

# Seestar S50 Overview - First Slide



- Photo of Sunspots on 2024-08-22 at 1414.
- Image dimensions 43 arc-min by 77 arc-min.

# Seestar S50 Overview - SAG

Stratford Astronomy Group - KR

Stratford, Ontario, Canada

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# What Seestar S50 Can Do

- What Can the Seestar S50 Do ?
  - Solar Photos and Videos - Sunspots
  - Lunar Photos and Videos - Craters
  - Astrophotography - Dark Sky or Moderate Light
  - Enhance Images to Reveal Faint Objects - Starfields, Nebulas, Clusters, Galaxies
  - Transfer Data to Computer for Improvement
  - Terrestrial Zoom Photography (30+ meters)
- What Cannot the Seestar Do?
  - Real-Time or Zoom Viewing of Objects - Takes 10-sec photos 0.72 deg by 1.28 deg.
  - Often Cannot Identify Unknown Starfields - Use [astrometry.net](http://astrometry.net) via computer.
  - Computer Enhancing is More Powerful - Lots of software is available. Helpful community at [cloudynights.com](http://cloudynights.com)

# Solar Photos and Videos - Sunspots

- Solar Photos and Videos - Sunspots

- Sunspots – Different Dates



Aug-07 and Aug-22



- Sunspots - Different Zooms - 1x, 2x, 4x  
Resource Wiki: Sunspot.
  - REMINDER: Don't Burn Out the Scope !!  
Install Solar Filter, THEN turn Scope towards Sun.  
Turn Scope away from Sun, THEN remove filter.

- Solar Photos and Videos - Remarks
  - How Fast is the Sun Rotating ?  
Depends upon solar latitude.  
Is 4:3 ratio a sort of phase lock?  
Resource Wiki: Solar rotation.
  - Can One See a Coronal Mass Ejection ?  
Imaging of sunspots coming over horizon ?  
Resource CloudyNights: Solar Observing and Imaging.  
User "groom" posts "daily" solar disk Seestar images.

# Lunar Photos and Videos - Craters

- Lunar Photos and Videos - Craters
  - Lunar Views – Different Conditions and Settings



July-11 and Aug-17



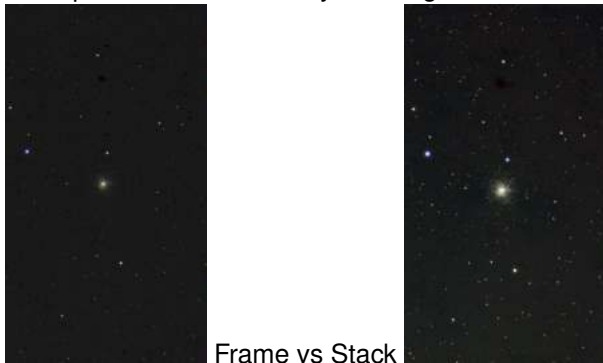
- Left Image (11-July) is on a Very Clear Night BUT it is overexposed. Can adjust on Seestar to reveal the crater structure along right side.
- Right Image (17-Aug) is an Overcast Weekend AND it is either underexposed or mist-filtered.

# Lunar Photos and Videos - Remarks

- Lunar Photos and Videos - Remarks
  - Lunar images (cropped) were taken at 1x zoom. 2x and 4x zooms might give better detail.
  - Nice Effects Looking thru Clouds or Trees  
Focus on Pine Needles not the Moon ?  
Focus on the Moon thru Tree Shapes ?
  - Sun and Moon Views are Recorded as Videos, File format is MP4. Can view on Computer. Use VLC (VideoLan) to Capture Snapshots. Nice videos of clouds skudding across Moon.

# Astrophotography - Frames vs Stacks

- Astrophotography - Frames vs Stacks
  - Example: M15 Cluster early morning of 2024-08-15



- 10-Second exposure = 1 Frame (5 MBytes).
- This stack is a summation of 58 individual frames.  
Stack of 58 frames is 580 sec (9+ min) of Light data.



- Astrophotography - Frame Capture
  - Sky can be Noisy or Dark - Moderate noise is OK. Scope will usually figure out its horizontal orientation.
  - S50 will discard frames with streaks (satellite).  
10-min of M15 frames took 16-min to gather data.
  - Can save individual frames in Seestar memory. Or scope will stack frames and save only stack.
  - You can review and discard frames that are bad. Remaining frames go into enhancement.
  - Storage capacity for about 8-10,000 frames. That is about 20-30 hours of observing.
  - Clean up frame directories when not needed. Can transfer to computer for long storage.

- Astrophotography - Stacked Images
  - Scope enhances (stacks) frames automatically to show a display of stacked image thus far. You can snapshot the stacked image during the enhancing process, as a progress record.
  - Repeated bad frames can ruin the whole stack, which is why keeping per-frame data is good.
  - Stacked images need only 12-15 MBytes storage. Can keep lots of stacked images on the Seestar. 10 GBytes could store about 7,000 stacked images, and leave 40 GBytes for individual frame workspace.
  - We can build a good library of images for sharing. Stacked images can be emailed or transferred.

# DeepSky - Globular Clusters

- DeepSky Images - Globular Clusters
  - M13 (16 frames, 29-June) and M15 (58 frames, 15-Aug)



M13 and M15



- Number of frames does not necessarily mean better. The M13 image was taken on a night of good seeing.
- One can try stacking frame sets from different nights. Does that work on the Seestar? Have not tried yet. Computer stacking of diverse framesets should work.

# DeepSky Images - Zoomed-In M13 and M15

- DeepSky Images - Zoomed-In M13 and M15
  - M13 (16 frames, 29-June) and M15 (58 frames, 15-Aug)



M13 and M15



- Book says M13 is 20 arc-min diameter, mag 5.9, and M15 is 12 arc-min diameter, mag 6.4, and that M15 central core is brighter than M13 central core.
- Can one see that when comparing these two images ? Angular diameter matters when using Seestar S50, because of its fixed field of view. No eyepiece swaps.
- These images are simple computer zooms, of the original 1020x1920 pixel 5x3 JPEG images which were produced by S50 to 216x216 pixel square JPEG images.

# DeepSky Images - Galaxies

- DeepSky Images - Galaxies
  - M82 (59 frames, 12-July) and M106 (55 frames, 12-July)



M82 and M106



- These are 216x216 pixel zooms of two galaxies.
- M82, the Cigar Galaxy, demonstrates that the S50 shows some impressive colours in its photos. However, the image needs more exposure time.
- M106 is a spiral galaxy. As with M82, more time (more frames) should show interesting details.

# DeepSky Images - Nebulas

- DeepSky Images - Nebulas

- M27 (5 min, 11-July) and M57 (25 frames, 18-July)



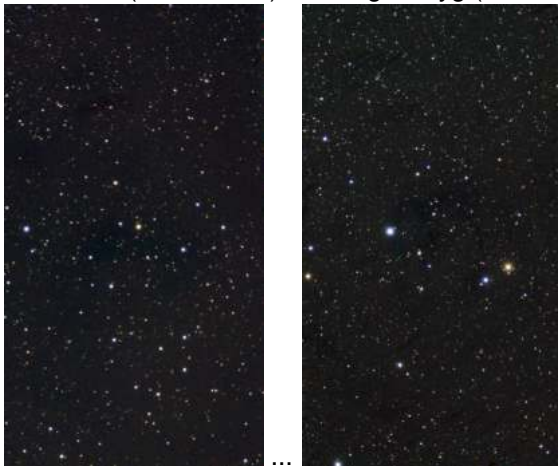
M27 and M57



- These are 216x216 pixel zooms of two nebulas.
- M27 is the Dumbbell or Apple Core Nebula. Beautiful colours, but want more details. Seeing was not great that observing night.
- M57 is the Ring Nebula, the original planetary. It is about what one can expect from observing a solar system planet using the Seestar S50.
- Nebulas are difficult objects, need dark sky. But they are worth the trouble. Colour !!

# DeepSky Images - Starfields

- DeepSky Images - Starfields
  - V538 Cas (147 frames) .. Omega1 Cyg (111 frames)



- V538 Cas is the bright yellow star at center of left photo.  
Omega1 Cyg is the brightest white star in right photo.

# Transfer Data to Computer

- Transfer Data to Computer
  - Connect Seestar to Computer using USB Cable  
Or connect via using Same WiFi Router.  
The S50 is device “seestar” over WiFi.  
(Seestar tutorial re this point was incorrect.)
  - Windows File Explorer works for copying files.  
Each Seestar frame is actually THREE files.
  - FIT (FITS) file (4MBytes) is raw data for stacking  
and other sophisticated computer processing.
  - JPG (JPEG) file (600KBytes) is what you see  
when you browse among the files on Seestar.
  - THN.JPG file (20KBytes) is a tiny thumbnail  
shown when looking at a collection of images.

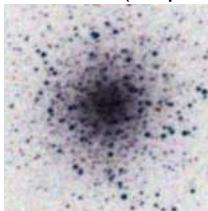


# Computer Processing - Invert Black/White

- Computer Processing - Invert Black/White
  - Use <https://pinetools.com/invert-image-colors> to invert the colours in a JPEG or PNG file. For example, if going to print image onto paper and do not want to use up lots of black toner.
  - M13 (from Seestar) and Inverted M13 (for printing)



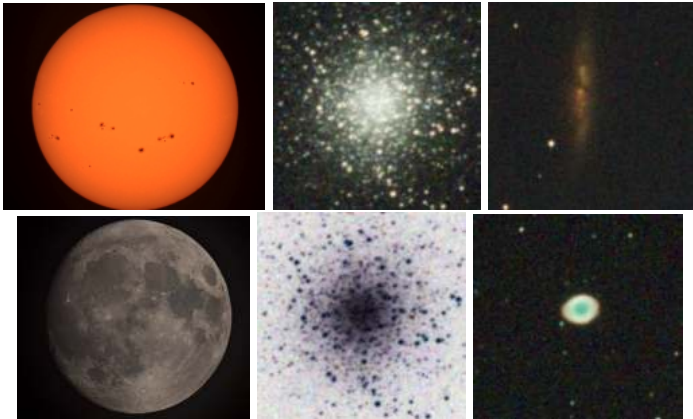
...invert...



- Computer Processing - Plate Solving
  - Lost in Space? Found an old astronomical photo plate, and want to know where in the sky it shows? Plate Solving is the technique to find the location. Use <https://nova.astrometry.net> website service. Can upload JPEG file, no approximate guess needed.
  - Understanding the info from Plate Solving ? Don't know yet. But enjoying learning about.
  - Fascinating algorithm, described in PDF file at <https://arxiv.org/abs/0910.2233>  
Background - wiki: Astrometric solving

- Computer Processing - Et Cetera.
  - Stretching (adjusting thresholds, intensity scales).
  - Making Mosaics (M31, Constellations for instance).
  - Website [cloudynights.com](http://cloudynights.com) is very helpful.  
Seestar category within Smart Telescopes.  
Many problems have been sorted out by others.  
Some great imagery, both Seestar-enhanced  
and Computer-enhancement of Seestar-data.

# Seestar S50 Overview - Last Slide



● The Sky's the Limit !!