The Lunar Observer

A Publication of the Lunar Section of ALPO

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In This Issue

Lunar Reflections, *D. Teske* 2
Observations Received 3
By the Numbers 5
Call for Observations: Hypatia, *R. Parish* 6
Aristotele's Crater, R. Hill 7
Searching for New Elusive Rilles, *KC Pau* 8
Gardner Mega-Dome to Lamont, *H. Eskildsen* 12
Crater Chains, *R. Hill* 14
Piccolomini Dome, *H. Eskildsen* 15
Wrinkle Ridges Near Piazzi Smyth, *A. Anunziato* 17
Posidonius, *H. Eskildsen* 20
Craters as Kepler Moon Villages, *A. Anunziato* 21
The Moon by Edouard Manet and the drawing on the trunk, *G. Scheidereiter* 24
Enigmatic Schiller, *F. A. Cardinalli and A. Anunziato* 29
Thermal Imagery of the November 2021 Lunar Eclipse, *D. Wilson* 32
Recent Topographic Studies 40
Lunar Geologic Change Detection Program, *T. Cook* 63
Basin and Buried Crater Project, *T. Cook* 73
Lunar Calendar, October 2022 78
An Invitation to Join A.L.P.O. 78
Submission Through the ALPO Lunar Archive 79
When Submitting Image to the ALPO Lunar Section 80
Future Focus-On Articles 80
Focus-On Announcement: Ever Changing Eratosthenes 81
Focus-On Announcement: Land of Cracks: Petavius 82
Key to Images in this Issue 83

The challenges of lunar observing! Please see page 53 for the resulting lunar image.

Online readers, click on images for hyperlinks

Lunar Reflections

Each month as I put together *The Lunar Observer*, I am thoroughly amazed at the quality of the work that is sent in by amateur lunar astronomers from around the world. Please look at the next page at our list of contributors and where they are from. In this issue, KC Pau leads us on exploration of newly discovered lunar rilles. Just think of that a moment. If the Moon has been mapped with orbiters with great detail, how is it that somebody with a 10 inch reflector can discover large new topographic features from here on Earth? Rik Hill, Howard Eskildsen and Alberto Anunziato lead us on topographic studies of the Moon. Alberto Anunziato looks into the history of Kepler and how he (Kepler) thought craters were built by lunar beings. Guillermo Scheidereiter explores the Moon with another delightful lunar story, this time starring Edouard Manet and his painting of the Moon (above). Darryl Wilson analyzes the results of his thermal lunar imaging of last November's lunar eclipse. Remember the next lunar eclipse is next month. Plus, Tony Cook continues his studies of Lunar Geologic Change and Buried Basins and Craters on the Moon. Plus, many wonderful images and drawings of the Moon in our Recent Topographic Studies. Many thanks to all who contributed to this issue! Please remember to look through your files to find lunar observations of the crater Eratosthenes. Please send them to Alberto and myself by October 20th. Until then...

Clear skies,
-David Teske

Lunar Topographic Studies

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Observations Received

Name	Location and Organization	Image/Article
Alberto Anunziato	Paraná, Argentina	Article with drawing *Wrinkle Ridges Near Piazzi Smyth, Enigmatic Schiller* and *Craters as Kepler Moon Villages.*
Rafael Benavides	Cordoba, Spain	Images of Cauchy, Mare Nectaris, Fracastorius and Castillo de Almodóvar del Rio (Córdoba).
Ioannis (Yannis) A. Bouhras	Athens, Greece	Image of Last Quarter Moon.
Cardinalli, Francisco Alsina	Oro Verde, Argentina	Article and image *Enigmatic Schiller* and image of Tycho.
Jairo Chavez	Popayán, Colombia	Images of the Waning Crescent Moon and the Waning Gibbous Moon.
Maurice Collins	Palmerston North, New Zealand	Images of Aristarchus (2), Rümker (2), Marius Hills and 12-day-old Moon.
Massimo Dionisi	Sassari, Italy	Images of Sinus Fidei, Huxley (2), Alphonsus and Rupes Recta.
Howard Eskildsen	Ocala, Florida, USA	Articles and images *Gardiner Megadome to Lamont, Piccolomini Dome* and *Posidonius*.

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

Lunar Topographic Studies

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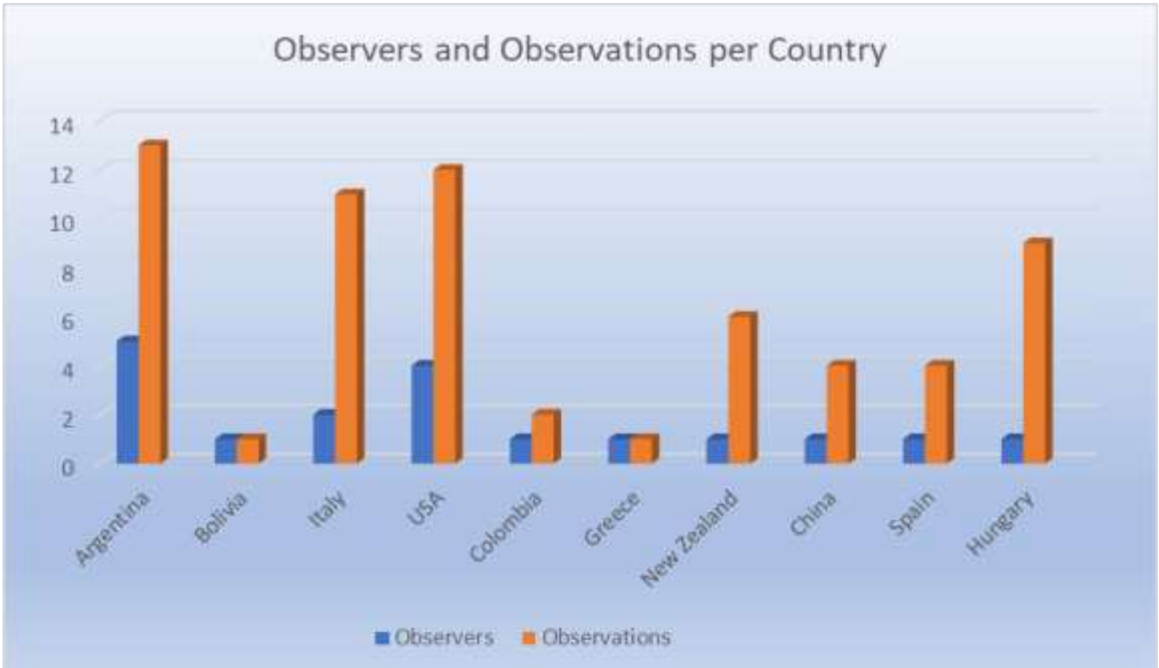
Observations Received

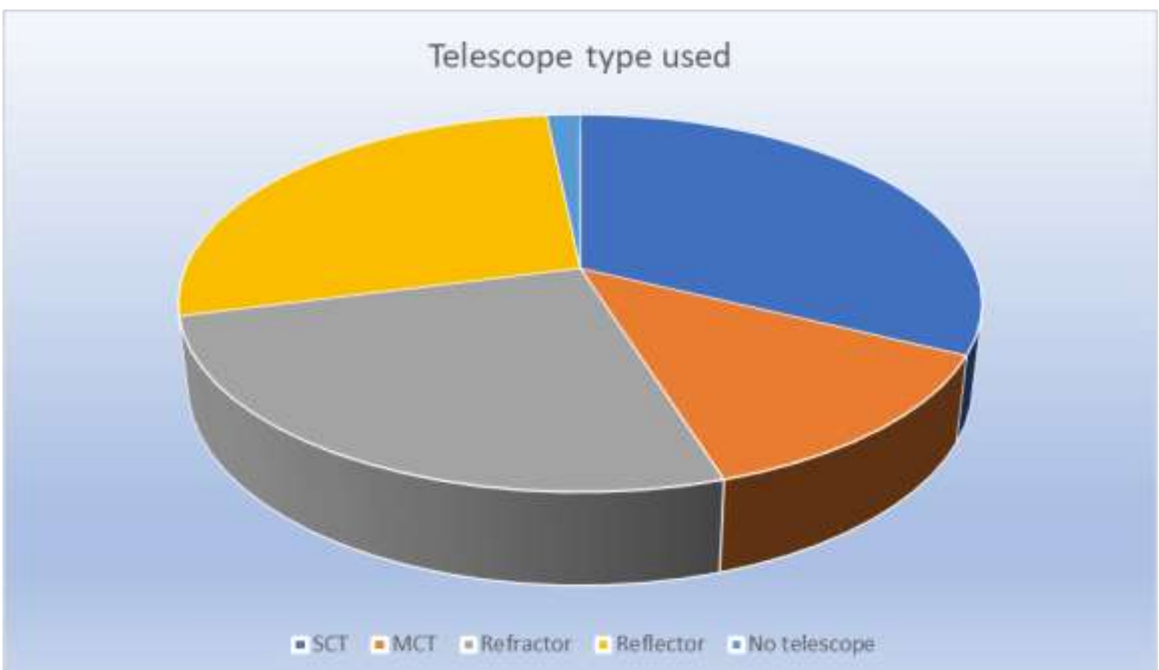
Name	Location and Organization	Image/Article
István Zoltán Földvári	Budapest, Hungary	Drawings of Dorsum Higazy, Hesiodus A, Moretus, Montes Carpatus, Montes Carpatus and Pytheas β, Montes Carpatus, Draper and Draper C, Kies A and Kies B, Mons La Hire and Helicon.
Marcelo Mojica Gundlach	Cochabamba, Bolivia, LIADA	Image of Tycho.
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Articles and images *Crater Chains* and *Aristotele's Crater*.
KC Pau	Hong Kong, China	Article and images *Searching For New Elusive Rilles*, images of Aristarchus and Petavius.
Raúl Roberto Podestá	Formosa, Argentina	Images of Theophilus, Albategnius, Montes Caucasus and Proclus.
Guillermo Scheidereiter	LIADA, Rural Area, Concordia, Entre Ríos, Argentina	Article *The Moon by Edouard Manet and the drawing on the trunk*, image of the Waxing Crescent Moon and Mare Serenitatis.
Fernando Surá	San Nicolás de los Arroyos, Argentina	Images of Aristarchus, Gassendi and Proclus.
Fabio Verza	SNdR, Milan, Italy	Images of Eratosthenes (2), Cleomedes, Petavius, Mare Crisium and Langrenus.
Paul Walker	Middlebury, Vermont, USA	Image of Copernicus.
Darryl Wilson	Marshall, Virginia, USA	Article and images *Thermal Imagery of the November 2021 Lunar Eclipse*.

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

October 2022 *The Lunar Observer*
By the Numbers

This month there were 63 observations by 18 contributors in 10 countries.





Call for Observations: Hypatia

Roy Parish

Stephen James O'Meara will have an article in an upcoming *Astronomy* about an interesting observation of the lunar crater Hypatia by Terry Atwood, of Shreveport, LA. At 01:13 U.T. on 16 Jan 1986, Atwood saw two bright rays flash across the crater floor and illuminate the west wall. Atwood and O'Meara are hoping that some A.L.P.O. members will look for the flash and confirm this lone observation. Roy Parish, also of Shreveport, has generated an ephemeris of times with similar illumination (Col 334 deg, solar azimuth at Hypatia 92 deg) using software written by the late Harry Jamieson, a long-time A.L.P.O. Lunar Coordinator. The ephemeris shown here is for central U.S.A.; the Moon may be below the horizon for some observers farther east and west. Stephen's article contains more detail about the observation and some interesting information about the crater and the fascinating woman for whom it's named.

You may want to mention that if any observer needs an individual ephemeris. I will be glad to do it. (rparish578@gmail.com). If you want to leave out the mention of me, that's OK, but I would hope to see Harry get some credit.

Printout by: Roy C. Parish (09-21-2022 at 11:10:52)

Starting Date = 2022 / 9 / 1 U.T.

Site Longitude = 93.62
Site Latitude = 32.32
Site Elevation = 45 meters
Feature = HYPATIA T.ATWOOD '86
Longitude = 22°36'
Latitude = -4°18'
Reproducing Lighting For: 1986 / 1 / 16 at 1 : 13 UT
Desired Solar altitude = -3.603° (Rising), Azimuth = 91.814°
Average Co-longitude = 333.786
In the time column, D=daylight, T=twilight

		---- Moon's ---- Topocentric		-- Earth's --		------- Sun's -------		
UT Date	Time	Alt°	Semi-diam"	Long°	Lat°	Colong°	Lat°	Azim°
2022/ 9/30	18:25D	13.78	969.07	-3.10	2.76	333.86	0.94	89.33
2022/11/28	21: 7D	30.12	988.83	3.69	6.77	333.74	-0.63	90.90
2023/ 1/27	2: 7	38.65	959.29	7.69	2.33	333.67	-1.53	91.81
2023/ 4/25	18:33D	33.99	900.75	3.00	-6.34	333.79	0.02	90.25
2023/ 6/23	17:28D	18.52	888.41	-2.29	-5.65	333.89	1.35	88.92
2023/12/17	19:37D	24.83	984.45	0.71	5.26	333.68	-1.36	91.64
2024/ 2/15	0:45T	58.11	977.90	6.24	-2.11	333.69	-1.22	91.49
2024/ 4/14	3:34	33.30	932.23	6.97	-6.71	333.81	0.25	90.02
2024/ 6/12	2:57T	33.74	902.45	3.31	-4.59	333.89	1.44	88.82

Aristotele's Crater

Rik Hill

On the south side of the of the east end of Mare Frigoris is the great crater Aristoteles (90km dia.). Visible 6 days into the lunation it is very obvious being almost the same size as Copernicus. It is certainly large enough, but has no defined central peak, only a few hills at its center. The walls are wonderfully terraced especially on the east side with a well-defined ejecta blanket beyond showing a nice radial splash pattern to the north. Mitchell (31km) on the eastern wall of Aristoteles, is completely overlain by ejecta from its larger, much younger neighbor. To the west is an even older ring crater Egede (37km) nearly completely buried by ejecta from numerous impacts and floods.

To the south of Aristoteles is another similar though slightly younger crater Eudoxus (70km). This crater also is large enough but lacks a clear central peak with only about a dozen smaller hills in the center. The ejecta blanket is closer in to the crater and more hummocky lacking any radial splash. Here too, notice the terracing is better defined on the eastern half of the crater. Farther south is a flat area that is Alexander (85km) just the ruins of a very ancient crater some 4 billion years old. West of Eudoxus are two craters the largest of which is Lamech (14km) and a little farther on the land rises to a wonderful plateau bounded on the west and south by spectacular kilometer high cliffs. What a magnificent sight this would be from the surrounding mare surface.

On the right edge of this image is the crater Burg (41km) that sits in the center of the fascinating Lacus Mortis (155km) that contains numerous rimae of differing origins one of which, Rima Burg, you can see going from the west wall of the lacus to just north of Burg. Off the south edge is another very different rima, an obvious vertical fault. Notice how straight that west wall of the lacus is. The walls of this lacus are very polygonal when the whole of it is shown. But that's for another day.

***Aristoteles**, Rik Hill, Loudon Observatory, Tucson, Arizona, USA. 2022 June 08 03:37 UT, colongitude 13.3^o. TEC 8 inch f/20 Maksutov-Cassegrain telescope, 665 nm filter, SKYRIS 132M camera. Seeing 8/10.*

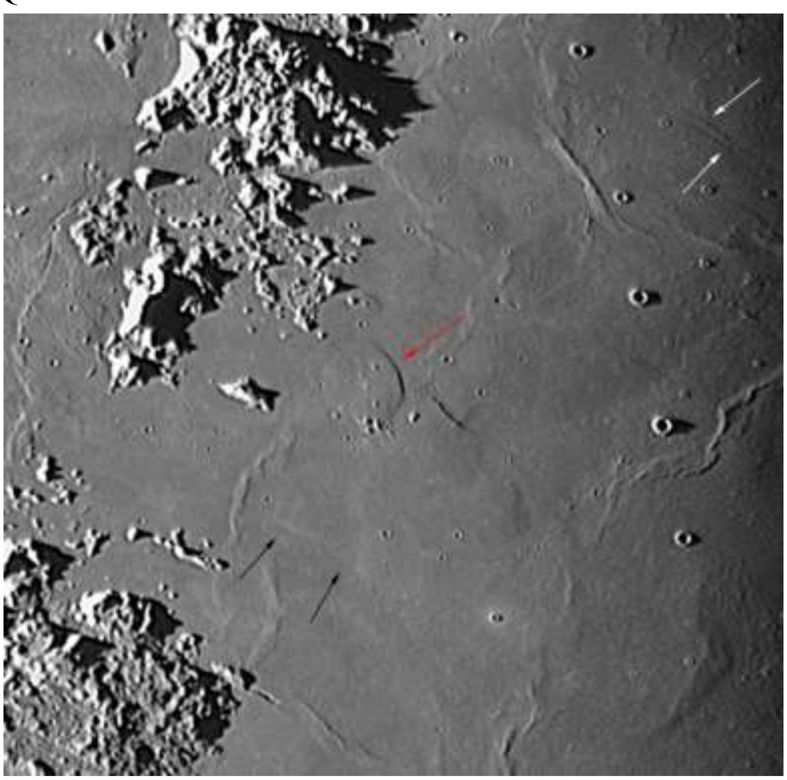
Searching For New Elusive Rilles

KC Pau

In 2011 December issue of Sky and Telescope, Dr. Charles Wood in his "Explore the Moon" column stated that "Backyard moon-watchers and lunar scientists tend to have different interests. The scientists are most interested in how and why things happened: in ages, compositions, and processes. Observers tend to be most interested in lunar geography: identifying features and perhaps searching for challenging craterlets or rilles. But often, amateurs have a chance to look in on lunar research discoveries for themselves." I totally agree with his points of view. As a moon observer for so many years, recently I devoted most of my observing time to look for elusive rilles on the moon. As you all know, space probes had already imaged every inch of the moon in great detail. It seems that it is not realistic for an amateur to discover delicate rille on the moon. However, with the fast development of CCD imaging and software technology, amateur now can acquire good quality of high-resolution moon image under oblique lighting angle. This kind of images may be missed or overlooked by space probes. Recently, LROC-QuickMap has launched a new experimental ACT Layers. Under this ACT Layers, a powerful new tool called TerrainHillshade is really a great help to confirm the existence of any elusive rille discovered by moon observers from their moon photos. It works by adjusting the light source position including zenith and azimuth, any elusive rille will show up as a real rille in front of your eyes. Not long ago, by using TerrainHillshade, my finding of Rimae Kan in north-western part of Mare Serenitatis is further confirmed (see LSC, TLO august 2022 issue). Recently, I had found two elusive rilles near Ina and in Mare Serenitatis. Again the existence of these rilles is confirmed by using TerrainHillshade. In the following, I want to share with you my experiences to discover these elusive rilles.

An elusive rille in the south-western part of Mare Serenitatis

Below is a photo taken on 16 Sep 2022, 20h49m UT with a 250mm f/6 Newtonian reflector prime focus with QHYCCD290M.

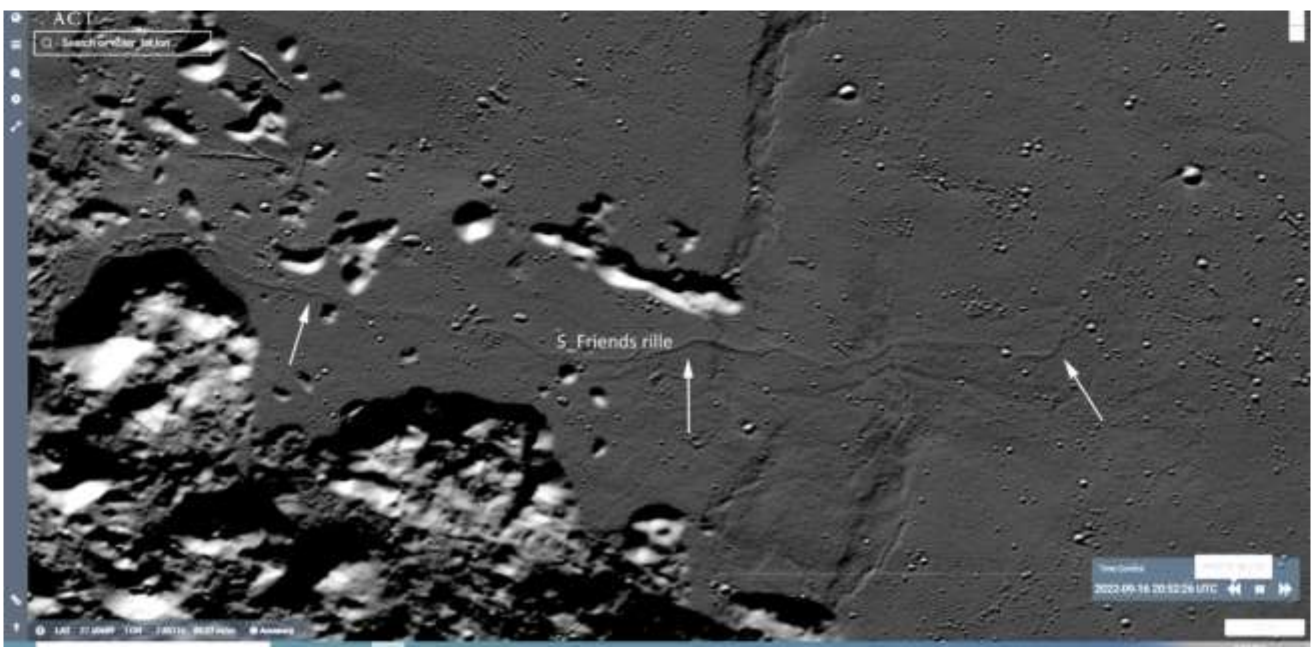


Rimae Kan is indicated by white arrows, Valentine Dome is by red arrow, a suspected streak is indicated by black arrows. It is this streak that causes my attention. I wonder if it is a real rille or just an illusion caused by light-shadow effect. Then, I immediately open the LROC-QuickMap to check if a rille is existed.

Lunar Topographic Studies

Under normal view, no rille is detected image credit:quickmap.lroc.asu.edu

In this normal view, no rille is detected but only a group of craterlets packed together and the power of my telescope cannot resolve them. Thus, a streak is seen instead. The next step is to open the TerrainHillshade tool. I carefully and patiently adjust the values of both the zenith and the azimuth to see if magic is happened. It takes quite a long time to reach the resulting view. The streak is only a group of craterlets but to my surprise a real linear rille south of the streak pops up into my eyes. It is a long and narrow rille with overall length 123 km and average width is about 0.65 km. The rille starts from a tiny craterlet in the east and wind through the plain and ends at somewhere north of crater Santos-Dumont. Finally, I screenshot the view and process it in Photoshop to increase the contrast and brightness so that the rille is well-displayed.

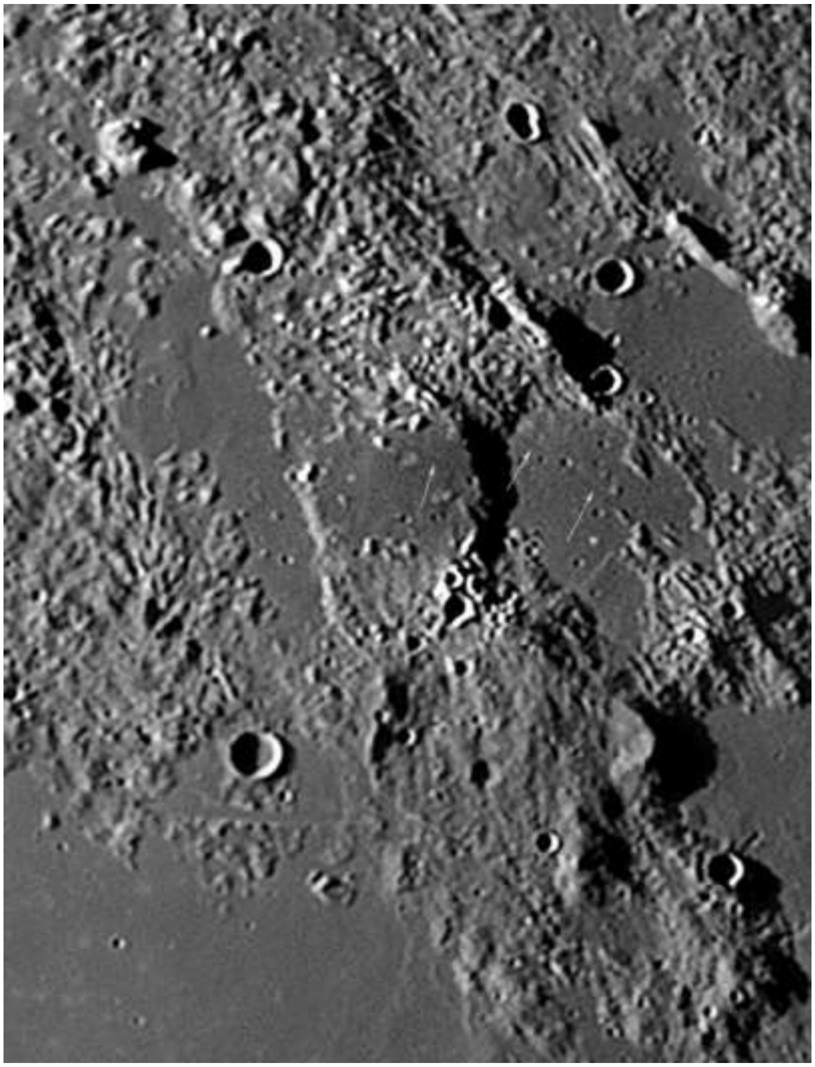


Under TerrainHillshade mode, the rille pops up mage credit:quickmap.lroc.asu.edu

For better communication among observers, I follow Danny Caes practice to name unofficially this rille as S_Friends rille to honor those guys that founded the second largest astronomy club 50 years ago in Hong Kong, China. I myself is also one of the founding members.

An elusive rille north-east of Ina in Lacus Felicitatis

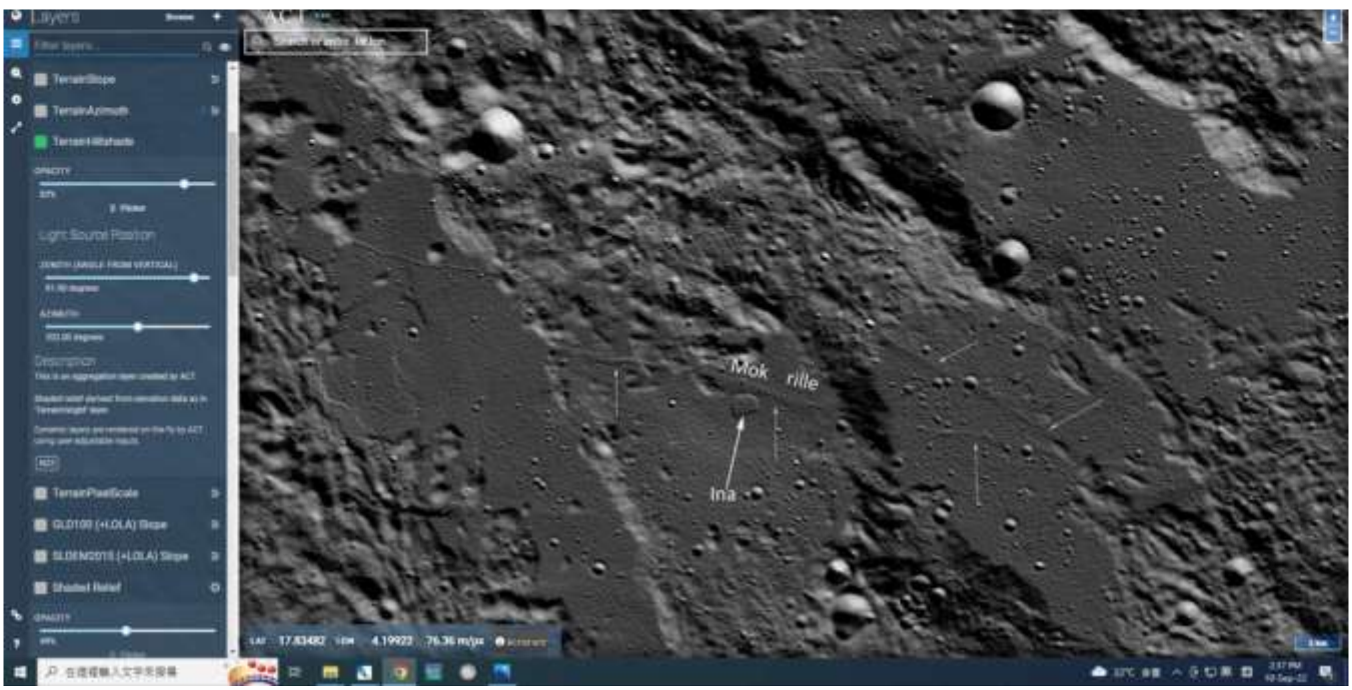
Below is a photo taken with 250mm f/6 Newtonian reflector and 2.5X barlow and QHYCCD290M on 9December 2017, 22h02m UT.



When I review this old photo several days ago, I notice there is a rille-like feature just barely seen north east of Ina. Another short rille is clearly seen in Manilius E. TerrainHillshade tool is employed to testify if the rille is really existing. Under normal view, a short streak is barely spotted north east of Ina but cannot be sure it is a real rille. Under TerrainHillshade mode, the rille is clearly seen with certainty. It runs diagonally from north west to south east across the plateau where Ina is located. The length of the rille is about 55 km with average width about 1 km. Again, I name this rille unofficially as Mok rille in honor of my best friend who is also a keen moon observer. Conclusively, amateur moon observers still have great opportunity to discover some elusive features on the moon if a good tactical plan is employed.

Lunar Topographic Studies

Under normal view, no rille is detected image credit:quickmap.lroc.asu.edu



Under TerrainHillshade mode, the rille pops up image credit:quickmap.lroc.asu.edu

Lunar Topographic Studies

Gardner Mega-Dome to Lamont

Howard Eskildsen

I finally got the courage to try my new imaging software with the Moon, I had been Photoshop, but it became too much for my computer to handle, so now I am using Affinity Photo. They have similarities, but also are significantly different, and Affinity is missing one of the filters, I had come to rely on. Anyway, I missed observing the Moon and decided to just accept whatever turned out. As it is I feel the Affinity process turned out acceptably.

Welcome to a volcanic wonderland. Gardner Mega-dome is just visible on the upper right, half illuminated in the setting Sun. Wrinkle ridges radiate away from it, across the margin of Mare Tranquillitatis, to crater ruins and peaks. Crater Jansen (note only one "s" in this spelling) lies just north of the ridges and is filled to the brim with lava, like a smaller version of Wargentin. A small crater lies inside near its southern margin. Multiple domes are visible on the right margin of the mare, some showing central pits.

Gardner Mega-Dome to Lamont, *Howard Eskildsen, Ocala, Florida, USA. 2022 September 15 09:28 UT, colongitude 146.1^o. Celestron 9.25 inch Schmidt-Cassegrain telescope, SKYRIS 236M camera. Seeing 7/10, transparency 4/6.*

Lunar Topographic Studies

On the lower left, oval ridges ring the formation named Lamont. It has been attributed to a buried crater, but I wonder if it might simply be the result of compressive forces as the solidified magma slowly settled. Several wrinkle ridges radiate away from the oval structure and nearly reach the other ridges noted above.

Between Lamont and the left margin, the crater Arago shows a curious interior that reminds me of a cow track due to a curious ridge angling upward from its center. More large domes are seen by crater, Arago alpha lies above it and Arago beta its left.

This image shows how over the ages multiple mare basalt flows filled low areas on the lunar surface and solidified. The lava's weight caused sinking that led to compressive forces producing the wrinkle ridges seen. Through the course of all this, craters impacted only to be later flooded with further basalt flows, some completely and others partly. As the volcanic activity decreased, domes were formed by intrusion or by effusive activity. The Gardner mega-dome may have been a combination of both while the small domes along the terminator were mostly extrusive.

As the volcanism ceased, other younger impacts excavated fresh, unaltered craters to complete the current scene. What a fascinating area to view and contemplate all that has gone on here over the eons.

Crater Chains

Rik Hill

As many of you undoubtedly know, the large crater below center is Copernicus (95 km dia.) and, appropriately enough, of Copernican age (less than 1.1 billion years old). To the upper right (northeast) of that crater is what seems like a smaller version, Eratosthenes (60 km) twice as old, of Eratosthenian age (1.1-3.2 b.y.o.). You can get a hint of this in that all the radial ejecta rays are gone around this crater erased from Copernicus ejecta. Between them and a little south is the ghost crater Stadius (71 km) barely seen here and older than either of the other two craters, as you might expect by its appearance. It is of Lower Imbrium age (3.2-3.8 b.y.o.) buried ejected material from both the other impacts as well as possibly the Imbrium impact itself.

But what interests us this time is not these big craters, but the chain of smaller craterlets and pits between Stadius and Copernicus. These have always fascinated me ever since I first noticed the larger craterlets in my 60 mm refractor in the early 1960s. Listed as satellite craters of Stadius, they range in size from 3-7 km for the named ones (Stadius A through W) though there are many more. You'll notice many are not nice round little craters, especially the spectacular northernmost gash. This is because they were formed from low velocity impacts of debris ejected in the Copernicus impact event. At one time they were thought to be examples of volcanic venting along a fault but now that we understand meteoric (asteroid) impact to be a dominant crater forming process we know a lot of these clustering of craterlets, near large craters to be the result of impact debris.

Try to see these in your telescope. For the small 50-80mm refractors they will be a challenge as they were once for me. A 10 cm telescope will start to show some of the fine detail. They are a good test for seeing.

***Copernicus and Stadius**, Rik Hill, Loudon Observatory, Tucson, Arizona, USA. 2022 May 11 02:07 UT, colongitude 30.7°. TEC 8 inch f/20 Maksutov-Cassegrain telescope, 665 nm filter, SKYRIS 132M camera. Seeing 8/10.*

Lunar Topographic Studies

Piccolomini Dome

Howard Eskildsen

Observing the Moon is like pulling a toy out of an overstuffed closet, you choose the one you want and as it is removed, the whole rest of the pile comes tumbling down on top of you demanding attention as well. I took this photo to show the Piccolomini dome, which is in the center of the photo just above the shadow from the southernmost portion of Rupes Alti. Mission accomplished. But wait!

The Nectaris-facing scarp of the Altai Mountains (Rupes Altai) is hideously deformed. Was it actually this ruggedly upthrust at the time of the Nectaris Basin impact, or has it been sculpted by later impacts, moonquakes, or other events. At least we don't have to consider the effects of water erosion, glaciation, and plate tectonics. Also, wind erosion would not be a factor unless, of course, lateral torrents of fluidized ejecta might be considered a temporary atmospheric wind. But where would such ejecta come from? Is it possible that the scarp could have been uplifted before the Nectaris Basin impact excavation was completed? It seems unlikely. Might more distant basin-forming events have had an effect. Wish I knew, but I will keep pondering and looking for clues.

Piccolomini Dome, *Howard Eskildsen, Ocala, Florida, USA. 2022 September 15 09:30 UT, colongitude 146.1^o. Celestron 9.25 inch Schmidt-Cassegrain telescope, SKYRIS 236M camera. Seeing 7/10, transparency 4/6.*

Lunar Topographic Studies

Of course, some of the irregularity of the Altai front is caused from subsequent crater-forming impacts, perhaps most of it. Several impacts along the front can be seen, the most notable being Rothman G, a 92 km, old, ruined, and partly filled crater that certainly took a bite out of the Altai Mountains. It is on the left central image.

And there is still more! Several craters show floors that have been uplifted, partly filled, or both. The bottom half of Catharina (at top of image) shows such modification as does the small crater Catherina S. The latter was nearly filled into oblivion. Same with Beaumont on the right top of the image. On the lower left corner of the image crater Riccius has an irregular interior with ripple-like marks, that on closer inspection appear to be tiny craters. Perhaps the wavy appearance is an artifact due to the limits of resolution of the image.

Much more could be discussed about this area, but I will save it for another time. This certainly has been a very busy part of the Moon over the eons, but it has been busy quite slowly in human terms.

P.S. Did anyone notice the small crater just southwest of Catharina that looks like an acorn? It has a dark “cap" on its left side and a bright “nut” on the right. But why is there a small bite out of the “cap” along its junction with the “nut?" The answer is in the image.

Wrinkle Ridges Near Piazzi Smyth

Alberto Anunziato

The eastern part of Mare Imbrium is, without a doubt, a fascinating area. A series of mountain peaks and ridges indicate the hidden topography of the ancient lava-buried basin that formed the Mare Imbrium. Near the terminator the mountains glow brightly, from Montes Recti to Montes Spitzbergen. The area that we observe is the surroundings of the Piazzi Smyth crater, which despite having a considerable size (22 km in diameter), does not present any detail, since it is below the limit of the complex craters with terraced walls and central peaks. It is crossed by a spectacular wrinkle ridge, which we will deal with later.

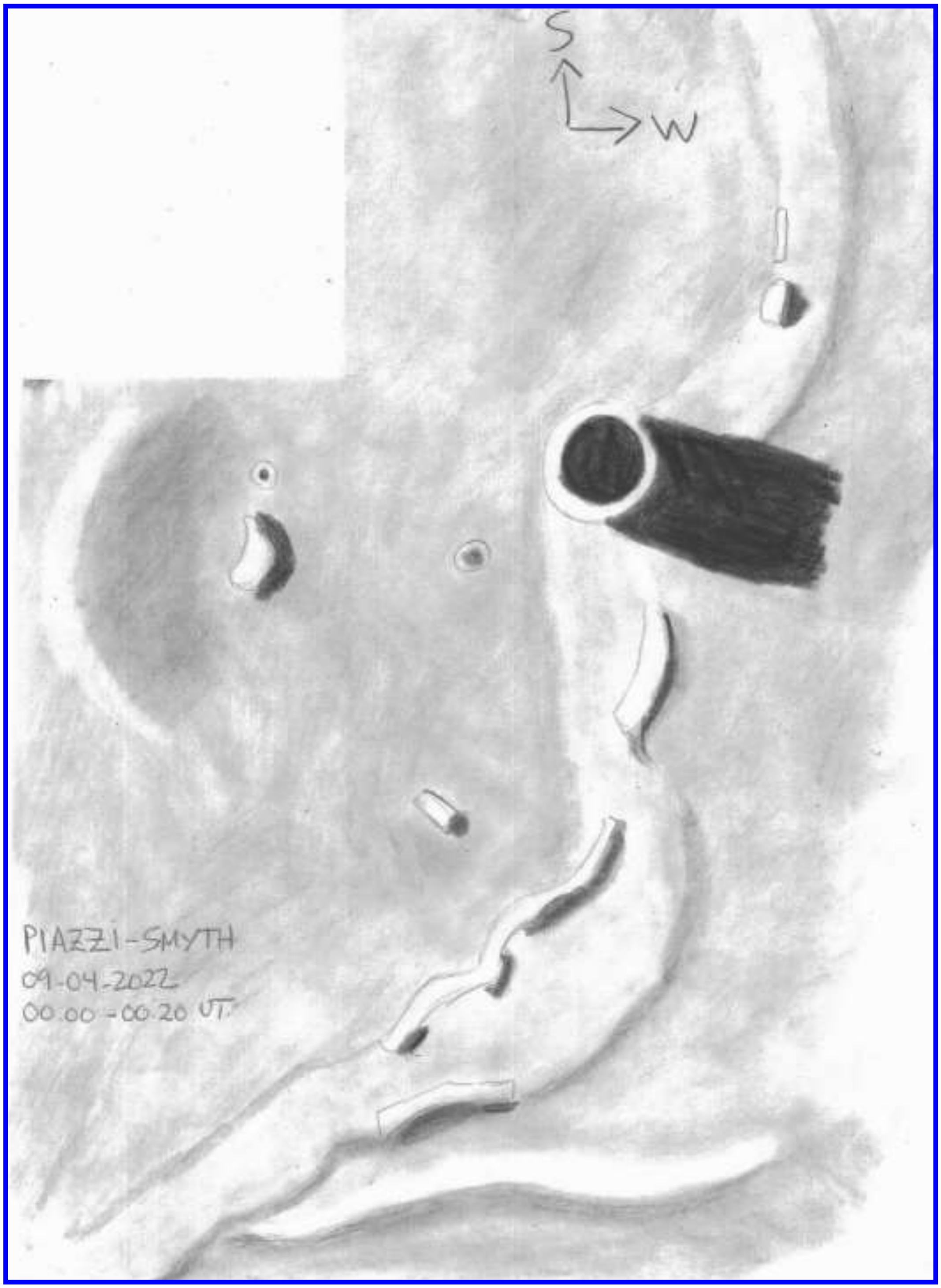


Image 1, Piazzi Smyth, *Alberto Anunziato, Paraná, Argentina. 2022 September 04 00:00-00:20 UT. Meade EX105 mm Maksutov-Cassegrain telescope, 154x.*

Lunar Topographic Studies

We will now compare the observation with the LROC Quickmap (from the Lunar Reconnaissance Orbiter mission) (IMAGE 2). Numbers 1 to 3 indicate isolated mountain peaks, which looked very bright and cast sharp shadows. The wrinkle ridges are indicated by the letters A, B and C. As is often the case when two ridges meet at a point, they are seen as one, such is the case of the wrinkle ridge A (north of Piazzi Smyth, that is, above) and the wrinkle ridge B (to the south). Ridge A is much less prominent than B, although there is likely to be a slight rise reaching Piazzi Smyth. Ridge A appears dim and with a very slight shadow, so it seems to be an anomaly that there is what appears to be the crest (highest part of a wrinkle ridge) a little north of peak 1 (it would be more likely to be a rocky elevation, but if so, it would be on the LROC Quickmap). The ridge B, on the other hand, is magnificent. You could clearly see the steeper upper part, called the crest, with sharp outlines (that's why we drew them that way) and pronounced shadow, even within the arch of the dorsum.

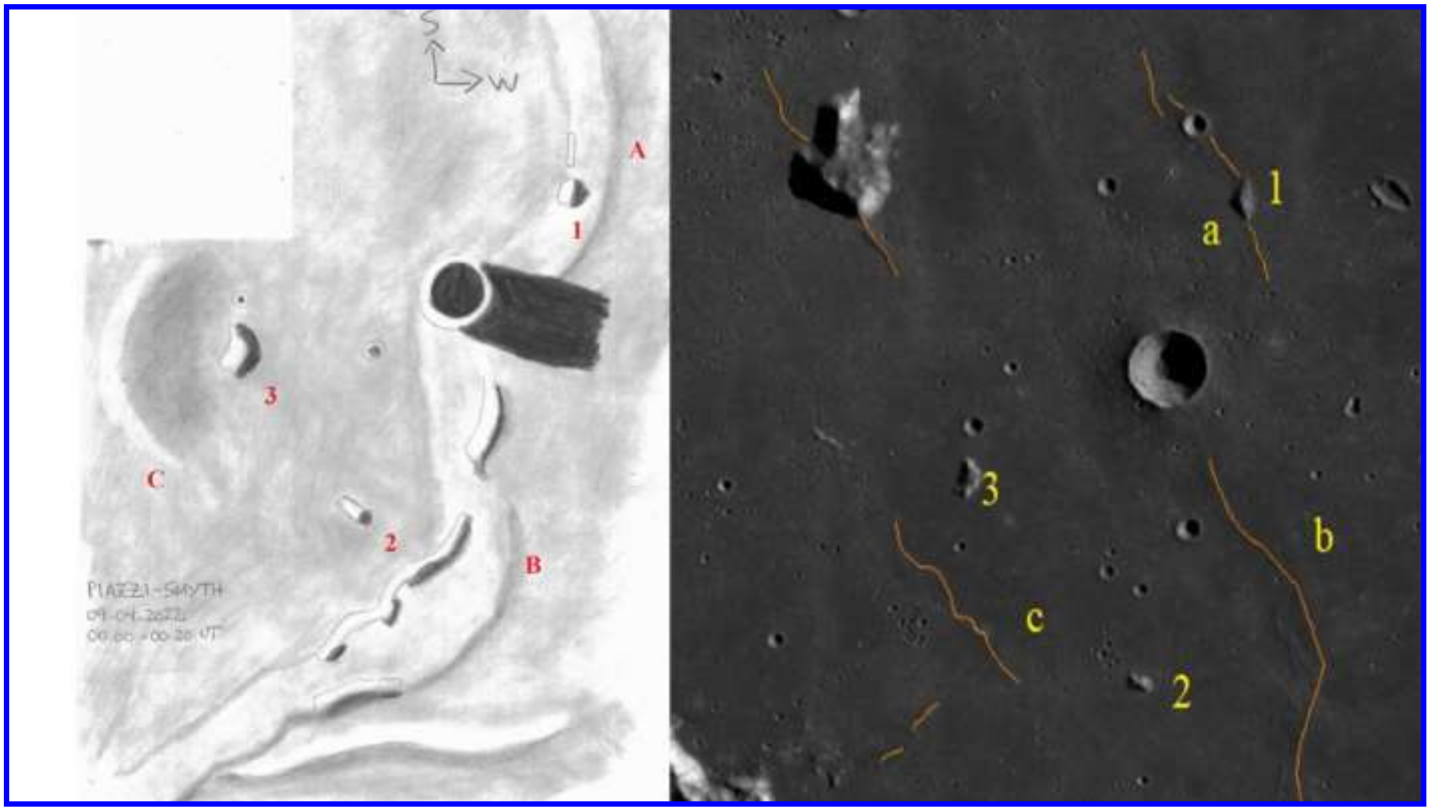


Image 2, Piazzi Smyth, *Alberto Anunziato, Paraná, Argentina. 2022 September 04 00:00-00:20 UT. Meade EX105 mm Maksutov-Cassegrain telescope, 154x and LROC image comparison.*

Lunar Topographic Studies

In IMAGE 3, also obtained from the LROC Quickmap, we tentatively mark these higher areas. Wrinkle ridge C, on the other hand, is the least evident, it was perceived as a slightly bright semicircle that delimited a slightly darker ground area. Three wrinkle ridges very different from each other, as usually happens. We also made a detailed observation of Mons Piton for the Lunar Geological Change Detection Program, which would be in the upper left of our image, and which we will share in the next issue.

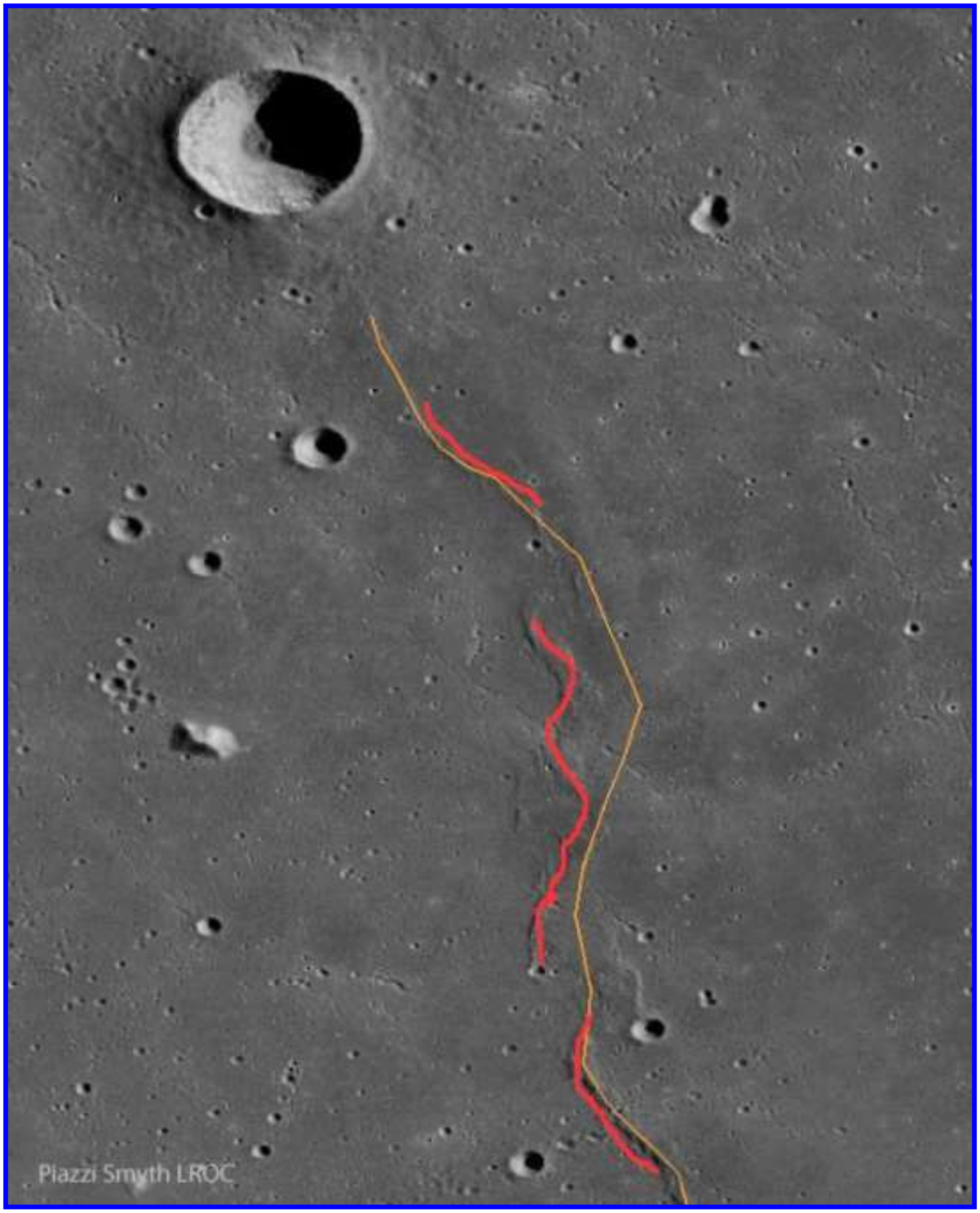
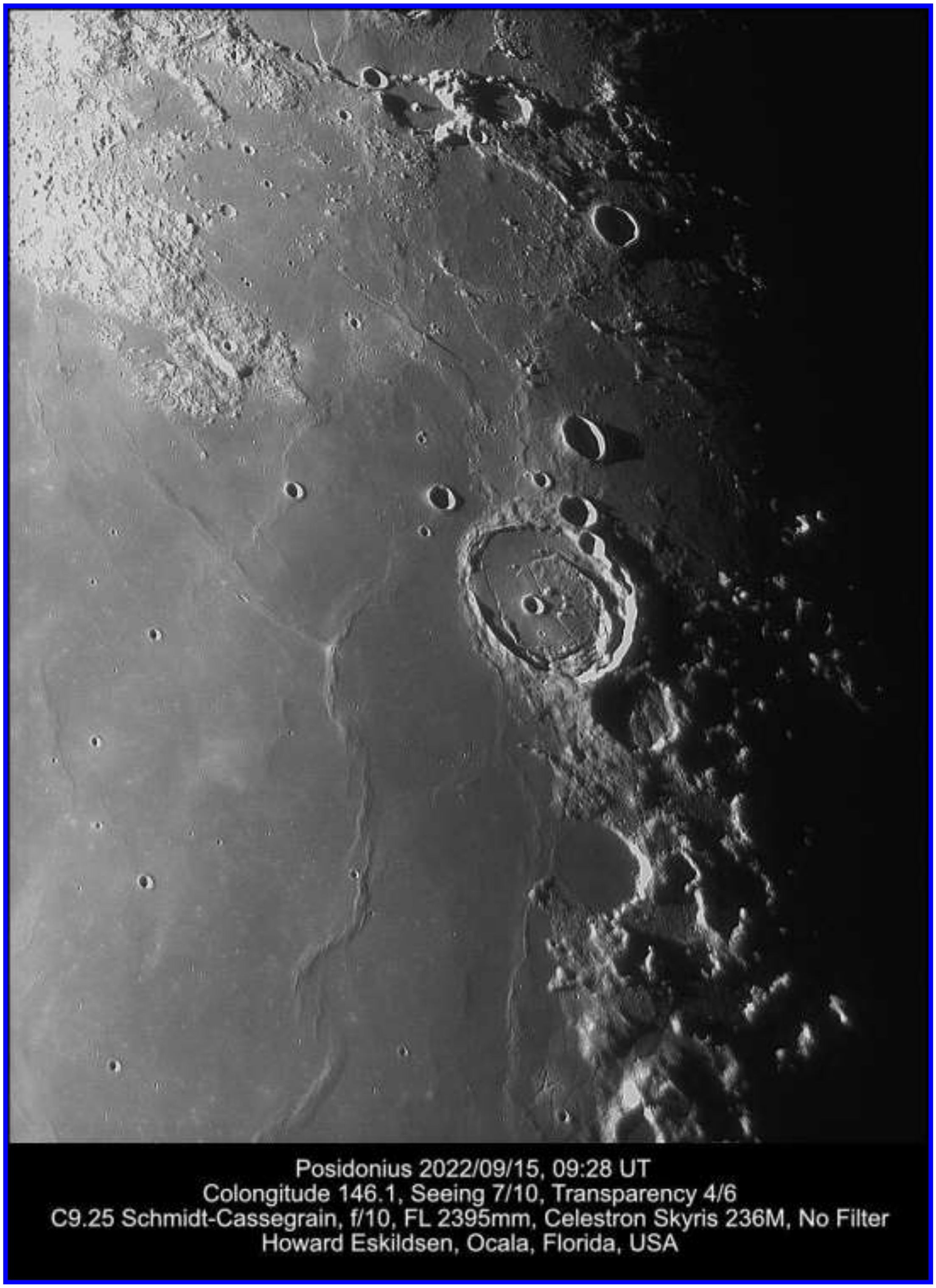


Image 3 Piazzi Smyth LROC.

Posidonius

Howard Eskildsen

The notable crater, Posidonius, lies just to left of center of the image. It has a floor that has been uplifted, fractured and partly filled with basalt on the north and west margins. Rilles fracture the uplifted floor on the right part of the crater floor while a sinuous rille sneaks along the western floor and extends to the margin of the northern crater where it arcs along the base of the inner rim. A notch in the western crater wall appears to be slightly lower than the floor at that point.



Other rilles, Rimae Daniel, course diagonally across the upper part of the image to the namesake crater Daniel, which is above Posidonius on this image. Other rilles are visible south of Posidonius and a notable group, Rimae Littrow, can be seen at the lower margin of the image.

Dorsa Smirnov snakes vertically across Mare Serenitatis and has earned the nickname Serpentine Ridge. Many other wrinkle ridges are visible in the surrounding mare. What a fun place to explore telescopically.

Posidonius, *Howard Eskildsen, Ocala, Florida, USA. 2022 September 15 09:28 UT, colongitude 146.1°. Celestron 9.25 inch Schmidt-Cassegrain telescope, SKYRIS 236M camera. Seeing 7/10, transparency 4/6.*

Lunar Topographic Studies

Craters as Kepler Moon Villages

Alberto Anunziato

Continuous visual observation, as long as the relentless clouds of our southern winter allow it, accustoms us to reflect on the relationship between what we observe on the lunar surface, through the eyepiece, and what we know about what we are observing, for have previously informed us. We are privileged to be able to observe based on what a series of space missions photographed from lunar orbit, not to mention what we know about lunar geology, for example. But the first observers had nothing to guide them, it was a true exploration without maps. Galileo made his first telescopic observation in 1609 and interpreted what he observed as a mountainous landscape for two reasons: because it was and because he had read the opinion of some philosophers (especially Plutarch) that the Moon was similar to the Earth, his observation confirmed the theory. But the analogy between the two worlds was not complete at all. The observers who followed were in great trouble interpreting what they were observing with their rudimentary instruments. It is clearly pointed out by Francis Manasek in "A Treatise in Moon Maps", referring to the observations of one of the most sagacious of the pioneers of selenography, the Italian Francesco Fontana (made in 1629): “Fontana worked in a period when telescope images were culturally very new and the creation of meaning from such images had no hermeneutic basis (…) Fontana is very weak when it comes to describing their morphology and clearly is struggling with the problem of what the various features really are and what he can call them. The generic term “spot” prevailed for a very long time. The following exemplifies his verbal inabilities to simply describe the structures themselves: “But other dark regions betray the presence on the lunar disc of hollows, pits, clefts, small clefts and narrow kinds of pathways, with the exception of some bright pathways which seem to indicate bright hollows. The dark areas are almost all observed to be less dark themselves when compared with the areas in shadow” (pages 103/105).

These epistemological difficulties are gigantic, which is why his observational skills are so appreciable, especially in the interpretation of what at that time was known by the generic and imprecise Latin term of “maculas”, whose nature was not known: “It was obvious to Fontana that some craters had central peaks and these he showed with artistic energy. The number of craters to which he ascribes central peaks is quite large and possibly not all of the central darkenings are meant to represent peaks. He does suggest a more complex crater morphology than do his contemporaries and, indeed, Hevelius only shows two central peaks on the whole lunar surface in his Map R (…) Fontana (…) depicted some craters as concave basins, others with central peaks, and others with suggestions of a flat floor” (page 107).

Of course, Fontana did not know that what he observed in the center of some craters was a mountain, we perceive it as such because we already know that certain craters must have one in their center. Manasek provides the news that Kepler would also have observed that some craters had something in their center and others did not. “When his *Somnium seu Opus Posthumun de Astronomia Lunari* was published in 1634 by his son, Ludwig, it contained a letter written in 1623 to Paulua Guldin in which Kepler, presumably using an astronomical telescope of his own design, observed that some craters had central peaks while other craters did not” (page 101).

How did Kepler interpret what he saw in the center? Not like mountains but like a kind of hollow elevation that he attributed to the intervention of intelligent beings. His little-known Appendix Geographica, seu mavis, Selenographica” (Geographical, or, if you prefer, Selenographical Appendix) to his novel “Somnium” (which tells of a trip to the Moon), anticipates what the notes to this appendix will attempt to demonstrate from their telescopic observations: that what we now know as craters (or at least those with a central peak, in modern terminology) are the result of intelligent design. This is what the Appendix says (the translation is ours):

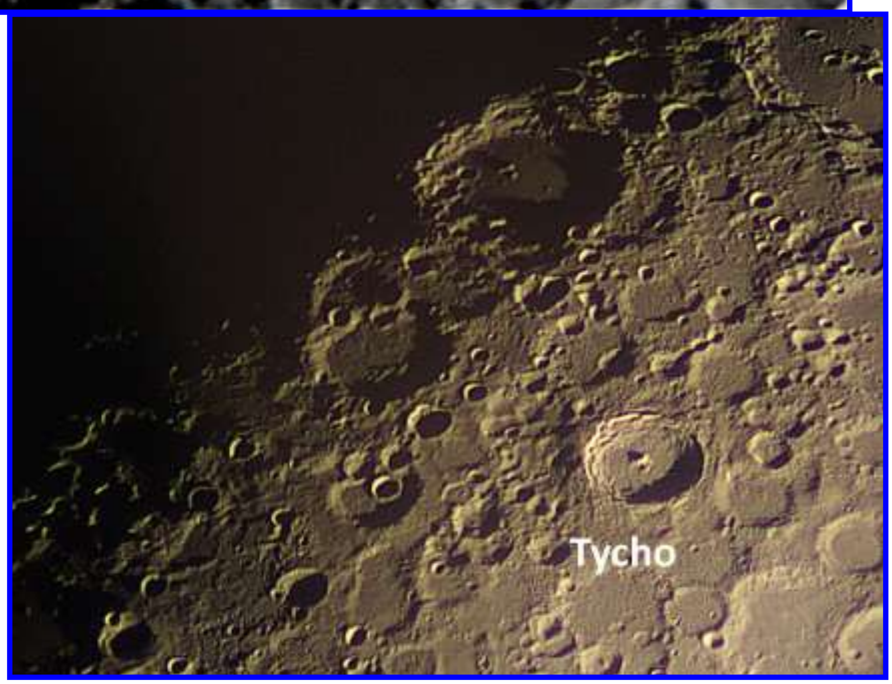
“If you think about the lunar villages, I will show you how I see them. The lunar cavities, first observed by Galileo, mainly indicate places that, as I show, are depressions in the surface, like our seas. But I deduce, from the very shape of the cavities, that these places are more like swamps. In these places, the endymionids usually measure the space of their villages, in order to protect themselves from humidity and moss, from the heat of the Sun and perhaps even from their enemies. Their method is as follows: they fix a stake into the center of the space that they are going to delimit for the construction, to this stake they tie strings, long or short depending on the size of the future settlement, the longest that I discovered reaches five Germanic miles; after having fixed the string, they extend it to the limit of the future circular palisade, which is the end of the string. Subsequently, they devote all their efforts to erecting the palisade, the moat being no less than a Germanic mile deep. In some villages they throw all the excavated material towards the interior, in others they throw it towards the outside, in others they throw the excavated material partly towards the interior and partly towards the outside, so that the palisade is double with a very deep intermediate moat. Each palisade has a perfect circular shape, achieved by all the strings extending the same distance from the stake. In this way, not only is the moat very deep, but also the center of the village, like the navel in the belly, forms a kind of lagoon, and the entire circular edge is very high due to the material excavated from the interior, since it would be very difficult to transport the excavated material when digging the moat to the center. Moisture from the fields is collected in the moat and all this liquid drains away, so that it floods the moat and it becomes navigable, and when it is dry, it can be crossed without problems. Consequently, when those who are in the center of space suffer the heat of the Sun, they move to the part that is in the shadow of their outer palisade, and those who are outside the center move to the shadowed area of the interior palisade of the moat. Thus, during the fifteen days in which the Sun continually burns the surface, they follow the shade (peripatetic-that is, those who walk -in the true sense of the word), in order to be able to withstand the summer. I propose to examine these problems point by point, starting from the phenomena observed with the telescope to check whether the conclusions agree with the axioms of optics, physics and metaphysics.

This text is followed by explanatory notes, point by point. We must not forget that Kepler devoted a large part of his work to lunar studies and that these were fundamental in the epistemological revolution of the change from the geocentric paradigm to the heliocentric paradigm. Thinking about the possibility that the Moon was inhabited was a certain possibility after experimentally corroborating Plutarch's thesis of its similarity to Earth. Kepler saw the circular shape of the craters as an indication of an ordering mind and for that he tested a hypothesis of how that ordering mind could have developed a technique to build villages ("oppida") that would allow the endymionids (so he called the supposed inhabitants of the Moon, by Endymion, loved by the goddess Selene) avoid the scorching sun of a sky without an atmosphere (Galileo had already noticed the absence of atmosphere on the Moon).

For Kepler, not all the craters (in our terms) would be swamps that house towns, in note 29 to the Appendix he says he had counted 23. We illustrate with two images of Tycho (which we opportunely sent to the Focus On corresponding to numbers 1 to 10 of Lunar 100), in a lunation phase that clearly illustrates what Kepler argues: the inhabitants of the center can move towards the shaded part, that is, to the left, while the endymionids that are in the moat (the floor of the crater) can move to the right, into the shadows of one of the crater walls (the palisade in Kepler's terms). Both images also illustrate how Kepler could have observed what we now call the central peak: as rounded luminous areas, which could be interpreted as a small crater within the larger crater, especially in IMAGE 1.

These speculations of Kepler were not irrational, I repeat, it was a possible interpretation in the first attempts to unravel what it was that they observed on the lunar surface. And it is also true that Kepler stated in a letter to his friend Matthias Bernegger that with his telescope he was constantly looking for the circular walls of the cities on the Moon.

Image 1, Tycho, *Luis Francisco Alsina Cardinalli, Oro Verde, Argentina, 2015 December 15 00:45 UT. Meade LX200 10 inch Schmidt-Cassegrain telescope, Canon EOS Digital Rebel XS camera.*



Tycho, *Marcelo Mojica Gundlach (Cochabamba, Bolivia, LIADA . 2019 July 07 23:30 UT. 150 mm refractor telescope, ZWO ASI120 camera. North is to the lower left, west to the upper left.*

Lunar Topographic Studies

The Moon by Edouard Manet and the drawing on the trunk

Guillermo Scheidereiter

I always kept in my memory the shape of that old trunk of dusty wood abandoned in a shed of the old house next to the wheels of a sulky, the mooring straps and leather breastplates with which the horse was fastened and the carpenter tools of my grandfather.[1] He built the house in his youth, after the long journey that began in his native Germany and brought him to Argentina, in the first half of the twentieth century. It was part brick and part adobe and surrounded by peach, orange, apple, poplar, and eucalyptus trees; the smell of earth, [2]flowers, forest can still be breathed in the place where it was located. Not far away, a corral, the noise of a cowbell, a cistern ("aljibe", in Spanish, whose curb still remains) and the permanent trill of benteveos, horneros and calandrias, constitute the characteristic forms that remain in my memory.[3]

In one room of the house, a lectern and some white, unpainted canvases were kept, overshadowed by the ashy traces left by the years and loneliness, as well as brushes and bottles with the remains of oil paintings of different shades. These elements belonged to my grandmother and currently, only one piece of porcelain is preserved that my mother rescued after the great storm, with the grooves to mix the colors. Although I was a child the last time I saw those objects (saving the reader unnecessary effort in calculating dates and ages, I tell him that my grandparents were no longer alive when I was born and my parents had lived in the new house for some years), still I have a very fresh memory of the painting with the Moon that was in a corner, on the floor, suffering neglect, humidity and the passage of time.

Edouard Manet, Le Clair de lune sur le port de Boulogne, 1868
(https://www.musee-orsay.fr/fr/oeuvres/clair-de-lune-sur-le-port-de-boulogne-835).

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[1]Small carriage that was widely used in rural areas of Argentina and in other parts of the world.
[2]Mass of mud, clay and straw.
[3]Local birds.

Lunar Topographic Studies

Years later I learned that it was a replica of a famous painting by Edouard Manet (1832-1883, Paris, France), *Le Clair de lune sur le port de Boulogne* (Moonlight over the Port of Boulogne), which is exhibited to the present in the Musée d'Orsay (https://www.musee-orsay.fr/fr/oeuvres/clair-de-lune-sur-le-port-de-boulogne-835), bequeathed by Count Isaac de Camondo, in 1911. The artist would have made this painting during one of his summer vacation stays in Boulogne-sur-Mer in 1868 and it represents the nocturnal activity on the edge of the port where a group of women awaits the arrival of the sailors. It never surprised me that a copy of this oil was part of my grandmother's objects, since she had French roots and probably studied painting in that country where, according to my father, she had lived for some time.

In *L'Astronomie*, a publication of the Société Astronomique de France, an article appeared, in 2016, entitled "*Clair de lune sur le port de Boulogne: enquête sur un tableau de Manet*", a translation by Janet Borg of a document written by Donald W. Olson, "*Moonlight on the port of Boulogne: A survey of a Manet*, which I could not access, but yes, researching about it, I learned something interesting that concludes there. Namely, by the calculations of the lunar phases, the 19th century maps that were consulted, the letters sent and received by Manet during his vacations and some photographs of the port of Boulogne, it was shown that the painting was painted from a window of the Hôtel Folkestone, where Manet was staying, on the pier at Boulogne-sur-Mer, around midnight between August 3 and 4, 1868.

That painting in the corner was, perhaps, my second encounter with the Moon, after the Moon itself. What caught my attention (and still does), is the light that the full form of the Moon shed behind the clouds, on the dense forest of masts. Undoubtedly, the scene and the play of light and shadow in this painting (reminiscent of Rembrandt's light and shadow), pay homage to the finest landscape painting.

And it is no coincidence that the Moon is the source of light used by great artists when portraying nocturnal landscapes. In "*The Book of the Moon, Histories, Myths and Legends*", the astronomer Fatoumata Kébé, maintains that it is in the poem La Chanson de Roland (The Song of Roland), where the word "*lune*" has its first appearance:

Clere is the noiz e the shining moon.

Clear is the night and the bright moon. *La Chanson de Roland* is the oldest known (or surviving) work of French literature, written in the 11th century in Old French and attributed to Turold, a Norman monk. It has its base in the battle of Roncesvalles, where Carlomagno's forces were commanded by Count Roldán. When he dies, Carlomagno, overwhelmed with grief, in a desperate act throws himself to the ground and implores God to stop the day. Then the moon comes out (http://guydepernon.com/site_4/ROLAND/AF/PAGE_64.xhtml):

Clere is the noit e the shining moon.
Carles se gist, mais doel ad de Rollant
E d'Oliver li peiset mult formment,
Some. XII. pers e of France gent.
[Qu']en Rencesvals ad laiset morz sang[l]enz.

From modern French it could be translated as:

Clear is the night and the bright moon.
Charles is in bed, but he thinks of Roland,
And Olivier's death causes him torment,
That of the twelve peers and of all the French,
Which he left in Roncesvalles, bloody!

Lunar Topographic Studies

The word "*lune*" comes from the Latin "*Luna*", which in turn derives from an Indo-European root, "*leuk*-", which means to shine, to illuminate (https://www.elcastellano.org/palabra/luna). Therefore, in the languages that derive from Latin, the word "*luna*" has an intrinsic relationship with light.

There are many world-renowned artists who in landscapes with night scenes gave special prominence to the light of the Moon and the Moon itself, as is the case of Vincent van Gogh who portrayed the Moon in one of his most famous works, "*The Night Starry*". There, the Moon, at the top right, dominates the night scene, seconded by Venus at the center, displaced to the left. The painting was made by van Gogh while he was in the Saint-Paul-de-Mausole asylum in Saint-Rémy, in the south of France, where he spent a year (1889-1890), seeking to recover from his mental illnesses. In more than one correspondence, van Gogh expressed concern about painting the night sky (https://www.moma.org/collection/works/79802?artist_id=2206&page=1&sov_referrer=artist).

Vincent van Gogh, The Starry Night, Saint Rémy, June 1889
(https://www.moma.org/collection/works/79802?artist_id=2206&page=1&sov_referrer=artist).

In British art we also find the Moon in the brush of the English master Joseph Mallord William Turner, in his oil painting "*Fishermen at Sea*", from 1796. The superiority and power of the moonlight contrasts with the weak light of a lantern, giving special emphasis to the power of nature over man (https://www.tate.org.uk/art/artworks/turner-fishermen-at-sea-t01585).

Lunar Topographic Studies

Joseph Mallord William Turner, Fishermen at Sea, 1796
(https://www.tate.org.uk/art/artworks/turner-fishermen-at-sea-t01585).

Thus, we see that the Moon and its light seem to have been features in the artistic movement of the 18th and 19th centuries. In German romanticism, the fascination with the Moon is confirmed in Caspar David Friedrich's painting, "*Two men contemplating the Moon*", where our natural satellite appears as an object of pious contemplation given in communion (https://www.metmuseum.org/art/collection/search/438417). And this just to mention a few.

Caspar David Friedrich, *Two Men Contemplating the Moon*, 1825-1830
(https://www.metmuseum.org/art/collection/search/438417).

Edouard Manet would have painted many paintings with scenes from the port of Boulogne-sur-Mer, however, this would be the only work in which he portrays a nocturnal event, where the light of the Moon prevails in the act.

Lunar Topographic Studies

Apart from the copy of "*Le Clair de lune sur le port de Boulogne*", the room had no other paintings or pictures hanging on the walls or pencil sketches, so the afternoon my mother opened the lid of the trunk in the shed, she was etched in my memory, because what I saw inside, dear reader, amazed me as much as the moonlight in Manet's painting. Inside were many paintings of vases of flowers, absent-minded birds perched on branches or in their nests, and fruit hanging from clusters or rising, huddled together, over the rims of a basket. They all reflected simply everyday moments, and were jealously guarded in rolls, carefully stacked one on top of the other, with the name of my grandmother, Elvira María, as the author. Also, there were some books whose brown pages showed signs of age and moisture, some written in French and others in German. A very small set of ivory dice in a silver tube (which is still preserved), was on a group of those stacked books and in a corner of the trunk, as if carelessly, two brown leather covers had a very old drawing inside, traced on a dark sheet, also stained by the passage of time. It featured a detailed sketched lunar crater, as if the draftsman were using a telescope or his wildest imagination to trace the curves, nooks, shadows, and lights that defined the terraced walls that accentuated the illuminated parapet.

I don't know if I recognized it as such instantly or at a later moment of maturity of understanding or if the custom of memory or the mysterious writing on the back installed it that way in my mind. Reading, observation and the years have led me to intuit the shape of Eratosthenes at the end of the Montes Apenninus.

I hope that the reader understands two important aspects of my story and what he will see next: the first, that I can only show him an old photograph of that strange drawing[4], since the original was lost forever in the storm and the mud brought by the great storm, like my grandmother's drawings and the copy of Manet's painting of which there was no other record than the one that remains in my memory. The second, that all this happened in the shelter of my astonished childhood, when everything was a game between the poplars and the orange trees, the peach trees and the apple trees, the cistern, the wet eucalyptus leaves, the aroma of the forest and wild flowers in the my mother's dress and hands; before the storm, when the old house was still standing.

The front of the drawing did not have any inscription, as can be seen in the photograph, but on the back there was a phrase written in French and some initials:

In the moonlight, next to the telescope.
Between never and always, on the port of Boulogne-sur-Mer.

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[4]This photograph was kept inside an old copy of "*Don Quixote of La Mancha*", by Miguel of Cervantes Saavedra. It lacks references. *E.M.*

Enigmatic Schiller

Luis Francisco Alsina Cardinalli and Alberto Anunziato

Schiller (IMAGE 1) is undoubtedly one of the most enigmatic craters. It is an elongated crater, but of gigantic size, its major axis measures 180 kilometers and the minor one 70 kilometers. Of course, its strange shape refers to its uncertain origin. Initially it was thought of a volcanic origin, in fact, until a few decades ago it was thought that most lunar craters were volcanic. I turned to the old "The Moon", by Thomas Elger, in search of a precise and beautiful description like all the ones in the book. But Elger (page 112) does not comment on the most obvious, its strange elongated shape. This has its historical explanation, for the paradigm of volcanic origin, Schiller is not so strange. Let us think that its shape and size are almost the same as the caldera today covered by Lake Toba (on the Indonesian island of Sumatra), which caused very significant climatic changes 70,000 years ago. The comparison is tempting, but the volcanic craters on the Moon, the ones we now know for sure to be volcanic, are very different in shape and size from Schiller. And, as Charles Wood says in "The Modern Moon": "The lack of surrounding massive ash deposits and the impact-like wall terraces makes this theory unlike" (page 177).

***Image 1, Schiller,** Luis Francisco Alsina Cardinalli, Oro Verde, Argentina, 2016 December 11 03:33 UT. Meade LX200 10 inch Schmidt-Cassegrain telescope, 742 nm IR pass filter.*

Lunar Topographic Studies

However, in 1985 it was still considered a relatively recent theory in "Implied origin for the craters Orcus Patera and Schiller from the lunar channel Bouvard", a text in which using what we now know as Vallis Bouvard, a chain of aligned impacts radial to the Mare Orientale basin, to which erosion gives the appearance of a valley (IMAGE 2), introduces what seems to have originated our crater, according to Robert Garfinkle: “Schiller appears to be the result of four or more overlapping impacts in which the mountains between the craters were destroyed and the area within the remaining exterior walls was flooded with generally smooth lava during the Imbrian age”. If we look at the craters near Schiller, such as Longomontanus or Clavius, we see that their floors, like Schiller's, are quite smooth despite being very old craters. But it is also true that “there is little evidence that any of the postulated craters overlap any of the others, implying that the craters formed simultaneously” (The Modern Moon, page 177), “Perhaps a small asteroid or comet was captured into lunar orbit and while spiraling inward, was torn into multiple pieces with the final near-grazing simultaneous impacts creating overlapping craters” (The Kaguya Lunar Atlas, page 132) and, more precisely: “Could a grazing impact account for a crater as big as Schiller? The dozens of large elongated craters on Mars point to an answer. Peter Schultz proposed that the Martian low angle impacts resulted when small moons about the size of Phobos and Deimos spiraled in and crashed onto the planet’s surface. Perhaps Schiller marks the final resting place of a small former satellite of our Moon” (The Modern Moon, page 177).

__Image 2__, Plate 246 Lunar Orbiter Photographic Atlas of the Moon.

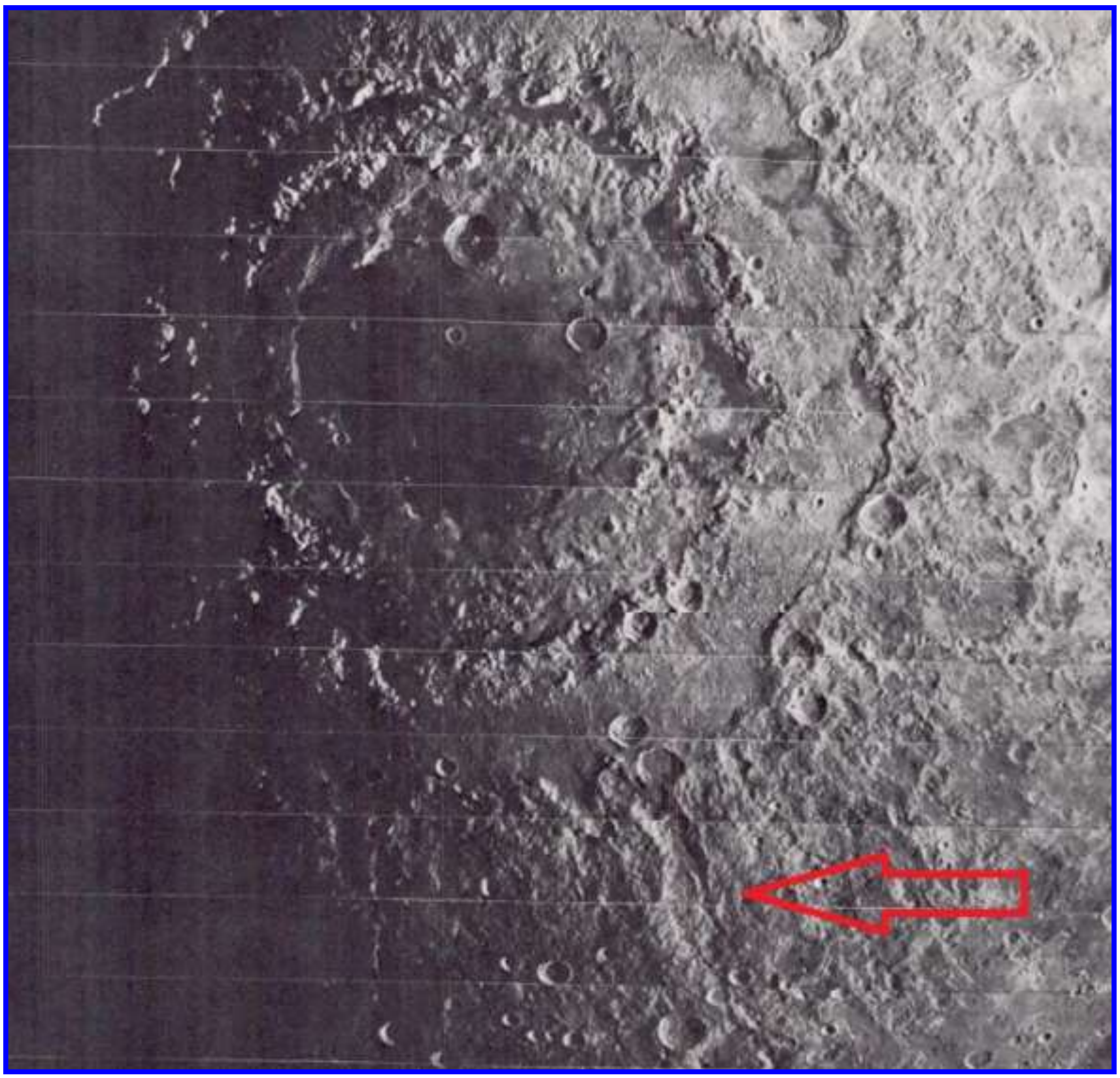


IMAGE 3 is an impressive view of Schiller from the Japanese Kaguya probe, which beautifully illustrates this description by Robert Garfinkle: “The crater is wider in the south than in the north, but tapers at each end. The floor at the southern end is smooth and, in the north, there are two mountain ridges that run down the middle of the crater and end near where a missing crater wall might have been. The northern has also has been hit with a couple of medium-size craters. The floor is sprinkled with small bright spots when observed under high solar angles of illumination”. Do you remember any other crater that features a central mountain ridge? Only Heraclitus, as I recall, relatively close to Schiller.

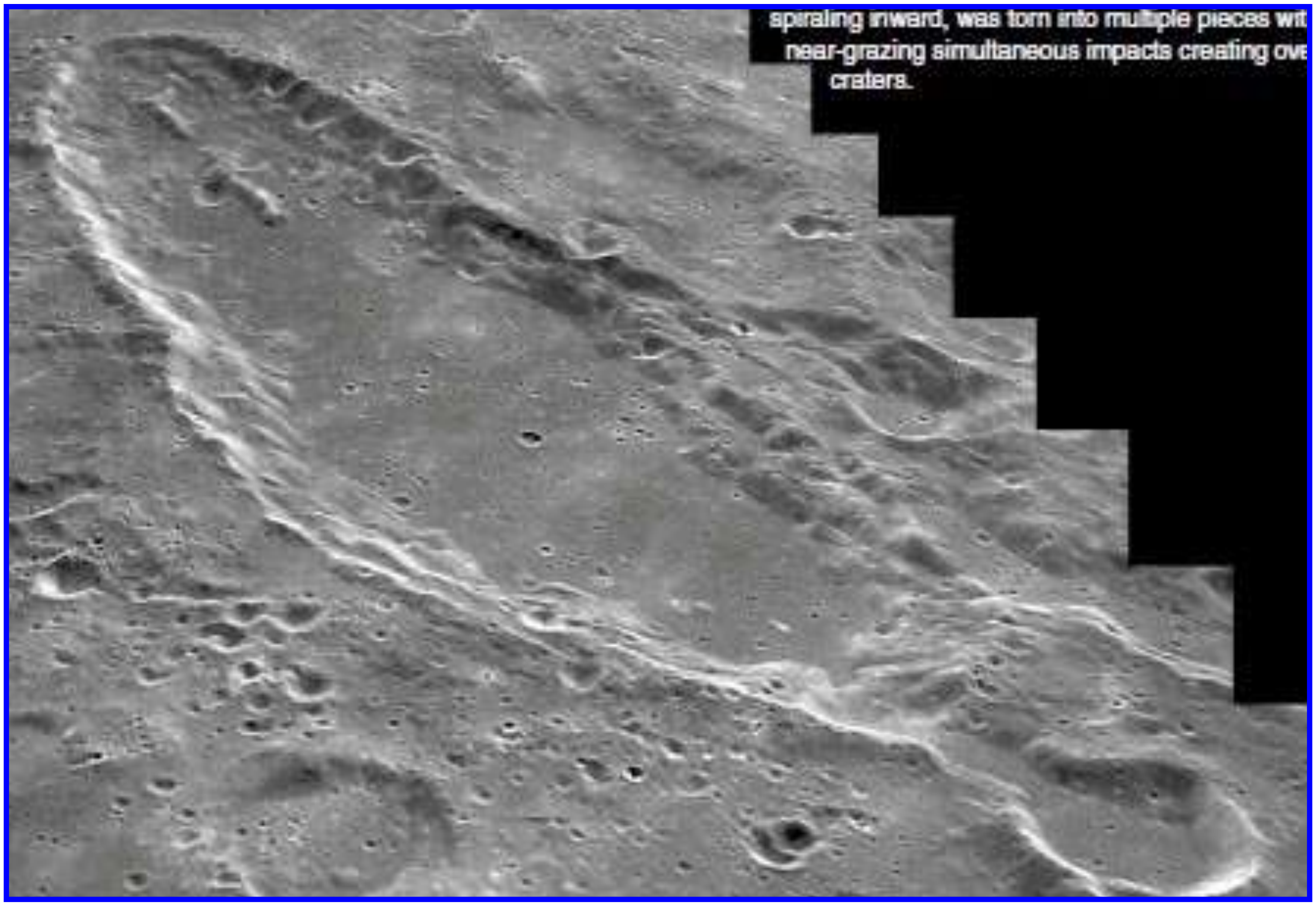


Image 3 Schiller, *Kaguya Lunar Atlas Page 71.*

References:

Bowker, David and Hughes, Kendrick (1971): Lunar Orbiter Photographic Atlas of the Moon, NASA.

Elger, Thomas (1895): The Moon, George Philip & son.

Garfinkle, Robert (2020): Luna Cognita, Springer.

Motomaro, Shimao and Wood, Charles (2011): The Kaguya Lunar Atlas, Springer.

Trego, Kent (1984): Implied origin for the craters Orcus Patera and Schiller fron the lunar channel Bouvard (Letter to the Editor), “Earth, Moon and Planets 33, pages 99-102.

Wood, Charles A. (2003): The modern Moon. A Personal View, Sky and Telescope.

Implied origin for the craters Orcus Patera and Schiller from the lunar channel Bouvard

Thermal Imagery of the November 2021 Lunar Eclipse

Darryl Wilson

This article documents three aspects of the total lunar eclipse of November 19, 2021. First, numerous thermal hot-spots were recorded from 0750 UT to 0820 UT. Thermal images of most of the disk are presented and many of the thermal features are identified. Second, rapid decline in emitted thermal radiation in the southern highlands surrounding Tycho from 0805 UT to 1004 UT is examined. Third, visible light images after totality were processed to show surface details still in the umbral shadow.

Weather was a constant problem throughout the event. Frequent wind gusts and mostly cloudy skies prevented observations most of the evening. Although effort was continuous, visibility was intermittent at best due to episodes of cloud cover that often lasted 15 minutes or more. At best, thin clouds usually degraded the view and caused contrast problems during processing of the images. Nevertheless, the immense amount of thermal detail with strong contrast permitted recording of many features during a 30-minute window of fairly clear skies during totality.

Figure 1 illustrates the entire eclipse event graphically to easily show the three imaging events the author managed to achieve during the evening. Clouds delayed the beginning of observations, then they interrupted observations from 8:23 UT (40 minutes before maximum) to 9:46 UT (43 minutes after maximum), resulting in no images for almost an hour and a half during mid-eclipse.

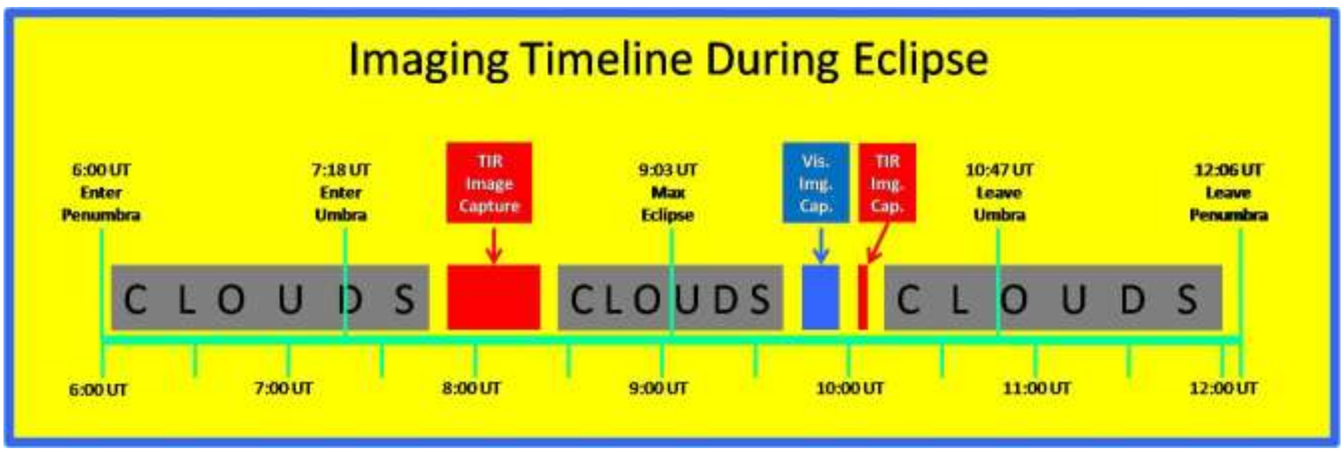


Figure 2 is a timeline of key eclipse events interspersed with this author's imaging efforts.

Lunar Eclipse Event Timeline

November 19, 2021

Partial eclipse begins	7:18 UT
First mosaic image	7:50 UT
50% into totality	8:00 UT
Last Mosaic image	8:20 UT
Mid eclipse	9:03 UT
First visible light image	9:46 UT
50% out of totality	9:55 UT
Last visible light image	9:58 UT
Last thermal image of Tycho	10:02 UT
Partial eclipse ends	10:47 UT

Figure 3 lists the craters that were identified in the thermal images for which umbral eclipse events were recorded and published in the January 2022 issue of "The Lunar Observer" [Ref. 1].

Lunar Eclipse Umbral Coverage Events

November 19, 2021

	Entry Time	Image Time	Cooling Time	Exit Time
Aristarchus	7:25	7:58	33 min.	9:51
Kepler	7:36	7:55, 7:59	19, 23 min.	9:50
Birt	8:06	8:05, 8:12	-1, 6 min.	9:51
Copernicus	7:41	7:55, 8:12	14, 31 min.	9:59
Tycho	8:24	8:05, 8:20	-19, -4 min.	9:37
Aristoteles	7:46	7:51, 7:53	5, 7 min.	10:27
Menelaus	7:57	7:51, 53, 55, 58	-6, -4, -2, 1 min.	10:23
Proclus	8:10	7:51, 7:53	-19, -17 min.	10:38

	Exit Time	Image Time	Warming Time
Tycho	9:37	10:02	25 min.

According to Sky and Telescope, at the author's location, the umbral phase began at 7:18 UT and was maximum at 9:03 UT. Except for the last one, all of the entries in Figure 3 represent images that were taken before maximum eclipse. Entry time is the time the umbra crossed each crater, as recorded by David Teske [Ref. 1]. Cooling time is the number of minutes after umbral coverage of the crater. Negative cooling times indicate that the crater was still in the penumbra and was still receiving some direct irradiation when it was imaged.

The last entry in Figure 3 represents an image of Tycho taken 25 minutes after the umbral phase was over. The warming time is the time Tycho was exposed to direct sunlight and began warming back to daylight temperature.

Figure 4 enumerates the collection of processed thermal images that comprise the entire set that was collected that night. The timestamp is the computer-recorded time of the first thermal image of a group that were stacked to form the processed image. Images were captured at a rate of about one every two seconds or so, so a stack of 40 could cover up to about two minutes. The mean time associated with a stack of thermal images is often about one minute later than the timestamp time.

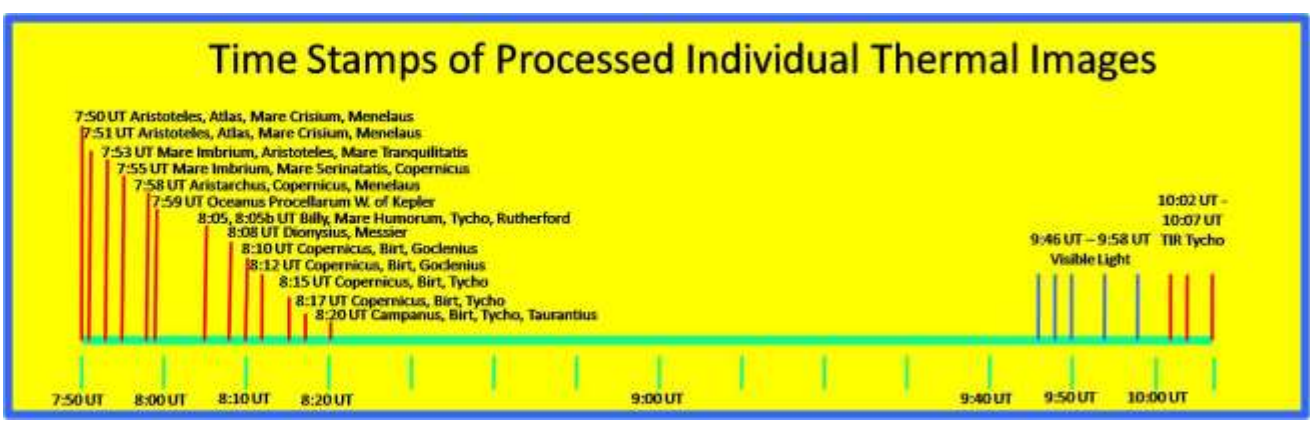


Figure 5 is a mosaic of thermal images collected from 7:50 UT to 8:20 UT. The umbral shadow obviously moved considerably during the 30 minutes that elapsed from the first to the last image, but the shadow edge was very roughly located near the yellow curve, and was advancing in the direction of the arrows. Several mosaicking discontinuities (e.g., eastern Mare Tranquillitatus) detract from the artistic value of the composition, but many thermal hot spots can be clearly identified.

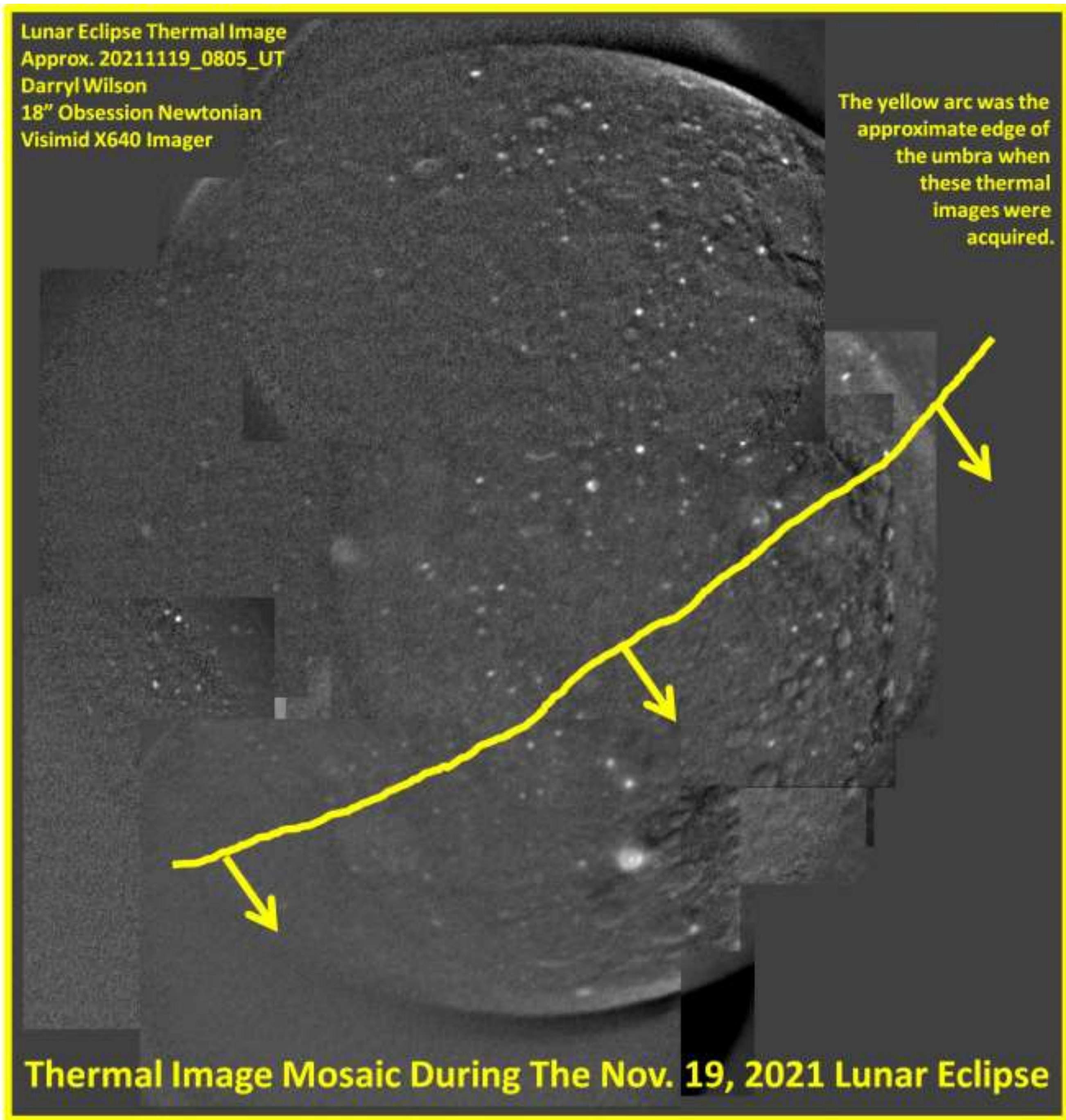


Figure 5, Thermal Image Mosaic During the November 19, 2021 Lunar Eclipse, *Darryl Wilson, Marshall, Virginia, USA. 2021 November 19 08:05 UT. 18 inch Obsession reflector telescope, Visimid X640 Imager. 1.8 arc seconds per pixel.*

A naive prediction might be that a thermal view of the moon would appear just as it has in previously published images (Refs. 2, 3, 4] until the umbral phase begins. Then, as the surface rapidly cools after insolation is abruptly blocked, high-contrast, glowing features would rapidly emerge. This is not what happens. High-contrast, glowing features begin to appear during the penumbral phase, and actually fade slightly during the umbral phase. Here's why.

Imagine you are standing in a lunar crater, looking toward the sun just before the eclipse begins. Eventually, the earth's limb contacts the limb of the sun and begins to cover the source of insolation that lights and heats your vicinity. Due to the highly insulating nature of lunar regolith, and its corresponding low heat capacity, a small change in insolation quickly causes a radiative imbalance that is corrected by a lowering of temperature of the regolith. Areas that have a greater fraction of regolith-free, exposed silicates have greater thermal inertia and cool much more slowly. This quickly causes a detectable temperature difference. Surface materials with high thermal inertia become hot spots that are the most prominent features in thermal images. Most are craters in the 6 to12 mile size range [Ref. 4].

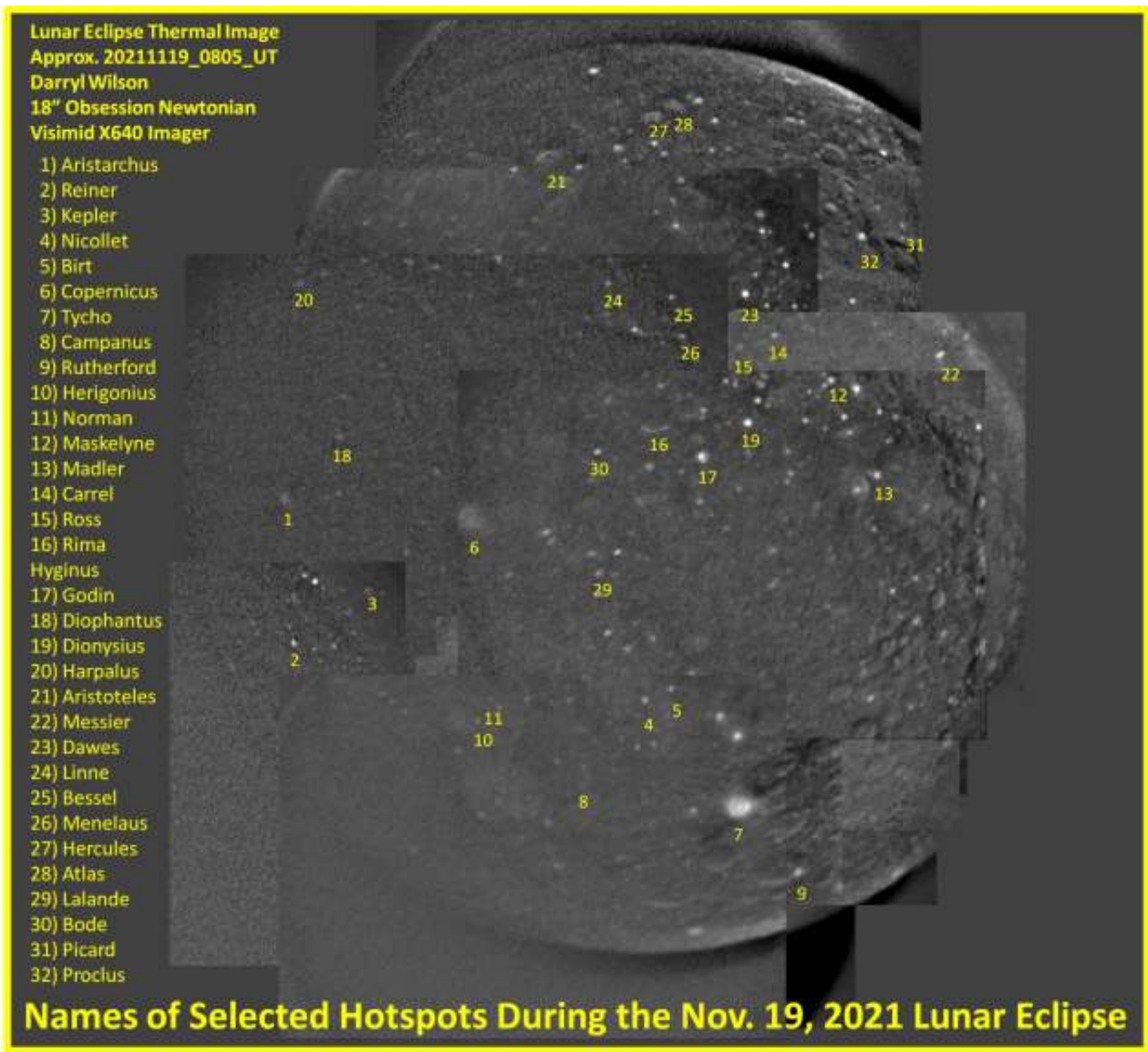


Figure 6 identifies 32 of the hotspots. Numbers have been placed directly below the feature they label whenever possible.

Tycho has long been known as a major lunar hotspot. Figures 7, 8, and 9 allow us to watch the progression of temperature changes near the crater during the two hours from just before to just after totality.

Figure 7 was imaged 19 minutes before umbral crossing. If the sun was 80% covered at that point, then it was irradiating Tycho at 20% of the normal rate. That would be 0.2 X 1340 W / m^2 / µm = 238 W / m^2 µm That's still more than the amount of irradiation we get on a cloudy day. But it's not enough to maintain normal daytime lunar surface temperatures.

The equation of radiative flux is $F = \varepsilon \sigma T^4$. Solar flux (F) at the earth's distance from the sun is about 1340 W / m^2, resulting in a maximum temperature on the lunar surface of 397 K (assuming an emissivity of 0.95). Changing F to 20% of its normal value results in a calculated temperature of 266 K. This means that at the time of the first image of Tycho, the equilibrium surface temperature of that area of the moon was about 130 C less than it would have been with full solar illumination. But the surface had been cooling ever since the penumbra first arrived, so the temperature imbalance was less than 130 C. How much less? The Lunar Reconnaissance Orbiter science team has shown that surface temperatures of the regolith drop rapidly (in a few hours) after sunset to about 100 K.

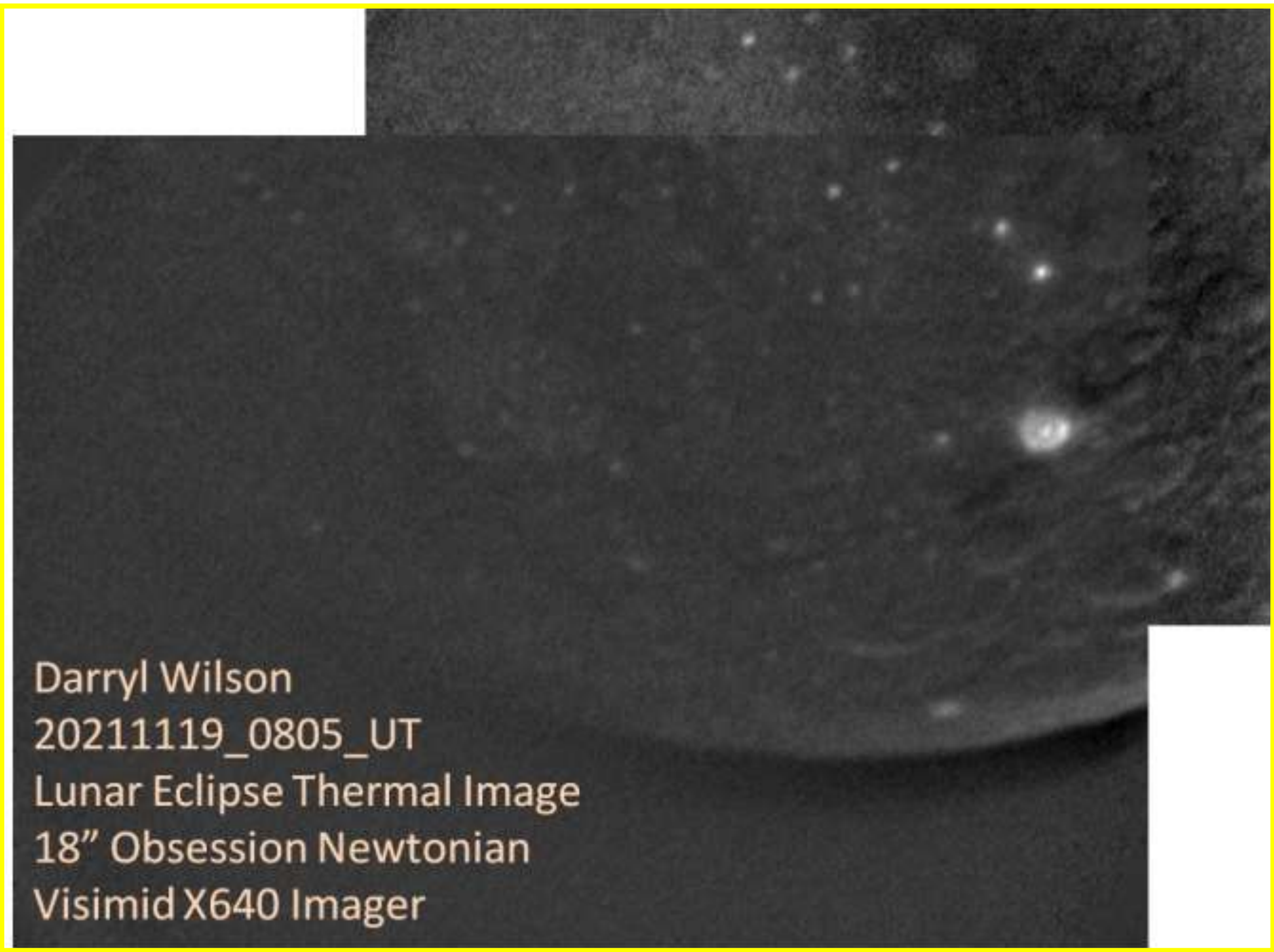


Figure 7, Tycho 19 minutes before the umbra during the November 19, 2021 Lunar Eclipse, *Darryl Wilson, Marshall, Virginia, USA. 2022 November 19 08:05 UT. 18 inch Obsession reflector telescope, Visimid X640 Imager. 1.8 arc seconds per pixel.*

Imaging Techniques

Cooling during the penumbral stage of the eclipse happens more slowly than that, but the low thermal inertia of the regolith causes it to cool significantly even as the penumbra advances with its almost imperceptible shadow. The result is a high contrast thermal image of the southern highlands at 0805 UT - 19 minutes before the umbra arrived.

Figure 8 was taken 15 minutes afterwards, and it looks almost identical to Figure 7. Close examination reveals that several of the faint hotspots to the west of Tycho have faded during those 15 minutes. The western area of the Figure 8 was in full eclipse at the time of the image, and cooling was proceeding as rapidly as possible.

Figure 8, Tycho 15 minutes later during the November 19, 2021 Lunar Eclipse, *Darryl Wilson, Marshall, Virginia, USA. 2021 November 19 08:20 UT. 18 inch Obsession reflector telescope, Visimid X640 Imager. 1.8 arc seconds per pixel.*

The image for Figure 9 was taken well after mid-eclipse. The umbral shadow was well to the east of Tycho at this time, and was moving upwards and to the right. The upper right of the image is slightly darker because that part of the surface had not yet had opportunity to warm as much as the western areas. Recall that this entire image is still in the penumbra, with greater solar obscuration at the upper right. We expect to see a steady temperature gradient from left to right in the image due to this factor. Nicollet and Birt, near the upper right, are still clearly visible as hotspots. Birt was still in the umbra only 10 minutes earlier, so the surrounding regolith has had little time to warm and only a sliver of sunlight.

Figure 9, Tycho well past mid-eclipse, November 19, 2021 Lunar Eclipse, *Darryl Wilson, Marshall, Virginia, USA. 2021 November 19 10:02 UT. 18 inch Obsession reflector telescope, Visimid X640 Imager. 1.8 arc seconds per pixel.*

All three Tycho images show Clavius and Rutherford. Note that Rutherford, a hotspot at 0805 UT and 0820 UT, had faded by 1002. This suggests that the cavity effect [Ref. 4] may be more important than the thermal inertia factor in its nighttime glowing ability.

Figure 10 is a visible light image of the eclipse at 0954 UT. It shows the position of the umbral shadow 8 minutes before the last thermal image of Tycho.

Figure 10, Moon, November 19, 2021 Lunar Eclipse, *Darryl Wilson, Marshall, Virginia, USA. 2022 November 19 09:54 UT. 3 inch refractor telescope, Celestron 274C Imager. 2.25 arc seconds per pixel.*

In this article, we examined thermal images acquired during the lunar eclipse of November 19, 2021. Poor weather conditions interfered with observations throughout the night, but some thermal images were acquired. A full disk mosaic was generated and used to identify and label many lunar hotspots. The time of umbral crossings of several craters were cross-correlated with the timing of imaging events to better understand how patterns of surface temperatures varied as a function of the fraction of solar irradiation incident to the surface as the eclipse progressed. We noted that strong thermal contrasts develop during the penumbral stage due to the low thermal inertia of the regolith surrounding small craters and areas of exposed fresh silicates. This was confirmed by solving the radiative flux equation for two conditions. A time-series of images of Tycho revealed cooling of some hot spots after umbral coverage, rapid disappearance of a hotspot caused by Rutherford, and a global temperature gradient from west to east after the umbra passed. We guessed that the rapid disappearance of the Rutherford hotspot means that it was caused by a cavity effect rather than an exposed silicate outcrop. A visible light image of the eclipse, taken just 8 minutes before the last Tycho image, was displayed.

1) Teske, David, "Partial Lunar Eclipse Crater Timings", December 2021, "The Lunar Observer", p. 22, 23.

2) Wilson, Darryl G., "Lunar Nighttime Thermal Analysis", November, 2019, "The Lunar Observer", p. 25-31.

3) Wilson, Darryl G., "Thermal Observations of Tycho: A First Look", March 2020, "The Lunar Observer", p. 21-29.

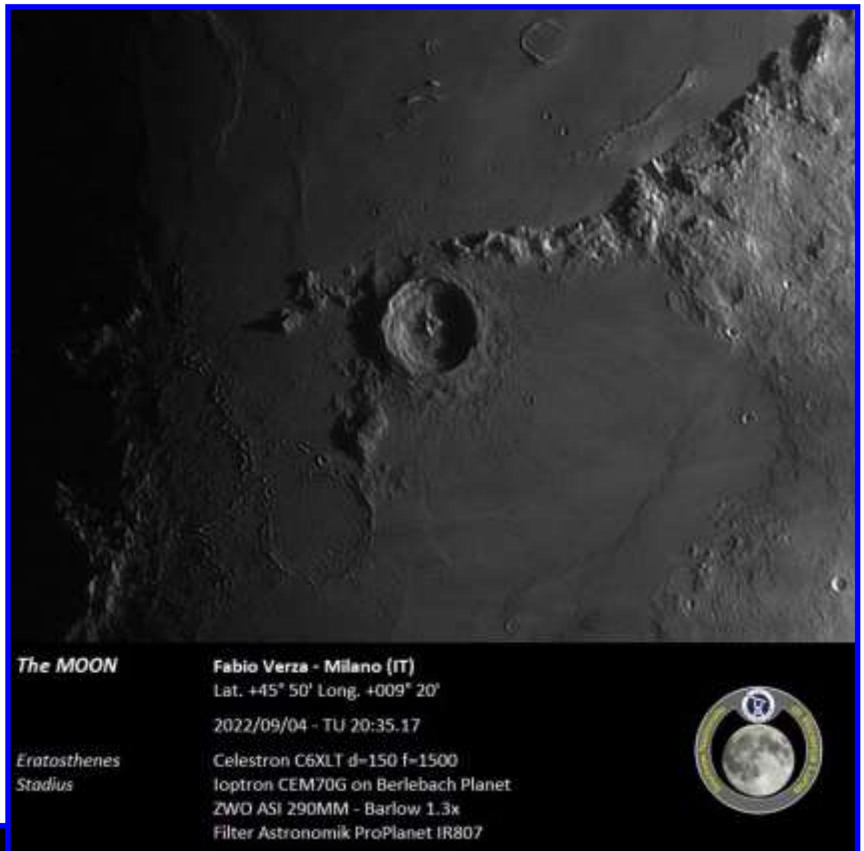
4) Wilson, Darryl G., "Basic Interpretation and Analysis of Lunar Thermal Images", p. 52 JALPO, Spring 2021, Vol. 63, No. 2.

Aristarchus, *Maurice Collins, Palmerston North, New Zealand. 2022 September 08 07:32. Celestron 8 inch Schmidt-Cassegrain telescope, QHY5III462C camera.*

Waning Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 August 14 21:35 UT 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

Recent Topographic Studies

***Eratosthenes**, Fabio Verza, SNdR, Milan, Italy. 2022 September 04 20:35 UT. Celestron 6 inch Schmidt-Cassegrain telescope, 1.3x barlow, iOptron CEM70G mount, Astronomik ProPlanet IR807 nm filter, ZWO ASI290mm camera.*



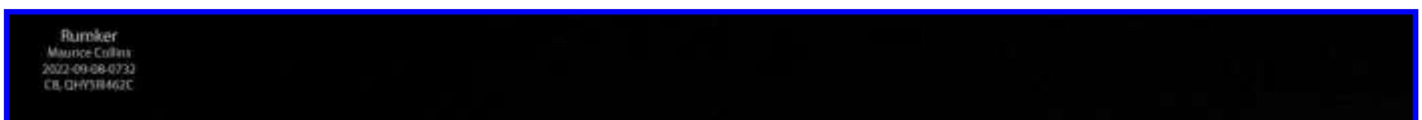
***Alphonsus and Arzachel Region,** Massimo Dionisi, Sassari, Italy. 2022 September 18 00:50 UT. Skywatcher Newtonian telescope, eyepiece projection 7 mm Celestron ortho, focal length 4550 mm, f/17.6, Skywatcher EQ6Pro mount, ZWO ASI120MC camera.*

Massimo adds "I am also attaching another image of a region that I do not know has ascertained domains, namely that of the two large craters Alphonsus and Arzachel (2022-09-18-0050_8-MD ALPHONSUS_N250_EP7_ASI120MC.jpg). Actually I also downloaded the GLR Catalog of Lunar Domes (C.A.Kapral and R.A.Garfinkle, May 2005) but I didn't find anything in that area; however, being near the terminator, I send it to you, in case it is possible to do some research. I don't know if this is the correct method for trying to identify new domes, although I think this kind of activity is beyond the capability of my telescope."

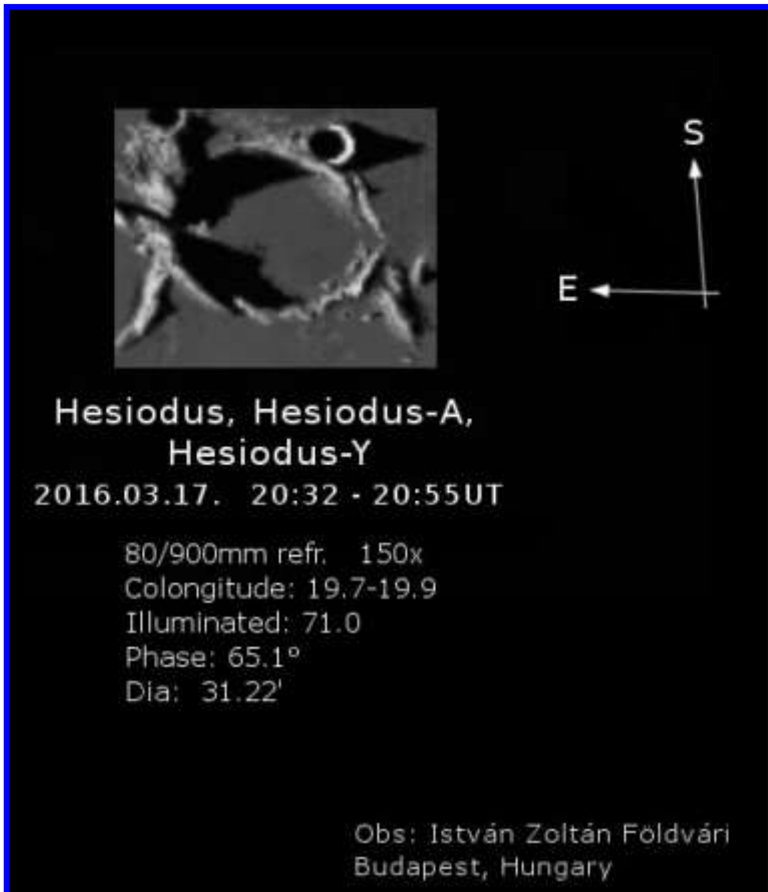
Recent Topographic Studies

Dorsum Higazy, Dorsa Stille and Lambert γ-δ, *István Zoltán Földvári, Budapest, Hungary. 2016 March 17, 20:12-20:25 UT, colongitude 19.5º to 19.6º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 6/10, transparency 5/6.*

Rümker, *Maurice Collins, Palmerston North, New Zealand. 2022 September 08 07:32. Celestron 8 inch Schmidt-Cassegrain telescope, QHY5III462C camera.*



Recent Topographic Studies



Hesiodus, Hesiodus-A and Hesiodus-γ, *István Zoltán Földvári, Budapest, Hungary. 2016 March 17, 20:32-20:55 UT, colongitude 19.7º to 19.9º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 6/10, transparency 5/6.*

Marius Hills, *Maurice Collins, Palmerston North, New Zealand. 2022 September 08 07:33. Celestron 8 inch Schmidt-Cassegrain telescope, QHY5III462C camera.*

Recent Topographic Studies

Moretus, *István Zoltán Földvári, Budapest, Hungary. 2016 March 17, 20:56-21:15 UT, colongitude 19.9° to 20.1°. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 4/6.*

Aristarchus, *KC Pau, Hong Kong, China. 2022 September 11 15:46 UT. 10 inch f/6 reflector telescope, 2.5x barlow, QHYCCD290M camera.*

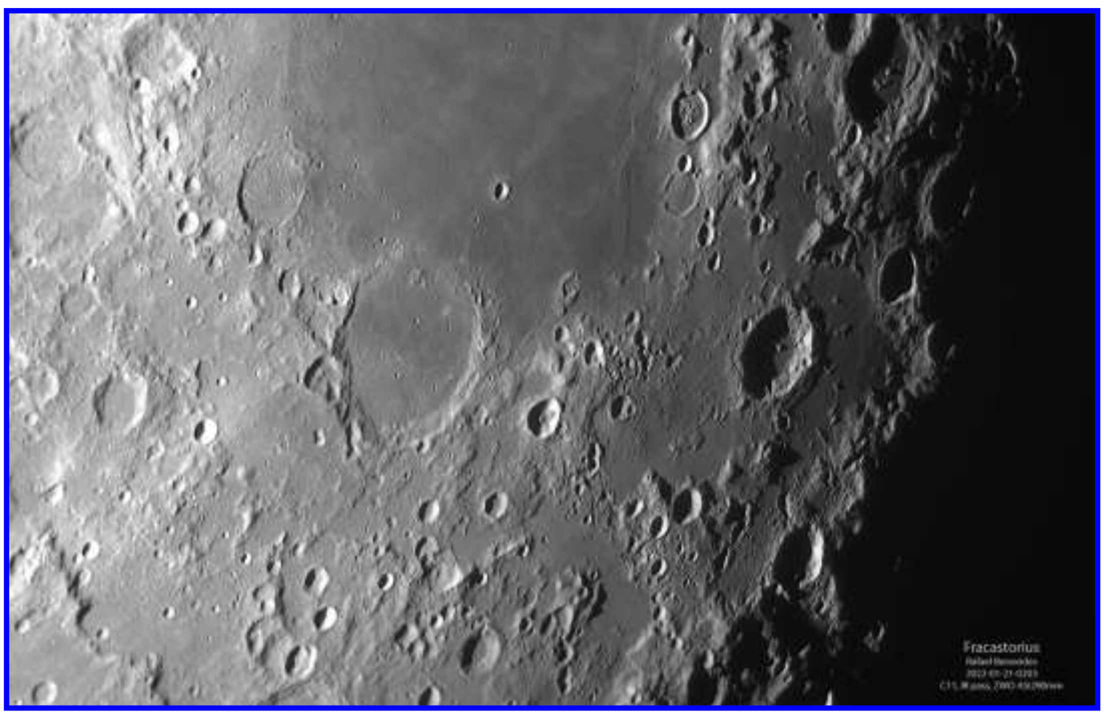
KC adds "It is taken on 11 September 2022 at 15m46m UT. The weather is very hot even near midnight. Heat current from neighborhood air conditioners worsen the seeing. To capture the bright rays of Aristarchus is always my target. Its patter is quite different from that of Copernicus and Kepler. It looks like a Chinese ink painting in my eyes."

Recent Topographic Studies

Copernicus, *Paul Walker, Middlebury, Vermont, USA. 2022 August 20 09:04 UT. 10 inch f/5.6 reflector telescope, Canon T7i camara, 3xDzoom.*

*Paul adds "*By far the best high magnification, high resolution image I have taken of surface features. A quick measurement using 2.0 miles for Copernicus A, I find the smallest hills visible in the bottom of Copernicus in this image are on the order of 0.4 - 0.5 miles across (0.3" - 0.4"). Visually I could see Copernicus A most of the time but I could not see smaller features. There are some linear artifacts from the stacking process due in part to my limiting the number of alignment points used. North is down."

Fracastorius, *Rafael Benavides Palencia, Posadas, Cordoba, Spain. 2022 January 21 02:03 UT. Celestron 11 inch Schmidt-Cassegrain telescope, Baader Planetarium IR pass filter, ZWO ASI290mm camera. Seeing 6/10, transparency 5/6.*



Recent Topographic Studies

12-Day-Old Moon, *Maurice Collins, Palmerston North, New Zealand. 2022 September 08 07:28-07:44. Celestron 8 inch Schmidt-Cassegrain telescope, QHY5III462C camera. North is to the lower left, west is to the lower right.*

Montes Carpatus, *István Zoltán Földvári, Budapest, Hungary. 2016 March 17, 21:16-21:30 UT, colongitude 20.1º to 20.2º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 5/6.*

Recent Topographic Studies

Petavius, *KC Pau, Hong Kong, China. 2022 September 12 15:43 UT. 10 inch f/6 reflector telescope, 2.5x barlow, QHY-CCD290M camera.*

*KC adds "*It is taken on 12 September 2022 at 15h23m UT. Seeing is moderate and transparency is poor with hazy sky. Petavius is quite near the evening terminator so that its radial ridges are displayed marvelously. As usual, the central rille is most attractive. The dome at the south-eastern edge of the crater floor is clearly shown with summit crater pit. The Palitzsch valley is hidden in darkness.

Recent Topographic Studies

Montes Carpatus and Pytheas β, *István Zoltán Földvári, Budapest, Hungary. 2016 April 16, 19:52-20:12 UT, colongitude 20.1º to 20.2º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 8/10, transparency 6/6.*

Cleomedes*, Fabio Verza, SNdR, Milan, Italy. 2022 September 11 22:16 UT. Celestron 6 inch Schmidt-Cassegrain telescope, 1.3x barlow, iOptron CEM70G mount, QHY5III462C IR camera.*

Recent Topographic Studies

Montes Carpatus, Draper and Draper C, *István Zoltán Földvári, Budapest, Hungary. 2017 September 29, 19:35-19:57 UT, colongitude 22.0º to 22.1º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 8/10, transparency 4/6.*

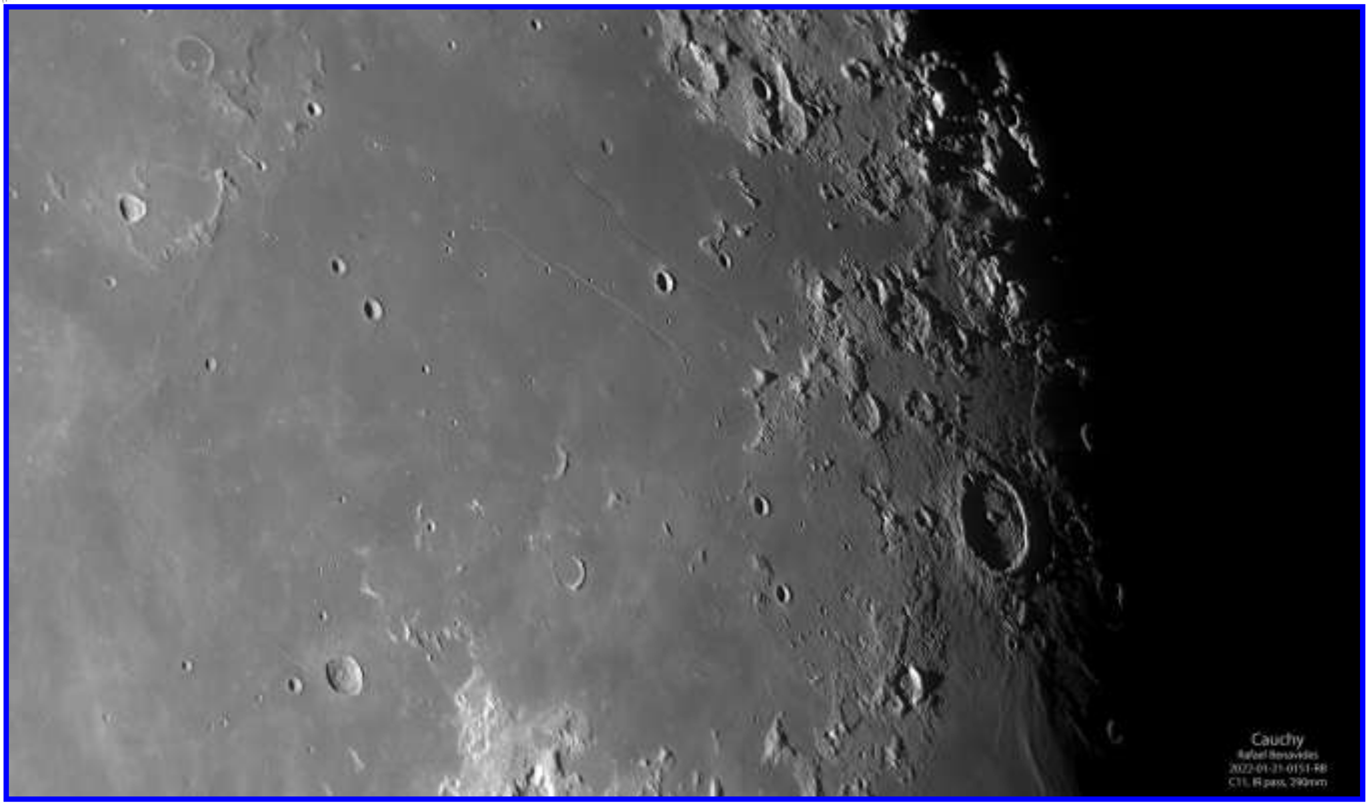
Sinus Fidei, *Massimo Dionisi, Sassari, Italy. 2022 September 16 23:52 UT. Skywatcher Newtonian telescope, focal length 4400 mm, f/17.6, Skywatcher EQ6Pro mount, ZWO ASI120MC camera.*

Recent Topographic Studies

Rümker, *Maurice Collins, Palmerston North, New Zealand. 2022 September 08 07:46. Celestron 8 inch Schmidt-Cassegrain telescope, 2x barlow, QHY5III462C camera.*

Kies-A, Kies-B, Kies-E and Kies-ω, *István Zoltán Földvári, Budapest, Hungary. 2016 April 16, 20:14-20:25 UT, colongitude 25.3°-25.4°. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 3/6.*

Recent Topographic Studies



Cauchy, *Rafael Benavides Palencia, Posadas, Cordoba, Spain. 2022 January 21 01:51 UT. Celestron 11 inch Schmidt-Cassegrain telescope, Baader Planetarium IR pass filter, ZWO ASI290mm camera. Seeing 6/10, transparency 5/6.*

Eratosthenes*, Fabio Verza, SNdR, Milan, Italy. 2022 September 05 20:26 UT. Celestron 6 inch Schmidt-Cassegrain telescope, 1.3x barlow, iOptron CEM70G mount, ZWO ASI290mm camera.*

Recent Topographic

***Petavius**, Fabio Verza, SNdR, Milan, Italy. 2022 September 11 22:06 UT. Celestron 6 inch Schmidt-Cassegrain telescope, 1.3x barlow, iOptron CEM70G mount, QHY5III462C IR camera.*

***Rupes Recta Region,** Massimo Dionisi, Sassari, Italy. 2022 September 18 00:37 UT. Skywatcher Newtonian telescope, eyepiece projection 7 mm Celestron ortho, focal length 4550 mm, f/17.6, Skywatcher EQ6Pro mount, ZWO ASI120MC camera.*

Massimo adds "The image 2022-09-18-0037_6-MD-RUPESRECTA_N250_EP7_ASI120MC.jpg on the other hand, I am reasonably sure of the identification of Birt 1 on the image of the Rupes Recta region; no trace instead of Birt 2, at least I can't see it.

The images are unfortunately not of a good quality: the seeing was quite poor (classifiable between III and IV of the Antoniadi scale) and some gusts of wind arrived at times which complicated the shooting considerably."

Recent Topographic Studies

Aristarchus, *Maurice Collins, Palmerston North, New Zealand. 2022 September 08 07:44. Celestron 8 inch Schmidt-Cassegrain telescope, QHY5III462C camera.*

Castillo de Almodóvar del Rio (Córdoba), *Rafael Benavides Palencia, Posadas, Cordoba, Spain. 2022 September 11 20:12 UT. Baader Planetarium IR pass filter, Canon EOS 1000 D camera, Sigma 50-500 mm, F 4.5-6.3. Seeing 2/10, transparency 1/6 (cloudy).*

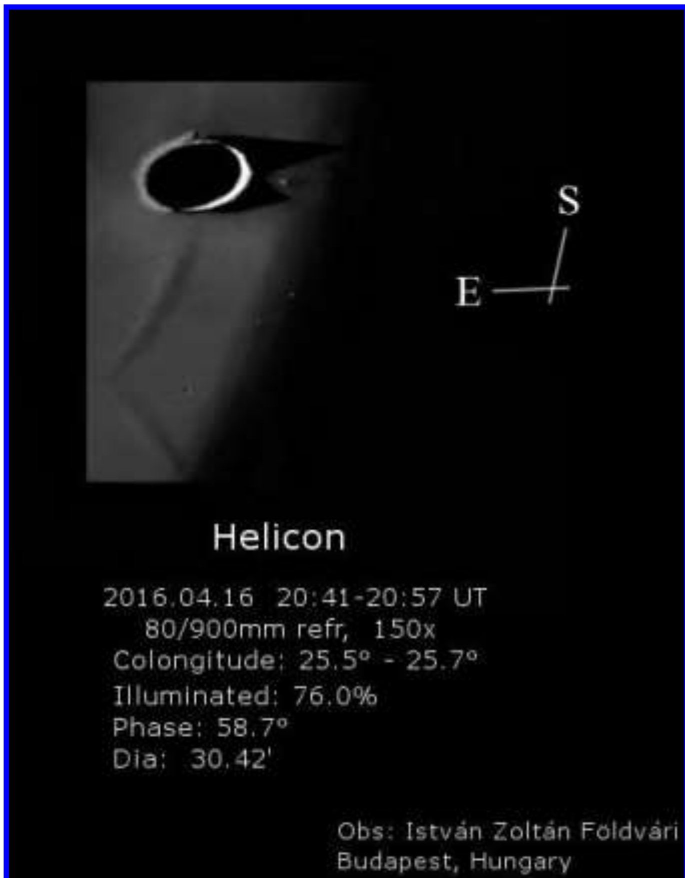
See front page for imaging challenge!

Recent Topographic Studies

Mons La Hire, Dorsum Zirkel, *István Zoltán Földvári, Budapest, Hungary. 2016 April 16, 20:25-20:40 UT, colongitude 25.4º -25.5º. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 4/6.*

Mare Crisium*, Fabio Verza, SNdR, Milan, Italy. 2022 September 11 22:12 UT. Celestron 6 inch Schmidt-Cassegrain telescope, 1.3x barlow, iOptron CEM70G mount, QHY5III462C IR camera.*

Recent Topographic Studies



Helicon, *István Zoltán Földvári, Budapest, Hungary. 2016 April 16, 20:41-20:57 UT, colongitude 25.5°-25.7°. 80 mm refractor telescope, 900 mm focal length, 150 x. Seeing 7/10, transparency 4/6.*

Aristarchus, *Fernando Surá, San Nicolás de los Arroyos, Argentina. 2022 August 12 23:20 UT. 127 mm Maksutov-Cassegrain telescope, Samsung A22 cell phone camera.*

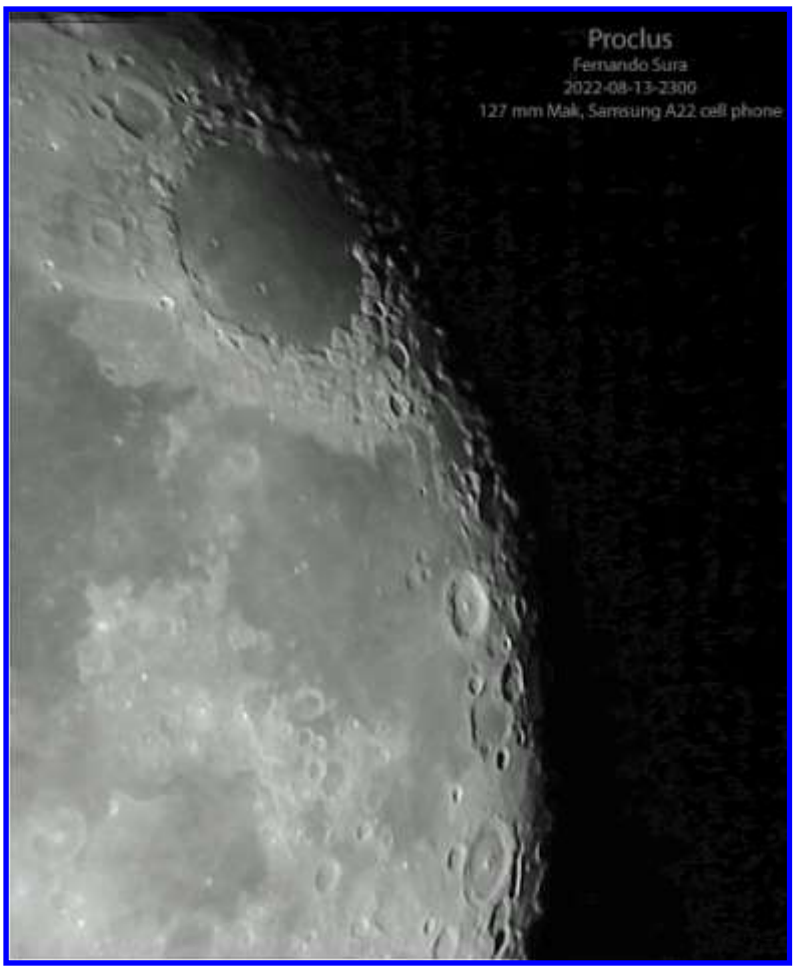
Recent Topographic Studies

Last Quarter Moon, *Ioannis (Yannis) A. Bouhras, Athens, Greece. 2022 September 17 23:43UT. AstroProfessional 80 ED refractor telescope, ZWO ASI290MC camera..*

Gassendi, *Fernando Surá, San Nicolás de los Arroyos, Argentina. 2022 August 12 23:30 UT. 127 mm Maksutov-Cassegrain telescope, Samsung A22 cell phone camera*

Recent Topographic Studies

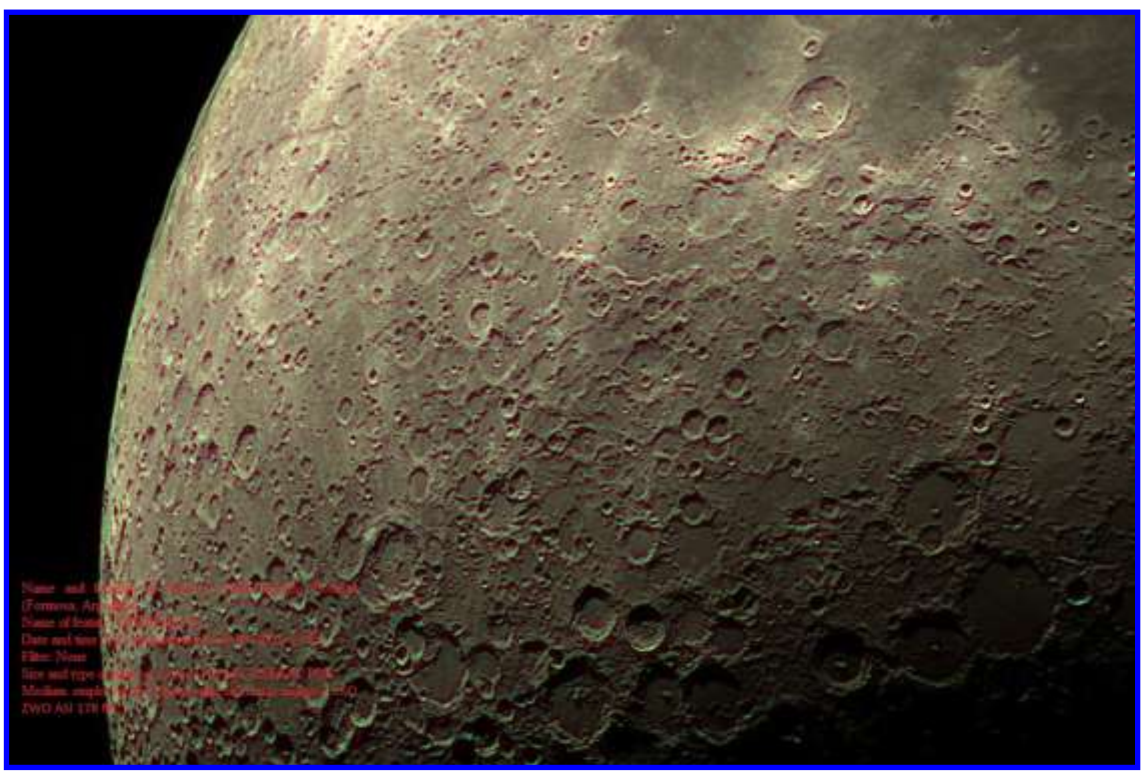
***Langrenus**, Fabio Verza, SNdR, Milan, Italy. 2022 September 11 22:09 UT. Celestron 6 inch Schmidt-Cassegrain telescope, 1.3x barlow, iOptron CEM70G mount, QHY5III462C IR camera.*



***Proclus,** Fernando Surá, San Nicolás de los Arroyos, Argentina. 2022 August 13 23:00 UT. 127 mm Maksutov-Cassegrain telescope, Samsung A22 cell phone camera*

Recent Topographic Studies

Mare Nectaris, *Rafael Benavides Palencia, Posadas, Cordoba, Spain. 2022 January 21 01:57 UT. Celestron 11 inch Schmidt-Cassegrain telescope, Baader Planetarium IR pass filter, ZWO ASI290mm camera. Seeing 6/10, transparency 5/6.*



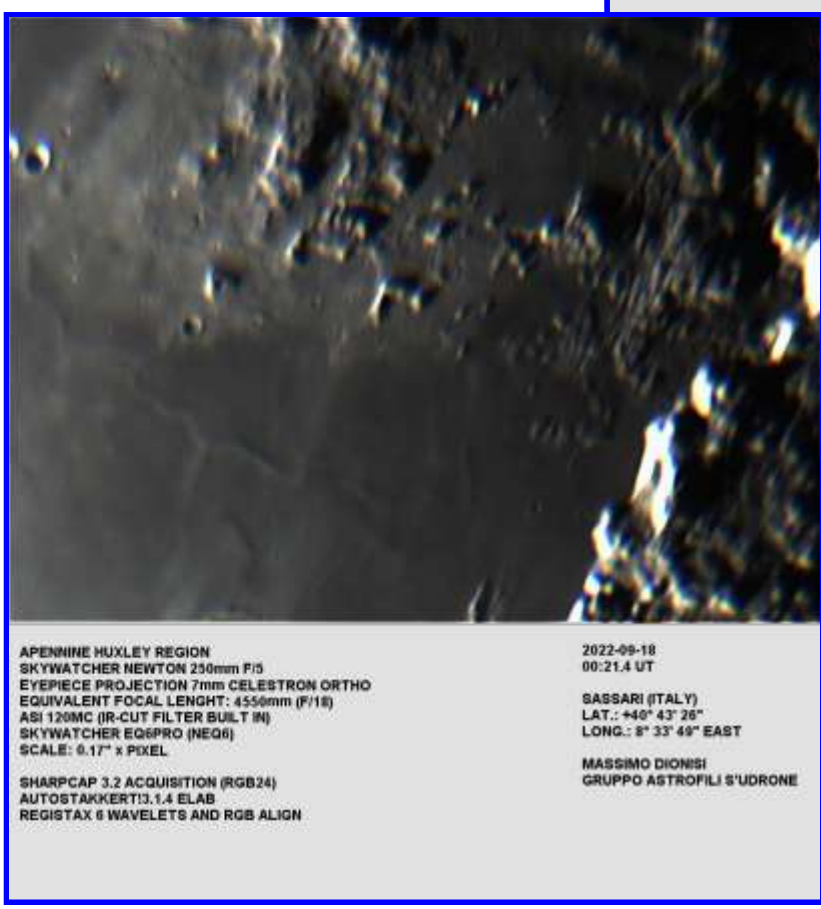
Theophilus, *Raúl Roberto Podestá, Formosa, Argentina, 2022 September 03 23:56 UT. 102 mm refractor telescope, ZWO ASI178MC camera. North is right, west is down.*

Recent Topographic Studies

Apennine Huxley Region, *Massimo Dionisi, Sassari, Italy. 2022 September 18 00:07 UT. Skywatcher Newtonian telescope, 3x barlow, focal length 3750 mm, f/17.6, Skywatcher EQ6Pro mount, ZWO ASI120MC camera.*

Massimo adds "These are two of the same region taken with the same instrument but with different resolutions. A 250mm f/5 Newtonian from Skywatcher has always been used but in the first photo a Celestron 3x Barlow lens (X-CEL LX) was applied, reaching an image scale of about 0.21 "x pixel; for to realize the second one I worked with the eyepiece projection technique, using a 7mm focal length orthoscopic from Celestron. In this case the resulting focal length was about four and a half meters with an image scale of about 0.17 "x pixels.

I am quite sure I was able to identify the Huxley 1 dome, however detecting selenographic coordinates slightly different from those tabulated in Raphael's Lunar Domes Atlas GLR Group: long .: -4.605 °, lat .: + 22.183 °



Obviously, this is a very rough estimate, deduced visually by examining the images and comparing it with the Virtual Moon Atlas, so I could easily be wrong. I tried to determine the coordinates because I wasn't 100 percent sure I had correctly identified the dome, but now I've only increased my uncertainty.

It is possible that Huxley 2 is also visible, a little further south; no evidence for Huxley 3 instead."

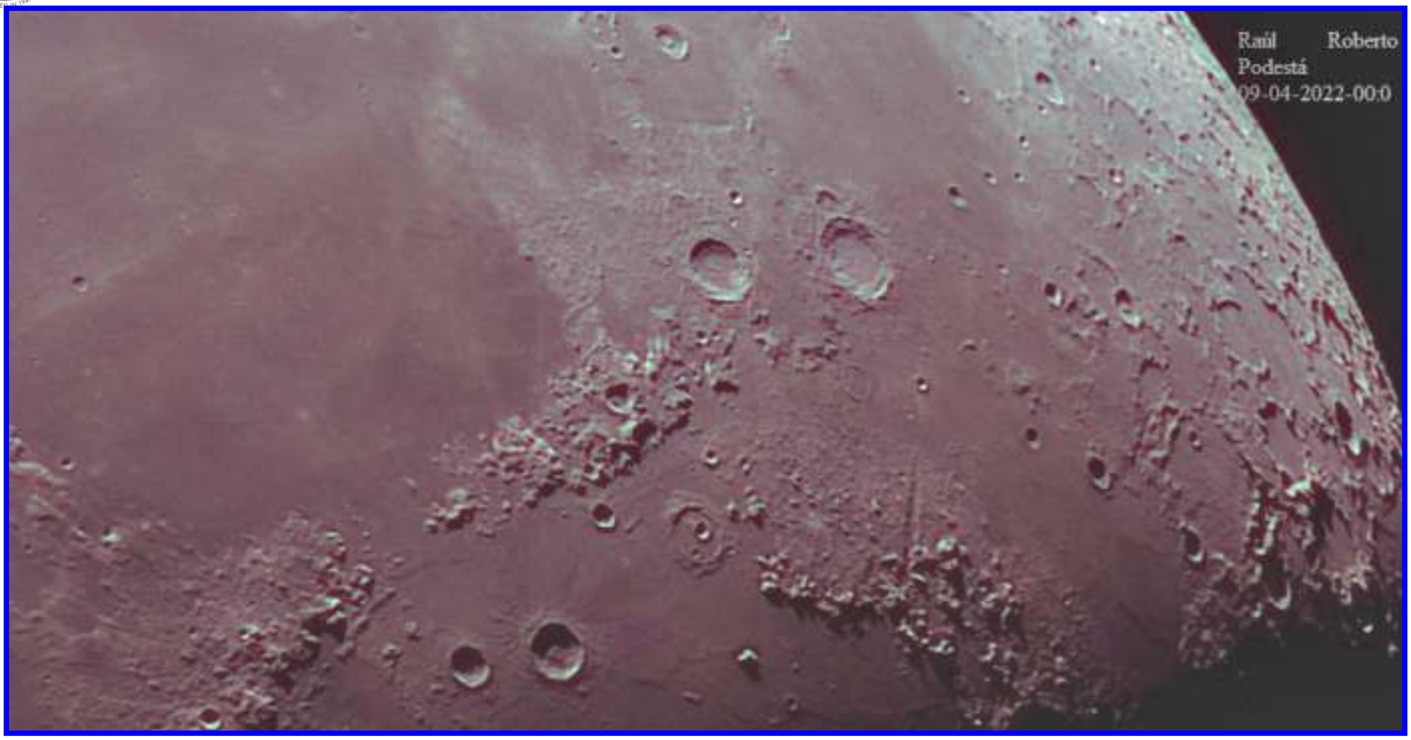
Apennine Huxley Region, *Massimo Dionisi, Sassari, Italy. 2022 September 18 00:21 UT. Skywatcher Newtonian telescope, eyepiece projection 7 mm Celestron ortho, focal length 4550 mm, f/17.6, Skywatcher EQ6Pro mount, ZWO ASI120MC camera.*

Recent Topographic Studies

Waning Crescent Moon, *Jairo Chavez, Popayán, Colombia. 2022 August 20 02:28 UT 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

Albategnius, *Raúl Roberto Podestá, Formosa, Argentina, 2022 September 03 23:56 UT. 102 mm refractor telescope, ZWO ASI178MC camera. North is right, west is down.*

Recent Topographic Studies



Montes Caucasus, *Raúl Roberto Podestá, Formosa, Argentina, 2022 September 04 00:00 UT. 102 mm refractor telescope, ZWO ASI178MC camera. North is right, west is down.*

Waxing Crescent Moon, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2022 August 31 23:00 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, IR685 nm filter, Player One Ceres C camera.*

Recent Topographic Studies

Proclus, *Raúl Roberto Podestá, Formosa, Argentina, 2022 September 03 23:57 UT. 102 mm refractor telescope, ZWO ASI178MC camera. North is right, west is down.*

Mare Serenitatis, *Guillermo Daniel Scheidereiter, LIADA, Rural Area, Concordia, Entre Ríos, Argentina. 2022 September 03 00:54 UT. Explore Scientific 127 mm Maksutov-Cassegrain telescope, IR685 nm filter, Player One Ceres C camera. North is left and west is down.*

Recent Topographic Studies

Lunar Geologic Change Detection Program

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

2022 October

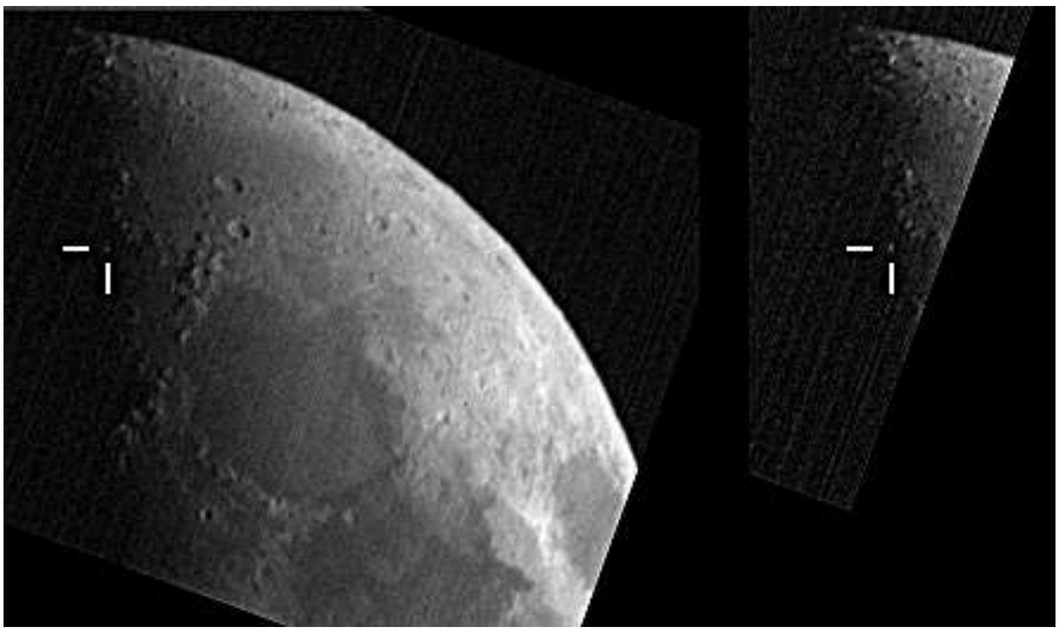


Figure 1. *The Moon as imaged in part (1.5-1.7 microns – i.e., monochrome) of the Short-Wave IR waveband, by Tony Cook (BAA) taken on 2022 Aug 04 and orientated with north towards the top. These are both raw uncalibrated images (no dark current removal or flat fielding) however they have undergone separate contrast stretches to compensate manually for transparency variations between the two times and have also undergone sharpening. Note that the Xenics Bobcat SWIR camera used has a relatively small image size of 320x200 pixels. The tick marks show the location of Mons Piton.* ***(Left)*** *Taken at 19:29 UT.* ***(Right)*** *Taken at 19:40 UT.*

LTP reports: One report was received from Trevor Smith concerning Mons Piton. We should not necessarily regard this as a LTP due to the Moon's very low altitude, but has been included here as it may explain some past LTP reports. On 2022 Aug 04 UT 19:41-20:10 BAA member, Trevor Smith (Codnor, UK), using a 16-inch Newtonian, x247, but under Antoniadi IV seeing conditions, found the mountain to be very bright, and further more red was seen around its eastern slopes. However, an examination of the bright and contrasty Proclus crater revealed it to be relatively color free compared to Piton. An additional examination of other features, north and south along the terminator (similar longitude to Mons Piton) revealed some tinges of color, but not as strong as the red on Mon Piton. At 19:50 he examined the mountain with a yellow filter and found that it still showed red along the eastern side, other features along the terminator had no color through this filter. Video images by myself (Newtown, UK) made earlier at 1929 & 19:40 UT, (in the SWIR (1.5-1.7 microns) did not reveal Mons Pico as especially bright - but the resolution was poor. Uncalibrated images can be seen in Fig 1. A friend of Trevor's, phoned him up the next day to say that they had seen a mountain on the terminator exhibiting red on the 14th August – this is effectively an independent confirmation.

Probably the redness can be explained by atmospheric spectral dispersion as the Moon was low, and strong color was especially visible on Mons Piton as this is an exceedingly contrasty object on the terminator. Please do not read too much into the fact that the mountain was not bright in the SWIR camera images (Fig 1), as the wavelength being used was nearly 2.5x longer than in visible light, Rayleigh criteria resolution is nearly 2.5x worse than in the optical, and I still have to perfect image calibration. In case you are wondering, why bother taking low resolution images at 1.5-1.7 microns? It is part of project to look for blackbody radiation from impacts on the dayside of the Moon.

Routine Reports received for August included: Jay Albert (Lake Worth, FL, USA – ALPO) observed: Adams, Agrippa, Aristarchus, Proclus, and Theophilus. Massimo Alessandro Bianchi (Italy – UAI) observed: Torricelli B. Francisco Alsina Cardinali (Argentina – SLA) imaged: Campanus and Mons Piton. Maurice Collins (New Zealand – ALPO/BAA/RASNZ) imaged: Fracastorius and several features. Anthony Cook (Newtown, UK – ALPO/BAA) imaged: several features in the Short-Wave IR (1.5-1.7 microns) and the Long Wave IR (7.5-15 microns). Walter Elias (AEA) imaged: Alpetragius, Alphonsus, Hercules, Maskelyne, Montes Apenninus, and Plato. Trevor Smith (Codnor, UK – BAA) observed Mons Piton. Bob Stuart (Rhayader, UK – BAA) imaged: Atlas, Langrenus, Petavius, Snellius, Timaeus and Vendelinus. Franco Taccogna (Italy - UAI) imaged: Lassell, Montes Teneriffe and Plato. Aldo Tonon (Italy – UAI) imaged: Aristarchus and Descartes. Fabio Verza (Italy – UAI) imaged: Aristarchus. Ivan Walton (UK – BAA) imaged the lunar crescent. Luigi Zanatta (Italy – UAI) imaged: Aristarchus.

Analysis of Reports Received:

Aristarchus (the following is a report from July that got delayed): On 2022 Jul 12 UT 23:01 Walter Elias (AEA) imaged the crater under similar illumination to the following two LTP reports:

Aristarchus 1950 Jun 29 UT 05:20-05:41 Observed by Bartlett (Baltimore, MD, USA, 3.5" reflector x100, S=6, T=5) "Strong bluish glare on E..SE wall." NASA catalog weight=4. NASA catalog ID #529. ALPO/BAA weight=2.

Aristarchus 1973 Apr 16 UT 23:45 Observer Schlegel (52.5N, 9E) equipped with a 60 mm refractor, noticed that Aristarchus was extraordinarily bright. ALPO/BAA weight=1.

Figure 2. *Aristarchus as imaged in color by Walter Elias (AEA) on 2022 Jul 12 UT 23:01 and orientated with north towards the top. Color saturation increased slightly.*

Concerning the Bartlett report, we can clearly see (Fig 2) some blue glare on the E-SE wall. It maybe natural color but it could also be atmospheric spectral dispersion in Walter's image, or a similar effect from Chromatic Aberration for the refractor that Bartlett used. We shall lower the weight from 2 to 1. Now moving onto the 1970 report, Aristarchus does indeed look somewhat bright, and to an inexperienced observer perhaps exceedingly bright. We shall therefore lower the weight from 1 to 0 and remove it from the LTP database.

Janssen: On 2022 Aug 02 UT 06:09-06:12 Maurice Collins (ALPO/BAA/RASNZ) imaged the whole Moon, but at sufficient resolution to examine this crater at similar illumination to the following report:

On 1983 Sep 11 at UT 23:52 K.P. Marshall (Columbia, 12" reflector, x268, seeing II), whilst sketching the crater Janssen noticed a tenuous red patch on the southern junction of the valley which joins Fabricius to A. Nothing resembling this found on nearby areas. The ALPO/BAA weight=2.

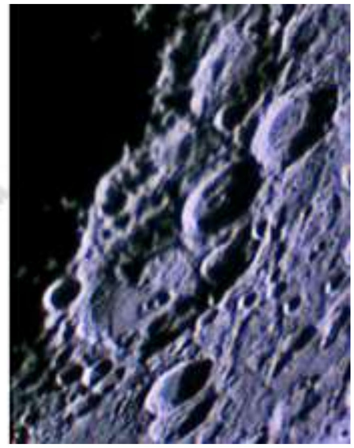



Figure 3. *Janssen crater with Fabricius on its NE floor interior. Janssen A is located just south of Fabricius. Orientated with north towards the top.* ***(Left)*** *A sketch by Kevin P. Marshall (BAA) made on 1983 Sep 11 UT 23:53.* ***(Right)*** *A color image by Maurice Collins (ALPO/BAA/RASNZ) taken on 2022 Aug 02 UT 06:09-06:12 with color saturation increased to 70%.*

In comparing Kevin Marshall's drawing to Maurice Collins' image (Fig 3), there appears to be quite a few inconsistencies in terms of crater sizes and amounts of shadow. One can speculate that the former could have been due to inexperience at sketching as the observer had only started submitting observations the BAA the year before. It is after all quite a complex crater to sketch for a beginner. The latter might be due to having the wrong date and/or UT as sometimes happens with observations away from the Greenwich meridian. Maurice's image, despite being color enhanced, shows no sign of color between Fabricius and Janssen A, which is interesting. Nevertheless the sketch inconsistencies suggests that we should lower the weight from 2 to 1 as a precaution.

Adams D: On 2022 Aug 05 UT 01:40-01:55 Jay Albert observed this crater under similar illumination to the following report:

Adams D On 2019 Sep 06 UT 21:44-22:20 T. Smith (near Great Yarmouth, UK, 90 mm Maksutov, x80, Seeing IV) saw a very bright spot on the SW. rim of Adams D - at first sight looked perhaps raised above the lunar background, but this was just due to its brightness. It was by far the brightest object on the NW quadrant of the Moon. In terms of brightness it was almost but not quite bright as Proclus, but only half the size of Proclus. No color was seen to the spot. The spot was not emitting any false color, there was no change in appearance, and there was no ray structure visible either. Observations ceased when the Moon got too low. ALPO/BAA weight=1.

Jay was using a Celestron NexStar Evolution 8" SCT (x226) with the Moon high up in the sky. The sky was initially mostly clear and slightly hazy, but thin cirrus clouds soon moved in with an increase in haze. Transparency was initially 3rd magnitude but shortly dropped to 2nd magnitude and seeing was 7-8/10.

Jay noticed easily the very bright spot in the LTP description on the S rim of the crater. It was very bright indeed and quite comparable to the north wall of Proclus. He was able to confirm visually that the spot was the brightest object near the rim of that SE region of lunar disk. As Jay has now confirmed this normal appearance, we can assign a weight of 0 and remove the LTP from the ALPO/BAA database.

Plato: On 2022 Aug 05 Franco Taccogna (UAI) attempted the following Lunar Schedule request:

BAA Request: It has been noticed that a bright carterlet can appear very suddenly on the floor of Plato in between needle like shadows, during local lunar sunrise. This happens in the space of just a minute or so, and can look really quite dramatic. This effect was first spotted by Brian Halls on 2014 Oct 31 Please send any high resolution images, detailed sketches, or visual descriptions to: a t c @ a b e r . a c. u k .

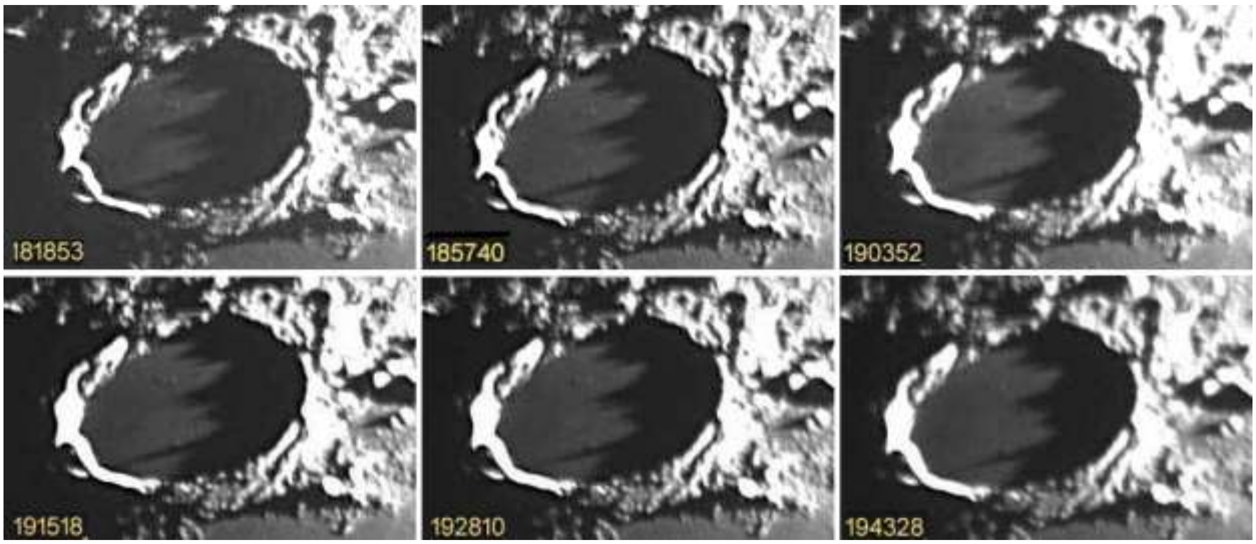


Figure 4. *Plato as imaged by Franco Taccogna (UAI) on 2022 Aug 05 and orientated with north towards the top. The UTs are given in each image as a yellow number: hhmmss*

It is interesting that the southern craterlet that emerges from the southern shadow spire, seems to be at its brightest at 19:15:18 UT but has faded a bit at about 19:43:28 UT – however this maybe seeing related. Franco included some LTVT simulated shadow plots (not shown here) by Aldo Tonon and Bruno Cantarella, which agreed with the shadow locations in the images very well.

Maskelyne: On 2022 Aug 05 UT 23:15 Walter Elias (AEA) imaged this crater under similar illumination to the following report:

2 deg S of Maskelyne (29E, 1N) 1969 May 25 UT 01:15-01:56 Observed by Jean, Barry, Bernie, (2) Madison (Montreal, Canada, USA, 4" refractor)"Very vis. pink patch red as seen thru a yellow filter. Photo of bright red spot nr. Mask. (confirm. -- Apollo 10 watch)" NASA catalog weight=5. NASA catalog ID #1145. ALPO/BAA weight=3.

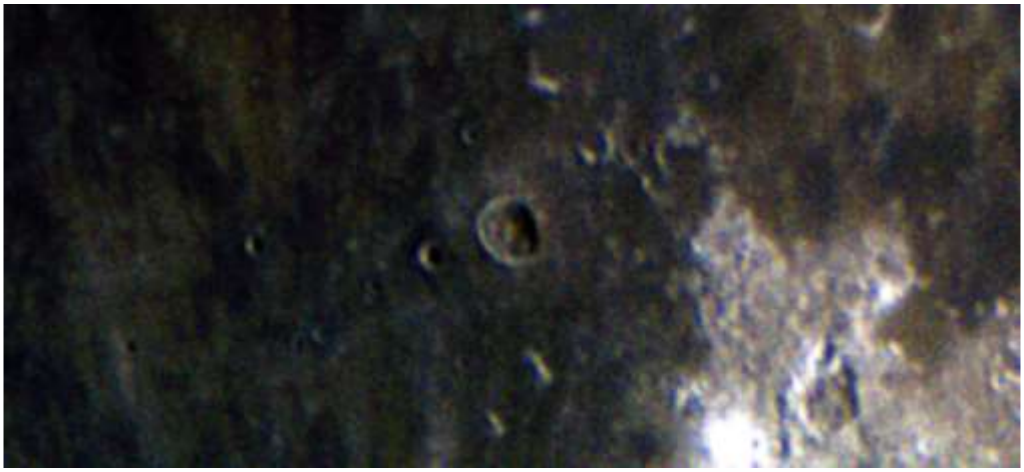


Figure 5. *Maskelyne as imaged by Walter Elias (AEA) on 2022 Aug 05 UT 23:15 and orientated with north towards the top. The image has been cut out from a larger image, color normalized, had it color saturation increased to 80%, then Gaussian blurred to remove some noise.*

If there was any pink or red spot due to lunar minerals then it should show up near the center of the bottom edge of Fig 5. However, all we see here are a couple of elongated mountain peaks. Normally the Jean LTP reports are given low weights in the Cameron catalog as there was deemed to be a quality issue, however Cameron gives a weight of 5 as independent observers were involved and a photograph is mentioned. Alas we do not have a copy of the photograph in our archives. Looking at the scanned copies of the Cameron catalog cards, it mentions that the LTP was during the Apollo 10 mission watch by amateur astronomer (though only Jean's name is mentioned) and the LTP call came through to the Smithsonian, who were a communication hub for LTP reports in those days. As a precaution the ALPO/BAA weight is set at a level of 3 and we will keep this for now.

Campanus: On 2022 Aug 08 UT 00:22 Francisco Alsina Cardinali (SLA) imaged this crater under similar illumination to the following report:

Campanus 2014 Jan 11 UT 22:00-22:30 S.Bush (UK, 6" SCT, x180, seeing average) made a sketch of the Campanus and Mercator craters. He found that the central peak of Campanus difficult to resolve and the floors of both craters were devoid of detail. Mercator was the lighter shade of the two floors. Earlier at 19:47 UT M.Brown (Huntingdon, UK) imaged this region and using Registax resolved details on the floors of both craters, though Mercator clearly was slightly lighter in floor shade and had less detail on its floor than Campanus. The most likely explanation was that it was just seeing effects blocking the visibility of detail - this of course is less of a problem for a Registax used on the CCD image. However just to be sure this observation is being given an ALPO/BAA LTP weight of 1, to encourage visual observers to attempt this observation under similar illumination and seeing.

Figure 6. *Campanus and Mercator with north towards the top.* ***(Left)*** *An image by Mike Brown (BAA) taken on 2014 Jan 11 UT 19:47.* ***(Center)*** *A Sketch by Steve Bush made on 2014 Jan 11 UT 22:00-22:30****.*** ***(Right)*** *An image by Francisco Alsina Cardinali (SLA) made on 2022 Aug 08 UT 00:22.*

Francisco's image (Fig 6 – Right) is interesting as the central peak is slightly less visible (due to resolution) than Mike Brown's image (Fig 6 – Left). This adds some weight to the theory that the Steve Bush LTP report may have had something to do with image resolution and atmospheric conditions at the time. I note that in Steve's sketch, although geometrically correct with most detail, the shadows are not as thick as they are in the images. Could this infer a date error? What we really need are some visual observations under different seeing conditions on the precited day and a day later to test these theories out. For now, we shall leave the weight at 1.

Aristarchus: On 2022 Aug 08 UAI observers. Fabio Verza and Luigi Zanatta, imaged this crater for the following lunar schedule request:

ALPO Request: On 2013 Apr 22 Paul Zellor noticed that the two closely spaced NW dark bands in Aristarchus had some (non-blue) color to them. Can we confirm his observation of natural color here? Ideally you should be using a telescope of 10" aperture, or larger. Please send any high resolution color images, detailed sketches, or visual descriptions to: a t c @ a b e r . a c. u k .

Figure 7. Aristarchus as imaged in color on 2022 Aug 08 and orientated with north towards the top. (Left) Taken Luigi Zanatta at 20:29UT. (Right) Taken by Fabio Verza at 20:32 UT.

Neither images (Fig 7) show a couple of dark banks on the NW, nor any color in that region, Fabio's image has a slight yellow cast to the whole crater and surrounds – this appears to be because the start level on the blue channel is above the shadow background, unlike the red and the green channels which show the full blackness of the shadows. In view of the fact that we cannot see what Paul Zellor saw, we shall leave the weight at 1 for now.

Torricelli B: On 2022 Aug 10 UT 20:50-21:11 Massimo Alessandro Bianchi observed visually this crater according to the following lunar schedule request and repeat illumination predictions for:

ALPO Request: How well can you see this crater in red and blue light? If possible, use Wratten 25 and 38A filters. If you do notice the crater is more difficult to see in one filter than the other, could it be because one filter is denser than the other? Check this out on other filters too to verify this idea. Email any visual descriptions, sketches, or images to: t o n y . c o o k @ a l p o - a s t r o n o m y . o r g

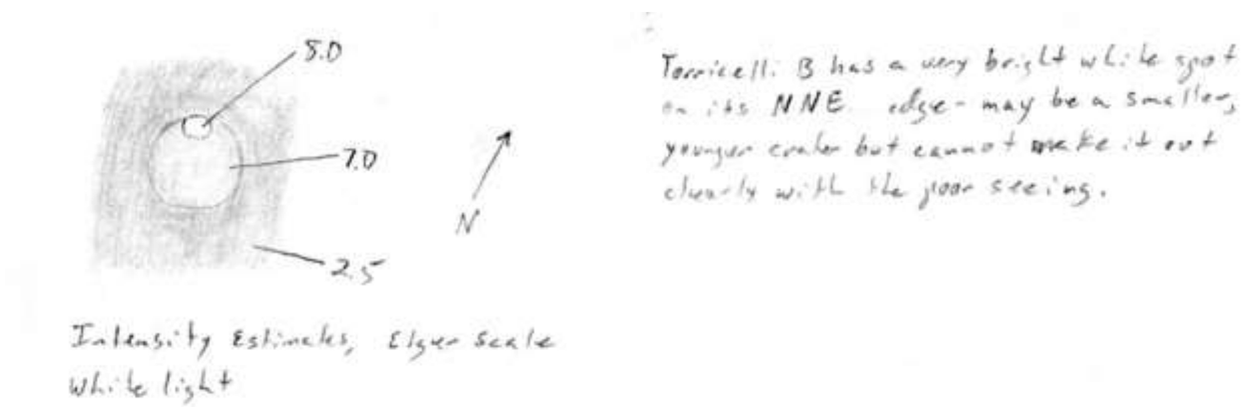


Figure 8. *A sketch of Torricelli B made by Robin Gray (ALPO) on 2002 Sep 20 UT 05:30-07:20.*

This actually refers to a LTP report from 2002 Sep 20 (See Fig 8 for the original sketch), but which we had taken off the LTP list and put on the lunar schedule list to check out: *"On 2002 Sep 20 Robin Gray (Winnemucca, NV, USA) found Torricelli B to be more difficult to see through a blue Wratten 38A filter than through a red Wratten 25 filter. This effect though might have had more to do with respective filter densities rather than an actual LTP. The ALPO/BAA weight=0."*

Massimo was using a Vixen VMC 260L Mak-Cass. 260 mm f/11.5 - Mag. 428x - Seeing III – Transparency 5th magnitude, but the sky had some cloud. Observing in white light and with Meade 4000 filter set: Red 25A, Dark Blue 38A, Green 58 and Yellow 12. By switching views through the red and blue filters the crater appeared darker in the dark blue filter. This was undoubtedly due to the filter being denser as it affected other features too. Massimo then compared Torricelli B to Moltke in red, blue, green and yellow filters: *"I noticed that with the dark blue filter alone **Torricelli B** appeared noticeably less bright than **Moltke**, while with the other filters the difference in brightness between the two craters was much less noticeable, perhaps only a little more pronounced with the red filter than with the yellow and green"*.

I think that we can take this off the lunar schedule website now as the effect repeated.

Plato: On 2022 Aug 14 UT 04:21 Bob Stuart (BAA) imaged Timaeus, but the frame included Plato. This was just 3 min outside the observing window for ±1.0° similar illumination and topocentric libration for the following report:

On 1975 Feb 27 at UT21:26-23:32 P.W. Foley (Wilmington, Dartford, Kent, U.K., 12" reflector) picked up a color Moonblink blink (brighter in blue) in Plato crater at 21:36, 22:15 and 23:32UT extended from 11 - 3 o'clock along entire area inside the crater - the effect was particularly diffuse and obscure, despite the surrounding localities being sharp. The effect was seen visually and was continuous. A check was made on star images and these were found to be very sharp and not pulsating, thus indicating good atmospheric conditions. This is a BAA Lunar Section report. The ALPO/BAA weight=3.

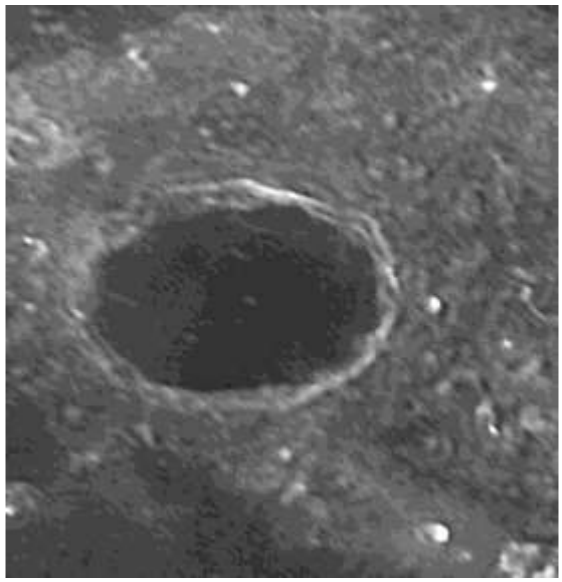


Figure 9. *Plato as imaged by Bob Stuart (BAA) on 2022 Aug 14 UT 04:21 and orientated with north towards the top.*

The location of Foley's reported LTP (he used coordinates with north at the bottom) would have been along the inner southern rim. Although Bob's image (Fig 9) is in monochrome and in yellow light rather than blue, this is what Plato would normally have looked like on the night that Foley observed. Note that there is a dark line on the floor just inside the southern rim, but being a monochrome image, there is no way to know if this would have been dark in blue light as well. As Foley checked star images for atmospheric spectral dispersion, and used a Moon Blink device (this can eliminate the effects of atmospheric spectral dispersion), we shall keep the weight at 3 for now.

Earthshine: On 2022 Aug 25 Ivan Walton (BAA) imaged the crescent Moon under twilight conditions to cover the following Lunar Schedule request:

BAA Request: Please try to image the Moon as a very thin crescent, trying to detect Earthshine. A good telephoto lens will do on a DSLR, or a camera on a small scope. We are attempting to monitor the brightness of the edge of the earthshine limb in order to follow up a project suggested by Dr Martin Hoffmann at the 2017 EPSC Conference in Riga, Latvia. This is quite a challenging project due to the sky brightness and the low altitude of the Moon. Please be very careful around sunrise so as not to be observing once the Sun has risen. Do not bother observing if the sky conditions are hazy. Any images should be emailed to: a t c @ a b e r . a c . u k

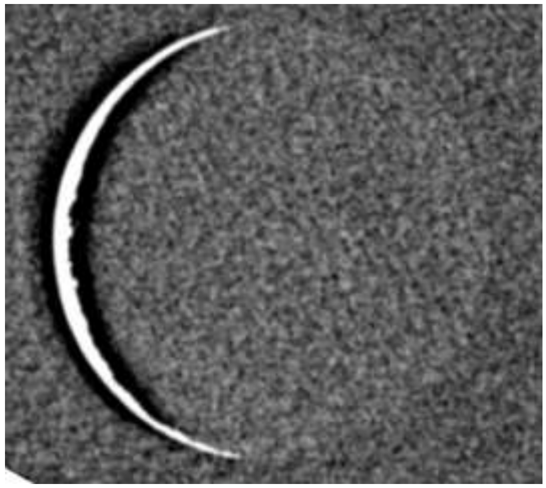


Figure 10. *Earthshine as imaged by Ivan Walton (BAA) on 2022 Aug 25 UT 05:44. This has been significantly contrast stretched and then Gaussian blurred to bring out the earthshine. North is towards the top.*

Although Fig 10 is somewhat noisy as it was really geared in exposure to show detail on the crescent, you can see the earthshine limb of the Moon. If you blur your eyes the eastern limb does have a slightly bright band around it, but I think this is too thick to be the effect that Prof Hoffmann was interested in and it is probably noise related or something to do with the processing by the camera as is evident by the ringing effect on the bright limb.

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 .

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

Basin and Buried Crater Project

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

Basins: Schiller-Zucchius

Alberto Anunziato has sent in some work conducted by the SLA on a possible 3rd ring in this basin and comments:

"Paul Spudis in "The geology of Multi-Ring Impact Basins" (Table 2.2 on page 40) includes this basin in the list of basins with less than three rings". You can see the basin quite clearly in the LROC Quickmap GRAIL Crustal Thickness layer (Fig 1), but not the rings.

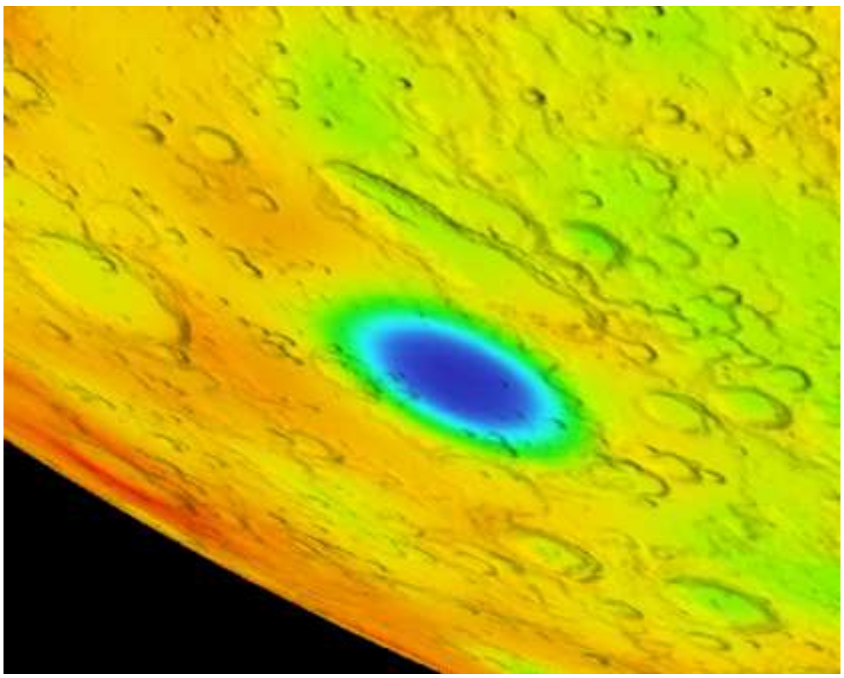


Figure 1*. GRAIL Crustal Thickness Map – blue is thin and red is thick. From the LROC Quickmap web site.*

Using an image that the SLA group took six years ago (Fig 2) of Schiller near the terminator, which passes through the edge of Zucchius opposite Schiller, they tried to depict the rings of this basin. Fig 2 (top) shows where the proposed two rings, according to Spudis are. Fig 2 (bottom shows an additional inner ring that the SLA group suggest might be an inner ring. The Lunar Wiki: http://the-moon.us/wiki/Schiller-Zucchius_Basin gives two ring diameters: 175 and 335 km. The proposed inner ring is of diameter 91 km, but it could also be a buried crater – however it does seem to be coincident with the centre of the Schiller-Zucchius basin. All three rings are more clearly seen in the slope Azimuth plot in Fig 3.

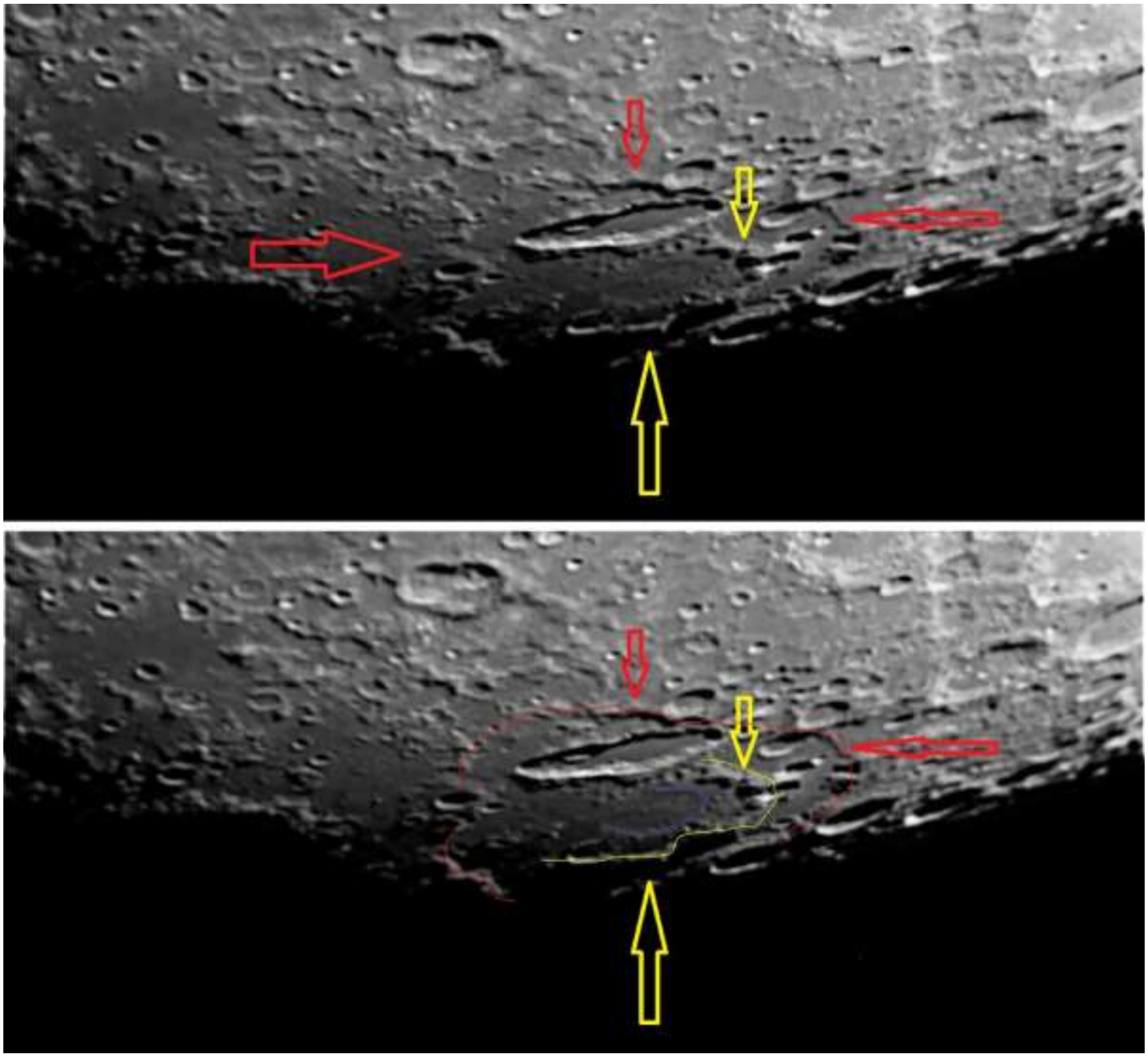


Figure 2*. An Earth based SLA image of the Schiller-Zucchius basin.* ***(Top)*** *Two rings found by Spudis.* ***(Bottom)*** *Third possible ring (in blue) found by the SLA team, with coloured line depictions for the existing two rings.*

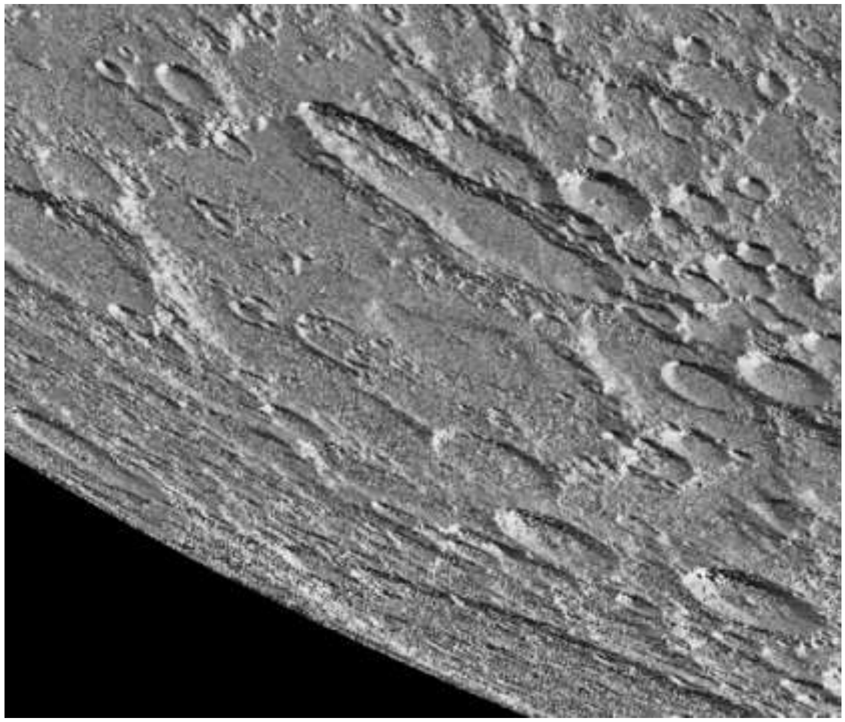


Figure 3. *Azimuthal Slope Map - from the LROC Quickmap web site.*

Buried Craters

Jay Albert (ALPO) emailed in the following: "*I looked through many of my old photos where I have previously suspected buried craters. Based on an article I read (I think by Chuck Wood) years ago, I had called them "ghost craters". I made copies of a few of these photos for this email and drew crude arrows pointing to features I thought might be buried craters. The photos dated before 2017 were made with my former 11" Celestron SCT and the ones after were taken with my 8" Celestron SCT. None of these arrowed features have names, although some of them have letter designations in Rukl while others have no designations at all.*"

Figure 4. *Images sent in by Jay Albert (ALPO) with arrows pointing to candidate buried/ghost craters.* ***(Top Left)*** *Ghost Craters Daguerre, Torricelli R taken on 2012-11-03.* ***(Top Right)*** *Bullialdus taken on 2020-04-04 UT 01:04.* ***(Bottom Left)*** *Gassendi taken on 2020-04-04 UT 01:56.* ***(Bottom Right)*** *Ghost crater D from Rukl 25 taken on 2014-09-02 UT 01:40.*

22.0 27 26=74/3

In Fig 4 (Top Left) we have three craters arrowed. The centre one is at 35.0°E 11.2°S and is 25 km in diameter and has no IAU name nor in our catalog. It is the least well defined. The right most one has no IAU name and is not in our catalog either, but is located at 35.3°W 10.5°S and 22.9 km in diameter. The left most one is the 2nd least well defined and again is not in our catalog and does not have an IAU name. This is 32.2°E, 10.8°S and 52.0 km in diameter.

In Fig 4 (Top Right) the arrowed area does not seem to have a buried crater at its tip 19.6°W, 23.5°S, but a little further east we have Wolf T located at 18.9°W, 23.4°S with a diameter of 27.1 km.

In Fig 4 (Bottom Left) two candidate ghost/buried are arrowed. The upper buried crater turns out to be PFC 35 from the ALPO/BAA buried crater catalog. The lower arrowed crater is not in the ALPO/BAA catalog, nor has an IAU name, so we will add this to the catalog with a position of 27.4°W, 16.6S and a diameter of 37.4 km.

In Fig 4 (Bottom Right) the arrowed ghost crater here turns out to be Maraldi D and is 66.5 km in diameter, so we do not need to add this to our buried craters list.

So, this is not a bad haul on a fishing trip for buried craters, four out of the seven candidates that Jay found are unknown (uncatalogued) and will be added to our database in the next few days!

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.

Lunar Calendar October 2022

Date	UT	Event
3	0014	First Quarter Moon
3		Greatest southern declination -27.4°
4	1700	Moon at perigee 369,325 km
5		North limb most exposed +6.7°
5	1600	Saturn 4° north of Moon
8	0300	Neptune 3° north of Moon
8	1800	Jupiter 2° north of Moon
9	2055	Full Moon
11		East limb most exposed +5.5°
12	0700	Uranus 0.8° south of Moon, occultation NW Mexico, West USA, Canada, Scandinavia
15	0500	Mars 4° south of Moon
16		Greatest northern declination +27.4°
17	1000	Moon at apogee 404,328 km
17	1600	Pollux 1.8° north of Moon
17	1715	Last Quarter Moon
19		South limb most exposed +5.5°
24		West limb most exposed -6.8°
25	1049	New Moon lunation 1235
29	1500	Moon at perigee 368290 km
30		Greatest southern declination -27.5°

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

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

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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: Ever Changing Eratosthenes

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 November 2022, will be Eratosthenes. 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 Ever Changing Eratosthenes Focus-On article is October 20, 2022

FUTURE FOCUS ON ARTICLES:

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

Subject	TLO Issue	Deadline
Ever Changing Eratosthenes	**November 2022**	**October 20, 2022**
Petavius	**January 2023**	**December 20, 2022**
Mare Nubium	**March 2023**	**February 20, 2023**
Reiner Gamma	**May 2023**	**April 20, 2023**
Mons Rümker	**July 2023**	**June 20, 2023**

Focus-On Announcement

EVER CHANGING ERATOSTHENES

Eratosthenes is a model impact crater, albeit "unfairly" overshadowed by the younger Copernican craters. It is interesting to observe its rim, well defined and with linear segments, its spectacular terraced walls, the central peaks, its irregular and fractured floor full of mounds, and its majestic ramp-shaped ejecta field, formerly known as “glacis”. Eratosthenes is very changeable, it is seen as a deep well of darkness near the terminator, passing through its phase of maximum splendor in the first or last quarter and to practically disappear in full moon, buried by the ejecta of its younger relative, Copernicus. And in addition to Copernicus, Eratosthenes has other very interesting sights: the complex topography of Sinus Aestuum and the grandeur of the Montes Apenninus.

NOVEMBER 2022 ISSUE-**Due October 20th, 2022: ERATOSTHENES**

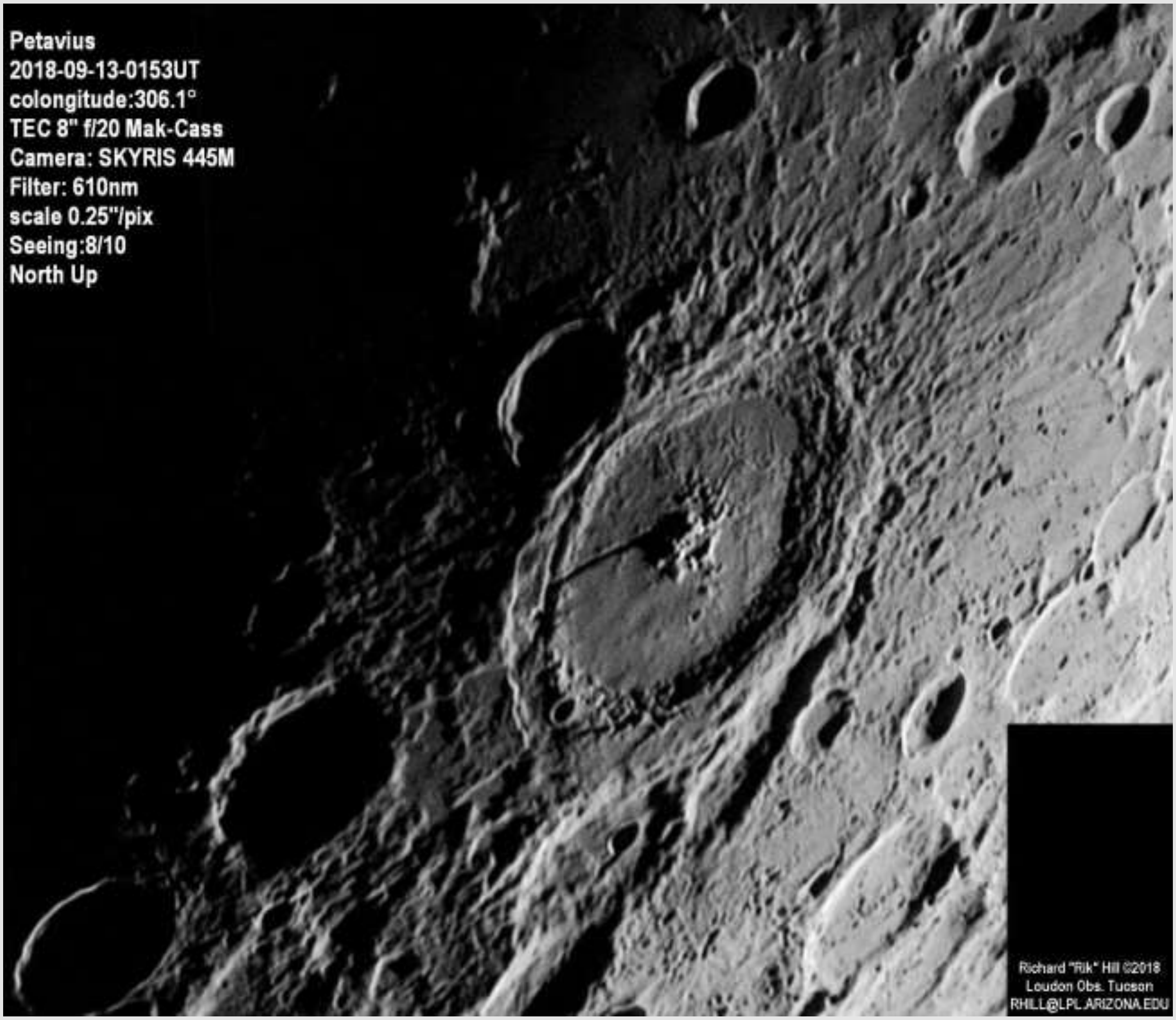
Fabio Verza

Focus-On Announcement

LAND OF CRACKS: PETAVIUS

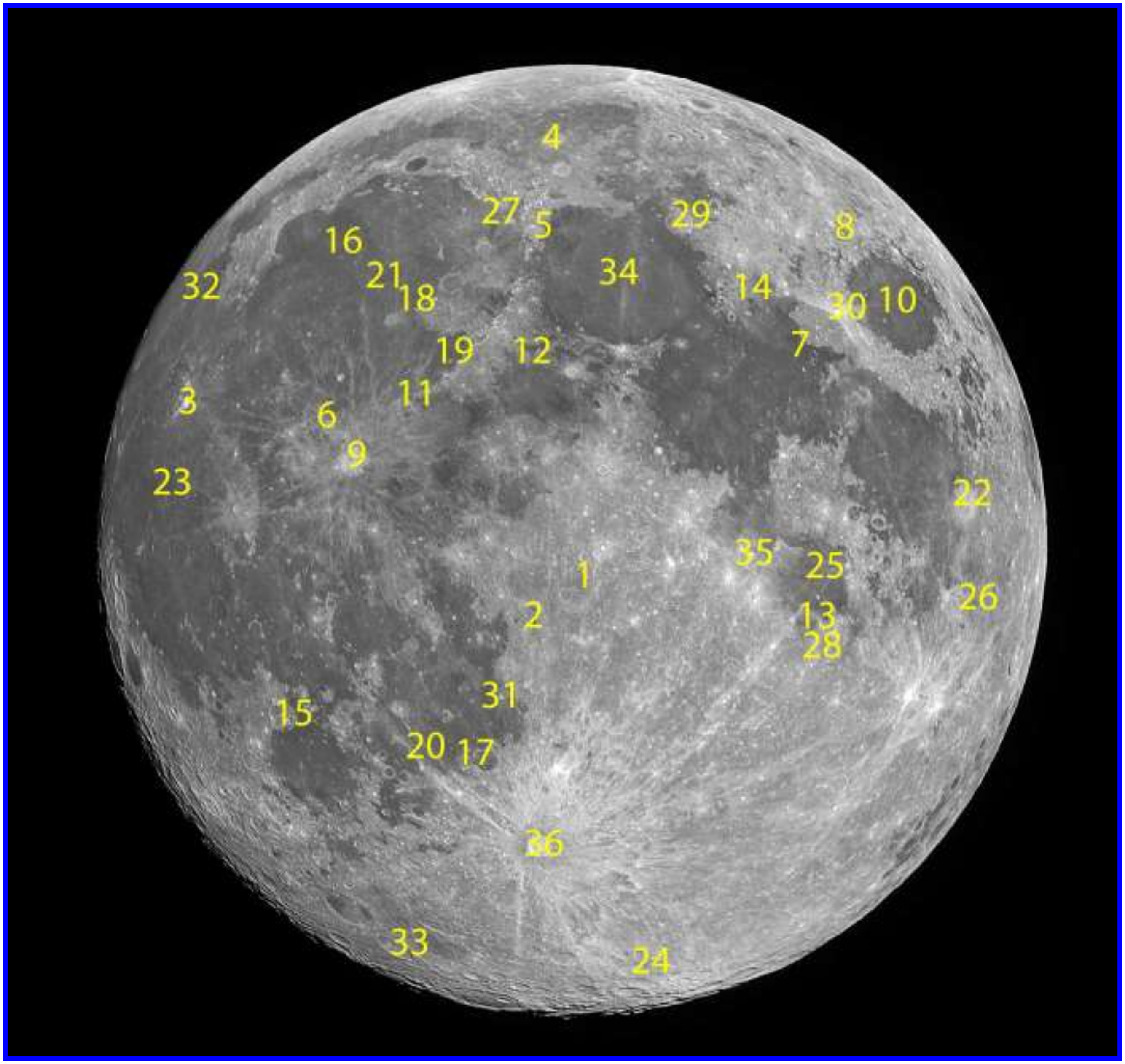
Petavius is a venerable antiquity, think how beautiful it must have been, hundreds of millions of years ago, when he would have looked like a super-grown Copernicus. Then it has lived through a whole geological history that has transformed it. Petavius is an opportunity to learn about the remains of its primitive grandeur, its massive, terraced walls, its mighty central peaks, and its ejecta field; and its more recent geological history: its uplifted ground and the rilles that later fractured it, including its best-known and most beautiful feature: Rimae Petavius, "the great cleft," as Elger called it.

JANUARY 2023 ISSUE – Due December 20, 2022: PETAVIUS
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



Rik Hill

Key to Images In This Issue



1. Albategnius
2. Alphonsus
3. Aristarchus
4. Aristoteles
5. Caucasus, Montes
6. Carpatus, Montes
7. Cauchy
8. Cleomedes
9. Copernicus
10. Crisium, Mare
11. Eratosthenes
12. Fidei, Sinus
13. Fracastorius
14. Gardner Mega Dome
15. Gassendi
16. Helicon
17. Hesiodus
18. Higazy, Dorsum
19. Huxley
20. Kies
21. La Hire, Mons
22. Langrenus
23. Marius Hills
24. Moretus
25. Nectaris, Mare
26. Petavius
27. Piazzi Smyth
28. Piccolomini
29. Posidonius
30. Proclus
31. Recta, Rupes
32. Rümker
33. Schiller
34. Serenitatis, Mare
35. Theophilus
36. Tycho