

# HOWTO Process a Lunar Video

USING AUTOSTAKKERT

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# 1 Introduction

This document is for anyone who is interested in getting from:



To:



The document describes the steps to:

- Stack a video using Autostakkert to produce a single TIF image.
- Process the image to bring out detail.

The video in this example was captured under intermittent/thin cloud. The capture took place around 21:00 on the 13<sup>th</sup> February 2019 in the car park at the local Village Hall.

The following equipment was used:

- Skywatcher 127 MAK telescope.
- Celestron CG5 Advanced GT equatorial mount.

- QHY5LII-M mono guide camera.

The following laptop was used for the video capture:

- Toshiba C50
- i3 processor
- 8Gb memory
- 500Gb drive

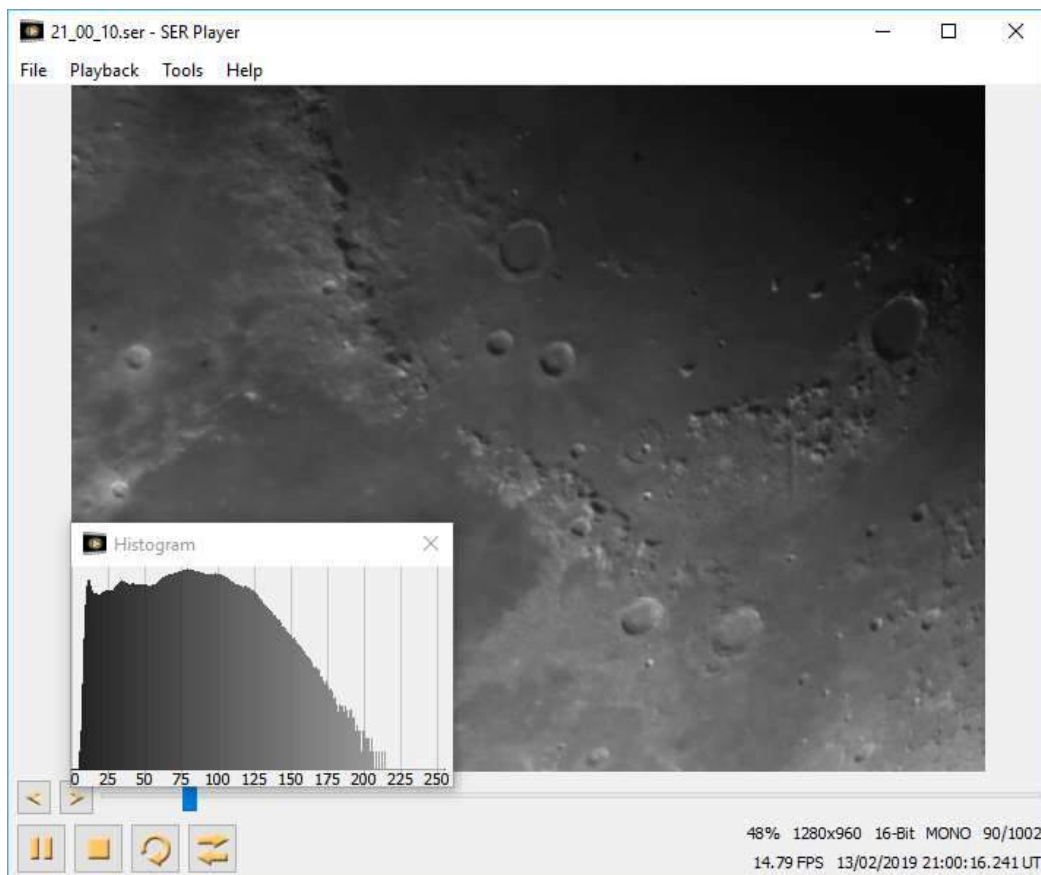
The following software was used:

- [SharpCap 3.2](#) – capture the video in SER format.
- [SER Player](#) – inspect the completed SER video.
- [Autostakkert v3](#) – stack the video frames to produce a single TIF image.
- [GIMP 2.10](#) – process the image to enhance detail (apply contrast, remove dust bunnies, rotate to correct orientation).

## 2 Getting Started

The captured video can be played back using the SER Player software. Double click the video file and from the *SER Player* menu select *Tools > Histogram*. Information such as frames per second, capture area, bit depth, capture date/time and number of frames can be seen. When capturing, ideally, aim to have the right-hand side of the histogram around 150. This histogram was fluctuating as thin cloud passed over the moon.

A 60 second video was captured in SER format at 15 frames per second, the resultant file containing 1,000 frames .



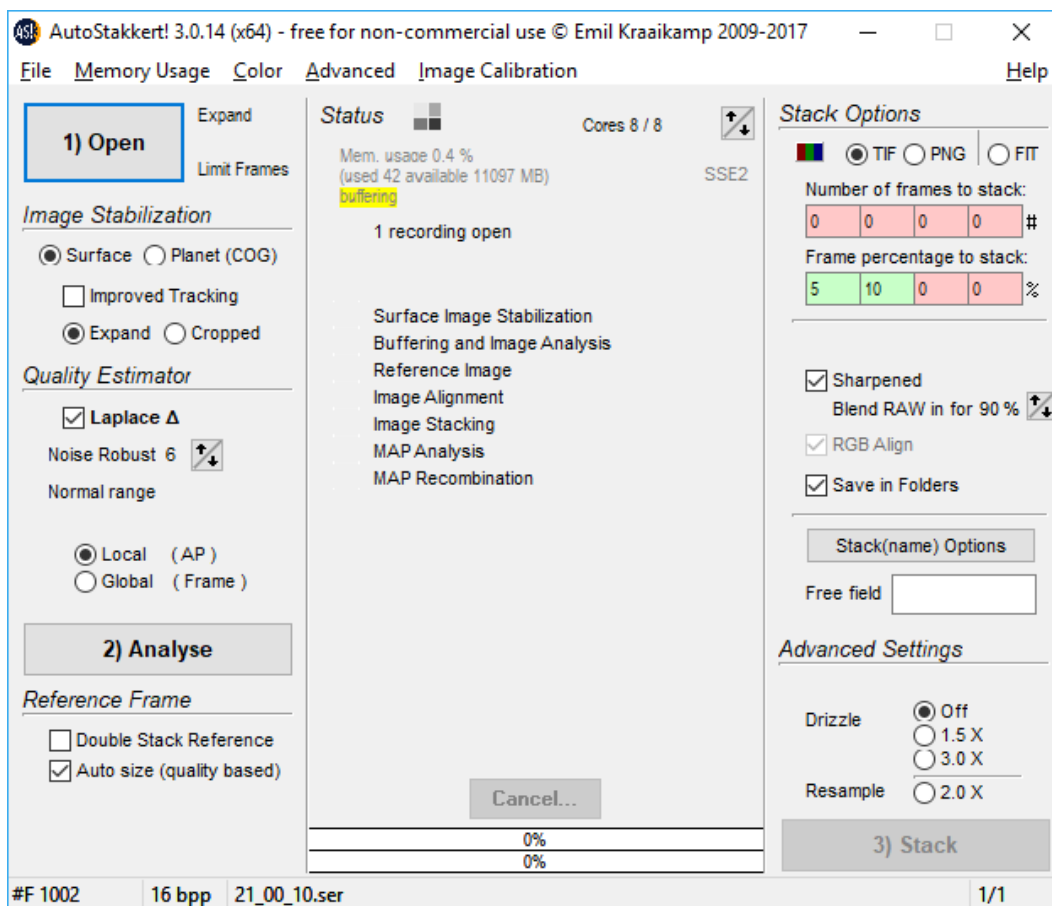
### 3 Processing with Autostakkert

The program Autostakkert (there are others) can be used to analyse the individual frames, give each frame a number based on quality (100% is defined as best) and stack a selected percentage of the frames.

These are the steps involved:

1. Define initial settings.
2. Define Anchor Point (for stacking).
3. Analyse.
4. Decide number of frames to stack.
5. Create Alignment Points.
6. Stack.
7. Post Process.

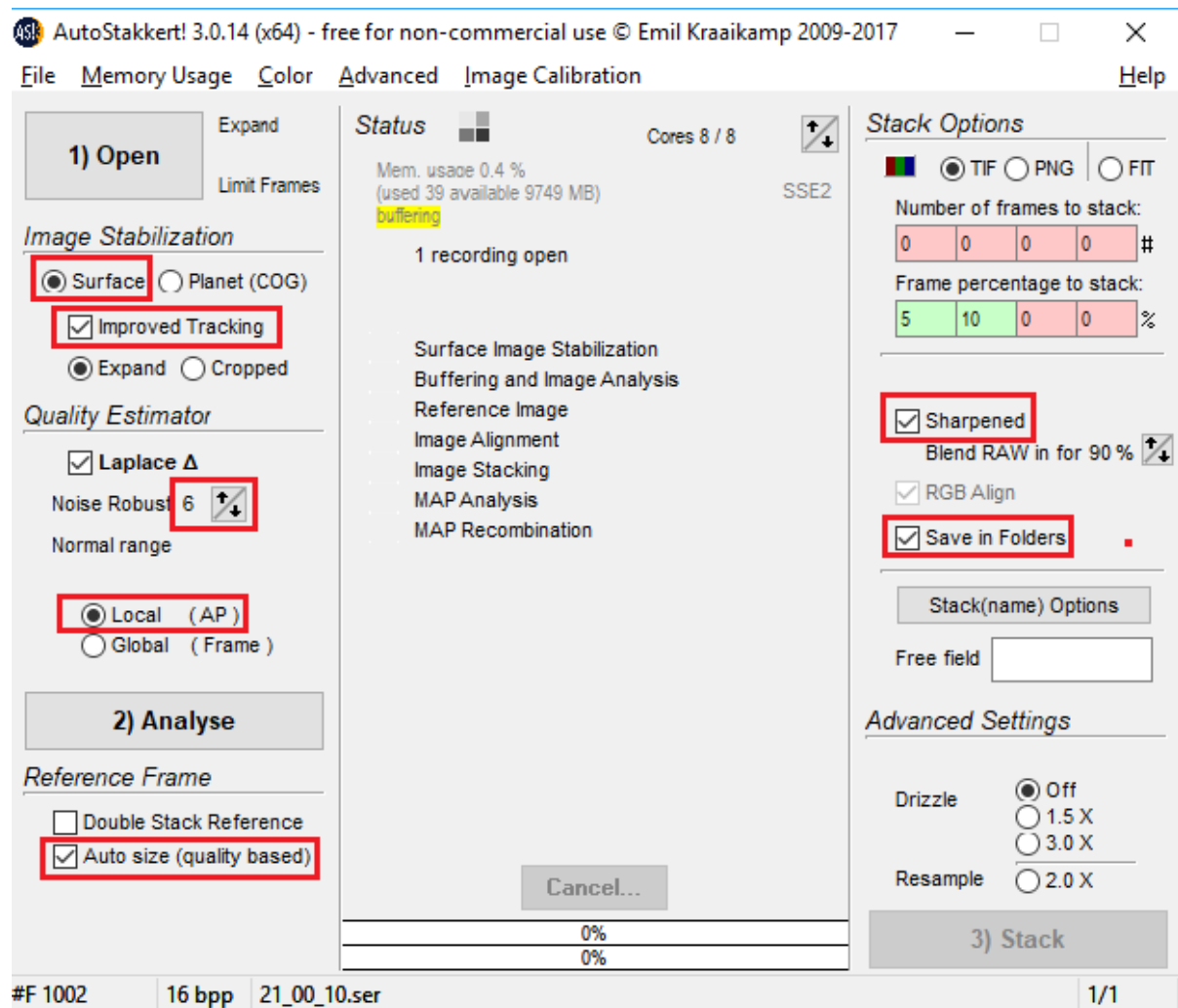
Start Autostakkert, drag and drop a suitable video capture file (AVI or SER format) onto the *Open* button and check the settings are suitable.



### 3.1 Define Initial Settings

Some settings need to be established on the first screen:

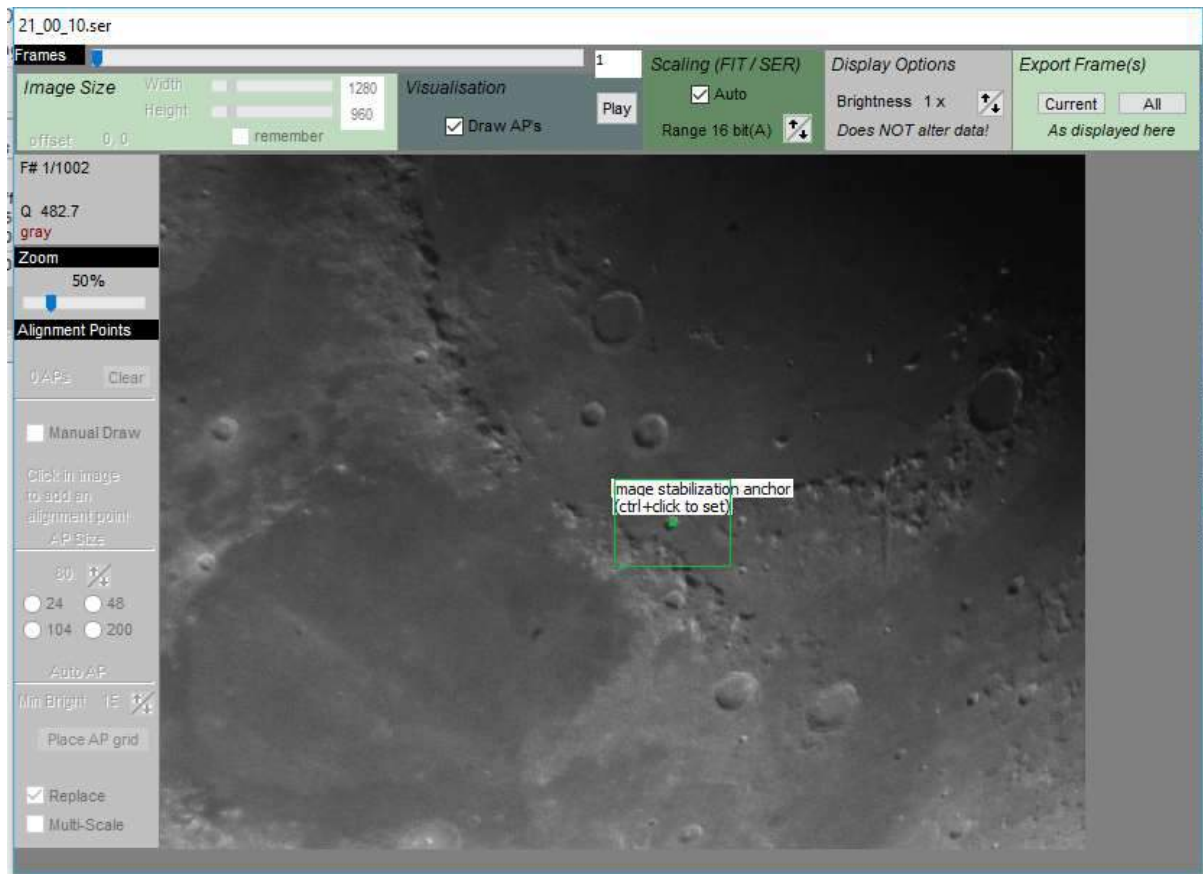
- Use *Surface* unless image is a full disc surrounded by black space.
- Improved tracking is slower but not that slow.
- *Local* for *Alignment Points*.
- *Sharpened* will produce 2 files, the *\_conv* file is sometimes good enough.



### 3.2 Define Anchor Point

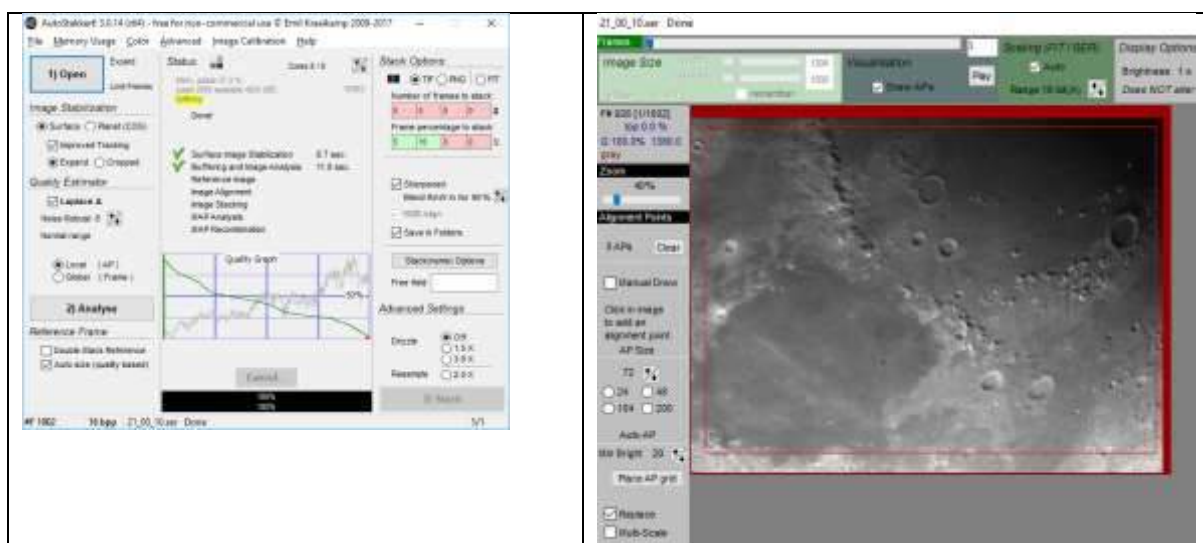
The second window is used to define a point to align all the frames:

- Select an anchor point with *Ctrl + Left Click* (try to keep away from the edges).
- Use *Alt + <number>* to adjust size of anchor box, allow the box to be large enough for some 'wobble'. *Alt + <3>* was used here.

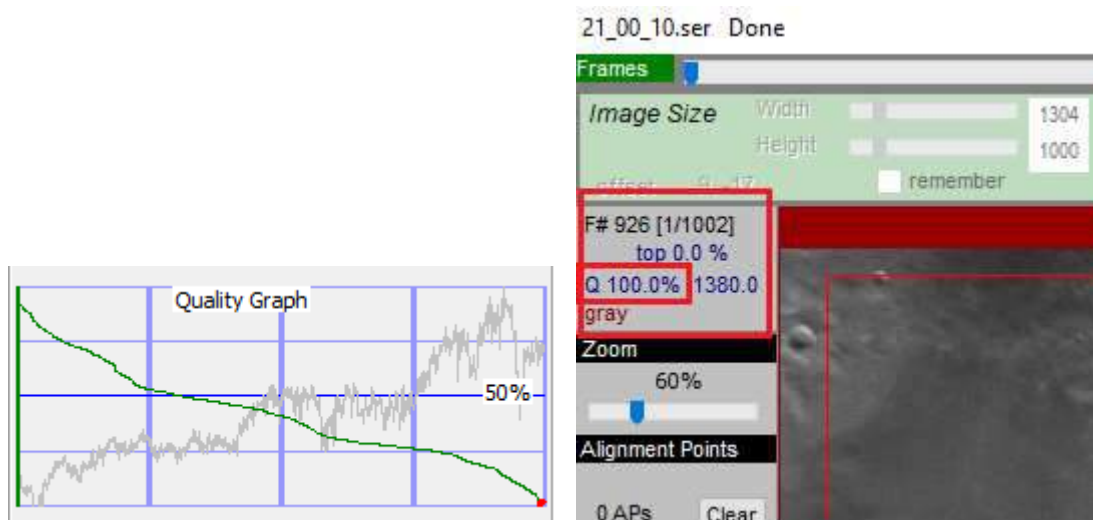


### 3.3 Analyse

Click the *Analyse* button. The following appears:



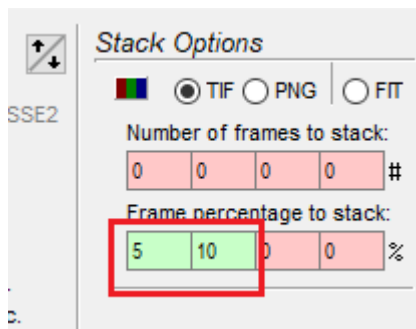
### 3.4 Define Number of Frames to Stack



How many frames to stack? The answer is “it really depends on the quality of data as to how many to stack”.

Quality graph – click on the vertical bars (quartiles) at 25, 50, 75 and 100%. On right hand image, look at the Q number. 100% is fabulous, once it gets down into the 60% things are not so good. As the frames are clicked through, inspect the frame. If the Q for 75% was 88% then maybe stack 75% of frames. The reality is 10 – 25 is a safe choice. As few as 5% of frames can be stacked as there is no point stacking in poor frames which will degrade the image.

In this example, top 10% gets down to a Q of 73% and top 5% gets a Q of 80%. There might be no visual difference between stacking 5% or 10% of frames. Both could be selected (up to 4 choices).

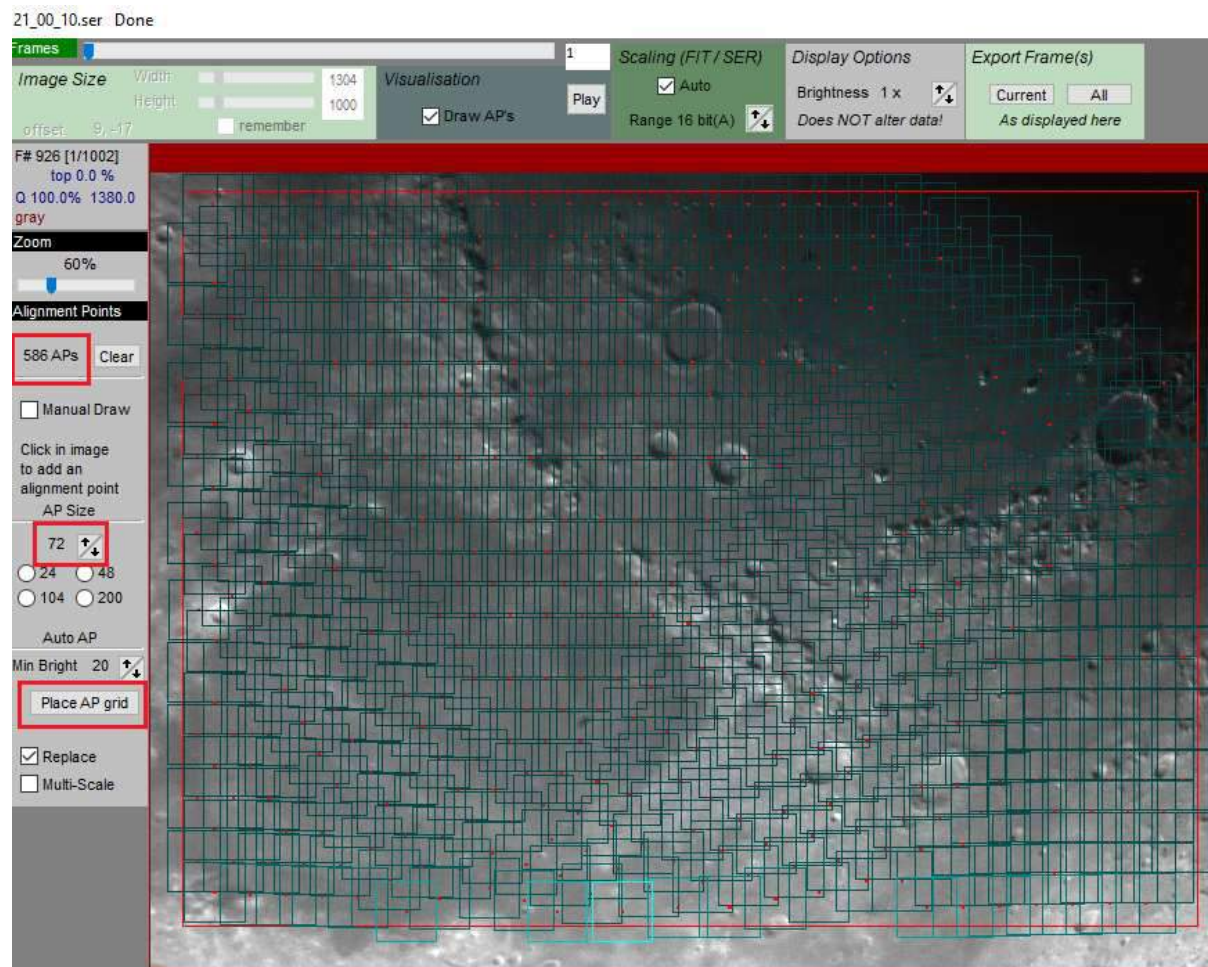


Instead of using percentages, the *Number of frames to stack* boxes can be completed.



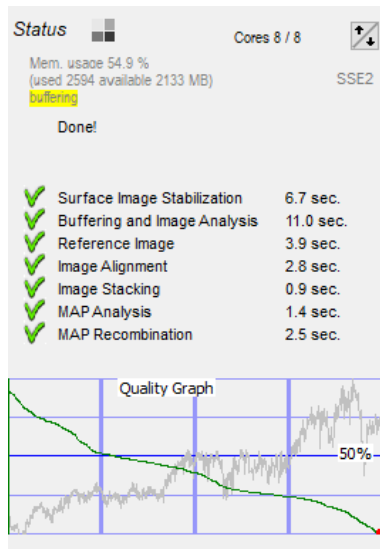
### 3.5 Create Alignment Points (APs)

Aim for around 500 APs for a full surface (using a guide cam 1280 x 960 type image). Define more APs if using a bigger frame camera or less for a webcam (640 x 480).






### 3.6 Stack

Click the *Stack* button. Upon completion the window shows:

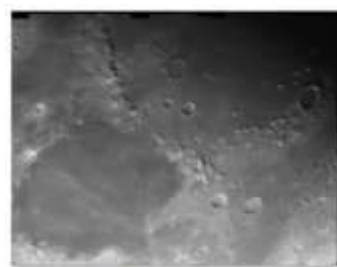
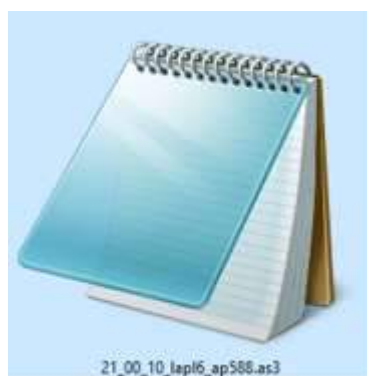


In this example, folders AS\_P5 and AS\_P10 will each contain 3 files – *tif*, *\_conv.tif* and the *log*. The log is very informative.

Name	Date	Type	Size
 21_00_10_lapl6_ap588.as3	16/02/2019 11:52	AS3 File	41 KB
 21_00_10_lapl6_ap588.tif	16/02/2019 11:52	TIF File	2,550 KB
 21_00_10_lapl6_ap588_conv.tif	16/02/2019 11:52	TIF File	2,550 KB

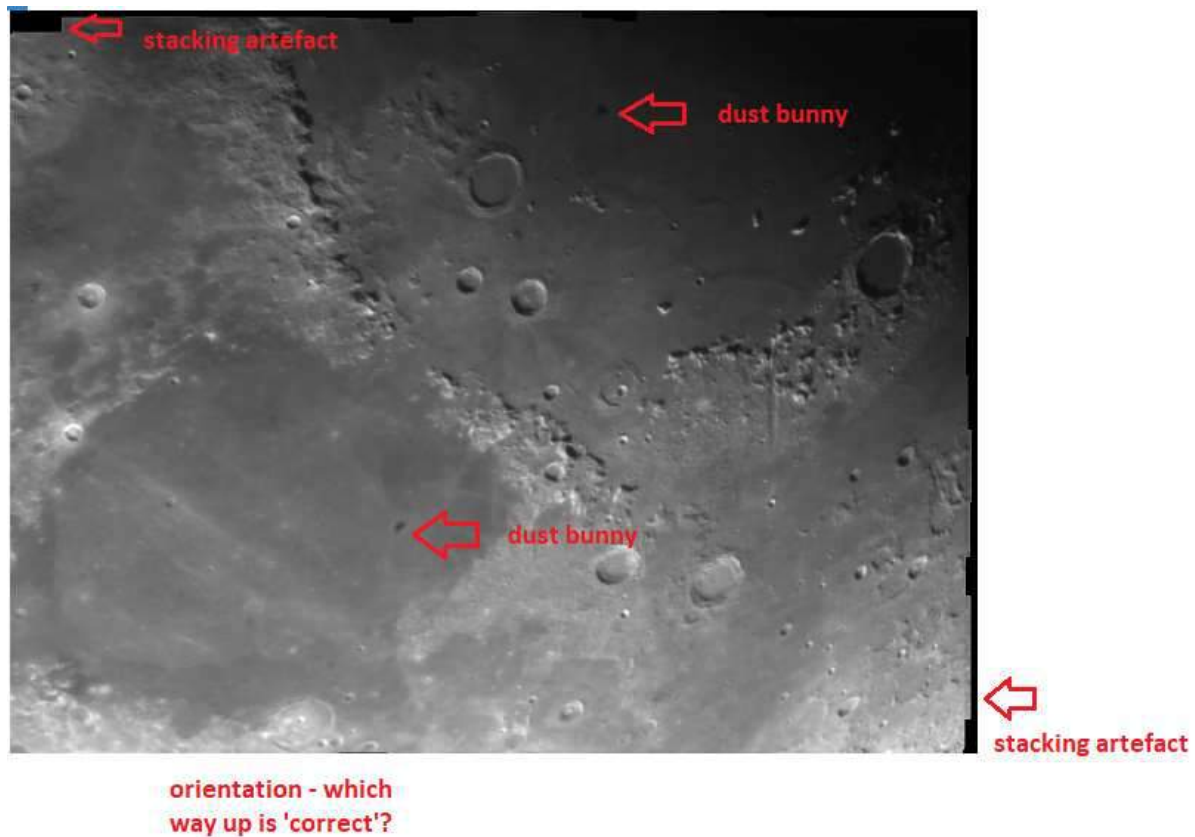
The file names contain:

Image-creation-time    Laplace-noise-value    number-of-APs



### 3.7 Post Process

The stacked and sharpened image looks like this:



There are several issues:

1. A couple of dust bunnies – dirt on the optics somewhere. These could be fixed by taking flat frame and applying a master flat to the stack (Autostakkert can do this). Alternatively, use the clone/stamp tool in an image editor such as GIMP.
2. Stacking artefacts – leftovers from the stacking process (this is normal). These are normally removed by cropping in an image editor such as GIMP.
3. Orientation – the lunar north is to the right in the image. By rotating counter-clockwise through 90 degrees, the image can be aligned with the view from earth. Again, an image editor such as GIMP can be used.
4. Applying a slight contrast to the image would help with definition.

## 4 Final Image

This is the final image with the above issues addressed. The mountain range shown is the Apennine Mountains. Download the Virtual Moon Atlas from <https://ap-i.net/avl/en/start> for more information.



A high-resolution image can be found at <https://www.astrobin.com/391271/?nc=user> .