ALPO ASSOCIATION OF LUNAR & PLANETARY OBSERVERS

The Lunar Observer

A Publication of the Lunar Section of ALPO

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

February 2022

Online readers, click on images for hyperlinks

In This Issue

I hope that this issue of *The Lunar Observer* finds you and your loved ones in good health. In this issue, you will find interesting articles by Robert H. Hays, Jr. about the crater Purbach that are accompanied by his great lunar drawings, Rik Hill articles and images about the Apennine Mountains and Arzachel and Alberto Anunziato draws and discusses wrinkle ridges in Mare Imbrium and in Mare Humorum with Francisco Alsina Cardinalli. Raffaello Lena contributed another of his lunar dome investigations, this time about lunar domes near Arago and in Mare Spumans. As always, Tony Cook has contributed an interesting article about lunar geologic change. Plus 13 lunar observers contributed lunar images and drawings from across the planet. Thanks to each of you who contributed!

As I write this in late January 2022, I have noticed in the news, both national and local, the a Space X rocket will soon hit the Moon and make a "giant" crater. 65 feet across by some estimates. Guess I will need a bigger telescope to see that one! No, even then, I will not see it, as it will impact (you know it) "the dark side of the Moon". I certainly hope it does not hurt any Pink Floyd albums!

Please remember to send in observations for next month's Focus-On article about Stevinus and Snellius to Alberto Anunziato and myself by February 20, 2022. Have a great month of lunar observing.
David Teske

Lunar Topographic Studies

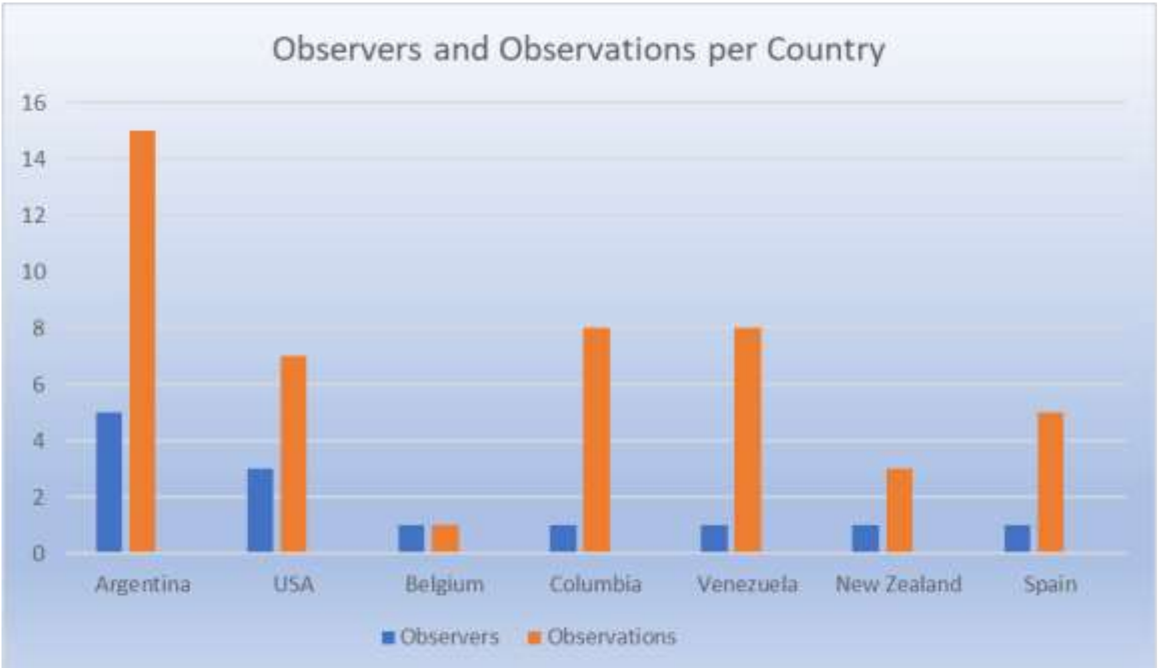
Coordinator – David Teske - david.teske@alpo-astronomy.org
Assistant Coordinator– Alberto Anunziato albertoanunziato@yahoo.com.ar
Assistant Coordinator – William Dembowski - zone-vx@comcast.net
Assistant Coordinator-Wayne Bailey– wayne.bailey@alpo-astronomy.org
Website: http://www.alpo-astronomy.org/

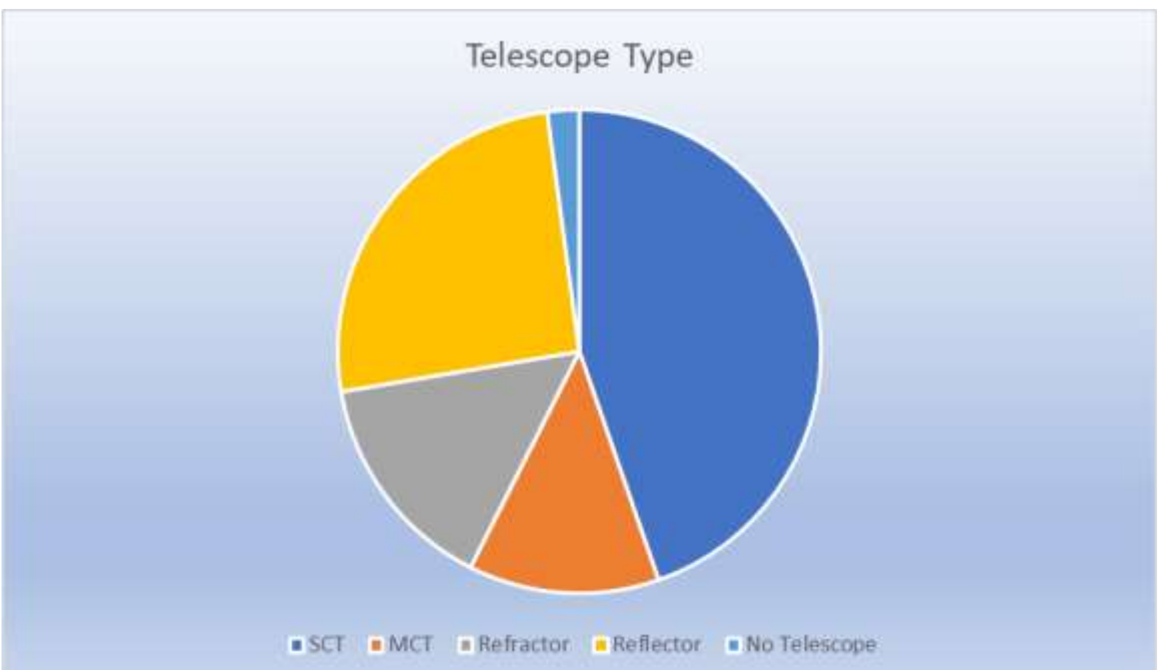
Observations Received

Name	Location and Organization	Image/Article
Alberto Anunziato	Paraná, Argentina	Article and drawing *Dorsa Argand and Dorsum Bucher Near the Terminator* and *The Eastern Part of Mare Humorum.*
Luis Francisco Alsina Cardinalli	Oro Verde, Argentina	Article and images *The Eastern Part of Mare Humorum.*
Jairo Chavez	Popayán, Colombia	Images of Fracastorius, Plato, Tycho, Full Moon, 30% Waxing Crescent Moon, 40% Waxing Crescent Moon, First Quarter Moon and 92% Waxing Gibbous Moon.
Maurice Collins	Palmerston North, New Zealand	Image of the 5.6 day old Moon, Theophilus and Lacus Mortis.
Jef De Wit	Hove, Belgium	Drawing of the naked eye Full Moon.
Walter Ricardo Elias	AEA, Oro Verde, Argentina	Images of the Waxing Crescent Moon, Petavius, Lunar South Pole, Mare Crisium, Ross D and Theophilus.
Robert H. Hays, Jr.	Worth, Illinois, USA	Articles and drawings *Purbach Interior Detail and Picard* and *Southwest Mare Crisium*.
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Article and image *Southern tip of the Apennines* and *Arzachel Sunrise.*
Raffaello Lena	Rome, Italy	Article *Investigating Lunar Domes In Arago Region and In Mare Spumans*.
Rafael Benavides Palencia	Cordoba, Spain	Images of Rupes Recta, Montes Apenninus and Eratosthenes, Archimedes, Autolycus, Aristillus, Rima Hyginus and Rimae Triesnecker and Promontorium Fresnel, Dawn in Archimedes, Autolycus and Aristillus.
Jesús Piñeiro	San Antonio de los Altos, Venezuela	Images of Messier, Rima Ariadaeus, Atlas, Clavius, Alphonsus, Archimedes, Eudoxus and Vallis Alpes.
Raúl Roberto Podestá	Formosa, Argentina	Images of Alphonsus (2), Archimedes and Waxing Gibbous Moon.
Guido Santacana	San Juan, Puerto Rico, USA	Images of Copernicus, Northern Mare Imbrium, Mare Humorum and Schiller.
Victor Velez	La Plata, Argentina	Images of Copernicus, Montes Apenninus and Tycho.

February 2022 *The Lunar Observer*
By the Numbers

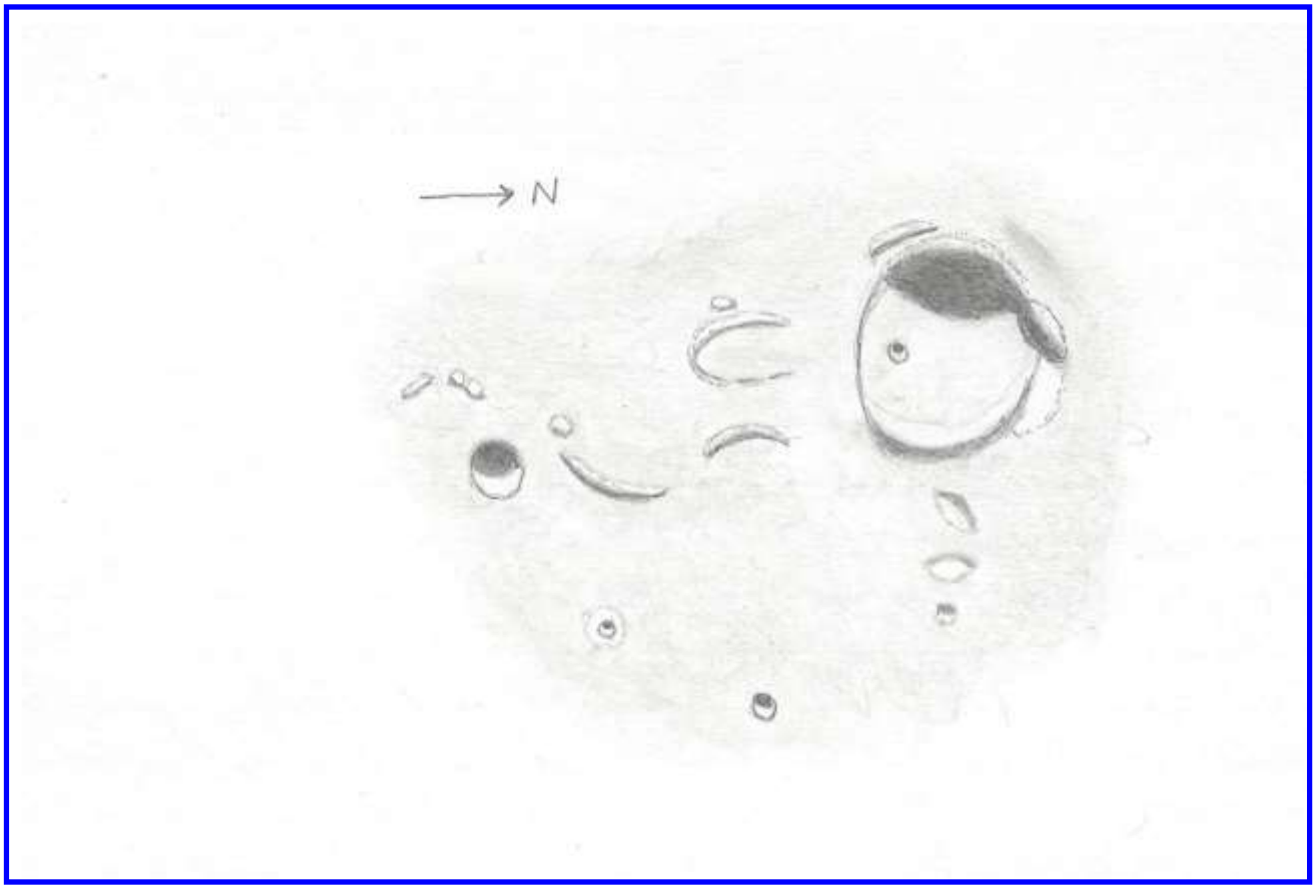
This month there were 47 observations by 13 contributors in 7 countries.





Purbach Interior Detail

Robert H. Hays, Jr.



***Purbach Interior Detail**, Robert H. Hays, Worth, Illinois, USA. 2021 August 21 08:26-08:50 UT. 15 cm reflector telescope, 170 x. Seeing 7-8/10, transparency 6/6.*

I drew this area on the morning of August 29, 2021. Purbach is a large crater with a broken north rim east of Mare Nubium. Purbach G is the largest crater within or on the rim of Purbach. This crater has a flattish south rim and a blunt point to the southeast. I drew its interior shadowing as I saw it. An irregular depression abuts the north rim of Purbach G. The tiny pit on its floor is Purbach GA. Three irregular craters are east of Purbach G. The Lunar Quadrant map shows them along the north rim of Purbach which appears to be missing. A short ridge is southeast of Purbach G, and a dusky spot is to its north near the aforementioned depression. Purbach A is the conspicuous crater well south of Purbach G. The haloed craterlet northeast of Purbach A is Purbach X. The pit north of X is Purbach T; this crater has no halo. Several curved ridges are between Purbach G and A. These may be the remnants of old rings. The one just north of Purbach A is probably Purbach W. Other detail appears to form a horseshoe, but the result may be too elongated to be from the same ring. An isolated peak is near Purbach W, and three more are west of Purbach A. Purbach itself does not have a noticeable central peak.

Southern Tip of the Apennines

Rik Hill

The night before Copernicus comes into view, we get a fine view of his little brother Eratosthenes (60 km dia.) seen here just left of center. The sunlight is catching just the tip of the central peak casting a shadow onto the base of the wonderfully terraced western interior wall. Only when the Sun is this low can you see the ejecta splash to the south of Sinus Aestuum. To the lower left (west) from Eratosthenes is the large ghost crater Stadius (71 km) splattered with secondary craters from the Copernicus impact trailing off into the terminator to the north.

To the east of Eratosthenes is a spectacular ridge that is the southern third of the Montes Apenninus with some of the taller peaks on the Moon. Mons Wolf (labeled "1") is 3.5 km high, Mons Ampere ("2") is a little shorter at 3 km, and Mons Huygens is a full 5.5 km in height from the floor of Mare Imbrium to its peak.

Above this ridge notice another smaller ghost crater, Wallace (27 km) to the east of Wallace above Mons Ampere "2" is the small crater Huxley (3 km). The irony in the juxtaposition of these two will not be lost on those familiar with the history of evolutionary biology!

Eratosthenes to Stadius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 December 13 00:47 UT, colongitude 16.1°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 132M camera. Seeing 8/10.*

Investigating Lunar Domes in Arago Region and in Mare Spumans

Raffaello Lena

In this contribution I provide an analysis of some recent images submitted by Maximilian Teodorescu andFrank Schenck regarding the domes in Arago region and in Mare Spumans.

Arago is a well-known crater located in the western part of Mare Tranquillitatis. Mare Tranquillitatis is situated on the site of an ancient pre-Nectarian impact basin [1-2]. As reported in [3] the older lavas in Mare Tranquillitatis are characterized by a lower Titanium content (reddish in colour ratio), while the youngest lavas erupted in the region are blue (higher Titanium content). The Arago region has been described in my previous note [4]. As shown in Fig. 1 three low domes, located to the north of Arago, are aligned. These three aligned domes, named as A4-A6, have base diameters of 11.1, 8.4 and 9.5km respectively. The height amounts to 65±10m for A4, 50±5m for A5 and 45±5m for A6, yielding flank slopes of 0.7° (A4) and 0.6° (A5-A6).

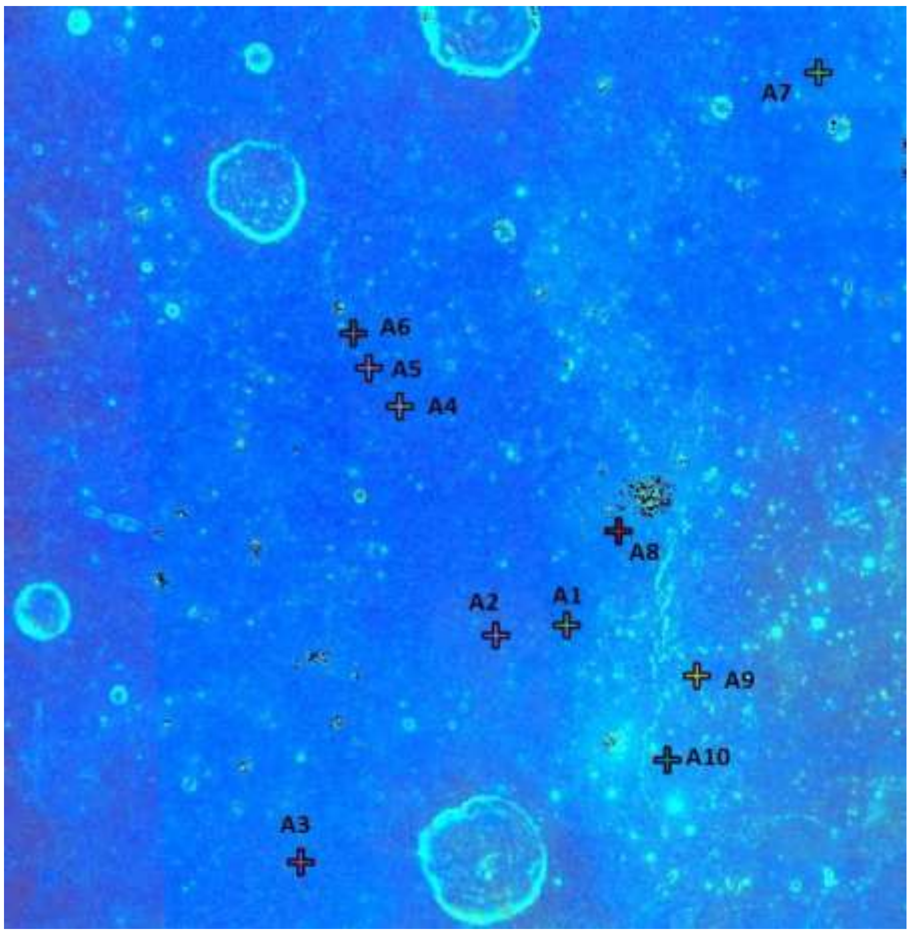


Figure 1: Clementine color ratio imagery of the Arago region including the lunar domes. The domes A1-A10 are described in a previous note by the author [4].

An excellent image of this region is shown in Fig. 2. The image was taken by Teodorescu on November 25, 2021 at 03:49 UT using a 355 mm Newtonian telescope. As very low solar illumination angles are required to reveal the gentle slopes of lunar domes, the subtle domes A4-A6 in the probes imagery are not prominent (Fig. 3) as in the telescopic image shown in Fig. 2 taken under oblique illumination.

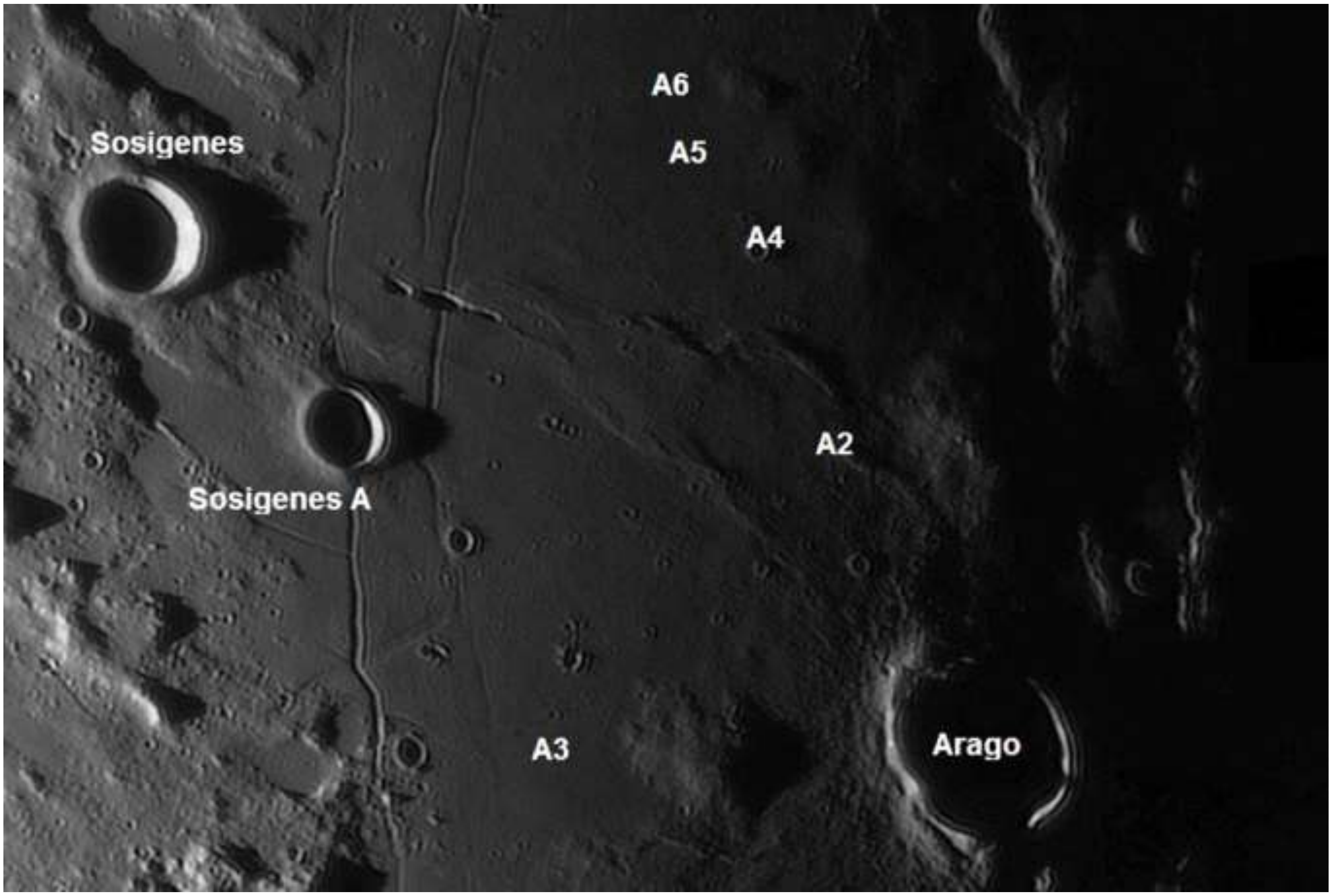
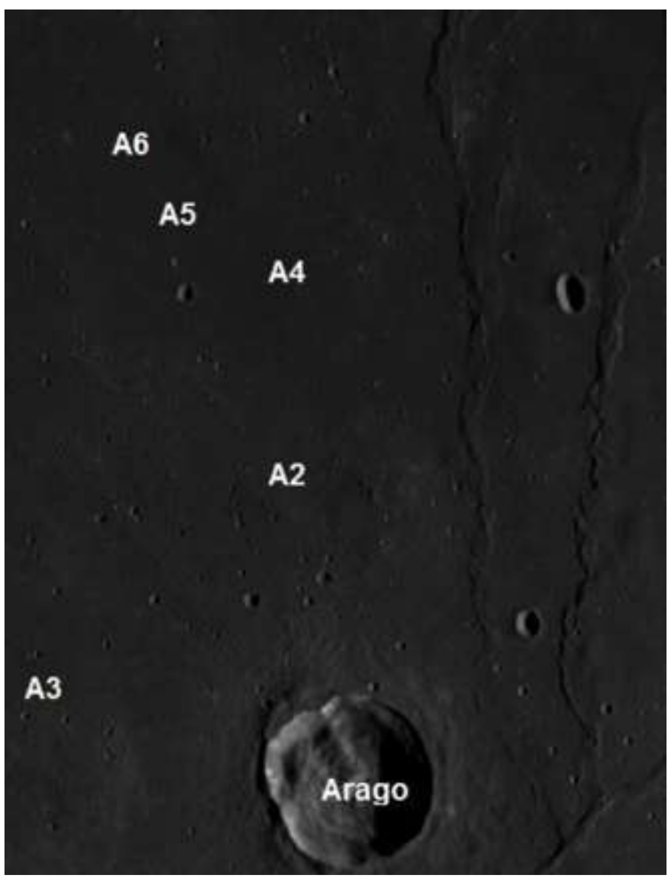


Figure 2: Telescopic image made by Teodorescu on November, 25 2021 03:49 UT.

Figure 3: WAC imagery



The telescopic image shown in Fig. 2 was also used to derive an elevation map of the examined domes, obtaining a three-dimensional (3D) reconstruction. A well-known image-based method for 3D surface reconstruction is shape from shading (SfS). This technique makes use of the fact that surface parts inclined towards the light source appear brighter than surface parts inclined away from it. The SfS approach aims to derive the orientation of the surface at each image location by using a model of the reflectance properties of the surface and knowledge about the illumination conditions, finally leading to an elevation value for each image pixel [2]. Thus I have derived the DEM and the 3 D reconstruction (Fig.4).

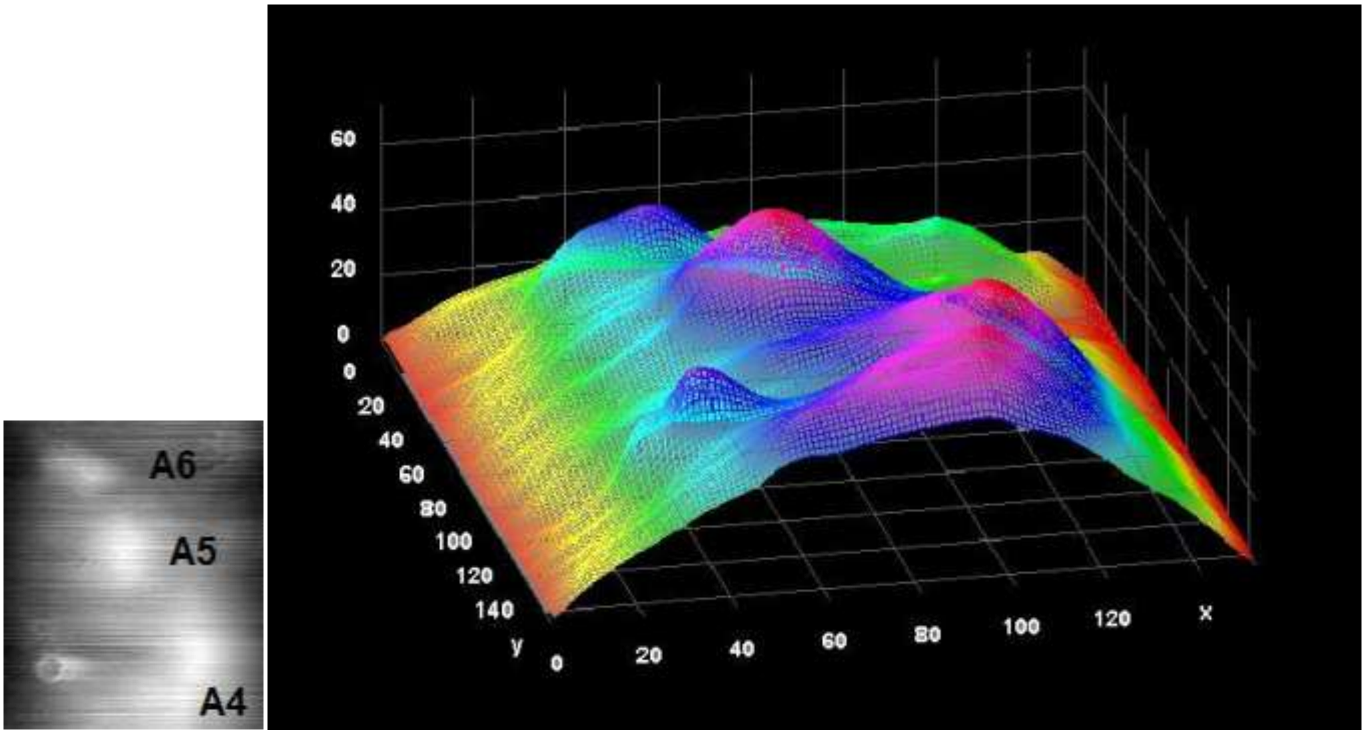


Figure 4: (left) DEM obtained using the telescopic image of Fig. 2. The domes A4-A6 are marked. (right)3D reconstruction of A4-A6, vertical axis is 30 times exaggerated.

To the north of Arago lie two known lunar domes Arago α (termed A2) and Arago β (termed A3). These two large domes (Fig. 2)- A2 and A3- belong to class D and formed during several stages of effusion, representing non-monogetic domes. The other smaller domes in Arago show lower flank slopes and according to their rheologic properties, belong to class A implying low lava viscosities of about 10^3 Pa s, high effusion rates and very short durations of the effusion process of about 3–4 months.

In another previous work, a dome in Mare Spumans has been identified using LROC WAC imagery and named as Spumans 1 (see link below)
http://www.alpo-astronomy.org/gallery3/var/albums/Lunar/Lunar- Domes/2021/Dome%20in%20Mare%20Spumans.pdf?m=1633191674

It lies at about 26 km south west of the crater Pomortsev.

An image of the dome was taken by Schenck on November, 21, 2021 at 03:16 UT using a C14 f/11 (Fig. 5).

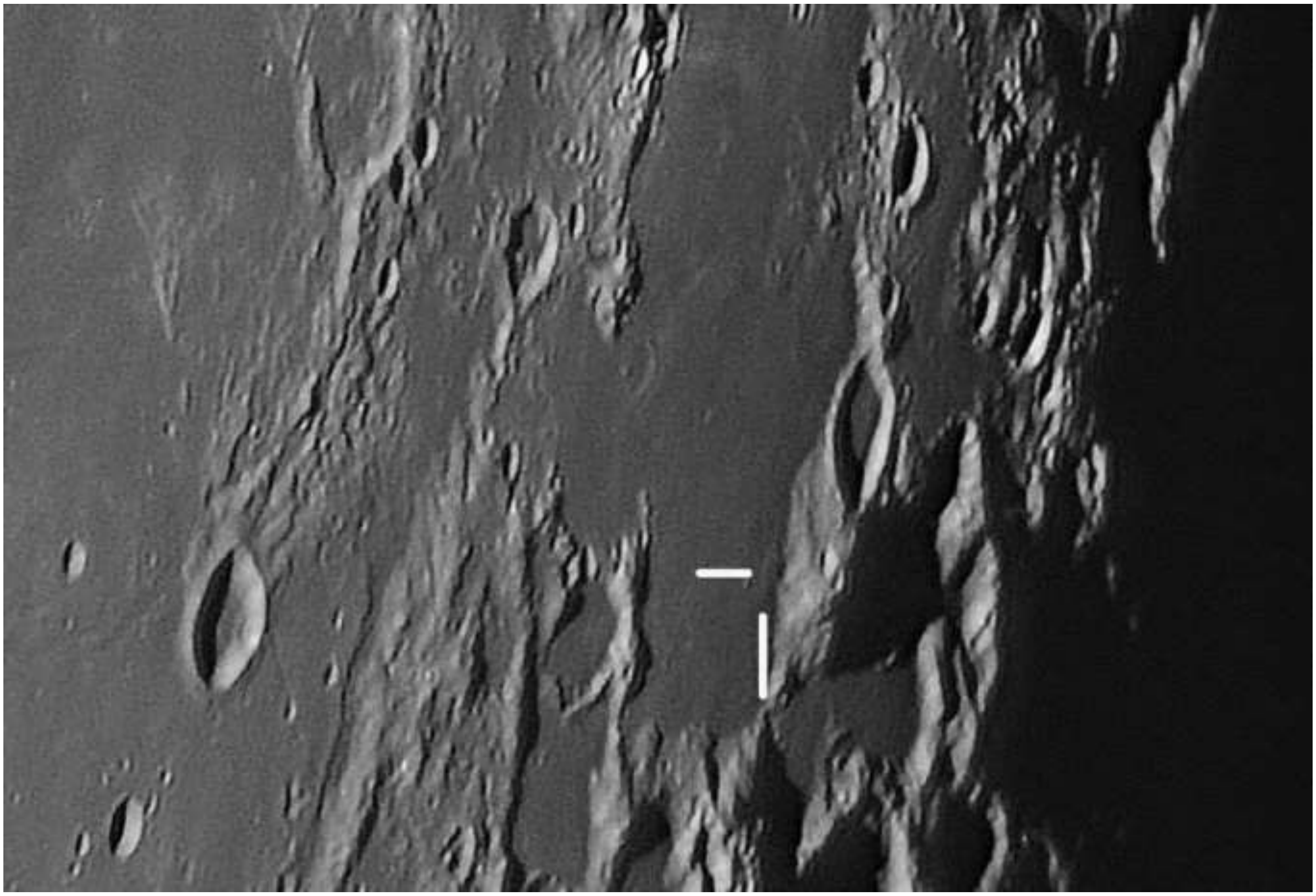


Figure 5: Telescopic image made by Schenck on November, 21 2021 03:16 UT. The dome Spumans 1 ismarked with white lines.

I have deleted the foreshortening effect transforming the telescopic image in cylindrical projection**,** using LTVT software package by Mosher and Bondo (Fig. 6).

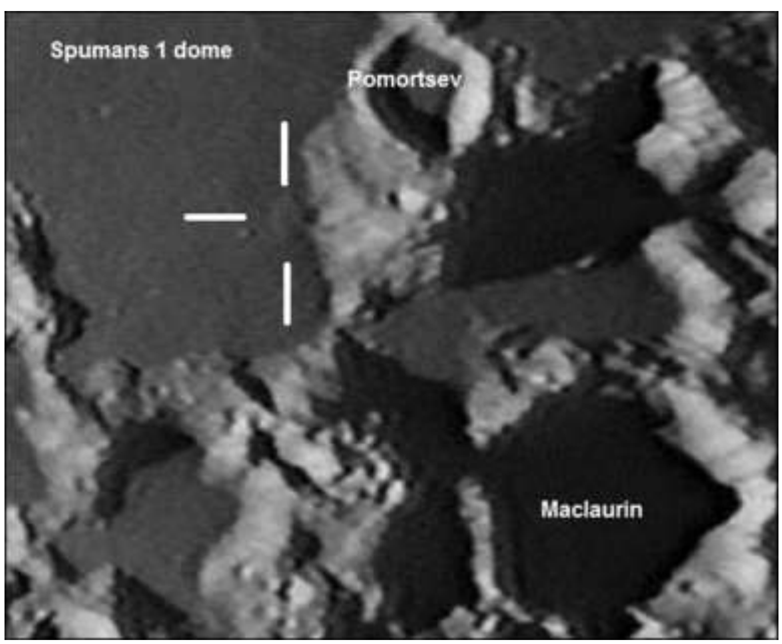


Figure 6: The dome Spumans 1 displays a circular shape. Image in cylindrical projection using LTVTsoftware package.

Inversely, a synthetic image of a dome can also be generated based on an available DEM as seen from a given direction for lighting from some other specified direction. The LTVT software was used to generate synthetic view of selected parts of the LOLA DEM as cylindrical projection deleting, also in this case, theeffect of foreshortening (Fig. 7).

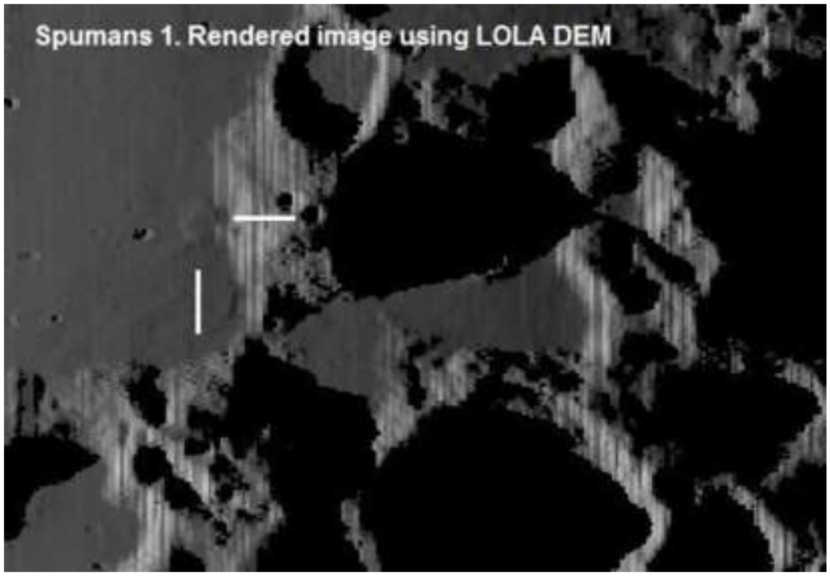


Figure 7: Image simulated based on the LOLA DEM using LTVT, displaying the dome Spumans 1 under the solar altitude of 3.9° as cylindrical projection, thus deleting the effect of foreshortening. The renderedimage may be compared with the telescopic image shown in Fig. 6.

Based on the telescopic image, the dome has a base diameter of 8.5 ± 0.5 km. The height, determined using the photoclinometry and SfS approach [2], amounts to 95 ± 10m. A 3D reconstruction is shown in Fig. 8.

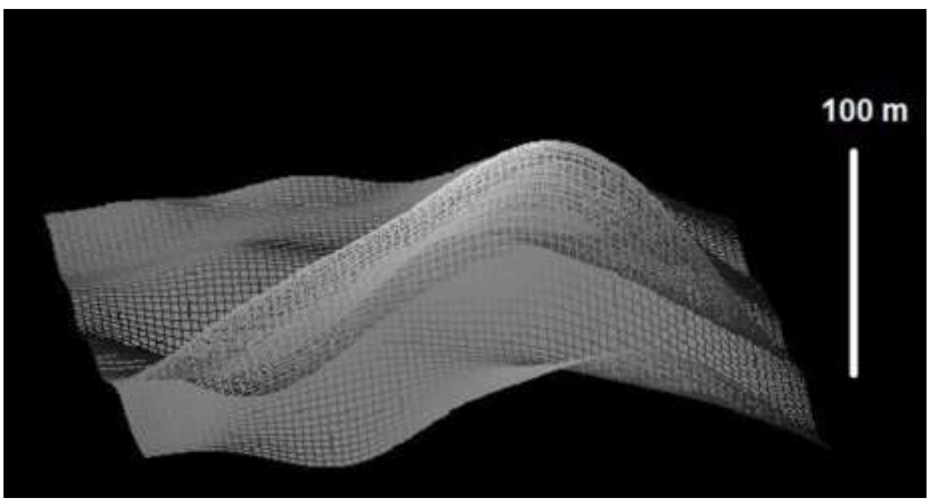


Figure 8: 3D reconstruction of Spumans 1, based on the telescopic image of Fig. 6. Vertical axis is 30times exaggerated.

The search for lunar domes in the easternmost regions of the Moon can be a goal for amateur astrophotographers and astronomers. I encourage high-resolution imagery of this area using telescopic images, so that we can have more data about the dome Spumans 1, actually under study.

Please check also your past imagery of the Mare Spumans and send them to us for the ongoing study(lunar-domes@alpo-astronomy.org).

References:

Wilhems, D. The geologic history of the Moon, USGS Prof. Paper 1348, 1987.
Lena, R., Wöhler, C., Phillips, J., Chiocchetta, M.T., 2013. Lunar domes: Properties and Formation Processes, Springer Praxis Books.
Rajmon, D., Spudis, P., 2001. Distribution and stratigraphy of basaltic units in Mare Tranquillitatis, Proc. Lun. Plan. Sci. Conf. XXXII, paper 2156.
Lena, R. 2017. Lunar Domes (part VIII): Domes in the Arago region, BAA LS circular vol. 54, 1, January 2017, pp. 9-16.
Lena, R. 2021. Lunar Domes (part LI): Searching domes in Mare Spumans, BAA LS circular vol. 58, 10, October 2021, pp. 23-26.
Mosher, J., & Bondo, H., 2006. *Lunar Terminator Visualization Tool (LTVT)*. See:https://github.com/fermigas/ltvt/wiki

Dorsa Argand and Dorsum Bucher Near the Terminator

Alberto Anunziato

The area I observed on the night of January 14, 2022 is located between the Harbinger Mountains (on the left, that is, to the east) and Gruithuisen (on the right). With the terminator passing a little to the south of the Dorsum Bucher, which is the ridge composed of a single segment, slightly sinuous, with a very bright eastern zone that comprises about a third of it. The two segments that dominate the scene are part of the Dorsa Argand, a system of wrinkle ridges. Seen from my backyard with my little 4-inch Maksutov-Cassegrain, the two segments look more interesting. The eastern segment interrupted at its southern end, with a small and very dim section and a much longer and very bright and homogeneous section, in which a very bright zone stands out in the center (probably the highest part). The western segment appears divided into two sections, the dimmer eastern and the brighter western. The two segments of Dorsa Argand cast shadows to the south. The Dorsum Bucher also casts shadows, but they are confused with the terminator. What we see in the far north is the westernmost foothills of the Harbinger Mountains, appearing bright but with some darker detail that could be related to lower zones in shadows. It is interesting to compare IMAGE 1 with IMAGE 2, which corresponds to the Apollo Image Atlas and was obtained in orbit by the Apollo 15 mission (it is image AS15-M-2078). The brightest part of Dorsum Bucher clearly corresponds to a much higher part of this wrinkle ridge, to the point that it is the only part of the relief that casts a shadow in the field of the image, if we exclude the heights of the Harbinger Mountains. With a small telescope, the low-lying wrinkle ridges appear more sinuous than they really are, as we see in the rather diverse shape that Dorsa Argand presents in the Apollo 15 image (in which Angstrom appears, which is missing from our sketch). There is a detail in IMAGE 1 that I cannot exactly relate to any relief in the area: the slightly bright semicircle on the terminator, to the west. It clearly looks like a crater, cut in half by the terminator, with its rim lit. I haven't found in the images I reviewed what that rather promiscuous medium sized crater would be. Being so close to the terminator and the dorsa drawn, it is difficult for me to have made a mistake in its location and it is, for example, Gruithuisen. Hopefully we can someday decipher this modest enigma.

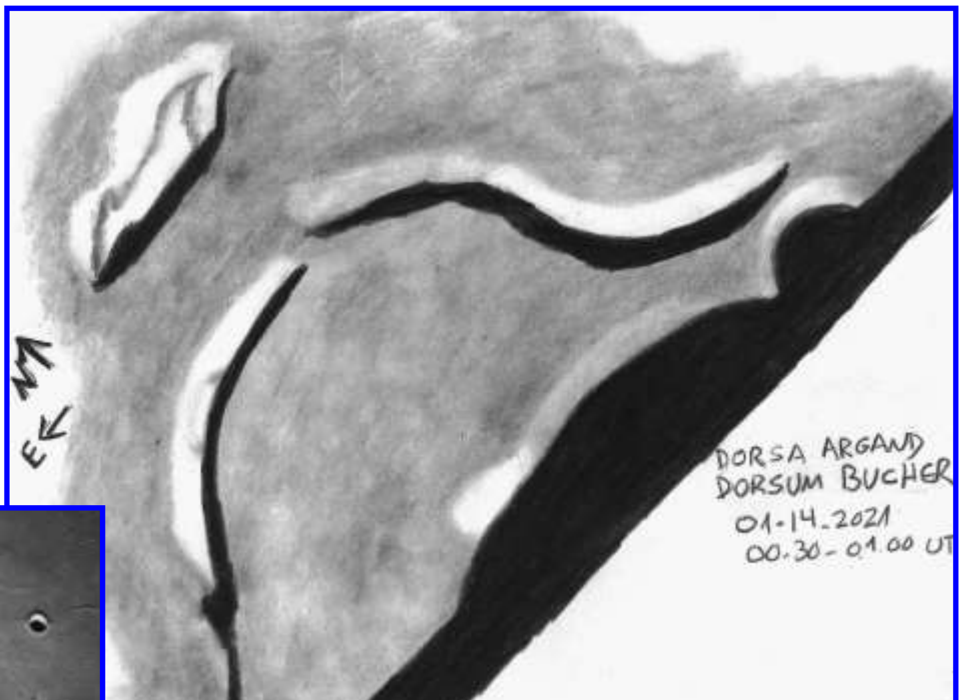
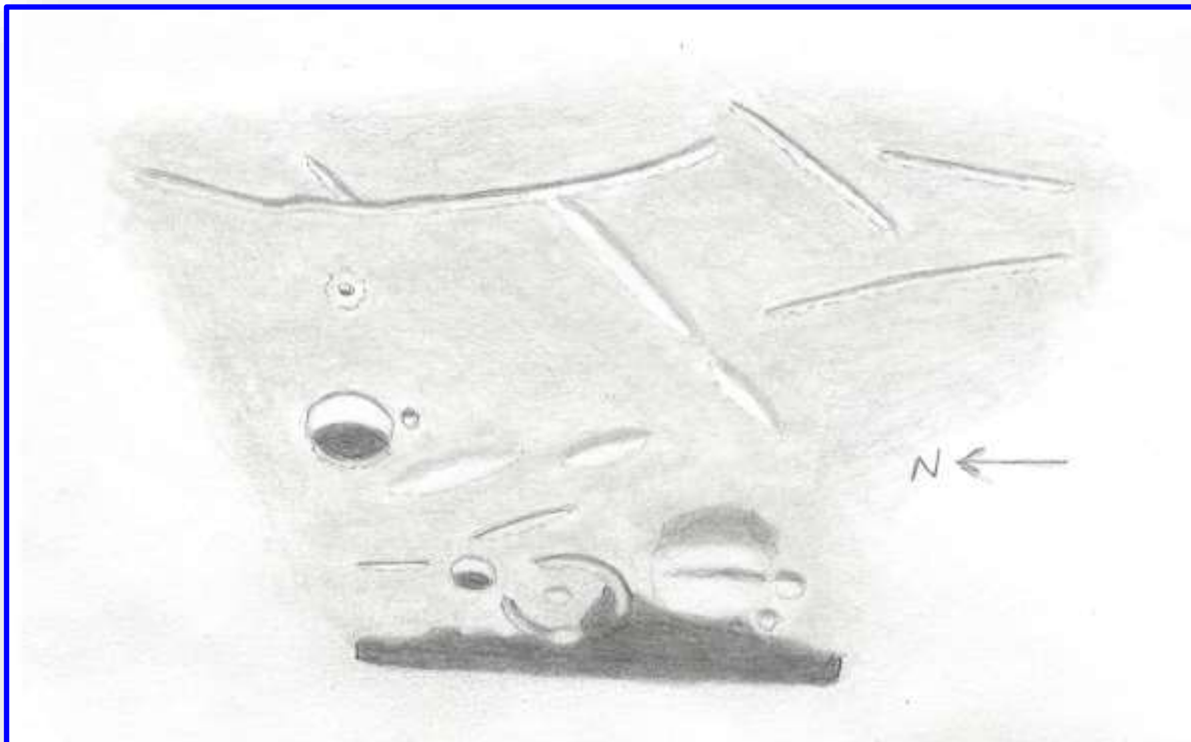


Image 1, Dorsa Argand and Dorsum Bucher, *Alberto Anunziato, Paraná, Argentina. 2022 January 14 00:30-01:00 UT. Meade EX105 Maksutov-Cassegrain telescope, 154 x.*

Image 2 Dorsa Argand and Dorsum Bucher, *Apollo 15, image AS15-M-2078*

Picard and Southwest Mare Crisium

Robert H. Hays, Jr.



Picard and Southwest Mare Crisium*, Robert H. Hays, Jr., Worth, Illinois, USA. 2021 October 23 08:45-09:39 UT. 15 cm reflector telescope, 170 x. Seeing 7-8/10, transparency 6/6.*

I observed this area on the morning of October 23, 2021. Picard is the largest intact crater in this sketch. This is a fairly large, crisp crater with a small peak just to its south. The crater Lick D to the southwest is a smaller version of Picard. Lick itself is south of Lick D and at the edge of Mare Crisium. Lick is larger than Picard, but its northeast rim is missing. Lick also has a rounded central peak. The nearby shadows are from rugged terrain at the edge of Mare Crisium. A strip of sunlit rim protrudes into a shadowed area. A large, nearly round mountain is south of Lick. This mountain is bisected by a strip of shadow, and two small peaks are just to its south. Two narrow ridges are southeast and north of Lick D, and two wider but lower ridges are south of Picard. The bright spot east of Picard contains the pit Picard Z. There is a network of ridges or wrinkles east and south of Picard. A 'Y' intersection is southeast of Picard. The longest ridge is nearly straight northward from this intersection before petering out. A short branch extends eastward from it near Picard Z. A wider but lower ridge goes southwest from the 'Y', ending south of the large mountain. There is a gap a little more than halfway along its length. The ridge south of the 'Y' is narrower but with darker shadowing than the one to its west. Three narrow, very straight ridges are farther to the south. All showed similar, modest shadowing. One is oriented northeast-southwest, and is nearly but not quite parallel to the one west of the 'Y'. Two similar ridges are nearly north-south, but are not parallel to each other. All these ridges are detached from each other and from the main ridge.

This article appeared in the January 2022 *The Lunar Observer*. I had made some typos in the original version, this article has been corrected. David Teske

The Eastern Part of Mare Humorum

Luis Francisco Alsina Cardinalli and Alberto Anunziato

What we see in IMAGE 1 is the eastern part of Mare Humorum. The terminator passes exactly through Gassendi, whose peculiar shape we recognize thanks to its rim and central peak shining with the rays of the rising Sun. Mare Humorum is almost circular, it is 410 km in diameter, its borders are quite defined, except in the area that we observed, in which the lavas of Oceanus Procellarum join with those of Humorum. With a small telescope the interior of Mare Humorum appears almost completely smooth, even with the terminator passing close by, but with a medium size telescope and with the terminator close up some interesting features are seen. The craterlets inside are, starting from right to left: Gassendi Y (3 km diameter), Gassendi J (9 km), Gassendi R (3 km), Gassendi O (11 km), Puiseux F (4 km), Puiseux C (3 km), Puiseux B (4 km), Puiseux D (7 km). On the left edge is a circular crater, with its western rim glowing brighter in the lunar sunrise. It is 41 km in diameter and is called Vitello.

Image 1 Mare Humorum, *Luis Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 December 10 02:04 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomic ProPlanet 742 IR-pass filter.*

In the detail of IMAGE 2 we see the Kelvin Promontorium, with shadows to the west and the highest peak shining. But what interested me most when reviewing this already old image is the clarity with which a series of concentric wrinkle ridges can be distinguished, which are actually quite low and mark a deformation of the crust around the mascon present in Humorum. In the words of Peter Grego ("The Moon and How To Observe It", Springer, 2005): "A well-defined concentric system of wrinkle ridges runs entirely around the eastern part of Mare Humorum, perhaps marking the location of the complex eastern rim of a submerged inner mountain ring more than 200 km in diameter. However, it is unusual that wrinkle ridges are absent in the west". Well, the west is in shadow, but the east is at our command. We thought it was interesting to start the analysis of the wrinkle ridges in the eastern part of Mare Humorum by recognizing the ones that appear in the IMAGE 1.

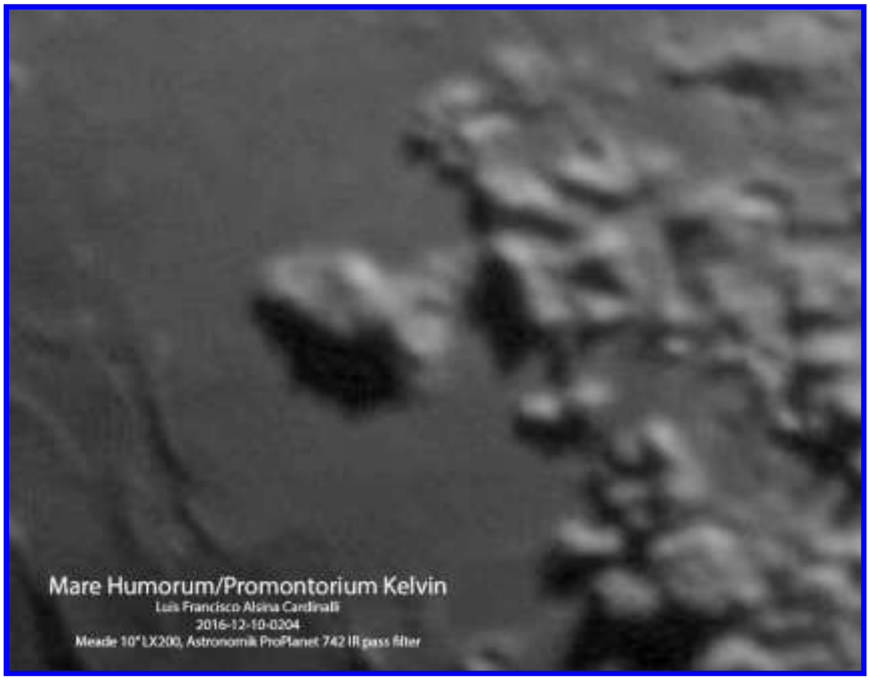


Image 2 Mare Humorum/Promontorium Kelvin, *Luis Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 December 10 02:04 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomic ProPlanet 742 IR-pass filter.*

If we compare the 6 segments that we mark in IMAGE 3 with the segments that appear in IMAGE 4 (which is part of the Map of lunar wrinkle ridges digitized from LROC Wide Angle Camera (WAC) global Mosaic), it can be a bit discouraging, since we see that most of the segments that are outside the scope of our instrument, which marks the limits of our possible contributions.

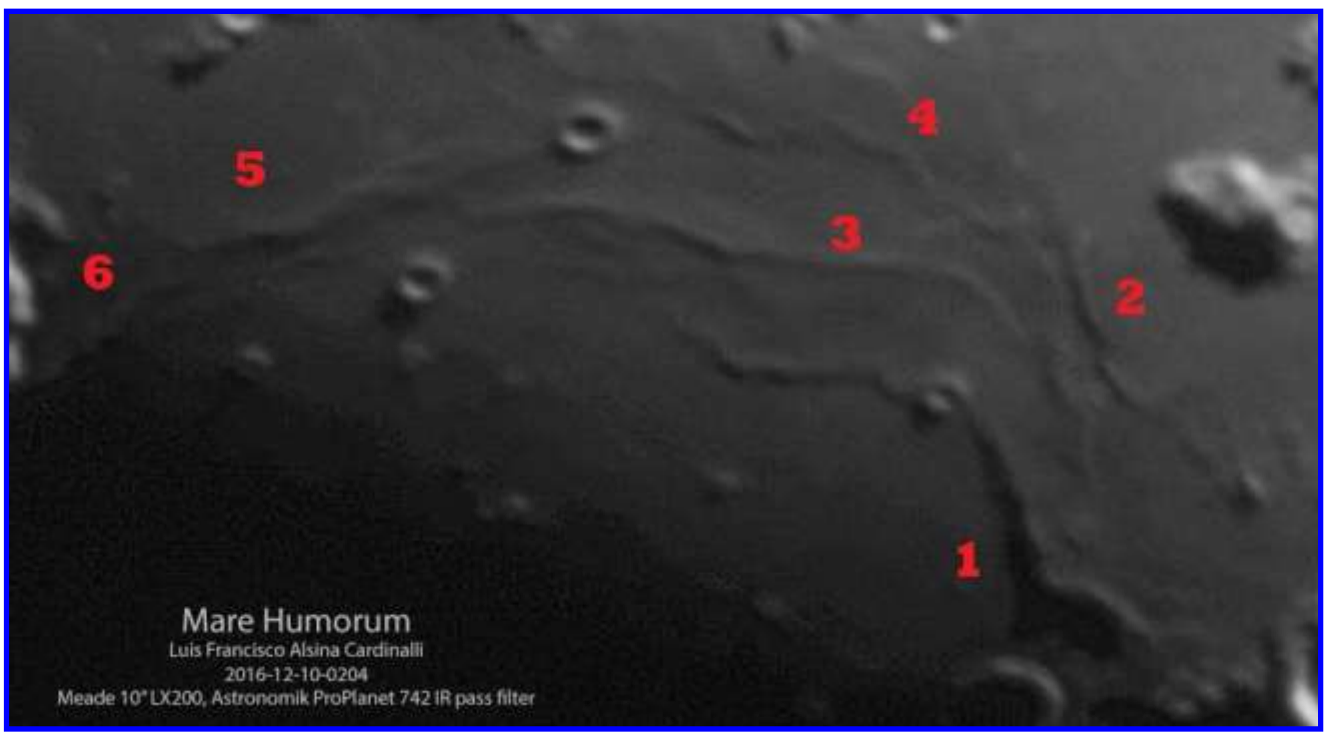


Image 3 Mare Humorum, Wrinkle Ridges Labeled, *Luis Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 December 10 02:04 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomic ProPlanet 742 IR-pass filter.*

It is more useful to compare IMAGE 3 with IMAGE 5, taken from Chart 52 of Antonin Rükl's Atlas of the Moon. In our image appear the wrinkle ridges that appear in the Rükl Atlas. Returning to IMAGE 3, the wrinkle ridges have the characteristics of the low-rise wrinkle ridges, except perhaps for segment 1 (in the center of which is Puiseux D), whose right half casts deep shadows and in which we see segments brighter than would be the highest parts ("crest"), it is also true that it is the segment closest to the terminator. Segment 2, parallel to segments 4, 3 and 1, is made up of two sections that do not quite touch at their ends (which would be the highest parts judging by the shadows they cast), although there is surely no such separation, but we fail to perceive the union. Segments 3 and 4 are pretty exemplary: there are brighter sections that also cast shadows (and which we can presume are the highest parts of the ridge). Segment 6 is quite low (and anodyne to see). Segment 5 is the most interesting, as we can distinguish the two parts of the wrinkle ridge: the arch (a broad and gently sloping at the bottom) and the crest or crenulated ridge, the steeper upper part, which we see brighter (and that in the highest areas casts a shadow).

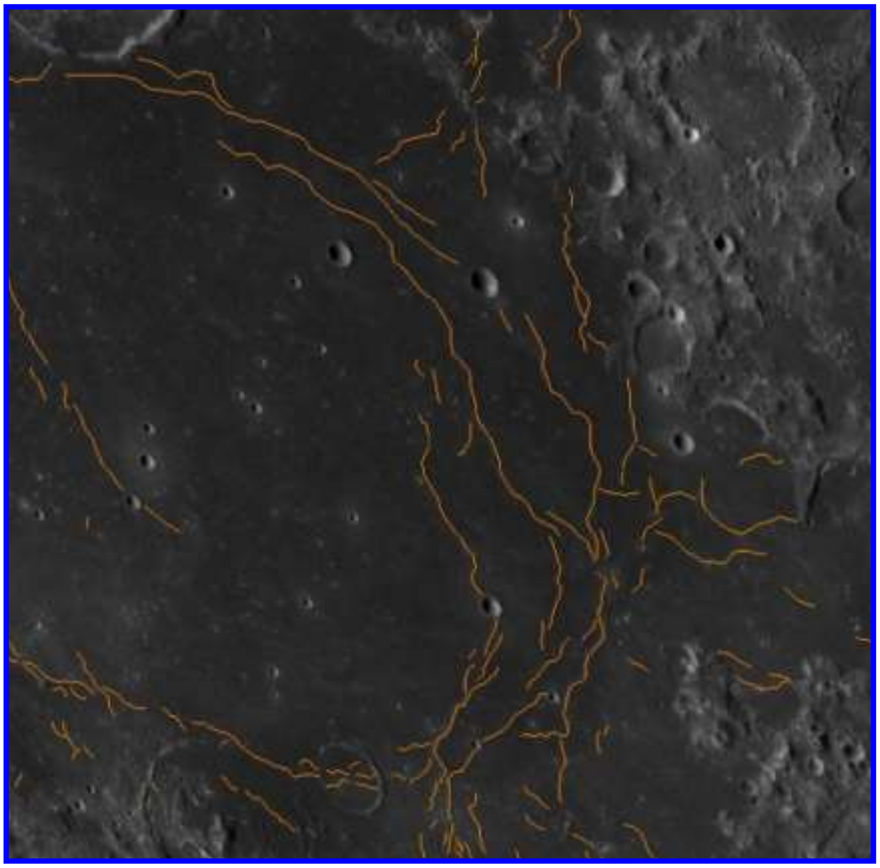


Image 4, *Map of lunar wrinkle ridges digitized from LROC Wide Angle Camera (WAC) global mosaic.*

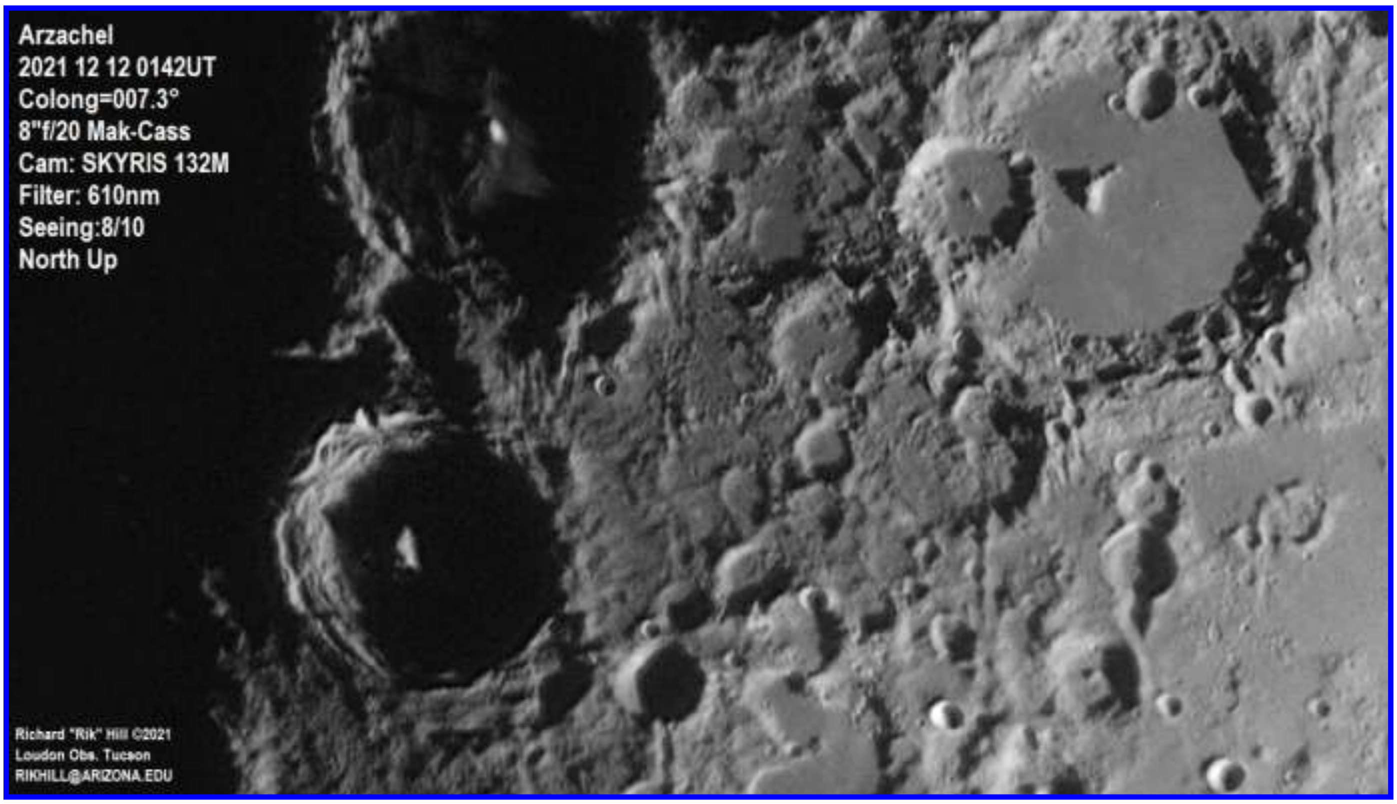
Image 5 Mare Humorum*, Rükl Atlas of the Moon, Chart 52. 2004, Sky Publishing Company.*

Arzachel Sunrise

Rik Hill

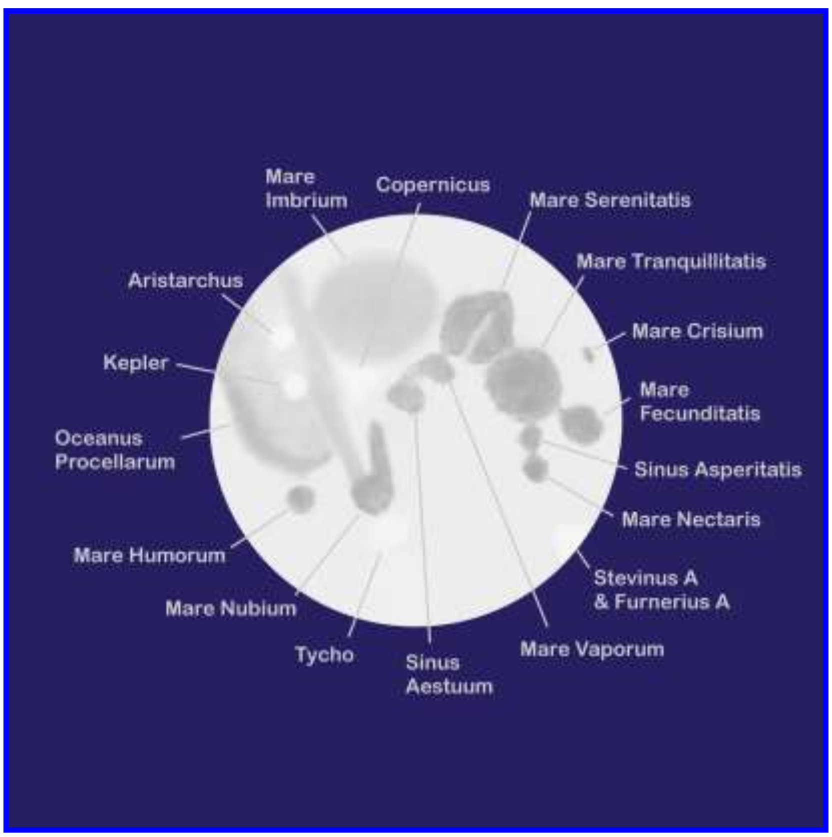
We have 3 large craters in this image that define the region. In the upper right is the grand crater Albategnius (139 km) with Klein (46 km) on its west (left) wall. Notice the off-center central peak casting a little triangular shadow on the floor of the larger crater. Further to the west is Alphonsus (121 km) with its floor just coming into the Sun with the tip of its central peak sparkling in the morning light. The circular dark area adjacent to the south wall of Alphonsus is Alpetragius (41 km). And further below the dramatic Arzachel (100 km) with a spectacularly terraced western wall and the eastern slope of the central peak catching sunrise. You can just see a small shadow of that peak on the western wall. This crater gives drama to this image! There are two vertical trenches between Arzachel and Alpetragius formed during the great Imbrium impact when city sized 'rocks' violently carved out these furrows in seconds!

South of Alpetragius is a curious formation. It looks like a couple craters crossed by another trench. In this case, however, it is a line of overlapping small craters. The larger crater is Vogel (27 km) with the even larger Argelander (36 km) south of it. East (right) of these is an odd crater with disrupted walls. This is Burnham with a breach in the southwestern wall and another smaller one in the northern wall. The northern one is caused by a crater (possibly old and buried) while the southwestern breach looks to be of a very different origin, possibly lava drainage. The floor of this crater is hummocky and contains a number of small craterlets that will require the best night to perceive.

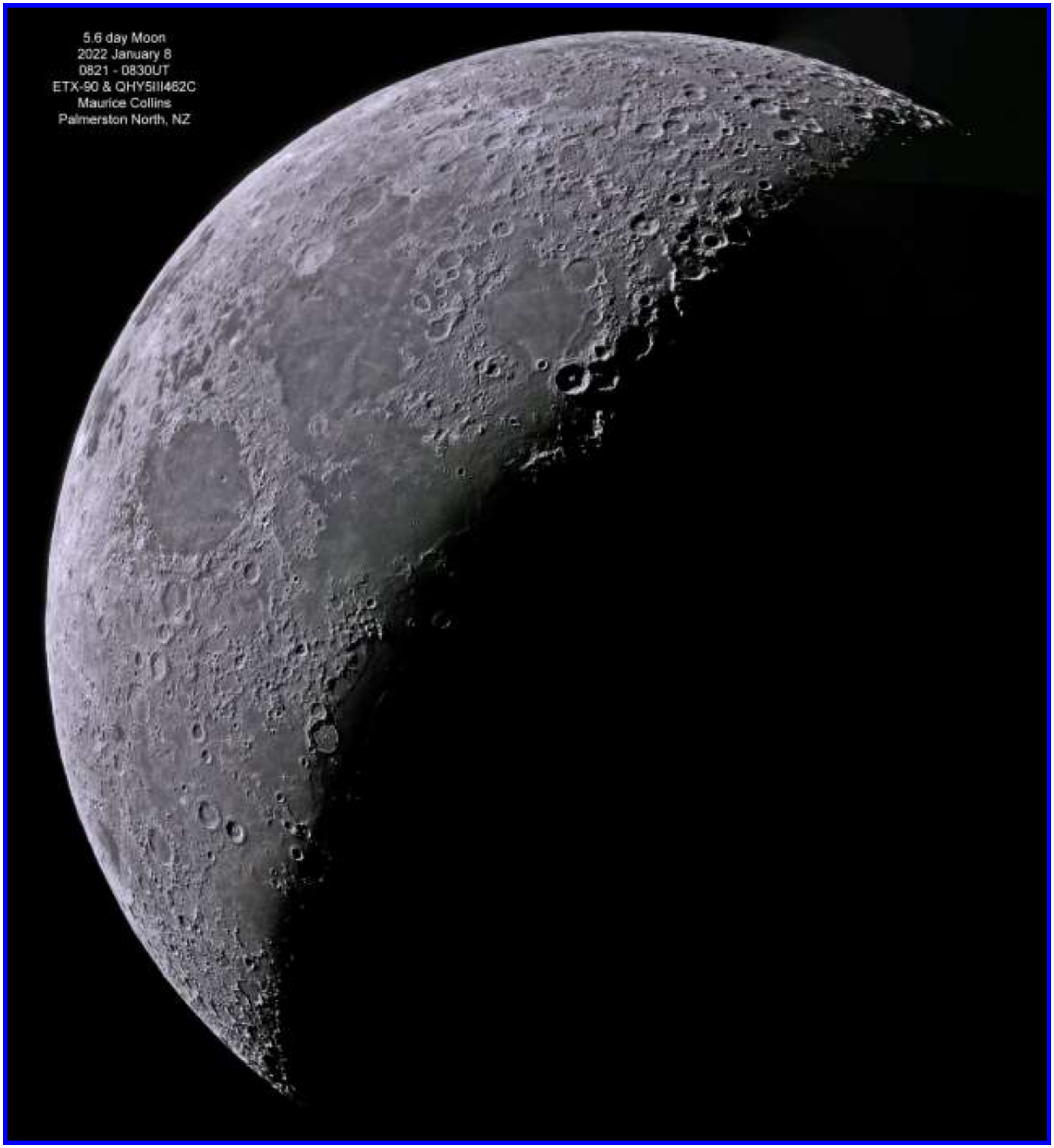


Arzachel, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 December 12 01:42 UT, colongitude 7.3°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 132M camera. Seeing 8/10.*

Naked-Eye Full Moon, *Jef De Wit, Hove, Belgium. Observations made over 15 different sessions, 2021 April 13-27.*

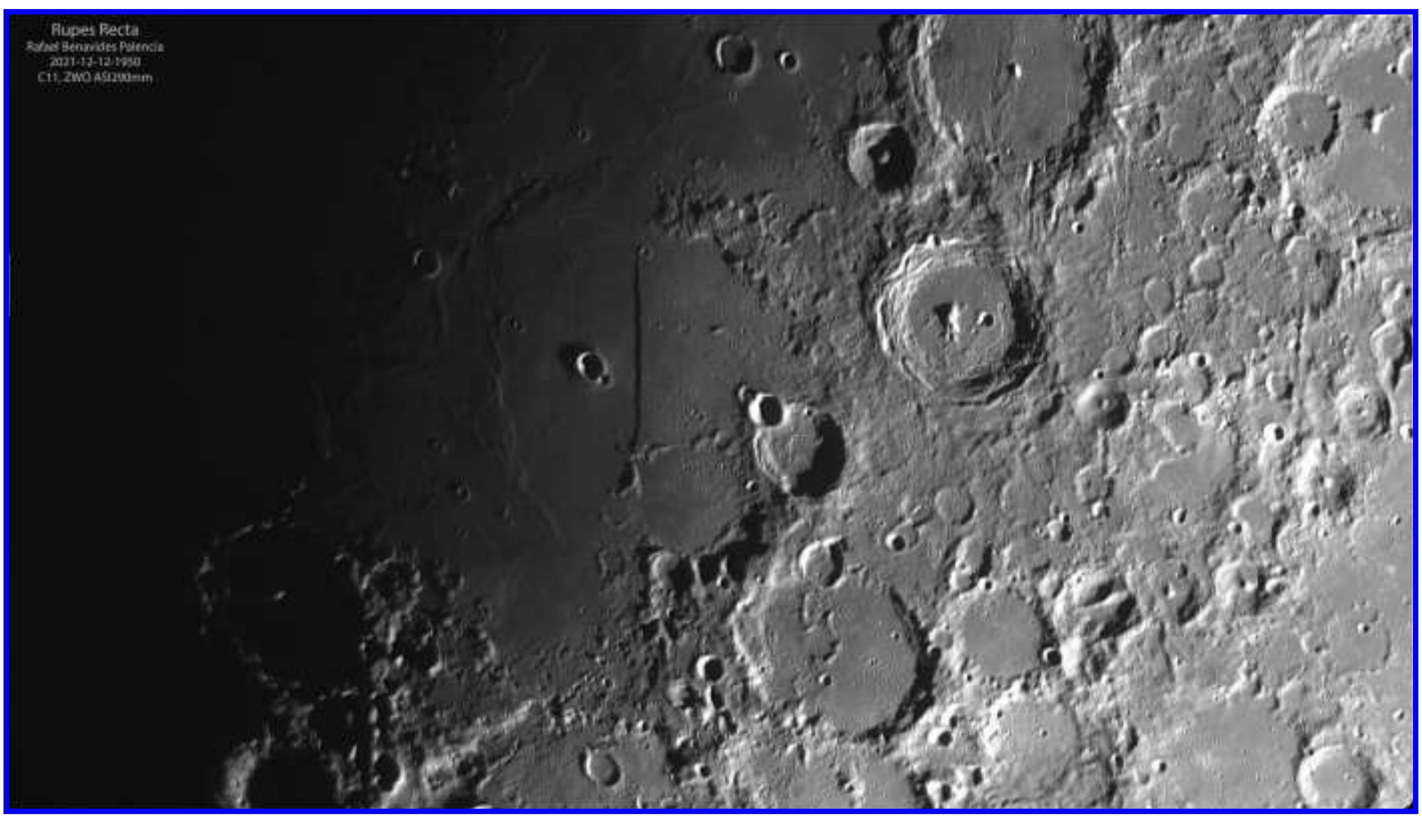


5.6 day old Moon, *Maurice Collins, Palmerston North, New Zealand, 2022 January 08 08:21-08:30 UT. Meade ETX 90 mm Maksutov-Cassegrain telescope, QHY5III462C camera.*



Copernicus, *Guido Santacana, San Juan, Puerto Rico, USA. 2022 January 14 01:01 UT. Bauch & Lomb 4000 4 inch Schmidt-Cassegrain telescope, ZWO ASI224MC camera.*

Rupes Recta, *Rafael Benavides Palencia, Cordoba, Spain. 2021 December 12 19:50 UT. Celestron 11 inch Schmidt-Cassegrain telescope, f/10, Baader Planetarium IR Pass filter, ZWO ASI290mm camera. Seeing 7/10, transparency 5/6.*



***Theophilus,** Maurice Collins, Palmerston North, New Zealand, 2022 January 08 08:23 UT. Meade ETX 90 mm Maksutov-Cassegrain telescope, QHY5III462C camera.*

***Waxing Crescent Moon,** Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2022 January 05 23:20 UT. 114 mm Helios reflector telescope, QHY5-II C camera, mosaic of 4 images. North up, west right.*

Rima Ariadaeus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 10 22:53 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North right, west up.*

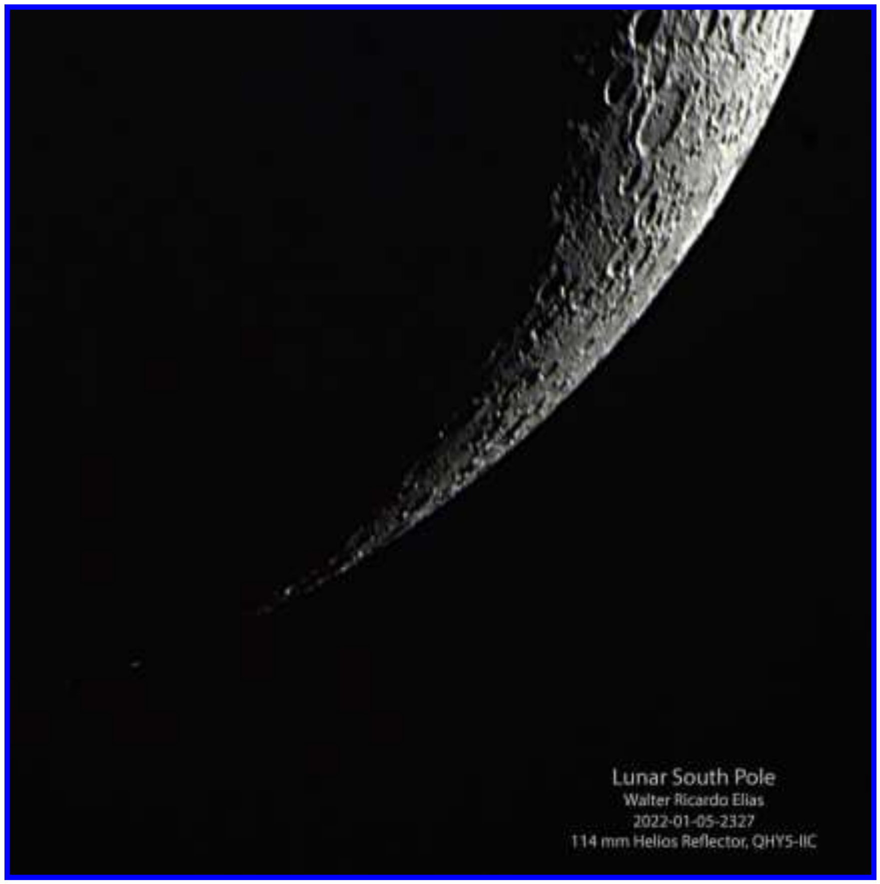
Fracastorius, *Jairo Chavez, Popayán, Colombia. 2022 January 08 00:13 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera. South to the upper right, west to lower right.*

Petavius, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2022 January 05 23:36 UT. 114 mm Helios reflector telescope, QHY5-II C camera.*

Montes Apenninus and Eratosthenes, *Rafael Benavides Palencia, Cordoba, Spain. 2021 December 12 20:12 UT. Celestron 11 inch Schmidt-Cassegrain telescope, f/10, Baader Planetarium IR Pass filter, ZWO ASI290mm camera. Seeing 6/10, transparency 5/6.*

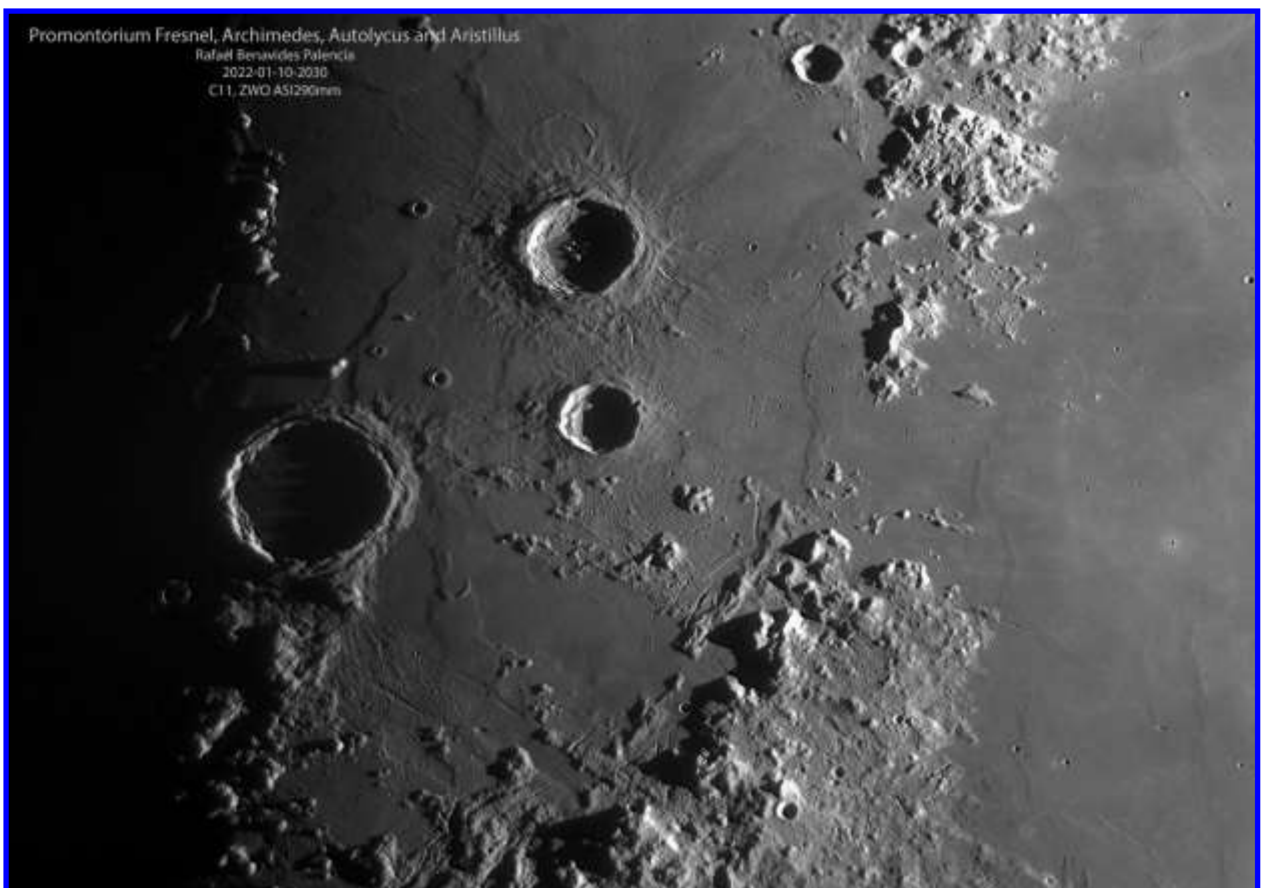
Lacus Mortis, *Maurice Collins, Palmerston North, New Zealand, 2022 January 08 08:21 UT. Meade ETX 90 mm Maksutov-Cassegrain telescope, QHY5III462C camera.*

Schiller to Clavius, *Guido Santacana, San Juan, Puerto Rico, USA. 2022 January 14 00:56 UT. Bauch & Lomb 4000 4 inch Schmidt-Cassegrain telescope, ZWO ASI224MC camera.*



Lunar South Pole, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2022 January 05 23:27 UT. 114 mm Helios reflector telescope, QHY5-II C camera.*

Promontorium Fresnel, Archimedes, Autolycus and Aristillus, *Rafael Benavides Palencia, Cordoba, Spain. 2022 January 10 20:30 UT. Celestron 11 inch Schmidt-Cassegrain telescope, f/10, Baader Planetarium IR Pass filter, ZWO ASI290mm camera. Seeing 8/10, transparency 5/6.*

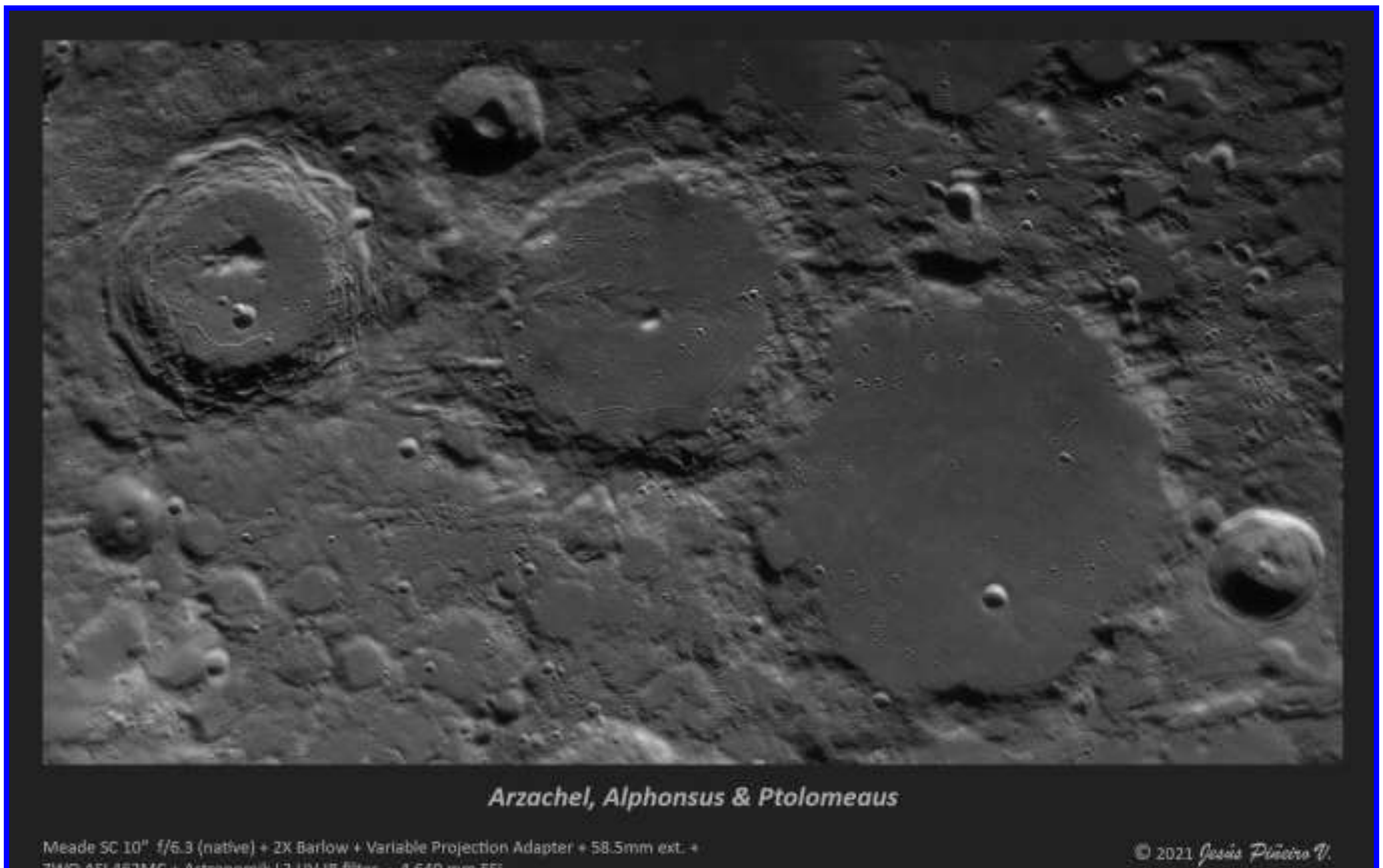


Mare Crisium, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2022 January 08 23:18 UT. Celestron CPC 1100 Schmidt-Cassegrain telescope, ZWO ASI120mm camera.*

Messier, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 10 22:48 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North is right, west is up.*

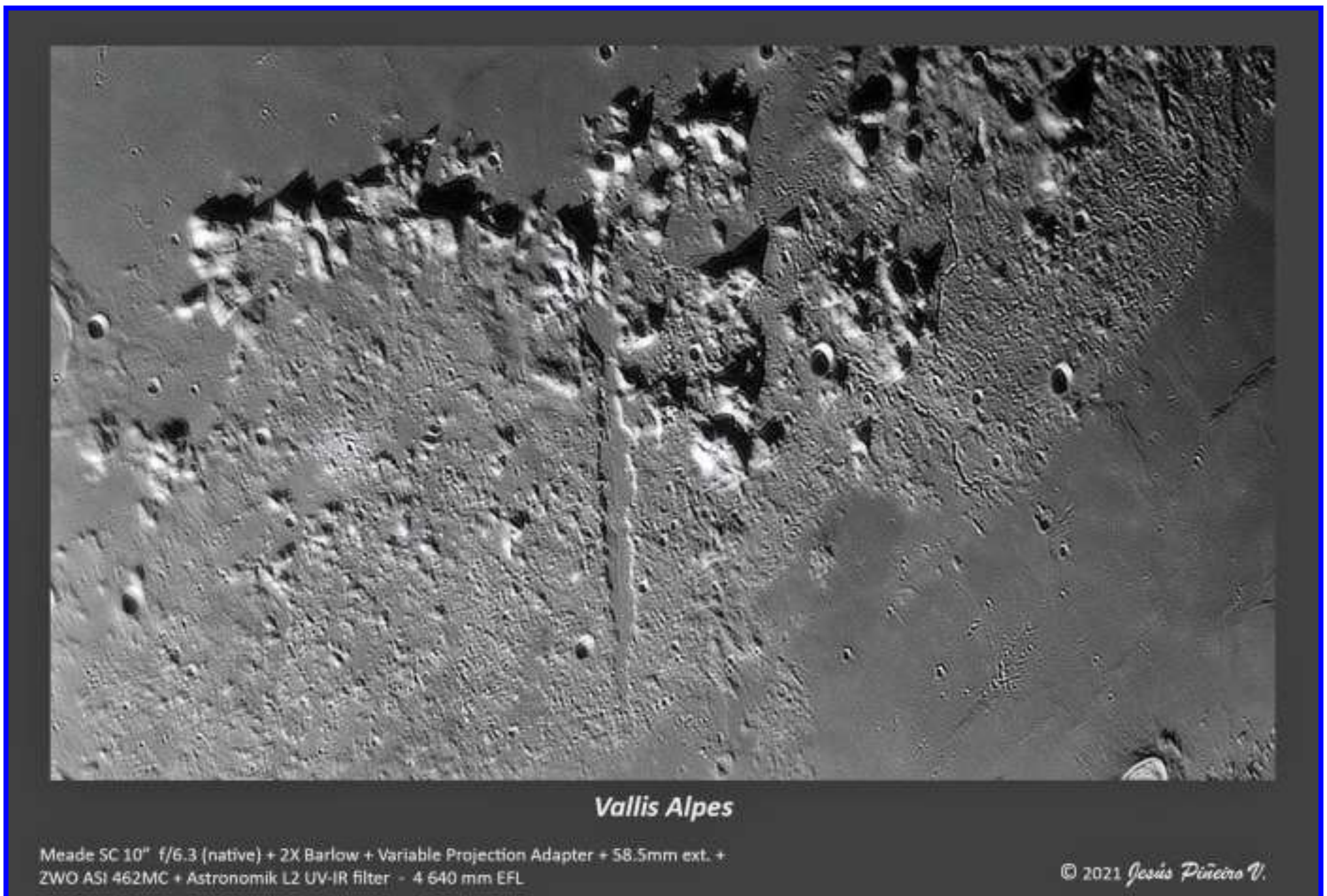
Northern Mare Imbrium, *Guido Santacana, San Juan, Puerto Rico, USA. 2022 January 14 01:04 UT. Bauch & Lomb 4000 4 inch Schmidt-Cassegrain telescope, ZWO ASI224MC camera.*

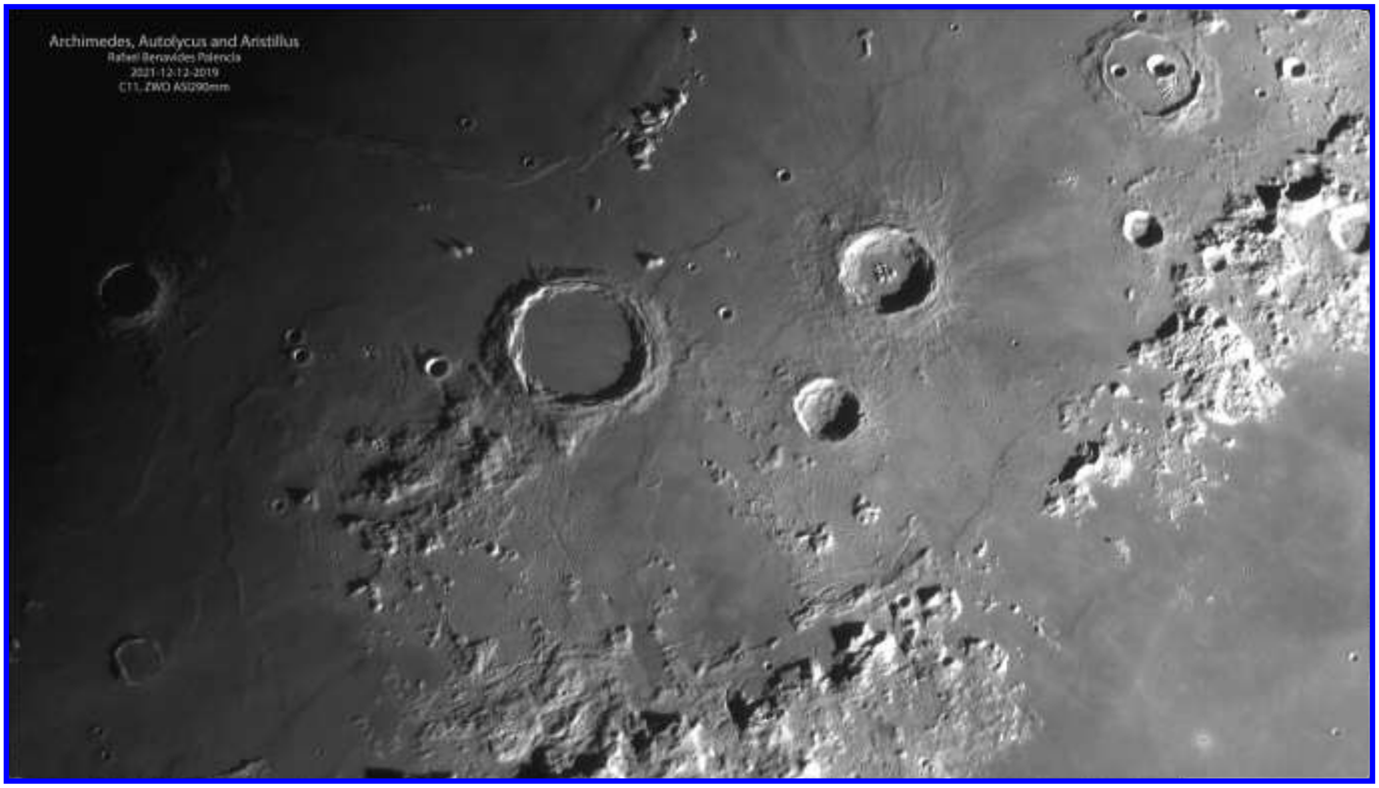
Alphonsus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 23:52 UT. Meade 10 inch Schmidt-Cassegrain telescope, 2x barlow, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North right,*



***Ross D,** Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2022 January 08 23:12 UT. Celestron CPC 1100 Schmidt-Cassegrain telescope, ZWO ASI120mm camera.*

***Vallis Alpes,** Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 23:59 UT. Meade 10 inch Schmidt-Cassegrain telescope, 2x barlow, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North lower right, west upper right.*





Archimedes, Autolycus and Aristillus, *Rafael Benavides Palencia, Cordoba, Spain. 2021 December 12 20:19 UT. Celestron 11 inch Schmidt-Cassegrain telescope, f/10, Baader Planetarium IR Pass filter, ZWO ASI290mm camera. Seeing 7/10, transparency 5/6.*

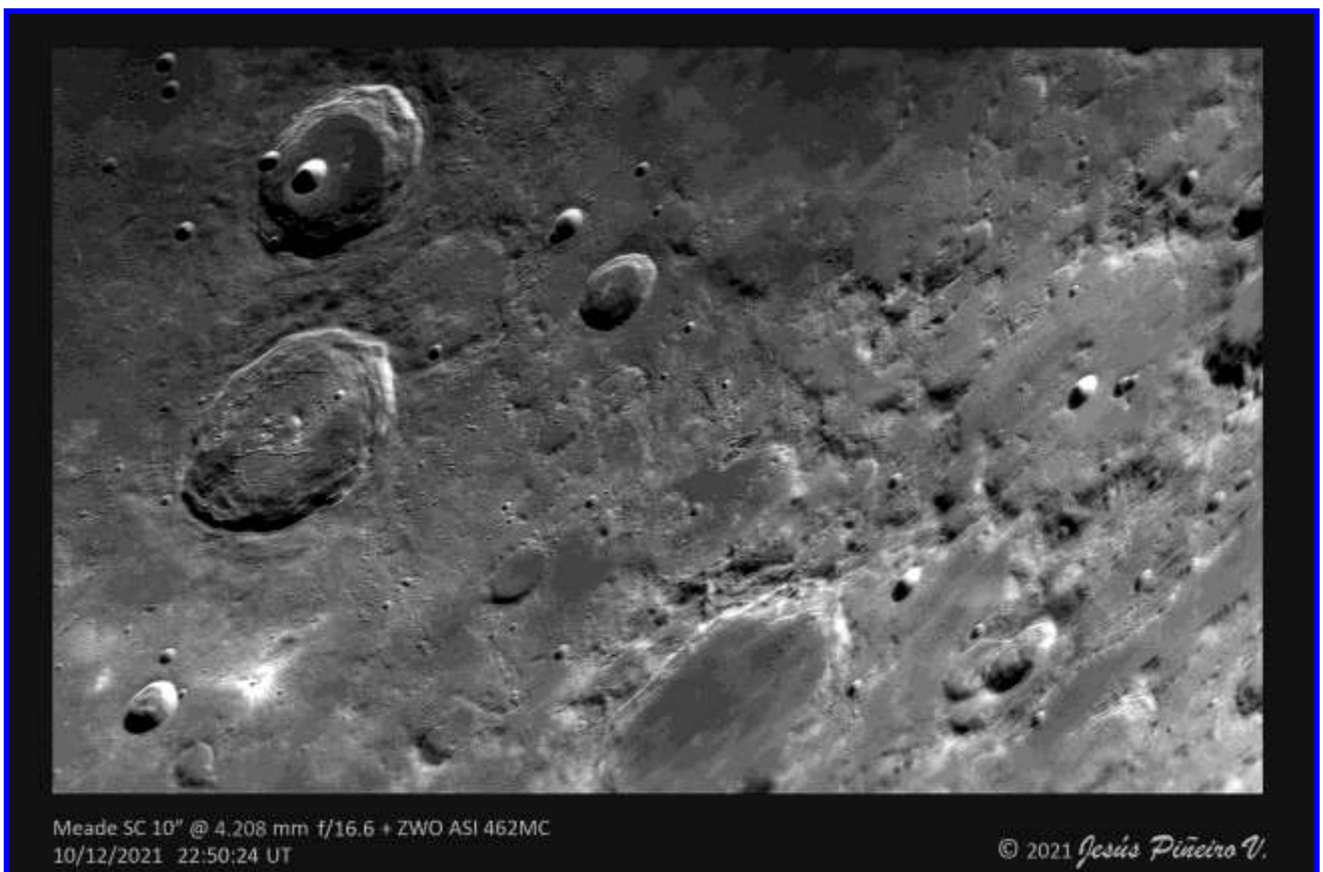
Plato, *Jairo Chavez, Popayán, Colombia. 2022 January 15 02:53 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

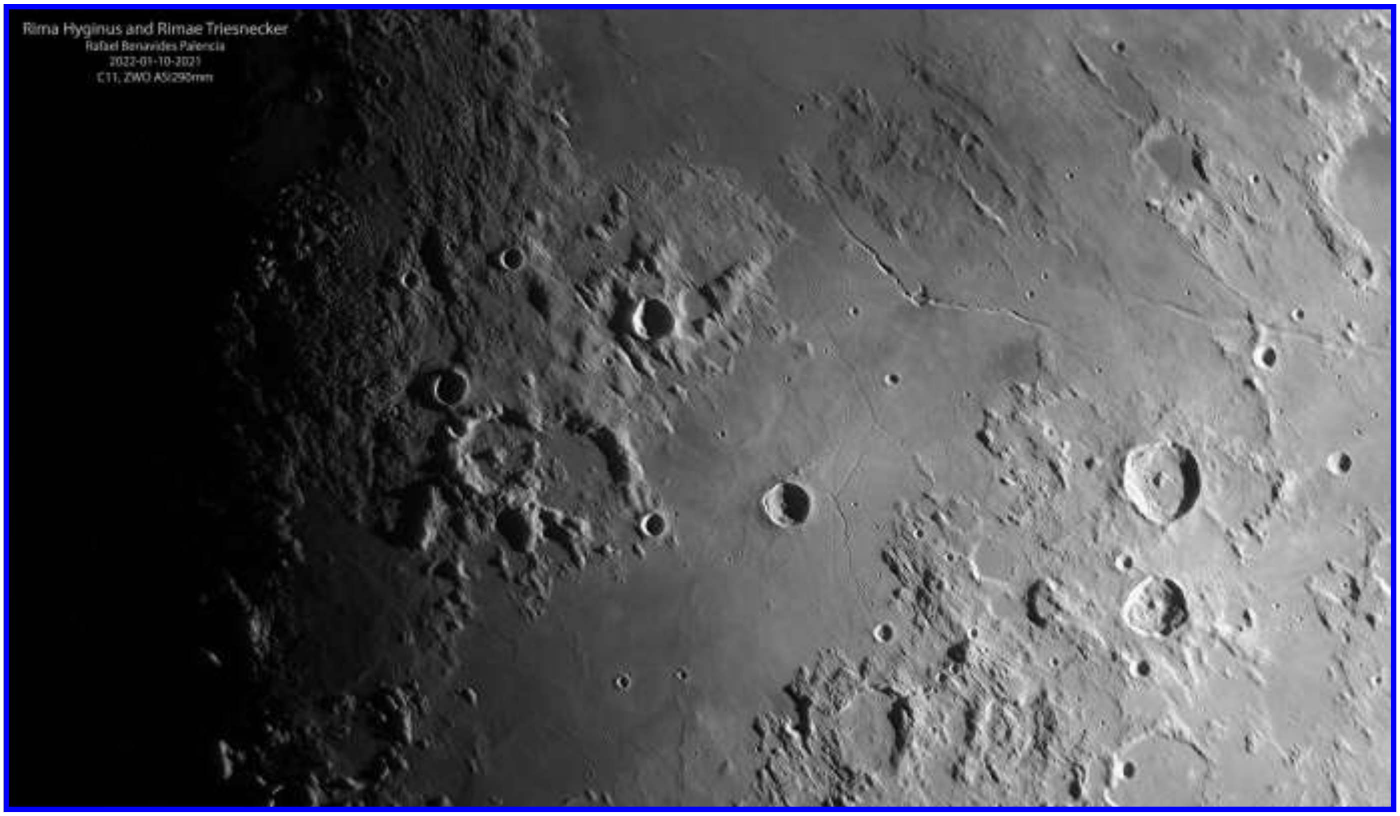
Theophilus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 2022 January 08 23:26 UT. Celestron CPC 1100 Schmidt-Cassegrain telescope, ZWO ASI120mm camera.*

Tycho, *Victor Velez, La Plata, Argentina. 2018 March 05 07:14 UT. 100 mm refractor telescope, MOTO E5 PLAY camera.*

Mare Humorum, *Guido Santacana, San Juan, Puerto Rico, USA. 2022 January 14 00:54 UT. Bauch & Lomb 4000 4 inch Schmidt-Cassegrain telescope, ZWO ASI224MC camera.*

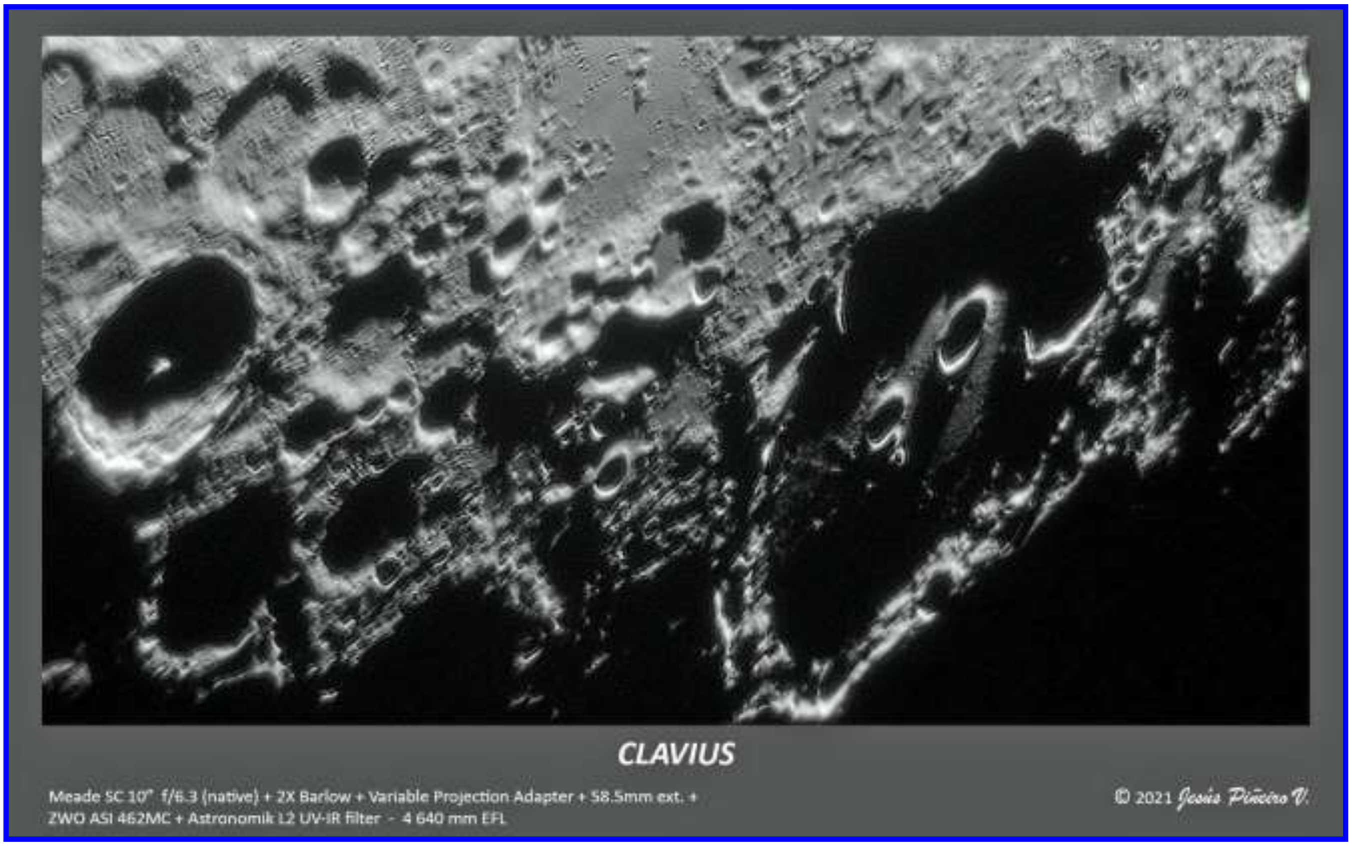
Atlas, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 10 22:50 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North upper right, west up.*





Rima Hyginus and Rimae Triesnecker, *Rafael Benavides Palencia, Cordoba, Spain. 2022 January 10 20:21 UT. Celestron 11 inch Schmidt-Cassegrain telescope, f/10, Baader Planetarium IR Pass filter, ZWO ASI290mm camera. Seeing 7/10, transparency 5/6.*

Tycho, *Jairo Chavez, Popayán, Colombia. 2022 January 14 02:46 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

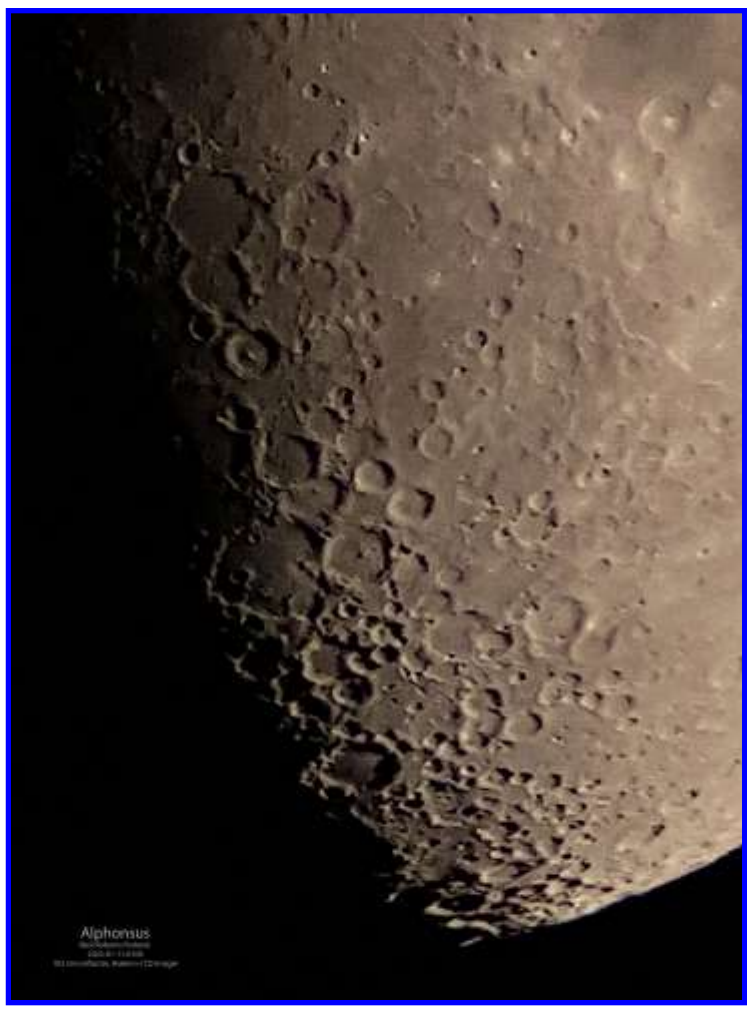


Clavius, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 23:46 UT. Meade 10 inch Schmidt-Cassegrain telescope, 2x barlow, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North left, west down.*

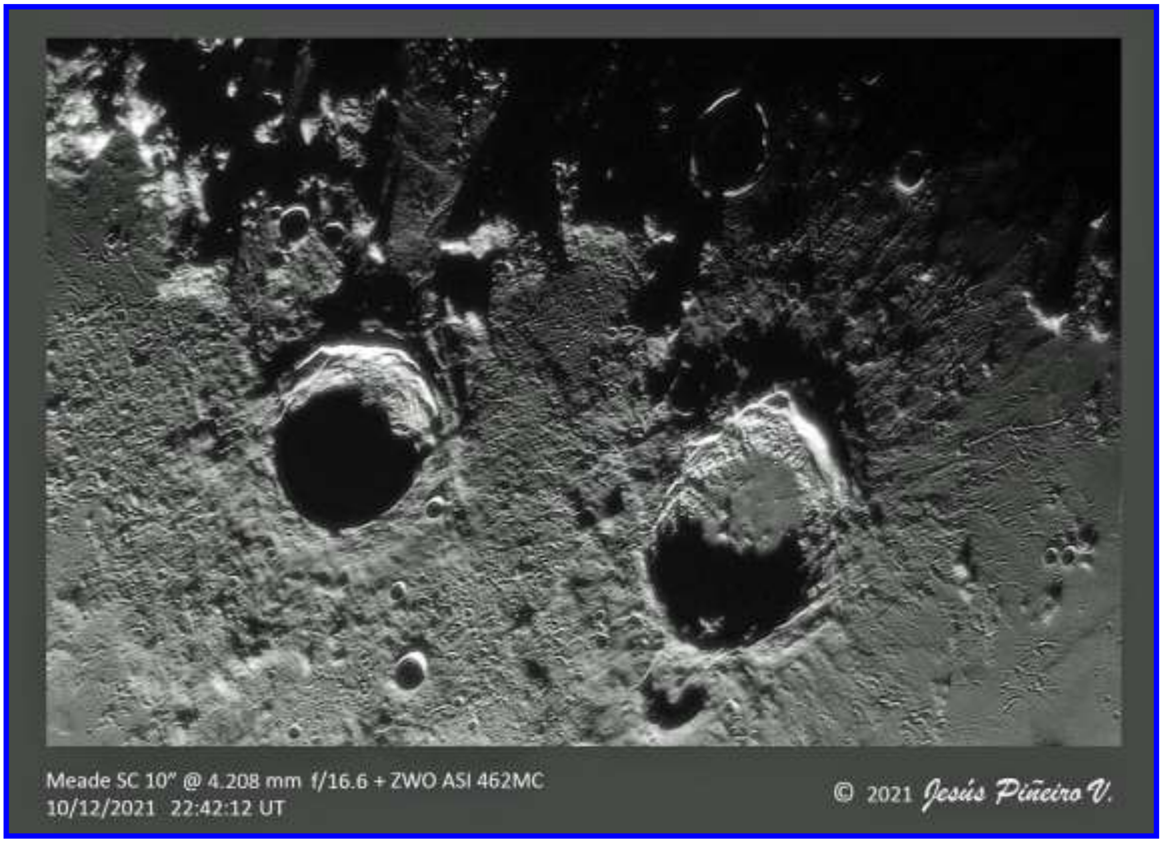
30% Waxing Crescent Moon, *Jairo Chavez, Popayán, Colombia. 2022 January 08 00:11 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

Montes Apenninus, *Victor Velez, La Plata, Argentina. 2018 March 09 08:20 UT. 100 mm refractor telescope, MOTO E5 PLAY camera.*

Alphonsus, *Raúl Roberto Podestá, Formosa, Argentina. 2022 January 11 01:19 UT. 102 mm refractor telescope, Hokenn CCD imager.*



Eudoxus, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 22:42 UT. Meade 10 inch Schmidt-Cassegrain telescope, Astronomik L2 UR IR filter 2", ZWO ASI 462 MC camera. North right, west up.*



-

92% Waxing Gibbous Moon, *Jairo Chavez, Popayán, Colombia. 2022 January 14 02:44 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

Full Moon, *Jairo Chavez, Popayán, Colombia. 2022 January 17 01:44 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera.*

Alphonsus, *Raúl Roberto Podestá, Formosa, Argentina. 2022 January 11 01:19 UT. 102 mm refractor telescope, Hokenn CCD imager.*

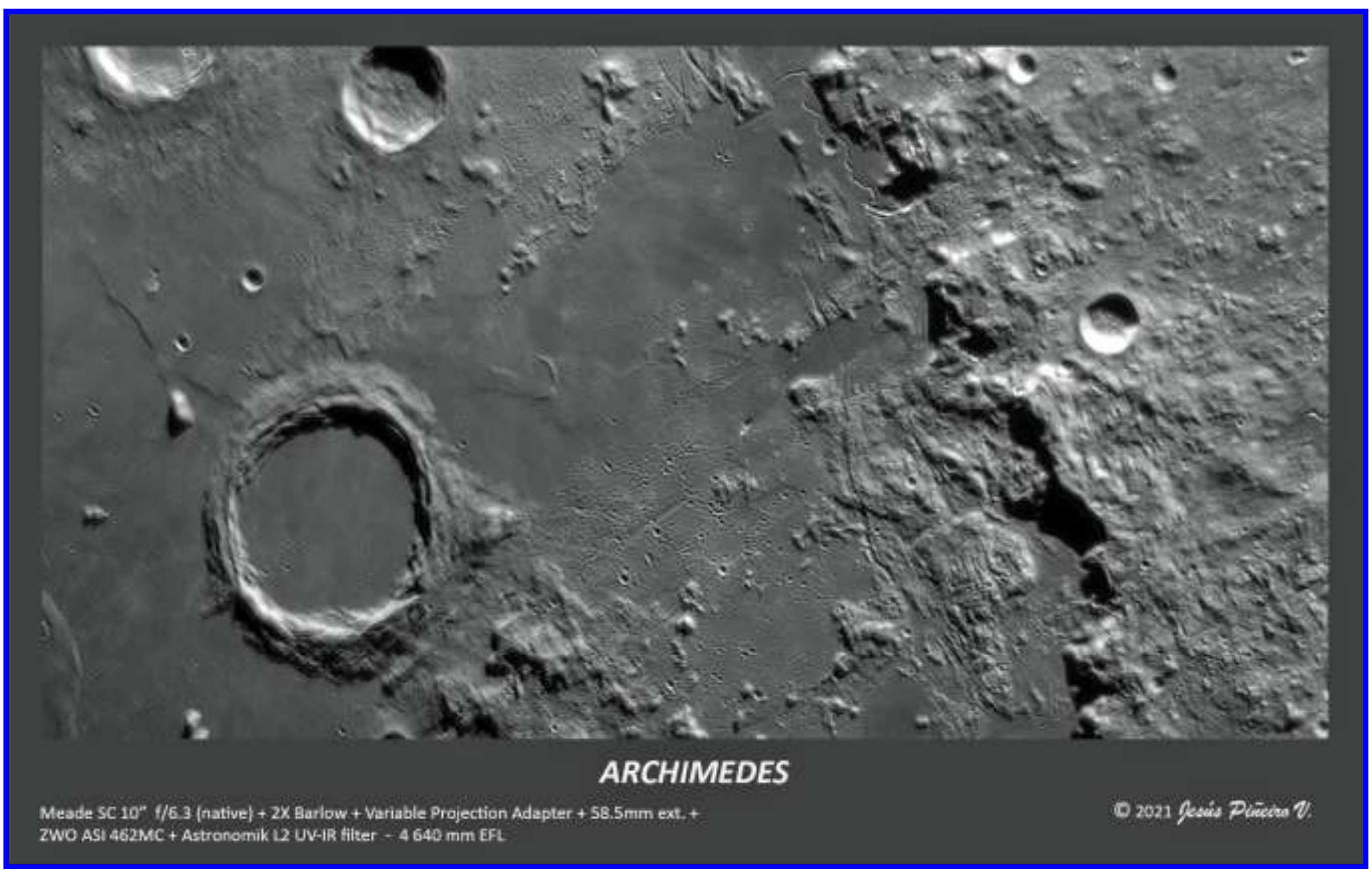
Copernicus, *Victor Velez, La Plata, Argentina. 2018 March 09 08:18 UT. 100 mm refractor telescope, MOTO E5 PLAY camera.*

Alphonsus, *Raúl Roberto Podestá, Formosa, Argentina. 2022 January 11 01:19 UT. 102 mm refractor telescope, Hokenn CCD imager.*

Archimedes, *Raúl Roberto Podestá, Formosa, Argentina. 2022 January 11 01:22 UT. 102 mm refractor telescope, Hokenn CCD imager.*

First Quarter Moon, *Jairo Chavez, Popayán, Colombia. 2022 January 10 03:17 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera. North down, west right.*

Archimedes, *Jesús Piñeiro, San Antonio de los Altos, Venezuela. 2021 December 12 23:54 UT. Meade 10 inch Schmidt-Cassegrain telescope, 2x barlow, Astronomik L2 UR-IR filter 2", ZWO ASI 462 MC camera. North left, west*



40% Waxing Crescent Moon, *Jairo Chavez, Popayán, Colombia. 2022 January 09 03:07 UT. 311 mm truss Dobsonian reflector telescope, Moto E5 Play camera. North down, west right.*

Waxing Gibbous Moon, *Raúl Roberto Podestá, Formosa, Argentina. 2022 January 11 01:09 UT. 102 mm refractor telescope, Hokenn CCD imager.*

Lunar Geologic Change Detection Program

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

2022 February

LTP reports: No LTP reports have been received for December.

Routine Reports received for December included: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Cassini, Eudoxus, and several features. Alberto Anunziato (Argentina – SLA) observed: Aristarchus, Prinz and Proclus. Massimo Alessandro Bianchi (Italy – UAI) imaged: Eudoxus, Mersenius C and Tycho. Anthony Cook (Mundesley, UK – ALPO/BAA) imaged several features. Walter Elias (Argentina – AEA) imaged: Aristarchus, Atlas, Hecataeus, Mare Crisium, Mare Humorum, Plinius, and Theophilus. Valerio Fontani (Italy – UAI) imaged: Eratosthenes, Sinus Iridum, and the Full Moon. Les Fry (West Wales – NAS) imaged: Bailly, Copernicus, Grimaldi, Inghirami, Lacus Aestatis, Mairan, Mare Smythii, Pythagoras, Vieta and Yakovkin. Rik Hill (Tucson, AZ, USA – ALPO/BAA) imaged: Mare Crisium, Arzachel, and Montes Apenninus. Jesús Piñeiro V. (Venezuela – SLA) imaged: Alphonsus, Archimedes, Atlas, Clavius, Eudoxus, Messier, Rima Ariadeus, and Vallis Alpes. Trevor Smith (Codnor, UK – BAA) observed: Aristarchus, Censorinus, Linne, Menelaus, Plato, Ross D, and several features. Franco Taccogna (Italy – UAI) imaged: the Full Moon. Aldo Tonon (UAI) imaged: Eudoxus and the Full Moon. Luigi Zanatta (Italy – UAI) imaged Eudoxus.

Routine Reports Received:

Ross D: On 2021 Dec 10 Trevor Smith (BAA) brought the power of his 16” Newtonian onto this small 9 km diameter crater, which was a subject of a LTP event back in 1967 (under similar illumination):

SE of Ross D 1967 Oct 10 UT 02:25-03:10 Observers: Daniel Harris (Tucson, AZ?) Corralitos Obs (Organ Pass, NM, USA, 24" reflector) "Bright area moved 80km/hr towards SSE & expanded as contrast reduced. Corralitos MB did not confirm" NASA catalog weight=3. NASA catalog ID #1049. Reports in ALPO/BAA archive mention observations from Edmund Arriola & Robert Moody, Jr. 02:40-03:10 (19" Whittier College, x170 & x400, T=4, S=2-3) & Cross 02:25-02:38 (12" f/66 Cass, x400, T=6, S=1.5 to 1") - the latter although seeing low visual activity, apparently according to Harris, took some yellow light photos that showed high activity? ALPO/BAA weight=2.

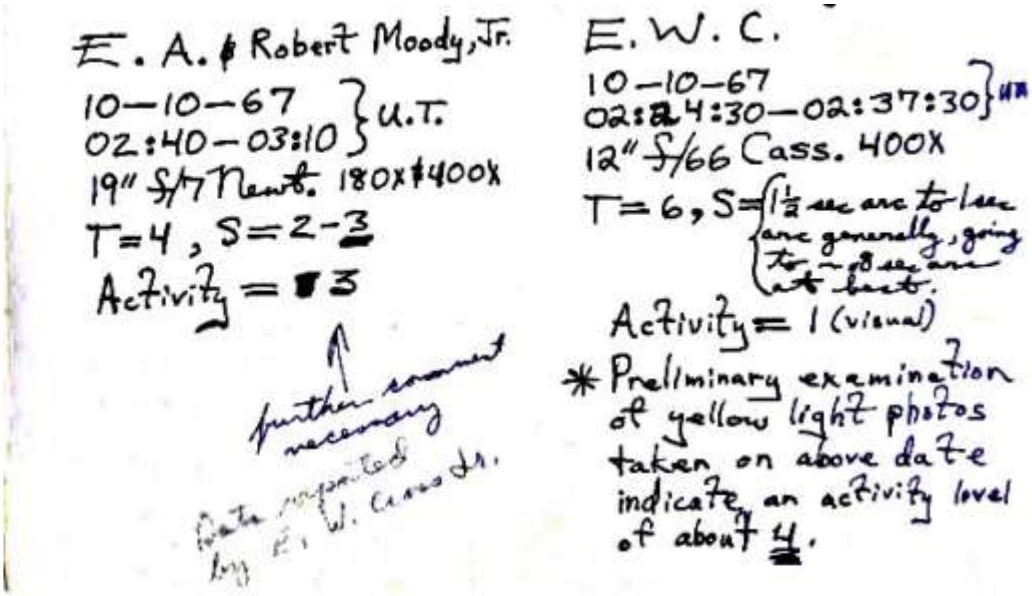


Table 2.–*Log of Corralitos Efforts to Confirm Reported LTP–Continued*

Date	Report	Observer	Corralitos
1967, Sept. 17, 2h, 5m to 2h, 21m	Red color in Aristarchus	Delano	Monitoring; not confirmed.
1967, Oct. 10, 2h, 15m	Bright moving spot near Ross D	Harris	Monitoring; not confirmed.

Figure 1. *Some Ross D observation from 1967 Oct 10. **(Top Left)** from E.A. Robert Moody Jr. **(Top Right)** from Eugene W. Cross. **(Bottom)** A negative report from Alan Hynek's group at the Corralitos Observatory, NM, USA.*

There have been numerous reports of LTP in Ross D, and I enclose some reports from the event in question in Fig 1. We do not appear to have anything from Daniel Harris or Edmund Arriola – as the Cameron catalog states, nor any photos in our archives. This is rather unfortunate. However, we do have Trevor Smith's modern report of what the crater normally looks like at this stage in illumination – though his seeing was Antoniadi IV-V.

Trevor observed from 17:00-17:20 and 17:40-17:50 on 2021 Dec 10. He saw a bright fuzzy patch to the NE of Ross D at a distance of about 25 km (a normal permanent feature). There was no moving bright patch seen at all (unsurprisingly) however under some fleeting moments of better seeing conditions, he did notice a greyish/white streak or ray, that just happened to lie in the SSE direction. This of course did not move but Trevor considers the possibility that under the right conditions, during all but brief perfect moments of seeing it might trick the eye/brain into thinking some movement was present? He also saw a lone mountain some 25 km away from the crater, but also in the SSE direction.

It is interesting to note that the Corralitos team, observing on the same night on 1967 Oct 10 at 02:15 UT did not detect any color blinks, however the event in question was not color but movement, and Corralitos were observing 10 min prior to the start of the LTP. However, I am also not sure what the Moody and Cross reports meant by "activity levels"? We shall leave the ALPO/BAA weight at 2 for now.

Eudoxus: On 2021 Dec 11 Italian UAI observers: Massimo Alessandro Bianchi, Alodo Tonon, Luigi Zanatta and in the Florida, USA ALPO observer Jay Albert - observed this crater under the following lunar schedule request and repeat Illuminations predictions - respectively:

BAA Request: Eudoxus - please try to image the interior of this crater. We are trying to detect bright spots and a linear features within the shadow of the east wall at sunrise. Nigel Longshaw (BAA) suspects that this might explain Trouvelot's observation in 1877 of a luminous rope-like feature. For selenographic colongitudes of between 0.2° to 1.2°.

"Eudoxus" 1877 Feb 20 UT 21:30-22:30 Observed by Trouvelot (Meudon, France, 13" refractor?) "Fine line of light like a luminous cable, drawn W. to E. across crater". NASA catalog weight=1. NASA catalog ID #185. ALPO/BAA weight=1. Within ±0.5° similar illumination to the observing times given for Trouvelot.

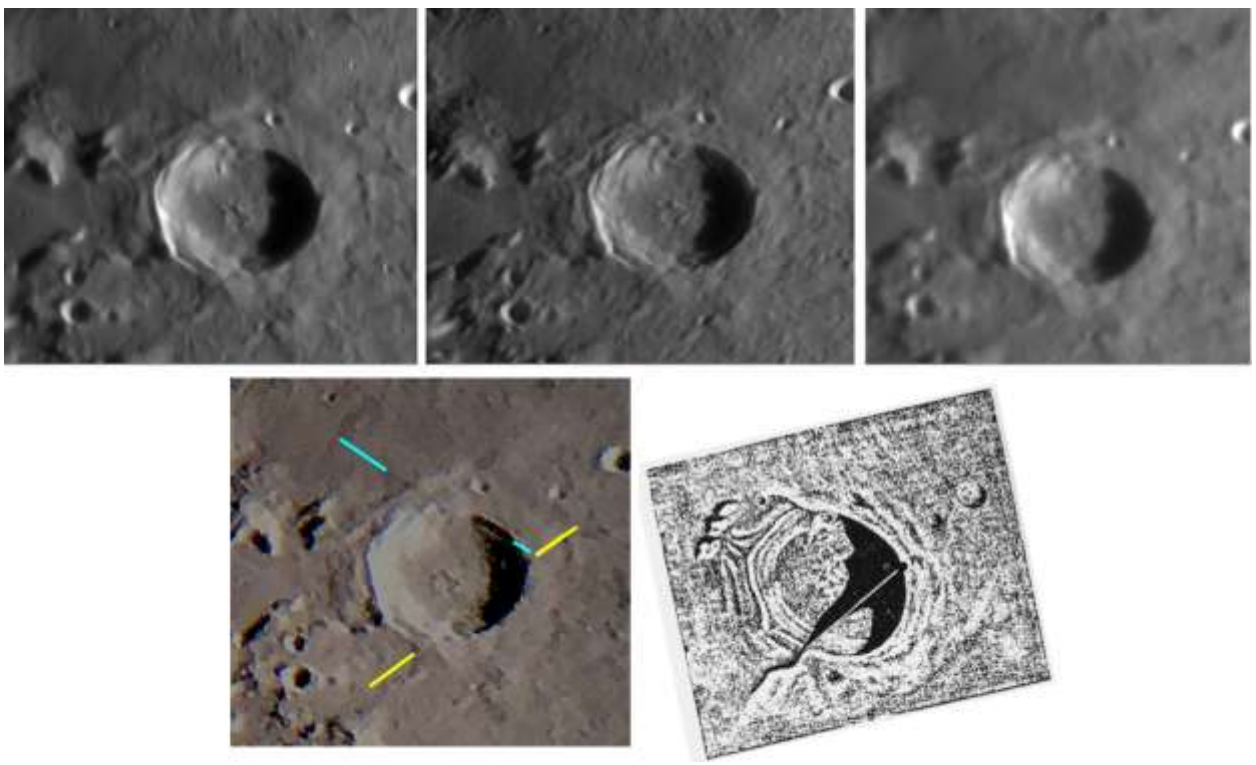


Figure 2. *Eudoxus, orientated with north towards the top.* ***(Top Left)*** *2021 Dec 11 UT 16:30 as imaged by Massimo Alessandro Bianchi (UAI).* ***(Top Centre)*** *2021 Dec 11 UT 17:20 as imaged by Aldo Tonon (UAI).* ***(Top Right)*** *2021 Dec 11 UT 17:31 as imaged by Luigi Zanatta (UAI).* ***(Bottom Left)*** *An iPhone image obtained by Jay Albert on UT 01:26. Arrows indicate two possible lineaments.* ***(Bottom Right)*** *A sketch by Trouvelot from a letter by Nigel Longshaw to the BAA Journal from 2007 Vol 117, No. 6, p344.*

Fig 2 Top left to Top Right were taken under similar colongitudes to Trouvelot's report (Fig 2 – Bottom Right), but fail to show what Trouvelot observed. This might infer that the time given by Trouvelot may not have been 21:30-22:30 UT 1877 Feb 20.

Jay, observing later, commented that he saw considerable shadow on the interior E wall and floor. Two points of light were seen within the shadow where higher elevations were touched by sunlight. A slim line of light running roughly N to S was also seen within the E wall shadow just north of the two points and parallel to the E wall. This appeared to be a lower slope or terrace of the E wall. No "fine line of light like a luminous cable…" was visible going E-W across the crater. He used a Celestron NexStar Evolution 8" SCT at x290 and observed visually from 00:30 to 00:50UT on 2021 Dec 12. He took an image later, which shows some of these features, as can be seen in Fig 2 (Bottom Left). Arrows have been used to highlight similarities between the Trouvelot sketch and Jay's image. The yellow tick marks refer to a lineament effect that Nigel Longshaw has noted before. The blue/green arrows in Fig 2 (Bottom left) refer to another lineament effect not shown in Trouvelot's sketch. We shall keep the weight of the 1877 LTP report at 1 as I do not fully understand the weird shadow shape associated with the southern crater crossing lineament.

Proclus: Alberto Anunziato (SLA) made a visual inspection of Proclus on 2021 Dec 09 UT 00:03-00 under similar illumination to the following report:

On 1989 Feb 10 at UT 19:00? Edmonds (England) observed a "bright red coppery" color in the north western part of Proclus crater. He checked and found that there was no color elsewhere, though he still suspects that the effect was spurious color. Cameron comments that usually blue is seen in the north and red in the south if due to spurious color. The Cameron 2006 catalog ID=350 and the weight=3. The ALPO/BAA weight=2.

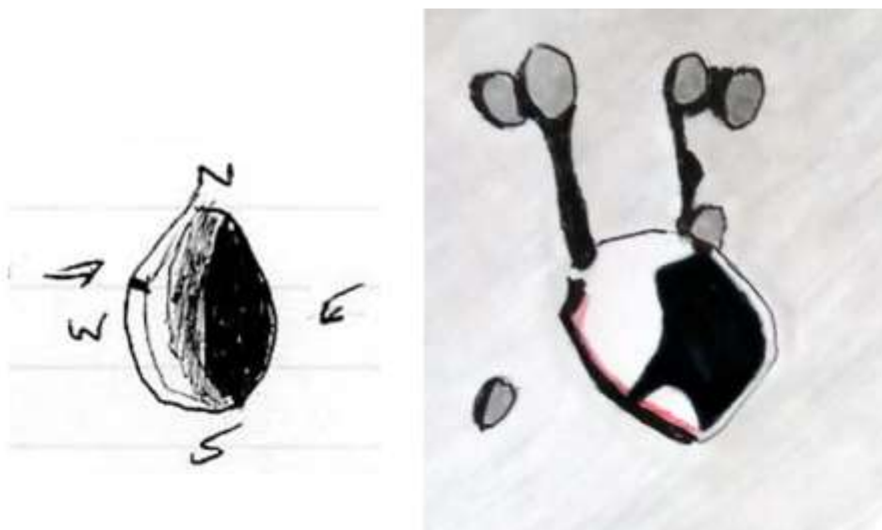


Figure 3. *Proclus orientated with north towards the top.* ***(Left)*** *Sketch by Marie Cook (BAA) made on 1989 Feb 10 UT 18:25.* ***(Right)*** *Sketch by Trevor Smith (BAA) made on 2020 Dec 19 UT 17:00-17:25.*

Alberto reported that no color was seen. We have examined this crater before under repeat illumination conditions on three other occasions. Prior to the Edmonds LTP, Marie Cook (BAA) at 18:25UT on 1989 Feb 10, also saw no color and noted the crater was 2/3 shadow filled (Fig 3 – Left) and 4 rays were visible outside the crater. Curiously half of the shadow was dark and the western half was less dark. Jay Albert on 2013 May 15 noted no color was visible. On 2020 Dec 19 Trevor Smith (BAA) recorded a thin slightly reddish color on the inner N & W wall (See Fig 3 Right), however as similar color was visible on other crater rims he did not assume this was out of the ordinary – presumably atmospheric spectral dispersion? So, Trevor's comment seems to disprove Cameron's theory. The odd thing about the 1989 LTP was that no color was visible in other craters and anyway the Moon was at 36° altitude above the horizon, not high, but not low either. I think that I will leave the weight at 2 for now.

Tycho: Venezuela observer Jesús Piñeiro V. (SLA) sent in the following image that contained this crater, under similar illumination to the following LTP report:

Tycho 2003 May 10 UTC 03:15 Observer Robert Spellman (Los Angeles, USA) - "CCD video of spur-like features coming off N & S edges of central peak - spurs pointed eastwards". It is now thought that this effect is almost certainly seeing flare as it is visible on other features in the image, although to a much lesser extent. The ALPO/BAA weight=1.

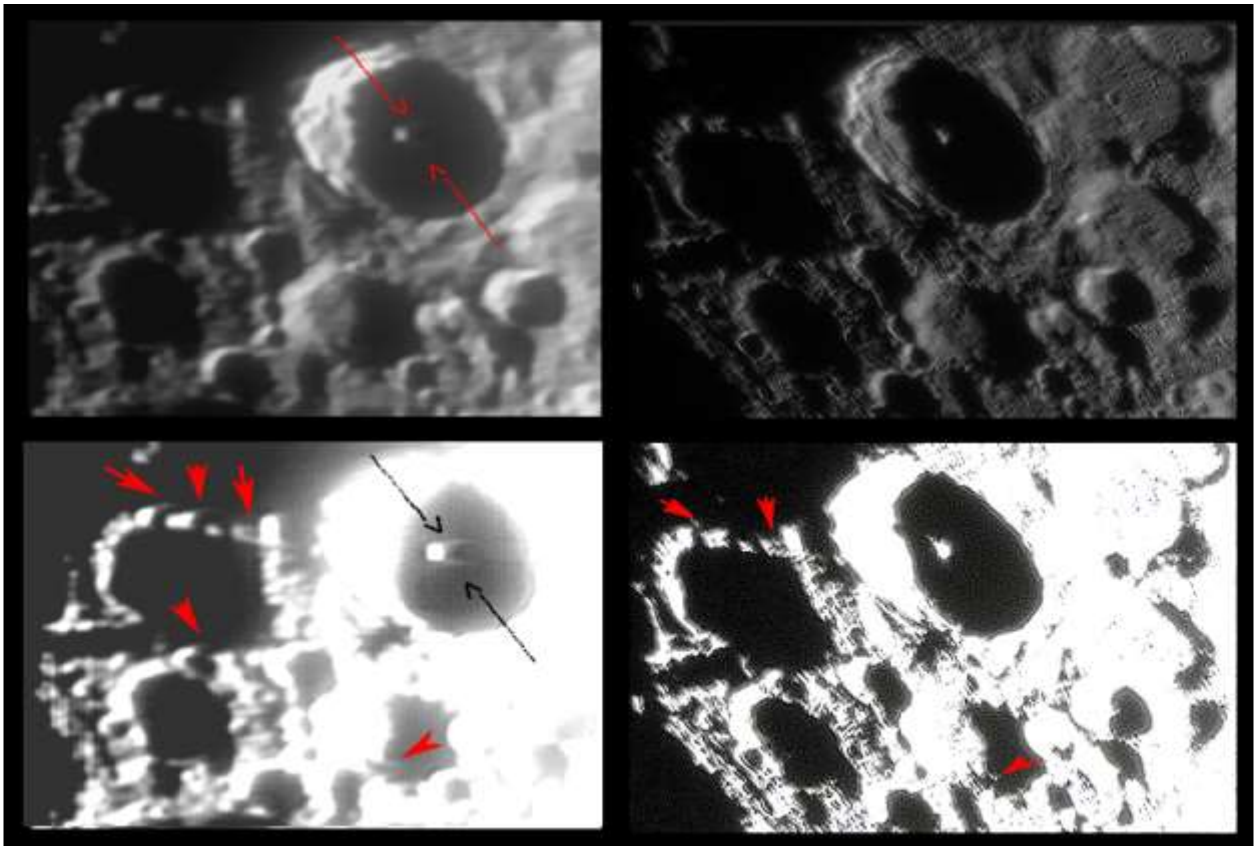


Figure 4. *Tycho, orientated with north towards the top.* ***(Top Left)*** *As imaged by Robert Spellman on 2003 May 10 UT 03:15 – red arrows point to two spur-like effects on the central peak.* ***(Top Right)*** *As imaged by Jesús Piñeiro V. (SLA) on 2021 Dec 12 UT 23:46.* ***(Bottom Left)*** *The same as top left but contrast stretched and sharpened to see detail inside shadowed areas – also other arrows added to show possible seeing flare/spur-like effects(?) elsewhere.* ***(Bottom Right)*** *The same as top right, but contrast stretched to bring out details in shadowed areas – red arrows added which match what were thought to be seeing flare effects in the Spellman image, but which are just illuminated ridges.*

For many years now, I have long suspected that the 2003 Tycho central peak spurs report was due to image ghosting caused by flaring effects in our atmosphere, where one gets double or triple offset faint images – or perhaps due to some effect with poor optics collimation. As you can see in Fig 4 (Bottom Left), other bright features sometimes have flare-like effects coming off bright sunlit peaks too, especially on the mostly shadowed filled crater just to the WSW of Tycho. However, Fig 4 (Bottom Right) casts some uncertainty on this explanation as three of the candidate flare effect parts of the image we see are actually narrow elongated sunlit tops of landforms – see Fig 4 (Bottom Left) for the same locations as those arrows. For now, I will keep the weight as 1 as we need another image at maybe a few minutes later to see if the central peak does indeed exhibit some sunlit parts of the floor, where Robert Spellman originally imaged the spurs effects. Also, it would be welcome to receive images taken under different seeing, and with non-perfect aligned optics, in case this is an explanation?

Full Moon Crater Brightness: Italian UAI observers: Valerio Fontani, Franco Taccogna, and Aldo Tonon have submitted images of the lunar disk, close to Full Moon. We are interested in these as there have been many past LTP reports, as measured with visual photometric devices (Crater Extinction Devices or C.E.D.s) that suggested that some craters were sometimes brighter than they normally were at a particular colongitude. By observing close to Full Moon time, the relative brightness of some key craters are related to their albedo, and so should not change unless due to slight differences in illumination and more particular viewing angles (topocentric libration). We shall make a full study of this in due course, but for now will note the relative brightness order of the craters, as is shown in Table 1.

	Fontani 2021Dec18 21:32UT	Tonon 2021Dec18 21:52UT	Taccogna 2021Dec19 18:14:UT
Aristarchus	185	190	188
Censorinus	252	220	236
Copernicus	146	165	156
Kepler	129	160	145
Plato	63	92	78
Proclus	252	205	229
Tycho	163	188	176
Bright Spot nr	207	201	204

Digital Number brightness of different craters

So, on 2021 Dec 18 Valerio Fontanis' results, from dark to bright, go: Plato, Kepler, Copernicus, Tycho, Aristarchus, bright spot near Hell, Censorinus=Proclus. Also, Tonons' results go: Plato, Kepler, Copernicus, Tycho, Aristarchus, bright spot near Hell, Proclus, Censorinus. So, the order is the same apart from Proclus and Censorinus changing places – easily explained due to difficulties in finding the representative brightest parts on these relatively small features. Interestingly on the following day, the order is again: Plato, Kepler, Copernicus, Tycho, Aristarchus, bright spot near Hell, Proclus and Censorinus.

Copernicus: On 2021 Dec 20 Walter Elias (AEA) imaged the region around this crater under similar illumination to the following report:

On 1978 Apr 23 at UT20:35 (Rawlings, UK, finder scope, x50) observed a bright flash (~0.3 sec duration) near to Copernicus (20W, 9N) with rays to the south east whilst he looked through a finder scope. Moore, who studied the drawing, suggests that the area of the flash was near Copernicus. However, Cameron says this cannot be the case if the flash was in darkness as mentioned in the BAA Lunar Section circular. She comments that it might have been a meteor? The Cameron 2005 catalog ID=28 and weight=1. The ALPO/BAA weight=1.

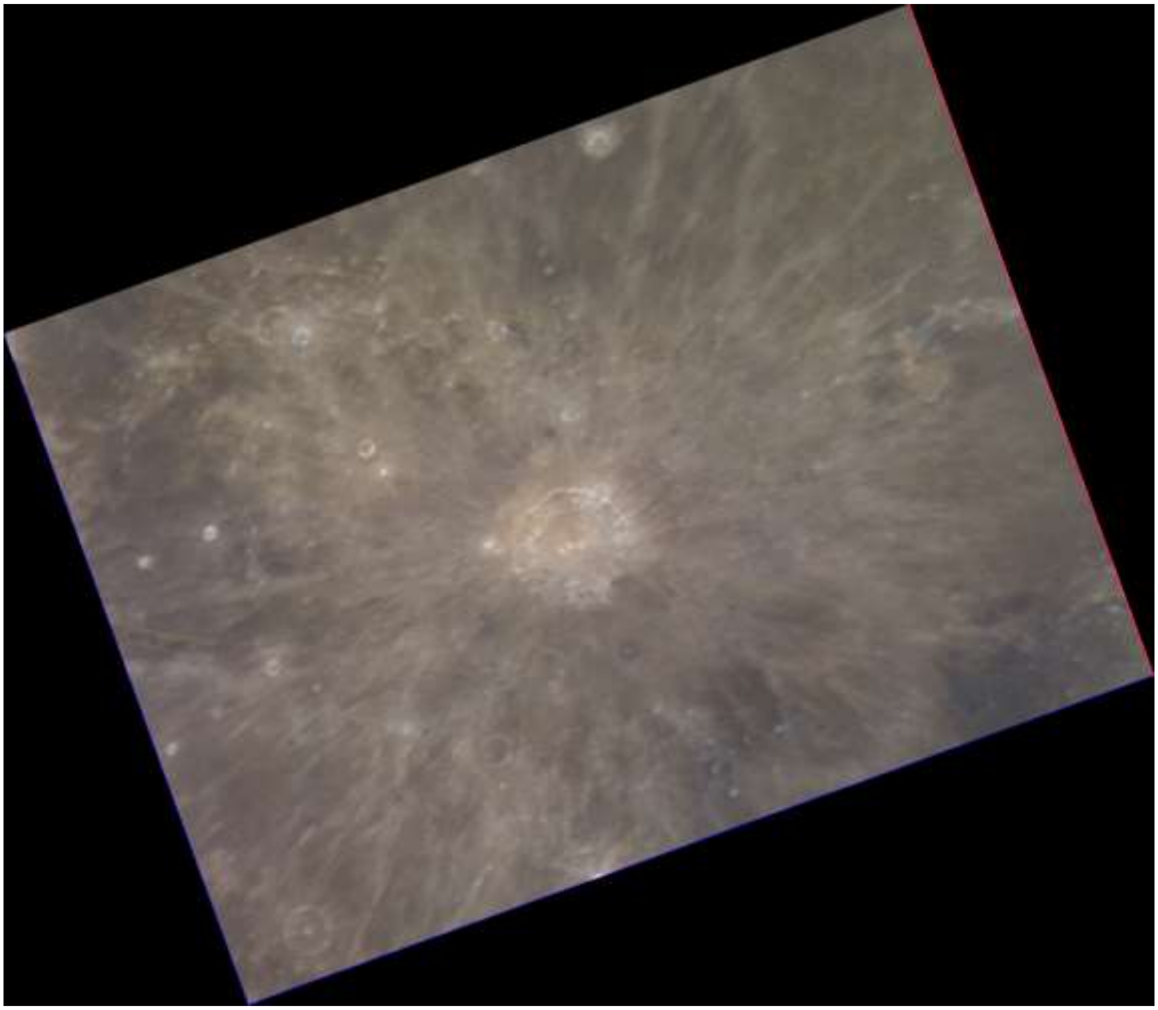


Figure 5. *Copernicus as imaged by Walter Elias (AEA) on 2021 Dec 20 UT 03:38. Image has been rotated/flipped so that north was towards the top and west is on the right. The image has undergone a color saturation increase of 75%.*

Fig 5 shows that Copernicus would have been very much fully illuminated. I have checked the BAA Lunar Section circular from 1978 Jun, p47 and 48, and nowhere does it suggest that the flash was seen on the night side of the Moon, and it is not clear whether the rays referred to came from the flash or were rays from a crater on the Moon For a meteorite impact to be visible in a small power finder scope it would have to be quite bright, possibly 2nd or 3rd magnitude or brighter. Such bright impacts tend to be of longer duration. If it had been a cosmic ray event then the duration would have been an instant flash. One other possibility was that maybe it was a strobe light from an aircraft passing through the field of view –at such a low altitude the plane would have been quite small, slow moving, and at low magnification the observer may not have seen the plane itself. I think this had better star at a weight of 1 as it was an unconfirmed report.

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

Lunar Calendar February 2022

Date	UT	Event
1	0546	New Moon Lunation 1226
2	2100	Jupiter 4° north of Moon
2		North limb most exposed (+6.5°)
5		East limb most exposed (+6.6°)
7	2000	Uranus 1.2° north of Moon, occultation Queen Maud Land, South Sandwich Islands
8	1350	First Quarter Moon
9	1100	Ceres 0.03° south of Moon, occultation Indian Ocean to Japan
11	0300	Moon at apogee 404,897 km
12	0400	Moon 1.9° north of M35
13		Greatest northern declination (+26.4°)
16	1656	Full Moon
17		South limb most exposed (-6.5°)
18		West limb most exposed (-5.0°)
23	2232	Last Quarter
26	2200	Moon at perigee 367, 789 km
26		Greatest southern declination (-26.5°)
27	0900	Mars 4° north of Moon
29	2000	Mercury 4° north of Moon

The Lunar Observer welcomes all lunar related images, drawings, articles, reviews of equipment and reviews of books. You do not have to be a member of ALPO to submit material, though membership is highly encouraged. Please see below for membership and near the end of *The Lunar Observer* for submission guidelines.

Comments and suggestions? Please send to David Teske, contact information page 1. Need a hard copy, please contact David Teske.

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

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

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

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

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

SUBMISSION THROUGH THE ALPO IMAGE ARCHIVE

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

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

It is helpful if the filenames follow the naming convention :

FEATURE-NAME_YYYY-MM-DD-HHMM.ext

YYYY {0..9} Year

MM {0..9} Month

DD {0..9} Day

HH {0..9} Hour (UT)

MM {0..9} Minute (UT)

.ext (file type extension)

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

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

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

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

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

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

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

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

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

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

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

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

CALL FOR OBSERVATIONS: FOCUS ON: Stevinus and Snellius

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the March 2022 Focus-On will be the craters Stevinus and Snellius. Observations at all phases and of all kinds (electronic or film based images, drawings, etc.) are welcomed and invited. Keep in mind that observations do not have to be recent ones, so search your files and/or add these features to your observing list and send your favorites to (both):
Alberto Anunziato – albertoanziato@yahoo.com-ar
David Teske – david.teske@alpo-astronomy.org

Deadline for inclusion in the Stevinus and Snellius Focus-On article is February 20, 2022

FUTURE FOCUS ON ARTICLES:

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

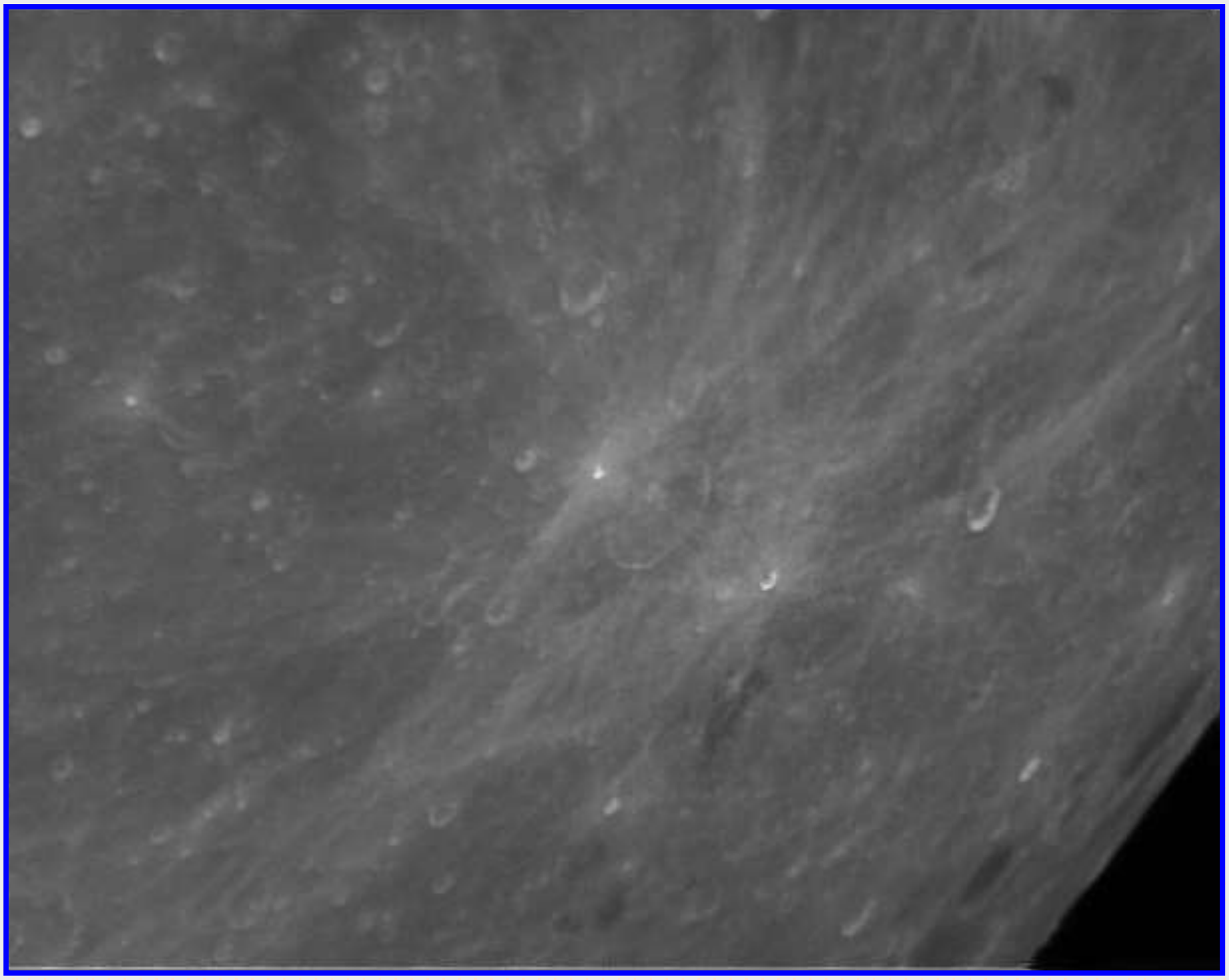
Subject	TLO Issue	Deadline
Stevinus and Snellius	**March 2022**	**February 20, 2022**
Mare Frigoris	**May 2022**	**April 20, 2022**

Focus-On Announcement

THE TWO FACES OF STEVINUS AND SNELLIUS

Stevinus and Snellius are two craters of almost identical size (75 and 83 km in diameter) located in the southeast quadrant of the Moon. They are two very different brothers: the Copernican Stevinus has the characteristics of a “young” crater, such as a central peak and terraced walls, while the Nectarian Snellius is the typical crater degraded by billions of years of successive meteoric impacts. The region is best known for the "headlights of the Moon", the Stevinus A and Furnerius A craters, which flank Stevinus and are two of the brightest ray systems on the lunar surface. It's amazing how two small craters can shine so brightly. But for this you have to wait for the full moon. The area is a delight to watch at any phase.

Please send articles, drawings, images, etc. to Alberto Anunziato and David Teske by **February 20, 2022** for the March 2022 issue of The Lunar Observer.

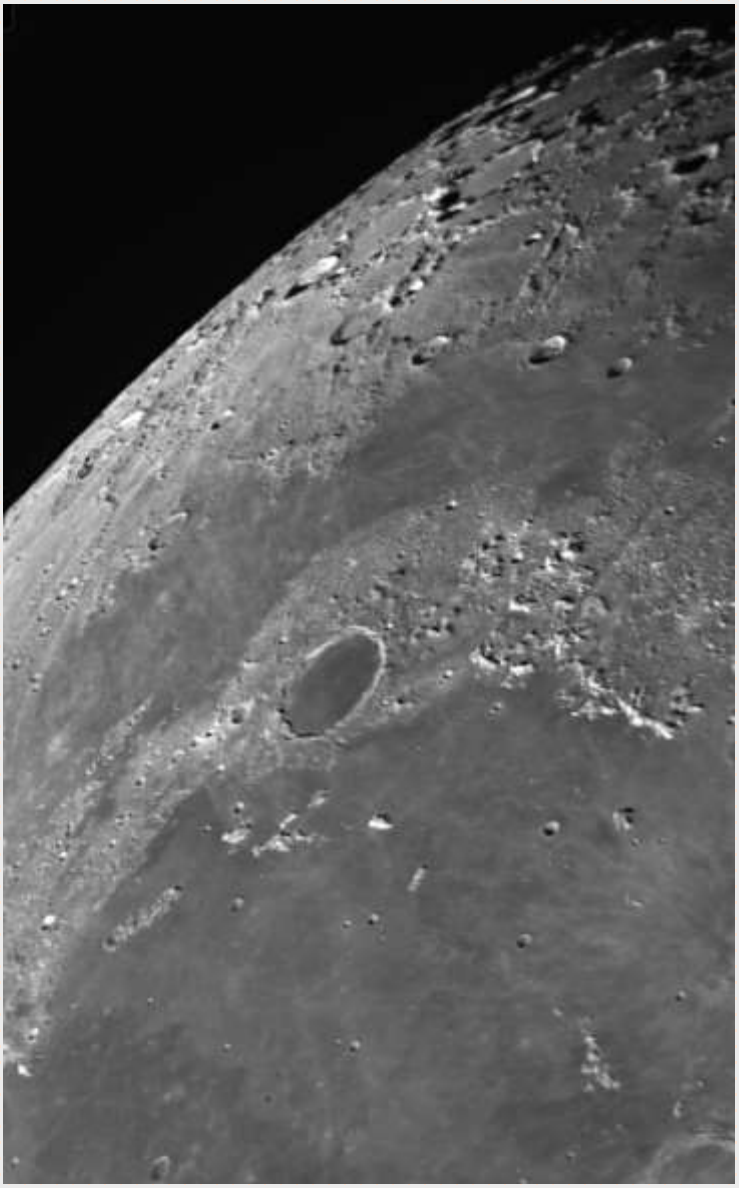


Focus-On Announcement

TRAVELING FROM EAST TO WEST ON THE MARE FRIGORIS

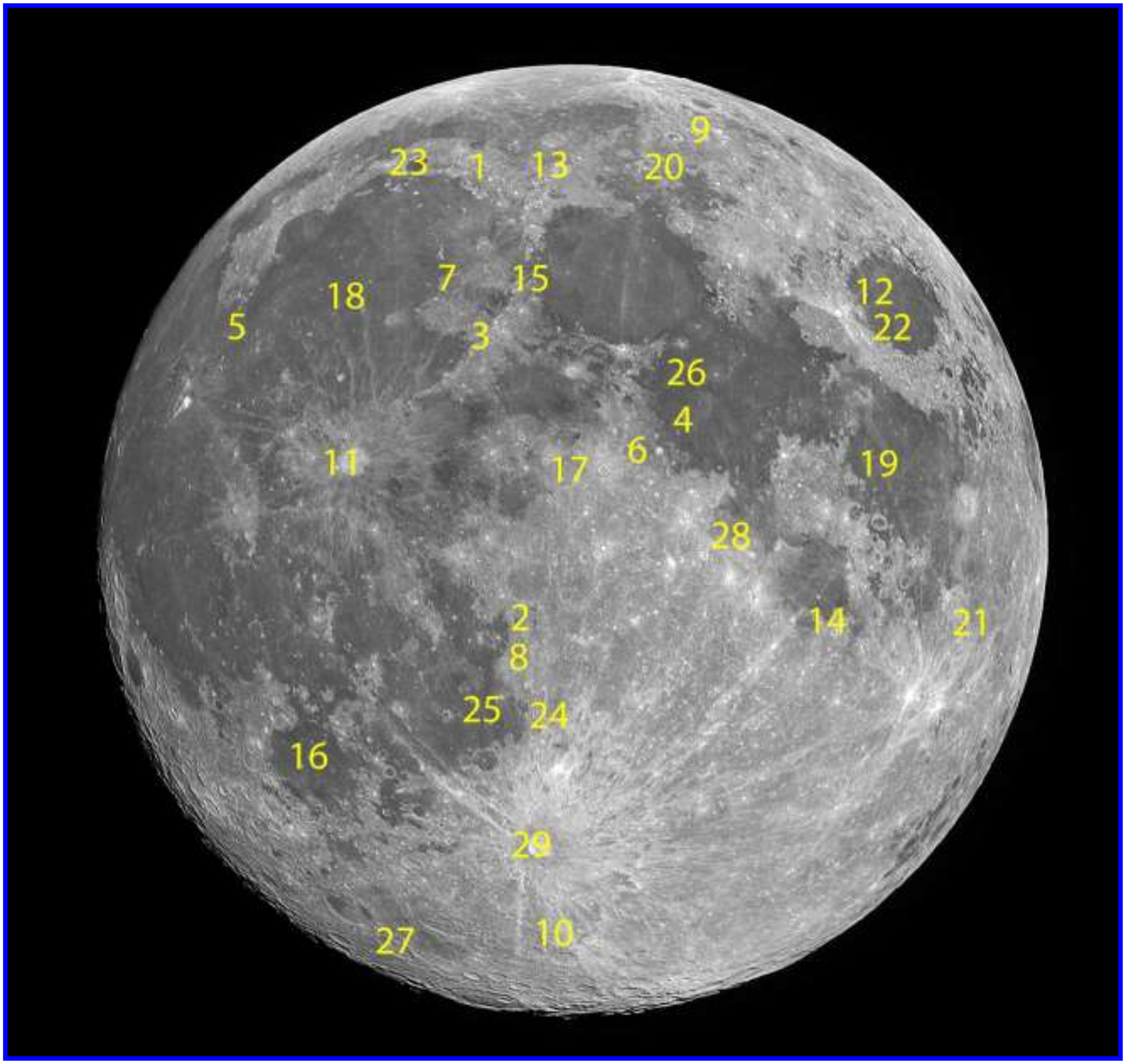
Mare Frigoris is the only mare that does not occupy a circular basin, it is an elongated strip of approximately 1500 kilometers that extends from the Lacus Mortis at its eastern end, passing through Aristoteles, Galle, Protagoras, Archytas, Timaeus, Birmingham, Fontenelle, La Condamine, Harpalus all the way to Sinus Roris in the west, with wonders like Plato and Sinus Iridum nearby. Mare Frigoris would be part of the Imbrium impact basin, and its north coast is covered by the material ejected by this impact. Let's share images of this area of the lunar north, sometimes forgotten due to its proximity to much more photogenic areas.

Please send articles, drawings, images, etc. to Alberto Anunziato and David Teske by **April 20, 2022** for the May 2022 issue of The Lunar Observer.



Sergio Babino

Key to Images In This Issue



1. Alpes, Vallis
2. Alphonsus
3. Apenninus, Montes
4. Arago
5. Argand, Dorsa
6. Ariadaeus, Rima
7. Archimedes
8. Arzachel
9. Atlas
10. Clavius
11. Copernicus
12. Crisium, Mare
13. Eudoxus
14. Fracastorius
15. Fresnel, Promontorium
16. Humorum, Mare
17. Hyginus, Rima
18. Imbrium, Mare
19. Messier
20. Mortis, Lacus
21. Petavius
22. Picard
23. Plato
24. Purbach
25. Recta, Rupes
26. Ross D
27. Schiller
28. Theophilus
29. Tycho