

### Siril Scripts

To locate your scripts, click on the “burger” (three lines) icon in the top right. Choose Preferences and then choose Scripts to see your scripts and their location. If necessary, copy the “Without” and Seestar scripts. They are not visible by default.

1. Find the location for your scripts. It should be /user/“your name”/Siril/Scripts.
    - Click on the burger (three lines) in the top right.
    - Click on Preferences.
    - Click on Scripts.
  2. Go [here](#).
  3. Click on the script.
  4. Download it to /user/“your name”/Siril/scripts.
- The **OSC\_Preprocess** script performs the following steps.
    - convert bias -out=../process -> stack bias rej 3 3 -nonorm
    - convert dark -out=../process -> stack dark rej 3 3 -nonorm
    - convert flat -out=../process -> calibrate flat -bias=bias\_stacked -> stack pp\_flat rej 3 3 -norm=mul
    - convert light -out=../process
    - calibrate light -bias=bias\_stacked -dark=dark\_stacked -flat=pp\_flat\_stacked -cfa -equalize\_cfa -debayer
    - register pp\_light -drizzle
    - stack r\_pp\_light rej 3 3 -norm=addscale -output\_norm -out=../result
  - The **Seestar\_Preprocessing** script performs the following steps. You can add -drizzle.
    - link light -out=../process
    - calibrate light -debayer
    - register pp\_light -2pass -drizzle
    - seqapplyreg pp\_light -filter-round=2.5k
    - stack r\_pp\_light rej 3 3 -norm=addscale -output\_norm -rgb\_equal -out=result
    - mirrorx\_single result

## Siril Pre-Processing (Stacking your images)

**(Option 1): SCRIPT PRE-PROCESSING (STACKING):** If you are starting with individual light frames and want Siril to stack them follow the steps below.

1. Create a folder for Siril with four subfolders (Biases, Darks, Flats, Lights). Just create a lights subfolder if you don't have calibration frames (and when you have Seestar images).
2. Load your image frames into the appropriate folders.
3. If you already have master calibration files (such as those from an ASiAir), place them in the appropriate folder (Biases, Darks, and Flats). Duplicate them so there is more than one of each.
4. Click the Home button and point to the folder where Siril will find the images (the subfolders) and place the results.
5. Run the appropriate script.
  - **OSC\_Preprocess** if you have a set of all three types of calibration frames.
  - **OSC\_Preprocess\_WithoutDark** if you don't have individual dark calibration frames.
  - **OSC\_Preprocess\_WithoutDBF** if you don't have individual calibration frames.
  - **Seestar\_Preprocessing** if you have lights (and no calibration frames) from a Seestar.
6. Open the **result.fit** file (in the process folder) or the file with information about the stacked image (e.g., M##\_300x10sec\_T10degC\_yyyy\_mm\_dd.fit) and process it (below).

**(Option 2): MANUAL PRE-PROCESSING (STACKING):** As an alternative, you can manually pre-process your light frames.

1. Create a folder for Siril to place the results (e.g., process).
2. Click the Home button and point to the folder you created in step 1.
3. **Conversion:** Click + and then go to your folder containing your light frames, highlight them and click Add. Specify a Sequence Name (e.g. results). Check Debayer. Click Convert.
4. **Calibration:** Specify the location of your calibration frames (fits, biases, and darks). Skip this step for Seestar images (lights only).
5. **Registration:** Choose Global Star Alignment (deep-sky) or Two-pass Global Star Alignment (deep-sky). You can choose to use Simplified Drizzle x2. Click Go Register. The registration stars will appear in the image to the left.
6. **Plot:** Switch to "AutoStretch". Click on the "Frames" icon in the lower right. Review the frames – click on the space bar or uncheck the line to remove any "bad" ones.
7. **Stacking:**
  - Choose the Stacking Method: Sum stacking or Average stacking with rejection.

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- Choose Image rejection: all (include all frames) or selected (include only frames selected in the previous step).
  - Click Start Stacking.
8. Continue on and process the stacked file (below).

**(Option 3): START WITH A PRE-PROCESSED (STACKED) IMAGE:** If you have a previously stacked tiff or fit file produced by Seestar, ASIStudio, or another package follow these pre-processing steps.

1. Create a folder for Siril to place the results.
2. Click the Home button and point to the folder you created in step 1.
3. Open the previously stacked file and process it (below).

## Siril Initial Processing

**(Option 1): INITIAL PROCESSING (within Siril):** Begin processing your previously stacked file or your results file in Siril.

1. Switch your view from Linear to **Autostretch**, which will stretch the file so you can see what it looks like. It might have a lot of green (RGGB format) – if so, run **Remove Green Noise**.
2. **Crop the Image:** Right mouse click and choose **Rotate&Crop** to crop the image and remove the stuff on the edges.
3. **Remove Gradients:** Perform **Background Extraction**. This is always done against the original image – so you can experiment with multiple passes.
  - Click **Generate**.
  - If necessary, make adjustments to better cover the background. Then click **Generate**.
    - **Smoothing:** reduce this to remove more gradients. Increase it to remove less gradients.
    - **Grid Tolerance:** reduce or increase the background coverage. Increase this if light areas are not included in the background. Decrease this if too much of the target object is included in the background.
    - **Samples per Line:** Adjust this to decrease or increase the number of background squares.
  - Manually adjust the background area.
    - Right mouse click to remove background squares over your object.
    - Left mouse click add background squares in the background.
  - Click **Compute Background**.
  - Click **Apply**.

**(Option 2): INITIAL PROCESSING (within GraXpert):** Begin processing your previously stacked file or your results file in GraXpert. Most people recommend using GraXpert.

1. **Loading:** Load your previously stacked file or results file to GraXpert
2. **Crop:** Crop the image and remove the stuff on the edges.
3. **Background Extraction:**
  - Choose the Background Extraction **AI-Model** (advanced options over on the right).
  - Choose the Background Extraction **Interpolation Method**.
    - **RBF** is the same (somewhat manual process) as Siril.
    - **AI** uses the (automatic) AI-Model.
  - (RBF Only) Adjust the settings.
    - **Points per Line:** Adjust this to decrease or increase the number of background squares.
    - **Grid Tolerance:** reduce or increase the background coverage. Increase this if light areas are not included in the background.

Decrease this if too much of the target object is included in the background.

- (RBF Only) Click **Create Grid**.
  - (RBF Only) Manually adjust the background area.
    - Right mouse click to remove background squares over your object.
    - Left mouse click add background squares in the background.
  - Adjust **Smoothing**: reduce this to remove more gradients. Increase it to remove less gradients.
  - Click **Calculate Background**.
4. **Denoising**:
- Choose the Denoising **AI-Model** (advanced option over on the right).
  - **Denoising Strength**: Reduce it for less of an adjustment and increase it for more of an adjustment.
  - Click **Denoise Image** to reduce the noise in your image.
5. **Saving**: Save your results.
- Choose the file type (32-bit Fits).
  - Save either the
    - **Processed** (pre-stretched) file or
    - **Stretched & Processed** file (if you don't want to stretch it again in Siril).
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- Stretch your image using 10 Bg, sigma 3 to view the results as you are going through this workflow. Use 30 Bg, sigma 2 to really bring out the gradients.
  - You can choose to view the results for each of these steps by selecting the appropriate image at the top of the screen.

## Siril Final Processing

**FINAL PROCESSING (within Siril):** Continue processing your image in Siril.

1. If necessary, switch your view from Linear to **Autostretch**, which will stretch the file so you can see what it looks like.
2. **Remove Green Noise.** Do this if you notice a greenish tint to your image.
3. **Correct the Color:** Perform **Color Calibration -> Photometric Color Calibration.**
  - Click **Get Metadata from Image** to populate information about the image including the focal length and pixel size.
  - If metadata from your image is not available, search for your object from the Sinbad catalog.
  - Click Force Plate Solving?
  - Click Apply and Siril will match the color of your object to the Sinbad catalog.
4. Improve the shape of the stars using **Deconvolution.** Be careful – if you go too far (too many iterations or too large a gradient decent step size), you will create dark circles around the stars and increase background noise.
  - (Option 1): Choose **Blind Deconvolution** and click on **Apply.**
  - (Option 2 generate PSF): Choose **PSF From Stars.** Click **Generate PSF.**
    - Before doing this, you might open the **Dynamic PSF** window by selecting **Star Processing** and then clicking on the gear. From within the window, choose profile type Moffat and select stars within a specific amplitude range (say .1 to .7). After running Generate PSF, you can clear the stars.
  - (Option 2 apply PSF): Using the PSF, click **Apply.**
    - Adjust the **Gradient decent step size** and repeat as needed.
5. **Remove the Stars (Optional):** Run **Star Processing -> StarNet Star Removal.** This will create two files: a starless file and starmask file. You will continue to work with the starless file.
  - Your view should be Autostretch
  - Check Pre-stretch linear Image
  - Check Generate star mask.
  - Click Apply.
6. **Stretch the image.** Switch your view back to **Linear** from Autostrech. If using a Starless image, make sure to Save when finished.
  - **(Option 1):** Auto Stretch Your Image using the **Histogram Transformation.**
    - Run the **Histogram Transformation.** Click on **Clip %** to apply the autostretch algorithm. Click Apply. This gives you a starting point. However, there are a couple issues with this: Galaxies tend to look too bright, and backgrounds tend to look too light.
    - (Optional) Manually make some more adjustments as needed.
      - Click on the + to zoom into your histogram.
      - Move the **left slider (shadows)** to the right toward the histogram. Click Apply. Repeat until the histogram is over on

- the left and the flat area is gone. This darkens the background. Keep the Clip % < .1% if possible. You might do this individually for each color (RGB) – for nebulae it is possible that green and blue need to be adjusted, but not red.
- Move the **middle slider (midtones)** a short way to the left or right. Click Apply. Repeat until the object looks good. Don't go too far to the right otherwise the object (particularly a galaxy) will be too bright.
- **(Option 2): Manually Stretch Your Image using the Histogram Transformation.**
    - (Optional) Run the **Asinh Transformation**. Move the Stretch factor to the right until you see a faint image of your object. Click Apply.
    - Run the **Histogram Transformation**. Use the middle (midtones) and left (shadows) sliders to manually stretch the image.
      - (Optional) Hit the + button once or twice to zoom in a little.
      - Move the **middle slider (midtones)** a short way to the left. Click Apply. Repeat until the object first comes into view and then looks good. Don't go too far otherwise the object (particularly a galaxy) will be too bright.
      - Move the **left slider (shadows)** to the right toward the histogram. Repeat until the histogram is over on the left and the flat area is gone. This darkens the background. Keep the Clip % < .1% if possible.
      - Repeat the above two steps by moving the left slider to the right and the middle slider back and forth. This spreads the histogram out and results in a better balance.
  - **(Option 3): Manually Stretch Your Image using the Generalized Hyperbolic Stretch Transformations.**
    - More to come here.
7. **Recombine the Stars** (If Stars were previously removed to a separate file): Run **Star Processing -> Star Recomposition** to combine the Starless and Starmask files.
- Specify your Starless file (which you have been working with) on the left. (Optional) Adjust the Stretch factor a little. If so, click Apply on the left.
  - Specify your Starmask file on the right. If not done in the previous step, adjust the Stretch factor ( $\ln(D+1)$ ) for the Starmask file.
    - Choose **Advance** and then **Generalize Hyperbolic Transform**. This gives the stars a more rounded look.
    - Set the slider to around .5 for the original number of stars.
    - Move the slider to the right to include more stars (maybe .7) – good option if using deconvolution.
    - Keep the slider a little to the left to diminish the stars (maybe .3).
  - Click **Apply** on the right.
8. Additional Optional Steps (If necessary)

- Perform **Noise Reduction**, although this doesn't always work well here. It is probably best to do this in GraXpert.
  - Adjust the **Color Saturation** to enhance the colors. This can be used to artificially enhance the shape of a nebula.
    - Set Amount to around .4 (maybe).
    - Set Background Factor to around 1.25 (maybe). This removes the saturation from the background.
  - ~~Stretch your image using the **Asinh Transformation**. This can be used to darken the background:~~
    - ~~Choose (maybe) 10 to 150 for the Stretch Factor. However, this often gives a very white washed-out image.~~
    - ~~Choose (maybe) .01 to .04 for **Black Point**. This might be useful to get a darker background.~~
    - ~~Click Apply.~~
    - ~~(maybe) Repeat Stretching your image using the Histogram Transformation in the previous step.~~
9. Save the final image as a 16-bit or 32-bit fit, png, jpg, or tif file.
- ~~Right mouse click and ... , or~~
  - Use the “down” button to the right of the SAVE button on the top right. The image will be saved in the home folder.



## Siril Workflow

### A Few References

- Max Dobres. [\*Astrophotography Image Processing with GraXpert, Siril & Gimp\*](#). Maxim Dobres ARPS FRAS – Astrophotography. [Amazon](#).
- “[Tutorial For a Complete Image Processing](#).” Free Astro.
- “[Siril v1.2.X Tutorial Beginners Walk Through](#).” Ariel’s Cosmic Corner/YouTube. December 12, 2024.
- “[Seestar S50. My Workflow in Siril, GraXpert, Gimp and Astrosharp. 12,000 Subs!!!!!!](#)” Photon Rookie/YouTube. September 23, 2024.
- “[AMAZING images with the Seestar SMART TELESCOPE ⚡ FULL tutorial, Free Software ONLY!](#)” Cuiv, The Lazy Geek/YouTube. July 5, 2024.
- “[From Raw to Finished: A Siril v1.2.x Tutorial for Beginner Astrophotographers](#).” Deep Space Astro/YouTube. June 2, 2023.