

Image Processing Work Flow by Debra Ceravolo

During Acquisition:

- Enter all camera/telescope/object information correctly in the Image fits header.
- Acquire approx. 20-30 images of bias frames, dark frames and flat fields.

Organize data:

- Backup and date all original data (good or bad) and keep separate from all future changes.
- Create folders and organize all files by filter used (red/green/blue/luminance/Ha/SII/OIII).
- Delete trailed images, images with cloud and bad FWHM values in those folders.

Calibrating Images:

- Put calibration subfolders in one file.
- Set calibration in Maxim DL with calibration wizard, choose median combine.
- Select folder, auto-generate and replace with masters. Use average combine for darks and bias frames. Use SD mask for flats.
- File/open batch save and convert. Select all images to be calibrated. Select path/perform calibration.
- Process/stack/ select calibrated files. Do not click on auto calibrate.
- Auto star match/combine with sigma clip, value 3.
- Create folder for combined original images. Save combined image in original fits.
- Stretch final image in Maxim DL using histogram, starting with max value, add gentle curves until data is visible but not over saturated. Check to see if stars are not clipped using star profile.
- Save combined master image in tiff, click manual stretch, 16bit, linear, screen stretch.

New Maxim DL 5 procedure:

- After calibrating images, combine images by:
 - Open stack menu
 - Align with 1 star auto-shift (or astrometric alignment)
 - Use SD mask to get rid of the ray hits etc. 4 passes, .50 sigma factor, ignore black pixels.
 - When combining color, use Red: 1.2, Green, 1 and blue .08

Registering images:

- Put master combined original tiff images in a folder named (the object) destined for the software Registrar. This software will precisely align the separate red, green, blue, luminance and narrowband master images together.
- Open Registrar
- Select images to be registered,
- Click registration button, choose multiple source.
- Important: crop all images together before saving.
- Operations/crop/pad control. Open all images and intersection with all group images.
- Save individual cropped images as tiff files in a new folder named Registered for Photoshop CS5.

Photoshop: LRGB

- Open red tiff image, convert to RGB and adjust curves, levels etc., making sure to NOT clip the histogram. Save as a Psd file with layers.
- Flatten image and save as tiff. Do this for all master images.
- Copy and paste green tiff image on top of red image, then blue on top of green.
- Make a copy of red background layer.
- Right click on red layer/ blending options. Choose color channel. Do this for green and blue.
- Save as RGB Photoshop file. Then flatten as Tiff.
- Increase saturation of RGB by 30%.
- Add luminance layer on top of sat. RGB. Bring opacity down to 50%.
- Save and flatten and layer luminance again on top but this time 100%. This increases the signal to noise ratio of LRGB. Save in PSP and Tiff.
- Balance color using curves by going through the different color channels and adjusting.
- When color is corrected, flatten and process details like dark lanes, Ha regions etc.
- Carefully pixel edit out any imperfections including bad columns, hot pixels and camera and filter defects. Crop out registration edges, rotate object for north up.
- Mild sharpening using the unsharp mask filter.
- Save as high res Tiff, name and date final image.
- To add narrowband to the RGB data, a different colorizing technique is used. See Debra's Sky and Telescope article in December 2011 issue titled 'Natural Color with Six Filters'.