



ASTROMI.CH

ModelCreator 2 Manual

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Introduction

Thank you for downloading ModelCreator.

ModelCreator is a small utility that allows you to create models for your mount. Existing Models can be analyzed, visualized and optimized to some extent.

While it is primarily intended for 10Micron mounts, it should work with other mounts that support modelling as well.

It creates models by slewing the telescope to predefined points, taking an exposure, plate solving and synching the solved position to the mount by either creating a new alignment point, or by aligning an existing model.

The idea behind ModelCreator is to have a utility that can be used with your favorite imaging software. It also supports a number of freeware utilities.

There are some limitations to this though. For example, if you use TheSkyX for image capture but would like to use PlateSolve2 to solve your images, certain information that PlateSolve2 expects to solve the image does not get written to the FITS header by TheSkyX. It is therefore possible that your favorite combination of software might not work, or not as good as expected.

System Requirements

ModelCreator was developed and tested on Windows 10 64-bit. It is assumed that the Windows OS is updated to the latest patches and updates. It should run on other versions of Windows, as long as the latest Version of the .Net Framework is installed.

General Requirements

Windows Operating Systems

- Windows 10
- Windows 8 / 8.1 (untested)
- Windows 7 (untested)

ASCOM

ASCOM Platform version 6.2 or higher needs to be installed on the computer that ModelCreator is run from.

Overview



- 1 – Model area
- 2 – Equipment profiles
- 3 – Equipment controls
- 4 – Mount information
- 5 – Modelling controls
- 6 – Control buttons
- 7 – Status bar

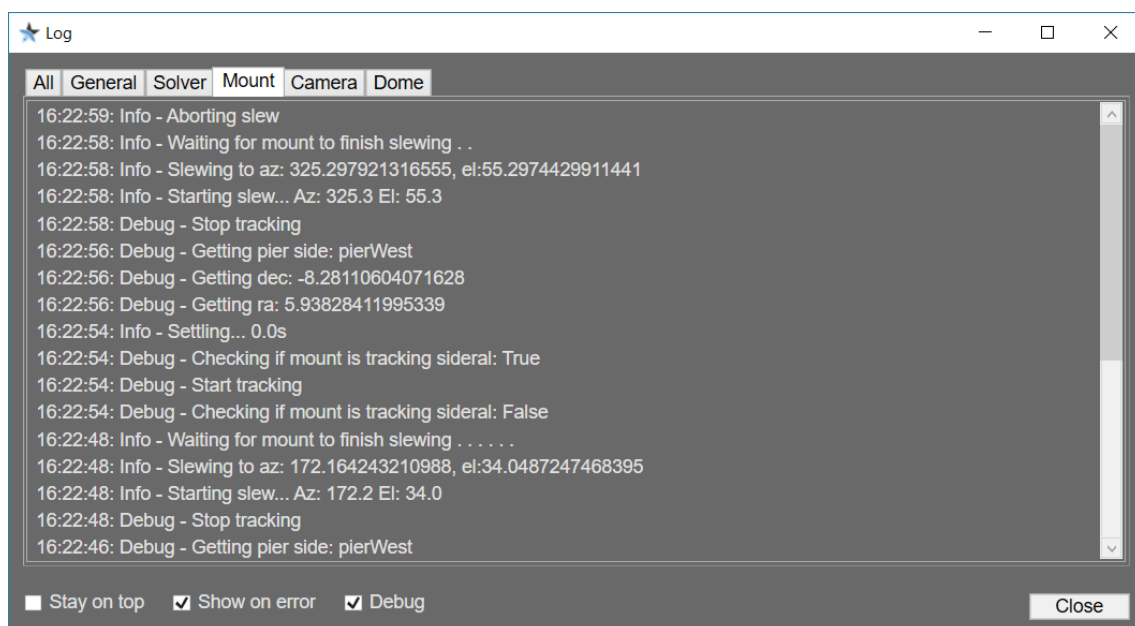
ModelCreator stores various information, like equipment profiles, model and mask definitions etc. This information is by default stored in your document's folder, in the subfolder Astromi\ModelCreator. This location can be customized, please see the "[Customizing folder locations](#)" section.

Log Window

Clicking the “Log” button brings up the Log window. It is also shown automatically when e.g. a modelling run is started or equipment profiles are edited.

It’s the central place where information concerning events, errors or anything the like is collected and accessible. Each time ModelCreator is started, a new log file is created. The name of the file contains the date and time to make it easy to locate the newest file. The most recent 10 files are kept, older files are deleted automatically on application startup.

The content of the log window is automatically saved to your Documents\Astromi\ModelCreator\Log folder at periodic intervals.

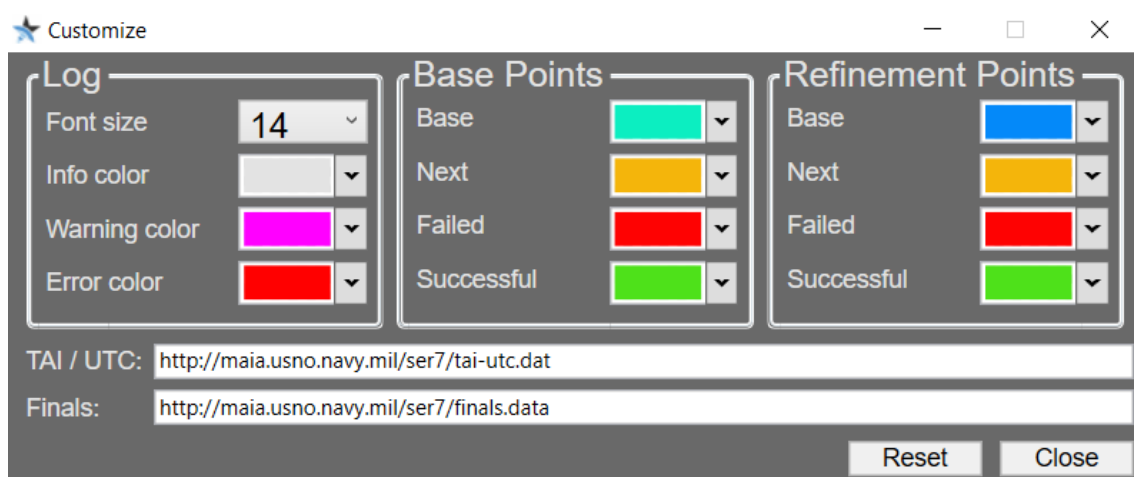


Checking “Stay on top” will make other windows stay behind the log window, while the “Debug” option will log extended information to help in troubleshooting cases. When “Show on error” is checked, the log window will automatically pop up if there is an error.

The log window is divided into different tabs, each corresponding to a certain category of log events. The name of the tab should indicate which type of log entries are shown, and should be self-explanatory.

A right-click with the mouse brings up options to either save the content of the log window to a file, or to the clipboard. It is also possible to customize parts of the application, for example the color of warning and error messages or the font size to aid in better readability, should the default colors be a problem.

It is also possible to specify the locations for the TAI / UTC and Finals data locations, which are automatically downloaded when launching the UTC and Earth rotation data update in the “Tools” tab.



Model area

The model area is used to define points around the sky. These points will be used to command your mount around the sky, take pictures, plate solve etc.

There are two types of points:

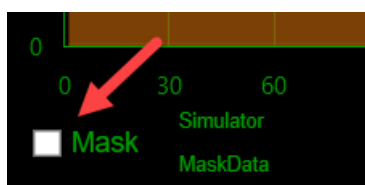
- Base Points
 - Base Points are used by the mount to calculate polar alignment and measure orthogonality etc. It is important that these are spread evenly around the sky
- Refinement Points
 - These are used to further refine the model. The mount supports up to 100 points in total.

Creating points

To create points, simply click anywhere on the chart using the left mouse button. If there are less than three base points defined, the points added will automatically become base points. If you click onto an existing point, it will be toggled between a refinement model point and base point.

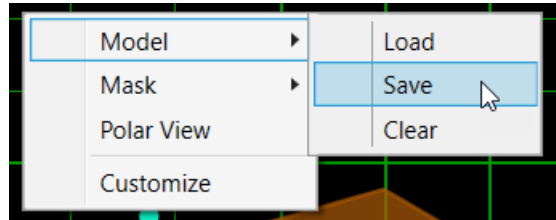
Right-Clicking a point will remove it from the map.

If you would like to create a mask to visualize areas in the sky where your view of the night sky is limited or blocked, tick the checkbox "Mask" and set points on the chart.

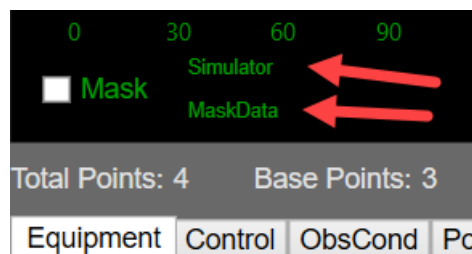


Loading, saving and clearing a model or mask

Once any number of points have been defined to represent a model, they can be saved to a CSV file. To do so, right-click on an empty area on the chart to bring up a context menu that allows to either Load, Save or Clear the current Model or Mask.

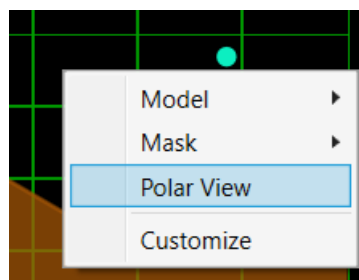


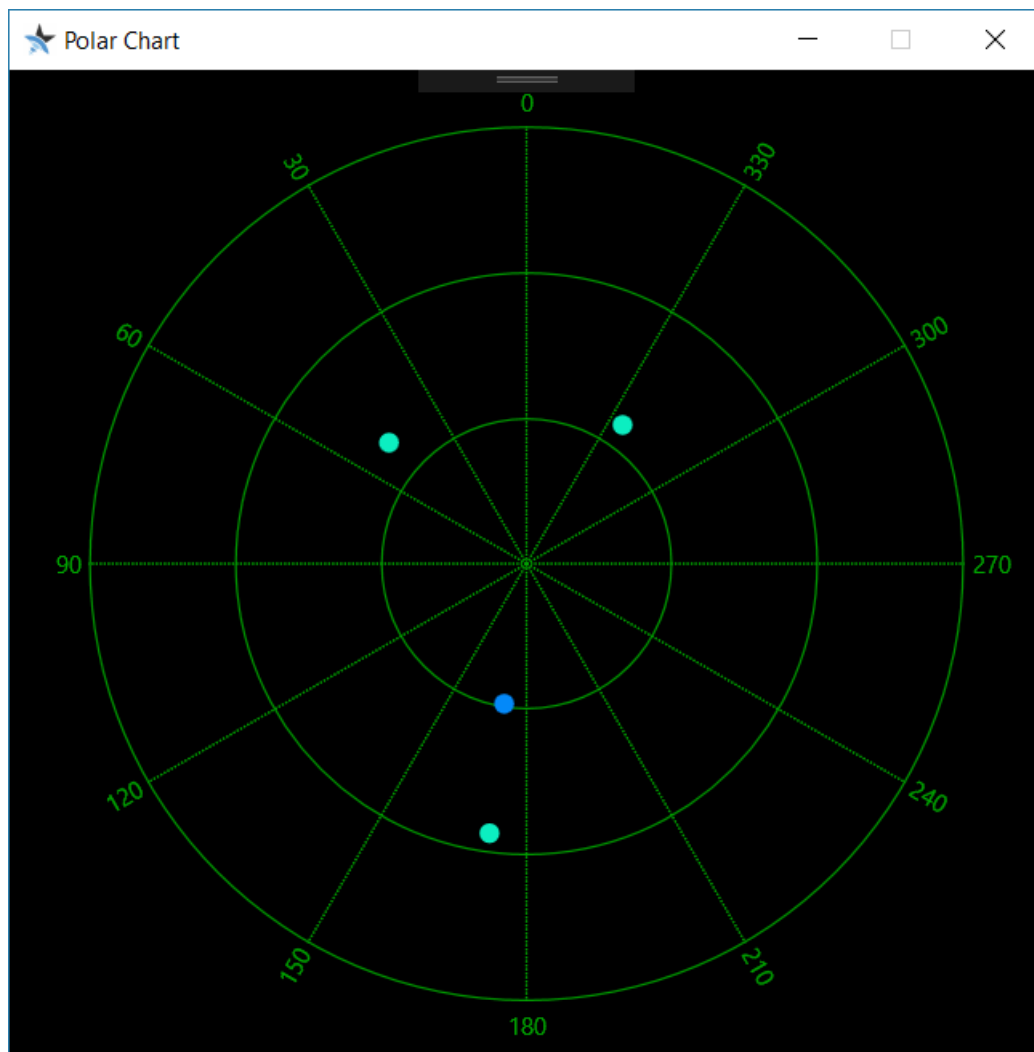
The name of the last saved or loaded Model / Mask is displayed on the bottom of the chart area.



Polar View

Right clicking on the modelling area and selecting “Polar View” from the context menu will open a new window showing a “top-down” view of the modelling area.



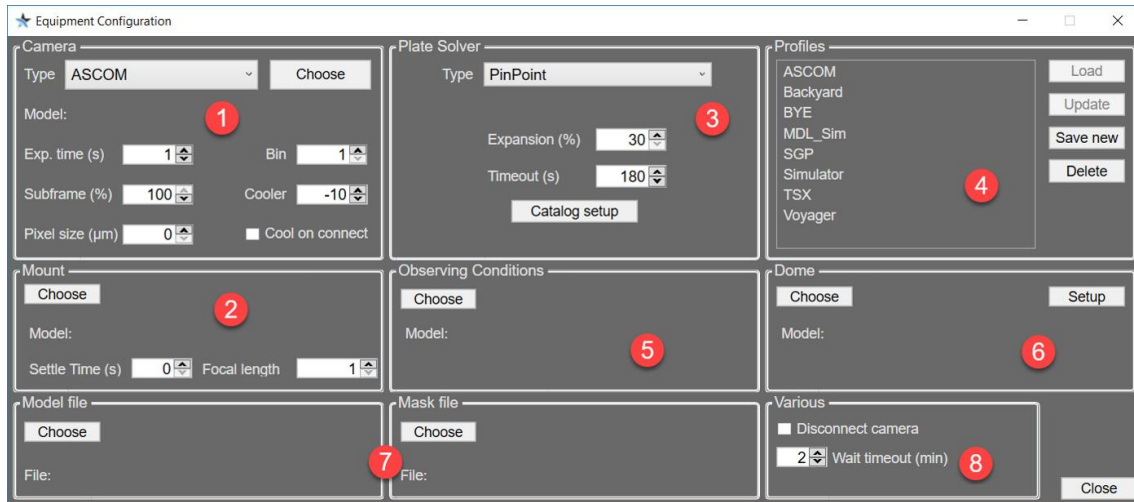


At the time of writing this, the polar view is just a view. It does not show Masks or Dome and it does not allow adding / editing points.

Equipment Profiles

Equipment Profiles are a central part of ModelCreator and store configurations. Before you can use ModelCreator, you need to define a profile that corresponds to your equipment and the software that you wish to use.

Clicking the “Profiles” button brings up the following view:



The screenshot shows the 'Equipment Configuration' window with the following sections and numbered callouts:

- 1**: Camera Type dropdown menu (currently set to ASCOM).
- 2**: Mount Type dropdown menu (currently set to Choose).
- 3**: Plate Solver Type dropdown menu (currently set to PinPoint).
- 4**: Profiles list (ASCOM, Backyard, BYE, MDL_Sim, SGP, Simulator, TSX, Voyager).
- 5**: Observing Conditions Model dropdown menu (currently set to Choose).
- 6**: Dome Model dropdown menu (currently set to Choose).
- 7**: Mask file Choose button.
- 8**: Wait timeout (min) spinner box (currently set to 2).

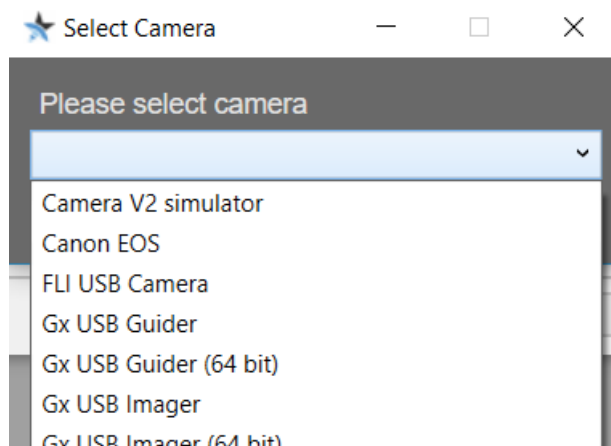
1 – Camera

Besides ASCOM, various 3rd party software can be used for controlling your camera. ModelCreator will, on startup, look for installed applications and list them in the “Type” dropdown.

Currently supported camera control software:

- ASCOM
- BackyardEOS
- BackyardNIKON
- MaximDL
- N.I.N.A.
- Sequence Generator Pro (Version 2.6.0.15 or higher)
- Starkeeper Voyager
- TheSkyX

Applications like ASCOM or SGP allow to specify the exact camera model to connect to. Therefore, the “Choose” button is active for these camera types. If the camera type is set to SGP, the application will be started in order to retrieve a list of cameras know to it. Select the model to use for imaging and click “Ok”



Specify the exposure time, binning, subframe percentage, the desired cooler temperature and whether the cooler should be turned on when the camera connects.

Specifying the pixel size is optional. This value is needed by the plate solver to calculate e.g. the plate scale. If this value is 0, the solver will try to read the value from the FITS-Header of the image that will be solved. This is the default value.

Note on 3rd party control software:

When an exposure has been taken, ModelCreator will command the imaging application to save the image. This is faster than transferring the image data to ModelCreator for writing the image file. The downside of this is, in order for the imaging application to be able to write the mount's coordinates to the FITS-Header that the mount also needs to be connected in the imaging application.

Note on TheSkyX: If you wish to use TSX for camera control and plate solving, please launch it "As Administrator" by right-clicking the icon and select "Run as Administrator". Please also make sure that you use a 32-Bit camera driver.

The 64-Bit version of TSX is also supported and is automatically discovered if the TCP server is enabled. Enabling it is done thru the Tools menu, option "TCP Server".

2 – Mount

Clicking the "Choose" button brings up the ASCOM Telescope Chooser where the proper driver for your mount can be selected.

If the setup requires settling after a slew, enter the appropriate time under "Settle Time (s)".

As the plate solver needs to know the focal length of the optics that the image was recorded thru, ensure that the focal length of your currently used optics is properly entered (in mm).

Selection the proper Epoch in the ASCOM-Driver is not critical.

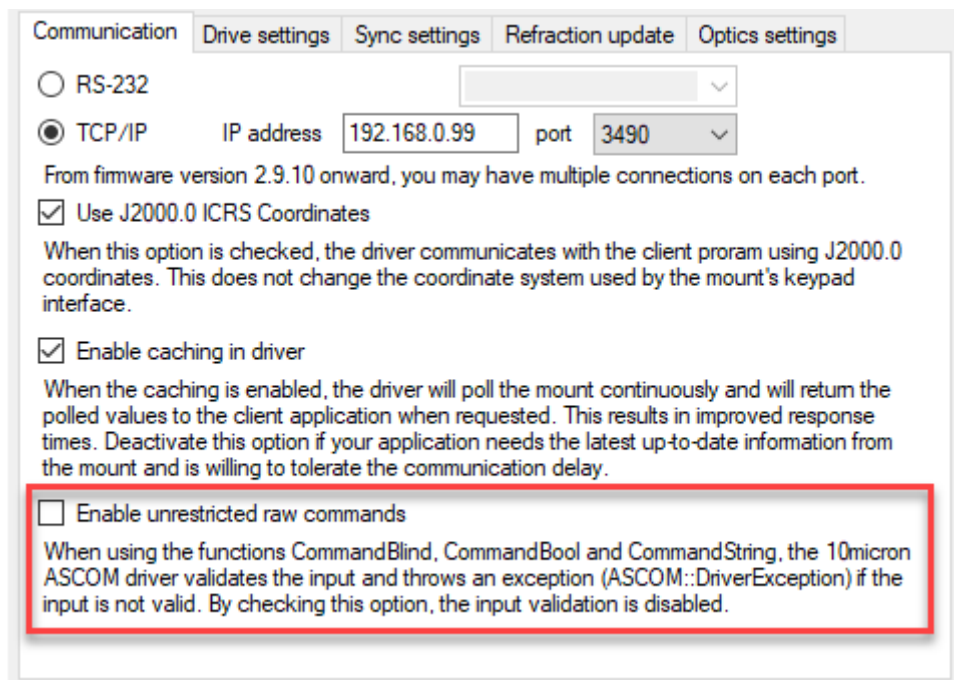
If a 10Micron mount is connected and depending on the setting one of the following applies:

- Driver set to J2000:
 - The Driver is responsible to convert the result from the plate solver to the mount's native coordinate system (JNOW).
- Driver set to JNOW:
 - ModelCreator will convert the result from the plate solver to the mount's native coordinate system (JNOW).

Driver Setup

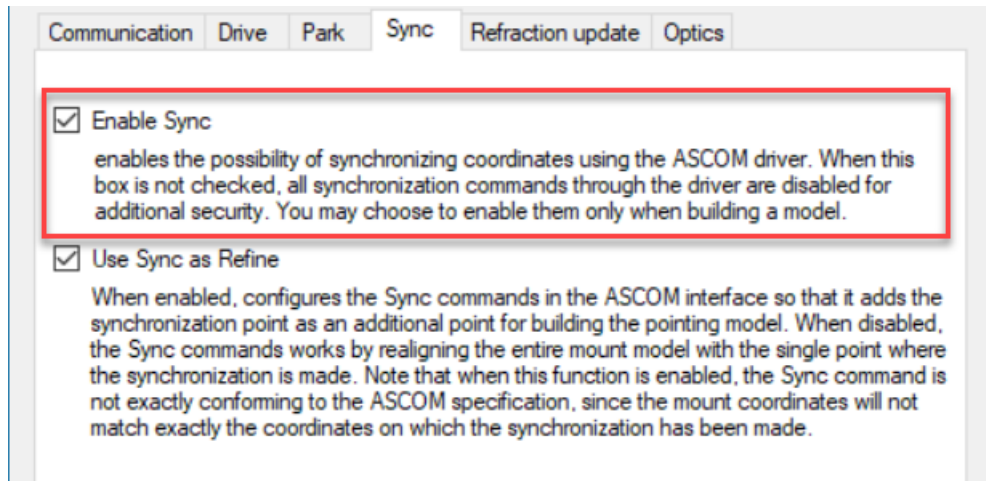
Official 10Micron driver

Ensure that "Enable unrestricted raw commands" is deselected.



The screenshot shows the 'Drive settings' tab of the 10Micron ASCOM driver configuration window. The 'Communication' section has 'TCP/IP' selected with an IP address of '192.168.0.99' and a port of '3490'. Below this, there are three checked options: 'Use J2000.0 ICRS Coordinates', 'Enable caching in driver', and 'Enable unrestricted raw commands'. The 'Enable unrestricted raw commands' option is highlighted with a red rectangular box. The text below this option states: 'When using the functions CommandBlind, CommandBool and CommandString, the 10micron ASCOM driver validates the input and throws an exception (ASCOM::DriverException) if the input is not valid. By checking this option, the input validation is disabled.'

On the “Sync settings” tab, please also ensure that “Enable Sync” is checked in the section



Note 1: “Use Sync as Refine” needs to be checked if a new model is to be built. If an existing model is to be aligned, uncheck this option

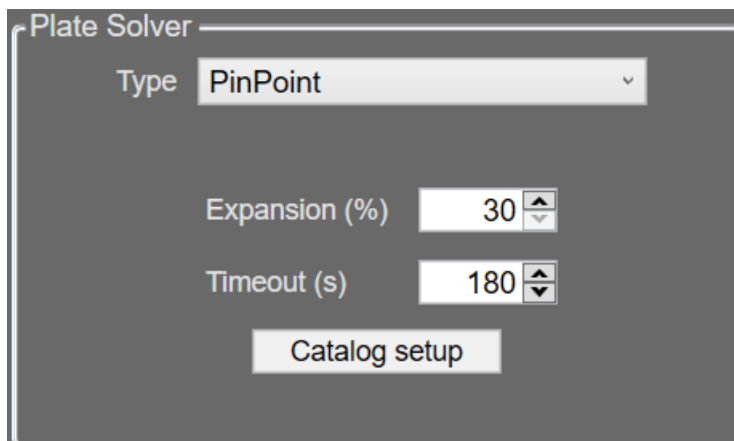
Note 2: Changing any of these settings will **ONLY** affect new connections to the mount. An existing connection is using whatever settings were defined at the time the connection was established. When making changes to these options, ensure that you are reconnecting to your mount.

3 – Plate Solver

Select your preferred application for plate solving. Each application needs to be properly configured, please consult the respective documentation of the selected software.

PinPoint ([Link](#))

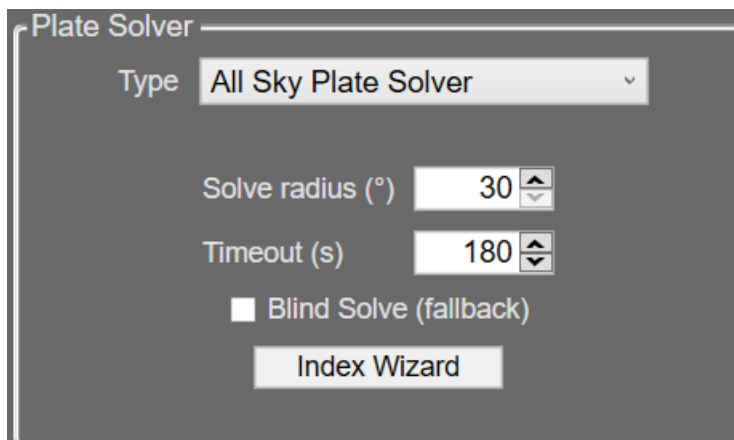
PinPoint is a fast, reliable solver that supports a variety of star catalogs.



The screenshot shows a window titled "Plate Solver". Inside, the "Type" dropdown menu is set to "PinPoint". Below this, there are two numeric input fields: "Expansion (%)" with a value of 30 and "Timeout (s)" with a value of 180. At the bottom of the configuration area is a button labeled "Catalog setup".

All Sky Plate Solver ([Link](#))

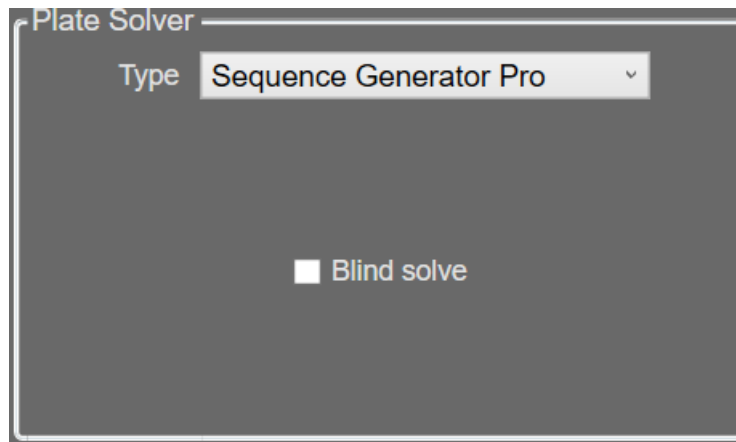
This freeware was created by Giovanni Benintende and is available for download at the link available above.



The screenshot shows a window titled "Plate Solver". Inside, the "Type" dropdown menu is set to "All Sky Plate Solver". Below this, there are two numeric input fields: "Solve radius (°)" with a value of 30 and "Timeout (s)" with a value of 180. Below these fields is a checkbox labeled "Blind Solve (fallback)" which is currently unchecked. At the bottom of the configuration area is a button labeled "Index Wizard".

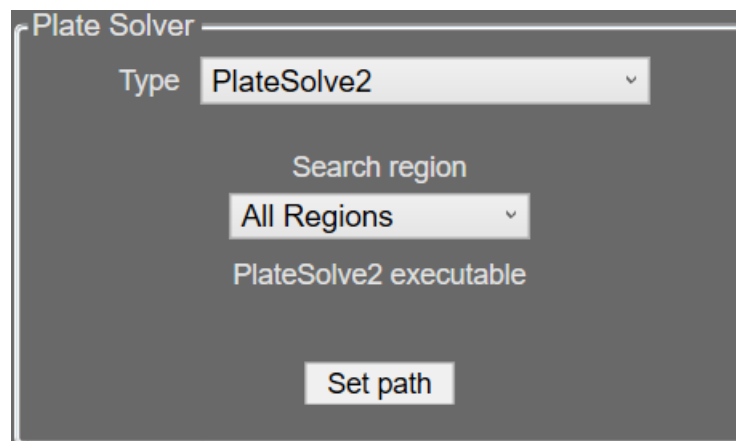
Sequence Generator Pro ([Link](#))

Every Plate solver that SGP supports can also be used thru ModelCreator. Please configure your preferred solver in SGP. Solving is initiated thru the SGP API.



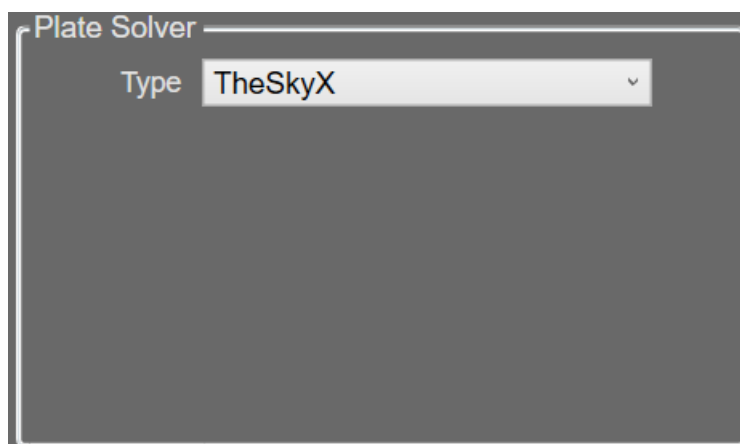
PlateSolve 2 ([Link](#))

Freeware utility by Planewave. PlateSolve2 is a small, quick solver that can be used by ModelCreator.



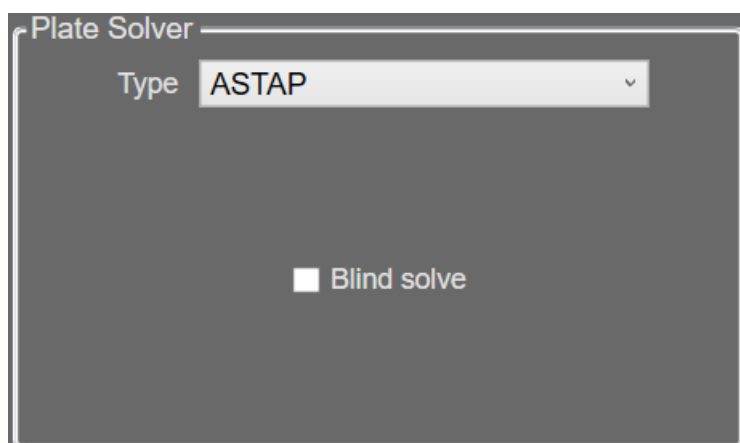
TheSkyX ([Link](#))

Full Planetarium-Suite offering a wide range of features.



ASTAP ([Link](#))

Application that supports astrometric stacking, plate solving and also supports viewing FITS files.



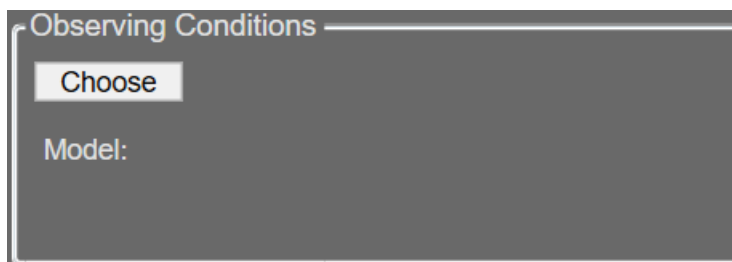
4 – Profiles

Use this section to load, update, save or delete profiles.



5 – Observing Conditions

ModelCreator supports the ObservingConditions interface that was introduced with ASCOM Platform 6.2.



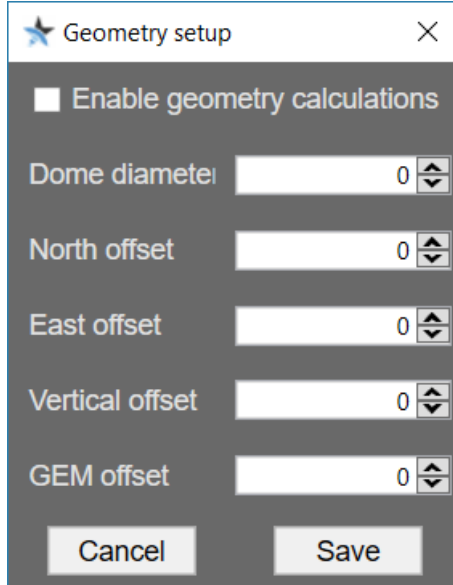
6 – Dome

ModelCreator can control a dome during the model build, if there is a corresponding ASCOM driver for the dome model available



ModelCreator can do the calculations for positioning the dome slit at the correct location, so that the telescope optics have an unobscured view out of the dome.

In order to do so, the dome geometry setup needs to be defined and enabled via the “Setup” button.

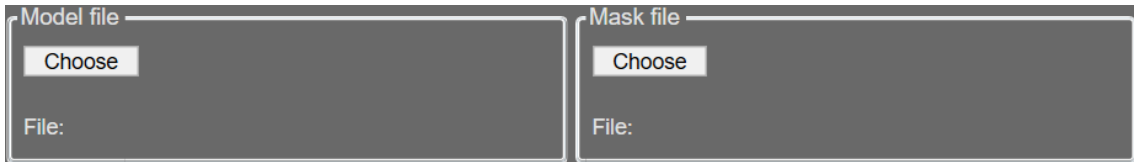


The "Geometry setup" dialog box contains the following elements:

- ☐ Enable geometry calculations
- Dome diameter: (with up/down arrows)
- North offset: (with up/down arrows)
- East offset: (with up/down arrows)
- Vertical offset: (with up/down arrows)
- GEM offset: (with up/down arrows)
- Buttons: Cancel, Save

7 – Model and Mask

Specify which Model and Mask files should be used with this profile. The model and mask will be automatically loaded when the profile is loaded.

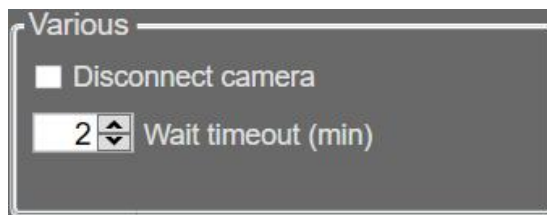


The interface shows two side-by-side panels for file selection:

- Model file:** Includes a "Choose" button and a "File:" label.
- Mask file:** Includes a "Choose" button and a "File:" label.

8 – Various

- “Disconnect camera” controls whether the camera is disconnected from the imaging application when ModelCreator disconnects from it. Often the application used for modelling and imaging is the same, so it can be desirable to not disconnect the camera from the imaging software when the modelling run is finished.
- “Wait timeout” controls how long ModelCreator will wait before considering a sequence action where a wait is involved (e.g. waiting for mount to complete the slew, wait for image to become available etc.) failed. A value of 0 disables the timeout checks.

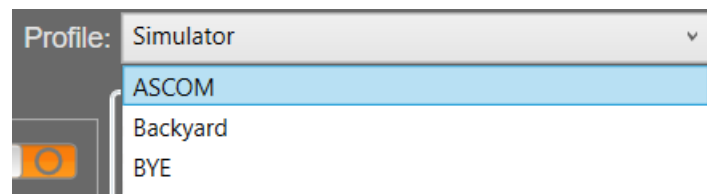


The "Various" settings dialog box contains the following elements:

- ☐ Disconnect camera
- Wait timeout (min): (with up/down arrows)

Profile selection

To load a previously defined profile, simply select it from the dropdown list. Equipment that is currently connected will be disconnected.

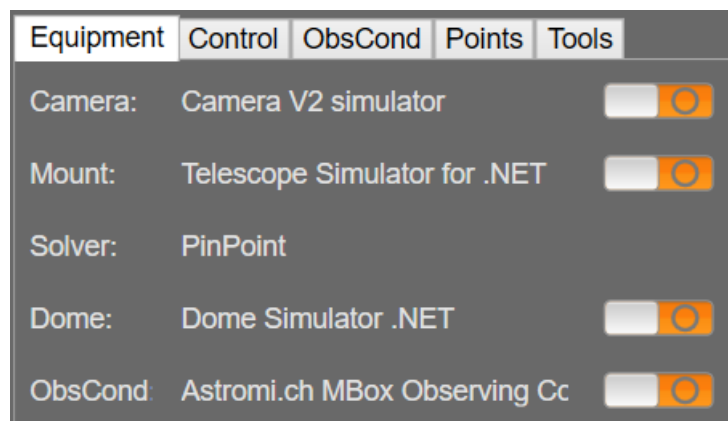


Equipment control

ModelCreator supports various equipment which is described in more detail in this section of the manual.

Navigating thru the equipment is done by clicking on the respective tab.

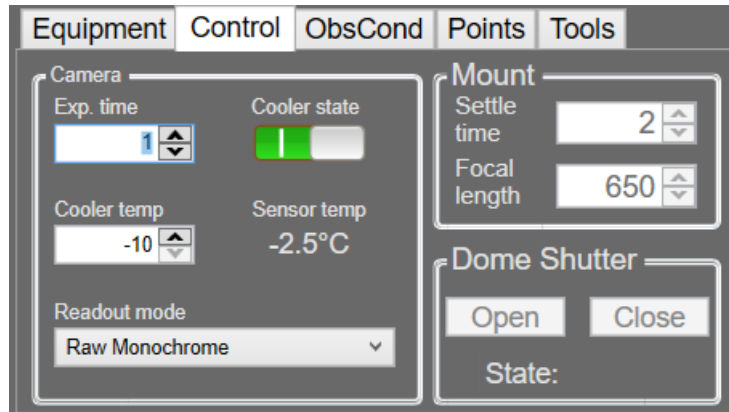
Equipment tab



The equipment tab is used to connect / disconnect equipment defined in the profile. It also provides a quick overview over what has been defined in the profile.

Control tab

The control tab provides quick access to adjust some settings on the fly during a modelling run. Changes done here are not saved to your profile!



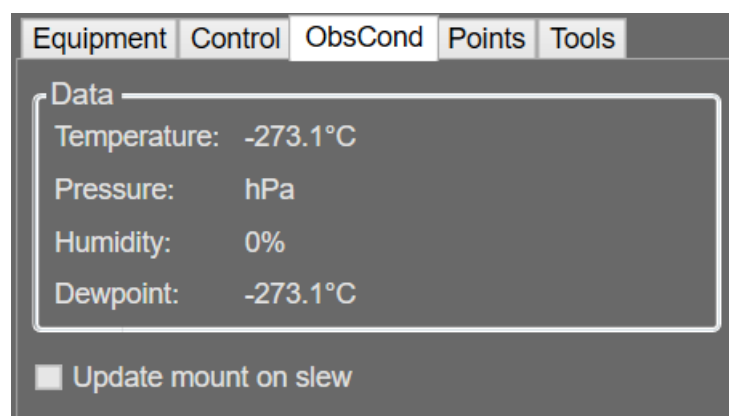
ObsCond tab

Displays information retrieved by your Observing Conditions device.

Additional information about your current location is displayed if you connect to an Astromi.ch MGBBox.

The "Update mount on slew" option is only available when a 10Micron mount is connected. If checked, refraction data will be sent to your mount at the start of each slew to ensure the mount's refraction information is always up to date.

Note: Ensure that only one device updates information in your mount.

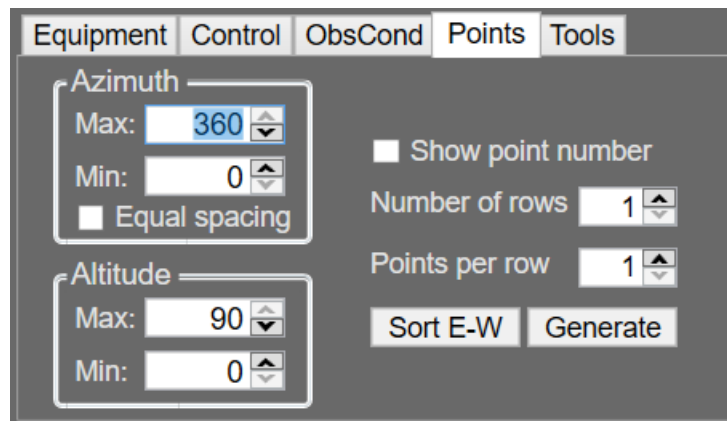


Points tab

ModelCreator can generate ModelPoints for you to build a model with. It features two modes for point alignment:

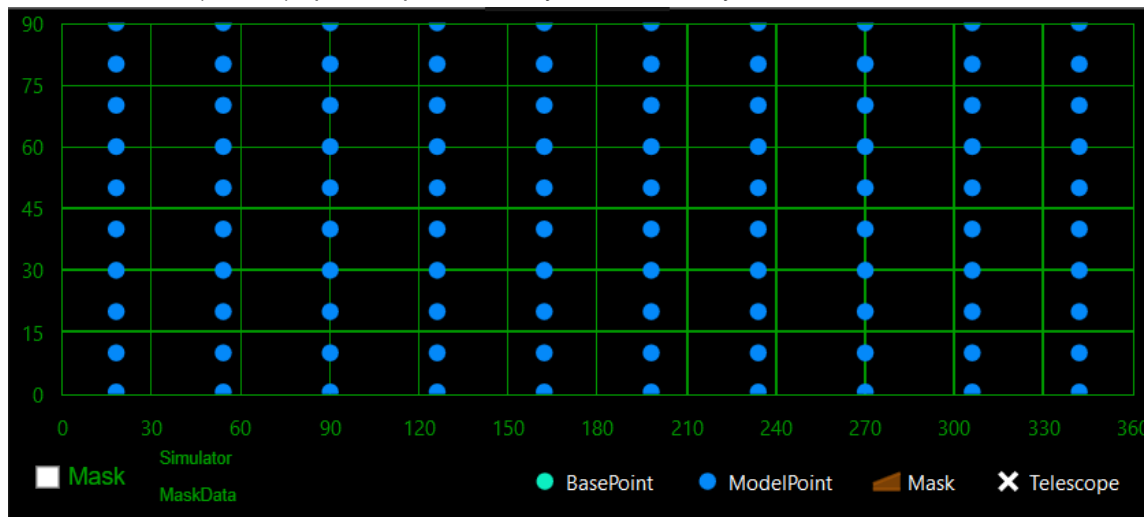
- Grid
- Equal spacing in azimuth

Please note that in the Equal azimuth spacing mode, certain fields are disabled like “Points per row”, “Rows” and “Maximum Altitude”.

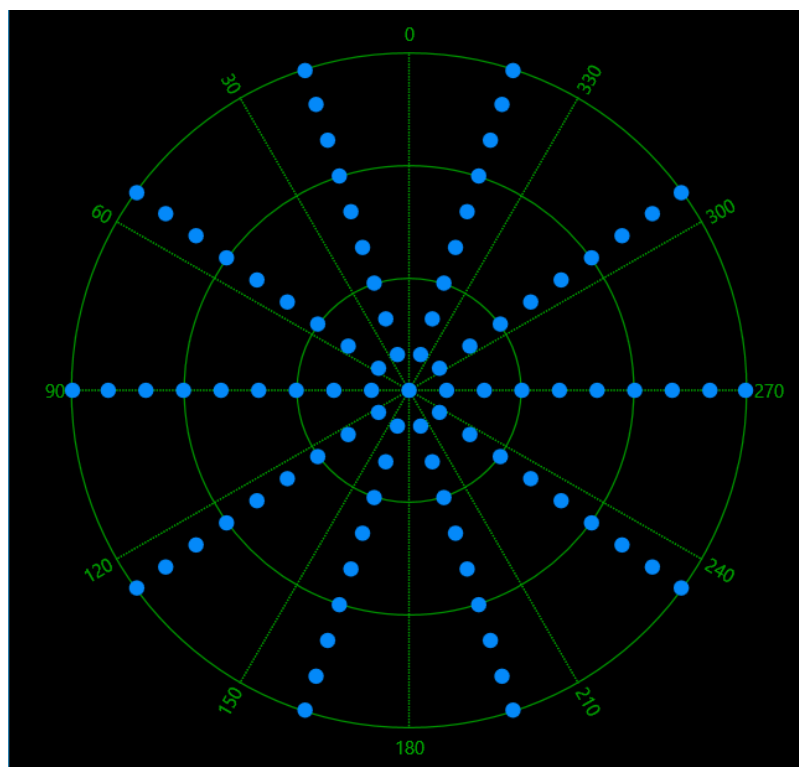


Grid Mode

The Grid-Mode (default) spreads points evenly across the sky in a Grid, within the defined limits:

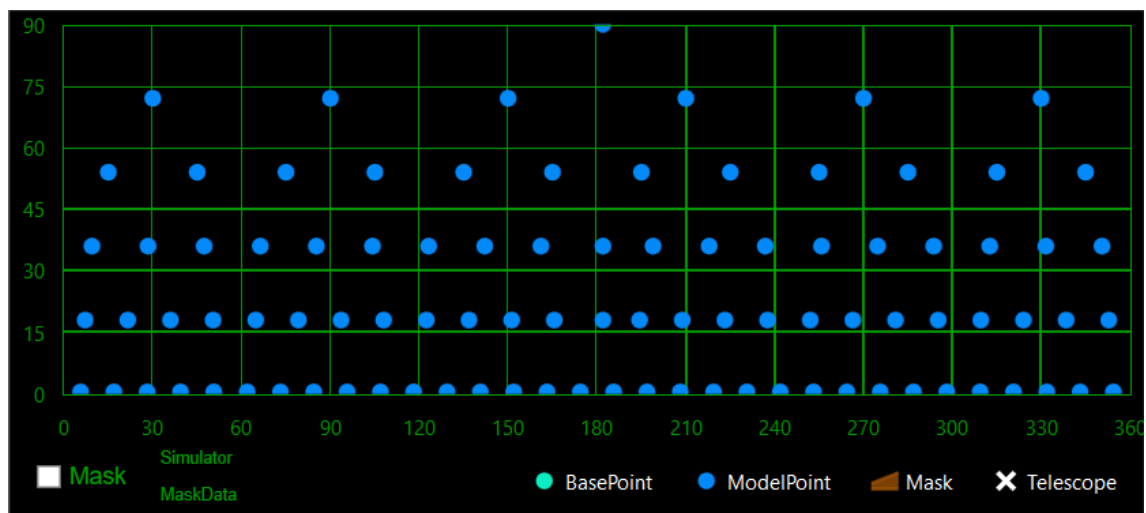


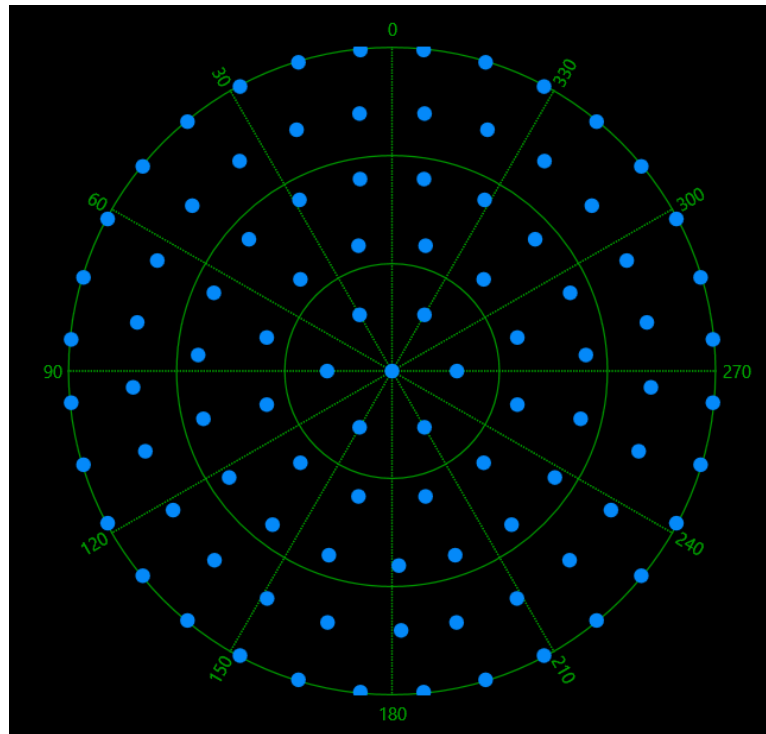
Polar View:



Equal azimuth spacing

Generating the points with equal spacing in azimuth might look a bit strange in the main view, however this probably makes more sense if you compare the polar views of the two methods





To generate points, specify:

- Maximum and minimum Altitude and azimuth
- Define the number of rows and points per row
- Click “Generate”

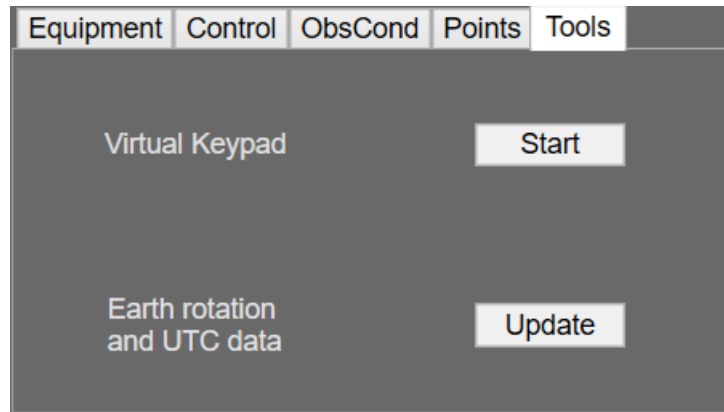
The points will evenly be spread across the defined limits, taking into account the limits and mask, should there be any.

“Sort E-W” will sort the points to hemisphere so that only one meridian flip will happen. Additionally, you can specify if you would like to have the point number displayed on the chart.

Note: If necessary, promote points to base points if you are building a model.

Tools tab

ModelCreator has support to automatically launch the virtual keypad, or to update the earth rotation and UTC data. The applications need to be installed on the computer that ModelCreator is run on and they need to be properly set up in terms of connection parameters (like mount IP-Address).



Virtual Keypad

The virtual keypad needs to be installed on the computer that ModelCreator is run on. If the virtual keypad has not been started yet, it will be started and a connection attempt to the mount is initiated. If the utility is already running, it will simply be brought to the front.

Updating earth rotation and UTC data

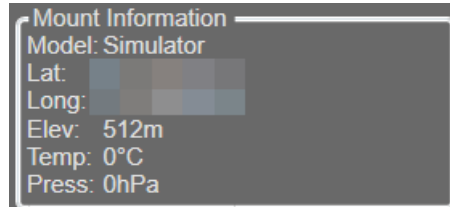
A click on the "Update" button besides the "Earth rotation and UTC data" label will initiate the update process.

It is important that this process is not interrupted once started and that you do not make any inputs or mouse clicks while the update is happening.

As a prerequisite, the computer you are trying to run the update from needs to have internet access, as the needed files will be downloaded at the beginning of the update sequence.

Mount Info

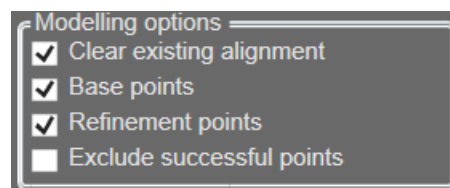
Once a connection to the mount is established, various information will be displayed here



Modelling controls

Allows you to control various aspects of the modelling run. Set if the current model stored in the mount should be deleted before creating a new one, if only base- refinement points or both should be included in the modelling run.

Exclude successful points can be used if in a model run a couple of points fail and would like to just repeat the failed points.



Control Buttons

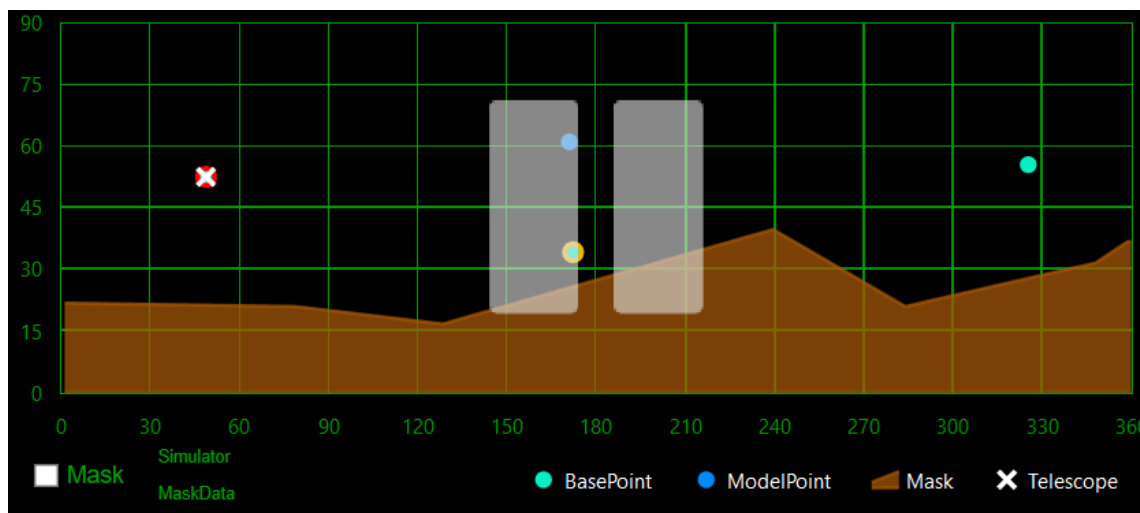
The control buttons allow access to the log window, start, and pause or abort a modelling run and close the application.

Pausing a modelling run

Pausing a modelling run can be useful if you e.g. notice that your focus has shifted a bit or you need to check your physical setup without losing the state of the already processed points.

Once a modelling run has been started, the caption of the “Run” button changes to “Pause”. Pushing the button causes the modelling run to pause after the current point has been processed. Once pushed, the button’s caption changes to “Continue” and a Pause-Sign is imposed over the points chart.

By pushing the “Continue” button or the Pause sign on the chart, the modelling run is continued where it stopped.



Status bar

The Status bar indicates various information about the progress of the modelling run. It can be divided into 4 sections



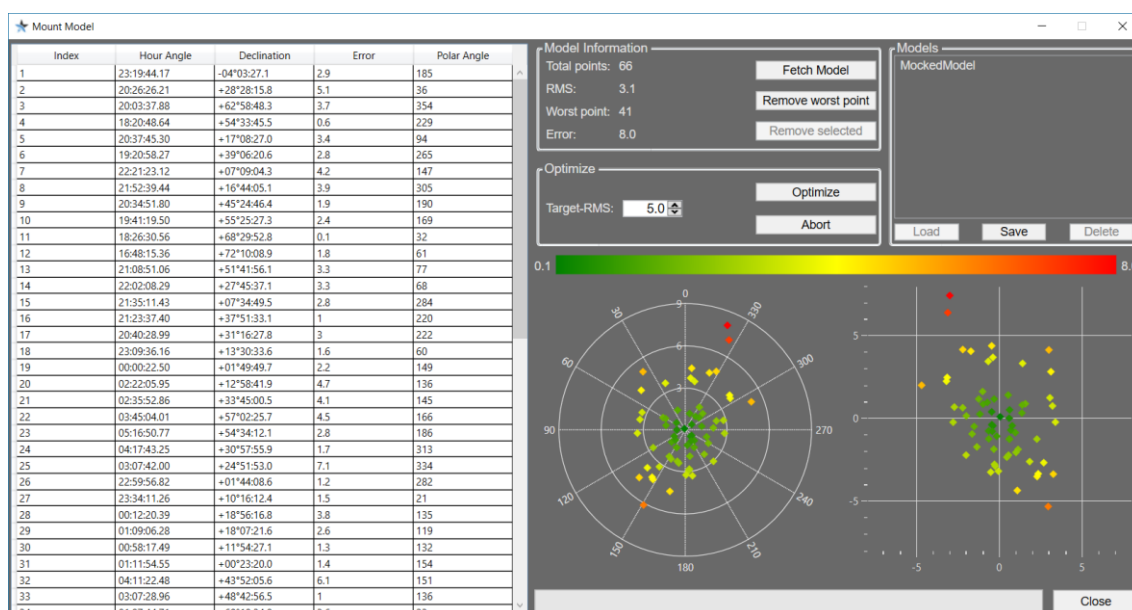
- 1 – Overall modelling progress. If there are points that had errors (e.g. because they failed to solve), the bar will turn red.
- 2 – Progress information in numbers
- 3 – The elapsed time
- 4 – The estimated time left

Model Analysis

ModelCreator allows you to load, visualize and optimize a model that is stored in the mount. After clicking the “Model” button (which is only active when there is a connection to a 10Micron mount) on the main Screen, you are presented with a screen similar to the one shown below. The screen can be divided into two sections:

Manage Models

If your Mount has Firmware 2.13.3 or newer installed, you have the possibility to manage the models stored in your mount.



Display and Manipulate a Model

First, click “Fetch Model” to transfer model data from the mount to the Computer. Clicking on either a column in the grid view or a point on the charts will highlight the corresponding point by making its symbol bigger.

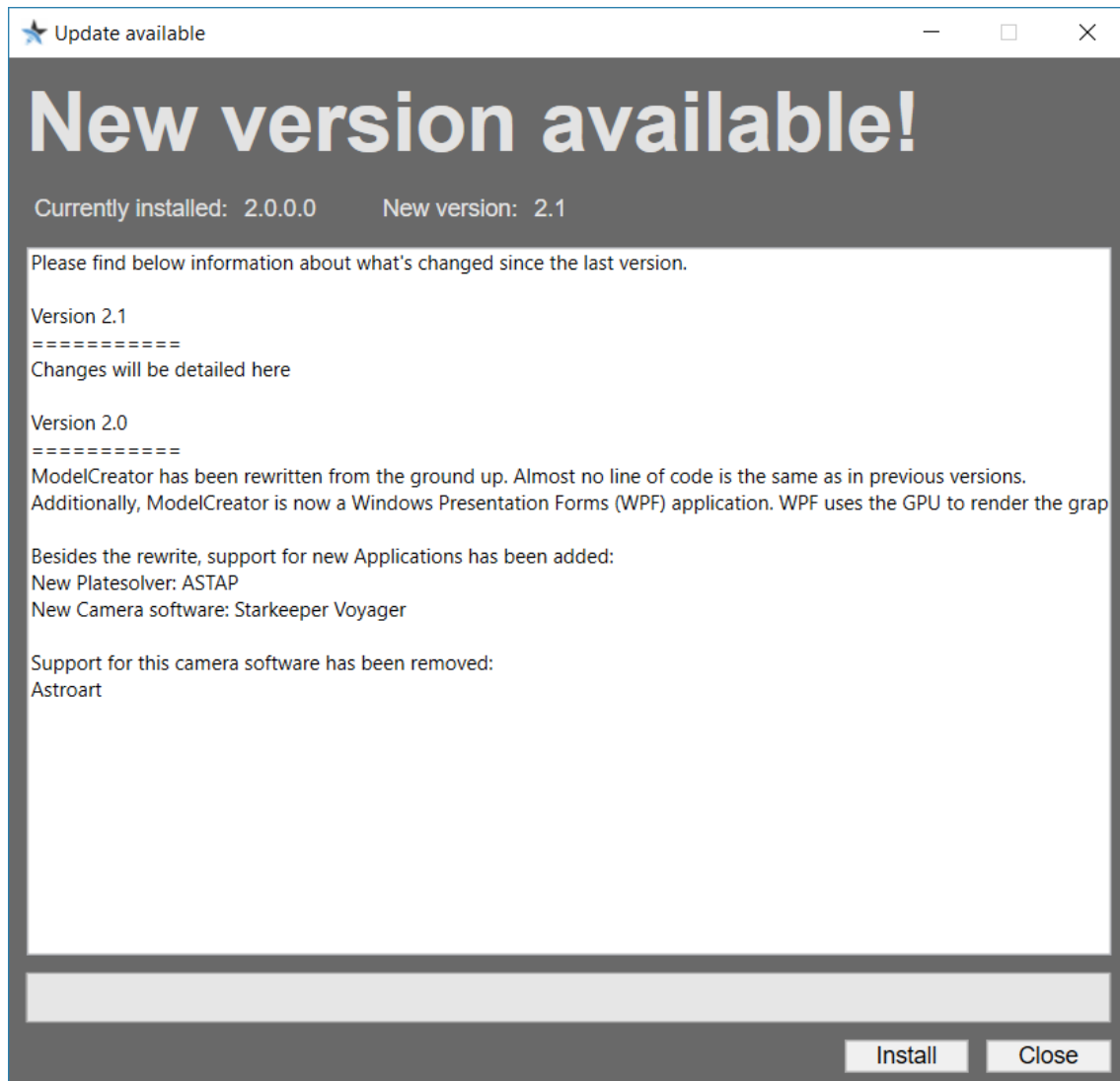
The grid view can be sorted by clicking on the corresponding column header.

The controls for removing a point or optimizing a model should be self-explanatory.

Auto Updater

Every time ModelCreator is launched, it checks online if there's a new version available and if there is, presents a notification screen.

You can choose to download and install the new version, or just use the currently installed one by closing the update notification.



Customizing folder locations

ModelCreator uses four folders to store necessary information, such as profiles, point files, logs and temporary files. On startup, the folders are created if they do not exist.

By creating a file called "FolderLocation.ini" in the installation directory of ModelCreator, these locations can be redirected.

Specify the location of the folders in the following way:

LogFolderPath="New Path"

PointsFolderPath="New Path"

ProfilesFolderPath="New Path"

TempFolderPath="New Path"

ModelFolderPath="New Path"

For example:

LogFolderPath=C:\ModelCreatorLogs

Folders can selectively be redirected, meaning you can use any combination of the redirects mentioned above, while leaving others in the default location.

Automation

ModelCreator can be automated using command line parameters. This is useful if you e.g. want to start the modelling run thru a batch file or some other means, without being in front of the application.

The following table provides an overview over the possible command line options and what they do:

| Option | Explanation | Mandatory |
|---------------|--|-----------|
| --profile | Load the specified profile. If this parameter is not specified, ModelCreator will try to load the last profile that was active. | No |
| --options | Comma separated list to specify the modelling options. Possible values: ClearExisting ExcludeSuccessful IncludeBase IncludeRefinement | Yes |
| --dome | Connects the dome specified in the profile | No |
| --obsCond | Connects the Observing Conditions Device specified in the profile | No |
| --modelPoints | Loads the specified model points file for the run. Generally, the points file specified in the profile will be loaded. This parameter can be used if you have multiple point files to be used with the same profile, for example | No |

Example:

ModelCreator.exe --profile MyEquipment --options ClearExisting,IncludeBase --obsCond

The command line in the example above will instruct ModelCreator to load a profile with the name "MyEquipment", set the Modelling options to clear an existing model and only run base points, and to connect to the Observing Conditions device.

Known Issues

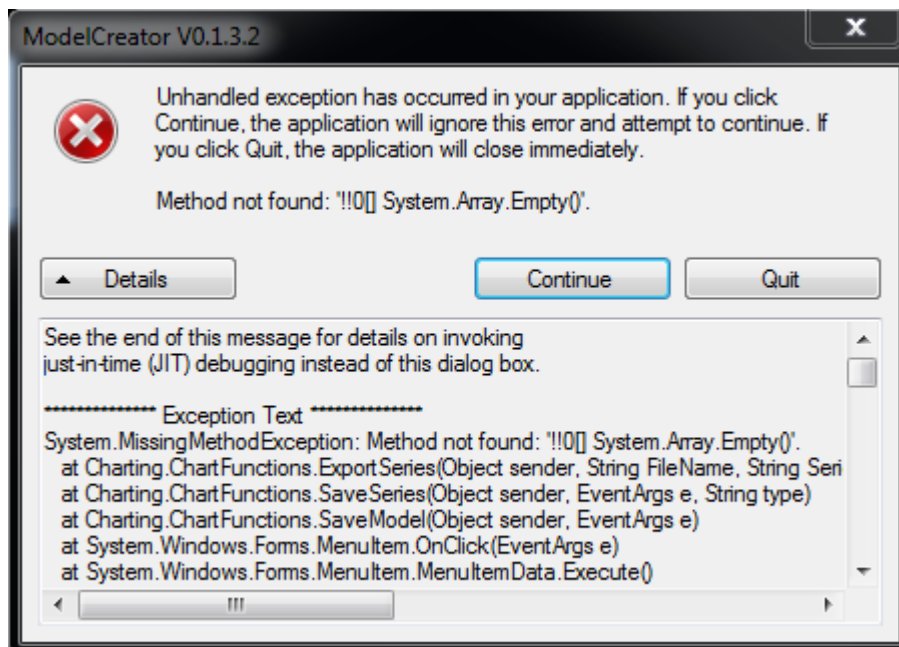
If you encounter problems using ModelCreator it might be necessary to run the software as administrator. Do so by right-clicking onto the icon and select “Run as Administrator”. The same may apply to other software that you are using, e.g. TheSky.

If you experience difficulties taking pictures thru the ASCOM Interface, it is most likely down to issues with the Camera driver. ModelCreator has very little control over the inner workings of the camera driver, so if e.g. taking a picture fails, it is likely due to issues in the driver.

.net Framework error

If you receive a .net Framework error like the one shown below, please ensure that your PC is up to date with the latest updates for the Framework.

Note: Some patches may show up under “optional updates”



Acknowledgments

I would like to express a big “Thank you” to those involved in testing, reporting issues and suggesting improvements. Without you, it would have taken a lot longer to get this application to what it is today.