Imager's Corner

Ever have an image with a lumpy background with banding or a gradient that you can't seem to tame? Here is a technique that can fix backgrounds as long as the deep sky object is small compared to the dimensions of the complete frame. Let me say up front that it is much, much, much better to not have produced the problem in the first place, but if you make it to the final steps in your process and find that there are blotches in your background or some minor banding then this technique could save you from going all the way back to the beginning of your workflow. This won't work on all types of images; you need an image where only the background is involved. The best subjects are star clusters or small galaxies where there is a lot of sky background visible in the image.

Let's start with an image of NGC7331 I took a few years ago at the Nova East star party. My camera sat in my car all day and the temperature inside the vehicle limbed to well over 40 degrees Celsius. As a result when I started imaging the camera produced quite a bit of banding and noise.



Figure 1 - Image of NGC7331 with a substantial amount of banding.

What we want to do here is to remove the banding and *blobs* in the background without making a mess of the stars and galaxies. The technique is a bit of a cheat and basically covers up the darker bands in the image. We start by sampling one of the brighter background blobs or bands in the image. Here I sampled the background just to the lower left of the main galaxy and it has an RGB intensity of 38, 50, 32. Now we make a fill layer with a RGB value of 50, 50, 50, the brightest of the three values measured in the previous step, Figure 2.



Figure 2 - Fill layer, used to cover up imperfections in the background.

The next step is to make a layer stack with the original, stretched image on the bottom and the fill layer on top. Set the blend mode to lighten as shown below using Images Plus, Figure 3.

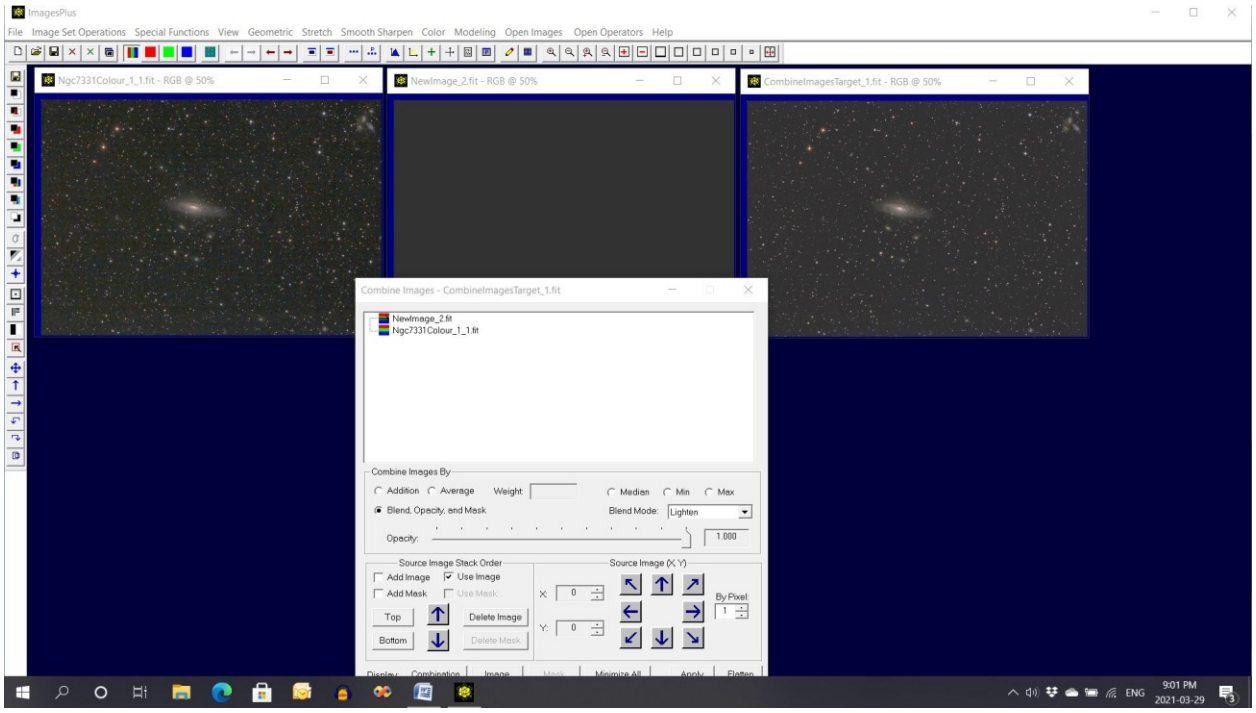

Figure 3 - Creating the image layer stack with a lighten blend mode set for the top layer

The lighten combine covers up the darker background blobs and bands producing an overly smooth background that looks a bit artificial as shown in Figure 4.

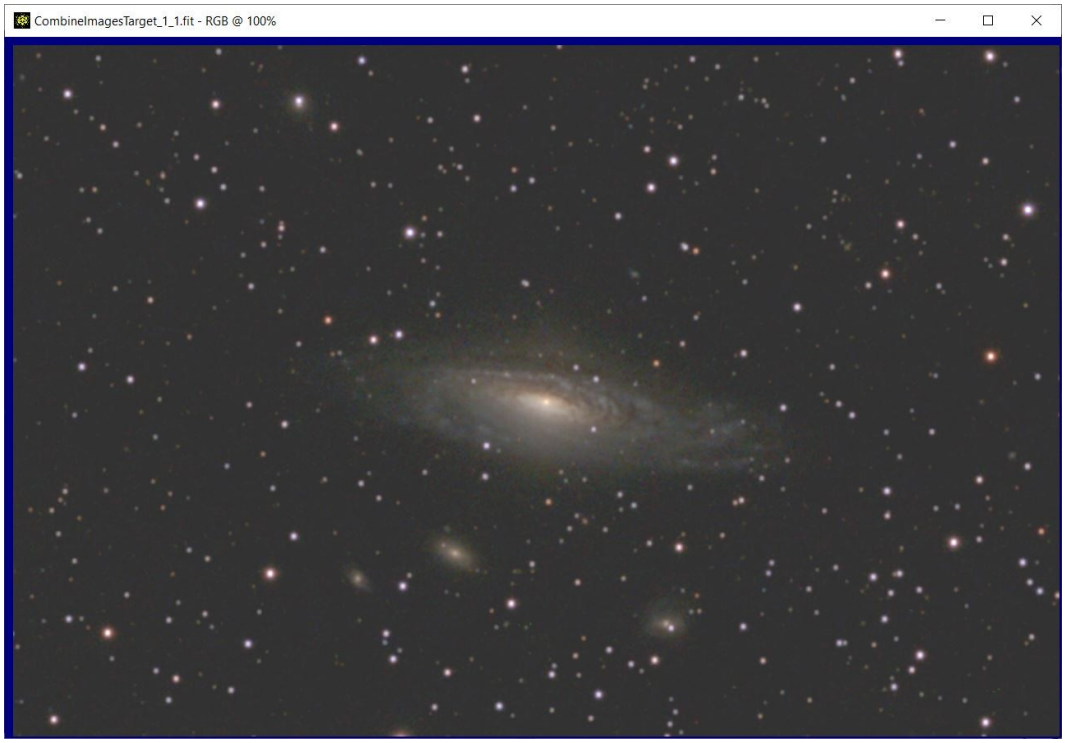

Figure 4 - Layer stack looks slightly un-natural due to very flat background.

To improve the background and make it look more natural just add a bit of noise to the fill layer. There is no rule of thumb as to how much noise to add so basically add enough so you are happy with the background and ensure that the galaxies and stars blend properly into the rest of the image. Here I used a standard deviation of 3 to add Gaussian noise to the fill layer.



Figure 5 - Adding a little noise to the top layer improves the blend to produce a more normal looking background.

With the background de-banded and much of the noise covered up with the fill layer, the stack is flattened and the final background level set using your favorite stretch. Here I used levels to set the black point for the image, Figure 6.

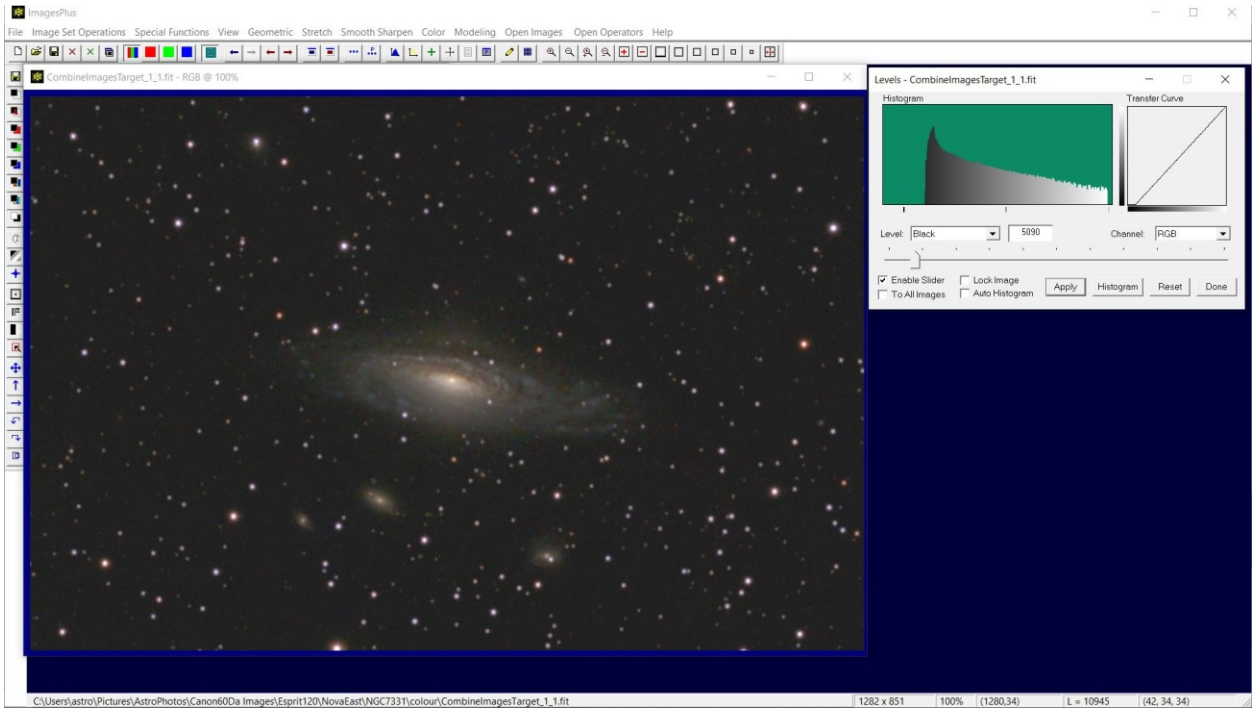

Figure 6 - Use your favorite stretch function to darken the background a bit. Here I used levels to set the black point.

Compare a crop of the original stretched image in Figure 7 to the processed version in Figure 8 below and I think you will see the improvement.



Figure 7 - Original stretched image with lumpy, noisy and banded background.

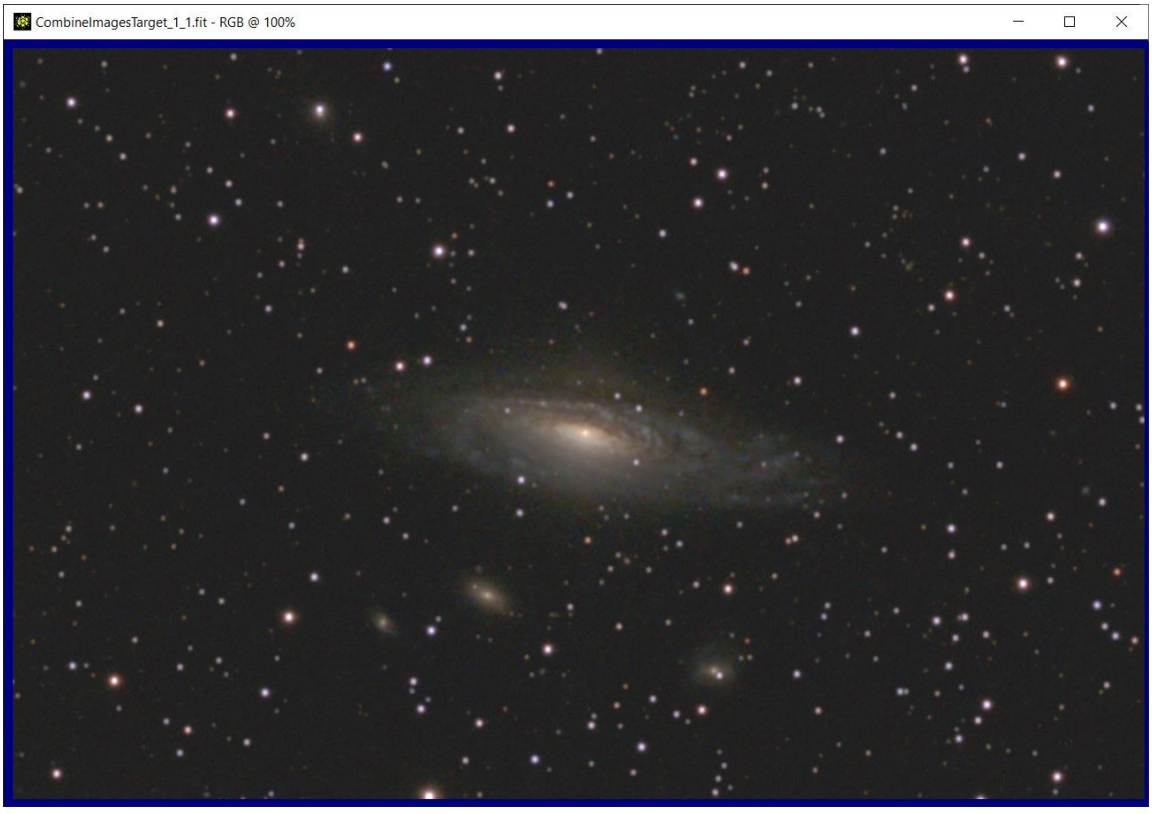

Figure 8 - Processed image