

Presentation:

When processing astronomical images, it is sometimes desirable to work locally, focusing only on one or more specific areas of the image. This would allow for the mitigation of artifacts that often appear on the limb following detail-enhancement processes. Conversely, one might want to exclude certain areas from specific image adjustments.



These local processing capabilities were previously missing in AstroSurface. They are now available as of version **AstroSurface W1**. These new features are expected to evolve in future releases. **NB :** However, they do require a solid mastery of astronomical image processing.

Local processing will, for example, allow for better highlighting of faint celestial bodies or planetary moons. The process involves first applying a global sharpening to the image, but without overdoing it. To finish, a stronger sharpening can then be applied to specific areas while avoiding zones that are already high in contrast. Another example would be increasing color saturation on limited areas of Saturn's disk without affecting the rest of the image. The possible applications are numerous.

In AstroSurface, when opting for local processing, you must choose between two methods.

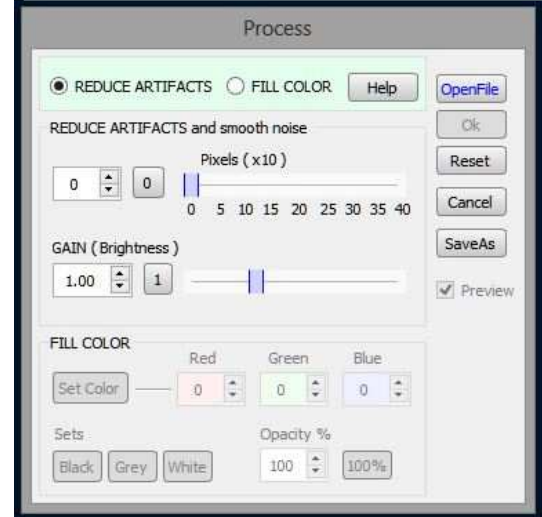
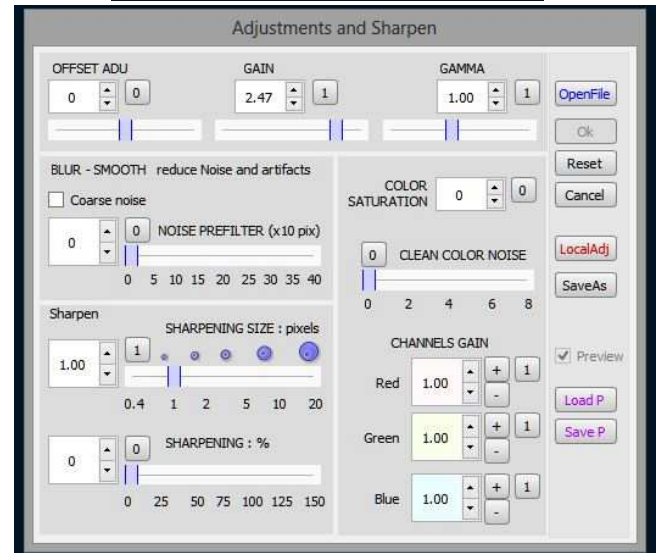
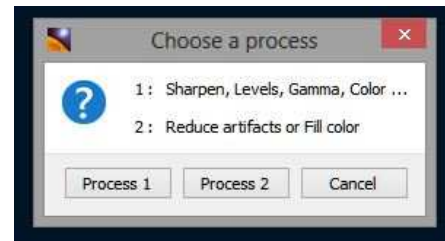
The first is likely to be the most frequently used, as it offers a wide range of adjustment options:

- Offset
- Gain
- Gamma
- Noise Prefilter
- Color Saturation
- Noise Color (reducer)
- Gain for each RGB channel
- Sharpen (Unsharp Masking)

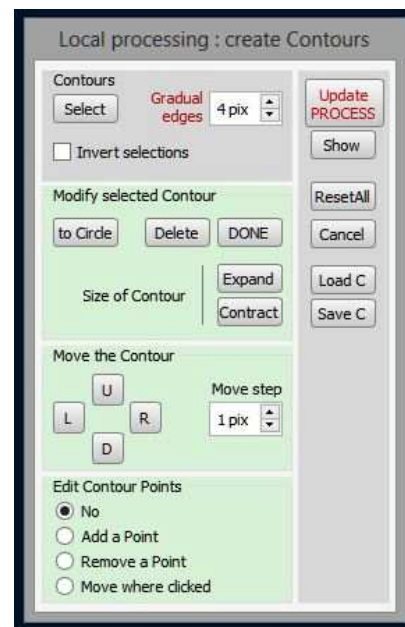
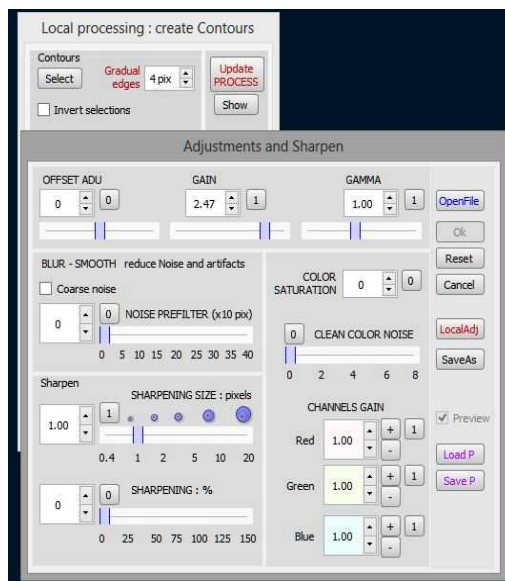
This method is strictly identical to the **Sharpen** method and therefore offers the same possibilities.

The second method offers the following two options to choose from:

- **Artifact and noise reduction** through smoothing and Gain (Brightness) adjustment.
- **Colorizing** one or more areas of the image (if it is a color image) or applying a grayscale tint (if it is a monochrome image).



Once you have selected **Process 1** or **Process 2**, the software will display the **Contours** creation window. These contours or selections are necessary to apply the local processing of Process 1 or Process 2. Shown opposite are the two windows displayed when opting for local adjustment with **Process 1 (Method 1)**. The window on the right is common to all local adjustments. It is used to create the selection contour(s) that define the specific area(s) to be processed.

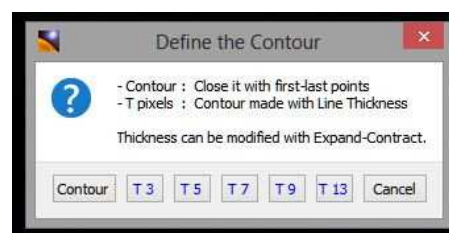


Practical Tip: Regarding the layout of the two windows, I recommend leaving them as they opened rather than placing them side by side. This ensures you don't lose visibility of the image being processed. This way, when you switch between them, the previous window will be partially behind the active one, and vice versa. To bring a window to the foreground, simply click on its top title bar.

appear when

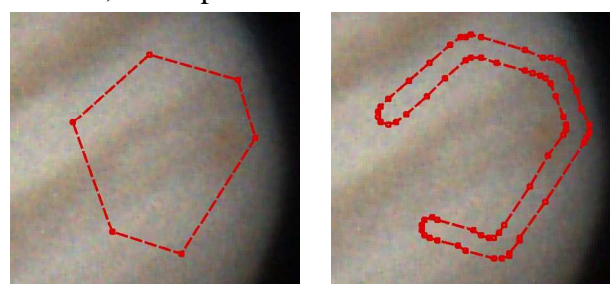
How to Create a Contour?

It involves drawing segments by clicking the mouse successively. To finish, simply double-click on the last point. The following selection window will then appear:



- If you click **Contour**, the shape will be closed by automatically drawing a line from the last point back to the first.
- If you click one of the buttons **T3, T5...T13**, a contour will be created based on the multi-segment line you drew, applying a thickness of 3, 5...13 pixels.

You can see the different effects of these two options on the right:



Important: Never click on the first point to finish a path!
Any contour can be modified later; for example, if the chosen **Thickness** is not suitable, you can use **Expand-Contract** to adjust it without having to redraw it.

Important: If you want to go back while a path is still in progress, simply press the **Del** or **Delete** keyboard key one or more times. Each press removes the last point and segment from the current path. Once the path is finished, you can modify the current contour. You must select it first to do so.



Managing Multiple Contours

To select a specific contour among several, simply click the "**Select**" button as many times as necessary. The selected contour will change color to green, indicating it is now editable.

- **Convert to Circle:** Transform the selected contour into a circular shape using the "**toCircle**" button.
- **Delete:** Remove the currently selected contour using the "**Delete**" button.
- **Reset:** Delete all contours. This clears every path you have drawn.

Creating a Circular Contour

In certain specific cases, you may want a contour to be perfectly circular. I will go into more detail on this feature later.

To do this, draw a path and select it. By pressing the "**toCircle**" button, a circular contour (an approximation) is created that encompasses all the points of the original path, and the original path is then deleted. This new contour is treated like an ordinary one; it can be moved, resized, and so on.

Inverting Selections

In some instances, you might prefer to define the areas that should **not** be processed. To achieve this, draw the contour(s) you wish to protect, then invert the selection by checking "**Invert selections.**"

Example: If you want to process the entire image except for two of Jupiter's moons, create two contours (one for each moon) and then check "**Invert selections.**"

Tip: Use the "**Show**" button to visualize exactly which areas will or will not be affected by the treatment.

Intersecting Contours

A contour can contain one or several others. Internal contours, or the overlapping areas common to two contours, will not be processed. This allows you, for example, to increase color saturation across a planetary disk except for one or more specific zones.

Note: Logically, this behavior also applies when "**Invert selections**" is checked. See the section above for more details.

The following options are available for the current contour (**green**):

- **Expand:** Enlarges the contour by a specified size, from 1 to 50 pixels.
- **Contract:** Decreases the size of the contour.
- **Move the Contour:** Moves the contour. The displacement step is adjustable in pixels.



Modifying Points of the Current Contour (in green)

These modifications are possible when the current contour is selected (green), meaning its path is completed.

- **Add a point / Remove a point:** Adds or removes the point closest to the mouse click.
- **Move a point:** To move a point, simply click where you want to place the point closest to the click.
- **Done:** To validate the modified Contour, click "**Done.**" It will change color (red) and be added to the list of existing contours.

Important: Adjusting Edge Softness

When locally processing a portion of an image, the transition between the treated zone and the surrounding untreated area is critical. If both zones have uniform intensity at the seams, there is no issue. However, this isn't always the case. You can make the subsequent processing progressive between each contour zone and the exterior using the "Gradual edge" setting (in pixels).

- **Default:** 4 pixels.
- **Adjustment:** Can be increased or decreased as needed. This setting is vital for the seamless blending of processed and unprocessed parts. You should experiment to familiarize yourself with this setting, as its value is often critical for achieving a good result.

Note: The "Gradual edge" parameter will be applied to **all** Contours! However, you can modify it at any time and visualize its effect, just like other contour modification methods.

Visualizing Zones and Saving

- **Show:** Hold down the "**Show**" button to visualize the areas affected by local processing. This also helps you evaluate the edge softness (the blurred area on each contour).
- **SaveC / LoadC:** Save a set of contours to a file or reload them later by providing a filename.
- **Load File:** This blue button allows you to use saved contours on a different image. This works best with images of the same size or when applying successive treatments to the same image using different contours.

Finalizing the Process

Once the paths are ready, click the large "**Update Process**" button. This applies the treatment using the parameters from your chosen settings window (**Process 1** or **Process 2**).

- **Going Back and Forth:** You can toggle between the **Selection Contours** window and the **Settings** window to fine-tune the "Gradual Edge" parameter or modify contours. Always click **Update Process** after making changes.
- **Reset:** Resets all settings to zero.
- **Preview:** Use the checkbox to see a before-and-after of your adjustments.
- **SaveAs:** Saves a version of the current image. You can also right-click for the **Histogram** option, which is standard across most AstroSurface methods.

Practical Advice

Everything is modifiable. To better see what you are tracing, use the **AstroSurface Viewer** options. In difficult cases, you can create a temporary version of a processed image to help you draw and save contours, then reload them for the final high-quality treatment.

Reminder: It will often be necessary to adjust the **Gradual Edge** parameter and the size of a Contour to ensure you process only what is needed while smoothing the transition.

Sharpening method (in Process 1):

1. **Sharpening %:** The strength of the filter.
2. **Sharpening Size:** The fine details to be enhanced. If too fine, you will mostly sharpen noise.
3. **Noise prefilter:** Almost always necessary to reduce noise and artifacts during sharpening.
4. **Clean Color Noise:** Recommended for color images to reduce chromatic noise often present in RGB images.

Pro Tip:

If the image has already undergone global processing (Deconvolution, Sharpen, or Wavelets), local sharpening should typically be done with a low **Sharpening %**, a larger **Sharpening Size**, and an active **Noise prefilter**.

In Practice

Local processing is often a complement to a modest global treatment. It usually follows basic adjustments (Levels, Contrast) to bring more visibility to faint details.

Remember:

Stay reasonable with settings to keep astronomical images looking natural. Master global settings first before moving to local processing, and never forget the **Noise Prefilter** and **Color Noise** tools!

Example: Removing Limb Artifacts To attenuate a limb artifact (the bright edge on a planet):

1. Click along the artifact from top to bottom to trace it with several segments (do not double back!).
2. Double-click then select **T7** for a 7-pixel wide contour.
3. Use **Process 2 (or 1)** to attenuate the area.

Don't hesitate to jump between windows as many times as necessary. With practice, it becomes very fast. Happy processing!

