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Beginners Guide to Image Processing

The Annie Maunder Prize
for Image Innovation

Insight Investment
Astronomy ✨
Photographer
of the Year

Beginners Guide to Image Processing

This guide is best used after watching the Annie Maunder Prize for Image Innovation [video tutorial](#). Below is a step-by-step guide to reproduce the image processing techniques used in that video. After trying this out you will be able to innovate with other images from the Hubble Space Telescope and more to enter into the Insight Investment Astronomy Photographer of the Year competition.

What do I need to get started?

Aside from being able to watch the video, the only other items you will need are:

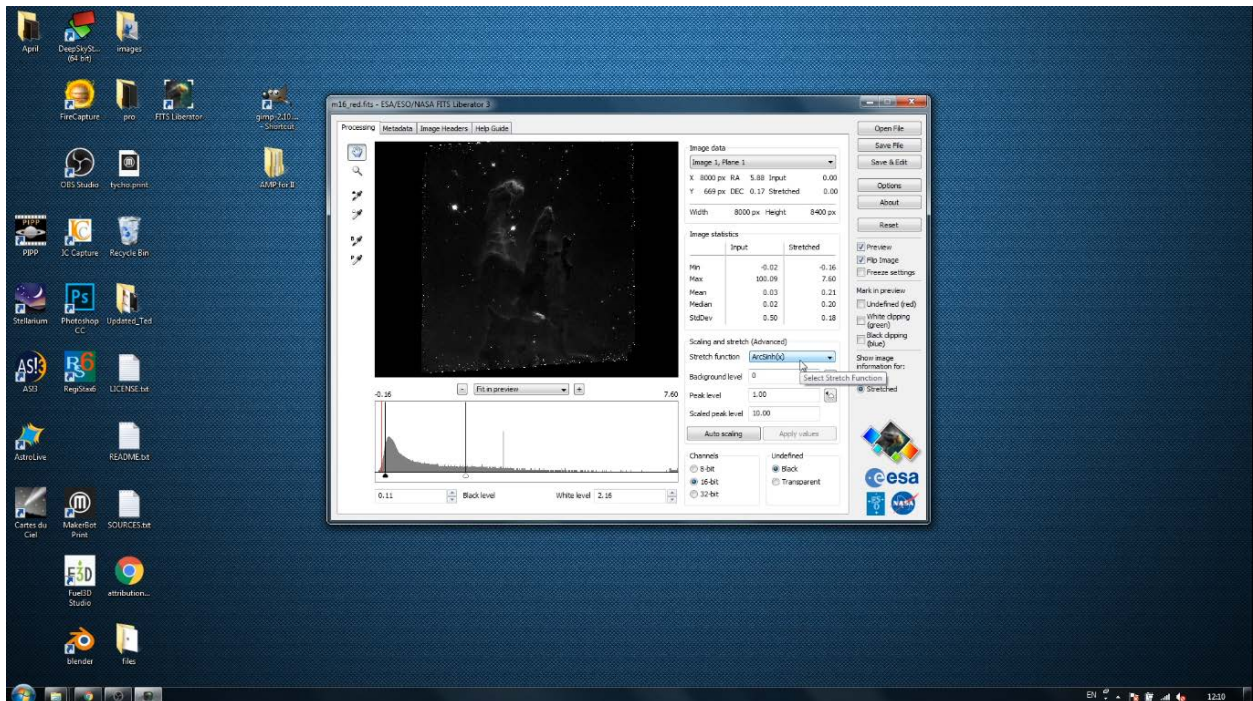
- The free [FITS Liberator](#) software to convert the space image files from the FITS file format to TIFF format that is recognised by photo editing software.
- The free [GIMP](#) photo editing software or your preferred equivalent.
- [Three example image files of the Eagle Nebula](#) (originally from the NASA Hubble Space Telescope)
- The link at the end of this document leads to another document called "Guide to Finding Images" so you can start image innovating with the space image of your choice.

What steps do I need to follow to reproduce what was done in the video?

Here are 10 steps to guide you through the process:

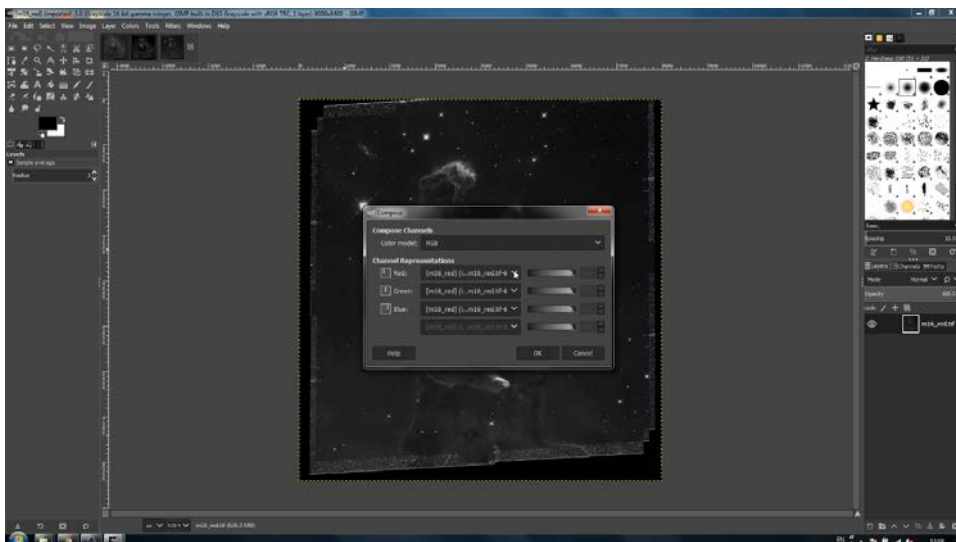
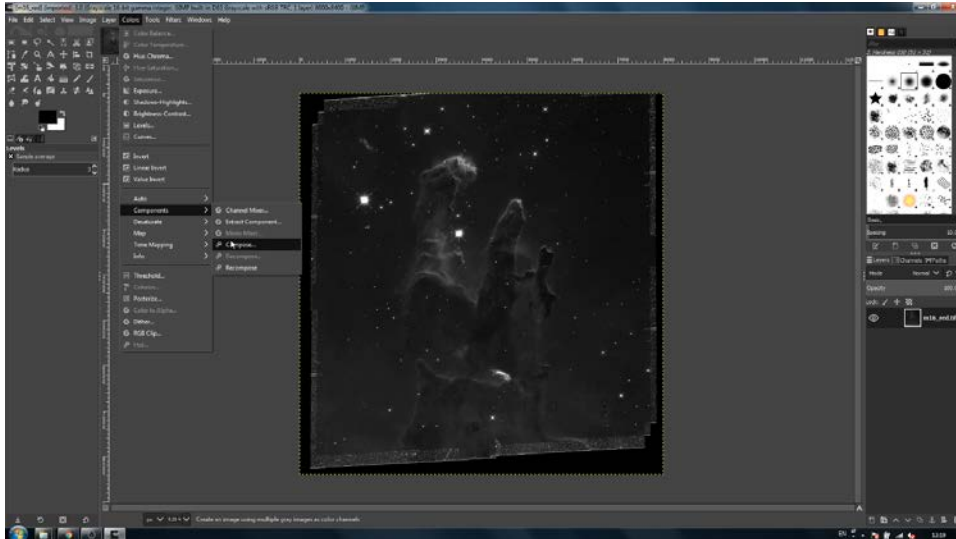
1. [Download the example images](#). These are of the Eagle Nebula (also known as M16). These files are known as FITS files and there are three: one red, one green and one blue. Here we have chosen three filters that approximate red, green and blue colours, but in your composition any combination of filters could be chosen for any purpose to produce a three colour composite. For more information on filter selection, try the accompanying [Guide for Finding Images](#) on page 2 for general comments and page 4 for Hubble-specific information.
2. Open the red file in FITS Liberator. Note that we have renamed the files to be more descriptive of their contents and that the raw files from archives will have less recognisable names. In FITS Liberator we will stretch the images. This process will take the details that are normally too subtle to see and 'stretches' the contrast to make them visible.

3. To 'stretch it' change the stretch function to "ArcSinh(x)" and adjust the black and white levels to make different parts of the image more visible. You should aim to make the background nearly pitch black and the nebula really clear.



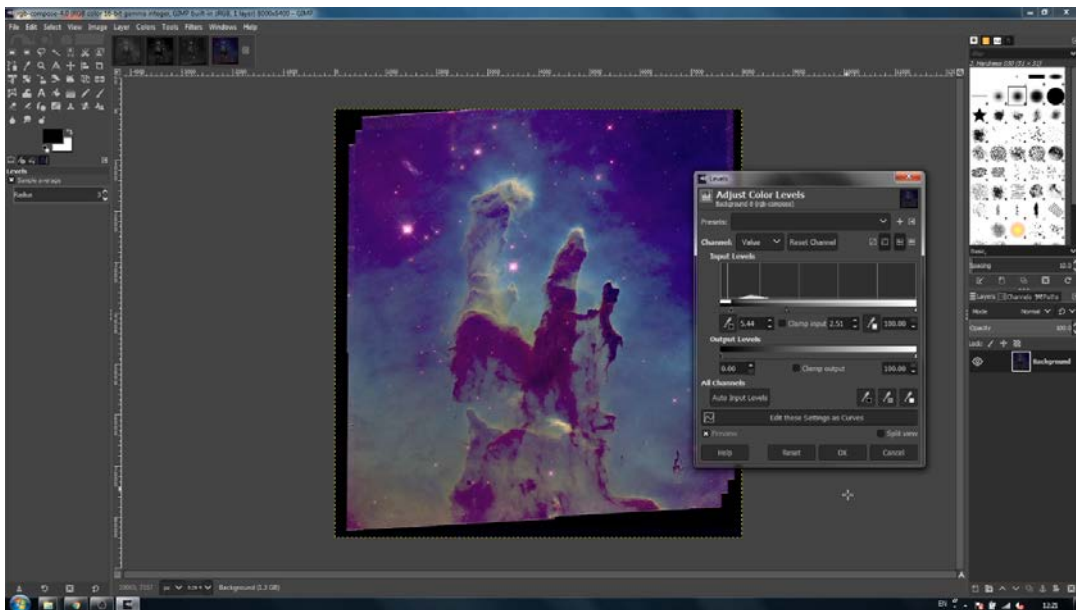
4. Save your file in TIFF format. This will allow you to open it in a photo editing program and merge with the other files into one coloured image and do further processing. Make sure you keep the colour in the filename.
5. Repeat steps 2, 3, 4 for the green and blue FITS files.
6. Open the TIFF files in GIMP or another program of your preference.

- In GIMP go to 'Colours' in the top menu bar then, 'Components' and then 'Compose' to select your images. Make sure that each TIFF image corresponds to the correct colours (R to red image, G to green image and B to the blue one).

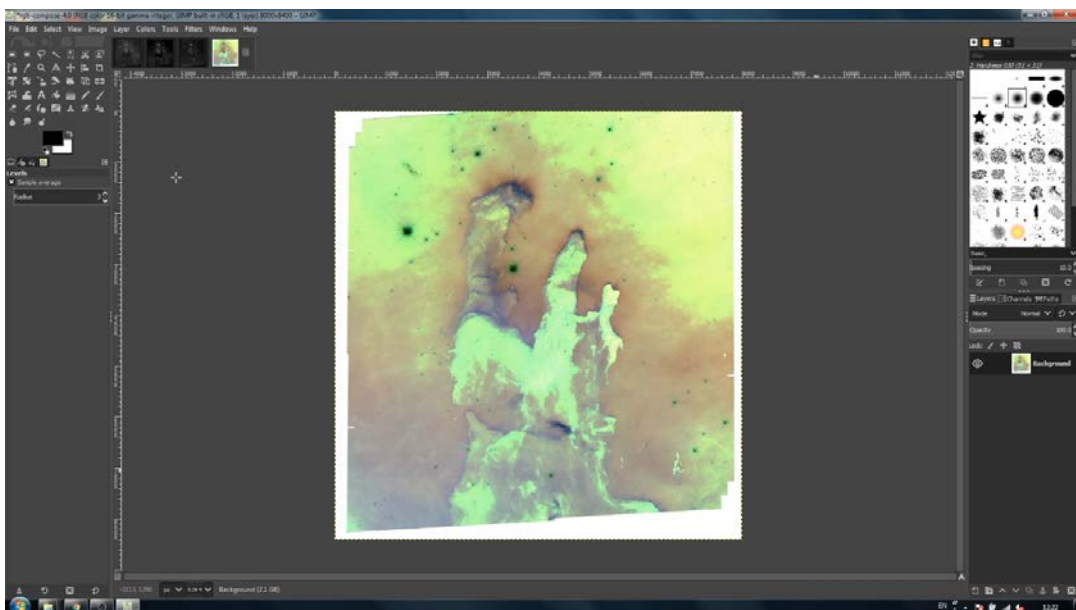


- Click OK and in a few moments your combined image will be ready. If there is a specific colour that is too faint or too bright, you can go back to FITS Liberator and change the black/white levels for that colour and repeat steps 6 and 7.

9. You can also go to the 'Image' menu in GIMP and click 'Curves' and/ or 'Levels' to adjust the different colours and find the right balance to your eye.



10. You can be as creative as you want and play with other settings, depending on the parts or features of the image you want to highlight.



And there you have it - to experiment with other amazing space images to enter into the Insight Investment Astronomy Photographer of the Year competition (through the Annie Maunder Prize for Image Innovation category), check out our [Guide for Finding Images](#) and good luck.