

Image Processing of ST2000XM Images with Small Focal Length

Part2 – Photoshop Workflow (CS2)

Bernhard Hubl, 5.09.2007

Image Processing of ST2000XM Images with Small Focal Length

1. ADAPTATION OF LUMINANCE AND RGB

The document www.astrophoton.com/tips/CCDSTACK_ST2000XM_eng.pdf describes the process of creating a DDP scaled RGB image and a DDP scaled luminance image. Both images are saved as 16 bit tif, which can be easily imported in Photoshop.

The color balance was already done with CCDSTACK. So, the color balance should not be modified.

After importing the luminance and the RGB image in Photoshop, I use a 'levels' layer to determine the black and the white point. Some 'curves' layers are used to adapt the histogram of the RGB image to the histogram of the luminance image.

At the end of this step, the RGB image and the luminance image should look very similar concerning the brightness distribution. The only difference between these two images is, that the RGB contains color and that the resolution and the SNR are much better in the luminance image.

2. REMOVE GRADIENTS

This step is optional, and is only done, when a bothersome gradient exists. If you have a very deep image, then you have to be very careful during gradient removing: Sometimes there are real nebulae, which seem to be gradients at first glance. This can happen even in galaxy fields (e.g. intergalactic cirrus in M81/M82 region: www.astrophoton.com/M081-2.htm).

The removal of a gradient should be done before the creation of the LRGB. If necessary, then the removal is done in both images. In my opinion, the best tool for this job is the GradientX Terminator of Russel Croman.

I do the following steps:

- Create a temporary curves layer: The dark areas in the image are extremely lightened to have a good judging of the efficiency of the gradient removal.
- Duplicate the background layer: GradientX Terminator should only act on the duplicated layer.
- Select object and stars
- Invert selection (only background should be selected)
- Deselect the outermost pixel rows and columns (The border pixels are sometimes not very good.)
- Filter->RC-Astro->GradientXTerminator
 - Balance Background Color: always on
 - Details: Coarse or Medium
 - Aggressiveness: Medium or High
- Reduce opacity of the layer to 85-95%
- Delete the temporary curves layer and reduce all layers to background layer.

3. LRGB

- Reduce the luminance image and also the RGB image to background layer.
- Select the luminance image: Image -> Mode -> RGB
- Select All (CTRL+A)

Image Processing of ST2000XM Images with Small Focal Length

- Copy (CTRL+C)
- Select RGB image
- Paste (CTRL+V): Now, the luminance image lies in a layer above the RGB image.
- Compare luminance with RGB: Remove artefacts, hot pixel,... with clone tool.
- Select luminance layer: Blend mode = luminance
- Several levels layers and curves layers are created, which act only on the RGB layer or only on the luminance layer (use clipping masks). Only small adjustments are done. It is the aim to reach a good object color and also good star colors of bright and faint stars.
- The color saturation is increased by typically 20%.

4. REDUCE COLORED PIXELS IN THE BACKGROUND

Sometimes, bothersome pixels with intense color are visible in the background and in faint nebula regions. The green pixels are the most problematic.

- Select RGB layer
- 600% zoom
- Eyedropper tool with sample size: 1 pixel
- Select -> Color Range
 - Fuzziness: approx. 20
 - Select green pixels in different regions of the image
 - Create a curves layer: slightly reduce green color.
- If necessary, then do the same procedure for blue and red pixels

5. GAUSSIAN BLUR

- Select RGB layer
- Select background
- Gaussian blur: radius 0.8 – 2.0 (radius should not be too big: color saturation is reduced by Gaussian blur)
- Hide RGB layer and choose luminance layer
- Select areas with high noise level (background and faint object areas)
 - Gaussian Blur:
 - Radius: 0.3 bis 0.4

6. HIGH PASS FILTER

The High Pass Filter can be used to highlight dark structures in galaxies.

- Duplicate luminance
- Blend Mode: Soft Light
- Filter->Other->High Pass: try different values: typically 8 to 10 pix
- Layer -> Layer Mask -> All hidden
- Use eraser to uncover the interesting areas

7. SHARPENING

- Sharpening only on luminance
- Select areas with good SNR
- Filter -> Sharpen -> Unsharp Mask
 - Amount: 50%; Radius 0.7 – 2.2; Treshold 0

Image Processing of ST2000XM Images with Small Focal Length

8. MINIMUM FILTER

The Minimum Filter is a very brutal tool, which reduces the dominance of bright stars. This filter cannot be used for every image, because the image could look unnatural (especially in dense star crowded areas).

- Reduce to background layer
- Duplicate layer
- Select only bright stars
- Deselect all objects (Only stars should be selected)
- Increase selection via Select->Modify->Expand (e.g. 2 pix)
- Filter -> Other -> Minimum -> 1 pix
- Edit -> Fade (30% - 60%)
- Adjust opacity of the minimum filtered layer to 80-90%