Astronomy Workshops

Basics:
Unsharp Mask
Light Pollution
Star Elongation
Noise

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First – some thoughts on post processing

- The original image contains all of the 'available' data.

- Post-processing can only manipulate the available data... not add.

- Over processing an image can introduce undesirable artifacts.... however a little can go a long way.

- Although you may practice techniques on other people's images to improve your skills, it's rarely a good idea to show it to them without their prior consent.

UnSharp Mask (USM)

- Un-intuitive name has dissuaded use for a long time

- Based on old Offset printing trick for sharpening slightly out of focus images.

- Prior to that, artist often use the basic principle of exaggerating edges to make object stand out in illustrations and painting.

- This works wonders … because it takes advantage of two characteristics which defines the concept of 'sharpness'.

What is 'Sharpness"?

- Two perceptual elements create the illusion of 'sharpness'

    – **Resolution** – sharp accurate optics create sharp images (e.g., even resolution with little or no vignetting and sharp contrast)

    – **Acuity** (Acutance) – the amount of brightness changes at the edges of optics. When edge transitions are accentuated, fine detail in an image become more apparent. Acutance in an image also relates to 'film-grain'. Film grain can actually enhance sharpness. The ultra fine grain of a digital image can soften sharpness.

What does the USM DO?

- Simply... the USM filter accentuates the edges of objects giving it that appearance of higher sharpness.

- Works by examining the contrast between adjacent pixels and then increases that contrast according to a preset amount when a preset threshold is exceeded.

But wait.......

- No such thing as a free lunch... there are caveats!

- All post processing degrades the original information in an original image. The USM doesn't create additional detail, it just changes the emphasis.

- Over emphasis can create some unwanted effects, such as noise.

- The amount of USM filtering required is very subjective.

- Never the less... USM is one of the best 'tricks in the bag' for image enhancement.

USM – *levels of complexity*

- There are numerous processes for Unsharp Masking from One Pass through to sequential multipass and selective sharpening in multi-layers.

- Will only cover the basic one-pass process which is suitable for lunar and planetary images, and some DSO images.

  Note: DSO images require considerable care as any sharpening can introduce noticible background noise, as you will see......

Single Pass USM Process

- Open the image, then open the USM filter.

- There are three sliders to adjust.

- RADIUS (most important – adjusts the width of the sharpening halo by setting the pixel width when comparing brightness differences).

- THRESHOLD – the amount of which the brightness must vary before being considered an edge pixel.

- AMOUNT – a percentage by which the sharpening effect is increased

Basic Process for 1-Pass USM

- Find the correct RADIUS setting

- Adjust the AMOUNT

- Adjust the THRESHOLD

- IMMEDIATELY AFTER CLOSING THE USM FILTER WINDOW … Select EDIT / Fade Unsharp Mask..., then select Lumosity at 100% and close the window. This last step applies USM filtering only to luminance information and not color information, resulting in less unwanted noise added to the image

Let's try it out...

Light Pollution Removal

- Demonstration of Noel Carboni's Light Pollution Action....

- While we're at it, we'll examine the shape of the stars, identify defects in the shape, then attempt to fix them....

- But these corrections usually add noise to the image, so we'll need to look at that as well.

Light Pollution Correction

- Open image in Photoshop and memorize a point where the background should be darkest.

- Open the Actions Panel and run the Light Pollution Removal action.

  - On the Dust and Scratches panel, set Radius (15) → OK

  - On the Curves window, choose the Set Black Point eye-dropper (left) then click the memorized point → OK.

- Watch the magic happen. Use the History Panel to back up if you need to redo the action.
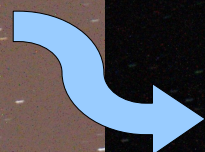
Fix Light Pollution

Fixing Elongated Stars - 1

In the Layers Panel, copy the image to a new layer and set the blend mode to **darken**.

- Use the Magic Wand to select the stars (click the background – selects everything ….)

- Reduce the selection by feathering to include some of the background around the stars. Start around 2 pixels.

- Use Ctrl-H to toggle off the incredibly annoying marquis.

Fixing Elongated Stars - 2

- Select the Move Tool and use the arrow keys to move the selection in the direction of the elongation. (just a few clicks are usually needed)

- Use Ctrl-H to toggle on the marquis, deselect the stars (Ctrl-D), then flatten the image.

- If needed, select the stars again and brighten them.

Fix Stars

Noise

- Many adjustments add colour and luminance noise to the image. As a last step, reduce the noise by adjusting the Levels or using a Noise Reduction program (Imagenomic's Noiseware).

- Make adjustments cautiously … they will begin to degrade the image at some point.

Fix noise and adjust contrast