The ESA/ESO/NASA

Photoshop FITS Liberator

Step-by-step guide to making your own images

The ESA/ESO/NASA Photoshop FITS Liberator v.2

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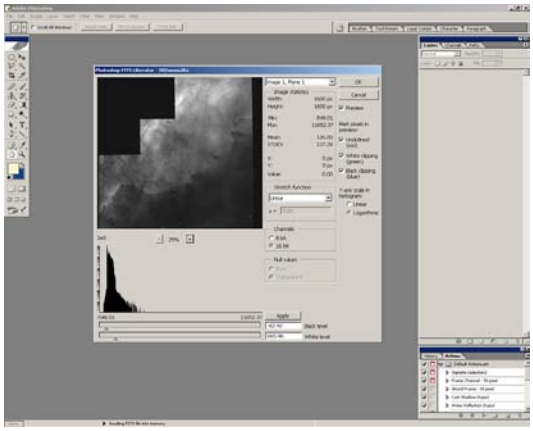
Step 1: Download

Download a set of FITS-files from the Educational data set page into the directory folder you want to work in.

Note: If your dataset contains more or less than three exposures you have to adjust the values of the hue mentioned below. If it contains two layers a third "psedogreen" layer can be created (in Photoshop CS, and 7.0) by adding the two existing layers - the blue and the red layer - to a new layer and divide this by two. in detail this is done by: "Image - > Calculations". Choose the blue layer as "Source 1 Layer", "channel Grey", the red layer as "Source 2 Layer", "channel Grey". "Blending Add". "Opacity 50%".

Step 2: 'Liberating' the FITS format images

Double click on one of the FITS files - this will open the image in the Photoshop FITS Liberator plug-in. Note that Elements 2 only operates in 8 bit and you will be asked to use the default colour depth if you do not select 8 bit in the FITS data window.
Now you have to choose the stretch function you want to use. Linear is the default setting, but you can experiment with the different possibilities to find the stretch function that brings out the most information in the image. You also have to set the black level and the white level sliders. This operation will truncate the information in the histogram of the image, so use it with care.
Repeat for the other images in the same dataset.

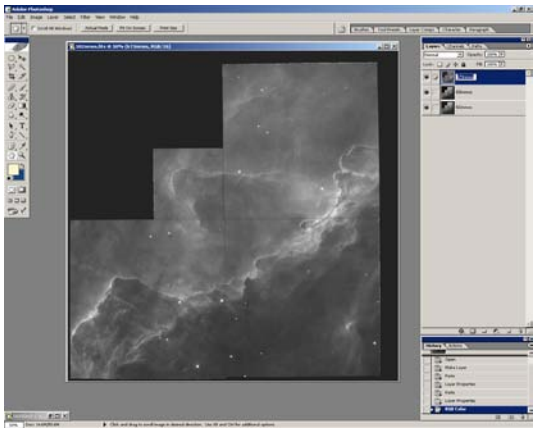


Using the Photoshop FITS Liberator plug-in

Now you have 'liberated' the data from the FITS format, the rest is hard work in Photoshop.

Step 3: Assemble the different exposures into different layers of the same image
You should now assemble the three images into one file. If the layer window does not automatically open, you can activate it through window -> layers (or by pressing F7).

One way of doing this is: select all in one image (short cut: Ctrl+a) - then "copy" (Ctrl+c).
Choose another image. Paste (Ctrl+v) the first image into the next image. This will create another layer in the first image, so you now have two images together in each their layer.
Rename the layers as you paste them as there are usually little visual difference between exposures (just double click on the name). Give them logic names like "656nmos-green".
Repeat with the third image, so you get all three images together in the same window, just in each their layer.
The layers should be in chromatic order, the first layer will be blue, so put the file corresponding to the lowest wavelength in the first layer, the middle wavelength in the second layer and the highest wavelength in the last layer that will become red (the layers are counted from the bottom of the screen and up).



Assembling and renaming layers.

If you have accidentally gotten the layers in the wrong order, you can drag them up and down as appropriate.

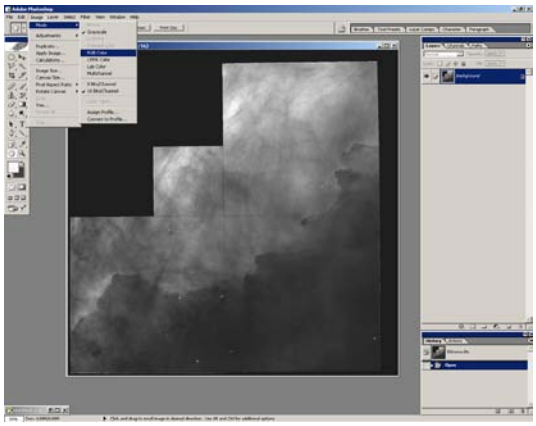
Save time and trouble
The action you can download from our download page takes care of step 3 through 7. So if you play the action, you can then go ahead to step 8. This will save you a lot of work.

So unless you are really interested in Photoshop detail, we recommend you play the action and then proceed to step 8.

On the download page there is a short description on how to load and play the action.

Step 4: Change mode to RGB
The grey scale images should now be converted to RGB images.

Do this by choosing image -> mode and then choose RGB as shown in the illustration.

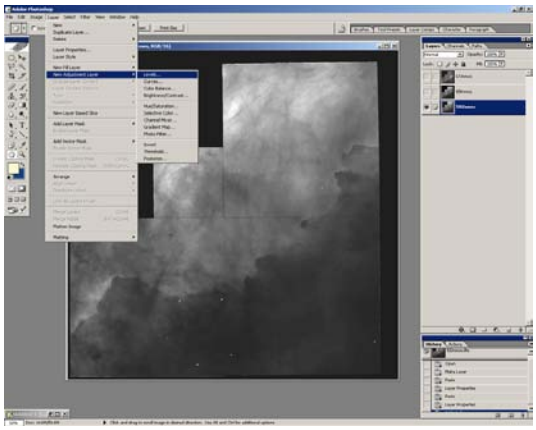


Changing mode from greyscale to RGB.

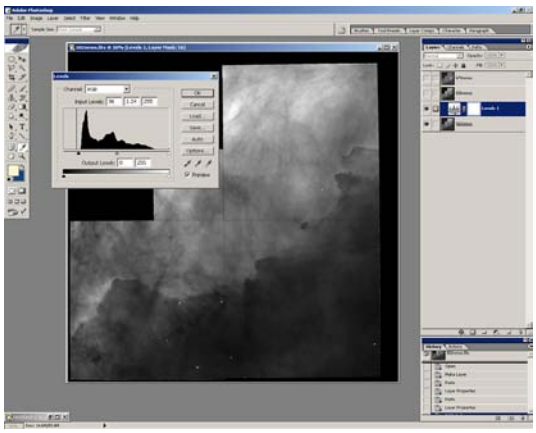
Step 5: Making a level adjustment layer

Now it is time to add some adjustment layers that allows you to change the intensities and colour of the layers. Having these as individual layers makes it easy to go back and re-adjust some settings later on.

Choose a layer by clicking on it.
Then add an adjustment layer by choosing Layer -> New Adjustment Layer -> Levels, as is shown in the illustration.
Remember to check the box "Use Previous Layer to Create Clipping Mask" (or "Group with previous layer" in Elements 2.0). If you forgot, delete the layer and make it again.
When the Levels dialogue box appears, you can slide the markers appropriately or wait and do this later.



Creating a level adjustment layer.

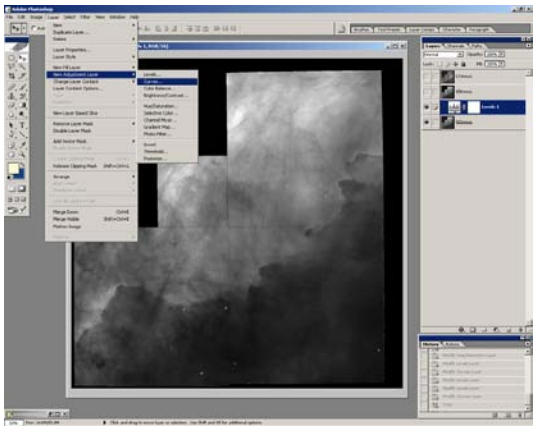


Adjusting the levels with the levels window.

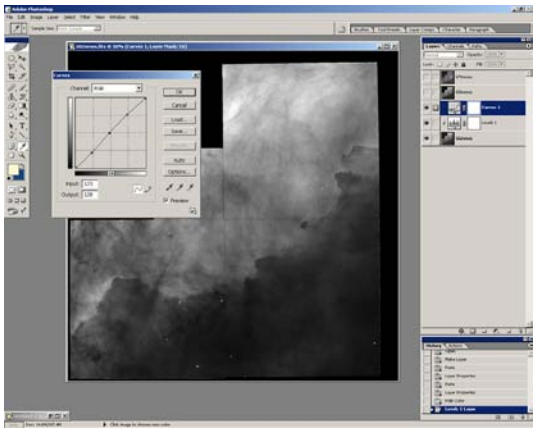
Step 6: Making curves and hue adjustment layers

Add another adjustment layer, this time choose Curves (not available in Elements 2.0).
Also check the box "Use Previous Layer to Create Clipping Mask" (or "Group with previous layer" in Elements 2.0).

Curves do the same as the stretch function earlier, but here it is possible to manipulate the stretch function by dragging the curve. Curves should be used with care. The main strength of this tool is its ability to emphasize either the light of the dark part of an image.

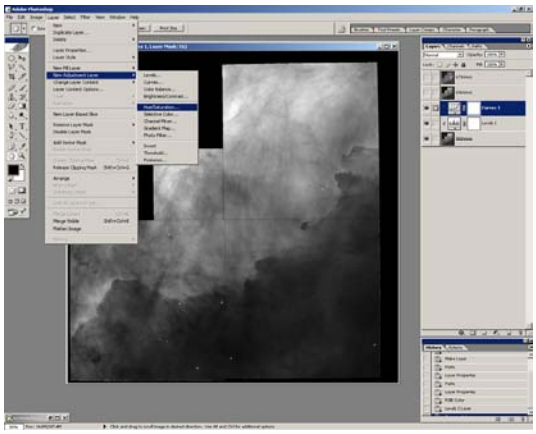


Creating a curve adjustment layer.



Adjusting curves.

Add a third adjustment layer, Hue/Saturation. Here you must also check the box "Use Previous Layer to Create Clipping Mask".



Creating a Hue/Saturation adjustment layer.

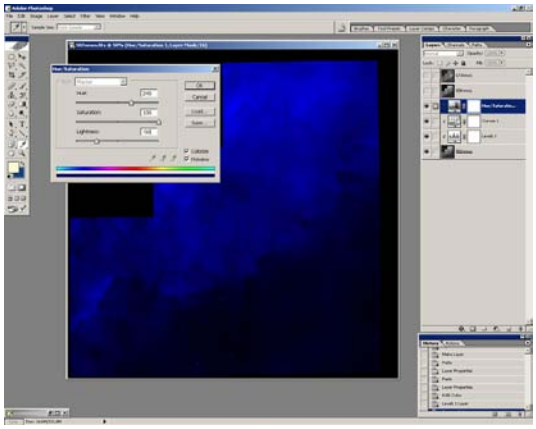
According to the layer you are making the adjustment layer for, choose the following values:

Colour	Blue	Green	Red
Hue	240	120	0
Saturation	100	100	100
Lightness	-50	-50	-50

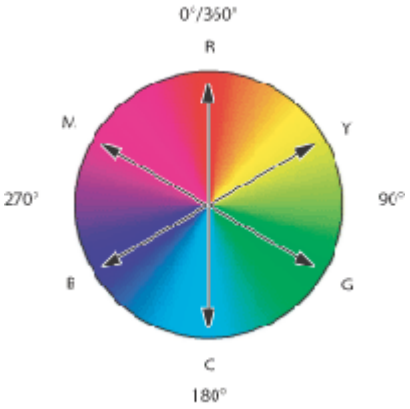
These values corresponds to the primary colours of the RGB system in Photoshop.

It is important to check the box "colorize" when the curves dialogue window pops up.

Repeat step 5 and 6 for the other two original layers, so you end up with three correction layers for each of the original layers.



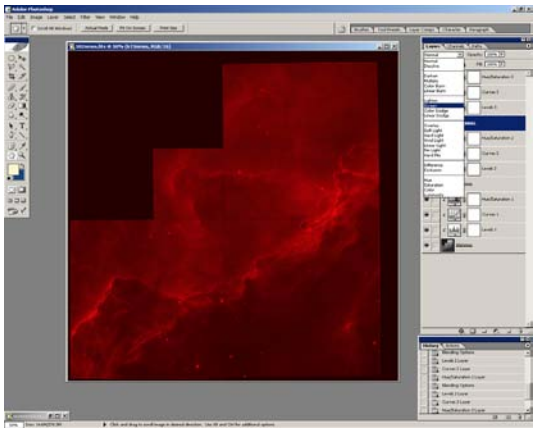
Giving a layer a hue.



The hue values given in the table corresponds to the primary colours of the RGB system (courtesy: adobe.com)

Step 7: Making the layers transparent to see all the colours

For each of the **original** layers (the exposures themselves), the mode should be set to "screen", as it is done in the illustration.
For each of the linked **adjustment** layers, the mode should be set to "normal", as it is done in the illustration. This is where you can spend a lot of time later selecting the best mask to suite the final image detail and blend. Changing between "Normal" and "Overlay" or "pin light" etc for example can have a dramatic effect. Also the sliders on the output can be moved to find the best detail, but for the start you may want to just use the "auto" setting.



Making the layers transparent by setting the layer mode to screen.

This will make the layer transparent, and it is the equivalent of having the three different layers behaving as slides instead of as paper images.

Step 8: Making the image look good

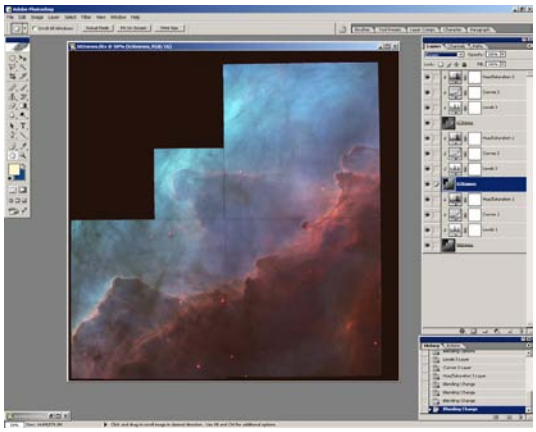
If you used the action, or if you did not touch the sliders during the manual operation, you should now go into each of the different correction layers and balance the colours. You do this by double clicking on each of the nine correction layer.

Generally it is advised to get as large a dynamic range as possible in the image, but much of this work is all a question of taste.

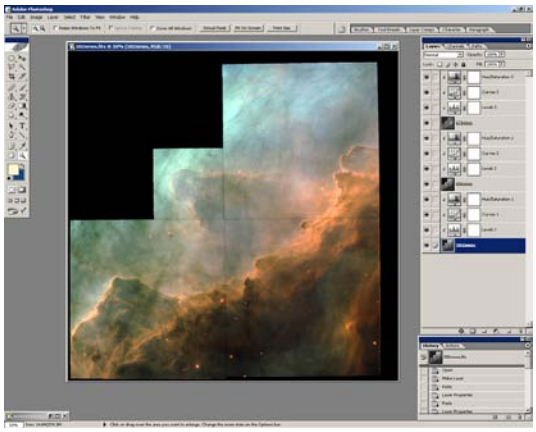
Now you should have a nice, well balanced colour image on your screen and it is time for some real fun! (now is a good time to save your image if you have not done this so far!).

Try for instance to remove some of the corrections by clicking on the "eye" to the left of the level. Put it back by clicking again. You can also redo the corrections by clicking on the appropriate correction level.

When you decide you cannot use more time on this fine tuning, you might have an image that looks somewhat like this figure.



The result so far, all layers are visible to give a colour image.

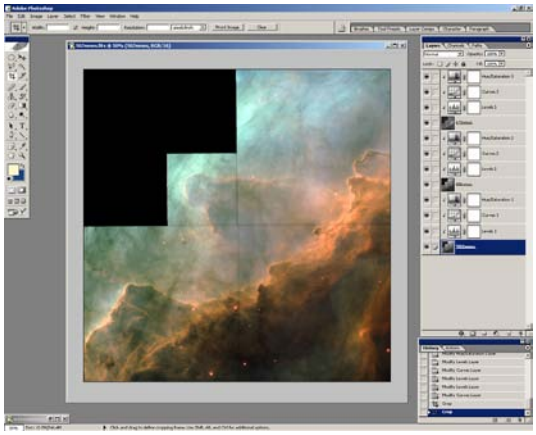


Fine tuning creates a more aesthetically pleasing image.

Step 9: Cropping

The image will definitely look better if you crop it.

Pick the cropping tool in the toolbox in the left side of the screen. Mark the area you want to keep, and choose "crop" in the image menu (or double click inside the selection)
You can compare your result with the draft image to the right (made by a professional).



Cropping the edges also gives a good impression. Are you satisfied now?