ASTROGATOR

July 2025

Grand Strand Astronomers

An Astronomical Journal of the Grand Strand Astronomers
of the Greater Myrtle Beach Area
GSA Founded on September 24, 2020

Grand Strand Astronomer's Monthly Events:
General Membership Meeting:
Thursday July 10, 2025 @ 7:00 pm
Meeting: VIA Zoom.
Please see email or Facebook for link

Observing Sessions:
Saturday July 26, 2025
Location: Hampton Plantation
Gates open @ 6:00 pm

NASA's Mars rover Curiosity acquired this image using its Left Navigation Camera on June 23, 2025 — Sol 4578, or Martian day 4,578 of the Mars Science Laboratory mission — at 02:38:50 UTC.
NASA/JPL-Caltech

Grand Strand Astronomer's Social Media

Grand Strand Astronomers Facebook

Grand Starnd Astronomer's Website

GSA Leadership

Executive Officer
Ian Hewitt

Treasurer
John Defreitas

Photograph not available at this time

Secretary
Gerald Drake

Social Media Coordinator
Denise Wright

Photograph not available at this time

Newsletter Coordinator
Tim Kelly

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Picture of the Month

The Curiosity Rover has an extensive Photojournal that documents its journey and discoveries on Mars. It's part of NASA's Mars Science Laboratory mission, and it has been sending back thousands of stunning photos since it landed on the Red Planet in 2012.

The images cover everything from wide landscapes to detailed close-ups of rocks, soil, and even the rover's own wheels.

Curiosity's Photojournal includes images captured by its various cameras

Call For Volunteers

Tim Kelly

Grand Strand Astronomers are looking for volunteers to help with the social media platforms such as Facebook, YouTube and Twitter if the need arises. Presently Facebook needs a new face lift and be brought up to present time activities. Our website can also use some TLC and someone responsible to keep it updated with club activities and astronomy related items. If anyone would like to help in these categories, please contact Ian Hewitt at the email address below.

We are looking for new and older club members to help contribute articles for the GSA Newsletter. You can be a novice level, medium level, or a experienced level astronomer. Knowledge such as types and location of numerous stars, nebula or galaxies to share with other club members. GSA would like to provide topics for all level of members and non-members that are both hands-on projects and educational sharing. You can either write you own or use one already written and published. See previous articles on older issues for contributions for self written articles. See Tim's contributions for an example of non-written subject matter or from an article written from another person. Please provide the title, name of the originator and website link that the original article can be found. You will not be required to submit articles every month, however every second or third month would be nice and a benefit to all members and non-members. Please send articles to **t.m.kelly349@outlook.com**

GSA Telescope Loaner Program

Gerald Drake

Did you know our club has telescopes available for loan? They are Dobsonians that were donated to the club when we first started. These are available for club members to use at no charge. All you have to do is take care of them and return them if someone else wants to borrow one. The first one is an Orion XT 8. It’s in great shape. It gives beautiful views of the moon, planets, and galaxies. Comes with accessories that include a 2X Barlow, 25mm eyepiece, 9mm eyepiece, and laser collimator tool. The other one is an Orion Skyquest XT 10 with Orion’s IntelliScope computerized object locator. It includes more than 14,000 objects in its database so you’ll be able to locate those dim galaxies. Should be hours of fun. Accessories are included. Both of these are begging to be used. Send us an email if you’re interested in borrowing one.

GSA Monthly Newsletter Articles

Tim Kelly

This is our club and our newsletter. Lets help each topic to continue to grow.

Grand Strand Astronomer's is looking for individuals who would like to participate in submitting newsletter articles dealing with anything astronomy. We can not rely on the same four (4) members to write and send in articles month after month. New thoughts and ideas make for good reading and beneficial growth for the club and the public of the Greater Myrtle Beach area.

One member's simple advancement could just be what a newbie is looking for to get over a hurdle that has been impeding their progress forward. The expertise by many members can be a form of mentoring.

Grand Strand Astronomers - Membership

Grand Strand Astronomer's had one new member for the month of June. GSA provides a large welcome to Margery McDonald. We have lots to learn and lots to teach.

GSA Meeting Recap for June 5, 2025

Gerald Drake

Ian welcomed everyone, both in-person and on YouTube. He introduced this meeting as an experimental format, noting that several astronomy clubs across the Carolinas were invited to join. We had 30 participants attend this meeting via Zoom. Clubs represented included: - Raleigh Astronomy Club - Midlands Astronomy Club (Columbia, SC) - Chapel Hill Astronomical Society (CHAOS) Ian expressed hopes to repeat this format in the future if successful.

Ian thanked the Coastal Carolina University Physics and Engineering Science Department for their support.

This meeting included a special speaker. Dr. Patricia Craig is a full-time instructor of astronomy and physics in the Physics and Engineering Sciences department at Coastal Carolina University. She earned her B.S. in Space Sciences from the Florida Institute of Technology, then her Ph.D. in Space and Planetary Sciences at the University of Arkansas. She then worked at NASA's Johnson Space Center and the Lunar and Planetary Institute in Houston studying the mineralogy of the martian surface. During her time there, she was added as a Science Team member of the Mars Science Lab Curiosity rover, helping to operate and analyze data from the CheMin (Chemistry and Mineralogy) instrument. When she's not on Mars or in the classroom, Dr. Craig enjoys reading, painting, playing golf, and growing sunflowers in the summer.

Below is a summary of Dr. Craig’s presentation generated by ChatGPT using the YouTube transcript of the meeting. You can see the full presentation on this YouTube link: https://youtu.be/QkoC6u9NL5E

Mars Rover Operations and Discoveries From Curiosity

Dr. Craig NASA Planetary Science Institute.

Dr. Craig introduced herself as a physics faculty member at Coastal Carolina University and a contractor with NASA through the Planetary Science Institute. She works on the operations team for the Curiosity Rover, part of the Mars Science Laboratory mission. Her presentation summarized the mission's goals, rover operations, and major findings from Mars over the past 12 years.

Key Highlights:

- Why Mars? Mars is Earth-like in many ways and has evidence of a watery past, with conditions potentially suitable for life.
- Mars Rovers: Sojourner, Spirit & Opportunity, Curiosity (2012), and Perseverance (2021).
- Landing Technology: Curiosity used a revolutionary “Sky Crane” landing system.
- Evidence of Water: Includes ancient riverbeds, clays, “blueberries,” and polar/subsurface ice.
- Curiosity Rover Achievements: First drilling on Mars, mineralogy analysis, and evidence of past habitability.
- Instruments: Features laser spectrometers, gas chromatographs, X-ray diffraction, and a weather station.
- Power & Communication: Uses a nuclear RTG; communicates through Mars orbiters and the Deep Space Network.

Perseverance Rover and Ingenuity Helicopter:

Perseverance landed in Jezero Crater, a site with an ancient river delta. It carries updated instruments like PIXL and MOXIE (oxygen generator), and deployed Ingenuity—the first powered flight on another planet. Ingenuity flew 72 times before being retired in 2023 after rotor damage.

Sample Return & Human Exploration:

Perseverance is collecting rock cores for a future return mission. Dr. Craig noted that today’s students might be the scientists who study them. MOXIE and materials tests are preparing for future human missions. Estimated timeline for human landing: mid-2030s, depending on funding and interest.

Q&A Highlights:

- Marsquakes may result from planetary cooling or an underestimated molten interior.
- Mountains on Mars are mainly volcanic due to the lack of plate tectonics.
- Atmospheric loss is caused by the lack of a protective magnetic field.
- Curiosity's mission is limited by its power supply, wheel integrity, and computer reliability.

Open Discussion:

After the live stream ended there was an open discussion. Dr. Craig expressed appreciation for getting to serve on the Rover team these past 10 years. What a great learning experience! The engineers that put the rover together are amazing. She invited everyone to monitor the rover websites as they share something new every day. Here is the one for Perseverance: https://science.nasa.gov/mission/mars-2020-perseverance/

The Curiosity Rover turns 13 on August 13, 2025. Yes, there is a teenager on Mars. Here is its website: https://science.nasa.gov/mission/msl-curiosity/ Watch for celebrations that may be coming. It is amazing that the batteries and computers are still holding up. Ian shard that the onboard computer is a RAD750 microprocessor that is radiation hardened; designed by Motorola and IBM.

The group shared that they enjoyed the presentation and would love to see more like it. There was discussion about holding a virtual star party. One of the visiting clubs shared that they did one for the recent lunar eclipse and it went well.

Club Business:

As the visiting clubs logged out, the Grand Strand Astronomers stayed on to cover some club business. Our Hampton Plantation outing is coming up June 21. The last outing was a success. Ian shared that he had some technical issues with his SeeStar at the last outing, but he was able to capture images of Omega Centauri from the beach near his home later. Will share those when they are processed.

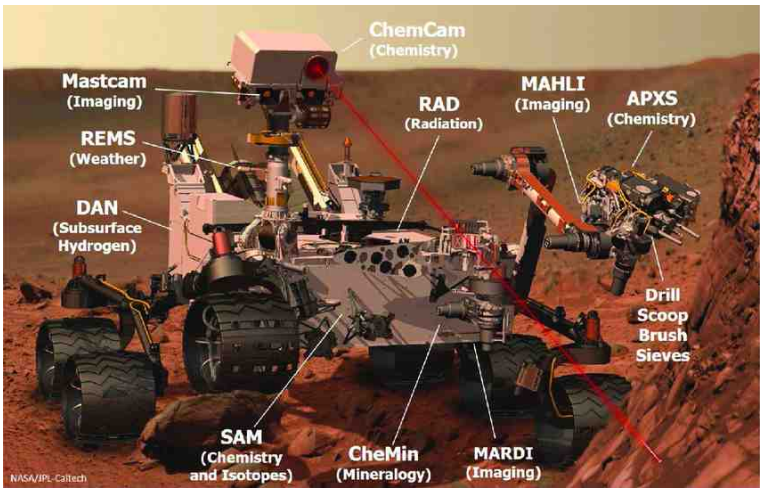
Nominations are now open for the GSA Club Officers. They are as follows: Executive Officer, Treasurer, and Secretary. Send your nominations to the club email: info@gsastro.org

We will attempt to hold a vote in the July 10 meeting.

One of the members shared that there is Mars Exploration Days Celebration in Mars, PA each June. Might be interesting to check out.

Once again, we discussed how well this special meeting went. Ian suggested we try something like it again in November, maybe from Coastal Carolina University.

Meeting adjourned.



Curiosity: Something in the Air

Scott VanBommel, Planetary Scientist

Earth planning date: Monday, June 23, 2025

Curiosity was back at work on Monday, with a full slate of activities planned. While summer has officially arrived for much of Curiosity's team back on Earth, Mars' eldest active rover is recently through the depths of southern Mars winter and trending toward warmer temperatures itself. Warmer temperatures mean less component heating is required and therefore more power is freed up for science and driving. However, the current cooler temperatures do present an opportunity to acquire quality short-duration APXS measurements first thing in the morning, which is what Curiosity elected to do once again.

Curiosity's plan commenced by brushing a rock target with potential cross-cutting veins, "Hornitos," and subsequently analyzing it with APXS. A sequence of Mastcam images followed on targets such as "Volcán Peña Blanca," "La Pacana," "Iglesia de Jarinilla de Umatia," and "Ayparavi." ChemCam, returning to action after a brief and understood hiatus, rounded out the morning's chemical analysis activities with a 5-point analysis of Ayparavi. After some images of the brush, and a handful of MAHLI snaps of Hornitos, Curiosity was on its way with a planned drive of about 37 meters (about 121 feet).

Curiosity's night would not be spent entirely dreaming of whatever rovers dream, but rather conducting a lengthy APXS analysis of the atmosphere. These analyses enable Curiosity's team to assess the abundance of argon in the atmosphere — from a volume about the size of a pop can (or soda can, depending on your unit of preference) — which can be used to trace global circulation patterns and better understand modern Mars. Recently,

Curiosity has been increasing the frequency of these measurements and pairing them with ChemCam "Passive Sky" observations. These ChemCam activities do not utilize the instrument's laser, but instead use its other components to characterize the air above the rover. By combining APXS and ChemCam observations of the atmosphere, Curiosity's team is able to better assess daily and seasonal trends in gases around Gale crater. A ChemCam "Passive Sky" was the primary observation in the second sol of the plan, with Curiosity spending much of the remaining time recharging and eagerly awaiting commands from Wednesday's team.

Cameras

Mastcam

A camera that takes color images and color video footage of the Martian terrain. The instrument is also used to study the Martian landscape and support the driving and sampling operations of the rover.

Tech Specs

Main Job

To take panoramic color images of the surface and atmospheric features and the terrain ahead of the rover.

Location

Mounted about human-eye height, about 6.5 feet (2.0 meters), with about 10 inches (25 centimeters) between them.

Color Quality

Similar to that of consumer digital cameras; 2 megapixels.

Image Size

~1600 X 1200 pixels

Image Resolution

RESOLUTION: 2.9 inches (7.4 centimeters) per pixel at a distance of about six-tenths of a mile (1 kilometer) and about 0.006 inch (150 microns) per pixel at a distance of 6.6 feet (2 meters)

Left Eye (Mastcam-34)

450 microns/pixel at ~6.5-foot (2-meter) distance 22 centimeters/pixel at ~.6 miles (1 kilometer)

Right Eye (Mastcam-100)

~150 microns/pixel at ~6.5-foot (2-meter) distance 7.4 centimeters/pixel scale at ~.6 miles (1 kilometer)

Focal Length

In focus from about 6 feet (2.1 meters), the nearest view of the surface, to infinity

Left Eye ~34 mm

Right Eye ~100 mm

Focal Ratio and Field of View

Left Eye f/8 and 15° to f/8.5 and 39.4°

Stereo Baseline of the Pair ~24.5 cm

Memory 8 Gigabyte memory allows several hours of HD video or 5,500+ raw frames to be stored (e.g., a full-scale mosaic of 360° x 80° imaged in 3 science color filters with at least 20% overlap between images)

HD Video 10 frames per second

Mars Hand Lens Imager (MAHLI)

A camera that provides earthbound scientists with close-up views of the minerals, textures, and structures in Martian rocks and the surface layer of rocky debris and dust.

Tech Specs

Main Job
Microscopic Imaging of minerals, textures and structures in rocks and soil at scales smaller than the diameter of a human hair.
Location
Mounted on the turret at the end of the robotic arm.
Color Quality
Similar to that of consumer digital cameras, with an autofocus ability.
Image Size
Up to 1600 x 1200 pixels
Focal Length
In focus from 18.3 mm at the closest working distance to 21.3 mm at infinity
Focal Ratio and Field of View
From f/9.8 and 34° to f/8.5 and 39.4°
Memory
8 Gigabyte flash memory storage; 128 megabyte synchronous dynamic random access memory (SDRAM)
HD Video
720p
Other
First sends back thumbnails so scientists can select best images to send back to Earth

Mars Descent Imager (MARDI)

A camera that took color video during the rover's descent toward the surface, providing an "astronaut's view" of the local environment.

Tech Specs

Main Job
Took pictures during the spacecraft descent through the Martian atmosphere.
Location
Mounted on the fore-port-side of the rover, pointing toward the ground.
Memory
8 Gigabyte flash memory storage allows over 4,000 raw frames
HD Video
Four color frames per second; close to 1,600 X 1,200 pixels per frame

For more of Curiosity's on board equipment and specifications with videos see: https://science.nasa.gov/mission/msl-curiosity/science-instruments/

Curiosity: Doing What We Do Best

Written by Natalie Moore, Mission Operations Specialist at Malin Space Science Systems

Earth planning date: Friday, June 6, 2025

Curiosity’s Wednesday plan executed even faster than we hoped, giving us back more power for this intense drill plan on the Altadena target. Additionally, APXS reported the Altadena post-DRT target had the chemistry we were looking for to proceed with trying to drill. We got the word that TAAM (the “Target Acquisition Assessment Meeting” to approve/disapprove drilling) was go for drilling the Altadena target.

We're starting this plan with our focus motors unstowed, left in the 2148 mc position for Mastcam-Right (M100) and the 2280 mc position for Mastcam-Left (M34), both focused on our Altadena workspace. Our left filter wheel is still immobile due to the mechanical stall on sol 3953, but we're able to see out of our "clear" filters to continue showing approximately what the human eye would see if we were there in person.

On the first sol, executing Saturday on Earth, Mastcam will take a mid-day 14-frame mosaic of the Mishe Mokwa butte about 800 meters (about a half-mile) to the southeast, the first in a three-level illumination experiment of this butte to execute this weekend. We'll then turn our lenses very close to some troughs and polygonal fractures near the rover's HGA (High-Gain Antenna) on the port side, capturing a total of 28 frames with both our "eyes." Afterwards, we'll give up commanding of the RSM (Remote Sensing Mast that Mastcam, ChemCam, and Navcam make up) to ChemCam while it shoots a raster of laser shots across a thick, bright vein in the Altadena post-DRT oval, shown here in one of the MAHLI images from 5 centimeters (about 2 inches) away. When ChemCam is done with the RSM, we'll resume command and take a documentation image of their laser attempt before moving onto our next target: change detections.

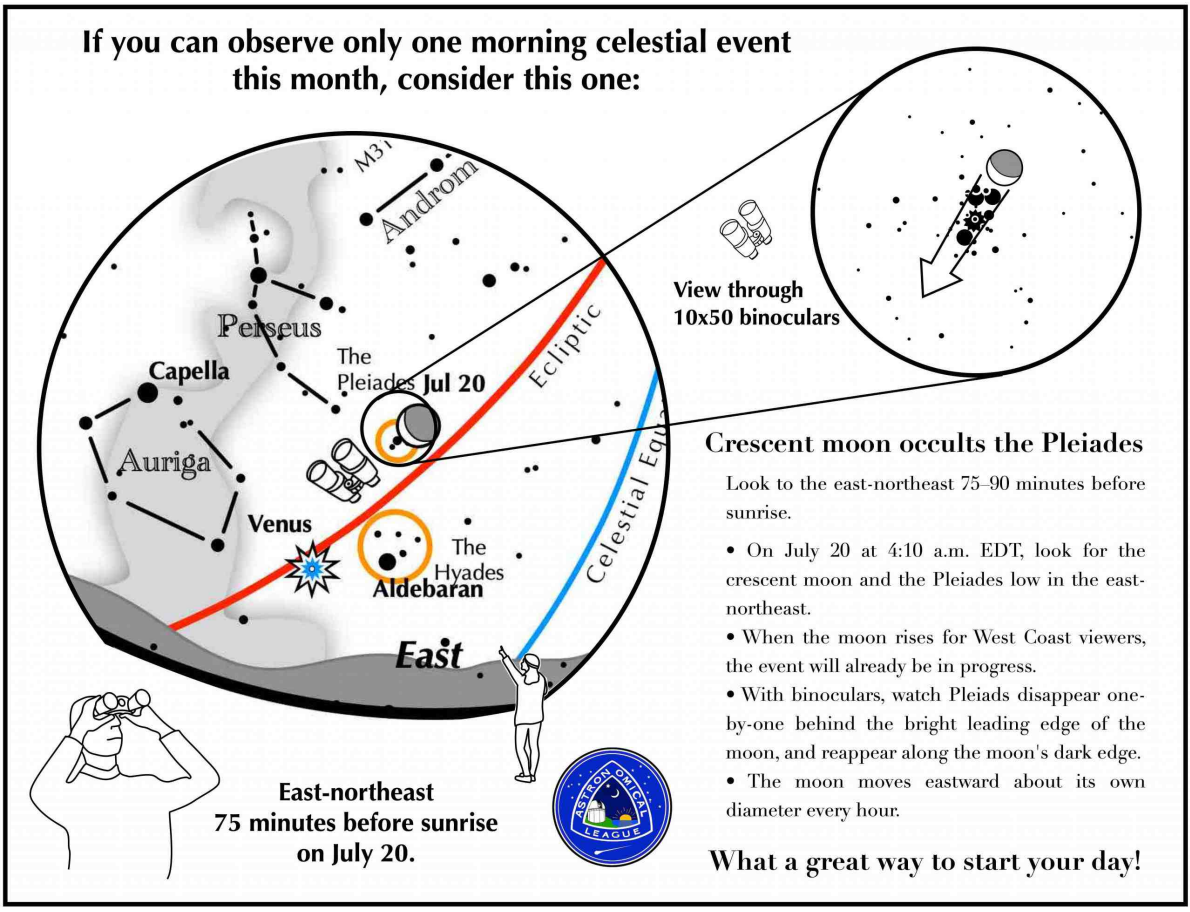
During drill campaigns, we're often asked to capture a single M100 frame multiple times over many sols, to assess any changes from wind or otherwise. At this drill site, we're focusing on two change detection targets named "Camp Williams." To get the most precise pointing possible, we first command the RSM to point 0.08 radians away from the target, then 0.04 radians away from the target, before finally taking our image of the target. This method, in theory, helps reduce the amount of backlash from moving the RSM so we're able to get the most similar pointing possible each time. After our change detection observations, we'll take four frames of the sky near the sun to measure the atmospheric opacity, or "tau."

We're letting the rover nap for a bit before waking her up for our second Mishe Mokwa butte mosaic, this time in the evening at around 17:10 local Gale time. We're hoping to see some dramatic shadowing from the approaching sunset behind the crater rim. That's everything for the first sol; quite a lot of science to use all that power we came into the plan with.

On the second sol, executing when it's Sunday on Earth, we'll drill the target. Mastcam won't wake up until after the drill attempt on Altadena has been completed, and hopefully it's successful. If so, we'll see a nice dime-sized hole where the Altadena DRT spot was with both our eyes, then take images of the drill bit from about 1.7 meters (about 5.6 feet) away. If the rover thinks everything executed successfully, we'll also take images of the SAM inlet cover #1 before and after trying to drop some of the Altadena sample on top. That's it for the second sol for Mastcam.

On the third sol, executing Monday on Earth when the team will be planning Tuesday and beyond, the only thing Mastcam has to do is document a second ChemCam laser target attempt on another bedrock target in the workspace called "Chavez Ravine." We won't use Mastcam again until the following morning, when we take another four-frame tau measurement before moving onto our final illumination experiment mosaic on Mishe Mokwa about 7:30 on sol 4566. Most of the time we're restricted to midday imaging to save heating time and plan complexity, but sometimes we get to see Mars at other times of day, when the shadows come out and create beautiful depth across the landscape.

2025-July-AM-Venus-Moon-Pleiades-Scaled



M6 and M7

The Astronomical League
OC
Open Cluster Program

M6 & M7

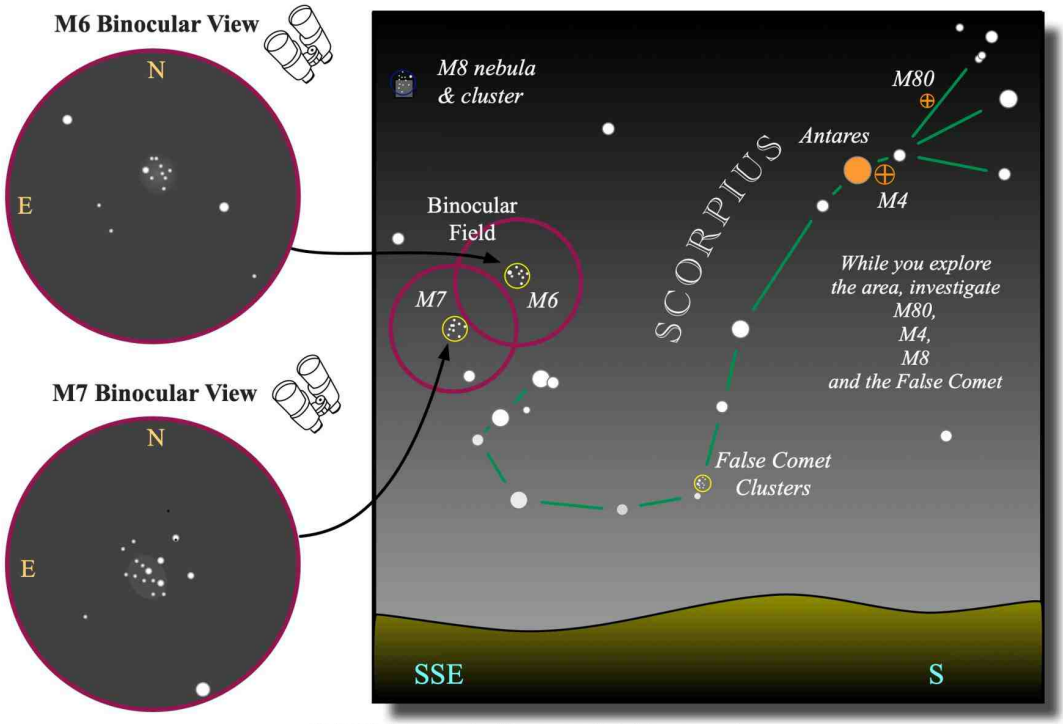
When these two big, bright, and beautiful open star clusters appear in the early evening in mid June, summer is not far behind.

If you have recently begun your journey under the stars, why not whet your appetite by exploring southeastern Scorpius and its two wonderful open star clusters, M6 & M7. You will return to them year after year!

While they are visible to the unaided eye from a dark location, binoculars help greatly.
1. Identify Scorpius standing low in the south-southeast on a late spring or early summer evening. As summer proceeds, it is found low in the south, then low in the southwest in the early fall.
2. From red Antares, direct your gaze southward down the scorpion's back, then turn eastward.
3. When its tail hooks northward, continue the length of that hook.
4. M6 and M7 should be plainly visible in the binocular field.

M6:
A faint hazy glow is seen by the unaided eye from a dark, clear site. Two dozen stellar lights can be discerned with 10x50 binoculars.

M7:
A glittery glow is easily spotted off the scorpion's tail by the unaided eye. Binoculars reveal many faint stars.

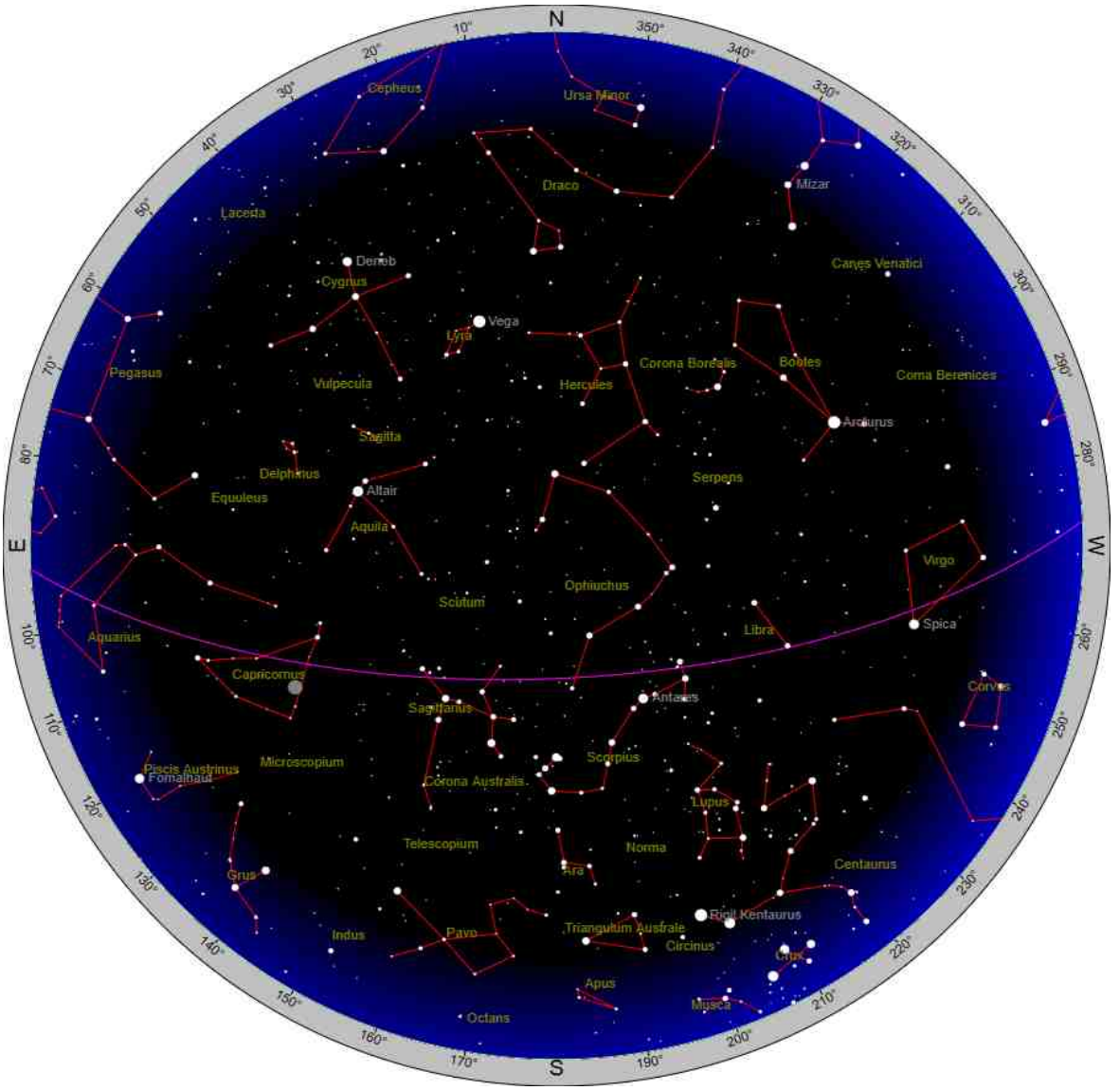


2506

HEAVENS ABOVE

Sky Chart

Year: 2025 **Month**: July **Day**: 15 **Hour**: 00 **Minute:** 00



Until next Month

Remember to always look up!