The Lunar Observer

A Publication of the Lunar Section of ALPO

David Teske, editor
Coordinator, Lunar Topographic Studies Section Program

May 2024

In This Issue

Online readers, click on images for hyperlinks

Lunar Reflections

A warm greeting to all readers. Hoping that spring (or autumn) is treating you well. In this issue of The Lunar Observer, you will find scores of interesting articles about the Moon, plus very nice images and drawings of the lunar topography. It has been an interesting month as editor. István Zoltán Földvári of Budapest, Hungary, has always amazed me with what he can glean from his small telescopes along the lunar limb. I asked him if he ever saw the crater Bruno, a young, far-side crater. He hadn't seen it (have you?) but did find its rays streaking across Mare Crisium. Now that is cool! The issue contains article about lunar topography from Paul Walker, Neil Wiley, Alberto Anunziato, Greg Shanos and Marcelo Mojica Gundlach. Along with this, Alberto Anunziato toured lunar crater chains in the Focus-On articles, with images and drawings from all over the world. As always, Tony Cook has provided insightful information on Lunar Geographic Change. It is wonderful to see these many articles. I hope that you enjoy them! Plus many images and drawings were contributed to the Recent Topographic Studies. Thank you to all who contributed!

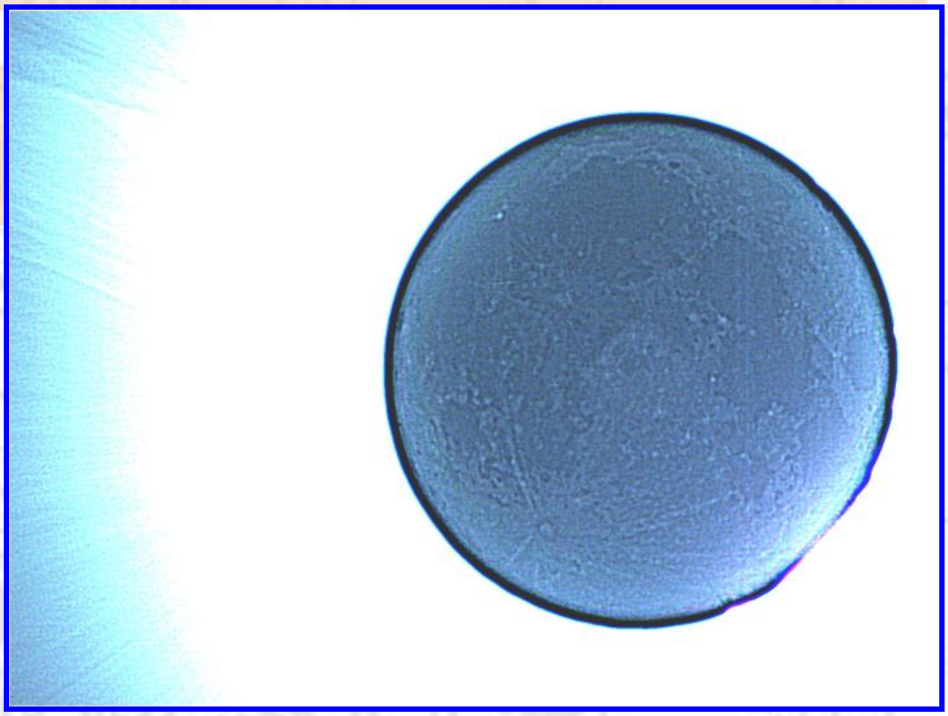
This past month, cloudynights.com has put the current edition of the ALPO *The Lunar Observer* on its home page! This has generated more views (837 views of the April TLO) of TLO and hopefully more interest in the newsletter and in ALPO.

Oh yes, and in this busy month, North America saw a total solar eclipse! Check out Darryl Wilson's image of the face of the New Moon below.

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

Clear skies,
-David Teske

Edited by David Teske: david.teske@alpo-astronomy.org
2162 Enon Road, Louisville, Mississippi, USA



New Moon Illuminated by Earthshine during Total Solar Eclipse, Darryl Wilson, Marshall, Virginia, USA. 2024 April 08 18:55 UT. 80 mm f/5 refractor telescope, SKYRIS 274C camera. Darryl adds: "The moon appears blue because it is illuminated by light reflected by earth, which is predominantly bluish. Aristarchus appears particularly bright, which is consistent with its bluish reflection in color enhanced imagery as published in TLO." Imaged from Hattieville, Arkansas.

Lunar Topographic Studies

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Observations Received

Name	Location and Organization	Image/Article
Alberto Anunziato	Paraná, Argentina	Focus-On article*: Crater Chains: The More the Merrier, Articles and drawings The Ridge That Crosses Pytheas, The Brightness of the Moon During an Eclipse as an Indicator of Atmospheric Transparency,* drawing of Copernicus secondary craters, images of Helmholtz and Byrgius.
Sergio Babino	Montevideo, Uruguay	Image of Theophilus.
Massimo Bianchi	Milan, Italy	Images of Sinus Iridum (2).
Ariel Cappelletti	Córdoba, Argentina, SLA	Image of Clavius.
Francisco Alsina Cardinalli	Oro Verde, Argentina	Images of Rheita, Theophilus, Schiller, Archimedes and Taruntius.
Jairo Chavez	Popayán, Colombia	Images of Mare Serenitatis, First Quarter Moon, the Waxing Gibbous Moon and Penumbral Lunar Eclipse (2).
Maurice Collins	Palmerston North, New Zealand	Images of the 9.5-day old Moon, 10-day old Moon, 11-day old Moon, 14.6 day-old Moon, 17.6 day-old Moon, 18.7 day-old Moon, Clavius, Copernicus (2), Plato and Schiller.
Massimo Dionisi	Sassari, Italy	Images of Hansteen, Schiller, Palmieri, Schickard, Sinus Iridum, Gassendi, Babbage (2), Doppelmayer, Reiner, Naumann, Aristarchus and Rümker.
Walter Ricardo Elias	Oro Verde, Argentina, AEA	Images of Tycho, Mare Crisium, Dorsa Stille (3), Copernicus (2), Catena Davy, Catena Abulfeda and Albategnius.
István Zoltán Földvári	Budapest, Hungary	Drawings of Abel, Sabine and Ritter and Rozhdestvenskiy.
César Fornari	Oro Verde, Argentina	Image of Catena Davy.
Desireé Godoy	Oro Verde, Argentina	Image of Metius.
Jeff Grainger	Cumbria, United Kingdom	Images of 8.2 day-old Moon, Atlas, Mare Australe, Mare Crisium, Nectaris Basin, Ptolemaeus and Triesnecker.
Marcelo Mojica Gundlach	Cochabamba, Bolivia	Article *Understanding and Visualizing "Seeing",* images of Copernicus (3), Catena Davy, Deslandres, Hyginus, Clavius, Timocharis, Deslandres and Rima Hyginus (2).

Many thanks for all these observations, images, and drawings.

Lunar Topographic Studies

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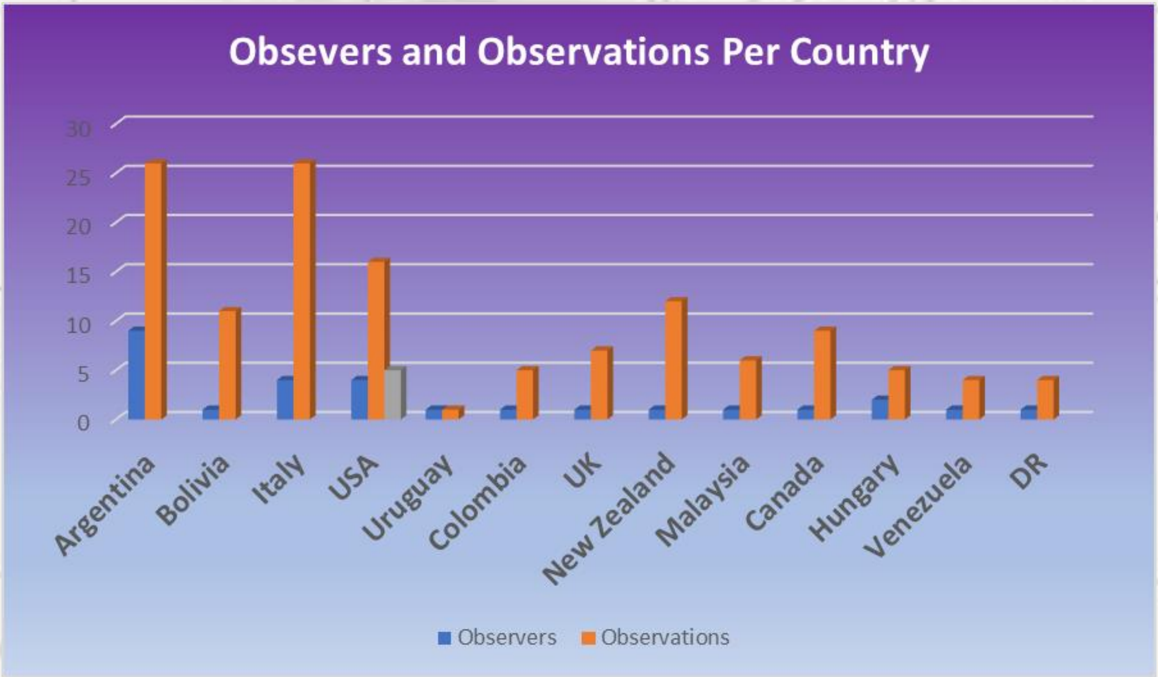
Observations Received

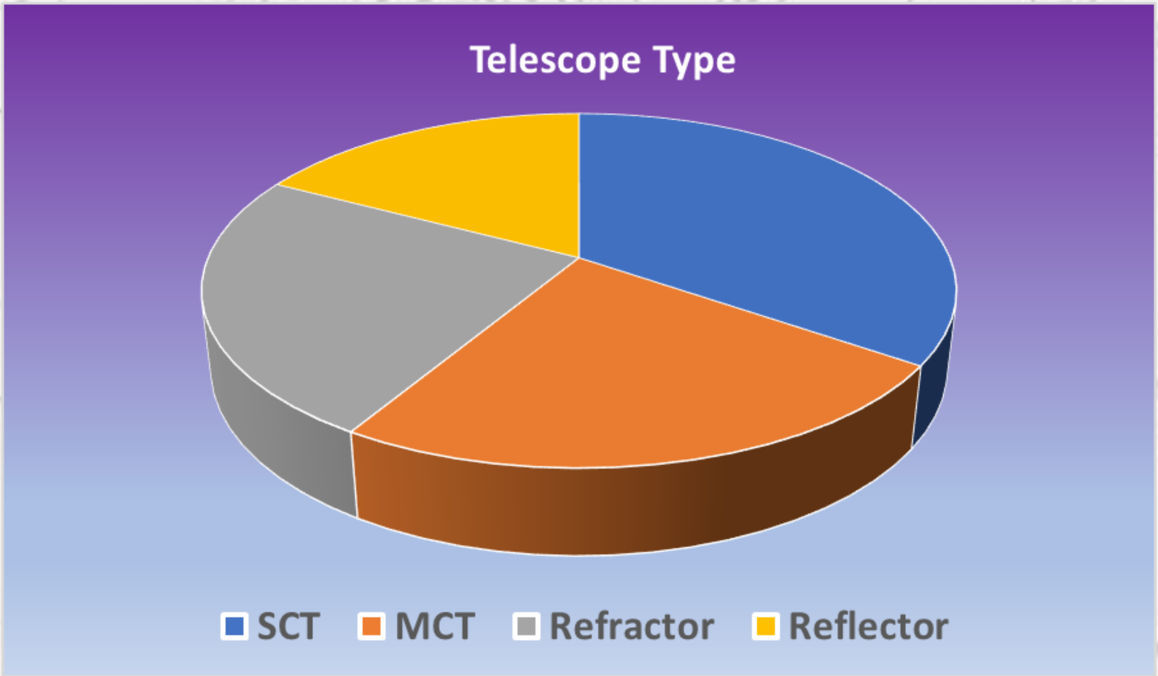
Name	Location and Organization	Image/Article
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Images of Catena Davy (3), Catena Abulfeda, Schiller and Clavius.
Raffaello Lena	Rome, Italy	Images of Arago (2), Cauchy (2), Janssen, Helmholtz, Oken and Aristoteles.
Felix León	Santo Domingo, República Dominicana	Image of Theophilus, Schickard, Schiller and Altai Scarp.
Attila Ete Molnar	Budapest, Hungary	Images of Jenner and rays from Bruno.
Luigi Morrone	Agerola, Italy	Images of Atlas, Gutenberg and Janssen.
Jesús Piñeiro	San Antonio de los Altos, Venezuela	Images of Eudoxus and Alphonsus.
Raúl Roberto Podestá	Formosa, Argentina	Images of the Penumbral Lunar Eclipse (3).
Erica Reisenauer	Oro Verde, Argentina	Image of Alphonsus.
Germán Savor	Oro Verde, Argentina	Images of Aristoteles.
Gregory Shanos	Sarasota, Florida, USA	Image of Catena Davy, article and image *Co-*
Michael Teoh	Heng Fe Observatory, Penang, Malaysia	Images of Aristarchus, Babbage, J Herschel, Kepler, Mersenius and Vieta.
David Teske	Louisville, Mississippi, USA	Images of Vallis Rheita (3) and Eratosthenes.
Ken Vaughan	Victoria, British Columbia, Canada	Images of Rupes Altai, Stöfler, Alpine Valley, Ptolemaeus, Eratosthenes, Sacrobosco, Moretus, Rupes Recta and Sinus Iridum.
Paul Walker	Middlebury, Vermont, USA	Articles and images *Mare Nubium, Mare Humorum, Palus Epidemiarum and Lacus Timoris, Copernicus, Montes Carpatus and Reinhold, Mare Frigoris, Sinus Roris, Sinus Iridum, Mare Imbrium and Montes Recti* and *Bessarion A, Kepler, Mare Insularum, Encke, Oceanus Pro-*
Neal G. Wiley	Philadelphia, Pennsylvania, USA	Article and image *A Valentine Day Mountain At*
Darryl Wilson	Marshall, Virginia, USA	Image of the New Moon Illuminated by Earthshine.

Many thanks for all these observations, images, and drawings.

May 2024 *The Lunar Observer*
By the Numbers

This month there were 130 observations by 30 contributors in 13 countries.





ALPO 2024 Conference: Call for Papers

Tim Robertson & Ken Poshedly, ALPO Conference coordinators

Overview

Due to the success of attracting more and more viewers and participants to our online conferences, the 2023 Conference of the ALPO will once more be held online, this time on Friday and Saturday, July 26 and 27.
The ALPO conference times will be:

- Friday from 1 p.m. to 5 p.m. Eastern Time (10 a.m. to 2 p.m. Pacific Time)
- Saturday from 1 p.m. to 6 p.m. Eastern Time (10 a.m. to 3 p.m. Pacific Time).
- The ALPO Conference is free and open to all via two different streaming methods:
- The free online conferencing software application, Zoom.
- On the ALPO YouTube channel at *https://www.youtube.com/channel/UCEmixiL-d5k2Fx27Ijfk41A*

Those who plan to present papers or presentations must (1) be members of the ALPO, (2) use Zoom, and (3) have it already installed on their computer prior to the conference dates. Zoom is free and available at *https://zoom.us/*
Those who have not yet joined the ALPO may do so online. Digital ALPO memberships start at only $22 a year. To join online, go to *http://www.astroleague.org/store/index.phpmain_page=product_info&cPath=10&products_id=39*, then scroll to the bottom of that page, select your membership type, click on "Add to Cart" and proceed from there.
There will be different Zoom meeting hyperlinks to access the conference each of the two days of the conference. Both links will be posted on social media and e-mailed to those who wish to receive it that way on Thursday, July 27.
The Zoom virtual (online) "meeting room" will open 15 minutes prior to the beginning of each day's activities.
Those individuals wishing to attend via Zoom should contact Tim Robertson at *cometman@cometman.net* as soon as possible.

Conference Agenda

The conference will consist of initial welcoming remarks and general announcements at the beginning each day, followed by papers and research findings on astronomy-related topics presented by ALPO members.
Following a break after the last astronomy talk on Saturday will be presentation of the Walter Haas Observing Award. A Peggy Haas Service Award may also be awarded.
A keynote speaker will then follow the awards presentations on Saturday. The selection of a keynote speaker is in progress and the final decision will be announced in the summer issue of this Journal (JALPO66-3).

Presentation Guidelines

All presentations should be no more than 15 minutes in length; the preferred method is 12 minutes for the presentation itself plus 3 minutes for follow-up questions. The preferred format is Microsoft PowerPoint.
Send all PowerPoint files of the presentations to Tim Robertson at *cometman@cometman.net* .

Suggested Topics

Participants are encouraged to present research papers and experience reports concerning various aspects of Earth-based observational astronomy including the following.

- New or ongoing observing programs and studies, specifically, how those programs were designed, implemented and continue to function.
- Results of personal or group studies of solar system or extra-solar system bodies.
- New or ongoing activities involving astronomical instrumentation, construction or improvement.
- Challenges faced by Earth-based observers such as changing interest levels, deteriorating observing conditions brought about by possible global warming, etc.

Information about paper presentations, the keynote speaker and other conference data will be published in this Journal and online as details are learned.

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.

Copernicus, Montes Carpatus and Reinhold

Paul Walker

Copernicus has a large number of secondary craters, many forming crater chains. The largest crater chain wiggles and is a bit broken. It runs from about the 1:15 to 2:00, is a little more than 1 Copernicus diameter away and is roughly perpendicular to it. This chain has several named craters in it, Stadius P at the lower end, Stadius R (largest crater 1/3 the way up), Stadius E (at the kink jutting left), Stadius F (middle of the triple) and Stadius T (top of the triple). At 1:00 and at the same distance is a smaller radial chain interrupted near its further end by a double crater. Following this chain toward Copernicus we find it broken with 2 additional short segments. Going back to the double crater, their alignment points the way to another chain that begins with a similar sized crater.

Copernicus, Montes Carpatus, Reinhold Paul Walker, Middlebury, VT, USA, (44°01'55"N, 73°09'20"W), February 21, 2024 03:01UT, Lunation: 11.17 Colongitude: 47.8 deg Sub-solar Lat: -1.1 deg, 10" f/5.6 Newt, 2x Barlow (3.39x), efl=4765mm, no fiter, 0.155"/px org. image, Canon T7i (DSLR), HD video @ 3x "digital" zoom, 1/640 sec @ ISO 1600, paulwaav@together.net, Stack- 20% of 9163 frames, North up, smallest visible craters ~ 1.4km (0.9mi), Processing: AutoStakker!3, Registax 6 (wavelets), Picture Window Pro 8

Moving counter clockwise around Copernicus, at about 11:30 and 1 diameter away, there is a deep tadpole shaped crater named Gay-Lussac D. On LROC QuickMap it looks like it is a short crater chain, though it is not clear Copernicus created it. A little less than 1 diameter out between 10:00 and 11:00 is Rima Gay-Lussac. Though in the image it looks like a crater chain on the LROC QuickMap it appears too eroded for a Copernicus crater chain and may not even be a chain. At 10:00 and the same distance is a definite crater chain. In this image forming a lopsided "V" or "Y" with the shadow of a mountain ridge. Continuing CCW at the same distance we come to another less pronounced radial chain. Away from Copernicus it appears to have a long break than a couple of short links.

There is kind of a chain at about 8:00, still at about the 1 diameter distance. It curves slightly up and is not obvious in the image. On the LROC QuickMap looks a rather messy and ill-defined but does look like a crater chain. Next up between 6:30 and 7:00 just under 1 diameter away is a short but slightly better-defined chain.

A tad before 6:00 there is a double crater, Fauth and Fauth A, 12 km and 9 km respectively. I suppose 2 is not enough to qualify as a chain, though there appears to be a 3rd very small crater on the south rim. I can't tell whether they formed at the same time as Copernicus, but looking them up in Luna Cognita, apparently there is evidence that they formed sometime after.

Understanding and Visualizing “Seeing”

Marcelo Mojica Gundlach

While I was searching through my historical archives for lunar images, I was thinking about what topic I could write about that would be helpful to observers, or astro-photographers, who are just starting out in this fascinating world of researching the Universe. While I was going from folder to folder, delighting again with the images of the past, it occurred to me that I could write about one of the observation parameters that deserve attention and study, and it is the famous one: “seeing”, about which we have read a lot, but that initially cannot be understood because it is not something that can be learned in a conference or in a course. We must experience it, appreciate how our observations or images have a substantial improvement when our atmosphere is stable. This is how I managed to find two images of the Clavius crater that clearly show us the difference between bad and excellent seeing.

We know that in all visual observations and astrophotography two parameters must be reported that give us an idea of the quality of our local atmosphere at the time we are carrying out our astronomical activity, these parameters are the transparency of the sky with a scale of 1 to 6, 1 being the worst and 6 the best, and the so-called “seeing” that represents the clarity and stability of the atmosphere, which takes into account the high currents called “jet stream”, with which one can appreciate the object studied. When bad conditions exist, we can see a lot of stellar flicker even near the zenith. The seeing scale is from 1 to 10, with 1 being the worst and 10 being the best, this being the parameter that most affects taking photographs, or images as they are now called. Especially in planetary it is very important because we work with quite a few magnifications, and when there is movement in the upper or lower layers of the atmosphere, the images acquired are not good if the seeing is low (from 1 to 3) and the more magnifications we use with the telescope, the more evident the weather conditions will be.

When a serious hobbyist works with solar, lunar or planetary observations, it is important that he know the climatic conditions of his workplace and to do so he must take data, at least one year, before he can have a clear idea of an excellent condition or a very bad one, meaning that you have to have experienced both extremes of quality. I say this from my own experience, because sometimes you manage to have a very sharp image by giving it a value of 10 and the following month you get much better images. That is why the serious amateur must be patient, disciplined and methodical.

In order to visualize the seeing, Fig. 1 shows two images obtained with the same instrument, a Mak with 150mm aperture, in different sky quality conditions. The quality of the right is notable, in which the maximum resolution of the telescope is used. It should be said that when the seeing conditions are not good, it is very difficult to focus the image and it is even more difficult for it to remain focused, in addition we will see that the image moves and that harms the image capture, causing the processors, like Registax, cannot obtain a final image.

Now, should we wait for excellent conditions to observe or photograph the Moon? Of course not! We must go out to do astronomy with the conditions we have, because we may be the only observers at that moment that we are observing and we can appreciate some unique phenomenon or discover something new in our skies.

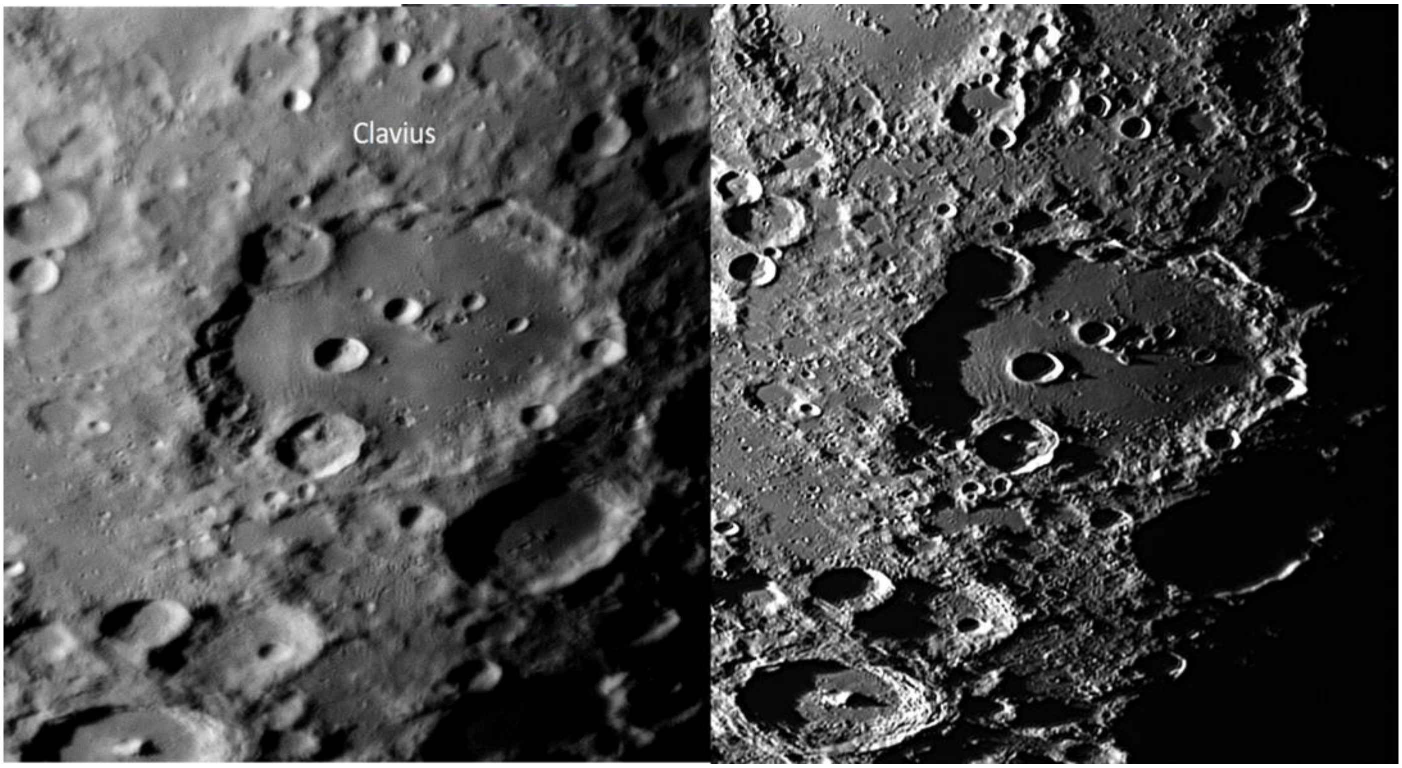


Fig.1. We can see in the images the Clavius crater in two different situations of climatic conditions. On the left you can see some details with bad conditions, a seeing of 2. However, with better sky conditions, seeing of 10 on the right, we can see many more details because the maximum resolution of the equipment is used. Both images were obtained with a Mak. Sky Watcher with 150mm aperture and a ZWO ANSI 178 B/W camera.

A Valentines Day Mountain at Theophilus

Neal G. Wiley

While waiting for the takeout to show up and before movie night got underway this past Valentines Day (beats jostling for a reservation!), the crystal-clear evening sky with the 5-day old moon and Jupiter just a handspan apart called to me, so I got out my little 60 x 700 mm classic Sears refractor with a 9mm Unitron eyepiece to have a look. Conditions were excellent, and I wasn't disappointed. It's amazing what you can do with a small aperture and good glass under the right conditions.

Theophilus caught my eye--though it took me a moment to get oriented and understand that it was Theophilus, since Catharina and Cyrillus were still hidden behind the terminator and I'm accustomed to seeing them as a threesome.

The crater was full of inky shadow, save for a spider-silk like, exquisitely fine trace of the western rim extending past the terminator. On that trace, though, there was a huge, bright oblong mountain. I made a quick sketch, and here's a quick iPhone snap through the eyepiece:

Theophilus is near the middle of the terminator. Of course, such a crude image doesn't do the scene justice, but it helps orient.

I'm always interested in the selenographical lore of obscure features, so I had to investigate this mountain. I turned first to the old masters for a name, since the IAU and modern commentators don't seem inclined to name this sort of thing anymore. The 19th century commentators were not so shy. In consulting Neison's 1876 The Moon, and the Condition and Configurations of Its Surface, I was intrigued to find that Theophilus was one of only three craters to which he devoted a special, separate inset chart. Here's the relevant part (see p. 499):

For an embarrassingly long moment, I thought the mountain of interest was what is marked as β on this chart. Of course, the chart is inverted from the modern orientation, and modern west is to the right in the chart. This is confirmed by the orientation of Theophilus B: Neison shows it at about 5 o'clock, modern charts show it at about 11 o'clock. So, this feature is not β. This mountain must fall directly opposite β, but Neison's chart is hard to read there. To my eye, it could either be γ or κ.

Neison's text (p. 499) is as follows: "Theophilus -- A magnificent ring-plain, 63.81 miles in diameter, with steep, lofty, much-terraced walls, rising in grand peaks to an immense height, γ being 14,326 feet, and κ from four measures, 15,925 feet high; whilst β towers aloft in a noble peak to the tremendous altitude of 18,238 feet above the interior, whilst μ is scarcely inferior, being 17,170 feet in height."

Out of curiosity, I compared Neison's altitude readings to the LROC laser altimeter data for this feature. That showed a displacement of some 5435 m between the floor and rim in the vicinity of this mountain, which is 17,831 feet. That most closely matches Neison's elevations for β or μ, but by position, neither of those fits.

Here is a detail from LAC chart 78, showing a high elevation in the (modern) west rim, which is clearly what we're looking for. No name is shown, of course.

Here is a detail view of Theophilus from B&M's mighty *Mappa Selenographica* (recall again that modern North is down and West is right).

From this additional perspective, it seems most likely that the mountain in question was indeed Theophilus γ. Mary Blagg's 1913 *Collated List of Lunar Formations* confirms that this is the same feature as Neison's γ.

Lunar Topographic Studies
A Valentine Mountain At Theophilus

Mare Nubium (western), Mare Humorum (far eastern), Palus Epidemiarum and Lacus Timorus Region

Paul Walker

Paul Walker, Middlebury, VT, USA, (44°01'55"N, 73°09'20"W), February 20, 2024 00:52UT, Lunation: 10.08 Colongitude: 34.6 deg Sub-solar Lat: -1.1 deg, 10" f/5.6 Newt, 2x Barlow (2.8x), efl=3946mm, no fiter, 0.19"/px org. image, Canon T7i (DSLR), HD video @ 3x
"digital" zoom, 1/400 sec @ ISO 3200, paulwaav@together.net

Because this has a feature that matches the Focus on Feature, I point out an unnamed crater chain in the extreme upper right corner right below the curved mountain (actually the western wall of the mostly filled in crater Gould). You may not be able to see it without magnifying the image. I just happened to notice this faint line of craters when checking out the image after processing. Looking at the LROC QuickMap at https://quickmap.lroc.asu.edu/ I see that it extends out of the image into Gould. From Gould it extends southwest to a small crater where it angles toward south with a curving arc. In spacecraft imagery it is seen as a somewhat jumbled complex of secondary craterlets. I also see there are tons of additional craterlets and crater chains of which only a few can be identified in the image. One of these is at about the 1:00 position relative to Bullialdus right at the edge of the image. Another can be found going off the 7:30 position from Bullialdus. You will see a small crater and a slightly less small crater, a tiny mountain. Turn to the 6:30 position from there to find a very small string of craters that looks kind of like a single quotation mark (').

Most of the crater chains are probably associated with the formation the large crater Bullialdus in the upper right. This crater (61x61 km, 37x37 mi) is a smaller version of Copernicus (93x93 km, 56x56 mi) with a c complex of central peaks, terraced walls, extensive apron of ejection material, and secondary craters, many forming crater chains. Definitely worth checking out visually when I get the chance.

As indicated in the title this image contains the western edge of Mare Nubium (upper right corner), showing some wrinkle ridges. On the left a little piece of Mare Humorum sits between the unnamed mountains Humorum's east flank. In the center of the image the irregular shaped flat area separated from Nubium by mountains and 2 large craters is Palus Epidemiarum. Palus Epidemiarum has a lot of rilles for its size. Toward the bottom of the image is Lacus Timorus, a small, elongated patch of lunar lava with a few partially submerged craters and a few bumps in the middle.

Mare Nubium has several named domes. The one only easy one in this image is Dome Kies Pi. To locate it, from formation the large crater Bullialdus in the upper right go south to the slightly smaller filled in crater Kies. Moving 7:00 from there, it is the bump with a small crater in the center (just before the small mountain in that direction). It is confusing, mostly due to my ignorance I'm sure, that on the Virtual Moon Atlas (VMA) has 2 slightly offset volcanic features labeled there, Dome Kies Pi, described as a 10x10 km volcanic dome with a 2 km summit crater (visible in the image though measuring 1.6 km on the LROC QuickMap) and Kies P 1, described as a 13x13 km volcanic shield with a large summit crater pit. Consulting Robert Garfinkle's Luna Cognita, I see he list a handful of domes in the area with the Kies designation and Greek letters with Kies Pi as one of them. He describes it as 13x13 km with a summit crater pit measuring about 1.3 km. The Lunar Domes Atlas GLR group (lunardomeatlas.blogspot.com) has this dome labeled as Kies 1. A dome labeled Kies 3 on this site is visible on this image.

Lunar Topographic Studies
Mare Nubium, Mare Humorum, Palus Epidemiarum and Lacus Timoris

Between Nubium and Humorum is a triple set of Garben rilles named Rimae Hippalus. Looks like these are associated with the Humorum basin.

As mentioned above Palus Epidemiarum has a slew of rilles, of the graben type, Rimae Ramsden. A harder to see rille, Rima Campanus on the 1960's LAC map but maybe now counted a part of Rimae Ramsden goes from Epidemiarum under the mountains to the north formed by the craters Campanus and Mercator into Nubium. Another rille, Rima Hesiodus, runs from the center of Palus Epidemiarum well into Nubium. One last feature in Palus Epidemiarum I'll mention is a nice little double crater, Marth, in the west end upper part. The outer rim is 6.6 km (4.1 mi) and inner rim 3.2 km (2.0 mi). It will not be too hard to spot with most scopes but you will need steady seeing and probably a 6" or 8" telescope to make out its double feature. On the south edge near the middle of Palus Epidemiarum is the 60 km (36 mi) flooded crater Capuanus. It has a conspicuous bump southeast of center. This is Capuanus 2, a 9x9 km (5x5 mi) volcanic shield.

Near the bottom, Lacus Timorus shows a few bumps that could be volcanic in nature though I find none of the sources I have that label them as such.

The large oval shadow to the southwest of Lacus Timorus is a triple crater, Hainzel, Hainzel A and Hainzel C. Looking at spacecraft images is looks like the order of formation is Hainzel, Hainzel C than Hainzel A.

Mare Nubium (western), Mare Humorum (far eastern), Palus Epidemiarum, Lacus Timorus Region, Paul Walker, Middlebury, VT, USA, (44°01'55"N, 73°09'20"W), February 20, 2024 00:52UT, Lunation: 10.08 Colongitude: 34.6 deg Sub-solar Lat: -1.1 deg, 10" f/5.6 Newt, 2x Barlow (2.8x), efl=3946mm, no fiter, 0.19"/px org. image, Canon T7i (DSLR), HD video @ 3x "digital" zoom, 1/400 sec @ ISO 3200, paulwaav@together.net

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Copernicus

Gregory T. Shanos

Moon on March 20, 2024 at 10:15 pm local time or March 21, 2024 at 02h 15m UT. The moon was at 85% phase and 79 degrees above the horizon. Meade LX200GPS ACF 8-inch alt-azimuth mounted with an Optec Lepus f/6.2 focal reducer. A ZWO ASI 178MM monochrome camera took a 90 second video which was aligned and stacked with Autostakkert 3.1.4 and sharpened with Registax 6.1. Further processing in Photoshop CS4. Seeing conditions were 4/10 with a jet stream. The transparency was perfectly clear at 9/10.

Copernicus is 93 x 93 kilometers or 57.8 x 57.8 miles in size and 4125 meters or 13,533.5 ft in height. Copernicus is young at 1.1 billion years old and exhibits a hexagonal form. Bright rays surround the crater. Very steep slopes dominant Mare Insularum at 900 meters (2952.8 feet) and bearing Fauth to the south and Gay-Lussac to the north. The floor of crater Copernicus is flatter to the north that to the south. Three central mountains within the crater are 1200 meters or 3937 feet in height. Prominent features include Montes Carpatus and Sinus Aestuum. Surrounding craters include Timocharis, Lambert, Euler, Pytheas, Eratosthenes, Reinhold, and Lansberg.

Copernicus, *Gregory Shanos, Sarasota, Florida, USA. 2024 March 21 02:15 UT. Meade LX200 ACF 8 inch Schmidt-Cassegrain telescope, Optec Lepus f/6.2 reducer, ASI 1ZWO 178MM camera. Seeing 4/10, transparency 9/10.*

Lunar Topographic Studies
Copernicus

Bessarion A, Kepler, Mare Insularum (west), Encke, Oceanus Procellarum (east edge), Maestlin R

Paul Walker

At the top we have a nice semi-circle of 8-13 km craters. Left to right they are Bessarion C, Bessarion B, Bessarion A, Bessarion E and Bessarion. Between the bottom two, are 2 small craters (left) (Bessarion H and E) and 2 small mountains (right) forming a slightly curved line making an upside-down bowl.

I would like to point out some volcanic features. Following a line 2:00 from Kepler (the crater in the center) you will come to the 9 km crater Milichius A, near the east edge. About 1:30 from there is a nice dome with a crater pit at the top. This is 8.9 km Milichius P 1 (as noted on the VMA). Going off from Milichius A in the 10:00 direction just a little way is a small dark feature that is elongated in the N-S direction. This is Milichius A 2. In the 11:00 direction from Milichius A, you will run into 2 small craters on a dark patch. This dark patch is a dome. Abutting this on the west (left) is a small light-colored feature, which if you zoom in, looks like a 5-pointed star, this is Milichius 5 (as marked on the VMA). Using the line tool on the LROC QuickMap this has 3 bowl shaped locations. The main bowl is toward the east point, a smaller one toward the west point and the smallest near tip of the northeast point. This feature appears to be large volcanic caldera of some sort. East-west this feature is ~8.5 km, SW-NE ~7.6 km. From the east it drops down ~250 m from the west end ~100 m. The north and south points are created by raised hills rather than depressions. Two other features marked as volcanic are south of Milichius A. One due south is the elongated bump oriented SW-NE and is labeled Milichius A 1. The other is a little southwest of that, larger, elongated N-S and with a depress sion on top is labeled Hortensius DA 1.

I had never noticed Kepler as being polygonal but it clearly is in this image. There are 2 other polygonal craters as well. Encke about 5:30 from Kepler and of similar size and the smaller Kunowsky at about 5:00 on the edge of the image.

The crater centered near the bottom is Encke E. Above that in the middle is a complex of rills named Rimae Maestlin. The two main rills intrude into the filled in crater to the west, Maestlin R. Maestlin R is interesting in that even in the image the eastern 1/3 looks similar to the area to its east while the western 2/3 is smooth. Apparently, the whole crater was flooded earlier but later another lava flow covered only the western side sparing the east. Using the line tool in the LROC QuickMap I see why. Apparently after the earlier flooding the surface to the east of the crater rose, causing the then bottom of the crater to slant down toward the west. The line tool shows the rough side to angle down to the west, dropping ~350 m until reaching the smooth side. From there it angles slightly up to the west wall (by ~30 m). Also, the crater rim on east is about 500 m above the rim on the west.

There is a nice crater chain here as well. It starts on the rim of Maestlin R at the 3:00 position, just above a small crescent shape in the wall. It starts out as a string of craters large enough to see in the image (~2.5 km across) if you enlarge it, going slightly east of north. It veers slightly more east appearing as only line before it gets lost in the jumble of hills and craters, some of which may part of the chain. If you keep going in that direction it comes out of the hills and goes onto a flat area as a faint line, ending in a larger crater before you reach more hills.

Lunar Topographic Studies
Bessarion A, Kepler, Mare Insularum, Encke and Oceanus Procellarum

The Ridge That Crosses Pytheas

Alberto Anunziato

Pytheas is a Copernican crater (20 kms. diameter) in the area south of the Mare Imbrium, more precisely in the extensive zone affected by the material ejected by the impact that generated the Copernicus crater. Pytheas is relatively famous for its bands and modest system of asymmetrical rays. It was not until I could observe Pytheas at the exact edge of the terminator that I noticed that it was crossed by a delicate wrinkle ridge. This area, in the surroundings of Copernicus, seems exceptionally smooth, but not even the areas most similar to the plains in the Moon are smooth, the moon is eminently mountainous. Clearly, lunar observation lends itself to philosophical reflection: nothing is the way we perceive it with our senses. At the moment of the observation, the east wall of Pytheas shone very intensely and projected a very broad shadow, the west wall shone quite less and it was clear that there were differences in brightness which, Elger explains like this: "Its bright walls, rising about 2,500 feet above the Mare, are much terraced within, especially on the W" (The Moon, George Philip & son, London, 1895, page 78), to what we may add, to increase dramatism, that is very deep (more than 2 kilometers). Elger describes the ridge that we present in IMAGE 1: "There is a bright little crater on the N. outer slope, with a short serpentine ridge running up to it from the region S. of Lambert, and another winding ridge extending from the S. wall to the W. of two conspicuous craters, standing about midway between Pytheas and Gay-Lussac". In IMAGE 1 we see 3 segments: one to the north of Pytheas (without discernible topographical features), and two to the south, each one with a bright area, from which shine we deduce that it is the highest part of the ridge, the crest.

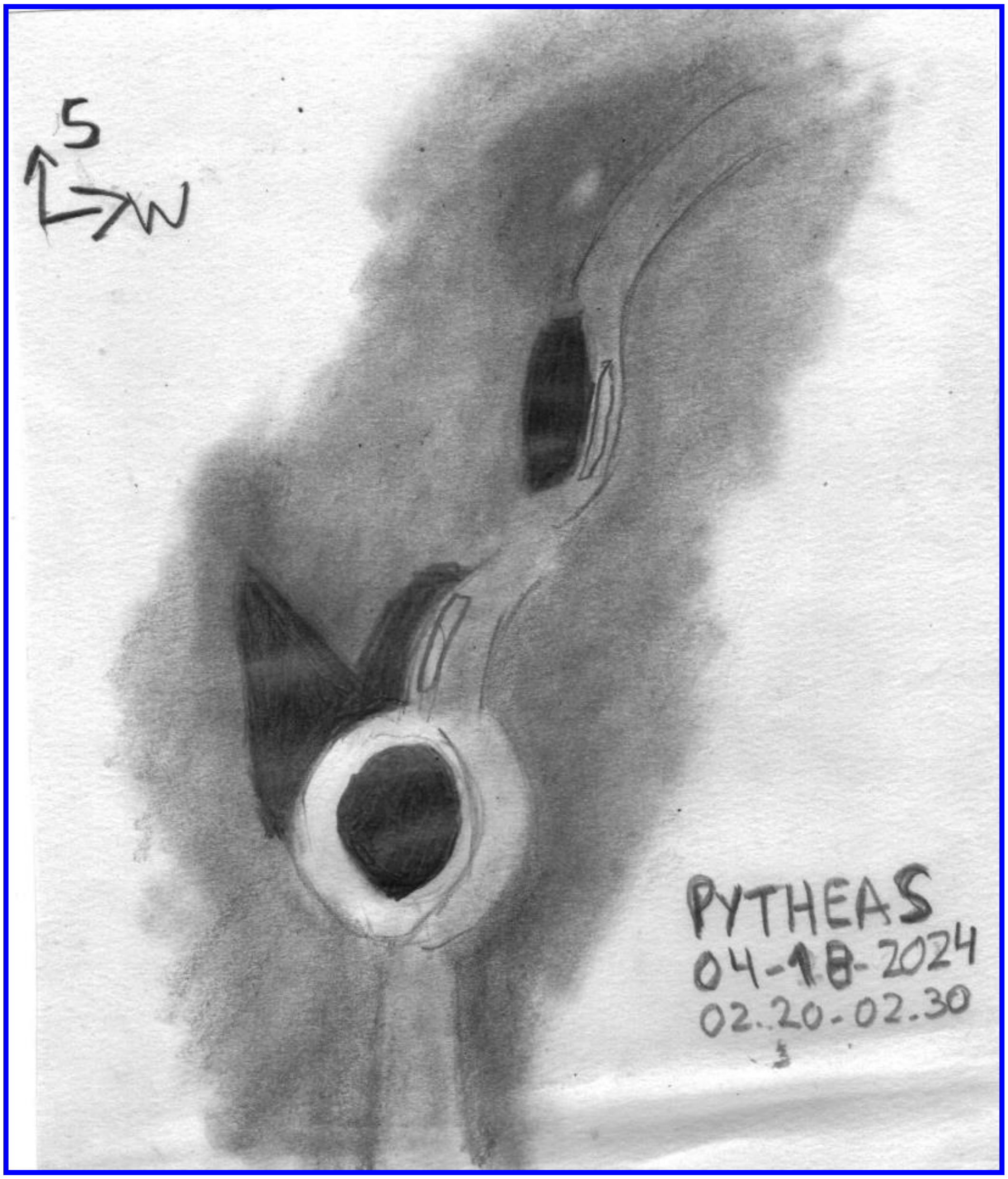

Image 1, *Pytheas, Alberto Anunziato, Paraná, Argentina. 2024 April 18 02:20-02:30 UT. Meade EX105 mm Maksutov-Cassgrain telescope.*

At the very top of the segment, the shadow is much brighter, is projected only by the arch, and on the inside, there is a not very bright point, which seems to coincide with a bright area in IMAGE 2, which we found in the Photographic Lunar Atlas for Moon Observers (Pau, Kwok Chuen, 2016, published by the author, Hong Kong). As always in this marvelous work, we encounter our little dorsum (page 239 of volume 2). The crests of the two segments on the top of IMAGE 1 are clearly visible in IMAGE 2 (we mark them with arrows). The shadow of the crest of the segment further up in IMAGE 1 is better understood with IMAGE 2: as the crest passes through the west slope, its shadow also includes a large part of the east slope (which should be not too steep). As always, visually the wrinkle ridges appear more sinuous than what they actually are, surely it is a question of resolution of the telescope: I cannot discern the lower areas of the ridge from the surface of the surrounding mare, as in the separation between the two segments at the south de Pytheas. A curious question. This ridge, as many others, crosses a crater. Elger was wondering about this connection: “It is a suggestive peculiarity of many of the lunar ridges, both on the Maria and elsewhere, that they are very generally found in association with craters of every size. Illustrations of this fact occur almost everywhere. Frequently small craters are found on the summits of these elevations, but more often on their flanks and near their base. Where a ridge suddenly changes its direction, a crater of some prominence generally marks the point, often forming a node, or crossing-place of other ridges, which thus appear to radiate from it as a center. Sometimes they intrude within the smaller ring-mountains, passing through gaps in their walls” (page 8). Surely it doesn't depend on anything else than the randomness of the impacts, but: how to know which feature first formed? “It is often not possible to determine whether a crater formed before or after the ridge itself. A crater uplifted during ridge formation may appear very similar to one which was emplaced on top of the ridge structure” (Yue, Z.,W. Li, K. Di, Z. Liu, and J. Liu (2015), Global mapping and analysis of lunar wrinkle ridges, *Journal of Geophysical Research: Planets*, 120, pp. 978–994, doi:10.1002/2014JE004777). We can’t seem to know, but we can deduce it, according to the paper cited: “ridge formation was not evenly distributed through time. A reasonable interpretation of our data could be that the majority of ridge formation occurred soon after basalt emplacement, followed by sporadic development at a rather low level. Local stresses from loading by basalt fill are probably the principal agent responsible for the formation of lunar wrinkle ridges as argued by numerous previous studies (…) Based on stratigraphic constraints that the youngest mare basalt units have been deformed by the wrinkle ridges, Watters and Johnson (2010) derived that formation of wrinkle ridges continued at least until as recently as □1.2 Ga ago”. Pytheas (as a Copernican crater) would thus be subsequent to the formation of the ridge that it cross

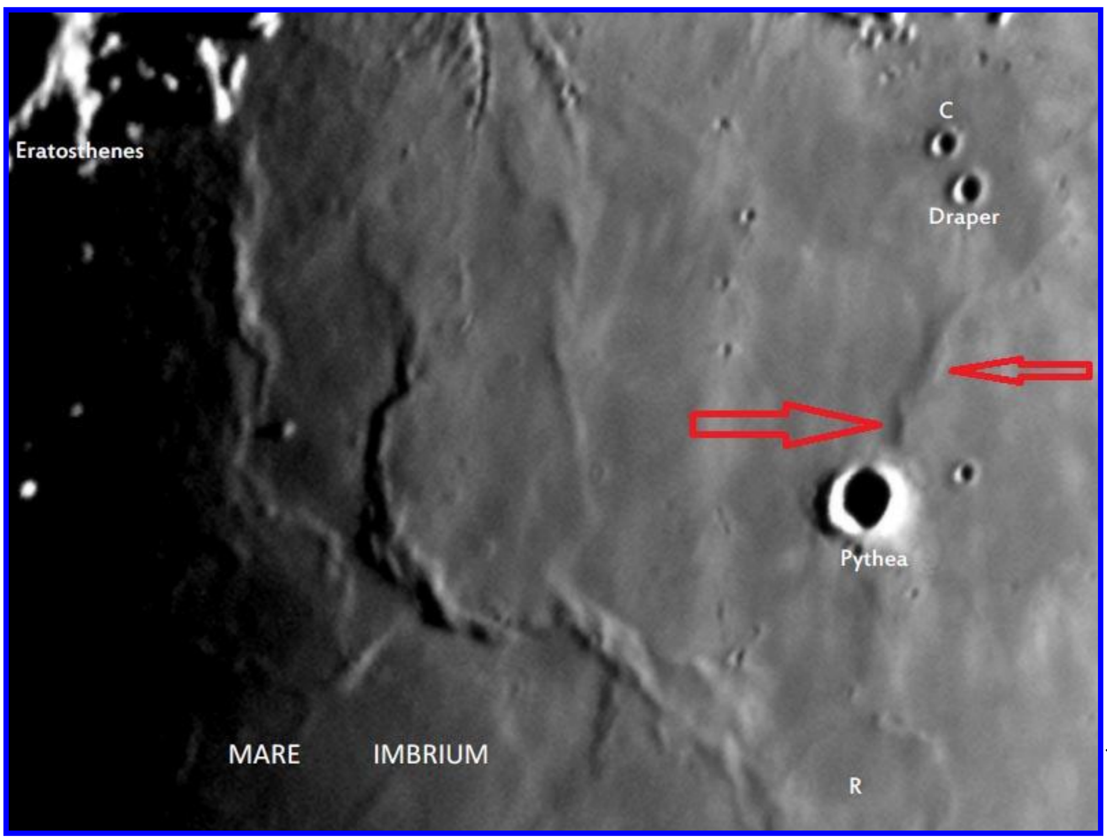

Image 2 Dorsum Pytheas, *Photographic Lunar Atlas for Moon Observers, Volume 2 page 239.*

Mare Frigoris (far west), Sinus Roris (east), Sinus Iridum (northeast), Mare-Imbrium (northwest) and Montes Recti

Paul Walker

At the extreme top right we have part of the crater Philolaus. The large relatively flat area to its left on the terminator doesn't appear to have name. The ridge on the far side of this area, center of terminator, appears to be the east rim of the crater Carpenter. The large crater on the far left of the terminator is J. Herschel. The smooth lava plain below that is Sinus Roris. To its right we have craters J. Herschel F and La Condamine B, ~18.8 km (11.7 mi) and 16.5 km (12.2 mi) respectively. To their right is the western end of Mare Frigoris. A piece of Sinus Iridum is in the lower left corner, separated from Mare-Imbrium (lower right) by a wrinkle ridge.

At the north end of the wrinkle ridge is Promontorium Laplace. Now I will lead you to a small rill in the mountains to the north. On Promontorium Laplace is the 10.6 km crater Laplace D. From there follow the shoreline of Mare-Imbrium until you see the similar but larger crater Maupertuis A (13.9 km). In the flat area just to the upper right (northeast) of this is a faint light colored "S" or "5" shaped rill, one of 2 that make up Rimae Maupertuis. If you enlarge the image and look carefully, you can see that the top of the "5" extends to where it ends between 2 small irregular craters. Comparing the image to the LROC QuickMap, you may be able to identify a small piece of the other rill to the right the 2 irregular craters.

Moving off the coast of Mare-Imbrium is the isolated 80 km long mountain range, Montes Recti.

Mare Frigoris (far west), Sinus Roris (east), Sinus Iridum (northeast), Mare-Imbrium (northwest), Montes Recti Paul Walker, Middlebury, VT, USA, (44°01'55"N, 73°09'20"W)
February 21, 2024 03:28UT, Lunation: 11.19 Colongitude: 48.0 deg
Sub-solar Lat: -1.1 deg, 10" f/5.6 Newt, 2x Barlow (3.39x), fl=4765mm, no filter, 0.155"/px org. image, Canon T7i (DSLR), HD video @ 3x "digital" zoom, 1/500 sec @ ISO 1600, paulwaav@together.net, Stack- 20% of 9237 frames, North up, smallest visible craters ~ 1.4km (0.9mi)
Processing: AutoStakker!3, Registax 6 (wavelets), Picture Window Pro 8
The terminator did not stack well, has a faint double image.

The Brightness of the Moon During an Eclipse as an Indicator of the Transparency of the Atmosphere

Alberto Anunziato

During a lunar eclipse, the Sun's rays are filtered by the Earth's atmosphere. The Moon presents variations in brightness in each eclipse, so the calculation of this brightness (photometry) is a useful tool to calculate the transparency of the filter, that is, of our atmosphere. That is the premise of a study that Giovanni Di Giovanni of the Osservatorio Astronomico CEA "A. Bellini" of the cooperative society COGECSTRE (cogecstre.com) in the city of Penne (Abruzzi, central Italy), has been carrying out for years, the synthesis of which can be read in "Lunar Eclipse Brightness and the terrestrial atmosphere" (Journal of the British Astronomical Association, vol.128, no.1, p.10-17).

The observations and study of the brightness of the Moon during an eclipse have an interesting historical implication: there are observations on the estimated color and brightness of the eclipsed Moon in various catalogs since 1670, so the study takes on an important diachronic dimension. The experimental technique to detect the brightness of the Moon during an eclipse consists simply of this: the brightness of the image of a detail of the lunar disk outside the eclipse, that is, the non-eclipsed Moon (called the reference Moon) is compared with the brightness of the image of the same detail of the lunar disk in eclipse, that is, immersed in shadow, or even in penumbra. Good mathematical software such as MATLAB or OCTAVE (free on the web) allows you to read the pixel values of each image (which are proportional to the duration of the exposure and the intrinsic brightness of the region of the Moon represented by that pixel).

We thus obtain the photometric density of each pixel that constitutes the image of the eclipsed Moon. More explicitly, this quantity expresses the brightness of the shadow that planet Earth projects on the lunar plane, it is worth around 4 inside the shadow and around 1 in the penumbra. The mathematical reduction work of the data can be read on page 13 of the cited article. With the numerical values of the photometric density it is possible to calculate not only the average transparency (optical thickness) of the atmosphere as a whole, but also the concentration of ozone in the Earth's stratosphere. The calculations are quite simple and direct. Only four formulas are needed, which bear the name: Colle Leone Formulae.

An interesting hypothesis to check and evaluate is the correlation between the reduction in the transparency of the atmosphere (deduced from the brightness values of the Moon during eclipses) and volcanic eruptions. The cited paper makes a fascinating analysis of the luminosity of 104 eclipses between 1703 and 2015 in correlation with volcanic eruptions: the transparency of the Earth's atmosphere was significantly reduced in the two years following each eruption, in which "dark" eclipses were observed. The correlation between eclipse darkness and volcanic eruptions in Di Giovanni's study shows how the atmosphere darkened dramatically after the most important volcanic eruptions, including the terrible eruption of Mont Pelée in 1902 that devastated the island of Martinique, the eruption of the volcano Tambora in Indonesia in 1815 (which caused the "year without summer" of 1816 and the colorful sunsets that William Turner, for example, portrayed in "The fighting Temeraire tugged to her last Berth to be broken up", or the famous Krakatoa explosion in 1883, also in Indonesia. The timeline tells us that from 1870 onwards the transparency of the atmosphere has been decreasing, which is not surprising because it coincides with the beginning of the so-called Second Industrial Revolution and the release of aerosols and greenhouse gases, although it also coincides with an increase in volcanic eruptions.

It is undoubtedly fascinating, we repeat the adjective, to be able to indirectly analyze the transparency of the atmosphere through the brightness of the eclipsed Moon. It is true that it is a difficult method due to how occasional eclipses are (on average one per year), but it is also true that it is the only one that allows us the diachronic analysis of said data in the almost four centuries of modern astronomy and detailed observation of eclipses. Data reduction (photometric images of eclipses from the 21st century with visual brightness estimates from the 16th century) allows us to recreate the history of our skies in the last times of humanity.

With the same spirit that animates amateur astronomical observation in general, and the moon in our particular case, it is possible to contribute our grain of sand to this fundamental study. Even with small optics (e.g. f300mm telephoto lenses) and digital cameras, good fit-for-purpose images of the Moon can be obtained, by obtaining images always with the same instrument (diameter and focal length), always with the same ISO, without filters, in the following sequence: at least two images before the eclipse, at least 3 images near the maximum phase and at least 2 images after the eclipse. Images should not be processed: There is no post-production!

From the Lunar Section of the Ibero-American League of Astronomy and the Argentine Lunar Society, we invited to participate in this study by observing the eclipse of March 25, which in Latin America was seen as penumbral, but which was not seen in Italy, so our observations could be used for the analysis of the current transparency of the Earth's atmosphere. Two prominent lunar observers from our association agreed to collaborate by obtaining images (two old acquaintances from the pages of this magazine): Jairo Andrés Chávez from Popayán, Colombia, and Raúl Roberto Podesta (physics professor at the University of Formosa, Argentina), who did it from that city. Unfortunately the Colombian clouds prevented Jairo from fully observing, but the weather was more benign for Raúl. The images we share belong to said observation campaign. The images of Jairo (IMAGE 1 and 2) are processed images, before the penumbra and the beginning of the penumbra respectively. Raúl's images are single frames of the Moon before the penumbra (IMAGE 3) and at the beginning of the penumbra phase (IMAGE 4 and 5).

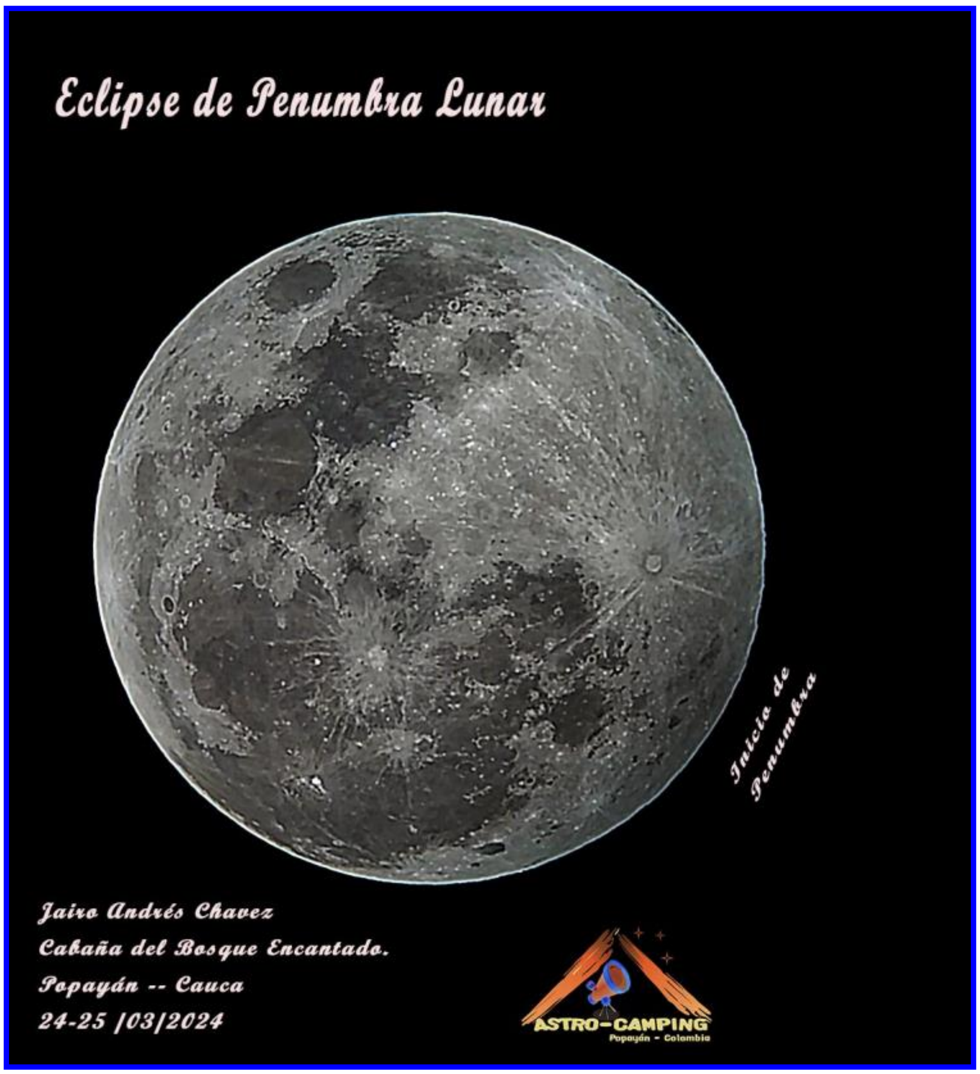

Image 1, Penumbral Lunar Eclipse, *Jairo, Chavez, Popayán, Colombia . 2024 March 25 05:56 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Image 2, Penumbral Lunar Eclipse, *Jairo, Chavez, Popayán, Colombia . 2024 March 25 06:06 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Image 3, Before the Penumbral Eclipse, *Raúl Roberto Podestá, Formosa, Argentina. 2024 March 25 04:47 UT. 80 mm refractor telescope, DSLR camera.*

Image 4, Penumbral Eclipse, Raúl Roberto Podestá, Formosa, Argentina. 2024 March 25 07:00 UT. 80 mm refractor telescope, DSLR camera.

Image 5, Penumbral Eclipse, Raúl Roberto Podestá, Formosa, Argentina. 2024 March 25 07:11 UT. 80 mm refractor telescope, DSLR camera.

Focus On: Crater Chains: The More the Merrier

Alberto Anunziato

On this occasion we focused on a doubly elusive category of lunar accidents: crater chains. Elusive because they are small not only for visual observation but also for photographic observation; and also because identifying and discerning their cause was very problematic. The specific term is “catena” (plural “catenae”), a Latin word that means, precisely, “chain”. A good definition, a broad definition, is Robert Garfinkle's: “A catena is an in-line chain or series of depression features. They appear to have been created by a series of impacting objects, such as comets or asteroids, which had broken up in space and their pieces impacted the Moon, one right after the other”. Garfinkle tells us that the term was used by the first great selenographer, the Polish Johannes Hevelius, in his monumental “Selenographia”. There were planetary events that helped explain the chains of craters on the Moon. In the images of the Voyager probe, two chains were detected on the satellites of Jupiter, Ganymede and Callisto, but it was in 1992 when the spectacular fragmentation of comet Shoemaker-Levy 9 showed us directly how the forces of Jupiter's gravitational tide acted and how the fragmentation process began, culminating in the impacts of 1994. In 1996, 8 crater chains on Callisto and 3 on Ganymede were confirmed, formed by impacts coming from the same body (almost always a comet, rarely an asteroid).

Let’s start with the most recognized crater chains, which bear the name of Catena, and among them, with which we can say they were the first ones to be explained, Catena Davy and Catena Abulfeda. According to Charles Wood in “The Modern Moon. A Personal View”, referring to Catena Davy (page 143): “The crater chain has been a mystery for many years. It is apparently not volcanic, since the craters don’t look like the volcanic pits found along the Hyginus rille and elsewhere. And there is no obvious source crater if the feature is a secondary crater chain. Robert Wichman (then at the University of North Dakota) and I proposed an explanation, as did Melosh and Whitaker of the University of Arizona. Suppose a comet or small asteroid passed so close to Earth that it was torn apart by Earth’s gravity, with the resulting pieces dispersing into a line. If such a train of particles hit the Moon, it could produce a crater chain like the one near Davy. This seem like a preposterous idea, but we have actually witnessed just such an event. In 1992 Comet Shoemaker Levy 9 passed perilously close to Jupiter and was gravitationally shredded into a “string of pearls” of 23 or more cometary fragments. These pieces sequentially collided with Jupiter in July 1994, in rapid fire sucession -on average one every 7 hours. Each impact created a flash as the speeding comet fragment was instantaneously transformed into heat. The aftereffect was a series of dark splotches in Jupiter’s atmosphere that persisted for many days”. This incredible event was like an experiment at a planetary level to explain other crater chains, on the Moon, by the example. The authors cited by Wood published in 1994 "Crater chains on the Moon: records of comets split by the Earth's tides?", whence they identified Catena Davy and Catena Abulfeda as possible crater chains formed by the fragmentation of comets that passed within the limit of roche of the Earth and, consequently, they fragmented and impacted on the Moon in the same way as the fragments of the comet Shoemaker-Levy 9 on Jupiter, taking into account that the gravitational tidal tension that suffers an object that passes the limit of Roche of the Earth is bigger even than the one that suffers those who are close to Jupiter at a similar distance. Later crater chains were discovered on Mars, Mercury and other bodies of the solar system.

Focus On: Chains of Craters-The More the Merrier

Davy Chain is an alignment of small craters (1 to 2 kilometers in diameter) that extends over a distance of 45 kilometers. Garfinkle states that they are Copernican craters. The alignment is seen perfectly in IMAGE 1 and its detail, thanks to the fact that the floor of the Davy crater is flooded with the lava that formed the nearby Mare Nubium. We can see that some of the craters are at a short distance and other superimposed one with the others, which we can also see in IMAGE 2 and 3. In the detail of this last one you can see a subdivision: the craters close to the east wall of Davy are superimposed while the ones closed to the center are seem top be more spaced from each other. Ptolemaeus and its surroundings is an ideal area to hunt for crater chains. The most visible of all, perhaps even more conspicuous than Catena Davy, is the one that extends from Müller Crater to the northern wall of Ptolemaeus. We can see this section in IMAGE 1 to 3 and in the details IMAGE 1 B and 3 B.

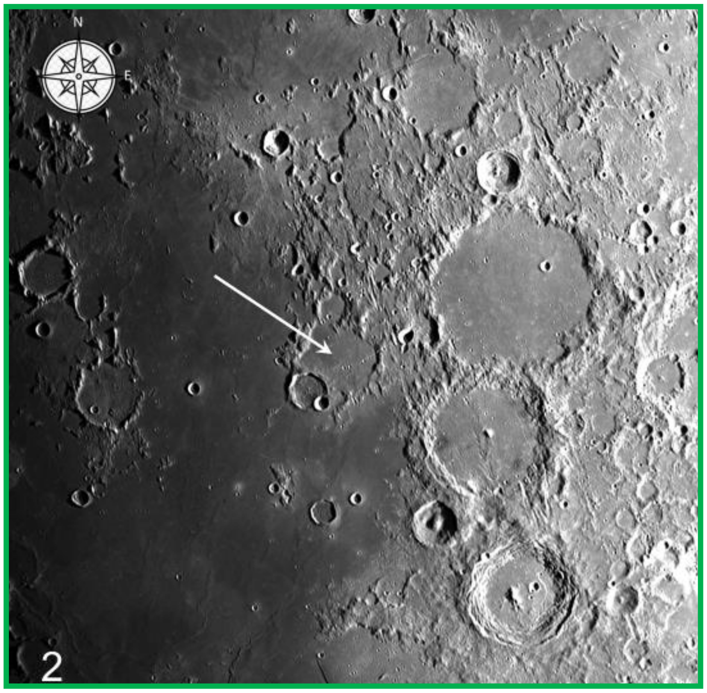

Image 1, Catena Davy, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2024 January 05 23:00 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO CMOS ASI 178 camera. Seeing 5/10, transparency 5/6.*

Image 1b, Catena Davy, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2024 January 05 23:00 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO CMOS ANSI 178 camera. Seeing 5/10, transparency 5/6. This is a close-up of image 1.*

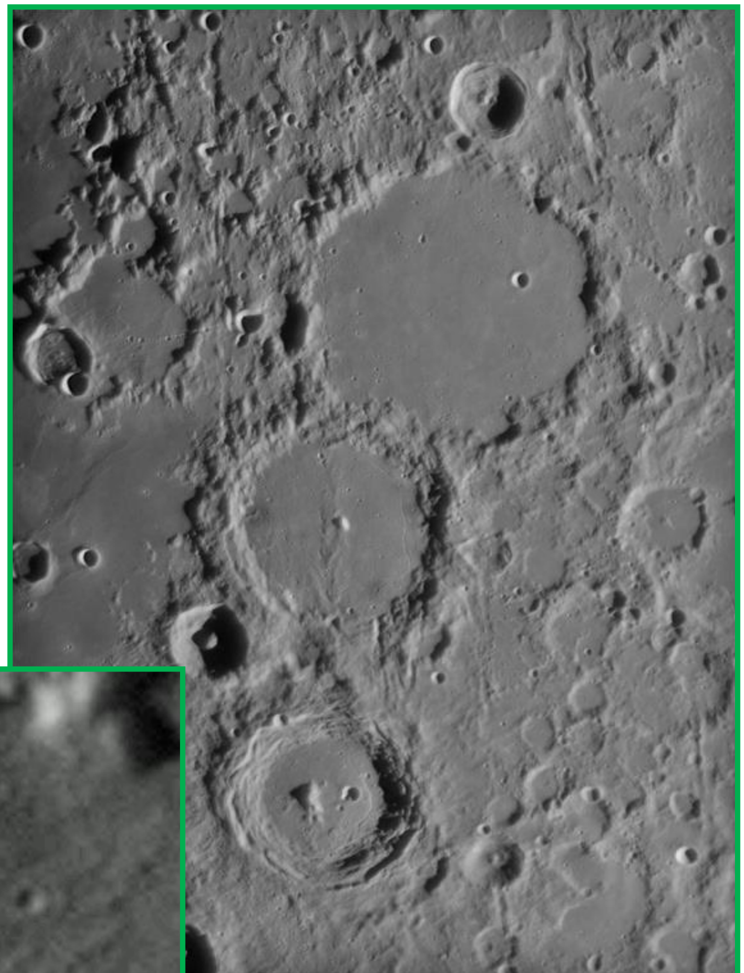

***Image 2, Alphonsus**, Erica Reisenauer, Oro Verde, Argentina. 2022 October 03 01:33 UT. 11 inch Schmidt-Cassegrain telescope, SVBONY IR pass 685 nm filter, QHY 5L-II-M camera.*

***Image 2a, Alphonsus**, Erica Reisenauer, Oro Verde, Argentina. 2022 October 03 01:33 UT. 11 inch Schmidt-Cassegrain telescope, SVBONY IR pass 685 nm filter, QHY 5L-II-M camera. This is a close-up of image 2.*

***Image 2b, Alphonsus**, Erica Reisenauer, Oro Verde, Argentina. 2022 October 03 01:33 UT. 11 inch Schmidt-Cassegrain telescope, SVBONY IR pass 685 nm filter, QHY 5L-II-M camera. This is a close-up of image 2.*

Focus On: Chains of Craters-The More the Merrier

Image 3, Catena Davy, *César Fornari, Oro Verde, Argentina. 2016 September 10 21:48. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, QHY5-II camera.*

Image 3a, Catena Davy, *César Fornari, Oro Verde, Argentina. 2016 September 10 21:48. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, QHY5-II camera. This is a close-up of image 3.*

Image 3b, Catena Davy, *César Fornari, Oro Verde, Argentina. 2016 September 10 21:48. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, QHY5-II camera. This is a close-up of image 3.*

Focus On: Chains of Craters-The More the Merrier

Like the Davy chain, it seems to have a subdivision, taking as the center the largest crater in the middle: “Running northwest from the western flank of Müller toward the northeastern wall of Ptolemaeus is an unnamed catena of over lapping cone craters. The largest member of this crater chain and is located next to Müller and is the satellite cone crater Müller F” (Garfinkle). The smaller craters are best seen in the detail of IMAGE 1 (1-B) and run from Müller A to Müller F, while the larger ones run from Müller F to the edge of Ptolemaeus. These larger craters are clearly superimposed, sharing walls, as seen in IMAGE 3 B. The best images of both chains of craters come below: IMAGE 4, IMAGE 5 (in which we also see in incredible detail the floor riddled with craters of Ptolemaeus, including some chains that we will see later), IMAGE 6, in which we learn the names of the craters that form Catena Davy, IMAGE 7 and detail 7A.

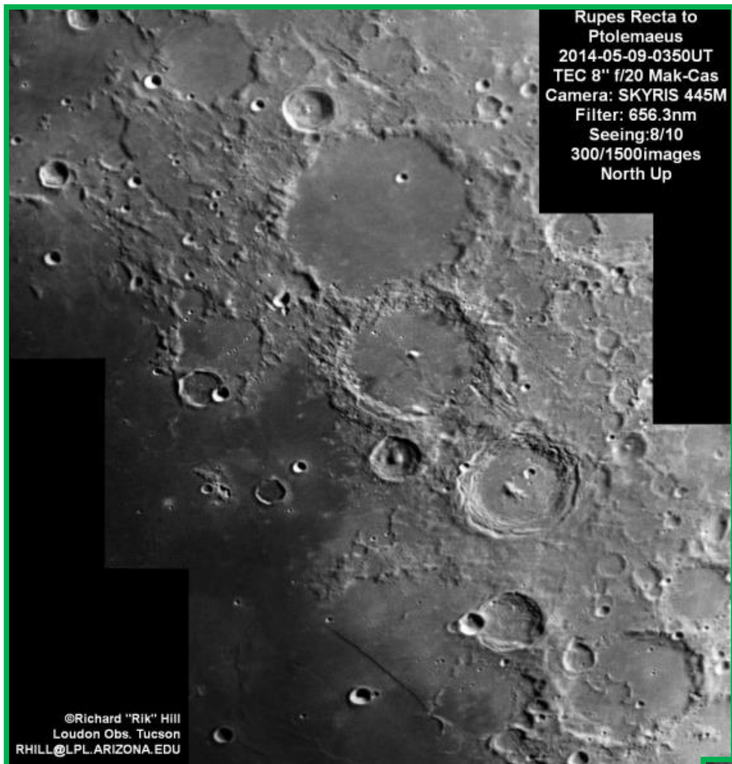

Image 4, Rupes Recta to Ptolemaeus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2014 May 09 03:50 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera, Seeing 8/10.*

Image 5, Catena Davy, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2019 May 14 02:33 UT, colongitude 27.0º. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera, Seeing 9/10.*

Focus On: Chains of Craters-The More the Merrier

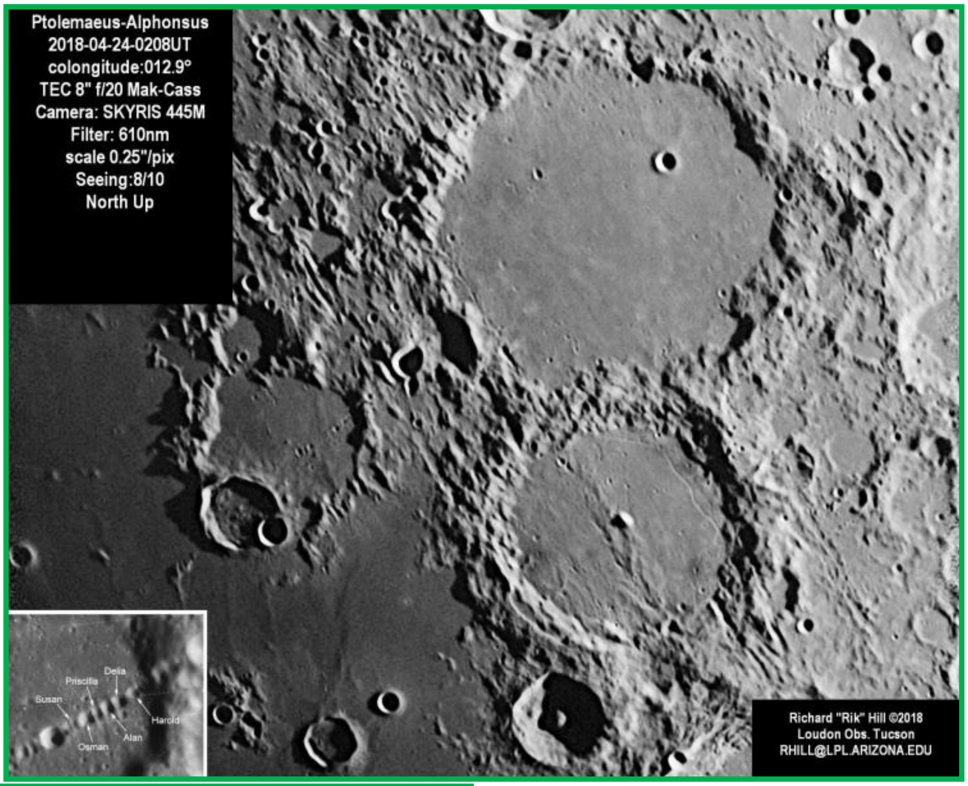

Image 6, Catena Davy, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2018 April 24 02:08 UT, colongitude 12.9°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera, Seeing 8/10.*

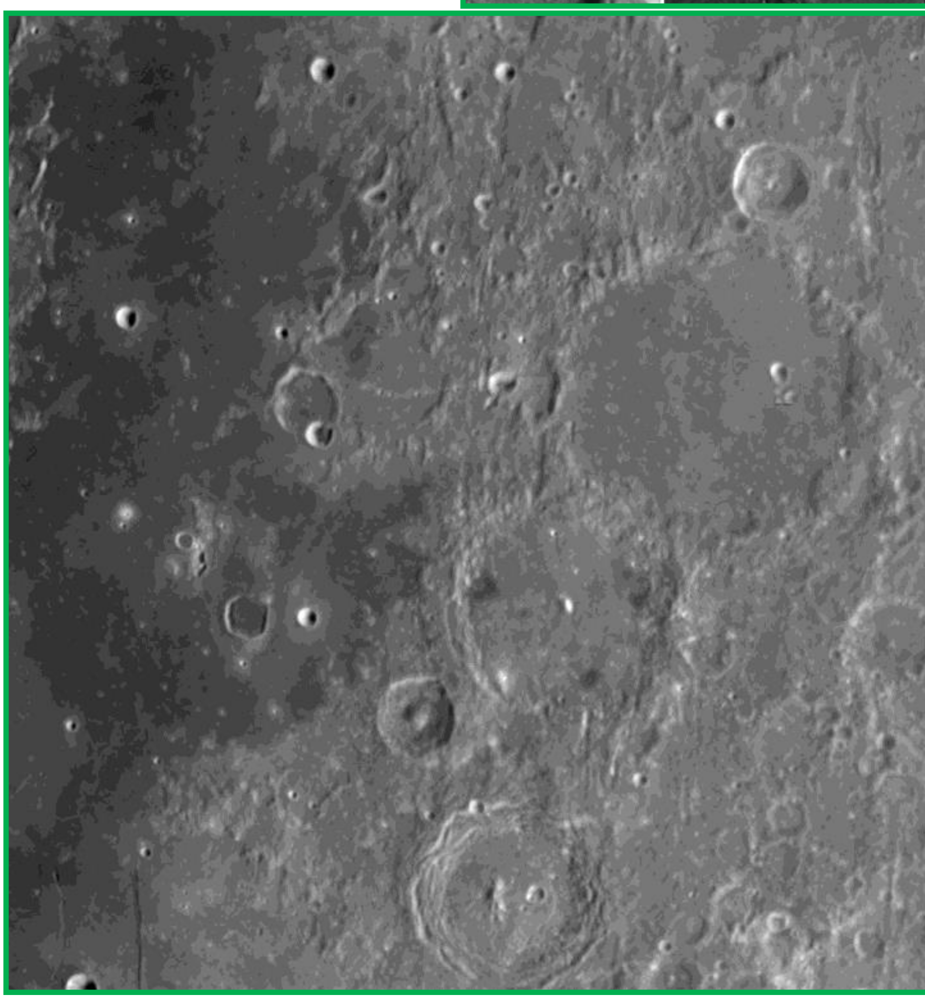

Image 7, Catena Davy, *Gregory Shanos, Sarasota, Florida, USA. 2024 March 21 02:19 UT. Meade LX200 ACF 8 inch Schmidt-Cassegrain telescope, Optec Lepus f/6.2 reducer, ASI 1ZWO 178MM camera. Seeing 4/10, transparency 9/10. Greg adds: "* Moon on March 20, 2024 at 9:33pm local time or March 21, 2024 at 01h 33m UT. The moon was at 85% phase and 71 degrees above the horizon. Meade LX200GPS ACF 8-inch alt-azimuth mounted with an Optec Lepus f/6.2 focal reducer. A ZWO ASI 178MM monochrome camera took a 90 second video which was aligned and stacked with Autostakkert 3.1.4 and sharpened with Registax 6.1. Further processing in Photoshop CS4. Seeing conditions were 4/10 with a jet stream. The transparency was perfectly clear at 9/10. The three large craters Ptolemaeus, Alphonsus and Arzachel are evident. Between Ptolemaeus and Davy crater are a chain of craters known as Davy Catena are visible. Image by Gregory T. Shanos."

Focus On: Chains of Craters-The More the Merrier

Image 7a, Catena Davy, *Gregory Shanos, Sarasota, Florida, USA. 2024 March 21 02:19 UT. Meade LX200 ACF 8 inch Schmidt-Cassegrain telescope, Optec Lepus f/6.2 reducer, ASI 1ZWO 178MM camera. Seeing 4/10, transparency 9/10. Greg adds: "*Moon on March 20, 2024 at 9:33pm local time or March 21, 2024 at 01h 33m UT. Cropped from the above image, Catena Davy is 47 km (29.2 miles) in length and contains a total of 23 craters. The craterlet in the middle of the chain is 2.6 km (1.6 miles) Davy YA. The large crater is Davy 35 km (21.7 miles) and smaller crater Davy A at 15 km (9.3 km). This crater chain is hypothesized to have occurred from a disrupted comet or asteroid similar to the Shoemaker-Levy 9 impact on Jupiter. Image by Gregory T. Shanos."

Another very conspicuous chain is Catena Abulfeda, which takes its name from the crater of the same name, at some distance west of Cyrillus: "This Imbrian-age decremental crater chain runs for about 209.97 km (130.46 miles) generally northwest to southeast from south of the crater Abulfeda, north of the crater Almanon, and ends on the floor area near the base of Rupes Altai. Although too large to have been a member of the impacting objects that created the loose catena, the crater Almanon C impacted along the catena alignment" (Garfinkle). We see it in IMAGE 8 and especially in IMAGE 9.

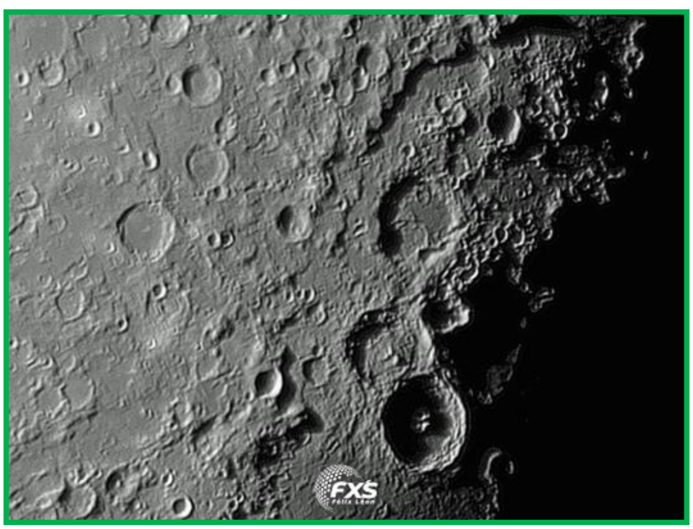

Image 8, Theophilus*, Felix León, Santo Domingo, República Dominicana. 2022 October 15 05:12 UT. 8 inch Schmidt-Cassegrain telescope, DMK 12 618 AU camera. North is down, west is right.*

Focus On: Chains of Craters-The More the Merrier

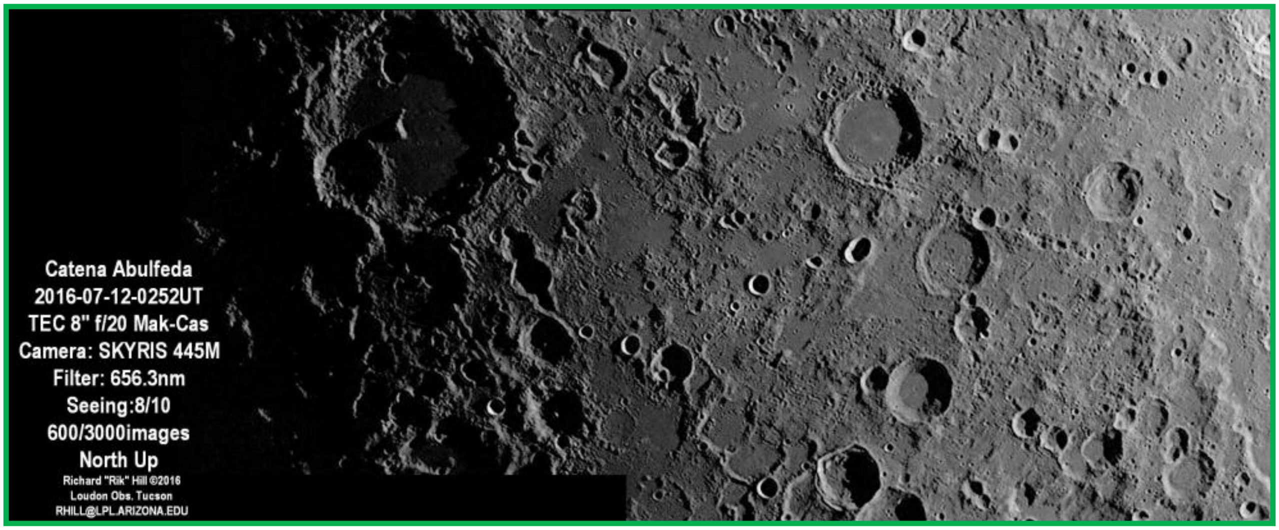

Image 9, Catena Abulfeda, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2016 July 12 02:52 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera, Seeing 8/10.*

In the pioneering study by Melosh and Whitaker an interesting comparison is made between Catena Abulfeda and Catena Davy: "Although the Davy chain is a relatively fresh, post-Imbrian chain, the Abulfeda chain is more degraded and is assigned an Imbrian age. The disparity in the lengths of these chains might at first suggest that they do not have similar origins. However, a simple model for tidal splitting that assumes a radial breakup at perigee shows that the length of the chain is a linear function of the parent size. Since the craters in Abulfeda chain are roughly 5 times larger than those in the Davy chain, it is not unreasonable that the Abulfeda chain is roughly 5 times longer (…) The length of crater chains on the Moon created by objects splitting within the Earth's Roche limit is thus very sensitive to the approach velocity, as low approach velocities allow a long time for the fragments to separate".

Another of the known and very easy to observe chains of craters is a "megachain" and is known as a valley: Vallis Reita, a string of craters, but on steroids. A 445-kilometer-long valley formed by craters up to 30 kilometers in diameter which share walls with their neighbors (IMAGES 10 to 14). These craters are secondary, fragments detached from a main impactor, although this impactor has colossal dimensions (the meteorite that formed the Mare Nectaris basin): "Megacrater alignments such as the Rheita Valley are essentially just secondary crater chains-monstrous versions of the lines of small secondaries radiating from young craters like Copernicus. The region around Janssen has emerged as a well-preserved museum of grooves and secondary craters formed by ejecta from the Nectaris impact basin" (Wood, page 106). Vallis Rheita, unlike the previous ones, has an exogenous origin, not a fragmented comet but an earlier larger impact.

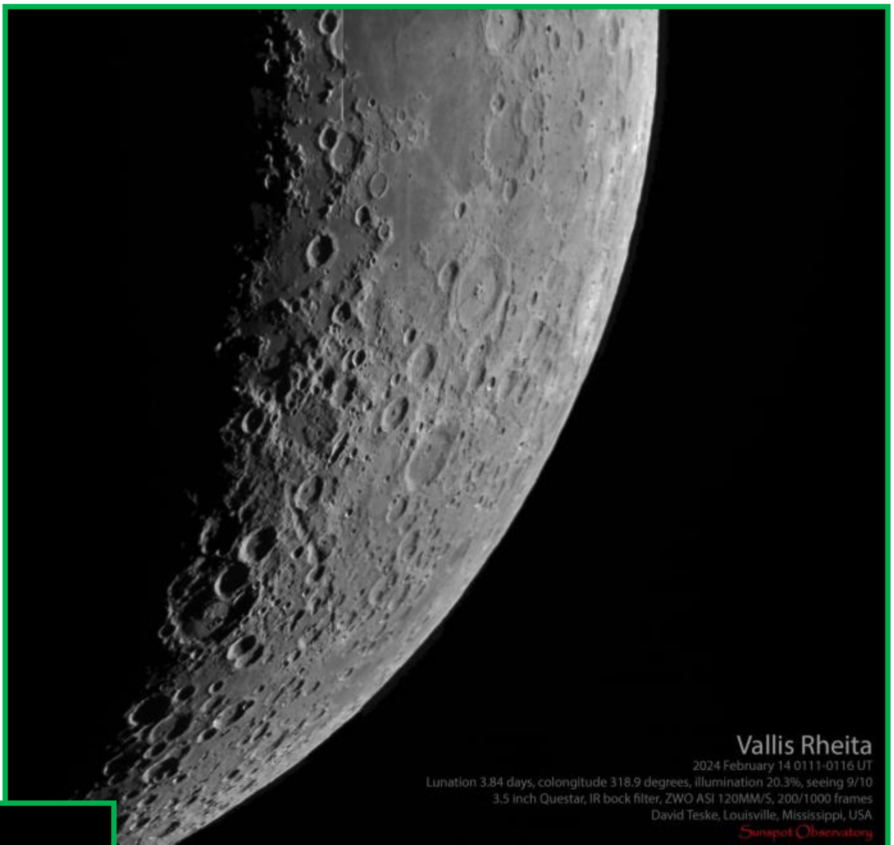

Image 10, Vallis Rheita, *David Teske, Louisville, Mississippi, USA. 2024 February 14 01:11-01:16 UT, colongitude 318.9 degrees. 3.5 inch Questar telescope, IR block filter, ZWO ASI120MM camera.*

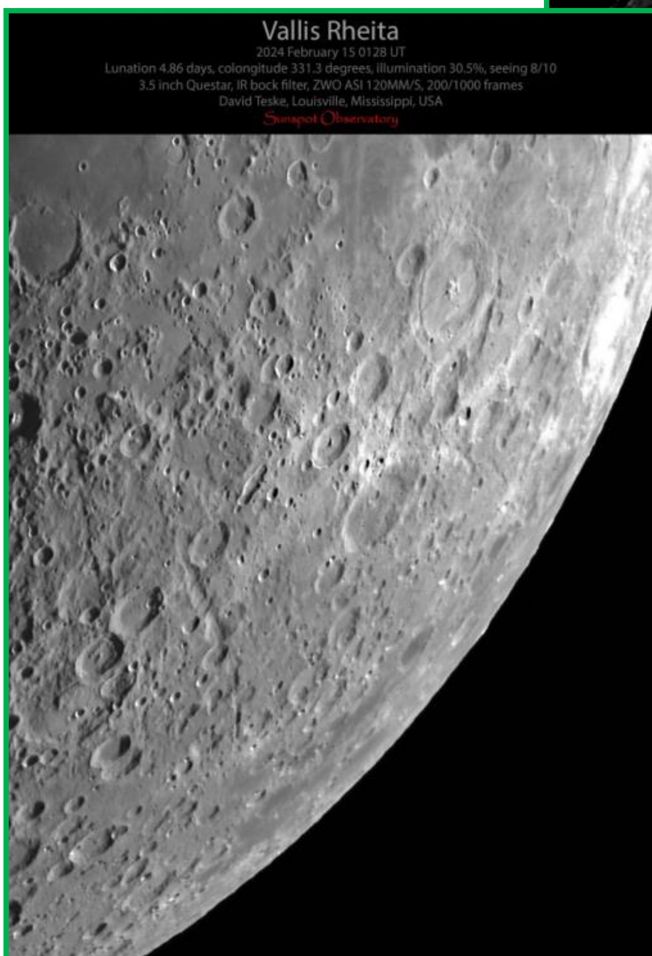

Image 11, Vallis Rheita, *David Teske, Louisville, Mississippi, USA. 2024 February 15 01:28 UT, colongitude 331.3 degrees. 3.5 inch Questar telescope, IR block filter, ZWO ASI120MM camera.*

Focus On: Chains of Craters-The More the Merrier

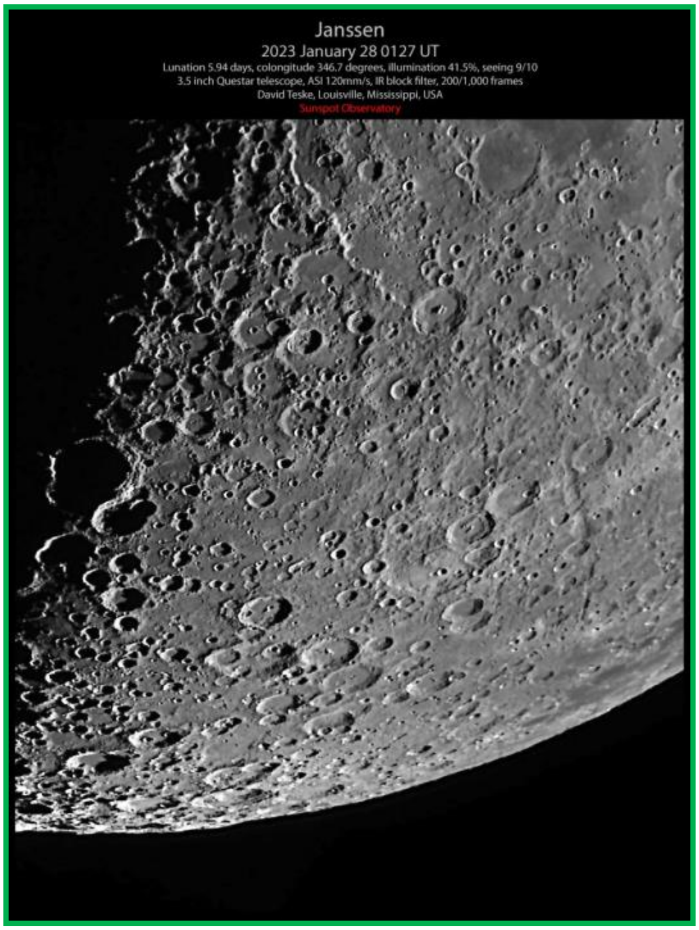

Image 12, Janssen, *David Teske, Louisville, Mississippi, USA. 2023 January 28 01:27 UT, colongitude 346.7 degrees. 3.5 inch Questar telescope, IR block filter, ZWO ASI120MM camera.*

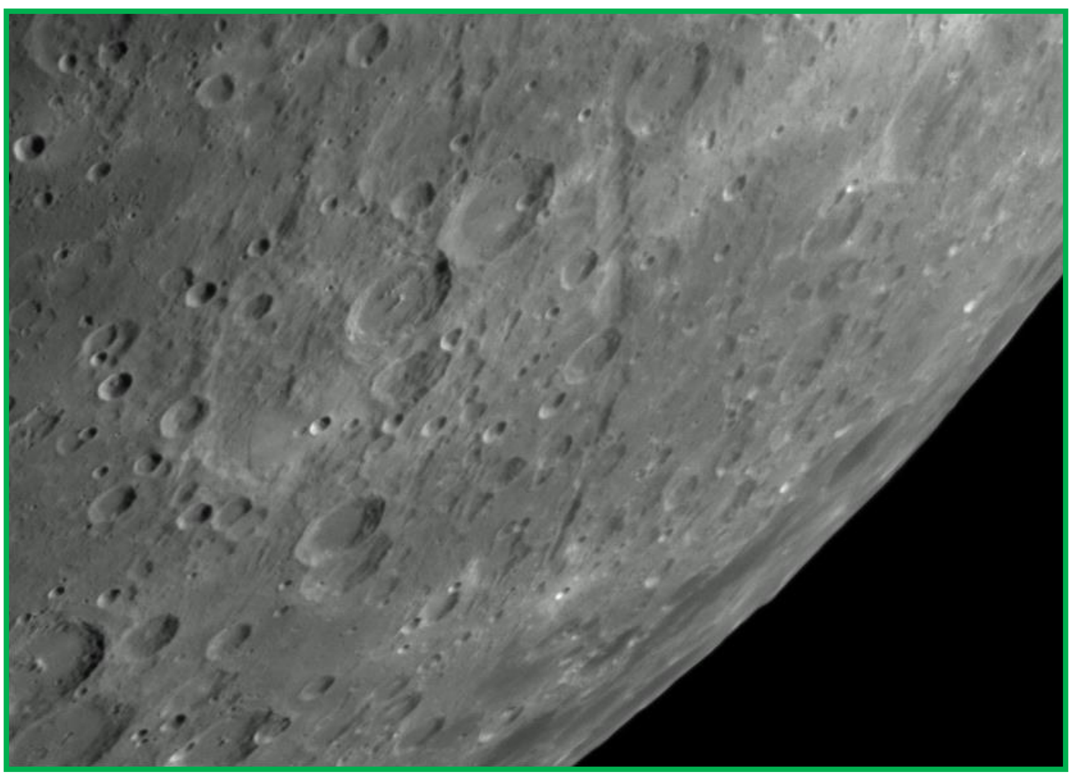

Image 13, Metius*, Desireé Godoy, Oro Verde, Argentina. 2016 October 09 01:28 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, Astronomik Pro-Planet 742 nm IR-pass filter, QHY5-II camera.*

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Image 14, Rheita, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2019 August 06 23:21 UT. 200 mm refractor telescope, IR pass filter, QHY5-I camera.*

From the colossal Vallis Rheita we move on to a miniature version, Vallis Capella, which we can see in IMAGES 15 and 16 and its details. This is Garfinkle's description: "This feature is actually a crater chain. The catena begins northwest of the crater Capella, cuts southeastward through Capella's rim in two places, and forms a wide channel that runs southeastward toward an area north of the crater Gaudibert. The vallis is about 49 km (30.4 miles) in length".

Image 15, Theophilus, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2017 July 01 23:20 UT. 200 mm refractor telescope, QHY5-II camera.*

Focus On: Chains of Craters-The More the Merrier

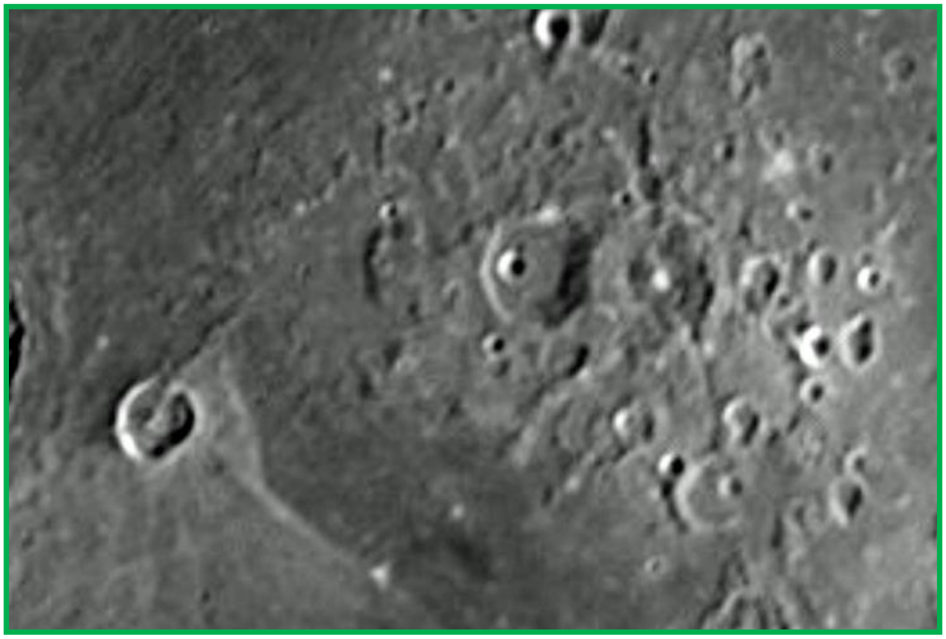

Image 15a, Theophilus, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2017 July 01 23:20 UT. 200 mm refractor telescope, QHY5-II camera. This is a close-up of image 15.*

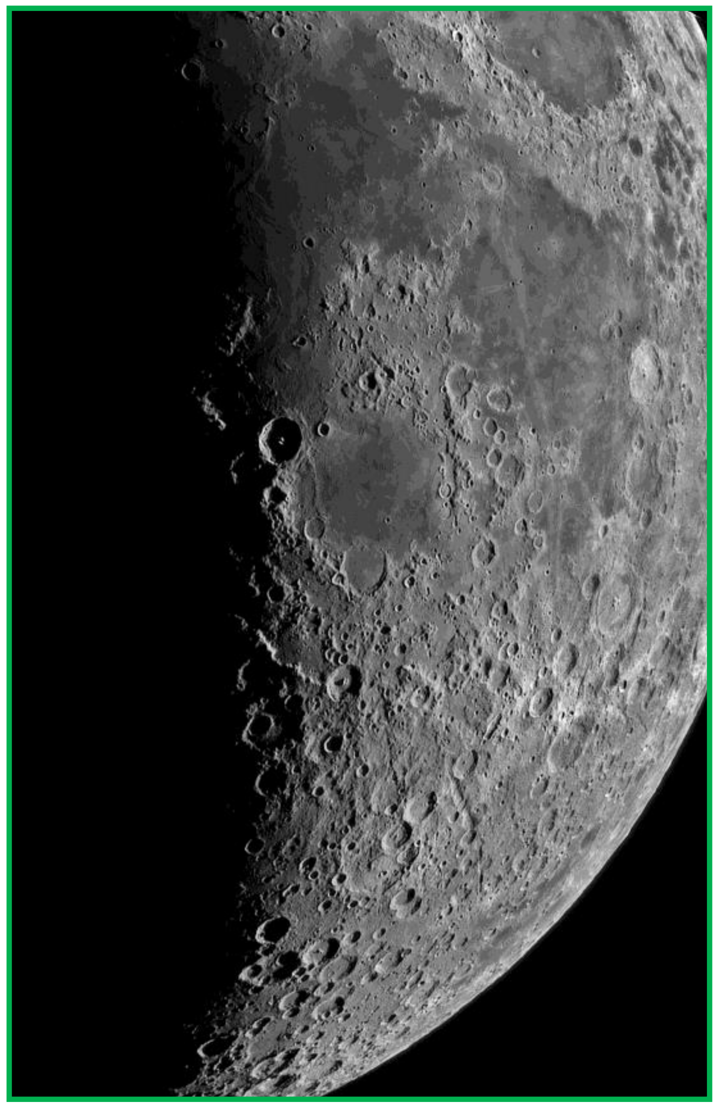

Image 16, Theophilus, *Sergio Babino, Montevideo, Uruguay. 2018 October 14 23:21 UT. 81 mm refractor telescope, ZWO ASI174MM camera.*

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Image 16a, Theophilus, *Sergio Babino, Montevideo, Uruguay. 2018 October 14 23:21 UT. 81 mm refractor telescope, ZWO ASI174MM camera. This is a close-up of image 16.*

The formation of the large basins has generated many chains of craters, such as the examples of Vallis Rheita and Vallis Capella and also the chains of craters that you see in the vicinity of Schiller, as in IMAGE 17 and its detail IMAGE 17 A, in which we see that two chains of craters intersect in the Segner crater. Says Garfinkle: “The Schiller region and the “Schiller Basin.” The basin is the flat region outlined by the western wall of Schiller, the southern walls of Weigel, Weigel A, and Segner, then northwest to Phocylides, east to Nöggerath, and then back to Schiller. To the southwest of Segner is the crater Zucchius with its central peak complex. The crater chains on the floor of the basin are radial to the “Orientale Basin” to the northwest of this region”. If they come from the Orientale basin, they are the chains of craters that run from west to east and that we also see in IMAGE 18, 19 and 20 and their detail. Now, returning to IMAGE 17 A, there is an important chain of non-overlapping craters running north-south, which perhaps, unlike the other chains in the Schiller basin, are of exogenous origin.

Image 17, Schickard*, Felix León, Santo Domingo, República Dominicana. 2021 March 27 00:10 UT. 127 mm Maksutov-Cassegrain telescope, DMK 12 618 AU camera. North is down, west is right.*

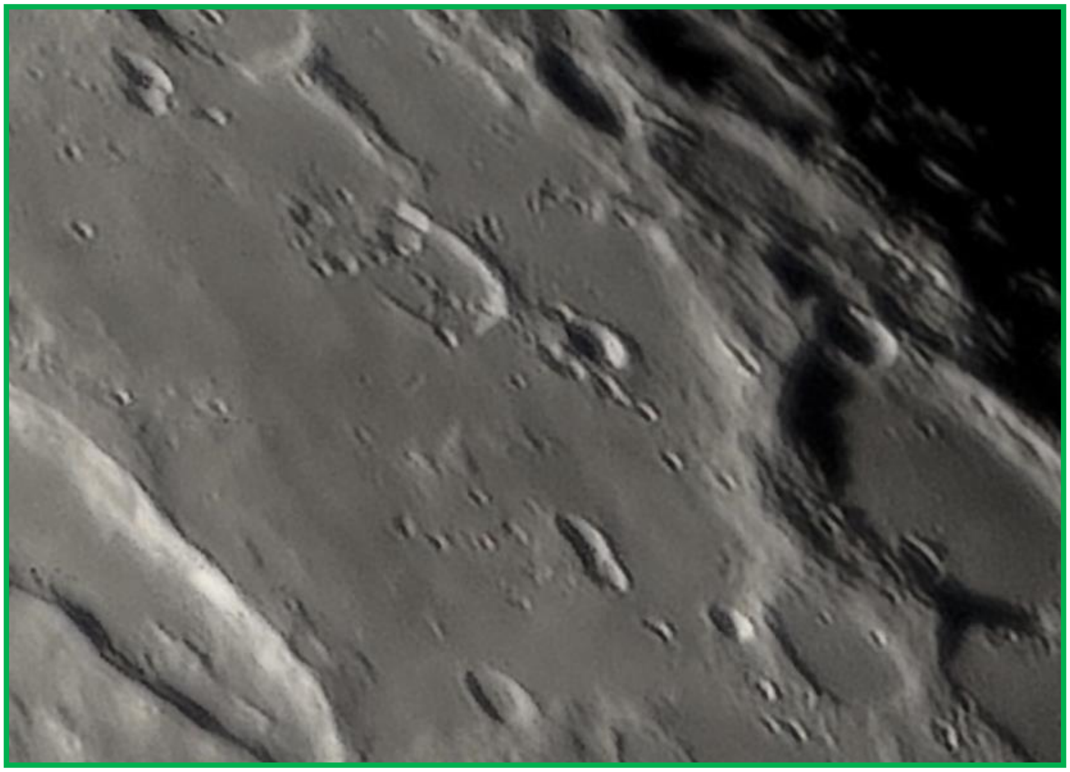
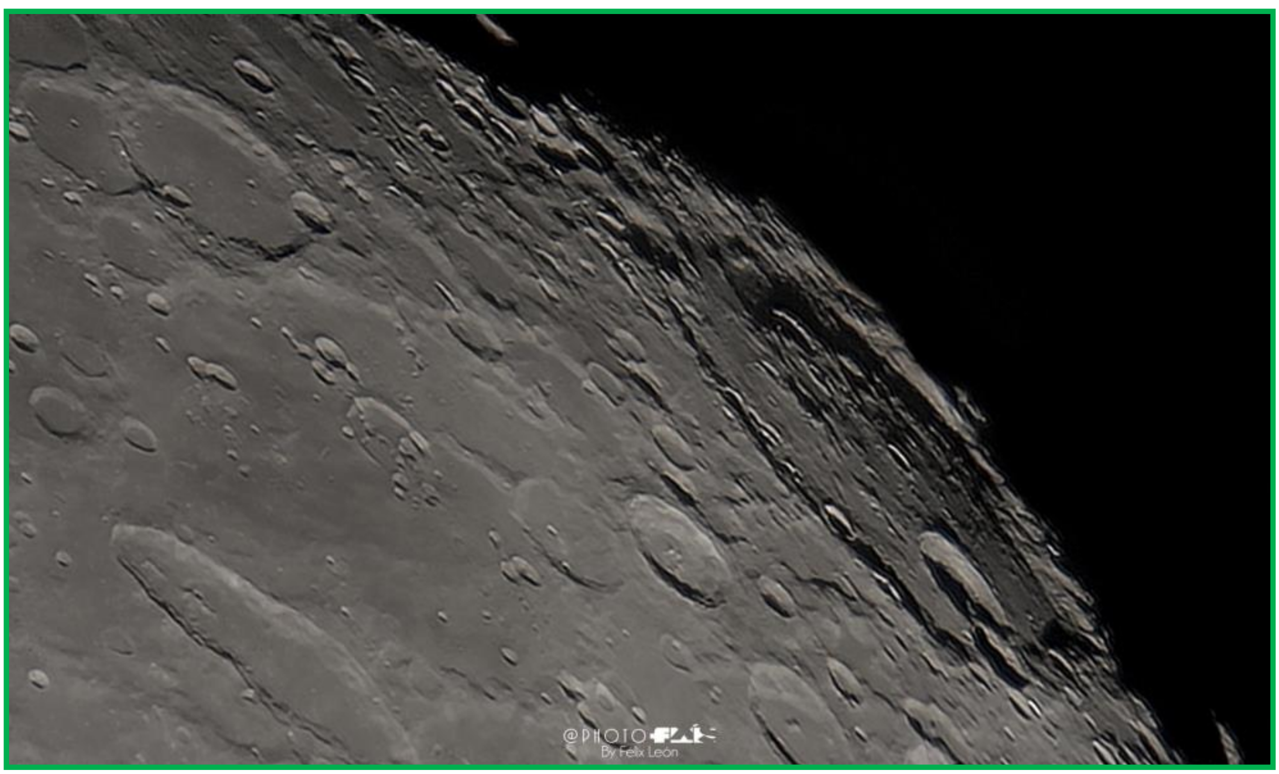


***Image 17a, Schickard**, Felix León, Santo Domingo, República Dominicana. 2021 March 27 00:10 UT. 127 mm Maksutov-Cassegrain telescope, DMK 12 618 AU camera. North is down, west is right. This is a close-up of image 17.*

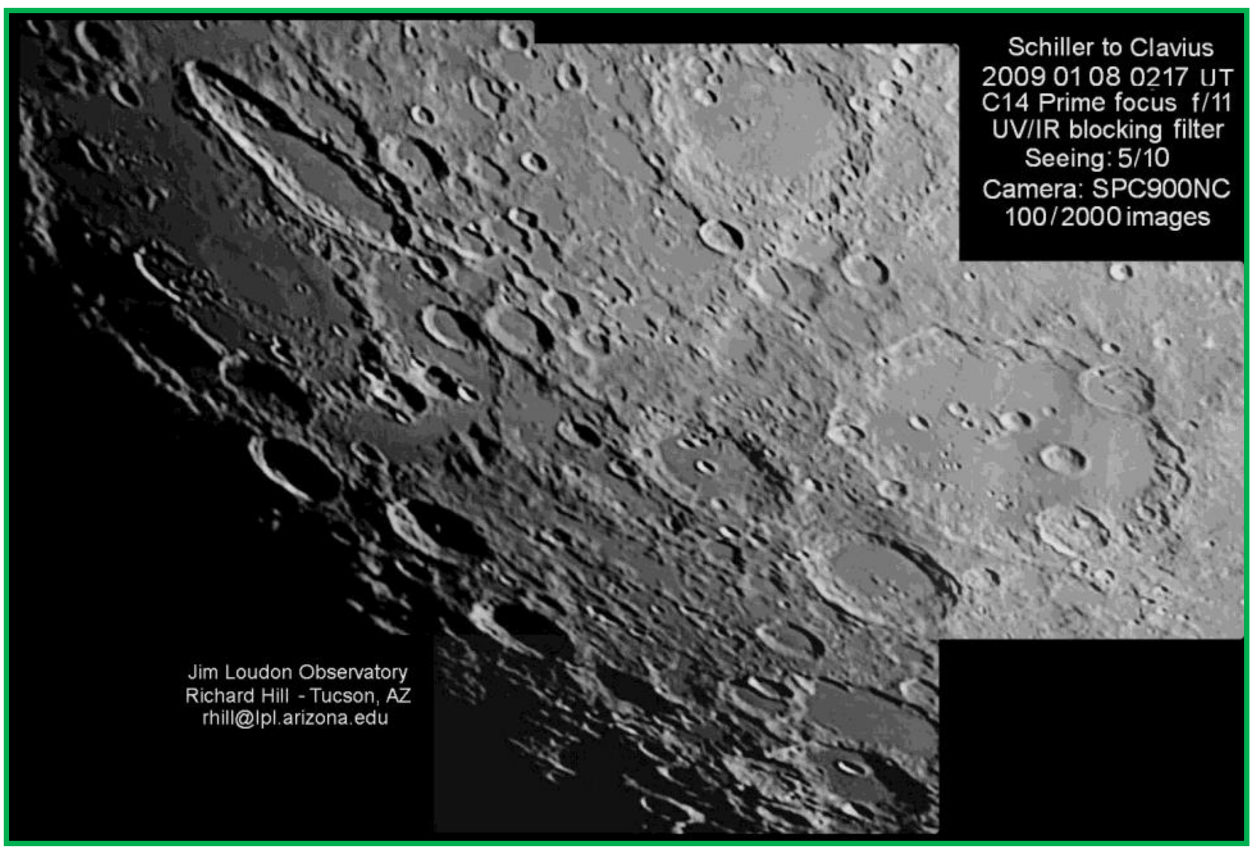
***Image 18, Schiller**, Felix León, Santo Domingo, República Dominicana. 2021 March 27 00:20 UT. 127 mm Maksutov-Cassegrain telescope, DMK 12 618 AU camera. North is down, west is right.*



Focus On: Chains of Craters-The More the Merrier

Image 19, Schiller, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 December 11 03:33 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomik Pro-Planet 742 nm IR pass filter.*

Image 20, Schiller to Clavius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2009 January 08 02:17 UT. Celestron 14 inch f/11 Schmidt-Cassegrain telescope, UV/IR blocking filter, SPC900NC camera, Seeing 5/10.*



Focus On: Chains of Craters-The More the Merrier

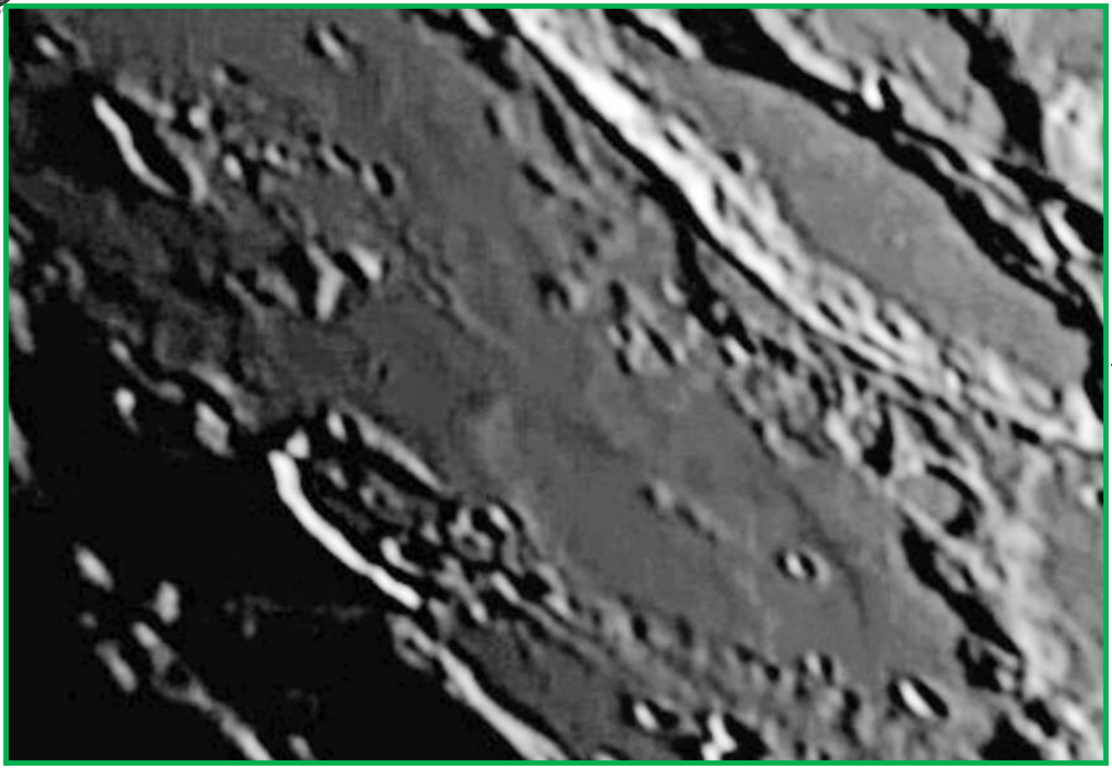


Image 20a, Schiller to Clavius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2009 January 08 02:17 UT. Celestron 14 inch f/11 Schmidt-Cassegrain telescope, UV/IR blocking filter, SPC900NC camera, Seeing 5/10. This is a close-up of image 20.*

Other chains of craters originating from secondary impacts of large craters are the chains of craters radial to Eudoxus (IMAGE 21 and detail, IMAGE 22 and detail). In images 21 A and 22 A we chose the most prominent of those observed, but there are many more, almost all with superimposed craters. Continuing with chains of secondary craters, the unnamed chain that we see in IMAGE 23 and 24 was discovered when collecting images for the Focus On Section dedicated to Sinus Iridum, thanks to a text by Charles Wood: “Look at the faint line of brightening that runs diagonally across the bay toward Bianchini - see the small pits along it? This is a ray but what was its source? Could it be Copernicus, more than 1000 km to the south?” (Wood, 2006). As far as I remember, it is the first time that I have seen a bright ray coincide with a row of secondary craters, not because it is impossible, since both selenographic features have the same origin (a meteorite impact) but because the bright rays disappear faster and are even more difficult to observe than secondary craters. The relative geological youth of Copernicus (according to Wood's hypothesis) allow us to see both phenomena coinciding (until the bright ray, which is already very faint), disappears. Also, on the floor of Clavius we see several secondary impacts in a row (IMAGE 25 and 26), and also some chain of craters (that is, originating from the fragmentation of a comet or asteroid and not a main impact), as we see in the detail of IMAGE 26, in which we see 3 superimposed craters. Secondary impact chains show craters separated from each other, the chains themselves almost always have overlapping craters (the degree of proximity of the craters to each other, as we have already seen, depends on the impact speed of the fragments). In IMAGE 27, a wide field image, we see (if we zoom in) both types of chains, for example in Maginus (below Clavius, to the south) we see secondary craters on its floor and in Jacobi (27 A) a chain of superimposed craters that mentions Garfinkle: (“This Imbrian-age crater is about 66.28 km (41.18 miles) in diameter and 3490 m (11,450 feet) deep. The degraded walls gently slope down to the pockmarked floor. A chain of craters cuts diagonally across the floor. Two of these craters are lettered”). More difficult to establish whether it is a catena or a row of secondary craters is what was previously known as Rima Ptolemaeus, strongly degraded (IMAGE 28 and its detail 28 A, at the top of the image): “Near the base of the western wall, to the west of Ptolemaeus M, is the crater chain formerly misnamed “Rima Ptolemaeus” (Garfinkle).

Image 21, Aristoteles, *Germán Savor, Oro Verde, Argentina. 2022 October 03 01:50 UT. Celestron 11 inch Schmidt-Cassegrain telescope, SVBony IR pass 685 nm filter, QHY5L-IIM camera.*

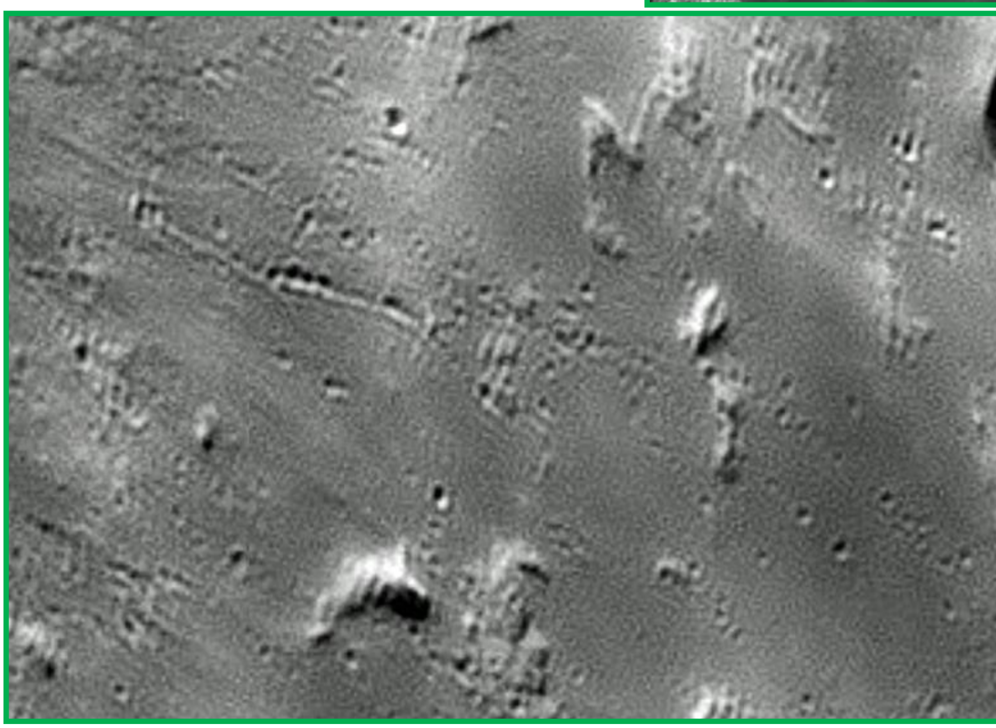


Image 21a, Aristoteles, *Germán Savor, Oro Verde, Argentina. 2022 October 03 01:50 UT. Celestron 11 inch Schmidt-Cassegrain telescope, SVBony IR pass 685 nm filter, QHY5L-IIM camera. This is a close-up of image 21.*

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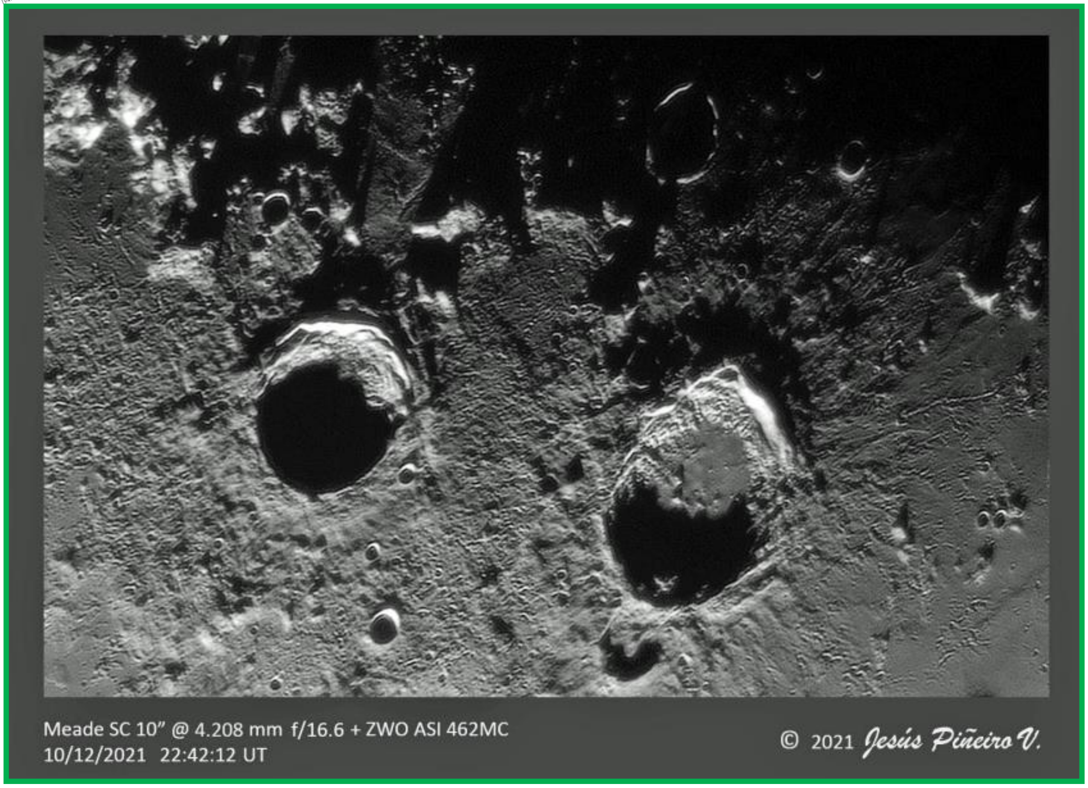

Image 22, Eudoxus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 10 22:42 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UV-IR 2" filter, ZWO ASI462MC camera. North is to the right, west is up.*

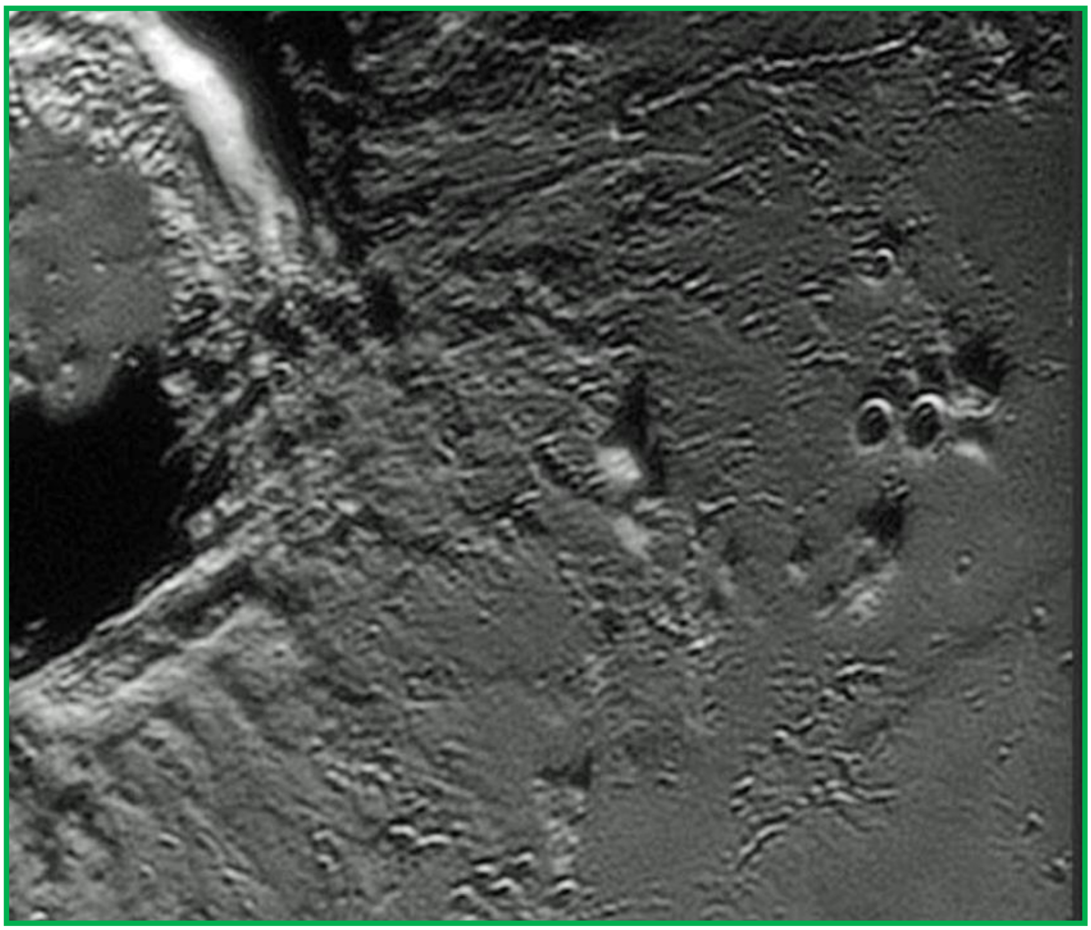

Image 22, Eudoxus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 10 22:42 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UV-IR 2" filter, ZWO ASI462MC camera. North is to the right, west is up. This is a close-up of image 22.*

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Image 23, Sinus Iridum, *Ken Vaughan, Victoria, British Columbia, Canada. 2023 October 26 04:38UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*

Image 24, Sinus Iridum, *Massimo Bianchi, Milan, Italy. 2022 April 13, 19:00 UT. Vixen VMC 260L Maksutov-Cassegrain telescope, Baader Green filter, ZWO ASI178MM camera. Seeing 4/10.*

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Image 24a, Sinus Iridum, *Massimo Bianchi, xxxxx. 2023 March 04, 19:016 UT. Vixen VMC 260L Maksutov-Cassegrain telescope, Baader Green filter, ZWO ASI178MM camera. Seeing 4/10.*

Image 25, Clavius, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2018 July 22 23:51 UT. 150 mm refractor telescope, Orion V-block filter, ZWO CMOS ASI camera.*

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Image 26, Clavius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2019 March 17 03:38 UT, colongitude 39.8º. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera, Seeing 8/10.*

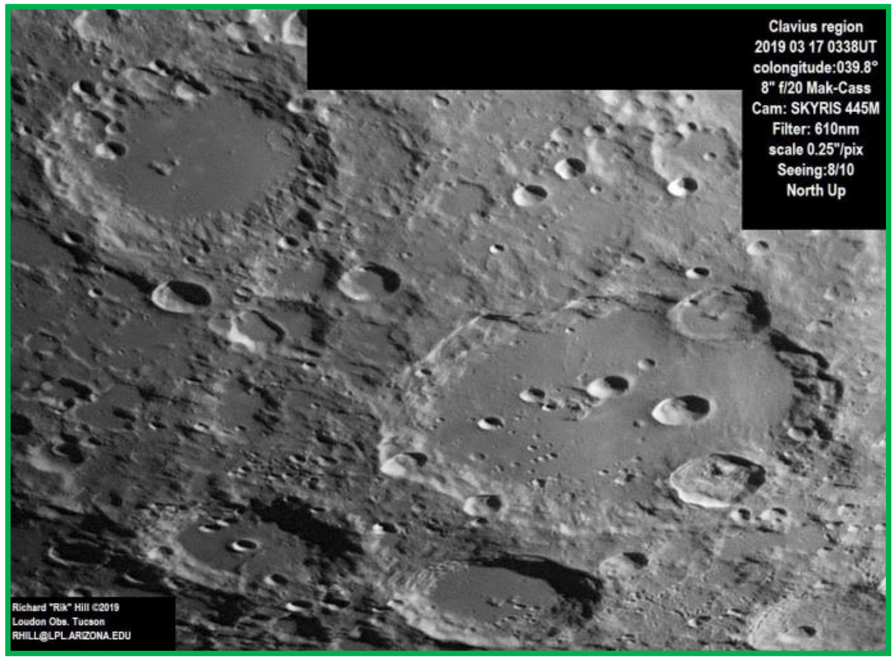
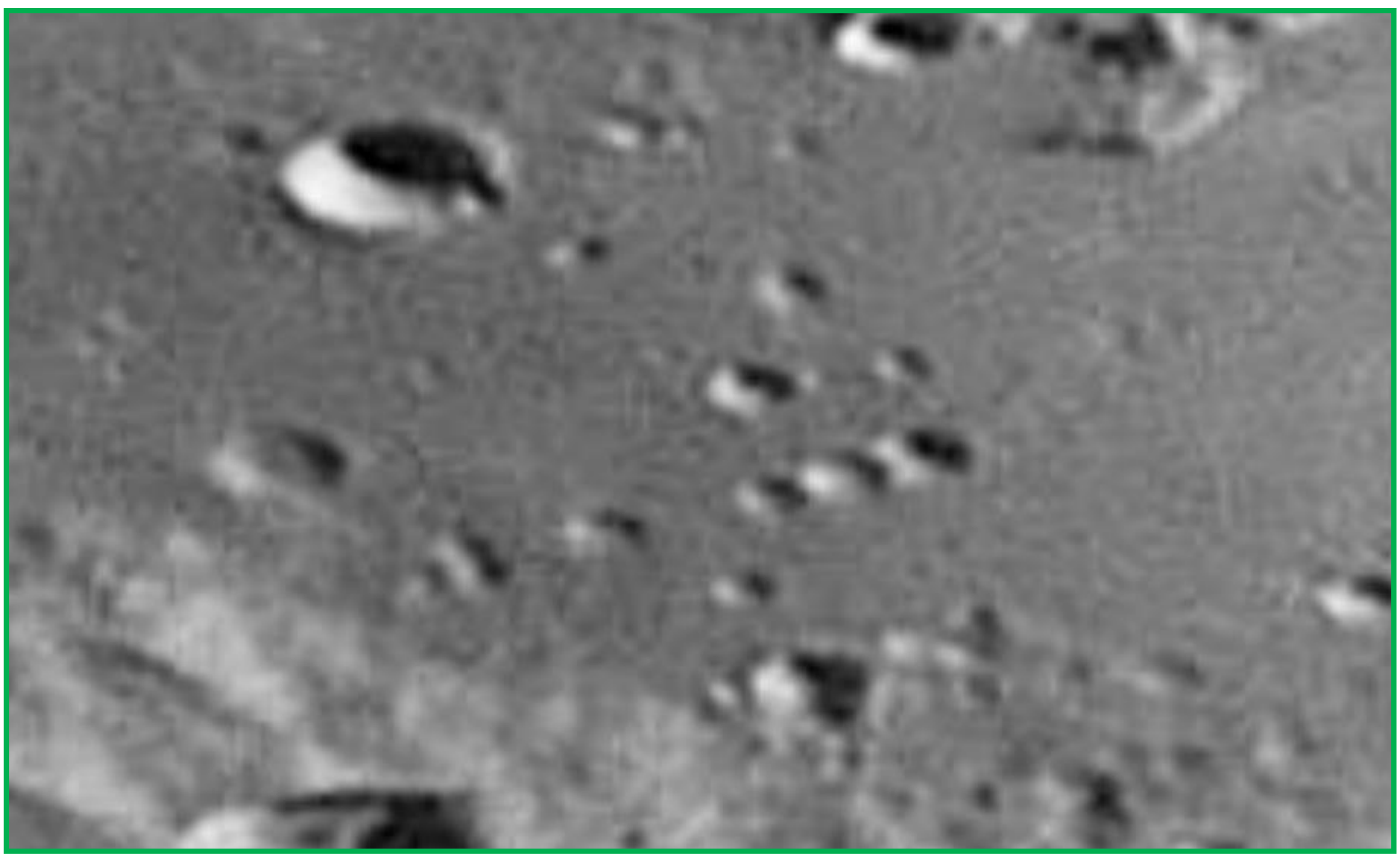


Image 26a, Clavius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2019 March 17 03:38 UT, colongitude 39.8º. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera, Seeing 8/10. This is a close-up of image 26.*



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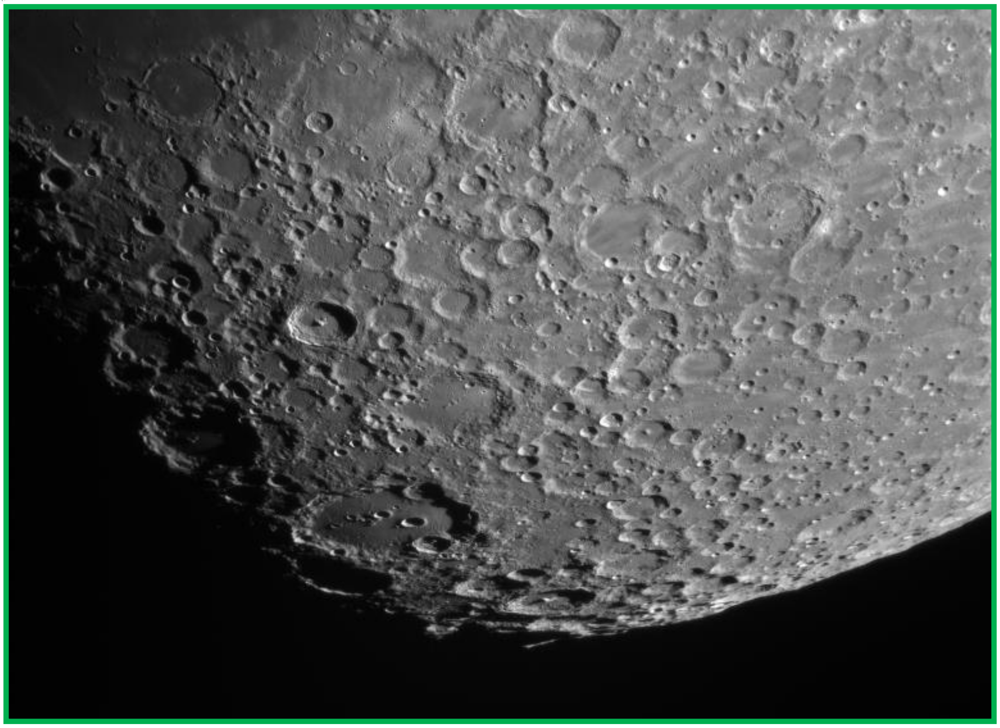

Image 27, Clavius, *Ariel Cappelletti, Córdoba, Argentina, SLA. 2019 November 07 8 inch Newtonian reflector telescope, IR filter, ZWO ASI1600 camera.*

Image 27a, Clavius, *Ariel Cappelletti, Córdoba, Argentina, SLA. 2019 November 07 8 inch Newtonian reflector telescope, IR filter, ZWO ASI1600 camera. This is a close-up of image 27.*

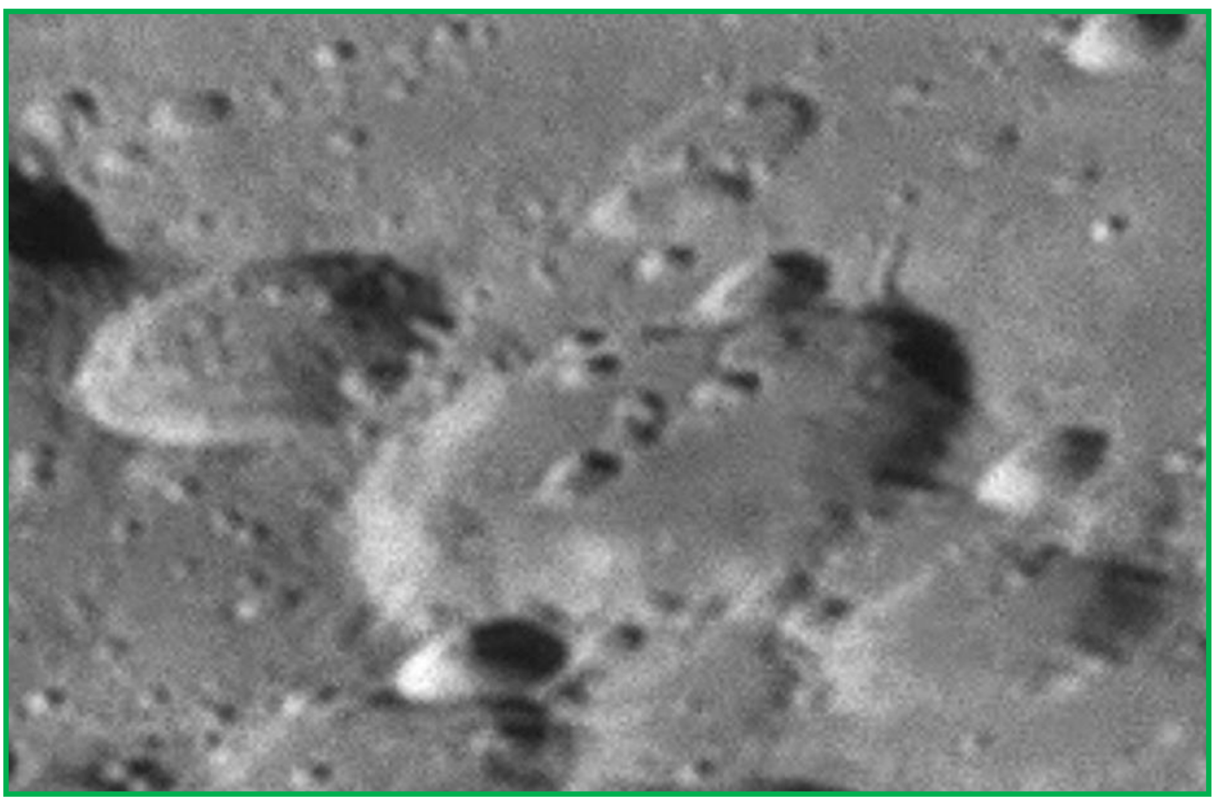

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Image 28, Alphonsus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 23:52 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UV-IR 2" filter, ZWO ASI462MC camera. North is to the right, west is up.*

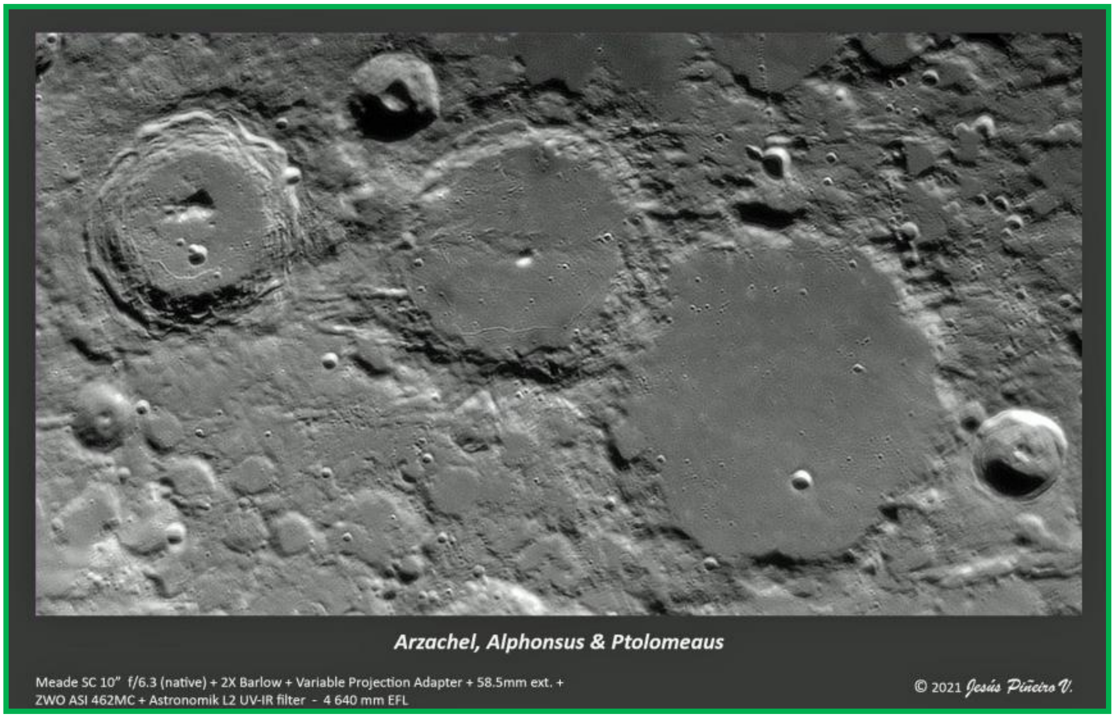
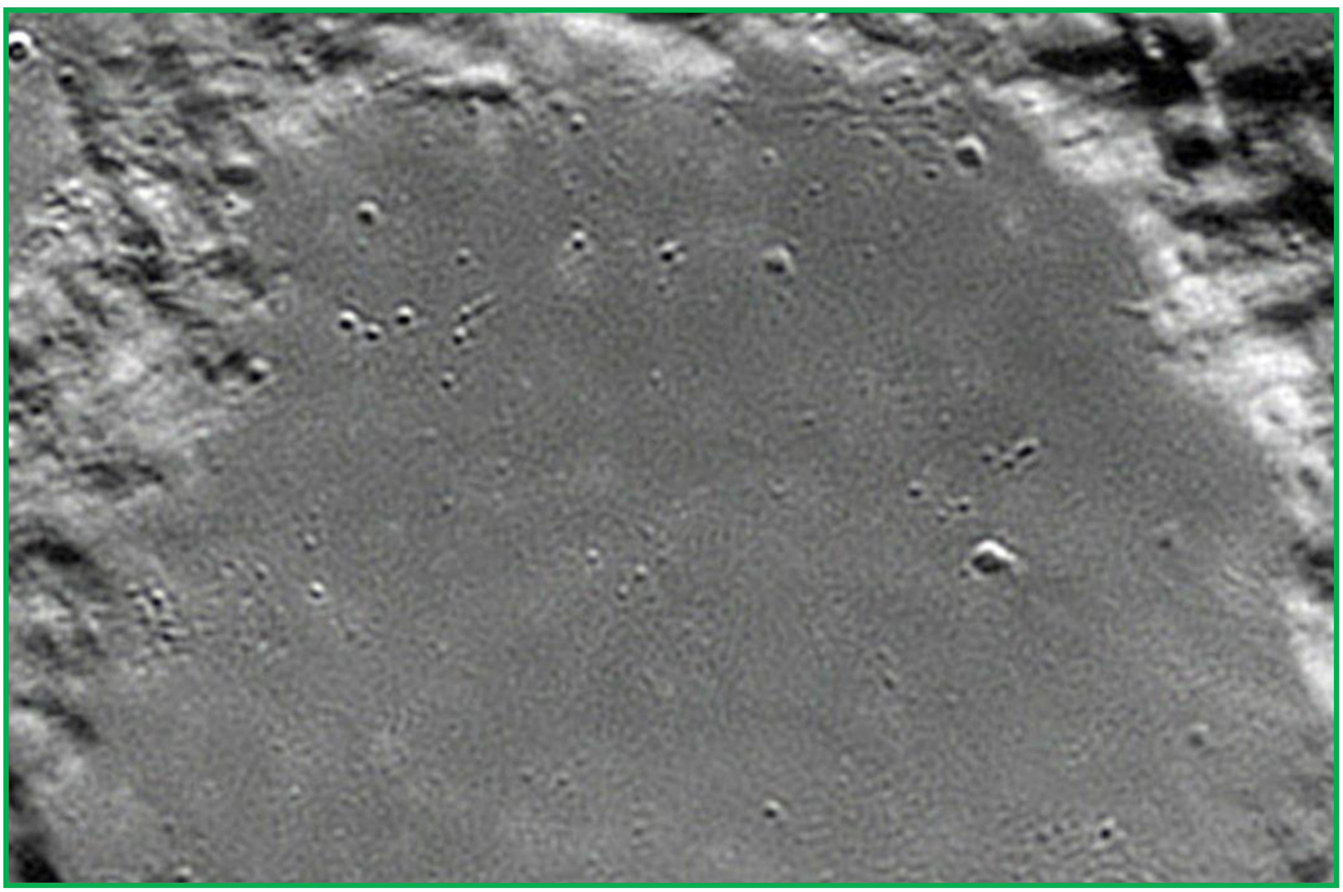


Image 28a, Alphonsus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 23:52 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UV-IR 2" filter, ZWO ASI462MC camera. North is to the right, west is up. This is a close-up of image 28.*



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The region between Copernicus and Eratosthenes shows the most conspicuous and well-known aligned craters on the Moon, as shown in IMAGES 29 and 30. The area is very chaotic. To the east of Copernicus and south of Eratosthenes we have "The easy-to-locate ghost ring of the crater Stadius. The floor is heavily pitted with Copernicus and Eratosthenes secondary craters. A chain of cone craters crosses the eastern edge of Stadius from Stadius C north to the bright crater Stadius B, outside the northern rim of Stadius. This crater chain was officially "Rimae Stadius (…) They are actually chains of cone craters located northwest of Stadius and should have been renamed as catenas. The name "Rimae Stadius" was dropped as an official feature name from the IAU lunar nomenclature in 1985. The chains are best observed when close to the sunrise terminator. By the next lunation day, they become very difficult to locate having blended into the surrounding gray surfaces". Without a doubt, the most spectacular chains are those that run northwest of Stadius. There is unanimity that they are secondary craters of Copernicus (and where else could they come from?), but I never understood why they seem to run from south to north and not from east to west (they seem to come from somewhere else), it's like the blocks ejected by the Copernicus impact would have fallen together, aligned like a curtain.

Image 29, Eratosthenes, *David Teske, Louisville, Mississippi, USA. 2022 September 17 09:12 UT, colongitude 168.4 degrees. 4 inch f/15 refractor telescope, 1.5x barlow, IR block filter, ZWO ASI120MM camera. Seeing 8/10.*

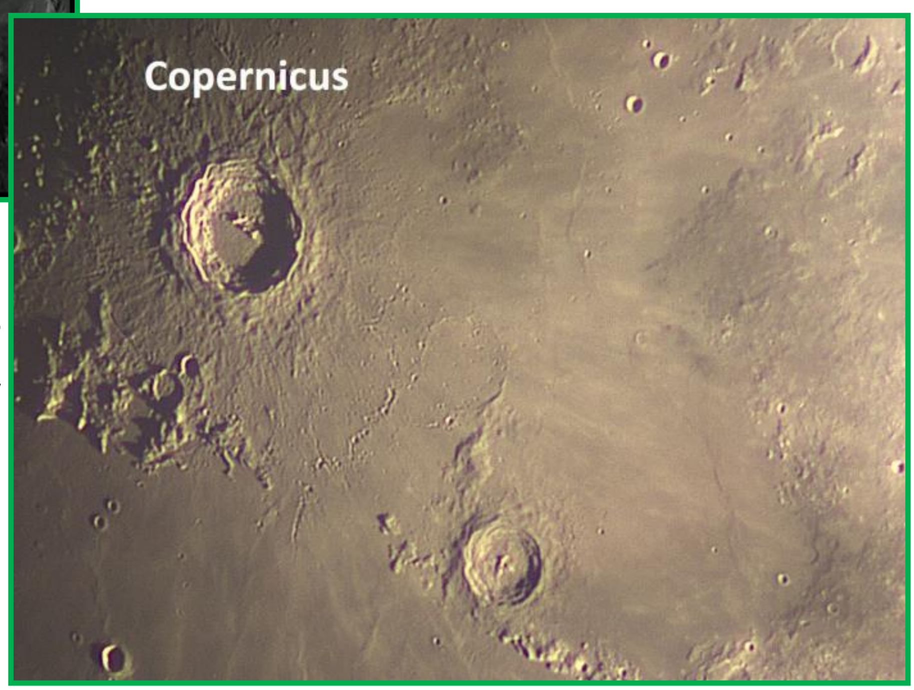

Image 30, Copernicus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2019 July 11 12:30 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI 120 camera. North is down, west is left.*

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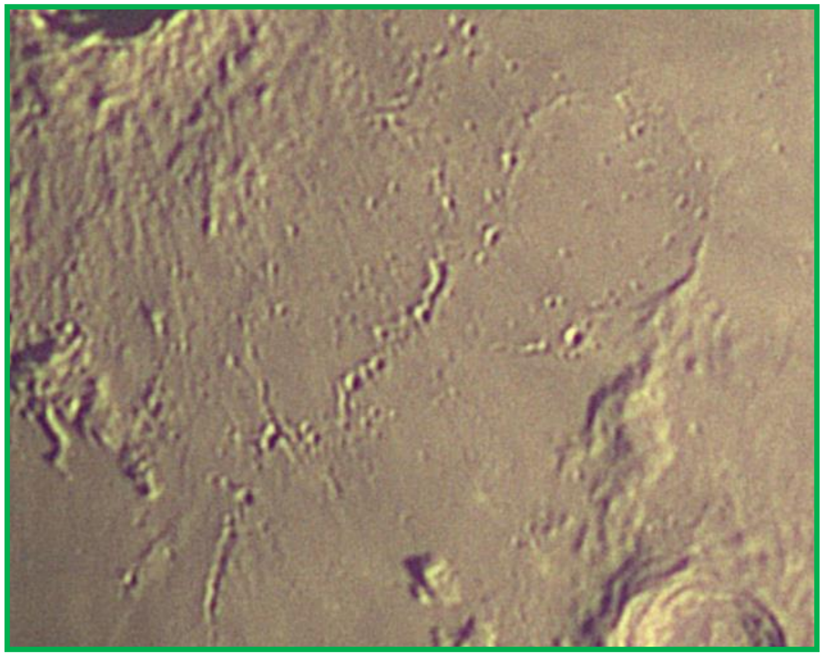


Image 30a, Copernicus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2019 July 11 12:30 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI 120 camera. North is down, west is left. This is a close-up of image 30.*

This can be seen in IMAGE 31: "The largest members of either of the chains are less than 5 km (3 miles) in diameter. Located to the east of the eastern terminus of Montes Carpatus is the cone crater chain "Rima Stadius I" (lat. 15.50°N, long 16.60°W). The feature runs north for about 50 km (31 miles) from the shore of Mare Imbrium, northwest of the Eratosthenian-age cone crater Stadius M (lat. 14.73°N, long 16.57°W), and out onto the mare. The cone crater chain "Rima Stadius II" (lat. 14.00°N, long 16.50°W) runs northeast to southwest for about 58 km (36 miles) in the rugged Copernicus ejecta blanket. This chain is radial to Copernicus. In 1932, the IAU adopted 4 "crater-rills," as named by Edmund Neison in 1876" (Garfinkle). Observing these craters closely near the terminator is incredible, a while ago (June 2021 issue of The Lunar Observer) I shared an observation experience (IMAGE 32) of the craters called Stadius M (1) W (2) U (3) J (4) T (5) F (6) S (7) E (8) and R (9). Of course, they are very small, 5 kilometers in diameter, except for Stadius M (7 km) and Stadius J (4 km), which means that we only see their interior in shadows and their bright edges. Yes we can perceive that Stadius T (5) and Stadius S (7) appear oval, which would not imply that they were produced by an oblique impact (like Schiller, for example), since it is evident that all of them were formed simultaneously from the same direction. The oval shape is likely nothing more than two overlapping craters. What struck me about the observation, and perhaps I was unable to convey in the drawing, is that the craters are united as in a kind of sheath, with common outer edges of with a pale glow, which would indicate that east and west the terrain is elevated. It is not that the east and west walls of the 9 craters are united, but at short distance from them the terrain rises. In addition, between the western walls of some craters and the common bright rim there were shadows indicating a certain depth of the terrain (craters 3, 5 and 6, as well as north of 9). Personal hypothesis: fragments 2 to 8 all impacted very close to each other, so that the terrain to the sides and to the south (since they were coming north) rose and formed a unit, craters 1 and 9 are further apart. The chain near the Hagecius crater that we see in IMAGE 33 is quite similar to those of the Rimae Stadius

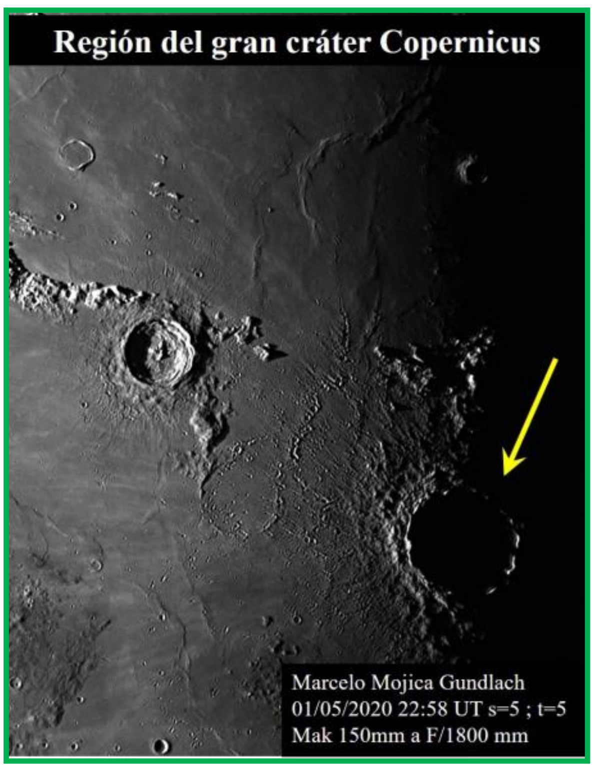


Image 31, Copernicus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 May 01 22:58 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI 178 camera B/W. North is down, west is right.*

Focus On: Chains of Craters-The More the Merrier

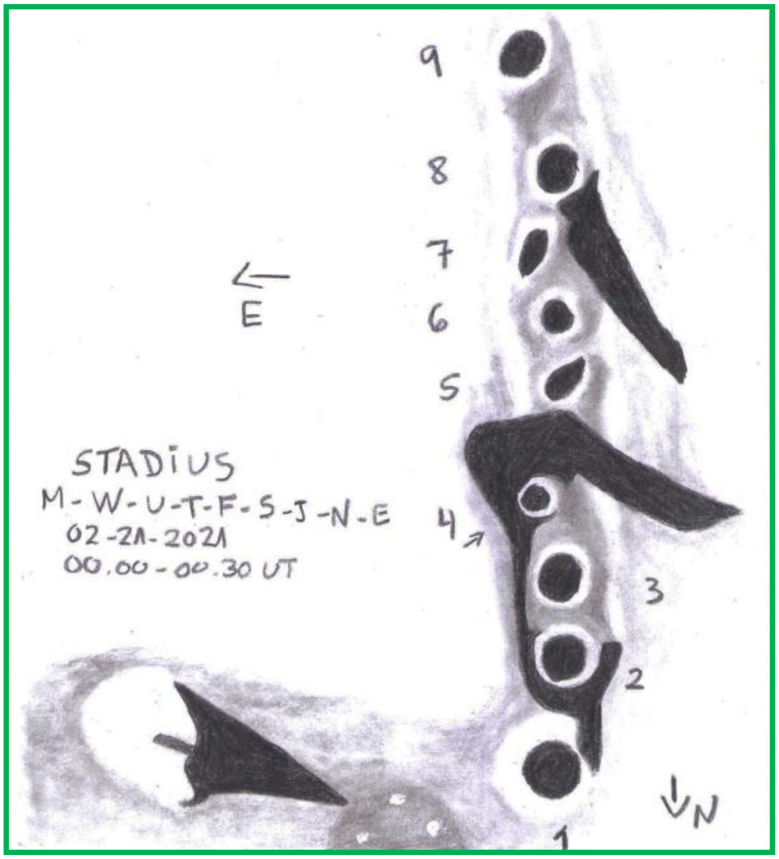
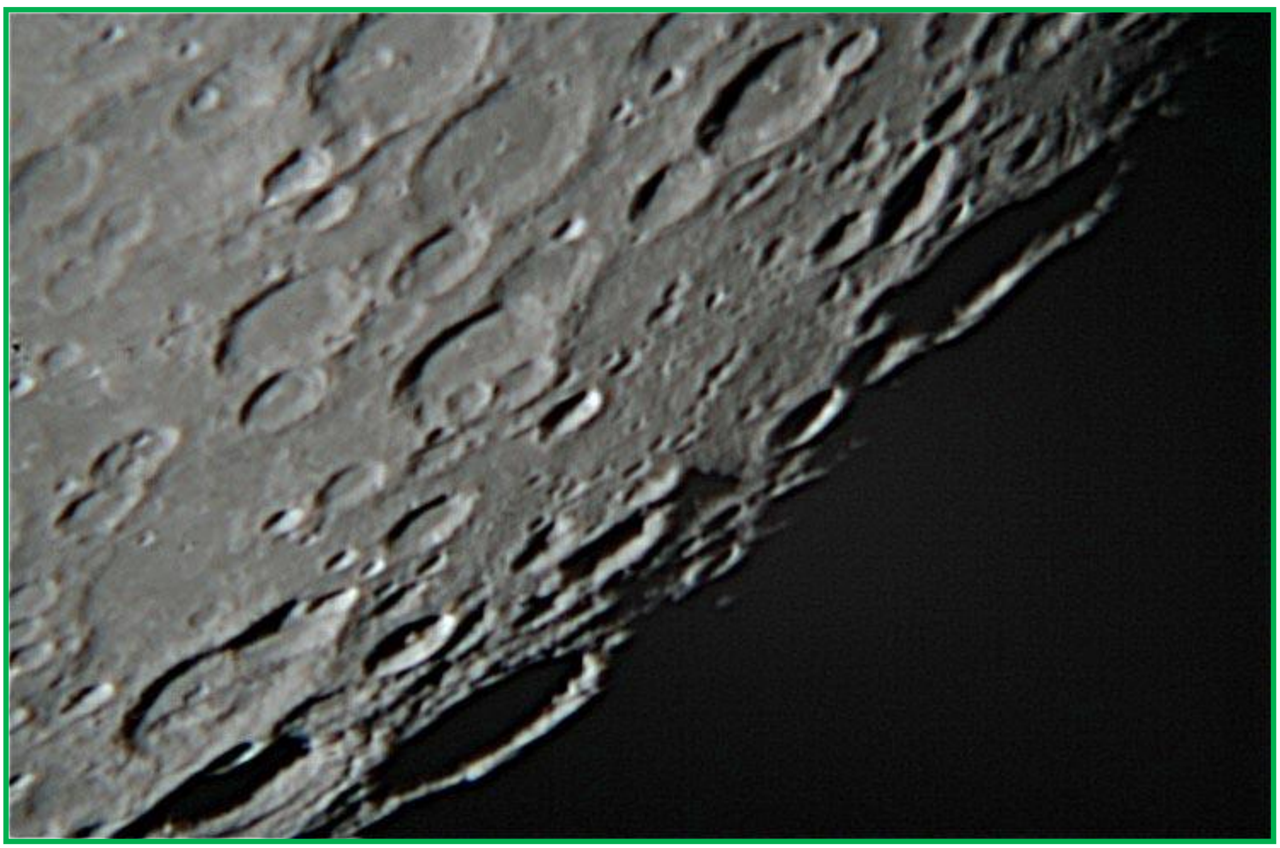


Image 32, Copernicus Seconary Craters, *Alberto Anunziato, Paraná, Argentina. 2021 February 21 00:00-0030 UT. Meade EX105 Maksutov-Cassegrain telescope, 154x.*

Image 33, Helmholtz, *Alberto Anunziato, Oro Verde, Argentina. 2018 March 04 06:42 UT. Celestron 11 inch CPC1100 Schmidt-Cassegrain telescope, Canon EOS Digital Rebel XS camera.*



Focus On: Chains of Craters-The More the Merrier

In IMAGE 34 we see a not very noticeable chain of craters, which we learned about from Garfinkle and which we had to include in detail 33 A, located in Vieta: "The crater floor is generally flat with a crater chain running east to west across the northern portion of the floor. From east to west, the main craters of this chain are: Vieta J (lat. 28.89°S, long 56.06°W), Vieta H (lat. 29.10°S, long 56.39°W), and Vieta G (lat. 29.37°S, long 57.12°W). These craters are each about 5.5 km (3.41 miles) in diameter".

Image 34, Byrgius, *Alberto Anunziato, Oro Verde, Argentina. 2016 April 30 09:02 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, QHY5-II camera.*

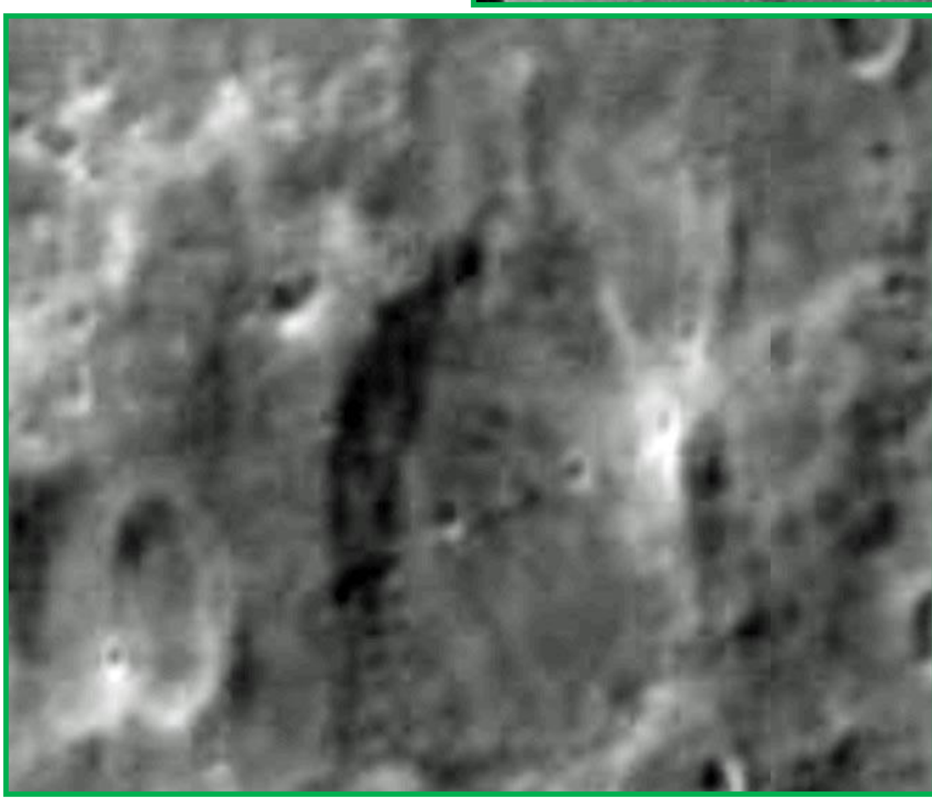


Image 34a, Byrgius, *Alberto Anunziato, Oro Verde, Argentina. 2016 April 30 09:02 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, QHY5-II camera. This is a close-up of image 34.*

Focus On: Chains of Craters-The More the Merrier

Do you recognize the Catena Timocharis in IMAGE 35? It is located next to the arrow that points to Timocharis, we do not know why such an inconspicuous chain received the honor of a proper name that has not yet reached other more prominent ones. It is also not so easy to recognize the "short crater chain runs north to south near the base of the crater's eastern interior wall. A bright ejecta blanket surrounds Hell. On the western rim of Hell A are three joined impact craters that have distorted Hell A's shape. On these craters is an unnamed north to south running crater chain that maybe is connected to another short chain outside the crater" (Garfinkle) (IMAGE 36 and detail 36 A). Garfinkle also points out that Rima Archimedes I is not a rille but a chain of craters, the truth is that we do not find it in IMAGE 37, despite the fact that the image is so clear that we can see several catenae, like the ones we show in detail 37 A.

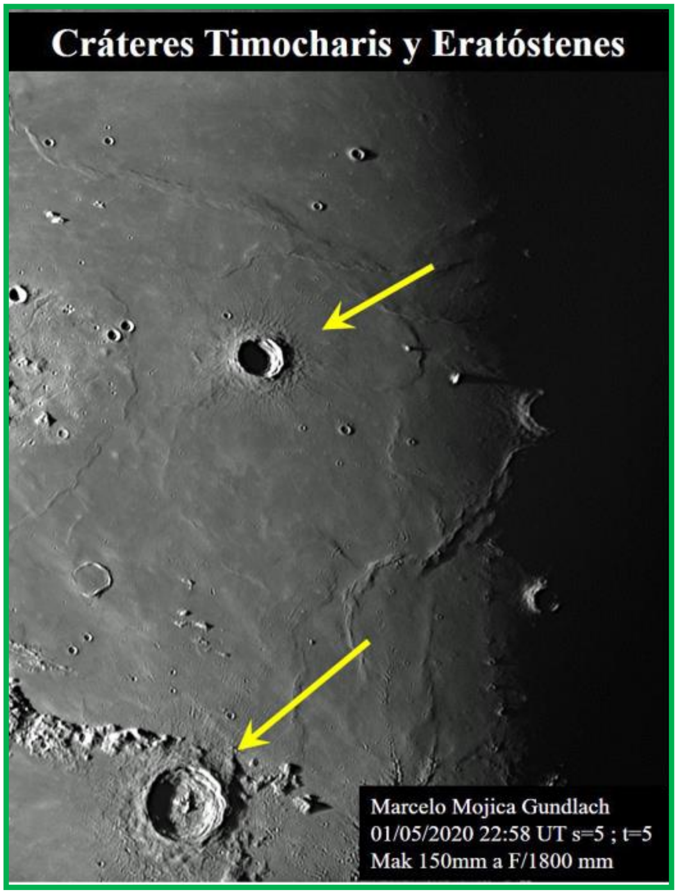


Image 35, Timocharis, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 May 01 22:58 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI 178 B/W camera. North is down, west is right.*

Image 36, Deslandres, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2023 April 30 21:56 UT. 90 mm Maksutov-Cassegrain telescope, IR filter, ZWO ASI 120 camera.*

Image 36a, Deslandres, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2023 April 30 21:56 UT. 90 mm Maksutov-Cassegrain telescope, IR filter, ZWO ASI 120 camera. This is a close-up of image 36.*

Image 37, Archimedes, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2018 February 25 00:57 UT. 200 mm refractor telescope, QHY5-II camera.*

Focus On: Chains of Craters-The More the Merrier

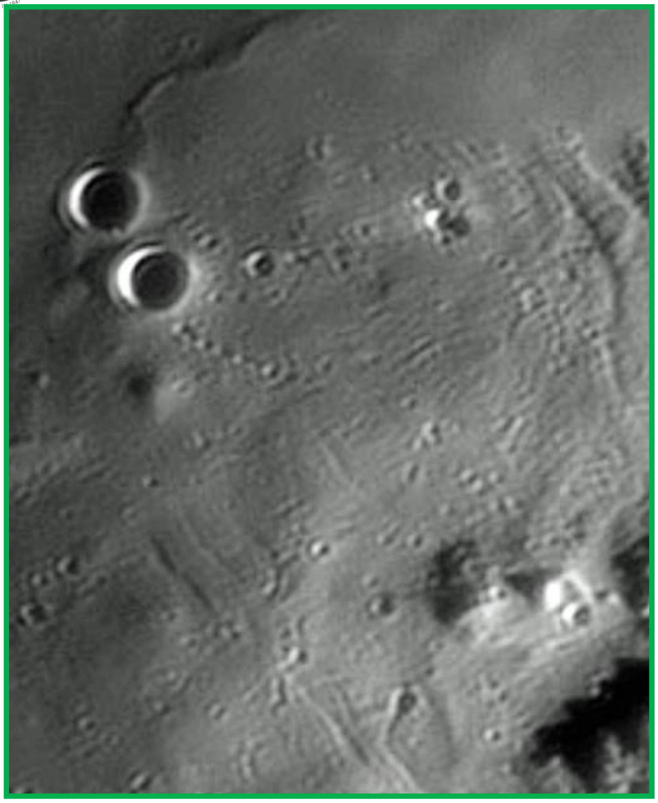


***Image 37a, Archimedes,** Francisco Alsina Cardinalli, Oro Verde, Argentina. 2018 February 25 00:57 UT. 200 mm refractor telescope, QHY5-II camera. This is a close-up of image 37.*

We owe Elger the vision of a chain of craters similar to Rima Stadius, but in an area of much older craters, in IMAGE 38 and its detail 38 A we see a chain that looks like a dark valley near Polybius: "POLYBIUS. A ring-plain, about 17 miles in diameter, in the hilly region S.E. of Fracastorius. The border is unbroken, except on the N., where it is interrupted by a group of depressions. There is a long valley on the S.W., at the bottom of which Schmidt shows a crater-chain".

***Image 38, Altai Scarp**, Felix León, Santo Domingo, República Dominicana. 2021 March 27 00:25 UT. 127 mm Maksutov-Cassegrain telescope, DMK 12 618 AU camera. North is left, west is up.*

Focus On: Chains of Craters-The More the Merrier

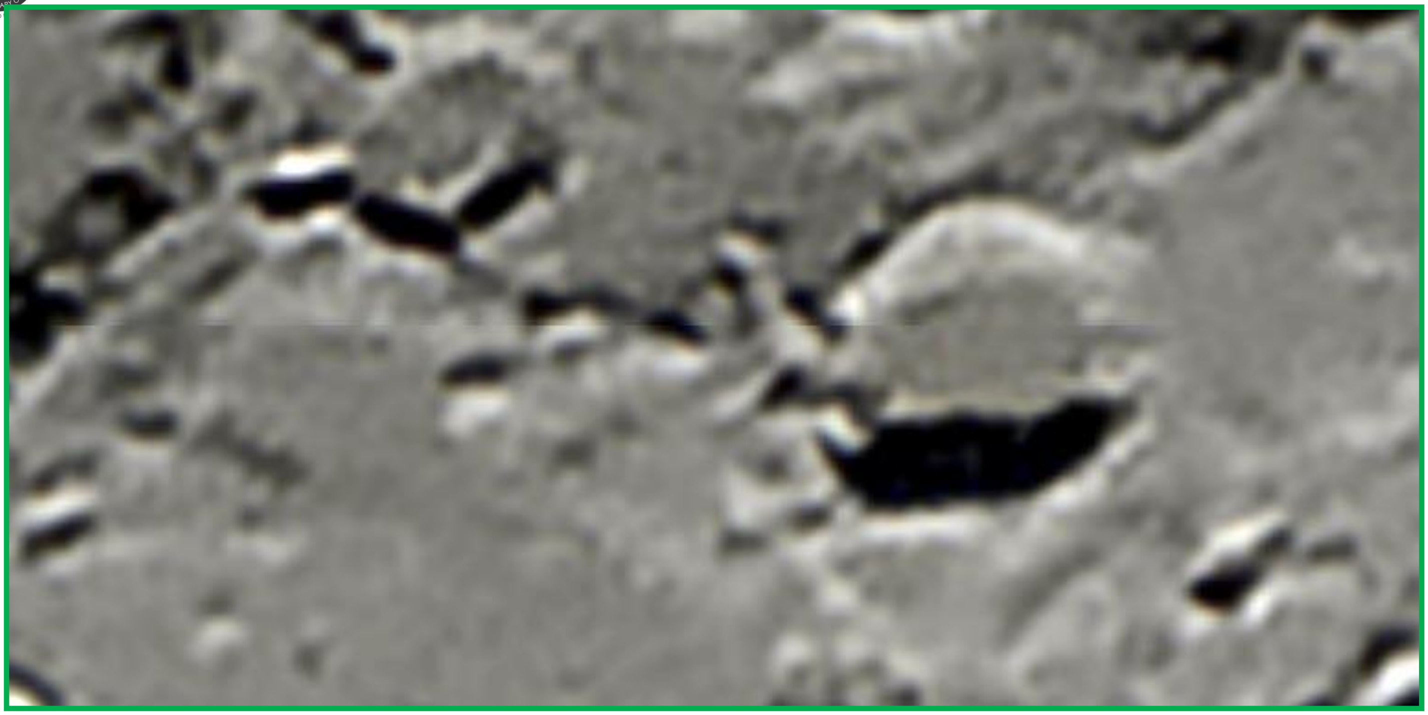


***Image 38a, Polybius**, Felix León, Santo Domingo, República Dominicana. 2021 March 27 00:25 UT. 127 mm Maksutov-Cassegrain telescope, DMK 12 618 AU camera. North is left, west is up. This is a close-up of image 38.*

Finally, we close this tour of the chains of craters on the visible side of the Moon with a third type of alignments, in addition to the “Catenae” formed by the fragments of a comet or asteroid fragmented by the Earth's gravitational tide, in addition to the chains of craters formed by secondary impacts, we have the chains of volcanic craters, which are collapse craters located in a line on a rille and which are most likely access skylights to lava tubes. The most famous, without a doubt, occurs in Rima Hyginus (IMAGE 39 and 40). Hyginus is 200 kilometers long and up to 4 kilometers wide. In its center is the Hyginus crater. The rille itself would have originated in a massive volcanic dyke, an eruption of basaltic lava. These chains produced by endogenous factors differ from those we have seen: “Exogenic crater chains were distinguished from the partially collapsed tube segments by the lack of crater rays and herringbone patterns in the vicinity of the latter. Also, exogenic crater chains are commonly composed of closely spaced or overlapping round to oval craters, while the craters in endogenic chains are elongate or irregular in form. Further, secondary craters within a chain are often deeper at one end than the other and downrange craters are commonly superposed on uprange craters. Endogenic craters are more uniform in depth and generally do not exhibit systematic overlap relationships” (Coombs and Hawke). In IMAGE 41 we tried without success to find the Catena Taruntius, but it is likely that we found an endogenous chain (41 A).

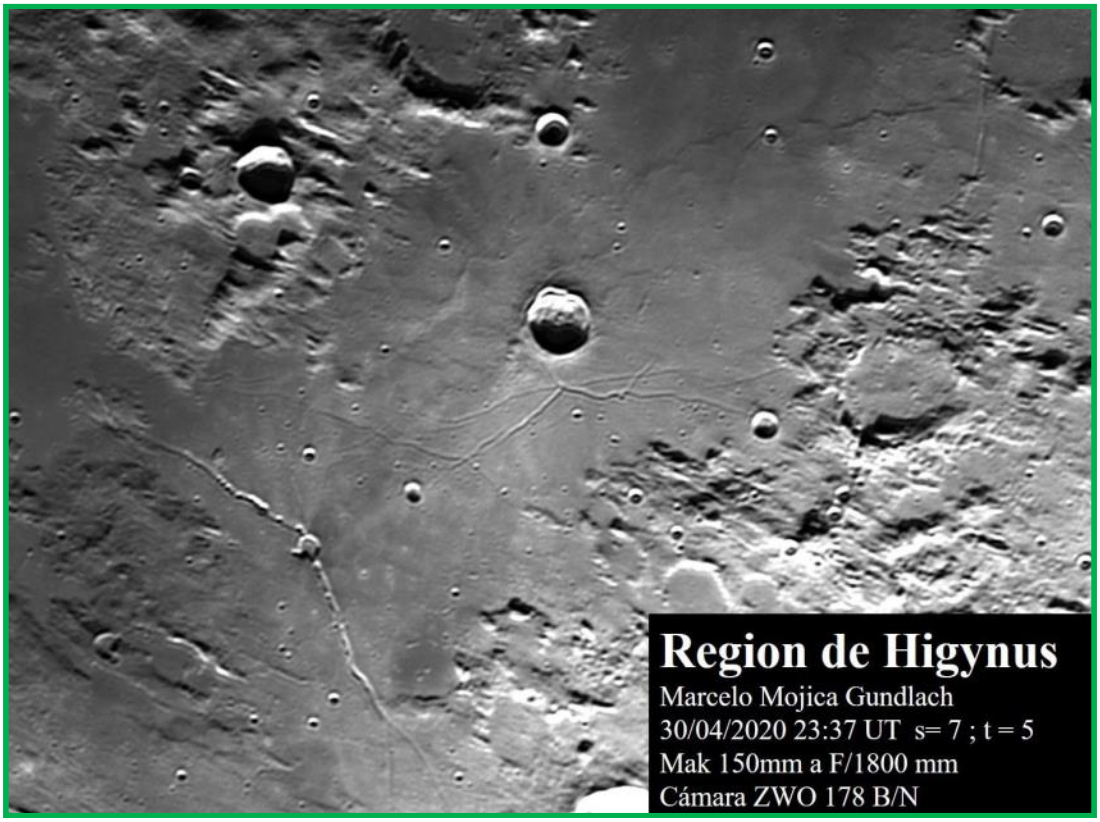


Image 39, Rima Hyginus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 April 30 23:37 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI 178 camera B/W. North is left, west is up.*

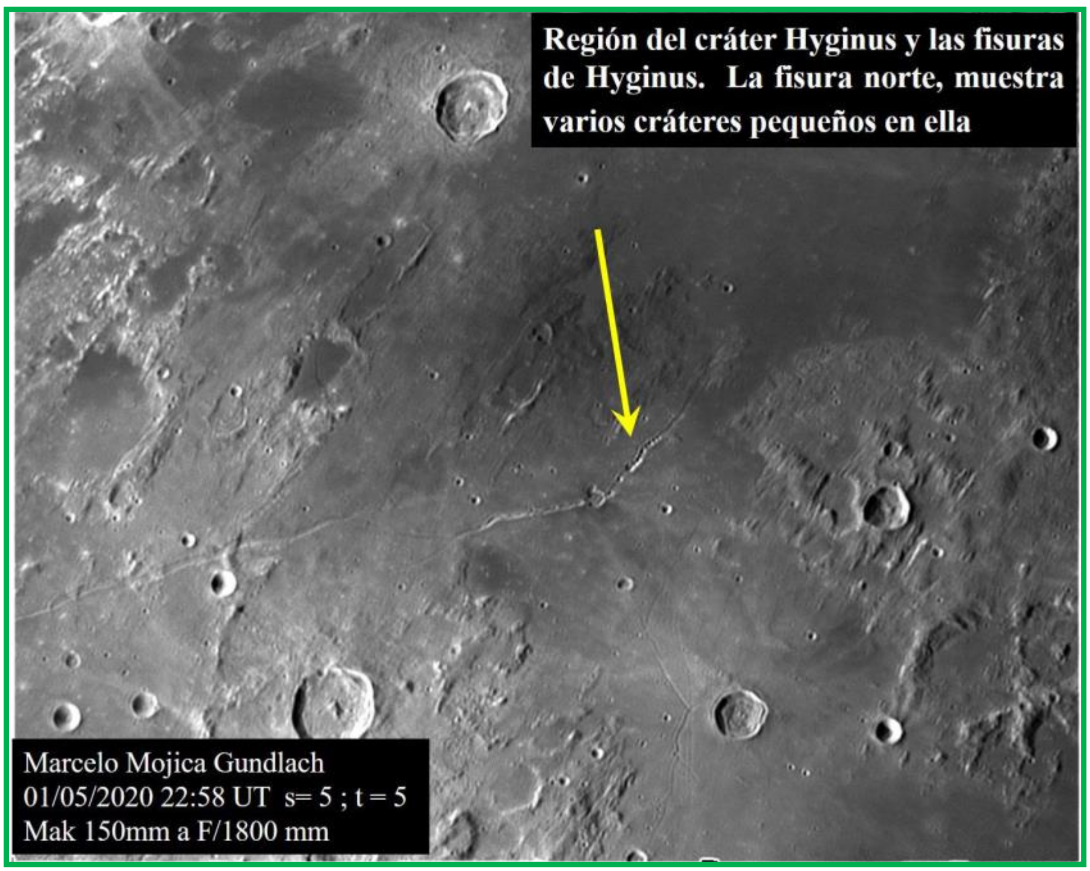
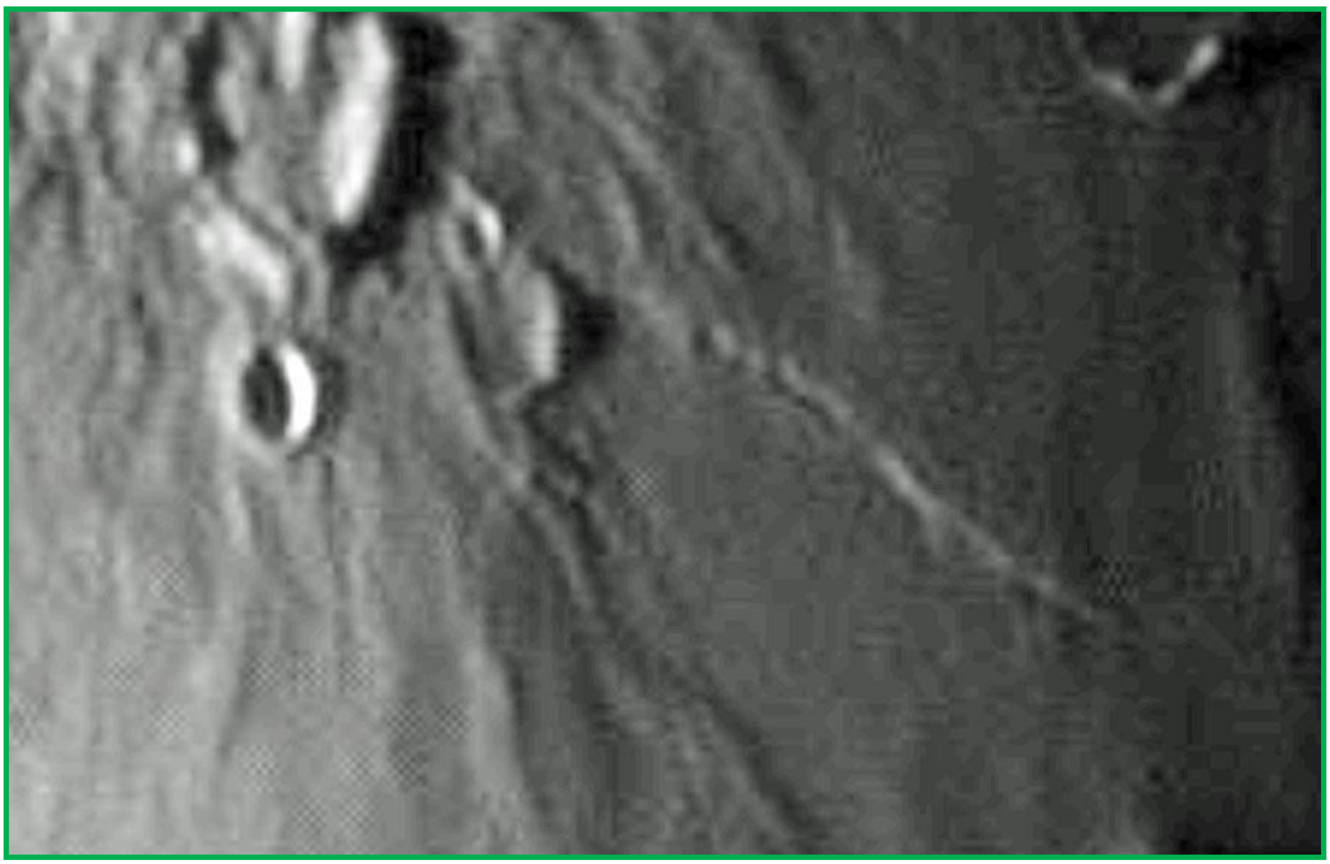


Image 40, Rima Hyginus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 May 01 22:58 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI 178 camera B/W. North is left, west is up.*

Focus On: Chains of Craters-The More the Merrier

Image 41, Taruntius, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 August 21 05:16 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomik ProPlanet 742 nm IR pass filter, QHY5-II camera.*

Image 41a, Taruntius, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 August 21 05:16 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomik ProPlanet 742 nm IR pass filter, QHY5-II camera. This is a close-up of image 41.*



Focus On: Chains of Craters-The More the Merrier

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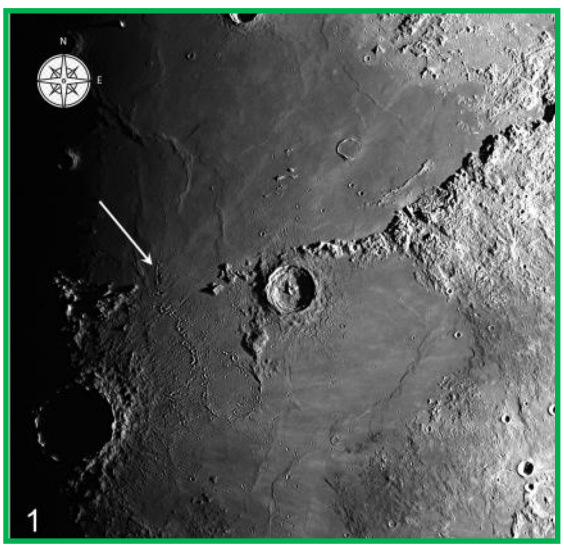
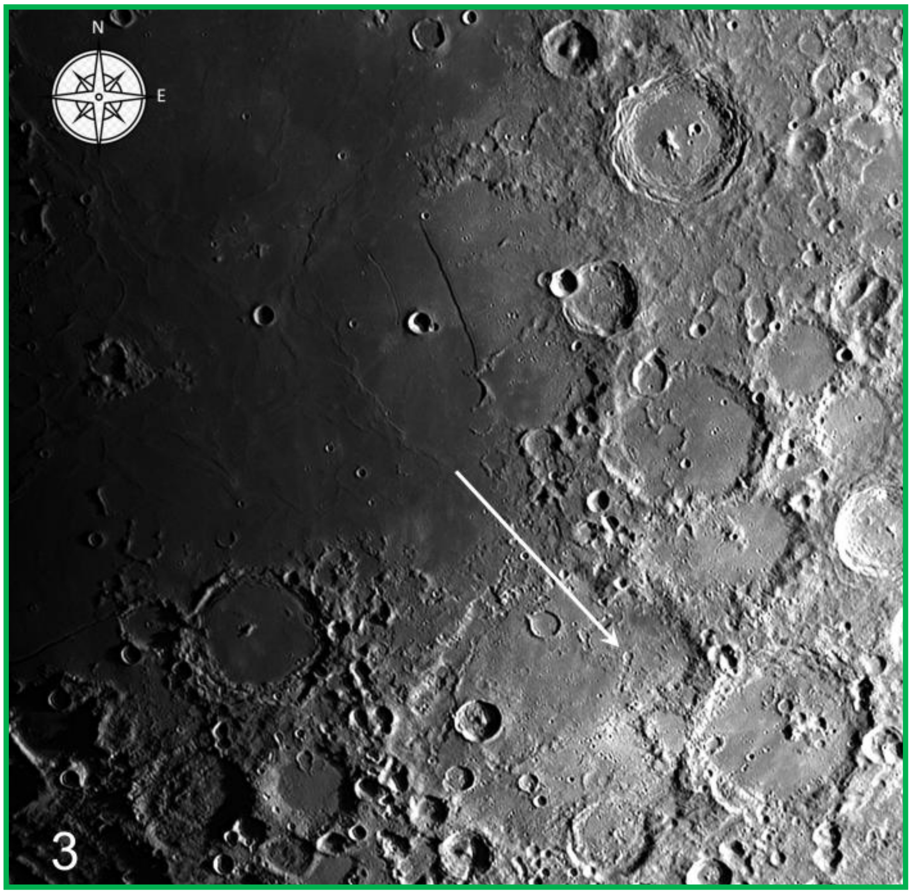


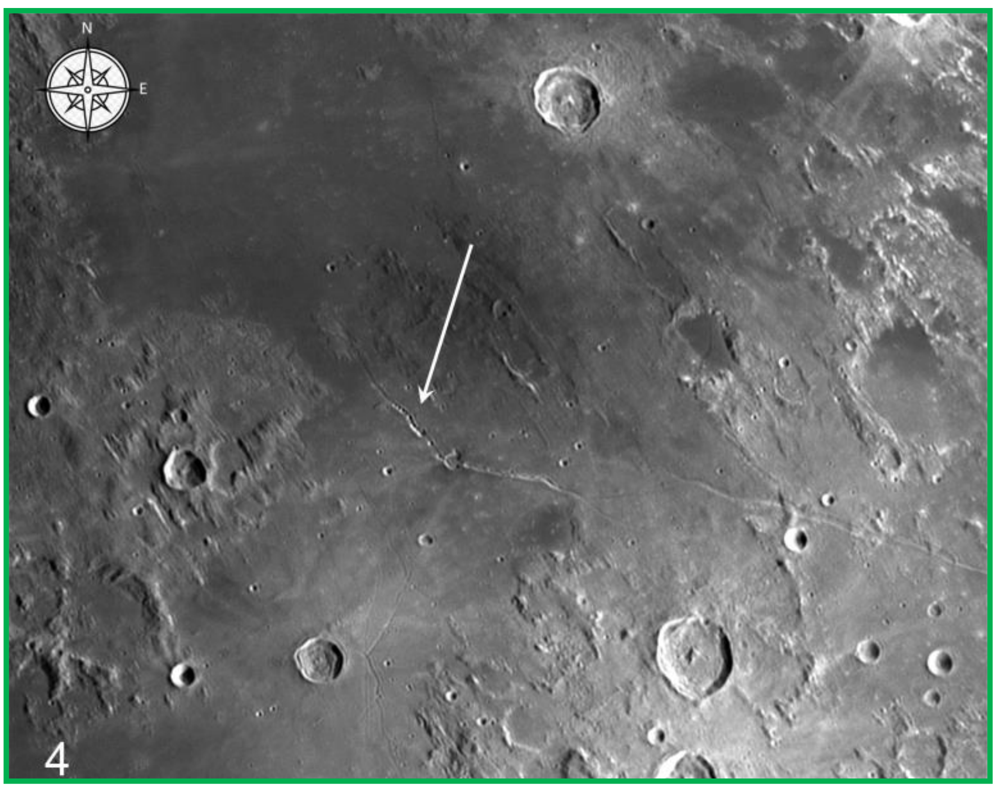
Copernicus, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 22:58 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*

Copernicus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2024 January 05 23:00 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO CMOS ASI 178 camera. Seeing 5/10, transparency 5/6.*

Focus On: Chains of Craters-The More the Merrier



Deslandres, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2024 January 05 23:00 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO CMOS ASI 178 camera. Seeing 5/10, transparency 5/6.*

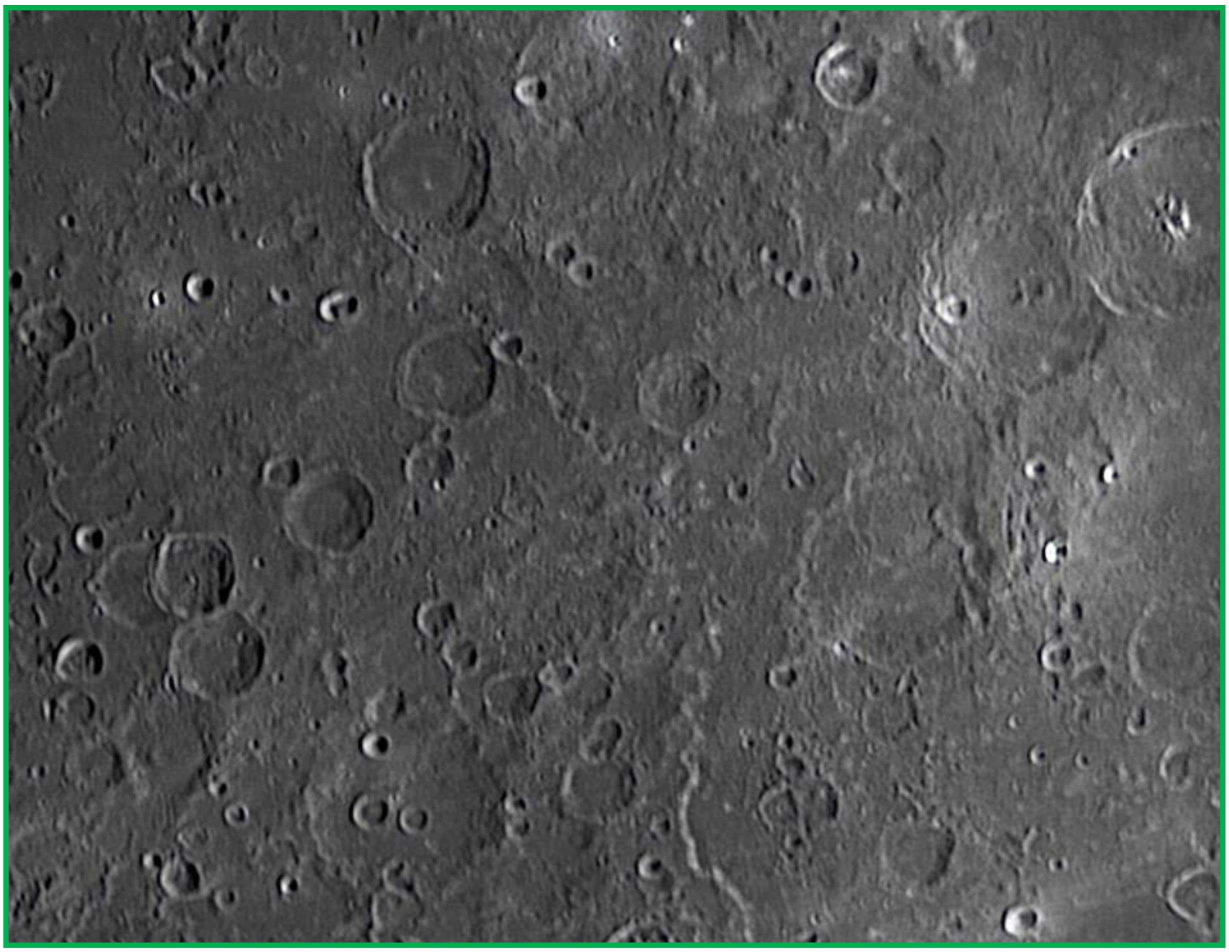


Hyginus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2024 January 05 23:00 UT. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO CMOS ASI 178 camera. Seeing 5/10, transparency 5/6.*

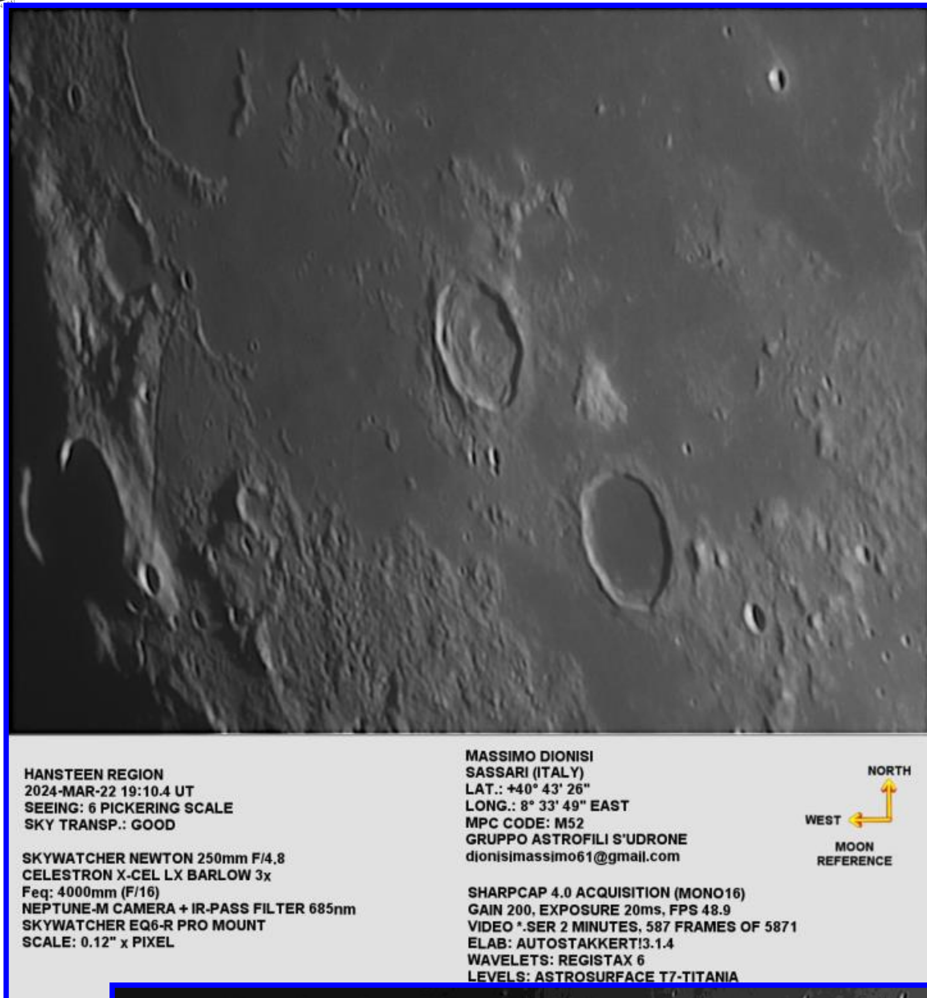
Focus On: Chains of Craters-The More the Merrier

Catena Davy, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 23:17 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*

Catena Abulfeda, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 23:21 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*



Focus On: Chains of Craters-The More the Merrier

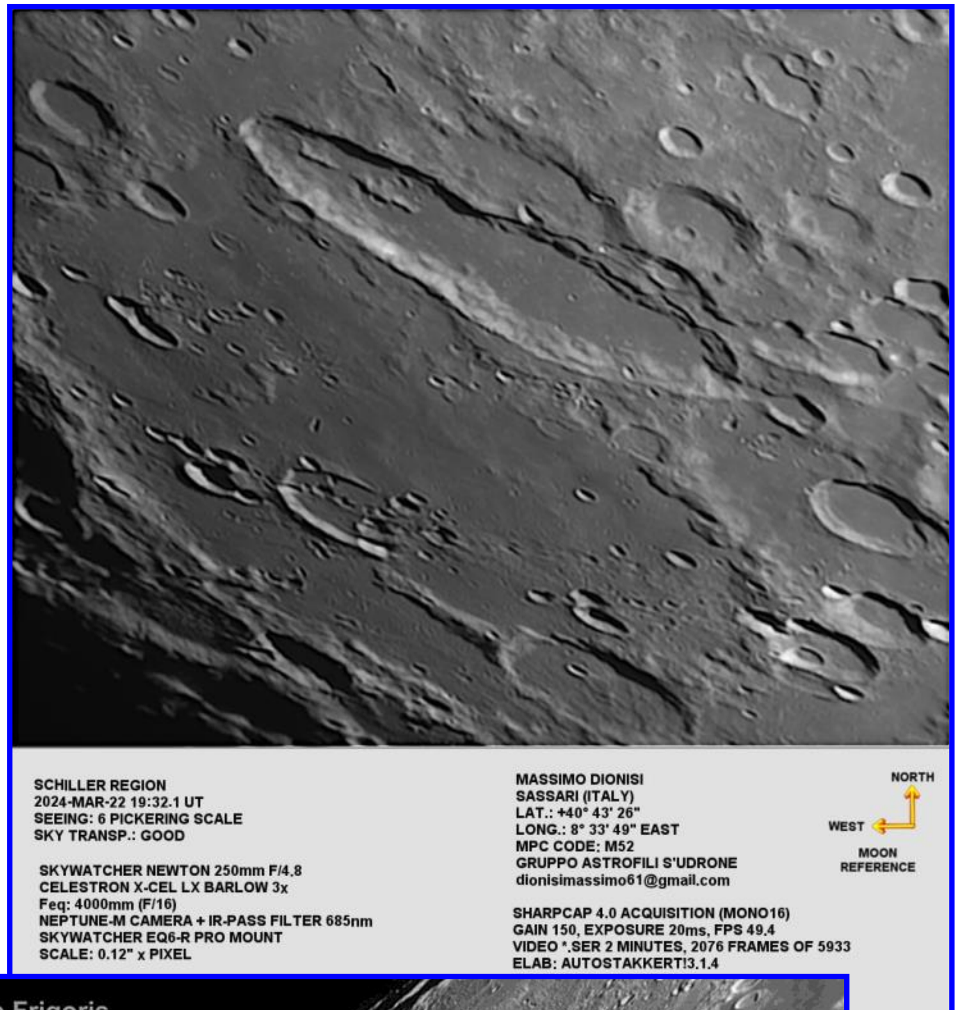


Hansteen, *Massimo Dionisi, Sassari, Italy. 2024 March 22 19:10 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*

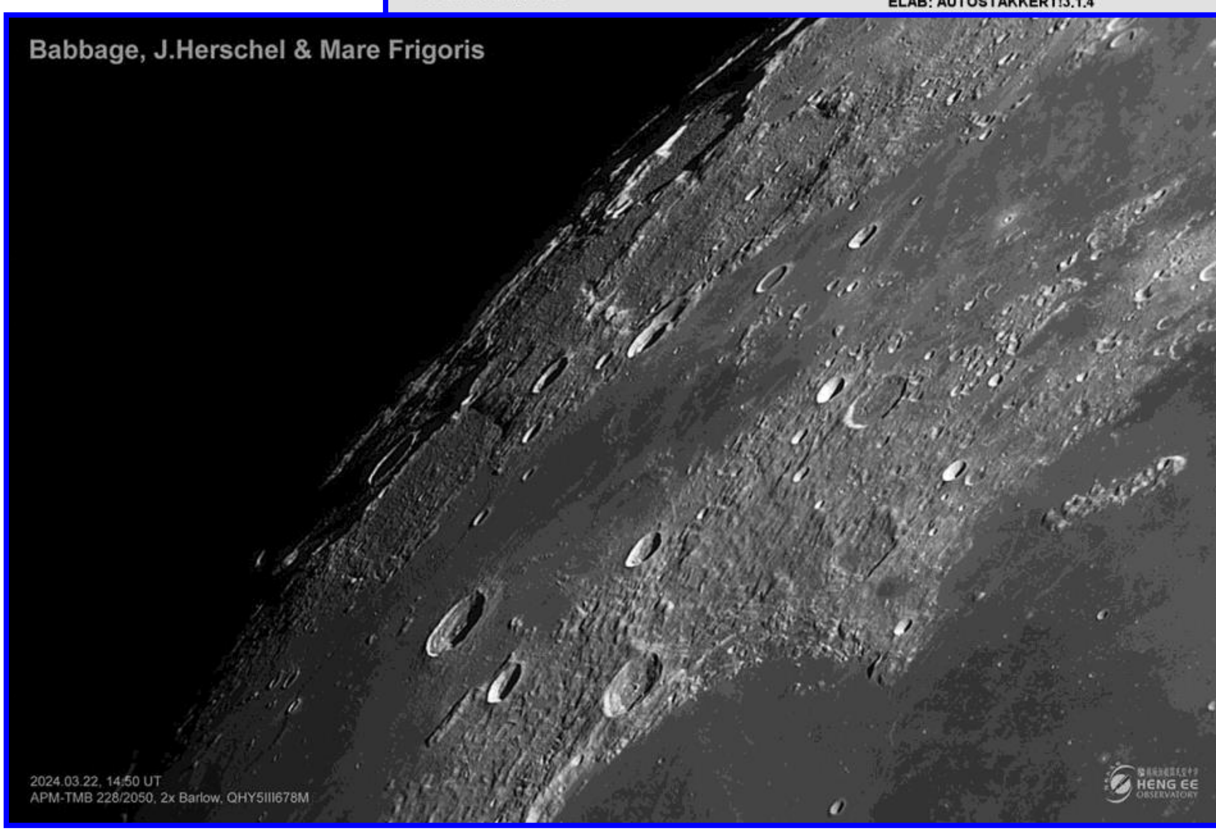
Aristarchus, Herodotus and Vallis Schröteri, *Michael Teoh, Heng Fe Observatory, Penang, Malaysia. 2024 March 22 14:45 UT. APM-TMB 228/2050 mm refractor telescope, 2x barlow, QHY5III678M camera.*

Recent Topographic Studies

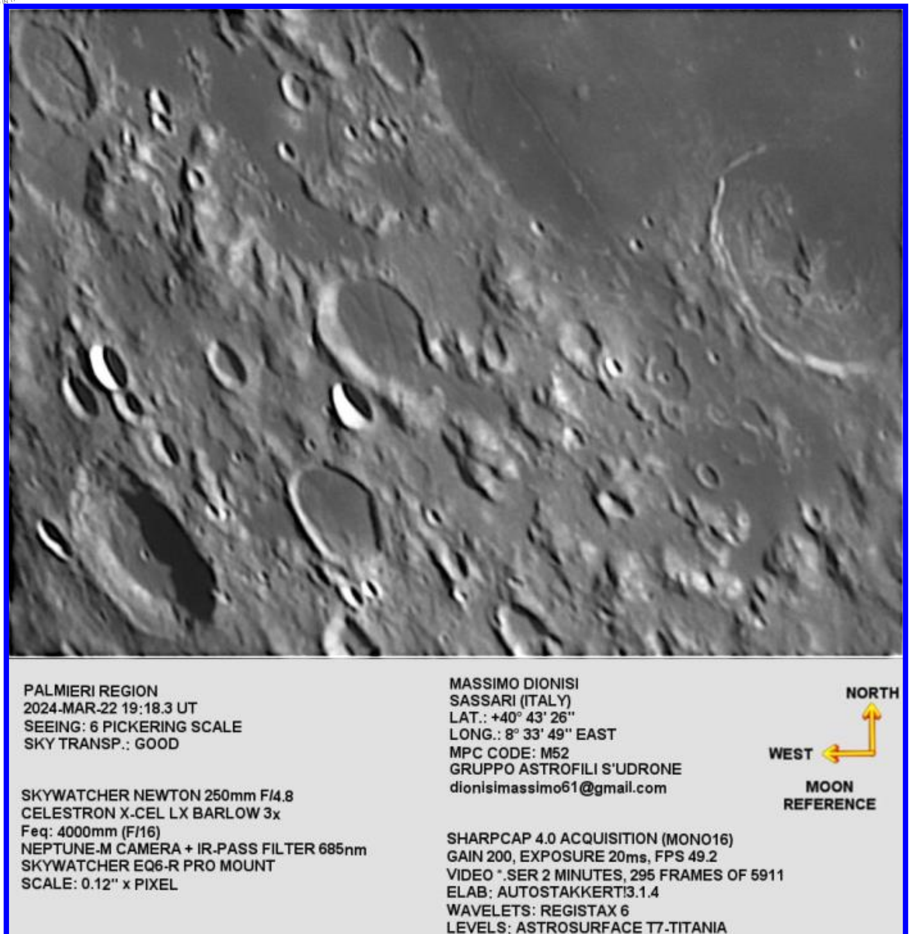
***Schiller,** Massimo Dionisi, Sassari, Italy. 2024 March 22 19:32 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*



***Babbage, J. Herschel and Mare Frigoris,** Michael Teoh, Heng Fe Observatory, Penang, Malaysia. 2024 March 22 14:50 UT. APM-TMB 228/2050 mm refractor telescope, 2x barlow, QHY5III678M camera.*

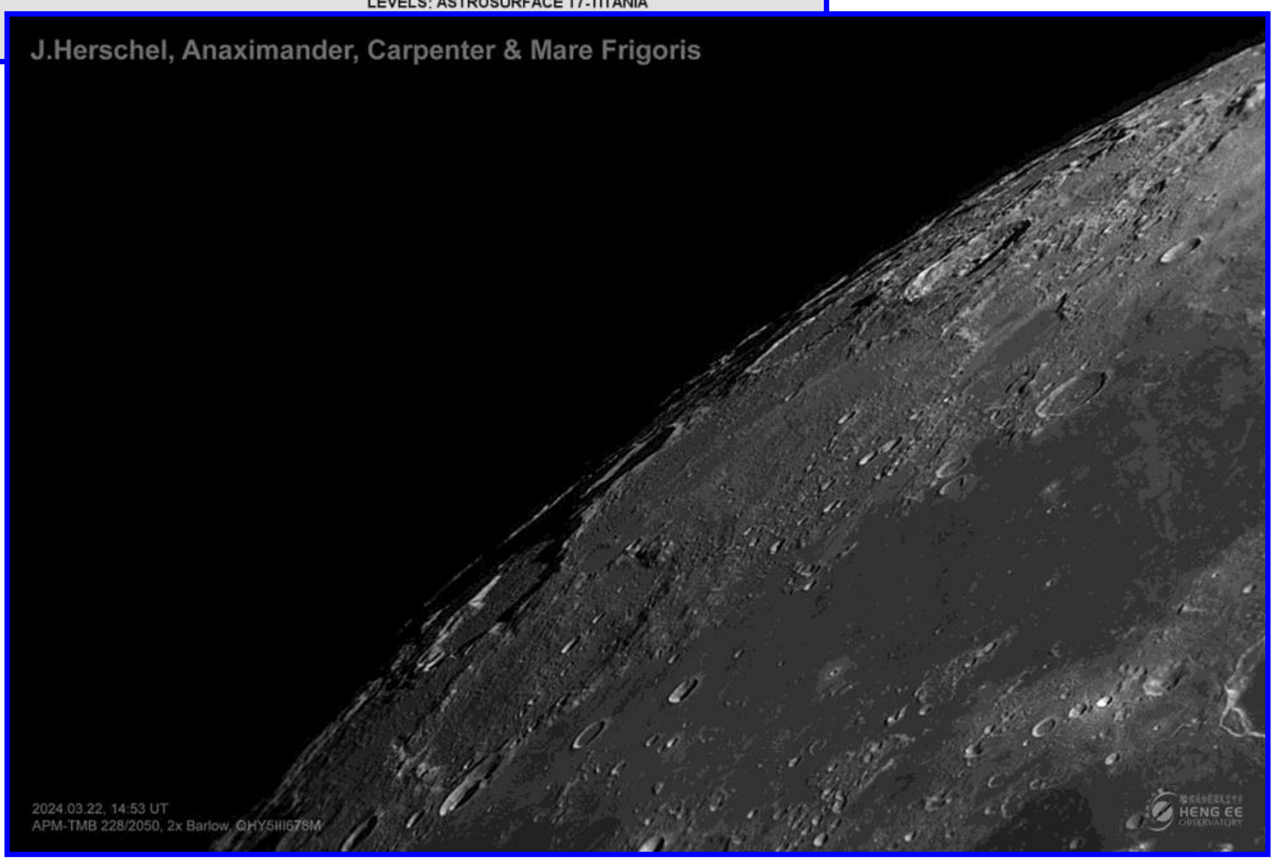


Recent Topographic Studies



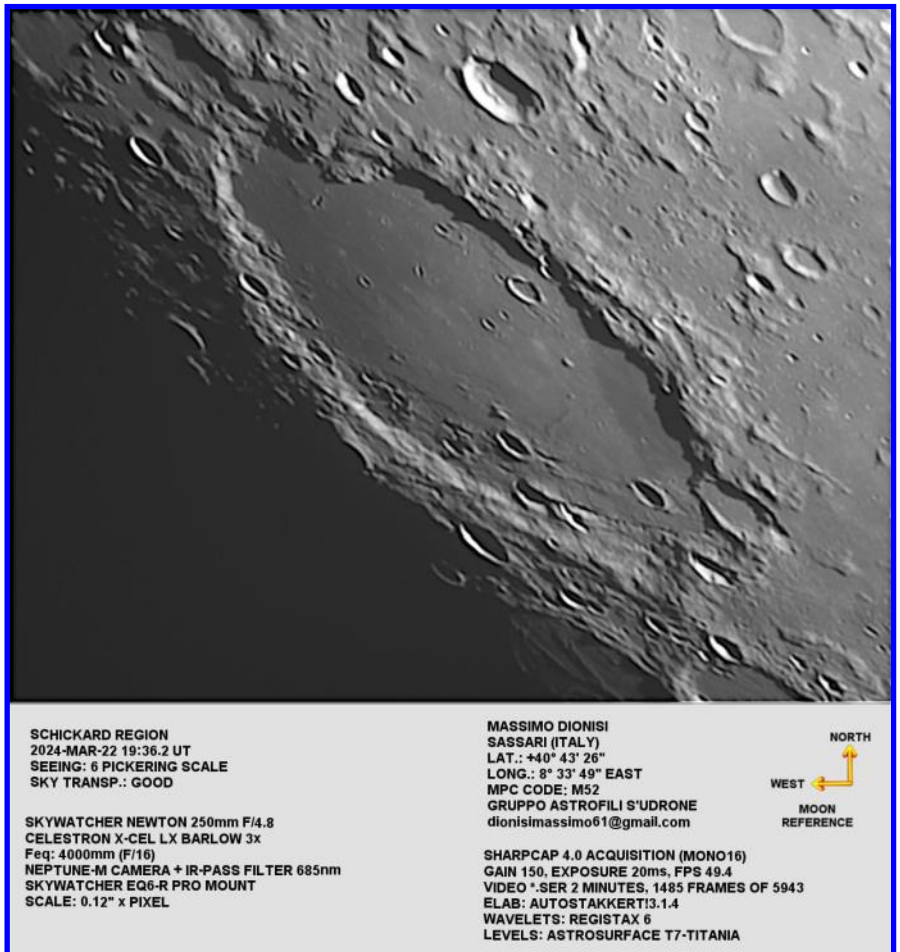
Palmieri, *Massimo Dionisi, Sassari, Italy. 2024 March 22 19:18 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*

J. Herschel, Anaximander, Carpenter and Mare Frigoris, *Michael Teoh, Heng Fe Observatory, Penang, Malaysia. 2024 March 22 14:53 UT. APM-TMB 228/2050 mm refractor telescope, 2x barlow, QHY5III678M camera.*



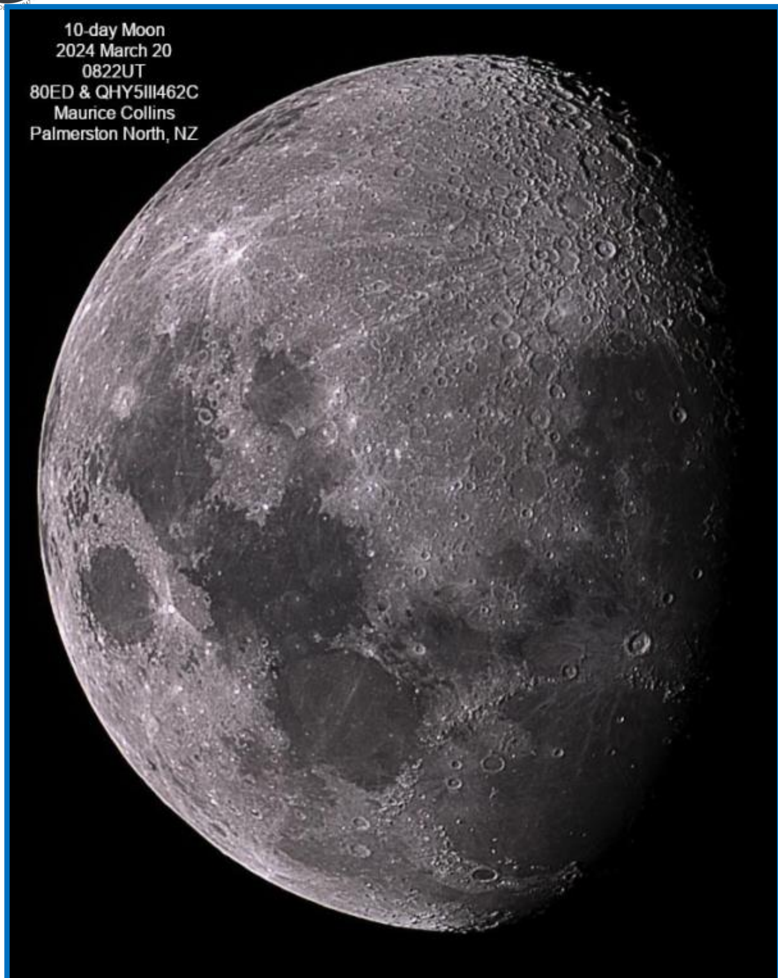
Recent Topographic Studies

Schickard, *Massimo Dionisi, Sassari, Italy. 2024 March 22 19:36 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*



Kepler, *Michael Teoh, Heng Fe Observatory, Penang, Malaysia. 2024 March 22 14:44 UT. APM-TMB 228/2050 mm refractor telescope, 2x barlow, QHY5III678M camera.*

Recent Topographic Studies

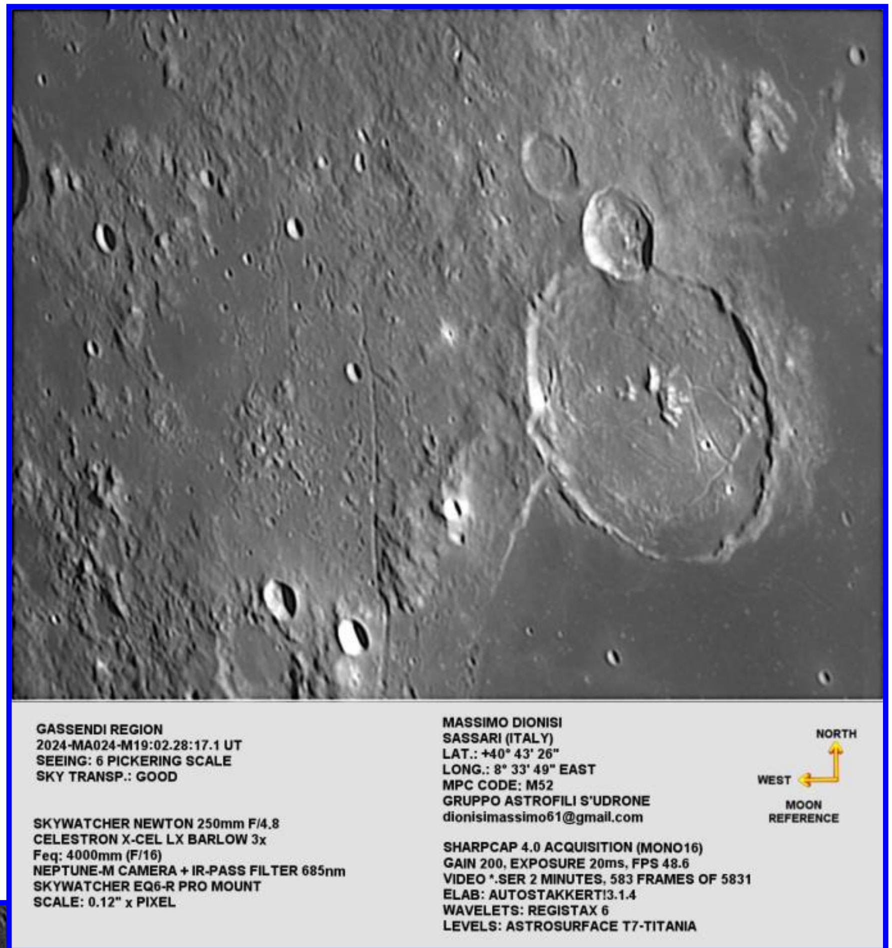


10-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 March 20 08:22 UT. 80 mm ED refractor telescope, QHY5III462C camera. North is down, west is right.*

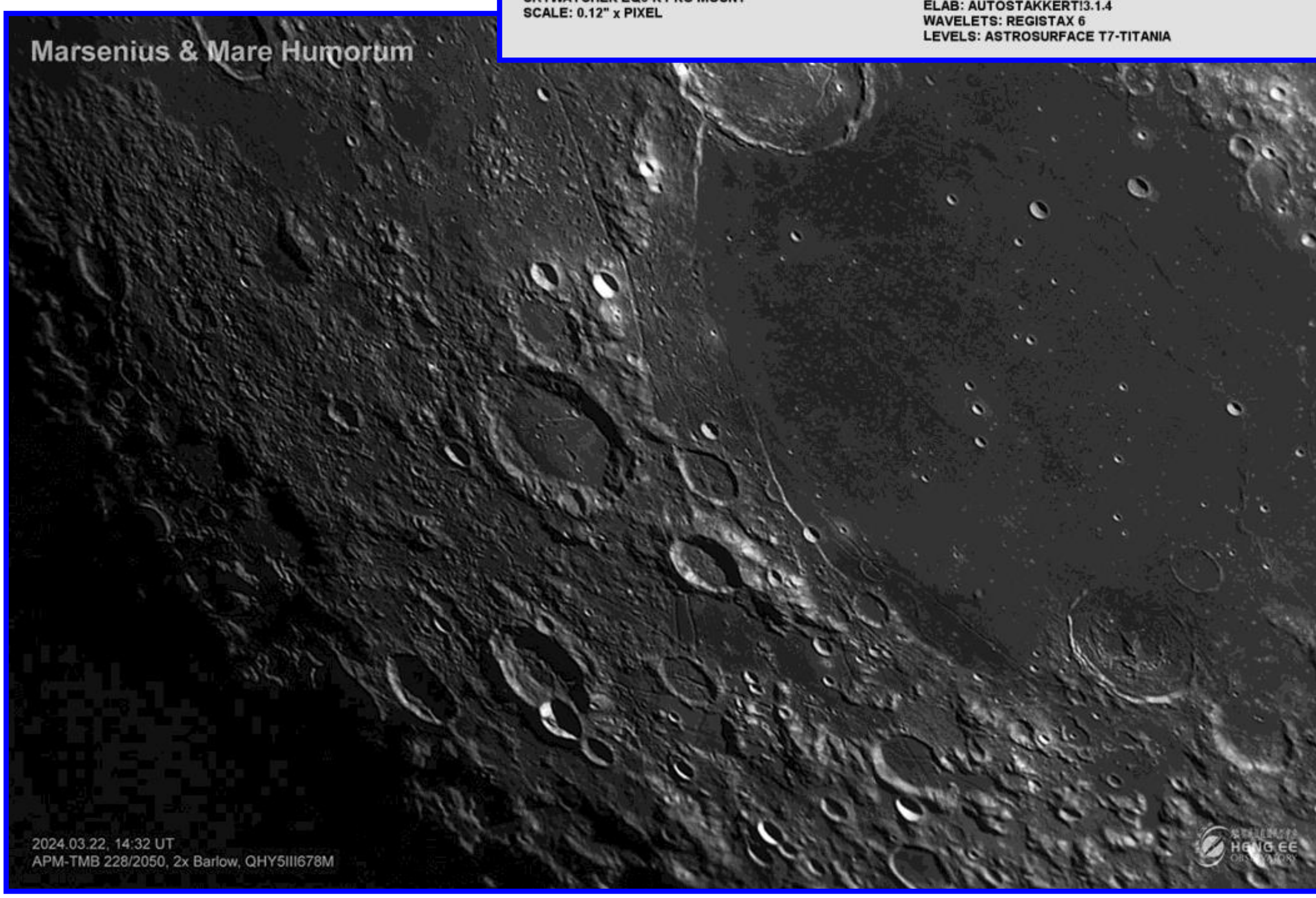
Sinus Iridum, *Massimo Dionisi, Sassari, Italy. 2024 March 22 20:04 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*

Recent Topographic Studies

Gassendi, *Massimo Dionisi, Sassari, Italy. 2024 March 22 19:02 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*



Mersenius and Mare Humorum, *Michael Teoh, Heng Fe Observatory, Penang, Malaysia. 2024 March 22 14:32 UT. APM-TMB 228/2050 mm refractor telescope, 2x barlow, QHY5III678M camera.*



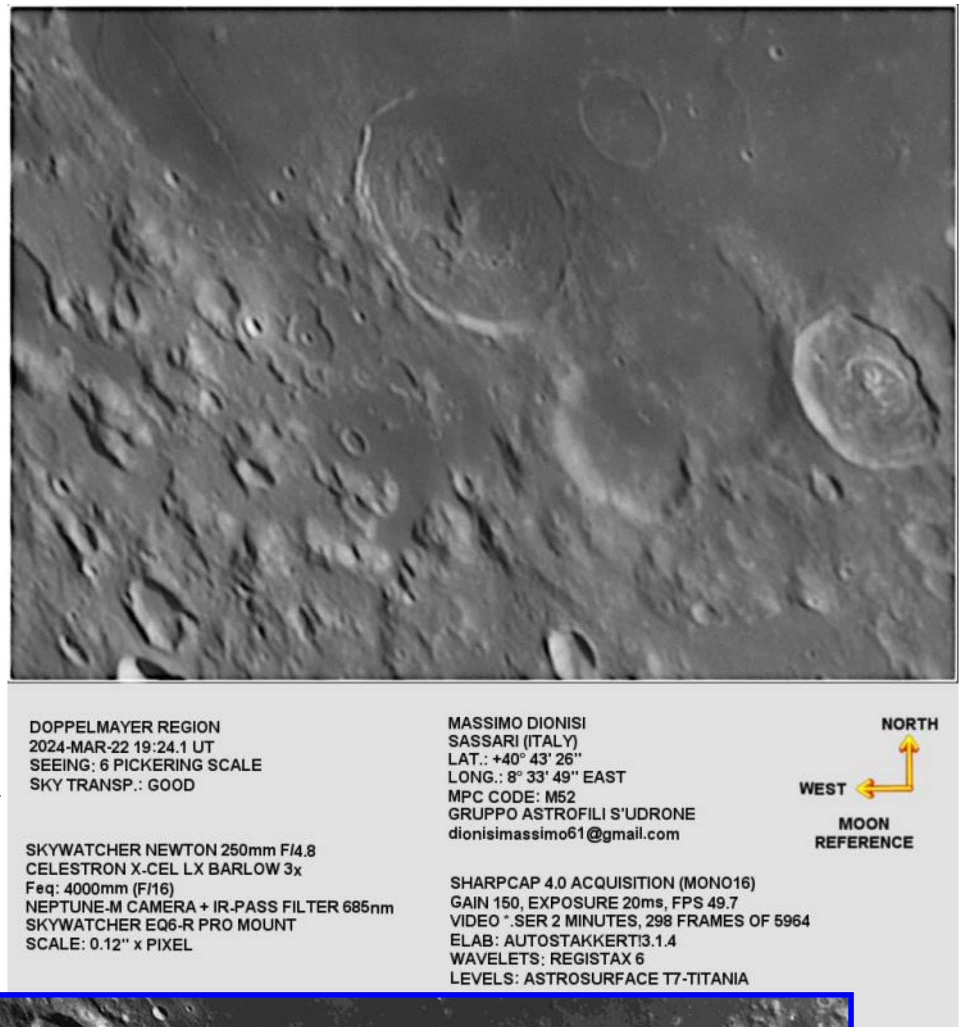
Recent Topographic Studies

Babbage, *Massimo Dionisi, Sassari, Italy. 2024 March 22 19:58 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*

11-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 March 21 08:21 UT. 80 mm ED refractor telescope, QHY5III462C camera. North is down, west is right.*

Recent Topographic Studies

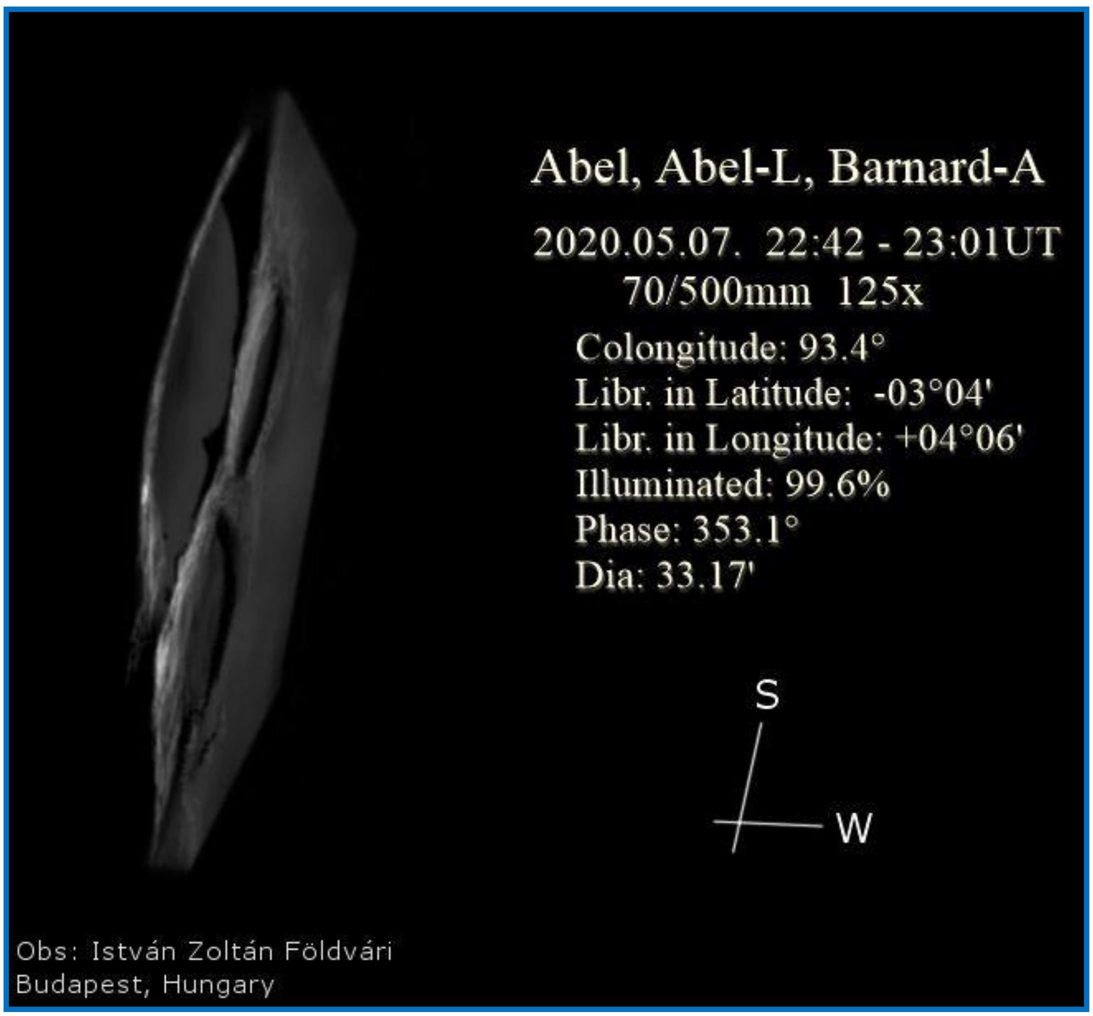
Doppelmayer, *Massimo Dionisi, Sassari, Italy. 2024 March 22 19:24 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 4,000 mm, IR pass filter 685 nm, Neptune M camera. Seeing 6 on Pickering scale, transparency good.*



Vieta & Fourier, *Michael Teoh, Heng Fe Observatory, Penang, Malaysia. 2024 March 22 14:31 UT. APM-TMB 228/2050 mm refractor telescope, 2x barlow, QHY5III678M camera.*

Recent Topographic Studies

Clavius, *Maurice Collins, Palmerston North, New Zealand. 2024 March 21 08:18 UT. 80 mm ED refractor telescope, 5x barlow, QHY5III462C camera.*



Abel, Abel L and Barnard A, *István Zoltán Földvári, Budapest, Hungary. 2020 May 07 22:42-23:01 UT, colongitude 93.4°. 70 mm refractor telescope, 500 mm focal length, Vixen Lanthanum LV 4mm eye-piece, 125x. Seeing 3/10, transparency 5/6.*

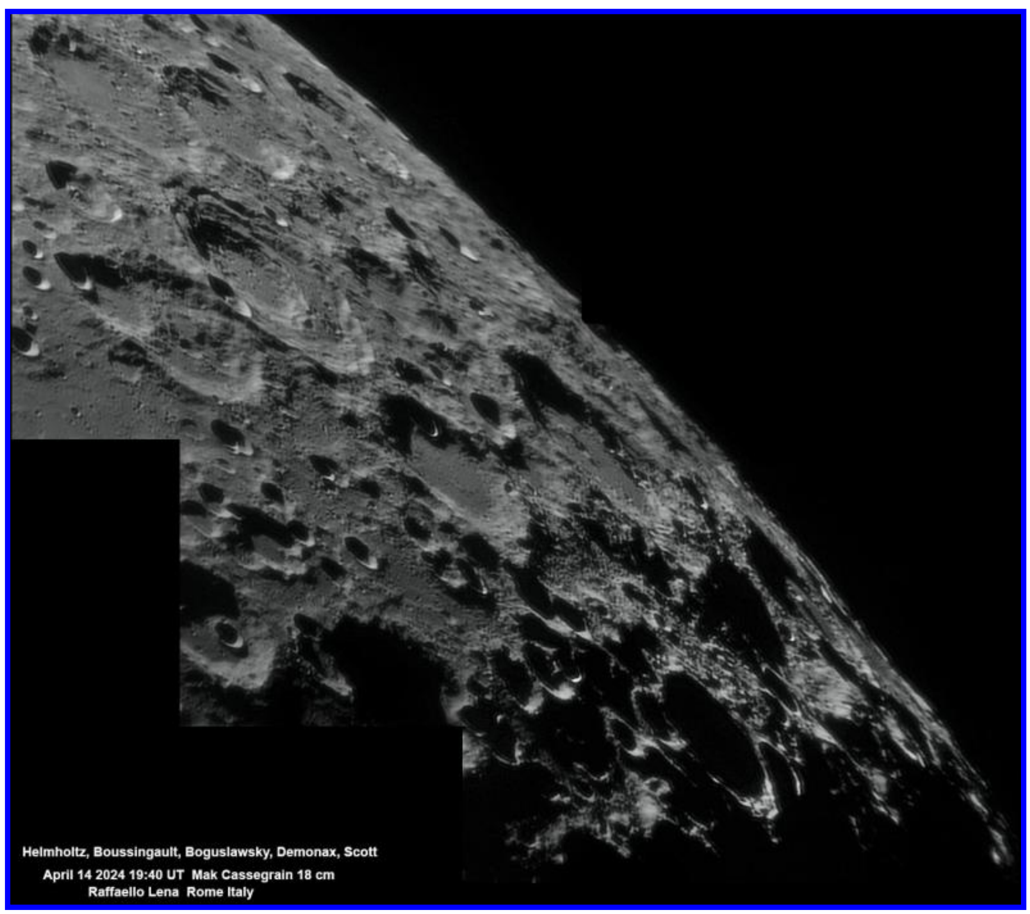
Recent Topographic Studies

Copernicus, *Maurice Collins, Palmerston North, New Zealand. 2024 March 21 08:16 UT. 80 mm ED refractor telescope, 5x barlow, QHY5III462C camera.*

Atlas, Hercules and Endymion, *Luigi Morrone, Agerola, Italy. 2024 April 13 18:37 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, FFC Baader barlow, Optolong filter green, Fornax 52 mount, Player One Saturn M-SQR (IMX 533) camera.*

Recent Topographic Studies

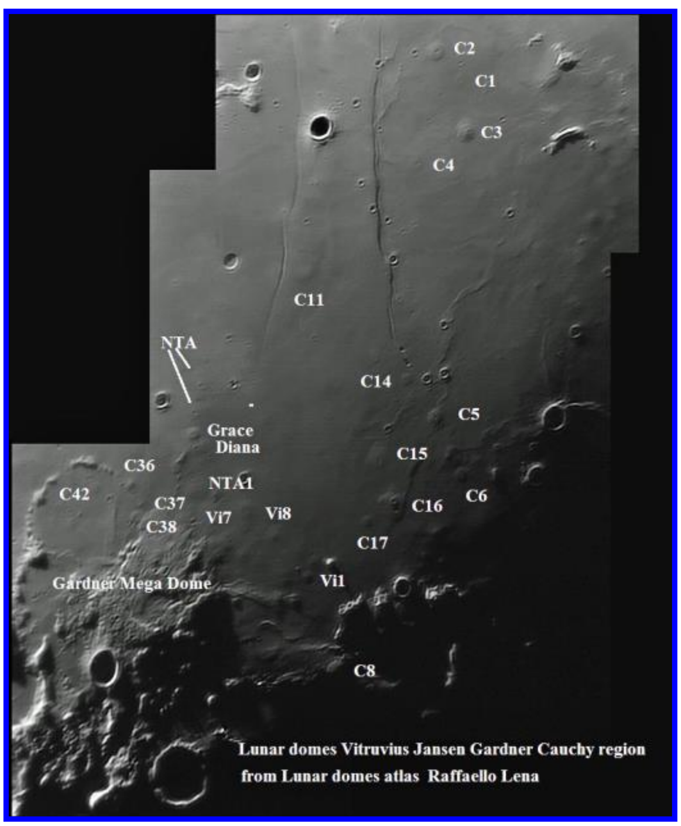
Plato, *Maurice Collins, Palmerston North, New Zealand. 2024 March 21 08:15 UT. 80 mm ED refractor telescope, 5x barlow, QHY5III462C camera.*



Helmholtz, *Raffaello Lena, Rome, Italy. 2024 April 14 19:40 UT. 18 cm Maksutov-Cassegrain telescope. North is to the left, west is down.*

Recent Topographic Studies

Gutenberg, *Luigi Morrone, Agerola, Italy. 2024 April 13 18:22 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, FFC Baader barlow, Optolong filter green, Fornax 52 mount, Player One Saturn M-SQR (IMX 533) camera.*



Cauchy Domes, *Raffaello Lena, Rome, Italy. 2024 April 13. 18 cm Maksutov-Cassegrain telescope. North is to the left, west is down.*

Recent Topographic Studies

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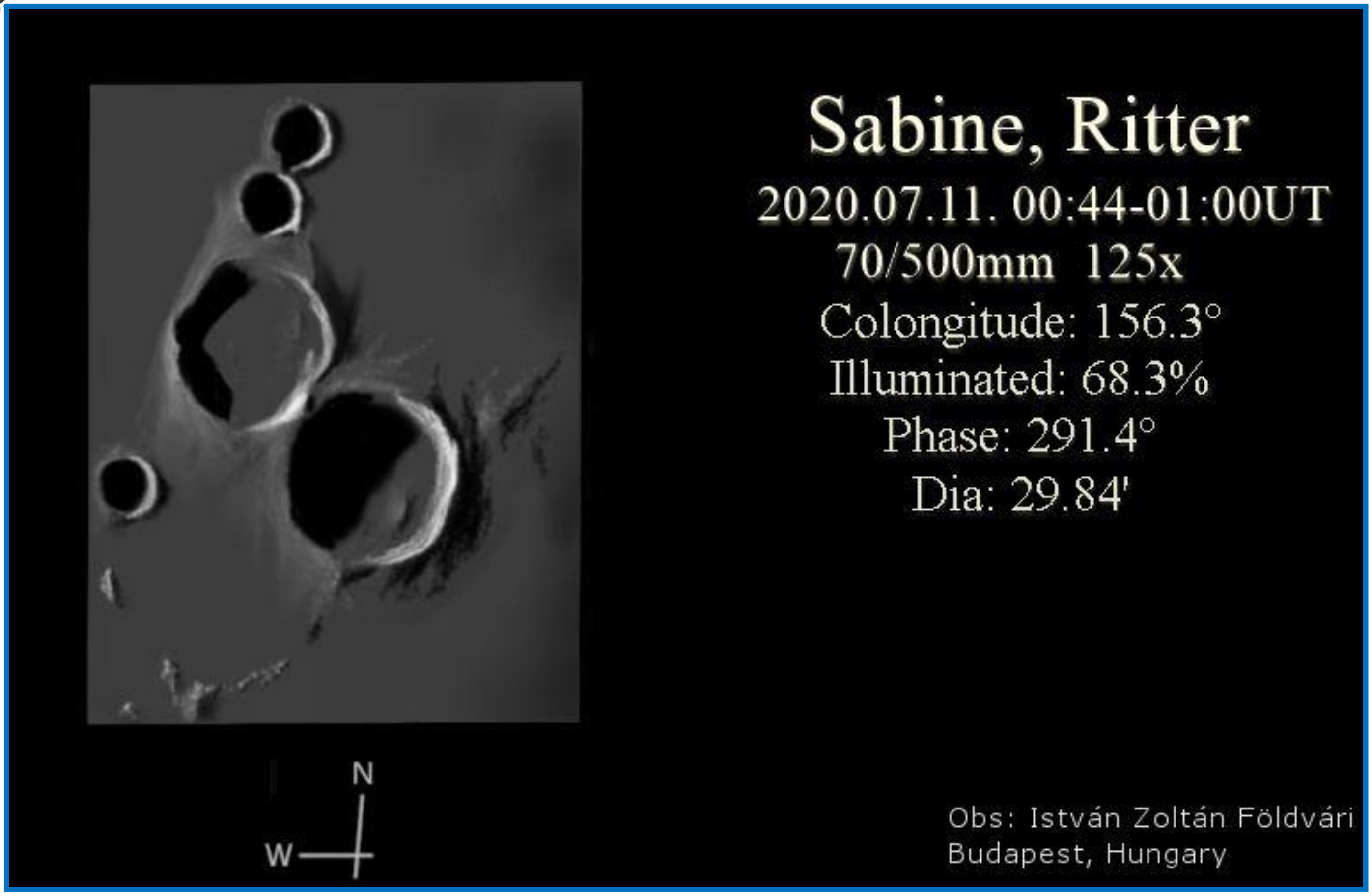
Rozhdestvenskiy, Rozhdestvenskiy K, Hermite, Hinselwood, Florey and Peary, *István Zoltán Földvári, Budapest, Hungary. 2020 July 11 01:00-01:28 UT, colongitude 156.5°. 70 mm refractor telescope, 500 mm focal length, Vixen Lanthanum LV 4mm eyepiece, 125x. Seeing 7/10, transparency 5/6. Below is an annotation of this drawing.*

Recent Topographic Studies

Janssen, *Luigi Morrone, Agerola, Italy. 2024 April 13 18:00 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, FFC Baader barlow, Optolong filter green, Fornax 52 mount, Player One Saturn M-SQR (IMX 533) camera.*

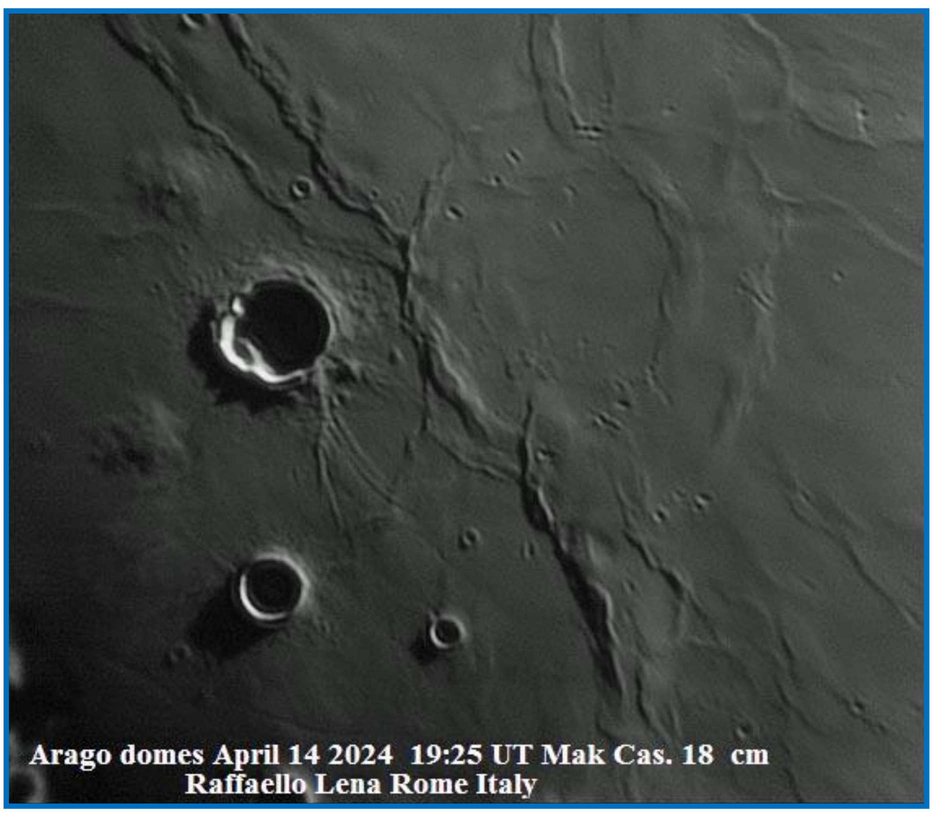
Cauchy Domes, *Raffaello Lena, Rome, Italy. 2024 April 13 18:34 UT. 18 cm Maksutov-Cassegrain telescope.*

Recent Topographic Studies



Sabine and Ritter, *István Zoltán Földvári, Budapest, Hungary. 2020 July 11 00:44-01:00 UT, colongitude 156.3º. 70 mm refractor telescope, 500 mm focal length, Vixen Lanthanum LV 4mm eyepiece, 125x. Seeing 7/10, transparency 5/6.*

Arago Domes, *Raffaello Lena, Rome, Italy. 2024 April 14 19:25 UT. 18 cm Maksutov-Cassegrain telescope.*



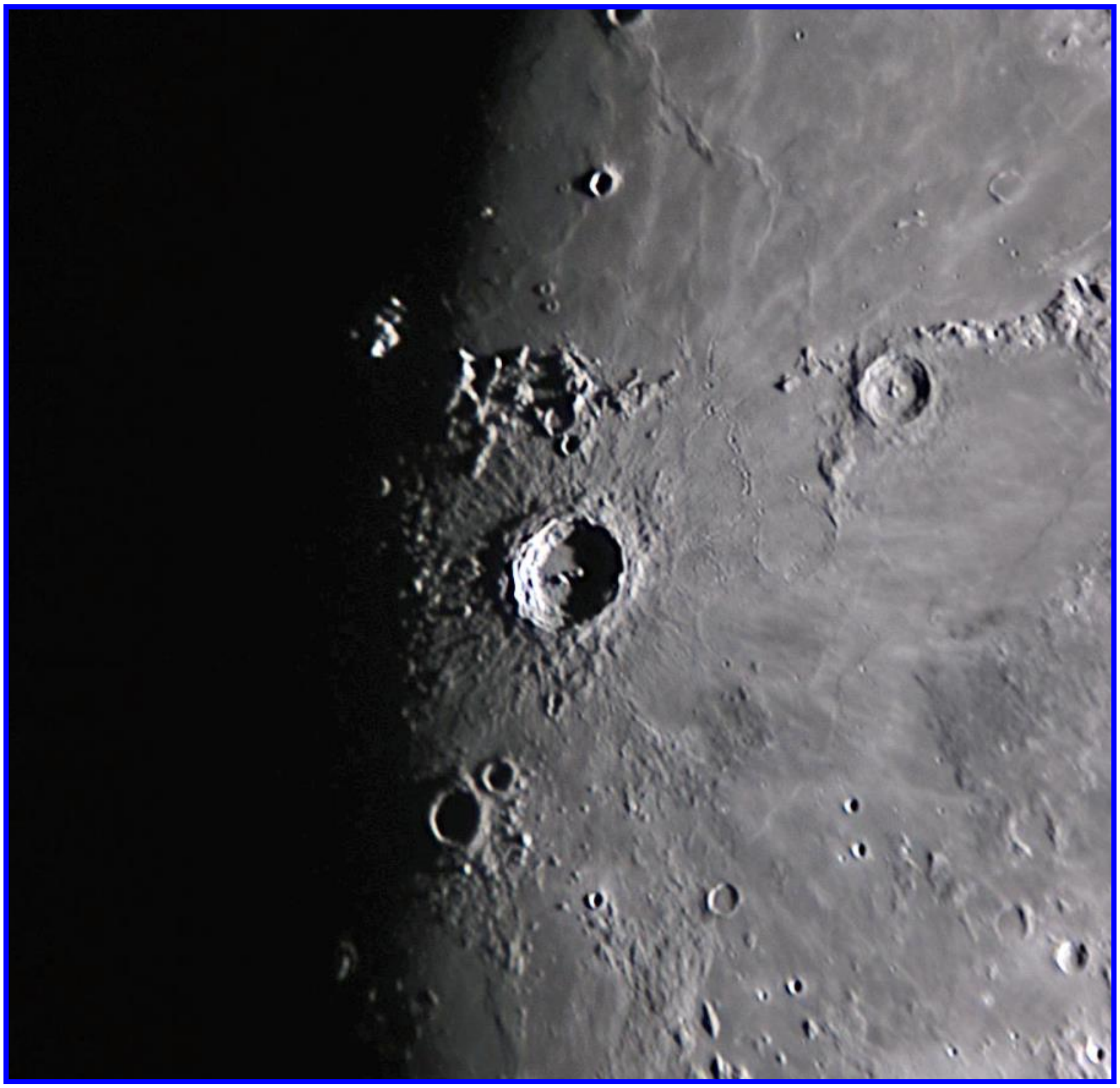
Recent Topographic Studies

Schiller, *Maurice Collins, Palmerston North, New Zealand. 2024 March 21 08:18 UT. 80 mm ED refractor telescope, 5x barlow, QHY5III462C camera.*

Janssen, *Raffaello Lena, Rome, Italy. 2024 April 13 18:55 UT. 18 cm Maksutov-Cassegrain telescope.*

Recent Topographic Studies

Oken, *Raffaello Lena, Rome, Italy. 2024 April 14 19:47 UT. 18 cm Maksutov-Cassegrain telescope.*

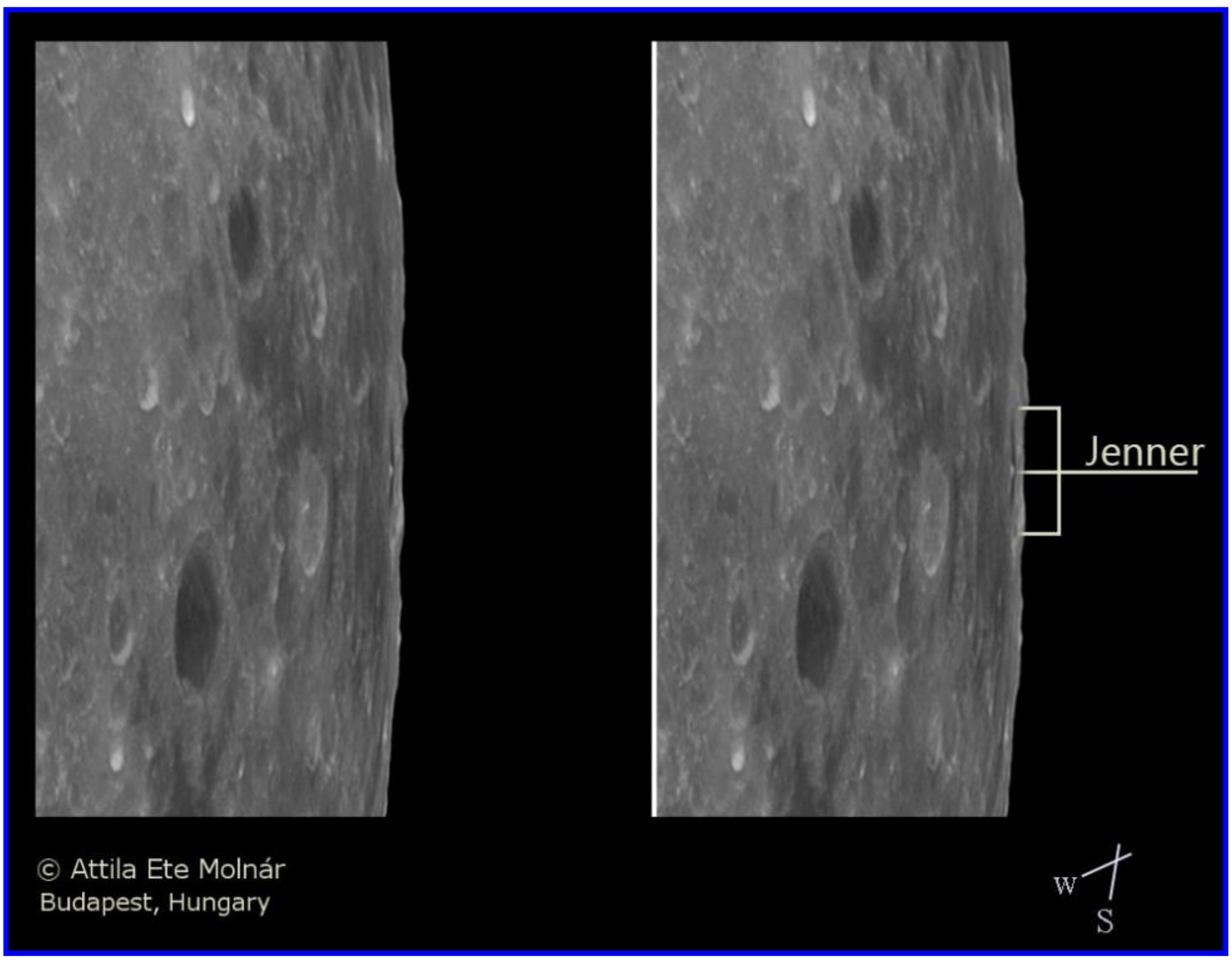


Copernicus, *Maurice Collins, Palmerston North, New Zealand. 2024 April 18 06:51 UT. William Optics FLT-110 mm refractor telescope, 2x barlow, QHY5III462C camera.*

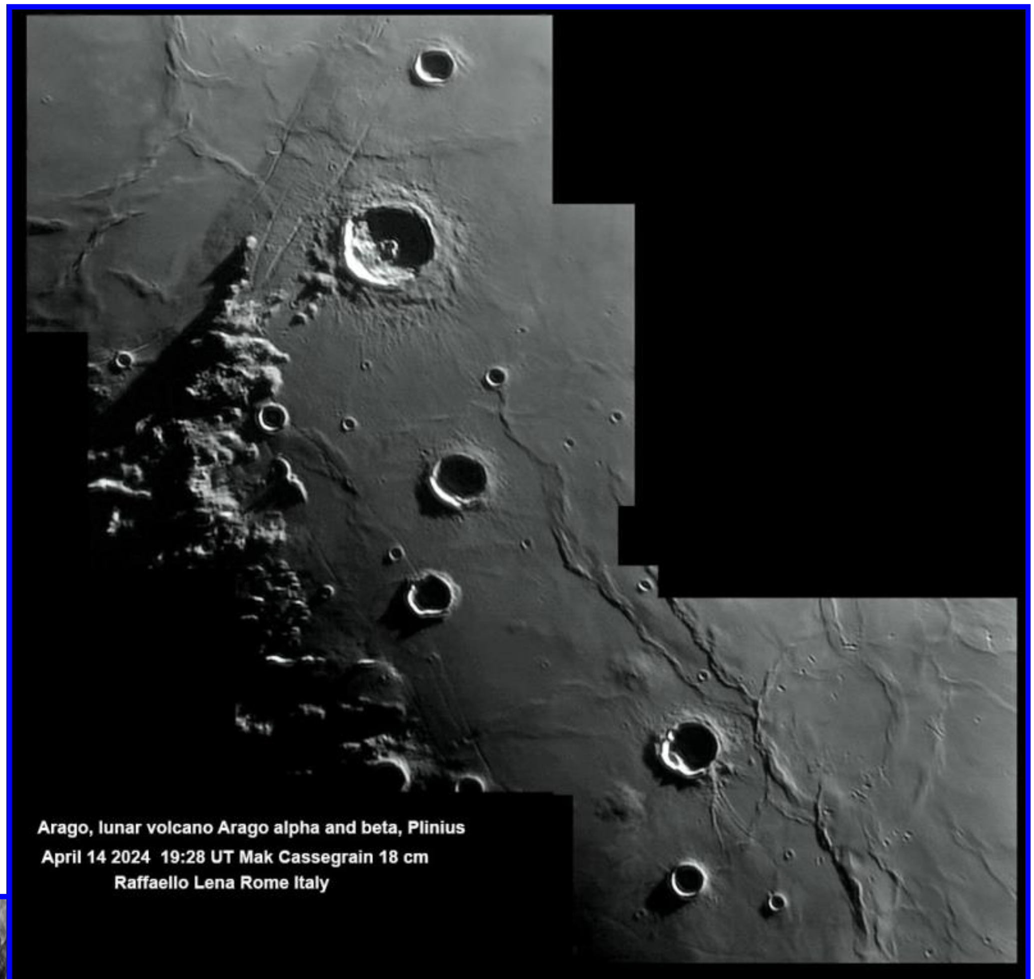
Recent Topographic Studies

Aristoteles, *Raffaello Lena, Rome, Italy. 2024 April 14 19:16 UT. 18 cm Maksutov-Cassegrain telescope.*

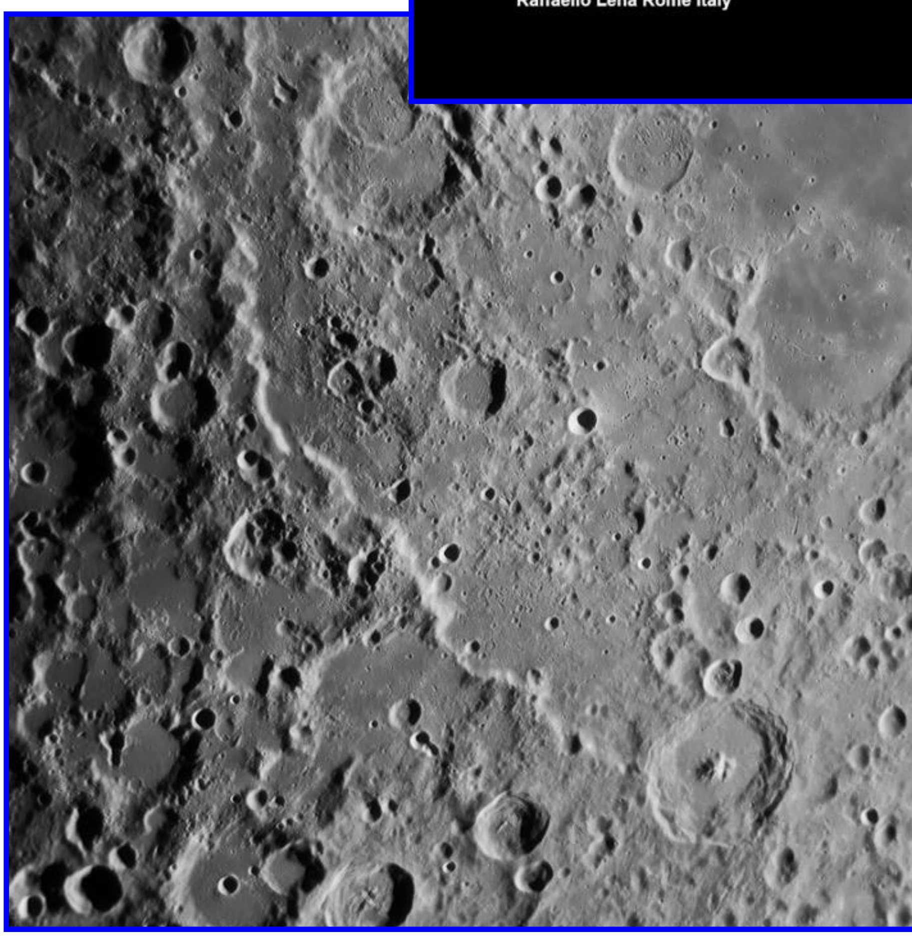
Jenner and Mare Australe, *Attila Ete Molnar, Budapest, Hungary. 2024 March 19 18:13-20:00 UT, colongitude 24.3º. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI178MC camera. Seeing 8/10, transparency 5/6. This wonderful image of a crater in the libration zone was submitted by István Zoltán Földvári.*



Recent Topographic Studies



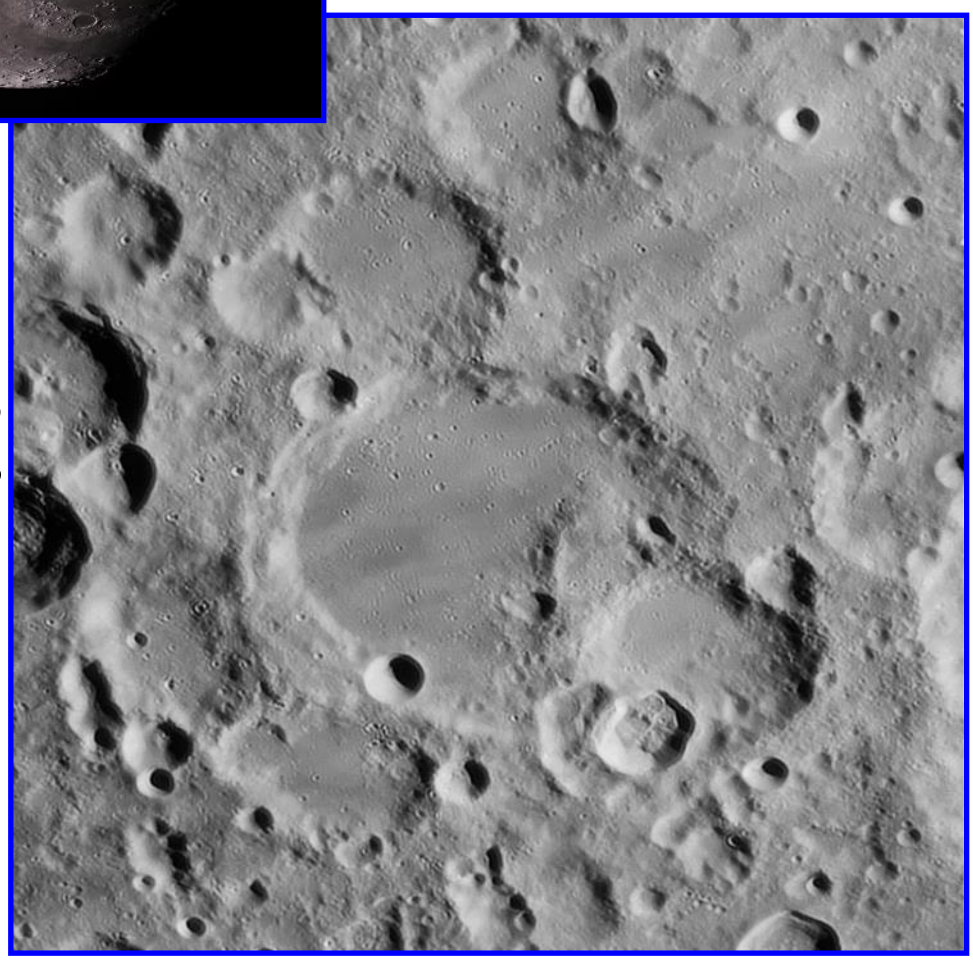
Arago, *Raffaello Lena, Rome, Italy. 2024 April 14 19:28 UT. 18 cm Maksutov-Cassegrain telescope.*



Rupes Altai, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 17 04:05 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*

Recent Topographic Studies

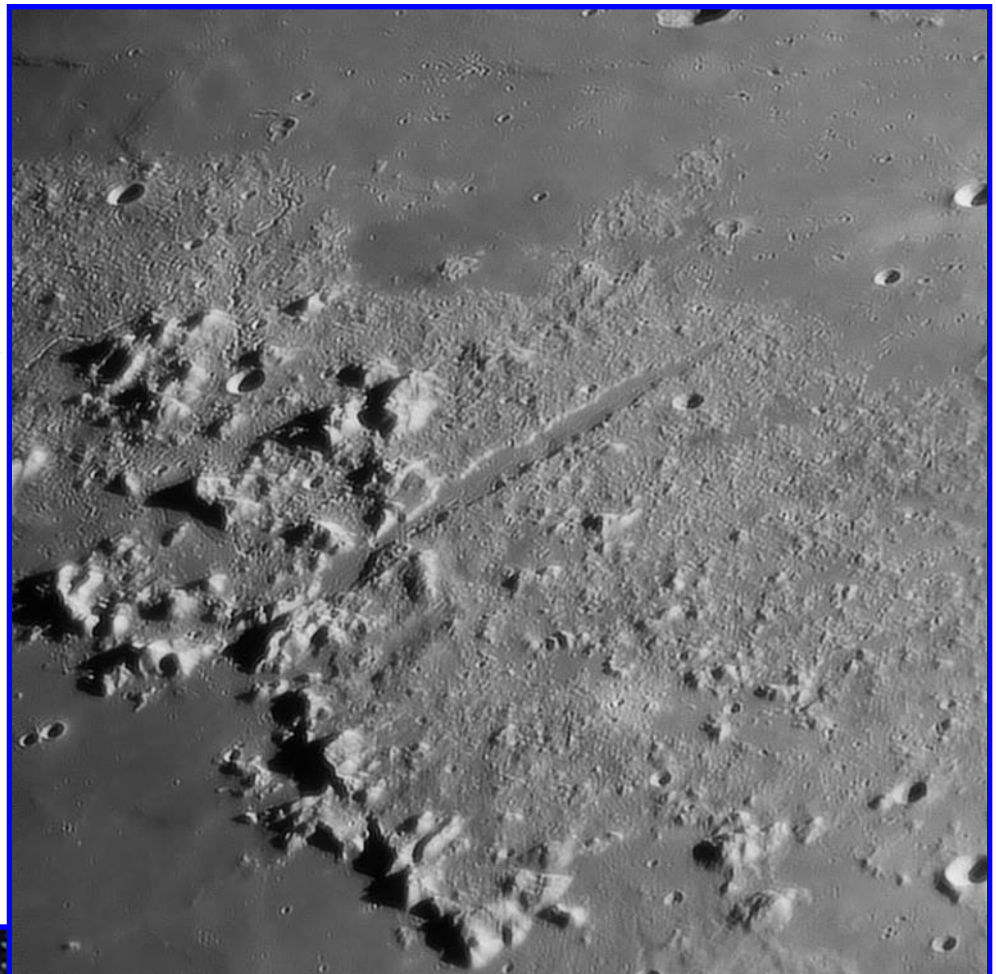
9.5-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 April 18 06:55-07:01 UT. William Optics FLT-110 mm refractor telescope, 2x barlow, QHY5III462C camera. North is down, west is right.*



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

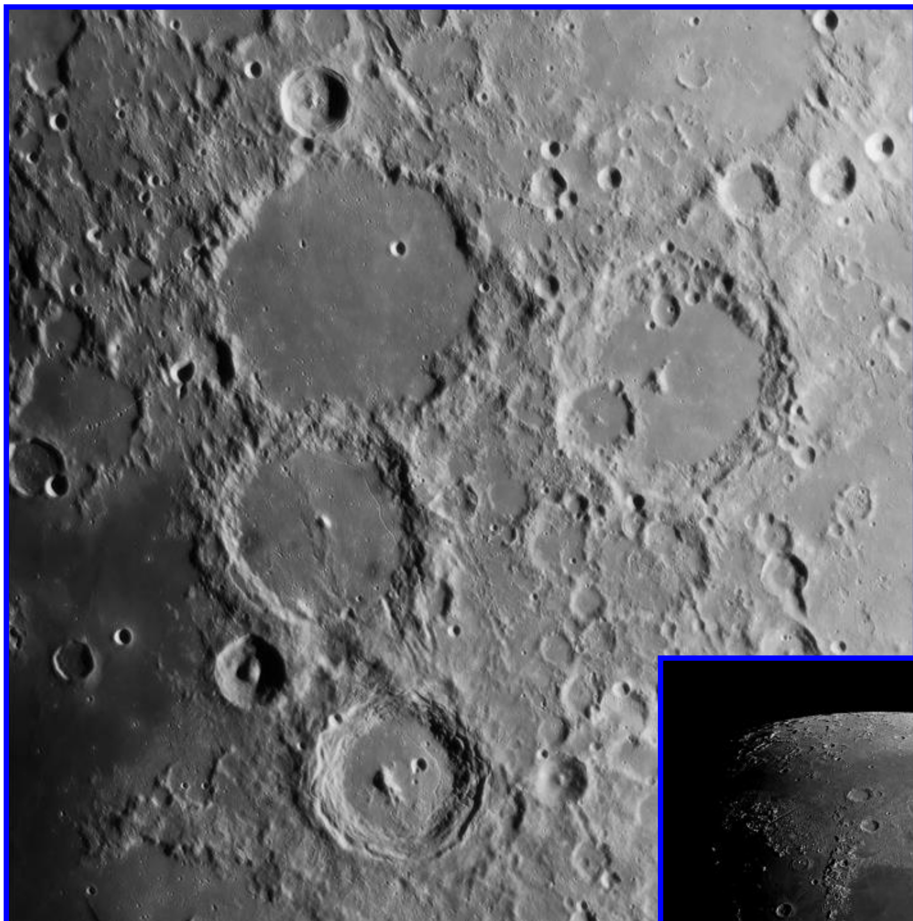
Recent Topographic Studies

Alpine Valley, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 19 04:08 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*



Mare Serenitatis, *Jairo, Chavez, Popayán, Colombia . 2024 March 17 23:17 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

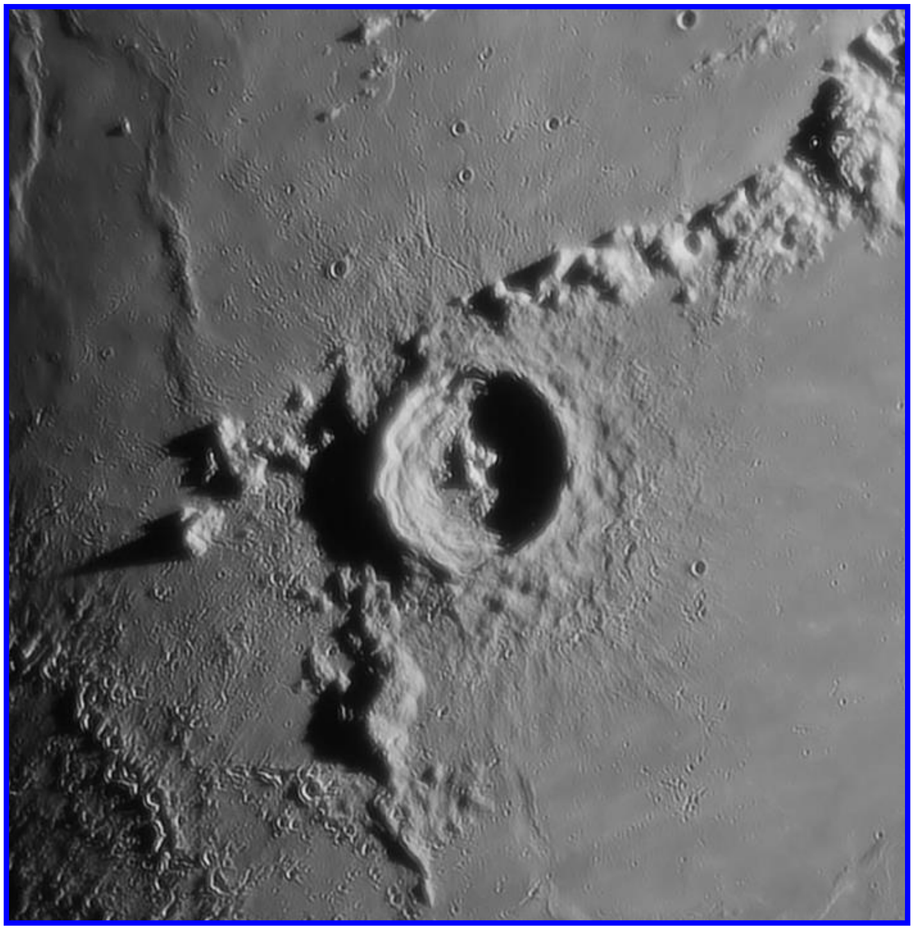
Recent Topographic Studies



Ptolemaeus, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 19 05:33 UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*

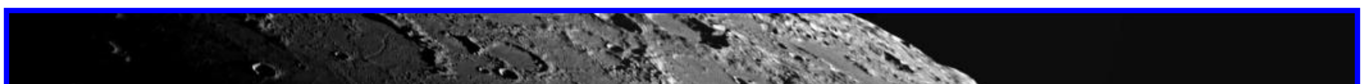
8.2 day-Old Moon, *Jeff Grainger, Cumbria, United Kingdom. 2024 April 16 21:59 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI174MM camera.*

Recent Topographic Studies

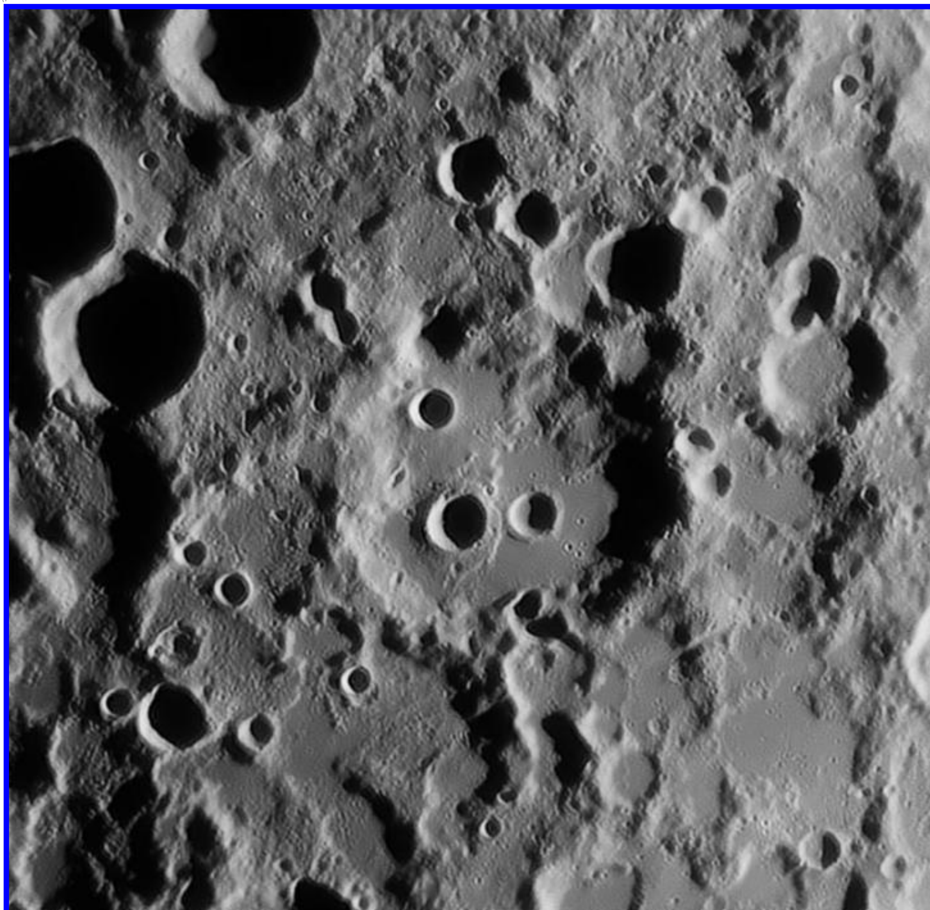


Eratosthenes, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 19 04:29UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*

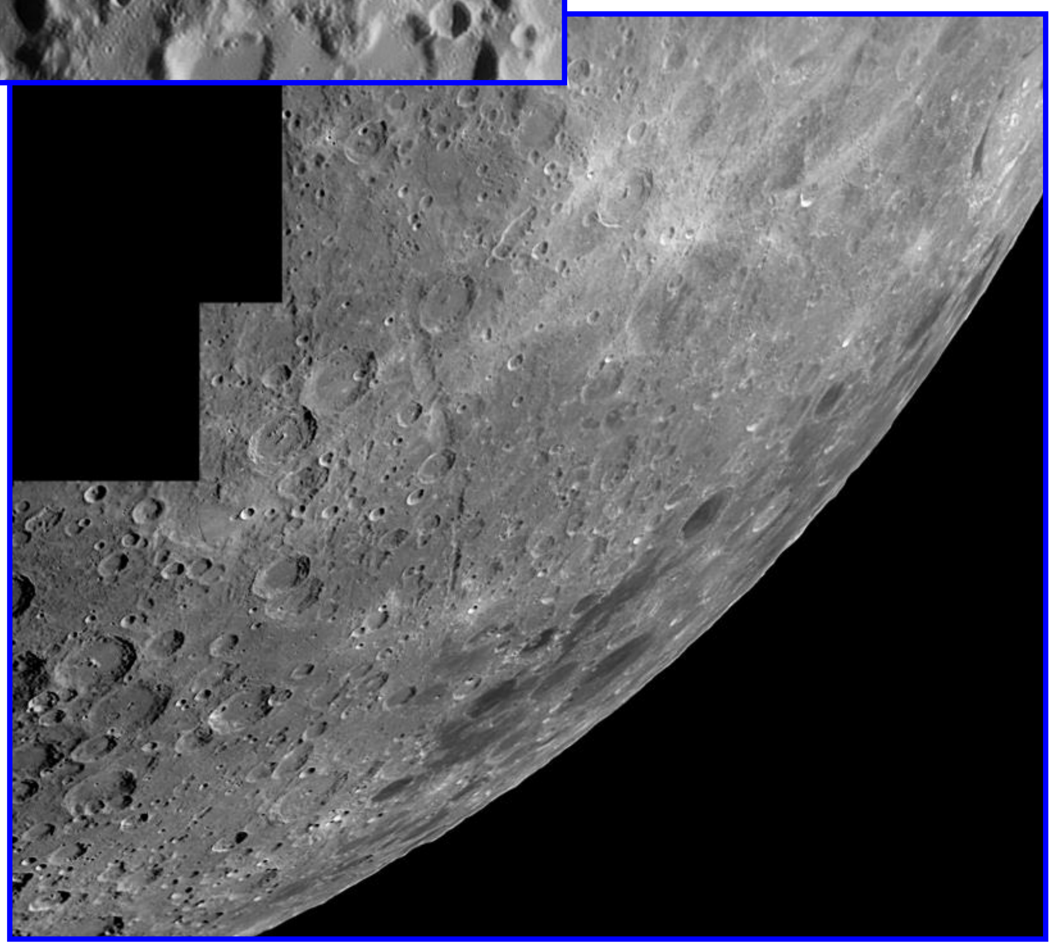
Atlas and Endymion, *Jeff Grainger, Cumbria, United Kingdom. 2024 March 15 20:23 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI462MM camera.*



Recent Topographic Studies



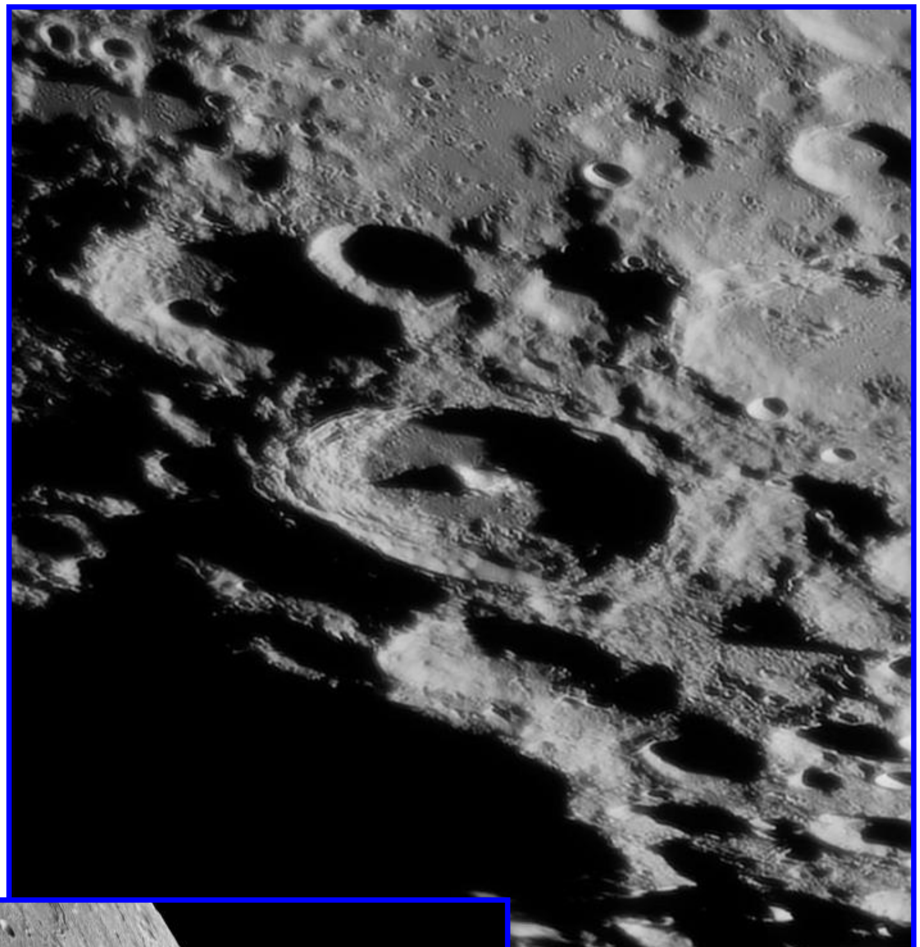
Sacrobosco, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 17 04:02UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*



Mare Australe, *Jeff Grainger, Cumbria, United Kingdom. 2024 April 16 19:52 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI462MM camera.*

Recent Topographic Studies

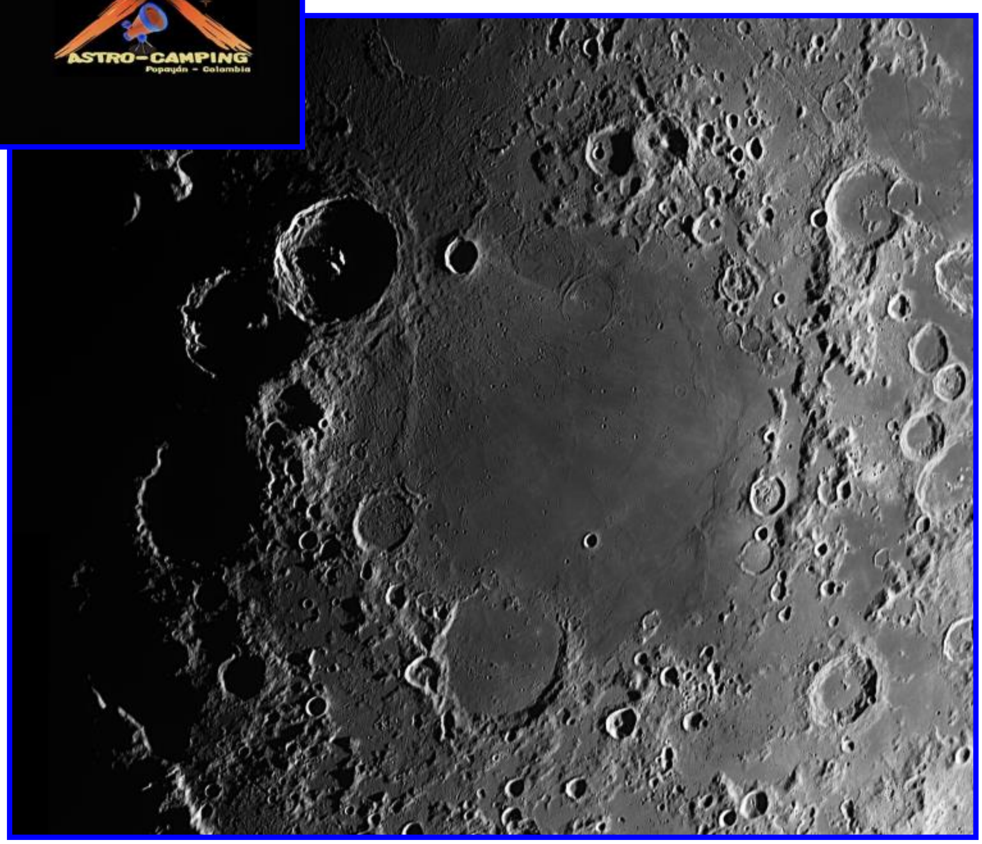
Moretus, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 19 07:06UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*



Mare Crisium, *Jeff Grainger, Cumbria, United Kingdom. 2024 March 15 20:53 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI462MM camera.*

Recent Topographic Studies

First Quarter Moon, *Jairo, Chavez, Popayán, Colombia . 2024 March 17 00:27 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*



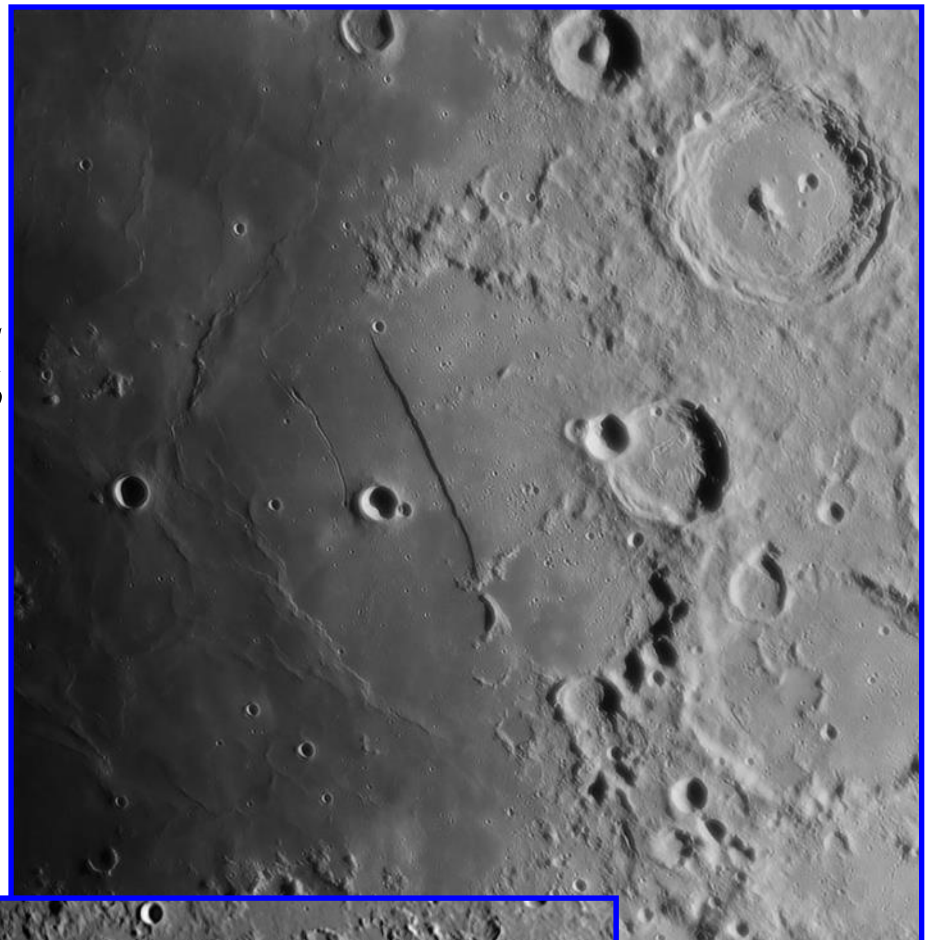
Nectaris Basin, *Jeff Grainger, Cumbria, United Kingdom. 2024 March 15 20:16 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI462MM camera.*

Recent Topographic Studies

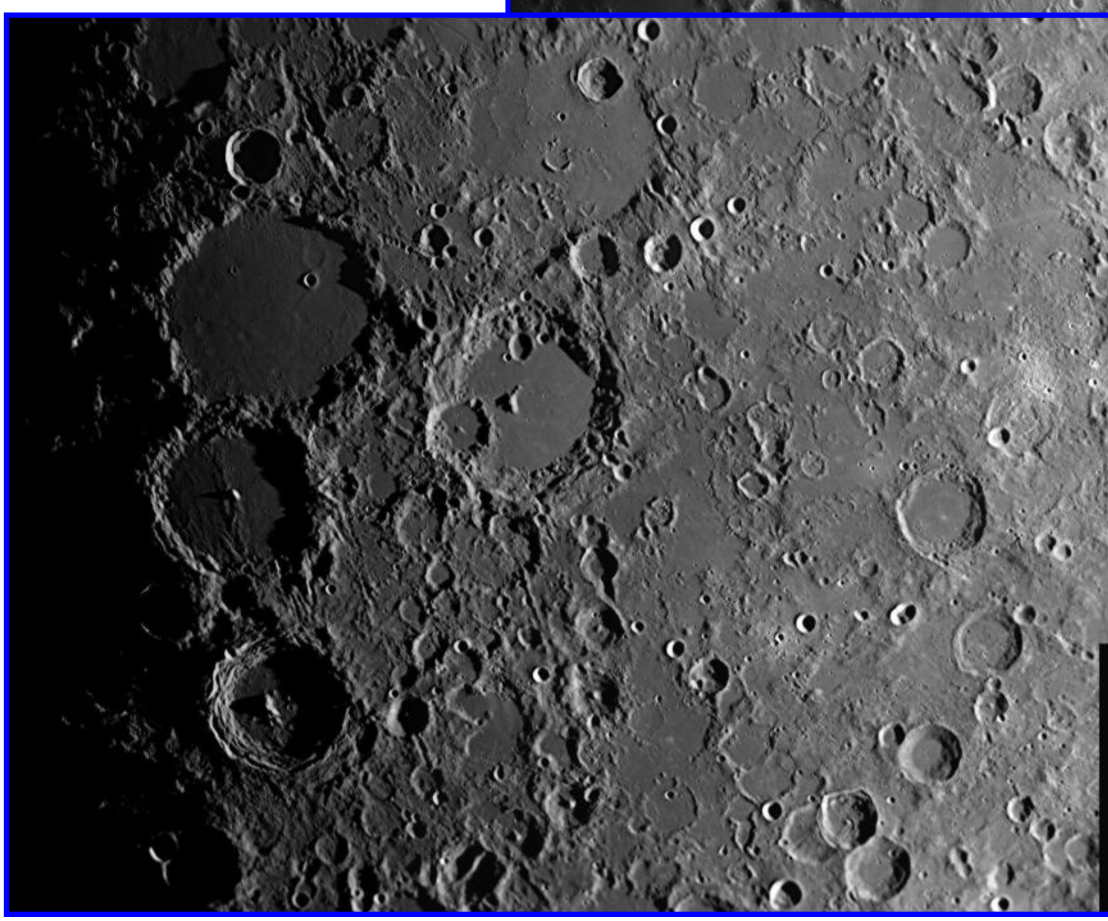
Babbage, *Massimo Dionisi, Sassari, Italy. 2024 April 21 18:54 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 3,600 mm, IR pass filter 685 nm, Neptune M camera. Seeing 5 on Pickering scale, transparency good.*

Tycho, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 23:04 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*

Recent Topographic Studies

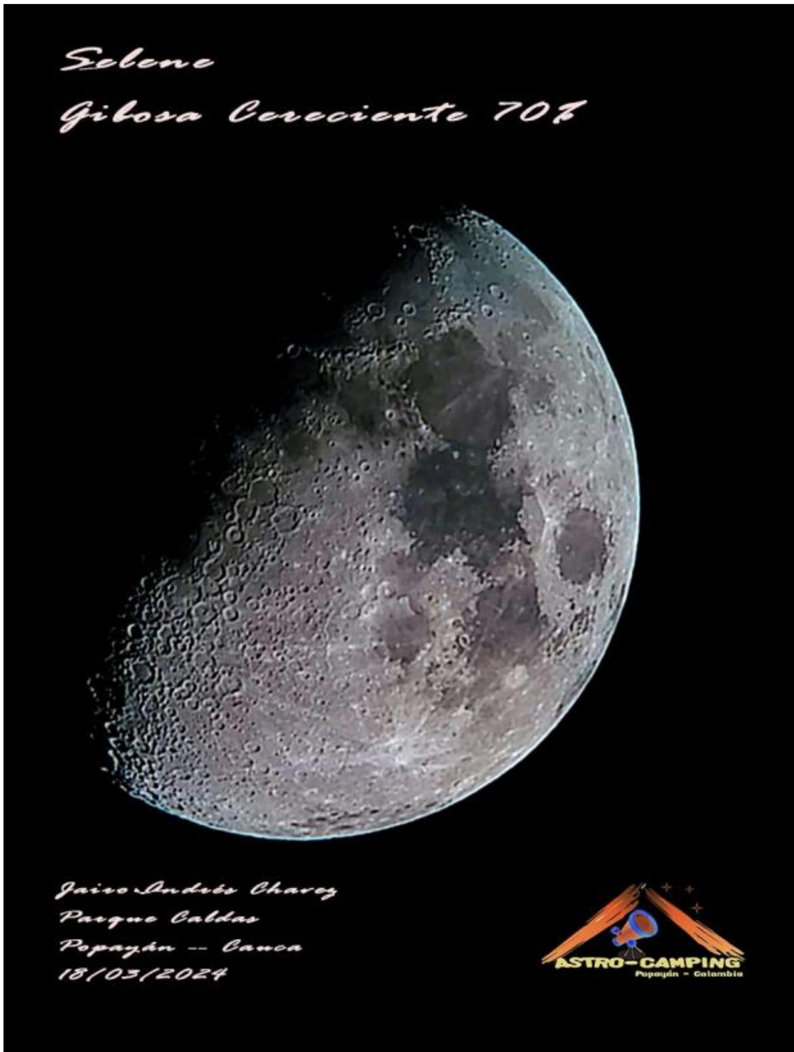


Rupes Recta, *Ken Vaughan, Victoria, British Columbia, Canada. 2024 March 19 05:45UT. Meade 12 inch LX200 GPS Schmidt-Cassegrain telescope, Astronomik 642 nm R-IR filter, ZWO ASI178MM camera.*

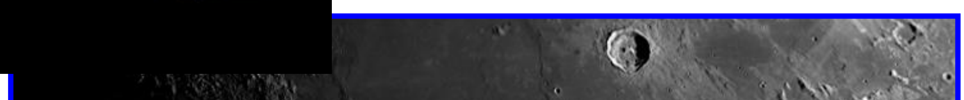


Ptolemaeus, *Jeff Grainger, Cumbria, United Kingdom. 2024 April 16 19:42 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI462MM camera.*

Recent Topographic Studies



Waxing Gibbous Moon, 70%, *Jairo, Chavez, Popayán, Colombia . 2024 March 19 00:54 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

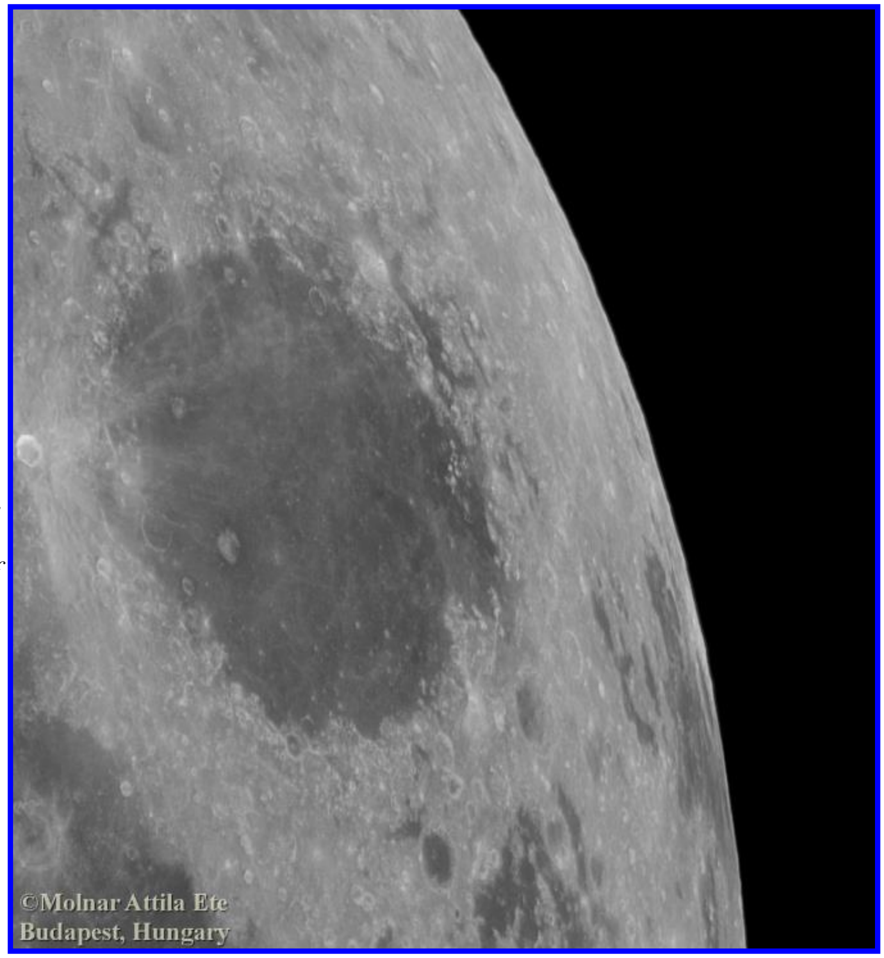


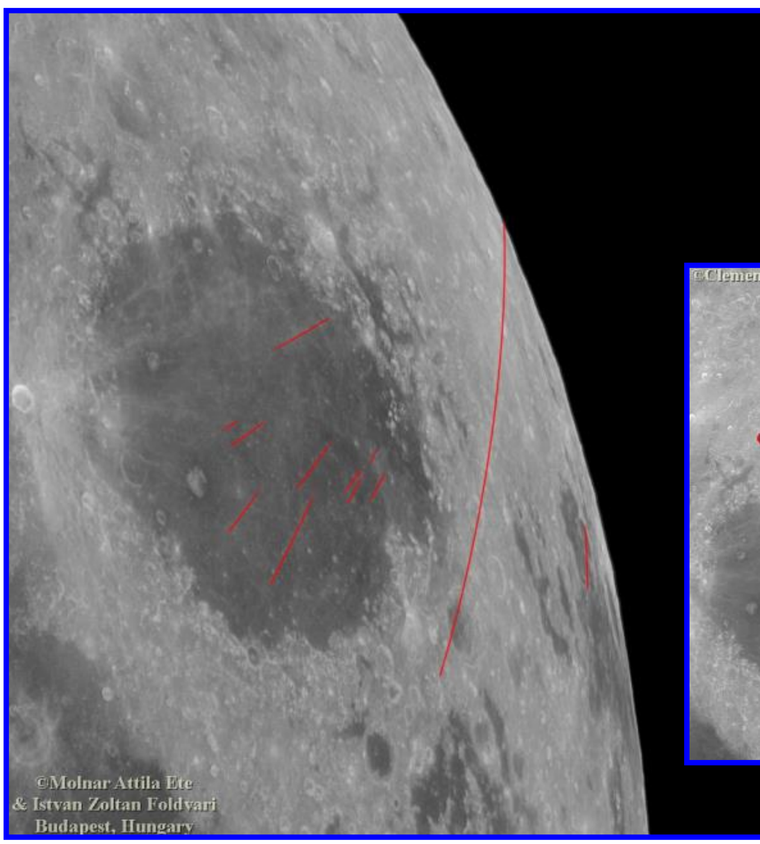
Triesnecker, *Jeff Grainger, Cumbria, United Kingdom. 2024 April 16 19:34 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 685 nm IR filter, ZWO ASI462MM camera.*

Recent Topographic Studies

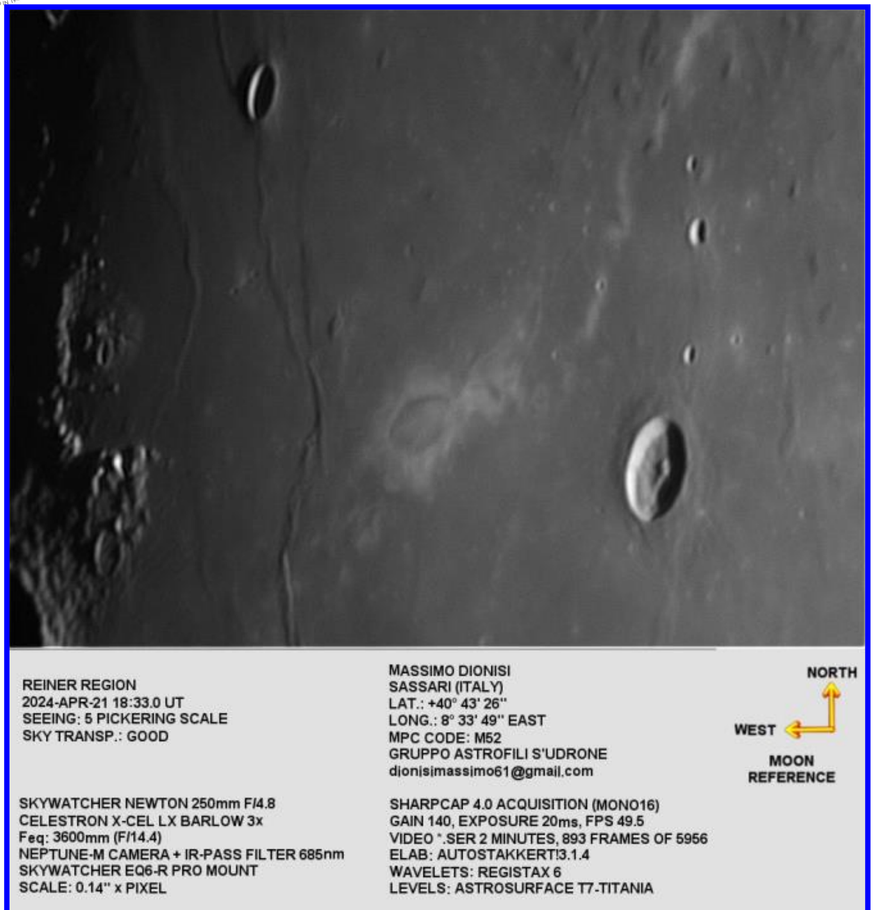
Rays from the crater Giordano Bruno, *Attila Ete Molnar, Budapest, Hungary. 2024 March 19 18:13-20:00 UT, colongitude 24.3°. 150 mm Maksutov-Cassegrain telescope, 1,800 mm focal length, ZWO ASI178MC camera. Seeing 8/10, transparency 5/6. This wonderful image of a crater in the libration zone was submitted by István Zoltán Földvári.*

*Note: As Istvan has such a keen eye for craters far into the libration zone, I recently asked him if he had ever seen the crater Giordano Bruno. This is an image that he supplied from his friend Attila Ete Molnar of Budapest, Hungary. Istvan reports: "*on Attila's previous Jenner crater photo, I found rays pointing to the Giordano Bruno crater in the Crisium region and nearby areas. I have drawn the objects on the photo. Please handle with caution, but I now believe these bright rays are associated with the Bruno crater." *Have any of our readers seen this?*





Recent Topographic Studies

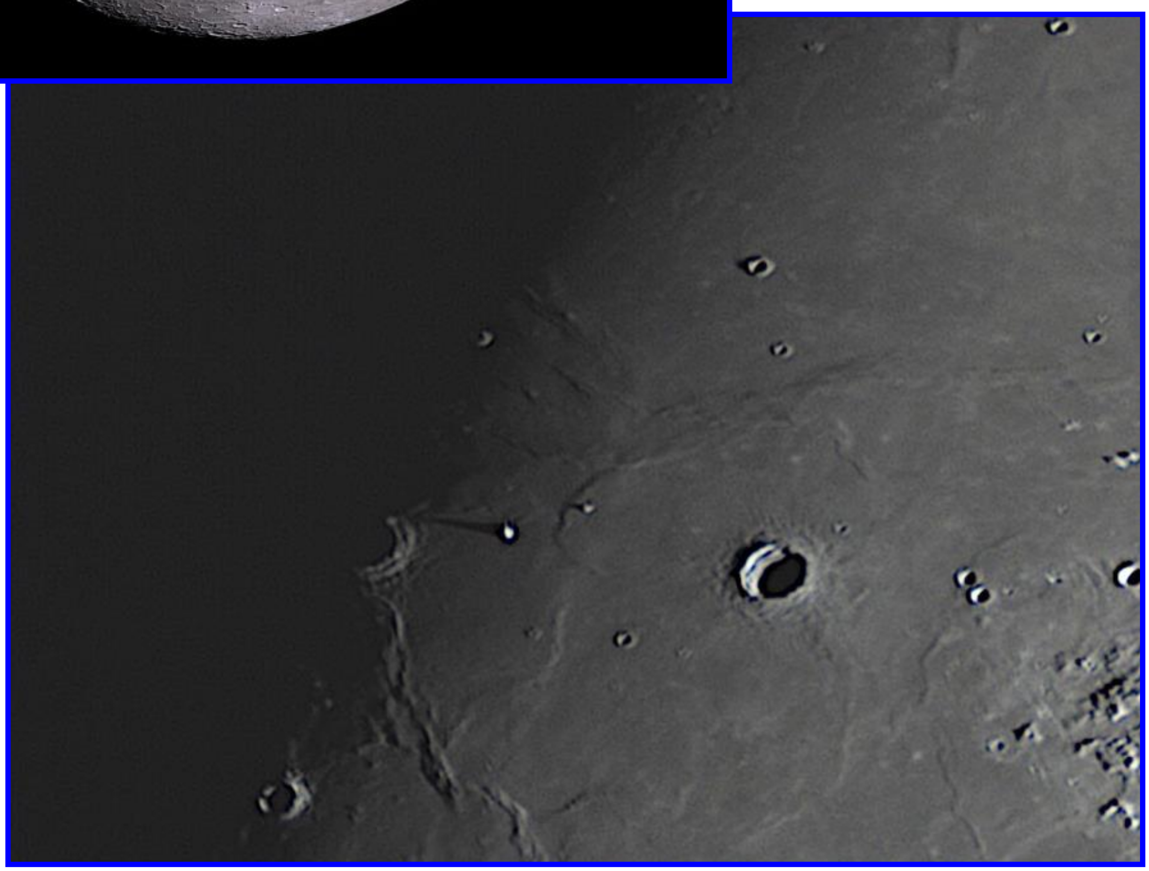


Reiner, *Massimo Dionisi, Sassari, Italy. 2024 April 21 18:33 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 3,600 mm, IR pass filter 685 nm, Neptune M camera. Seeing 5 on Pickering scale, transparency good.*

Mare Crisium, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 23:06 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*

Recent Topographic Studies

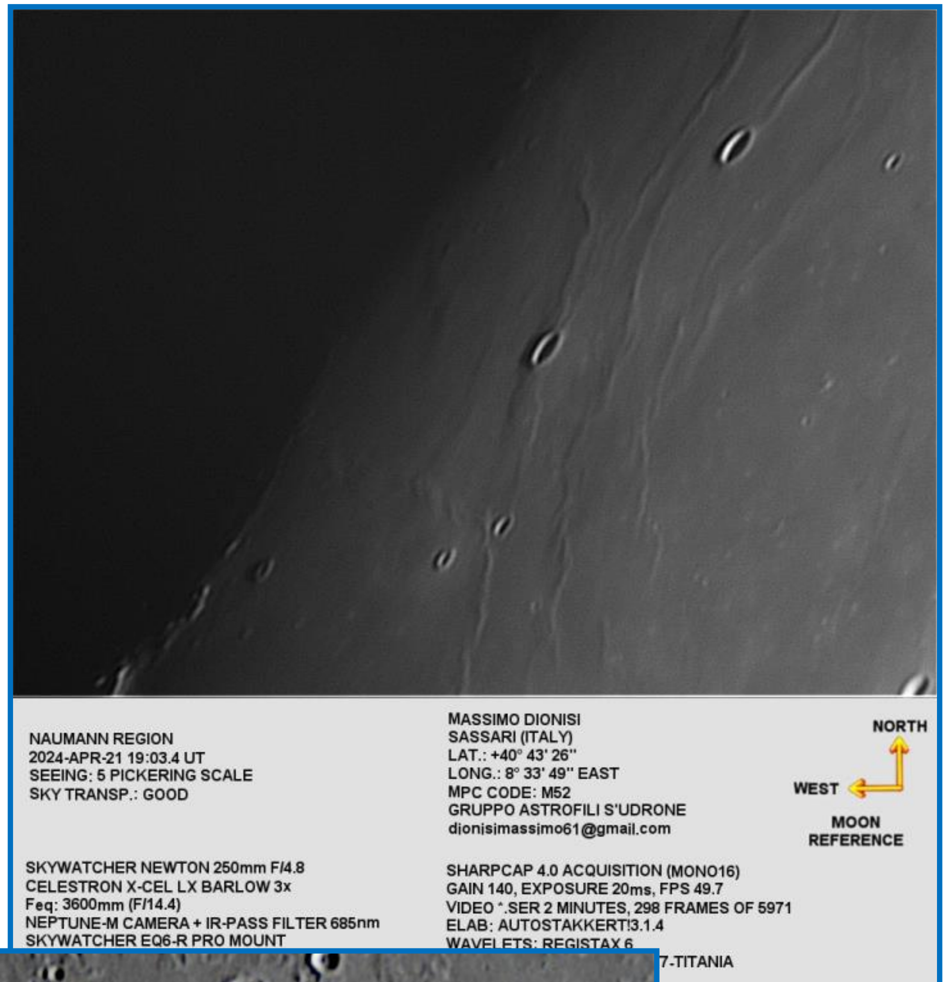
17.6-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 April 26 09:08-09:09 UT. 80 mm ED refractor telescope, 2.5x barlow, QHY5III462C camera. North is down, west is right.*

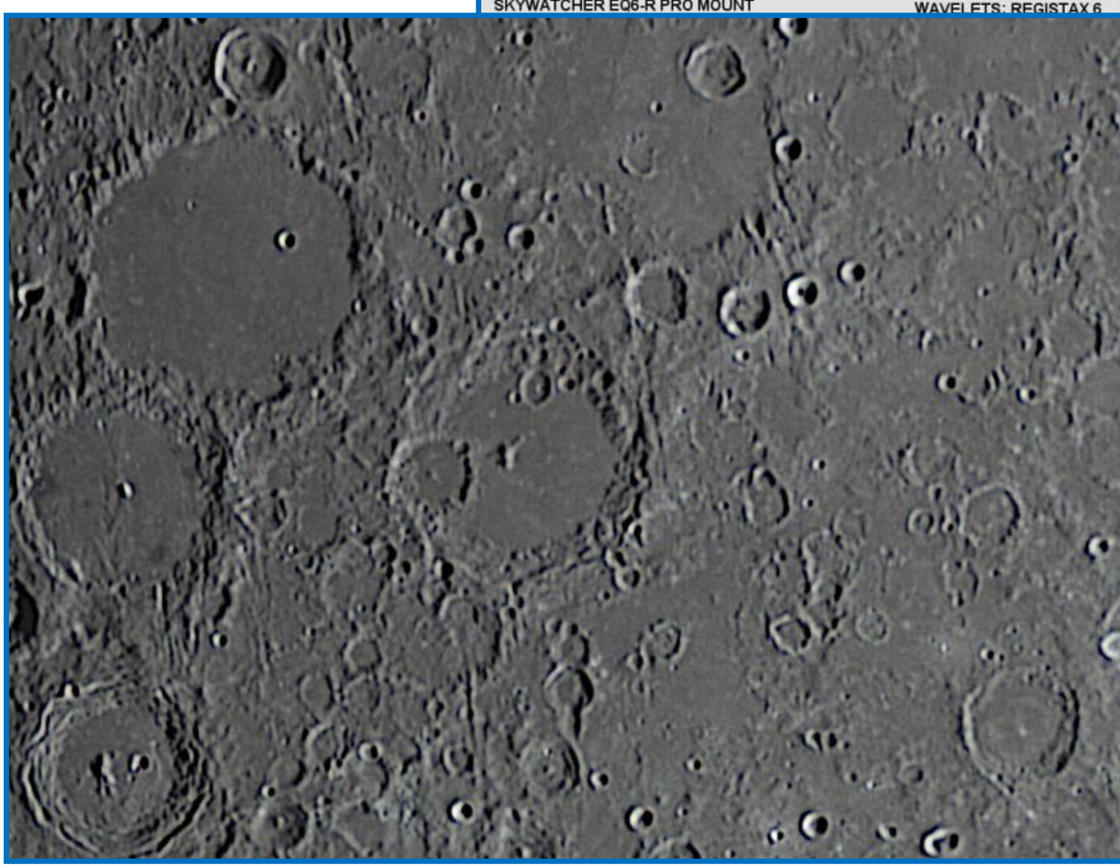


Dorsa Stille, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 22:54 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*

Recent Topographic Studies

Reiner, *Massimo Dionisi, Sassari, Italy. 2024 April 21 19:03 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 3,600 mm, IR pass filter 685 nm, Neptune M camera. Seeing 5 on Pickering scale, transparency good.*



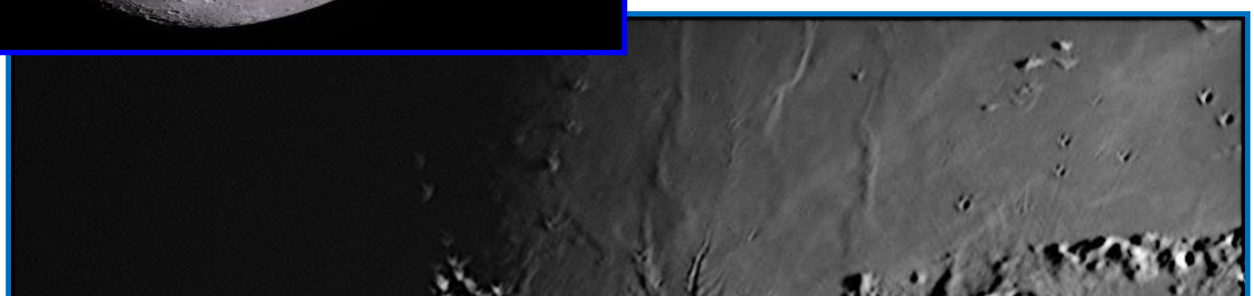


Albategnius, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 23:12 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, QHY5IIC camera.*

Recent Topographic Studies

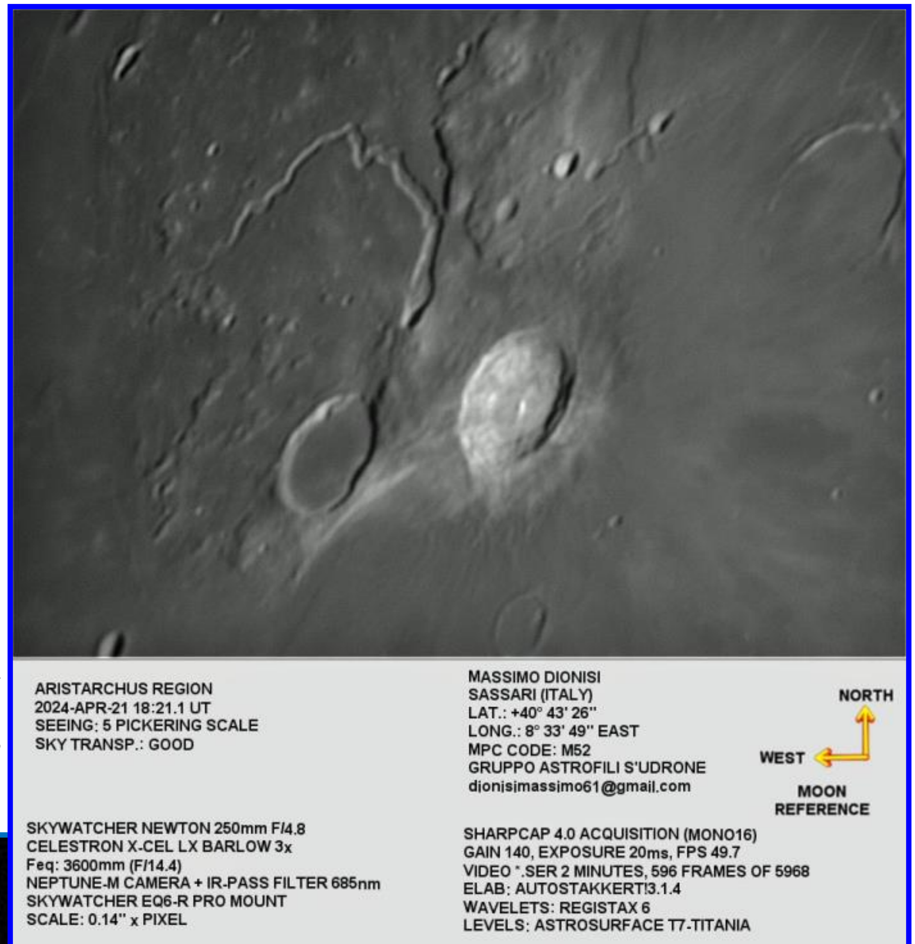
18.7-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 April 27 10:39-10:45 UT. 80 mm ED refractor telescope, QHY5III462C camera. North is down, west is right.*

Copernicus, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 22:47 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, ZWO ASI120MM/S camera.*

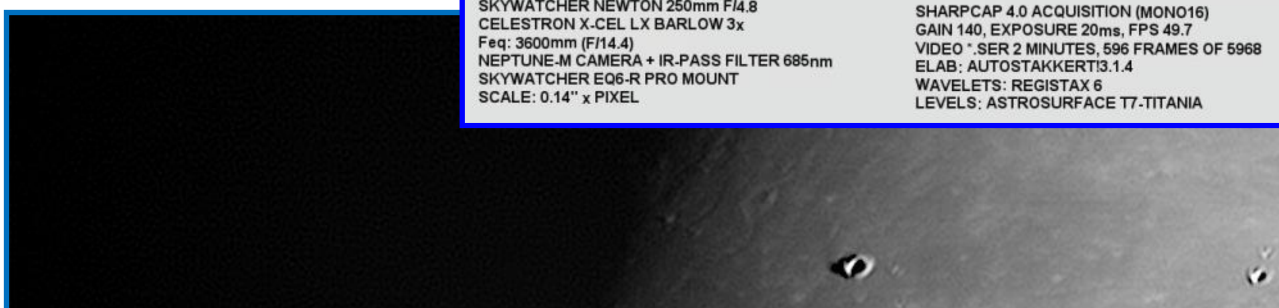


Recent Topographic Studies

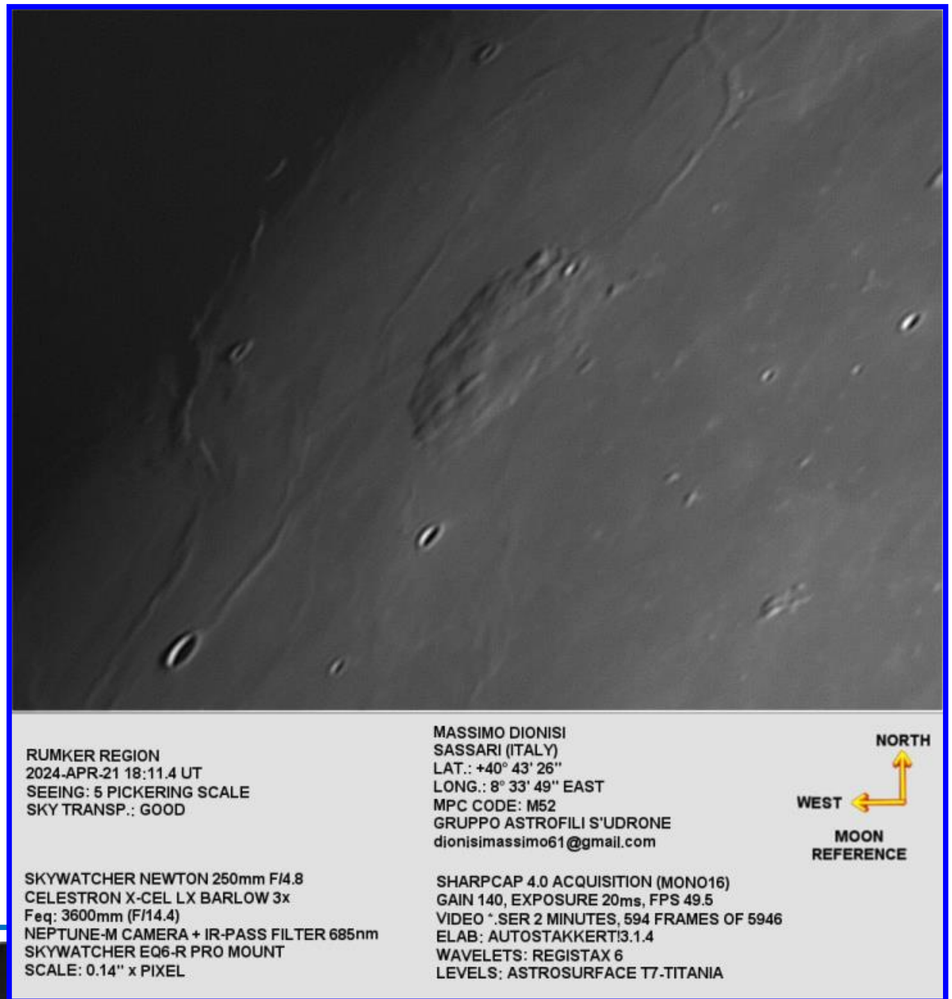
Aristarchus, *Massimo Dionisi, Sassari, Italy. 2024 April 21 18:21 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 3,600 mm, IR pass filter 685 nm, Neptune M camera. Seeing 5 on Pickering scale, transparency good.*

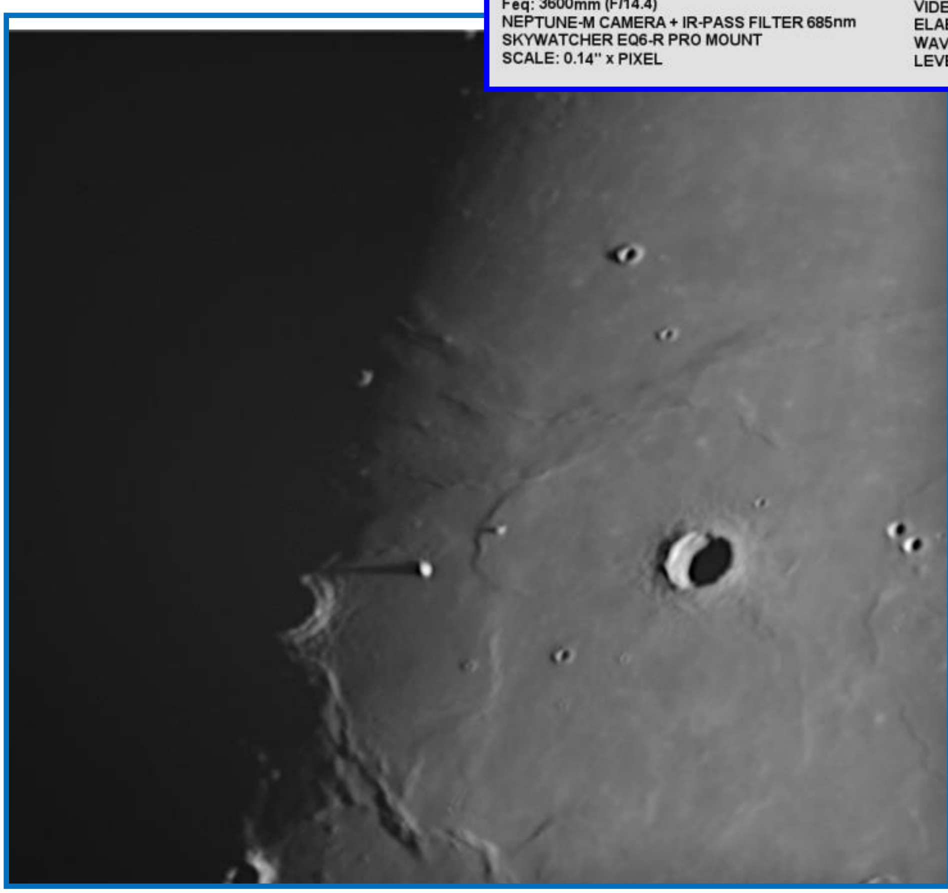


Dorsa Stille, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 21:50 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, ZWO ASI120MM/S camera.*



Rümker, *Massimo Dionisi, Sassari, Italy. 2024 April 21 18:11 UT. Sky Watcher Newtonian reflector telescope, f/4.8, 3x barlow, effective focal length 3,600 mm, IR pass filter 685 nm, Neptune M camera. Seeing 5 on Pickering scale, transparency good.*





Dorsa Stille, *Walter Ricardo Elias, Oro Verde, Argentina, AEA. 2024 April 17 21:49 UT. Celestron CPC 1100 11 inch Schmidt-Cassegrain telescope, ZWO ASI120MM/S camera.*

Recent Topographic Studies

Above, 14.6-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 April 21 07:40-07:47 UT. 80 mm ED refractor telescope, 3x barlow, QHY5III462C camera. North is down, west is right.*

Right, 14.6-Day Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2024 April 21 08:21-08:33 UT. William Optics FLT110 mm refractor telescope, 2x barlow, QHY5III462C camera. North is down, west is right.*

Please note, these images show the same age Moon at about the same time with different sized refractor telescopes. Can you see any difference?

Recent Topographic Studies

Lunar Geologic Change Detection Program

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

2024 May

LTP Reports Received
No further LTP reports have been received since the two potential LTP seen in Aristarchus on 2024 Feb 23 UT 19:22 and 2024 Mar 23 UT 22:08 and described in the April LGC newsletter.

Routine reports received for February included: Bob Bowen (Ynyslas, UK – NAS) imaged: the gibbous Moon. Francisco Alsina Cardinalli (Argentina – SLA) imaged: Censorinus, Copernicus, Hyginus, Linne and Proclus. Maurice Collins (New Zealand - ALPO/BAA/RASNZ) imaged: Mare Serenitatis, Maurolycus, Theophilus and several features. Andy Conway (South Hetton, UK) imaged: Aristarchus. Walter Elias (Argentina – AEA) imaged: Aristarchus and Riccioli. Valerio Fontani (Italy – UAI) imaged: Alphonsus, Malapert, and Plato. Rik Hill (Tucson, AZ, USA – ALPO/BAA) imaged: Copernicus. Luigi Morrone (Italy – BAA) imaged: Archimedes, Aristotles, Boussingault, Cassini, Cryrillus, Hercules, Metius, Posidonius, Ptolemaeus, and Vallis Alpes. Trevor Smith (Codnor, UK – BAA) observed: Aristarchus, and Plato. Franco Taccogna (Italy – UAI) imaged: Alphonsus, Apianus, Faraday, Herodotus, and Malapert. Aldo Tonon (Italy – UAI) imaged: Alphonsus. Ivan Walton (Remote observing from Chile – BAA) imaged: several features.

Analysis of Routine Reports Received (February)

Riccioli: On 2024 Feb 04 UT 07:03 Walter Elias (AEA) imaged this crater under similar illumination to the following Walter Haas visual report:

Riccioli 1937 Sep 29 UT 09:10 Observed by Haas (Alliance, OH USA, 12?" reflector) "Vivid deep purple (Deep purple color on the previous day), but on July 2, 1937 at col. 195deg it was gray tinged with brownish purple. Pbs. conditions similar on all." NASA catalog weight=4 (high). NASA catalog ID #426. ALPO/BAA weight=3.

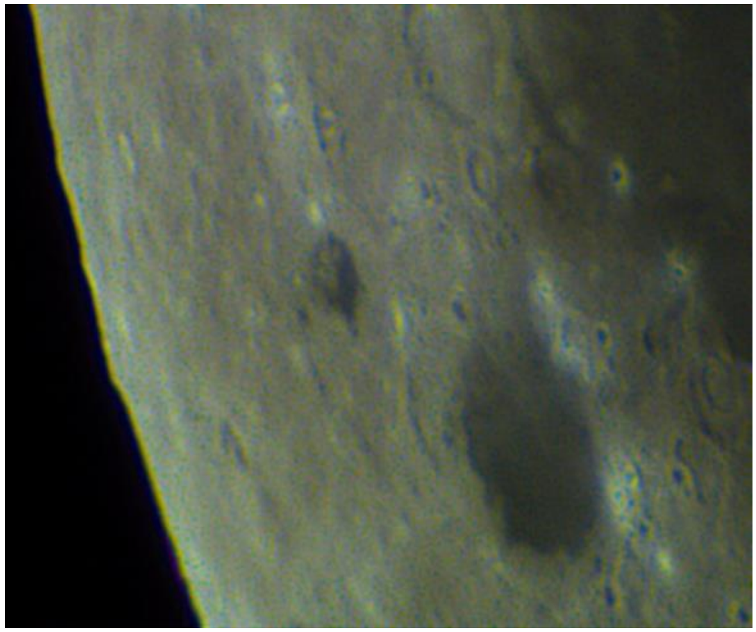


__Figure 1.__ Riccioli just NW of Grimaldi as imaged by Walter Elias on 2024 Feb 04 UT 07:03 and orientated with north towards the top. Note that the color saturation on this image has been enhanced and the imaged sharpened.

Fig 1 may exhibit a slight hint of purple on the mare filled section of the crater's floor, but it is certainly not vivid. We shall leave this ALPO.BAA LTP at a weight of 3 for now.

Censorinus: On 2024 Feb 16 UT 07:58 Maurice Collins (ALPO/BAAA/RASNZ) imaged the area around Theophilus and this by accident included Censorinus under similar illumination to the following LTP report:

On 1988 Nov 15 UT 19:15 Holmes (Rochdale, UK, 215mm Newtonian) noticed the Censorinus apron (just east of the crater and including the rim) was fuzzy but the crater was clear - a sketch was provided. A BAA Lunar Section observation. Cameron 2006 Catalog Extension ID=339 and weight=3. ALPO/BAA weight=2.

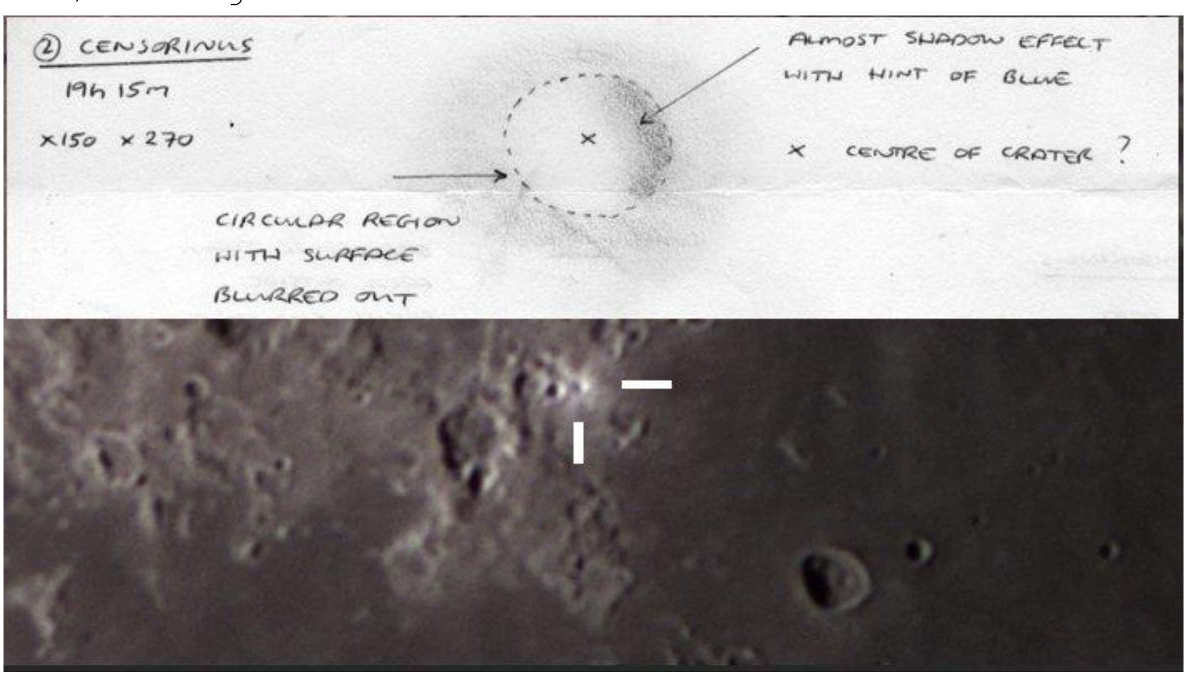


***Figure 2.** Censorinus orientated with north towards the bottom. **(Top)** A sketch by Mark Tom Holmes (BAA) made on 1988 Nov 15 UT 19:15. **(Bottom)** An image by Maurice Collins with the location of Censorinus indicated by tick marks – captured on 2024 Feb 16 UT 07:58.*

Although the image (Fig 2 - bottom) by Maurice is of lower resolution that the Holmes sketch (Fig 2 - top), it does show the crater as sharp. It is curious how the shading on the sketch is on the opposite side to where Maurice captured it. As Mark Holmes used 21.5cm Newtonian, and had an arrow on his report showing that he knew where south was, it is unlikely that he would have drawn the shading on the wrong side. I think that we will up the weight of this report from a 2 to a 3.

Faraday: On 2024 Feb 16 UT 17:40 Franco Taccogna imaged this crater for the following lunar schedule request:

ALPO Request: We have reports of details visible in the shadows of Apianus and Faraday craters. Just curious to see if this effect repeats. Please take some exposures of sufficient length to be able to see shadings in the shadows of these, and neighbouring, craters. Do not use excessive sharpening on the images. Please email these to: a t c @ a b e r. a c. u k

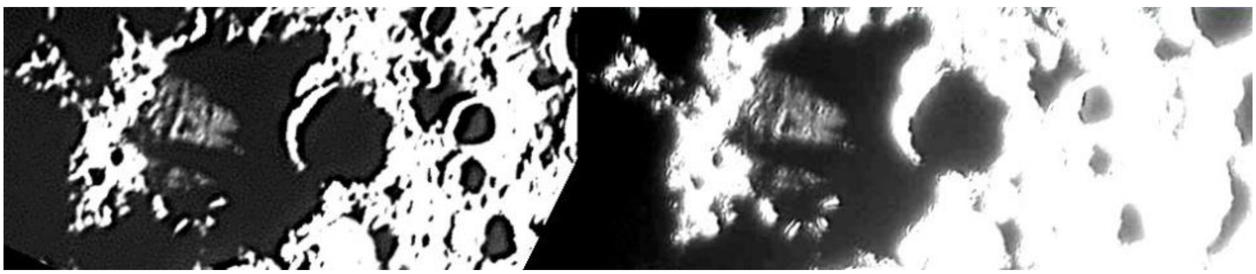


Figure 3. *Faraday crater at the centre and orientated with north towards the top. Images have been greatly contrast stretched to bring out details in the shadowed region.* ***(Left)*** *Image by Franco Taccogna taken on 2024 Feb 16 UT 17:40.* ***(Right)*** *Image by Walter Elias (AEA) taken on 2023 Mar 28 UT 23:01.*

Fig 3 (left) and (Right) both show a light shading on the outer part of the interior shadow inside Faraday – so I think the interior shading is normal and we can remove this observation from Lunar Schedule requests.

Hyginus N: On 2024 Feb 17 UT 00:52 Francisco Alsina Cardinalli (SLA) imaged this crater under similar illumination to the following report:

Hyginus N 1965 Apr 08 UT 20:00? Observed by Hoffman (Germany?) "Saw variable shining bright lights". NASA catalog weight=1. NASA catalog ID #873. ALPO/BAA weight=1.

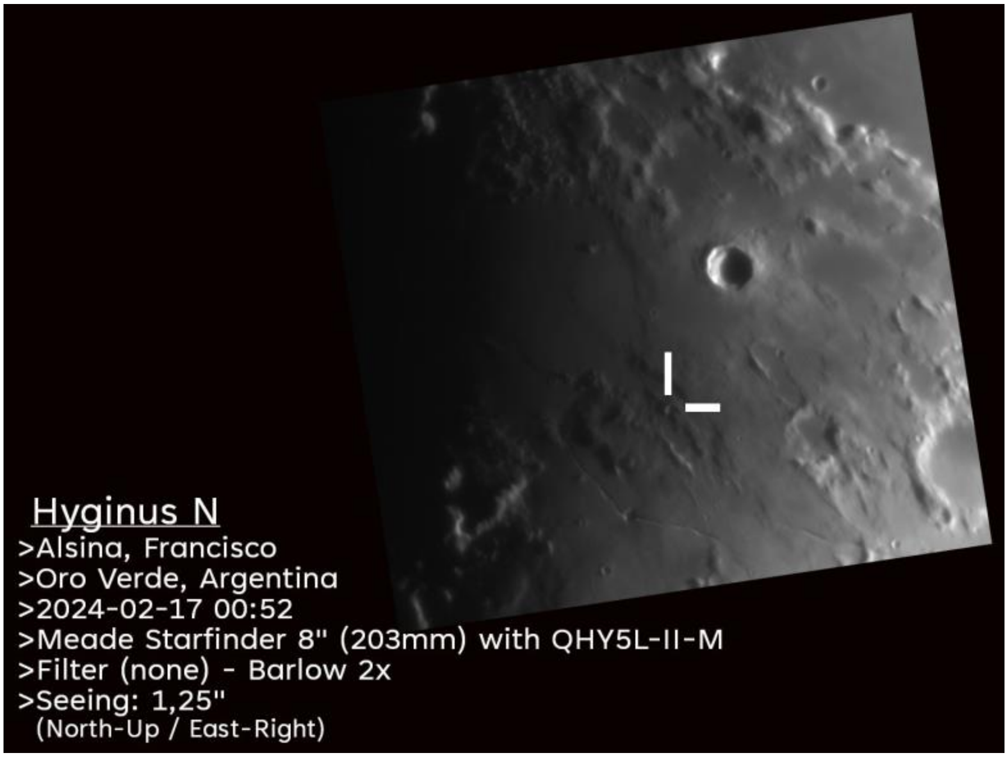


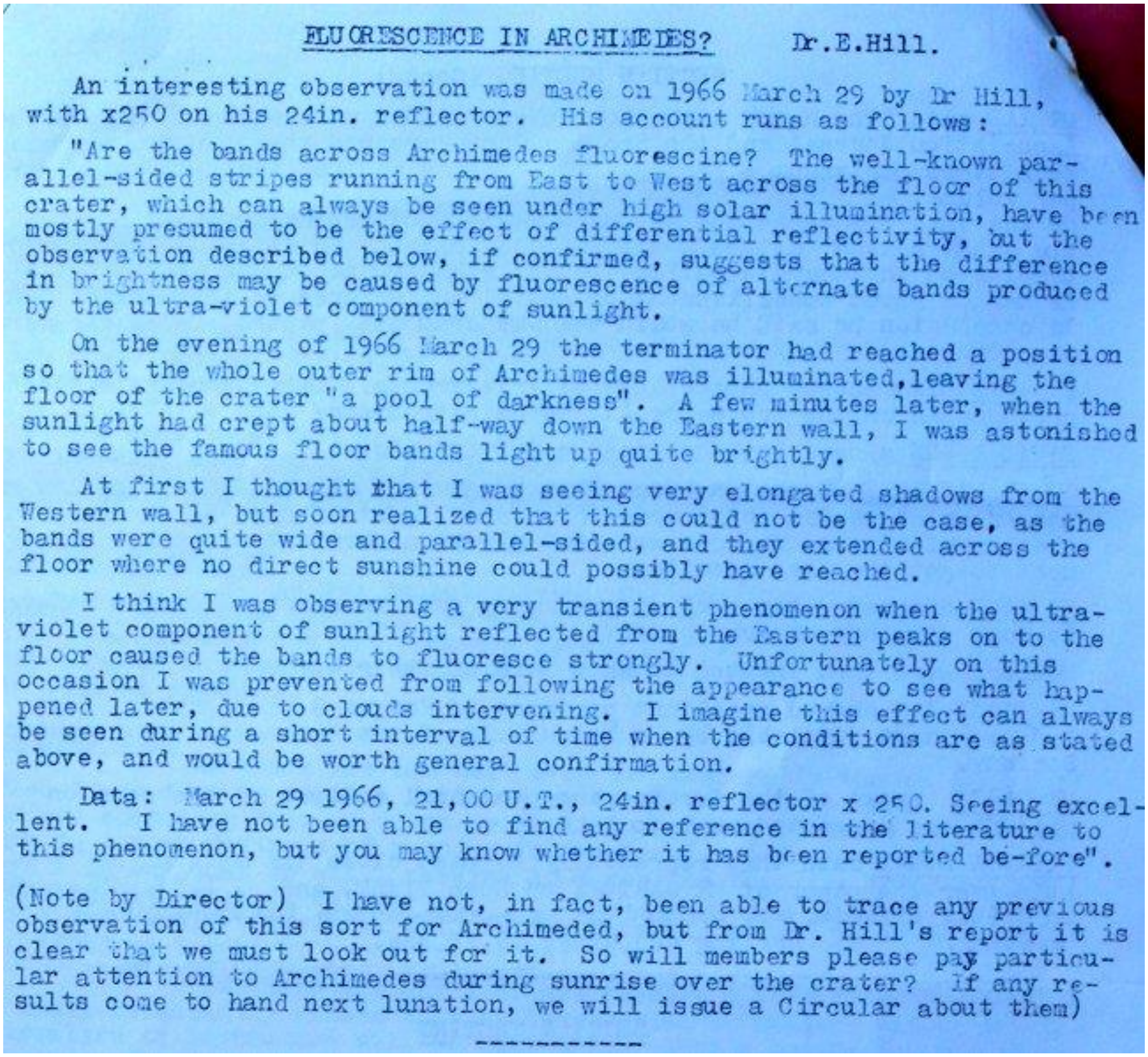
Figure 4. *Hyginus N as imaged by Francisco Alsina Cardinalli (SLA) and orientated with north towards the top. Hyginus N is indicated by the two tick marks. Observation details are given in the image.*

Fig 4 shows the location of Hyginus N, but "Hyginus N" from 1965 might also refer to Hyginus Nova, as speculated to have existed by Klein. But anyway, there are no signs of "shining bright lights, variable, or otherwise.

Hoffmann was quite a prolific LTP observer on the night on 1964 Apr 08, spotting similar "variable shining bright lights" in Alphonsus, Linne and Proclus too, and there was even a similar sounding observer, "Hoppman", but supposedly in Czechoslovakia, who also observed that night and saw a green flash or brightening in Censorinus.

We shall leave the weight of the 1965 LTP at 1 for now, but am considering revisiting Hoffman (or Hoppman)'s reports and removing them from the LTP database as it is really difficult to believe that one observer would spot so many LTPs going off at once and not be seen by anybody else. Or at least looking up details on this observer or finding better references.

Archimedes: On 2024 Feb 17 UT 18:02 Luigi Morrone (BAA) imaged this crater under similar illumination to the report described in Fig 5:



FLUORESCENCE IN ARCHIMEDES? Dr.E.Hill.

An interesting observation was made on 1966 March 29 by Dr Hill, with x250 on his 24in. reflector. His account runs as follows:

"Are the bands across Archimedes fluorescine? The well-known parallel-sided stripes running from East to West across the floor of this crater, which can always be seen under high solar illumination, have been mostly presumed to be the effect of differential reflectivity, but the observation described below, if confirmed, suggests that the difference in brightness may be caused by fluorescence of alternate bands produced by the ultra-violet component of sunlight.

On the evening of 1966 March 29 the terminator had reached a position so that the whole outer rim of Archimedes was illuminated,leaving the floor of the crater "a pool of darkness". A few minutes later, when the sunlight had crept about half-way down the Eastern wall, I was astonished to see the famous floor bands light up quite brightly.

At first I thought that I was seeing very elongated shadows from the Western wall, but soon realized that this could not be the case, as the bands were quite wide and parallel-sided, and they extended across the floor where no direct sunshine could possibly have reached.

I think I was observing a very transient phenomenon when the ultra-violet component of sunlight reflected from the Eastern peaks on to the floor caused the bands to fluoresce strongly. Unfortunately on this occasion I was prevented from following the appearance to see what happened later, due to clouds intervening. I imagine this effect can always be seen during a short interval of time when the conditions are as stated above, and would be worth general confirmation.

Data: March 29 1966, 21,00 U.T., 24in. reflector x 250. Seeing excellent. I have not been able to find any reference in the literature to this phenomenon, but you may know whether it has been reported be-fore".

(Note by Director) I have not, in fact, been able to trace any previous observation of this sort for Archimeded, but from Dr. Hill's report it is clear that we must look out for it. So will members please pay particular attention to Archimedes during sunrise over the crater? If any results come to hand next lunation, we will issue a Circular about them)

Figure 5. *A copy of p6 of the BAA Lunar Section Circular Vol 1, No. 6, p4.*

Looking at the iron oxide map (Fig 6 – right), it is quite clear that the bands across the floor of Archimedes are actually ray material from Autolycus, and do not run quite E-W, unlike the shadow spires (Fig 6 – left). Therefore, the two are unrelated. But something seems to have spooked Dr E. Hill in 1966 inside the shadow filled floor of Archimedes. The image by Luigi is within ±0.5˚ of the 1966 observation, and so quite likely has the Sun at a slightly higher altitude above the surface. We have covered this report before in the 2018 Jul newsletter and the general feeling then was that it was simply shadow spires, albeit thinner/ shorter and less noticeable than we see in Fig 6 (Left). We still have the problem that Dr Hill says the bands were "quite wide" (unlike the shadow spires) and extended "across the floor where no direct sunlight could possibly have reached". I think we shall leave this ALPO/BAA catalog report at a weight of 1 for now.

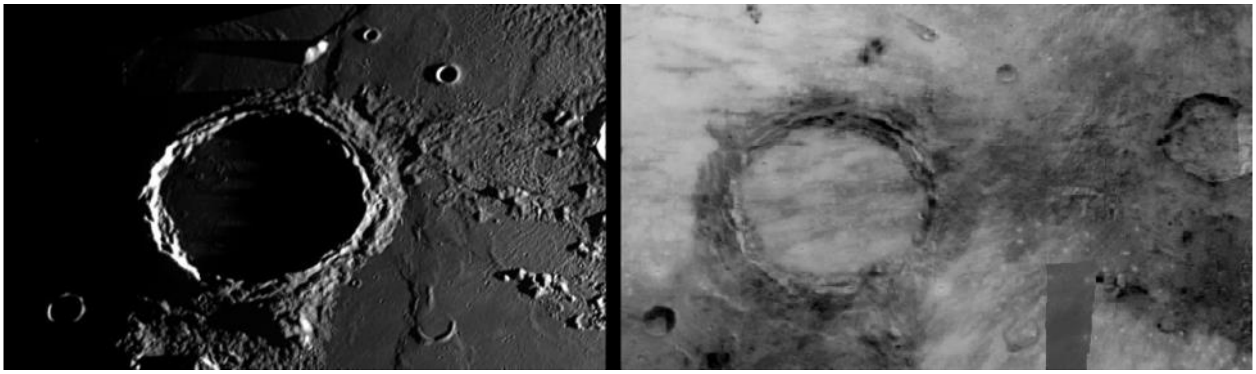


Figure 6. *Archimedes orientated with north towards the top.* ***(Left)*** *Image by Luigi Morrone (BAA) Taken on 2024 Feb 17 UT 18:02.* ***(Right)*** *An enhanced Clementine mission UVVIS camera FeO Abundance map (black=9.4% by weight of Iron Oxide and white=20% by weight of Iron Oxide)*

Alphonsus: On 2024 Feb 17 there were two repeat illumination events in the evening that were captured by UAI observers: Valerio Fontani, Franco Taccogna, Aldo Tonon and Luigi Zanatta:

Alphonsus 1967 Feb 17 UT 17:47-18:12 Observed by Moore and Moseley (Armagh, Northern Ireland, 10" refractor, x300) "Eng. moon blink suspected just inside SW floor on the elevation NW of famous dark patch. Feb 18 was cloudy, then on Feb 19, after some neg. results with blink, suddenly a bright glow in same place." NASA catalog weight=4. NASA catalog ID #1014. ALPO/BAA weight=4. Note that this covered the period 18:32 -20:08 on 2024 Feb 17 as seen from Rome.

On 2003 Apr 10 at 00:40UT a GLR observer G. Jasmin (Quebec, Canada, using a 10" F-10 Schmidt Cassegrain) took a photograph of Alphonsus crater on Kodak 400ASA film with an exposure of 1/30th sec. There was a light visible (diameter 10 km) inside Alphonsus and the effect was present for 5 minutes. The observer commented that they have seen a light in this crater many times before, but never as long as 5 minutes. This report was submitted to the GLR group in Italy. The ALPO/BAA weight=2. Note that this covered the period 20:03-21:56 on 2024 Feb 17 as seen from Rome.

Figure 7. *Alphonsus as imaged on 2024 Feb 17 and orientated with north towards the top. (Left) as captured by Aldo Tonon (UAI) at 18:23UT.* ***(Right)*** *as captured by Luigi Zanatta at 21:28 UT.*

Figure 7 (Left) is just a few minutes before the ±0.5˚ similar illumination observing window for the 1967 LTP event and although not in color shows that one cannot see the dark spot on the SW floor at this stage in the illumination, but the SE one you can. Maybe they were using the "classical coordinate system" (E & W were revered to IAU) in those days and Cameron's catalog did not correct these? But either way I cannot see the "elevation" that the report refers to? We will lower the weight to 3 for now until I can find out more details about the original report.

For the 2003 LTP report, Fig 7 (Right) is what the illumination should have looked like. I cannot see a "light visible" inside Alphonsus. Maybe the Canadian observer got the date wrong, which sometimes happens with observers in the Americas. But at least we have a good context image now. We shall leave the weight at 2 for now, and if anybody has a copy of the photograph taken, then I would be delighted to receive a copy as it will be useful to compare with Fig 4 (Right).

Copernicus: On 2024 Feb 19 UT 03:36 Rik Hill (ALPO/BAA) imaged this crater under similar illumination to the following two LTP reports:

Copernicus. On 1995 Jul 07 at UT 04:22 R. Spellman (Los Angeles, CA, USA) noted that the floor of Copernicus was slightly darker in blue light. The ALPO/BAA weight=1. This report came from R. Spellman's web site.

Copernicus 1969 Nov 18 UT 21:10-21:11 Observed by Hedervari (Budapest, Hungary, 3.5" refractor) "Yellowish-red stripe on inner W. wall (chrom. aberr.? Apollo 12 watch)." NASA catalog weight=2. NASA catalog ID No. 1217. ALPO/BAA weight=1.

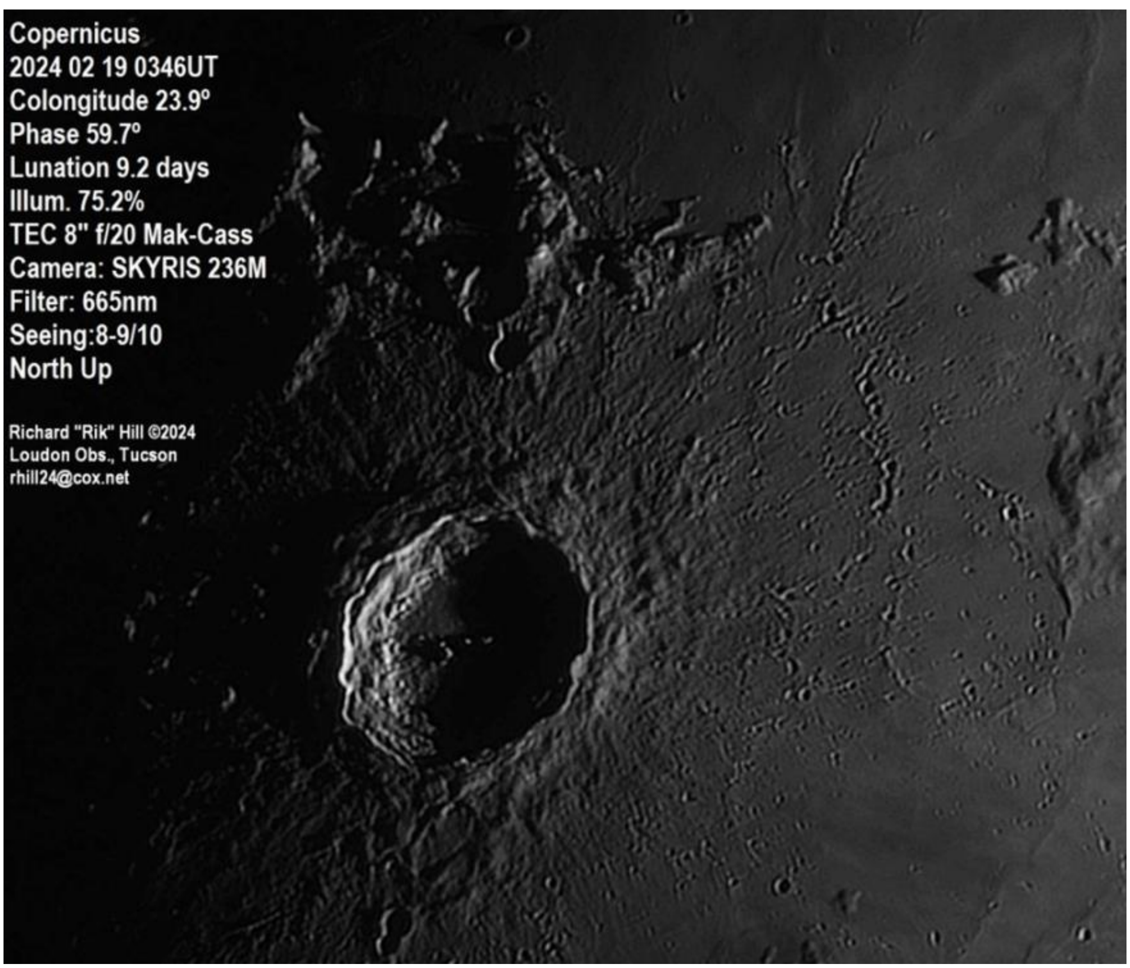


Figure 8. *Copernicus as imaged by Rik Hill (ALPO/BAA) in monochromatic red light and orientated with north towards the top.*

Although Rik's image (Fig 8) is monochrome, it does provide a useful context image with which, in future we can apply simulated atmospheric spectral dispersion, or indeed chromatic aberration in order to see at least if the colors seen in the 1969 observation were due to either of these two effects. For the 1995 observation, color filters were used, which should rule out these effects.

Proclus: On 2024 Feb 19 UT 19:36 Bob Bowen (NAS) imaged the whole Gibbous Moon under similar illumination to the following report:

On 1988 Dec 18 at UT20:25 W. Cameron (Sedona, AZ, USA - TV camera telephoto) noticed on a live TV shot of the Moon (apparently channel 3 TV broadcast at 11:25PM local time), that Proclus was brighter than Censorinus (or Dionysus) and was the brightest feature on the Moon. It was photographed from San Juan in Puerto Rico. Cameron 2006 catalog ID=342 and weight=. ALPO/BAA weight=5. ALPO/BAA weight=1.

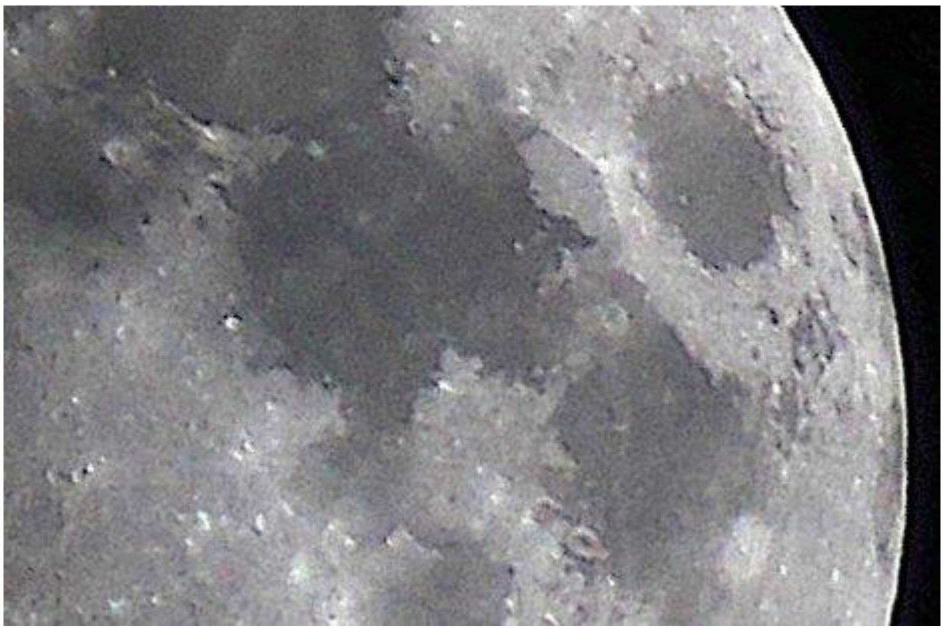


Figure 9. *Mare Serenitatis, as imaged by Bob Owen (NAS) and orientated with north towards the top. The bright ray craters: Dionysius, Censorinus and Proclus, are located around the edges of the mare.*

Although Bob's image (Fig 9) has some saturation on all three bright ray craters mentioned in the 1988 LTP report, it does show that all three craters tend to be very bright at this phase. We shall leave the weight of this report at 1 for now, but at least we have a context image for that phase of the Moon in 1988.

Aristarchus: On 2024 Feb 22 UT 22:32-22:42 Trevor Smith (BAA) observed visually this crater under similar illumination to the following report:

Aristarchus 1975 Sep 18 UT 21:00? Observed by Foley (Kent, England, 12" reflector) "Deep blue-viol. spot in NW (IAU?) interior corner." NASA catalog weight=3. NASA catalog ID #1414. ALPO/BAA weight=3.

Trevor, using a 16-inch Newtonian under Antoniadi IV seeing, saw no hint of that "spot" colors or anything unusual about the crater, nor the vicinity. We shall therefore leave the weight of the Foley report at 3 for now.

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

Lunar Calendar May 2024

Date	UT	Event
1	1127	Last Quarter Moon
3	2300	Saturn 0.8° north of Moon, occultation Antarctica
4	1900	Mars 0.2° south of Moon, occultation Africa to Japan
5	2154	Moon at ascending node
5	2200	Moon at perigee 363,163 km Large Tides
8	0322	New Moon (lunation 1254)
8		Moon 0.4° south of Pleiades
11		Greatest northern declination +28.4°
12		East limb most exposed +6.2°
12		South limb most exposed -6.7°
12	2300	Pollux 1.6° north of Moon
15	1148	First Quarter Moon
16	1300	Juno 1.1° south of Moon, occultation Greenland to Japan
17	1900	Moon at apogee 404,640 km
19	1635	Moon at descending node
20	1000	Spica 1.4° south of Moon
23	1353	Full Moon
24	0300	Antares 0.4° south of Moon, occultation SE North America to Africa
25		West limb most exposed -5.3°
26		Greatest southern declination -28.4°
27		North limb most exposed +6.6°
27	0500	Ceres 0.9° north of Moon, occultation Antarctica
30	1713	Last Quarter Moon
31	0800	Saturn 0.4° north of Moon, occultation southern South America, South Africa

SUBMISSION THROUGH THE ALPO IMAGE ARCHIVE

ALPO's archives go back many years and preserve the many observations and reports made by amateur astronomers. ALPO's galleries allow you to see on-line the thumbnail images of the submitted pictures/observations, as well as full size versions. It now is as simple as sending an email to include your images in the archives. Simply attach the image to an email addressed to

lunar@alpo-astronomy.org (lunar images).

It is helpful if the filenames follow the naming convention :

FEATURE-NAME_YYYY-MM-DD-HHMM.ext

YYYY {0..9} Year

MM {0..9} Month

DD {0..9} Day

HH {0..9} Hour (UT)

MM {0..9} Minute (UT)

.ext (file type extension)

(NO spaces or special characters other than "_" or "-". Spaces within a feature name should be replaced by "-".)
As an example the following file name would be a valid filename:

Sinus-Iridum_2018-04-25-0916.jpg
(Feature Sinus Iridum, Year 2018, Month April, Day 25, UT Time 09 hr16 min)

Additional information requested for lunar images (next page) should, if possible, be included on the image. Alternatively, include the information in the submittal e-mail, and/or in the file name (in which case, the coordinator will superimpose it on the image before archiving). As always, additional commentary is always welcome and should be included in the submittal email, or attached as a separate file.

If the filename does not conform to the standard, the staff member who uploads the image into the data base will make the changes prior to uploading the image(s). However, use of the recommended format, reduces the effort to post the images significantly. Observers who submit digital versions of drawings should scan their images at a resolution of 72 dpi and save the file as a 8 1/2"x 11" or A4 sized picture.

Finally a word to the type and size of the submitted images. It is recommended that the image type of the file submitted be jpg. Other file types (such as png, bmp or tif) may be submitted, but may be converted to jpg at the discretion of the coordinator. Use the minimum file size that retains image detail (use jpg quality settings. Most single frame images are adequately represented at 200-300 kB). However, images intended for photometric analysis should be submitted as tif or bmp files to avoid lossy compression.

Images may still be submitted directly to the coordinators (as described on the next page). However, since all images submitted through the on-line gallery will be automatically forwarded to the coordinators, it has the advantage of not changing if coordinators change.

ATTENTION ALL CONTRIBUTORS
Effective Immediately (March 1, 2024)

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

ATTENTION ALL CONTRIBUTORS
Effective Immediately (March 1, 2024)

In his efforts to make our organization as professional as possible, the late Walter Haas, the founder of the ALPO, urged that all image and sketch CAPTIONS be as complete as possible. This could enable others to perform their own observations using as much of the original caption data as possible to obtain the same or at least similar results. And while not everyone can provide every detail, we request the following in your captions:

1. Name of feature or object followed by name of imager and their specific location (including geographical coordinates if readily available).
2. Date and Universal Time when image was captured (or sketch was completed) using either the three-letter abbreviation or full spelling of the month to avoid possible month-and-date or date-and-month confusion.
3. Sky seeing (steadiness) conditions (0 = Worst and 10 = Perfect).
4. Sky transparency (opacity of the atmosphere) conditions (poor to good)
5. Intensity conditions (Standard ALPO Scale of Intensity: 0.0 = Completely black and 10.0 = Very brightest features, Intermediate values are assigned along the scale to account for observed intensity of features).
6. Equipment details (including instrument type, brand is optional) and aperture size (inches or mm/cm); telescope mount data (if applicable), camera brand and type, filter data (if applicable), as much exposure data as available (sketchers should provide other pertinent data).
7. Capturing, exposure and processing software data.
8. Personal comments about specific features including north (or south) in the image (sketch), markings and all other items pertinent to the subject being presented.
9. Any other pertinent comments.
10. Email or other contact information.

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: Mare Nectaris

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 May 2024, will be Mare Nectaris. 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 Mare Nectaris Focus-On article is June 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
Mare Nectaris	**July 2024**	**June 20, 2024**
Aristoteles and Eudoxus	**September 2024**	**August 20, 2024**
Archimedes Region	**November 2024**	**October 20, 2024**

Focus-On Announcement
Mare Nectaris: A Small Basin Full Of Wonders

Mare Nectaris is one of the smallest maria on the Moon, but also one of the most varied. It would be very interesting to receive your best images of the most notorious features of Mare Nectaris: the heights of Rupes Altai, Mädler and his complicated design of bright lines (rays or elevations?), the complicated topographies of Fracastorius, Gaudibert and Piccolomini, the rilles, wrinkle ridges and chains of craters that we can find; and, of course, the fantastic trio of Theophilus, Cyrillus and Catherina. And thus take a circular walk through a fairly identifiable basin and understand a little more about its geology and landscape.

FOCUS ON MAY 2024: Due April 20, 2024: CHAIN OF CRATERS

FOCUS ON JULY 2024: Due June 20, 2024: MARE NECTARIS

FOCUS ON SEPTEMBER 2024: Due August 20, 2024: ARISTOTELES AND EUDOXUS

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

Francisco Alsina Cardinalli

Focus-On Announcement
Aristoteles and Eudoxus: Similar and Different

The Moon offers us many areas of contrasts, one of them is very close to two areas that we have recently visited in the Focus Section, near Mare Frigoris and Lacus Mortis, two very close giants: the Aristoteles and Eudoxus craters. These two craters, so magnificent and so close, allow an interesting comparison between two geological eras in the same image: the Eratosthenian Aristoteles and the Copernican Eudoxus.

FOCUS ON JULY 2024: Due June 20, 2024: MARE NECTARIS

FOCUS ON SEPTEMBER 2024: Due August 20, 2024: ARISTOTELES AND EUDOXUS

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

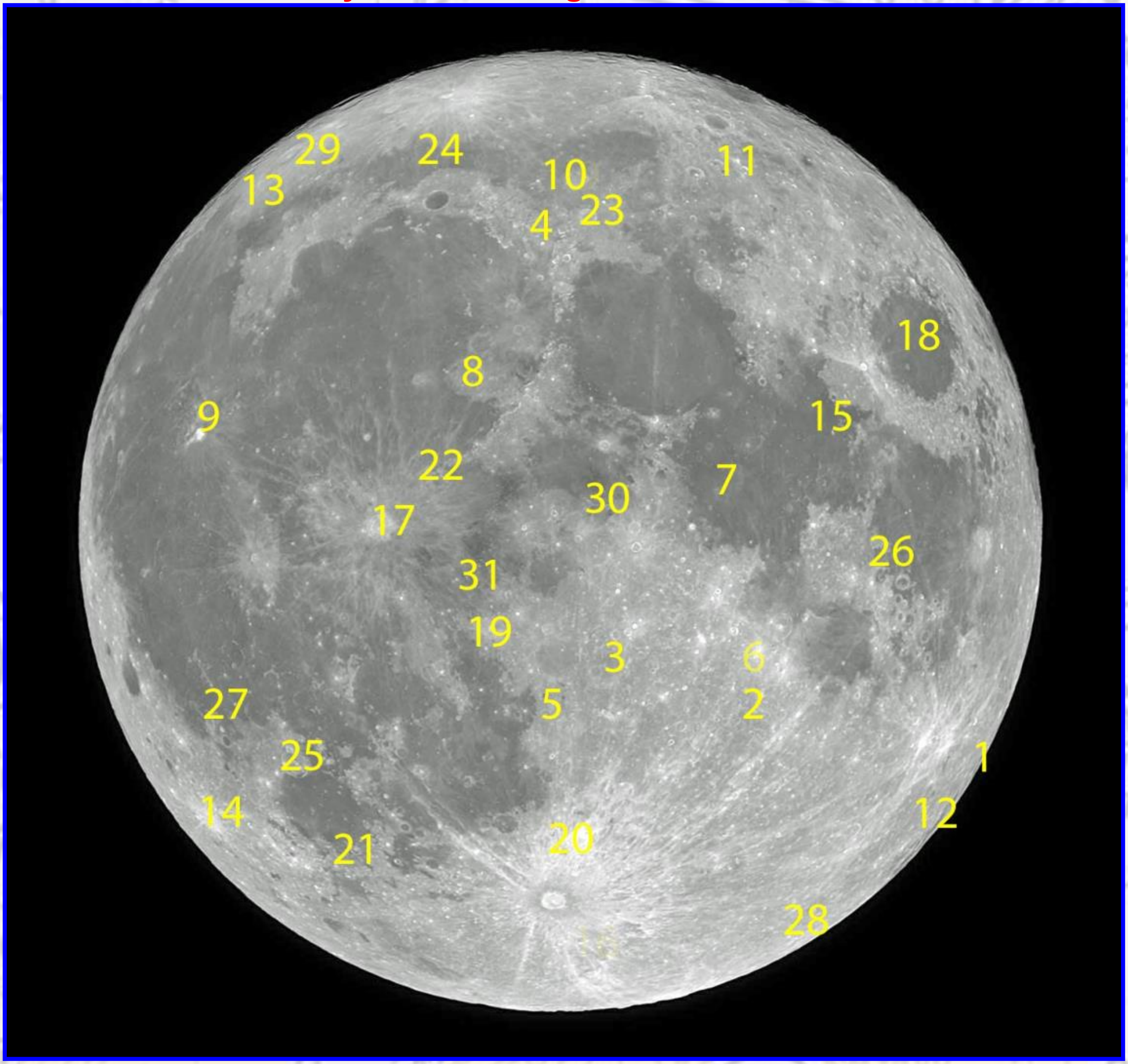
FOCUS ON JANUARY 2025: Due December 20, 2024: ANAXAGORAS

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

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

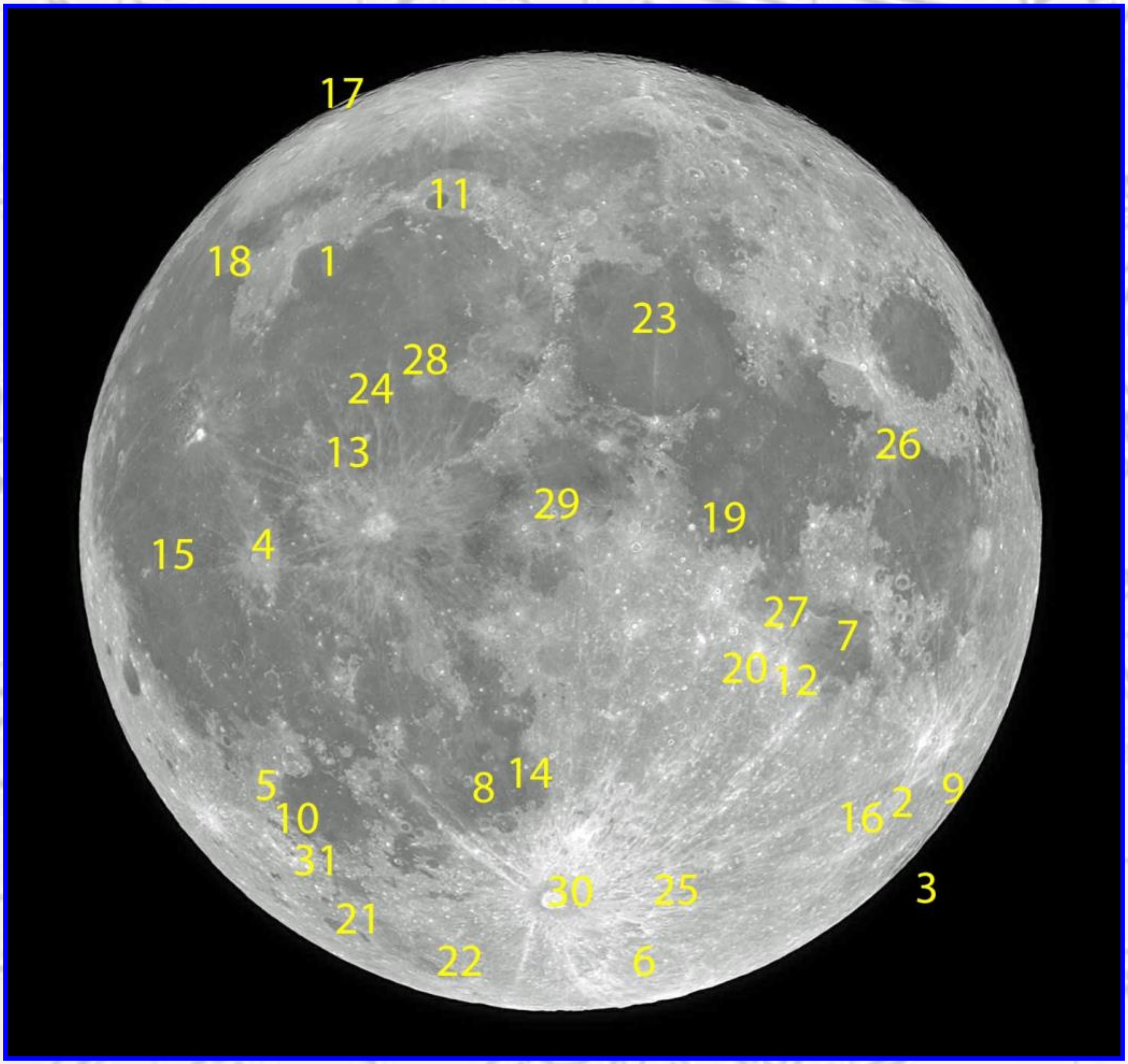
Germán Savor

Key to Lunar Images In This Issue



1. Abel
2. Abulfeda
3. Albategnius
4. Alpes, Vallis
5. Alphonsus
6. Altai, Rupes
7. Arago
8. Archimedes
9. Aristarchus
10. Aristoteles
11. Atlas
12. Australe, Mare
13. Babbage
14. Byrgius
15. Cauchy
16. Clavius
17. Copernicus
18. Crisium, Mare
19. Davy
20. Deslandres
21. Doppelmayer
22. Eratosthenes
23. Eudoxus
24. Frigoris, Mare
25. Gassendi
26. Gutenberg
27. Hansteen
28. Helmholtz
29. Herschel, J
30. Hyginus
31. Insularum, Mare

Key to Lunar Images In This Issue



1. Iridum, Sinus
2. Janssen
3. Jenner
4. Kepler
5. Mersenius
6. Moretus
7. Nectaris Basin
8. Nubium, Mare
9. Oken
10. Palmieri
11. Plato
12. Polybius
13. Pytheas
14. Recta, Rupes
15. Reiner
16. Rheita, Vallis
17. Rozhdestvenskiy
18. Rümker, Mons
19. Sabine
20. Sacrobosco
21. Schickard
22. Schiller
23. Serenitatis, Mare
24. Stille, Dorsa
25. Stöfler
26. Taruntius
27. Theophilus
28. Timocharis
29. Triesnecker
30. Tycho
31. Vieta