The Lunar Observer

A Publication of the Lunar Section of ALPO

David Teske, editor

Coordinator, Lunar Topographic Studies Section Program

DECEMBER 2024

In This Issue

Lunar Reflections

A warm greeting to all readers. Wishing all of our readers and contributors across the world a joyous and peaceful holiday season. May 2025 be a year of promise and peace.

Thanks to all who contributed to this issue of The Lunar Observer. I am very pleased that Brian Cudnik, the ALPO coordinator of the Lunar Impact and Search section contributed a most interesting report of recent lunar impacts. Perhaps searching for these impacts might be on your observing program for the year ahead. Topographic studies were investigated with interesting tours of the Moon by Rik Hill, Alberto Anunziato, Greg Shanos and Robert Reeves. David Teske had a fantastic read this fall of Robert Reeve's new Photographic Atlas of the Moon and he wrote a review of this book. Perhaps a holiday gift for a favorite lunar observer? As always, Tony Cook has provided wonderful reports of Lunar Geologic Change and Buried Craters and Basins. Plus many people contributed fine lunar images and drawings to the Recent Topographic Studies. Many thanks to all who contributed to this issue!

Interested in an article in The Lunar Observer from past months? Check out the annual index in the ALPO Lunar Image Gallery.

Please remember to follow the future Focus-On topics and gather observations of these features. Next up is the very interesting Anaxagoras. Observations are due to Alberto and myself by December 20, 2024.

Clear skies,
-David Teske

Guidelines Reminder

CHOOSE ONLY YOUR BEST IMAGES and limit the number to no more than eight (8) per each issue of the TLO. (obviously, if there is an article you are writing or contributing to this does not apply).

The image filename should be submitted with the object name spelled correctly, then the year-month-day-hour-minutes-Your Name or initials So, my image of Copernicus should have a file name of:
Copernicus_2023-08-31-2134-DTe
means
Copernicus, 2023 August 31, 21:34 UT by David Teske

Please keep images to 400 kB or less
Please see end of issue for more details.
Email to drteske@yahoo.com or lunar@alpo-astronomy.org

Online readers, click on images for hyperlinks

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Lunar Topographic Studies

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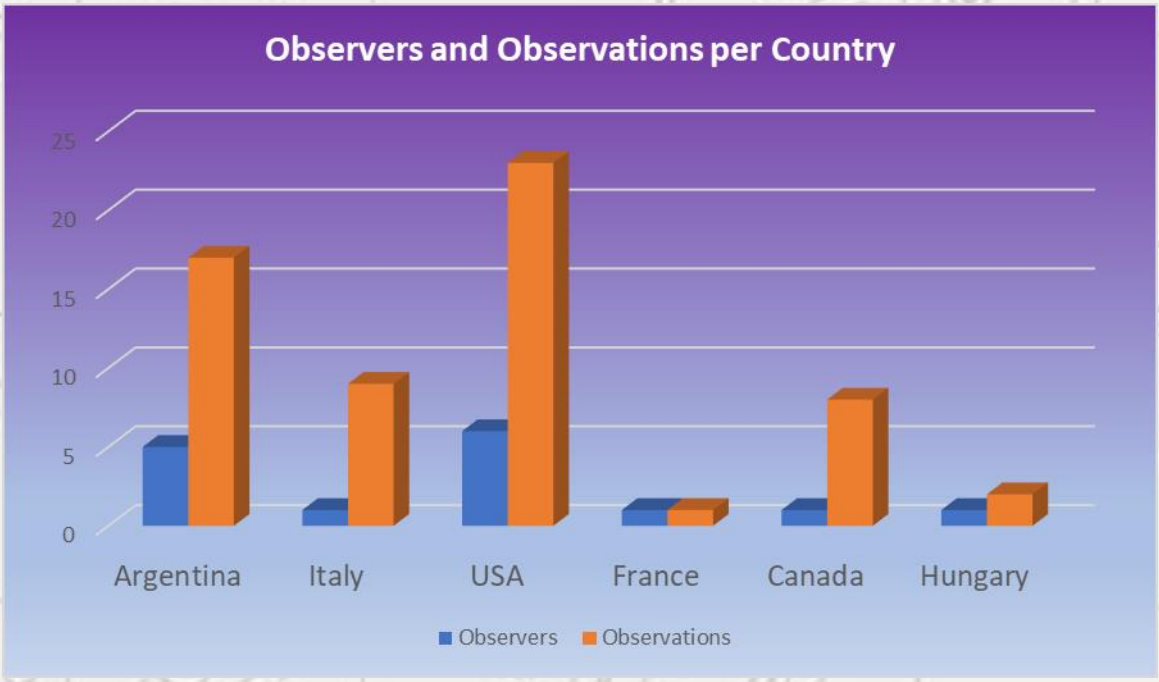
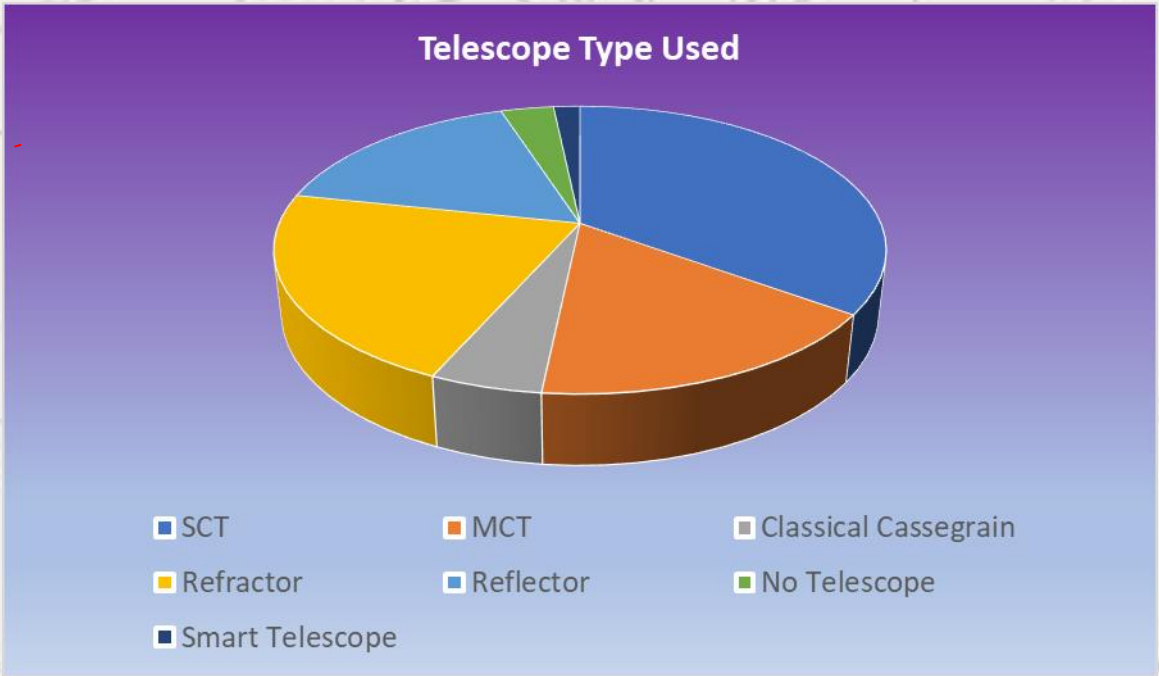
Observations Received

Name	Location and Organization	Image/Article
Alberto Anunziato	Paraná, Argentina	Article: *The Map of the Floor of Archimedes in 1880 and Now: Bright Rays, Craterlets and a Tiny Wrinkle Ridge* and article and drawing *Some Details on the Walls of Manzinus Crater.*
Leonardo Colombo	Molinari, Argentina	Images of the First Quarter Moon and the Waxing Gibbous Moon.
Brian Cudnik	Houston, Texas, USA	Article *Lunar Meteor Watch*
Massimo Dionisi	Sassari, Italy	Images of Condorset, Gauss, Endymion, Hecataeus, Kästner, Mare Undarum, La Perouse, Lacus Spei and Peirescius.
Juan Carlos Dovis	Sunchales, Argentina	Image of the Waxing Crescent Moon.
Walter Ricardo Elias	Oro Verde, Argentina, AEA	Images of Aristarchus, Plato, Riccioli (2) and Schickard.
István Zoltán Földvári	Budapest, Hungary	Drawings of Mons Malapert, Sarabhai
Axel Guillerand	Margny-les-Compiègne, Hauts-de-France, France	Image of Archimedes.
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Article and image *Raining Rocks!*
Raúl Roberto Podestá	Formosa, Argentina	Images of Alphonsus, Archimedes, Aristillus, Mädler, Proclus, Dionysius, Stevinus and Tycho.
Robert Reeves	San Antonio, Texas, USA	Article and 8 images *Lunar Lookalikes:*
Gregory T. Shanos	Sarasota, Florida, USA	Articles and images *A Surprise Lunar V, Beaver Supermoon, The Four Supermoons of 2024* and *The Lunar Occultation of Spica.*
Michael Sweetman	Sky Crest Observatory, Tucson, Arizona, USA	Images of Copernicus (2) and Ptolemaeus.
David Teske	Louisville, Mississippi, USA	Book review of *Photographic Atlas of the Moon-A Comprehensive Guide for the Am-*
Ken Vaughan	Cattle Point, Victoria, British Columbia, Canada	Images of Cassini, Clavius, Copernicus, eastern Mare Imbrium, Lacus Mortis, Maginus, Plinius and Rima Ariadaeus.

December 2024 *The Lunar Observer*
By the Numbers

This month there were 60 observations by 15 contributors in 6 countries.





Lunar X Predictions for 2024

40°N-75°W, Eastern Time Zone

Date, 2024	358° Colongitude	Altitude/Azimuth	Cloudy Nights
January 18	5:15 am	–37° / 345°	4:05 am
February 16	7:40 pm	+66° / 236°	6:49 pm
March 17	10:22 am	–11° / 38°	10:10 am
April 15	11:08 pm	+43° / 268°	11:41 pm
May 15	11:01 am	–16° / 53°	12:13 pm
June 13	10:15 pm	+34° / 244°	11:49 pm
July 13	9:11 am	–43° / 58°	10:48 am
August 11	8:15 pm	+24° / 212°	9:31 pm
September 10	7:49 am	–65° / 65°	8:29 am
October 9	8:12 pm	+16° / 206°	8:09 pm
November 8	8:33 am	–49° / 79°	7:49 am
December 7	10:43 pm	+4° / 253°	9:36 pm

Note: The Lunar X is not an instantaneous phenomenon; rather, it appears and evolves over several hours, so the times above are fundamentally approximate and serve only as a guide. The ardent observer should look a little early to catch the initial visible illumination. A less-dramatic Lunar X against a fully illuminated background can still be seen at least several days later. Because of the Moon's nominal 29.5-day synodic period (phase-to-phase), favorable dates for a given location tend to occur on alternate months (unfavorable dates for 40°N-75°W are shaded gray in this table). The 358° colongitude value for the terminator reaching the Lunar X and making it visible (see this RASC paper) and the corresponding lunar altitude/azimuth for 40°N-75°W were determined with WinJUPOS, which is freeware linked from the WinJUPOS download page.

The Cloudy Nights comparative data, derived by a different method, was presented in this post.

Daylight Saving Time for 2024 begins on March 10 and ends on November 3. The listed times are EST/EDT as appropriate for the date.

Submitted by Greg Shanos.

Lunar X Predictions for 2024-2028

5 Year Lunar "X" and "V" Schedule * **

	2024	2025	2026	2027	2028
Jan	18: 0830	6: 1645	25: 1630	15: 0015	4: 0830
Feb	16: 2345	5: 0800	24: 0730	13: 1530	3: 0015
Mar	17: 1400	6: 2300	25: 2145	15: 0600	3: 1500
Apr	16: 0300	5: 1300	24: 1100	13: 1930	2: 0430
					1: 1700
May	15: 1600	5: 0130	23: 2245	13: 0730	31: 0400
Jun	14: 0400	3: 1330	22: 0945	11: 1830	29: 1430
Jul	13: 1430	3: 0015	21: 2000	11: 0500	29: 0030
		1: 1100			
Aug	12: 0130	30: 2130	20: 0630	9: 1530	27: 1100
Sep	10: 1230	29: 0900	18: 1730	8: 0200	25: 2245
Oct	10: 0015	28: 2115	18: 0530	7: 1400	25: 1130
Nov	8: 1245	27: 1045	16: 1900	6: 0300	24: 0145
Dec	8: 0230	27: 0115	16: 0930	5: 1730	23: 1645

* All times are listed as the day of the month and then the hour in **UT**

** All times are approximations based on LTVT calculations. They are accurate to ± 1 hour.

Submitted by Greg Shanos.

Photographic Atlas of the Moon: A Comprehensive Guide for the Amateur Astronomer, Robert Reeves, Hardcover – September 1, 2024

Written by a dedicated selenophile (a person who loves the Moon), this guide to Earth's celestial companion is a non-technical narrative that quickly elevates the lunar novice to lunar authority.

Photographic Atlas of the Moon explains how the Earth and the Moon are locked together in a co-dependent embrace, each affecting the other in ways that impact our lives. The reader will learn in comprehensible, jargon-free language about the Moon we see, its orbit, its creation and the differing geologic details of the Moon, some of which can be seen with the naked eye. All the photographs in this lavishly illustrated book were taken by the author, an internationally recognized authority on celestial photography. Reeves has perfected image processing techniques that allow the amateur astronomer, using modest equipment, to exceed the quality of Earth-based professional lunar photographs taken during the Apollo era.

Although Reeves is an accomplished deep-sky photographer, his current passion is re-popularizing the Moon within the amateur astronomy community. Momentum is building for a manned return to the Moon to continue the exploration started over half a century ago. Photographic Atlas of the Moon will provide even the most novice reader with an understanding of the Moon and its allure so they can appreciate the upcoming explorations by NASA's Artemis lunar program.

https://www.amazon.com/Photographic-Atlas-Moon-Comprehensive-Astronomer/dp/022810498X/ref=rvi_d_sccl_1/136-6077595-9611424?pd_rd_w=NTjEa&content-id=amzn1.sym.f5690a4d-f2bb-45d9-9d1b-736fee412437&pf_rd_p=f5690a4d-f2bb-45d9-9d1b-736fee412437&pf_rd_r=7XZ4992GTVJKS0K7P4F5&pd_rd_wg=WEmPb&pd_rd_r=310acd54-2b8b-4d1c-a84a-abe0a3d2034f&pd_rd_i=022810498X&psc=1

Lunar Meteor Watch
Updated October 22, 2024

Brian Cudnik
Coordinator, Lunar Impacts Search Program
Association of Lunar & Planetary Observers

Quarterly Briefings and Opportunities to Observe Lunar Meteors

IMPORTANT NOTE: We have an e-mail list or group, lunar-impacts@groups.io and we encourage all those who are interested to sign up.

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Monthly Observing Campaign for Lunar Meteors

For the ongoing monthly routine observations, the defined start is set at three days after New Moon until two days after First Quarter for the first half. The second half resumes two days before Last Quarter and continues until three days before New Moon. The actual duration of each observing interval will vary due to ecliptic angle, lunar elongation, and observer latitude. I am posting these plans on a quarterly basis, which provides, briefly, the observing schedule along with any meteor showers active during the observing windows. In general, the observations fall into three groups: evening, from three days after New Moon (NM) to two days after First Quarter (FQ); morning, from two days prior to Last Quarter (LQ) to three days prior to New Moon (NM); and significant shower, when the moon is favorably placed (usually during these two intervals) during annual showers (whose names will appear in bold type) with ground-based ZHR's of 20 or more.

We just began the morning part of the current month's campaign (Last Quarter is 24 Oct). Note that individual showers will no longer be mentioned by name unless their terrestrial ZHR is 5 or greater.

Interval: 22 – 29 Oct (LQ = 24 Oct; NM = 1 Nov), morning. The tail end of the Orionids is active.
Interval: 4 – 11 Nov (NM = 1 Nov; FQ = 9 Nov), evening. The south Taurids are active currently. They peak on 5 November with a ZHR of 7.
Interval: 21 – 28 Nov (LQ = 23 Nov; NM = 1 Dec), morning. Several minor showers are active currently, including the Leonids.
Interval: 4 – 10 Dec (NM = 1 Dec; FQ = 8 Dec), evening. The Geminids start to be active this time. Several minor showers are active as well.
Interval: 20 – 27 Dec (LQ = 22 Dec; NM = 30 Dec), morning. Only the Ursids are active during this time, peaking on 22 December with a ZHR of 10.
Interval: 2 – 8 Jan 2025 (NM = 30 Dec; FQ = 6 Jan), evening. The Quadrantids, which peak around January 4 (ZHR of 80 over a brief period) are active as is the Antihelion Source.

As always, check back often for any updates on activity related to any new developments. The full observing plan for lunar meteors for 2024 (and earlier years to 2015) can be obtained by emailing bmcudnik@gmail.com.

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The Latest Reports of Lunar Meteor (and Jupiter) Impact Candidates
Observing Program for Jupiter Meteors is now Live

Jupiter is now visible for most of the night, rising around 9 pm local time. It reaches opposition in December. Observers who are documenting meteoroid impacts on the Moon are encouraged to monitor Jupiter, from the time it gets high enough to observe until about 30 minutes or so before local sunrise. Due to system configurations, one may go up until sunrise or even after, but the amount of time currently available to observe Jupiter is a little over an hour and increasing. The same equipment used for lunar meteor observation can also be used for Jovian meteor observations, except a Barlow lens rather than a focal reducer should be used. Jovian fireballs last one to several seconds, so they may be easier to document – when they do occur.

A Jovian Fireball Recorded
On 15 November 2023, a Japanese amateur astronomer recorded another fireball in Jupiter's atmosphere. This seems to be happening on a fairly regular basis. All who can monitor Jupiter for fireballs are strongly encouraged to do so. Currently, Jupiter is in solar conjunction and will not be visible again until late June. One of the goals for the next apparition of Jupiter is to set up a Jupiter meteor patrol to always monitor Jupiter to document meteors in the giant planet's atmosphere. More details on this program will be shared later this summer.

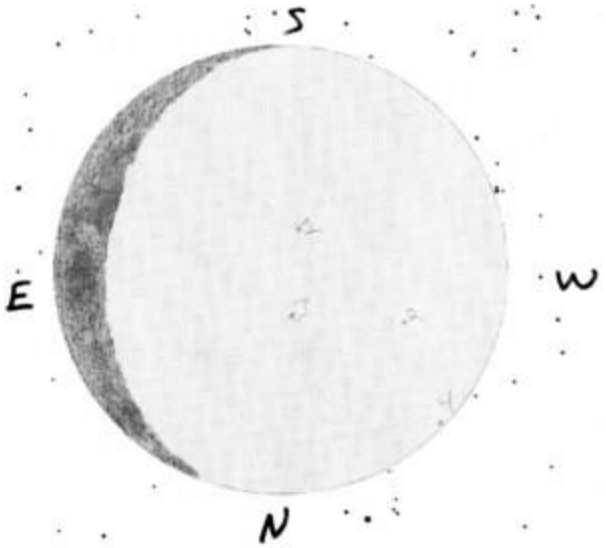
Lunar Geminid Candidates – 15 December 2023
I received a report about four Geminid meteor candidates, listed below. The observer's name is Lawrence Garrett, who observed from Vermont. Due to technical and logistical considerations, he was unable to observe with his video setup, so all the observations were visual. Unfortunately, he did not provide a date, but based on the lunar phase and UT of the observations, it was almost certainly on 15 December 2023. The Moon was rather low, and clouds interfered off-and-on. He watched the Moon from 21:27:00 UT to 22:20:00 UT, before the clouds increased enough to end his session. The observations were made with an 8-inch Celestron telescope, keeping time with a handheld "dual timer" set to radio clock. The details of his report as submitted follows:

Candidate 1 21h:47m28s Strong time recorded—— Gray and wider then suspected cosmic rays—-see detail below
Candidate 2 21h53m12s Strong time recorded—— Gray and wider then suspected cosmic rays—-see detail below
Candidate 3 21h57m00s Time many be 2 seconds in error —-Gray and wider then suspected cosmic rays—see detail below
Candidate 4 22h05m54s Time many be 2 seconds in error—- Limb Candidate brighter than the above with white appearance

The more detailed descriptions follow:
The start of observations at 21h27:00 UT held earthshine very weak, without defined limb at 72x, 6″ f/8 reflector.
But between 21h27:00 and 21h47m, at least 9 very small flashes were seen in the dark limb, one suspected on the bright lunar disk, and one right on the terminator. I dismiss these as cosmic rays. Indeed, later in the night I seemed to spot a cosmic ray as a line moving right off the dark lunar disk. They seemed far too many to be impacts. They were very pinpoint, white and brief.

Candidates 1-3 were mid disk, larger than pinpoint and gray.
Candidate 4 was one of at least 6 limb suspects, but as only this one seen without side vision, plotted. These western limb Candidates seemed to have two flashes before lunar limb was visible, and appeared the most like confirmed events are. Of these, three were near the "4" position area, and two or 3 at the "2 O'clock" position.

While I did record periods without flashes, with so many near limit vision events, brighter lunar features near the edge of visibility, I cannot really report these as "no event visible times. As the moon grew brighter, clouds and brightness ended the observation.



This sketch, with the bright lunar crescent presented in dark gray, shows the location of each of the impact candidates relative to the crescent. Confirming video observations are sought.

Lunar Perseid Candidate 13 August 2023
a report from an experience German visual observer, Peter Slansky, who reported an apparent bright impact point flash that he viewed naked-eye on the dark side of the rising crescent Moon during the Perseid meteor shower on 13 August. Based on the location of the flash in his sketch, this was out of the zone that Perseid meteors were impacting and was likely a large sporadic, if it is an actual meteor. The observation was made "from the Tiefenbach glacier near Sölden, Tyrol/Austria, 2940 m altitude. (Observing location was 46.9173° N; 10.9348° E). I have sent the following report to the groups.io list and am providing it below as well.

"Bright flash on the dark side of the Moon on 13 August 2023 at 00:50 UT"

"Shortly after the moon had fully risen, I saw a pinpoint flash on the dark side for a fraction of a second. XXX (his observing partner who apparently wishes to remain anonymous) witnessed my spontaneous exclamation, but he didn't see it. I ran to my radio clock and noted 02:50:05 CEST as the time of the event (00:50:05 UT; 13.8.2023), with an accuracy of plus or minus 3 seconds. I made a sketch of the position immediately after the observation. I have attached the sketch that he made. if the moon was only 2°34' above the horizon it is likely that few if anyone, in Europe was watching."

If anyone has been watching the Moon for Lunar Perseids or otherwise and witnessed a flash, please let us know.

Philippe Lognonné (based in France) is assembling collaborators for a NASA proposal he is putting together that features an Artemis-3 International Flash network. This would consist of a global, coordinated network of observers to monitor the southern regions of the Moon systematically and (near) continuously (as much as possible) for impact flashes to support the Artemis-3 mission. This collaboration is looking for observers in America. I have replied to express interest but need to locate a dedicated observer (or several) to participate in this. So, if those of you stateside are interested in participating with regular observations please let me know as soon as you can.

Venus Fireball Campaign Update
We just concluded a campaign to video the night side of Venus in search of fireballs. The techniques and technology are like observing lunar meteors, except instead of using a focal reducer to widen the field, use a 2x or 3x Barlow lens (as seeing allows) to enlarge the image of Venus (which narrows the field) at moderate to high magnification.

I came across an article in the March 2023 issue of Sky and Telescope (pp. 52-53). The article is titled "Hunting for Venusian Fireballs" by Tom Dobbins. The Venusian fireball hunt ran from June 16 to July 7, when the planet is favorably placed and physically close to the Earth to maximize the chances of observing fireballs. A similar three-week period occurred August 28 to September 18, when the planet was in a similar crescent phase but in the predawn hours.

As of this writing I have received no reports of any Venus meteor candidates. If you have any reports, please e-mail them to me at bmcudnik@pvamu.edu

More Lunar Meteor Candidate Observations

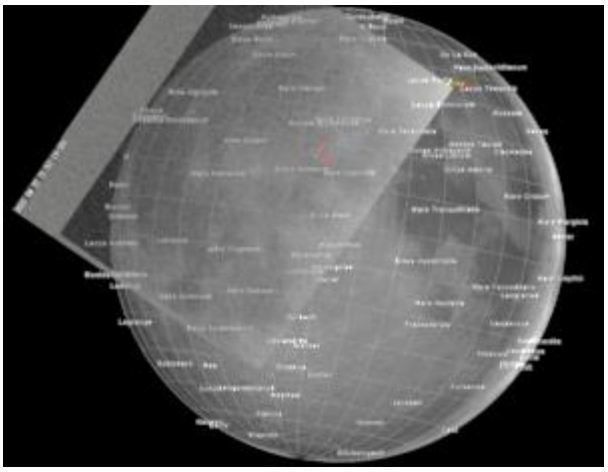
Two Lunar Meteor Candidates Observed in Brazil

24 May 2023
An observer in Brusque, Brazil (Mr. Silvano de Souza) reported a lunar meteor candidate in the earthshine side of the waxing crescent Moon. This report was received from Anthony Cook who received it from Alexandre Amorim, NEOA-JBS
The observer was located at 27°05'55" S latitude, 48°55'15" W longitude.
These photos are available at:
https://drive.google.com/drive/folders/1fd9hX6CK2W4GsiFUKPE61nQMdPGfnFc1?usp=share_link
https://drive.google.com/file/d/1EZb1GP9w3JLjuq2Ve43AVhdkjnzCjU_O/view?usp=share_link

All photos were taken using a 150mm f/8 refractor, eyepiece 23mm and a Motorola smartphone. The photo was taken at 21:16:13 UT (18:16:13 Brazilian Time, GMT-3), according to the smartphone clock (which should be good to +/- 1 second).

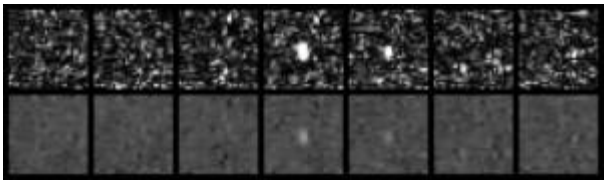
The "flash" appears to be located near selenographic longitude 10° East, latitude 65° South. (Reference: Moon Virtual Atlas © Chevalley. Mr. Amorim further reports: "In the original image, the flash is in pixels 818 x 2099. In another site, Florianopolis, our local group NEOA-JBS led an observation session between 22:00 and 22:40 UT using a 80mm f/15 refractor. The Moon was one of observed objects, but nothing in the earthshine was detected, despite our session were one hour later than Silvino's photos."

22 April 2023



The map above shows the location of a probable lunar meteor impact observed by Eneida Passos Pereira, an amateur astronomer from João Pessoa, Brazil. His colleague Marcelo Zurita produced the above map showing the location of the lunar meteor. This phenomenon appeared in at least two video frames so it seems to be legitimate event that occurred close to "Mare Vaporum" at 21:52:19 UT on 22 April. Clouds fuzzed out the image of the impact, which is determined to be at latitude 16.3 deg., longitude -5.3, or close to Marco Polo F crater. Tony Cook, of the British Astronomical Association, was clouded out at the time of this observation, so he could not provide a follow-up.

The telescope used was a Coletti, diam. = 115 mm, FL = 700 mm; so this a 4.5-inch, f/6 scope, equipped with a Samsung SCB-2000 camera.



Confirming video is sought, but the observing window is so narrow, we would only be able to get a confirming video from someone else close to or within the same longitude band as these observers

A Bright Meteor on the Moon

At 11:14 UTC on 23 February 2023, a Japanese astronomer recorded a meteoroid impact flash on the nightside of the waxing crescent Moon. This was Daichi Fujii, the curator of the Hiratsuka City Museum, who captured this event that happened near Ideler L crater, just slightly northwest of the Pitiscus crater, in the Moon's southern hemisphere. A video and images of this impact event can be viewed at https://www.space.com/meteorite-impacts-moon-february-2023-video

Another Lunar Eclipse Meteor?

AntonioI received a report about a possible lunar meteoroid impact during the November 19, 2021, near-total lunar eclipse. Russ Stolling, of Fresno, California, reported seeing "a very short (quick!) white flash/spark at the upper right of the dark edge of the moon." It only flashed once and was observed visually with a 40mm f/5 telescope and 15 mm eyepiece. The flash occurred between 8:52 and 8:53 UT on 19 November, near the NNE (Celestial) limb of the moon, likely between Harpalus Crater and the limb. Check your images/videos around this time to try to verify this impact event, which may have been a Leonid. Unfortunately, there was a gap in my images between 8:47 UT and 9:02 UT so I did not record this.

I am not aware of any other reports of lunar meteor impact flash candidates occurring during this eclipse.

Yet another Jupiter meteor was seen from Japan at 13:24 UT on 15 October 2021. This makes the 11th such event observed and confirmed (assuming confirmation takes place, but the video looks really convincing). Read more about it at this website.

Jupiter Fireballs

Another Jupiter meteor was observed and confirmed in September, bringing the total of such events to six. Visit the Sky and Telescope magazine news website article about this event for more information. The meteor was observed by amateur astronomer José Luis Pereira of Brazil at around 22:39:30UT, 13 September 2021.

As of this writing, I have not received any recent reports of lunar meteor flash activity. Keep checking this section for the latest in such reports and observations, which will be posted as soon as possible after they are received.

Lunar Meteor Candidates Reported in 2020

Antonio MercataliI received a report from Shavarsh Khachatryan, from Nor Kharberd, Armenia (Latitude: 40° 5′ 48.43″; Longitude: 44° 28′ 33.08″). He reports the transit of a dark object across the Moon's disk, taking 3 seconds to cross (possibly a satellite or other object) at 18:55 UT on October 28. Then at 19:05 UT (this was the time recorded in the report), Shavarsh witnessed visually "a distinct but minuscule (very small) flash… around crater Carlini in Mare Imbrium. The phenomenon was exceptionally brief less than a second in any case. The color of the flash was yellow white more towards yellow." Shavarsh used an Omegon ED triplet, focal length 952mm, aperture 127 mm (5 inch), at 106 x magnification. The eyepiece was a 9 mm with an FOV of 0.52 degrees. The Moon was a very fat Gibbous phase so I anticipate few would be observing for lunar meteor impacts. Nonetheless, if anyone in Europe or Africa was observing the Moon at this time, check your observations for any of the phenomena just discussed.

Lunar Lookalikes
Three Similar Crater Pairs on the Moon

Robert Reeves

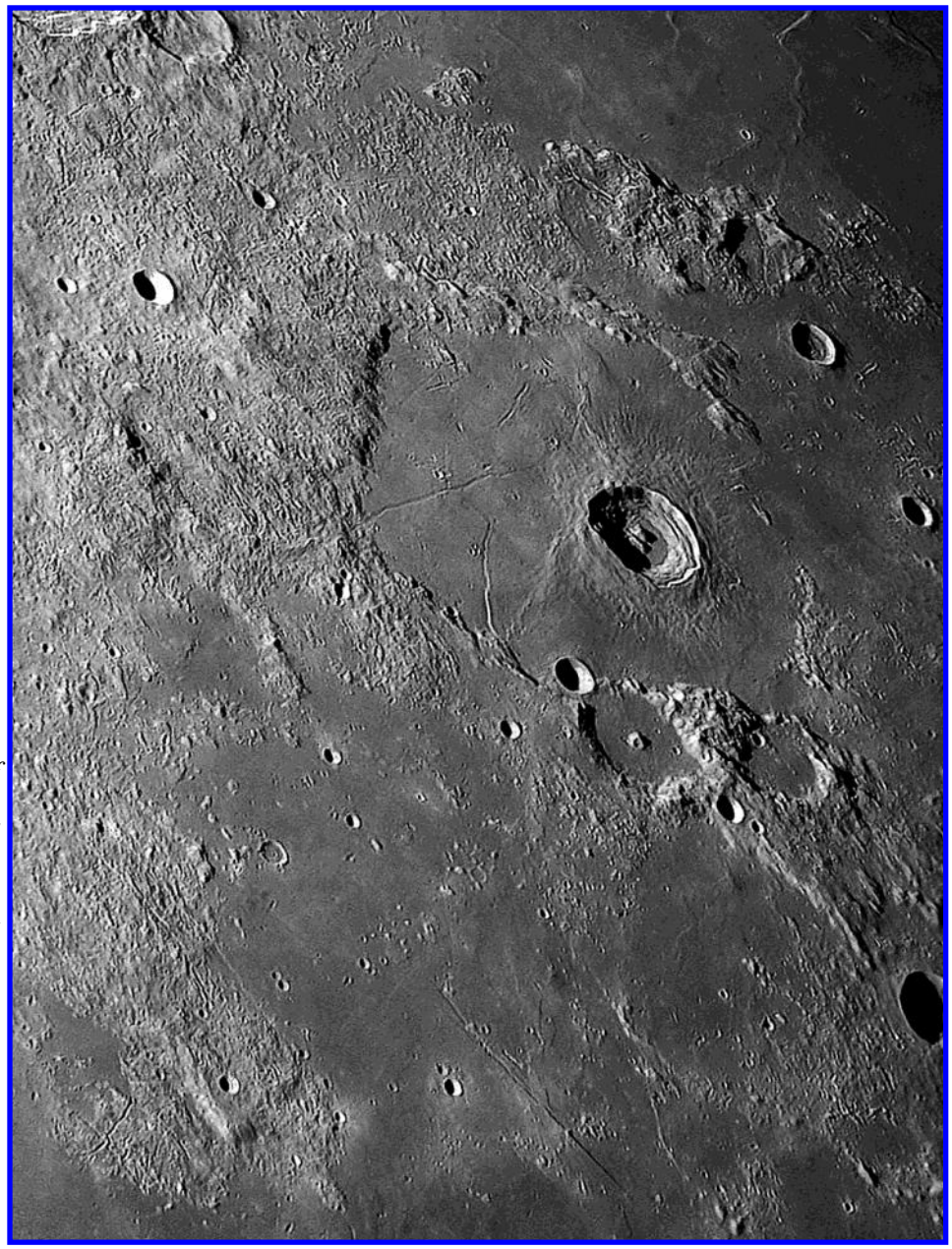
A lunar novice might be tempted to think that craters on the Moon are similar, all being variations of a hole in the ground. There is some truth to that in that craters on the Moon were excavated by the explosive impact of a cosmic projectile. With observing experience, we soon see that each crater is unique, individual, and has its own form, much like the smiling faces of children at play, but the face of your child is recognized as different than the others. During my lunar adventures, I have noted many craters that are similar, but it is rare that pairs of similar-sized craters look alike. Three such pairings are easily seen with a modest telescope. I present these crater pairs that are nested side by side and display a similar appearance, looking much like a pair of owl eyes staring back at us: Plana and Mason on the southern rim of Lacus Mortis, Isidorus and Capella on the northern shore of Mare Nectaris, and Pallas and Murchison on the northeastern shore of Sinus Medii. Each of these three crater pairs mirror each other in size, orientation, and degree of degradation.

Plana and Mason appear first during the waxing crescent Moon. These twin craters lie on the southern rim of Lacus Mortis, itself a large ancient lava filled crater designated as the Lake of Death. Both Plana on the west and Mason on the east are approximately 3.8 billion years old and date from the Nectarian Epoch. Plana and Mason are similarly ruined and flooded by ancient lava flows and span 43 and 33 kilometers, respectively. Only Plana's central peak survives, rising 800 meters above the crater's lava-flooded floor. Curiously, the central peak was struck by an impact that blasted a 3.5-kilometer-wide, 150-meter-deep crater on its southern slope. In interior of flat-floored Mason lies at two kilometers below mean lunar elevation and is about 200 meters lower than the floor of Plana. Plana is named after the Barron Giovanni Plana, a 19th century Italian astronomer. Mason is named after the 18th century British astronomer Charles Mason, who along with British surveyor Jeremiah Dixon, are the namesake for the famous "Mason-Dixon line" dividing the northern and southern USA.

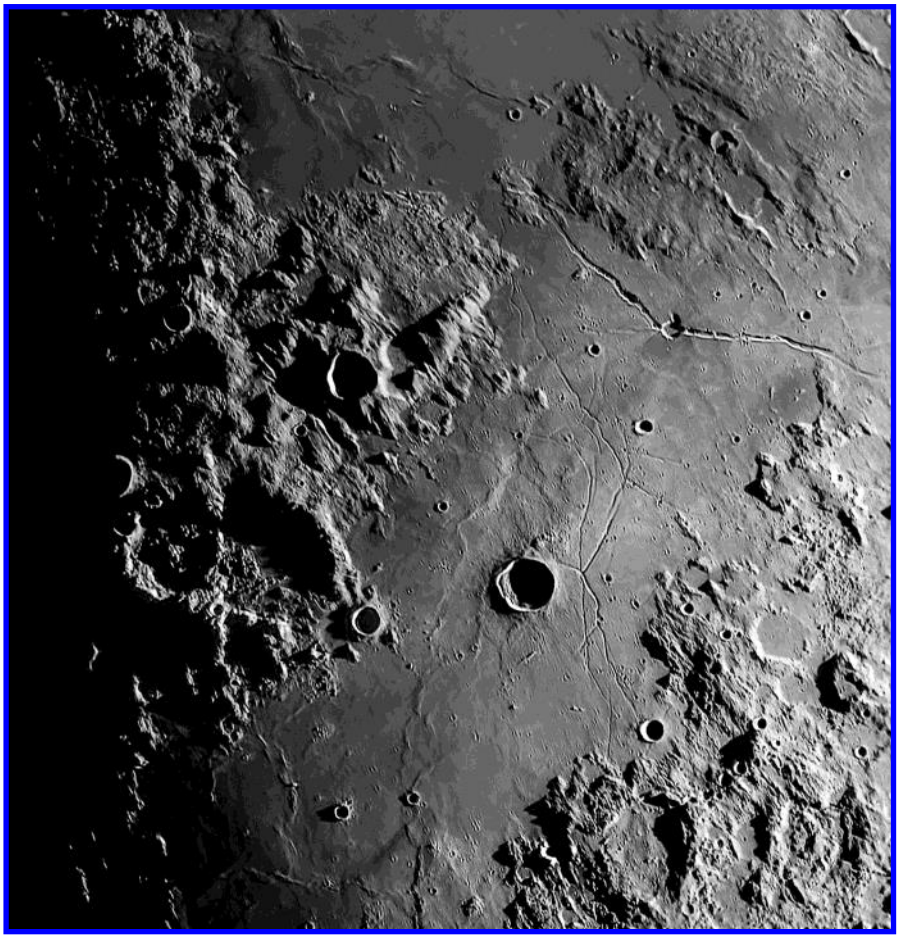
Isidorus and Capella lie on the northern shore of Mare Nectaris and continue the twin crater theme of having the same east-west orientation, similar size, and degree of degradation. Both craters date from the Nectarian Epoch. This time the eastern member of the crater pair retains a 500-meter-high central peak, but both crater interiors are smoothed with debris, possibly thrown from the Nectaris Basin impact. Spanning 41 and 48 kilometers respectively, Isidorus and Capella lie between the first and second of the concentric Nectaris Basin impact rings. The floor of Isidorus lies 2500 meters below mean lunar elevation while the floor of Capella plunges an additional 500 meters. The planet-altering seismic shock from the formation of the Nectaris Basin would explain the extreme ruin of both crater's walls. We can raise our bow in salute to the legendary archer William Tell as Capella looks like an apple pierced by an arrow. Vallis Capella bisects Capella crater and extends further to the southeast. Officially listed as 106 kilometers in length, to me Vallis Capella appears longer. The southeastern reach of the valley continues north of Gaudibert crater, extending its reach to 200 kilometers. Riccioli named both craters in in 1651, the western member designated Isidorus after Isidore de Seville, a 6th century Spanish astronomer. Capella was named after Martianus Capella, a 5th century Carthaginian lawyer.

The third crater pair lies on the lunar meridian and does not appear until the first quarter phase. Pallas and Murchison are co-joined similar-sized craters lying on the northwestern shore of Sinus Medii and date from the Nectarian and pre-Nectarian Epochs, respectively. The ancient, ruined form of 58-kilometer Murchison is partially overlain by the almost equally ruined rim of 50-kilometer Pallas. The pair continues the theme of only one crater having a central peak. Pallas' central peak protrudes one kilometer above the lava-flooded crater floor while Murchison's central peak is buried. A breach in the southeastern wall of Murchison, and another breach in the wall dividing Pallas and Murchison, allowed lava flows from Sinus Medii to flood into Murchison and then spill into Pallas. The floor of both craters lies one kilometer below mean lunar elevation. The 10-kilometer-wide satellite crater Pallas A lies atop the ruined western rim of Pallas while the 13-kilometer-wide crater Chladni lies outside the breach in Murchison's southeastern wall. Pallas on the west gained its name first, being designated by Madler in 1837 after fellow countryman Peter Simon Pallas, an 18th century German naturalist. In 1865, the Englishman Birt named Murchison after Sir Roderick Impey Murchison, a 19th century Scottish geologist.

The next time you telescopically browse the Moon's surface, take time to enjoy something different and seek out these crater pairs that provide style and personality to their regions on the face of the Moon.

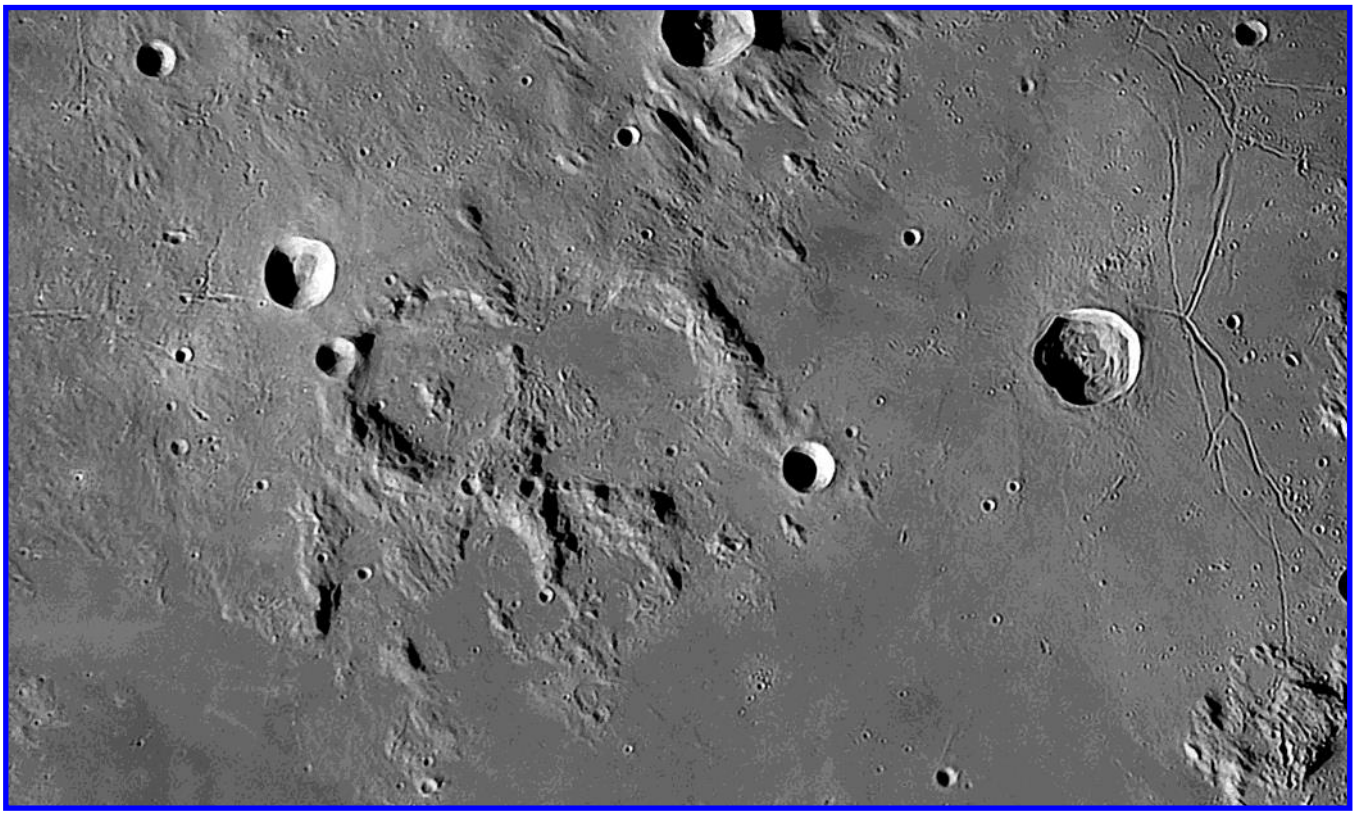


Plana and Mason *Robert Reeves.jpg The twin craters Plana and Mason are easily located by spotting the distinctive bull's eye pattern of Lacus Mortis near the northeastern limb. The merged pair reside on the southern rim of Lacus Mortis. The theme of Plana and Mason appearing like owl eyes is reinforced by the unnamed 100-kilometer-wide ghost crater south of the pair that appears like the body of an owl. All photos by Robert Reeves*

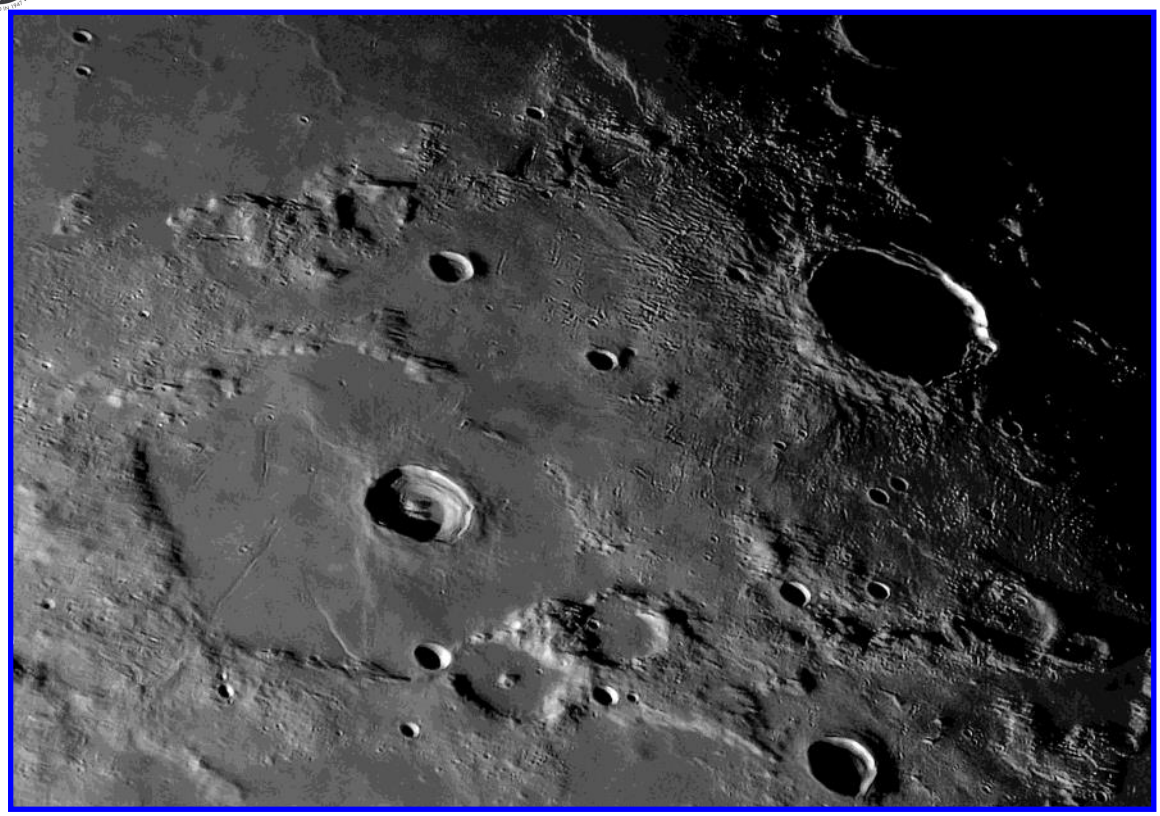


Triesnecker Hyginus *Robert Reeves.jpg*
The figure-eight shape of Pallas and Murchison lies west of landmark Rimae Triesnecker on Sinus Medii. Sunset shadows accentuate the ruggedness of the two-kilometer-high western wall of Pallas and the 1200-meter-high eastern wall of Murchison.

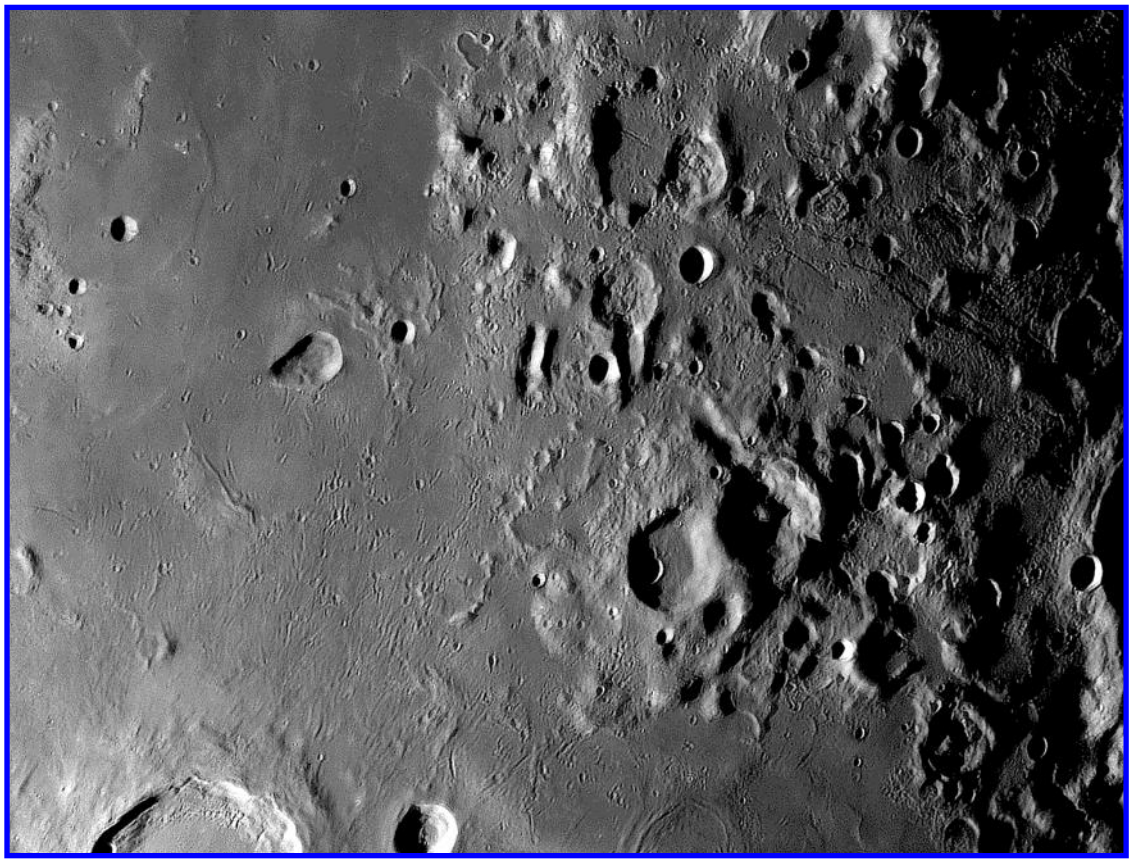
Pallas Murchison *Robert Reeves.jpg*
Breaches in the walls of Pallas and Murchison allowed lava from Sinus Medii to flood and flatten the interiors of both craters, accentuating their owl eyes appearance.



Lunar Topographic Studies
Lunar Lookalikes: Three Similar Crater Pairs On the Moon



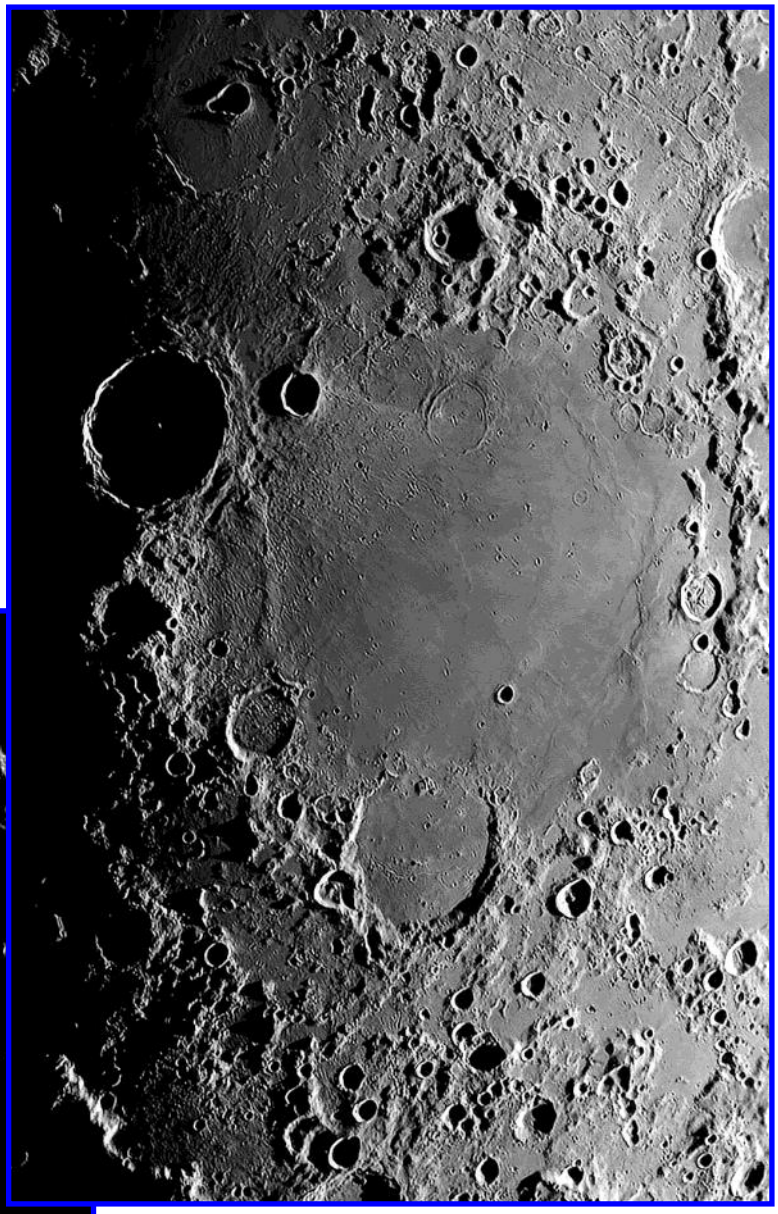
Lacus Mortis Hercules *Robert Reeves.jpg*
Sunset shadows reveal Plana's central peak is pitted by the chance impact of a 3.5-kilometer-wide crater on its southern slope.



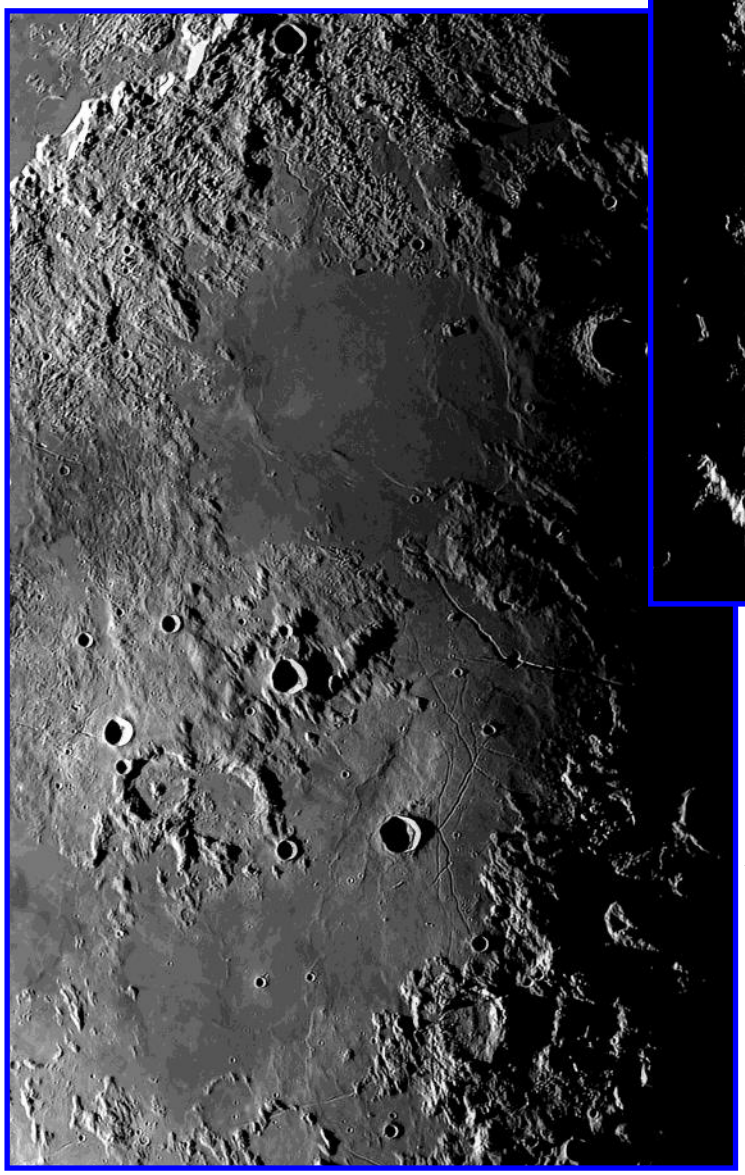
Isidorus Capella *Robert Reeves.jpg*
The unusually smooth and rounded appearance of Isidorus' and Capella's walls and floors indicate they may predate the formation of the Nectaris Basin.

Lunar Topographic Studies

Lunar Lookalikes: Three Similar Crater Pairs On the Moon

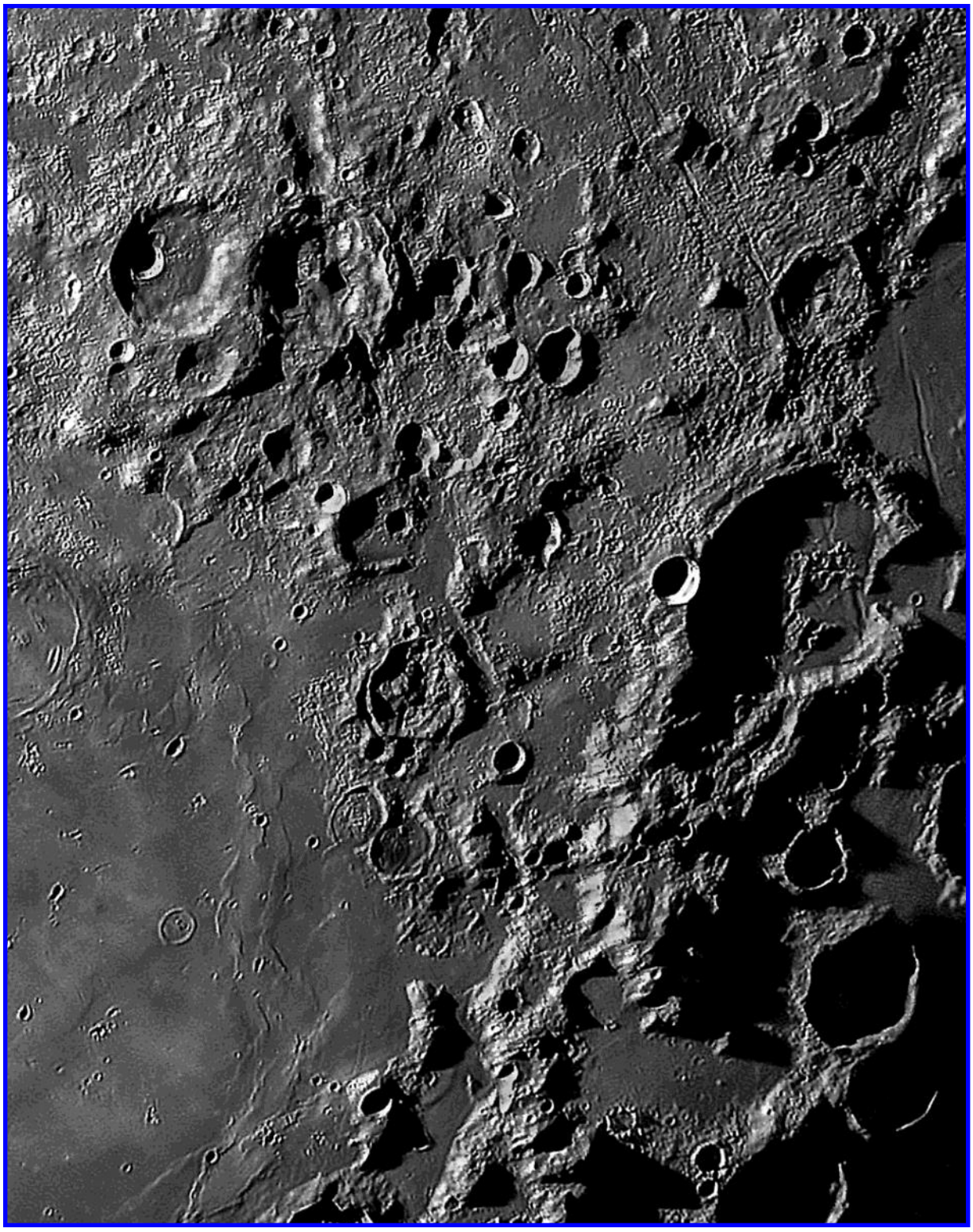


Mare Nectaris *Robert Reeves.jpg*
Mare Nectaris is ringed by many stunning features, including the overlapping craters Isidorus and Capella on the northern shore.



Vaporum Medii *Robert Reeves.jpg*
The crater pair of Pallas and Murchison are cradled on the shoreline bend of the combined kidney shape of Mare Vaporum and Sinus Medii.

Lunar Topographic Studies
Lunar Lookalikes: Three Similar Crater Pairs On the Moon



Vallis Capella *Robert Reeves.jpg*
Two-hundred-kilometer-long Vallis Capella bisects Capella crater and extends southeast to floor-fractured Gaudibert crater.

A Surprise Lunar V

Greg Shanos

Surprisingly, the Lunar V was visible on November 8, 2024 at 7:48 p.m. local time or November 9, 2024 at 0h 48m UT. The Lunar X was not visible at this time. The moon was first quarter at 48% phase and only 39° above the horizon. The seeing was rather good however, the transparency was only average through high thin clouds and haze. A Seestar S50 smart scope took a 1:44 minute AVI video which was processed using Autostakkert 3.1.4 and Registax 6.1.08. Further sharpening and processing in Photoshop CS4. Image by Gregory T. Shanos, Longboat Key, Sarasota, Florida

Some Details on the Walls of Manzinus Crater

Alberto Anunziato

Usually craters are too complex for my limited drawing skills. I can record important aspects but the overall result is not very attractive. The Manzinus crater, in crescent moon and close to the terminator, however, seemed worthy of recording for its appearance. Manzinus is an important crater (88 km in diameter), but due to its location in the highlands near the south pole it is very obscured, lost among so many similar craters, so ruined that they seem terribly similar: without central peaks, without terraces on their walls and without traces of ejecta blankets. It seems a boring panorama, but as we sharpen our eyes (as always, in astronomical observation) we find interesting details. In the case of Manzinus what caught my attention was that the walls seemed to have "bands". Obviously, knowing something about the surface of the Moon we can deduce that a crater as old as Manzinus should not have dark bands (the most famous example is the "young" Aristarchus). In reality they were irregularities in the west and south walls, where the bright areas should be higher or protruding areas.

Without a doubt the most interesting were the west and south walls, on the west wall it looked like a kind of hollow surrounded by bright areas, after a while this hollow (which looked like the entrance to a cave) became more precise as a dark round area, like a crater, although its edges were not bright but rather irregular whitish spots. This crater is Manzinus J (12 km in diameter) and probably the bright areas around it are the raised relief, without a rim, and the crater is very deep (that is why it looks like a round spot). On the south wall there also seemed to be an entrance to a cave, with an irregular shadow that seemed to enter it. If you look closely you can see that it was a very old crater that cut through the wall and that today is nothing more than a semicircle. This is Manzinus S (11 km in diameter).

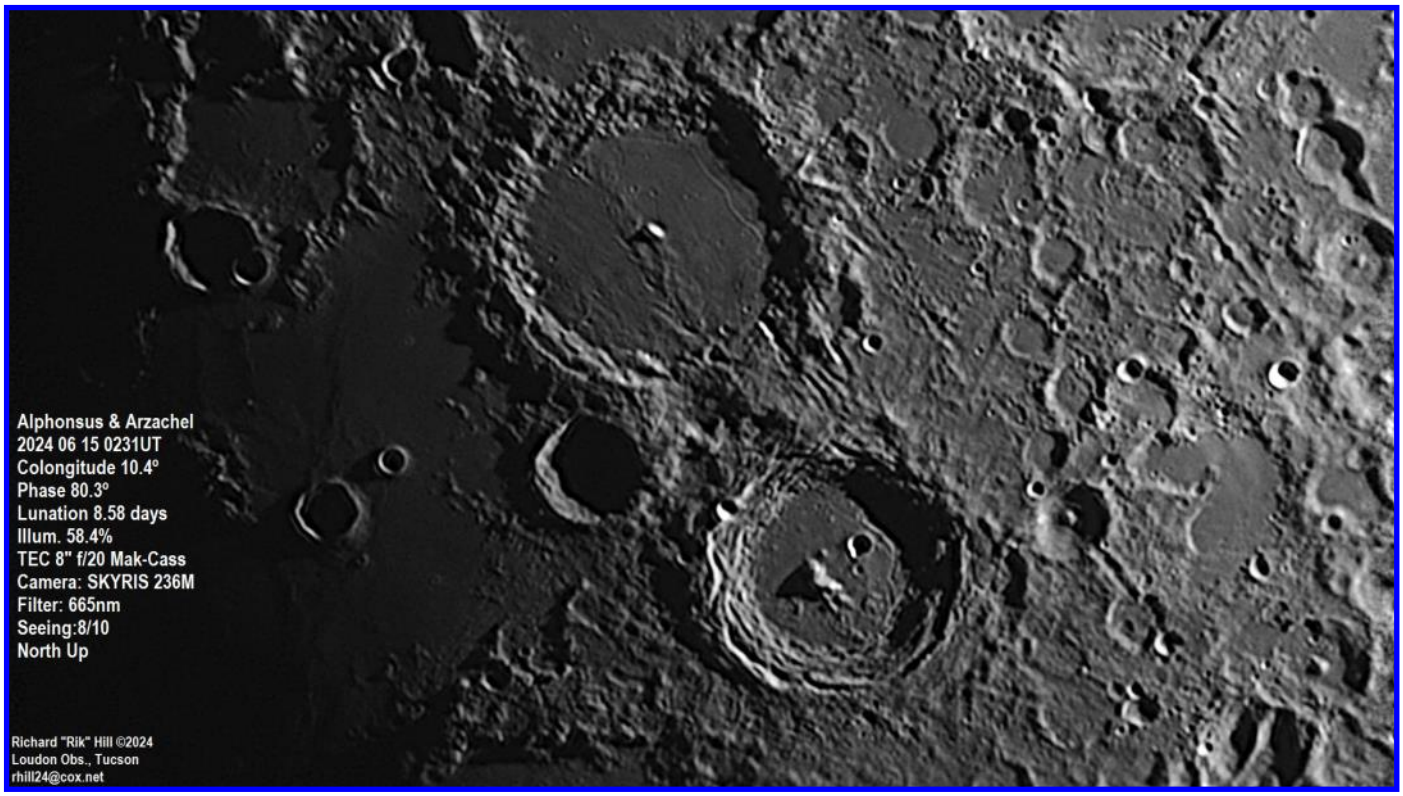
Peter Grego in "The Moon and How to Observe It" refers to the "noticeably convex floor" of Manzinus, but I was unable to observe this feature. At 154x no detail could be seen on the floor, only the walls were interesting.

This seemingly nondescript crater deserves a closer look, which I will surely do, looking for details of the west and south walls in photographic images, to repeat a second, more profitable visual observation.

***Manzinus**, Alberto Anunziato, Paraná, Argentina. 2024 November 09 01:35 -02:05 UT. Meade EX105 Maksutov-Cassegrain telescope, 154 x.*

Raining Rocks!

Rik Hill



Alphonsus and Arzachel, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2024 June 16 02:31 UT, colongitude 10.4˚. TEC 8 inch f/20 Maksutov-Cassegrain telescope, 665 nm filter, SKYRIS 236M camera. Seeing 8/10.*

In the center of the terminator at the quarter moon are three magnificent craters: Ptolemaeus, Alphonsus and Arzachel. The last two we see here with Alphonsus (118km dia.) being the upper one with a bright central peak and Arzachel (97km) below with a central peak and crater. There's a nice system of rimae in both craters seen in this image. And during high sun dark haloed craters can be seen in Alphonsus, possible evidence for volcanism. Alphonsus was the site of the exciting flight of the Ranger 9 spacecraft that crash landed at 14:08 UT on March 24, 1965 just above and to the right of the central peak seen in this photo.

Because of dark haloed craters on the floor of Alphonsus this was considered as a landing site for first Apollo 16 and when that was rejected, Apollo 17 where possible materials from recent (last hundred million years) eruptions could be collected. But concerns over contamination from ejecta from the Imbrium impact made Taurus Littrow a better choice.

Below Alphonsus is the beautifully terraced Arzachel with its off-center central peak rising 1.5km above the crater floor. Between these two craters is the mostly shadow filled Alpetragius (40km) and further out is the deeply shadow filled Lassell (24km).

To the east (right) of these craters are large scratches in the lunar surface, scars from mountain sized 'rocks' ejected during the Imbrium impact event. How exciting that would have been to see these grand features formed in seconds in a telescope! But then I imagine you would have been too busy taking cover from the mountain sized lunar meteorites raining down!

The Beaver Supermoon

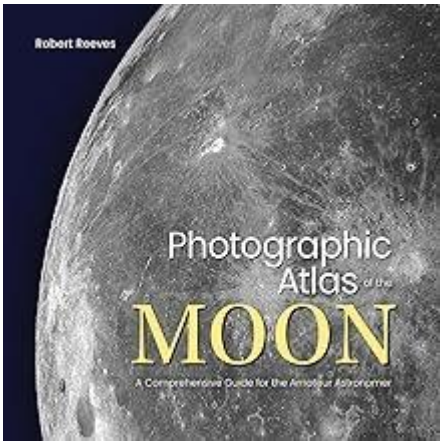
Gregory T. Shanos

The Beaver Supermoon occurred at 4:29 p.m. ET (21h 29m UT) on Friday, November 15, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon had not yet risen. This image was taken on November 15, 2024 at 8:52 pm local time or November 16, 2024 at 1h 52m UT when the moon was full at 99.8% phase and only 40°above the horizon. The seeing was good under perfectly clear skies. This was the orientation of the moon as it was rising. A Meade 60mm 260mm f/4 refractor was tracking the moon on an inexpensive Orion EQ equatorially mounted tripod. A ZWO ASI 178MM monochrome camera with an Optolong UV-IR cut filter utilizing Firecapture v2.7.14 to acquire the video and a MSI GF 65 gaming computer. The SER video file was processed using Autostakkert 3.1.4 and Registax 6.1.08. Further sharpening and processing in Photoshop CS4. Image by Gregory T. Shanos, Longboat Key, Sarasota, Florida.

Photographic Atlas of the Moon-A Comprehensive Guide for the Amateur Astronomer by Robert Reeves.

ISBN 9780228104988

Reviewed by David Teske



Introduction

I am a collector and reader of all things lunar, and have been for many years. As such, I have read just about every lunar atlas that I can get my hands on, cover to cover. The latest book in this list is the Photographic Atlas of the Moon-A Comprehensive Guide for the Amateur Astronomer by Robert Reeves. In short, this is a wonderful, well written, well-illustrated book for students of the Moon, whether beginners or seasoned observers. Reeves is a well-known lunar imager, and his images are spectacular in this volume. His descriptions of lunar features are interesting and very informative. Any lunar observer is sure to learn more about the features of the Moon. Please note, this book has wonderful illustrations, images and text about the Moon. It is not, however, the book that you would take outside to identify lunar features. That task would be done much better by the Rükl Atlas of the Moon or the Duplex Moon Atlas by Ronald Stoyan. These two atlases have great labeled lunar maps and images, but do not have the discussion of lunar features as does the Reeves book.

Book Features

The Photographic Atlas of the Moon is a hardbound book, 10.25 x 10.25 inches in size, with 288 pages. I am really impressed that the publisher, Firefly, used heavy paper with a nice matte finish for this book. This really helps the images pop out.

Book Content

The table of contents lists the following:

The Introduction consists of:
Chapter 1 The Creation of the Moon
Chapter 2 The Face of the Moon
Chapter 3 The Language and Science of the Moon
Chapter 4 The Moon's Orbit
Chapter 5 The Lunar Seas
Chapter 6 The Lunar Craters

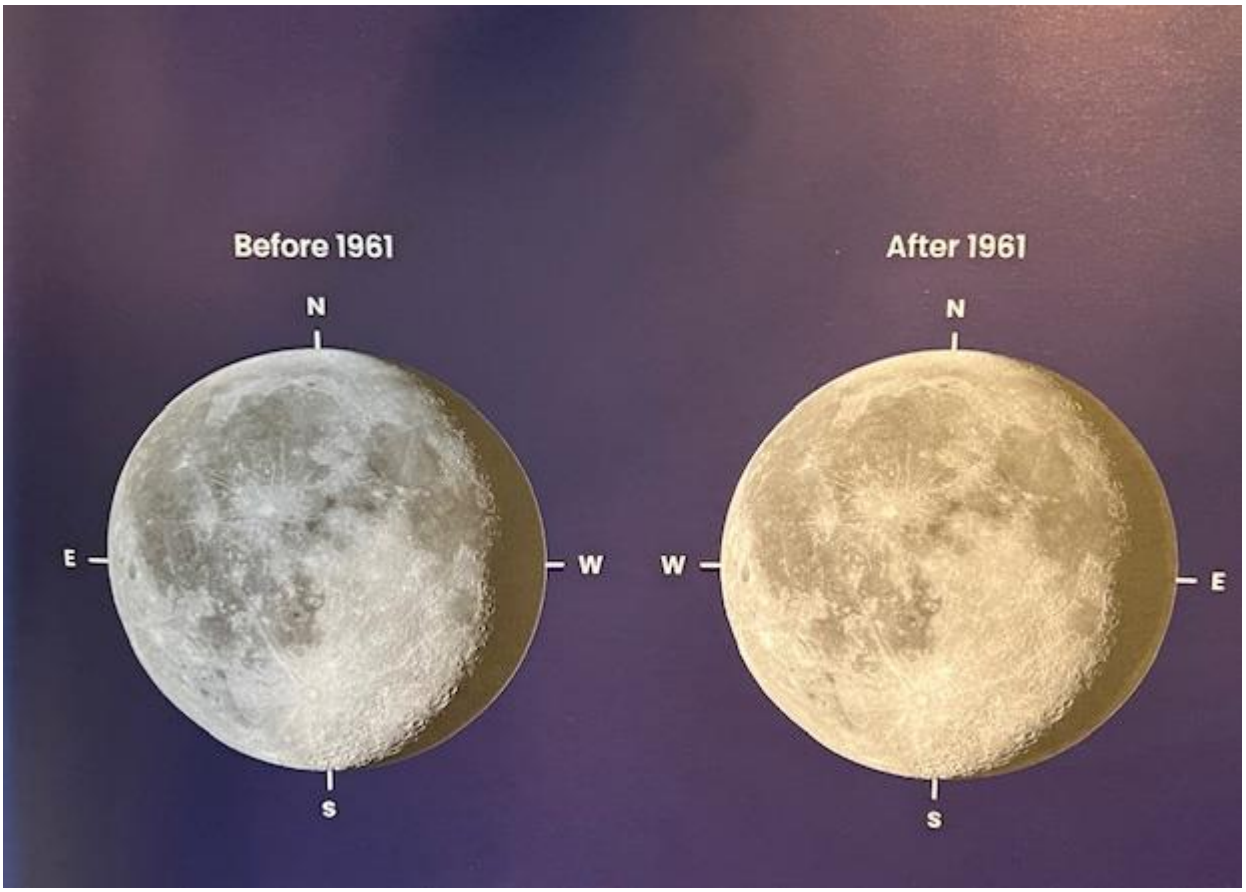
Most of the book is the Atlas of The Moon with sections such as “Exploring the Waxing Gibbous Moon”.

A fun additional section of the atlas is Nicknamed Features of the Moon, which consists of 20 lunar features that you have heard of (the Straight Wall) and others you may not have heard of (the Heart of the Moon or the Steppingstones).

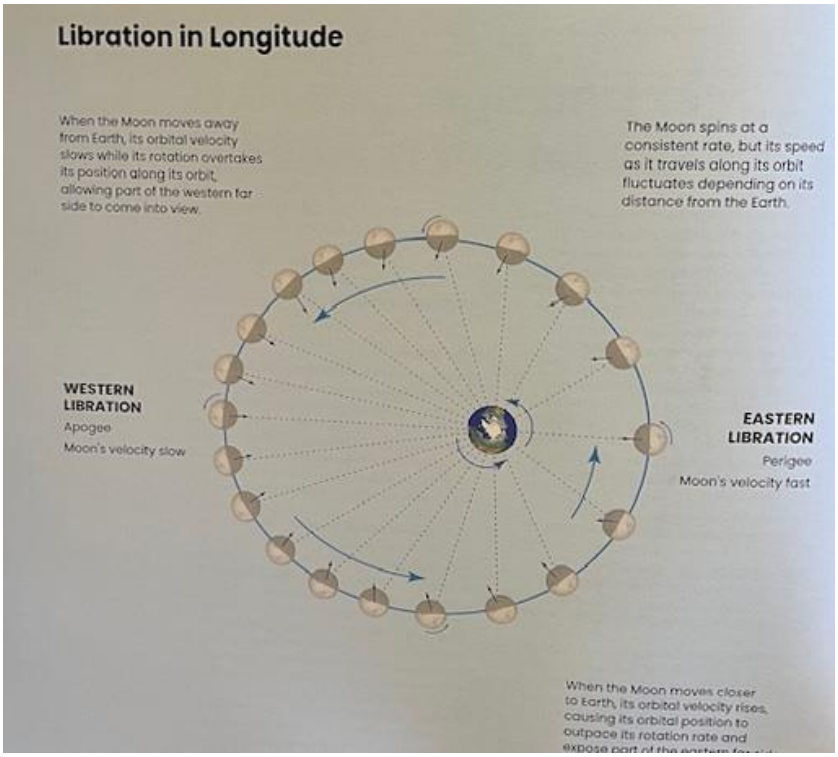
The book concludes with Additional Resources for the Moon Observer. If there is a second edition of this Atlas, I would recommend that this section be more comprehensive.

Illustrations
The Atlas is profusely illustrated with very nice, large, color, full-page illustrations demonstrating the concept that Reeves is trying to explain. No black and white line drawings are in this Atlas! Reeves reports that he developed the illustrations and graphic artists at Firefly made the illustrations. I am really impressed by the quality of these drawings. Please refer to the images of illustrations below.

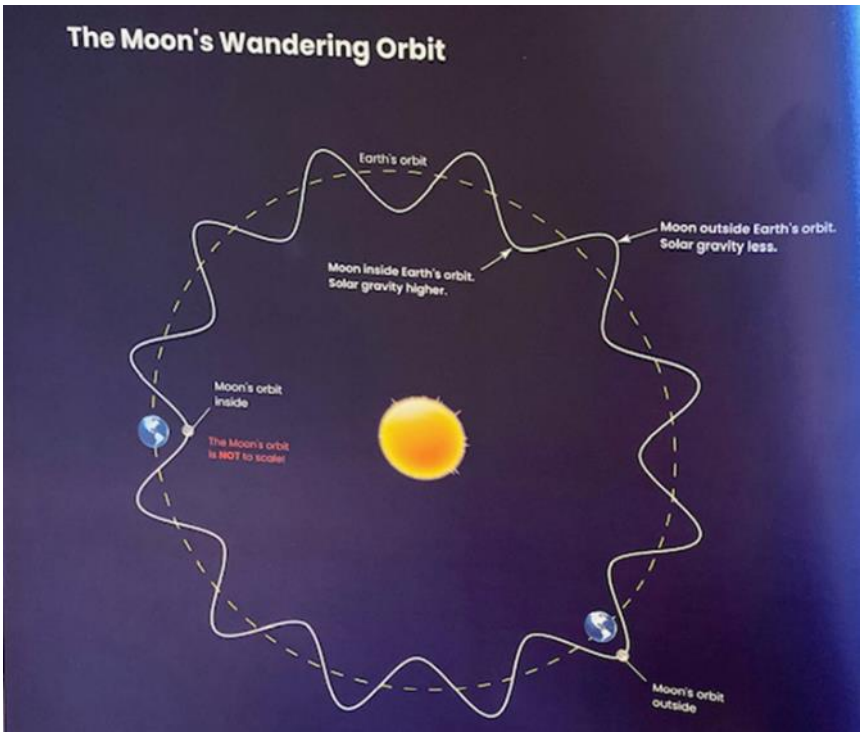
Page 17 Lunar Directions



Page 26 Libration in longitude



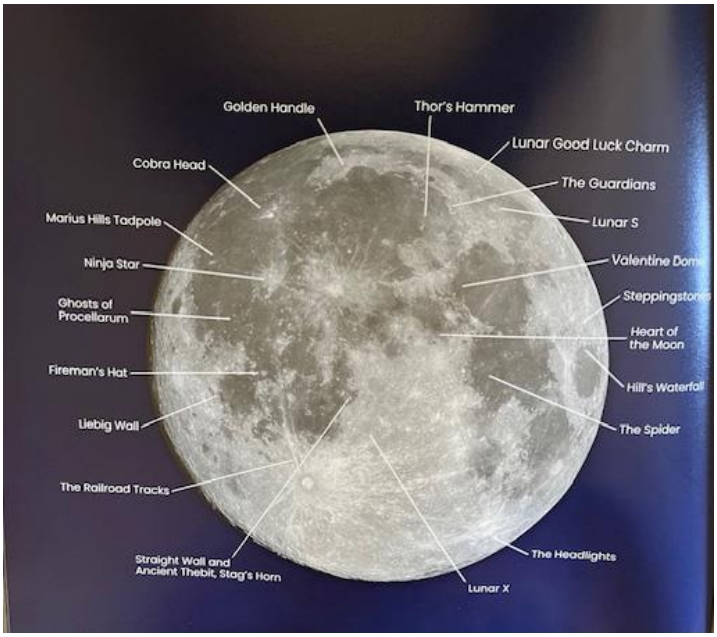
Page 34 The Moon's wandering orbit



Page 63 The Atlas of the Moon

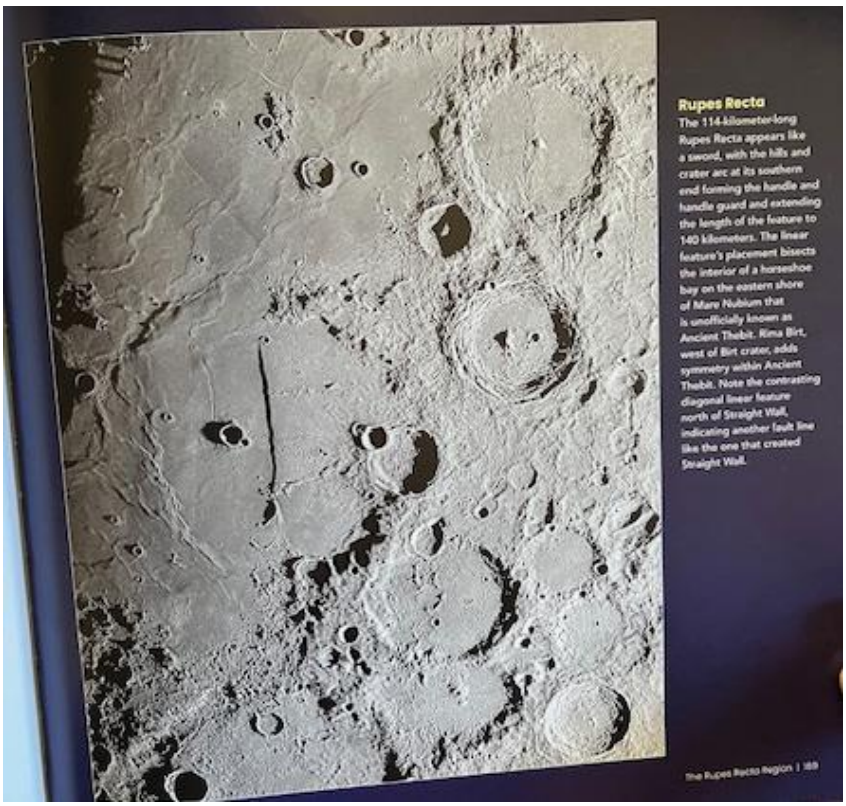
THE ATLAS OF THE MOON

Page 268 Nicknamed Features of the Moon

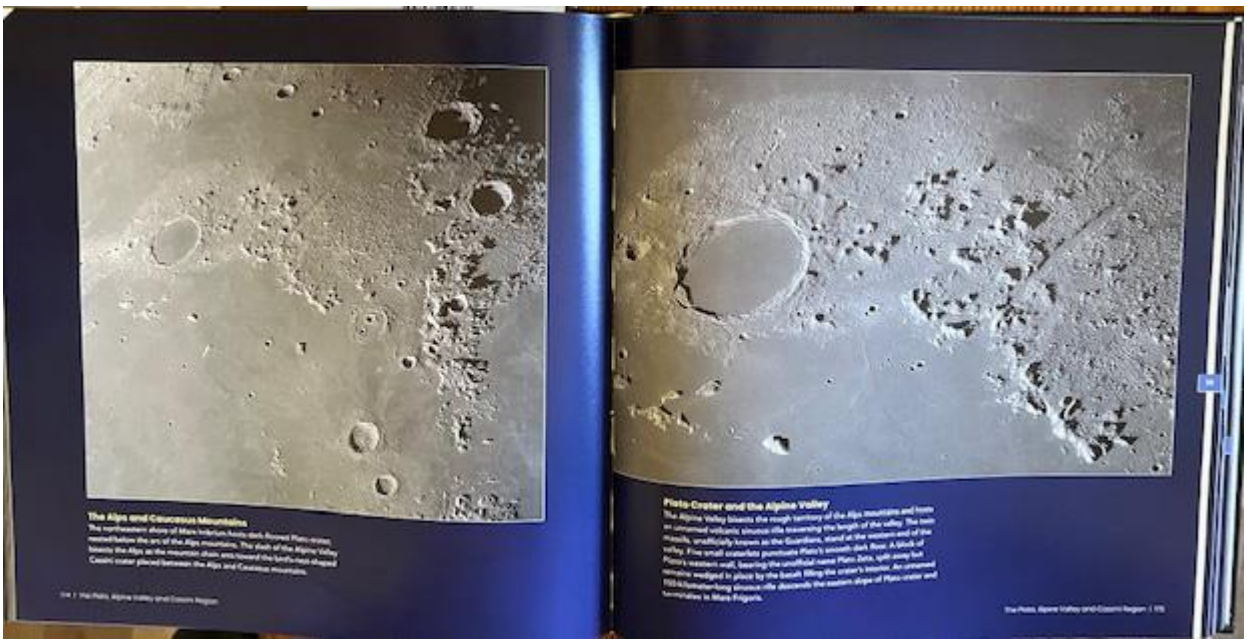


The lunar images are all taken by Reeves using his armada of telescopes, which were Celestron 8 and 11-inch Schmidt-Cassegrain telescopes, a 7-inch Maksutov-Cassegrain and a 20-inch Dobsonian reflector telescope. Reeves lunar imaging is well known, as it frequently appears in Amateur Astronomy, Sky and Telescope, Astronomy, Deep Sky and The Lunar Observer magazines. All of the images that Reeves showcases in his Atlas are very sharp, detailed and illustrate his descriptions well. A sampling of the lunar images of Reeves is below.

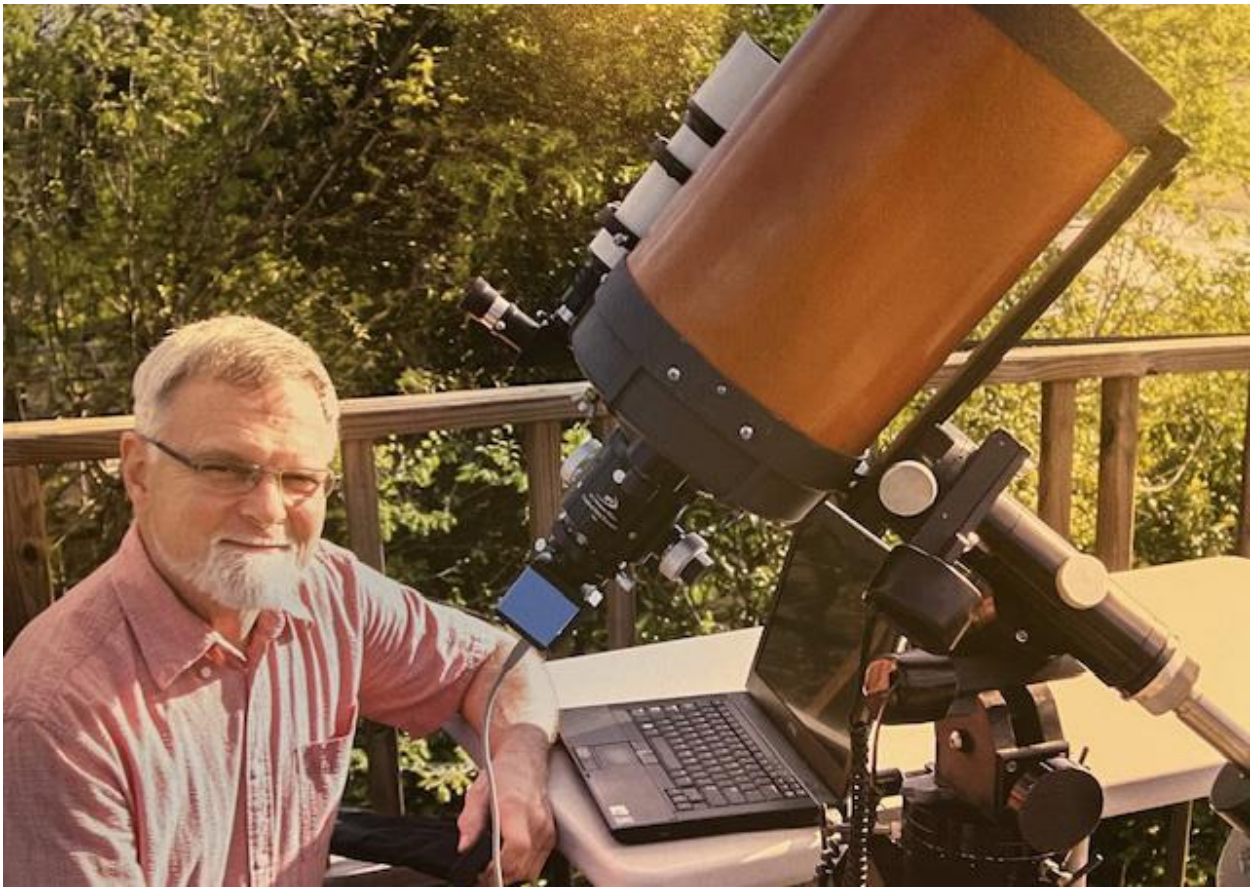
Page 169 Rupes Recta



Page 174-175 Plato



Page 23 Robert Reeves



Samples

As I read prose about lunar features frequently, I must say the writing in the Atlas almost sound like Reeves is next to me telling me about the lunar features as I am looking through his telescope. A few samples are below:

From page 173 The Plato, Alpine Valley and Cassini Region

"When it was initially suspected that massive asteroid impacts created the basins and craters on the Moon, it was thought that the Alpine Valley was ripped open by huge chunks of debris heaved up by an asteroid impact. Today, it is recognized that the creation of the Alpine Valley was more benign. The valley is a graben, a geological feature created by the slumping of land between two fault lines. The Alpine Valley is 155 kilometers long and 15 kilometers wide. The floor of the valley descends 800 meters from the surrounding hilly terrain. Most of the channel forming the Alpine Valley lies 2,700 meters below mean lunar elevation and the valley superficially appears to connect Mare Imbrium with Mare Frigoris. The western end of the valley funnels down to a gorge 200 meters wide that opens onto a delta leading to Mare Imbrium. The narrow channel is bounded by a northern massif that rises 1.8 kilometers while the southern massif rises 2.5 kilometers above the plains of Mare Imbrium, both collectively known by the unofficial name of "the Guardians." To me, they look like massive ancient Egyptian monuments guarding the path to the pharaoh's paradise."

From page 260, The Grimaldi Region
"Giovanni Riccioli named Grimaldi in 1651 after Francesco Grimaldi, a fellow Jesuit and partner in Riccioli's 17th-century lunar mapping efforts. Riccioli didn't leave himself off the lunar map. He affixed his name to the 155-kilometer-wide crater northwest of Grimaldi, so that the lunar partners would remain together. Riccioli is a floor-fractured crater with the channels of Rimae Riccioli crisscrossing the southern half, while the northern interior is flooded with dark basalt."

From page 264 Mare Orientale
"The reason the Eastern Sea lies on the Moon's western limb is that prior to 1961, the east and west cardinal points on the Moon were reversed. The eastern limb was the side appearing closest to Earth's eastern horizon as the Moon rose, as seen from the northern hemisphere. When it was realized that the Moon was a target soon to be explored by rocket probes and astronauts, it was decreed that lunar maps would mimic terrestrial maps, with west on the left. Thus, the Eastern Sea found itself on the western limb."

Conclusion
If the Moon is the subject of your astronomical observing program, whether as a beginner or seasoned observer, Robert Reeves Photographic Atlas of the Moon seems to me as a must-have resource. Way back when I started my lunar explorations, I wish that this book had been around. Luckily for the lunar observer of the mid 2020s, there are a good number of fine lunar observing books to choose from. This one should be at the top of that list.

David Teske
Coordinator, Lunar Topographic Section
Association of Lunar and Planetary Observers

The Map of the Floor of Archimedes in 1880 and Now: Bright Rays, Craterlets and a Tiny Wrinkle Ridge

Alberto Anunziato

In last month's edition of our magazine the dossier on Archimedes, Autolycus and Aristillus appeared in the Focus On section, in which reference was made to the fact that the uniformity of Archimedes' floor seems to be deceptive and can be a fascinating subject of research and to the book by Thomas Elger "The Moon", which says that at the end of the 19th century it was a fascinating issue: "The most noteworthy features in connection with this formation are the crater-cones, craterlets, pits, white spots, and light streaks which figure on the otherwise smooth interior. Mr. T. P. Gray, F.K.A.S., of Bedford, who, with praiseworthy assiduity, has devoted more than ten years to the close scrutiny of these features, Mr. Stanley Williams, and others, have detected four crater-cones on the E. half of the floor, and about fifty minute craters and white spots, also probably volcanic vents, and a very curious and interesting series of light streaks, mostly traversing the formation from E. to W. A little E. of the center is a dusky oval area about 6 miles across, and S.W. of this is another, much smaller. Under some conditions of illumination, the two principal light markings may be traced over the W. wall, and for some distance on the plain beyond".

The details of the appearance of the floor of Archimedes lend themselves to an analysis of the bright rays that cross on the smooth floor (or at least if you see it with medium magnification) covered with lava. It seemed interesting to me to do a small comparative investigation between ancient visual observations and our modern photographic images. For this it was necessary to find the authors cited by Elger. I could find online a resume of the observations of T. P. Gray in The Astronomical Register in 1880 called "The Archimedes crater" (available at: https://ui.adsabs.harvard.edu/abs/1880AReg...18R.138G/abstract), in which it was included the map we see in IMAGE 1, which according to the author is the result of 72 observations made between November 1879 and October 1880, which are compared with the observations of other observers (Mr. Knott) in 1860 and 1861. The comparison between the observations of 1860/1861 and those from 1879/1880 has as objective "the purpose of detecting any change in the arrangement of the markings" (the citations are all of Gray's text). By "light markings" or "light streaks" Gray refers, in the terminology of the time, to what we currently call "bright rays". The search for changes on the lunar surface now seems strange to us, not so much so at the end of the 19th century, a time in which the true nature of the bright marks that we now know corresponded to the material ejected in the impacts that created the most recent craters (in the Copernican period). Typical of the marvelous climate of the time, of scientific studies by systematic amateurs, is the study that we have analyzed, comparing observations of a 20 years timespan: "although little, if any, change is noticed in the craterlets, there is a decided alteration in the light markings", we will see what these alterations are, considering that we compare the visual observations reported in the text of 1880 with the images of Archimedes that our friends sent to compose the Focus On section of the past month.

Some clarifications before starting the comparison. In IMAGE 1 we have added the cardinal points, according to modern convention (Mare Crisium is located in the east limb), while in the original text the ancient convention is used (which has been used prior to 1961, with Mare Crisium in the west), in the citations of this text we will use the modern nomenclature. The photographic images that we use are the ones sent, as mentioned before, to the Focus-On section of the past month, at the end we will indicate the authorship and location in the October 2024 edition of The Lunar Observer. We will use croppings of these images, only the part corresponding to Archimedes, which must be kept in mind: they are images that they didn't mean to record the surface of Archimedes, but a much larger field, so we must keep in mind that when enlarging a small detail of an image the more it expands, the less the resolution. It is interesting how these images demonstrate a scientific value, even when they were taken for other purposes to those in mind by the imagers.

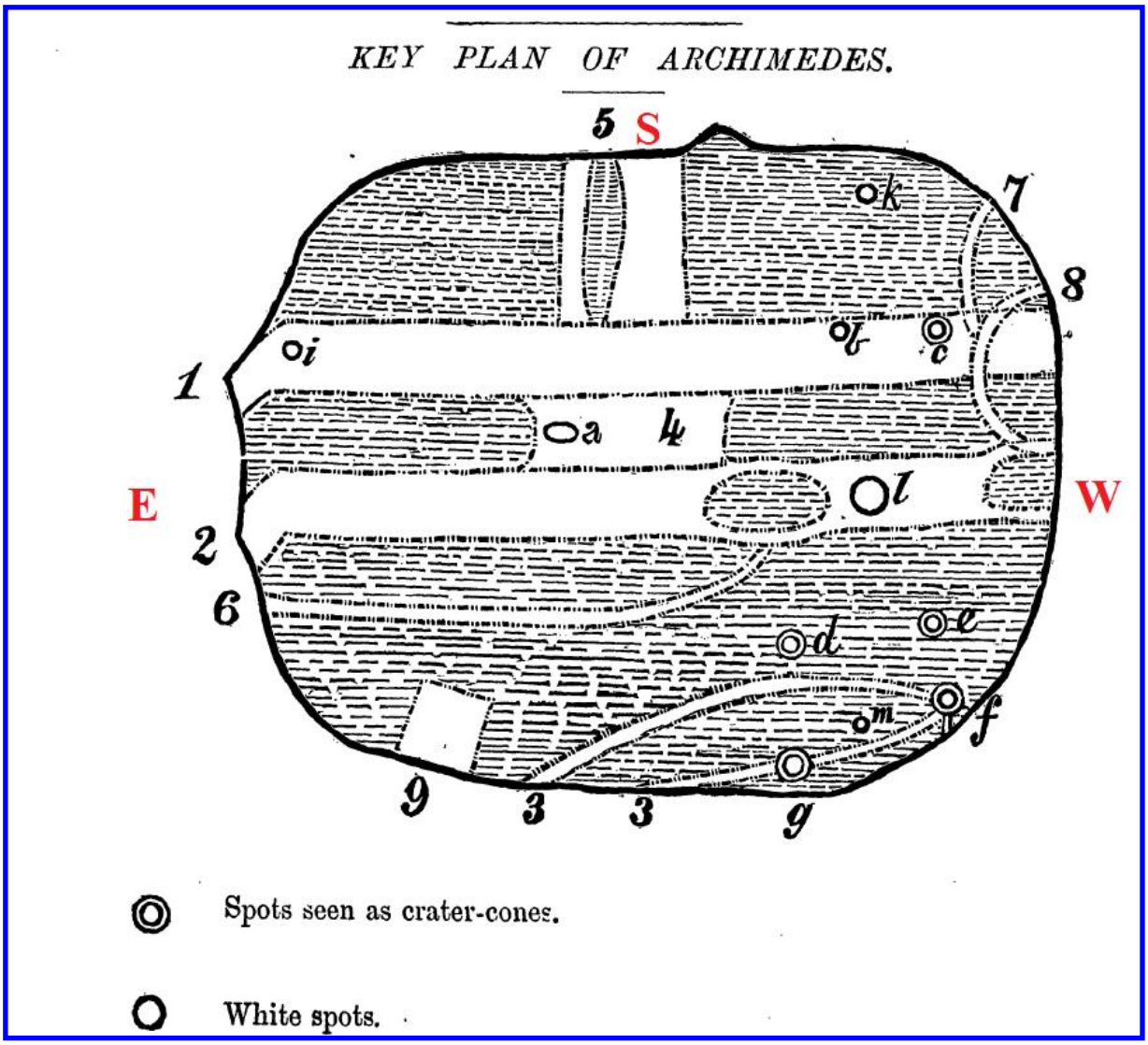


Image 1 Archimedes, T. P. Gray, 1880.

Lunar Topographic Studies

The Map of the Floor of Archimedes in 1880 and Now: Bright Rays, Craterlets and a Tiny Wrinkle Ridge

IMAGE 2 is a composition with 4 images of Archimedes cropping from images sent to the Focus On section of the past month (we change the original contrast of each image a little to highlight the bright areas of the interior of the crater a little more). As we see in these 4 overviews, the structure of the bright zones seems to be more complicated than the map of IMAGE 1. The most evident characteristics are the two central bright zones, which run from east to west. Visually I remember that with a small telescope like mine (105 mm Maksutov-Cassegrain) you can clearly see these two bright rays broadening on the walls, especially on the east wall.

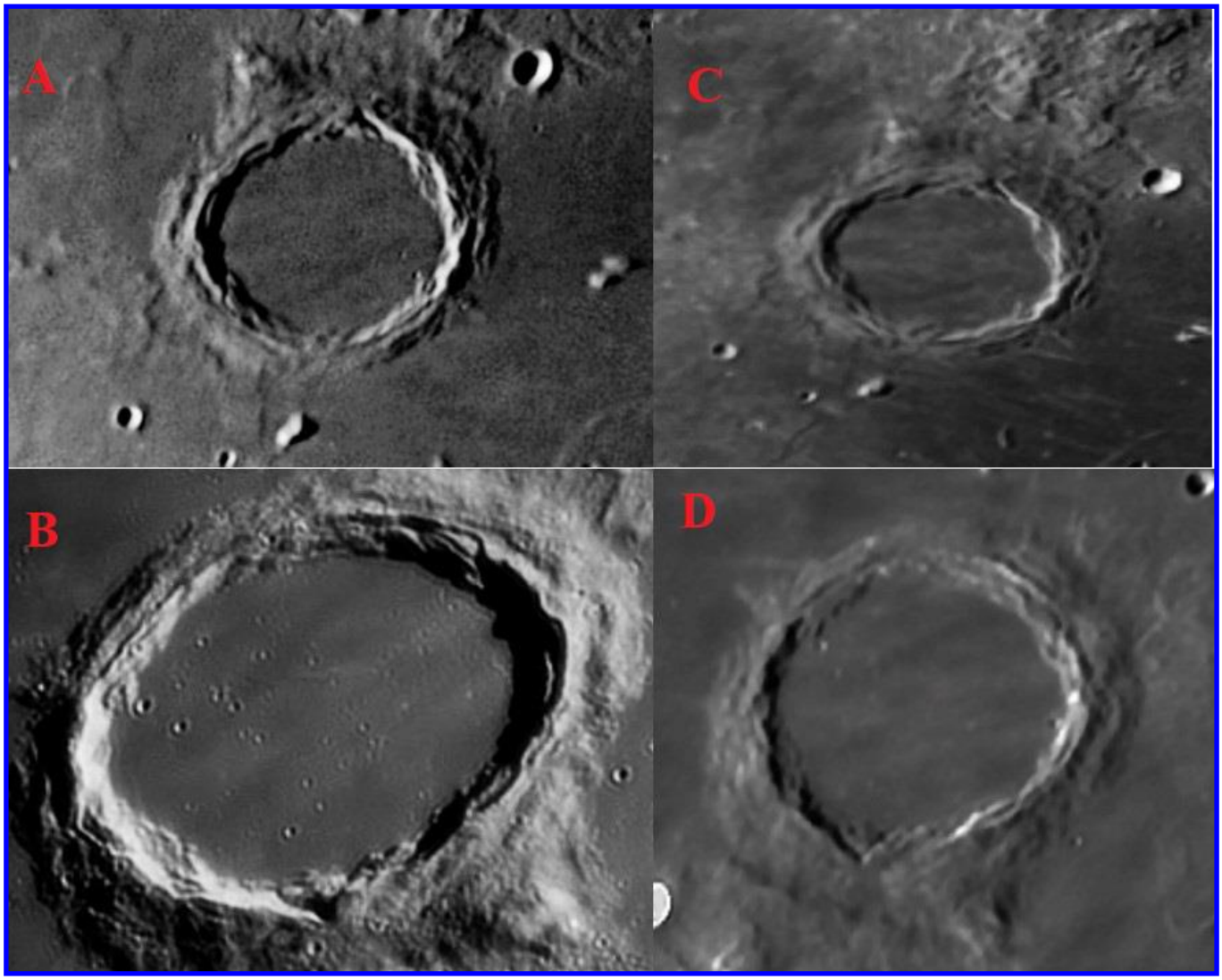


IMAGE 2: The Lunar Observer, November 2024: A: Rik Hill Image 35, page 53. B: Ken Vaughan Image 38, page 57. C: Félix León Image 28, page 49. D: David Teske Image 24, page 47.

Lunar Topographic Studies

The Map of the Floor of Archimedes in 1880 and Now: Bright Rays, Craterlets and a Tiny Wrinkle Ridge

Now let's see a comparison between Gray's article map (IMAGE 1) and IMAGE 3, which is an old photographic image of us and which seems to be quite similar to IMAGE 1. Gray begins his analysis from the top side, with the “double streak 5”, which is not very evident and that “only a few occasions has its double appearance been noticed”, in our image we could only see it if we try hard. Always to the north we find the “south bright zone. Number 1, nearly always visible and showing but little variation, except that its E. end seems generally to bend sharply northwards, and its E. end has been occupied by the curved streaks 7 and 8”. The streak 1 is more evident. What I can't even distinguish in our photographic image are the bright streaks 7 and 8 on the edge, which were not very evident in the 19th century, and which were only observed on 3 occasions "when these difficult objects have been visible". Between streaks 1 and 2, which run from east to west, streak 4 runs from up north. Once again, only by looking at the Gray map can we locate the area indicated in the modern image, it would be found to the left of the number 4 in the image. More northwards we find “The central bright zone, streak 2, is, perhaps, the most interesting feature on the floor; like the S. zone, its E. end is sharply bent”. This central streak can be seen clearly, included also the two dark zones in its interior. Southwards, in the map of Gray, we find “the narrower streak 6, eighteen observations have been made of it, but the whole has seldom been seen at once; it is a faint object and difficult to trace, especially the W. half”. Well, it is very difficult to see, even to the point that we are not sure which one will be. In principle it would be the line that runs above the number 6 and ends in the dark oval in the centre of streak 2, although from number 6 a similar streak starts, due to its narrowness and its layout, although it seems to be longer, its location could coincide with “Streak 9, a broad and very short streak, seen on 5 occasions”, although they are not similar in the least. Finally, from the north wall, on Gray's map two very thin bands emerge, both identified as 3 (north and south): “the S streak 3 is considerably fainter than streaks 1 or 2… the N streak 3 is more difficult”; perhaps the streaks that we indicate with the number 3 would be the northern streaks.

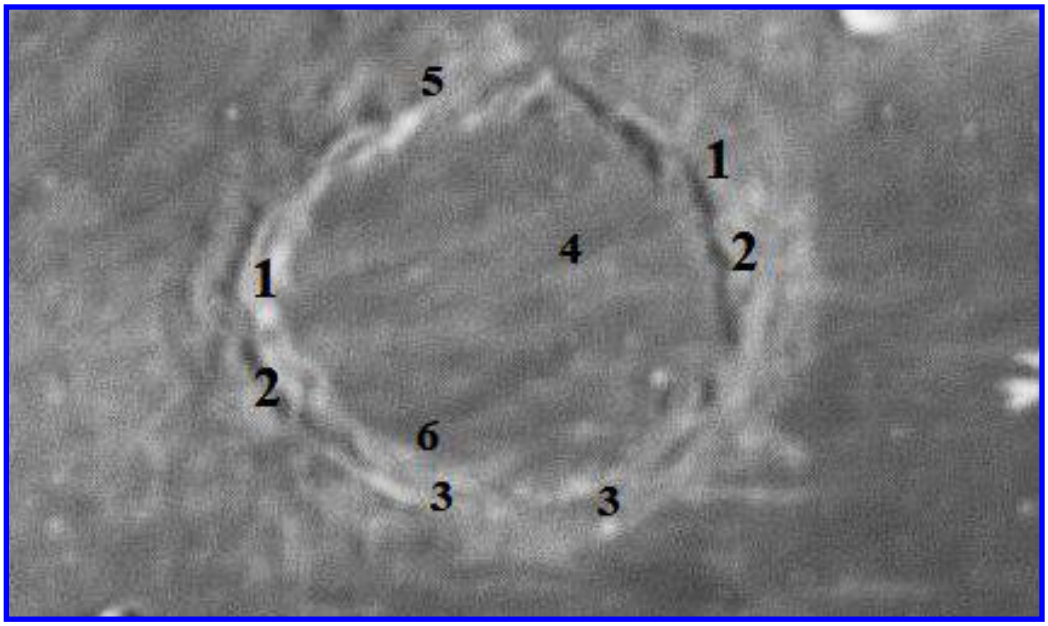


IMAGE 3: The Lunar Observer, November 2024, Alberto Anunziato Image 37, page 55.

Returning to the issue of the variations, according to the text we cited extensively, between the Knott’s observations from 1860/1861 and those by Allison and Gray from 1879/1880 the differences were: “it is evidente that the N portion of the floor does not represent the same appearance that it did in 1860. It seems to have become darker (…) the question arises whether this fading away of the N bright zone has been sudden or gradual, the following extract from Mr. Neison’s “Moon”, under the head of Archimedes, seems to indicate a period when this streak was passing from its bright appearance in 1860 to the narrow and faint markings which is its present aspect”.

Compared to the Focus On images from last month, synthesized in IMAGE 2, they do not seem to correspond to the outline of Gray's map (IMAGE 1), even the bright areas seem to be more extensive than in the 1880 map. It is obvious that the bright rays change, they darken, but it is very unlikely that we will be able to distinguish the process in 20 years (or 200 years). Gray's text tells us nothing about the standardization of observations, we have no information on seeing, for example. Perhaps there is a process of simplification of observations in the form of a map, which then conditions subsequent observations. Although the images that make up IMAGE 2 do not seem to correspond to the drawing in IMAGE 1, IMAGE 3 does seem to be quite analogous. The observation of bright rays is still as necessary as in 1880 and the exact mapping of bright surfaces is very difficult. Gray seems to consider the most interesting question of the Archimedes floor to be that of the bright streaks, but there are other considerations on this basaltic plain limited by the walls of Archimedes. In addition to the 11 bright streaks we have already analyzed, Grey's map also shows "eleven spots; six of which have been seen as crater cones"; today we would call crater cones craterlets. Obviously, it is often a question of resolution: a white spot with a higher resolution ends up being a craterlet. The comparison we make (IMAGE 4) with one of the panoramas included in IMAGE 2 obviously shows many more craterlets in the modern image. We highlight two examples of "white spots". The arrow on the right shows what appears to be the white spot "l" on Gray's map, a diffuse spot that, however, appears to be a craterlet: "sometimes hazy and ill defined; sometimes brilliant and distinct"; the arrow on the left of what certainly seems to be a bright spot, indicates on the map as "a": "a small oval, white patch".

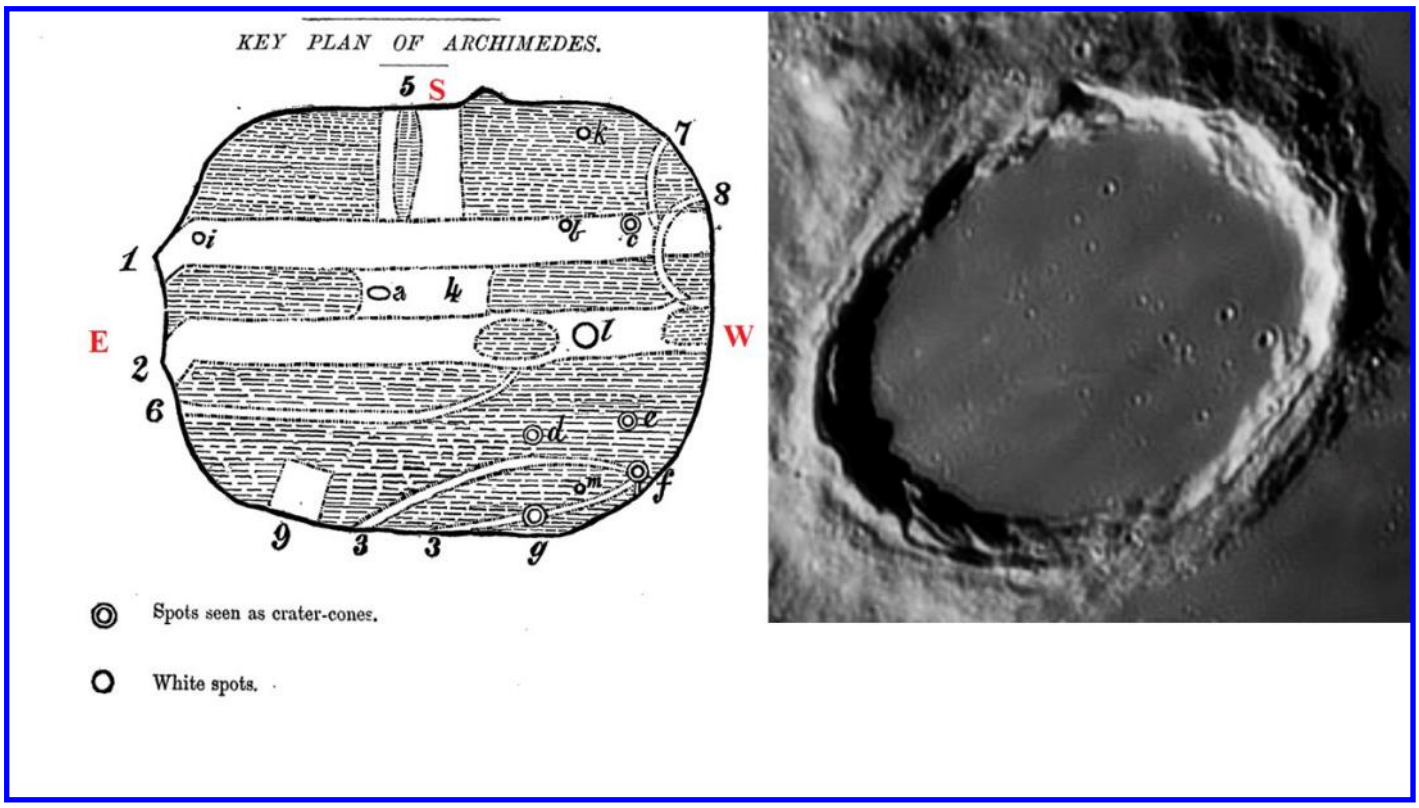


IMAGE 4: Left: Gray, 1880. Right: The Lunar Observer, November 2024, Ken Vaughan Image 38, page 57.

Finally, there is one type of selenographic feature that Gray and other 19th-century observers missed: the small central wrinkle ridge. There are other craters with extensive lava-covered floors that have wrinkle ridges (like Grimaldi), and Archimedes has them too, although they are devilishly difficult to observe. In last month's Focus On article, I referred to what appeared to be a chain of craters in the center of Archimedes, and with more time to review the images I realized my mistake: it is a tiny wrinkle ridge, whose structure is made up of 4 segments running "en echelon". It is interesting, obviously, because it is an example of a small wrinkle ridge: instead of a single arch with crests on its top, a set of small arcs that have the same structure as crests would have, in this case "en echelon" (the other possible shape is the crest running along one of the margins of the arch). In IMAGE 5 we see, on the left, the wrinkle ridge (which we can see due to the oblique illumination) and on the right the wrinkle ridges recorded by the Map of the Lunar Wrinkle Ridges of the Lunar Reconnaissance Orbiter Quickmap. The other 3 ridges, near the walls, must be quite a bit more difficult to observe, although the ones near the north wall can be discerned in IMAGE 5.

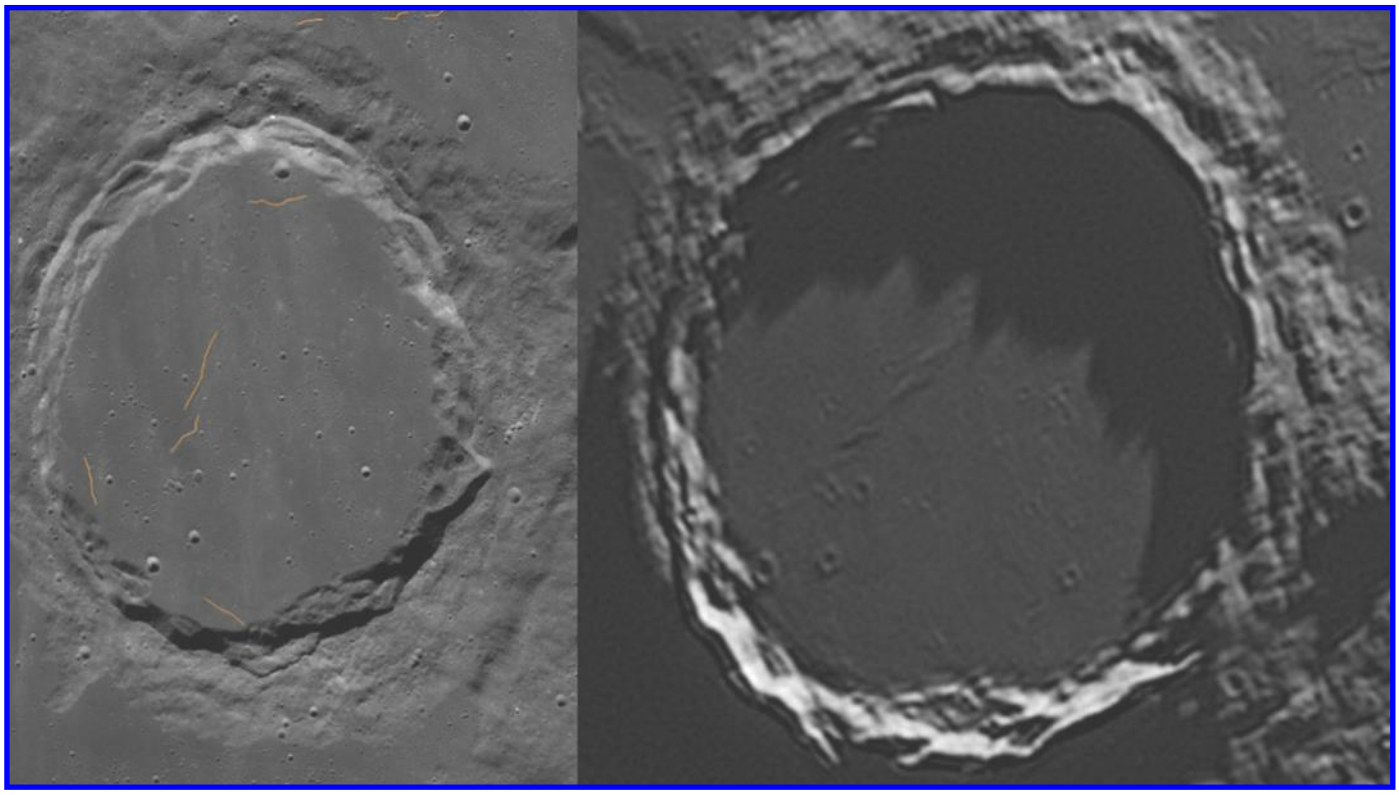


IMAGE 5: Left: LRO Quickmap. Right: The Lunar Observer, November 2024, Jesús Piñeiro Image 17, page 41.

I would like to close with a tribute to the spirit of the selenographers of the 19th century, who carried their love for the Moon to the point of achieving results that significantly increased our knowledge of our satellite, reproducing the final words of the text that we have quoted so often: "In conclusion, may I ask those gentlemen, who are interested in the study of light streaks to observe, if only occasionally, this very interesting formation. A new series of observations has been commenced with a larger number of observers and instruments, by which means we hope to obtain fresh knowledge of the marks of Archimedes". We, gentlemen of the XXI century, will continue the search.

The Four Supermoons of 2024

Gregory T. Shanos

On average the moon is 238,855 miles (384,400 km) from Earth. Since its orbit is elliptical, at its farthest point, known as apogee, the moon is 252,088 miles (405,696 km) distant. At its closest point, or perigee, the moon is 225,623 miles (363,105 km) away.

A supermoon refers to any full moon that occurs when the moon is within 90% of its closest approach to Earth. The supermoon is 7% larger and 14% brighter than a typical full moon. Another reference states that a supermoon can appear up to 14% larger and 30% brighter compared to a typical full moon. I state both references for completeness. Either way, a supermoon is both larger and brighter than a typical full moon.

A supermoon requires two key alignments to occur. The moon needs to be at its closest approach, or perigee, to the Earth in its orbit. The moon also needs to be at full phase, which happens every 29.5 days when the sun fully illuminates the moon. Therefore, supermoons can only happen a few times a year because the moon's orbit changes orientation while the Earth orbits the sun – that is why we don't see a supermoon every month. Serendipitously, there will be four supermoons in a row this year on August 19th, September 17th, October 17th, and November 15th.

I was fortunate enough to observe all four supermoons under good seeing conditions perfectly clear skies! As a treat, the September 17th supermoon occurred during a partial lunar eclipse which was maximum at 8.7% during totality. Below are my images of the supermoons. All were taken using a Meade 60mm 260mm f/4 refractor was tracking the moon on an inexpensive Orion EQ equatorially mounted tripod. A ZWO ASI 178MM monochrome camera with an Optolong UV-IR cut filter using Firecapture v2.7.14 to acquire the video and a MSI GF65 gaming computer. The SER video file was processed using Autostakkert 3.1.4 and Registax 6.1.0.8. Further sharpening and processing in Photoshop CS4. Image by Gregory T. Shanos, Longboat Key, Sarasota, Florida.

Figure 1: According to data from Fred Espenak's guide, the four supermoons of 2024 will be as follows:

Name	Date and time	Distance from Earth
Sturgeon Blue Moon	Aug. 19 at 2:26 p.m. ET (1826 GMT)	224,917 miles (361,970 km)
Harvest Moon	Sept. 17 at 10:34 p.m. ET (0234 GMT on Sept 18)	222,131 miles (357,486 km)
Hunter's Moon	Oct. 17 at 7:26 a.m. ET (1126 GMT)	222,055 miles (357,364 km)
Beaver Moon	Nov. 15 at 4:29 p.m. ET (2129 GMT)	224,853 miles (361,867 km)

Upper Left: The Sturgeon Blue Supermoon occurred at 2:26 p.m. EDT (18h 26m UT) on Monday, August 19, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon had not yet risen. This image was taken on August 19, 2024 at 11:48pm local time or August 20, 2024 at 3h 48m UT when the moon was full at 99.7% phase and only 37°above the horizon.

Upper Right: The Harvest Supermoon occurred during a partial lunar eclipse! This image was taken two minutes after maximum eclipse (8.7%) on September 17, 2024 at 10:46pm local time or September 18, 2024 2h 46m UT. The eclipsed supermoon was only 38 degrees above the horizon.

Lower Left: The Hunters Supermoon occurred at 7:26 am EDT (11h 26m UT) on Thursday, October 17, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon was setting. This was the largest supermoon of the year. This moon was 14% larger at 33.5 arc sec in diameter. This image was taken on October 17, 2024 at 10:33 pm local time or October 18, 2024 at 2h 33m UT when the moon was full at 99.4% phase and only 41°above the horizon.

Lower Right: The Beaver Supermoon occurred at 4:29 p.m. ET (21h 29m UT) on Friday, November 15, 2024, when the moon was 100% fully illuminated. However, it was daytime from my location and the moon had not yet risen. This image was taken on November 15, 2024 at 8:52 pm local time or November 16, 2024 at 1h 52m UT when the moon was full at 99.8% phase and only 40°above the horizon.

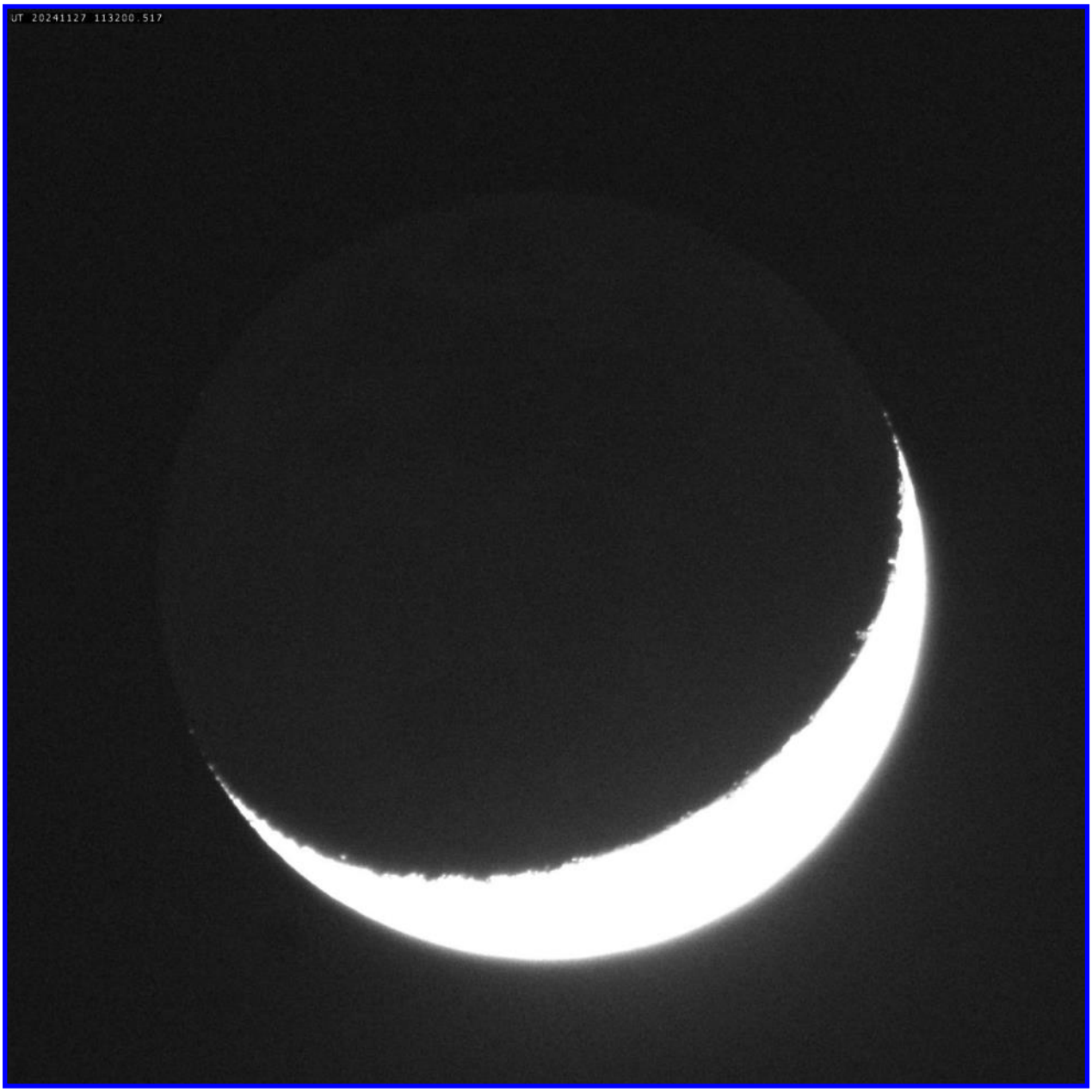
Lunar Topographic Studies
The Four Supermoons of 2024

Lunar Occultation of Spica
November 27, 2024

Gregory T. Shanos

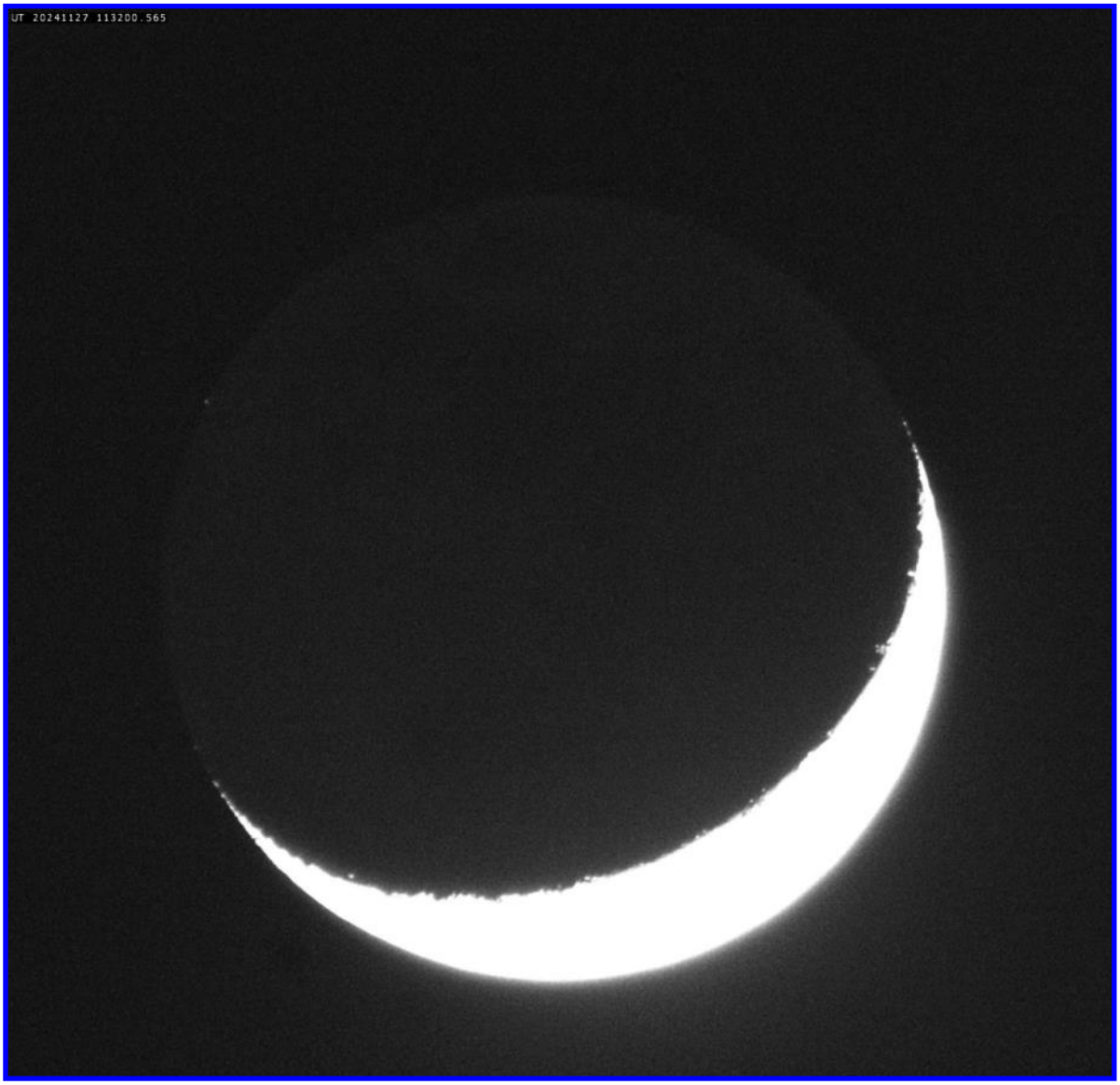
DISAPPERANCE: A lunar occultation of Spica (mag +1) was visible from Longboat Key Sarasota, Florida (27° 20' 58.64"N and 82° 36' 18.91" W) on November 27, 2024 at 5h 48m 59.462s AM local time or November 27, 2024 10h 48m 59.462s sec Universal Time. An hour earlier a thick fog rolled in and observing the occultation seemed hopeless. Fortunately, the fog cleared and I was able to observe the entire event. The sky transparency became clear with some remaining haze and high humidity. The seeing was above average to good. The moon was a waning crescent at 13% phase and only 24 degrees above the horizon just before disappearance. Telescope was a Meade 60mm refractor 250mm fl at f/4 with an Orion EQ tracking tripod. A ZWO ASI178MM monochrome camera with an Optolong UV-IR cut filter and Firecapture v2.7.14 software were utilized to acquire the video. The apparatus was connected to an MSI GF65 gaming computer. Individual frames from the video were extracted using DVD VideoSoft JPG converter v5.0.101 build 201. Slight processing with Photoshop CS4. This frame is a mirror-image since the refractor utilized a diagonal prism. Image by Gregory T. Shanos.

DISAPPERANCE: This is the next frame which occurred 0.047 seconds later when Spica was occulted by the moon. Note the accuracy of the embedded time 0.047 seconds! Slight processing with Photoshop CS4. Image by Gregory T. Shanos.

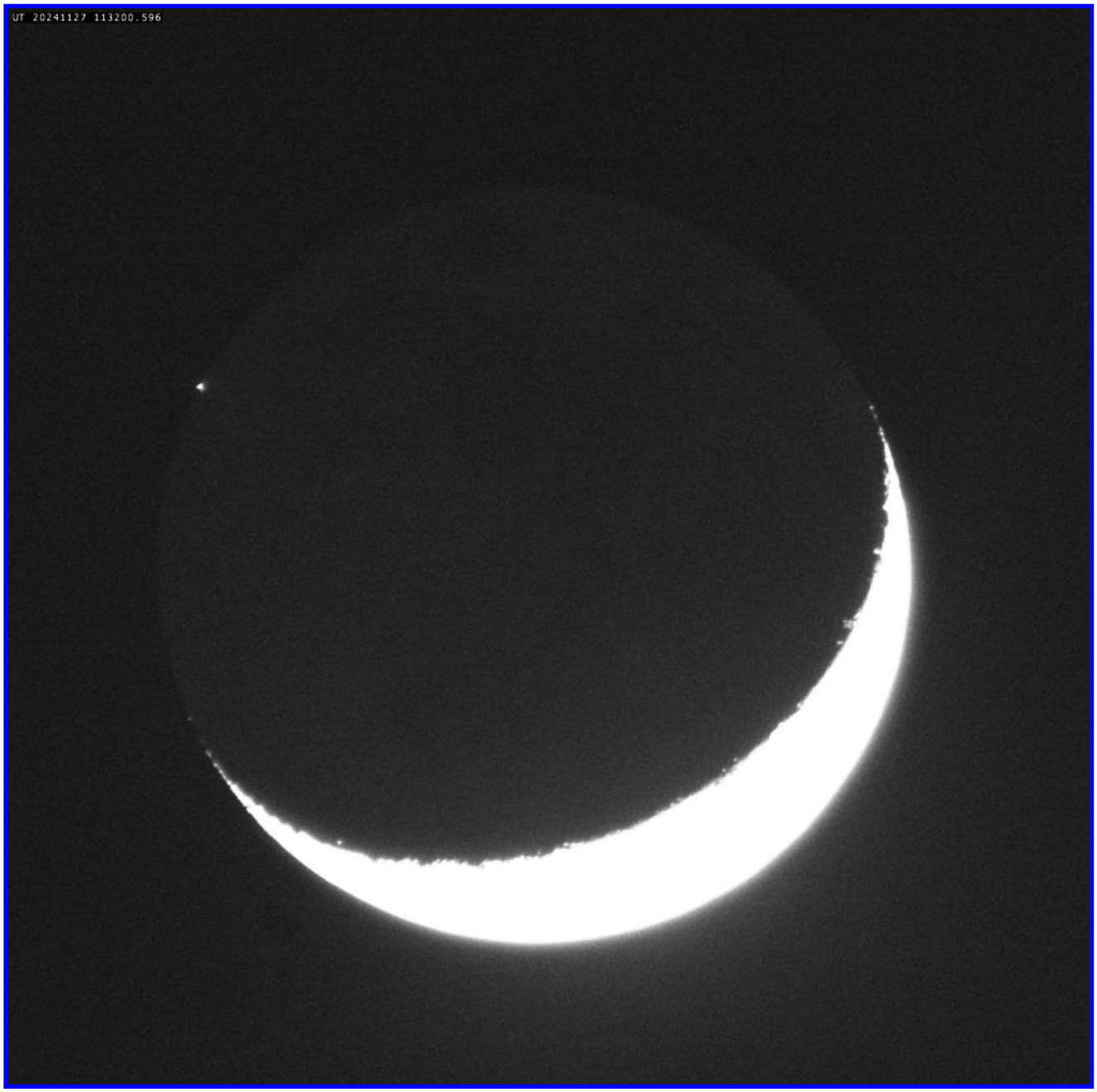


REAPPERANCE: Just prior to reappearance at 6h 32m 00.517s AM local time or 11h 32m 00.517 s Universal Time the moon had risen to 32 degrees above the horizon. The seeing and transparency remained the same. The earthshine was clearly visible. The crescent moon had to be over-exposed to view the earthshine. Deep twilight was occurring at this time. Image by Gregory T. Shanos.

Lunar Topographic Studies
The Lunar Occultation of Spica November 27, 2024



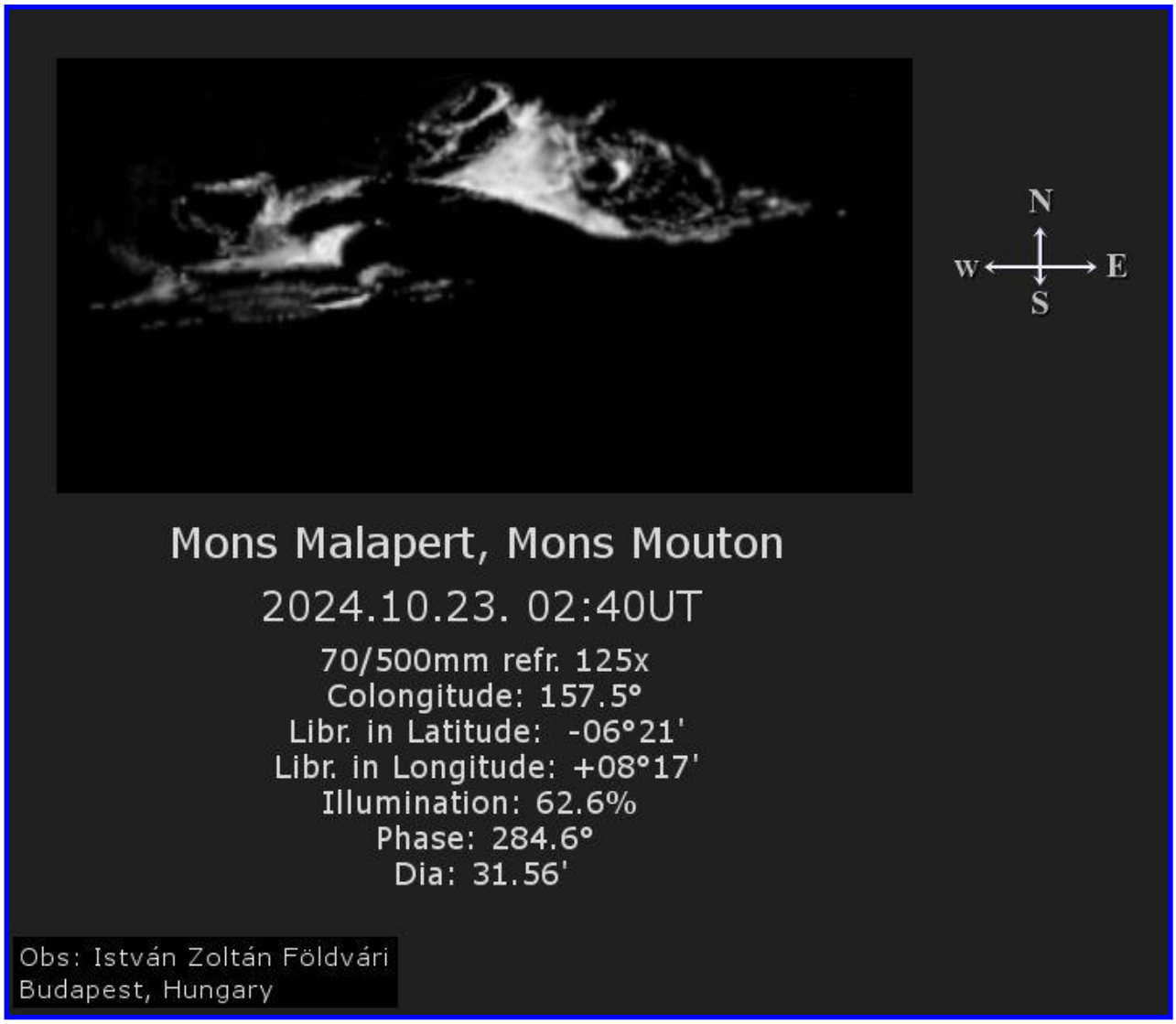
REAPPERANCE: Spica reappeared at 6h 32m 00.565 sec AM local time or 11h 32m 00.565sec Universal Time. Note the accuracy of the embedded time 0.048 seconds! This time is consistent with the time of disappearance of the star. Image by Gregory T. Shanos.

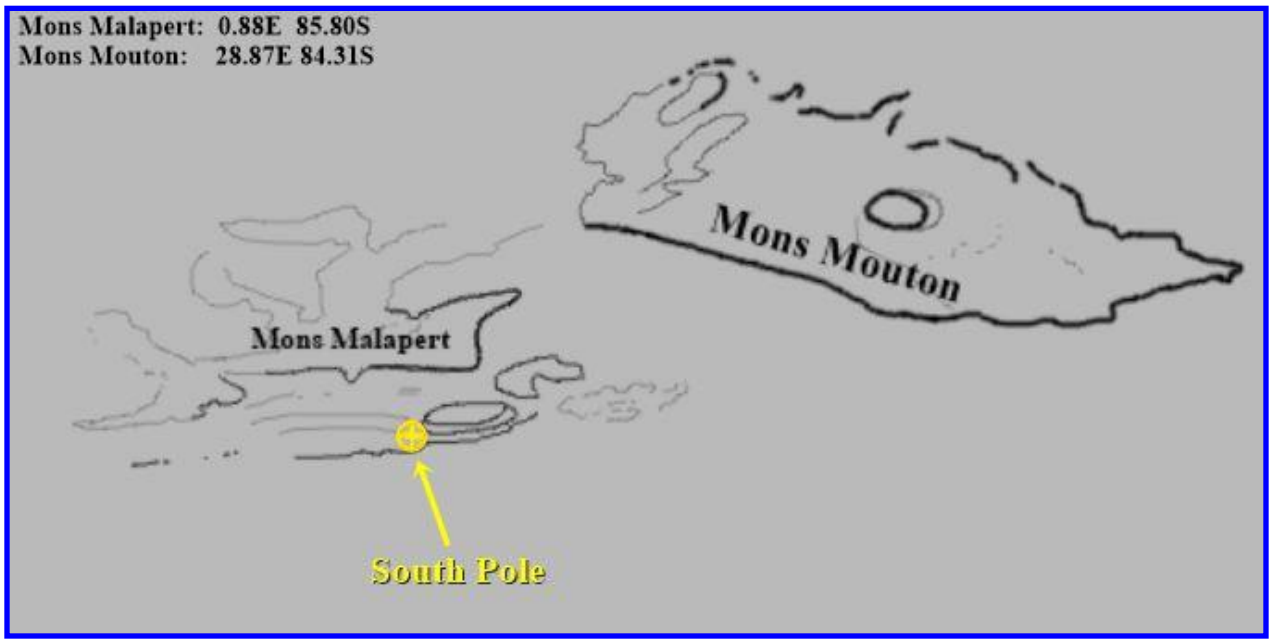


REAPPERANCE: Spica really "popped" into view to the naked eye while watching the computer screen at 6h 32m 00.596 sec AM local time or 11h 32m 00.596sec Universal Time. Image by Gregory T. Shanos

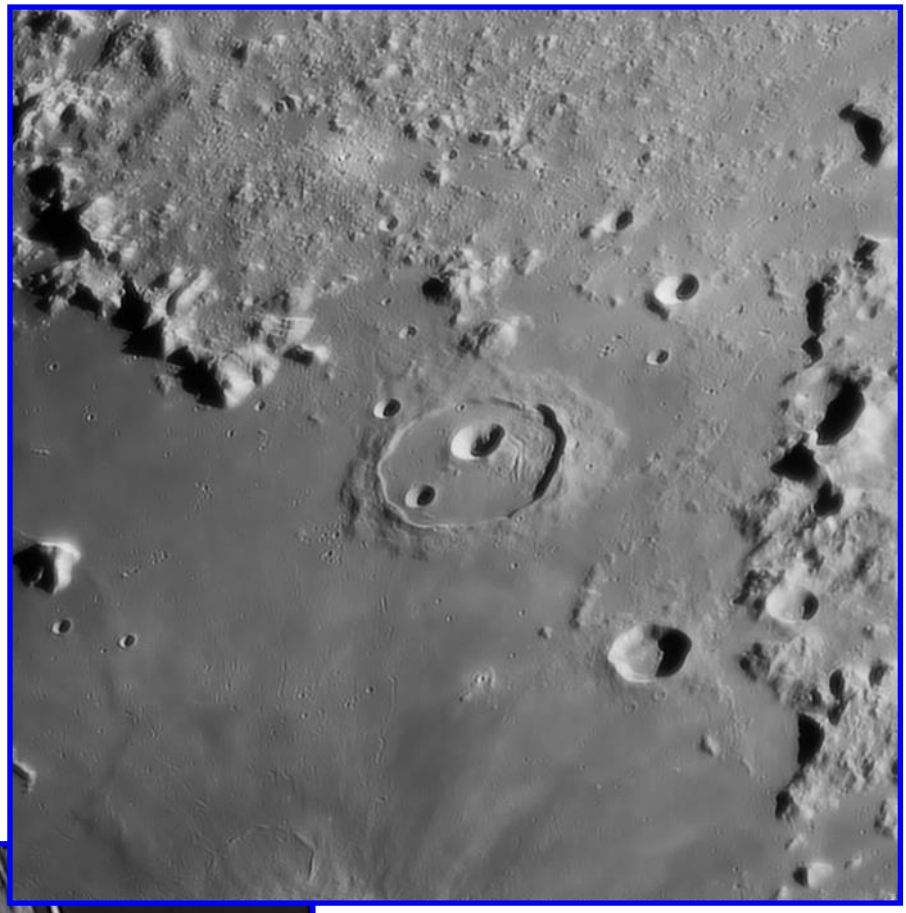
My personal Ambient Weather WS 8480 Falcon Station registered a Temperature: 60.0°F, Humidity: 98%, Dew Point: 59.3°F, Barometer: 29.84 in Hg and Wind: SE at 0mph at the end of the event.

Lunar Topographic Studies
The Lunar Occultation of Spica November 27, 2024

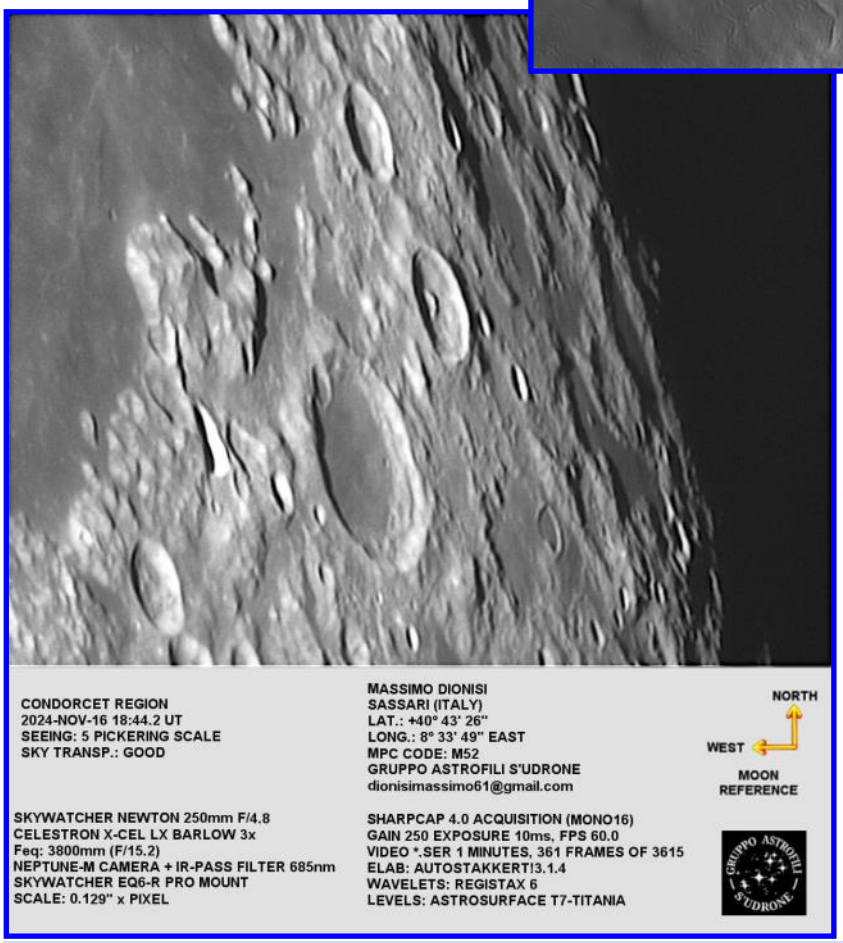




Recent Topographic Studies

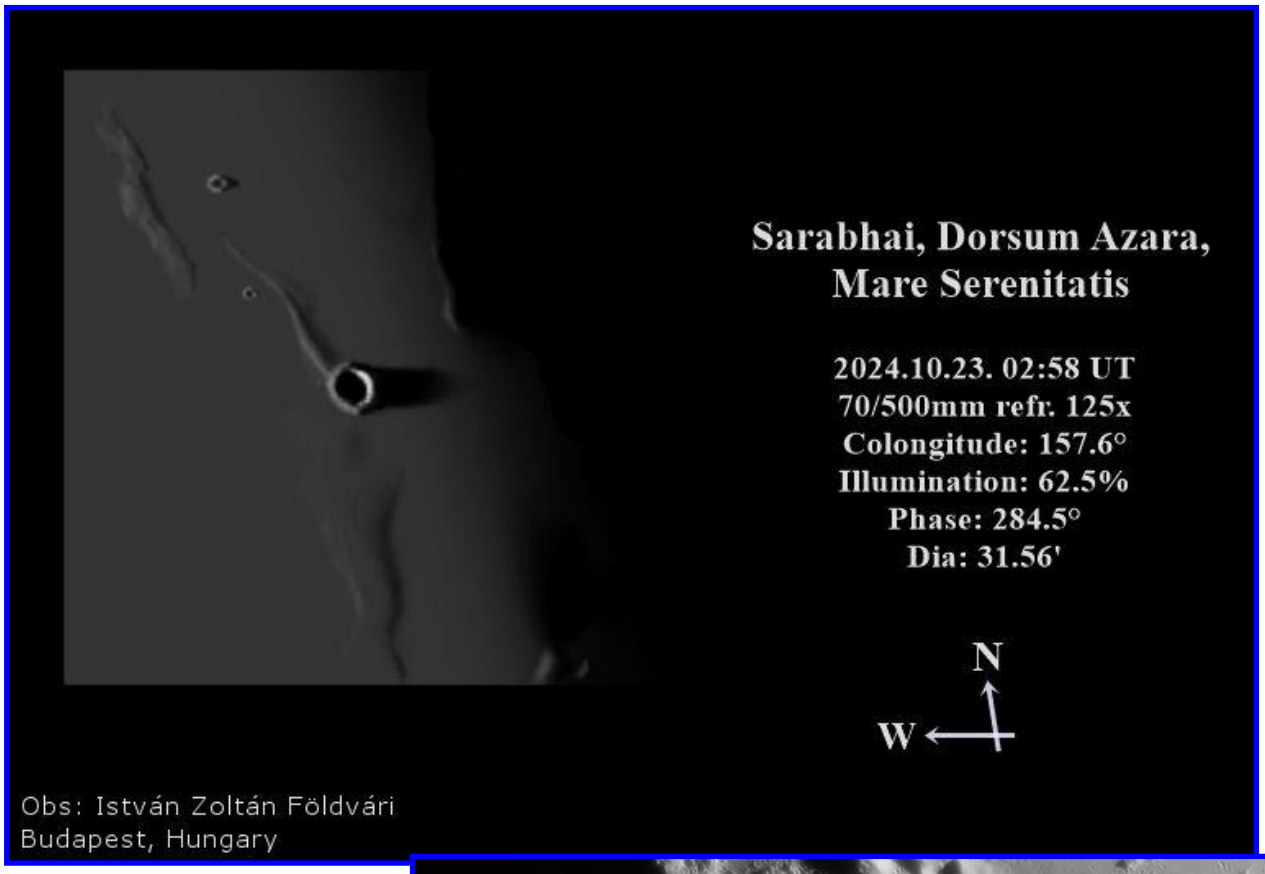


***Cassini**, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 19 04:01 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

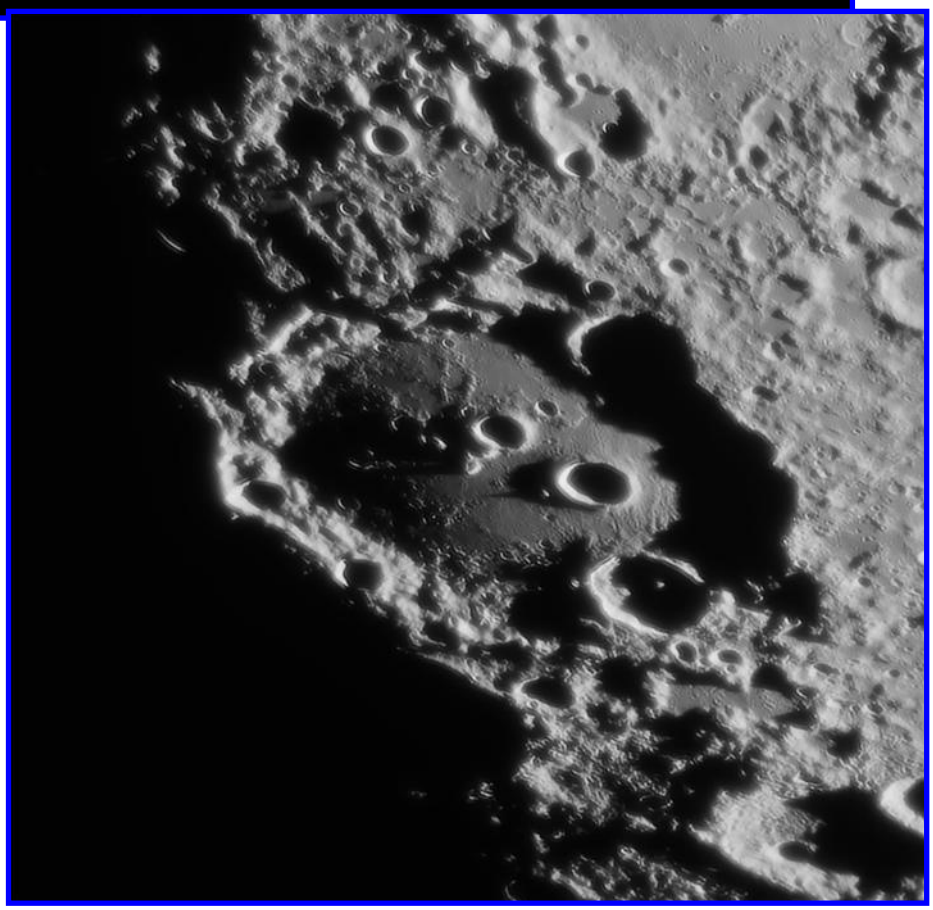


***Condorcet,** Massimo Dionisi, Sassari, Italy. 2024 November 16 18:44 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies

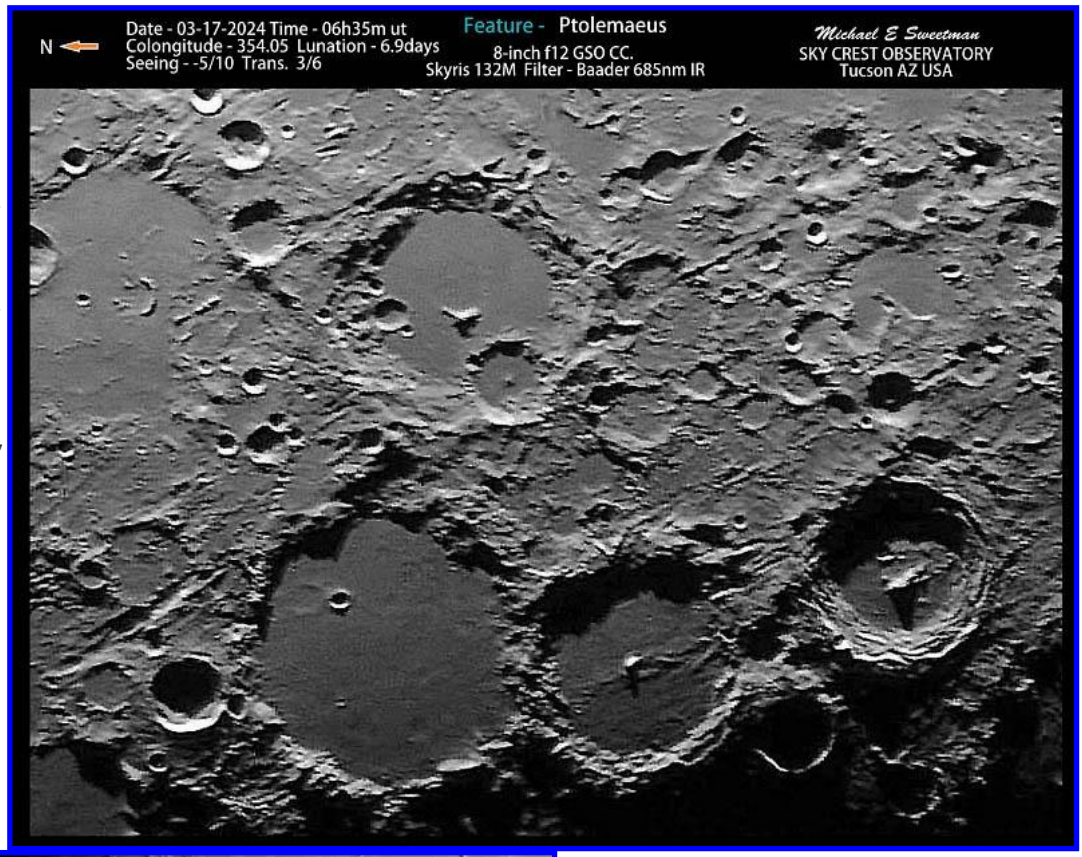


Sarabhai, Dorsum Azara and Mare Serenitatis, *István Zoltán Földvári, Budapest, Hungary. 2024 October 23 02:50-03:00 UT, colongitude 157.6º. 70 mm refractor telescope, 125x.*

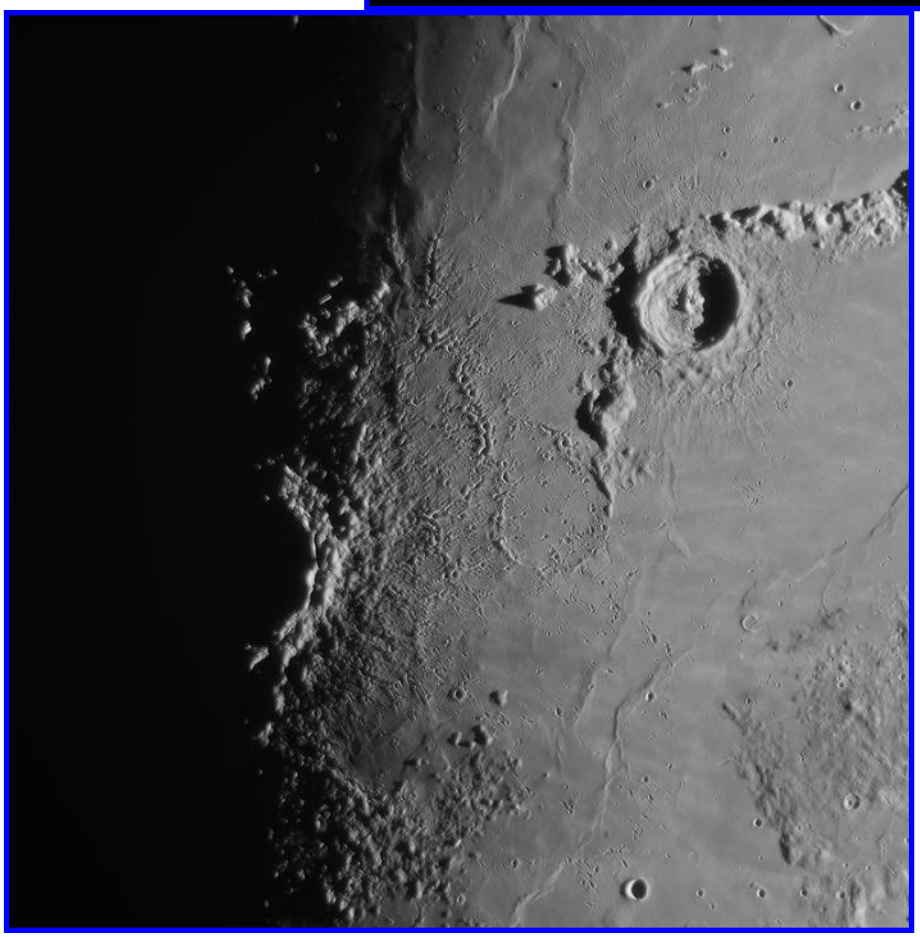


Clavius*, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 19 06:03 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

Recent Topographic Studies



Ptolemaeus, *Michael Sweetman, Sky Crest Observatory, Tucson, Arizona, USA. 2024 March 17 06:35 UT, colongitude 354.05˚. 8 inch f/12 GSO Classical Cassegrain telescope, Baader 685 nm IT filter, SKYRIS 132M camera. Seeing 5/10, transparency 3/6.*



Copernicus Sunrise*, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 19 07:17 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

Recent Topographic Studies

Archimedes, *Axel Guillerand, Margny-les-Compiègne, Hauts-de-France, France. 2024 November 11 19:53 UT. Takahashi FC-100-DF (100/740) refractor telescope, 2.5x barlow, IR cut filter, ZWO ASI715MC camera.*

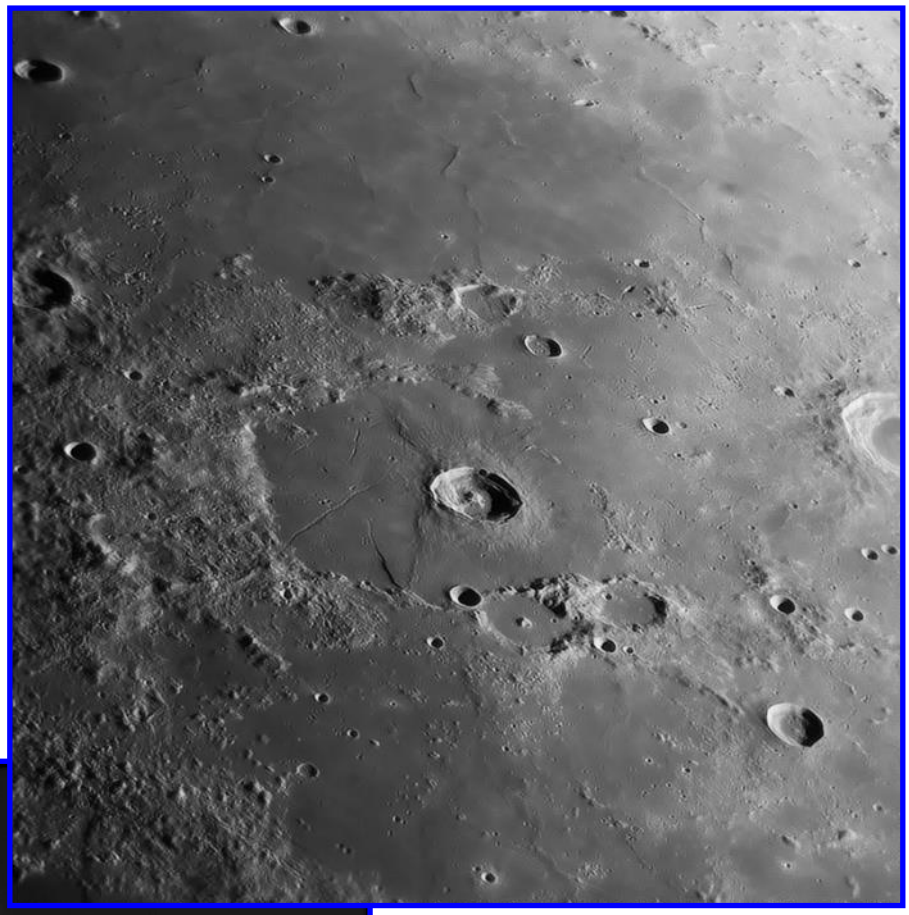
Endymion, *Massimo Dionisi, Sassari, Italy. 2024 November 16 18:53 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies

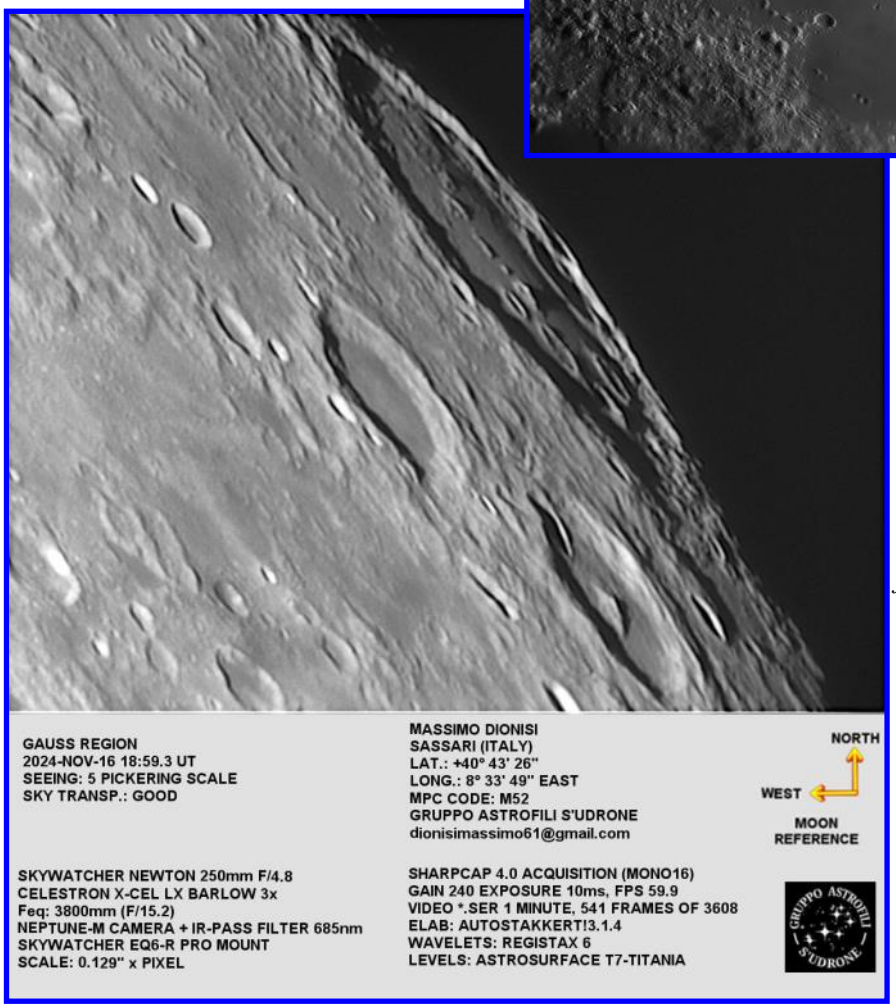
***Eastern Mare Imbrium**, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 19 07:14 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

***Waxing Gibbous Moon**, Juan Carlos Dovis, Sunchales, Argentina. 2024 November 08 23:45 UT. 4.5 inch reflector telescope, EOS Rebel T7 camera. North is down, west is to the right.*

Recent Topographic Studies

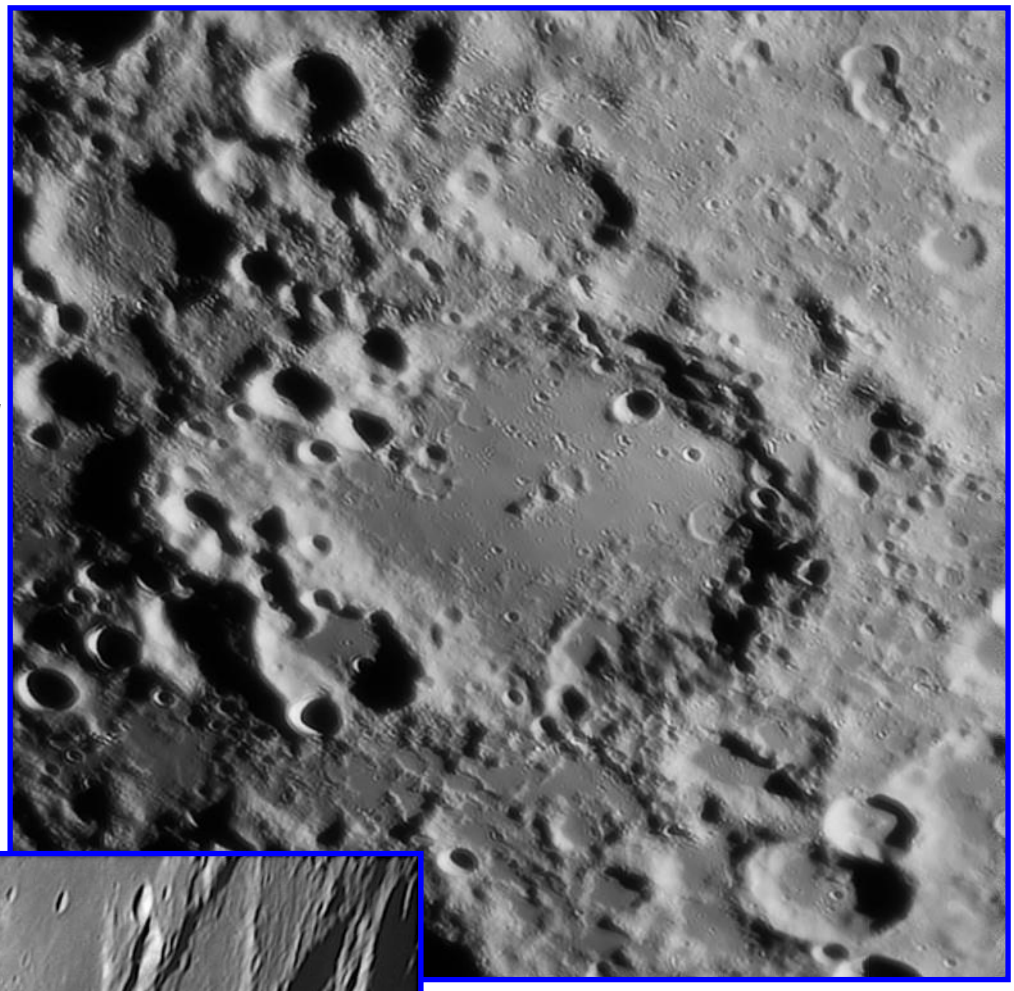


***Lacus Mortis**, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 17 03:35 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

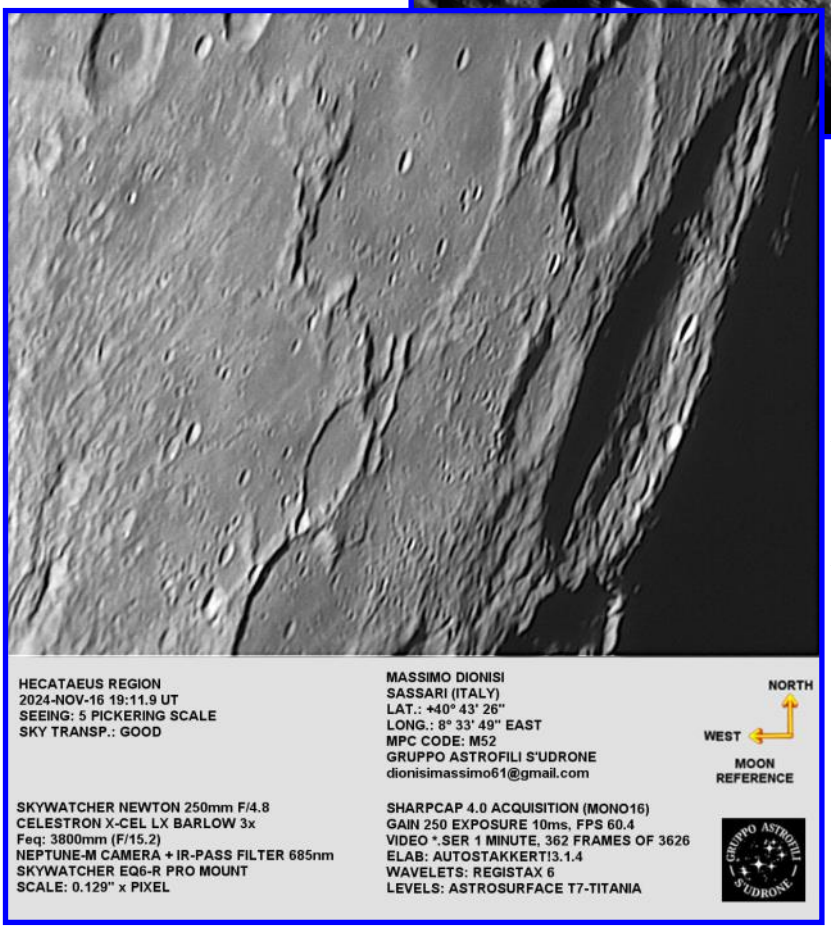


***Gauss,** Massimo Dionisi, Sassari, Italy. 2024 November 16 18:59 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies

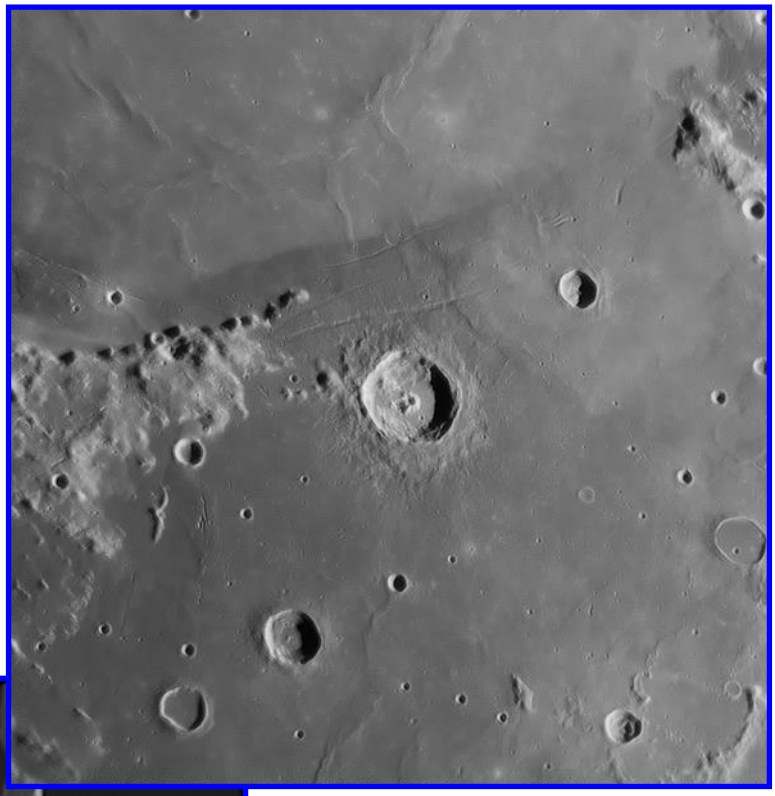


***Maginus**, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 19 07:09 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

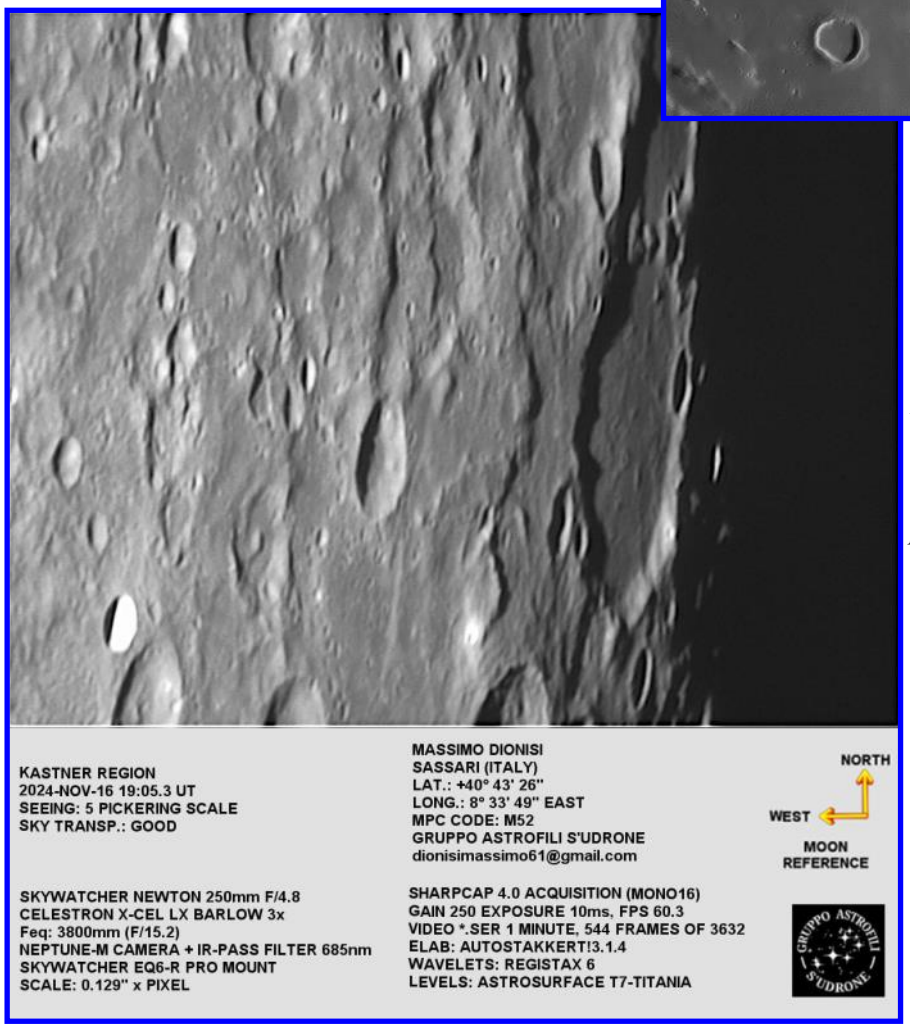


***Hecataeus,** Massimo Dionisi, Sassari, Italy. 2024 November 16 19:11 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies

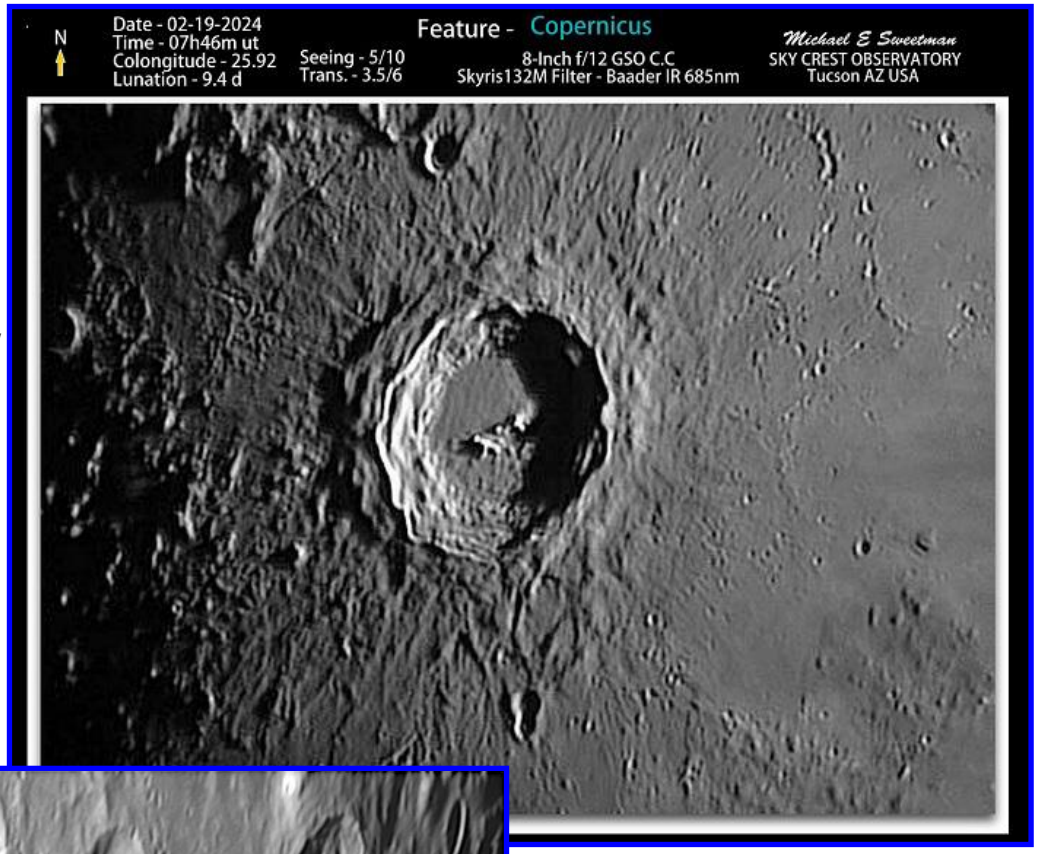


***Plinius**, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 17 03:46 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*

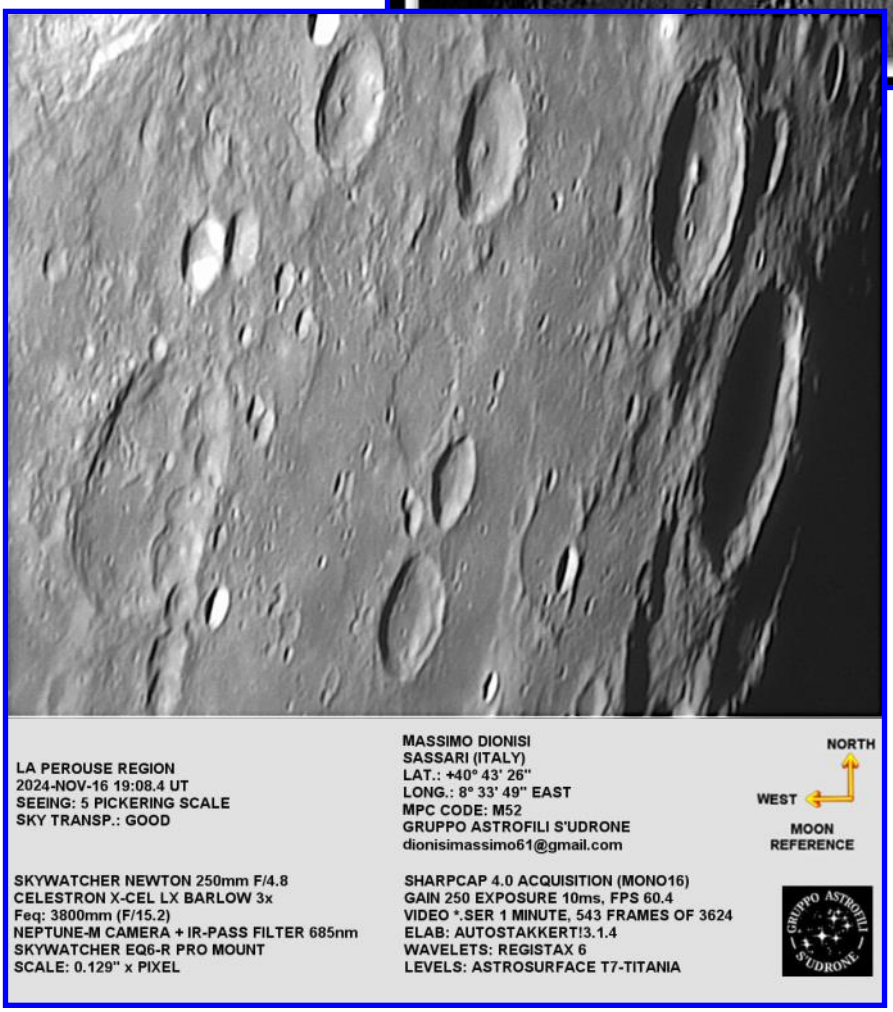


***Kastner,** Massimo Dionisi, Sassari, Italy. 2024 November 16 19:05 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies

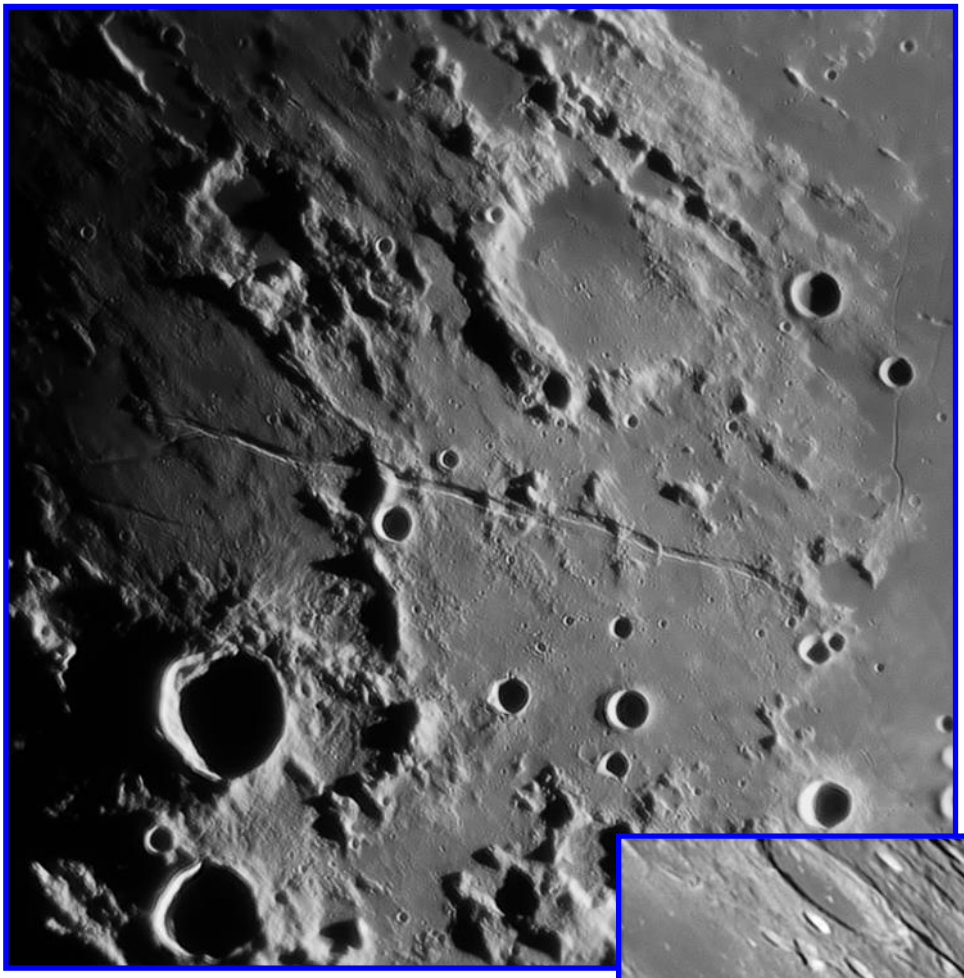


Copernicus, *Michael Sweetman, Sky Crest Observatory, Tucson, Arizona, USA. 2024 February 19 07:46 UT, colongitude 25.92˚. 8 inch f/12 GSO Classical Cassegrain telescope, Baader 685 nm IT filter, SKYRIS 132M camera. Seeing 5/10, transparency 3.5/6.*

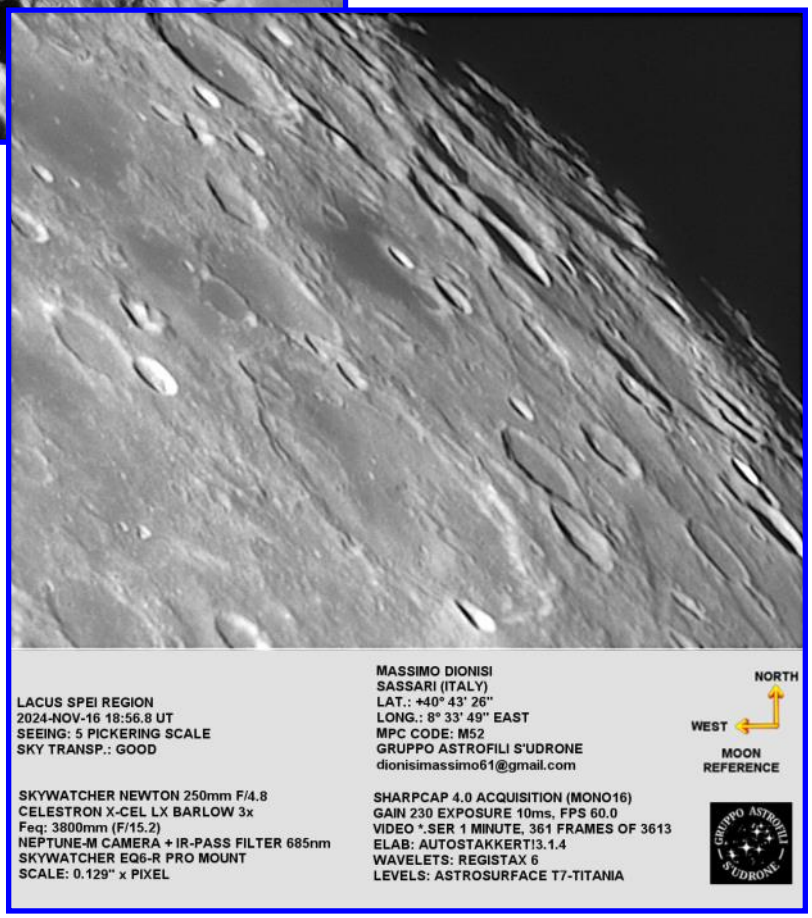


La Perouse, *Massimo Dionisi, Sassari, Italy. 2024 November 16 19:08 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies



***Rima Ariadaeus**, Ken Vaughan, Cattle Point, Victoria, British Columbia. 2024 March 17 03:57 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178MM camera.*



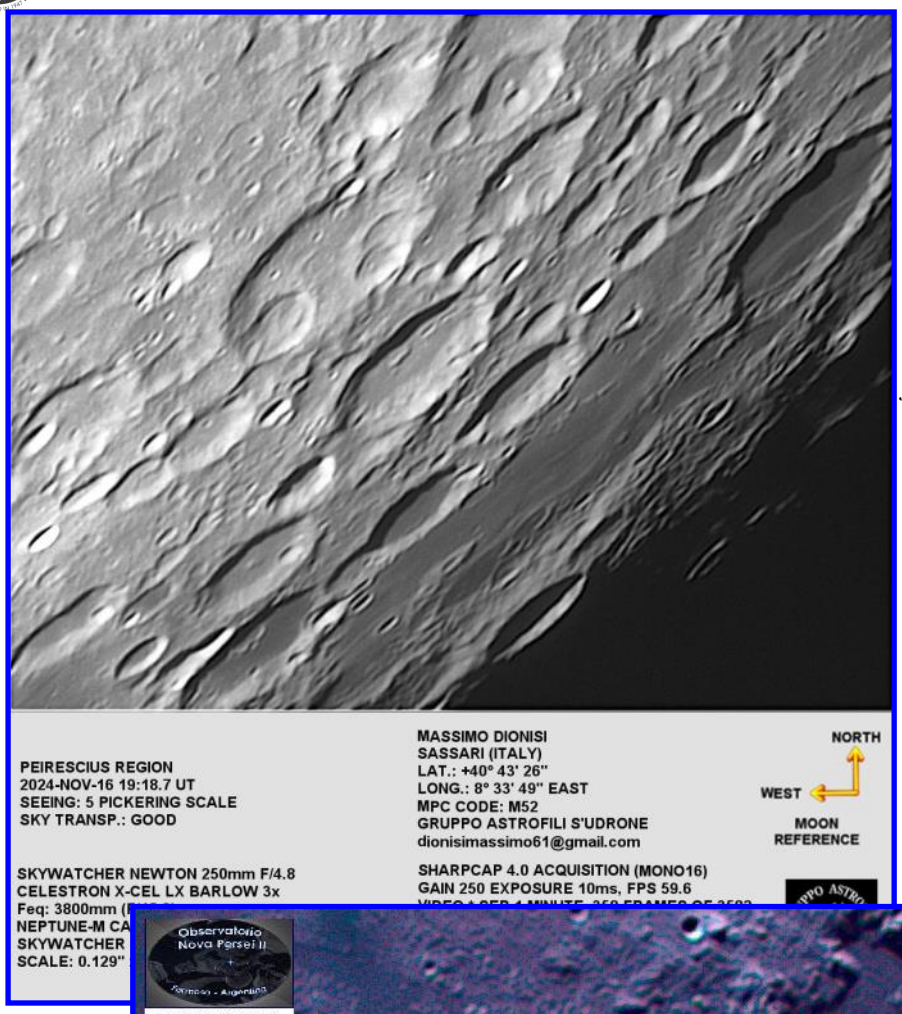
***Lacus Spei,** Massimo Dionisi, Sassari, Italy. 2024 November 16 18:56 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Recent Topographic Studies

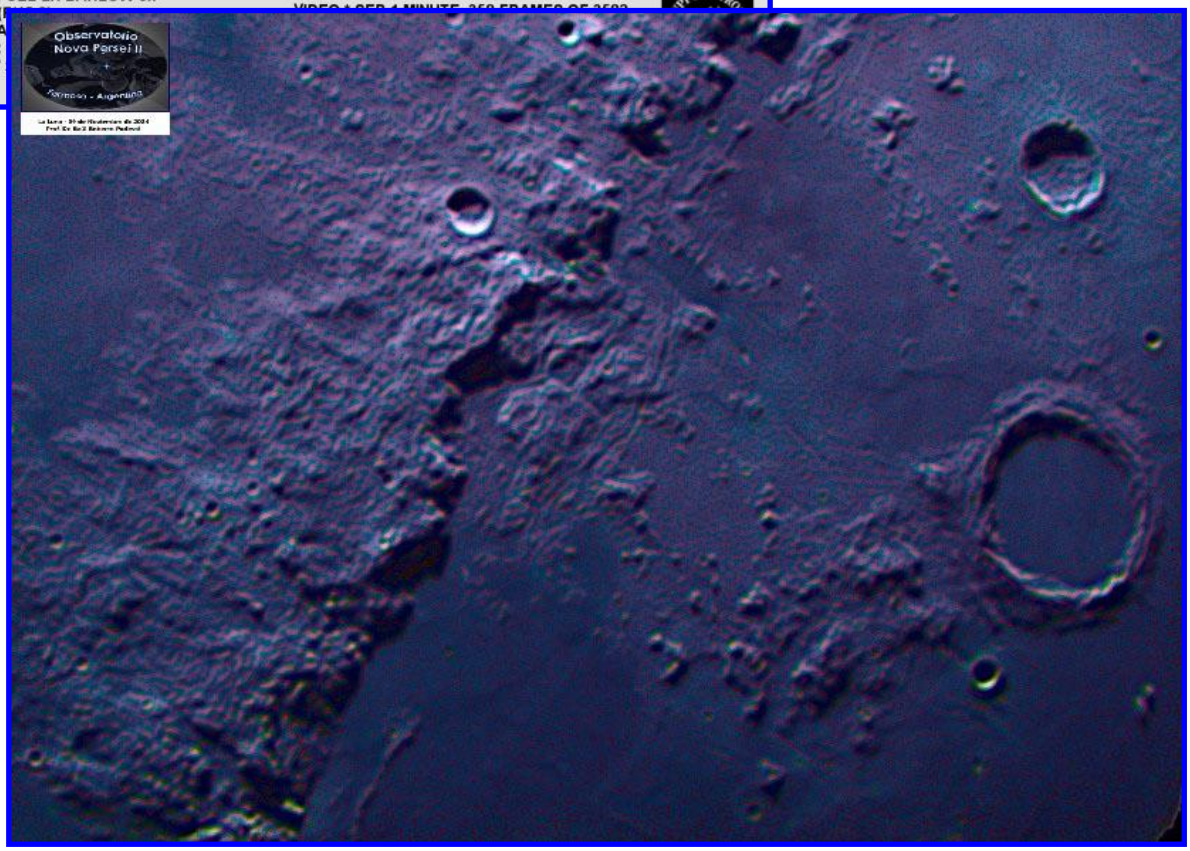
Mare Undarum, *Massimo Dionisi, Sassari, Italy. 2024 November 16 18:40 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*

Alphonsus, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 01:12 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

Recent Topographic Studies



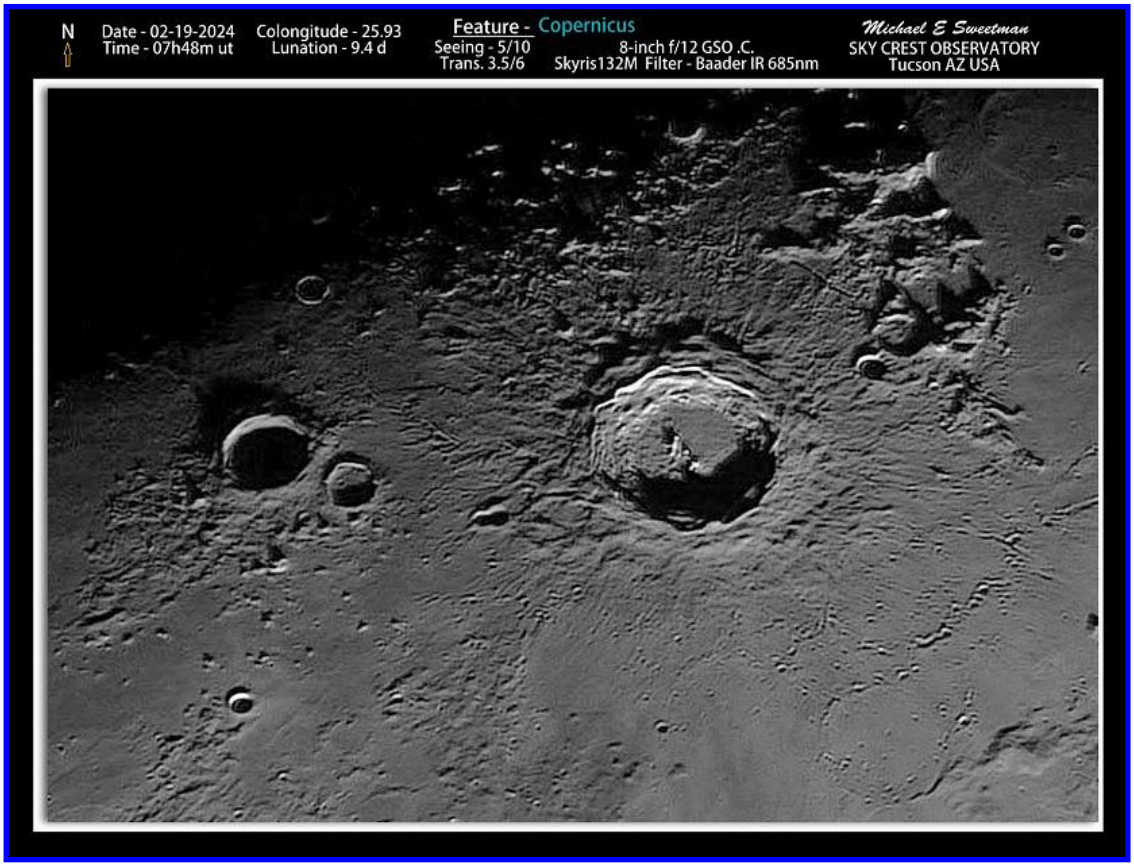
Peirescius, *Massimo Dionisi, Sassari, Italy. 2024 November 16 19:18 UT. Skywatcher 10 inch f/4.8 Newtonian reflector telescope, 3x barlow, efl 3800 mm, 685 nm IR-pass filter, Neptune M camera. Seeing 5 on Pickering scale, sky transparency good.*



Archimedes, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 00:59 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

Recent Topographic Studies

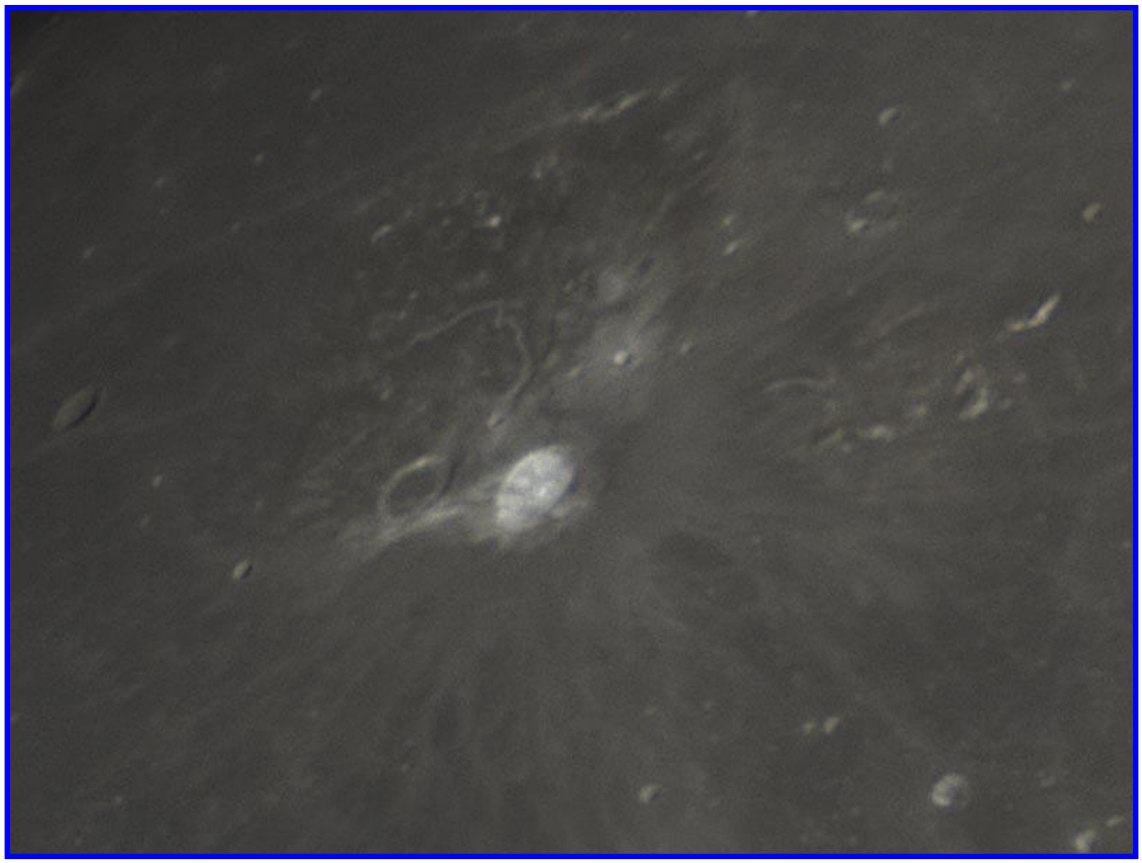
Copernicus, *Michael Sweetman, Sky Crest Observatory, Tucson, Arizona, USA. 2024 February 19 07:48 UT, colongitude 25.93˚. 8 inch f/12 GSO Classical Cassegrain telescope, Baader 685 nm IT filter, SKYRIS 132M camera. Seeing 5/10, transparency 3.5/6. North is right, west is up.*



Aristillus, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 00:58 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

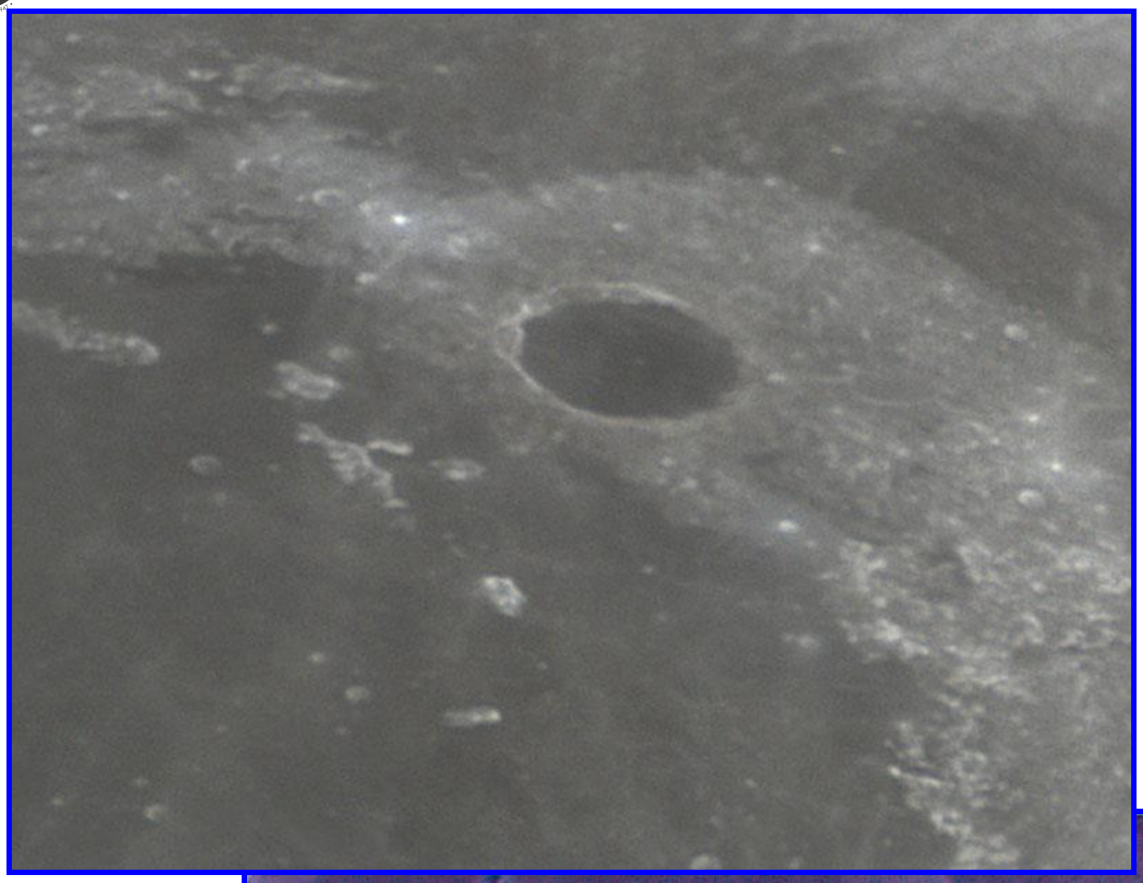
Recent Topographic Studies

First Quarter Moon, *Leandro Colombo, Molinari, Argentina. 2024 October 11 02:00 UT. 67 mm telephoto lens, green filter, Canon EOS 450D camera. North is down, west is right.*



Aristarchus, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 November 15 00:00 UT. Celestron 1100 SPC Schmidt-Cassegrain telescope, QHY5C-II camera.*

Recent Topographic Studies



Plato, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 November 15 01:05 UT. Celestron 1100 SPC Schmidt-Cassegrain telescope, QHY5C-II camera.*

Mädler, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 01:08 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

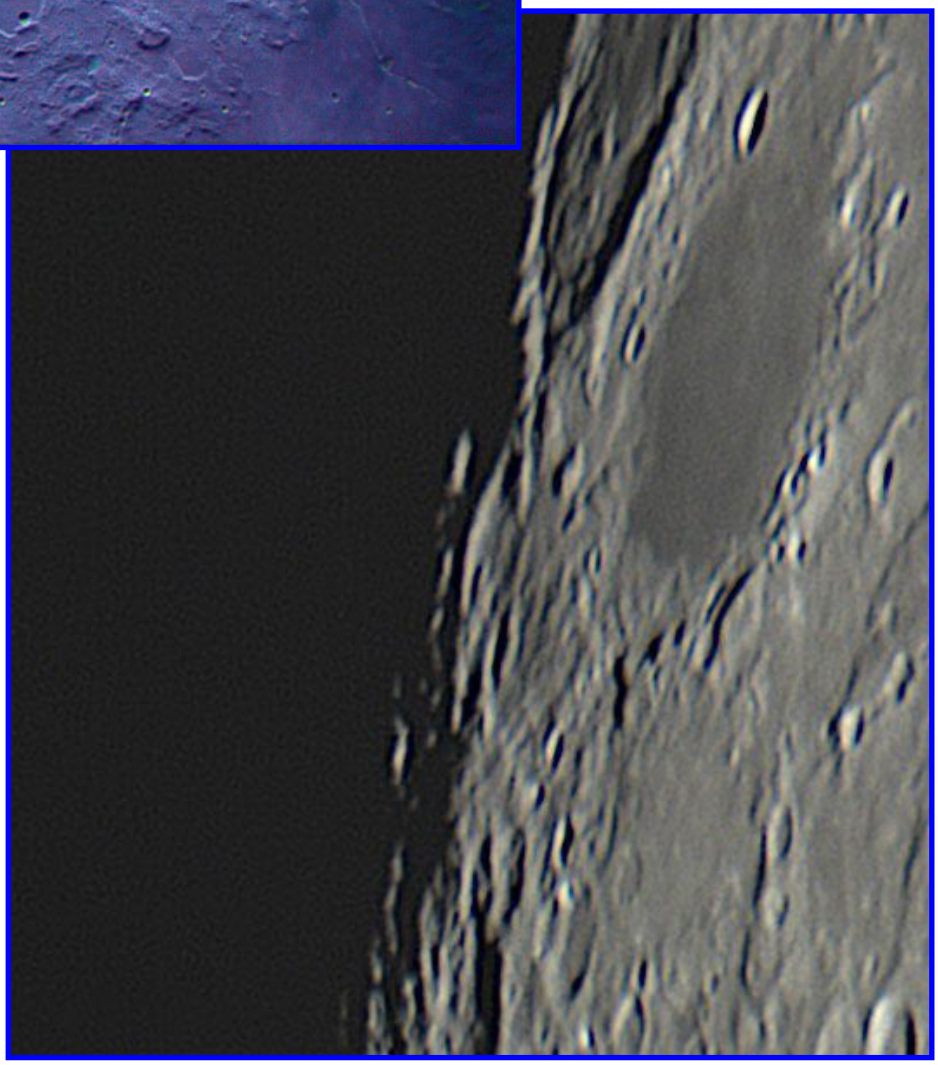
Recent Topographic Studies

Waxing Gibbous Moon, *Leandro Colombo, Molinari, Argentina. 2024 October 12 02:00 UT. 67 mm telephoto lens, green filter, Canon EOS 450D camera. North is down, west is right.*

Proclus, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 00:55 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

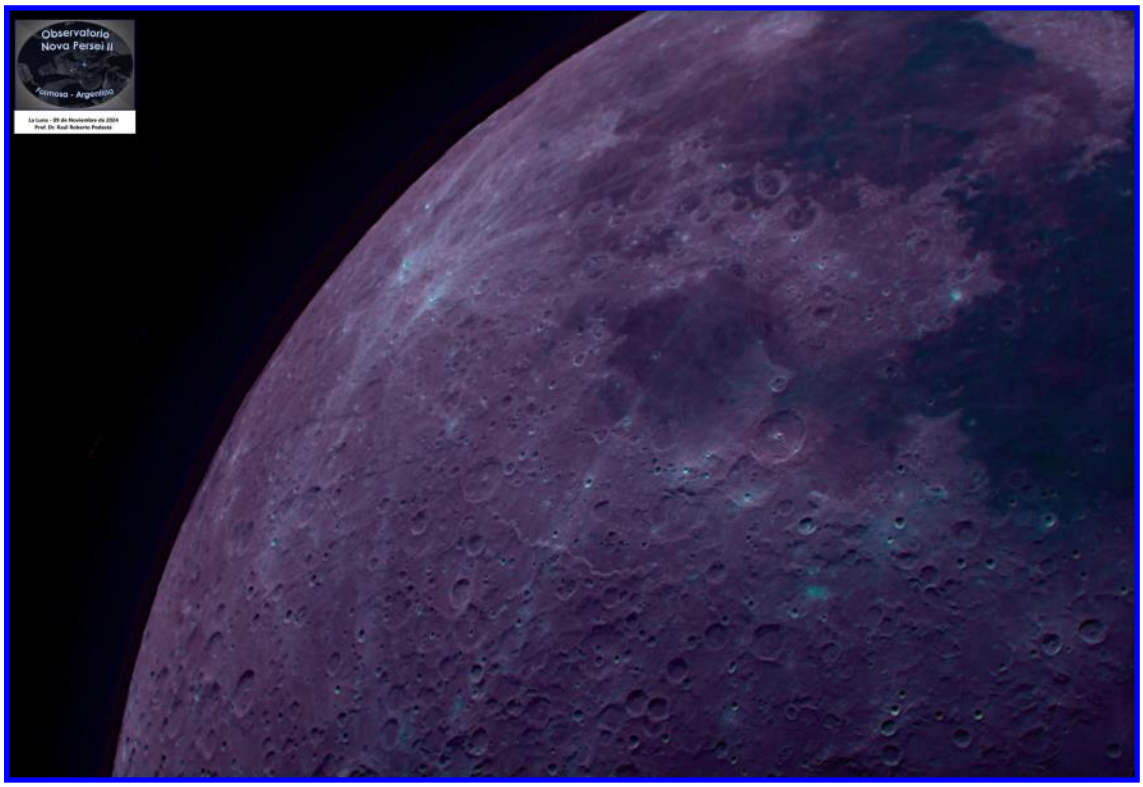
Recent Topographic Studies

Dionysius, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 01:12 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*



Riccioli, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 November 15 00:29 UT. Celestron 1100 SPC Schmidt-Cassegrain telescope, QHY5C-II camera.*

Recent Topographic Studies



Stevinus, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 00:53 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

Schickard, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 November 15 00:48 UT. Celestron 1100 SPC Schmidt-Cassegrain telescope, QHY5C-II camera.*

Recent Topographic Studies

Tycho, *Raúl Roberto Podestá, Formosa, Argentina. 2024 November 10 01:06 UT. 127 mm Maksutov-Cassegrain telescope, UV/IR cut filter, ZWO ASI ZWO178MC camera. North is right, west is down.*

Riccioli, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 November 15 00:16 UT. Celestron 1100 SPC Schmidt-Cassegrain telescope, QHY5C-II camera.*

Recent Topographic Studies

Lunar Geologic Change Detection Program

Coordinator Dr. Anthony Cook- atc@aber.ac.uk
Assistant Coordinator David O. Darling -DOD121252@aol.com

LTP Reports Received
No new LTPs have been reported.

Routine reports received for October included: Maurice Collins (New Zealand – ALPO/BAA/RASNZ) imaged: several features. Walter Elias (Argentina – AEA) imaged: Aristarchus and Gassendi. David Finnigan (UK – BAA) imaged: Aristarchus, Gassendi, Kepler and Milichius. Valerio Ghirardo (Italy, UAI) imaged: Cyrillus. Alexander Vandenbohede (Belgium – BAA) imaged: Abulfeda, Albetegnius, Alphonsus, Bailly, Clavius, Delambre, Hipparchus and Manilius.

Note that we I have included some BAA pooled observations in with this report.

Analysis of Routine Reports Received (October)

Gassendi: On 2024 Oct 16 UT 01:33 Walter Elias (AEA) imaged this crater under similar illumination to the following report:

Gassendi 1976 Oct 06 UT 21:30 P. Moore (Selsey, UK, x400, seeing poor) observed redness in the c.p. area. The ALPO/BAA weight=1.

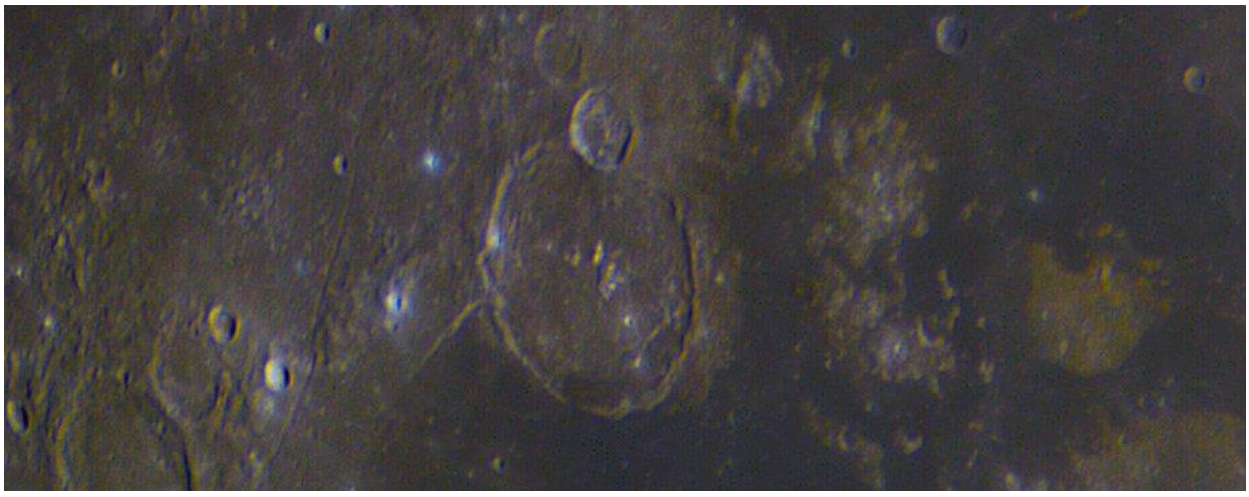


Figure 1. *Gassendi as imaged by Walter Elias (AEA) on 2024 Oct 16 UT 01:33. The image has had its color saturation increased to bring out colors.*

Looking back at the archives I see that Patrick Moore was using his 15" reflector, and it is not stated whether he was using a Moon Blink device or not, and the seeing conditions were poor, but anyway as you can see from Walter's image (Fig 1), there is no sign of redness on the central peaks. A much more convincing LTP report by Moore, Robinson and Foley had been made earlier on 1976 Oct 04. We shall leave the weight of this report at 1 for now.

Aristarchus: On 2024 Oct 16 UT 08:43-08:53 Maurice Collins (ALPO/BAA/RASNZ) produced an image mosaic of the whole Moon under similar illumination to the following report:

Aristarchus. 2024 Mar 23 UT 22:08. G.Vega (Argentina, Oro Verde - 20cm f/5 Newtonian on an EQ5 Goto mount - two color cameras used: a Player One Ceres C & a Nikon D5100). Color images show a region of blueness from the W. rim of Aristarchus and the NE of Herodotus (maybe also on the inner SE rim of Herodotus?) i.e. generally SE of the Cobra's Head. Blue color is usually present on the rim of Aristarchus and to the north - but I don't recall seeing such strong blue coloration in this region before? No other craters exhibit this blue color. As the color is present in two images, taken with different cameras it looks genuine. Two other color images, at lower resolution, were taken from Oro Verde, by W.Elias, at 23:06 and 23:18, but neither of these exhibit this blue color - but that maybe a resolution issue? ALPO/BAA weight=3.0

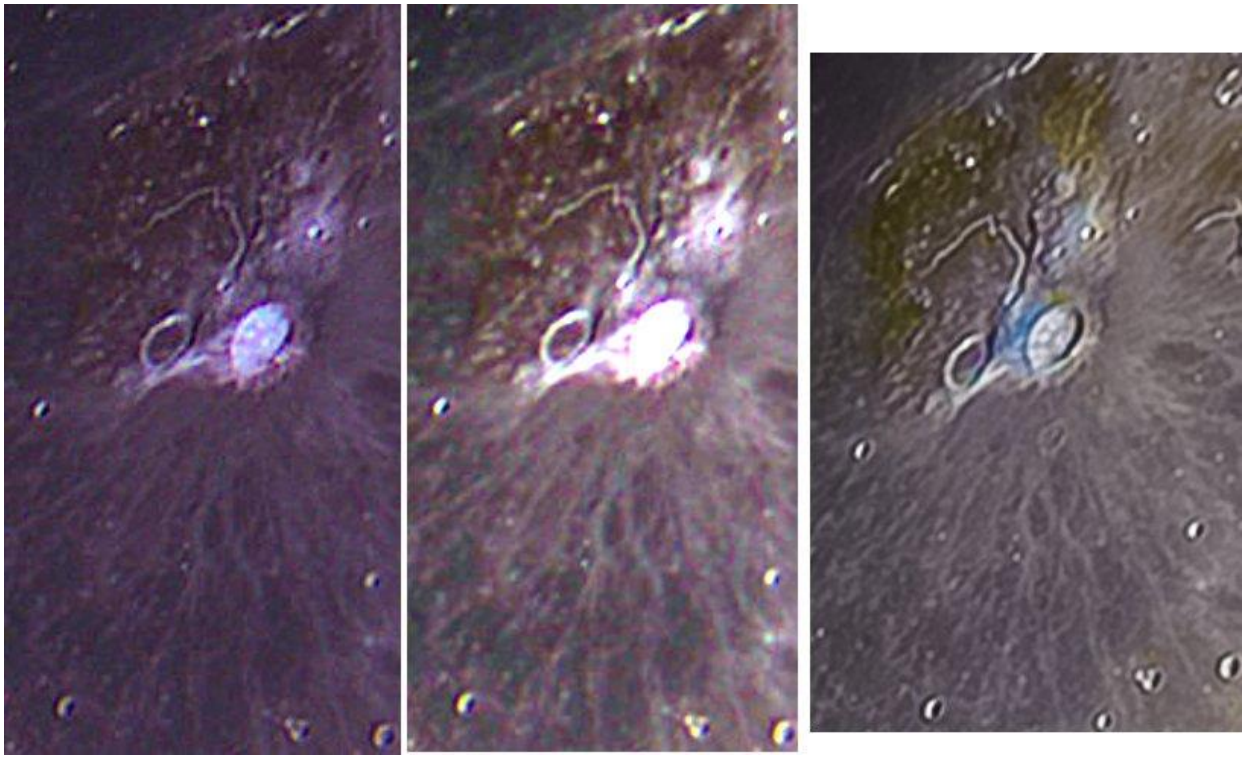


Figure 2. *Aristarchus with north towards the top.* ***(Left)*** *A section of a whole Moon mosaic by Maurice Collins taken on 2024 Oct 16 UT 08:43-08:53 – this has had its color saturation increased to bring out some colors and has also been sharpened.* ***(Center)*** *Same as the image on the left but has now been color normalized using Gimp software – not the interior of Aristarchus is now saturated.* ***(Right)*** *A color saturation increased version of an image taken by Gonzalo Vega (SLA) from Oro Verde Observatory, Argentina, at a date and time quoted at 2024 Mar 23 UT 22:08.*

Although Fig 2 (center), by Maurice, is saturated inside Aristarchus, the contrast and colors have been manually adjusted to be reasonably similar to Gonzalo's image from March - Gonzalo is new to the LGC program, but has shown some extraordinary imaging so far. Some minor changes in appearance may occur due to libration differences, note that the blueness seen in Gonzalo's image (Fig 2 – Right) cannot be seen on Maurice's image (Fig 2 – Center). There is however, a blob on the eastern exterior of the rim of Aristarchus that looks different between Fig 2 Left and Right. Also, the interior shadows are marginally different in appearance.

Just as a precaution I decided to compare the terminator area to the west in both Maurice's and Gonzalo's images – see Fig 3. From this we can see a significant difference, for example in Gonzalo's image we can see Schiaparelli, but in Maurice's image the terminator is further to the west and we can see: Schiaparelli, Seleucus and Krafft. So as a working hypothesis, and this occasionally catches out observers significantly to the west of the Greenwich Meridian, maybe Gonzalo used the wrong date and it should have been 2024 Mar 22 at 22:08UT.

A couple of tests were conducted, firstly I found an image in the archive that would be at similar illumination to what the Moon would have looked like on 2024 Mar 22 UT 22:08 (Fig 4 – Left). Secondly, I asked Maurice to run two LTVT simulations, both at UT 22:08UT but one for 2024 Mar 22 (Fig 5 – Left), and the other for 2024 Mar 23 (Fig 5 – Right). I think you will agree that it looks like 2024 Mar 22 UT 22:08 is the closest in appearance to Gonzalo's image (Fig 2 – Right and Fig 3 – Right). In the mean-time, email correspondence with Gonzalo suggests that he is sure that his date and UT are correct – but I will carry on discussing this with him until we figure out what is going on.

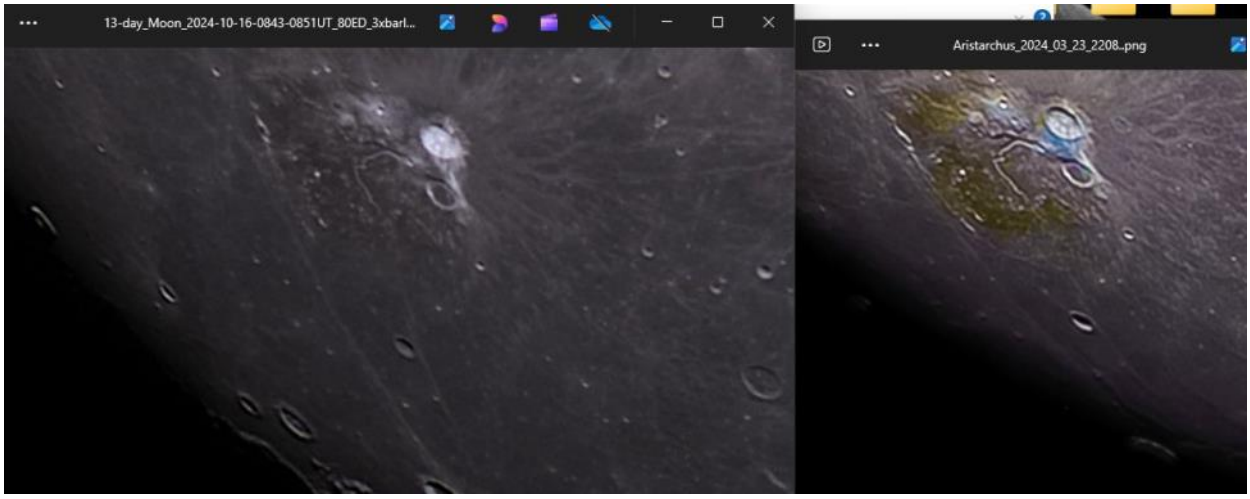


Figure 3. *Aristarchus with north towards the left.* ***(Left)*** *A section of a whole Moon mosaic by Maurice Collins taken on 2024 Oct 16 UT 08:43-08:53.* ***(Right)*** *Image by Gonzalo Vega (SLA) taken at a quoted date and time of 2024 Mar 23 UT 22:08.*

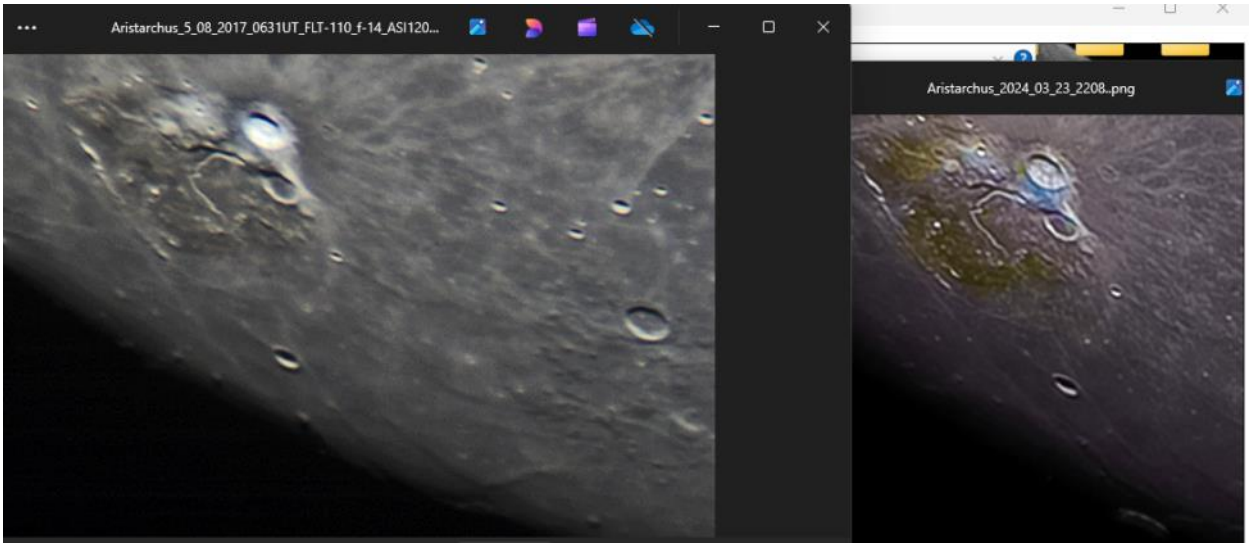


Figure 4. *Aristarchus with north towards the left.* ***(Left)*** *Aristarchus as imaged by Maurice Collins taken on 2017 Aug 05 UT 06:31.* ***(Right)*** *Image by Gonzalo Vega (SLA) reportedly taken on 2024 Mar 23 UT 22:08.*

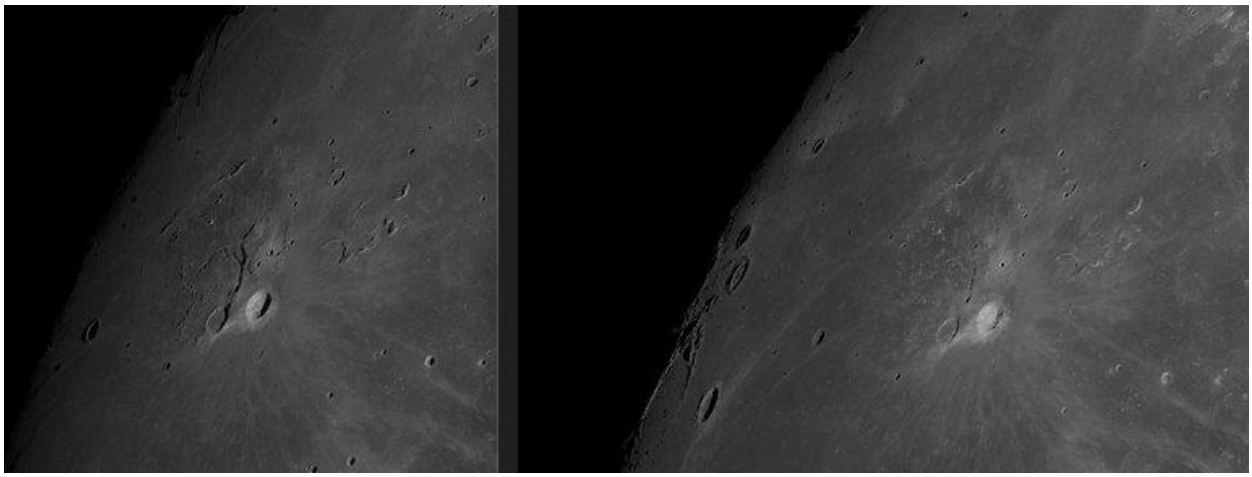


Figure 5. *Aristarchus as simulated by Maurice Collins using LTVT for:* ***(Left)*** *2024 Mar 22 UT 22:08* ***(Right)*** *2024 Mar 23 UT 22:08.*

Out of interest, Fig 6 is a comparison of Maurice's 2017 Aug 05 UT 06:31 image (Left) – assuming Gonzalo's image had been taken on 2024 Mar 22, and Gonzalo's image (Right). Maurice has picked up some blue around Aristarchus, but it is not in the same place and might be related to atmospheric spectral dispersion. Gonzalo's image is of higher quality from better seeing conditions and shows little evidence of atmospheric spectral dispersion. We shall leave the ALPO/BAA weight at 3 for now because there are differences between the normal appearance (Fig 6 – Left) and what Gonzalo obtained (Fig 6 – Right) with that blueness between Aristarchus and Herodotus. Can you spot any other differences? If so please email them to me.

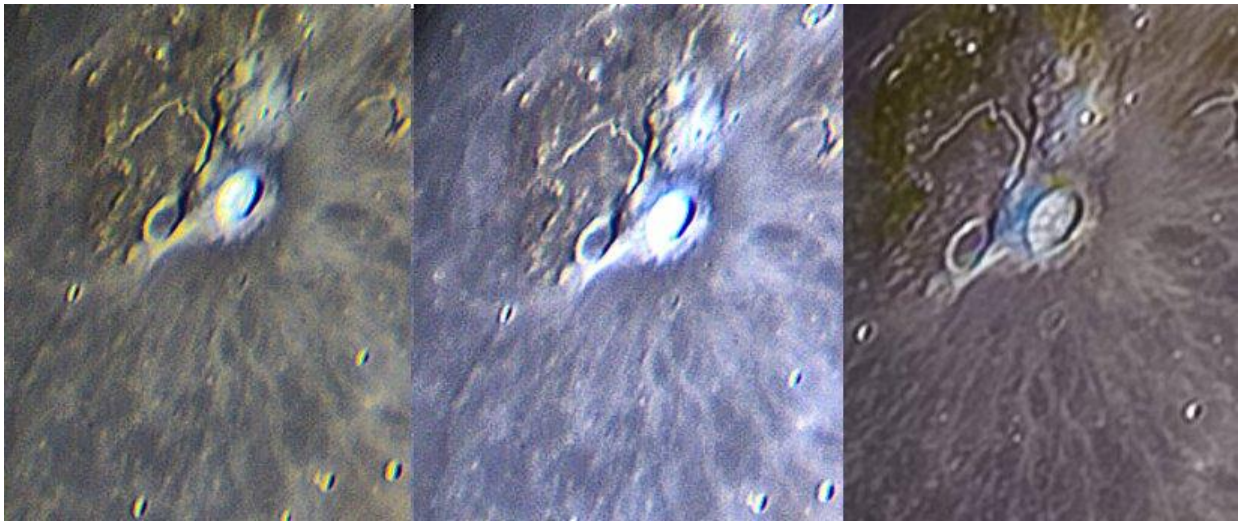


Figure 6. *Aristarchus with north towards the top.* ***(Left)*** *A section of a whole Moon mosaic by Maurice Collins taken on 2017 Aug 05 UT 06:31 – this has had its color saturation increased to bring out some colors and has also been sharpened.* ***(Center)*** *Same as the image on the left but has now been color normalized using Gimp software – note the interior of Aristarchus is now saturated.* ***(Right)*** *A color saturation increased version of an image taken by Gonzalo Vega (SLA) from Oro Verde Observatory, Argentina, at a date and time quoted at 2024 Mar 23 UT 22:08 but may have been on 2024 May 22?.*

Cyrillus: On 2024 Oct 20 UT 20:38 Valerio Ghirardo (UAI) imaged this crater under the flowing lunar schedule request:

BAA Request: Cyrillus. There is a small white craterlet just north of the three central peaks. We are interested to receive high resolution images of this in order to find out at what selenographic colongitude, in the lunar evening, that it loses its white spot appearance. Please use scopes larger than 6 inches in diameter. Please email these to: a t c @ a b e r . a c . u k

Figure 7. *Cyrillus, just below Theophilus, with north towards the top. As taken by Valerio Ghirardo (UAI) on 2024 Oct 20 UT 20:38. The image has been sharpened.*

Valerio is another newcomer to the program, and we welcome their efforts to get started on solving some of our puzzling historical enigmas. This particular one refers to a very small but prominent white spot that is sometimes seen just north of the central peaks, on the floor – we are interested in learning when this starts to become visible and when it fades from view in selenographic colongitude during morning and evening phases of the Moon. Clearly it is not visible here, though it is possible that higher resolution maybe needed.

General Information: For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: http://users.aber.ac.uk/atc/lunar_schedule.htm . By re-observing and submitting your observations, only this way can we fully resolve past observational puzzles. If in the unlikely event you do ever see a LTP, firstly read the LTP checklist on http://users.aber.ac.uk/atc/alpo/ltp.htm , and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter LTP alerts can be accessed on https://twitter.com/lunarnaut .

Dr Anthony Cook, Department of Physics, Aberystwyth University, Penglais, Aberystwyth, Ceredigion, SY23 3BZ, WALES, UNITED KINGDOM. Email: atc @ aber.ac.uk

AN INVITATION TO JOIN THE A.L.P.O.

The Lunar Observer is a publication of the Association of Lunar and Planetary Observers that is available for access and participation by non- members free of charge, but there is more to the A.L.P.O. than a monthly lunar newsletter. If you are a nonmember you are invited to join our organization for its many other advantages.

We have sections devoted to the observation of all types of bodies found in our solar system. Section coordinators collect and study members' observations, correspond with observers, encourage beginners, and contribute reports to our Journal at appropriate intervals.

Our quarterly journal, *The Journal of the Association of Lunar and Planetary Observers-The Strolling Astronomer*, contains the results of the many observing programs which we sponsor including the drawings and images produced by individual amateurs. Additional information about the A.L.P.O. and its Journal is on-line at: **http://www.alpo-astronomy.org.** I invite you to spend a few minutes browsing the Section Pages to learn more about the fine work being done by your fellow amateur astronomers.

To learn more about membership in the A.L.P.O. go to: **http://www.alpo- astronomy.org/main/member.html** which now also provides links so that you can enroll and pay your membership dues online.

Lunar Calendar December 2024

Date	UT	Event
1	0621	New Moon (lunation 1261)
3		Greatest southern declination -28.5˚
3		North limb most exposed +6.6˚
4	2300	Venus 2˚ north of Moon
5		West limb most exposed -5.2˚
8	0900	Saturn 0.3˚ south of Moon, occultation in Pacific
8	1527	First Quarter Moon
9	0900	Neptune 0.8˚ south of Moon, occultation in Asia
9	1936	Moon at ascending node
12	1300	Moon at perigee 365,361 km
13	1000	Uranus 4˚ south of the Moon
13	1800	Moon in Pleiades
14	2000	Jupiter 5˚ south of Moon
15	0902	Full Moon
16		Greatest northern declination +28.4˚
16		South limb most exposed -6.5˚
18		East limb most exposed +6.1˚
18	0900	Mars 0.9˚ south of Moon, occultation in Artic
22	2218	Last Quarter Moon
22	2321	Moon at descending node
24	0700	Moon at apogee 404,485 km
24	2000	Spica 0.2˚ south of Moon occultation China and Pacific
28	1500	Antares 0.09˚ north of Moon, occultation Polynesia to South America
30	2227	New Moon (lunation 1262)
30		Greatest southern declination -28.4˚
30		North limb most exposed +6.5˚
31		West limb most exposed -4.8˚

CONTRIBUTION GUIDELINES

While it is a great honor to put together The Lunar Observer, we are now overwhelmed by our success with some issues in excess of 200 pages.

The increased time it requires for me to perform this job (as a volunteer) pulls me away from my own family and other obligations. Thus, the following rules are being implemented to improve content flow on my end and provide you with the criteria needed to make the "TLO" even more professional in appearance and subject matter.

1. **Review your image(s) at your location before submitting it/them, then brighten or darken it/ them as needed and if required, using whatever tools you have at hand. Images deemed unsuitable (including blurry, out-of-focus or "clouded-out" images) will either be returned for your attention or simply not used.**
2. **Images in jpeg format are preferred but others are also acceptable.**
3. **Crop your images to avoid jagged edges.**
4. **Orient the image so it makes the most sense. North at the top (with Mare Crisium at the upper right) is preferred but not required. To our many wonderful southern hemisphere contributors, please orient as you wish (probably south at top).**
5. **Be very limited on end-of-the-month submissions.**
6. **CHOOSE ONLY YOUR BEST IMAGES and limit the number to no more than eight (8) per each issue of the TLO. (obviously, if there is an article you are writing or contributing to this does not apply).**
7. **The image filename should be submitted with the object name spelled correctly, then the year-month-day-hour-minutes-Your Name or initials So, my image of Copernicus should have a file name of:**

Copernicus_2023-08-31-2134-DTe
means
Copernicus, 2023 August 31, 21:34 UT by David Teske

If we all do this going forward, it should make putting this all together faster and easier. Many of you already do this. Thank you for your contributions and your help. We have a premier lunar resource for the planet.

Please send images/drawings/text to drteske@yahoo.com or lunar@alpo-astronomy.org

Below are two sample captions. Both at least attempt to follow the above-stated guidelines

Meton Region as imaged by Massimo Dionisi of Sassari, Italy (10°43'26" N, 8° 33'9" E), on 2024 January 30, at 00:03 UT. Equipment details: Sky Watcher 250 mm, f/4.8 reflector telescope, Tecnosky ADC, Celestron X-cel LX 3x Barlow lens, effective focal length = 4,750 mm, 685 nm IR pass filter, Neptune-M camera, Skywatcher EQ6-R Pro mount. Seeing conditions = III-to-IV (Antoniadi scale). Software details: SharpCap 4.0 acquisition (mono), AutoStakkert! 3.1.4 ELAB, Registax Wavelets.

Lunar craters Hausen and Bailly D as imaged by István Zoltán Földvári of Budapest, Hungary on 2020 April 07, at 21:03-21:17 UT. Colongitude 86.5°. Equipment details: 70 mm refractor telescope, f/l = 500 mm, Vixen Lanthanum LV 4mm eyepiece, 125x, Baader Contrast Booster Filter. Sky seeing = 7 out of 10, sky transparency = 6 out of 6.

When submitting observations to the A.L.P.O. Lunar Section

In addition to information specifically related to the observing program being addressed, the following data should be included:

Name and location of observer
Name of feature
Date and time (UT) of observation (use month name or specify mm-dd-yyyy-hhmm or yyyy-mm-dd-hhmm)
Filter (if used)
Size and type of telescope used Magnification (for sketches)
Medium employed (for photos and electronic images)
Orientation of image: (North/South - East/West)
Seeing: 0 to 10 (0-Worst 10-Best)
Transparency: 1 to 6

Resolution appropriate to the image detail is preferred-it is not necessary to reduce the size of images. *Additional commentary accompanying images is always welcome.* **Items in bold are required. Submissions lacking this basic information will be discarded.**

Digitally submitted images should be sent to:
David Teske – david.teske@alpo-astronomy.org
Alberto Anunziato–albertoanunziato@yahoo.com.ar
Wayne Bailey—wayne.bailey@alpo-astronomy.org

Hard copy submissions should be mailed to David Teske at the address on page one.

CALL FOR OBSERVATIONS: FOCUS ON: Anaxagoras region

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the January 2025, will be Anaxagoras. Observations at all phases and of all kinds (electronic or film based images, drawings, etc.) are welcomed and invited. Keep in mind that observations do not have to be recent ones, so search your files and/or add these features to your observing list and send your favorites to (both):

Alberto Anunziato – albertoanziato@yahoo.com-ar
David Teske – david.teske@alpo-astronomy.org

Deadline for inclusion in the Anaxagoras Focus-On article is December 20, 2024

FUTURE FOCUS ON ARTICLES:

In order to provide more lead time for contributors the following future targets have been selected:

Subject	TLO Issue	Deadline
Anaxagoras	**January 2025**	**December 20, 2024**
Clavius	**March 2025**	**February 2025**
Volcanic Features	**May 2025**	**April 20, 2025**
Rupes Recta	**July 2025**	**June 20, 2025**
Mare Humorum	**September 2025**	**August 20, 2025**

Focus-On Announcement
Anaxagoras, the "Tycho" of the North

Anaxagoras, with a diameter of 50 km, is a relatively small and relatively recent crater (it belongs to the Copernican period) and that is why we can appreciate the deadly magnificence of the ejected materials, which cover surfaces that reach more than 600 kilometers from the crater and with the Sun's rays striking frontally near the full moon it has an undeniable similarity to Tycho. With a more oblique illumination it is a real challenge to locate it, since it is quite close to the northern limb, a location that has taken away its prominence among those who observe and photograph the Moon. It is an interesting crater, with features such as a central peak of anorthosite and bright rays that cross its walls.

FOCUS ON NOVEMBER 2024: Due: October 20, 2024: ARCHIMEDES, AUTOLYCUS AND ARISTILLUS

FOCUS ON JANUARY 2025: Due December 20, 2024: ANAXAGORAS

FOCUS ON MARCH 2025: Due February 20, 2025: CLAVIUS

FOCUS ON: MAY 2025: Due April 20, 2025: VOLCANIC FEATURES

Image Alberto Anunziato

Focus On Announcement:
Lunar Base Clavius

Clavius has literary and cinematic reminiscences, at least for those of us who dream of 2001: A Space Odyssey, in which a gigantic underground base was located in this crater. Due to its size and peculiar structure, it is a very recognizable place among the somewhat monotonous southern lands. In this Focus On we will have the opportunity to study a giant from the most remote times of the Moon, the Nectarian period. In addition, Clavius may be a place of importance in the future of lunar exploration, since in 2020 the presence of water (or rather the trace of hydrated minerals) was detected in this crater. Will the literary Clavius Base become a reality?

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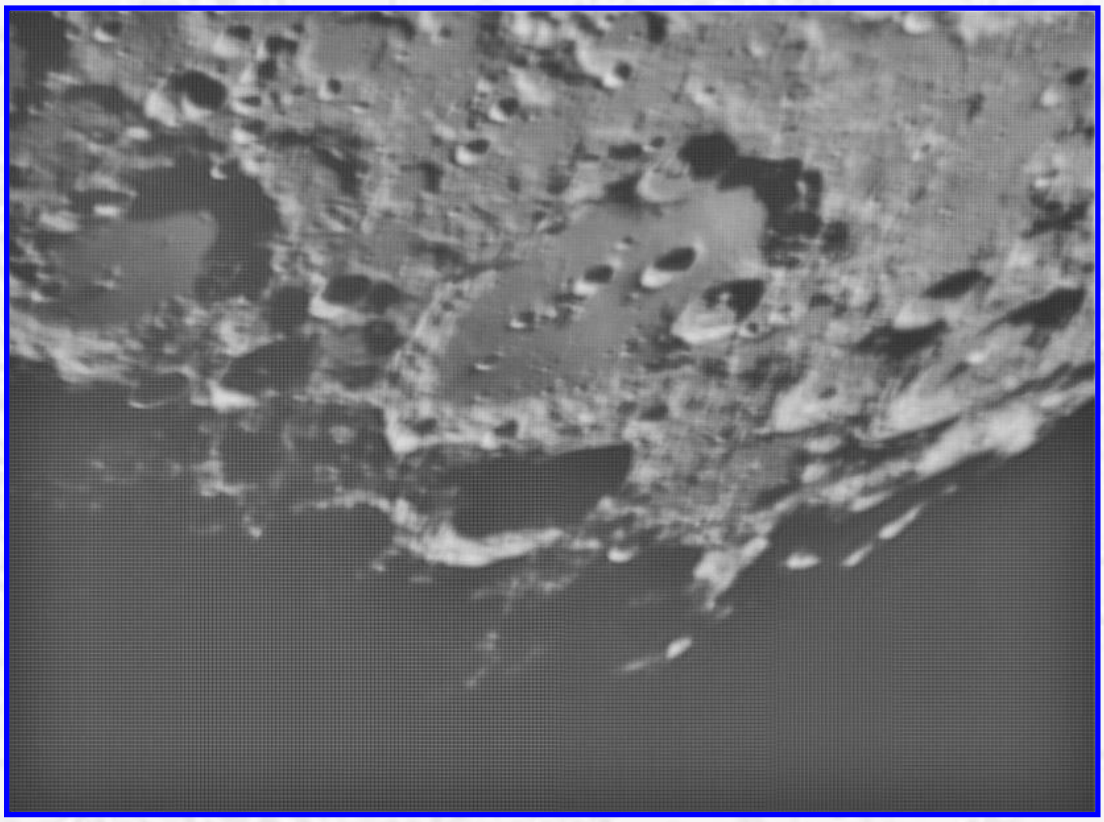
MAY 2025 ISSUE-Due April 20 2025: VOLCANIC FEATURES

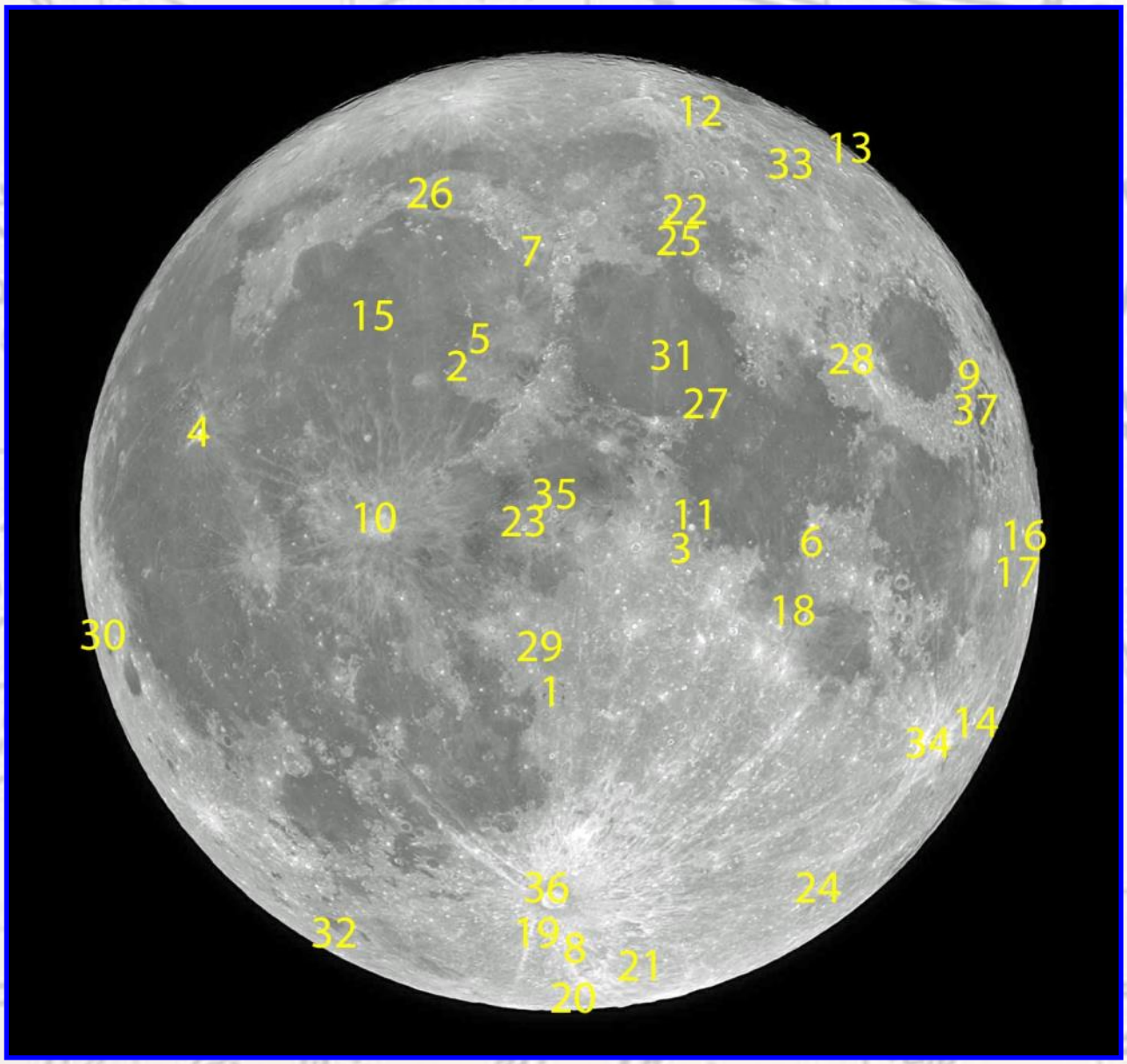
JULY 2025 ISSUE-Due June 20, 2025: RUPES RECTA

SEPTEMBER 2025 ISSUE-Due August 20, 2025: MARE HUMORUM



Fernando Sura

Key to Lunar Images In This Issue



Gregory Shanos

1. Alphonsus
2. Archimedes
3. Ariadaeus
4. Aristarchus
5. Aristillus
6. Capella
7. Cassini
8. Clavius
9. Condorcet
10. Copernicus
11. Dionysius
12. Endymion
13. Gauss
14. Hecataeus
15. Imbrium, Mare
16. Kästner
17. La Perouse
18. Mädler
19. Maginus
20. Malapert
21. Manzinus
22. Mortis, Lacus
23. Pallus
24. Peirescius
25. Plana
26. Plato
27. Plinius
28. Proclus
29. Ptolemaeus
30. Riccioli
31. Sarabhai
32. Schickard
33. Spei, Lacus
34. Stevinus
35. Triesnecker
36. Tycho
37. Undarum, Mare