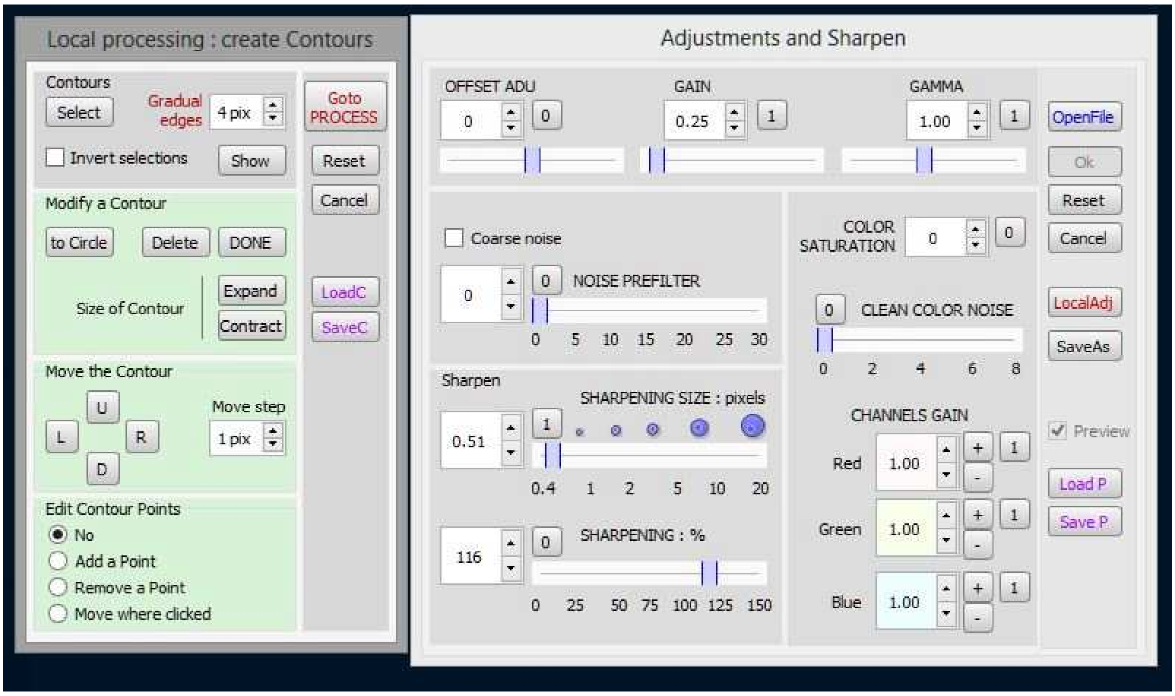
Introduction

For astronomical image processing, you sometimes want to perform local adjustments. On one or more areas of the image. It is possible also to avoid processing some areas. This is often done in addition to previous treatments that affect the entire image: levels, contrast, light sharpening, saturation, etc. This possibility of local processing was missing in AstroSurface. It is now available since AstroSurface W1.

<u>Please note</u> : These new features are intended for users who are already proficient in image processing.

Local adjustments allow you to better highlight faint stars or planetary satellites, for example. You can also reduce the appearance of those unsightly artifacts that appear on the edges of planets following strong sharpening. For example, you can process the entire image with a gentle sharpening. Then you can apply a stronger sharpening and contrast to specific areas, avoiding the high-contrast edges.

Another example: you can increase the color saturation in limited areas of Saturn's disc without affecting the rest of the image. The examples can be numerous.



TIP : When both windows are open, it's best <u>not to place</u> them side by side, as shown above. This avoids cluttering the image being processed. Leave them one behind the other. The one being used will then move to the foreground.

Principle of the New "Local_ADJ" Method in AstroSurface

This method is the old Sharpen, to which the possibility of applying it locally or not has been added. This method has the following settings:

- Offset, Gain, Gamma
- Noise Prefilter
- Color Saturation
- Noise Color (reducer)
- Gain of RGB channels
- Sharpening

How to Use the Method

When you start the method, you are prompted to work in either Global or Local mode.

- In Local mode, an additional window opens in addition to the usual one. This window, called "Local Processing: create Contours," allows you to create the closed Contours on which the adjustments from the main window will be applied. You can create one or more Contours.
- If you close this window, you return to the usual, or Global, processing mode. Similarly, if you wish to return to Local mode from Global mode, there is a 'LocalAdj' button in the main method.

How to Create a Contour

You create segments by successive mouse clicks. To close a contour, simply double-click on the last point.

- Note: You should not click on the first point as you might be tempted to do. In other words, for a triangle-shaped contour, you just need to click twice and double-click on the last vertex. Three vertices for a triangle, then.
- Important: While drawing a contour that is not yet finished, if you want to go back, just press the 'Suppr' or 'Delete' key on the keyboard, once or multiple times. Each time, the last point is removed from the path.Once the path is complete, you can modify the current contour. See below.

Inverting Selections

In some cases, you want to define the areas not to be processed instead.To do this, you draw the contour(s) not to be affected and then invert the selection by unchecking 'Process inside contour'. For example, if you want to process the entire image except for two of Jupiter's satellites, you will need to create two contours, one for each satellite. Invert the selection by checking ' Invert Selections '. Tip: Visualize what will be processed again with the 'Show' button.

Create a Circular Contour.

Just select a Contour and click toCircle button. This replaces the selected Contour by a circular Contour than will contain all points of previous one. The new Contour can be processes as anywone.

Contours intersection.

A contour can contain one or more contours. Internal contours or the part common to two contours will not be processed. This allows, for example, to increase color saturation on a disk except in one or more areas. Note: This behavior also works if ' Invert selections ' is checked. See above.

Managing Multiple Contours

- To select a contour from one or more, simply click the 'Select' button as many times as necessary. The selected contour changes color, turns green, and can then be modified.
- Click 'Done' after modifications of a contour, turns red
- Delete the selected contour with the 'Delete' button.
- Delete all contours with the 'Reset' button. All paths are deleted.

Options for the Current Contour (Green Color)

- Expand: Enlarges the contour by a size to be entered in pixels, from 1 to 50.
- Contract: Shrinks the size of the contour.
- Move the Contour: Moves the selected contour. The movement step is adjustable in pixels.

Modifying the Points of a selected Current

These modifications are possible when the current contour is selected (in green) and its path is complete.

- '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 that is closest to the click.

To validate the modified Contour, just click 'Done'. It changes color and is added to the others if there were any. (Red color)

Adjusting the "Progressivity of the Edges"

When you locally process a portion of an image, the question of the transition between the processed area and the surrounding unprocessed one arises. If the two areas have uniform intensity connections, there is no problem. But this is not always the case.

There is a way to make the subsequent processing gradual between each contour area and the outside. This is the **'Gradual edge'** setting, in pixels. By default, it is set to four pixels, but you can increase it depending on the case.

- Important: This setting should be adapted according to the result obtained with each processing attempt. The parameter is then applied for all contours !
- Sometimes one Contour will be expanded or contracted and Gradual Edge modified to process exactly what we want.

Visualizing the Area(s) Defined by the Contours

Hold down the **'Show'** button to visualize the area(s) affected by the local processing.

Saving and Loading Contours

You can save a set of contours and reload them from a file using the 'SaveC' and 'LoadC' buttons,

Using Saved Contours with Another Image

There will be no error when loading the contours if they all fit within the loaded image. This scenario is often useful with images of the same size, even if you need to adapt the contours a little before processing. Or to do successive treatments but with the same image and various combinations of contours. To load another image, don't forget the blue button ' Open File '.

How to Finalize the Processing

When the paths seem correct, just click the large 'Goto Process' button. This will apply the processing with the parameters from the main window if any were defined. You move to the main method or window. It is recalled that this method often reuses its last used parameters: Offset, Gain, Saturation, Sharpen...

At this level, you use the settings as you would in normal use. The 'Reset' button (in the main window) allows you to set the settings to zero. Then you do what you want. There is the 'Preview' checkbox to see before and after the adjustment. You can save and load sets of parameters with the 'LoadP' and 'SaveP' buttons.

Save a version of the current image with 'SaveAs'. Otherwise, right-click also offers the Histogram option. This is usually already known, as is often the case with many AstroSurface methods.

Practical :

Of course, you can always modify contours and then return to the settings, and vice versa, to achieve the desired result. Everything is editable. To better visualize what you're tracing, you can use the AsroSurface Viewer options. In difficult cases, you can use a temporary version of a processed image to create contours to save them... for subsequent processing.

A Reminder About Sharpening

There are three settings to sharpen images with this method:

- Sharpening %: The strength of the filter's application.
- Sharpening Size: The fineness of the details to be sharpened; if too fine, you mainly sharpen noise.
- Noise Prefilter: This filter is almost systematic because it reduces the appearance of noise and various artifacts during sharpening.

You could also add the 'Clean Color Noise' filter for color images. This reduces the colored noise that is often present on RGB images, with or without applied saturation.

- Advice: If the image has already undergone a global 'Deconvolution', 'Sharpen' or 'Wavelets' treatment... and it is a matter of then sharpening certain limited areas, this second sharpening is often done with a rather low 'Sharpening %', a larger 'Sharpening Size', and an activated and adjustable 'Noise Prefilter'.

In Practice

- A local adjustment can often complement a rather modest global one. Local processing often comes after some basic settings: Levels, Contrast... And the zone-based processing will then bring more visibility to certain less visible information. You will have to experiment to gain experience and above all remain reasonable in the settings to keep a natural look to the astronomical images.
  It's a good idea to start by mastering the global settings outside of local processing. And don't forget to use the NOISE PREFILTER and COLOR NOISE filters !