Capturing and Processing an Image of Saturn

USING SHARPCAP, AUTOSTAKKERT AND REGISTAX
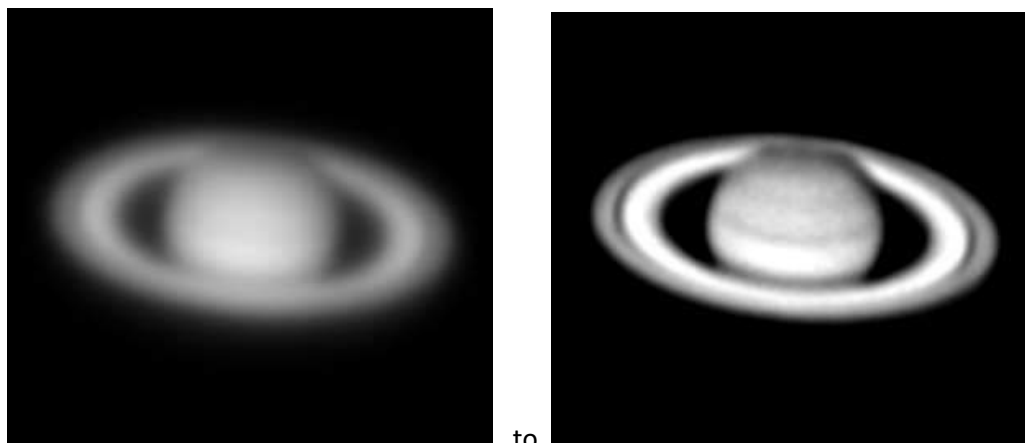
David Richards

Contents

1   Introduction

This document is for anyone who is interested in getting from

 to

The document describes the steps to:

- Capture a video of Saturn using SharpCap.
- Stack the resulting video using Autostakkert to produce a single TIF image.
- Process the image with Registax to bring out planetary detail.

The video in this example was captured under clear-sky (cloudless) with a 99% waxing moon. The capture took place around 03:00 on the 10th May 2017, when Saturn was due south in the North West of the UK.

The following equipment was used:

- Celestron C8 SCT telescope.
- Celestron CG5 Advanced GT equatorial mount.
- Altair GPCAM MONO v1 camera.
- Altair 685nm IR blocking filter (optional).
- Celestron 2x Barlow lens.

The following laptop was used for the video capture:

- Lenovo T400
- 2.4GHz Core 2 Duo processor
- 8Gb memory
- 120Gb SSD drive

The following software was used:

- SharpCap 3.0.3881 – capture the video in SER format.
- SER Player – inspect the completed SER video.
- Autostakkert v2.6.8 – stack the video frames to produce a single TIF image.
- Registax v6.1 – process the TIF image to enhance detail.
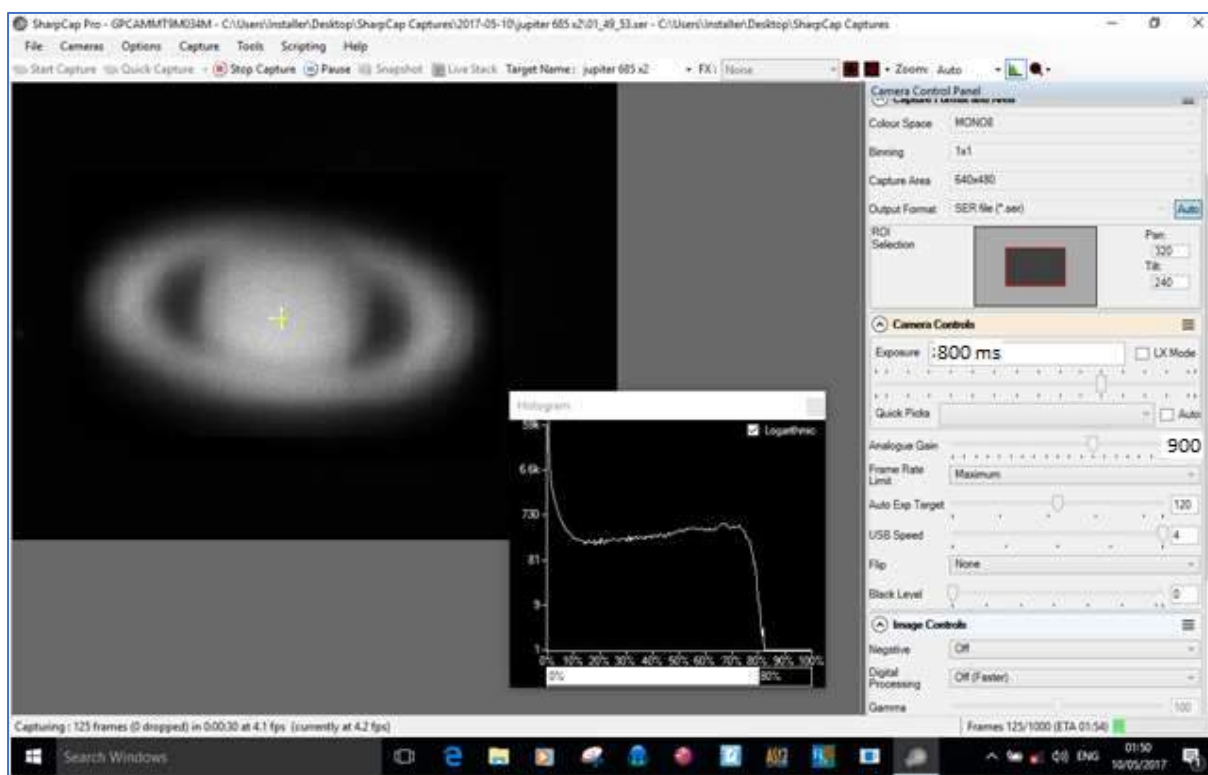
The process described below has resulted in image consistency by systematically following a basic procedure. The next steps to improve the resultant images would be to look at achieving higher frame rates during the capture.

2   Getting Started

These are the important points to consider in SharpCap when attempting to capture a reasonable video:

- Set the *Gain* to 90% for Saturn.
- Start the *Histogram* and ensure the Logarithmic checkbox is selected.
- Adjust the *Exposure* until the right-hand side of the histogram was at 80%.

For this scenario, large planetary disk, the shape of the histogram (with a logarithmic vertical scale) should be a 'whale'. See http://docs.sharpcap.co.uk/2.9/#The%20Histogram for further information and background reading. In the picture below, SharpCap is shown ready to capture with the histogram undocked.
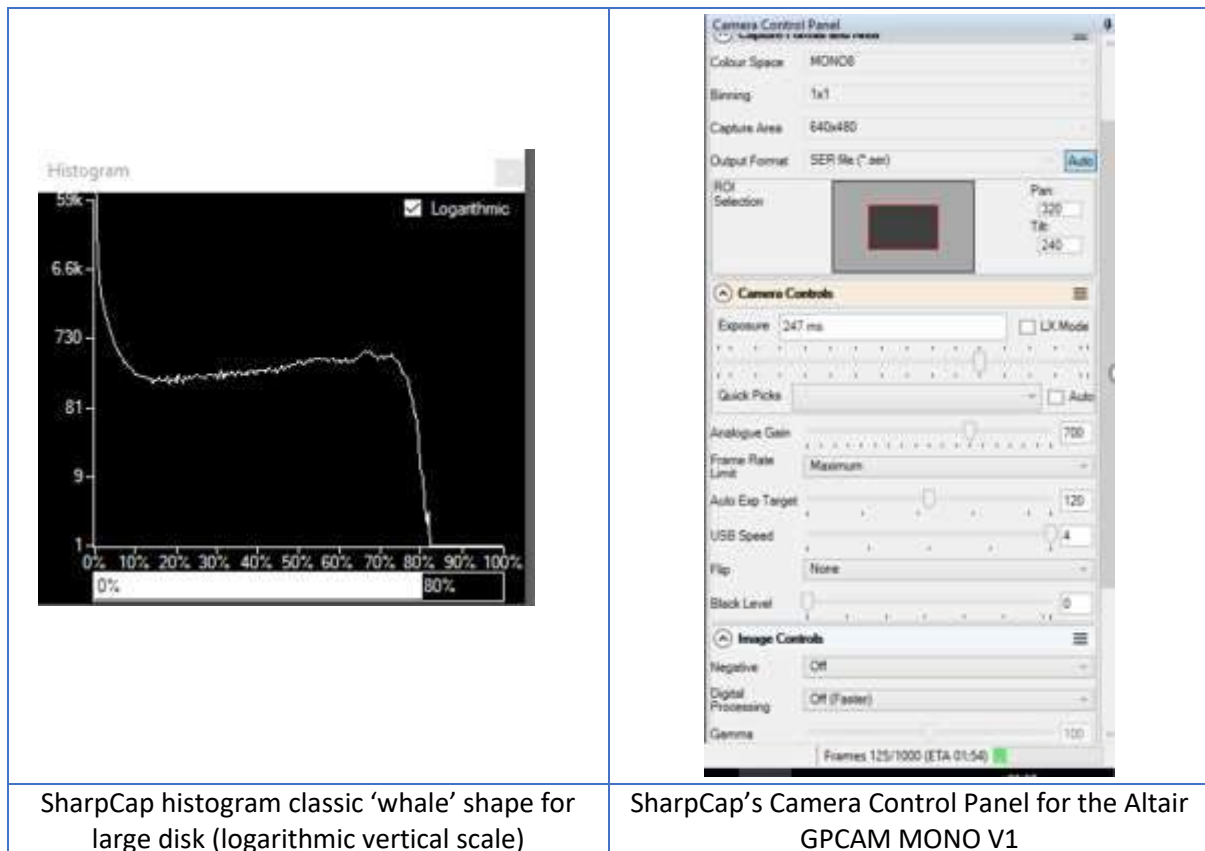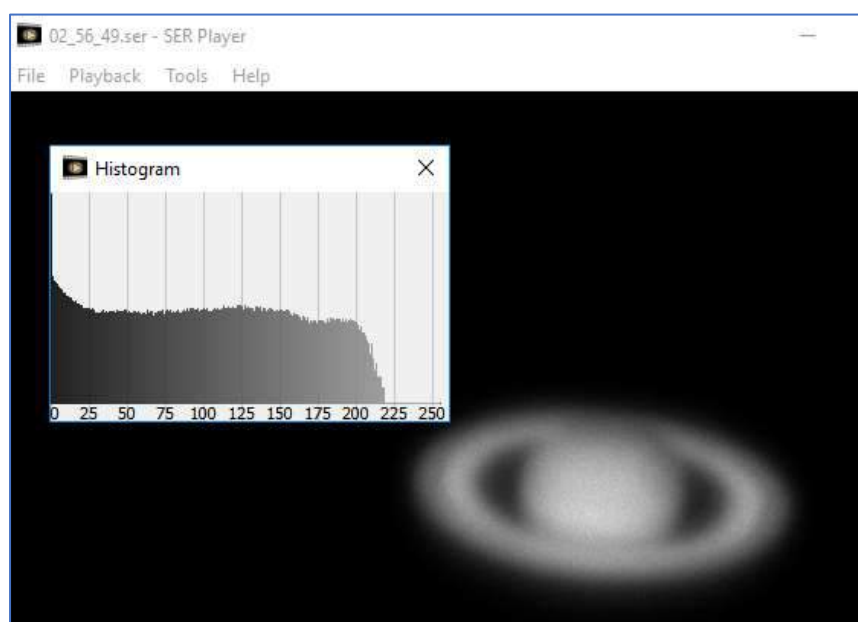

3   Capturing the Image

These were the steps to configure SharpCap, steps 1 – 4 being settings in the *Camera Control Panel*.

1. The *Colour Space* was set to *MONO8* (*MONO12* could be selected but would have reduced the frame rate).
2. The *Capture Area* was set to *640 x 480*. A smaller *Capture Area* will help achieve higher frames per second.
3. The *Output Format* was set to *SER*.
4. The *Analogue Gain* was set to 9*00* (900/1000 is 90%).
5. A suitable *Target Name* was defined in the tool bar. In this case 'Saturn *685 x2'* was set to indicate the equipment used. This became the name of the capture folder.
6. SharpCap's *Histogram* was started via the tool bar and the *Logarithmic* checkbox selected.
7. The *Exposure* was adjusted until the right-hand side of histogram was around *80%*.
8. A 200-frame image was obtained via the *Quick Capture* button on the tool bar.

Only *Analogue Gain* and *Exposure* were adjusted, no other *Camera Controls* or *Image Controls* were adjusted.

SharpCap histogram classic 'whale' shape for large disk (logarithmic vertical scale)	SharpCap's Camera Control Panel for the Altair GPCAM MONO V1

The completed image file was inspected using the *SER Player* from the *PIP* website at https://sites.google.com/site/astropipp/ser-player . From the *SER Player* menu, *Tools > Histogram* was selected to enable the histogram in the player. The shape of the histogram was reasonable for a large disk, giving high confidence that the data captured was suitable for processing.
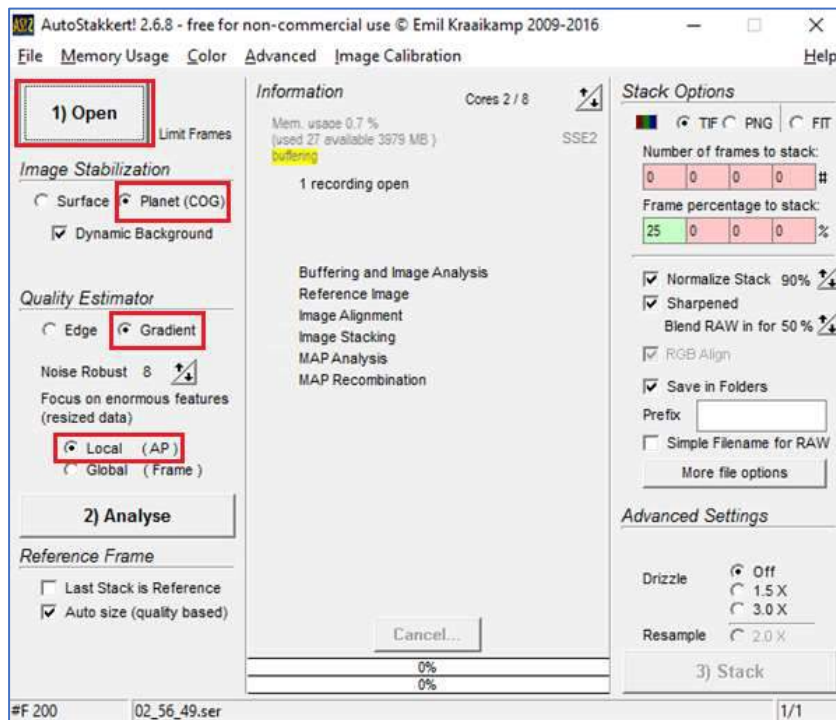
These are the contents of the *Camerasettings.txt* file:

```
[GPCAMMT9M034M]
Output Format=SER file (*.ser)
Capture Area=640x480
Binning=1x1
Pan=320
Tilt=240
Colour Space=MONO8
Black Level=0
Flip=None
USB Speed=4
Auto Exp Target=120
Frame Rate Limit=Maximum
Analogue Gain=900
Exposure=800
Timestamp Frames=Off
Contrast=10
Gamma=100
Extra Controls=On (Slower)
Negative=Off
Apply Flat=None
Subtract Dark=None
Display Brightness=1
Display Contrast=1
Display Gamma=1
```
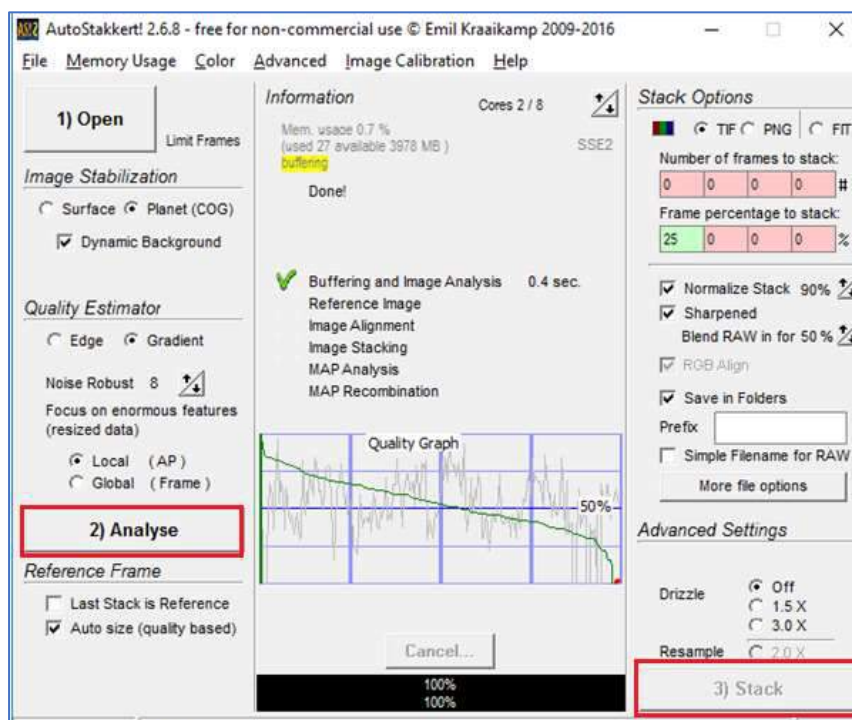
4 Processing with Autostakkert

This section describes how to process the video file to stack the frames and create a single TIF file.
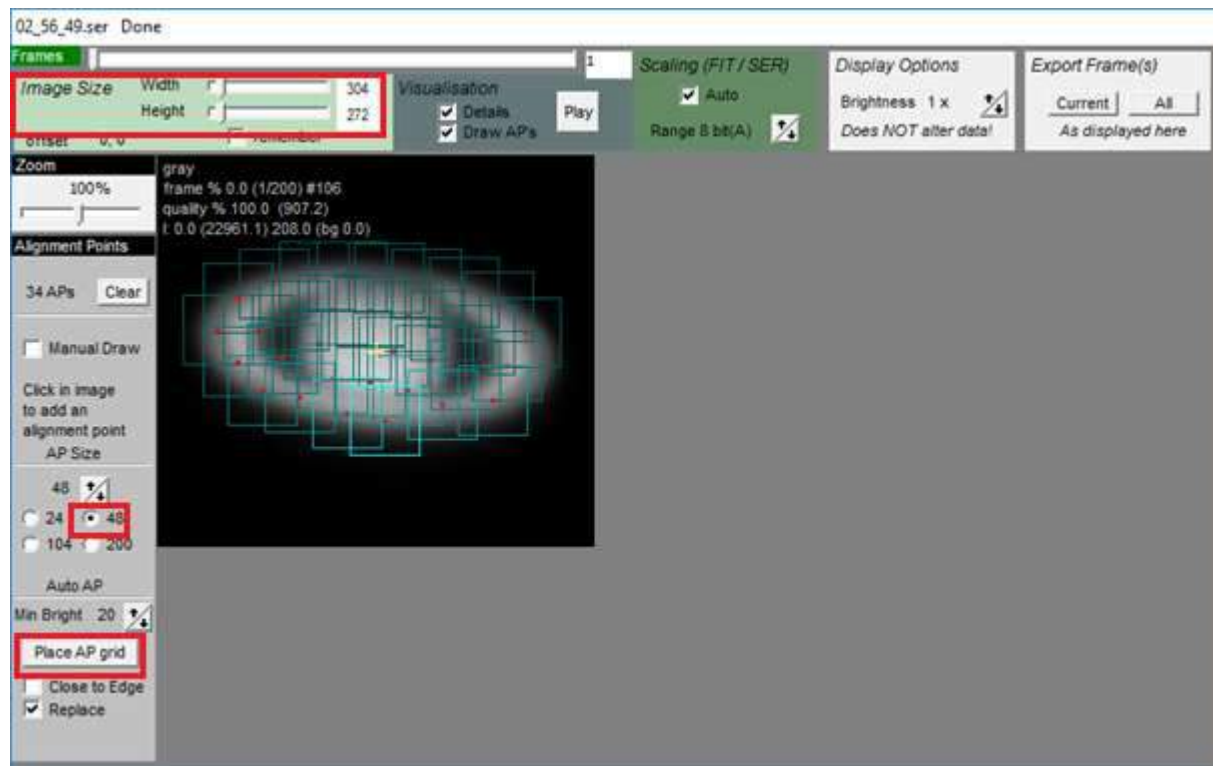
1. Start Autostakkert, drag and drop a suitable video capture file (AVI or SER format) onto the *Open* button and check the settings are suitable. The *Frame percentage to stack* depends on the quality of the video but 25% is a good starting point.

2. Click the *Analyse* button and wait for processing to complete.

3. In the other Autostakkert window, crop the *Image Size* (unless trying to include moons). Select a larger *Alignment point (AP) size* (48 in this example) and click *Place AP grid*. Any APs (red dots) at the edge of the image can be removed with a mouse right-click.

4. Click the *Stack* button in 2 above. Upon completion of processing, two TIF images will be created in the folder *AS_p25* (the image before stacking and the image after stacking the best 25% of the frames).
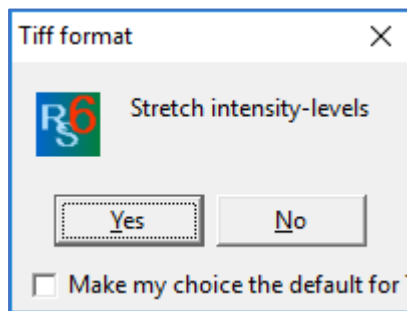
5   Processing with Registax

Further useful information can be found on Christophe Pellier's website at http://www.planetary-astronomy-and-imaging.com/en/finalising-processing-registax6/ - many thanks to the author for creating the tutorial material. Here is an outline of the steps taken (the order with the Layers is important):

1. Move the *Layer 2 slider* over to the right (100%).
2. Increment the *Sharpen filter* for *Layer 2*, doing this will bring out detail but also add noise.
3. Increment the *Denoise filter* for *Layer 2*, until the noise is just removed.
4. Move the *Layer 1 slider* over to the right (100%).
5. Increment the *Sharpen filter* for *Layer 1*, doing this will bring out detail but also add noise.
6. Increment the *Denoise filter* for *Layer 1*, until the noise is just removed.
7. Partially move the *Layer 3 slider* over to the right until satisfactory detail is brought out.
8. Increment the *Sharpen filter* for *Layer 3*, doing this will bring out detail but also add noise.
9. Increment the *Denoise filter* for *Layer 3*, until the noise is just removed.
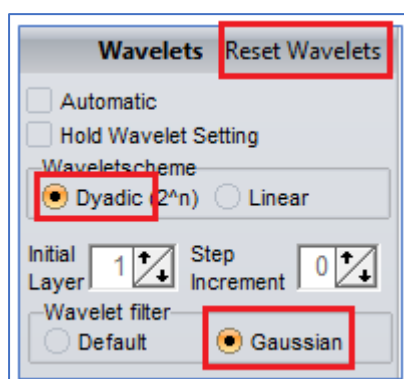10. Do not adjust *Layers 4, 5, 6*.

[Note: *Layer 3* can be omitted if the image has enough detail after processing *Layer 2* and *Layer 1*.]

There are no hard and fast rules, Registax final output is very much down to user preference. The settings given below are guidelines – learn by experience and experimentation.

1. Start Registax and load the TIF file stacked image called *x_conv.tif*. Answer *Yes* to the *Stretch intensity-levels* window if it appears.
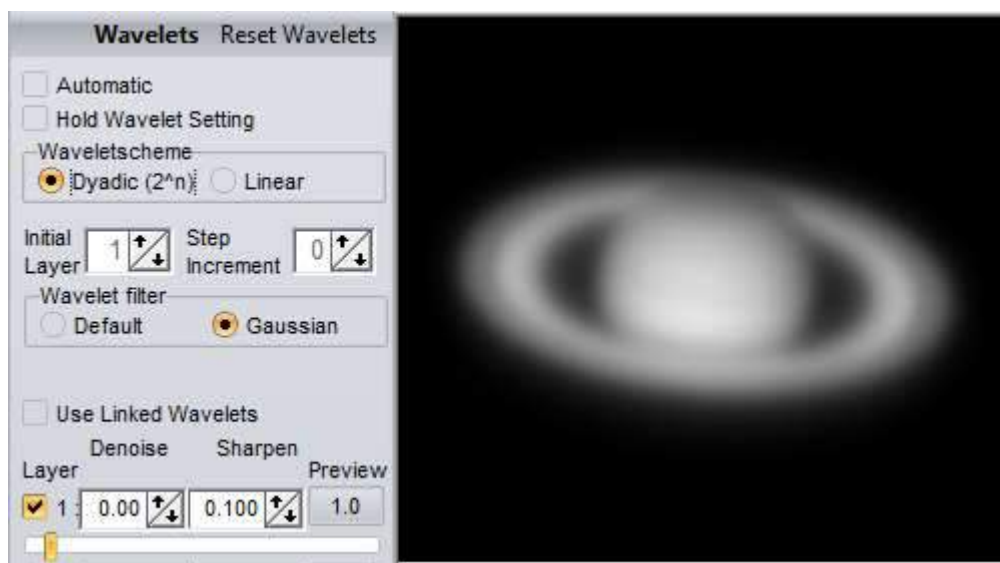

2. Select *Dyadic Wavelets* and *Gaussian filters* as shown below.
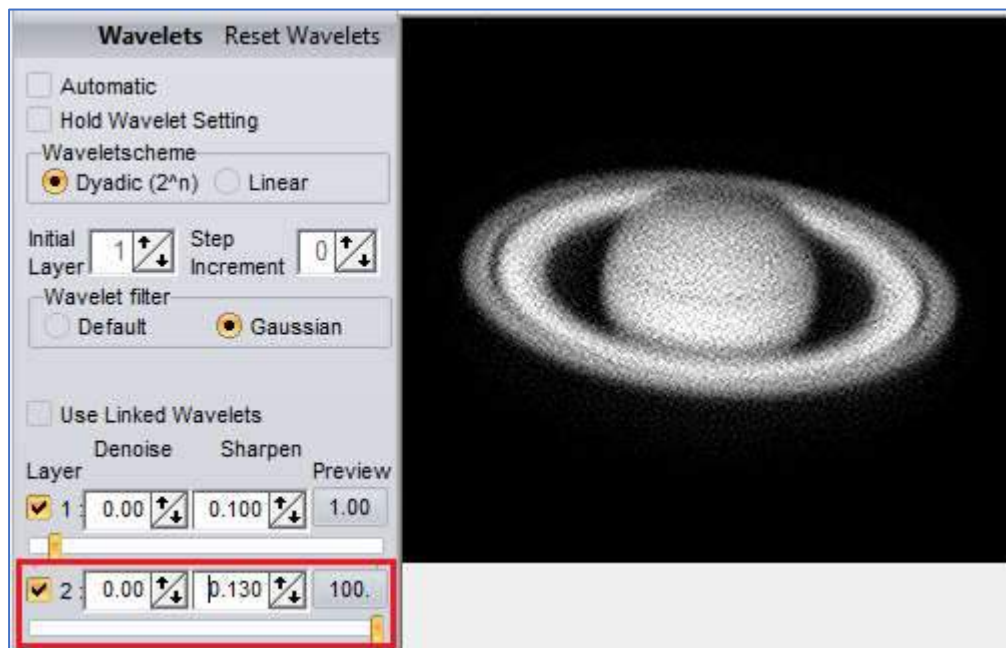

The steps below show how to adjust the *Layer sliders* plus the *Sharpen and Denoise settings* to bring out the detail in the image. The layers *must* be adjusted in the order given. The images for each layer adjustment have been kept on the same page, to allow the reader to see and compare the effects of the adjustments.

[Note: if it all goes wrong use the *Reset Wavelets* button to reset back to the initial loaded image.]
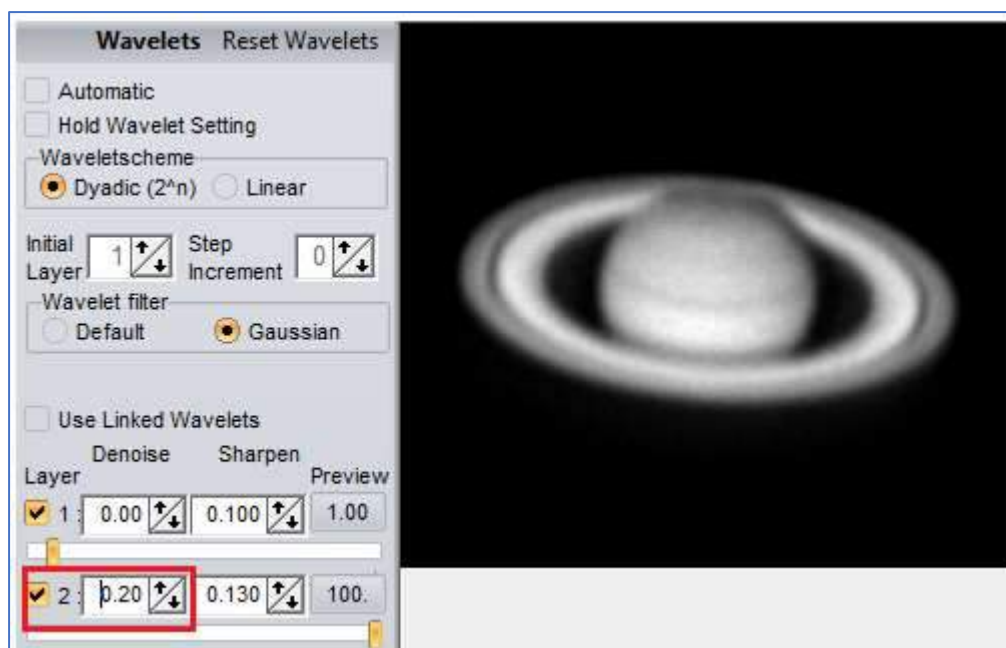
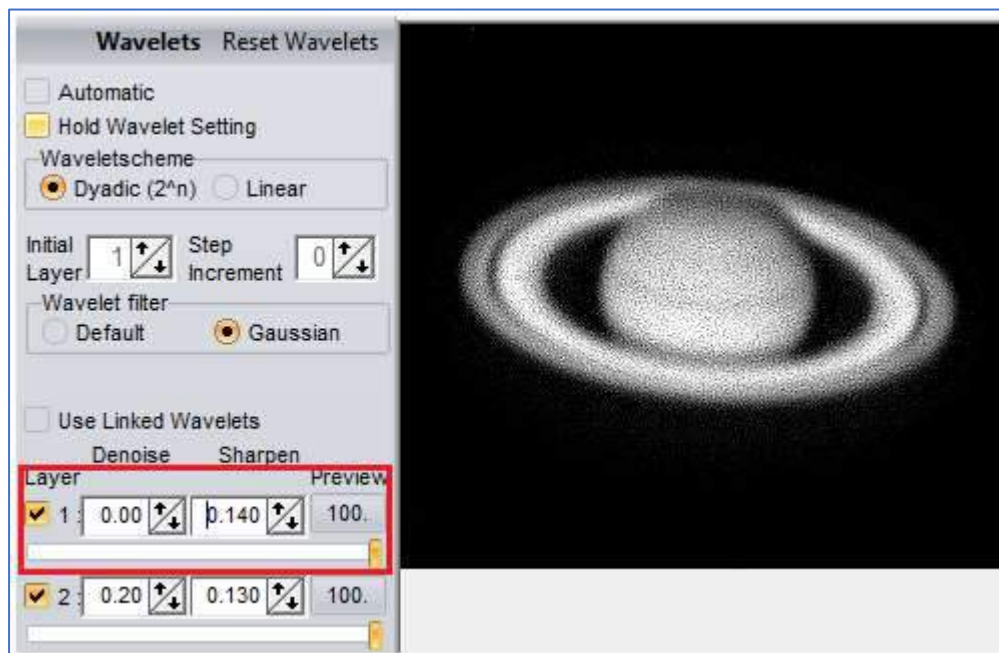This is the TIF image when first loaded into Registax.

1. For *Layer 2*, move the slider to 100% (less if 100% destroys the image). Increment the *Sharpen* filter (0.130 in the example) to bring out detail (this will also increase noise).
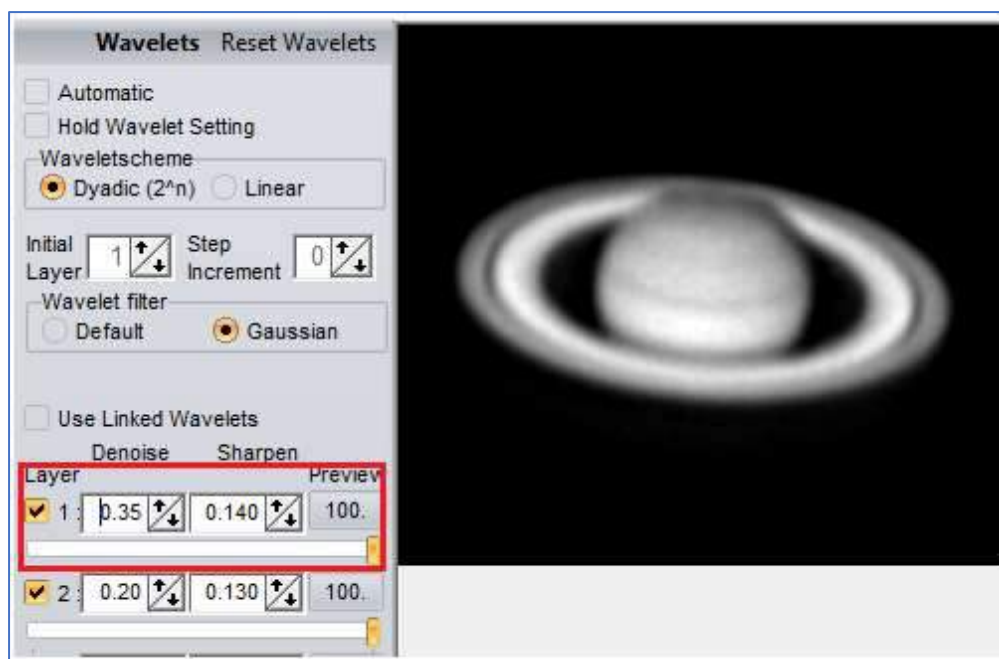

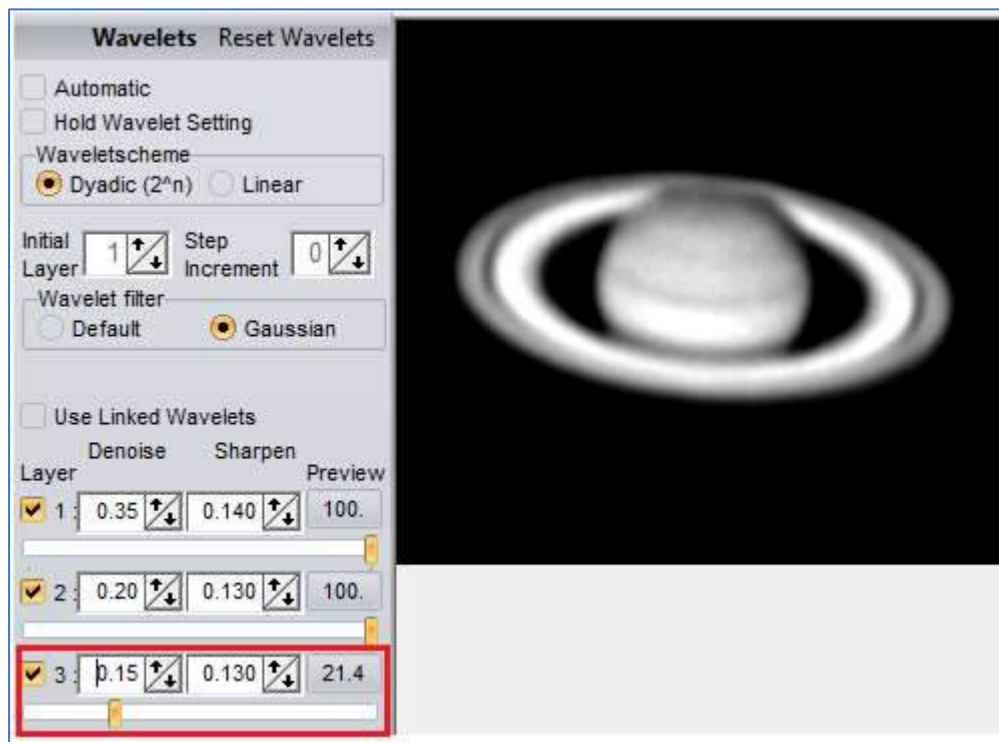2. For *Layer 2*, increment the *Denoise* filter (0.20 in the example) until the noise just disappears.

3. For *Layer 1*, move the slider to 100% (less if 100% destroys the image). Increment the *Sharpen* filter (0.140 in the example) to bring out detail (this will also increase noise).
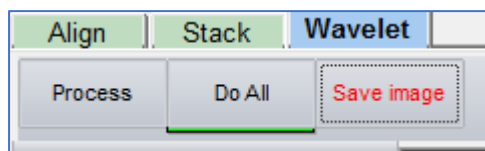

4. For *Layer 1*, increment the *Denoise* filter (0.35 in the example) until the noise just disappears.

5. For *Layer 3*, move the slider to around 50% (less if 50% destroys the image). Increment the *Sharpen* filter (0.130 in the example) to bring out detail (this will also increase noise). Then, increment the *Denoise* filter (0.15 in the example) until the noise just disappears.
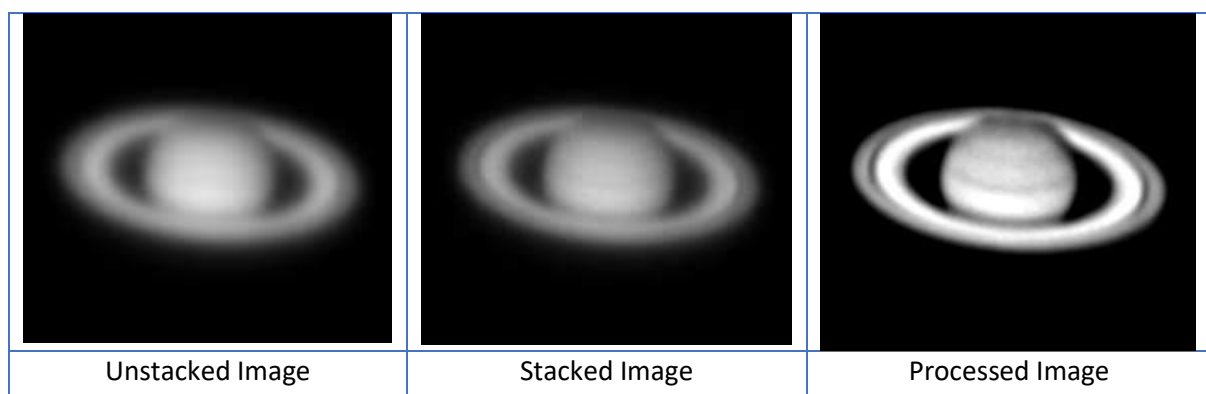

6. To finish, click the *Do All* and *Save image* buttons.

7. The processed image will be saved in the *AS_p25* folder. The image could be further processed using image editing software, examples of which are Gimp and Photoshop.
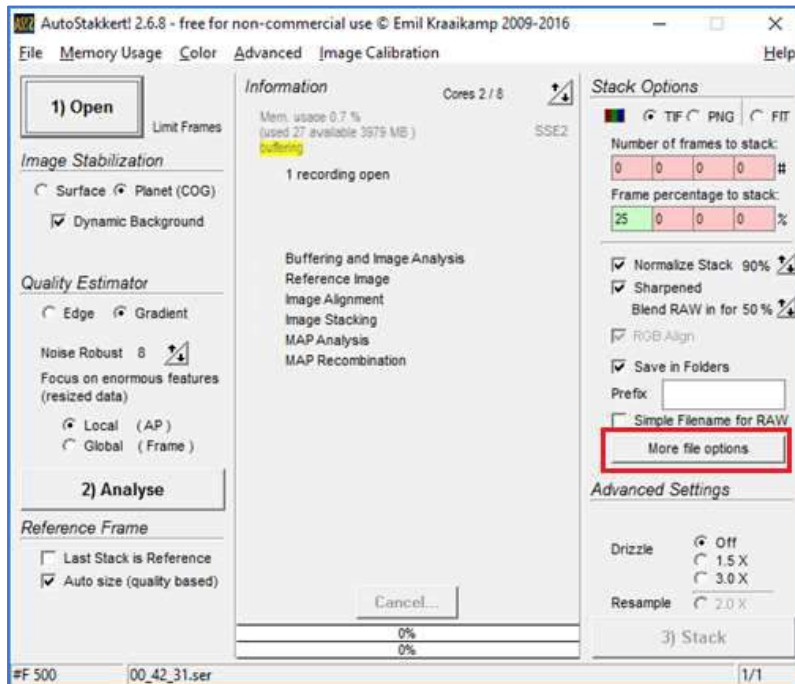
The resultant image is shown below on the right (with the initial unstacked image on the left).

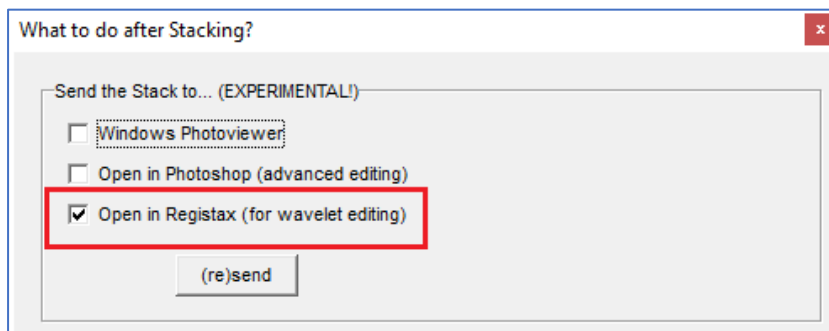| Unstacked Image | Stacked Image | Processed Image |

6   Linking Autostakkert and Registax

Autostakkert and Registax are generally used together, so some simple configuration can make the post processing operation seamless. If Autostakkert is configured correctly and if both programs are started before stacking with Autostakkert commences, the resultant stacked image will be automatically loaded directly into Registax.

1. Start Autostakkert and load any video file. The More file options button becomes active.

2. Click *More file options* and select *Open in Registax* (for wavelet editing).

3. For subsequent processing, start both Autostakkert and Registax. Completed stacked images will be loaded directly into Registax.