The Lunar Observer

A Publication of the Lunar Section of ALPO

February 2023

In This Issue

Online readers, click on images for hyperlinks

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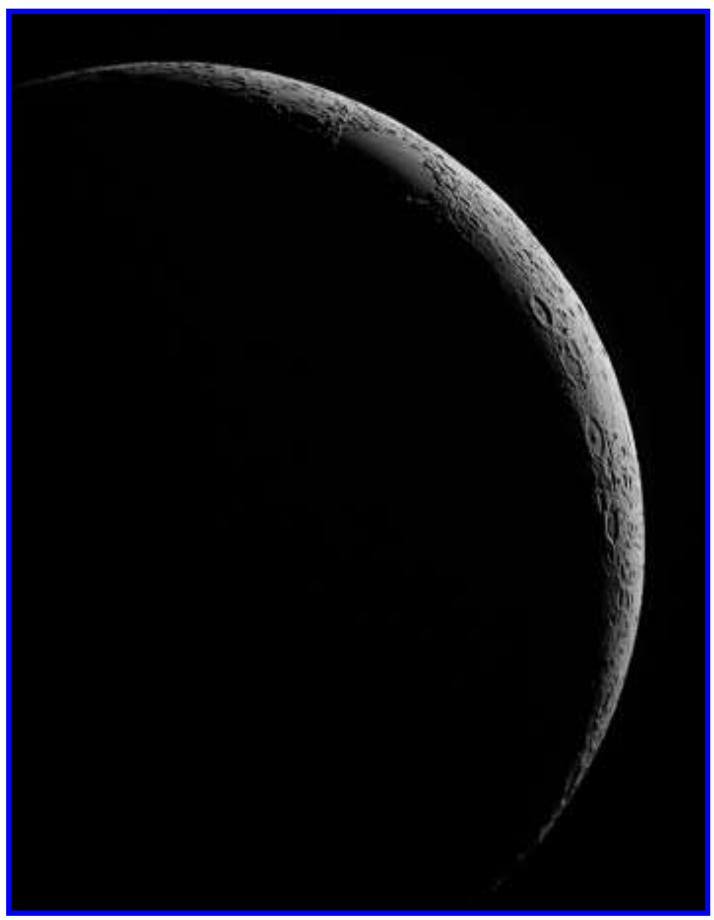
Lunar Reflections

Happy February to all. Hope it goes good for you! As I write this, I think we have a great edition of *The Lunar Observer*. In this issue, Alberto Anunziato, Robert H. Hays, Jr. and David Teske take you on lunar tours of interesting topography. Two additional topographic features are highlighted here. Howard Fink of New York City has brought us "The Whole Moon as a Slideshow". See page 7 for details. Also, John Moore brings us a sticky situation, actually Sinus Viscositatis, the "Bay of Stickiness" on page 25. You can see this newly-named lunar feature in a small telescope! Please check out page 8 for a selection of lunar and planetary books available from David Darling, the Assistant Coordinator of the Lunar Geologic Change Program. Guillermo Scheidereiter brings us another fascinating article on lunar history, this time discussing impacts on the Moon. Many thanks to all who contributed the many images and drawings that make up our Recent Topographic Studies. As always, Tony Cook leads us on Lunar Geologic Change studies and his Basin and Buried Craters Project. Also, check out the news of the upcoming ALPO conference, coming this summer, on page 5.

Please remember to follow the future Focus-On topics and gather observations of these features. Next up is Mare Nubium. Observations are due to Alberto and myself by February 20, 2022.

Clear skies,
-David Teske



Right, 2 day-old Moon, *Gregory T. Shanos. See page 34.*

Lunar Topographic Studies

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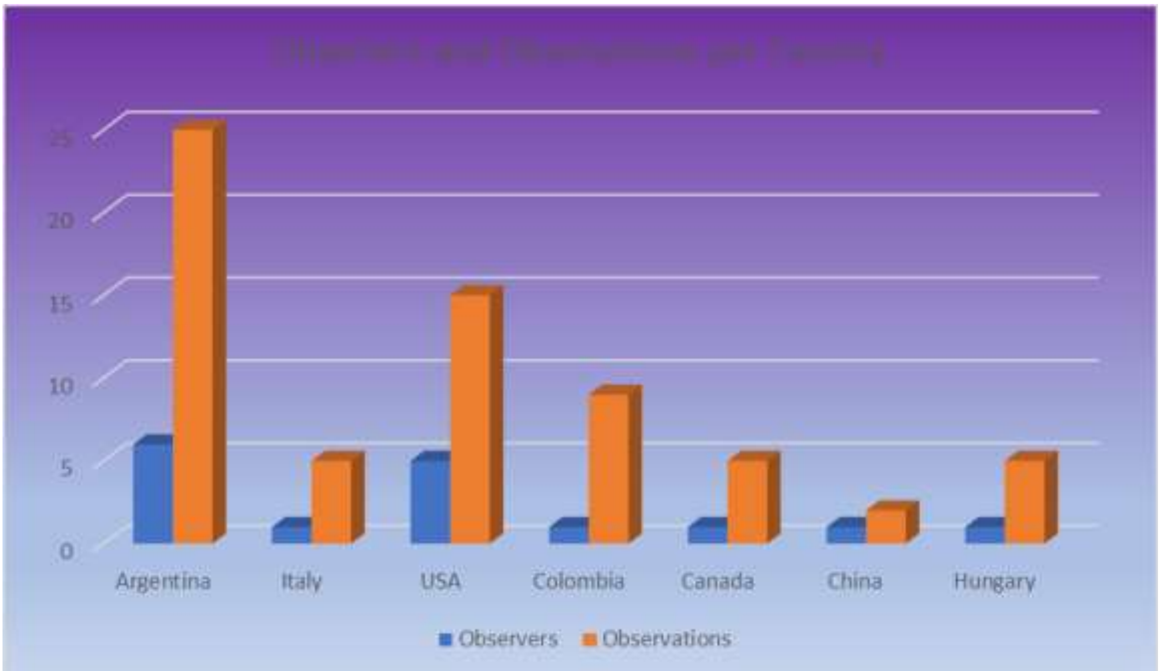
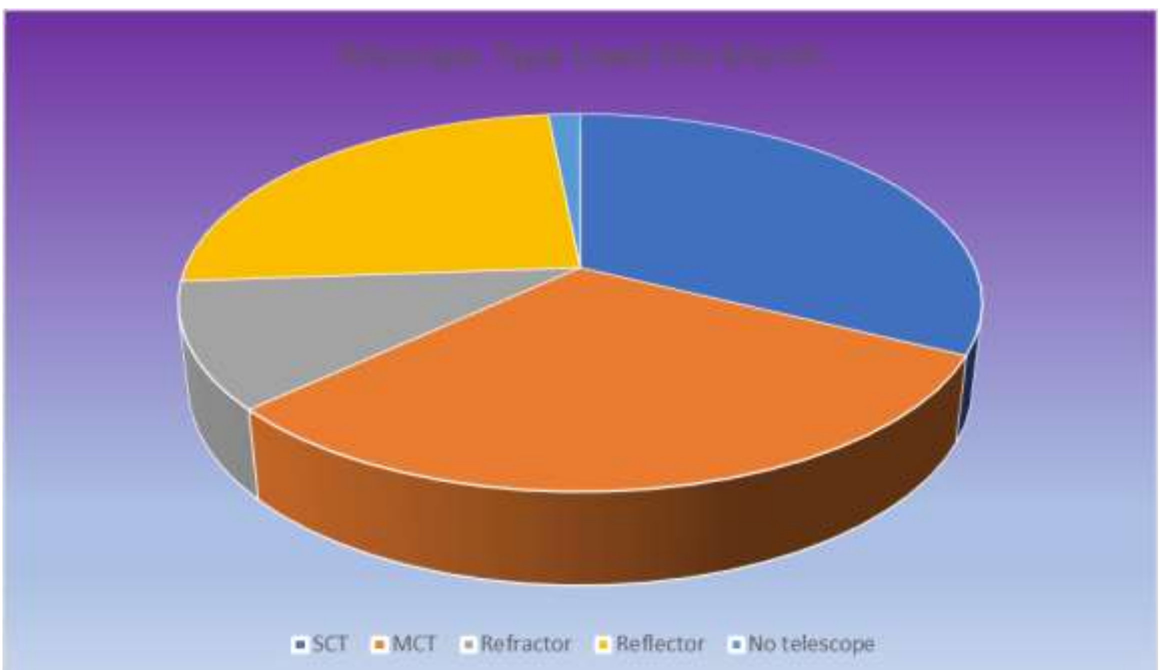
Observations Received

Name	Location and Organization	Image/Article
Alberto Anunziato	Paraná, Argentina	Articles and drawings *One of the Most Beautiful Areas on the Moon, Plutarch as a Precursor of Galileo* and *Dorsum Azara*
Donald Capone	Waxahachie, Texas, USA	Images of Mare Insularum, Eratosthenes, Timocharis, Le Verrier, Plato, Rupes Recta, Pitatus, Tycho, Clavius and Fra Mauro.
Jairo Chavez	Popayán, Colombia	Images of the Waxing Gibbous Moon (3), Waning Gibbous Moon (2), Waxing Crescent Moon, Mare Nectaris (2), and Aristoteles.
Leonardo Alberto Colombo	Córdoba, Argentina	Images of Clavius and Mare Imbrium.
Walter Ricardo Elias	AEA, Oro Verde, Argentina	Images of Censorinus (2), Cichus (2), Messier, Aristarchus, Gassendi, Mare Tranquillitatis, Tycho (2), Vallis Schröteri, Copernicus and the Waxing Gibbous Moon.
Howard Fink	New York, New York, USA	Article *The Whole Moon as a Slideshow*.
István Zoltán Földvári	Budapest, Hungary	Drawings of Lilius, Fontenelle, Montes Carpatus, Demonax and Lamé.
Diego Giufrida	Manuel B. Gonnet, Argentina	Image of Babbage.
Robert H. Hays, Jr.	Worth, Illinois, USA	Drawing and article *Letronne*.
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Image of the Moon-Saturn-Venus conjunction
Luigi Morrone	Agerola, Italy	Images of Hyginus, Arzachel, Vallis Alpes, Aristoteles and Eudoxus and Nearch.
KC Pau	Hong Kong, China	Images of Sinus Iridum and Rupes Recta.
Pedro Romano	San Juan, Argentina	Images of Clavius, Bullialdus, Copernicus and Sinus Iridum.
Guillermo Scheidereiter	LIADA, Rural Area, Concordia, Entre Ríos, Argentina	Article *Impacts on the Moon*, images of Petavius, Endymion, Aristarchus, Mare Crisium, Langrenus, Reiner Gamma, Schickard and Schiller, Bailly, Byrgius, Tycho, Mare Humorum and Kepler.
Greg Shanos	Sarasota, Florida, USA	Images of Copernicus and the 2-day-old Moon.
David Teske	Louisville, Mississippi, USA	Image and article *Zebra Stripes in Southwest Mare Tranquillitatis.*
Ken Vaughn	Cattle Point, Victoria, British Columbia, Canada	Images of Copernicus, Albategnius, Montes Teneriffe, Atlas and Aristoteles.

February 2023 *The Lunar Observer* By the Numbers

This month there were 66 observations by 16 contributors in 7 countries.





ALPO 2023 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 28 and 29.
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 (JALPO65-3).

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.

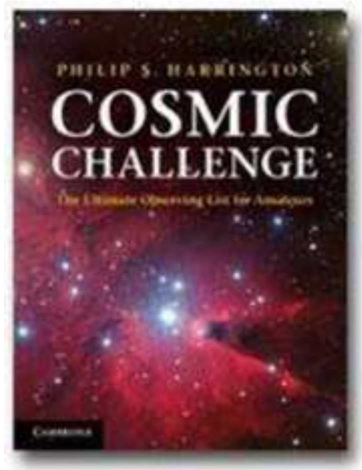
Information about paper presentations, the keynote speaker and other conference data will be published in this Journal and online as details are learned.

Lunar X and V Visibility 2023

Submitted by Greg Shanos

Table 4.3 Lunar X and Lunar V Visibility Timetable

	2023
Jan	29; 00:37
Feb	27; 15:02
Mar	29; 04:59
Apr	27; 18:10
May	27; 06:28
Jun	25; 18:02
Jul	25; 05:07
Aug	23; 16:07
Sep	22; 03:26
Oct	21; 15:27
Nov	20; 04:23
Dec	19; 18:16



Note: The dates and times listed are based on calculations made with the Lunar Terminator Visualization Tool (LTVT) by Jim Mosher and Henrik Bonda. This useful freeware program may be downloaded from https://github.com/fermigas/ltvt/wiki.

The Whole Moon as slideshow

Howard Fink

Here are the 144 Lunar Astronautical Charts done as 3D digital elevation models using Lunar Orbiter Laser Altimeter data and painted with the appropriate Wide Angle Camera images (The title above is the link). The poles are clay models.

You can also go to astrobin.com and type LAC XXX in the search box to reach an individual chart. Full resolution is 20-30 megapixels. All the Apollo landing sites have instructions to find the sites. If running the slideshow, clicking the chain icon at the upper left will go to the chart page where you can find the full resolution image.

The process used in creating the charts:

The Lunar Reconnaissance Orbiter has a laser altimeter that has been collecting data since 2009, the Moon LRO LOLA DEM 118m v1.

I downloaded the 16-bit tiff file where each number (0 - 65,535) in the array represents twice the height above a reference radius of the Moon. A computer program written in Mathematica allows me to select a particular area by latitude and longitude from the file to create a bump map from the data and then map it onto a sphere the size of the Moon. The surface of this bump map is textured with an image of the Moon selected from the Moon LRO LROC WAC Global Morphology Mosaic 100m v3 using the same coordinates as the bump map. The resulting surface is then oriented so the viewpoint is slightly oblique, as though in orbit looking forward. This is the snapshot posted on astrobin. There is a link in the description to the actual LAC Chart, which has an overhead image where the features are labeled accompanied by coordinate gridlines.

If theq link above doesn't work, try this:

https://urldefense.proofpoint.com/v2/url?u=https-3A__www.astrobin.com_users_finkh_-3Fpublic-3D-26sub-3Dtitle-26slideshow-3Dtrue-23hpk4r8&d=DwMFaQ&c=slrrB7dE8n7gBJbeO0g-IQ&r=FXOvYvAEhUD4dF3eSiVSakvdDyk6Djiwg0h0BIlH2tg&m=WviyAKmnxtNIg-JzKFSSvGiA0JjzQLaSFC8UFj8D3ovdPOIcXRiqIC5Xove0kOBe&s=prytOXzib8blcMLtlRuuKp-ZHsM_SKHeqUieIeR_DBY&e=

Book Announcement

David Darling, a very long-time member of the ALPO Lunar Section has some great lunar and planetary books that he is downsizing. If interested, please contact him at DOD121252@aol.com. If a book is chosen, please pay for postage.

The following is a listing of the books I wanted to give to A.L.P.O. Being I was a lunar and planetary observer myself most of these listed deal with that subject.

TO A ROCKY MOON / A Geologist's History of Lunar Exploration / Publish 1993 / Don E. Wilhelms

OBSERVING THE MOON / Published 2000 / Peter T. Wiasuk

THE MOON / Published 1981 / Patrick Moore

THE PLANET OBSERVER'S HANDBOOK / Published 1994 / Fred W. Price

OBSERVING THE MOON/ The Modern Astronomer's Guide / Published 2000 / Gerald North

THE NASA ATLAS OF THE SOLAR SYSTEM / Published 2000 / Ronald Greeley and Raymond Batson

NEW GUIDE TO THE MOON / Published 1976 / Patrick Moore

PHOTOGRAPHIC ATLAS OF THE MOON / Published 2002 / S.M. Chong, Albert C. H. Lim, P.S. Ang

HIGH RESOLUTION ASTROPHOTOGRAPHY / Published 1995 / Jean Dragesco

FULL MOON / Published 1999 / Michael Light

SOLAR SYSTEM EVOLUTION A New Perspective 2nd edition / Published 1992 / Stuart Ross Taylor

WORLDS BEYOND / Published 2002 / S. Alan Stern

PLANETARY LANDSCAPES / Published 1994 2nd edition / R. Greely

FOOTPRINTS ON THE MOON / Published 1969 / By the Writers and Editors of the Associated Press

THE CAMBRIDGE ENCYCLOPEDIA OF THE SUN / Published 2001 / Kenneth R. Lang

MOON DUST / Published 2005 / Andrew W. Smith

ENCYCLOPEDIA OF THE SOLAR SYSTEM / Published 1999 / Paul R. Weissman, Lucy-Ann McFadden, Torrence V. Johnson

SOLAR ECLIPSE The Path of Darkness: Apocalypse or Portent? / Published 1990?/ Thomas Crump

CHASING THE SHADOW / Published 1994 / Jeol Harris and Richard Talcott

THE ATLAS OF MERCURY / Published 1977 / Charles A. Cross and Patrick Moore

WONDERS OF THE UNIVERSE / Published 1989 / Staff of World Book

BEYOND Visions of the Interplanetary probes / Published 2003 / Michael Benson

GLORIOUS ECLIPSES Their Past, Present and Future / Published 2003 / Serg'e Brunier and Jean-Pierre Luminet

THE GEOLOGY OF MARS / Published 1976 / Thomas A Mutch and Raymond E. Arvidson and Jame W. Head, III and Kenneth L. Jones and R. Stephen Saunders

ADVANCE AMATEUR ASTRONOMY / Published 1991 / Gerald North

OBSERVERS GUIDE TO ASTRONOMY / Volume 1 & 2 / Published 1994 / Edited by Patrick Martinez

A MAN ON THE MOON / Three Volume Set / Published on 30th Anniversary of Apollo Landing / Andrew Chatkin

THE NEW ASTRONOMY AND SPACE SCIENCE READER / Published 1977 / Edited by John C. Brandt and Stephen P. Maran

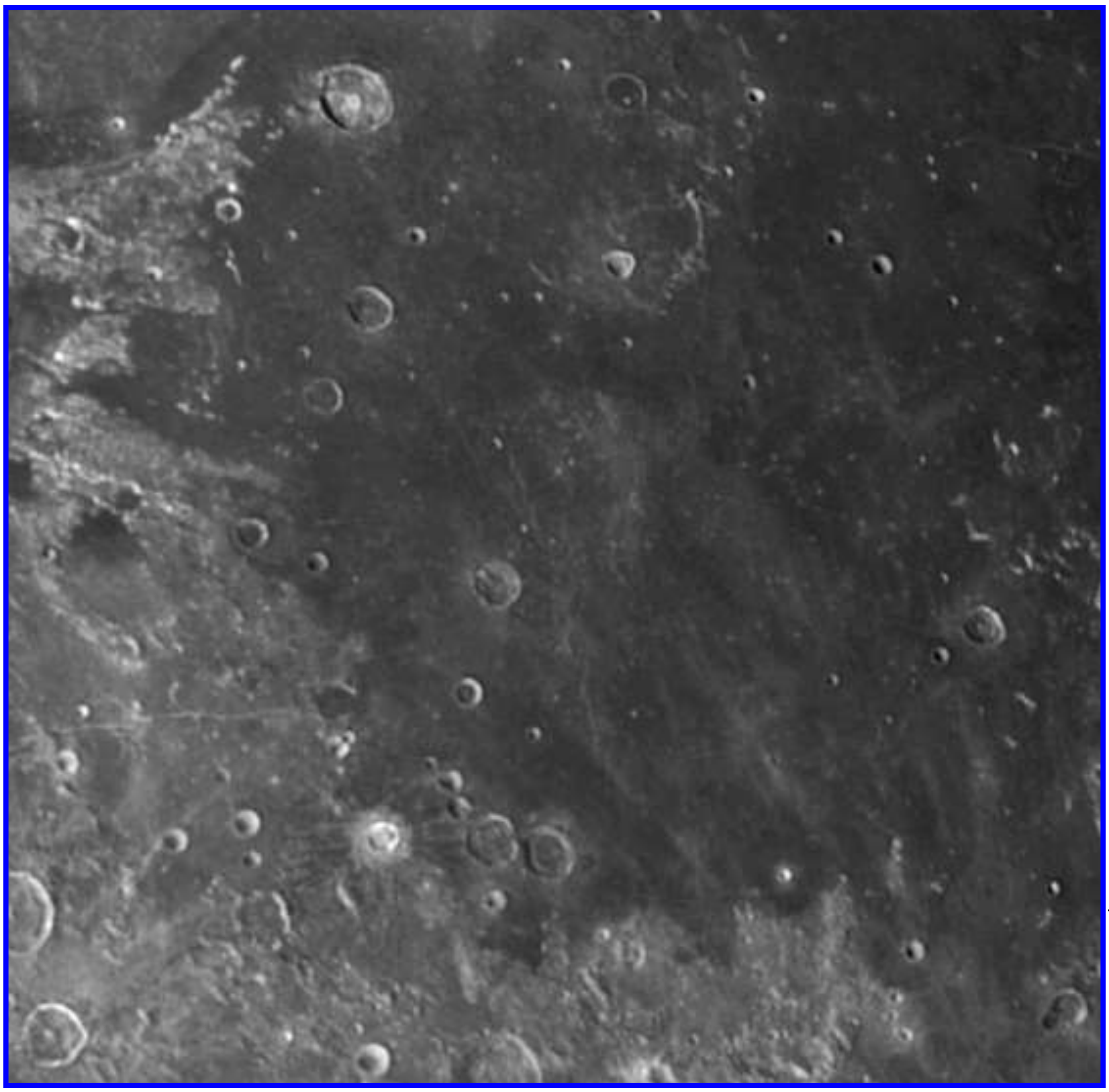
Lunar Topographic Studies

Zebra Stripes in Southwest Mare Tranquillitatis

David Teske

Apollo 11 landed at Statio Tranquillitatis in southwestern Mare Tranquillitatis in July 1969. This historical aspect makes this area of the Moon very interesting to explore with a telescope of any size. Of course, the landing area is well beyond the reach of any telescope. But the varied craters, rilles, mountains and domes of this area make it a joy to explore with a small telescope. In this particular exploration, I looked at the Moon when it was just past Full Moon, thus brightly lit.

Arago is a crater that I normally associate with its two large nearby domes. In high lighting, the domes are no longer visible, but the floor and topography of Arago stand out. Close inspection shows that 26 km wide Arago does not have a central peak, but rather a ridge that extends from where the central peak should be to the northwest wall. Perhaps a large scallop or arcuate collapse on the northwest terrace of Arago merged on the floor to the central peak to form this central ridge.



On the southern floor of Mare Tranquillitatis is the bright 6 km wide crater Moltke. This bright haloed crater served as a navigation point for Neil Armstrong as Apollo 11 came in for landing. Parallel with the southern shore of the Mare is Rima Hypatia, a very broad, linear rille. It stretches from the crater Sabine to just past Moltke where it splits in two.

Dionysius, *David Teske, Louisville, Mississippi, USA. 2022 March 20 07:26 UT, colongitude 117.0º. 4 inch f/15 refractor telescope, ZWO ASI120mm/s, IR block filter, seeing 7/10.*

Lunar Topographic Studies

On the southwestern corner of Mare Tranquillitatis is a cluster of four craters, two small and two large and shallow. The two larger craters are Ritter and Sabine, with Sabine being farther east (right). Both craters are shallower than expected for craters of this size and both have unusual floors. Sabine has an unusual ridge that resembles a thin doughnut extending around the moat-like edge of its floor. Ritter has a lumpy floor with a central ridge and an elevated, arcuately bounded rough area. These two craters are now recognized as floor-fractured craters (FFC) formed when magma rising in the basin pushed the floors of these impact craters up. These FFC are common around lunar maria. These two craters appear to be of similar age. Perhaps long ago an asteroid was split by the lunar gravity to cause a double impact. What a sight that would have been!

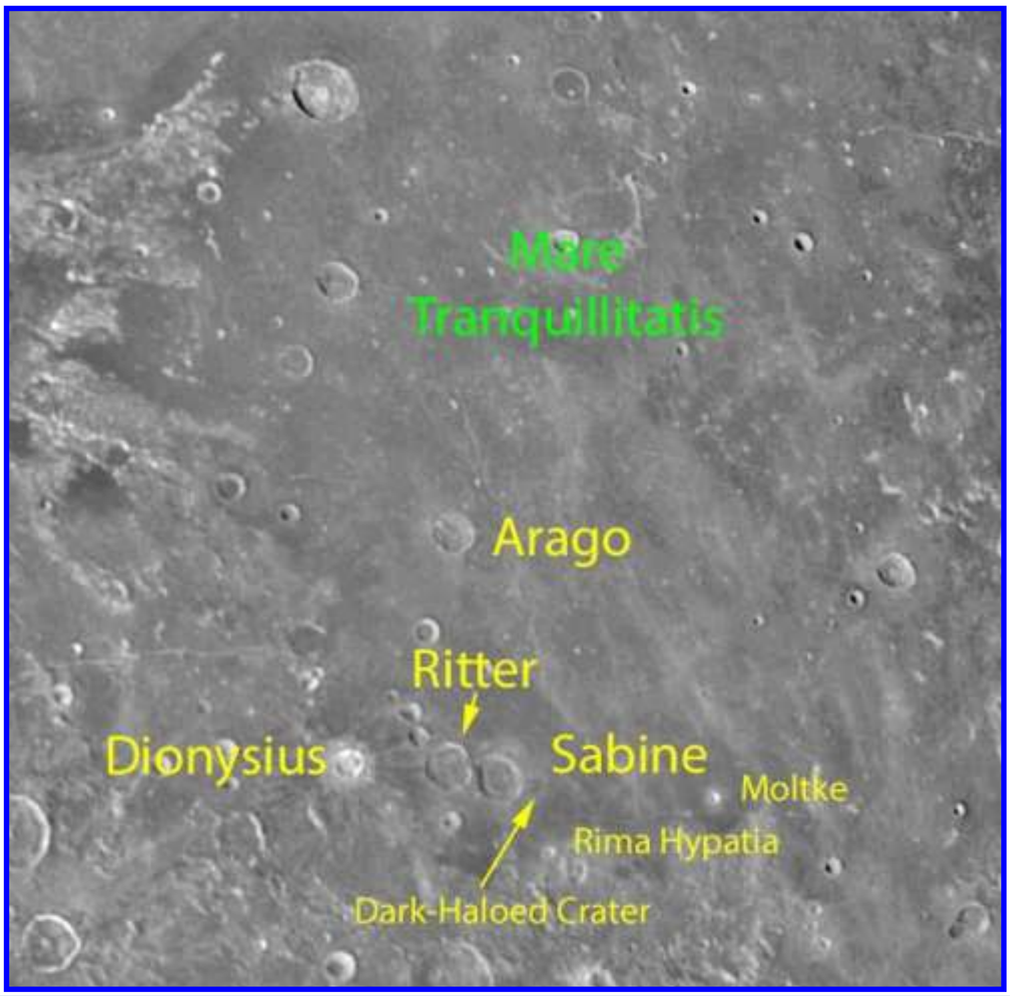
Just west (left) of Ritter and Sabine is the slightly smaller, bright crater Dionysius. This crater is 18 km wide and 3 km deep, has a bright collar and short dark rays under high Sun, as imaged here. Dionysius may be a dark haloed crater like the small one to the east of Sabine. If this is correct, then when Dionysius formed on the basin ejecta-mare boundary, the impact excavated and scattered a localized dark volcanic ash deposit or lava flow as ray material. The dark material was mare lava and the bright material was anorthositic basement rock that was brought to the surface from greater depths by the impact. Other nearby craters did not dig deep enough to reach this dark material. The rays of Dionysius are both light and dark materials. This radial "zebra pattern" of stripes is unique on the nearside of the Moon. A pattern of dark stripes within the bright halo of Dionysius extends even across Ritter to the rim of Sabine. These dark rays are plainly visible with my small telescope. I find it odd that they were first noted by the U.S. Air Force scientist Vern Smalley in 1965 or in 1994 on images returned by the Clementine lunar probe. It makes me wonder what else is on the Moon in plain sight, waiting to be discovered?

Chu, Alan, Wolfgang Paech, Mario Wigand & Storm Dunlop. 2012. The Cambridge Photographic Moon Atlas. Cambridge University Press, New York.

Moore, John. 2014. Craters of the Near Side of the Moon.

Wood, Charles. 2003. The Moon: A Personal View. Sky Publishing Corp. Cambridge.

Wood, Charles & Maurice Collins. 2012. 21st Century Atlas of the Moon. Lunar Publishing, UIAI Inc., Wheeling.



Dionysius (labeled), *David Teske, Louisville, Mississippi, USA. 2022 March 20 07:26 UT, colongitude 117.0°. 4 inch f/15 refractor telescope, ZWO ASI120mm/s, IR block filter, seeing 7/10.*

Lunar Topographic Studies

One of the Most Beautiful Areas on the Moon

Alberto Anunziato

I don't remember looking closely at Mons Delisle until the night I tried to document with IMAGE 1. The two most prominent craters are: Diophantus (17 km diameter) to the south and Delisle (25 km diameter) to the north. The "hummocky terrain" around both mentioned by Kwok C. Pau (Photographic Lunar Atlas for Lunar Observers, Volume 2, page 322) is not visible with oblique illumination near the terminator.

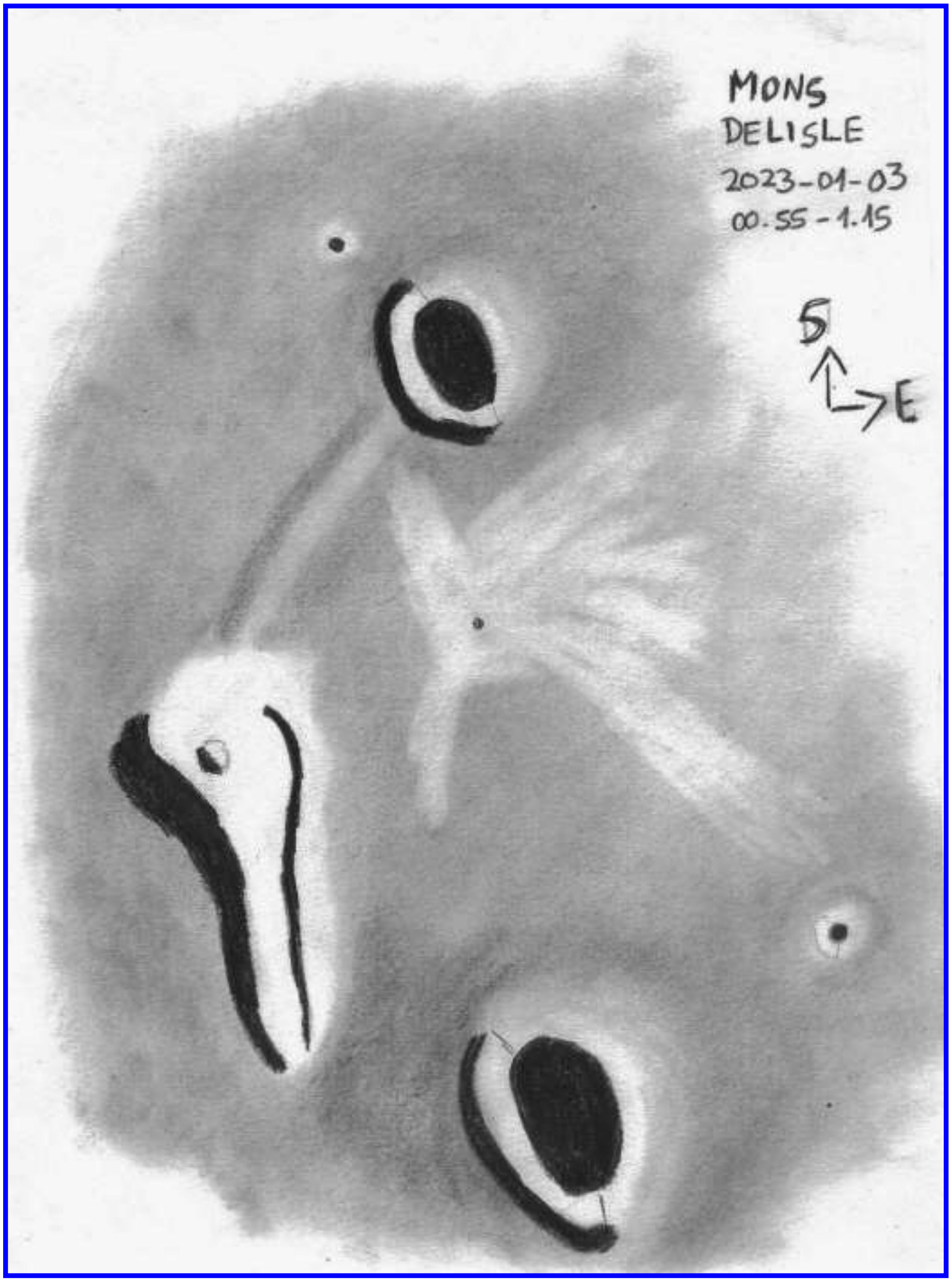


Image 1, Mons Delisle, *Alberto Anunziato, Paraná, Argentina. 2023 January 03 00:55 –01:15 UT. Meade EX 105 Maksutov-Cassegrain telescope, 154x.*

But there are three very different features between the two impact craters. The first, and most notorious, is Mons Delisle, which Elger refers to as "A triangular mountain", and Pau gives more details: "Its southern end is bulbous and the northern end tapers. Mons Delisle is nicknames as "the baby" by Gerard Kuiper". To tell the truth, I only distinguish the form of a baby in the images on pages 323 and 324 of the Atlas de Pau, in which Mons Delisle appears under different illuminations. During the observation I could see a brighter area that even cast a shadow to the east, and an internal shadow that I estimated would correspond to that cast by the highest part of the massif, which runs from north to south. This interior shadow, from north to south, seems quite anomalous, Mons Delisle being so narrow, and also it is not appreciated in the images that I could find.

Lunar Topographic Studies

To clarify the doubt, I resorted to that extraordinarily useful tool, the Lunar Reconnaissance Orbiter Quickmap, more precisely its relief map (Terrain-slope), which corresponds to the screenshot of IMAGE 2. As you can see, the interior of Mons Delisle presents an internal depression in its center, which can be distinguished in IMAGE 1 as an internal shadow. Less well known than Mons Delisle is "a winding ridge running up to the N. wall" of Delisle (Thomas Elger, The Moon, page 80). It is quite prominent, not enough to recognize the elements of its topography (arch and crest), but to cast a shadow. And the third element is a truly fascinating bright ray crater: Samir, just 1.2 km in diameter. Even with oblique illumination, not at all conducive to showing bright rays, the ejecta of this small, but recent (and therefore bright) crater is quite a spectacle. The pattern of the rays is characteristic of very small craters. I'd love to enjoy it close to a full moon, but I'm sure being so small it can be easily confused with other glowing materials. One last consideration. I drew a black dot in the center of the bright rays, but Samir's shadow cannot exceed its 1.2 km diameter, which puts it outside the resolving power of my small 105mm Maksutov-Cassegrain. At the time of the observation, I did not know the diameter of Samir. Could it be that my brain has completed, from what I expected to see, the bright rays with a crater that should be there, that I wasn't seeing? It doesn't seem like a pleasant prospect to me, registering things that I don't see, but that my brain, like a pareidolia, pretends to see. You have to record what you see, or think you see, and then check it against what you really should see. An interesting philosophical reflection derived from visual observation.

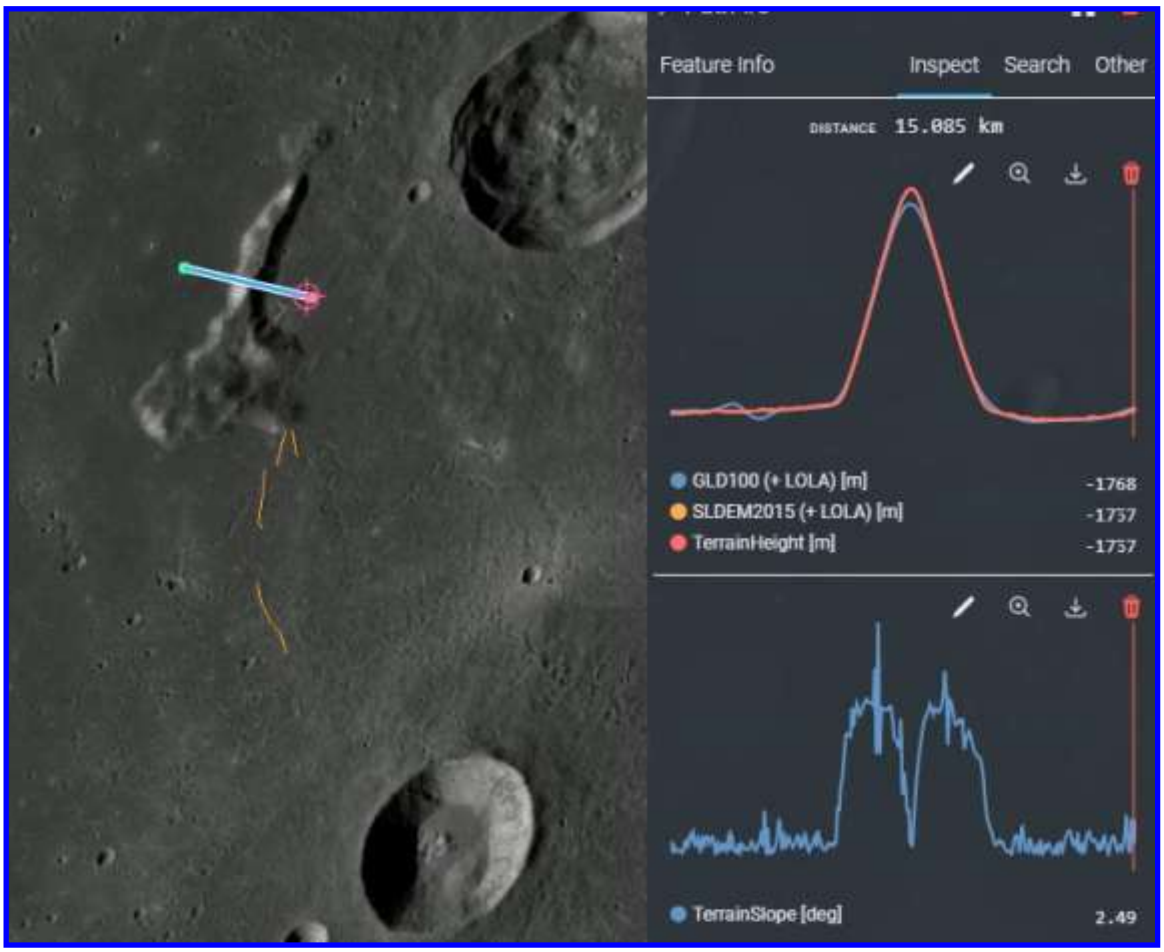


Image 2, Mons Delisle, *LROC QuickMap.*

Lunar Topographic Studies

Impacts on the Moon
Guillermo Scheidereiter

The Moon appears to us somewhat disturbingly from remote times (although I have started the text with the usual filler, "The Moon...", please, give me a little credit and continue reading). The inhabitants of the Earth have experienced a mixture of feelings for her that range from sympathy to amazement, through tenderness, familiarity, friendship, love and even hatred [1]. Mythology worshiped her in multiple personifications, the men and women of science of all times felt captivated by her existence, her changing form and mystery, while minstrels and poets have sheltered her in the most passionate phrases and they personified her as a snowy goddess showering clusters of golden stars across the sky. Allow yourself, dear reader, a moment to read one of the most beautiful comparative personifications in the verses of the distinguished American poet, Emily Dickinson:

The Moon was but a Chin of Gold
A Night or two ago –
And now she turns Her perfect Face
Upon the World below –

Her Forehead is of Amplest Blonde –
Her Cheek – a Beryl hewn –
Her Eye unto the Summer Dew
The likest I have known –

Her Lips of Amber never part –
But what must be the smile
Upon Her Friend she could confer
Were such Her Silver Will –

And what a privilege to be
But the remotest Star –
For Certainty She take Her Way
Beside Your Palace Door –

Her Bonnet is the Firmament –
The Universe – Her Shoe –
The Stars – the Trinkets at Her Belt –
Her Dimities – of Blue –
[2]

The French poet, playwright and novelist Victor Hugo, for his part, gave perhaps one of the most sublime descriptions of the iconic rising moon in the beautiful ending of the poem *Booz Endormi*, where Ruth wonders what many of us have ever wondered:

Everything rested in Ur and in Jerideth; The stars dotted the deep and dark sky; The fine and clear crescent among these shadow flowers shone in the west, and Ruth wondered,

Motionless, opening his eye half under his veils, What god, what harvester of the eternal summer, Had, on leaving, carelessly thrown this golden sickle into the field of stars. [3]

Silent was all in Jezreel and Ur;
The stars were glittering in the heaven's dusk meadows.
Far west among those flowers of the shadows.
The thin clear crescent lustrous over her,

Made Ruth raise question, looking through the bars
Of heaven, with eyes half-oped, what God, what comer
Un to the harvest of the eternal summer,
Had flung his golden hook down on the field of stars. [4]

The ages of humanity have shown us the fascination that the silver sphere embodies in our individual and collective imagination, and what science would discover and explain in the coming years about the formation, nature, physiognomy and composition of the Moon and how this knowledge it would change our understanding and perception of our inspiring white lighthouse, it has made the Moon become more real and less romantic the more we know it (have the discoveries and advances of science been able to cloud the inspiration of the poets?). Allow me then to take you to a less melancholic and sentimental terrain (although I confess that I wanted to continue on the ground I was treading on), or do you think that the Moon is a disk whose sole purpose is to serve as a mere source of inspiration, or a goddess that rises above the seas in a silver chariot, or a jug that pours golden stars into the black of night? Or, the what is more dramatically naive, that part of the sky that is made of cheese, or that, like a discovery made by Alice in Wonderland, inhabits a curious and lively rabbit?

The first conquerors who arrived in South America (when Argentina was not Argentina) and who established communication with the natives of these lands, heard about a rain of fire that occurred a long time ago and whose testimony was transmitted in the oral tradition of the brave inhabitants of the central-coastal Argentina, in particular, what currently constitutes the provinces of Chaco and Santiago del Estero. It is said that the seekers of wild honey who entered the depths of the lush Chaco Forest chasing the sweet elixir of the bees, used to return (when they succeeded), with arrow wounds whose rods were made of hard quebracho and their ends were, curiously, wrought in iron.

Faced with such stories and facts, viceroys representing the Spanish crown in these moors, brave captains of sea, land and war, intrepid generals with thick mustaches and adventurous treasure seekers, undertook tortuous journeys to find the origin of the iron of the arrows that crossed the bodies of those who cut the wild honeycombs. In the presumption that the ferrous material came from the bowels of the Earth (because it was not often that people thought of meteorites in those dark ages), as the result of a roaring volcano from those times of the rain of fire of which they spoke Mocovíes and Abipones, the conquering Goths entered the Chaco jungle with the hope of finding gold and precious stones.

It was thus that Hernán Mexía de Mirabal led the expedition that, in 1576, resulted in the discovery of a rock that in subsequent analyzes of successive expeditions (on which I will not go into detail because you, dear reader, will find references in the virtuous wiquipedia), determined a high concentration of the purest iron and, to the disappointment of the lovers of wealth, a small fraction of silver [5]. The ferrous fragment of rock that the adventurous conqueror from the Crown of Castile found, was baptized "*Mesón de Fierro*" (iron table), due to its similar appearance to a table, and its elusive measurements swayed and wobbled (allow me the irony sustained in the disagreements of those who visited the rock), about three meters long and more than one meter wide and high (there was also no agreement on the weight that was reported between 23,000 and 41,000 kilograms).

Surely, the impacts caused by this "rain of fire" generated different holes in the earth and probably caused fires, death of animals and perhaps people. The Jesuit missionary Guevara wrote in 1764, about "the fall of the Sun":

"... then it was then that floods of fire flowed everywhere, and flames that embraced and consumed everything; trees, plants, animals and men. Few Mocoví people, to repair themselves from the fires, were abysmal in the rivers and lagoons, and became capiguarás and caimanes. Two of them, husband and wife, sought asylum in a towering tree, from where they watched rivers of fire flow that flooded the surface of the earth; but unexpectedly a flame was snatched upwards that scorched their faces and turned them into monkeys..." [6]

"... then it was when floods of fire ran everywhere, and flames that embraced and consumed everything; trees, plants, animals and men. Few mocoví people, to repair themselves from the fires, plunged into the rivers and lagoons, and became capiguaras and alligators. Two of them, husband and wife, sought refuge in a very high tree, from where they watched rivers of fire run that flooded the surface of the earth; but unexpectedly a flame was snatched up that scorched their faces and turned them into monkeys..."

The *Mesón de Fierro* is a vestige of that age that gave its characteristics to the place that is now known as Campo del Cielo, because there is a significant density of meteorites in the area. Sadly, it happened that the passing of the years, the lush forest of quebrachos in the Santiago del Estero and Chaco jungles and the loss of concrete references and precise plans, made the *Mesón de Fierro* disappear and no one else, for a long time, knew about it.

The Earth rebuilds itself from its wounds quite quickly by lifting its surface through erosion, which eliminates or significantly attenuates its scars over the years. The Moon may take longer to rebuild than the Earth since it does not have an atmosphere, nor wind nor water, which are the most direct causes of erosion (this does not mean that there is no erosion on the Moon, but that it is of a different nature; caused by impacts, lava flows, landslides, cracks, solar wind). When we look at the Moon, therefore, we peek into the past and can imagine the shocks of our solar system, since, although we see an apparently "permanent" Moon, this was not always the case.

Galileo Galilei was one of the first scientists to point a telescope at the sky (until then they were used to scan the horizon looking for the entrance of merchant ships to the port or possible enemy banners behind the hills), along with Thomas Harriot, in England. And, as all eager astronomy enthusiasts do, when we first set up our telescope, Harriot and Galileo directed their modest targets at the Moon (Harriot is estimated to have observed the Moon about six months before Galileo using a six-power telescope, hypothesis supported by a drawing by Harriot dated July 1609). [7]

Galileo was deeply impressed by the world he discovered. The Moon was not an oval of celestial ether, nor a translucent and immutable flat disk, nor a snowy goddess, nor did she see a rabbit (much less a piece of cheese wandering through the sky). Galileo saw mountains and craters; an ashen-looking rocky world, independent and covered in traces and mystery.

Phases of the Moon according to Galileo.

“Contrary to what Aristotle affirmed, the Moon <<is not covered with a smooth and polished surface>>, wrote Galileo, but is <<… rough and uneven, covered everywhere, like the surface of the Earth, with enormous prominences, deep valleys and abysses>>.” [8]

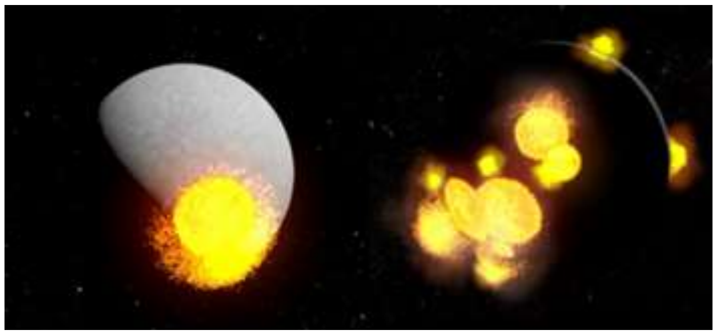
Our beautiful natural satellite was not the only thing that Galileo observed through the telescope, he also dedicated himself to looking at Jupiter and its moons, Venus, explaining its phases, observing sunspots and describing the Vía Láctea (Milky Way), on which he underlined : <<Wherever the telescope is pointed, a great multitude of stars immediately comes into view>> [9]. The descriptions made by Galileo from his observations with the telescope are published in March 1610 in his work Sidereus Nuncius. In this work he includes a drawing of the Moon in different phases, dating from November 30, 1609. Although scientific precision cannot be attributed to them, it is important to recognize that, among others, these drawings begin to mark a new stage of science and the observation of the universe. These watercolors are in a copy of the first edition of Sidereus Nuncius acquired by a New York antique dealer in... Argentina! [10]

Since then, we humans have not stopped aiming our telescopes at the most attractive object in our night sky. So permanent and changing at the same time, the Moon shows us in each phase its familiar landscapes, which today we know have been carved in immemorial times of turbulence and agitation, of rivers of lava and magma, of molten rocks, of impacts, of worlds wounded and chaotic. Seas, cracks, bays, valleys, domes, ridges, mountains and craters make up a face sculpted by the debris of the universe, which debates between light and darkness, inviting us to contemplate and admiration (and after so many raptures of pure inspiration literary, allow me to think perhaps, that far outside the scientific sphere, in the complacency and astonishment of mortals, finds the Moon, its most transcendental purpose). But before my literary spirit takes me like a supermarket cart, with locked wheels, towards the gondola of letters, let us return to the cold lunar world to ask ourselves: was the Moon always as we know it?

Part of the answer is in the same paragraph where the question is posed and, although I presume that you, dear reader, know about the Moon and its becoming, let's briefly review its early stages and its subsequent evolution.

Early stages of Moon formation

According to the most accepted theory about the origin of the Moon, after the great clash between "the goddesses" Gaea and Thea, more than 4,600 million years ago (what is known as the Prenectaric period), the Moon is a ball of magma very hot. Over time, this magma cools and crystallizes, giving rise to its inner layers (upper and lower mantle) and to the surface, that is, its crust. Imagine for a moment that you are pointing your telescope, securely mounted in your backyard, at the Moon, and no matter what phase or where you focus your attention, the surface looks bright and smooth; the terminator reminds him of an almost perfect line drawn with a school compass. But that smooth, rising moon would have neither calm nor rest in a universe that roared rubble in the silence of space. The solar system was agitated in the swing of hot worlds that were adrift in a cauldron of fast rocks. It is presumed that around 4.3 billion years ago, the Moon was struck by a meteorite at the south pole that generated the Aitken basin (on the far side of the Moon) and, subsequently, an intense "attack" known as “great late bombardment” configures the main basins and the first craters. The young and soft face of the Moon is reconfigured and begins to feel the force of the cosmos.



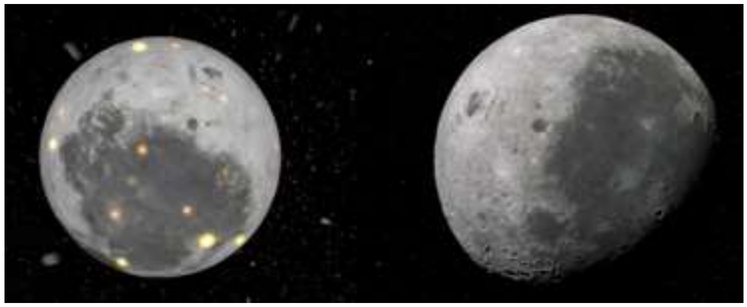
Formation of the first basins and craters

Later, there will be more impacts and volcanic activity that make up basins, for example, the one that contains the current Sea of Tranquility (it does not seem to have had a very calm origin...). The Prenectaric period gives rise to the Nectarian, in direct allusion to the Nectaris basin, and the great bombardment ends with the creation of the last basins, such as the Serenidad basin.

Formation of seas and craters

That virgin Moon dressed in silk is now beginning to become a wild world. If we imagine ourselves inhabiting the also young Earth, and we look at the Moon with the naked eye, we would see darker areas than others and, with a telescope, recently formed craters. Then comes the Imbrian period, which extends between 3,850 and 3,200 million years, and the solar system calms down its impetus of fiery fury. Rocky fragments like those that collided with the young Moon now follow an uncertain course in the immensities of space and time while others are grouped to start some orbital path and impacts on the Moon become a more sporadic phenomenon. Intermediate craters are now being formed, the crust becomes thinner and from the interior, part of the molten magma emerges and floods the basins, forming the seas.

Later, the great Eratosthenes arrives on the Moon mounted on a horse of rock and fire, like a deity from Greek mythology, and marks the beginning of the Eratosthenian period, around 3.2 billion years ago. Now, on the Moon there are lava lakes, cracks and gaps, superimposed craters, domes, "rotten swamps" and the volcanoes enter the mysterious realm of dreams, definitively ceasing their activity. And one night when the Moon looked calm, some god enraged with a universe whose overwhelming beauty made him pale, like a beast possessed by a fit of rage, threw a small rocky world on the silver queen and was formed what we know today as Copernicus crater. With it the Copernican period was born some 13.2 billion beautiful moons ago. With the passing of millions of centuries, the neighborhood of our mother star quietens down and the density of impacts decreases. The Moon embodies a hectic past that later calms down to show us, in the litany of nights, its familiar face.



Impacts on the Moon (left) and the Moon today (right).

Just as grains of sand are part of the beach, craters are part of the Moon. These are formed in just a few seconds caused by the impact of a meteorite. According to the mass of the meteorite and its speed, the magical mathematical formulas of physics will allow us to explain how the energy of the movement produces holes and fusions, crushing, walls that come off and collapse on each other, molten rocks in a second of hell, crystals that melt, fragments that are ejected generating new impacts and, when everything has happened..., stillness ensues. And one summer night, while we are wondering the same thing as Ruth, the eyepiece of the telescope shows us a new crater. We see it there, where it was not before, recently sculpted and shining on the lunar terminator. With the excitement and trembling of the haste, we run in search of our camera to be the first to photograph it, report it, raise the cup of triumph and, finally, with the astronomical world surrendered at our feet, see how our name is placed on that great showcase of mathematicians, physicists, astronomers, engineers, etc., immortalized in lunar craters. There would even be a space mission to explore the new crater and the probe would bear... our name!... Excuse me, reader friend, I got carried away by the imagination! The reality is that after the Copernican period there are no more impacts on the Moon that are large enough to form craters of considerable size. This means that humanity has not witnessed the formation of a new crater on the Moon... Has humanity not witnessed the formation of a new crater on the Moon?!

Although it seems very unlikely that humans have witnessed an impact on the Moon capable of generating a large crater, the previous question seems to find a glimpse of an answer in the chronicles of the British historian Gervase of Canterbury, who writes the following report referenced in the afternoon of June 25, 1178:

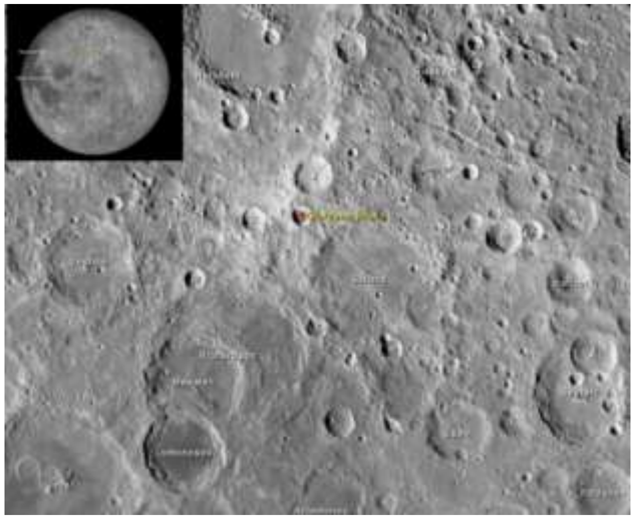
In this year, on the Sunday before the Feast of St. John the Baptist, after sunset when the moon had first become visible a marvelous phenomenon was witnessed by some five or more men who were sitting there facing the moon. Now there was a bright new moon, and as usual in that phase its horns were tilted toward the east; and suddenly the upper horn split in two. From the midpoint of the division a flaming torch sprang up, spewing out, over a considerable distance, fire, hot coals, and sparks. Meanwhile the body of the moon which was below writhed, as it were, in anxiety, and, to put it in the words of those who reported it to me and saw it with their own eyes, the moon throbbed like a wounded snake. Afterwards it resumed its proper state. This phenomenon was repeated a dozen times or more, the flame assuming various twisting shapes at random and then returning to normal. Then after these transformations the moon from horn to horn, that is along its whole length, took on a blackish appearance. The present writer was given this report by men who saw it with their own eyes, and are prepared to stake their honour on an oath that they have made no addition or falsification in the above narrative. [11]

Illustration of the Canterbury monks

As the meteorite expert Jack Hartung has suggested, the curious event witnessed by the surprised (and, let me add, lucky) monks, could be the birth of an apparently recently formed crater known as Giordano Bruno. The astronomers Derral Mulholland and Odile Calame supported this hypothesis, showing that "[1]*the Moon presents a vibration or tremor with a period (approximately three years) and an amplitude (approximately three meters), which agrees with the idea that the Giordano Bruno crater it was excavated less than a thousand years ago*." [12]. It goes without saying that these vibrations are caused by the impact of the meteorite (or comet) that could have generated the crater and, although they end up damping, they do not do so in a short period of time. Of course, this theory has its weaknesses, such as the one that suggests that the impact would have thrown a large amount of lunar rock towards Earth, and this is not recorded in any chronicle. [13][2]

Although the event related by the Canterbury monks does not seem to be in the realm of the enigmas revealed, let us at least recognize that the evidence is more than suggestive. In recent years, state-of-the-art observatories and amateur access to high-resolution equipment have made it possible to detect impacts on the Moon, even if they are not large enough to cause large craters. For example, in 2013, the Spanish astronomer José María Madiedo from the University of Huelva and head of the MIDAS Project (Moon Impacts Detection and Analysis System), confirmed an impact on the Moon produced by a rock with a mass of about 400 kg. and a diameter between 0.6 and 1.4 meters, which could have produced a crater of about forty meters in diameter, in the Mare Nubium.

[1]An academic who had the misfortune to sustain, in the splendor of the Holy Inquisition, the existence of other worlds, many of them inhabited. For such "heresy" he was sentenced to die at the stake.
[2]Vibrations are studied with laser retroreflector mirrors installed on the Moon by Apollo missions astronauts.



Giordano Bruno Crater, Virtual Moon Atlas

It is estimated that the meteoroid crashed at around 61,000 km/h, producing an energy of 15 tons of TNT [14]. Madiedo also detected an interesting impact during the 2019 eclipse [15]. This, just to cite some of these detected events[3], since they have been revealed more and with more regularity, given technological advances and their accessibility.

Impact on the Moon of 2013 (left) and 2019, during the eclipse (right).

The question that floats latent in our minds is whether we will see or witness an impact capable of producing a crater on the Moon that we can see with our telescopes from our backyards. One that we can draw, describe and photograph. May it enrich our knowledge about the formation of craters and, why not, may it inspire an impressed poet to dedicate heartfelt verses to it that transcend time and slip into the illustrious letters between the fine prose of Dickinson and Victor Hugo. However, let us recognize that such an event would at least worry us, as it could also occur on Earth.

[3]For example, the NELIOTA Project (Near-Earth object Lunar Impacts and Optical TrAnsients), of the ESA (European Space Agency), has been running since 2015 and keeps a record of detected flashes. Watch: https://neliota.astro.noa.gr/DataAccess

We have talked about poets and poetry, about impacts on the Moon, about profound transformations, and also about rains of fire on Earth. So, to finish these notes, I refer you to the time a few paragraphs ago, when we were going through the threads of the history of the "Mesón de Fierro". Well, I still need to tell you that at the time of the expeditions, when the location of the meteorite was still known, it was agreed that the geographical demarcation line between the provinces of Santiago del Estero and Chaco, would be precisely the one that passed through the mythical ferrous fragment. The dust accumulated in the old consensus was removed by the authorities of Santiago del Estero in 1873 with the presumption that such a geographical limit would considerably expand the territory of their province to the detriment of the Chaco. The truth is that by means of a law they offered an extraordinary reward of 25,000 hectares of land and a considerable sum of money to whoever provided precise coordinates for the location of the meteorite [16]. Sixty-four years later, in 1937, the geophysical engineer Juan Baigorri Velar [17], hired a notary public to certify the exact location of the “Mesón de Fierro”, since he had found it while searching for oil in the region. The authorities of Santiago del Estero, aware of the facts and having information about the area where Baigorri Velar worked, in an act of mischief, decided to repeal the law, find the meteorite by their own means and save the reward (or direct the reward willfully). This led Baigorri Velar to hide the rock with earth and branches and the rest was done by the lush Chaco forest. This is how the Mesón de Fierro was irretrievably lost in the kingdom of mysteries and is still waiting for some intrepid adventurer, an Indiana Jones of the meteorites, to take it out of ostracism to delight us with its splendor of iron and silver.

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Plutarch as a Precursor of Galileo

Alberto Anunziato

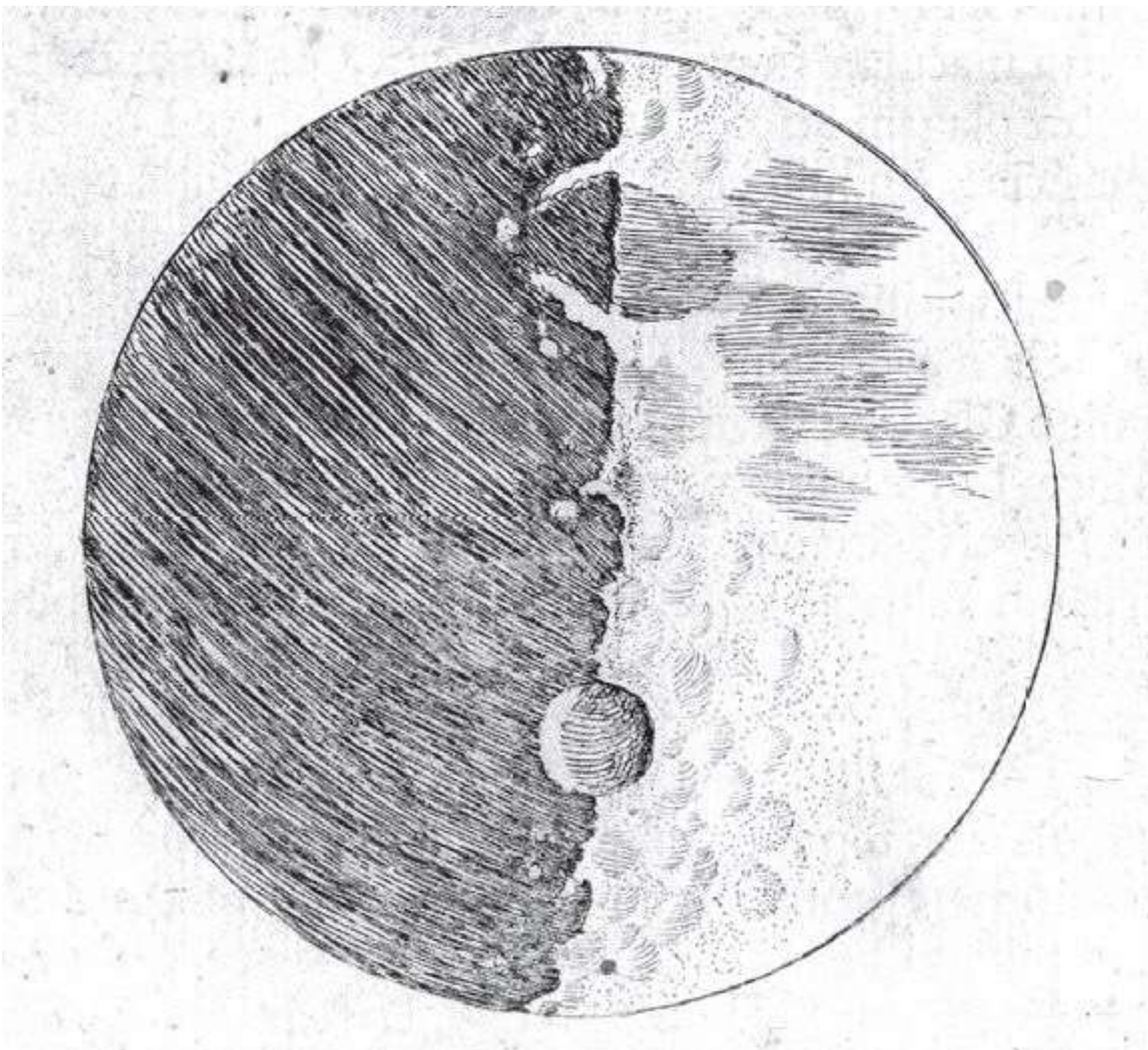
"*Seeing is believing, but we do not see with our eyes only. We look at the world with the aid of inherited images that we may strive to improve but that we do not work to replace unless something dramatic occurs"* William Shea

The art of seeing exceeds the sense of sight, it is an art that is learned theoretically, like any art. John Herschel said it in an insurmountable way in their "Scientific Papers": "Seeing is in some respects an art which must be learnt. To make a person see with such a power is nearly the same as if I were asked to make him play one of Handel's fugues upon the organ. Many a night I have been practicing to see, and it would be strange if one did not acquire a certain dexterity by such constant practice". When we look at the Moon today, we see it aided by a wealth of knowledge gained from three and a half centuries of visual observations and more than 60 years of space missions in lunar orbit and surface. When we observe visually, it would be difficult for us to recognize what we do not know previously, which can also lead to an observational bias (that is why it is convenient to record everything that is observed, without judging its reliability while we are behind the eyepiece, the time to check is after the observation). Observing is an art? Sure, let's think that today we can observe Sirius B, Sirius's companion star with telescopes much smaller than the 470 mm refractor with which it was first observed. On the Moon examples abound, dorsa, for example, were first recorded by Johann Schröter at the end of the 18th century, but they are visible with much smaller telescopes than those used by his predecessors, who saw maria as completely smooth (or at least that's how they recorded them). So, each observer observes "standing on the shoulders of giants". And the first telescopic lunar observation? We know that it was made by the Englishman Thomas Harriot, but the second was much more documented, it was made by Galileo Galilei on November 30, 1609, and was documented (along with the following) in what, I dare say, was the book most important in the history of astronomy: "Sidereus Nuncius" ("Sidereal Message" or "Sidereal Messenger"). Was Galileo's a pure observation, he did not know what he could see on the Moon? No, the debate about the nature of the Moon had been going on for centuries when Galileo brought his pioneering telescope to the surface of our moon. In accordance with the Ptolemaic conception of a universe without changes outside Earth, the Moon was thought of as one more celestial body, a perfect sphere, made of glass or fire, and the dark spots ("the face that is seen on the Moon") they were explained as visual defects of the observers, reflections of the terrestrial seas and other similar hypotheses. The minority paradigm conceived the Moon as a different body from the others, similar to the Earth.

Of the works of the ancients that we preserve, this minority paradigm is explained in the work of the philosopher Plutarch of Chaeronea "On the visible face on the Moon" (included in "Moralia"). It is a dialogue in which the different opinions about the nature of the Moon are debated to later discuss its metaphysical nature as the headquarters of daimons and the transitory dwelling place of souls before incarnating again as a human being. The most interesting, and astonishing, thing about Plutarch's work is the "observational" foundation of his Moon-as-another-Earth hypothesis (from which he derives its habitability), which "has clefts in herself, or depths and hollows, for which those who make her an earth-like body find room" (page 19): the analysis of the terminator (remember, observed with the naked eye): "the appearance of the dark places in the Moon is not uniform; there are ishtmuses, so to call them, where the brightness parts and defines the shadow, each region is marked off and has its proper boundary, and so the places where the light and shade meet assume the appearance of height and depth" (page 18); "But the Moon has many irregularities and rough parts, so that the rays proceeding from a large body, when they fall on considerable eminences, are exposed to counter-illuminations and reciprocal dispersion; the cross-light is reflected, involved and accumulated as though it reached us from a number of mirrors (…)" (page 30). The quotations belong to the translation by A. O. Prickard of 1911: "The Face which appears on the Orb of the Moon".

Lunar Topographic Studies

On “Sidereus Nuncius” Galileo analyzes his observations with the telescope, decisive for the change towards the Copernican paradigm. The first observations analyzed are the lunar ones, and he makes a description of the lunar surface: “I have been led to that opinion which I have expressed, namely, that I feel sure that the Surface of the Moon is not perfectly smooth, free from inequalities and exactly spherical, as a large school of philosophers considers with regard to the Moon and the other heavenly bodies, but that, on the contrary, it is full of inequalities, uneven, full of hollows and protuberances, just like the Surface of the Earth itself, which is varied everywhere by lofty mountains and deep valleys” (the quotations belong to the translation by Edward S. Carlos of 1880).



Galileo does not quote Plutarch in "Sidereus Nuncius", he quotes the Pythagoreans, but clearly knew his text. This omission may be due to the fact that he was known for his vanity (the attribution of the telescope as his invention is due to his statements), which would lead him to deny its source (and in fact he was accused of plagiarizing Plutarch, based on the analysis text of the Sidereus Nuncius, comparing it with Xilander's Latin translation of the Greek text). Or, because he considered the data obtained with observation as epistemologically superior to the opinions of philosophers, unlike Kepler. Galileo in Sidereus Nuncius states two proofs of the existence of elevations and depressions on the Moon. The first is a verification of what was stated by Plutarch: the terminator is unequal: “the boundary which divides the part in shadow from the enlightened part does not extend continuously in an ellipse, as would happen in the case of a perfectly spherical body, but it is marked out by an irregular, uneven, and very wavy line, as represented in the figure given, for several bright excrescences, as they may be called, extend beyond the boundary of light and shadow into the dark part, and on the other hand pieces of shadow encroach upon the light:—nay, even a great quantity of small blackish spots, altogether separated from the dark part, sprinkle everywhere almost the whole space which is at the time flooded with the Sun’s light”. It is an experimental verification of what was stated by Plutarch. Although perhaps what Plutarch stated could have been the result of visual observation (will the irregularities of the terminator be seen with the naked eye?). The second proof is original from Galileo, the presence of luminous points in the dark part of the visible face, near the terminator, which he correctly interpreted as the highest points that receive the first rays of the Sun at dawn, by analogy with the Earth: “several bright excrescences, as they may be called, extend beyond the boundary of light and shadow into the dark part (…) is it not the case on the Earth before sunrise, that while the level plain is still in shadow, the peaks of the most lofty mountains are illuminated by the Sun’s rays? After a little while does not the light spread further, while the middle and larger parts of those mountains are becoming illuminated; and at length, when the Sun has risen, do not the illuminated parts of the plains and hills join together?”.

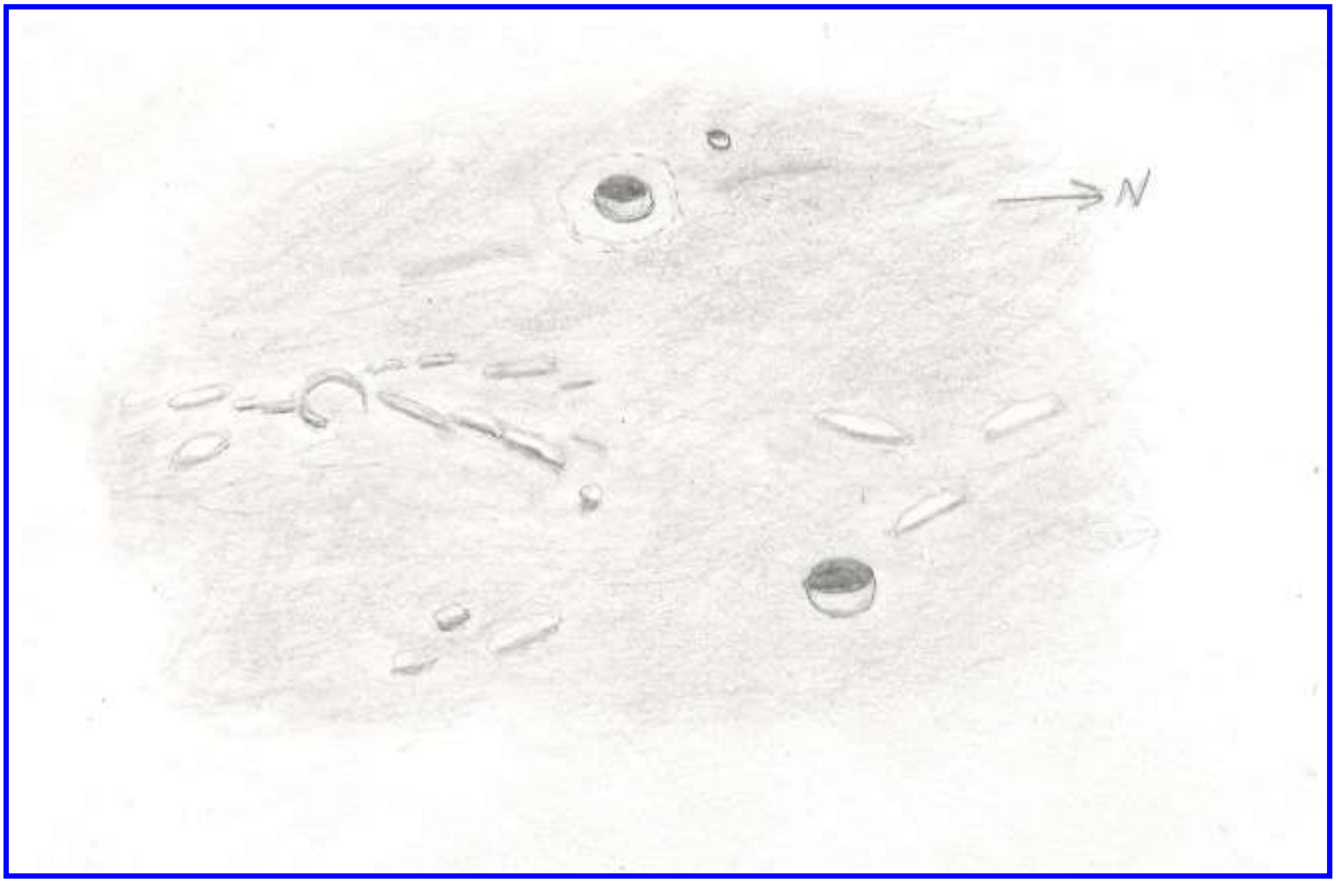
There are no direct descriptions of the mountains, nor are there any full lunar features. First, because “The problem was that the act of seeing through a telescope was not so simple. The lenses placed at both ends of a tube not only magnified the image, they also produced distortions: elongations, blurriness, color fringes. The field of vision of Galileo’s telescope was very narrow and he could not see more than a small fraction of the Moon at a time. It was virtually impossible to focus the meter-long instrument without fixing it to a windowsill or a stand. Elderly scholars, who tried to handle the telescope, were annoyed when the object kept jumping about” (William R. Shea: “Galileo the Copernican”, page 52). In addition, the telescope that he used for the lunar observations of the Sidereus Nuncius, which barely reached 8 magnifications. The accompanying image is the one Galileo chose to illustrate the irregularity of the terminator and the bright spots in its vicinity (in the part of the Sidereus Nuncius that we quote). The detail in this and other Galileo drawings is little, but that is because the purpose of Galileo's drawings was not cartographic but “emphasize analogies with terrestrial landscapes rather than differences” (William Sheehan-Thomas Dobbins, Epic Moon, page 9).

My hypothesis is that Galileo would have taken much longer to recognize that there are elevations and depressions on the Moon as on the Earth if he had not known Plutarch's text. Would the mountains of the Moon be self-evident when viewed with an 8-power telescope? We will never know, because those who followed Galileo in the telescopic observation of the Moon did so on the basis of his observations and the interpretation made based on Plutarch's text. Galileo used the observations to refute one paradigm (a smooth and perfect Moon) and support another (the Moon as a terrestrial body), but both paradigms were pre-existing. The Renaissance culture in which modern astronomy arose placed enormous importance on classical sources, and Galileo leaned on Plutarch as would any scientist of the day. Let us not forget that Kepler was a devotee of Plutarch's book and all of his observation and lunar theory of his rest on acknowledgment of that source. Galileo founds modern science when he attributes essential value to observation over authority, but he used authority to validate observation in the first place. Plutarch continued to be a source of theoretical validation of early observations, not only in Kepler but in the first lunar encyclopedia, Hevelius's “Selenographia”, published in 1647, Plutarch is a cited authority. Understandably, after Hevelius, Plutarch ceased to be quoted, the authority of Greek science no longer needed as observations multiplied and confirmed his text.

Lunar Topographic Studies

Letronne

Robert H. Hays, Jr.



Letronne (West Side), *Robert H. Hays, Jr., Worth, Illinois, USA. 2022 October 20 10:28-10:56 UT. 15 cm reflector telescope, 170 x. Seeing 7-8/10, transparency 5/6.*

I sketched the west side of this feature on the morning of October 20, 2022 before the Moon hid eta Leonis. Letronne is a 'bay' on the southwest edge of Oceanus Procellarum, and has obviously been flooded by it. Its northwestern part is a nearly continuous ridge. Letronne kappa is the detached peak off its north end. A few low ridges are to its west. Letronne P is the partial ring just south of the main ridge, and detached peaks are farther to the south. The Lunar Quadrant map shows it as a conspicuous crater, but it has only low walls. Its northeast rim is missing. There are three hills southeast of Letronne kappa. The middle one is Letronne alpha, and Letronne omega is to its southeast. The northern one is longer and lower, and it is not shown on the Lunar Quadrant map. The conspicuous crater north of Letronne is Flamsteed A. Three low ridges are to its north. Letronne F is northwest of Letronne. This crater is nearly as large as Flamsteed A, and it also has a diffuse halo. The small crater northwest of F is Letronne FA. Two vague strips of shadow are nearby. These three craters are all equally crisp, differing only in size.

Sinus Viscositatis: Bay of Stickiness -- the firstly-named lunar feature of January 2023
John Moore

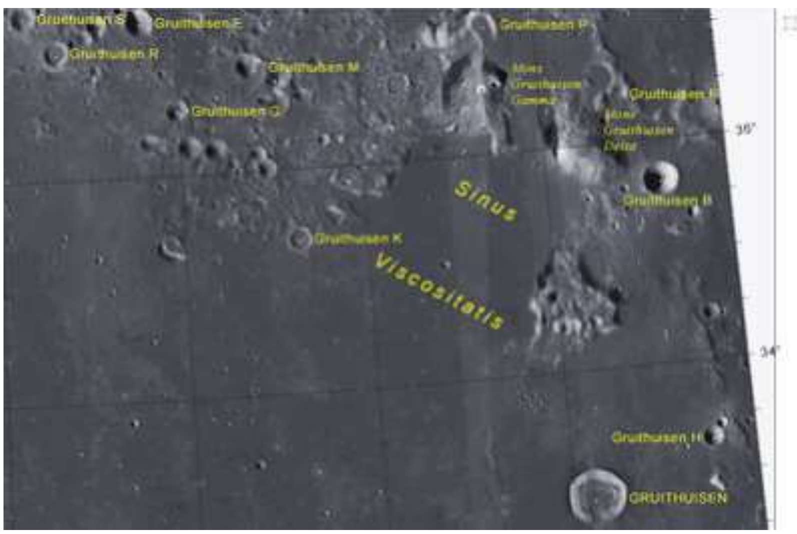
Yes, we have the first named lunar feature of 2023, and it's a bay called Sinus Viscositatis -- the 'Bay of Stickiness'.

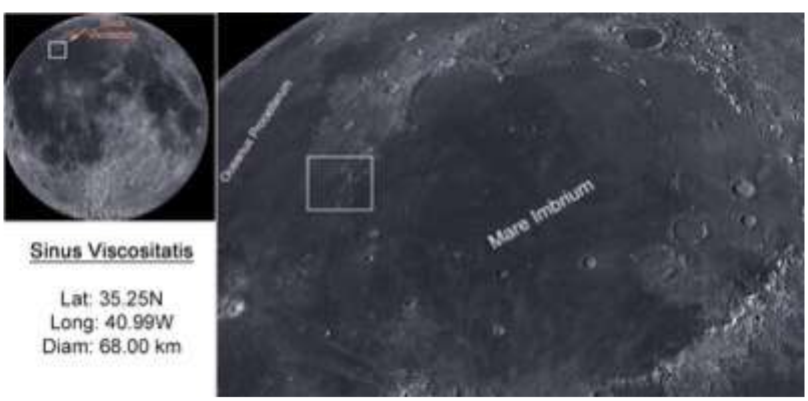
Unlike most features named in 2022 (and in previous years), which were extremely small, on the limb or on the farside etc., this one should be capturable/viewable by most telescopes.

Located just off the western shores of Mare Imbrium, and having a size coming in at ~ 68.00 km in diameter, it surely must be a welcome for those wanting more prominent lunar features added to the moon's official nomenclature.

Below, some images to give its location: the first shows it in the *PDF reference* of *LAC 23* (credit IAU), the second from a general perspective (credit John Moore). Click *here* for a more LROC high-rez (zoomable in and out) version.

John Moore

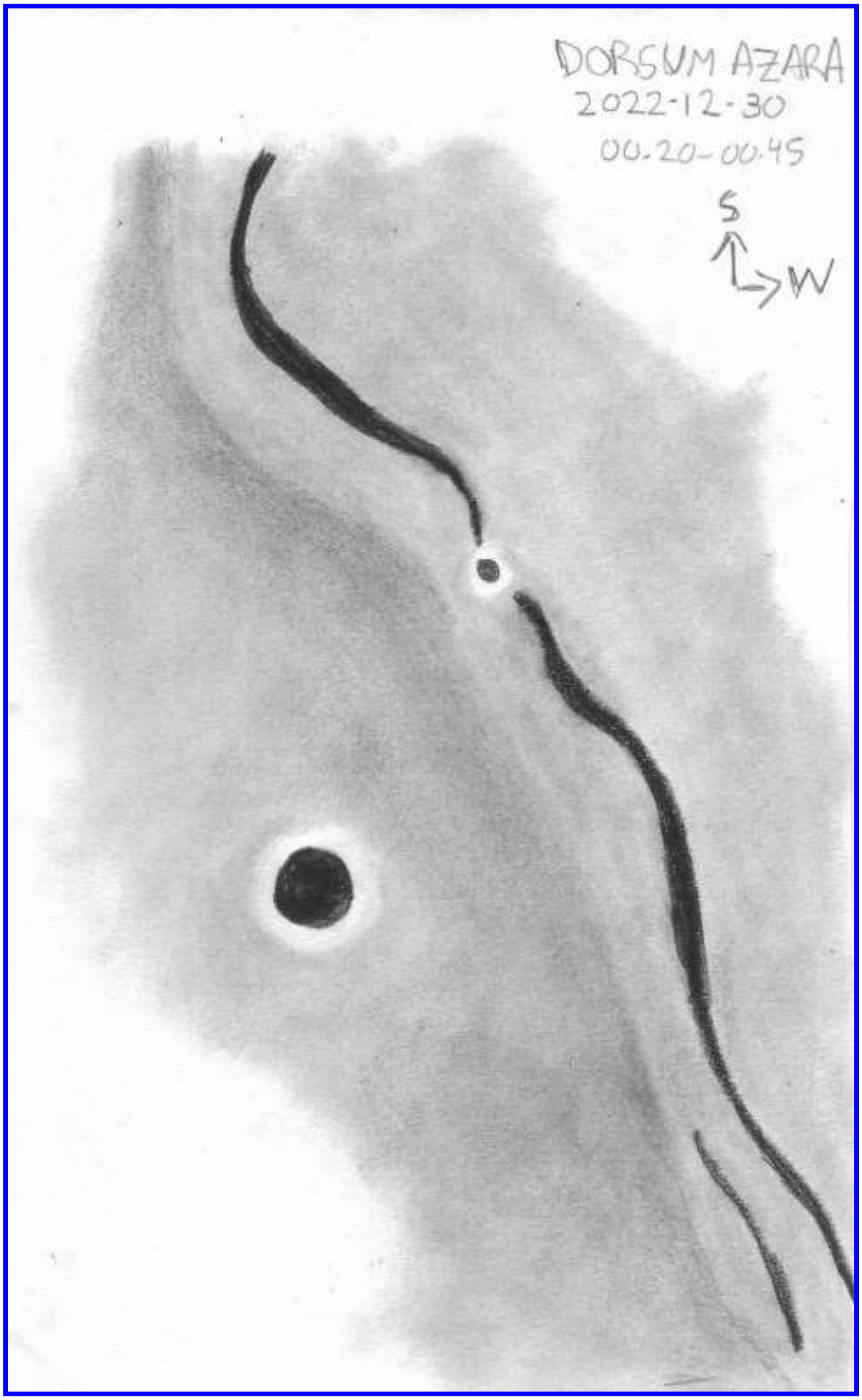




Lunar Topographic Studies

Dorsum Azara

Alberto Anunziato



Behind the eyepiece, even near the terminator, Dorsum Azara (in the Mare Serenitatis) looked like a miniature wrinkle ridge, it looked sharp, but in shades of pale gray and its shadow was thin, no details of its topography could be distinguished. At the time, I thought it was a not very tall wrinkle ridge, although I was intrigued by the fact that it had a proper name, which would indicate that it is important. There are many wrinkle ridges that are unnamed but whose topographic components are clearly distinguishable. Dorsum Azara has a name, but it doesn't seem particularly important. Well, to find out more about Dorsum Azara I turned to the wonderful wrinkle ridges encyclopedia that is Robert Garfinkle's Luna Cognita Chapter 27. "Probably the most interesting of the wrinkle ridge systems on the nearside forms a large "U" in the southeastern region of Mare Serenitatis. This extensive ridge system consists of Dorsa Smirnov, Dorsa Lister, Dorsum Azara, and Dorsum Nicol (…)

Image 1, Dorsum Azara, *Alberto Anunziato, Paraná, Argentina. 2022 December 30 00:20 –00:45 UT. Meade EX 105 Maksutov-Cassegrain telescope, 154x.*

Lunar Topographic Studies

Running generally north to south is the twisting ridge of Dorsum Azara. This low narrow ridge rises south of the bright cone crater Bessel D, turns south at Sarabhai, and ends at the crater Deseilligny. Most of this ridge is less than about 200 meters (656.16 feet) in elevation. This ridge is best viewed in very low angles of solar illumination". Well, it's a low wrinkle ridge, less than 200 meters high (although that's not low if future Moon dwellers have to scale it). I only registered a part of Dorsum Azara, according to Garfinkle, probably the highest part. It is interesting to compare IMAGE 1 with IMAGE 2, which is a detail taken from the Lunar Chart (LAC) 42 (available at https://www.lpi.usra.edu/resources/mapcatalog/LAC/), oriented according to IMAGE 1, in which the crater on the left is Bessel D (5 km in diameter) and the one on the right has no name, it is much smaller. In IMAGE 1 it appears on the western edge of Dorsum Azara, while in IMAGE 2 it appears in the center. This would mean that what we observed and recorded would be the upper parts (called the crest) and what escaped our sight was the arch (the component that is below the crest, wider and lower). In the IMAGE the crest of the Dorsum Azara is clearly seen, which would coincide with what was recorded in IMAGE 1.

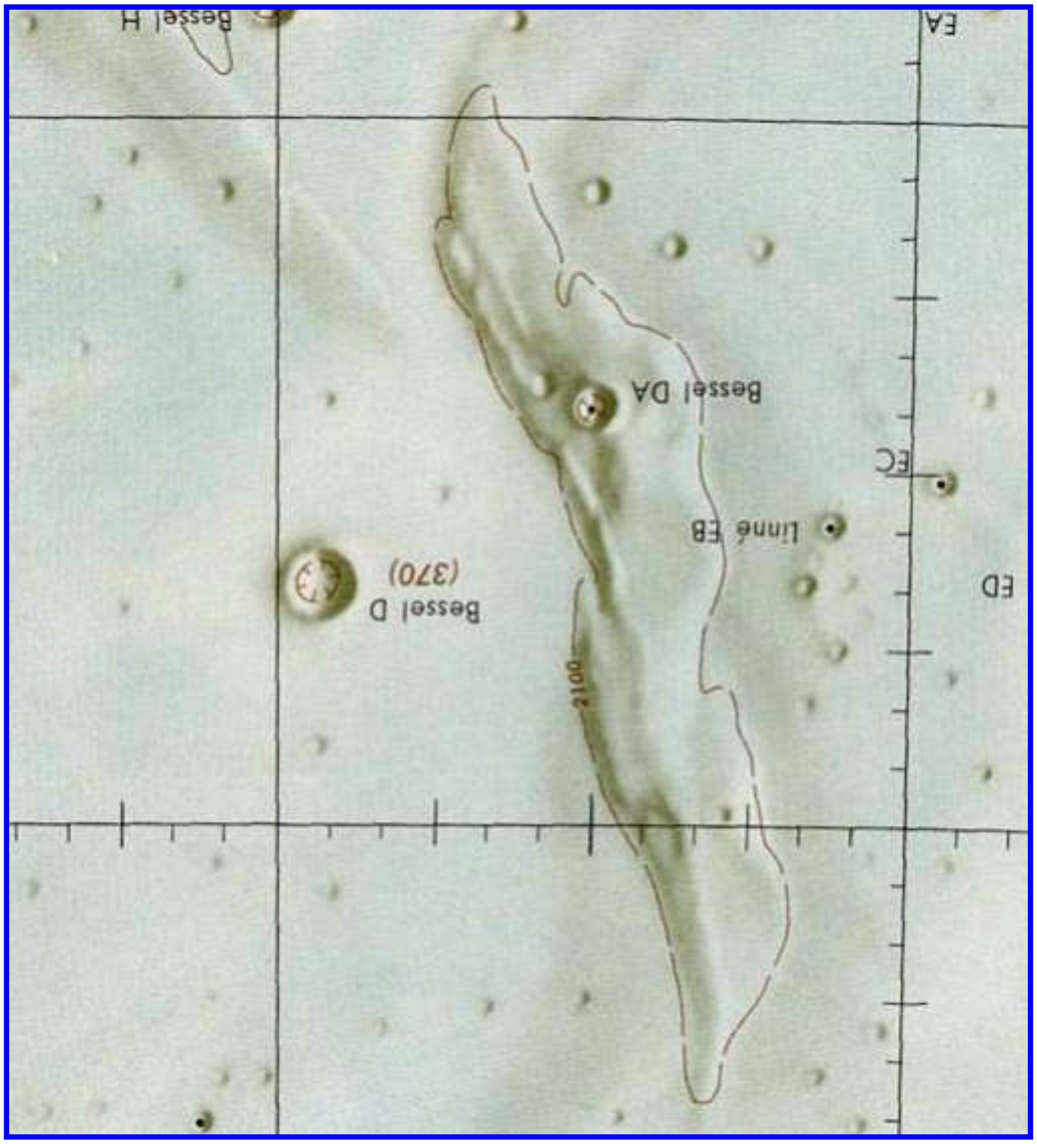
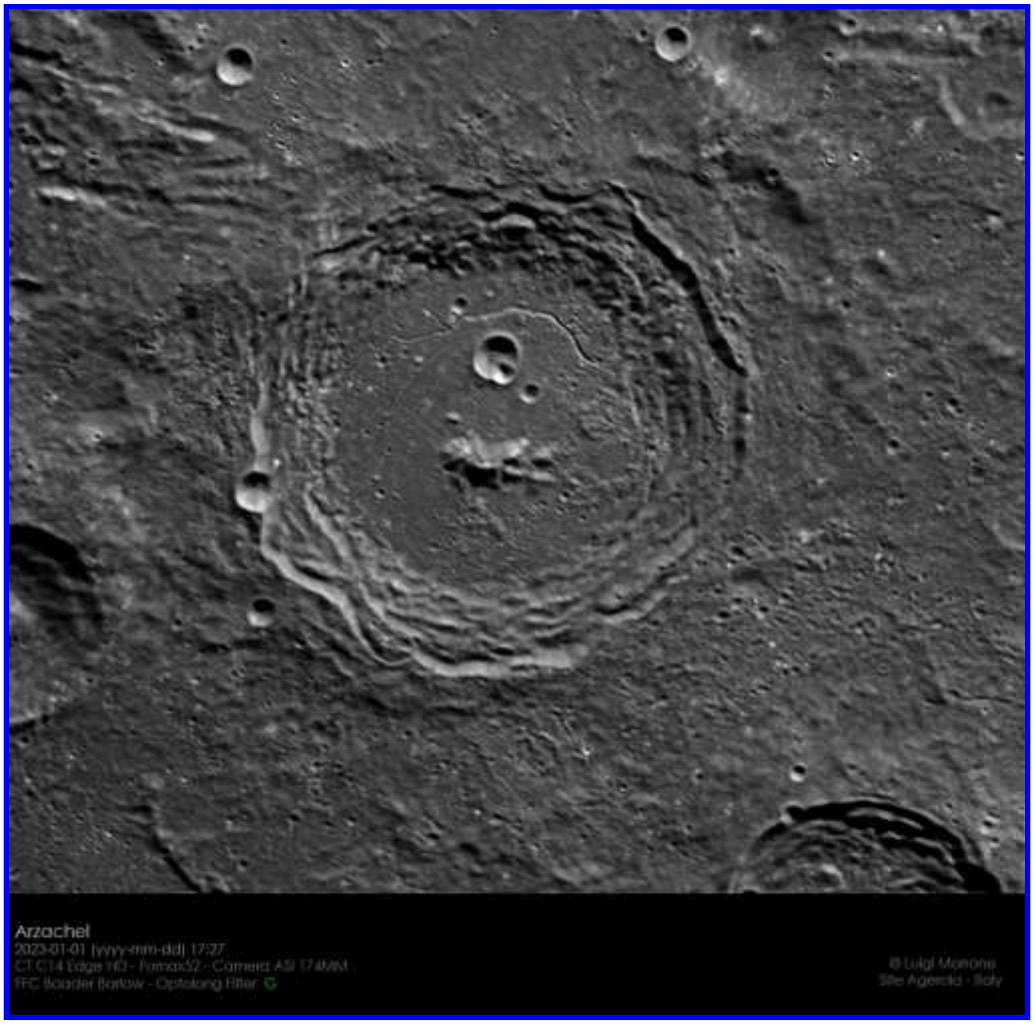


Image 2, Dorsum Azara, *LAC*

Rima Hyginus, *Luigi Morrone, Agerola, Italy. 2023 January 01 17:20 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, Fornax52 mount, FFC Baader Barlow, Optolong filter red, ZWO ASI174MM camera.*

Aristoteles, *Jairo Chavez, Popayán, Colombia. 2022 December 30 00:54 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is left, west is down.*

Recent Topographic Studies



Arzachel, *Luigi Morrone, Agerola, Italy. 2023 January 01 17:27 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, Fornax52 mount, FFC Baader Barlow, Optolong filter green, ZWO ASI174MM camera.*

Mare Nectaris, *Jairo Chavez, Popayán, Colombia. 2022 December 28 23:58 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is left, west is down.*

Recent Topographic Studies

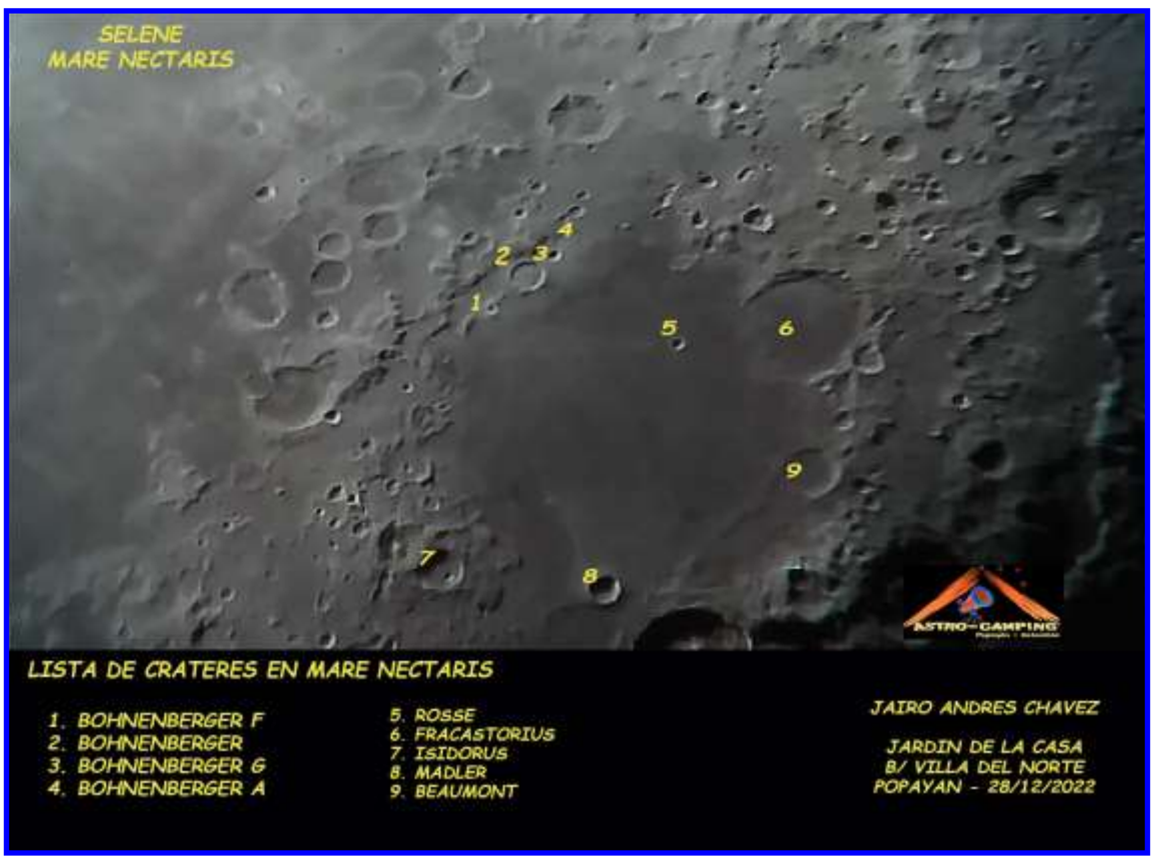
***Vallis Alpes,** Luigi Morrone, Agerola, Italy. 2023 January 01 17:15 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, Fornax52 mount, FFC Baader Barlow, Optolong filter green, ZWO ASI174MM camera.*

***Babbage,** Diego Giufrida, Manuel B. Gonnet, Argentina. 2022 December 06 02:23 UT. Sky-watcher 130 mm reflector telescope, 6.3 mm eyepiece projection, Canon EOS 60D camera.*

Recent Topographic Studies

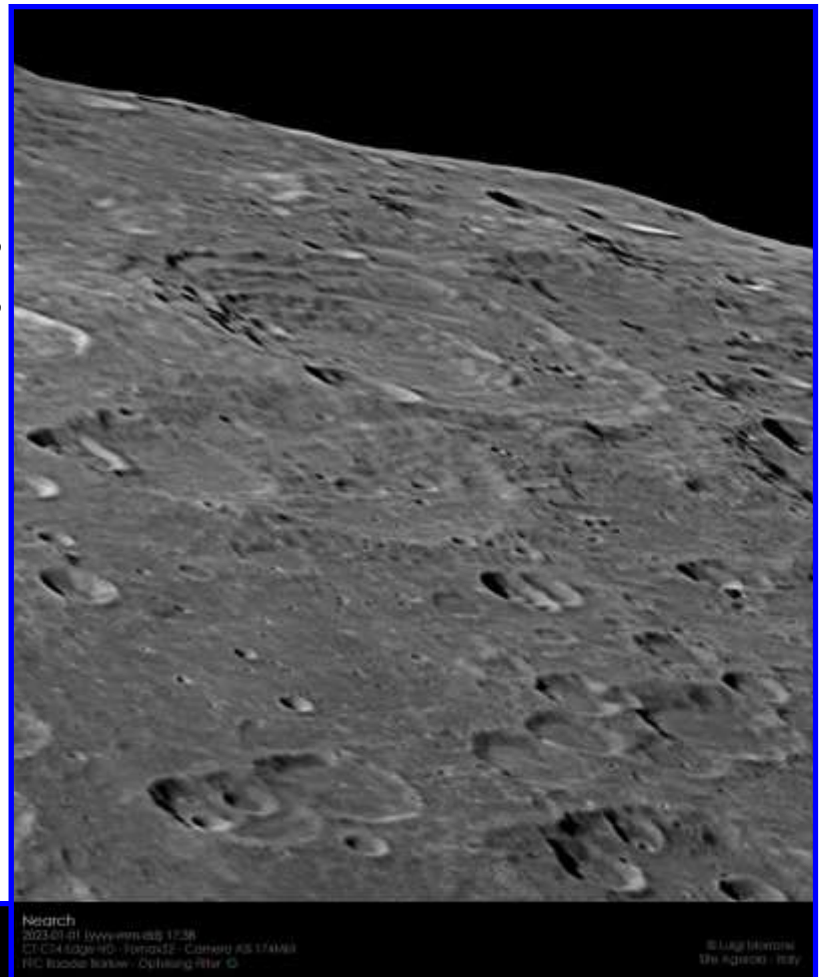
Aristoteles and Eudoxus, *Luigi Morrone, Agerola, Italy. 2023 January 01 17:09 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, Fornax52 mount, FFC Baader Barlow, Optolong filter green, ZWO ASI174MM camera.*

Mare Nectaris, *Jairo Chavez, Popayán, Colombia. 2022 December 28 23:58 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is left, west is down.*



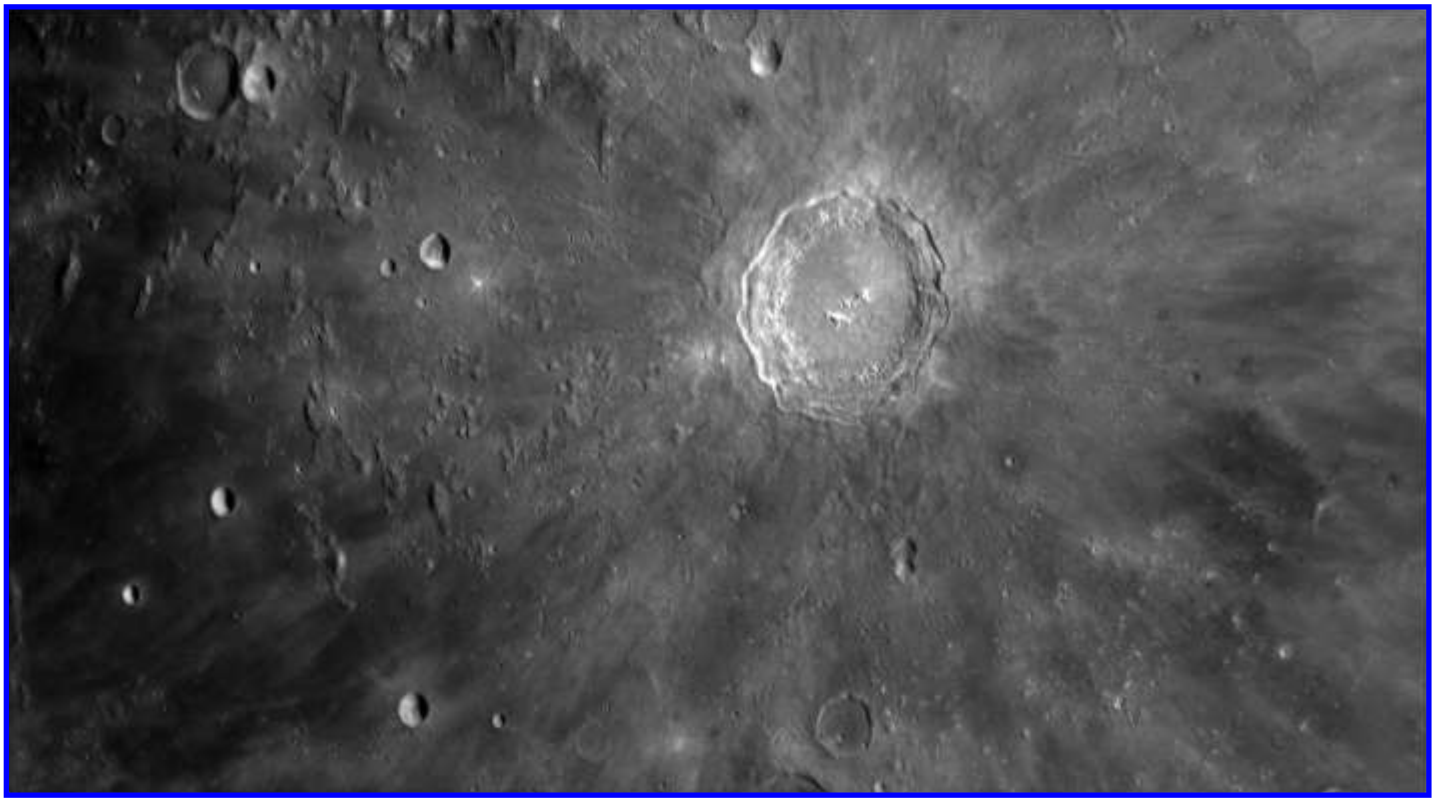
Recent Topographic Studies

Nearch, *Luigi Morrone, Agerola, Italy. 2023 January 01 17:38 UT. Celestron 14 inch Edge HD Schmidt-Cassegrain telescope, Fornax52 mount, FFC Baader Barlow, Optolong filter green, ZWO ASI174MM camera. North is down, west is right.*



Lilius and Lilius A, *István Zoltán Földvári, Budapest, Hungary. 2017 September 29, 18:46-19:05 UT, colongitude 21.664°. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 4/6.*

Recent Topographic Studies



Copernicus, *Gregory T. Shanos, Sarasota, Florida, USA. 2023 January 04 02:13.8 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomik L2 UV-IR cut filter, ZWO ASI290 MM camera. Seeing 7/10, transparency 7/10.*

Greg adds: **Copernicus** is an impact crater located in eastern Oceanus Procellarum. It was named after the astronomer Nicolaus Copernicus. The crater formed during the Copernican period (1.1 billion years ago) and has a prominent system of rays. The circular rim has a discernible hexagonal form, with a terraced inner wall and a 30 km (18.6 miles) wide, sloping rampart that descends nearly a kilometer to the surrounding mare. There are three distinct terraces visible, and arc-shaped landslides due to slumping of the inner wall as the crater debris subsided. Due to its recent formation, the crater floor has not been flooded by lava. The terrain along the bottom is hilly in the southern half while the north is relatively smooth. The central peaks consist of three isolated mountainous rises climbing as high as 1.2 km (0.75 miles) above the floor. These peaks are separated from each other by valleys. The crater rays spread as far as 800 km (497 miles) across the surrounding mare. Source: Wikepedia

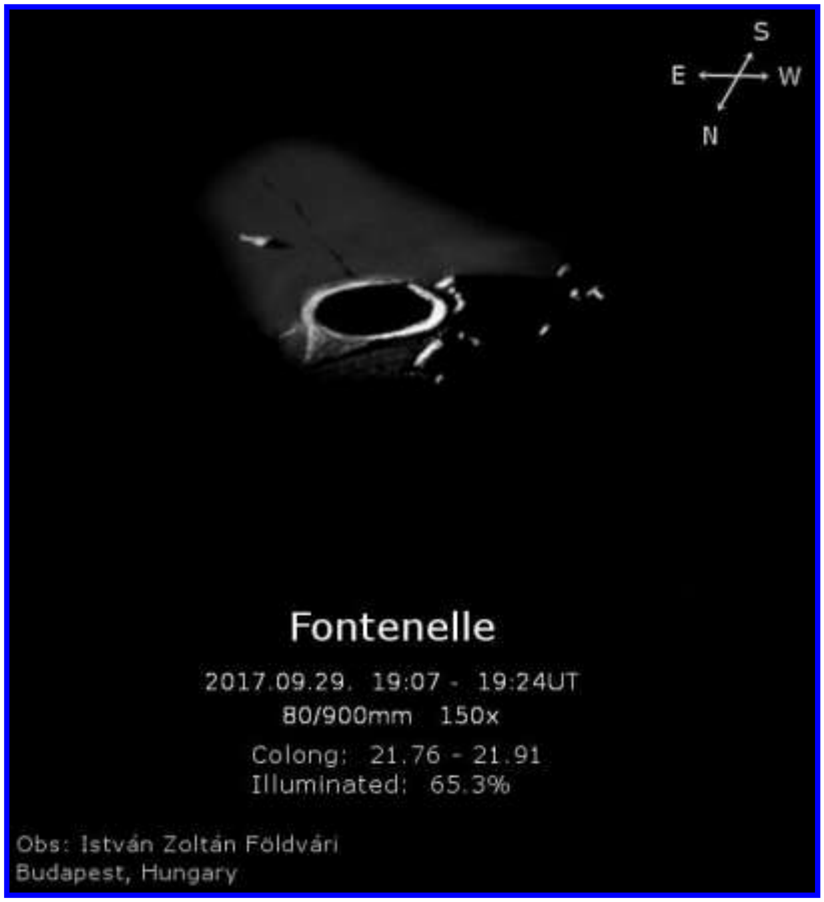
Recent Topographic Studies

2-Day-Old-Moon, *Gregory T. Shanos, Sarasota, Florida, USA. 2021 June 13 01:04 UT. Meade 60 mm f/4.3 refractor telescope, focal length 260 mm, Baader UV-IR cut filter, ZWO ASI290 MM camera. Mare Crisium is clearly visible. South of it on the terminator are the large craters Langrenus, Vendelinus, Petavius with its huge central mountain and Furnerius.*

Waxing Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 November 01 22:58 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is down, west is right.*

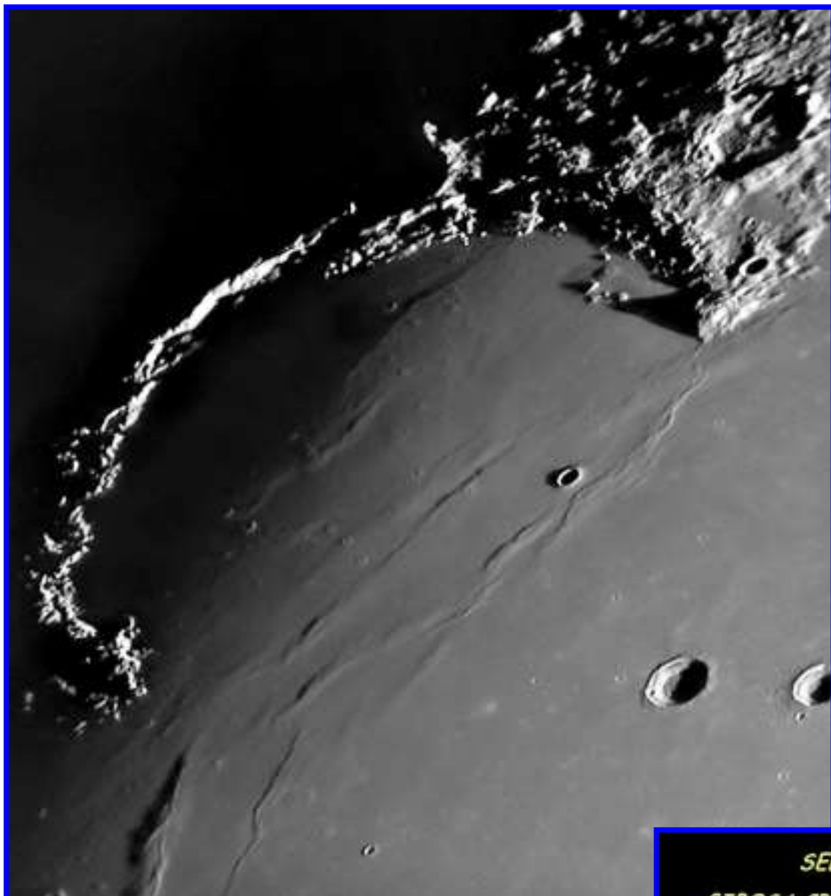
Recent Topographic Studies

__Fontenelle,__ István Zoltán Földvári, Budapest, Hungary. 2017 September 29, 19:07-19:24 UT, colongitude 21.76º-21.91º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 4/6.

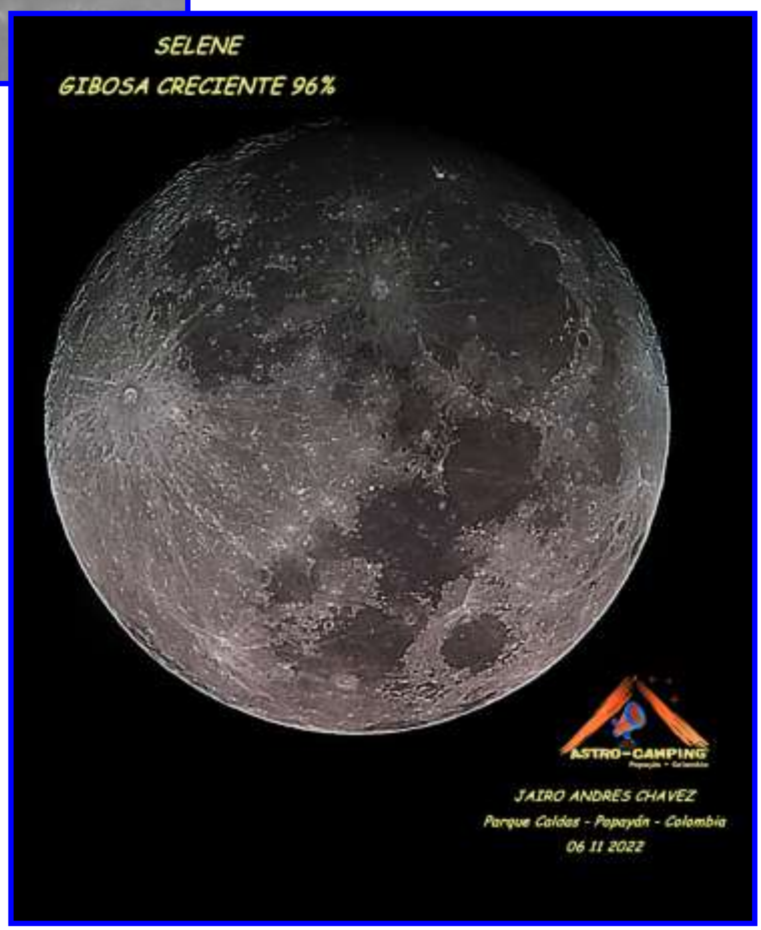


__Clavius,__ Pedro Romano, San Juan, Argentina. 2023 January 02 23:00 UT. 102 mm Maksutov-Cassegrain telescope, ASI120 camera. North is down, west is right.

Recent Topographic Studies



Sinus Iridum, *KC Pau, Hong Kong, China. 2023 January 02 11:57 UT. 250 mm f/6 Newtonian reflector telescope, 2.x barlow, QHY-CCD290M camera.*

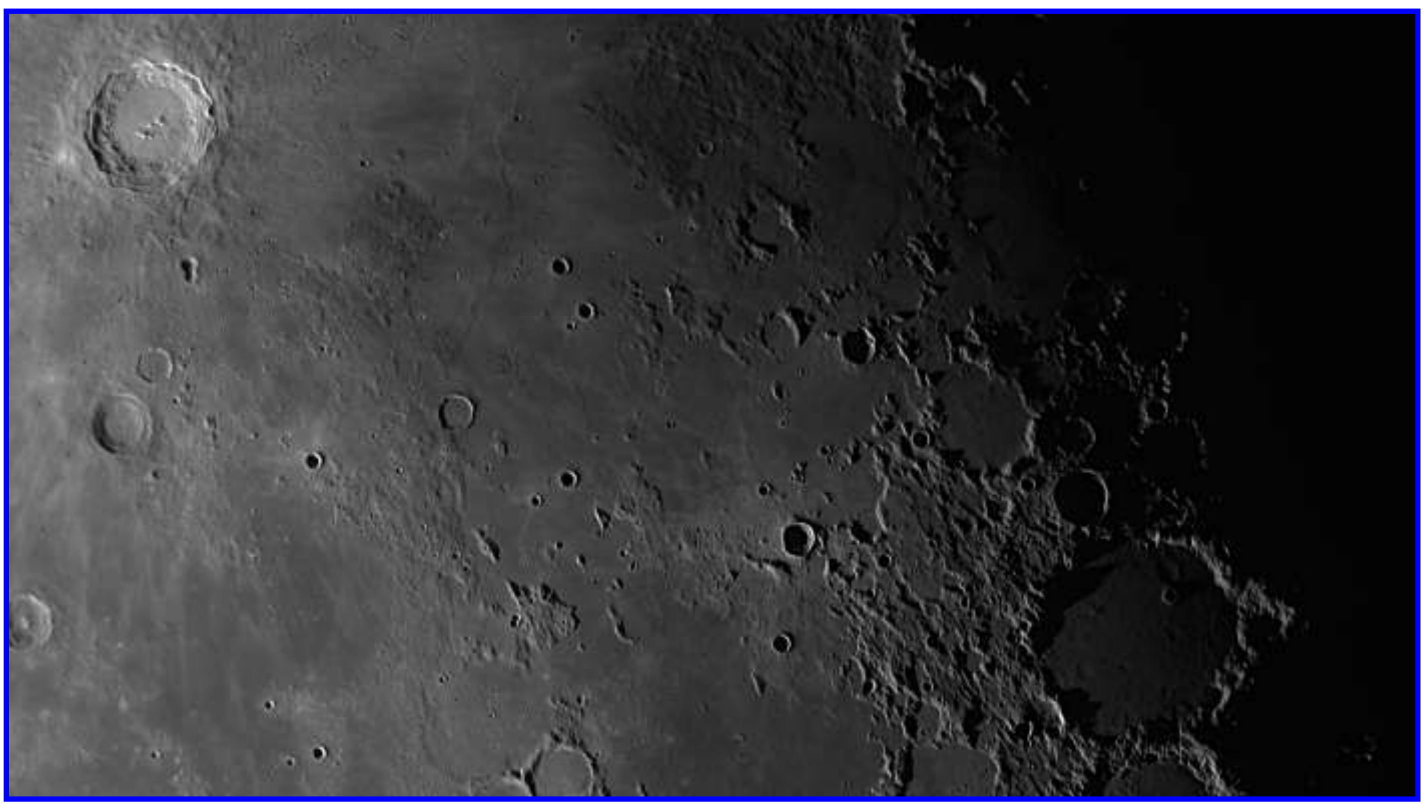


Waxing Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 November 07 00:02 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is right, west is up.*

Recent Topographic Studies

Clavius, *Leonardo Alberto Colombo, Córdoba, Argentina. 2023 January 02 02:00 UT. 102 mm Maksutov Cassegrain telescope, IR pass 685 nm filter, QHY5LII-M camera. North is down, west is right.*

Mare Insularum, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:22 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*



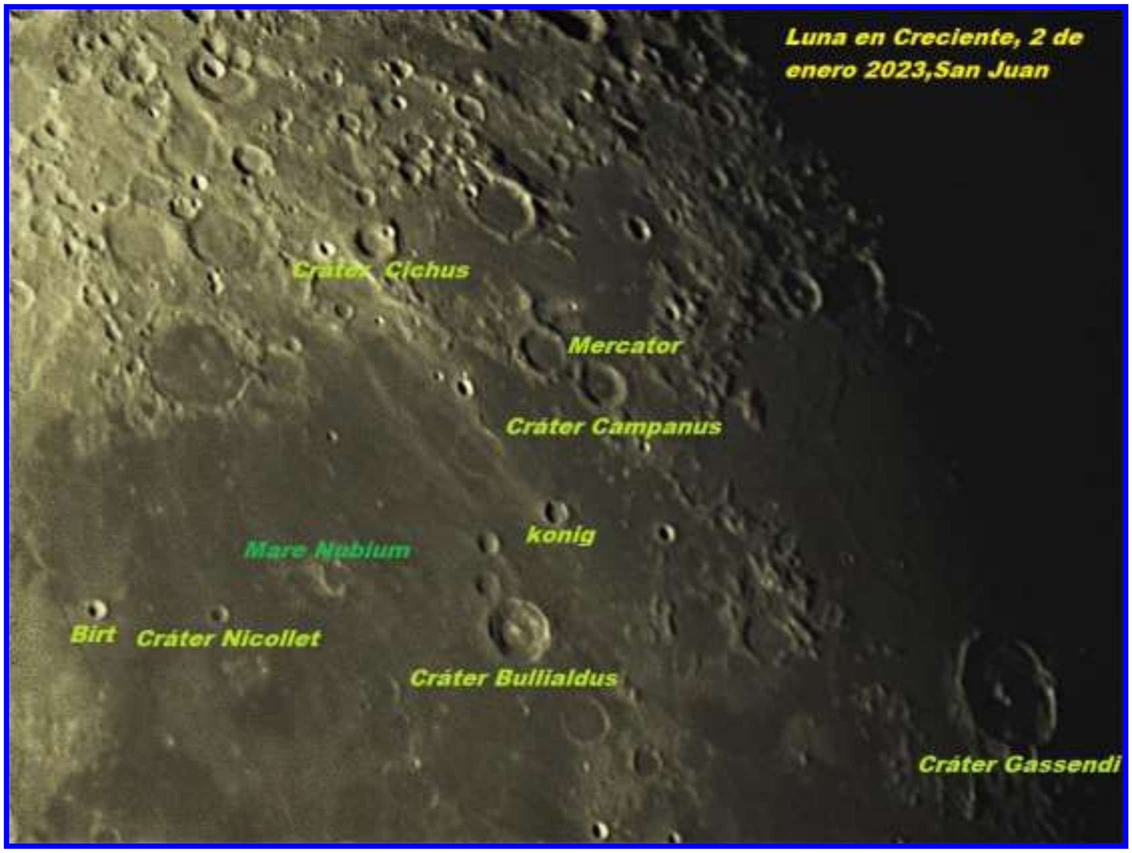
Recent Topographic Studies

Waning Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 November 09 02:30 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is lower right, west is upper right.*

Petavius, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2022 December 28 00:35 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, Barlow Celestron X-Cel LX 2x, IR685 nm filter, Player One Neptune M camera. North is to the left, west is down.*

Recent Topographic Studies

Bullialdus, *Pedro Romano, San Juan, Argentina. 2023 January 02 23:08 UT. 102 mm Maksutov-Cassegrain telescope, ASI120 camera. North is down, west is right.*

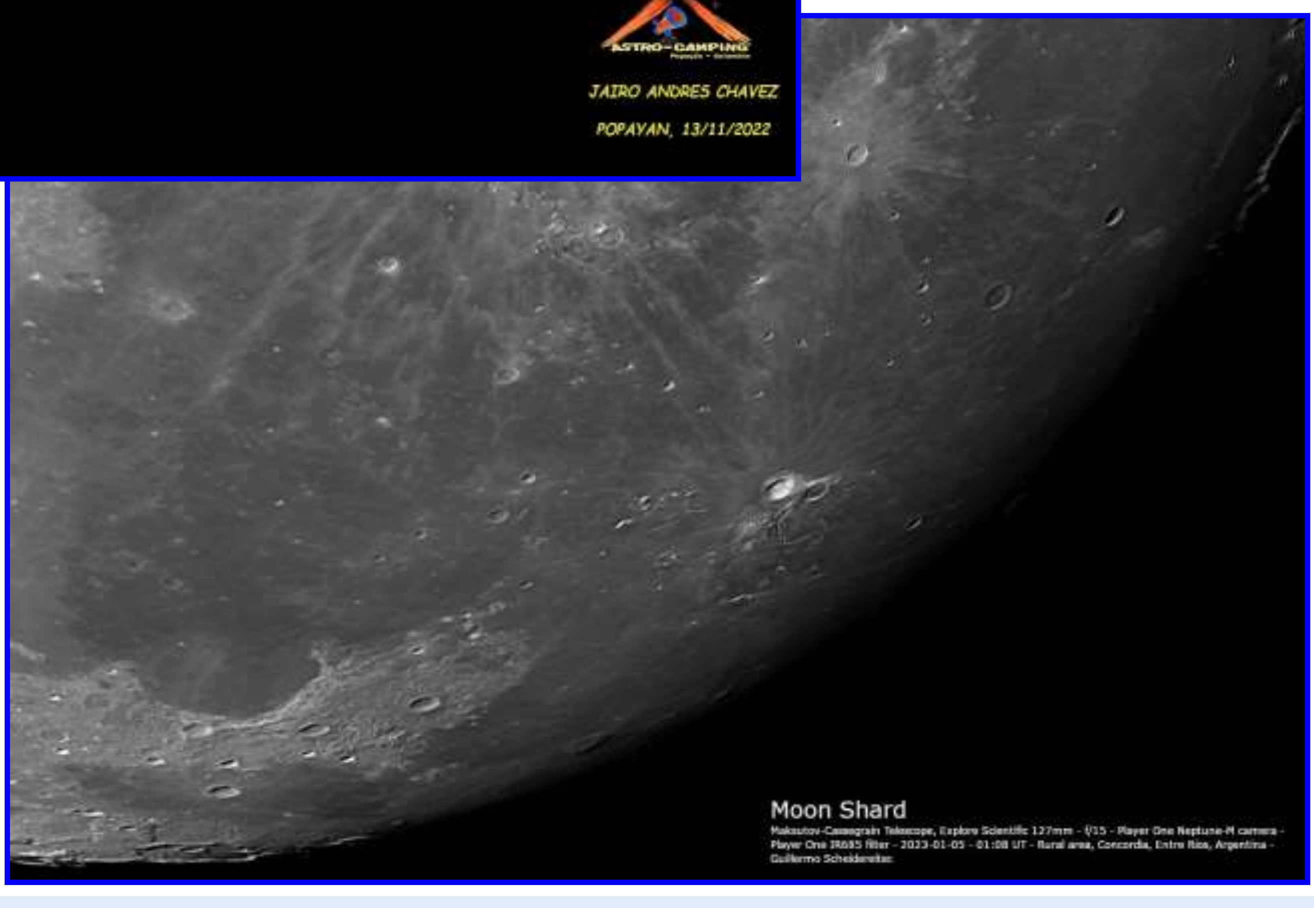


Endymion, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2022 December 28 00:00 UT. Explore Scientific 127 mm, IR685 nm filter, Player One Neptune M camera. North is to the left, west is down.*

Recent Topographic Studies

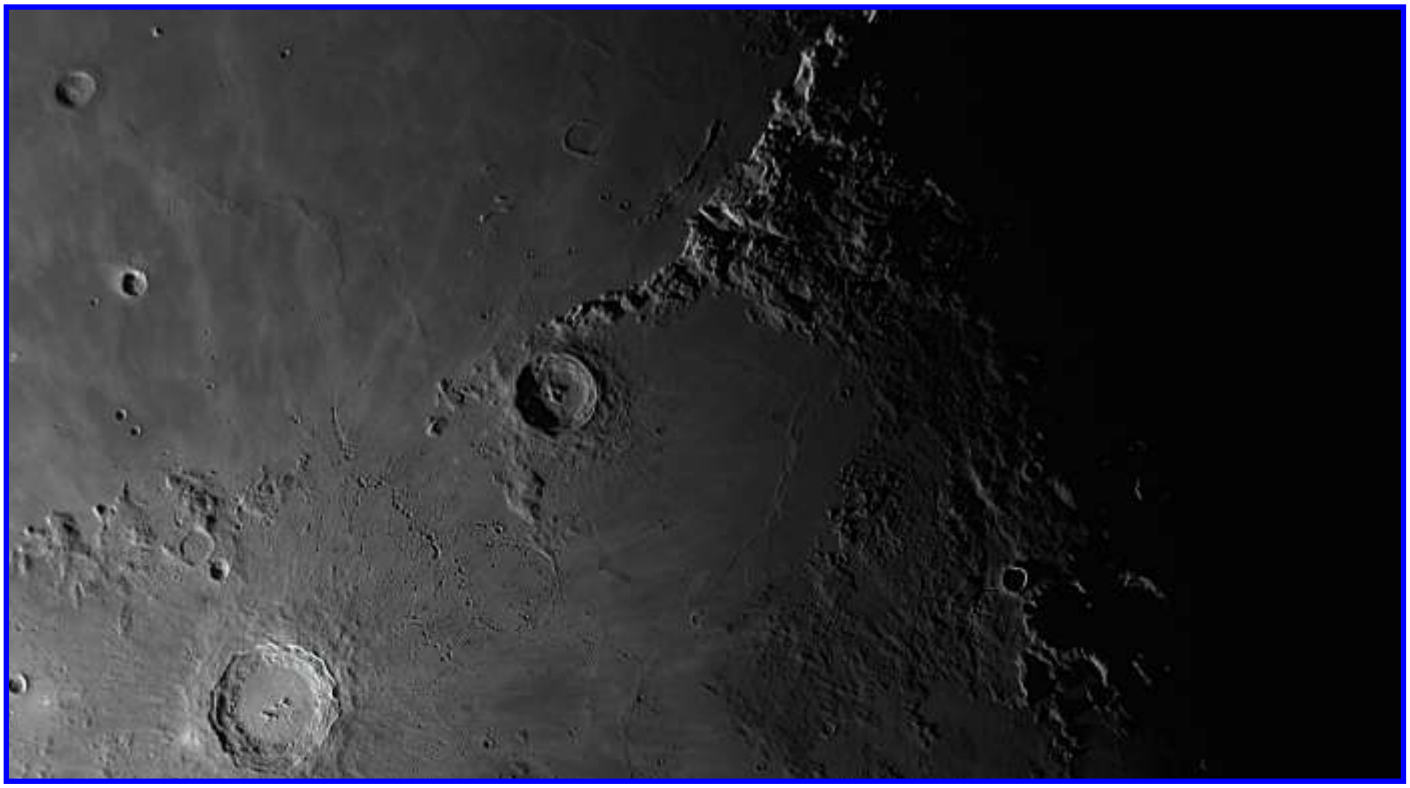
Waning Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 November 14 02:20 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is lower right, west is upper right.*

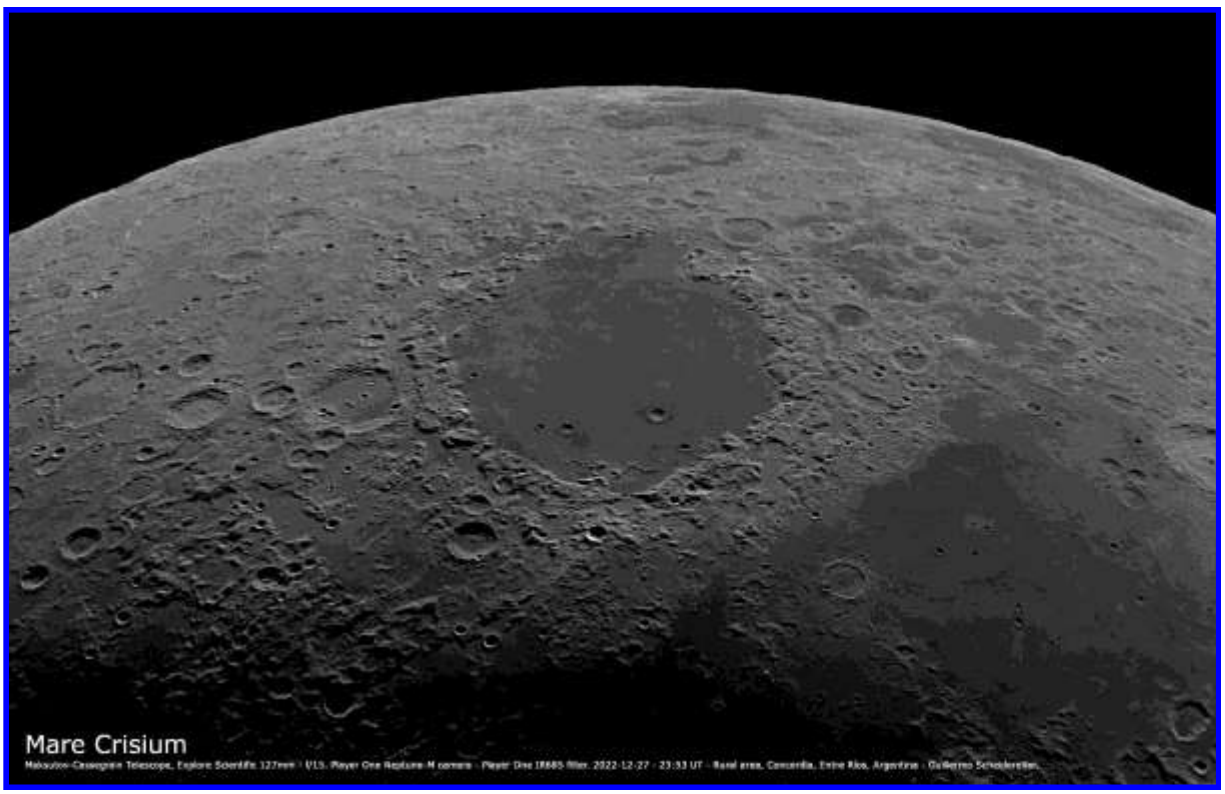
Aristarchus, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:08 UT. Explore Scientific 127 mm, IR685 nm filter, Player One Neptune M camera. North is down, west is to the right.*



Recent Topographic Studies

Eratosthenes, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:29 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*





Mare Crisium, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2022 December 27 23:53 UT. Explore Scientific 127 mm, IR685 nm filter, Player One Neptune M camera. North is left, west is down.*

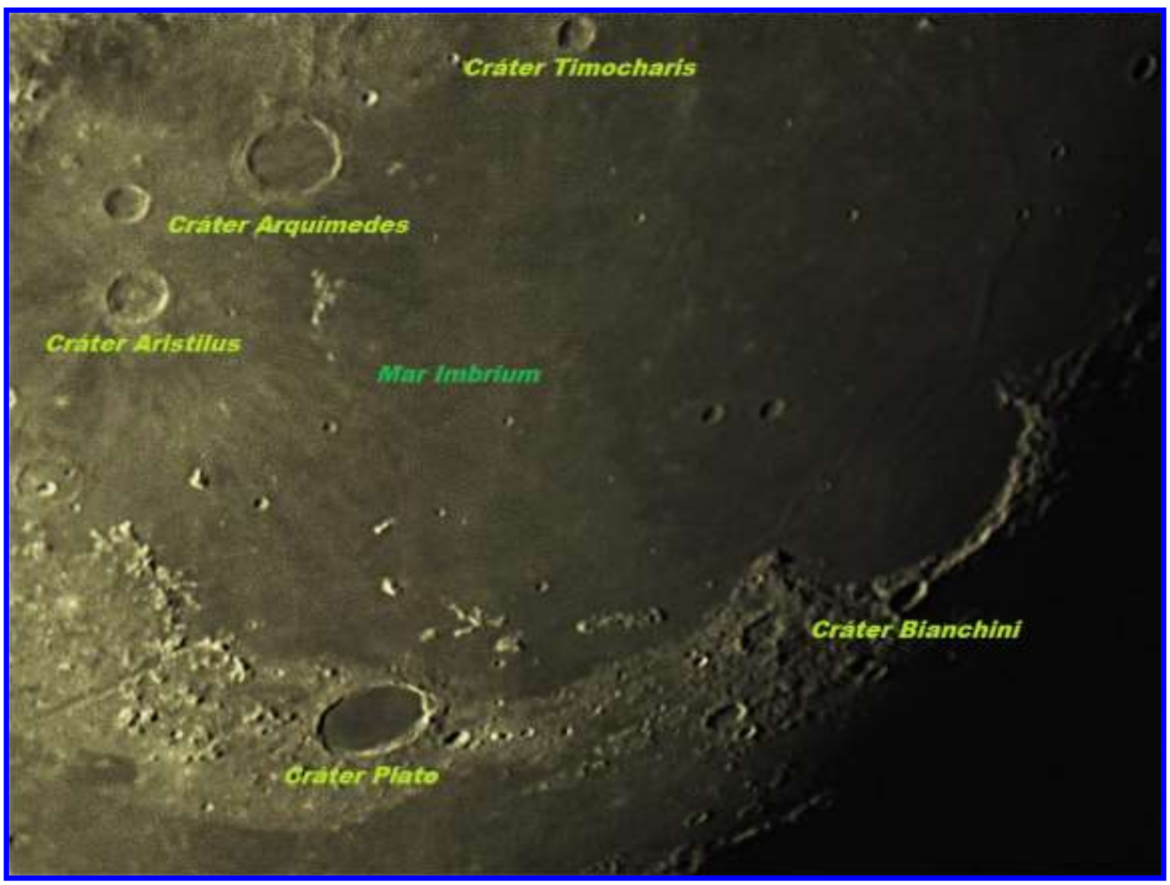
Recent Topographic Studies

Waxing Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 December 03 03:19 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera.*

Langrenus, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2022 December 28 00:12 UT. Explore Scientific 127 mm, IR685 nm filter, Player One Neptune M camera. North is left, west is down.*

Recent Topographic Studies

Southeast Mare Imbrium, *Leonardo Alberto Colombo, Córdoba, Argentina. 2023 January 02 02:00 UT. 102 mm Maksutov Cassegrain telescope, IR pass 685 nm filter, QHY5LII-M camera. North is down, west is right.*

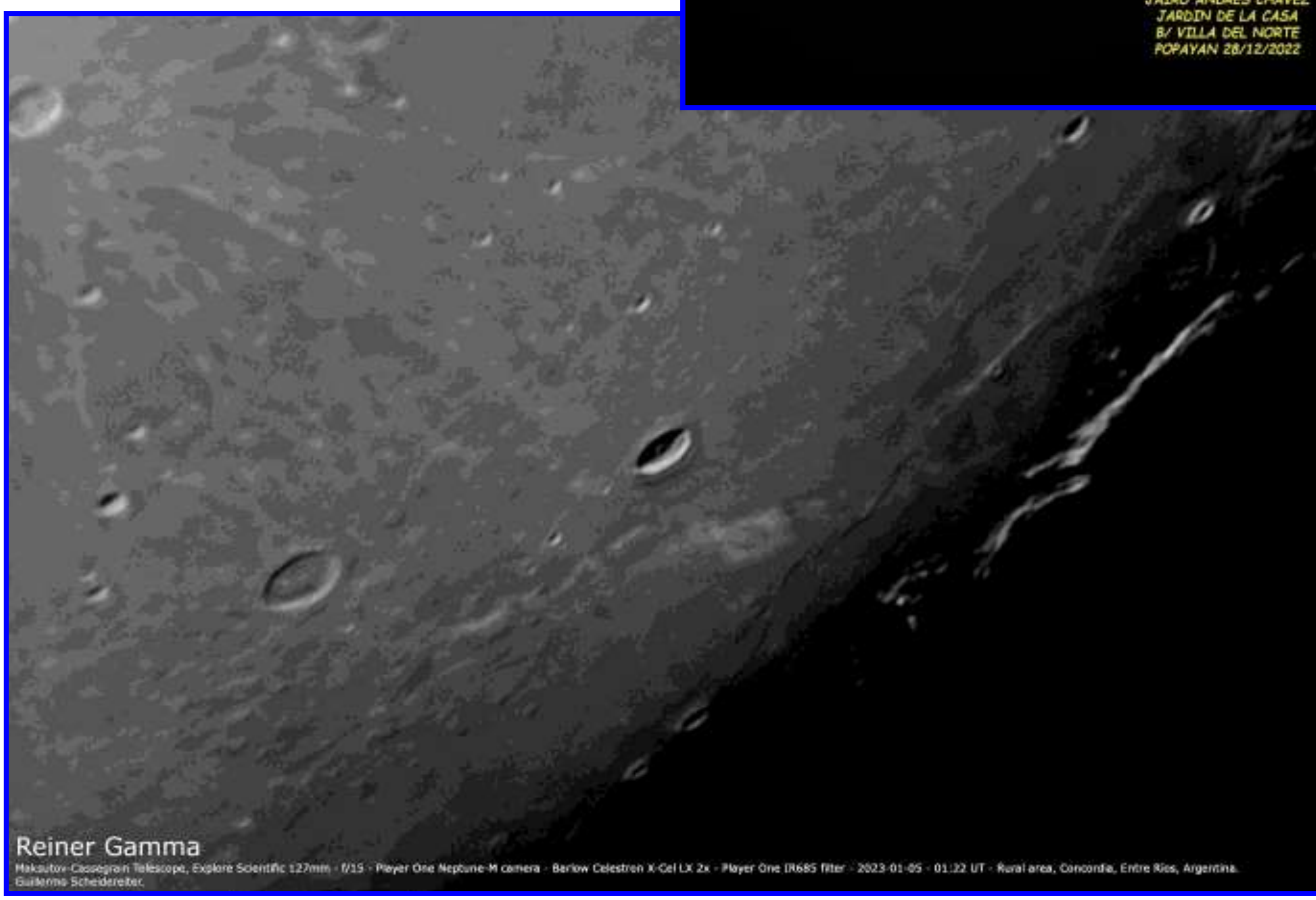


Sinus Iridum, *Pedro Romano, San Juan, Argentina. 2023 January 02 23:20 UT. 102 mm Maksutov-Cassegrain telescope, ASI120 camera. North is down, west is right.*

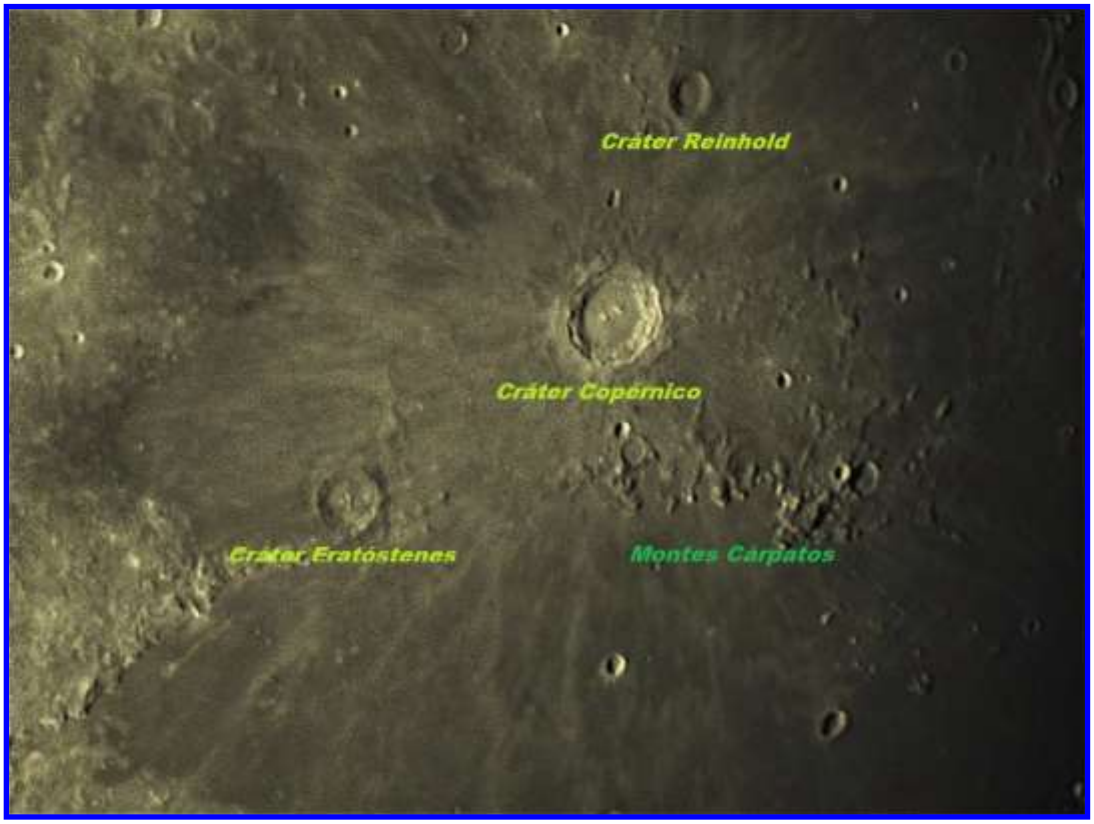
Recent Topographic Studies

__Waxing Crescent Moon,__ Jairo Chavez, Popayán, Colombia. 2022 December 29 00:43 UT. 311 mm truss Dobsonian reflector telescope, MOTO E5 PLAY camera. North is to the lower right, west is to the upper right.

__Reiner Gamma,__ Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:22 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, Barlow Celestron X-Cel LX 2x, IR685 nm filter, Player One Neptune M camera. North is to the left, west is down.



Recent Topographic Studies



Copernicus, *Pedro Romano, San Juan, Argentina. 2023 January 02 23:15 UT. 102 mm Maksutov-Cassegrain telescope, ASI120 camera. North is down, west is right.*

Timocharis, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:37 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*

Recent Topographic Studies

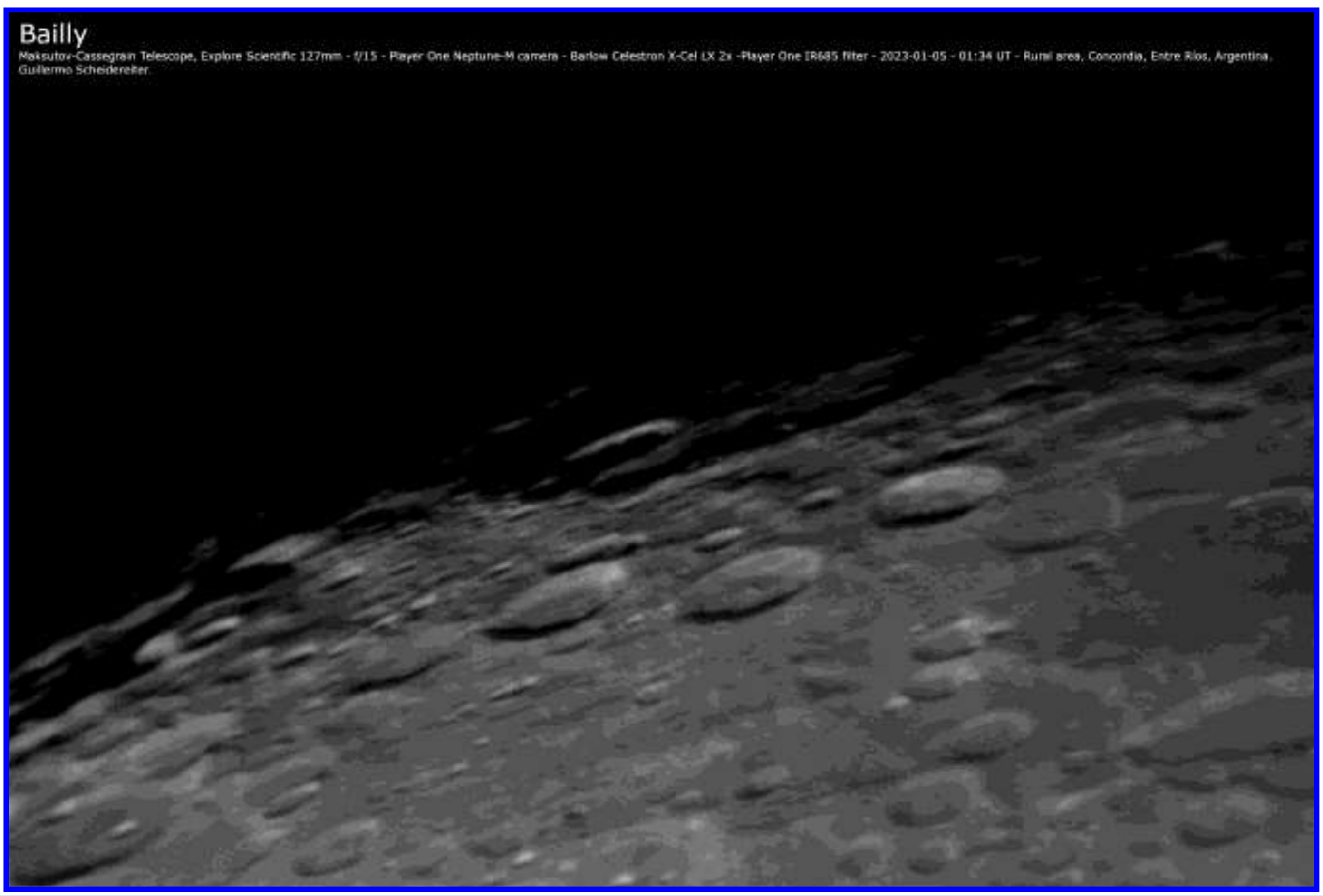
Gassendi, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 05 01:24 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Mare Tranquillitatis, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 05 01:29 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

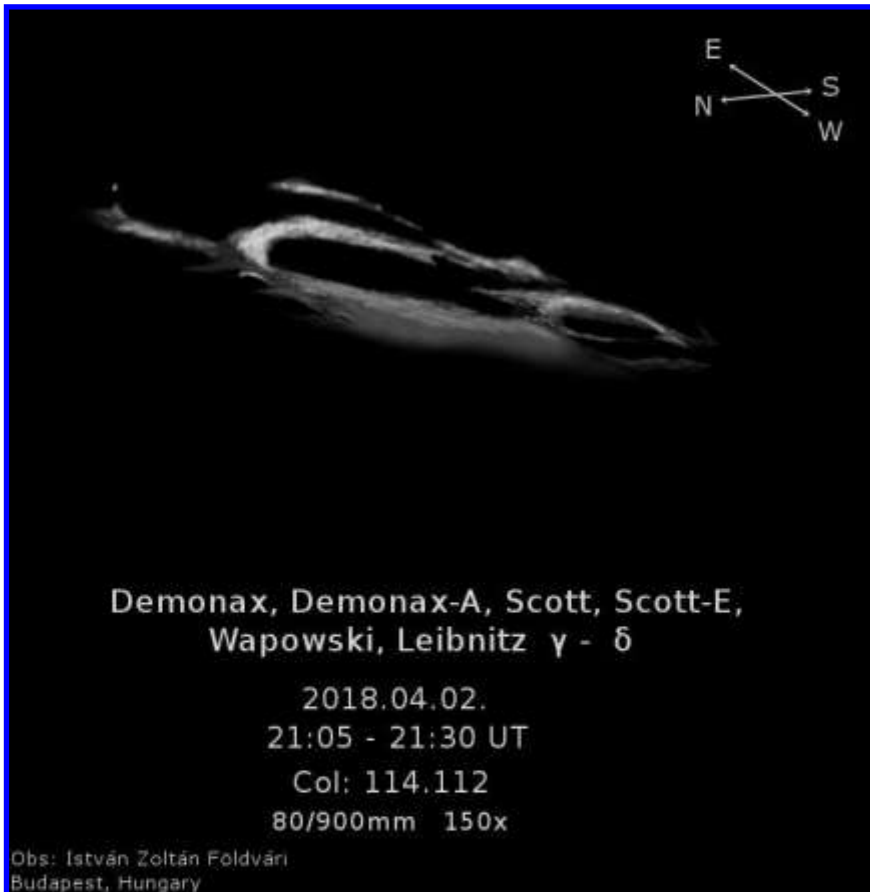
Recent Topographic Studies

Le Verrier, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:47 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*

Bailly, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:34 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, Barlow Celestron X-Cel LX 2x, IR685 nm filter, Player One Neptune M camera. North is to the right, west is up.*



Recent Topographic Studies



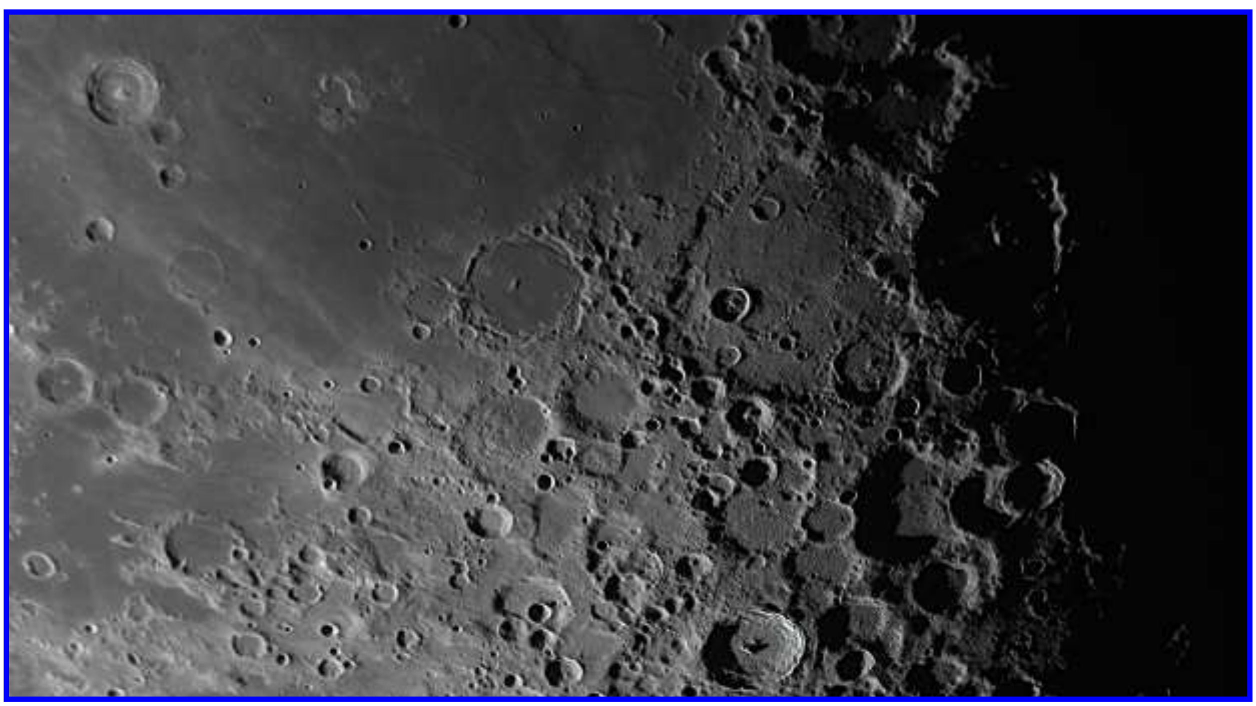
Demonax, Demonax A, Scott, Scott E, Wapowski, Leibnitz γ-δ, *István Zoltán Földvári, Budapest, Hungary. 2018 April 02, 21:05-21:30 UT, colongitude 114.0º-144.3º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 6/10, transparency 5/6.*

Byrgius, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:39 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, Barlow Celestron X-Cel LX 2x, IR685 nm filter, Player One Neptune M camera. North is to the right, west is up.*

Recent Topographic Studies

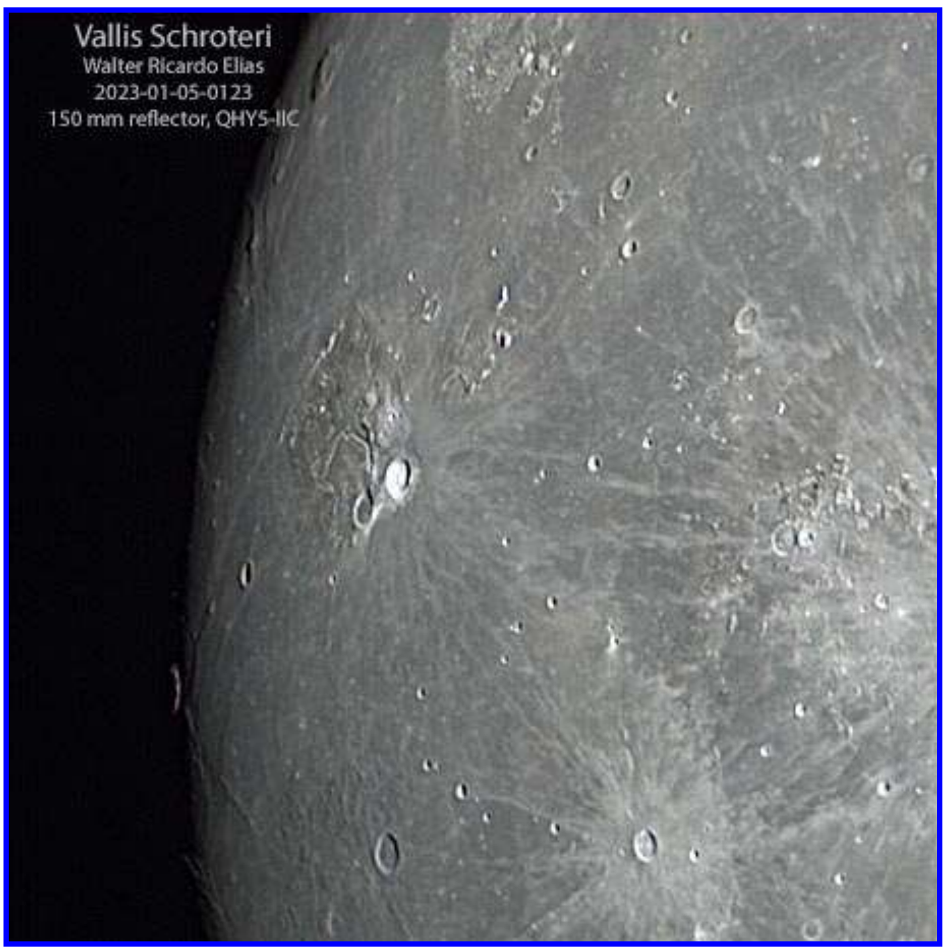
Tycho, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 02:00 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, IR685 nm filter, Player One Neptune M camera. North is to the right, west is up.*

Pitatus, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 10:59 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*



Recent Topographic Studies

Tycho, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 05 01:27 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*



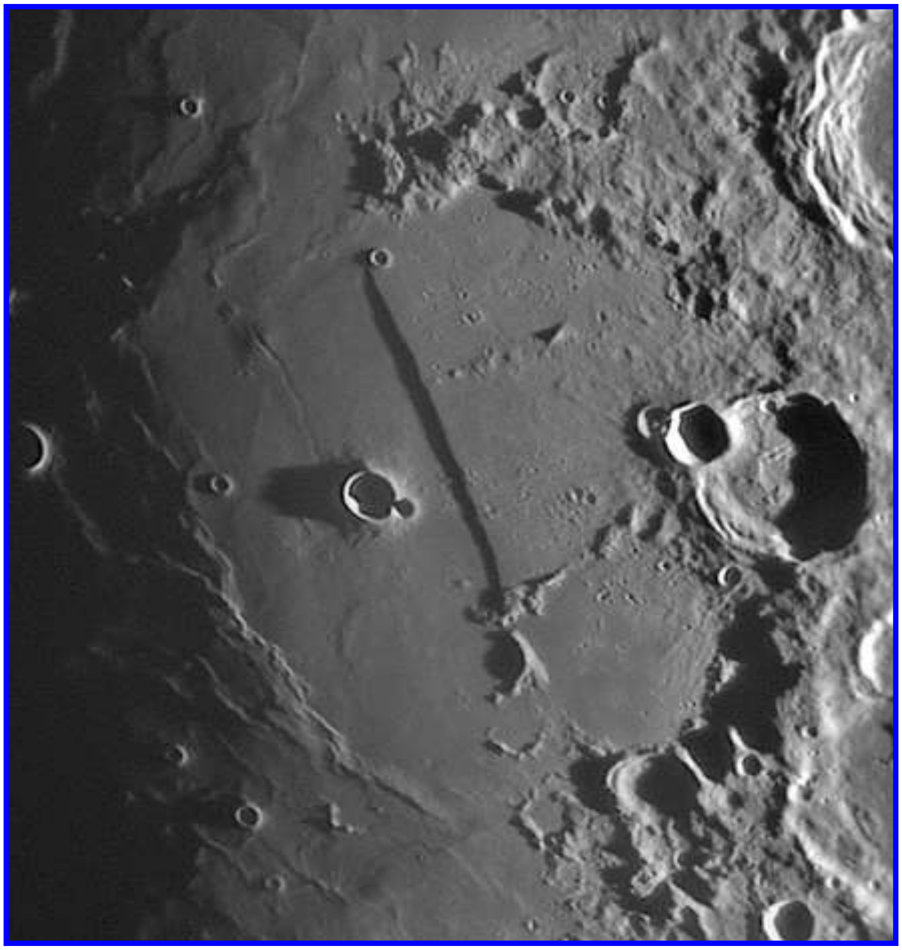
Vallis Schröteri, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 05 01:23 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Recent Topographic Studies

Montes Carpatus, Draper, Draper C and Mare Imbrium, *István Zoltán Földvári, Budapest, Hungary. 2017 September 29, 19:35-19:57 UT, colongitude 22.0º-22.1º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 6/10, transparency 4/6.*

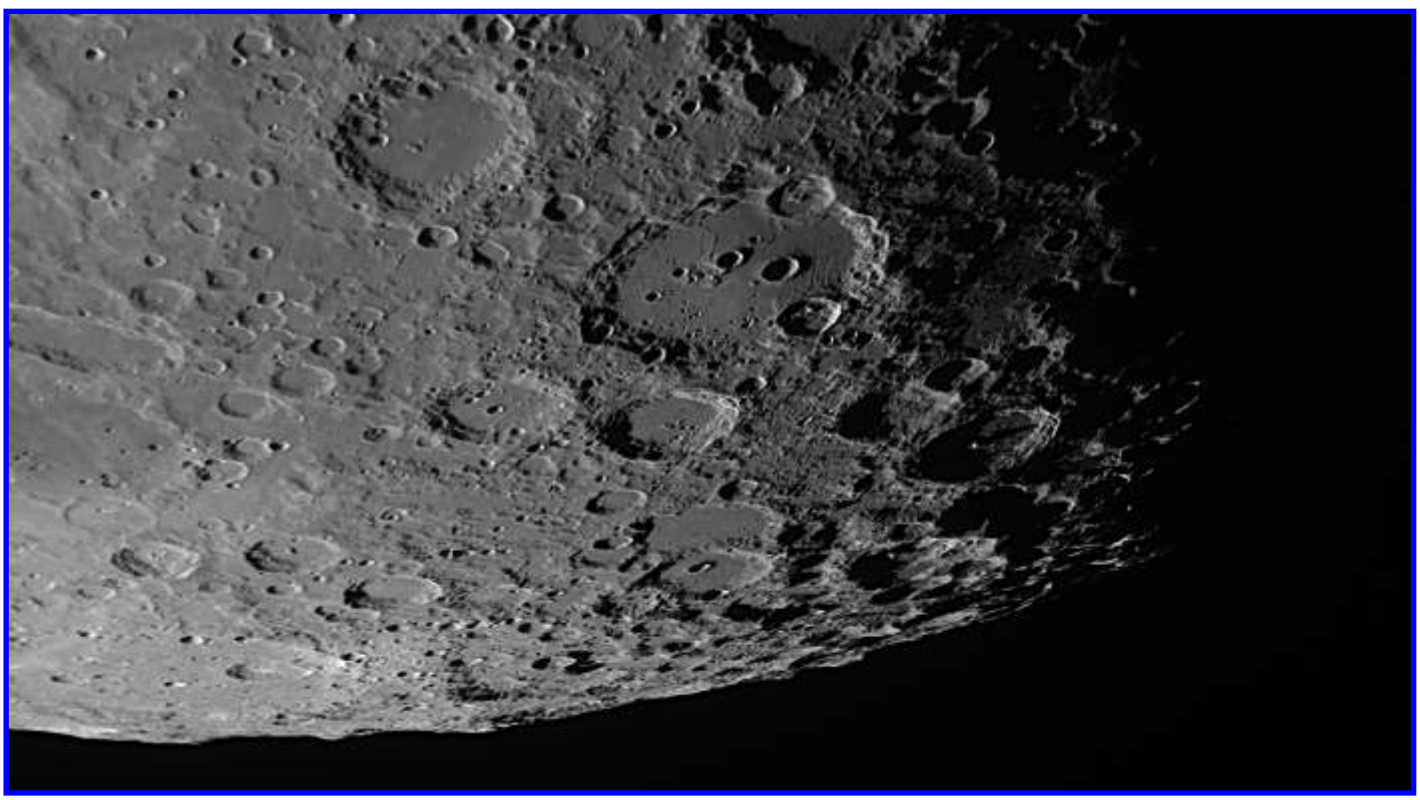
Mare Humorum, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:51 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, IR685 nm filter, Player One Neptune M camera. North is to the right, west is up.*

Recent Topographic Studies



Thebit, *KC Pau, Hong Kong, China. 2022 December 31 13:20 UT. 250 mm f/6 Newtonian reflector telescope, 2.x barlow, QHYCCD290M camera.*

Clavius, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:06 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*



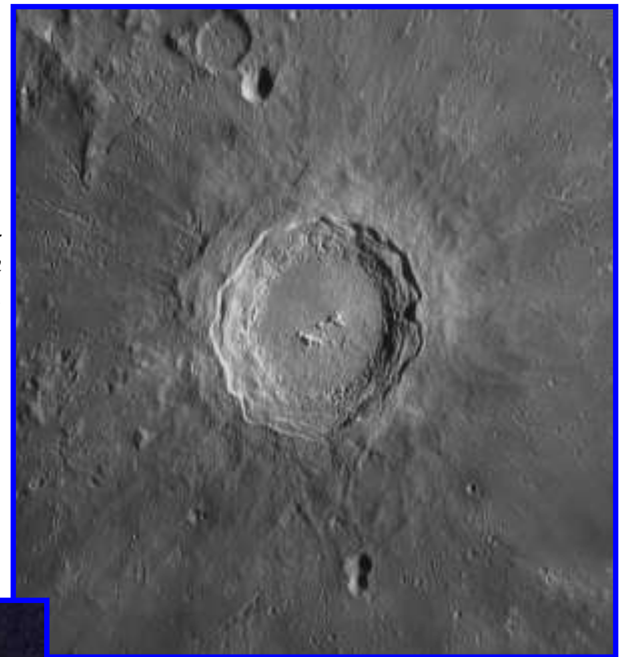
Recent Topographic Studies

Censorinus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 01 23:30 UT. Sky-watcher 150 mm reflector telescope, QHY5-IIC camera*

Plato, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:52 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*

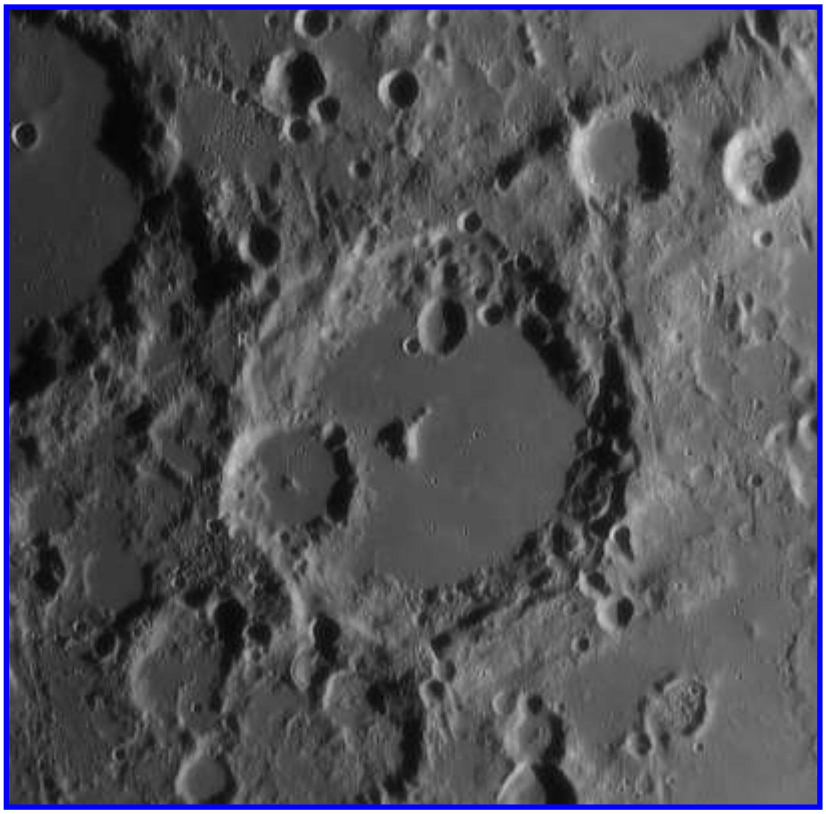
Recent Topographic Studies

Copernicus, *Ken Vaughan, Cattle Point, Victoria, British Columbia, Canada. 2022 February 12 03:37 UT. Meade LX200 12 inch GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178 mm camera.*



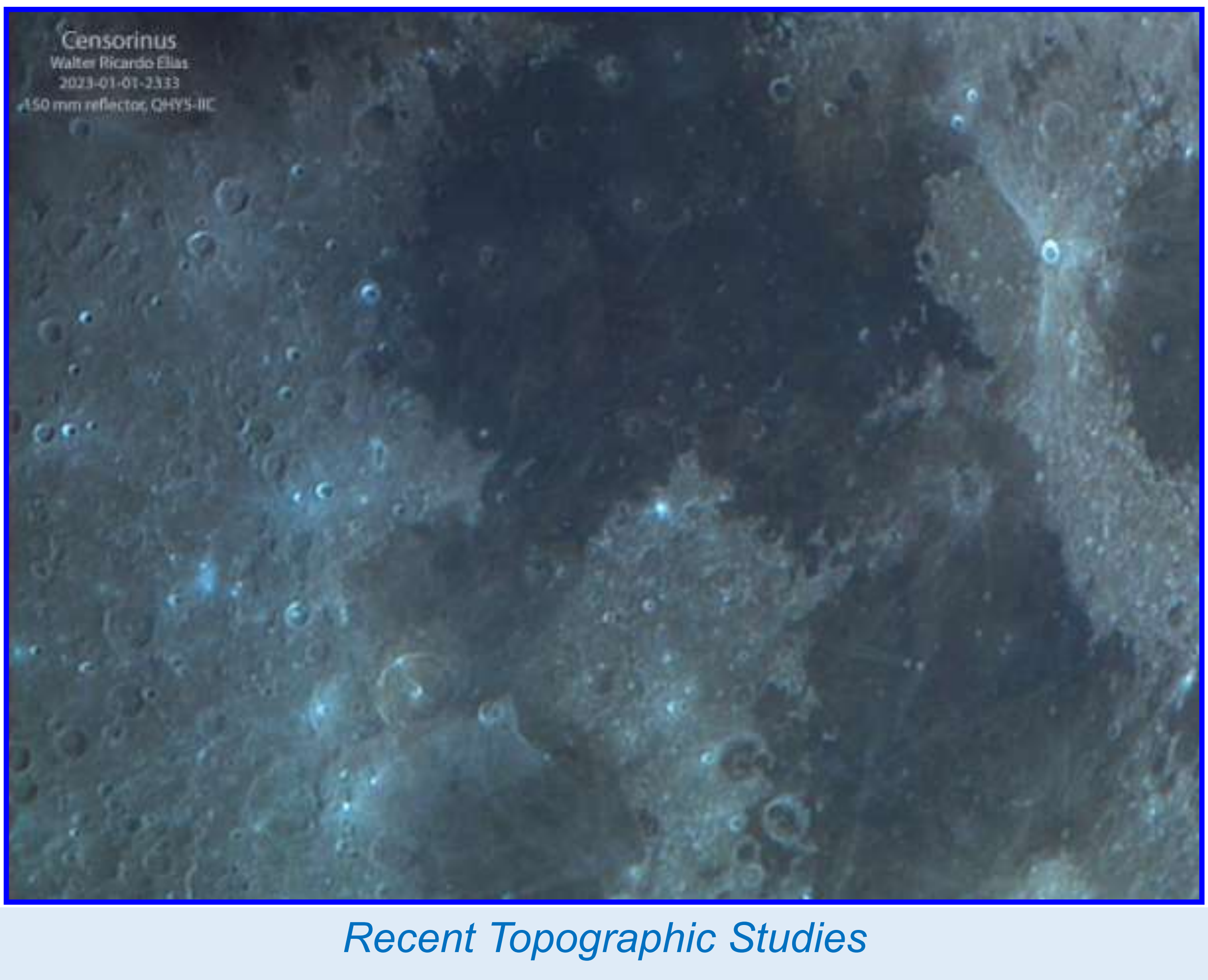
Conjunction of the Moon, Venus and Saturn, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2023 January 24. Kodak Easy Share camera.*

Recent Topographic Studies



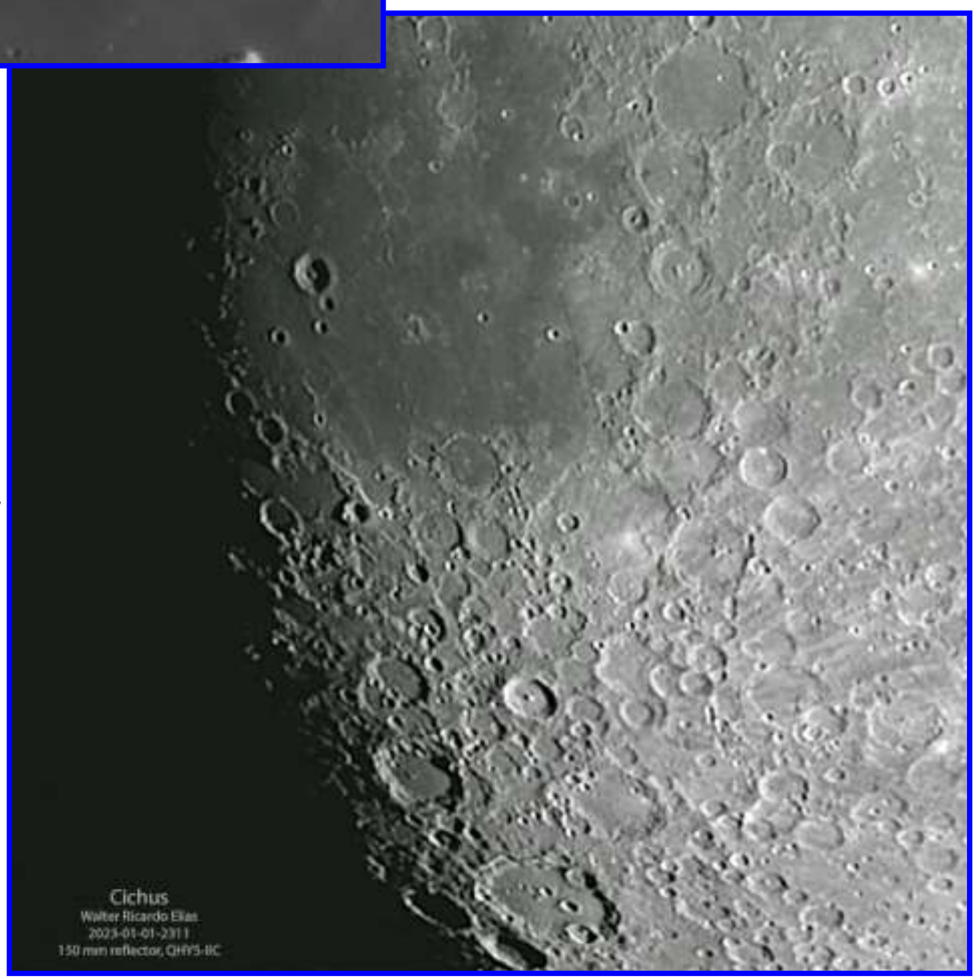
Albategnius, *Ken Vaughan, Cattle Point, Victoria, British Columbia, Canada. 2022 May 08 05:31 UT. Meade LX200 12 inch GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178 mm camera.*

Censorinus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 01 23:33 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*



Recent Topographic Studies

Montes Teneriffe, *Ken Vaughan, Cattle Point, Victoria, British Columbia, Canada. 2022 February 12 04:02 UT. Meade LX200 12 inch GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178 mm camera.*



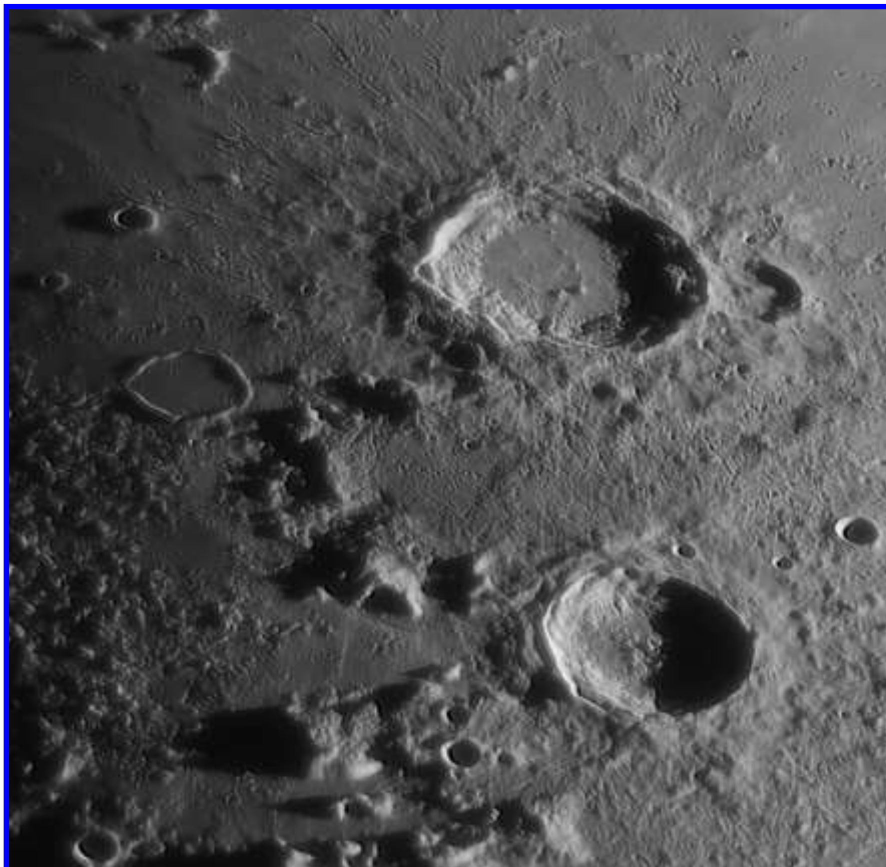
Cichus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 01 23:11 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Recent Topographic Studies

Atlas and Hercules, *Ken Vaughan, Cattle Point, Victoria, British Columbia, Canada. 2022 February 07 03:45 UT. Meade LX200 12 inch GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178 mm camera.*

Cichus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 01 23:21 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Recent Topographic Studies



Aristoteles, *Ken Vaughan, Cattle Point, Victoria, British Columbia, Canada. 2022 March 10 05:27 UT. Meade LX200 12 inch GPS Schmidt-Cassegrain telescope, Astronomik 642 R-IR filter, ZWO ASI178 mm camera.*

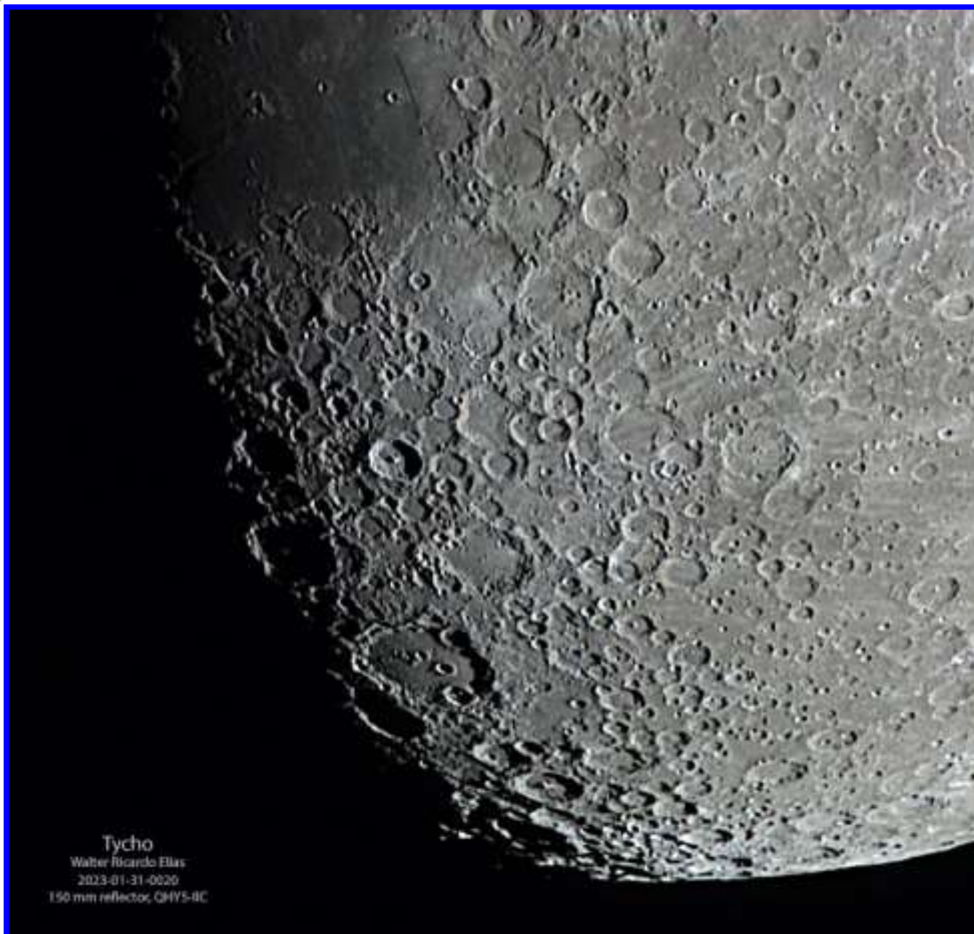
Messier, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 01 23:09 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Recent Topographic Studies

Aristarchus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 05 00:53 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Copernicus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 31 00:18 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

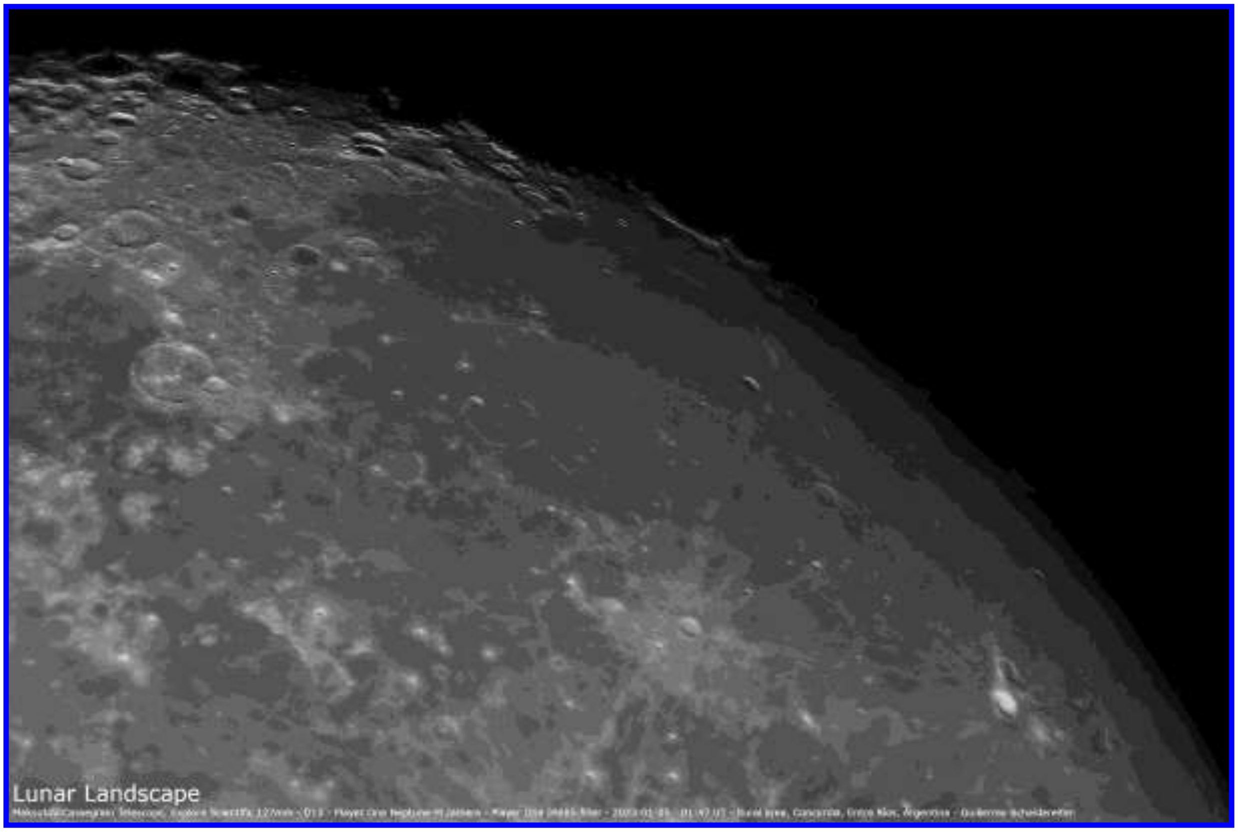
Recent Topographic Studies



Tycho, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 31 00:20 UT. Skywatcher 150 mm reflector telescope, QHY5-IIC camera*

Waxing Gibbous Moon, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2023 January 31 00:11 UT. Skywatcher 150 mm reflector telescope, Canon EOC T1i camera*

Recent Topographic Studies



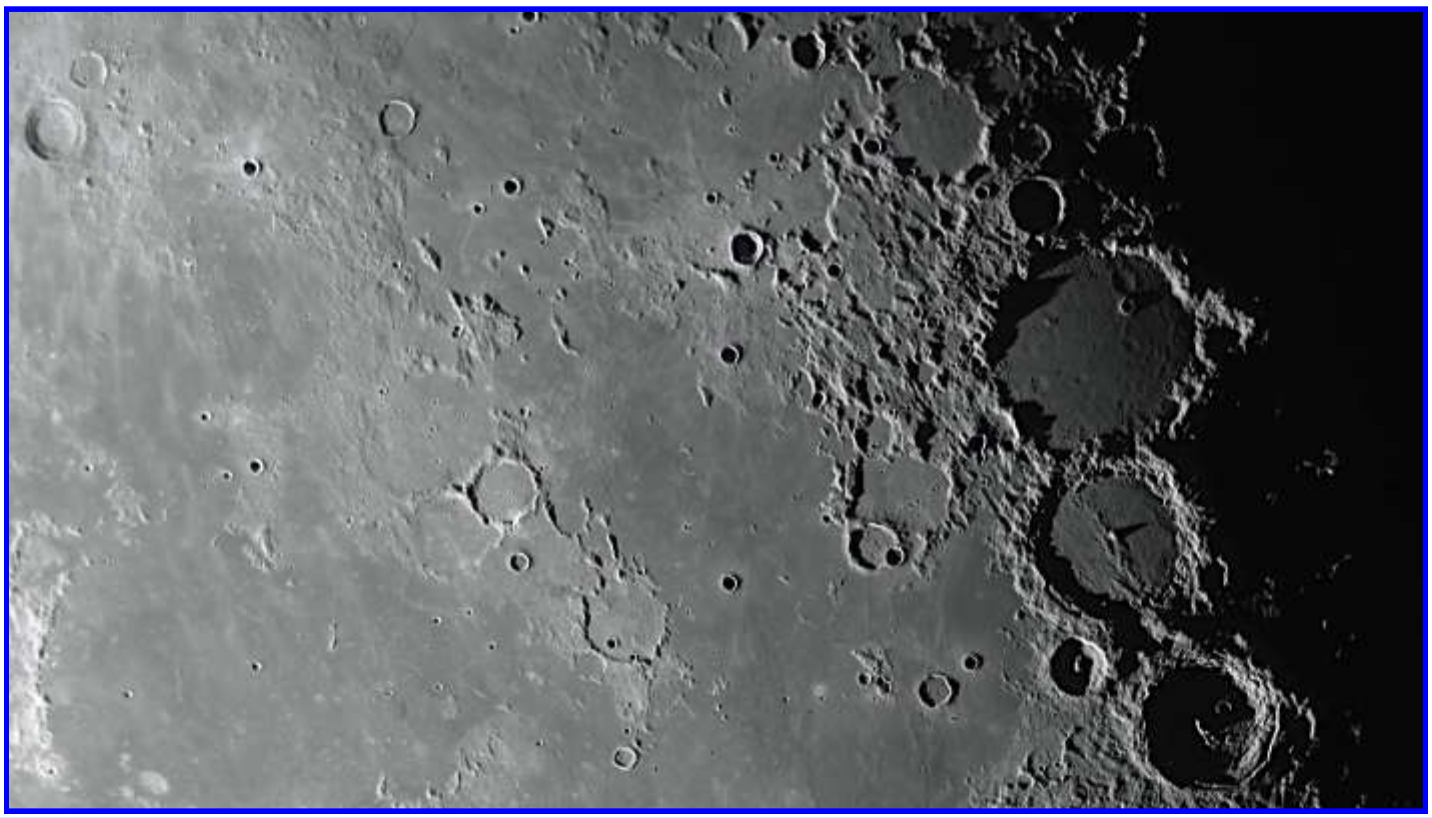
Kepler, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:47 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, IR685 nm filter, Player One Neptune M camera. North is to the right, west is up.*

Tycho, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:03 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*

Recent Topographic Studies

Lamé, Lamé G, Lamé J and Vendelius F , *István Zoltán Földvári, Budapest, Hungary. 2018 April 02, 21:26-21:49 UT, colongitude 114.2º-114.4º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 6/10, transparency 5/6.*

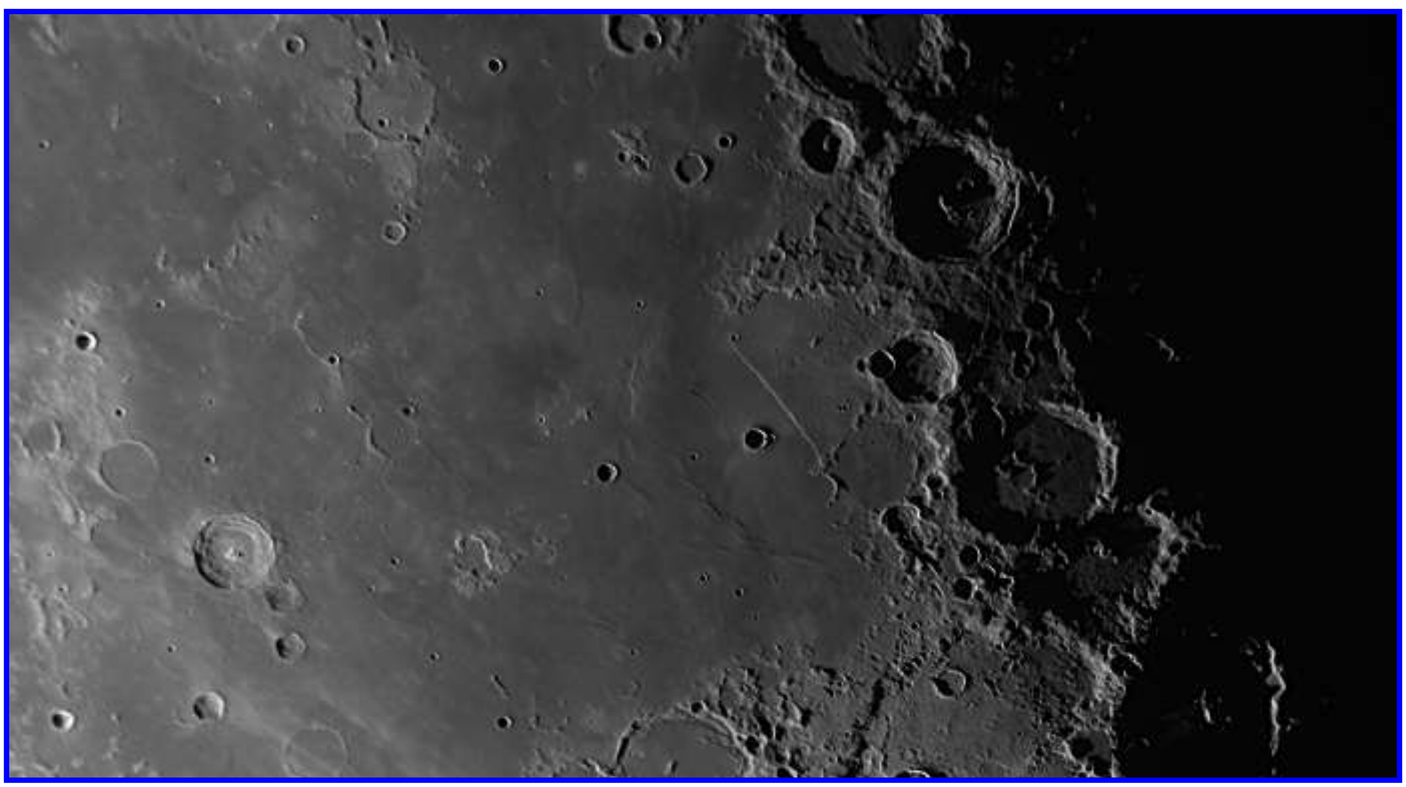
Fra Mauro, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 11:11 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*



Recent Topographic Studies

Schickard and Schiller, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2023 January 05 01:37 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, Barlow Celestron X-Cel LX 2x, IR685 nm filter, Player One Neptune M camera. North is to the right, west is up.*

Rupes Recta, *Don Capone, Waxahachie, Texas, USA. 2023 January 14 10:56 UT. Meade 2120 10 inch Schmidt-Cassegrain telescope, ASI678MC camera.*



Recent Topographic Studies

Lunar Geologic Change Detection Program

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

2023 February

News: Congratulations to Luigi Zanatta (Italy – UAI) for being the first to discover a bright impact flash on 2022 Jan 26 UT 20:33:30 and this was then confirmed by my PhD student, Daniel Shewood, who was observing remotely from Observatory De La Côte D'azur, France. The flash was located a few hundred km east of Aristarchus. More about this in a later newsletter, once some analysis has been done.

LTP Reports: Sulpicius Gallus M

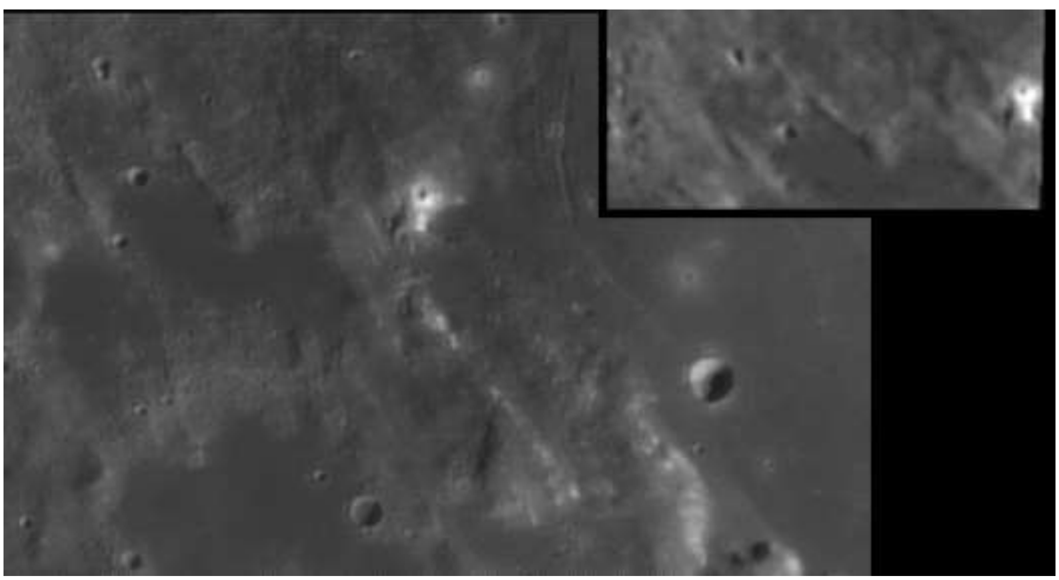


Figure 1. *Sulpicius Gallus M is the brightest feature in the main image and was taken by Franco Taccogna on 2022 Dec 31. The inset is a similar illumination by Rik Hill taken on 2014 Mar 10 UT 01:40.*

Although this turned out not to be a LTP, I just want to say that Franco Taccogna (UAI) noticed that Sulpicius Gallus M was exceedingly bright compared to other features (See Fig 1) on 2022 Dec 31 UT 17:00-18:00. Alexandre Amorim, observing from Brazil a few hours later noted that it was bright, certainly brighter than it appeared in the Hatfield Lunar Atlas. However, analysis of past images in the ALPO/BAA archives, at similar illumination revealed that this was normal appearance (See Fig 1 – top right inset) for this crater. Although this is not a LTP we will include it in the Lunar Schedule web site, just to see at what selenographic colongitude it attains this brilliance. "M" turns out to be a very interesting volcanic vent.

Last Minute Report received for November: Valerio Fontani (Italy – UAI) imaged: Cassini E.

Routine Reports received for December included: Alexandre Amorim (Brazil – ALPO) observed: Sulpicius Gallus M. Jay Albert (Lake Worth, FL, USA – ALPO) observed: Aristarchus, Mons Vinogradov, Picard, and Plato. Alberto Anunzatio (Argentina – SLA) observed: Eratosthenes, Gassendi, Mare Crisium, Mont Blanc, Plato and Sinus Iridum. Anthony Cook (Newtown, UK – ALPO/BAA) imaged: several features in the Short-Wave IR (1.5-1.7 microns). Walter Elias (Argentina – AEA) imaged: Eratosthenes and Tycho. Valerio Fontani (Italy – UAI) imaged: Tycho. Nigel Longshaw (Oldham, UK – BAA) observed: Madler. Eugenio Polito (Italy – UAI) imaged: Tycho. Trevor Smith (Codnor, UK – BAA) observed: Eratosthenes, Manilius, Plato, Timocharis, Tycho and several features. Bob Stuart (Rhayader, UK – BAA) imaged: Adams, Amundsen, Ansgararius, Banachiewicz, Beheim, Boguslawsky, Cabeus, Condorcet, Demonax, Drygalski, Gill, Hano, Hecataeus, Helmholtz, Humboldt, Kastenr, Nox-Shaw, La Perouse, Le Gentil, Malapert, Mallet, Mare Australe, Marinus, Mutus, Neumayer, Oken, Pontecoulant, Schomberger, and Wexler. Franco Taccogna (Italy – UAI) imaged: Sulpicius Gallus M and Tycho. Aldo Tonon (Italy – UAI) imaged: Eudoxus and Tycho.

Analysis of Reports Received:

Cassini E: On 2022 Nov 30 UT 17:48-18:08 Valerio Fontani imaged this area under similar illumination to the following report:

Cassini E 2002 Dec 11 UT 16:30-18:46 Observed by Knott (Liverpool, England, 216mm Newtonian, x216, red and blue filters used) seeing III, transparency good) "Observations carried out of the area extending from the Alpine Valley to the Crater Cassini. At 17:12 a pin point bright flash was seen NW of the rim of the crater E in white light. A 2nd pin point flash was also seen at 18:18, this time thru a blue filter. The 2nd flash was also seen on the NW rim of the crater E. The observer does not think this was a LTP as the seeing was III, but the flash was so bright as to be startling. Other peaks within the Alps were bright but were much less so in red and blue filters, where the rim of the crater E. NW edge was very bright in all filters, including white light. Incoming cloud prevented further observation." BAA Lunar Section report. ALPO/BAA weight=1.

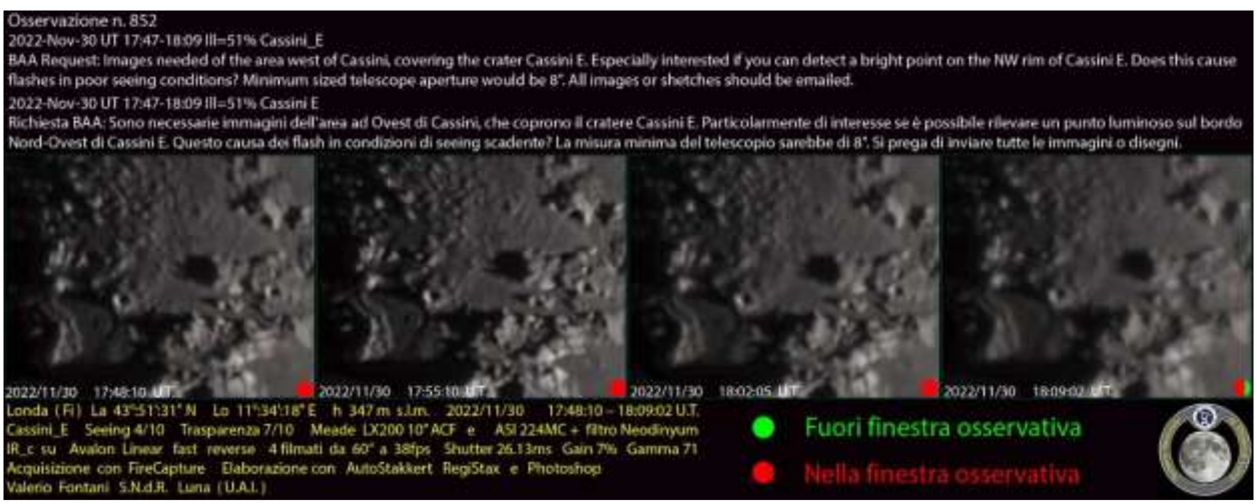


Figure 2. *The area in the vicinity of Cassini E as imaged by Valerio Fontani on the dates and UTs given in the images above. North is towards the top. Cassini C is just to the lower right of the center of each image and Cassini E is slightly above this (marginally smaller than Cassini C) but not very clearly defined as a crater at this stage in the illumination.*

Its interesting, looking at Valerio's images, that Cassini E is not very well defined, though you can just about make out the illuminated western rim. Nor is it especially bright, even in Valerio's sharper images on the far left & left of Fig 2. So, whatever made a flash of light at 17:12 and 18:18 visible to John Knott on 2002 Dec 11 must have been unusual. We shall leave the weight at 1 for now, but could consider raising this in future, depending upon what other images we can find under similar illumination. We have investigated a repeat illumination observation before, for Cassini E, in the 2020 August newsletter.

Alphonsus: On 2022 Dec 01 UT 21:38 Les Fry (NAS) took an image of Rupes Recta, that by chance captured half of Alphonsus under similar illumination to the following report:

On 1993 Jun 27 at UT 19:55-20:21 and 20:24-21:04) D. Kane (England? UK, 4" refractor) discovered that the central peak of Alphonsus crater was very bright. The central peak was also brighter in red than in blue light. However, G. North (Herstmonceux, UK, 6" reflector, x135, seeing V-III) and M. Cook (Frimley, UK, 4" reflector, x10, seeing=III) observed that the central peak was normal, however they did not use filters. The Cameron 2006 catalog ID= and weight=3. The ALPO/BAA weight=2.

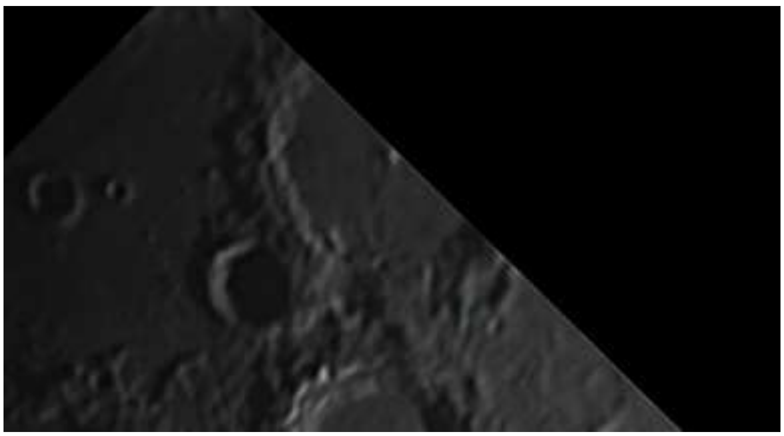


Figure 3. *Half of Alphonsus as imaged by Les Fry on 2022 Dec 01 UT 31:38 and re-orientated with north towards the top.*

Although the image (Fig 3) that Les took was monochrome and it was never intended to target Alphonsus, we do see just over half of the central peak. It does not look especially bright; therefore, we shall leave the weight at 2 for now.

Sinus Iridum: On 2022 Dec 04 UT 03:05-03:25 Alberti Anunziatio (SLA) observed and sketched this area under similar illumination to the following report:

Sinus Iridum 1996 Apr 28 UT 20:00 Observed by Brook (Plymouth, UK, 60mm refractor, x112, seeing III, slight breeze, twilight) "dark shaded area on floor ~1/4 diameter of Sinus Iridum on western interior by rim" BAA Lunar Section Observation. ALPO/BAA weight=1.

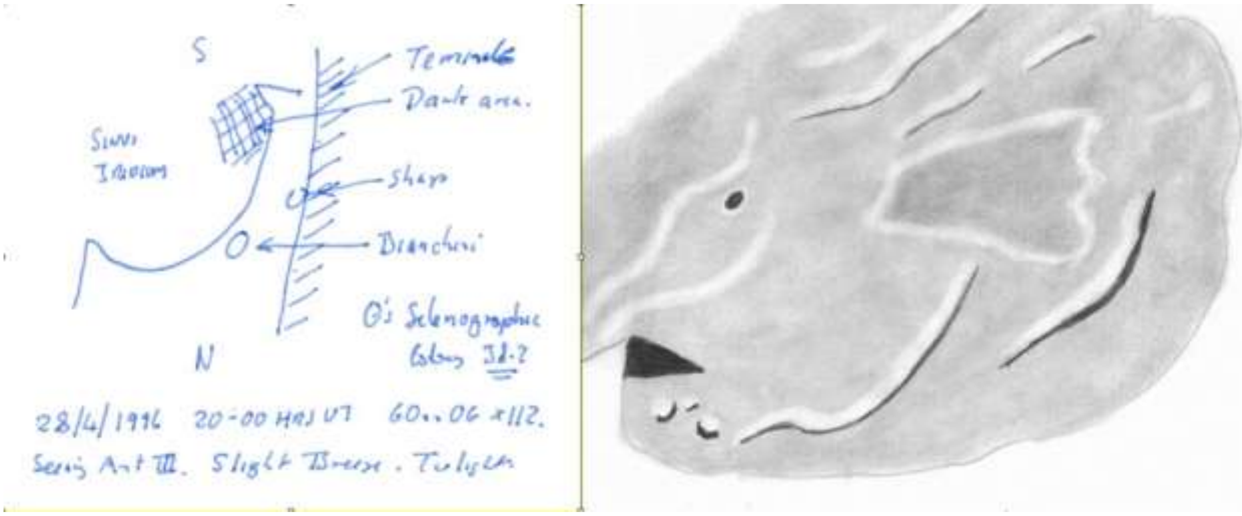


Figure 4. *Sketches of Sinus Iridum, orientated with north towards the bottom. (Left) By Clive Brook from 1996 Apr 28 UT 20:00. (Right) By Alberto Anunziato from 2022 Dec 04 UT 03:05-03:25 – detail to the northern shore of Sinus Iridum not shown.*

Alberto was observing the dorsa in Sinus Iridum (Fig 4 – Right) and thought he saw something similar to the written description of what Brook reported, and in the December edition of the ALPO The Lunar Observer said: *"I don't know what the darker spot seen in the western sector is due to, framed in bright lines, I estimate that it corresponds to differences in the types of lavas present in Sinus Iridum (easier to observe near full moon)"*. Alberto did not have access to Clive Brook's sketch (Fig 4 – Left), so did not know that the positions of the dark patch was not at the same position as depicted by Clive Brook back in 1996, however Clive was using a small telescope, so maybe the positional accuracy of his sketch was not great. We have covered repeat illumination observations of this LTP before in the 2016 Oct, 2017 May, 2018 Apr, 2020 Mar, Apr & Aug newsletters. We shall leave the ALPO/BAA weight at 1 for now.

Mädler: On 2022 Dec 7 UT 20:30 Nigel Longshaw (BAA) observed Mädler under similar illumination to the following report:

Mädler 1940 Sep 16 UT 02:10 Observed by Haas (New Mexico? USA, 12" reflector?) "Bright spot on S. rim was I=5.8 comp. with 8.9 on Aug 17 (see #470)." NASA catalog weight=4. NASA catalog ID #473. ALPO/BAA weight=2.

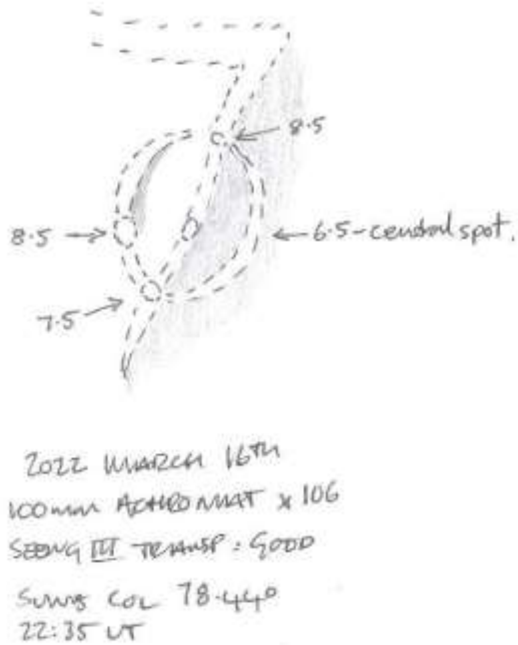


Figure 5. *Mädler as sketched by Nigel Longshaw (BAA) in March 2022. Date and UT given on the sketch. Elger scale intensity visual measurements arrowed. North is towards the bottom.*

Nigel comments: *"I have manged a couple of repeat illumination observations of Mädler this year in relation to the Haas report that a 'spot' on the southern rim was seen as dimmer in Sept 1940 than it was in August. I observed on 2022 March 16* (Fig 5) *and 2022 Dec 7* (Fig 6)*. Under high illumination the cater walls are broken into a series of spots and arcs – see attached sketches –do you think the Haas report refers to the section of the southern wall which is seen as a bright spot? If so, I recorded the spot of similar brightness on both occasions. I was however a little confused with the figures in the repeat illumination text for the 1940-8-17 observation so I checked back with the entry number 470 in the NASA catalogue. I think the figures in the repeat illumination text need changing to reflect the catalogue entry when on 1940-8-17 Haas recorded a bright spot as I=8.9. Essentially the catalogue entries indicate Haas has an intensity estimate of 8.9 on 1940-8-17 but recorded I=5.8 on 1940-9-16."* In a subsequent email he says: *"I located the description in my copy of the Haas paper last night - unfortunately, it does not give any further information regarding the precise location of the 'spot'. However, looking at some of the drawings/intensity estimates of other features included in the paper I wonder if the observation of Mädler relates to a smaller feature than the appearance of the southern rim indicated in my sketches."*

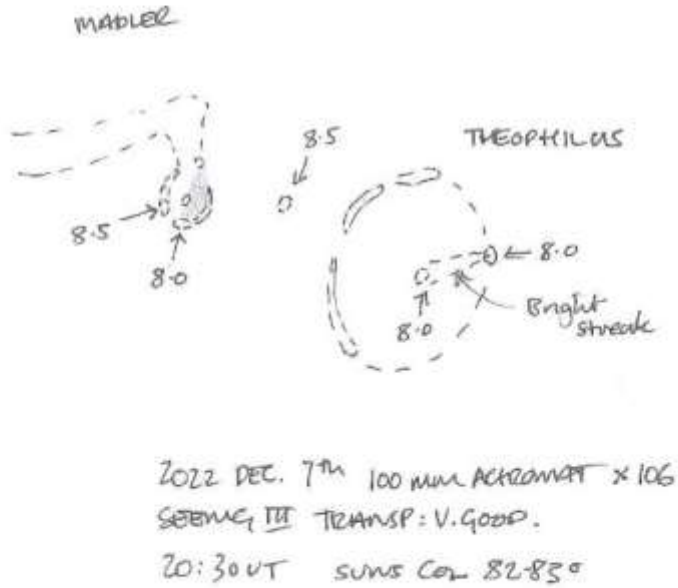


Figure 6. *Mädler as sketched by Nigel Longshaw (BAA) in December 2022. Date and UT given on the sketch. Elger scale intensity visual measurements arrowed. North is towards the bottom.*

As we have copies of Cameron's card index system that went into her production of her 1978 catalog, I thought that I would include a copy here (Fig 7), however as you can see this individual card refers to many LTP from the paper by Haas "Does Anything Ever Happen on the Moon?", and it does not really enlighten us. Many years ago, in correspondence with Walter Haas, I was trying to find out whether the LTPs attributed to him in the Cameron catalog had the correct data and weights. For the 1940 Sep 16 event he wrote back to say that the date and UT and weights were indeed correct but that it was *"hard to say whether 470 or 473 is the normal aspect of a feature in Maedler"*. #470 being an entry of an earlier LTP he saw in Mädler on 1940 Aug 17 at 06:05 UT, and #473 being the 1940 Sep 16 event. I think for now we should just keep on monitoring Mädler (visually or with CCD) at the appropriate repeat illumination and see if we can find any variations in brightness of its associated spots.

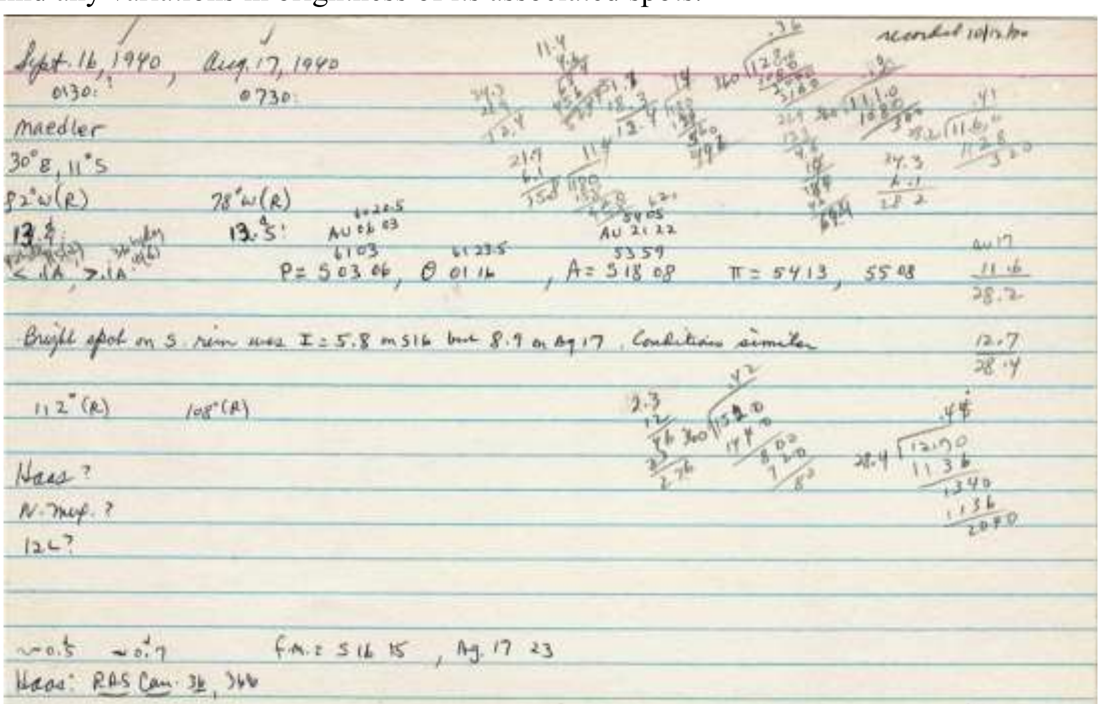


Figure 7. *The card for the 1940 Sep 16 Mädler LTP from the Cameron 1978 catalog.*

Aristarchus: On 2022 Dec 10 UT 04:30-04:45 Jay Albert (ALPO) observed visually this area of the Moon under similar illumination to the following report:

On 1990 Dec 03 at UT23:00-01:30 M.C. Cook (Frimley, Surrey, UK) noticed that the central peak of Aristarchus was quite bright and extended to a circular region in the east in the crater "sprout" area - Cameron suggests that this is Bartletts self-defined EWBS area. Beyond the rim to the east was very bright. However, no color effect was seen in filters. A sketch was supplied. Cameron notes the coincidence of perigee and full Moon. The Cameron 2006 catalog ID is 416 and the weight=3. The ALPO/BAA weight=1.

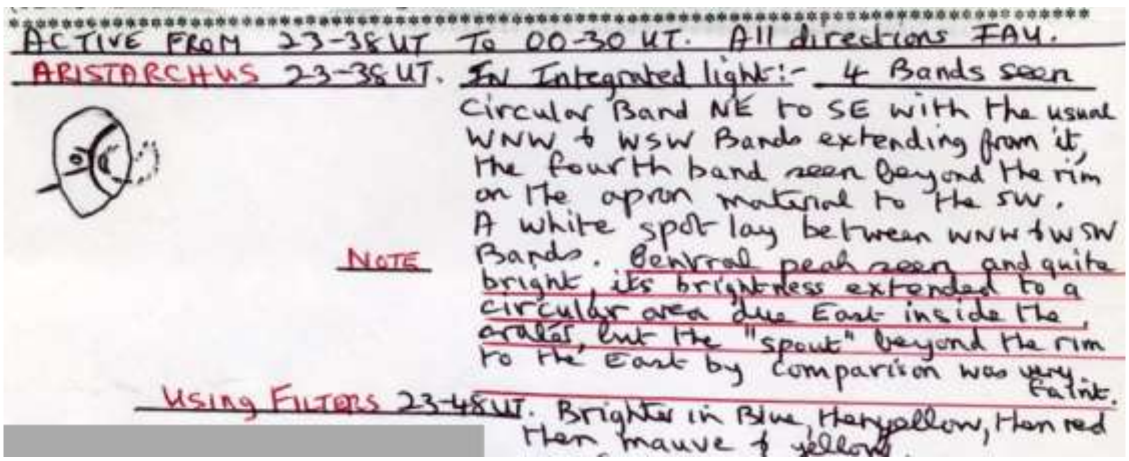

ACTIVE FROM 23-38UT To 00-30 UT. All directions FAY.
ARISTARCHUS 23-38UT. In Integrated light:- 4 Bands seen
Circular Band NE to SE with the usual WNW & WSW Bands extending from it, the fourth band seen beyond the rim on the apron material to the SW. A white spot lay between WNW & WSW Bands.
NOTE
Central peak seen and quite bright, its brightness extended to a circular area due East inside the crater, but the "spout" beyond the rim to the East by comparison was very faint.
USING FILTERS 23-48UT. Brighter in Blue, then yellow, then red then mauve & yellow.

Figure 8. *Aristarchus LTP report by Marie Cook from 1990 Dec 03. Note that the sketch of Aristarchus has been mirror flipped to put north at the top and west on the left.*

Jay noted that the central peak was very bright (as stated in the LTP report), but that the peak did not appear extended in any way in the east of the crater. Despite the crater being very bright in full sunlight, the vertical bands on the interior wall were still visible. An especially bright spot was seen on the NE rim completely separated from the central peak on the crater floor. Jay had seen that NE bright spot on several occasions before. He noticed no color in or around the crater. A variable polarizer filter was used to cut the glare of the crater and improve the detail after the initial unfiltered viewing part of the session. For a comparison I have included a copy of Marie Cook's original report (Fig 8). As there are differences between these two similar illumination observations, we shall keep the ALPO/BAA weight at 1 for now but consider raising it if other repeat illumination observations, to within ±0.5˚, also show a similar discrepancy.

Eratosthenes: On 2022 Dec 16 UT 06:55-07:15 Trevor Smith (BAA) observed this crater visually with a 16-inch reflector under similar illumination for the following report:

Eratosthenes 1976 Aug 18 UT 06:12 Observed by Bartlett (Baltimore, MD, USA, 4.5" refractor, 45, 225x, S=6, T=3-2) "Again, c.p. is vis. within shadow but much brighter than on Aug, 4 (4 deg) & similar to June at same col. The 2nd bright spot seen in June was not seen tonite. (roughness on walls seen in LO IV & V pics show why these pseudo-shadows appear)." NASA catalog weight=4. NASA catalog ID #1445. ALPO/BAA weight=2.

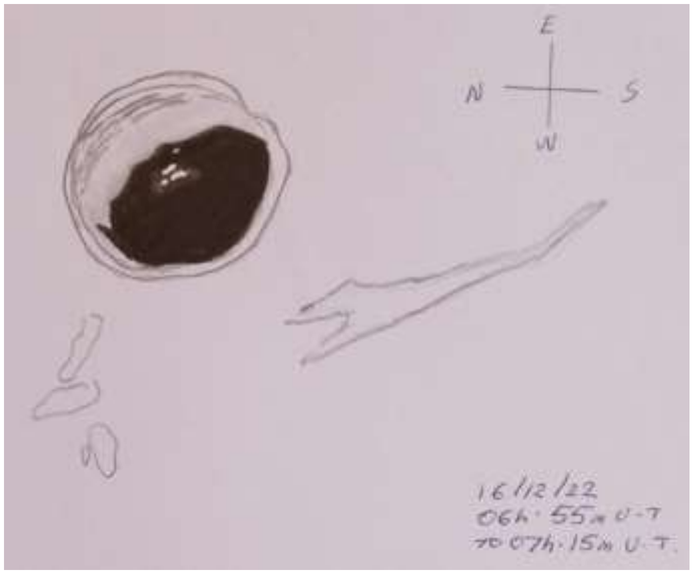


Figure 9. *Eratosthenes as sketched by Trevor Smith (BAA) for the date and UT given on the observation. Note that north is towards the left.*

Trevor comments that: *"Bartlett reported on 1976-6-20 that the floor was covered in shadow and the central peak was seen as a bright spot. Another tiny spot was seen on the south/east floor. I looked and the detail on and around the terminator was quite strong. The floor of Eratosthenes was about three quarters full of black shadow. The central peak was split into three parts with the black floor shadow all around it. The terracing to the inside eastern rim was bright and very easy to see with much fine detail visible. A very tiny but quite bright pin point of light was just visible in the dark shadow to the south/east of the central peaks. (See quick sketch)"* (Fig 9). We shall leave the weight at 2 for now.

Tycho: On 2022 Dec 16 UT 08:41-08:42 Walter Elias (UAI) imaged this crater under similar illumination to the following report:

Tycho 1992 Aug 21 UT 07:58-10:59 Observed by Darling (Wisconsin, USA, 16" & 11" reflectors, visual, photographic, CCD video observations made) "At 08:56UT a V-shaped glow started to appear in the shadow to the east of the central peak" ALPO LTP report. See: http://www.ltpresearch.org/ltpreports/ltp19920821.htm ALPO/BAA weight=1.

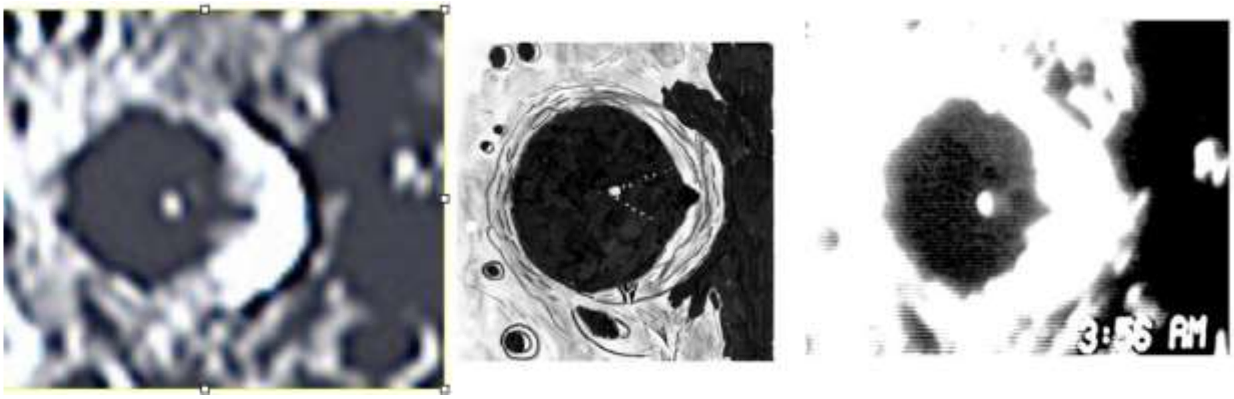


Figure 10. Enhanced images, and a sketch of Tycho, with north towards the top. **(Left)** Walter Elias' image from 2022 Dec 16 UT 08:42 Selenographic Co-longitude = 186.1˚. **(Center)** Sketch by David Darling from 1992 Aug 21 UT 09:46 Selenographic Co-longitude = 187.0˚. **(Right)** Image by David Darling from 1992 Aug 21 UT 09:56 Selenographic Co-longitude = 187.1˚.

Although Walter's image (Fig 10 – Left) is lower in resolution than David Darling's 1992 image, it is starting to show the first signs of the illuminated V-shaped neckless formation. From the UK, Trevor Smith (BAA) was observing visually a little earlier at 07:55-08:10 UT (Selenographic Co-longitude = 185.7˚-185.8˚) and did not see any sign of a "V" shaped formation or any glow or obscuration east of the central peak. So, this effect is fairly rapid and we have seen it before under another repeat illumination observation covered in the 2012 Dec newsletter (p13 in ALPO TLO and p34-35 in the BAA LSC). So, I am now fairly confident that David Darling's original observation was not a LTP, but out of curiosity we will put it onto the Lunar Schedule website to see if we can get some higher resolution time lapse image of this V shape forming.

Eudoxus: On 2022 Dec 30 UT 16:52, 17:00, 17:07 Aldo Tonon imaged this crater for the following lunar schedule request:

BAA Request: Eudoxus - please try to image or sketch the crater. This is to try to explain a line of light effect seen inside this crater by French astronomer Trouvelot back in Victorian times. The BAAs Nigel Longshaw says that this may be seen between colongitudes of 0.3 to 1.2 degrees. Please send any images or sketches to: a t c @ a b e r . a c. u k .

Figure 11. *Eudoxus as imaged by Aldo Tonon (UAI) on 2022 Dec 30 UT 17:00 and orientated with north towards*

At the date and UT given by Aldo (See Fig 11), the selenographic colongitude was 0.8˚. There are a couple of faint incisions at the north and south ends of the interior shadow, that pass across respective sides of the crater rim, and a curved piece of illuminated inner terrace showing up on the eastern edge of the interior shadow. Whether any of these are what Touvelot was referring to as a “line of light effect” is unclear to me?

Tycho: On 2022 Dec 31 UT UAI members: Franco Taccogna, Eugenio Polito, and Aldo Tonon, imaged this crater for the following lunar schedule request:

BAA Request: How early can you see the central peak of this crater illuminated by scattered light off the crater's west illuminated rim? High resolution and/or long exposures needed to capture detail inside the floor shadow. All images should be sent to me on the email address below, whether or not you were successful in capturing the central peak: a t c @ a b e r. a c. u k

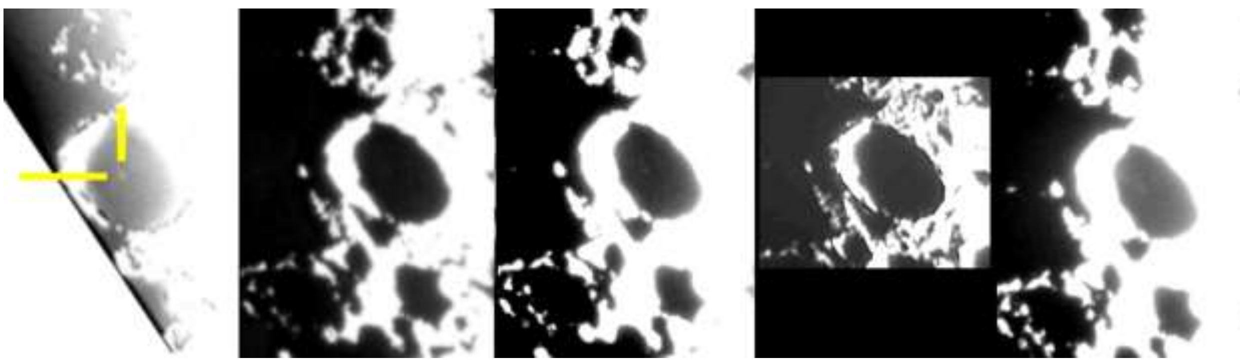


Figure 12. *Images of Tycho orientated with north towards the top. Subsequent solar altitudes calculated with LTVT but manually using the cursor to point at the location of the central peak, so we could easily have an error of the order of ±0.03˚.* ***(Far Left)*** *An image by Brendan Shaw taken on 2003 May 09 UT 21:04 ($Alt_{\odot}$=1.11º) clearly showing the central peak as pointed at by the yellow tick marks.* ***(Left)*** *An image by Franco Taccogna taken on 2022 Dec 31 UT 16:10 ($Alt_{\odot}$=1.80º) and not showing the central peak.* ***(Center)*** *An image by Franco Taccogna taken on 2022 Dec 31 UT 16:20 ($Alt_{\odot}$=1.82º) and now showing the central peak.* ***(Right)*** *An image by Eugenio Polito taken on 2022 Dec 31 UT 16:25 ($Alt_{\odot}$=1.84º) and not showing the central peak.* ***(Far Right)*** *An image by Franco Taccogna taken on 2022 Dec 31 UT 16:26 ($Alt_{\odot}$=1.90º) and more clearly showing the central peak.*

This lunar schedule request refers back to an image taken by Brendan Shaw which showed the central peak of Tycho to be visible when the Sun was too low to illuminate it directly. As you can see from Fig 12 (Far Left) the solar altitude was +1.11º from the bottom of a mostly shadow filled crater. Simulations show that even allowing for the height of the central peak, and a 0.5˚ angular diameter of the Sun, the central peak ought not to be illuminated by direct sunlight. Instead, it is theorized that it is being illuminated by scattered light off of the western sunlit rim. However, this theory is contradicted by images taken by UAI observers on 2022 Dec 31, which show that despite more modern imaging techniques, that the central peak is not visible at a higher solar altitude of +1.80º (Fig 12 – Left), and barely starts to become visible at 1.82º (Fig 12 – Center), even at an altitude of +1.90º (Fig 12 – Far Right) it is not as strong as it was back in 2003. To rub home the point, both Aldo Tonon – working at lower resolution, and Eugenio Polito (Fig 12 – Right) who used higher resolution but less exposed than Franco’s images, were not able to detect the central peak at all.

So, what could be going on? Here are four possible theories. 1) Atmospheric seeing, transparency, atmospheric scattering, and image contrast/exposure is affecting the visibility of the central peak, after all it was not seen in Aldo Tonon and Eugenio Polito's images. 2) The peak is being illuminated by sunlight scattered off the western illuminated rim. But if so, this is a large angular extent source of illumination from an arc about 180º in length, so one would have thought this would not only illuminate the central peak but also some of the shadowed floor, and there should not be a significant change in its brightness over a ten-minute period from the western rim as we saw in Franco Taccogna's images. 3) Although virtual computer models show no light breaking through gaps in the eastern rim, with the Sun so low, maybe the digital elevation models are no accurate enough? 4) And now the most unlikely theory – Tycho is known to have electrostatically charged dust particles levitating above the horizon at sunrise and sunset as imaged by Surveyor 7 in the 1960's. Charged dust particles hop from dark areas in shadow into the sunlight at sunrise – perhaps dust particles on the slopes of the central peak are levitating and forming a brief cloud over the top of the peak, making it into sunlight, and then falling out of the sky once they lose their charge from the solar UV? There is no proof yet that this would work though, nor have sufficient quantities of dust particles to scatter the sunlight. However, a NASA experiment (Shadowcam) on the recent Korean Orbiter will be imaging the shadowed areas inside craters near the south pole, so if dust levitation is taking place on the borders of shadows or at the tops of shadowed peaks on crater floors, this is where it might be detected. If not, then its more likely to be one of the simpler explanations (1,2,3) which explain the 2003 LTP. Anyway, in the mean-time, please keep on trying to image the floor of Tycho when it is predicted by the Lunar Schedule website or on the repeat illumination website.

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. To keep yourself busy on cloudy nights, why not try "Spot the Difference" between spacecraft imagery taken on different dates? This can be found on: http://users.aber.ac.uk/atc/tlp/spot_the_difference.htm . 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 .

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Basin and Buried Crater Project

Coordinator Dr. Anthony Cook- atc@aber.ac.uk

The Flamsteed-Billy Basin (45˚W, 7˚S)

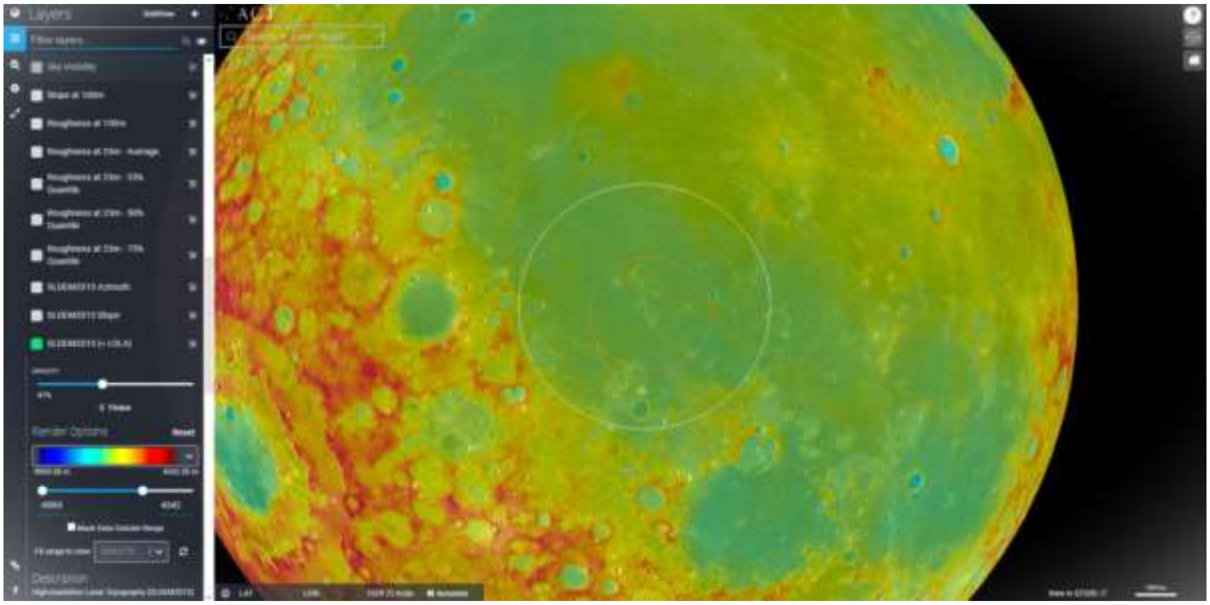


Figure 1. *The location of the Flamsteed-Billy basin main (white circle) and peak ring (faint inner orange circle) - according to Dominique Hoste) on the NASA/ACT Quickmap website under the stereo WAC/LOLA colorized topographic digital elevation model.*

The 570 km diameter Flamsteed-Billy basin, lies on the south western part of the nearside of the Moon's disk, and is designated as "uncertain" in the Lunar Wiki, probably because it is so highly degraded and flooded by mare basalts – so it is likely pre-Nectarian in era. Liu *et al* (2022) give a diameter of 580 km for the main ring and 399 km for the inner peak rim. By looking at topography (Fig 1), gravity (Fig 2) and crustal thickness (Fig 3) maps, Dominique Hoste has written in to confirm that it is a "peak-ring" basin – as this shows up well in the crustal thickness map (Fig 3). They have also provided some cross-sectional radii (Fig 3), which when averaged allow the following diameters for the main and peak rings to be derived: 630 ± 13 km and 309 ± 8 km respectively. The errors I added are from the standard deviations of their given measurements. Using standard deviations is a good way to work out how degraded basin ring structures are. Of course, if a basin is elliptical then this won't help as the standard deviations of an attempt to fit a default circle to an elliptical basin would be increase as the eccentricity departs from 0.0, but there are no indications in Figs 2 and 3 that this is the case. Dominique's main ring measurement is larger than the Liu *et al* (2022) value but smaller for the peak ring. It is perhaps unsurprising that measurements of degraded structures are very subjective. It might be helpful if other readers could try to measure the Flamsteed-Billy basin rings so that we can come up with a consensus on the mean ring diameters and associated error associated error – though I appreciate that it's a real challenge to identify what features on the Moon are actual remnants of the rings and which aren't. The best strategy, is to use lots of datasets like: shallow illumination telescope images or virtually computed hill shadings, spacecraft gravity, topographic data, and anything else that might give us clues to define the basin shape and size.

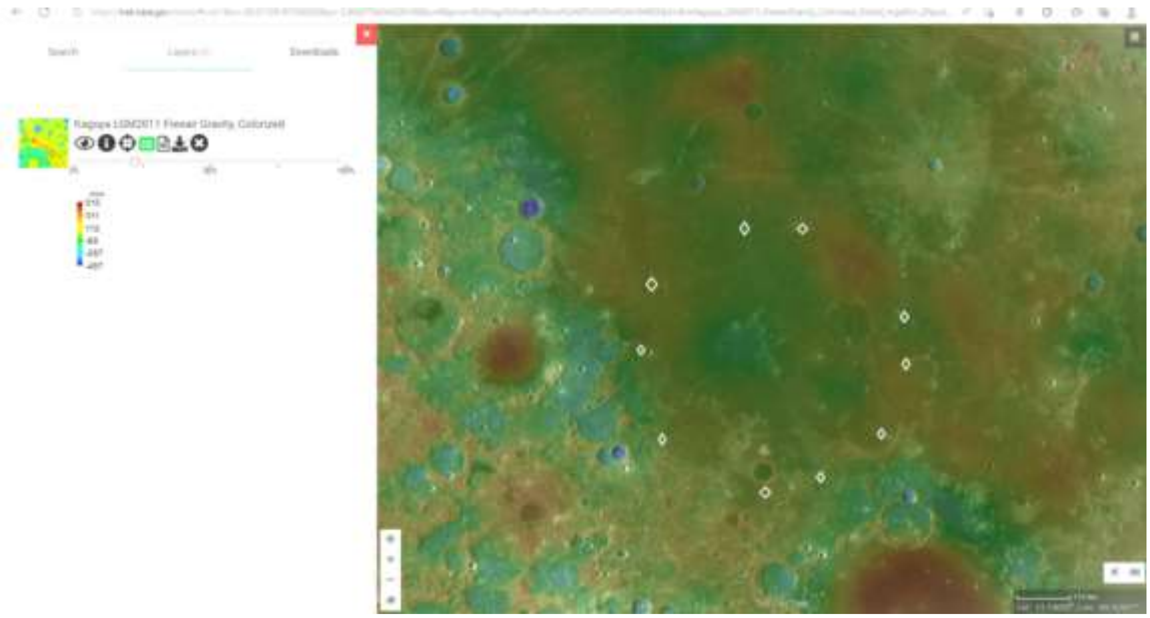


__Figure 2.__ Dominique Hoste's estimated locations of the main ring of the Flamsteed-Billy basin main ring as seen on the Kaguya Free Air gravity dataset.

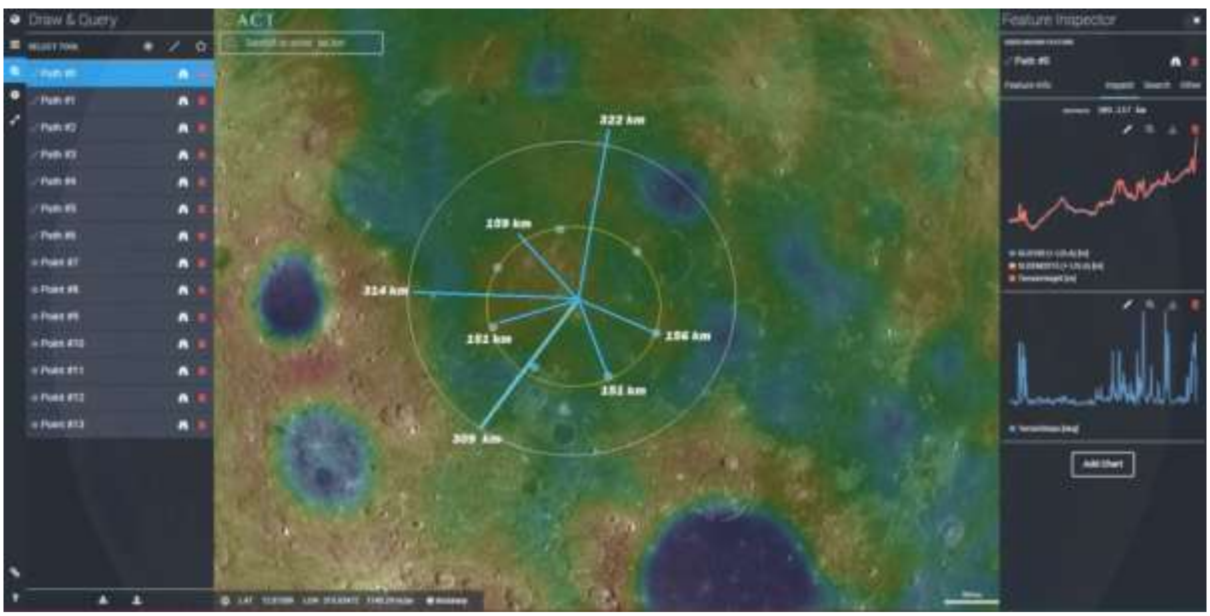


__Figure 3.__ Dominique Hoste's attempts at radii measurements of the main and peak rings of the Flamsteed-Billy basin using the NASA/ACT Quickmap website crustal thickness layer.

References:

J. Liu et al. (2022). "Characterization and Interpretation of the Global Lunar Impact Basins Based on Remote Sensing", Icarus, Vol 378, article ID: 11492.

Lunar Wiki (accessed 28/1/2023) https://the-moon.us/wiki/Flamsteed-Billy_Basin

If you think that you have discovered a new impact basin, or unknown buried crater, please check whether it has been found previously on the following web site, and if not email me its location and diameter so that I can update the list:
https://users.aber.ac.uk/atc/basin_and_buried_crater_project.htm.
Alternatively, if you want an observational challenge, try to see if you can image one of more of the basins or buried craters at sunrise/set and establish what colongitude range they are best depicted at. Or you can even do this "virtually" with LTVT software. As you can see from the tables on the web sites there are lot of blank cells to fill in on the sunrise and sunset colongitude columns – so a good opportunity for you to get busy!

Lunar Calendar February 2023

Date	UT	Event
2		Greatest northern declination +27.4°
3	2000	Pollux 1.9° north of Moon
4	0900	Moon at apogee 406,476 km
5	1828	Full Moon (smallest in 2023)
5		South limb most exposed -6.6°
12	0731	Moon at descending node
13	1601	Last Quarter Moon
13		West limb most exposed -7.4°
14	1900	Antares 1.8° south of Moon
17		Greatest southern declination -27.5°
18	2100	Mercury 4° north of Moon
19	0900	Moon at perigee 358,267 km Large Tides
19		North limb most exposed +6.5°
20	0706	New Moon lunation 1239
21	1800	Neptune 2° north of Moon
22	0800	Venus 2° north of Moon
22	2200	Jupiter 1.2° north of Moon, occultation Antarctica
24	1856	Moon at ascending node
25	1300	Uranus 1.3° south of Moon occultation Greenland, northern Canada
25		East limb most exposed +7.3°
27	0806	First Quarter Moon
28	0500	Mars 1.1° south of Moon, occultation Mongolia to Greenland

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.

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: Expedition to Mare Nubium

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 March 2023, will be Mare Nubium. 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 Nubium Focus-On article is February 20, 2023

FUTURE FOCUS ON ARTICLES:

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

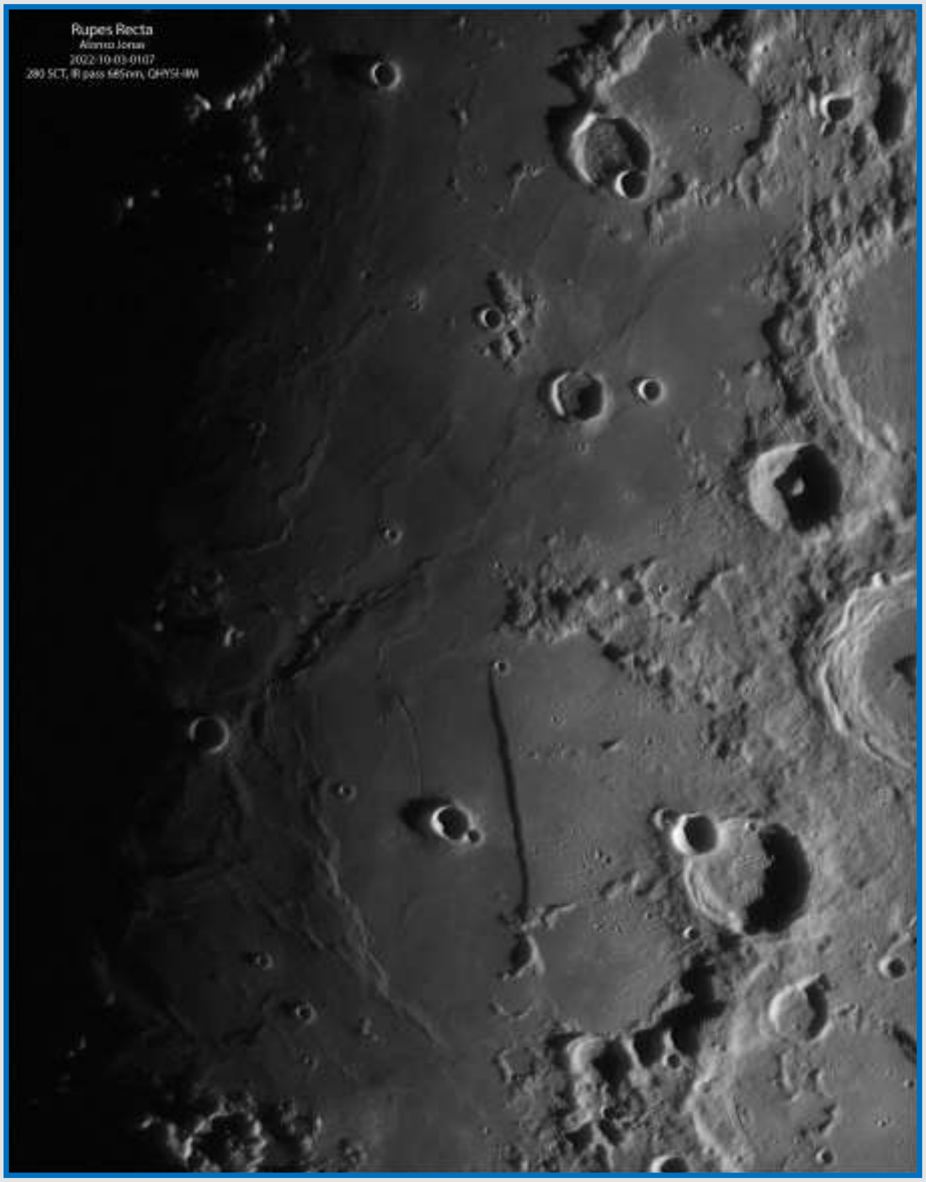
Subject	TLO Issue	Deadline
Mare Nubium	**March 2023**	**February 20, 2023**
Reiner Gamma	**May 2023**	**April 20, 2023**
Mons Rümker	**July 2023**	**June 20, 2023**
Floor-Fractured Craters	**September 2023**	**August 20, 2023**
Dorsa Smirnov	**November 2023**	**October 20, 2023**

Focus-On Announcement

Expedition to Mare Nubium

Mare Nubium is small, not very large, but it has an incredible variety of features: an impact crater beauty, not very fresh but incredibly preserved as Bullialdus, strangely shaped craters like Wolff, giants like Pitatus, almost disappeared craters like Kies or Gould, the most conspicuous concentric crater (Hesiodus A), domes, rilles, wrinkle ridges, the bright rays of distant Tycho, and one of the most beautiful features, Rupes Recta. We will share the lunar images of our observers to dream of an expedition through the sea of clouds.

MARCH 2023 ISSUE-Due February 20, 2023: MARE NUBIUM
MAY 2023 ISSUE-Due April 20th, 2023: REINER GAMMA
JULY 2023 ISSUE-Due June 20th, 2023: MONS RÜMKER

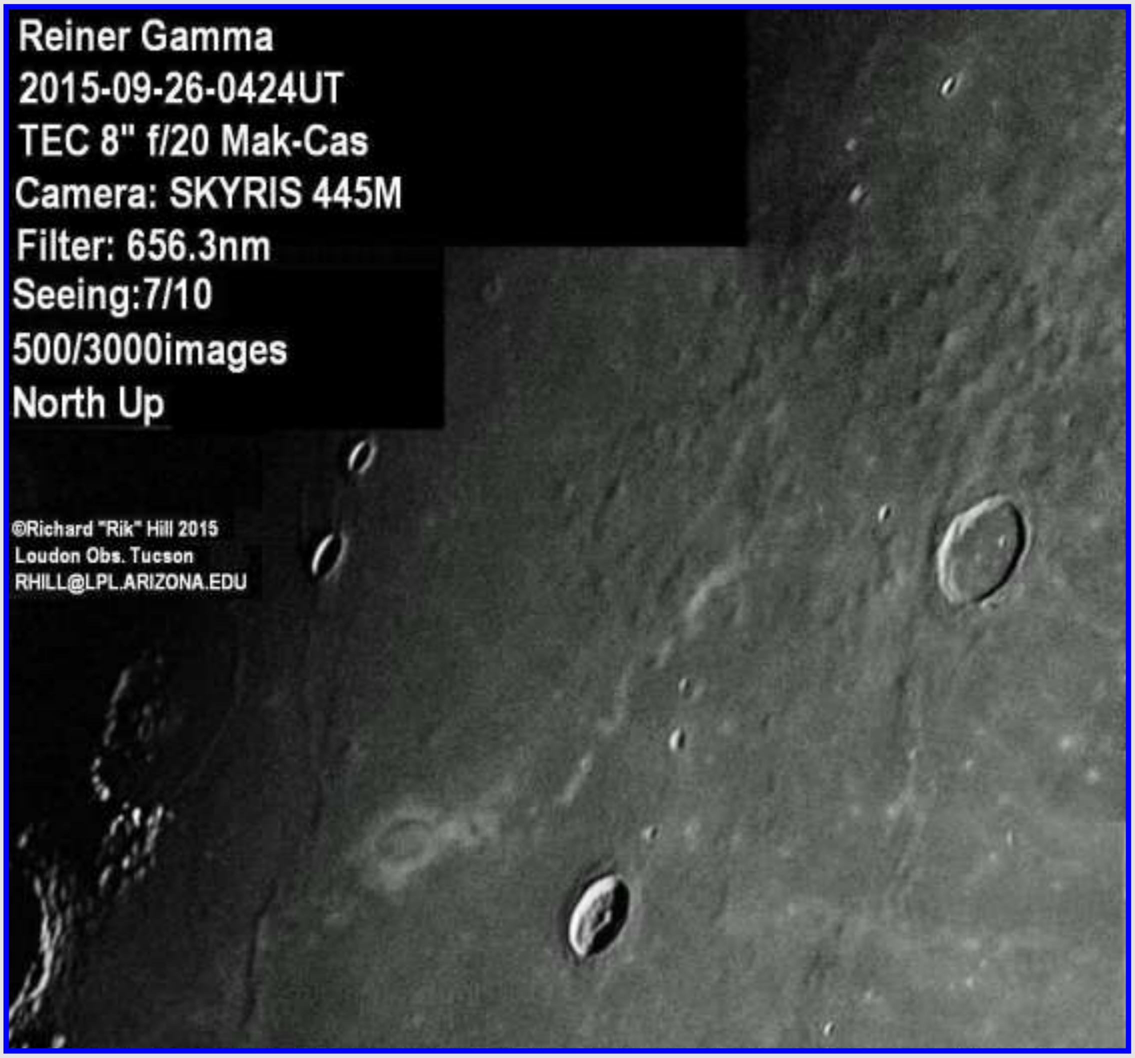


Jonás Alonso

Focus-On Announcement
Mysterious Reiner Gamma

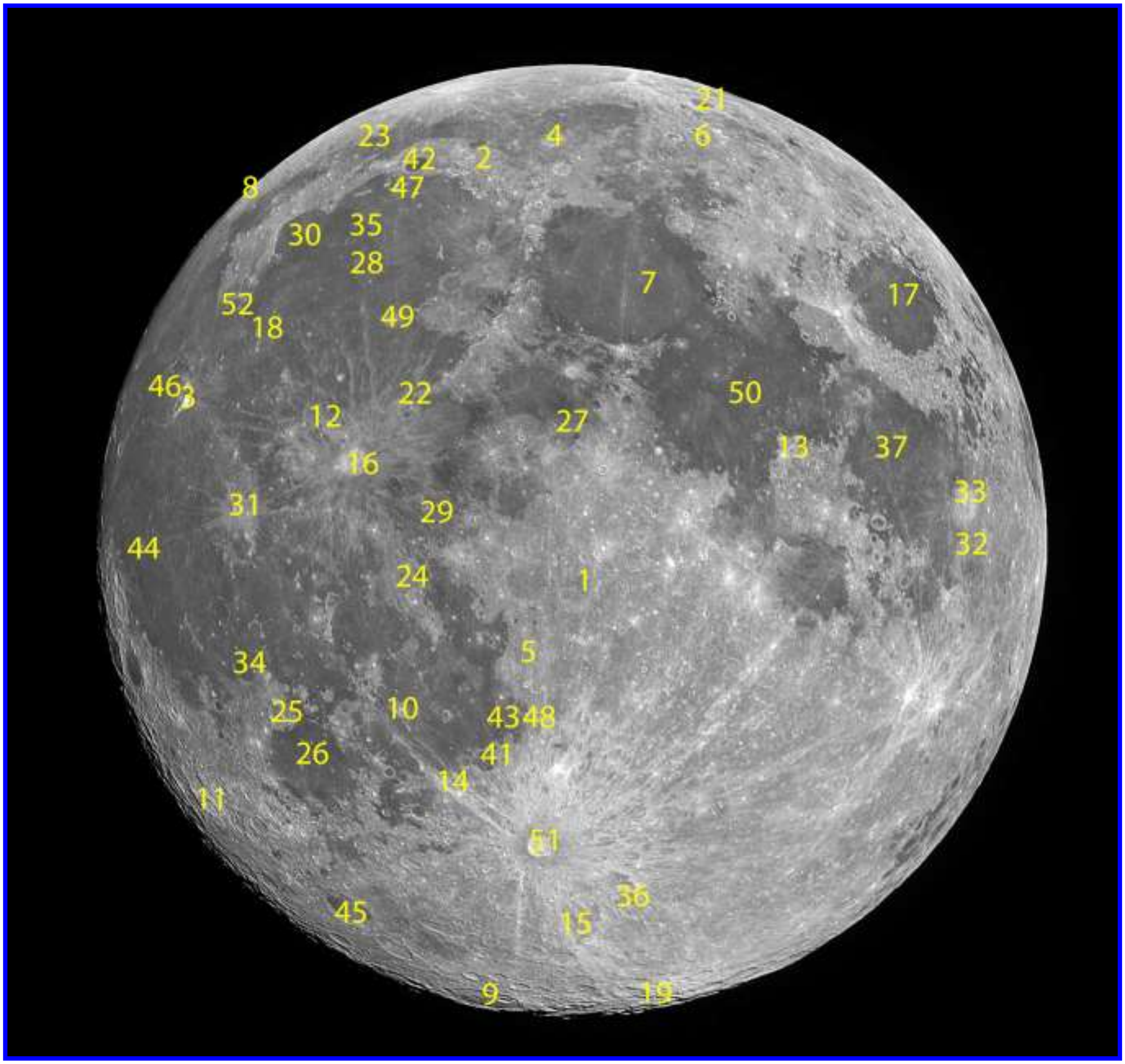
Reiner Gamma deserves the name anomaly with honors. There are other lunar swirls, but Reiner Gamma is the only one visible to us, amateurs. It shares the near side with the swirls of Mare Marginis and Mare Ingenii, which we can only partially glimpse under favorable libration conditions. There are different theories about the nature of Reiner Gamma, everyone has a transitory moment of reign, but we are not completely sure what caused our anomaly. We will ask ourselves about its nature and we will try to provide images that make us better understand the topography of the area.

MARCH 2023 ISSUE-Due February 20, 2023: MARE NUBIUM
MAY 2023 ISSUE-Due April 20th, 2023: REINER GAMMA
JULY 2023 ISSUE-Due June 20th, 2023: MONS RÜMKER
SEPTEMBER 2023 ISSUE-Due August 20th 2023: FLOOR FRACTURED CRATERS
NOVEMBER 2023 ISSUE-Due October 20th 2023: DORSA SMIRNOV



Rik Hill

Key to Images In This Issue



1. Albategnius
2. Alpes, Vallis
3. Aristarchus
4. Aristoteles
5. Arzachel
6. Atlas
7. Azara, Dorsum
8. Babbage
9. Bailly
10. Bullialdus
11. Byrgius
12. Carpatus, Montes
13. Censorinus
14. Cichus
15. Clavius
16. Copernicus
17. Crisium, Mare
18. Delisle
19. Demonax
20. Dionysius
21. Endymion
22. Eratosthenes
23. Fontenelle
24. Fra Mauro
25. Gassendi
26. Humorum, Mare
27. Hyginus, Rima
28. Imbrium, Mare
29. Insularum, Mare
30. Iridum, Sinus
31. Kepler
35. Le Verrier
36. Lilius
37. Messier
38. Nearch
39. Nectaris, Mare
40. Petavius
41. Pitatus
42. Plato
43. Recta, Rupes
44. Reiner Gamma
45. Schickard
46. Schröteri, Vallis
47. Teneriffe, Montes
48. Thebit
49. Timocharis
50. Tranquillitatis, Mare
51. Tycho
52. Viscositatis, Sinus