickFilter. When you enter a search string into the edit field of the QuickFilter, then only those data rows are shown which contain this search string in one of the data fields. This is a very fast and efficient way to reduce the number of data rows in a main data table. QuickFilter is available in the tabs Browser, Planner, EditObject and EditPicture.
- **Improved performance of ObjectBrowser:** Switching between ImageBrowser and ObjectBrowser is now much faster than in the previous release.
- **Improved performance of SlideShow in Planner**
- **Export CSV:** The main data tables of the tabs Planner, EditObject and EditPicture can be exported into a csv-file.
- **Simplified button structure in Browser and Planner**
- **New default name for REF images in Planner**

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18.8. What's new in release 3.1

- **10 bugs fixed**
- **Night vision mode:** The Help tab and the About tab were improved to give better results when using a software which enables a night vision mode (e.g. software The Sky).
- **Sorting of tables:** Improved sorting of tables according to object name.
- **Edit Picture:** Edit Picture is easier to use because of removing the extension jpg in picture name.
- **New catalogues:** Sandqvist and DCLD.
- **Working with an external hard disk:** Working with CCD-Guide on two different computers using the same external hard disk is now easier, because the paths are automatically set.

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18.9. What's new in release 3.0

- **Set Filter in all tabs:** Advanced filter options are now available in all tabs. This was possible by moving the old Set Filter tab into a new window, which can be called in all tabs of CCD-Guide.

- **ObjectBrowser:** The ImageBrowser tab was renamed to Browser tab. The Browser tab contains now two different modes: the ImageBrowser mode and the ObjectBrowser mode. The ImageBrowser feature was already available in Release 2.0, but the ObjectBrowser mode is completely new. The ObjectBrowser opens the possibility to browse through the object data of all objects of the CCD-Guide database including the usage of the advanced filter options of the Set Filter window.

- **Planner:** The Planner tab was completely reworked and is now much easier to use. The creation of setups was moved to Edit Setup tab. The free space in Planner tab was used to show a bigger preview image of the planner image. The data grid of the Planner tab can show all planner data rows of all of your setups in one table and you can filter your planner data rows with new filter options.

- **New Set Filter features:** The Set Filter window has a new type of filter criteria, the so called 'Planner Criteria'. With these criteria you can easily filter your planner data rows. You can save and reload your filter settings. This is very useful, if you create many complex and powerful filters.

- **New planetarium programs:** In Release 2.1 you could open Cartes du Ciel, centred on an object which was selected in the ImageBrowser. Release 3.0 gives you the possibility to choose between the following planetarium programs: Cartes du Ciel, Guide 8, Guide 9, The Sky6 Pro and The SkyX Pro. The planetarium button is now not only available in the ImageBrowser but also in the ObjectBrowser and in the Planner.

- **Link to sky-map.org:** When you are connected to the internet then you can use the new sky-map.org button, which opens sky-map.org, centred on the selected object in ImageBrowser, ObjectBrowser or Planner.

- **FOV Image in Planner:** When you are connected to the internet then you can use the new FOV Image button to download an image from sky-map.org with the right image field of your selected setup.

- **Export to Planner:** The active object in ImageBrowser or in ObjectBrowser can be easily exported to the Planner.

- **Order of tabs:** The order of tabs was changed, so that the most important tabs come first. The new tab sequence is: 1. Browser (ImageBrowser + ObjectBrowser); 2. Planner; 3. Edit Setup; 4. Edit Object; 5. Edit Picture; 6. Options.

- **Find Object:** Find Object is now easier to use. It is not necessary to enter a blank character between the catalogue name and the catalogue number. (e.g: 'ngc 1' and 'ngc1' are allowed).

- **Sorting in data grids:** By clicking on the head of data columns you can sort the data grid. This feature is now available in all tabs.

- **Import new comets:** When you are connected to the internet, then you can import new comets into your object database from www.minorplanetcenter.net .

- **Filter status is indicated:** When a filter is active on a data grid, then the active filter is indicated by bold characters of the Set Filter button. When a Find Object filter is active, then this active filter is indicated by bold characters of the Find Object button.