Astrophotography
Simple Enhancement Procedure For Light Polluted Locations

Many people often get despondent when attempting to do astrophotography when they take a photo or series of photos that shows "no detail" and are severely light polluted. Interest in the hobby then fades rather rapidly. This article is an attempt to show what can be done with very little effort and using two software packages FREELY available on the internet. **Deepskystacker v3.22** & **Paint.Net v3.36**. A google search will allow you to download these quickly.

Selection of object

Decide what you are going to photograph. It is better to select a region of the sky where your object lies rather than "push" your scope around all over the sky.

Setting up for the evening

Setup your scope with your peripherals, Mount, Scope, Laptop, power supply.
Balance your scope with all equipment mounted. Camera, guide scope and so on
Polar align your scope. If you have a GOTO system do a 3 star alignment
Single axis tracking in Right Ascension (RA) is the minimum requirement

Taking Your Shots (Light Frames)

Tracking errors are difficult to overcome 100%. Therefore take a lot of short exposure shots of say 15 seconds to 30 seconds to minimize star elongation. (20 to 30 shots are recommended.). I find ISO 1600 acceptable with a Sony a300 DLSR camera. Bearing in mind that ISO 1600 will generate more noise and collect more light pollution.

Taking Dark, Dark Flat, Bias and flat frames. All of these frames MUST be created with the same Time, Temperature, & ISO settings of the Light Frames

Dark & Dark Flat Frames. Dark frames are used to remove the dark signal from the light frames. The best way to create the dark frames is to take pictures in the dark by covering the lens. Alternatively cover the end of the scope with your camera attached. Take 10 to 20 frames

BIAS FRAMES. These are used to remove the CCD or CMOS sensor readout signals from the Light Frames. The best way to take these is to take the shortest possible exposure (1/4000 sec) in the dark by covering the lens or capping the end of the scope. 10 to 20 of these are sufficient.

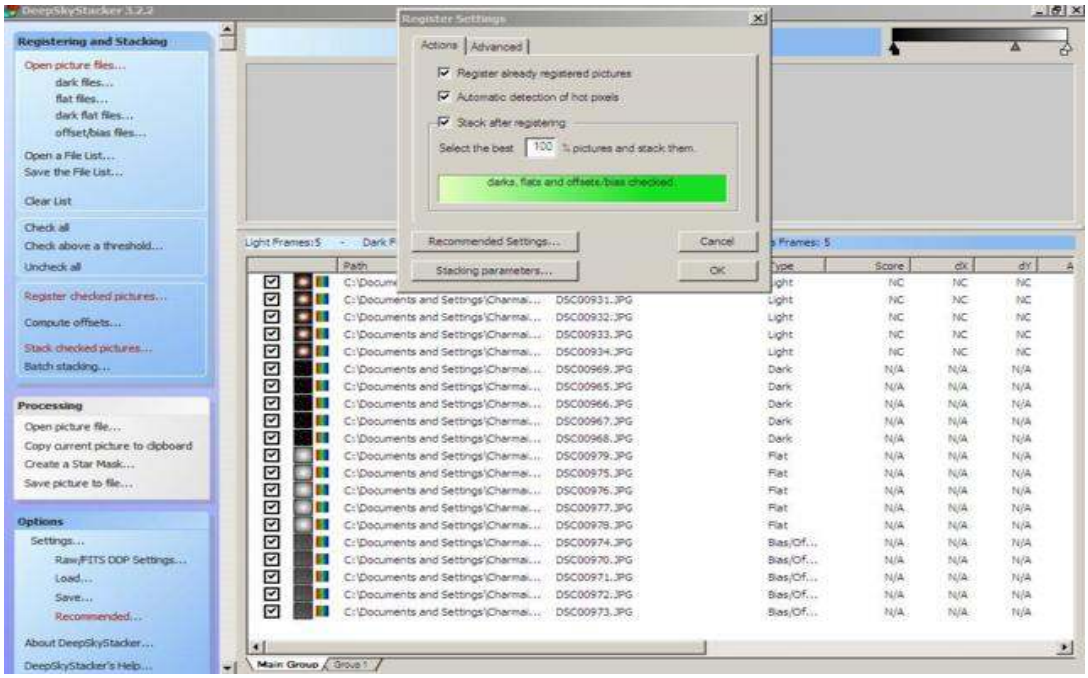
FLAT FRAMES. These are used to correct uneven field illumination. Your camera MUST be on the scope. The best way to take these is to cover the end of the scope with a smooth white cloth and takes your shots at a bright area. Let the camera do the exposure time. Auto mode. Take 10 to 20 of these.

Example of a light polluted photo. (M83 ISO 1600, 30 seconds – One of five frames)
No detail and apparently useless with severe light pollution. Scope 10" skywatcher f4.7 on an EQ5 GOTO mount. Camera - Sony a300 prime focus set at 2 X zoom

Processing

View your photos and remove any obvious poor pictures. Normally these will be a picture with poor tracking due to wind or other effects.

Stack your photos. I used **DeepSkyStacker 3.22** for this tutorial.



Settings as follows:- I have used jpg pics which are less appropriate. Experiment with different file formats.

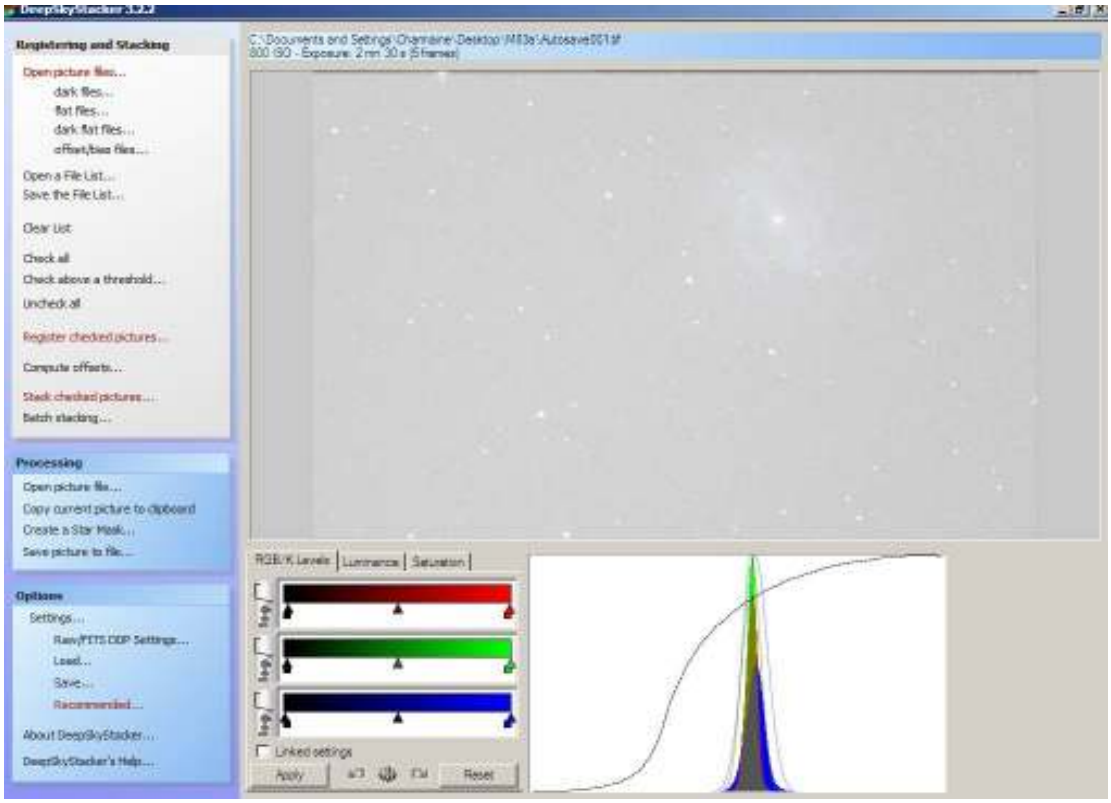
Load your Lights. In this case **5 frames of M83**. See above.
Load our dark frames – 5 frames
Load your flat frames – 5 frames
Load your bias frames – 5 frames

Stacking Parameters

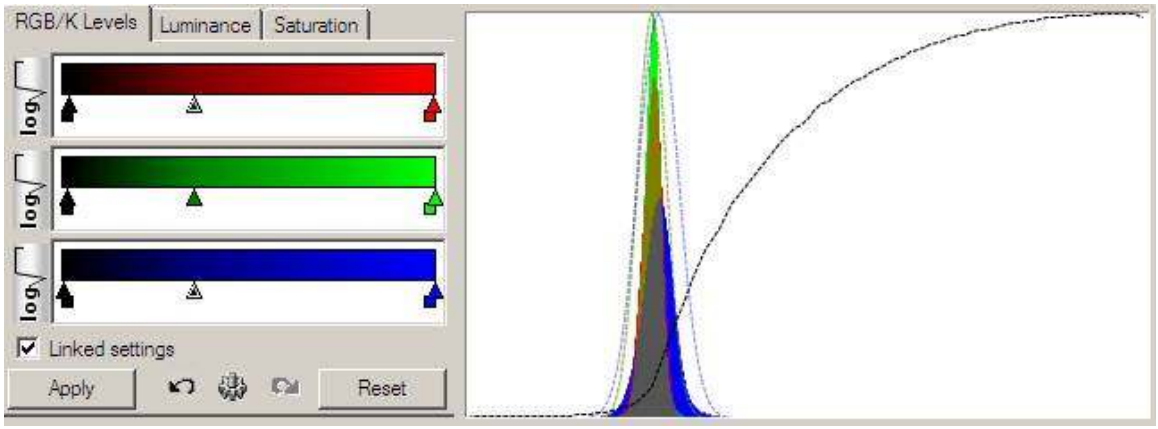
Result – Standard mode. Reduce worker threads
Light – Average (for 5 frames)
Dark – Median , Hot Pixel, Dark optimization
Flat – Median
Bias – Median
Alignment – Auto
Intermediate Files – default
Cosmetic – Detect & clean – 1 pixel 80%
- Detect & clean – 1 pixel 80%

Output – default
Intermediate files – default
Start processing. This will take approximately 3 to 5 minutes depending on frame size and computer speed

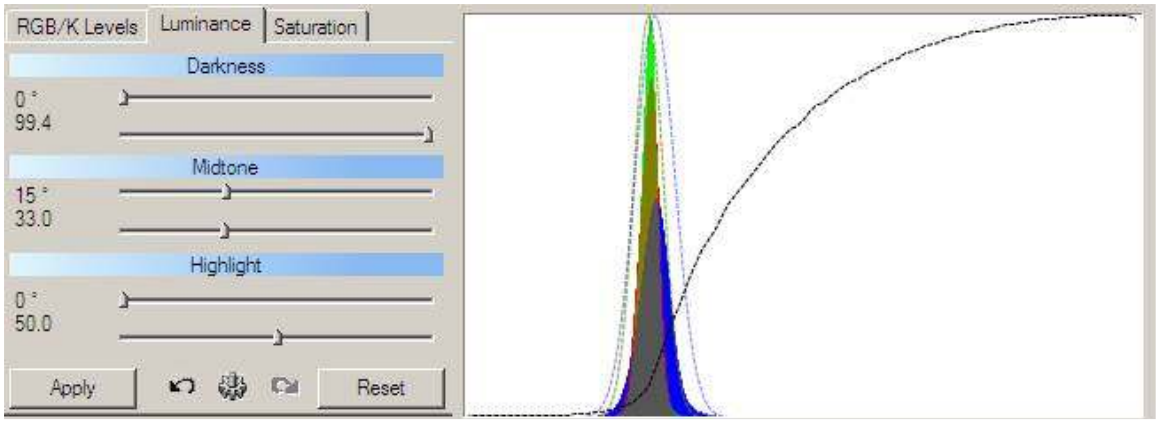
Result – "Oh sh-oot". Pretty flat and once again looks useless!! Time for a few beers to calm the nerves. But all is not lost.



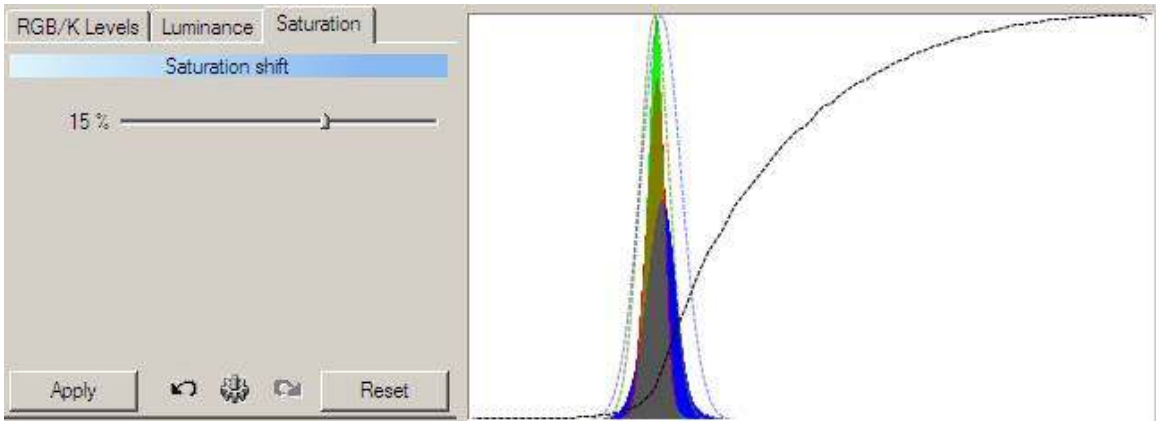
Now apply enhancement as follows. Experimentation is recommended.
Adjust the RGB/K Levels to the left with the linked settings box checked. Notice that the peaks on the curve have moved to the left. See main picture above.



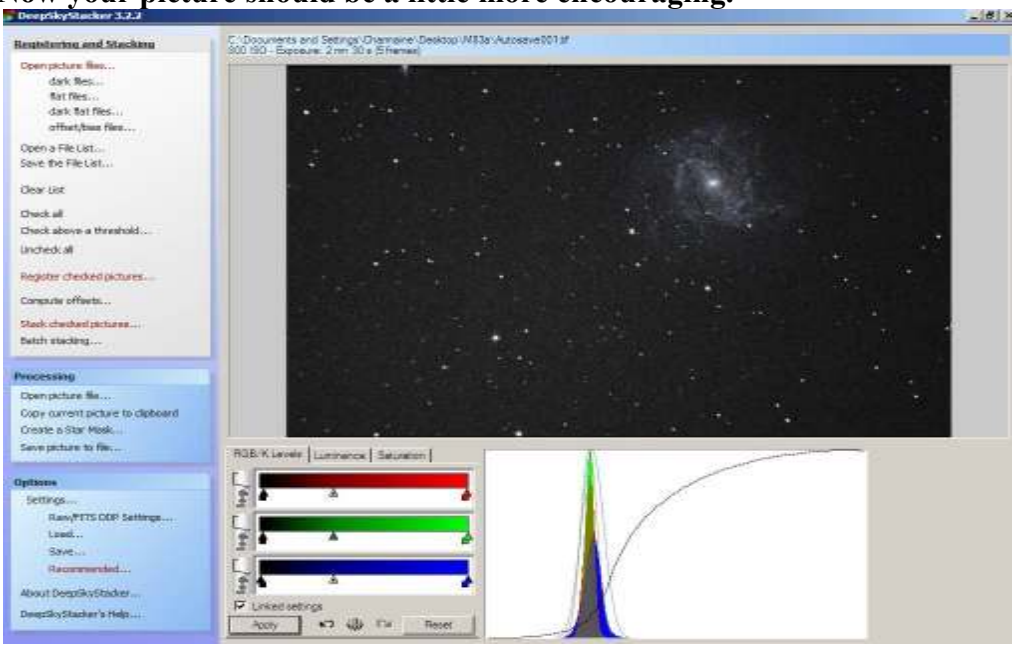
Adjust the Luminance as follows. Again experiment



Adjust the Saturation to 15%. I find this best

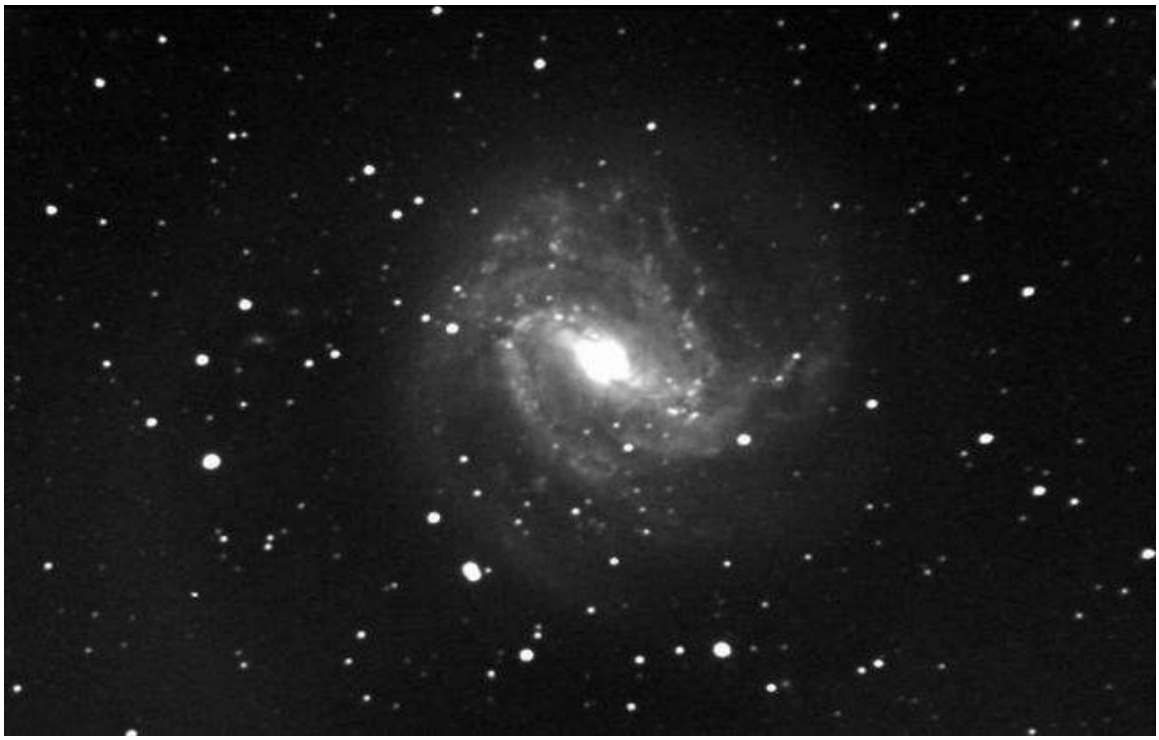


Now your picture should be a little more encouraging.

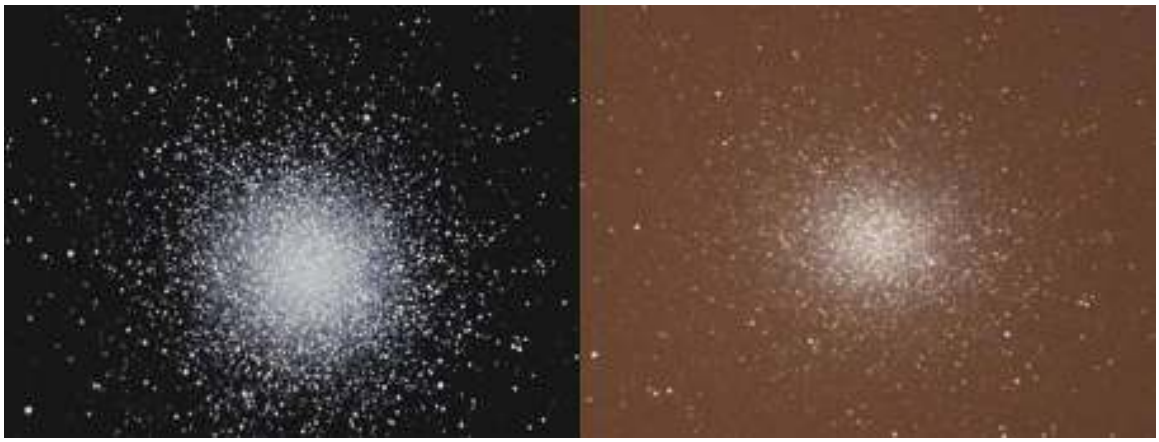


Save your work. The saved image will be in 16 bit TIFF format. After further enhancement in **Paint.Net v3.36**. Levels, Curves, Hue/Sat & noise reduction (found in effects) **VOILA !!** Save your masterpiece.

As a comparison, I have included the below photo from the Meade Interactive Messier Catalogue. Apart from the size difference there is a good likeness.



Another example of what this simple procedure can achieve.



This is omega Centaurus. 5 frames, same procedure as above with the exception that dark, flat & bias frames were not used. Also this was taken with an 8" f5 skywatcher, Sony a300 at ISO 1600 for 30s. Quite an improvement from the light polluted frame on the right

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