

Before Getting Started...

V12 Tutorial: Fixed Formatting

Forced "U.S.-centric" settings

Ini (text) files are used; mixing formats can cause problems.

- Time separator ':' colon (also used as RA/Dec separator)
RA: 12:45:22.6 Dec: +05:32:57.9 UT: 04:52:30 (leading zeros/24-hour)
- Date separator '-' dash Date order yyyy-mm-dd
May 12, 2023: 2023-05-12 (leading zeros)
- Decimal point '.' period
Value = -0.45587 (leading zero for $|x| < 1.0$, no thousands grouping)
- Millimeters for focal lengths; meters for apertures (30 cm = 0.30 m)

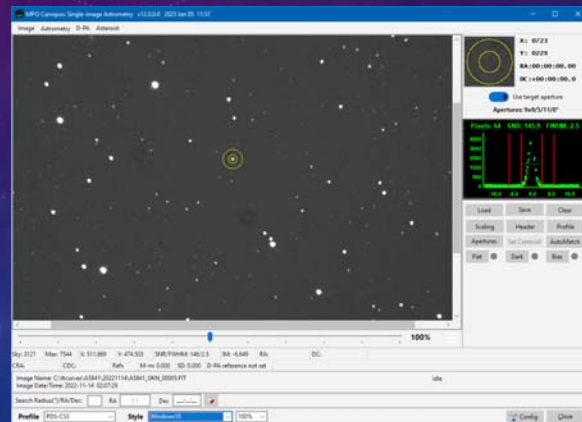
MPO v12 Tutorial

Creating a Variable Stars User Profile

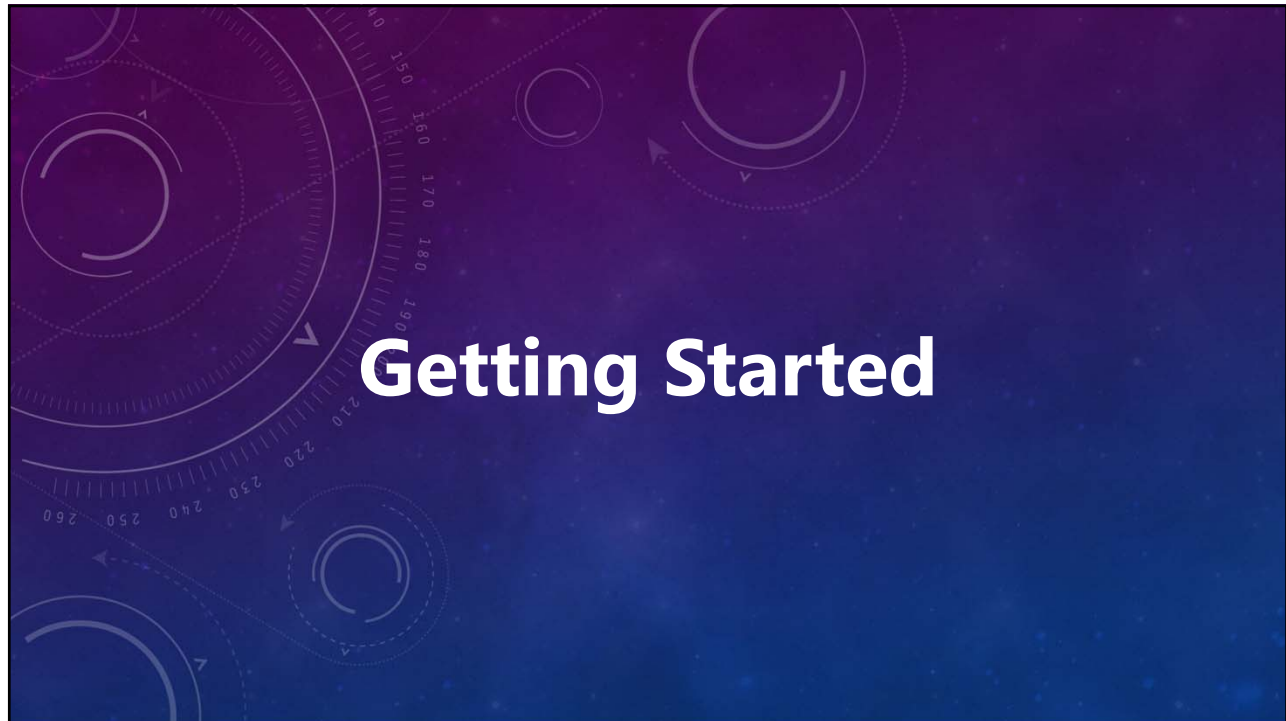
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V12 Tutorial: Creating a Variable Star User Profile The Same Only Different

- This profile is for only when working with variable stars.
- The "TutorialsProfile.mp4" on YouTube is for most other cases, asteroids in particular, and includes instructions on adding/editing the telescope and camera lists.



MPO YouTube channel <https://youtube.com/@8734Warner>



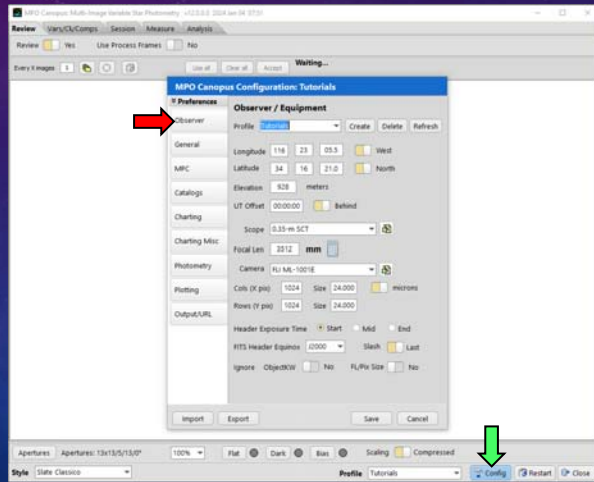
V12 Tutorial: Creating a Variable Star User Profile Creating a User-profile for Variable Star Examples

- Open MPO Launcher.
- Click <Photometry> tab.
- Click <Variable star>.
- Wait for program to appear.

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- Click <Config>.
- Wait for Configuration form to appear.
- If necessary, click on <Observer> in the panel on the left side of the form.



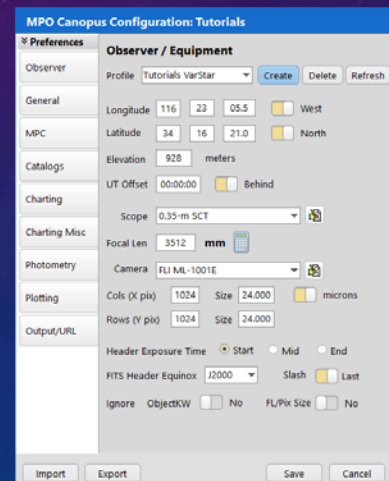
V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

From here on, match all settings on the tab being shown, even if not mentioned.

Button names within <>, e.g., "Click <Clear>," means click a button with a caption of Clear.

The settings are valid only for the tutorials. You must create a separate profile that matches your setup and images.



V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

If a new installation, only a DEFAULT profile exists, or at least it should.

Create a New Profile (make a copy of the current settings)

Type "Tutorials VarStar" (without quotes) in the Profile name field.

Click <Create>.

Values for all text fields should not include quotes.

MPO Canopus Configuration: Tutorials

Preferences

Observer / Equipment

Observer Profile: Tutorials VarStar [Create] [Delete] [Refresh]

General Longitude: 116 23 05.5 West

MPC Latitude: 34 16 21.0 North

Catalogs Elevation: 928 meters

Charting UT Offset: 00:00:00 Behind

Charting Misc Scope: 0.35-m SCT

Charting Misc Focal Len: 3512 mm

Photometry Camera: FUJIL-1001E

Plotting Cols (X pix): 1024 Size: 24,000 microns

Plotting Rows (Y pix): 1024 Size: 24,000

Output/URL Header Exposure Time: Start Mid End

FITS Header Equinox: J2000 Slash Last

Ignore ObjectKW: No FL/Pix Size: No

Import Export Save Cancel

The Observer Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- **Long/Lat** (*confirm in correct hemisphere*)
- **UT Offset** (*FITS headers, NOT computer*)
- **Scope/Camera Names**
(*"TutorialsProfile.mp4" if no scope/camera*).
- **Focal Length** (*mm. Use calculator to convert*)
- **Columns/Rows** (*number of binned pixels*)
- **Pixel sizes** (*binned size, not physical*)
- **Header Exposure Time**
- **FITS Header Equinox**
- **Ignore Object/KW and FL/Pix Size:** Yes, but only if having problems with Automatch

MPO Canopus Configuration: Tutorials

Preferences

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Elevation: 928 meters

Catalogs

UT Offset: 00:00:00 [Behind]

Charting

Scope: 0.35-m SCT

Charting Misc

Focal Len: 3512 mm

Photometry

Camera: FUJ ML-1001E

Plotting

Cols (X pix): 1024 Size: 24,000 [microns]

Rows (Y pix): 1024 Size: 24,000

Output/URL

Header Exposure Time: [Start] [Mid] [End]

FITS Header Equinox: J2000 [Slash] [Last]

Ignore Object/KW: [No] FL/Pix Size: [No]

[Import] [Export] [Save] [Cancel]

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

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Focal Len: 3512 mm

Photometry Camera: FLI ML-1001E

Plotting

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Rows (Y pix): 1024 Size: 24,000

Output/URL

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FITS Header Equinox: J2000 [Slash] [Last]

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FITS Header Equinox: J2000 [Slash] [Last]

Ignore Object/KW: [No] FL/Pix Size: [No]

[Import] [Export] [Save] [Cancel]

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- UT Offset (*FITS headers, NOT computer*)
- Scope/Camera Names
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- Focal Length (*mm. Use calculator to convert*)
- Columns/Rows (*number of binned pixels*)
- Pixel sizes (*binned size, not physical*)
- **Header Exposure Time**
- FITS Header Equinox
- Ignore Object/KW and FL/Pix Size: Yes, but only if having problems with Automatch

MPO Canopus Configuration: Tutorials

Preferences

Observer / Equipment

Observer Profile: Tutorials VarStar [Create] [Delete] [Refresh]

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FITS Header Equinox: J2000 [Slash] [Last]

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[Import] [Export] [Save] [Cancel]

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- Pixel sizes (*binned size, not physical*)
- Header Exposure Time
- **FITS Header Equinox**
- Ignore Object/KW and FL/Pix Size: Yes, but only if having problems with Automatch

MPO Canopus Configuration: Tutorials

Preferences

Observer / Equipment

Observer Profile: Tutorials VarStar [Create] [Delete] [Refresh]

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Header Exposure Time: Start Mid End

FITS Header Equinox: J2000 [Slash] [Last]

Ignore Object/KW: No FL/Pix Size: No

[Import] [Export] [Save] [Cancel]

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- Long/Lat (*confirm in correct hemisphere*)
- UT Offset (*FITS headers, NOT computer*)
- Scope/Camera Names
(*"TutorialsProfile.mp4" if no scope/camera*).
- Focal Length (*mm. Use calculator to convert*)
- Columns/Rows (*number of binned pixels*)
- Pixel sizes (*binned size, not physical*)
- Header Exposure Time
- FITS Header Equinox
- **Ignore Object/KW and FL/Pix Size: Yes, but only if having problems with Automatch**

MPO Canopus Configuration: Tutorials

Preferences

Observer / Equipment

Observer Profile: Tutorials VarStar [Create] [Delete] [Refresh]

General

Longitude: 116 23 05.5 [West]

MPC Latitude: 34 16 21.0 [North]

Catalogs Elevation: 928 meters

Charting UT Offset: 00:00:00 [Behind]

Charting Misc Scope: 0.35-m SCT

Photometry Focal Len: 3512 mm

Camera: FLI ML-1001E

Plotting Cols (X pix): 1024 Size: 24,000 [microns]

Rows (Y pix): 1024 Size: 24,000

Output/URL

Header Exposure Time: [Start] [Mid] [End]

FITS Header Equinox: J2000 [Slash] [Last]

Ignore Object/KW: No FL/Pix Size: No

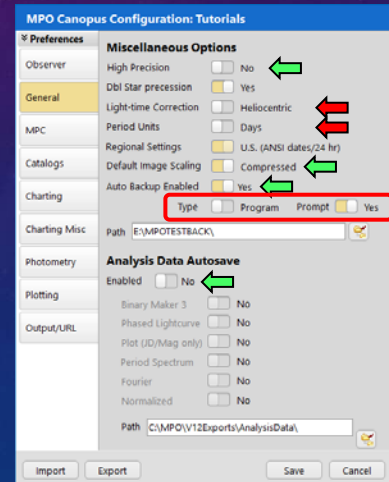
[Import] [Export] [Save] [Cancel]

The General Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- High Precision: No
- **Light-time Correction: Heliocentric**
- **Period Units: Days**
- Default Image Scaling: Normal
- Auto Backup Enabled: YES!!
 - Type: Program (only tables used by program)
 - Prompt: Yes (allows keeping the program open)
 - Path: <A directory NOT under MPOV12, preferably on a different physical drive>
- Analysis Data Autosave Enabled: No



The MPC Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

Do not use these values for the profiles you create for your personal use!

- Set values as shown here
Ignore Header Name value (asteroid specific)
- **Critical fields**
 - MagBand: **V**
 - Photo/Ast Cat: **APASS**

MPO Canopus Configuration: Tutorials

Preferences

MPC Astrometry (MPC 80/ADES)

Observer: Header Name: Tutorials

General: Report Style: ADES (1-line PIPE Delimited)

MPC: MPC Code: XXXX Report Type: MBA

Catalogs: Observatory: My Observatory

Submitter: J. Q. Astronomer

Charting: Observers: J. Q. Astronomer

Charting Misc: Measurers: J. Q. Astronomer

Photometry: Aperture: 0.350 m Design: Schmidt-Cassegrain

Fz ratio: 0.10 Defocus: CCD

Plotting: Mag Band: V

Output/URL: Photo/Ast Cat: APASS

Comments:

MPC Email: obs@cfa.harvard.edu

Your Email: jqa@jqaobs.org

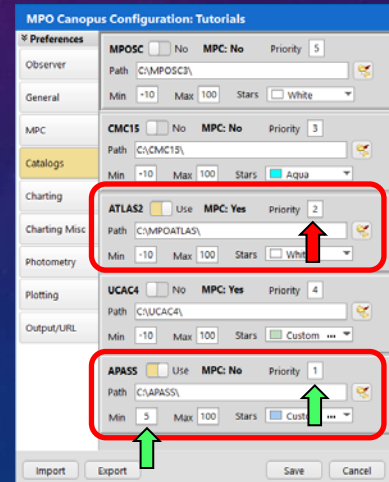
Import Export Save Cancel

The Catalogs Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- Used (maybe) if switch = Use
- **Change paths to match those on your machine!**
- Use defaults for Min/Max mags (note APASS)
- Avoid duplicate colors for used catalogs
 - Comp 1 = **Lime** Target = **Yellow**
- Used in priority number order
 - MPC tab Photo/Ast catalog must be used and priority 1
 - Priority 0: not used even if switch = Use



The Charting Tab

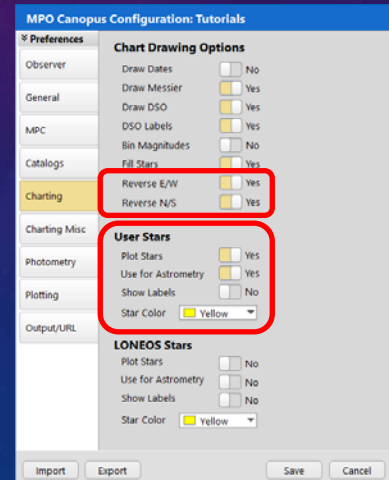
V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- Reverse E/W (*mirror X-axis*)
- Reverse N/S (*mirror Y-axis*)
- User Stars: **Plot Stars = Yes**
- LONEOS: **Plot Stars = No**

User Stars and LONEOS always plotted if Plot Stars = Yes, but only after priority catalogs

*Landolt standards in LONEOS always **Red***

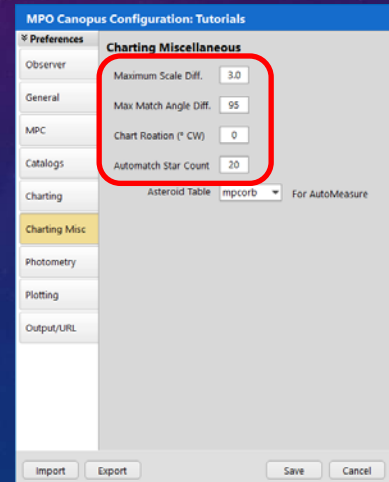


The Charting Misc Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- **Maximum Scale Diff / Max Angle Diff**
(tries to avoid really bad matches)
- **Chart Rotation** *(helps with Automatch)*
- **Automatch Star Count**
Controls number of match searches
Matching time increases significantly as this value increases
- **Asteroid Table** *(orbit elements source for AM)*
Used only if the FITS header doesn't have an RA/Dec but OBJECT keyword has asteroid number and/or name



The Photometry Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- **Default Filter (not mag band): C**
- **Default AAVSO Filter: CV**
- **AAVSO Observer Code: XXX**
- **Default Mag Band: V**
- **Default Color Index: VR**

MPO Canopus Configuration: Tutorials

Preferences

Observer: Default Filter: **C**

General: Default AAVSO Filter: CV, AAVSO Obs Code: XXX

MPC: Default Mag Band: V, Default Color Index: VR

Catalogs: Dark: , Bias: , Flat:

Charting: Clear process frame if blank: No

Photometry: Photometry Magnitudes: Method: Derived, Clipping: 0.5, Saturation %: 90, Ignore: No, Max MIR Std Dev: 0.03, Min Comps SNR: 10, Camera eADU: 2.3

Plotting: Output/URL:

Buttons: Import, Export, Save, Cancel

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- **Default Filter (not mag band): C**
- **Default AAVSO Filter: CV**
- **AAVSO Observer Code: XXX**
- **Default Mag Band: V**
- **Default Color Index: VR**

MPO Canopus Configuration: Tutorials

Preferences

Observer: Default Filter: C

General: Default AAVSO Filter: **CV**, AAVSO Obs Code: XXX

MPC: Default Mag Band: V, Default Color Index: VR

Catalogs: Dark: , Bias: , Flat:

Charting: Clear process frame if blank: No

Photometry: Photometry Magnitudes: Method: Derived, Clipping: 0.5, Saturation %: 90, Ignore: No, Max MIR Std Dev: 0.03, Min Comps SNR: 10, Camera eADU: 2.3

Plotting: Output/URL:

Buttons: Import, Export, Save, Cancel

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- Default Filter (*not mag band*): C
- Default AAVSO Filter: CV
- **AAVSO Observer Code: XXX**
- Default Mag Band: V
- Default Color Index: VR

MPO Canopus Configuration: Tutorials

Preferences

Observer: Default Filter: C

General: Default AAVSO Filter: CV

MPC: AAVSO Obs Code: XXX

Catalogs: Default Mag Band: V

Charting: Default Color Index: VR

Charting Misc: Dark: [] Bias: [] Flat: []

Clear process frame if blank: No

Photometry

Plotting: Method: Derived

Output/URL: Clipping: 0.5

Saturation %: 90

Ignore: No

Max MIR Std Dev: 0.03

Min Comps SNR: 10

Camera eADU: 2.3

Import Export Save Cancel

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- Default Filter (*not mag band*): C
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MPO Canopus Configuration: Tutorials

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Observer: Default Filter: C

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MPC: AAVSO Obs Code: XXX

Catalogs: Default Mag Band: V

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Clear process frame if blank: No

Photometry

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Import Export Save Cancel

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MPO Canopus Configuration: Tutorials

Preferences

Photometry Defaults

Observer: Default Filter: C

General: Default AAVSO Filter: CV

AAVSO Obs Code: XXX

MPC: Default Mag Band: V

Catalogs: Default Color Index: VR

Dark: []

Charting: Bias: []

Charting Misc: Flat: []

Clear process frame if blank: No

Photometry

Plotting: Method: Derived

Clipping: 0.5

Saturation %: 90

Ignore: No

Max MIR Std Dev: 0.03

Min Comps SNR: 10

Camera eADU: 2.3

Import Export Save Cancel

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- **Method: Derived**
- * Clipping: 0.5 (sigmas above sky level)
- Saturation percent: 90
- Ignore Saturation: NO!
- Min Comps SNR: 10
- * Camera eADU: 2.3

* *Must not change for any measurements under this profile.*

MPO Canopus Configuration: Tutorials

Preferences

Photometry Defaults

Observer: Default Filter: C

General: Default AAVSO Filter: CV

AAVSO Obs Code: XXX

MPC: Default Mag Band: V

Catalogs: Default Color Index: VR

Dark: []

Charting: Bias: []

Charting Misc: Flat: []

Clear process frame if blank: No

Photometry

Plotting: Method: Derived

Clipping: 0.5

Saturation %: 90

Ignore: No

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Import Export Save Cancel

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Photometry Defaults

Observer: Default Filter: C

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MPC: Default Mag Band: V

Default Color Index: VR

Catalogs: Dark: [] Bias: [] Flat: []

Clear process frame if blank: No

Photometry Magnitudes

Method: Derived

Clipping: 0.5

Saturation %: 90

Ignore: No

Max: MIR Std Dev: 0.03

Min Comps SNR: 10

Camera eADU: 2.3

Import Export Save Cancel

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Photometry

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Saturation %: 90

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Charting: Clear process frame if blank: No

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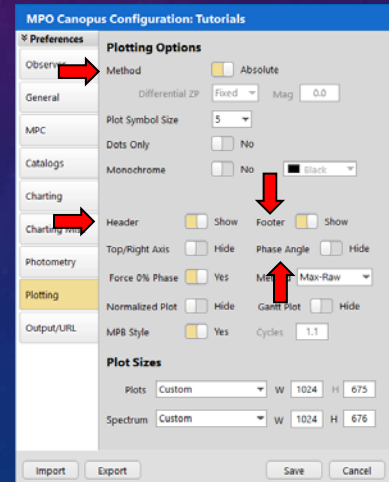
Buttons: Import, Export, Save, Cancel

The Plotting Tab

V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

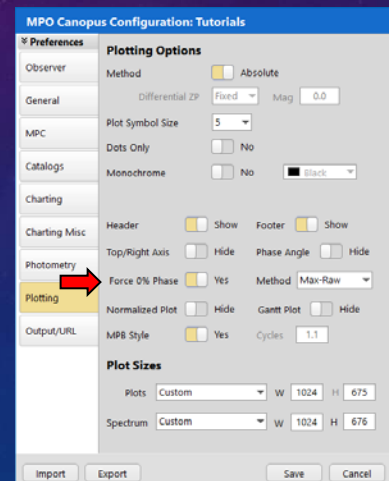
- **Method: Absolute**
- **Header: Show**
- **Footer: Show**
- **Phase Angle: Hide**
- **MPB Style: Yes**
- **Plots: Custom (1024x675)**



V12 Tutorial: Creating a Variable Star User Profile

Creating a User-profile for Variable Star Examples

- **Force 0% Phase: Yes**
- Yes**
A chosen extrema is forced to 0% period phase
- No**
0% phase is at the minimum HJD in the data sets



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Creating a User-profile for Variable Star Examples

- Method (0% phase): **Max-Raw**

Max-Raw

Extrema is brightest magnitude point

Max-FA

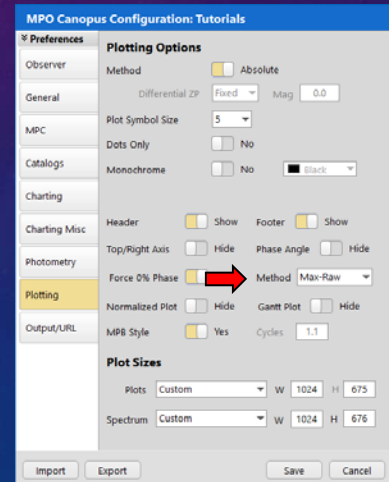
Extrema is the Fourier curve value based on the brightest magnitude

Min-Raw

Extrema is faintest magnitude point

Min-FA

Extrema is the Fourier curve value based on the faintest magnitude

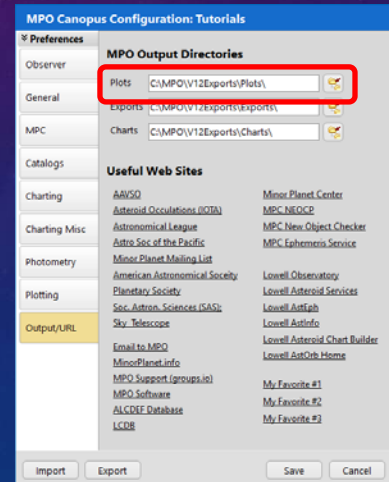


The Output Tab

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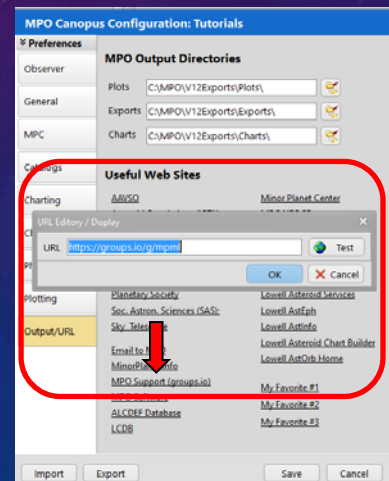
- **Plots: {Default save directory}**
- **Links to popular sites**
 - Right-click on a link to update and test the URL.



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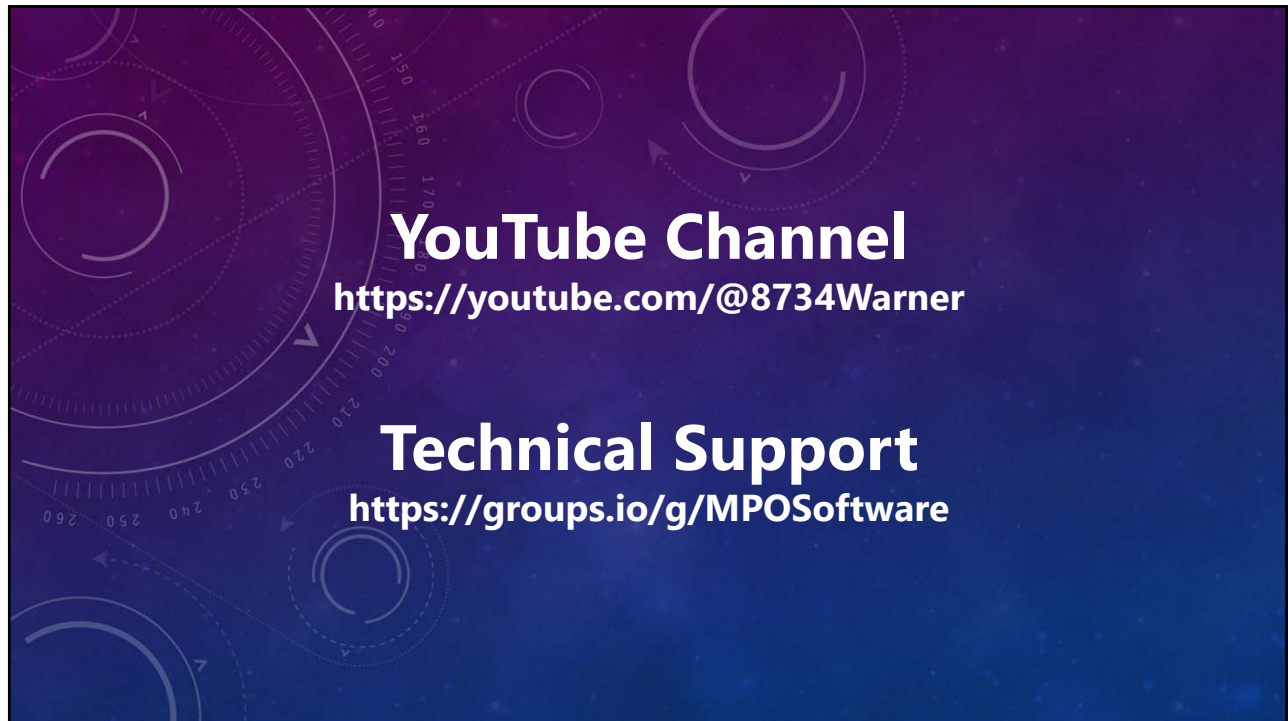
- **Plots: {Default save directory}**
- **Links to popular sites**
 - Right-click on a link to update and test the URL.





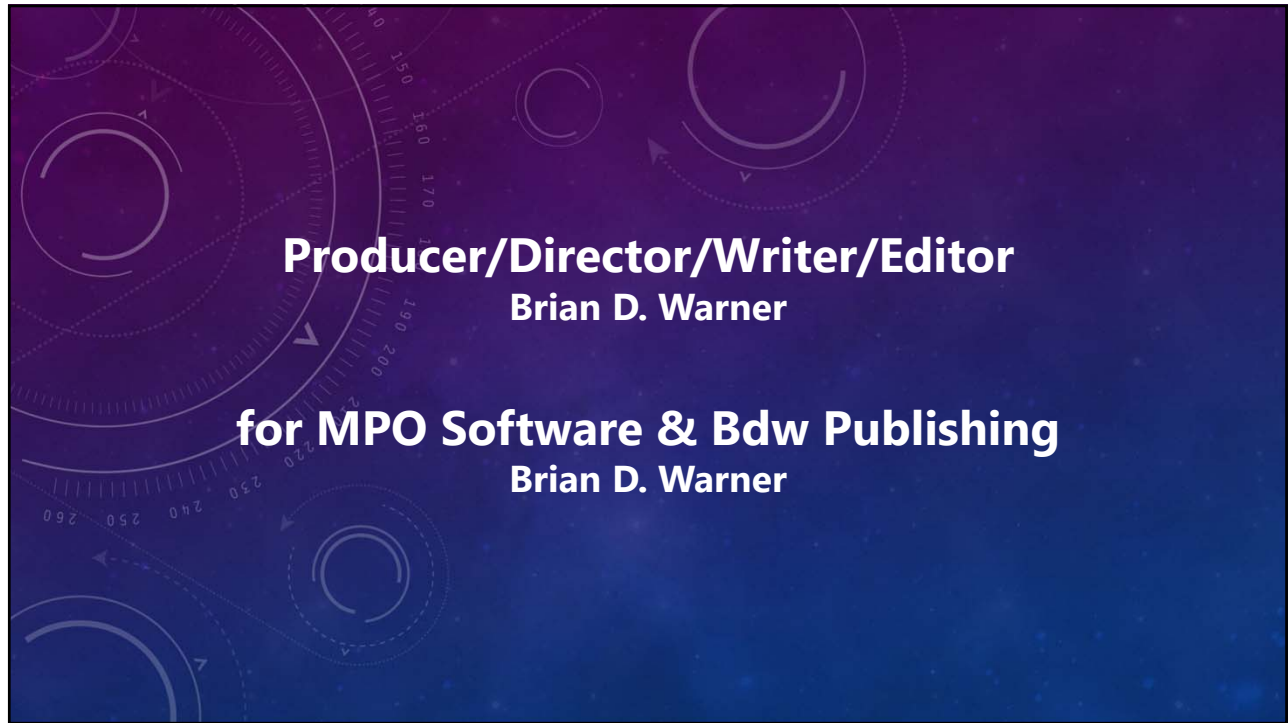
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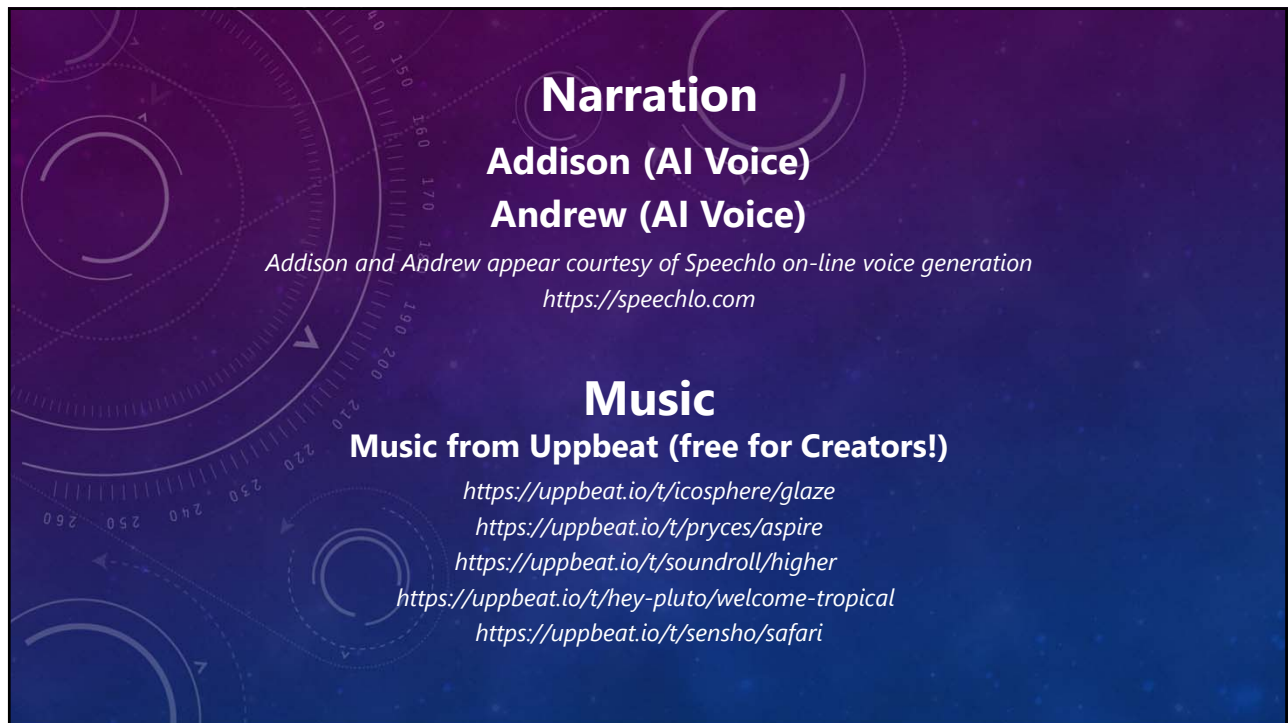
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<https://youtube.com/@8734Warner>

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



Producer/Director/Writer/Editor
Brian D. Warner

for MPO Software & Bdw Publishing
Brian D. Warner



Narration
Addison (AI Voice)
Andrew (AI Voice)

Addison and Andrew appear courtesy of Speechlo on-line voice generation
<https://speechlo.com>

Music
Music from Uppbeat (free for Creators!)

<https://uppbeat.io/t/icosphere/glaze>
<https://uppbeat.io/t/prycles/aspire>
<https://uppbeat.io/t/soundroll/higher>
<https://uppbeat.io/t/hey-pluto/welcome-tropical>
<https://uppbeat.io/t/sensho/safari>

Catering

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Caffeination

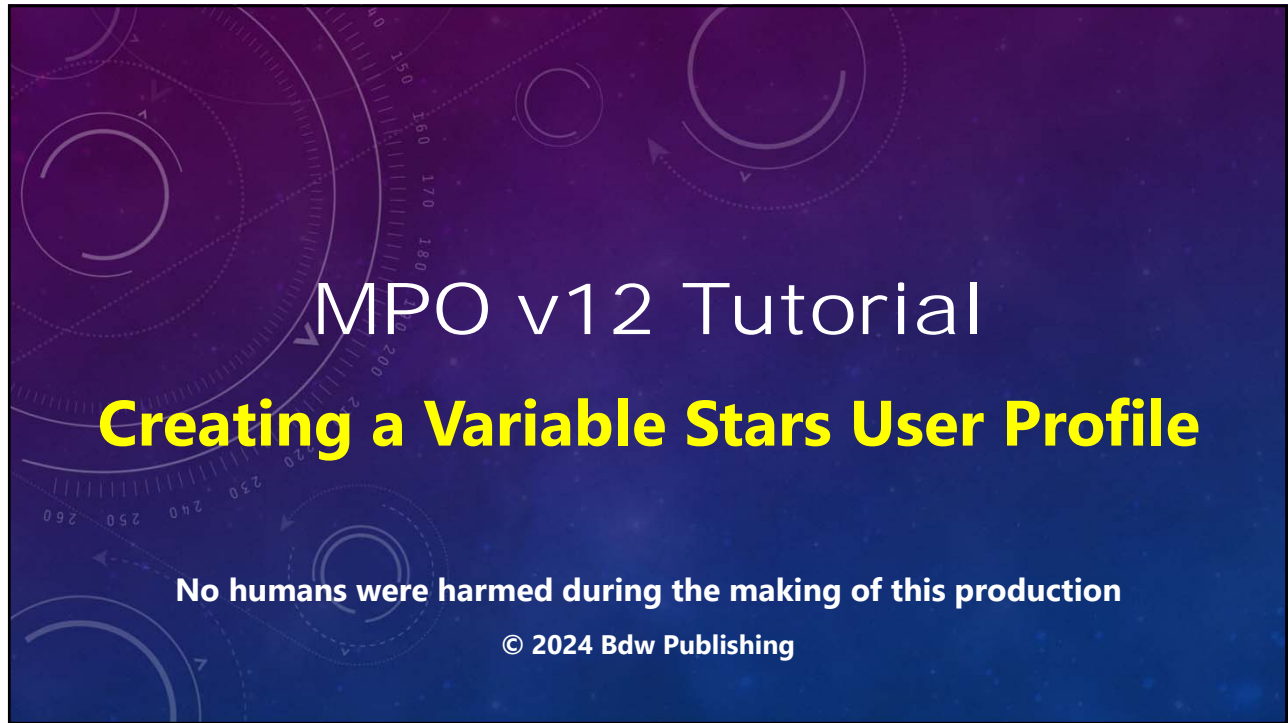
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