

# Notes for creating mosaics with PixInsight

## Introduction

Notes based on experience of building mosaics taken with data from iTelescope (paid for remote telescope time) and more recently lunar imaging with FireCapture / ZWO ASI 120MC.

Comments / feedback welcome.

## Useful links

- Creating a Seamless Supermosaic, by Steve Allan

<https://www.youtube.com/watch?v=H2r3ZYqCaP8>

- Pix Insight star alignment documentation

<https://pixinsight.com/doc/tools/StarAlignment/StarAlignment.html>

- Pix Insight Gradient Merge Mosaic documentation:

<https://pixinsight.com/doc/tools/GradientMergeMosaic/GradientMergeMosaic.html>

## Overall process

Best description of the process is by Steve Allan, "Creating a Seamless Supermosaic":

<https://www.youtube.com/watch?v=H2r3ZYqCaP8>

In this video a mosaic of 12 Ha linear (i.e. unstretched) panels are merged using the following process:

- Create a placeholder panel using star alignment (Working mode = Register/Union - Mosaic) / Frame adaptation selected.

Select one panel as the reference panel and then align a second panel. The newly created mosaic of 2 panels becomes the reference panel and the next panel is added, and so on.

The output of this phase is a 'placeholder' mosaic which determines the final size of the mosaic and is later used to snap in the panels without any joins.

- Align each of the panels to the placeholder mosaic (from step 1) using Star Alignment with reference image as the Placeholder mosaic, Working mode set to Register/Match Images and Frame adaptation is selected.

The main challenges you are going to face are:

- Aligning the individual panels to creating the placeholder mosaic (step 1) or by aligning the panels into the placeholder mosaic (step 2) particularly if the data is low quality e.g. has star trails on the periphery. Tactics including using generate previews of the mosaic to provide a 'hint' to Star Alignment and / or by aggregate panels into rows (or columns) and then aggregating rows into the final panel.
- Achieving consistent color balance across the whole panel. The Star Alignment documentation provides some useful hints. Both the Star Alignment documentation and the video suggests using Frame Adaptation option which applies a linear fit to the target images to using the reference image as the baseline.

## Tips and tricks

### **If alignment fails, align against a preview**

Often during creating the initial placeholder mosaic or snapping the individual panels to the mosaic, Star Alignment will either take significant time or fail to align. (Often this seems to be at the last panel 😊). One trick (source: PixInsight forum) is to provide a hint to Star Alignment by making the reference a preview. In the example below, the next image should align into the top left quadrant. Star Alignment can be helped by creating a preview area slightly larger than where the image should appear. This also has the side effect of reducing the time needed for Star Alignment at the expense of manual operations.

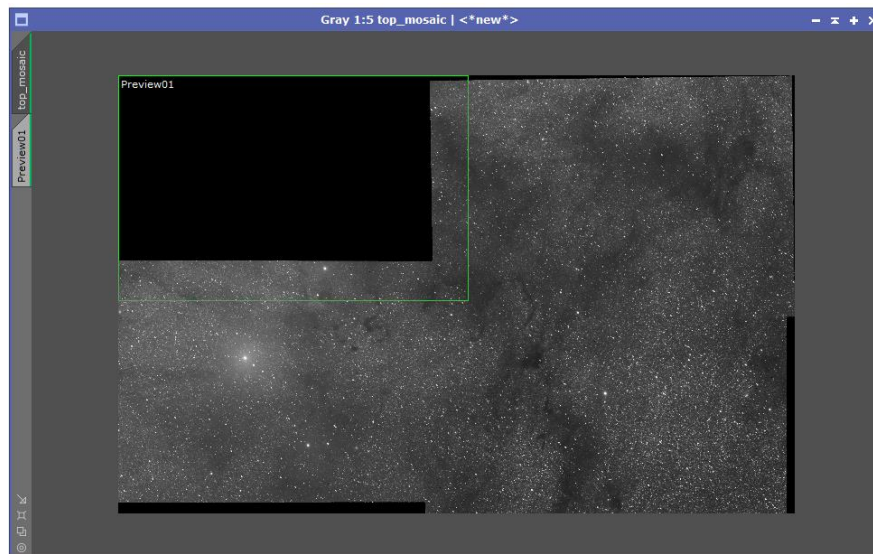


Figure 1

### **Tweak the alignment order; align and aggregate by row**

- Another couple of tactics to align troublesome panels include:

- Changing the order of alignment for example, as you are building the placeholder mosaic a panel will not align (even by building a preview over the reference), start again but align the troublesome panel earlier.
- Aligning panels to create rows; align the rows to create the placeholder mosaic

### **Consider which panel is the reference panel**

As you align panels along the right ascension axis, these panels will be aligned to an angle to the reference frame. Whilst the final mosaic can be rotated into its final desired orientation it's probably best to reduce the amount of rotation needed by making the most important panel (if one exists) the starting reference frame.

I suspect (but could be wrong ☺) that the reference panel should be one with good color balance rather than a panel with poor balance. (Ideally all panels should have equal quality but pragmatically more telescope time will be dedicated to certain panels at the expense of other panels).

### **Check the results of Star Alignment**

Most of the time, Star Alignment gives the correct results. However, in rare cases the algorithm can give strange results leading to some odd looking mosaics.

### **Use Aladin to help with co-ordinates**

With luck, your telescope control software will calculate the right ascension and declination of the panels for you. In other scenarios, such as iTelescope, RA and Dec must be calculated taking into account the telescope's field of view, the amount of buffer at the intersection of each panel and the non-linearity of RA against the dec axis.

Alternatively, the Aladin tool can be used to preview and explore the area of the sky

<http://aladin.u-strasbg.fr/>

### **Do a run through with 1 shot of luminance**

Make sure your math is correct by doing a dry-run of the panel with a single shot of luminance. Running through step 1 of the process (building a placeholder mosaic) should be enough.