The Lunar Observer

A Publication of the Lunar Section of ALPO

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Back issues: http://www.alpo-astronomy.org/

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Online readers, click on images for hyperlinks

In This Issue

Hoping that this finds you and your loved ones doing well. As I prepare the September issue of *The Lunar Observer*, I look fondly to the pleasant autumn nights when weather is often favorable at night for getting out with the telescope and doing some lunar observing. Not too hot, not too cold, no bugs, just right!

In this issue of *The Lunar Observer*, you will find a number of interesting articles, images and drawings. Robert H. Hays, Jr. features a new observation of Cysatus C and Deluc G, plus some articles from past issues to re-examine. Rik Hill provides a study of three fascinating areas, Heraclitus, Rima Hadley and Plato. Alberto Anunziato looks at the remarkable crater Sirsalis E, a ghost crater on the shores of Oceanus Procellarum and wrinkle ridges near Piazzi Smyth viewed in light different than previous observations. The Focus-On Lunar 100 by Jerry Hubbell and Alberto Anunziato features Lunar Targets 81-90 which includes ever more challenging targets such as the Prinz rilles, the craters Humboldt and Perry and craterlets in Plato. Tony Cook provides another thorough report of Lunar Geologic Change and Detection. Many thanks to all who contributed so much to *The Lunar Observer*, as always!

Congratulations to Dr. Tony Cook, as he will head up the British Astronomical Association (BAA) Lunar Section! Along with ALPO, the BAA has a great lunar program. Tony will be editing the BAA *Lunar Circular* newsletter. Good work Tony!

Lunar Topographic Studies

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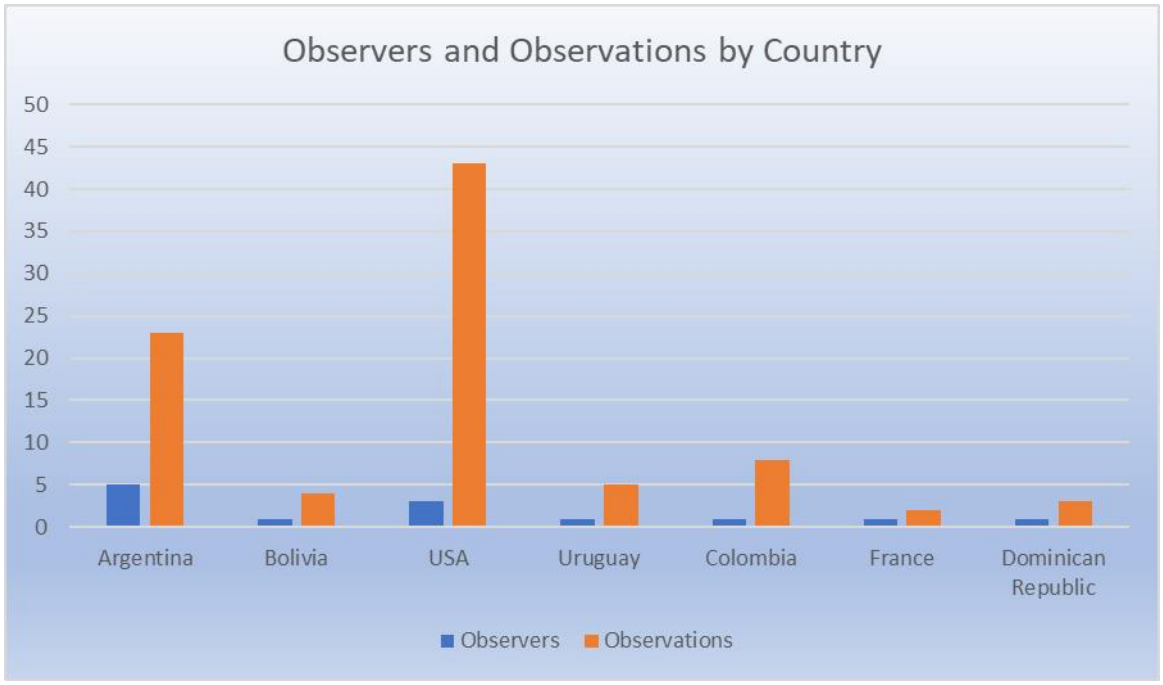
Observations Received

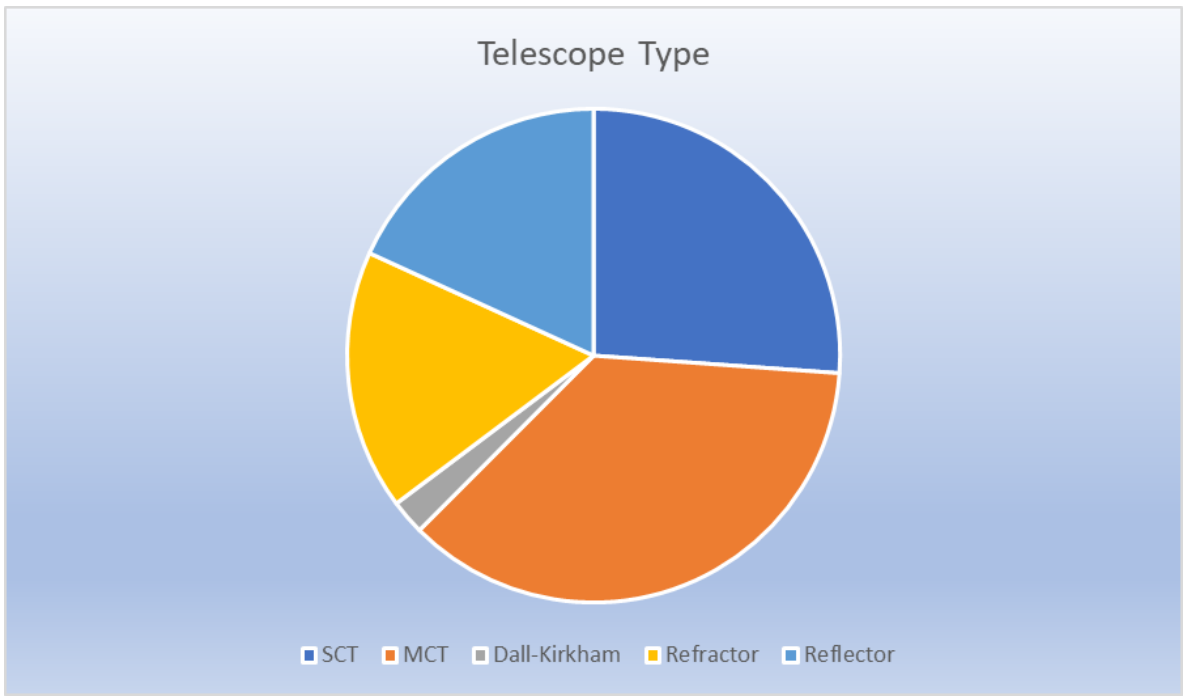
Name	Location and Organization	Image/Article
Alberto Anunziato	Oro Verde, Argentina	Images of Plato, Humboldt, articles and drawings Sirsalis E, The Little-Known Brother of Flamsteed P and Piazzi Smyth Wrinkle Ridge Revisited.
Sergio Babino	Montevideo, Uruguay	Images of Hesiodus A, and Pitatus, Linné, Langrenus and Prinz.
Ariel Cappelletti	Córdoba, Argentina, SLA	Image of Plato.
Francisco Alsina Cardinalli	Oro Verde, Argentina	Images of Linné, Plato, Prinz (5), Peary, Valentine Dome (2) and Armstrong, Aldrin and Collins (2).
Jairo Chavez	Popayán, Colombia	Images of Copernicus, Petavius (2), Plato, Tycho (2), Gassendi and Mare Crisium.
Michel Deconinck	Aquarellia Observatory - Artignosc-sur-Verdon - Provence - France	Pastels of Plato craterlets and Langrenus rays.
Desireé Godoy	Oro Verde, Argentina	Images of Linné, Langrenus (3) and Peary.
Marcelo Mojica Gundlach	Cochabamba, Bolivia	Images of Hesiodus, Plato (2) and Valentine Dome.
Robert H. Hays, Jr.	Worth, Illinois, USA	Articles and drawing of Cysatus C and Deluc G, Crüger and Mösting A.
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Article and images Platonic Musings, Heraclitus, Hadley Rille, images of Hesiodus (3), Linné, Plato (5), Pitatus (3), Langrenus (3), Aristarchus (7), Humboldt (2), Peary (3), Valentine Dome, Armstrong, Aldrin and Collins (4)
Eduardo Horacek-Esteban Andrada	Mar del Plata, Argentina	Image of Aristarchus.
Felix León	Santo Domingo, República Dominicana	Images of Hesiodus A, and Pitatus, Plato and Prinz.
David Teske	Louisville, Mississippi, USA	Images of Hesiodus A, Linné, Plato, Pitatus, Langrenus, Valentine Dome, Armstrong, Aldrin and Collins

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

September 2021 *The Lunar Observer*
By the Numbers

This month there were 88 observations by 18 contributors in 7 countries.

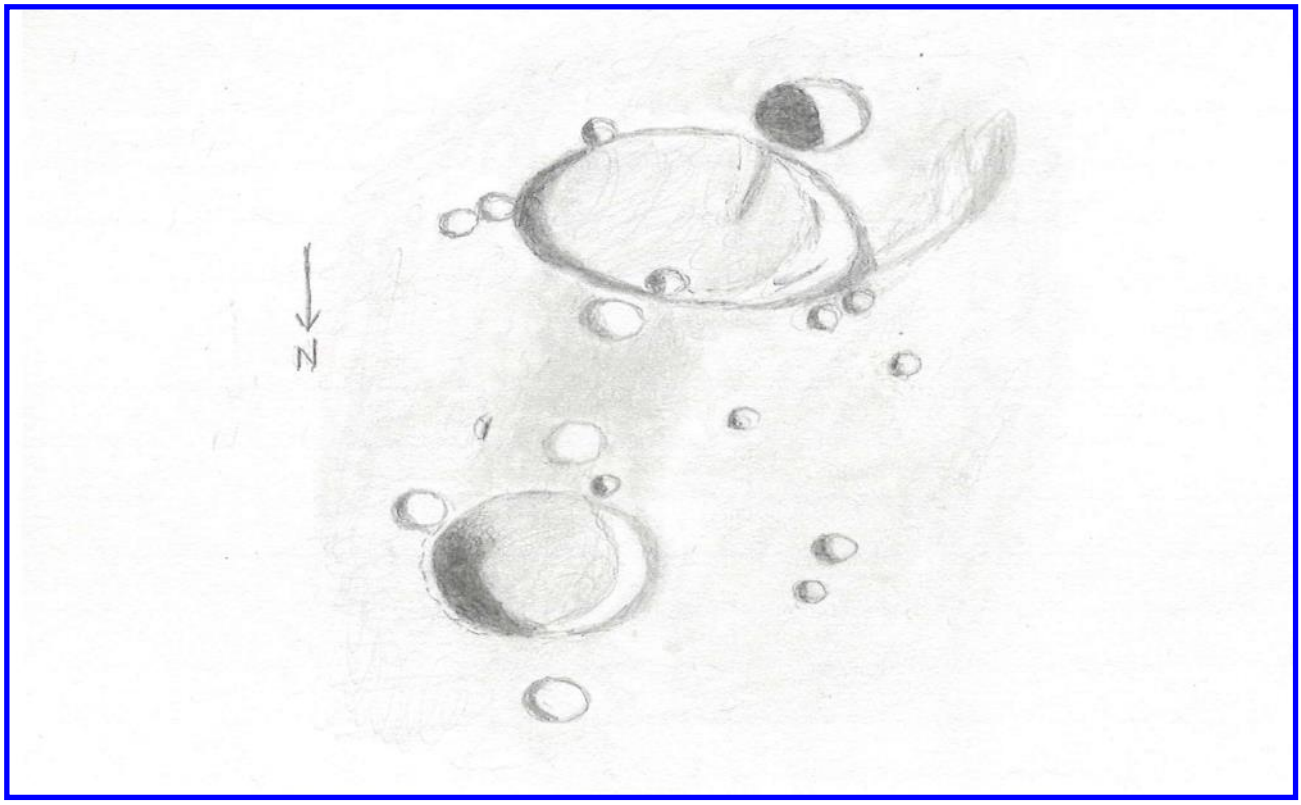




Cysatus C and Deluc G

Robert H. Hays, Jr.

I drew this area on the evening of April 21/22, 2021. These craters are near the central meridian, but are well south of Maginus. Libration was favorable this evening. The large elongated crater to the south is Cysatus C. This crater is tilted slightly north of west and has a pointed west end. Cysatus C is actually two craters, according to the Lunar Quadrant map. The letter designation refers to the eastern part. Cysatus is the deep, crisp crater to its southwest. A low ridge extends into the interior of Cysatus C from near Cysatus A. It is in the right place to be a part of an old crater rim, but it doesn't seem curved enough for that. A ragged hill is west of Cysatus A, and a ridge or wrinkle connects it to the west lobe of C. Cysatus J is the fair-sized crater just north of Cysatus C, and a smaller pit nearby is just inside the rim of C. Several small craters are scattered along or near the rims of Cysatus C. Deluc G is the large crater north of Cysatus C. This crater is the deeper of the two, and has no noticeable irregularities. Deluc V is just southeast of this crater, and Deluc S is the small pit along the south rim of Deluc G. A shallow saucer is near Deluc S. Deluc W is the larger of the two craters west of Deluc G, and Deluc N is the shallow crater north of G. A grayish area is between the two main craters, and takes in Cysatus J and the saucer near Deluc S.



Cysatus C & Deluc G, *Robert H. Hays, Jr., Worth, Illinois, USA. April 22, 2021 02:35-03:25 UT. 15 cm reflector telescope, 170 x. Seeing 8-7/10, transparency 6/6.*

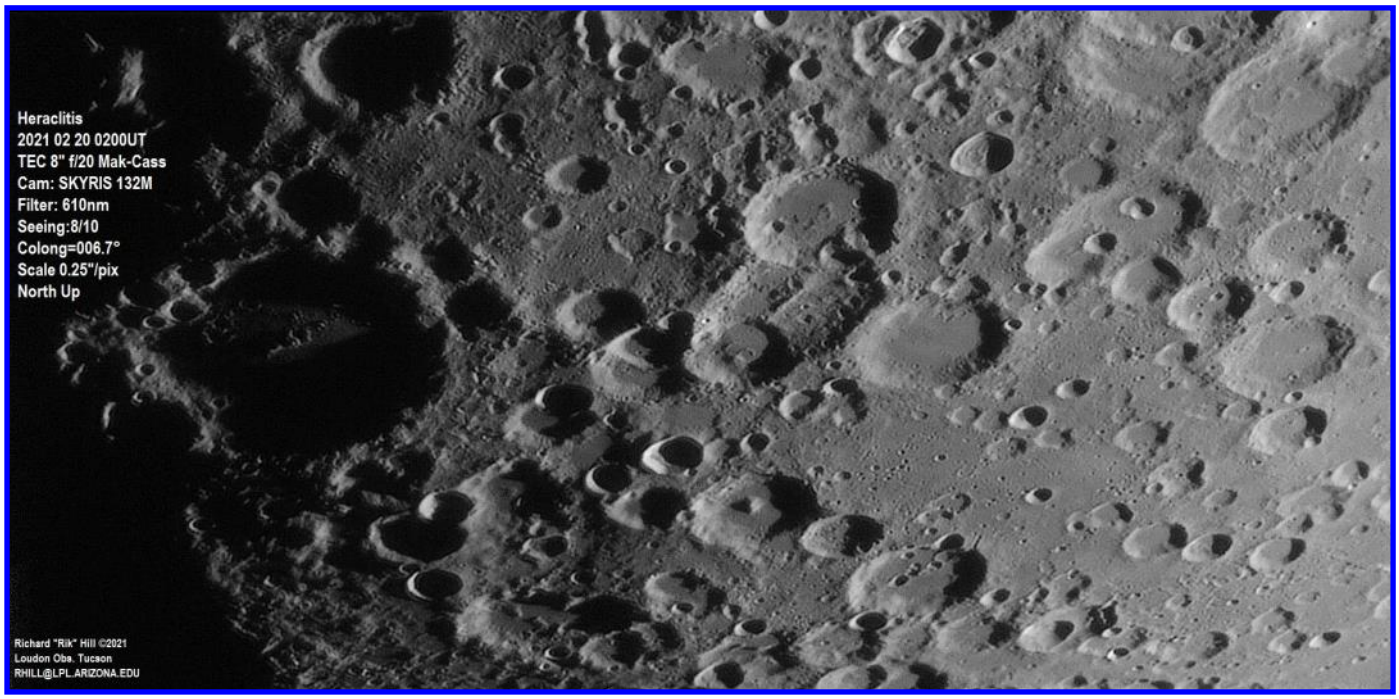
Heraclitus

Rik Hill

Heraclitus is the sideways Mickey Mouse in the middle of this image. The flat floored cater just right of center is Cuvier (77 km). It forms one of the ears of Mickey. Above and to the left is another similar sized crater Licetus (77 km) forming the other ear, and between is an odd elongated feature with a crater at the left end. This forms Mickey's nose and is Heraclitus D, the 50 km diameter crater at the end. Heraclitus itself is listed as 94 km around but clearly is not round. Measuring on LROC QuickMap I get 40 x 60 km.

On the far-left side of the image is the large crater Maginus (168 km) still in deep shadow except for a little shaft of sunlight that is shining through a low spot in the eastern wall. Above, fully in shadow, is Proctor (54 km) and further north even deeper in shadow is Saussure (56 km). East of Cuvier (right) and a little north is the crater Clairaut (77 km) and in the upper right corner is Barocius (85 km) and south of it is the smaller crater Baco (71 km). Due south of Cuvier is Jacobi (70 km) and above and west of it is Lilius (63 km) with a little central peak.

So, what makes a feature like Heraclitus? Two schools of thought here. First of all, it is a pre-Imbrium crater between 3.85 and 4.55 billion years old so whatever the origin, there has been a lot of modification in the intervening 4 billion ears. One speculation is that it is the merger of two or more craters. We have other examples of this on the Moon. A second idea attributes this elongated formation to very low angle impact similar to that thought to have formed Messier A and B. Pick your favorite cause!



Heraclitus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 February 20 02:00 UT, colongitude 6.7°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 132M camera. Seeing 8/10.*

Sirsalis E, The Lesser-Known Brother of Flamsteed P

Alberto Anunziato

Sirsalis E is a little-known crater, I could not find information about it other than in the Virtual Moon Atlas Software, which only tells us that it is 72 km in diameter. It is surely a minor crater, but at the time of the observation, so close to the terminator, it looked spectacular on the west shore of the Oceanus Procellarum. It is similar to a crater that I knew from Lunar Listing 100 and that is very close to the east, Flamsteed P. Both Flamsteed P and Sirsalis E are secondary craters that are larger than the main crater. But the similarity is less superficial. Says Charles Wood, referring to this area of the Moon ("Modern Moon. A Personal View", 2003 Sky Publishing Corporation, page 172): "Oceanus Procellarum is characterized mainly by the arcuate remnants of older craters that have been partially buried by lavas. Examples include the Flamsteed P ring, Letronne, and Wichmann R. The most likely explanation for the occurrence of so many flooded in the south may be that the south is covered by a thin veneer of lavas, whereas mare lavas in the north completely bury older craters". Although Wood does not remember our crater either, the description of the area is accurate, it is an area with many partially buried craters. I kept the elongated shape with which I could observe it with my small telescope and with the shape that large craters take near the limb. The walls, which we could call mountains rising above the sea of lava, are all diverse from one another. The west wall is the most prominent, it is only interrupted for a short distance and casts very dark shadows. If we establish a relationship darker shadows-higher points, the southern part would be the highest, since the northernmost segment casts a very faint shadow. There are even segments of this west wall that cast pointed shadows that would indicate steep peaks. What was interesting, when comparing the initial observation (IMAGE 1) with Chart 39 of the Atlas of the Moon by Antonin Rükl (2004, Sky Publishing, Cambridge), IMAGE 2 is a detail of it, is that in IMAGE 1 there are two more fragments.

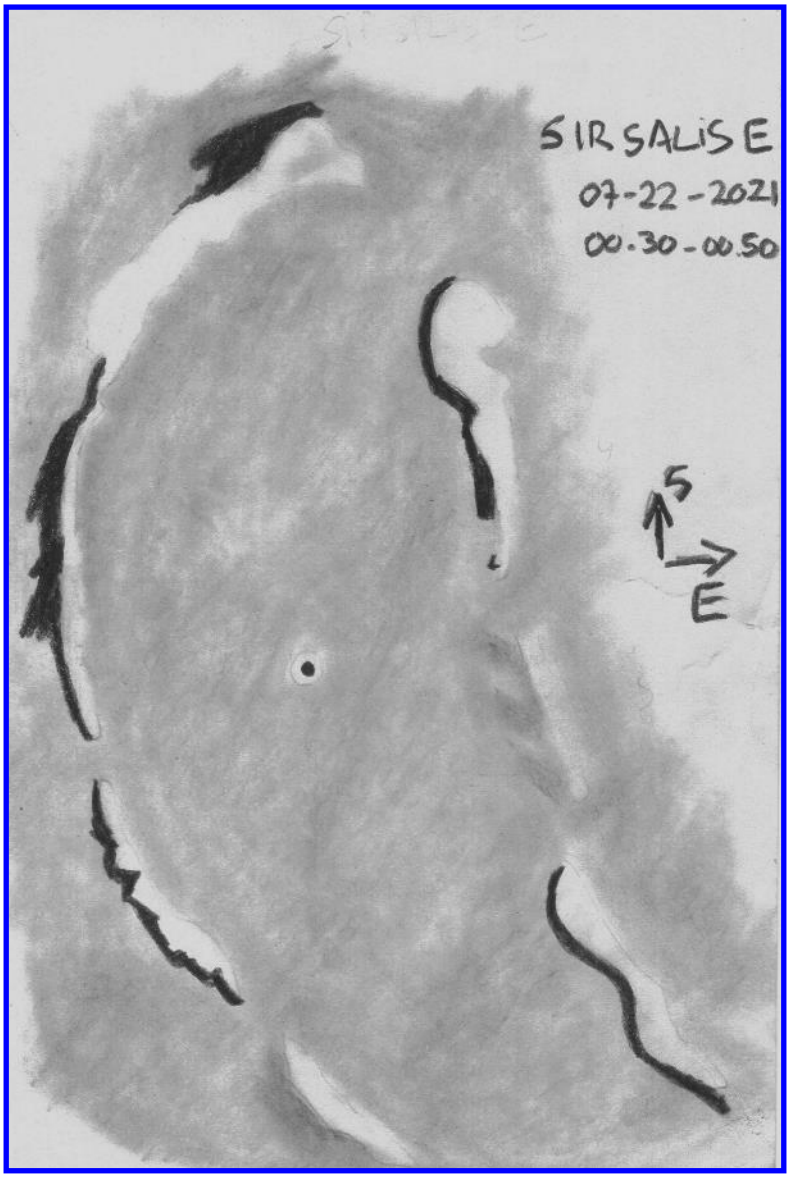
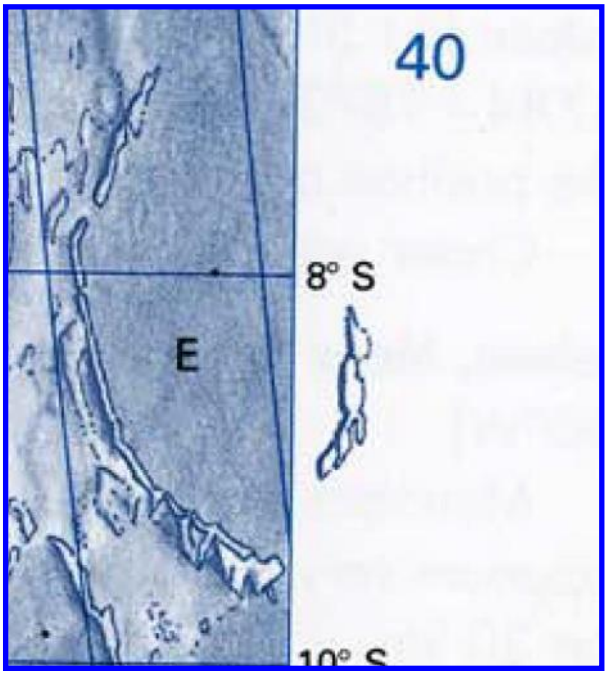


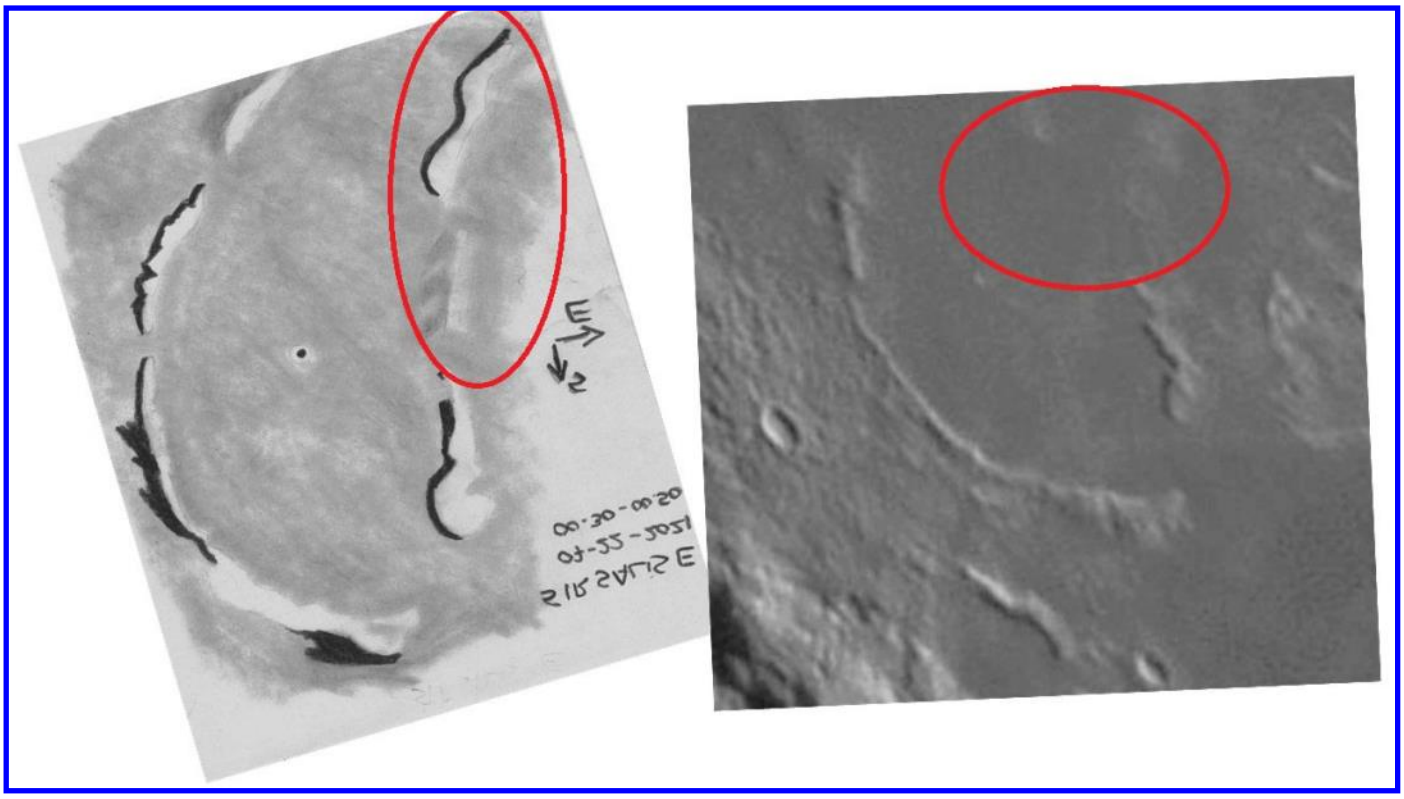
Image 1, Sirsalis E, *Alberto Anunziato, Paraná, Argentina. 2021 July 22 00:30-00:50 UT. Meade EX 105 mm Maksutov-Cassegrain telescope, 154 x.*

Image 2, Sirsalis E, *Rükl Atlas of the Moon, chart 39.*



By the way, our poor Sirsalis E appears falling off Chart 39, it doesn't even appear complete! It seems that, near the terminator and with good seeing, you can see extra parts of the walls of Sirsalis E. On the Jim Loudon Observatory-Lunar Image Archive website we find in an image of Rima Sirsalis (https: // www. lpl.arizona.edu/~rhill/images_moon/sirsalis2012-05-04-0519finA.jpg) a view of Sirsalis E that, compared to image 1, shows within the red circles the two extra segments that we observed, although the inferior extra segment, which we see as dimmer and with very light shadows, appears sharper in the Rik Hill image (right) while the extra-top segment appears sharper in my visual observation and almost invisible in the Rik Hill image. I have no explanation for this, but anyway this segment coincides with what should be the buried rim of the crater, so visual observation, in moments of good seeing, may have shown an unknown part of the lunar surface.

Image 3. *Comparison of Sirsalis E as drawn by Alberto Anunziato, Paraná, Argentina. 2021 July 22 00:30-00:50 UT. Meade EX 105 mm Maksutov-Cassegrain telescope, 154 x and Rik Hill image of Sirsalis E 2012 May 04 05:19 UT.*

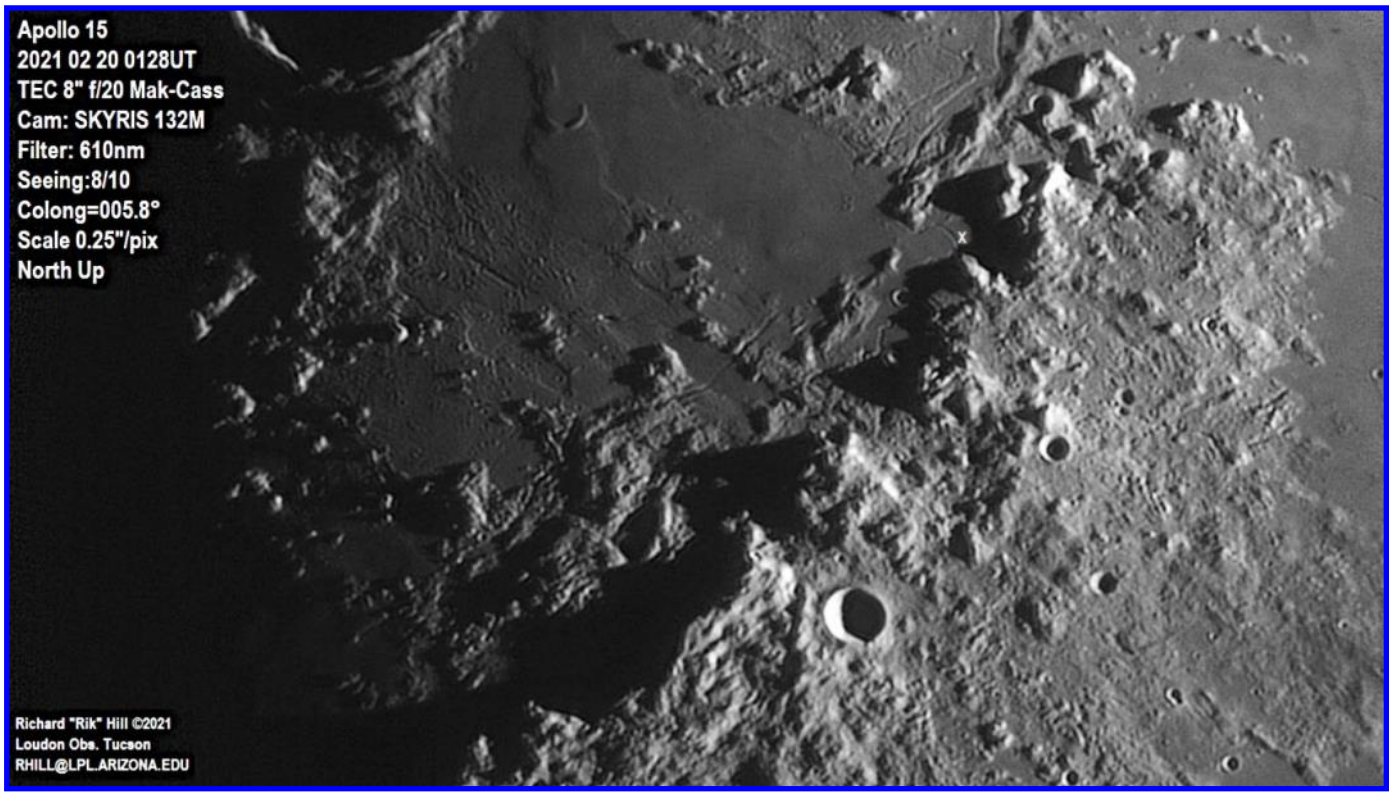


Hadley Rille

Rik Hill

The large set of mountains running roughly diagonal in this image are the northern portion of the Montes Apenninus. The crater below center is Conon (22 km dia.) and you can see a small piece of Archimedes at the top left. Between the Montes and Archimedes is a smooth area known as Palus Putredinis which I highlighted in an earlier write up. Parallel to the Montes on the south side of the Palus is a large broad rima, Rima Bradley (134 km long). On the northern side is a series of smaller, thinner rimae roughly parallel to the Montes, Rimae Fresnel (94 km long). The ridge just below these rimae ends on the north with Promontorium Fresnel. Next to this ridge is a small crater Santos-Dumont (9 km) looking to be a caldera on a mountain. A look at it in LROC QuickMap shows it to be a relatively young crater on a plateau, that bisects a thin rima. Ducking in and out of the shadows of the Montes is another rima with a small crater in the middle, Bela (12km) even though it looks to be smaller than Santos-Dumont in this lighting. That rima is Rima Hadley or "Hadley Rille" and the 'X' marks the spot where Apollo 15 touched down in July 1971, 50 years ago last month. Of the three astronauts on that mission David Scott, Alfred Worden and James Irwin only Scott survives at the age of 89.

The big mountain just to the upper left of Conon is Mons Bradley (4200m high) but it's not the highest. The bright peak to the upper right of the Apollo 15 site is Mons Hadley (4800 m), almost 5 km high! Definitely nose-bleed altitudes!!

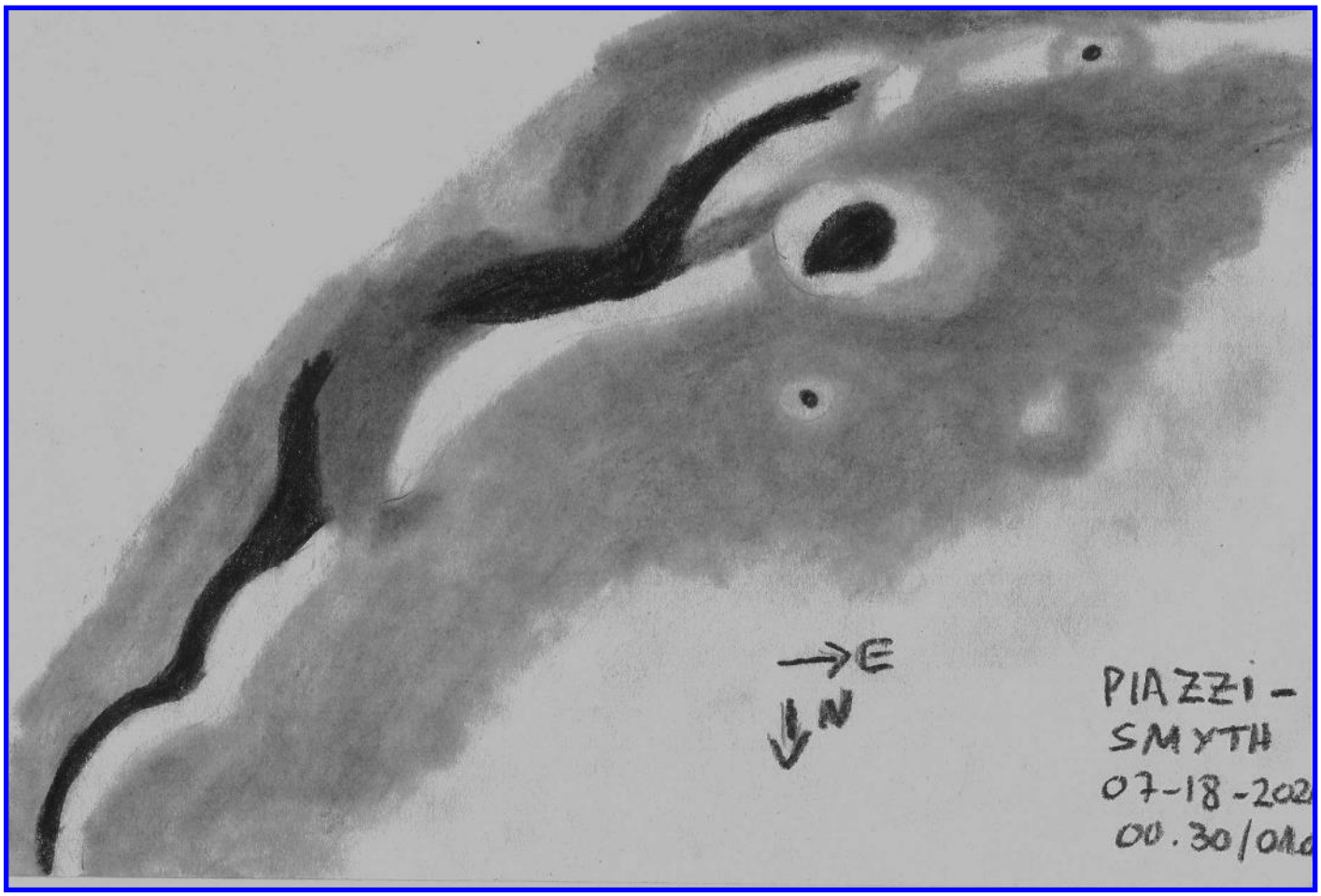


Apollo 15, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 February 20 01:28 UT, colongitude 5.8°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 132M camera. Seeing 8/10.*

Piazzi Smyth Wrinkle Ridge Revisited

Alberto Anunziato

In the February 2021 issue of “The Lunar Observer” we published a drawing of the wrinkle ridge that intersects Piazzi Smyth crater (with a diameter of 13 km) in Mare Imbrium at a 3.4º colongitude and with the Sun illuminating from the east and with the shadows to the west. The observation that we present now had the opposite illumination, that is, from the west (colongitude 10.2º) and covers the segment to the north of Piazzi Smyth. To the west of Piazzi Smyth, the segments diverge in what appears to be a canyon flooded by shadows, while to the east of the crater a brighter area allows us to deduce a kind of ramp (what was formerly called “glacis”) that reflects the light of the rising sun. This dorsum was pointed out by Thomas Elger, one of the first to describe in some detail this lunar feature in "The Moon" (George Philip & son, London, 1895) as one of the most representative: "A comparatively low power serves to show the curious structural character of this immense ridge, which appears to consist of a number of corrugations and folds massed together, rising in places, according to Neison, to a height of 700 feet and more. The Mare Imbrium also affords an example of a ridge, which, though shorter, is nearly as prominent, in that which runs from the bright little ring-plain Piazzi Smyth towards the west side of Plato” (page 8). Elger clearly observed the details of the structure of a wrinkle ridge, which appears uniform with little magnification or if attention is not paid, but which is actually a set of superimposed platforms when the observation is sharpened. And this dorsum, still unnamed, was a beautiful example for Elger and for us the promise of a more detailed study in the future.

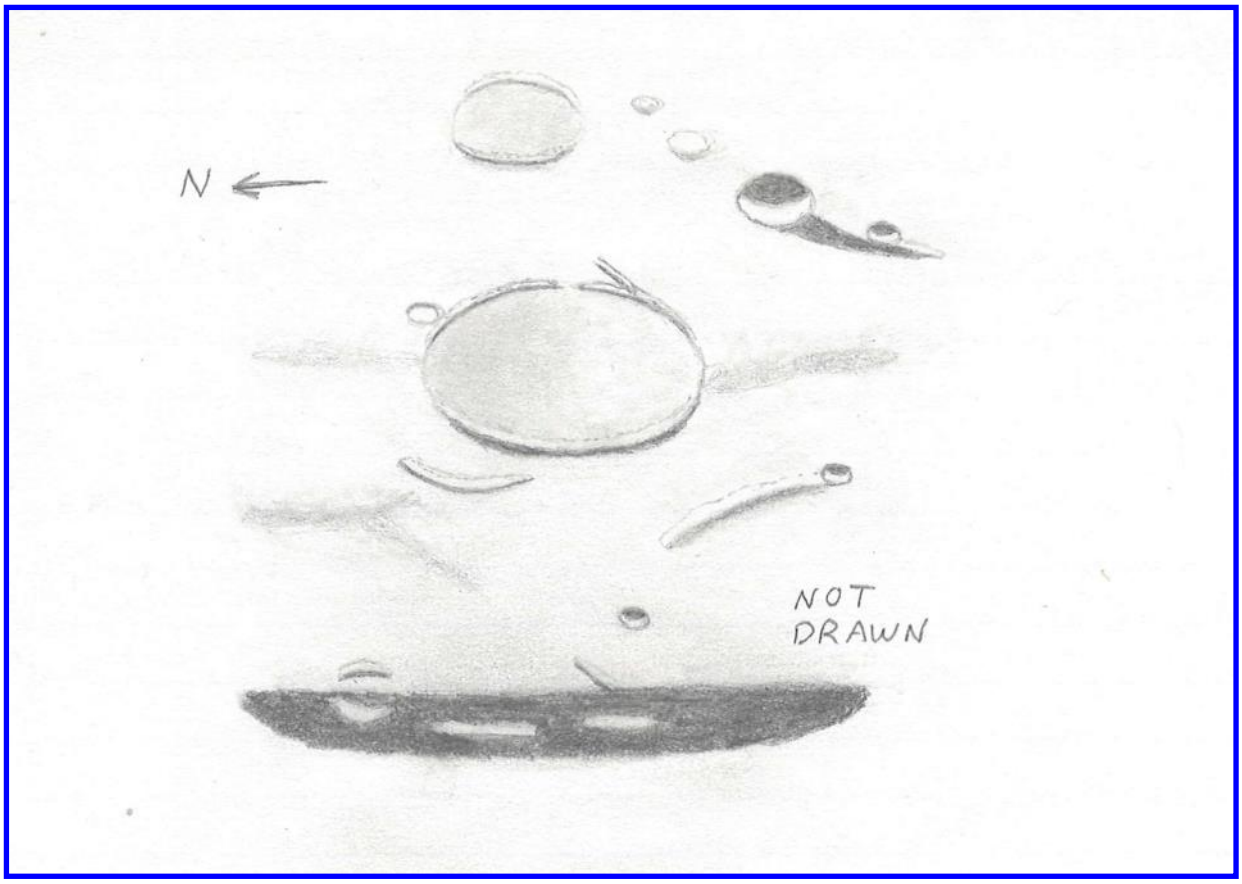


Piazzi Smyth Dorsum, *Alberto Anunziato, Paraná, Argentina. 2021 July 18 00:30-01:00 UT. Meade EX 105 mm Maksutov-Cassegrain telescope, 154 x.*

Crüger

Robert H. Hays, Jr.

I drew this crater and vicinity on the night of September 7/9, 2014. The Moon was about 21 hours before full. This crater is to the south of Grimaldi. It is a shallow crater completely filled with mare material, though it is not near any of the lunar 'seas.' The northwest rim of Crüger is its highest, and there may be a tiny gap in its east rim. The north end of Crüger's interior is slightly darker than its south end. A short, curved ridge is outside the northwest rim of Crüger, but is not concentric with it. A short spur protrudes from its southeast rim, and what appears to be a shallow saucer is on Crüger's northeast side. Crüger E is the fairly large, deep crater southeast of Crüger, and Crüger H is south of E. A strip of dark shadow abuts the west sides of these craters. A dusky area east of Crüger appears to be a ghost ring. This feature's west rim (nearest to Crüger) has a narrow, nearly straight, dark shadow. Its other rims were very low or absent. This dusky area was quite well defined, however, and was tinted like the southern half of Crüger. Two hills lie between this ghost ring and Crüger E. The small craters Crüger G and BA are south and west of Crüger respectively. A slightly curved ridge extends northward from Crüger G. This ridge had lighter shadowing than the one northwest of Crüger. Some vague strips of shadow were north and south of Crüger. The one northwest of Crüger may be part of the ruined ring Rocca Q, according to the Lunar Quadrant map. This area appeared relatively smooth considering its proximity to the terminator. Some things noted in this area were bright ridges in dark shadow and what appears to be a broken crater.

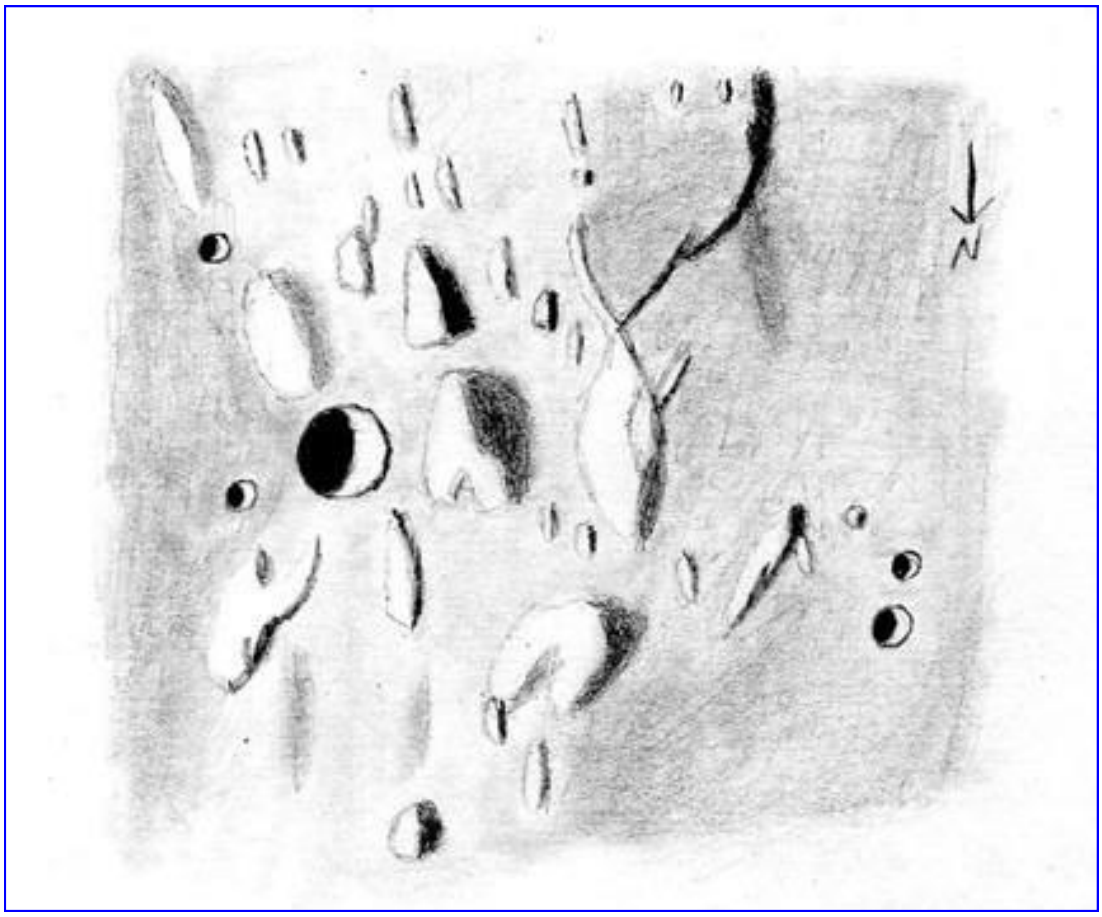


Crüger, *Robert H. Hays, Jr., Worth, Illinois, USA. 08 September 2014 04:22-05:12 UT. 15 cm reflector telescope, 70 x. Seeing 7/10, transparency 6/6. This first appeared in The Lunar Observer in December 2014. This was also in the March 2021 The Lunar Observer with the Focus-On Lunar 52 Crüger. The drawing has been updated. Thanks Robert!*

Mösting A

Robert H. Hays, Jr.

I observed this crater and vicinity on the evening of May 23/24, 2018. This area is near the center of the visible side close to Sinus Medii. Mösting A is a crisp round crater with a bright interior. The small pit just east of Mösting A is Flammarion D, and Flammarion B is the similar crater to its south. Several nearby mounds are part of the broken ring of grayish Flammarion. There is a great variety of elevations in this area which I have tried to draw as well as possible. A large low mound notched in its north side is just west of Mösting A, and a similar mound is to its northwest. A large triangular hill with dark shadowing is southwest of Mösting A. This hill is surrounded by smaller peaks with mostly lighter shadowing except for one to its west. Another peak with dark shadowing is the roundish one well north of Mösting A. A large, roughly Y-shaped complex is farther to the west. The southeast end is a narrow, broken ridge. The southwest arm is a strip of dark shadow generally widening to the south. This arm did not show a sunlit side. The area south of the Y junction is gray and smooth except for two tiny peaks. North of the Y junction is a low mound with some interior shadowing. Mösting B is the larger of a close pair of craters to the west; its smaller neighbor is Mösting BA. All of the intact craters in this drawing are crisp and round. An elongated hill with fairly dark shadowing is between the B-BA pair and the north end of the Y complex. Several small low peaks are also in this area.



Mösting A, *Robert H. Hays, Jr. Worth, Illinois, USA. 24 May 2018 02:45-03:45 UT. 15 cm reflector, 170 x. Seeing 8/10, transparency 5/6. This originally appeared in the December 2018 The Lunar Observer. This article and drawing was in the May 2021 The Lunar Observer for the Focus-On Lunar 61 Mösting A. There was a typing error in the May article.*

Focus On: The Lunar 100
Features 81 through 90

Jerry Hubbell
Assistant Coordinator, Lunar Topographical Studies

This is the ninth article of ten in a series on Chuck Wood's Lunar 100 list. Chuck Wood, the founder of the Lunar Photo of the Day (LPOD) (Ref.), first discussed this list of lunar features in a Sky & Telescope article published in 2004, and later published on the Sky & Telescope website (Ref.). This series will run from May 2020 until January 2022. I may insert a few other topics in between this series so the end date for this series may extend out to the end of 2022. Chuck wanted this list of lunar features (L1 to L100) to be like the well-known list of Messier objects that would give lunar observers a way to progress in their study of the moon and become life-long observers. The list contains all the diverse features of the Moon including Mare, Craters, Rilles, Mountains, and Volcanic Domes. The list starts out with the naked eye view of the full disk of the Moon and progresses through more difficult features.

This series of Focus On articles is meant to be the basis for a lunar visual observing program but is not limited to that. It can be the basis for starting your own image-based study of the Moon, which will enable you to use the *Lunar Terminator Visualization Tool (LTVT)* (Ref.), a sophisticated software program used to do topographical measurements of the lunar surface. These articles will introduce and show each of the Lunar 100 features as observed and submitted by our members through drawings, images, and narrative descriptions. Although you can use your naked eye and binoculars to start observing objects L1 – L20, observing objects L21 – L80 will require the use of a 3-inch (76-mm) telescope. Features at the end of the list (L81 – L100) will require a 6 to 8-inch (152 to 203-mm) telescope. Many of the features are best observed at different phases of the Moon.

One of the best ways to help you learn the features of the Moon is through sketching the lunar surface. During this series of articles, we will highlight drawings of many of the Lunar 100 features. Springer Books publishes an excellent book, released in 2012, called *Sketching the Moon* (Handy, et al.) (Ref.). There are other resources on the Internet to help you get started observing and sketching the Moon including the ALPO's excellent *Handbook of the ALPO Training Program* (Ref.)

In this article we continue with features 81 through 90 on Chuck's list. Here is a list of features 81 – 90:

L	FEATURE NAME	SIGNIFICANCE	RUKL CHART
81	Hesiodus A	Concentric crater	54, 64
82	Linné	Small crater once thought to have disappeared	23
83	Plato craterlets	Small craters at the limits of detection	3
84	Pitatus	Crater with concentric rilles	54
85	Langrenus Rays	Aged ray system	28
86	Prinz rilles	Rille system near the crater Prinz	19
87	Humboldt	Crater with central peaks and dark spots	60
88	Perry	Difficult to observe polar crater	4
89	Valentine Dome	Volcanic Dome	13
90	Armstrong, Aldrin and Collins	Small craters near the Apollo 11 landing site	35

This month we had a great response to our request for images and drawings for the ninth set of 10 features of the Lunar 100 (L81 – L90). I am grateful for all the submissions we received. Many of the images came from Alberto Anunziato's groups, SAO-SLA, and LIADA. Early on he prefaced the images he sent on behalf of his group this way:

> *"LUNAR 100 PROGRAM Sociedad Astronómica Octante-Sociedad Lunar Argentina*
>
> *When we found out that the next objectives of the Focus On Section would be the features listed in the Charles Wood's famous Lunar 100, the members from Sociedad Lunar Argentina (SLA) and Sociedad Astronómica Octante (SAO) of the República Oriental del Uruguay, we considered interesting to join the initiative of "The Lunar Observer" (TLO) and therefore we launched our Lunar 100 Program, under the auspices of the Lunar Section of the Liga Iberoamericana de Astronomía (LIADA). The objective is twofold. We will report the images submitted to the program to "The Lunar Observer". And we will also publish them in all the media of SLA, SAO and LIADA. We think it is a great opportunity to stimulate amateur lunar observation and if the call is successful, we can dream of some final joint publication."*

We look forward to future drawings and images submitted by ALPO, SLA, SAO, LIADA members and others from across the world. Please share with us any images you have in your image catalog; we hope to see everyone participate in these Focus On articles.

– Jerry Hubbell

COMPUTER PROGRAMS

Virtual Moon Atlas
https://sourceforge.net/projects/virtualmoon/

Lunar Terminator Visualization Tool (LTVT) http://www.alpoastronomy.org/lunarupload/LTVT/ltvt_20180429-HTML.zip

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ADDITIONAL READING

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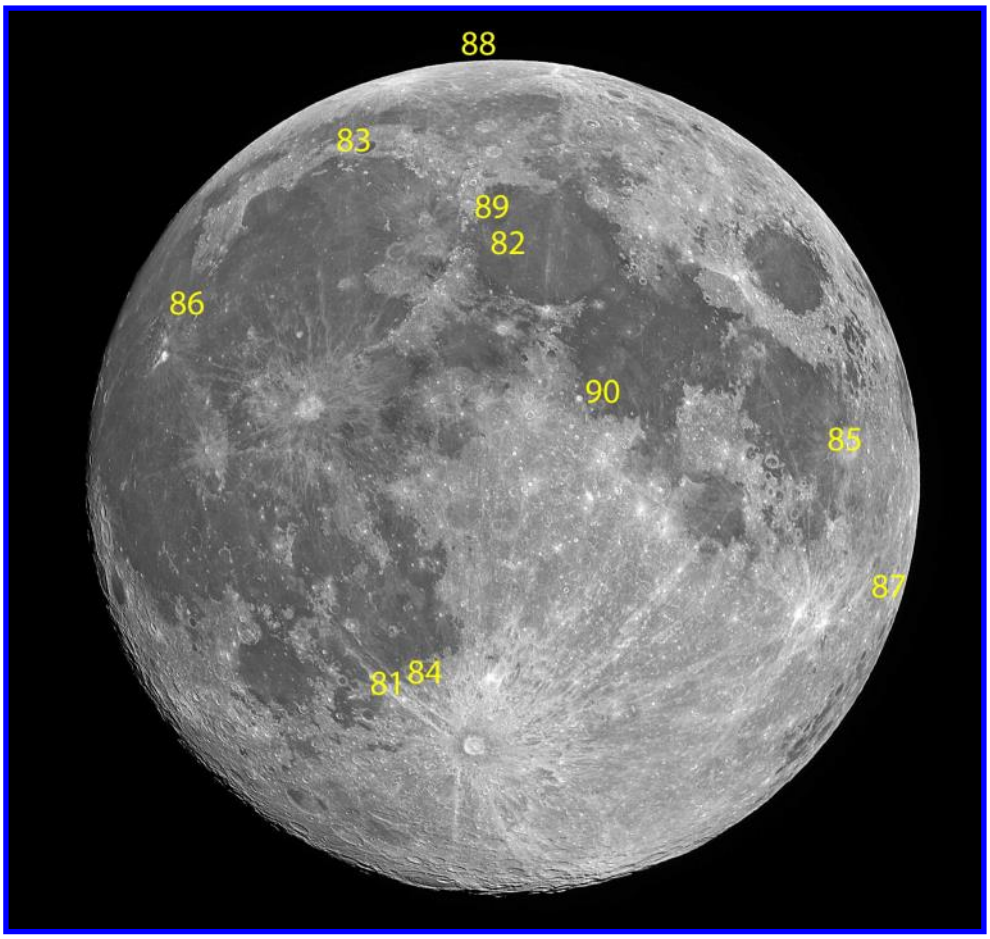
LUNAR 81 TO 90

Alberto Anunziato

In our search for images that illustrate the "Lunar 100" list made by Charles Wood as a lunar observation program of increasing difficulty, we reached number 90. For some months now, we have accompanied the representative images of each lunar feature with extracts from Charles Wood's work "Modern Moon. A Personal View" (2003 Sky Publishing Corporation), relating what the author points out in said book about the lunar features that he will later include in his list.



L	FEATURE NAME	SIGNIFICANCE	RUKL CHART
81	Hesiodus A	Concentric crater	54, 64
82	Linné	Small crater once thought to have disappeared	23
83	Plato craterlets	Small craters at the limits of detection	3
84	Pitatus	Crater with concentric rilles	54
85	Langrenus Rays	Aged ray system	28
86	Prinz rilles	Rille system near the crater Prinz	19
87	Humboldt	Crater with central peaks and dark spots	60
88	Perry	Difficult to observe polar crater	4
89	Valentine Dome	Volcanic Dome	13
90	Armstrong, Aldrin and Collins	Small craters near the Apollo 11 landing site	35

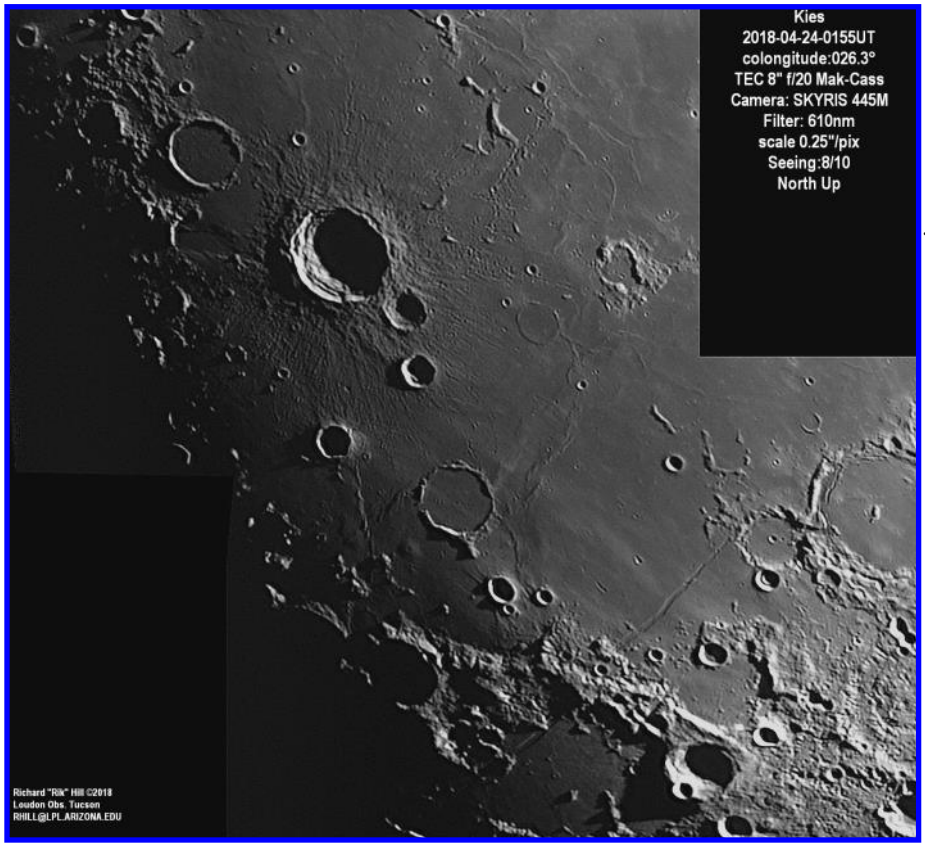
LUNAR 81 HESIODUS A CONCENTRIC CRATER

Hesiodus A is the most prominent of a not very wide species of craters, the concentric craters, which was the subject of a Focus-On Section a few years ago. Charles Wood thus refers to the one who would later be chosen as LUNAR 81: "… a truly unusual crater: Hesiodus A. Located on the simple impact southwest rim of Hesiodus, Hesiodus A is 14.5-km-diameter crater that looks just like a normal simple impact crater when the sun is low. But as the Sun rises, lo and behold, Hesiodus A reveals a perfect little doughnut or circular ridge. And inside the doughnut are two or three tiny central peaks. Hesiodus A is the most easily observed concentric crater on the Moon. I once wrote a short paper cataloging 51 concentric craters. Nearly all occur near mare edges and have diameters of 2 to 20 km. The inner doughnuts cannot be impacts that just happened to be centered on preexisting craters. They must be formed by some sort of volcanic extrusions or annular intrusions, neither of which have many analogues on Earth" (page 148). We chose an image of Rik Hill to have the most complete view of this double crater, although the sample of observations received includes images with frontal illumination, the ideal moment to observe Hesiodus A according to Wood, as well as images with oblique illumination.

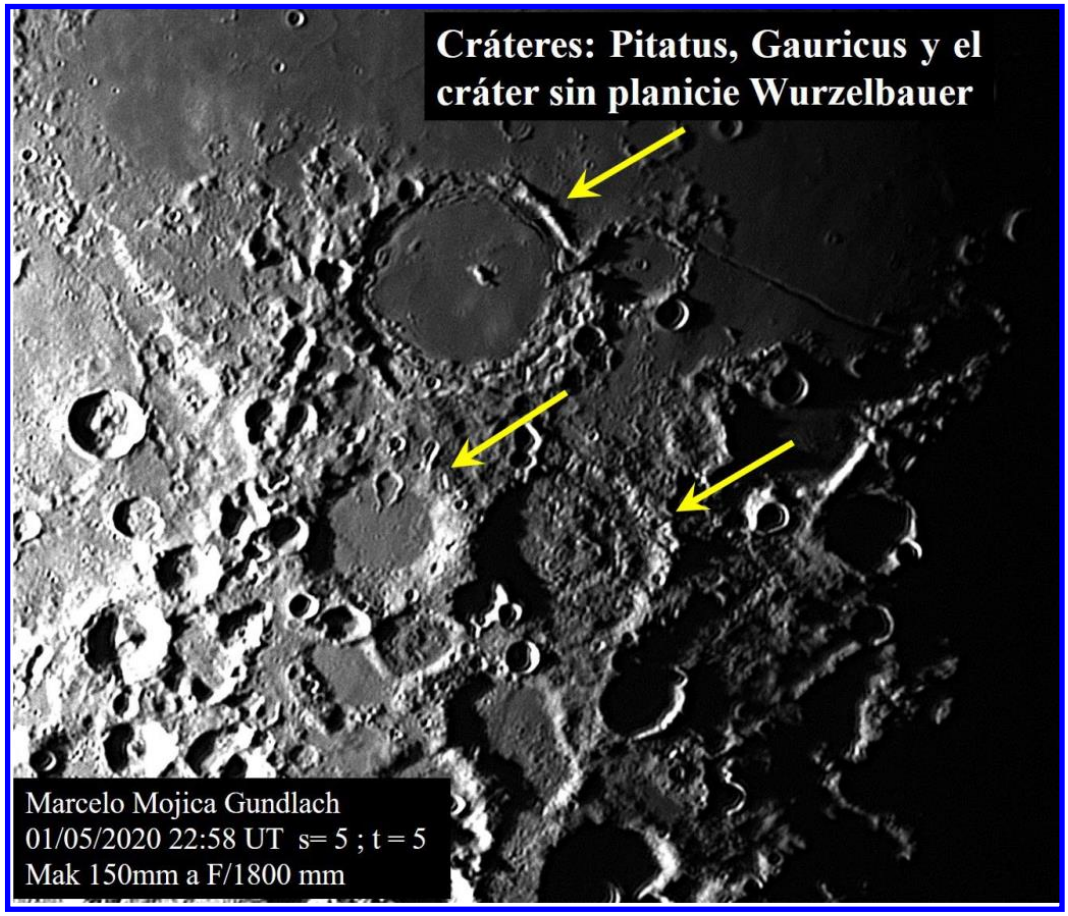
Kies, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2017 April 08 04:05 UT. 8 inch f/20 TEC Maksutov -Cassegrain telescope, 665 nm filter, SKYRIS 445M camera. Seeing 7/10.*

Hesiodus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2010 January 20 04:38 UT. Celestron 14 inch Schmidt-Cassegrain telescope, 2 x barlow, f/2 UVIR blocking filter. Seeing 7/10.*

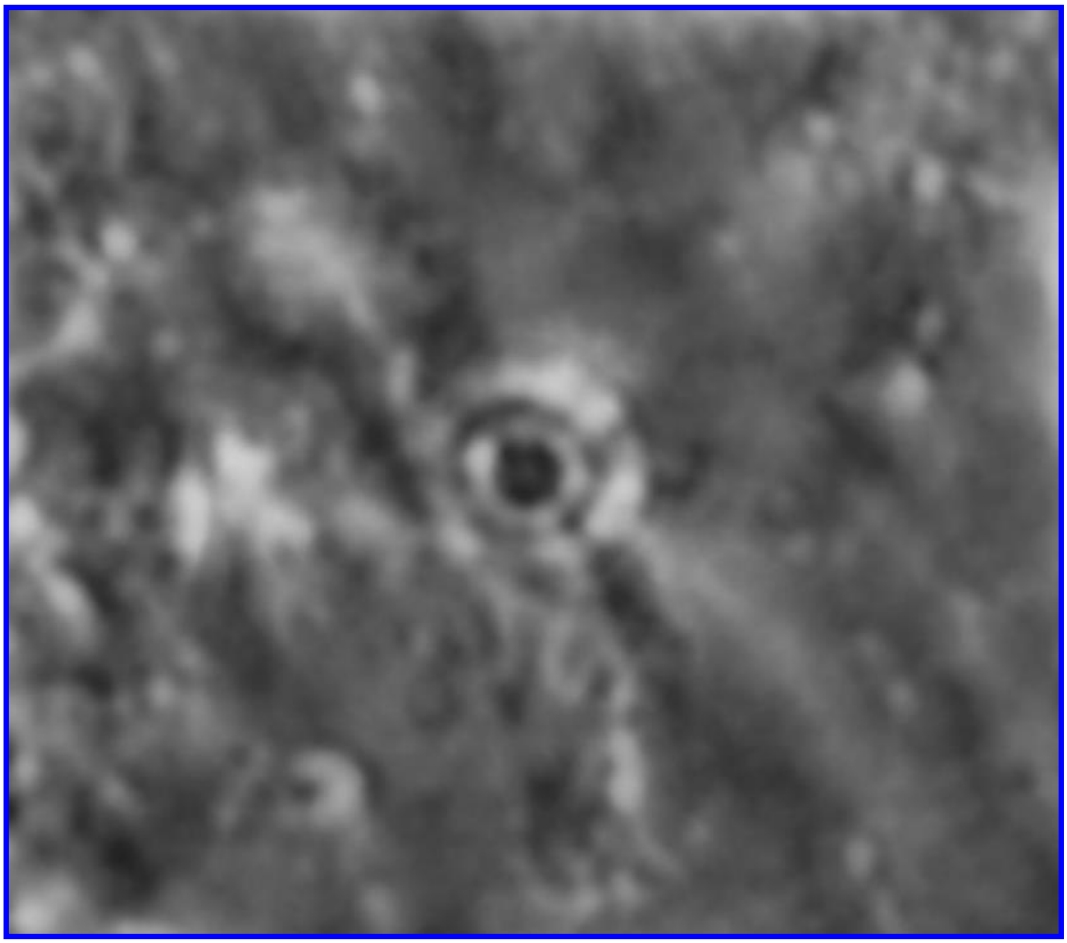
Hesiodus A, *Felix León, Santo Domingo, República Dominicana. 2021 January 23 22:55 UT. 127 mm Maksutov-Cassegrain telescope, DMK21618AU camera. North right, west down.*



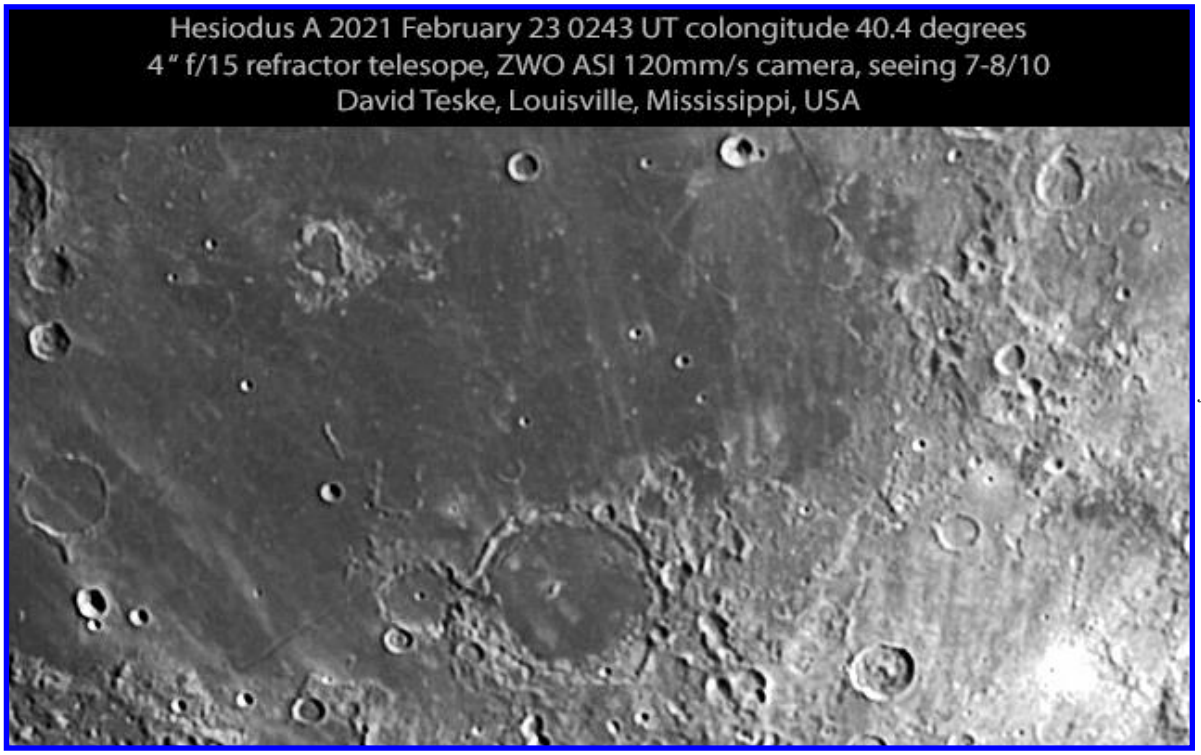
Kies, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2018 April 24 01:55 UT, colongitude 26.3°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*



Hesiodus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 January 05 22:58 UT. 150 mm Sky Watcher Maksutov-Cassegrain telescope, ZWO ASI camera. Seeing 5/10, transparency 5/10. West is to the right.*



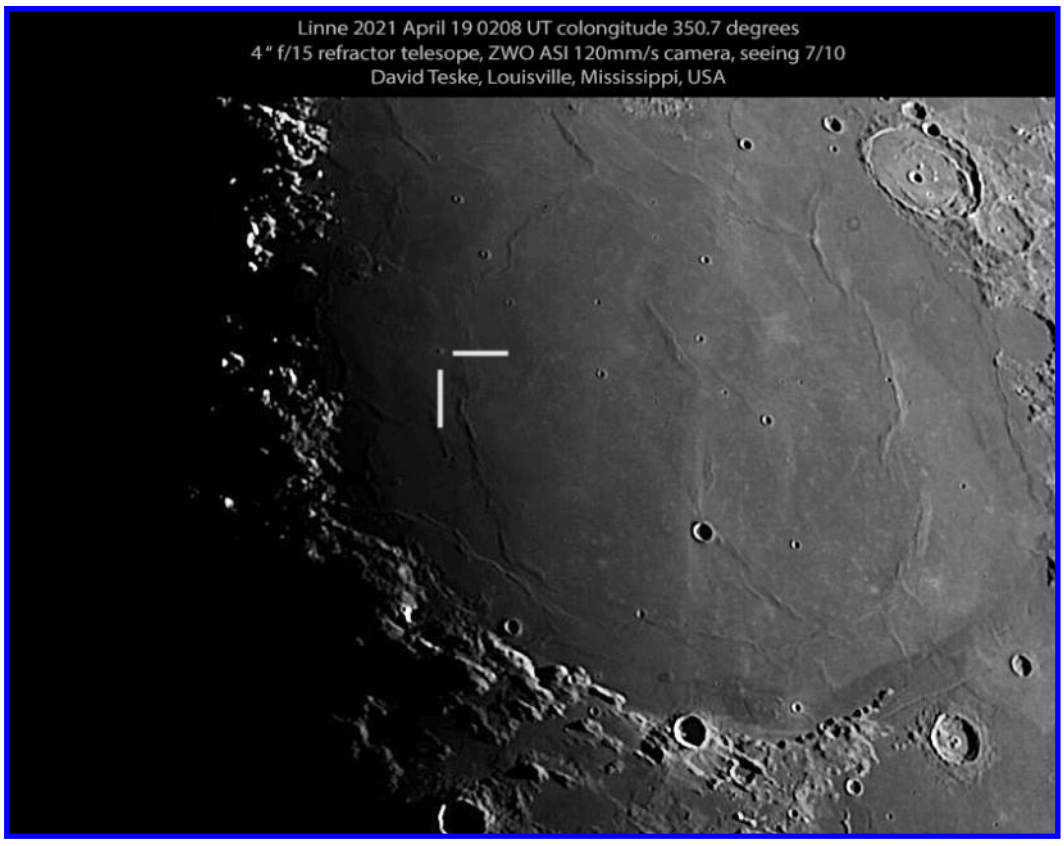
Hesiodus A, *Sergio Babino, Montevideo, Uruguay. 2019 December 05 01:03 UT. 250 mm catadrioptic telescope, ZWO ASI174 mm camera.*



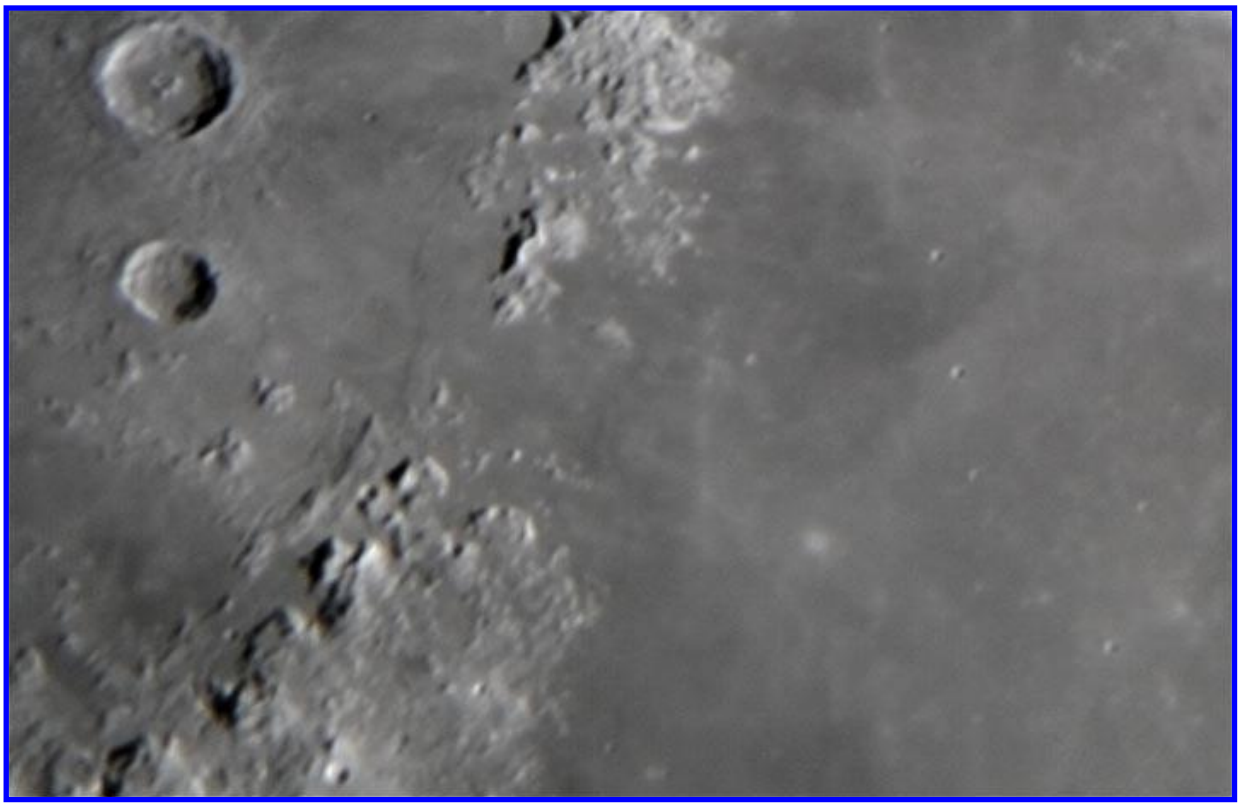
Hesiodus A, *David Teske, Louisville, Mississippi, USA. 2021 February 23 02:43 UT, colongitude 40.4°. 4" f/15 refractor telescope, IR block filter, ZWO ASI120mm/s camera. Seeing 7-8/10.*

LUNAR 82 LINNÉ SMALL CRATER ONCE THOUGHT TO HAVE DISSAPEARED

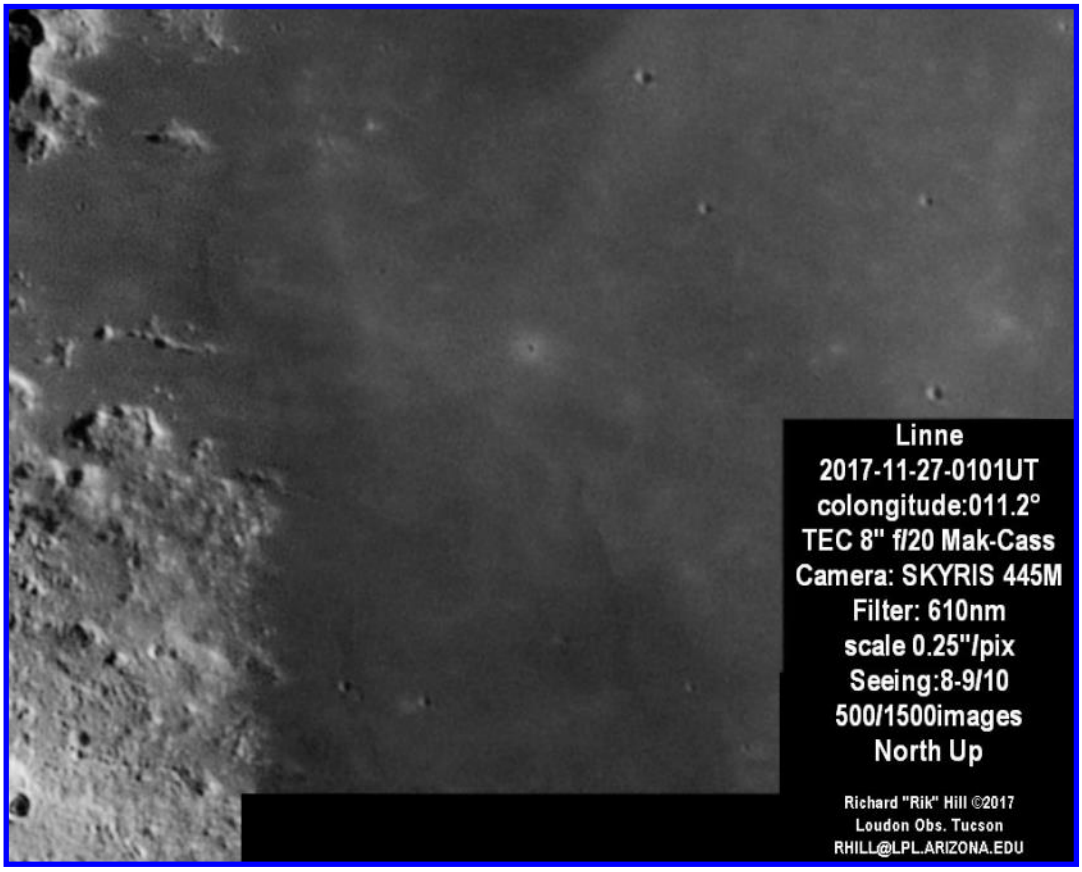
Linné's story is one of the most fascinating in the fascinating history of selenography, a real mystery solved is LUNAR 82: "The vast expanse of Mare Serenitatis contains few craters worthy of prolonged note, but one is notorious for a controversy concerning its very existence. In 1866 the renowned astronomer Julius Schmidt made a startling announcement: a conspicuous crater on the Moon had disappeared! The most authoritative lunar map of the time, published by German astronomers Wilhelm Beer and Johann Mädler in 1837, showed a 10-km-wide, 330-m-deep crater in northwestern Mare Serenitatis called Linné. That map consistent with an 1824 chart made by an earlier German Moon-mapper, Wilhelm G. Lohrmann. But Schmidt had found that Linné was no more, in its place was a brilliant white patch. Schmidt's report caused a sensation, and astronomers (…) once again pointed their telescopes to the Moon. They found that there certainly was no obvious deep crater at Linné's location; in its place was a bright spot that was reported to change in size and visibility. To add to the mystery, a tiny crater pit now lay at the center of the spot (…) A variety of speculations were advanced to explain the purposed changes of Linné, including crater collapse, filling with viscous lava flows, and impact of the meteorite that destroyed the original Linné and created the tiny replacement. Harvard astronomer William H. Pickering even attributed the changes to the bright spot as being due to hoarfrost! (…) "the nature of Linné and its bright spots does change, but the changes are due simply to the angle of the Sun above the crater-a factor that classical selenographers never seemed to adequately appreciate. The crater is a text-book example of a very fresh impact crater, about twice the diameter of Meteor Crater in Arizona" (pages 78-80). The image we chose to illustrate is by David Teske and shows us a lesser-known facet of Linné, most images show us as a bright spot, as Julius Schmidt saw it, Teske's image shows it as what it is near the terminator, an impact crater. It is not often to see the crater Linné and David succeeded.



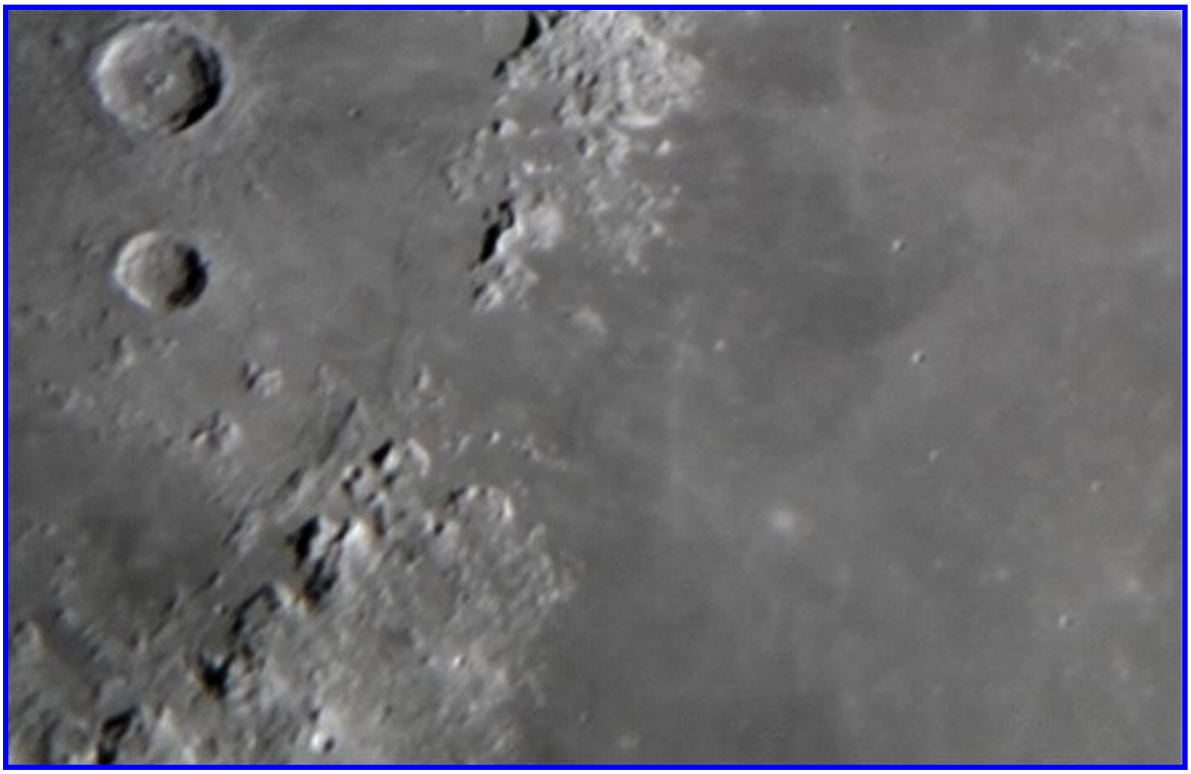
Linné, *David Teske, Louisville, Mississippi, USA. 2021 April 19 02:08 UT, colongitude 350.7°. 4" f/15 refractor telescope, IR block filter, ZWO ASI120mm/s camera. Seeing 7/10.*



Linné, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2015 December 20 02:16 UT. 10 inch Meade LX200 Schmidt-Cassegrain telescope, Canon EOS Digital Rebel XS camera.*



Linné, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2017 November 27 01:01 UT, colongitude 11.2°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8-9/10.*



Linné, *Sergio Babino, Montevideo, Uruguay. 2019 December 05 01:03 UT. 250 mm catadrioptic telescope, ZWO ASI174 mm camera.*

Linné, Desireé Godoy, Oro Verde, Argentina. 2016 October 09 02:55 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, 742 IR-pass filter, QHY5-II camera.

LUNAR 83 PLATO CRATERLETS CRATER PITS AT LIMITS OF DETECTION

"Because the floor possesses a few small impact craters near the detectability limits with small telescopes, there have been unacknowledged contest to detect the largest number of craters. Harvard astronomy professor W. H. Pickering apparently won in 1892 by announcing his mapping of 71 spots on Plato's floor. Comparison of these old maps of floor details with very high-resolution photographs obtained by the Orbiter IV spacecraft in 1967 demonstrates that the observers did detect the largest four craters and some of the others but that their estimates of sizes, locations and numbers were often seriously in error. Because many 19th-century observers believed the changes occurred frequently on the Moon, the inevitable differences between depictions of Plato's floor by experienced observers were often attributed to real physical variations rather than to the difficulties of interpreting features at the threshold of visibility" (page 35). Plato craterlets are a true test for observation and instrumentation, Rik Hill's image illustrating LUNAR 83 shows the floor of Plato and its craterlets with a hard-to-find degree of precision.

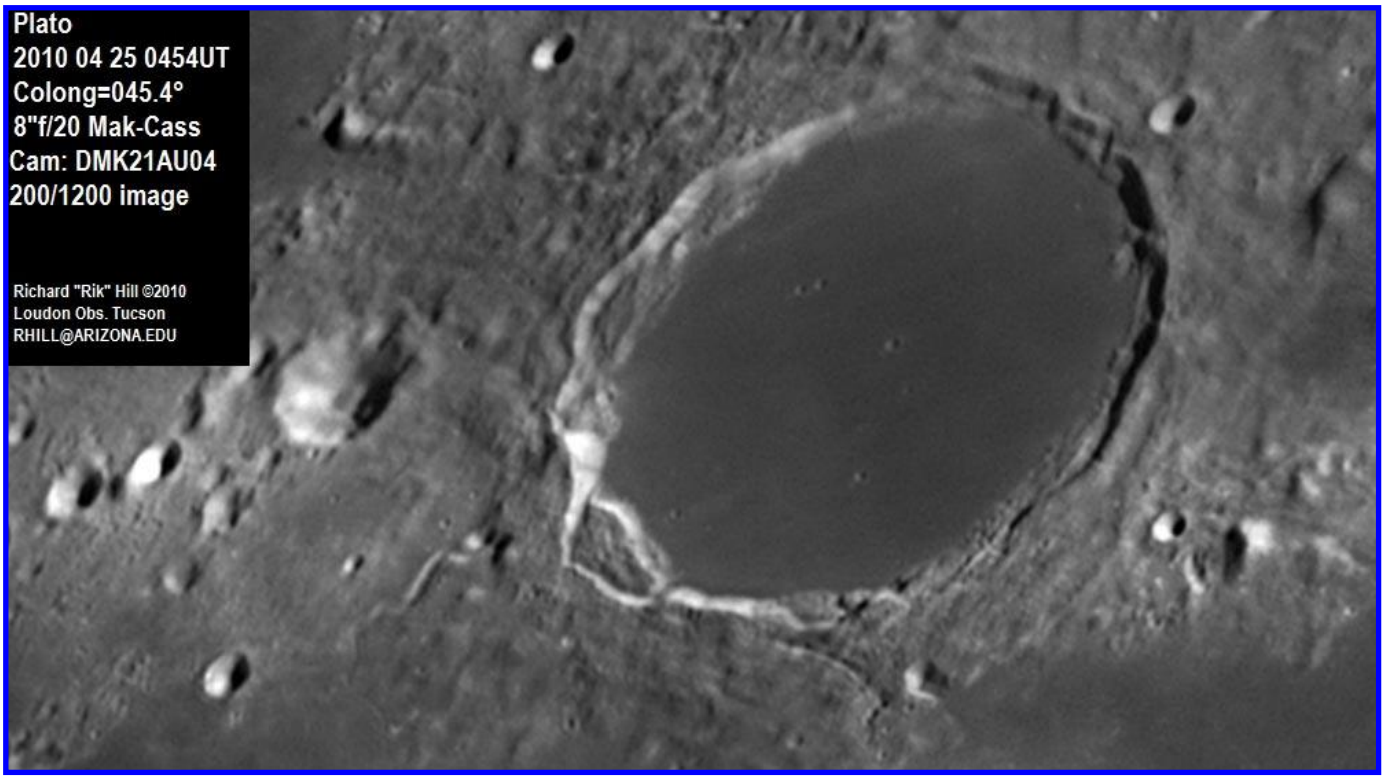
Plato Craterlets, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2010 January 26 03:54 UT. Celestron 14 inch Schmidt-Cassegrain telescope, 2 x barlow, f/2 UVIR blocking filter, DMK21AU04 camera. Seeing 8/10.*

Platonic Musings

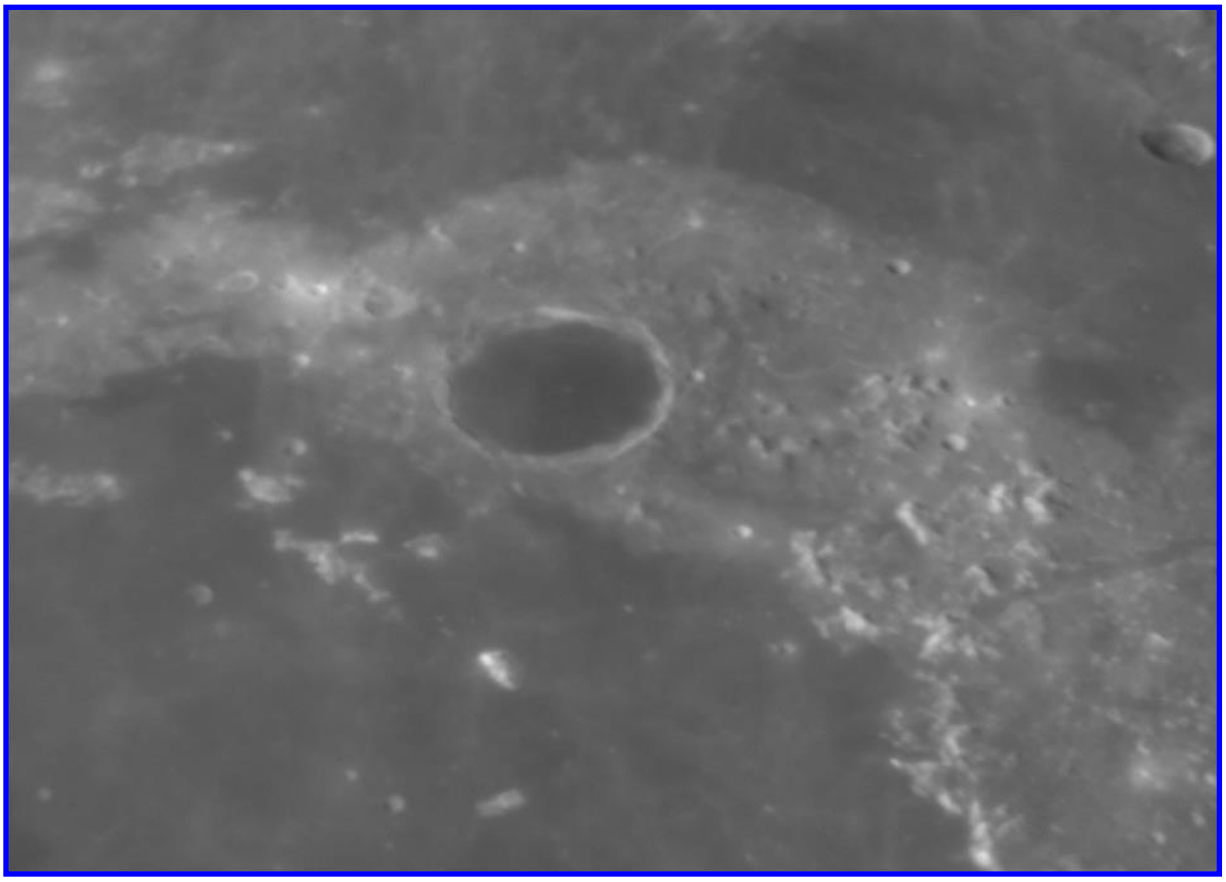
Rik Hill

Her is an image from the archive. Plato is a large "ringed plain" crater some 14 km in diameter. It's one of the first features that new lunar observers learn. It sits between Mare Frigoris and Mare Imbrium just north on Montes Teneriffe and Mons Pico. On the floor of Plato are the elusive "craterlets" of Plato. The ones seen in this image are from 2-2.5 km in diameter. They are difficult to see because the lighting has to be just so for them to be easily seen. This is the best view I ever got of the craterlets on the floor of Plato and one of the few nights at my place where the C14 beat the TEC 8" f/20.

Off to the left of Plato is the oddly shaped Plato A (22 km), a banded crater also known as Bliss. It is a shallow crater probably older than Plato and filled with ejecta from the Plato impact event. Note the unnamed rimae below Plato. The more resolution you have the more you see.

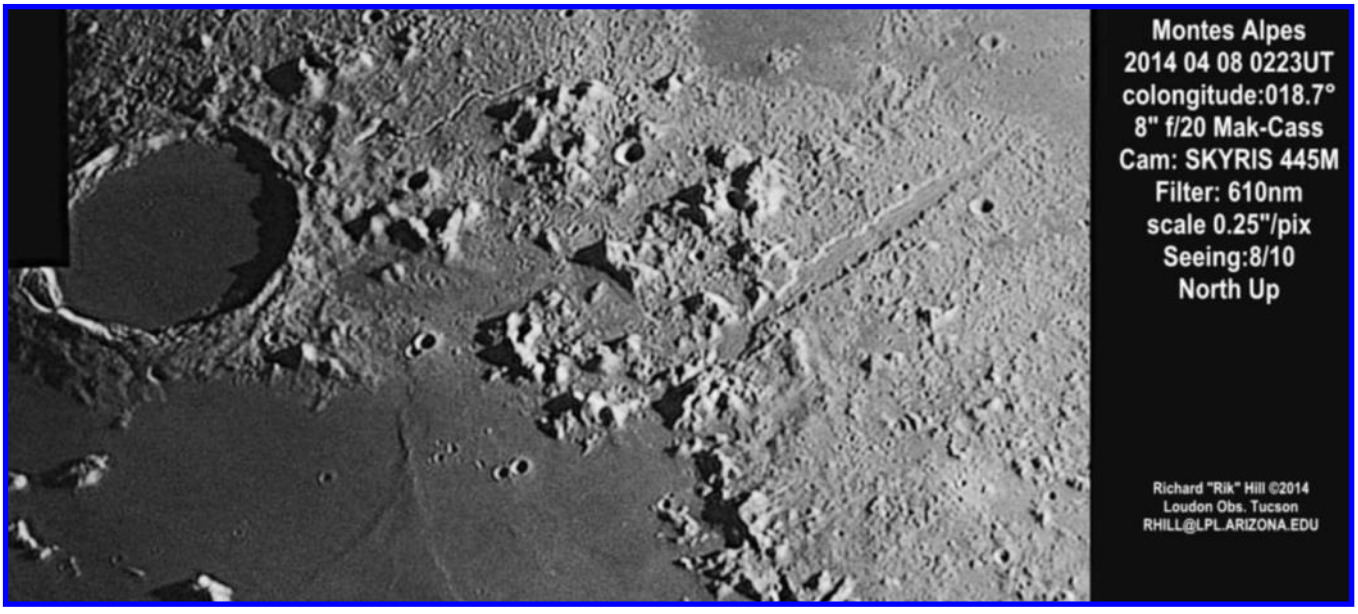


Plato Craterlets, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2010 April 25 04:54 UT, colongitude 45.4°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, DMK21AU04 camera.*



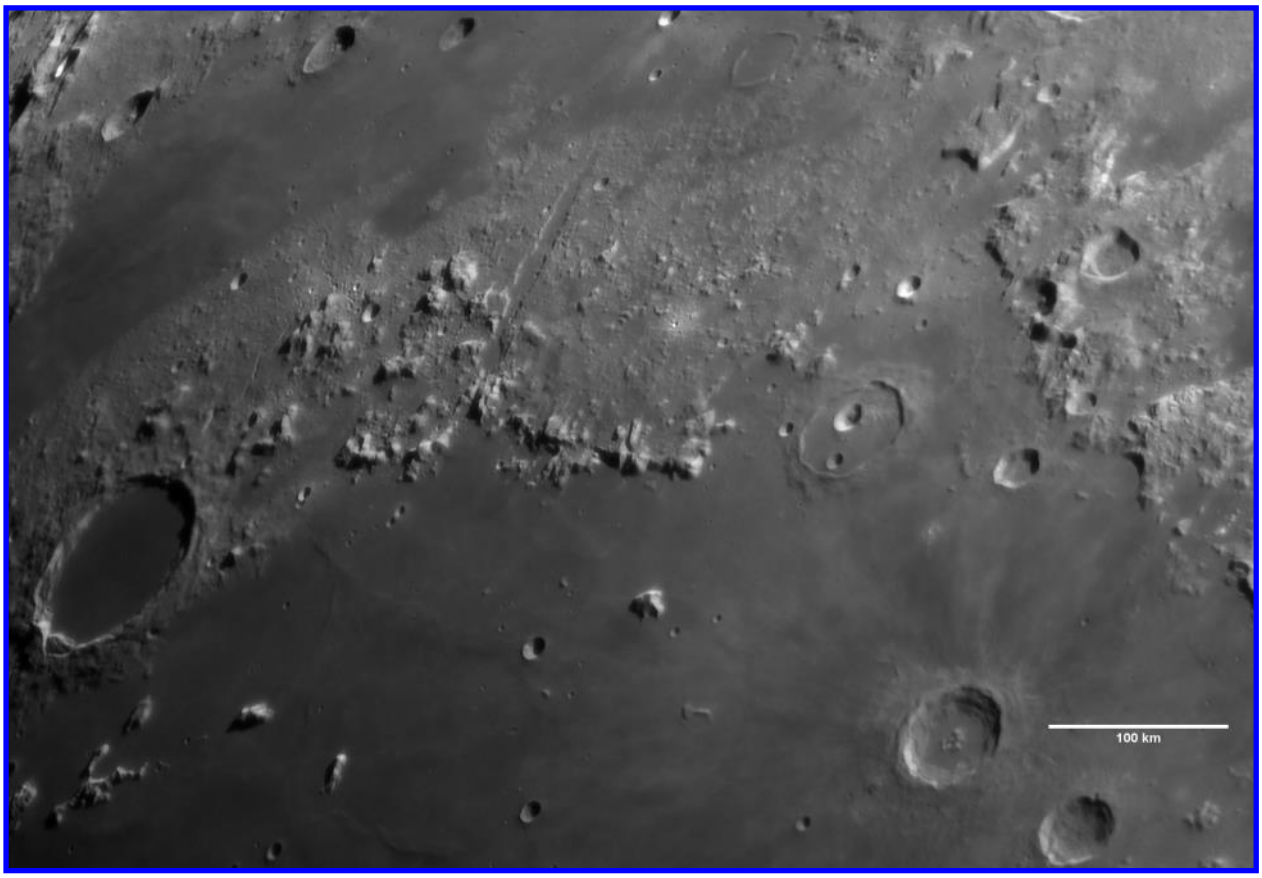
Plato, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 August 14 04:02 UT. Celestron 130 mm Astro-master Newtonian reflector telescope, Astronomik ProPlanet 742 nm IR-pass filter, QHY5-II camera.*

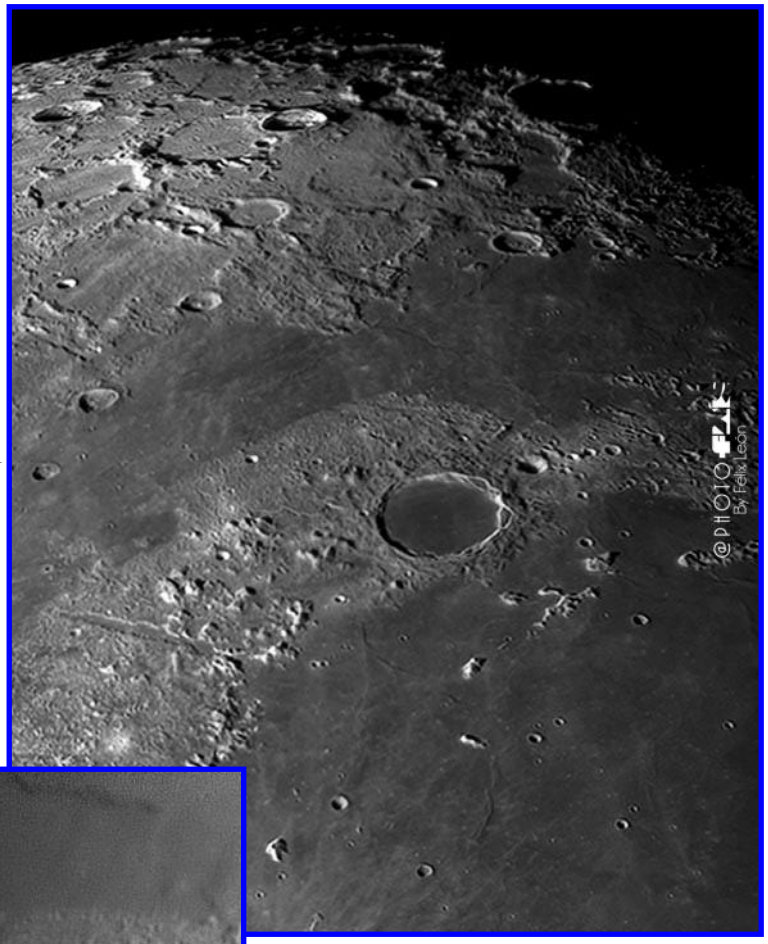
Montes Alpes, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2014 April 08 02:23 UT, colongitude 18.7°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*



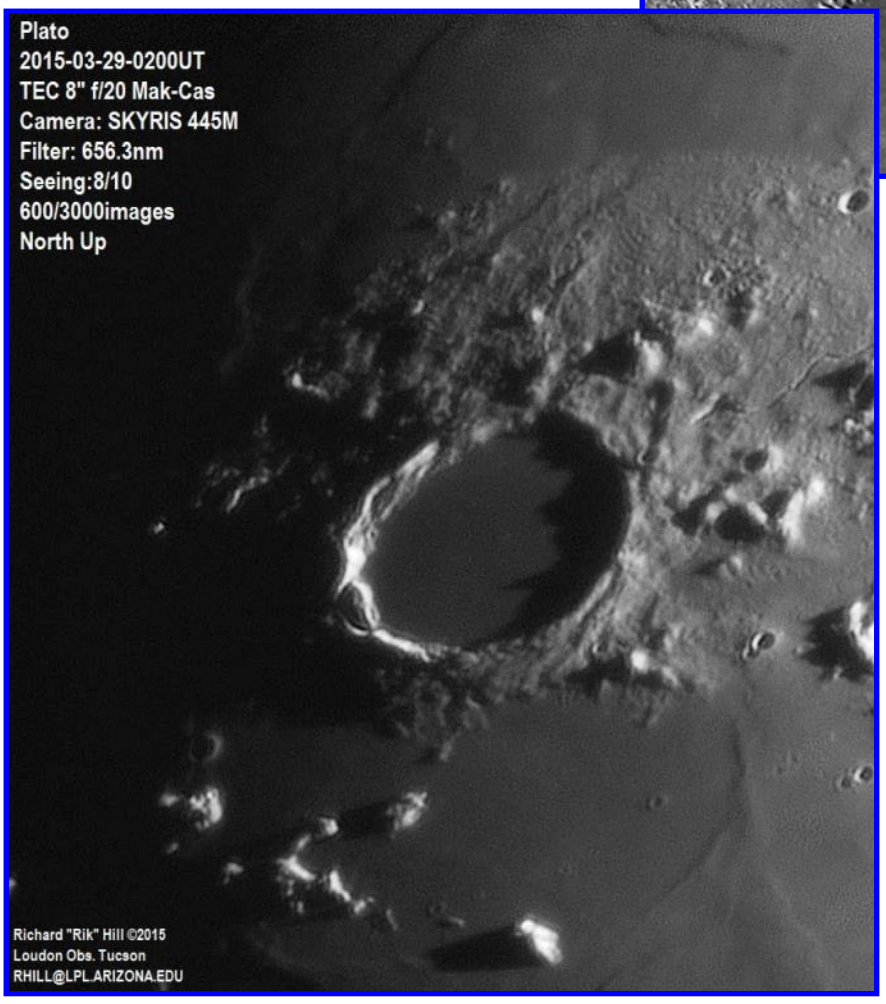
Plato Region, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2013 February 20 01:25 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, DMK21AU04 camera. Seeing 8/10.*

Plato, *Ariel Cappelletti, Córdoba, Argentina, SLA . 2020 June 02 23:10 UT. 254 mm Newtonian reflector telescope, ZWO ASI178 mc camera.*

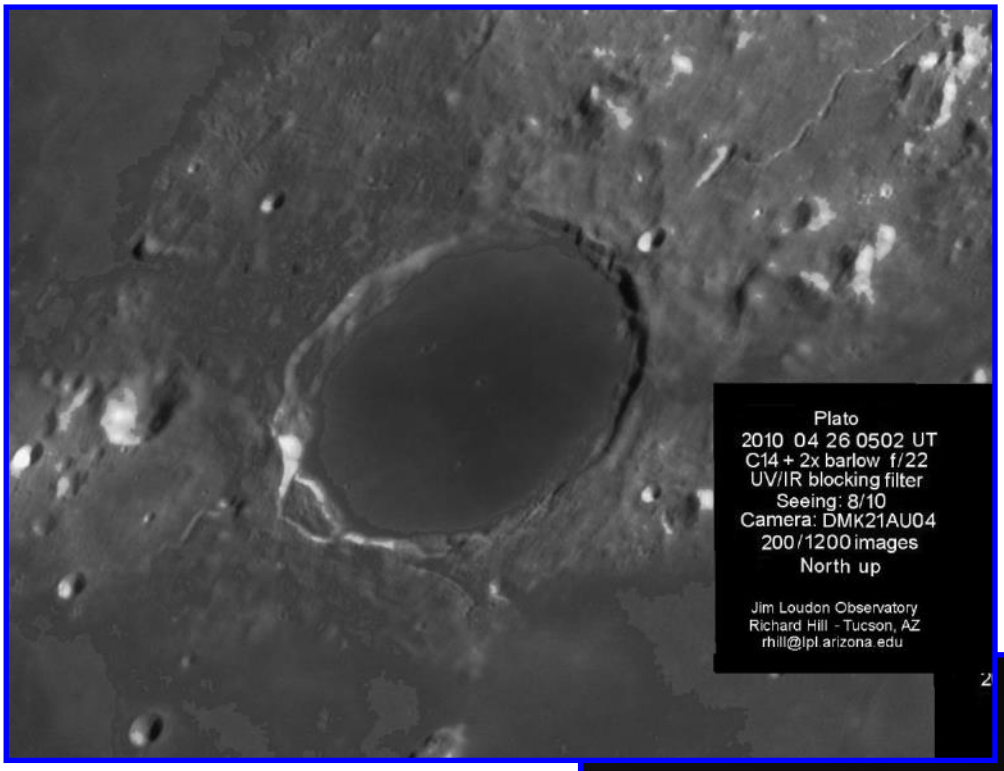




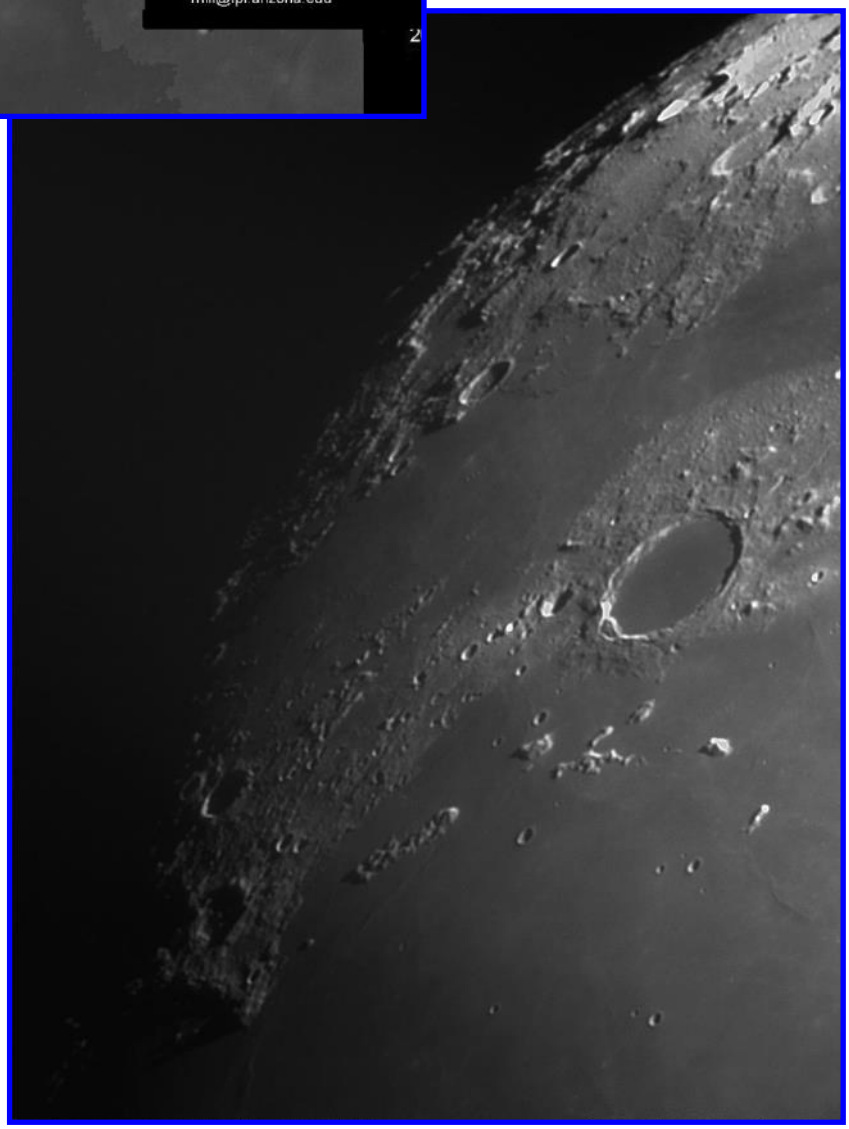
Plato, *Felix León, Santo Domingo, República Dominicana. 2021 January 23 22:25 UT. 127 mm Maksutov-Cassegrain telescope, DMK21618AU camera. North up, west right.*



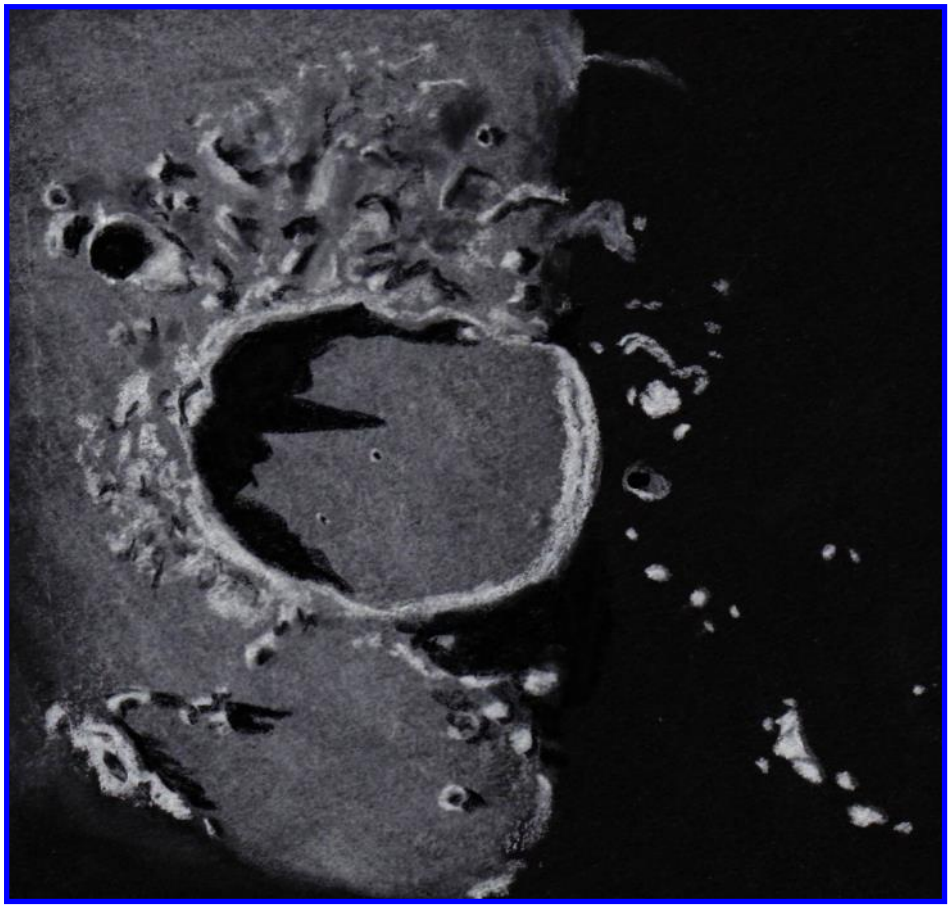
Plato, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2015 March 29 02:00 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera. Seeing 8/10.*



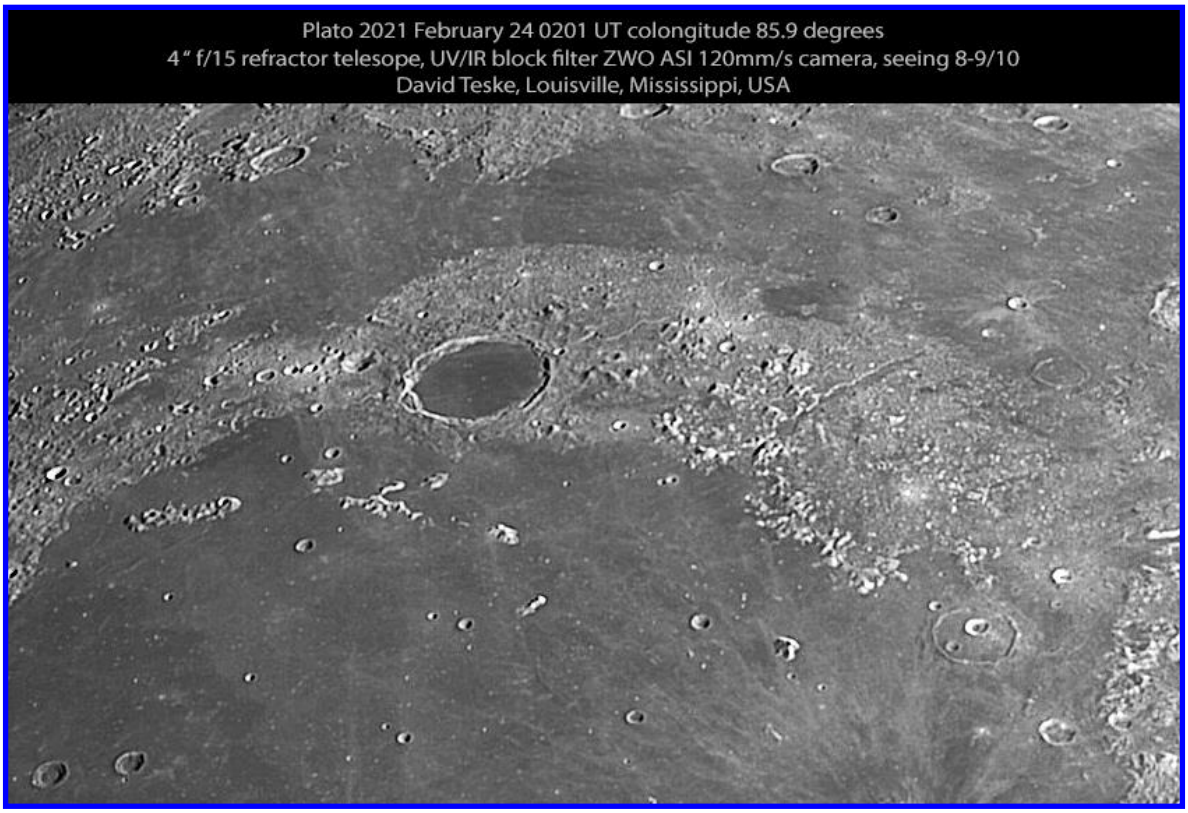
Plato, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2010 April 26 05:02 UT. 14 inch Schmidt-Cassegrain telescope, 2x barlow, f/22, UV/IR blocking filter, DMK21AU04 camera. Seeing 8/10.*



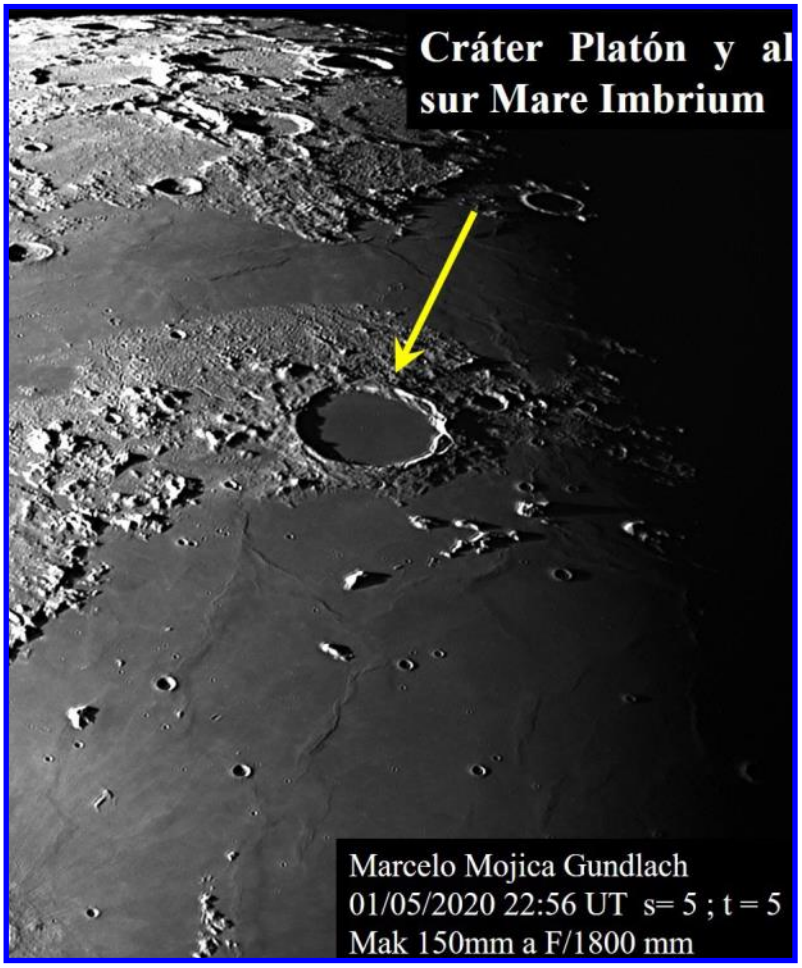
Plato, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2018 July 22 23:46 UT. 150 mm refractor telescope, Orion V-block filter, SWO CMOS camera.*



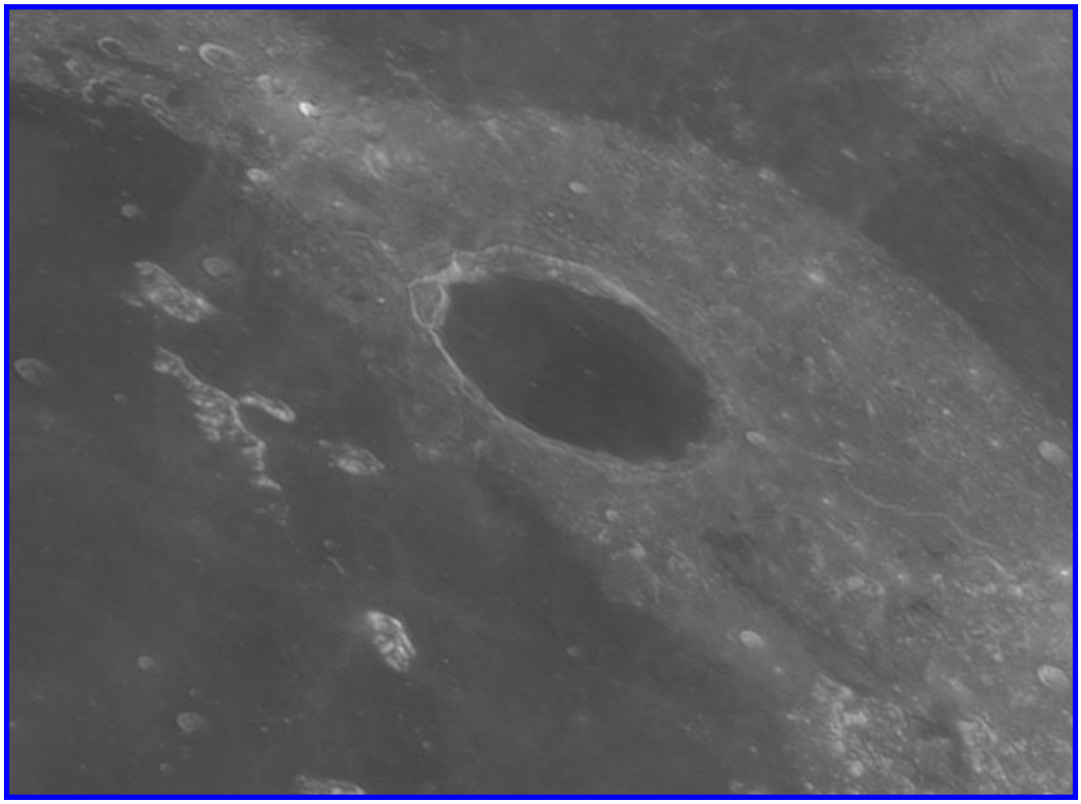
Plato Craterlets, *Michel Deconinck, Aquarellia Observatory - Artignosc-sur-Verdon - Provence - France. 2017 July 06 03:35 UT. 250 mm Takahashi Mewlon Dall Kirkham telescope, f/10, 13 mm Ethos eye-piece.*



Plato, *David Teske, Louisville, Mississippi, USA. 2021 February 24 02:01 UT, co-longitude 85.9°. 4" f/15 refractor telescope, IR block filter, ZWO ASI120mm/s camera. Seeing 8-9/10.*



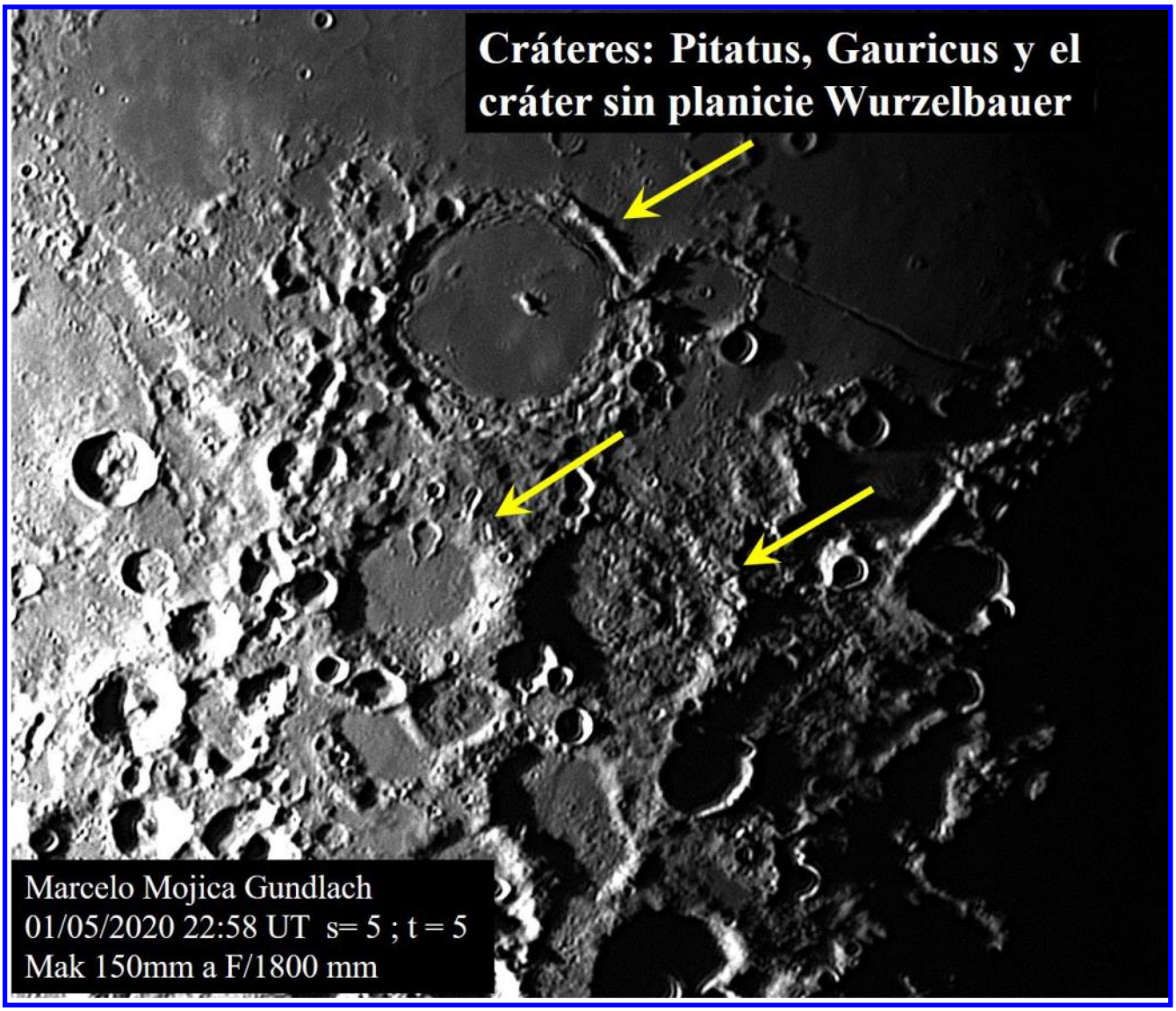
Plato, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 May 01 22:56 UT. 150 mm refractor telescope, Orion V-block filter, SWO CMOS camera. West is to the right.*



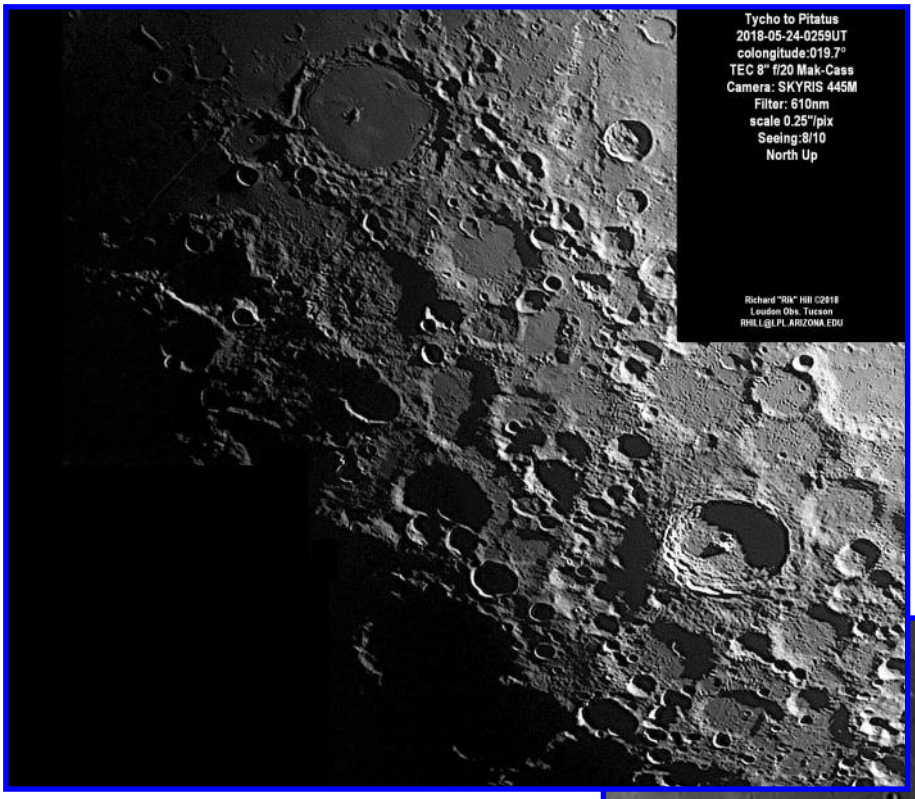
Plato, *Alberto Anunziato, Oro Verde, Argentina. 2016 June 19 05:22 UT. Meade 10 inch LX200 Schmidt-Cassegrain telescope, Astronomik Pro-Planet 742 nm IR-pass filter, QHY5-II camera.*

LUNAR 84 PITATUS CRATER WITH CONCENTRIC RILLES

For Charles Wood the landscape of Pitatus appears in these words: "the Eastern part of the rille appears to be outlined by whitish deposits and that its northwestern portion appears to crack a low rise. Lunar Orbiter photographs show that a series of rilles encircle the entire floor and that tiny rilles connect the peak to southwestern and southeastern rims. Clearly volcanism filled Pitatus and made the rilles. The white rille rims could be sulfur or other volcanic emanations like those that sometimes occur along lava channels in Hawaii" (pages 147/148). We chose the image of Marcelo Mojica to illustrate LUNAR 84 because it beautifully shows the rilles that Wood mentions and that surely motivated the inclusion of Pitatus in the Lunar 100 list.



Pitatus, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 January 05 22:58 UT. 150 mm Sky Watcher Maksutov-Cassegrain telescope, ZWO ASI camera. Seeing 5/5, transparency 5/6. West is to the right.*



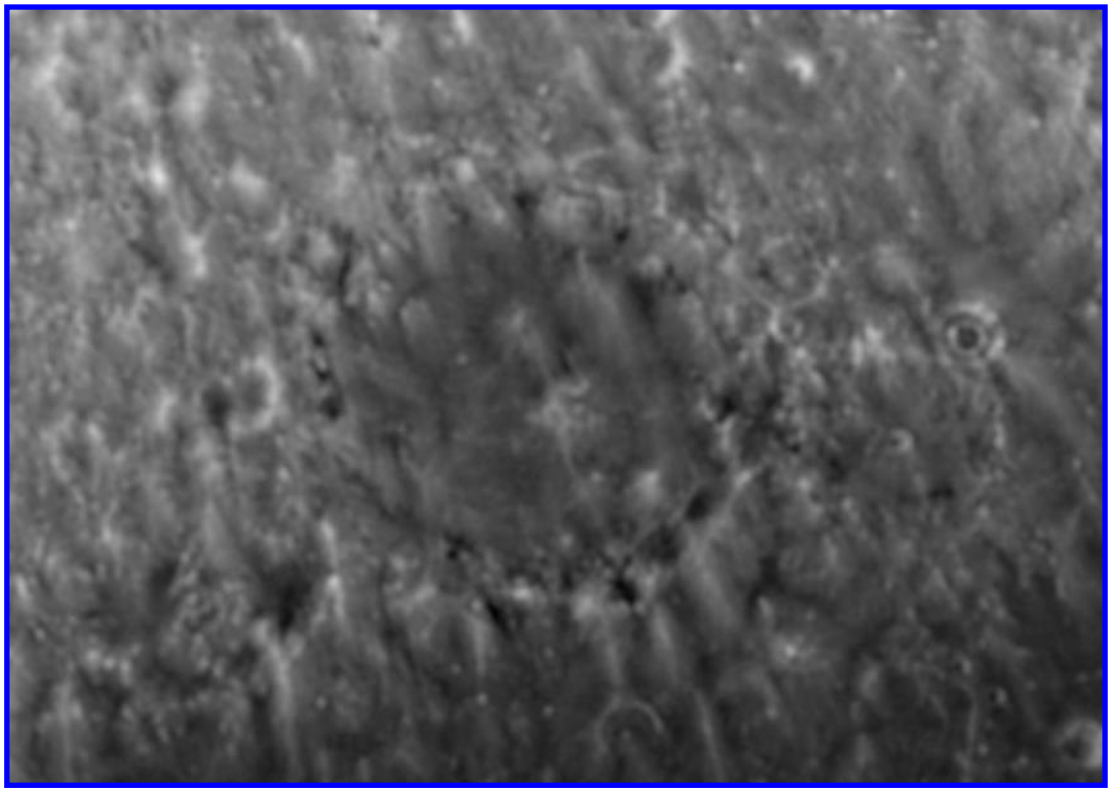
Tycho to Pitatus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2018 May 24 02:59 UT, colongitude 19.7°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Pitatus, *David Teske, Louisville, Mississippi, USA. 2020 December 08 11:13 UT, colongitude 188.1°. 4" f/15 refractor telescope, IR block filter, ZWO ASI120mm/s camera. Seeing 8/10.*

Pitatus, *Felix León, Santo Domingo, República Dominicana. 2021 January 23 22:55 UT. 127 mm Maksutov-Cassegrain telescope, DMK21618AU camera. North right, west down.*

Pitatus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 February 22 01:56 UT, colongitude 21.2°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 132M camera. Seeing 8/10.*

Pitatus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2007 September 04 11:02 UT. 14 inch Schmidt-Cassegrain telescope, UV/IR blocking filter, SPC900NC camera. Seeing 6/10.*

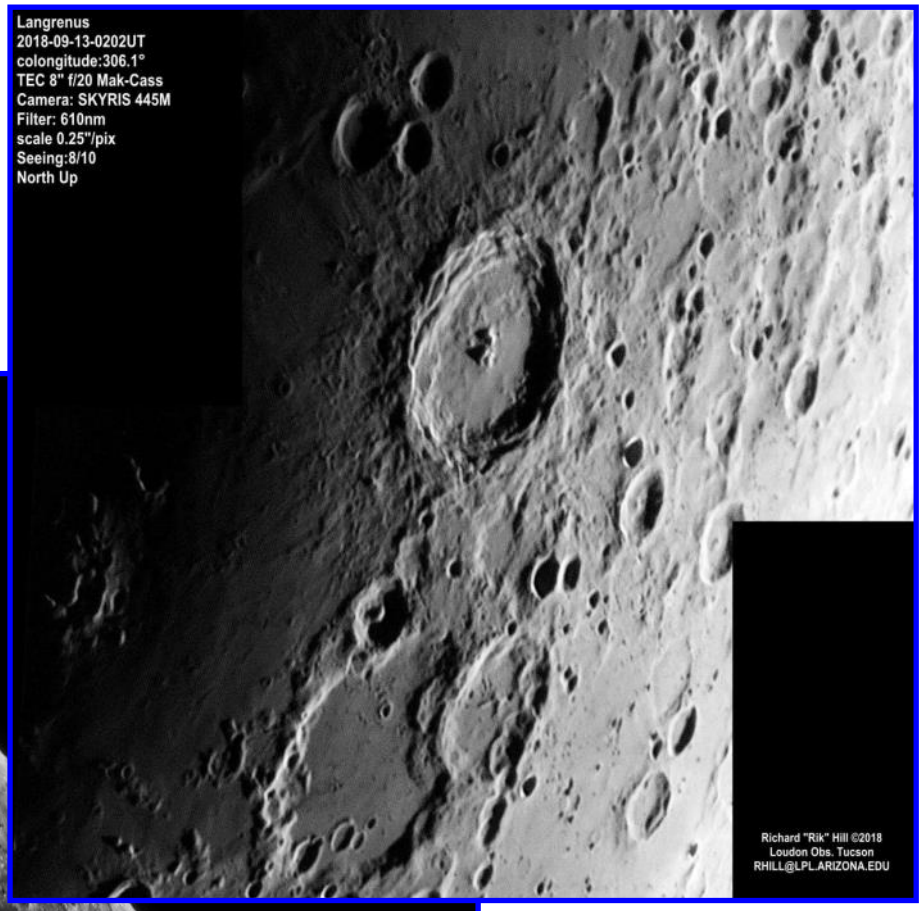


Pitatus, *Sergio Babino, Montevideo, Uruguay, SAO-LIADA. 2019 December 05 01:03 UT. 250 mm catadrioptic telescope, ZWO ASI174 mm camera.*

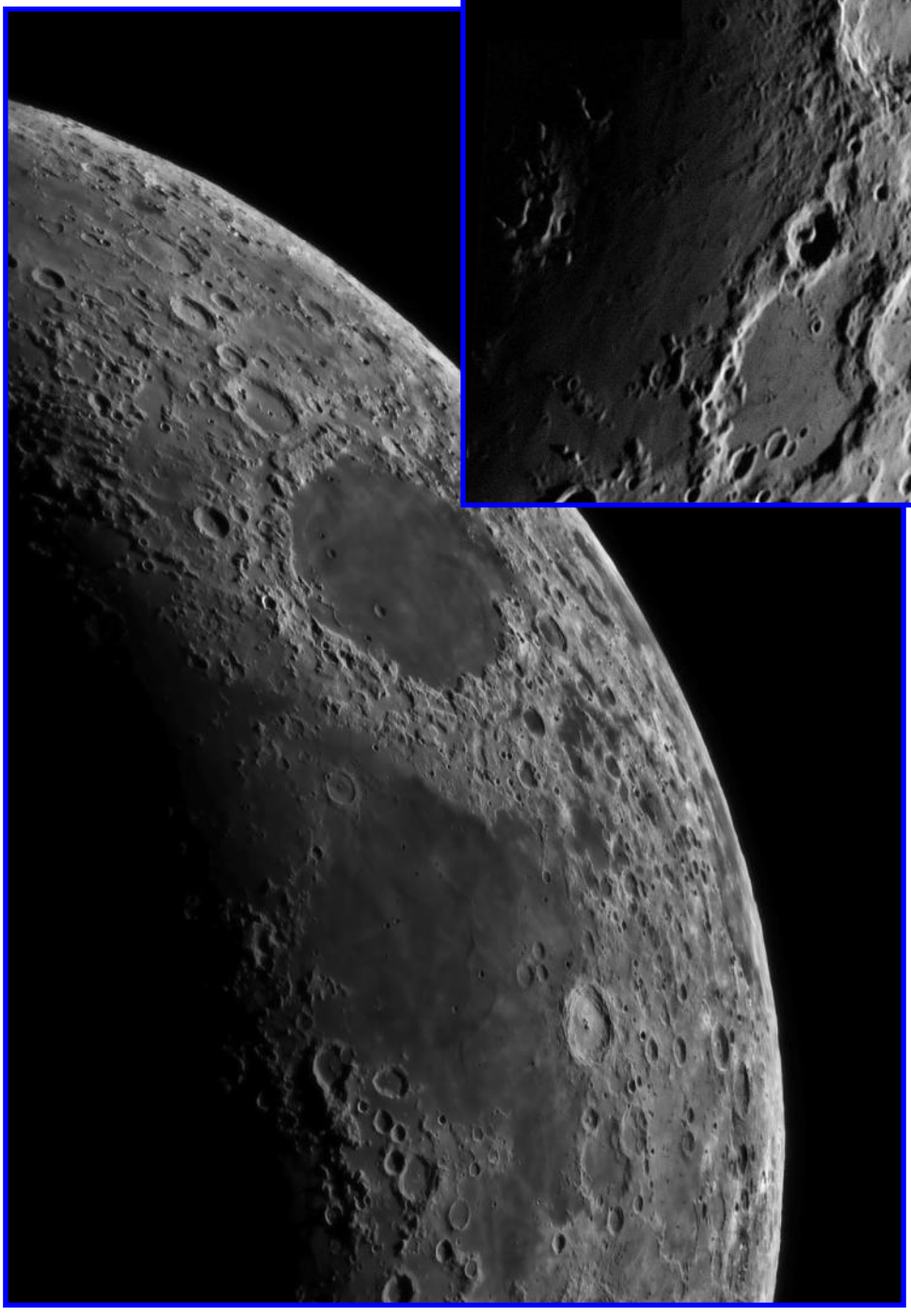
LUNAR 85 LANGRENUS RAYS

Charles Wood has included Langrenus, a crater with many characteristics that make it one of the most interesting on the Moon, due to its not so bright and not very old rays, rays from the Eratosthenian period: "Langrenus (132 km) is a glorious crater whose secondary craters gouge the surrounding mare. These secondaries and a prominent ray system led to Langrenus being classified as Copernican in age…. Because Copernican-age craters are defined as being younger than the mare lavas, some of the nearly grand craters have been reclassified as Eratosthenian-they've passed their prime and are beginning the long process of erosional decay" (page 109). We chose the image of Desireé Godoy because it shows very clearly that ancient, but spectacular, system of bright rays.

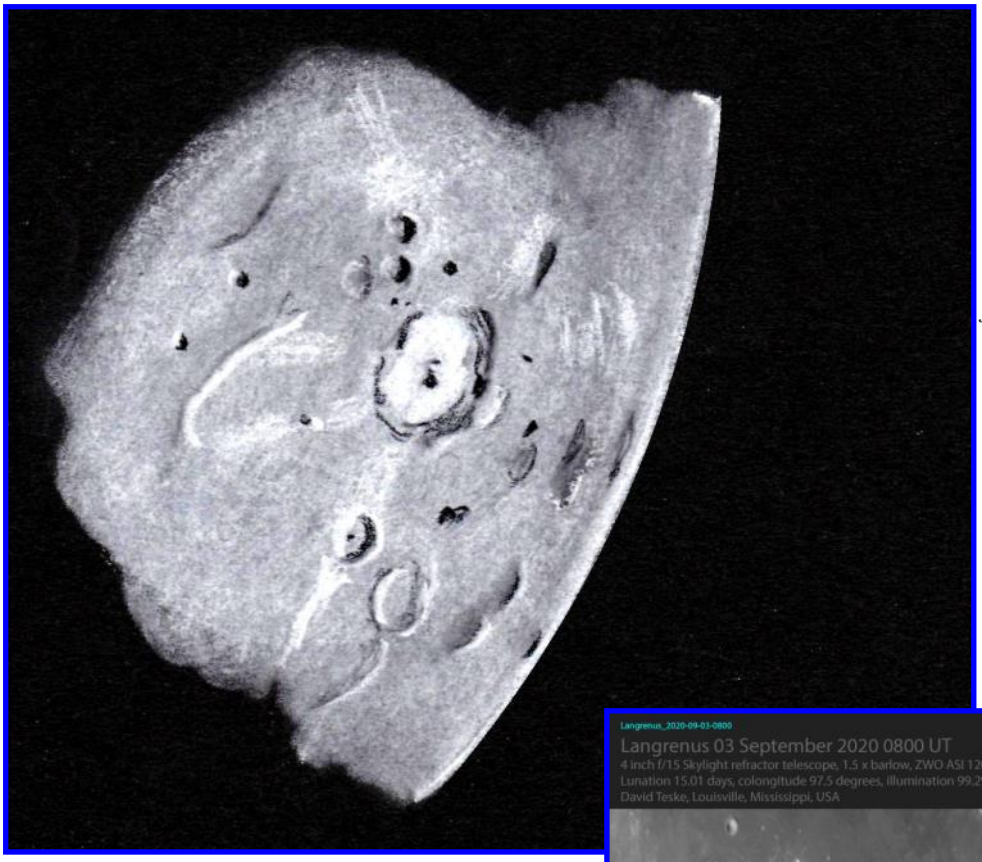
Langrenus, Desireé Godoy, Oro Verde, Argentina. 2019 November 08 01:20 UT. 200 mm reflector telescope, QHY5-LII-M camera.



Langrenus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2018 September 13 02:02 UT, colongitude 306.1°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*



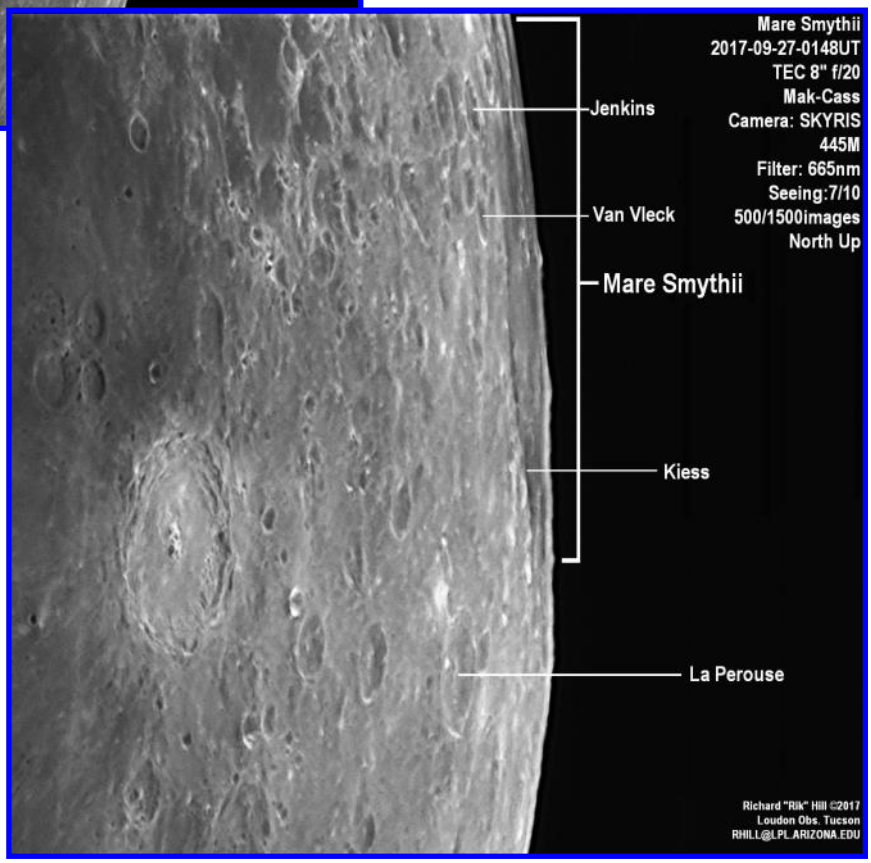
Langrenus, *Sergio Babino, Montevideo, Uruguay, SAO-LIADA. 2018 October 13 22:24 UT. 203 mm catadrioptic telescope, ZWO ASI174 mm camera.*



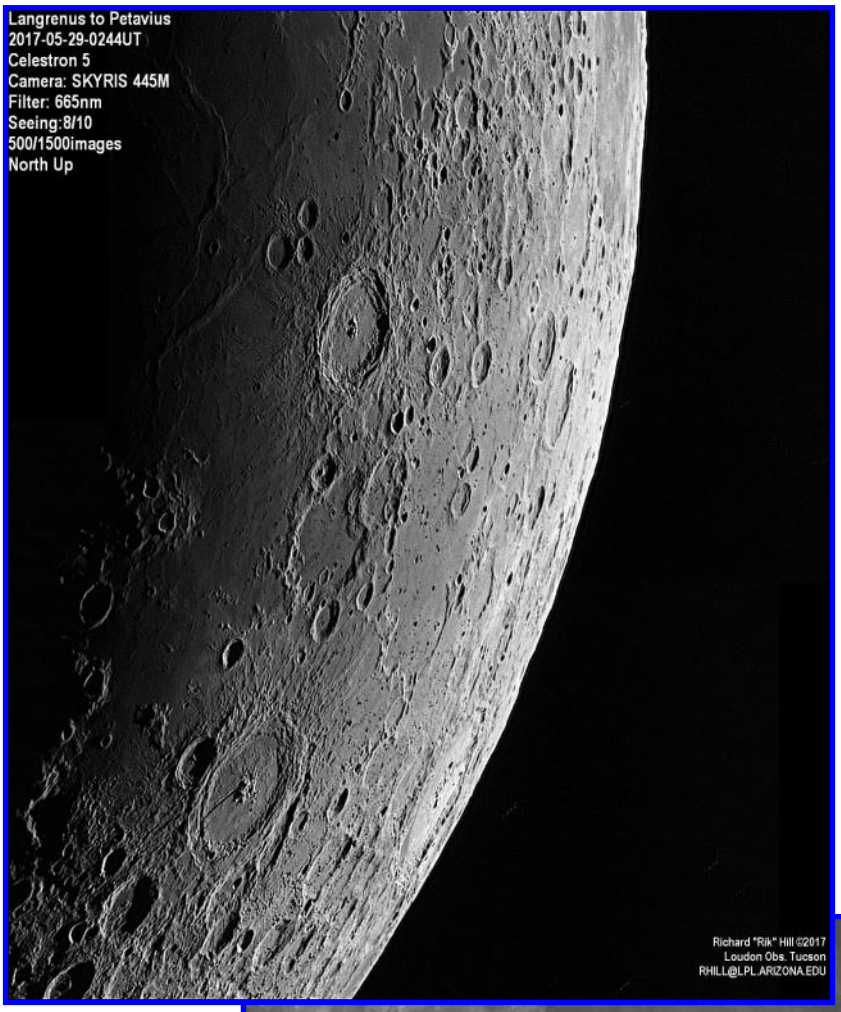
Langrenus Rays, *Michel Deconinck, Aquarellia Observatory - Artignosc-sur-Verdon - Provence - France. 2014 August 19 18:45 UT. 102/1000 mm Bressler refractor telescope, 10 mm Delos eyepiece.*

Langrenus, *David Teske, Louisville, Mississippi, USA. 2020 September 03 08:00 UT, colongitude 97.5°. 4" f/15 refractor telescope, 1.5 x barlow, IR block filter, ZWO ASI120mm/s camera. Seeing 8/10.*

Langrenus, Desireé Godoy, Oro Verde, Argentina. 2019 November 08 01:28 UT. 200 mm reflector telescope, QHY5-LII-M camera.



Mare Smythii, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2017 September 27 01:48 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 665 nm filter, SKYRIS 445M camera. Seeing 7/10.*



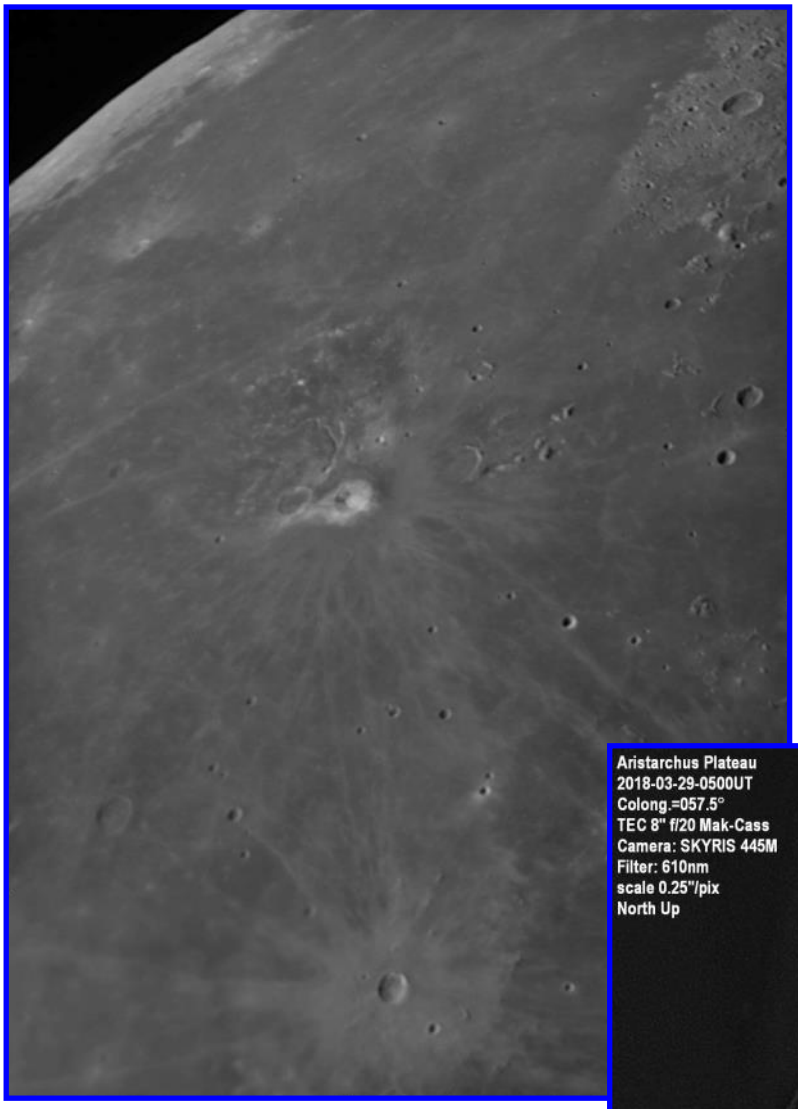
Langrenus to Petavius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2017 May 29 02:44 UT. Celestron 5 inch Schmidt-Cassegrain telescope, 665 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Langrenus, Desireé Godoy, Oro Verde, Argentina. 2016 September 11 00:50 UT. Celestron 11 inch Edge HD Schmidt-Cassegrain telescope, QHY5-II camera.

LUNAR 86 PRINZ RILLES RILLE SYSTEM NEAR THE CRATER PRINZ

"These four large sinuous rilles are miniature versions of Schröter's Valley-beginning with a broad Cobra Head-like depression (just barely visible in a 6-inch telescope) that wiggles away downhill from its source. I propose that the Harbinger Mountains are an uplifted area of older, pre-Imbrian rocks. The uplift tilted Prinz, allowing lavas to flood in. And the cause of the uplift? The rise of a large pond of magma that ultimately escaped to the surface, forming the rilles" (page 169). The Rik Hill image shows the sinuous Prinz rilles with great precision, which is the reason why we chose it as the most representative, and also shows what is perhaps the most interesting geological panorama of the visible side of the Moon.

Aristarchus Plateau, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 February 24 04:55 UT, colongitude 56.6°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 132M camera. Seeing 7/10.*



Prinz Rilles, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 April 30 05:38 UT. 10 inch Meade LX200 Schmidt-Cassegrain telescope, QHY5-II camera.*

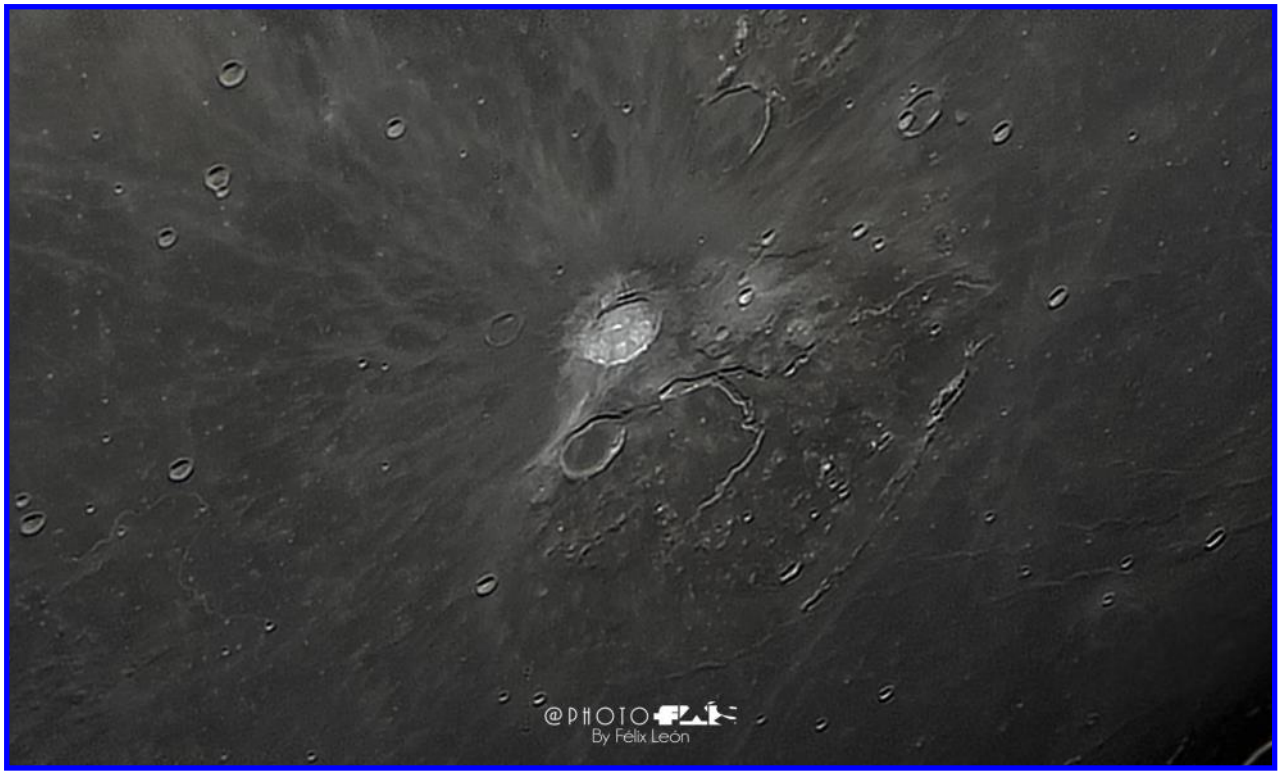
Aristarchus Plateau, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2018 March 29 05:00 UT, colongitude 57.5°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera.*

Aristarchus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2015 September 26 04:33 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera. Seeing 7/10.*

Prinz Rilles, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 December 11 03:17 UT. 10 inch Meade LX200 Schmidt-Cassegrain telescope, Astronomik Pro-Planet 742 nm IR-pass filter, QHY5-II camera.*

Aristarchus Plateau, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2015 February 02 04:12 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Prinz Rilles, *Sergio Babino, Montevideo, Uruguay, SAO-LIADA. 2020 April 08 00:16 UT. 203 mm catadrioptic telescope, ZWO ASI174 mm camera.*

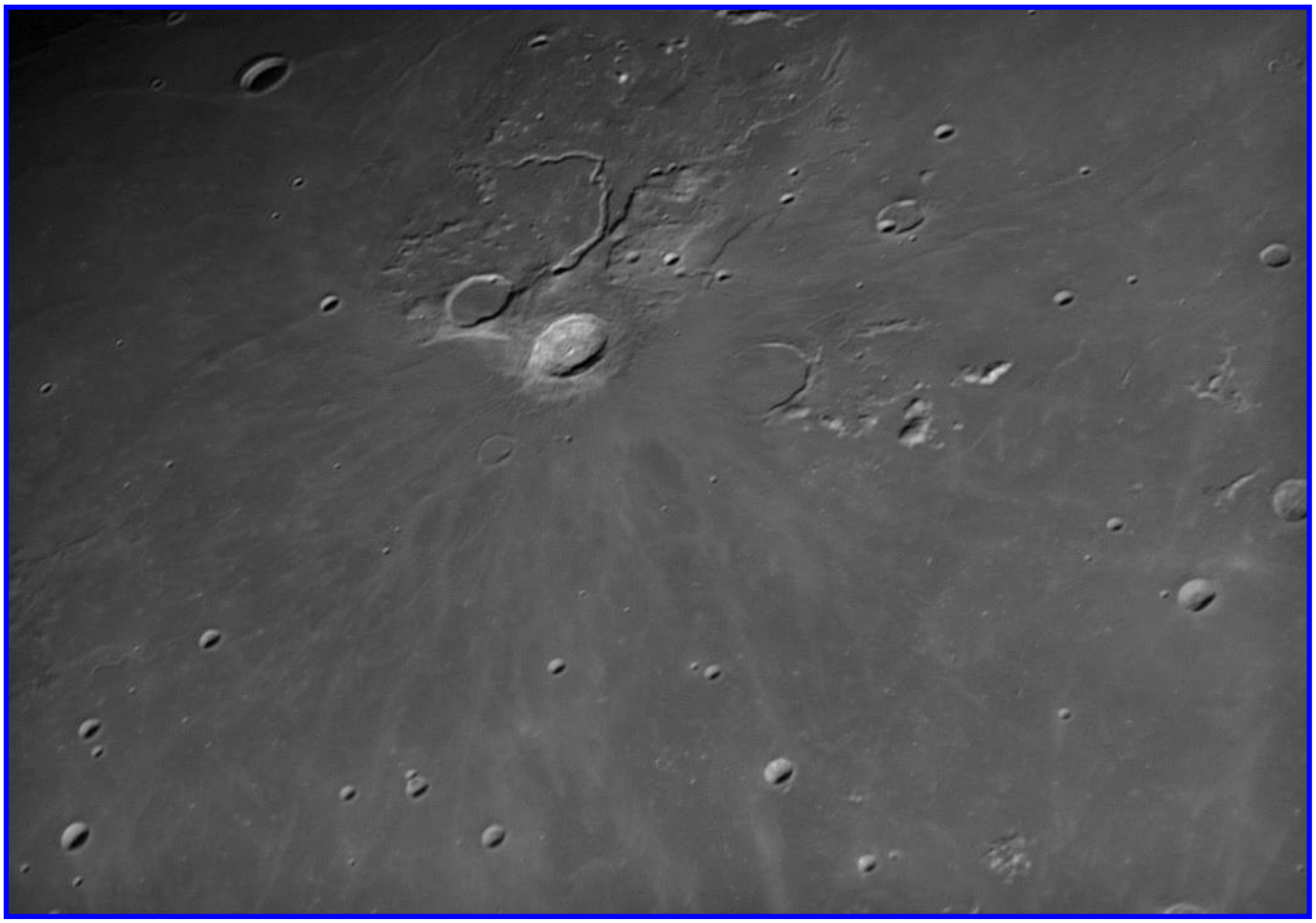


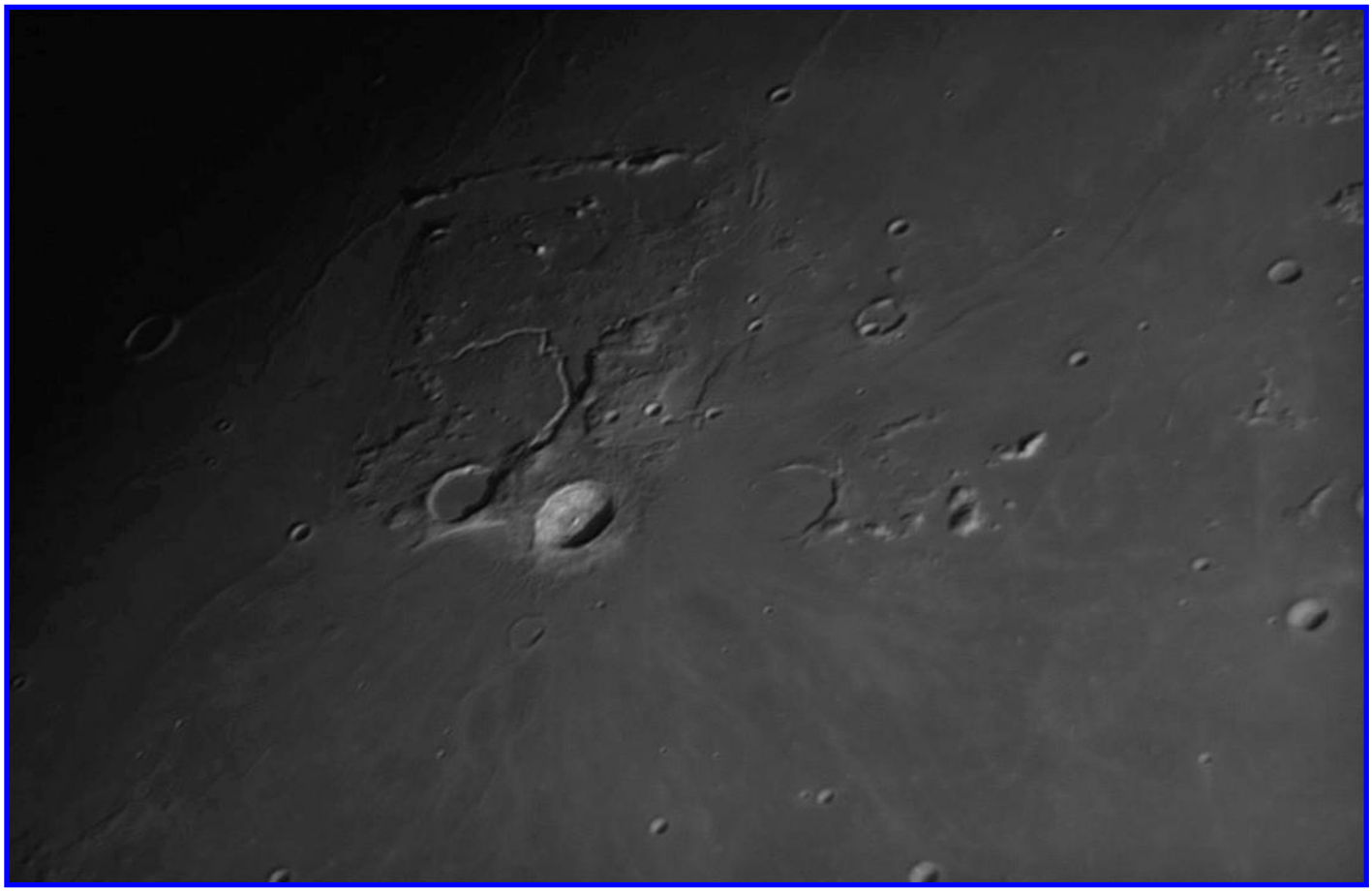
Prinz, *Felix León, Santo Domingo, República Dominicana. 2021 March 27 00:45 UT. 127 mm Maksutov-Cassegrain telescope, DMK21618AU camera. North up, west right.*

Aristarchus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2019 March 18 04:42 UT, colongitude 53.0°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Aristarchus Plateau, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2016 November 12 04:24 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera. Seeing 8/10.*

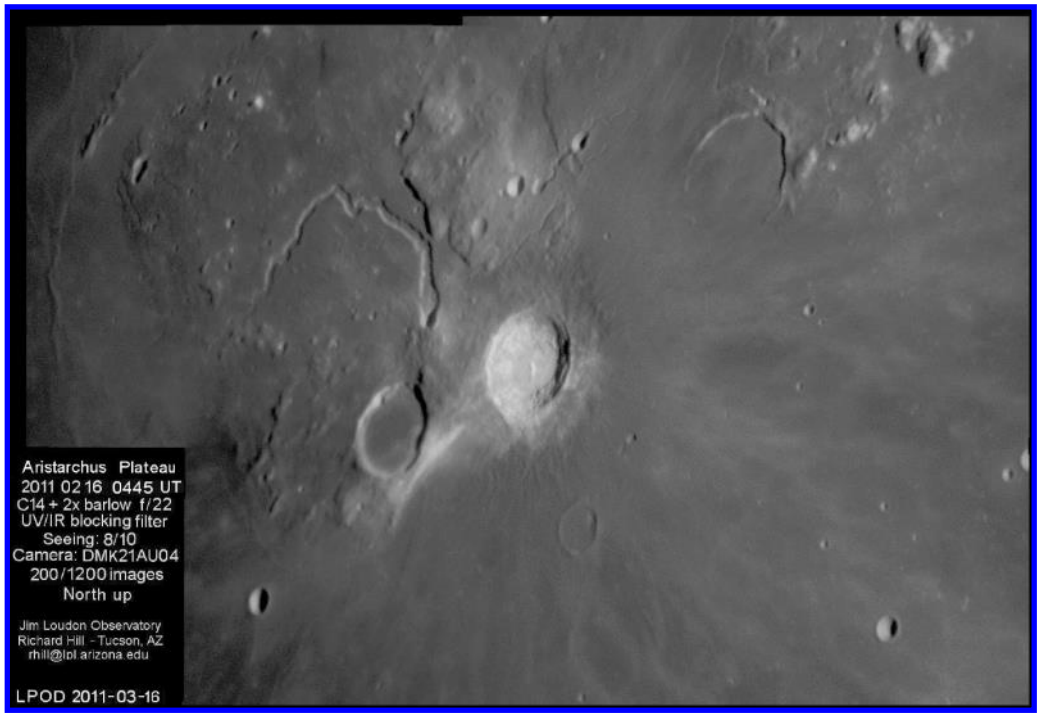
Prinz rilles, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 December 12 00:34 UT. 8 inch Meade Starfinder reflector telescope, Astronomik ProPlanet 742 nm IR-pass filter, QHY5-II camera.*





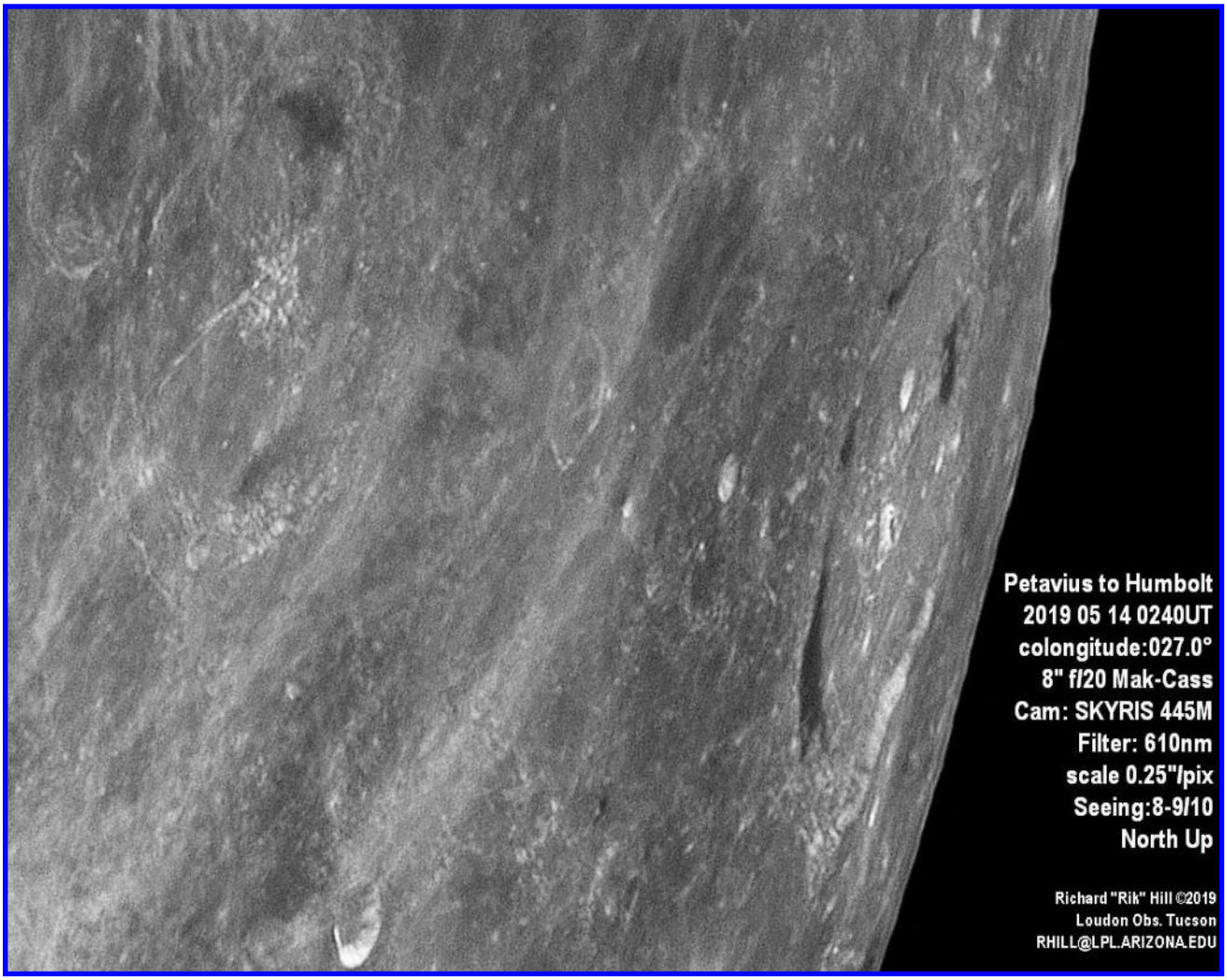
Prinz rilles, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2019 February 17 04:41 UT. 8 inch refractor telescope, Astronomik ProPlanet 742 nm IR-pass filter, QHY5-II camera.*

Aristarchus Plateau, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2011 February 16 04:45 UT. Celestron 14 inch Schmidt-Cassegrain telescope, UV/IR blocking filter, DMK21AU04 camera. Seeing 8/10.*



LUNAR 87 HUMBOLDT CRATER WITH CENTRAL PEAKS AND DARK SPOTS

"Another beautiful example of a FFC is Humboldt, a bigger brother of Petavius, with floor fracturing and dark volcanic spots. But because it is so close to the limb, you will be lucky to find this 207-km wide crater, much less see its floor. With its line of peaks and a diagonal of dark mare material on its near floor. Humboldt would be regarded as one of the most spectacular craters on the Moon were it better placed" (page 107). Humboldt is a devilishly difficult crater to observe, so close to the limb that very favorable libration conditions are needed to see this beauty, only an observer as experienced as Rik Hill could give us such a complete picture.



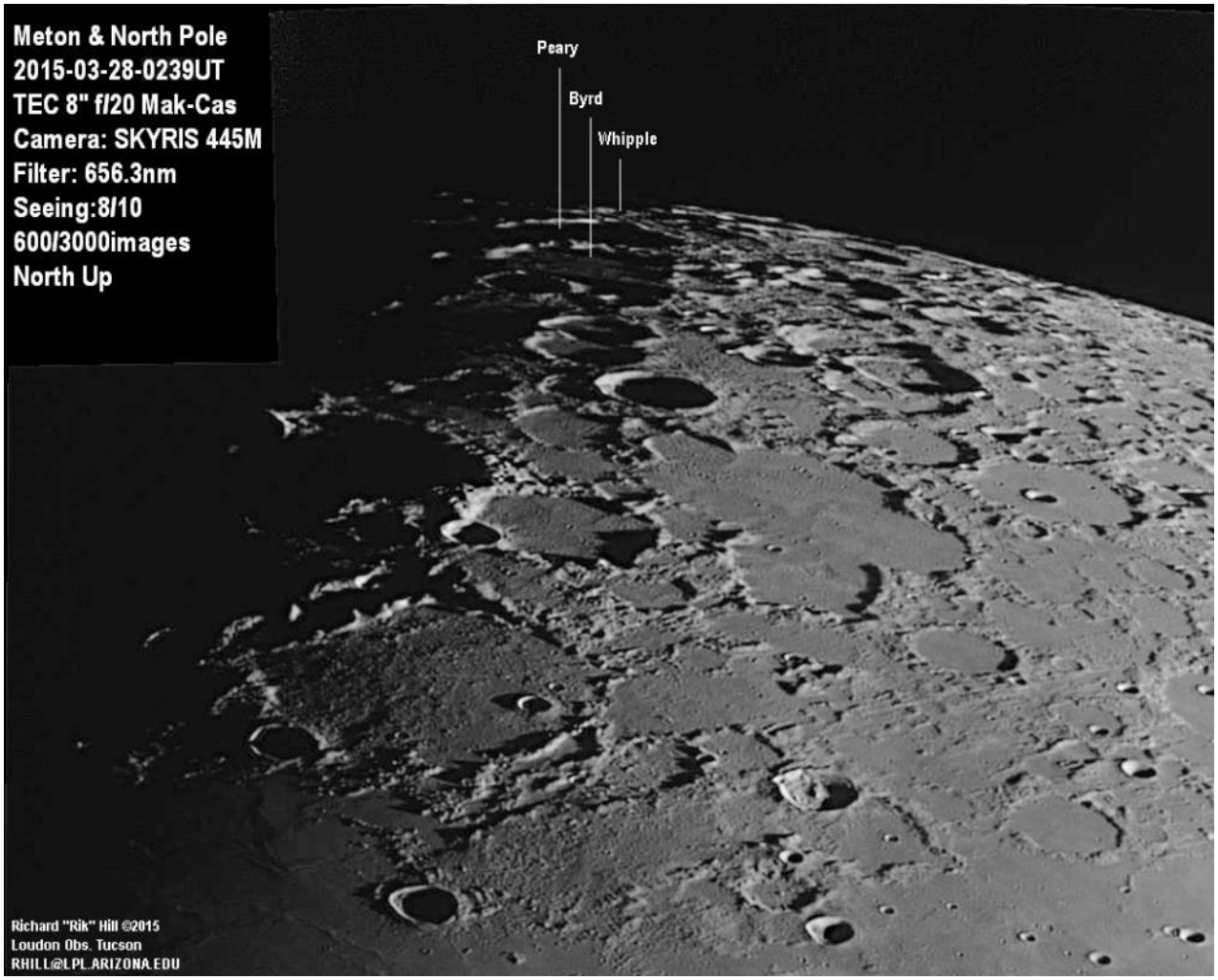
Petavius to Humboldt, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2019 May 14 02:40 UT, colongitude 27.0°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8-9/10.*

Petavius, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 January 17 00:47 UT, co-longitude 312.2°. 6 inch Dynamax Schmidt-Cassegrain telescope, 665 nm filter, SKYRIS 132M camera. Seeing 7/10.*

Humboldt, *Alberto Anunziato, Paraná, Argentina, SRA. 2019 September 15 04:02 UT. 180 mm Newtonian reflector telescope, QHY5-II camera.*

LUNAR 88 PEARY DIFFICULT TO OBSERVE POLAR CRATER

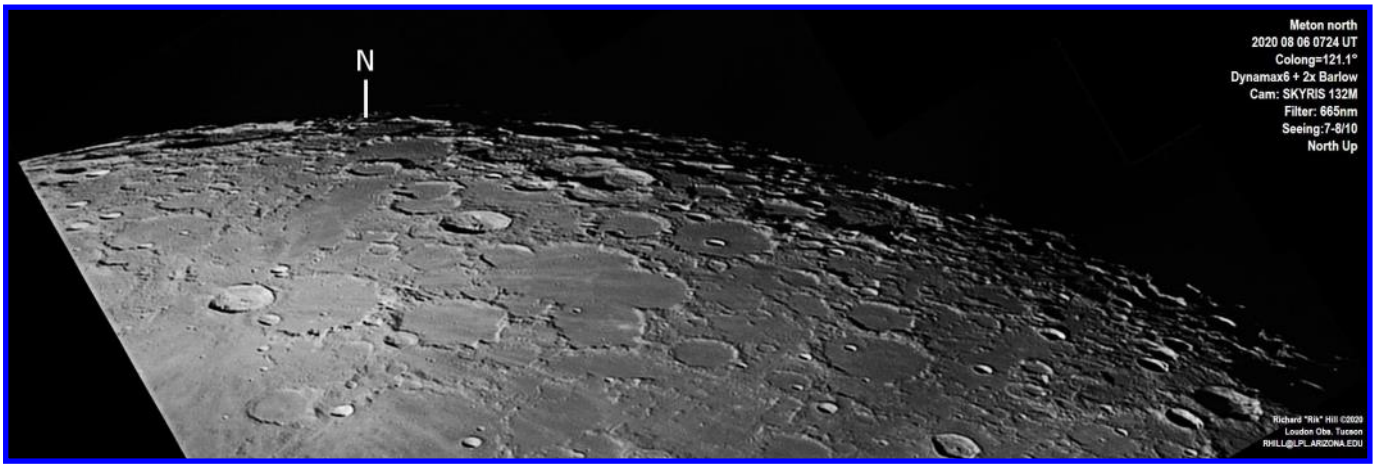
Lunar 88 is another devilishly difficult crater to observe and that requires favorable libration conditions: Peary. "The nomenclature of lunar craters at the north pole reflects our fascination with explorers of the terrestrial poles by sprinkling a few of their names among those of the ubiquitous dead Greeks. The name of the Admiral Peary, the first person to reach Earth's North Pole (discounting Santa) is given to a 75-km-wide crater centered at 89º N." (page 66). Once again, Rik Hill came to our aid with an image that takes us to the lunar far north, where our descendants are likely to walk, as it is the favorite area for a future inhabited lunar base.

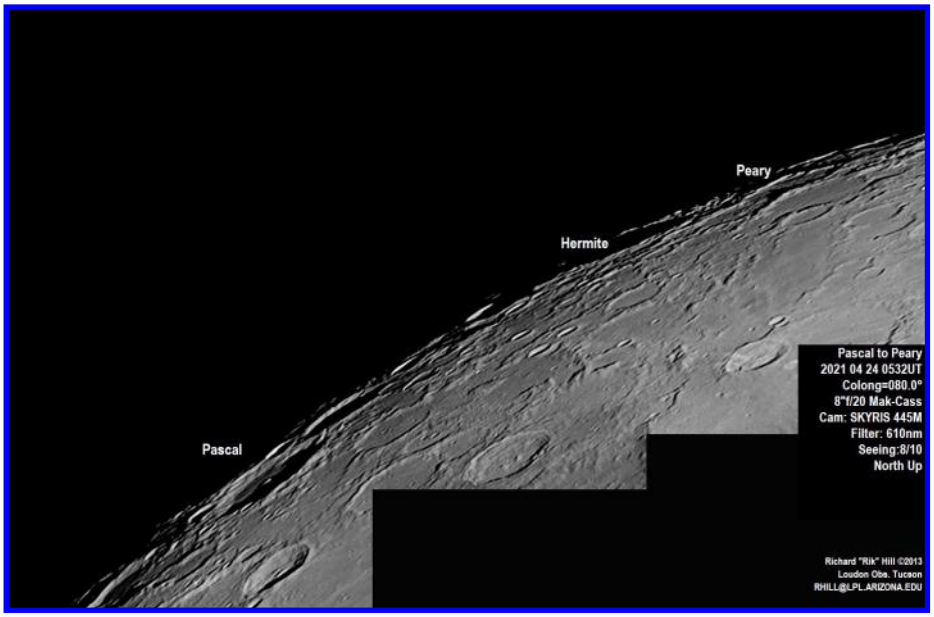


Meton and North Pole, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2015 May 28 02:39 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Peary, Desireé Godoy, Oro Verde, Argentina. 2020 August 28 23:45 UT. 200 mm refractor telescope, 742 nm filter, QHY5-II camera.

Meton north, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2020 August 06 07:24 UT, colongitude 121.1°. 6 inch Dynamax Schmidt-Cassegrain telescope, 2x barlow, 665 nm filter, SKYRIS 132M camera. Seeing 7-8/10.*



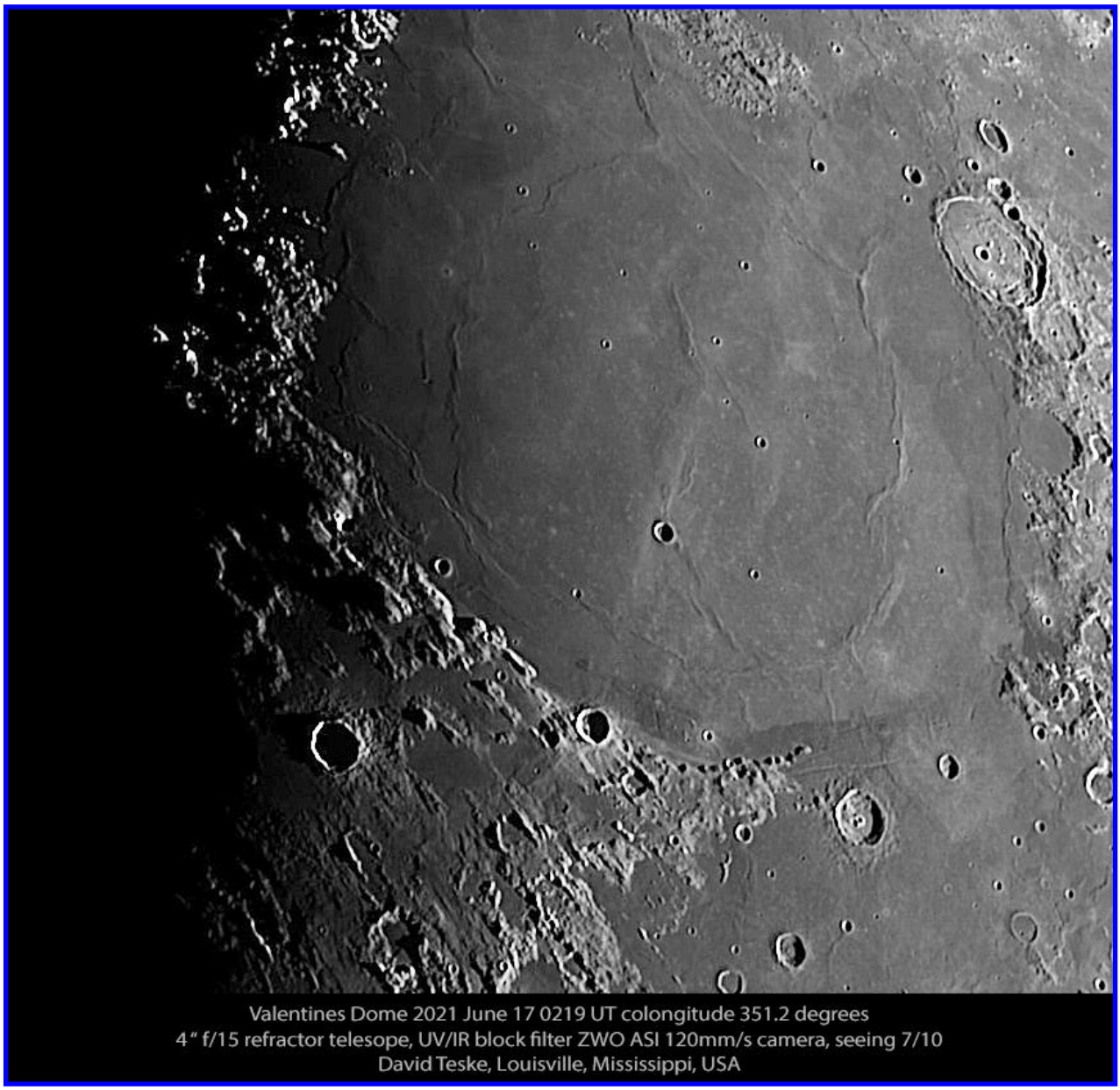


Pascal to Peary, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2021 April 24 05:32 UT, colongitude 80.0°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Peary, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2019 February 17 02:43 UT. 8 inch refractor telescope, QHY5-II camera.*

LUNAR 89 VALENTINE DOME VOLCANIC DOME

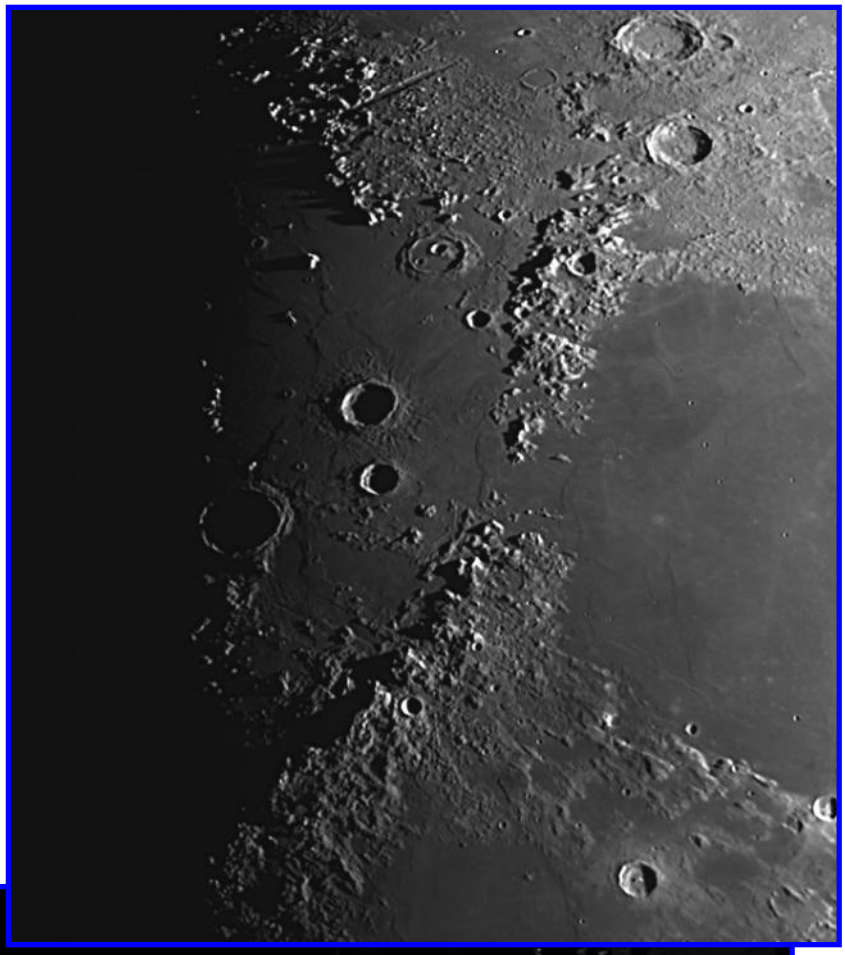
"The Valentine Dome (named for its heart shape) is a broad low (100 meters high) structure popularized by a sketch appearing in the April 1962 issue of Sky and Telescope magazine (page 212) drawn by the Hawaiian lunar artist Alika Herring. The 30-km-wide dome is unusual in that it has three conspicuous and six less obvious smaller hills that apparently protrude from it. Under suitable lighting conditions it is a striking formation, visible with small telescopes" (page 80). Small telescopes, but not too small, we are in the 89th place and it is a rather difficult feature to observe. David Teske's image, taken right at the terminator, shows the small hills glowing.



Valentine Dome, *David Teske, Louisville, Mississippi, USA. 2021 June 17 02:19 UT, colongitude 351.2°. 4" f/15 refractor telescope, IR block filter, ZWO ASI120mm/s camera. Seeing 7/10.*

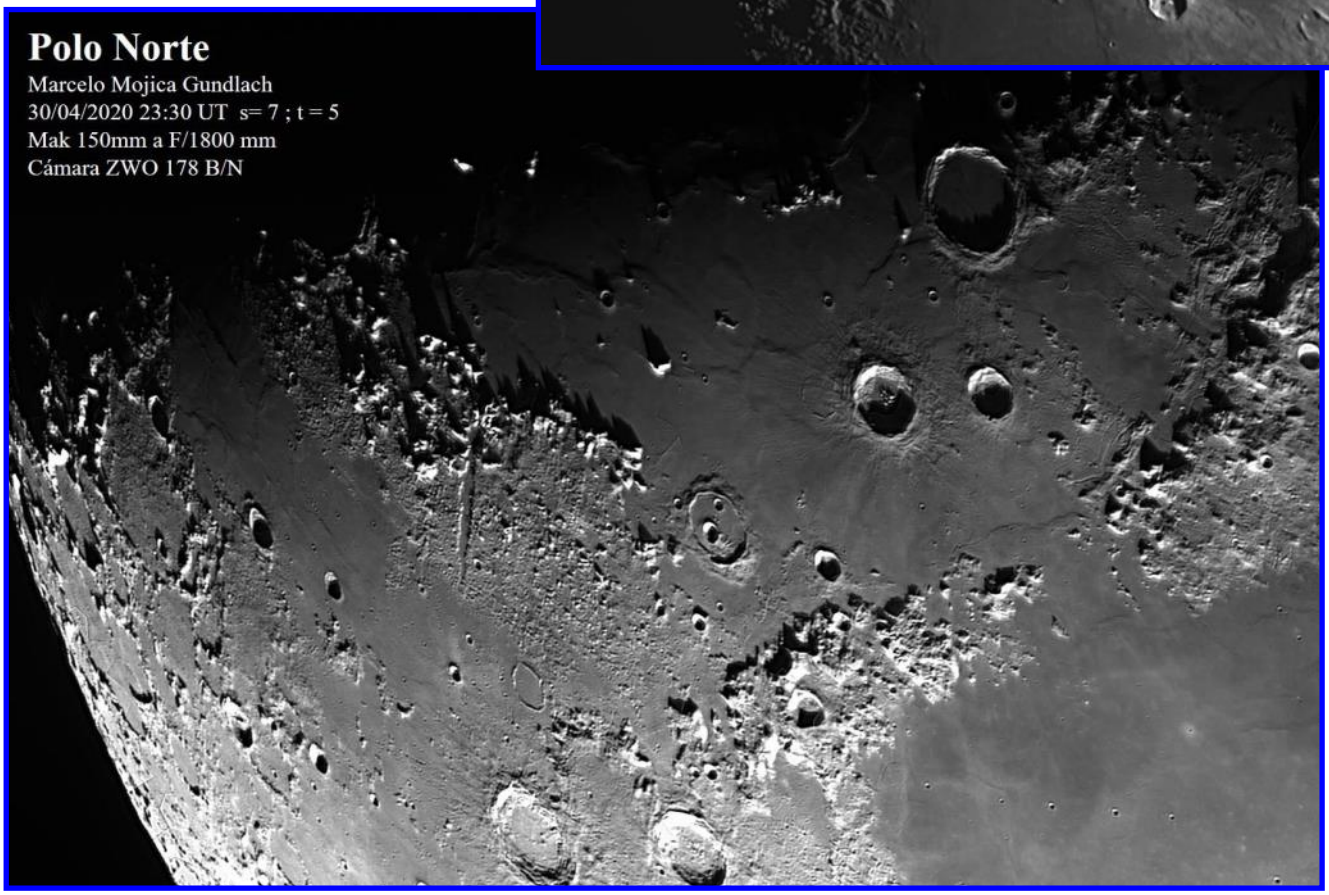
Linné, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2018 April 23 02:21 UT, colongitude 0.7°. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 610 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Valentine Dome, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2017 July 01 23:34 UT. 8 inch refractor telescope, QHY5-II camera.*



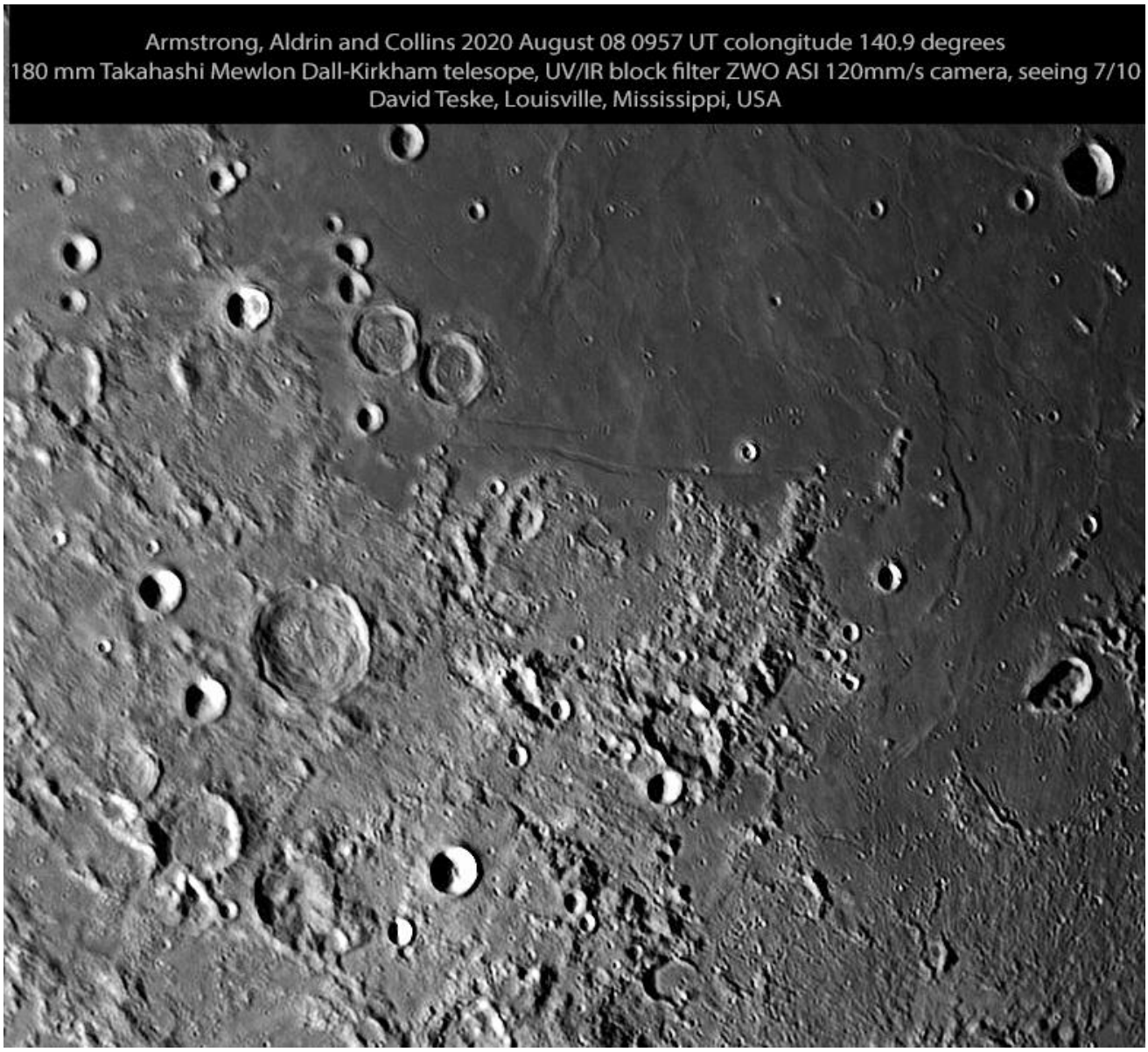
Valentine Dome, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2017 July 02 00:05 UT. 8 inch refractor telescope, Astronomik Pro-Planet 742 nm IR-pass filter, QHY5-II camera.*

Valentine Dome, *Marcelo Mojica Gundlach, Cochabamba, Bolivia. 2020 April 30 23:30 UT. 150 mm Sky Watcher Maksutov-Cassegrain telescope, ZWO ASI178B/N camera. Seeing 7/10, transparency 5/6. North is to the left, west is down.*

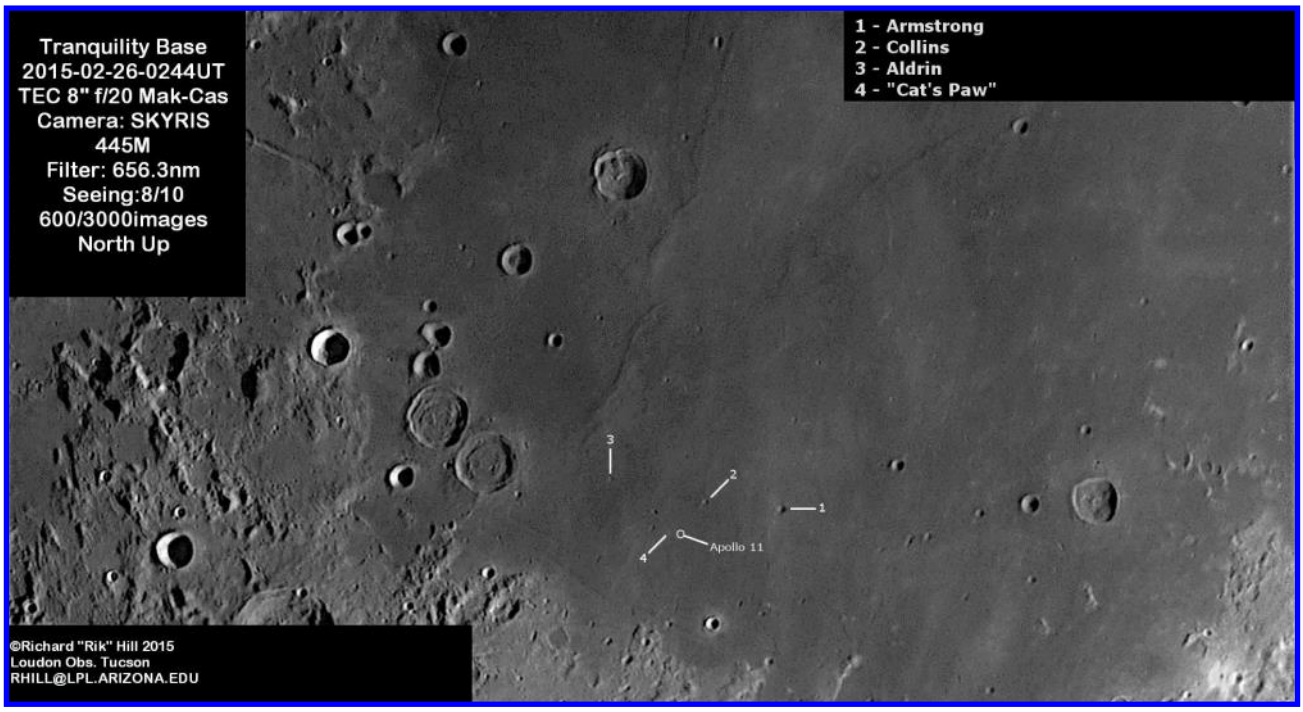


LUNAR 90 ARMSTRONG, ALDRIN AND COLLINS SMALL CRATERS NEAR THE APOLLO 11 LANDING SITE

In number 90 we find ourselves in one of the most important places in the history of humanity, although it is not on our planet, but precisely in the place where we took our first steps outside our cradle. In the image of David Teske that we selected we can see the ridge to which Wood refers and the three craterlets that recall three heroes: "If you look when the angle of illumination is really shallow, you will see a low wrinkle ridge that Eagle probably landed on or near. With a higher Sun angle, just east of Sabine you may glimpse a line of three craters, 2 to 4 km in diameter, that now bear the names of Armstrong, Collins and Aldrin" (page 84).

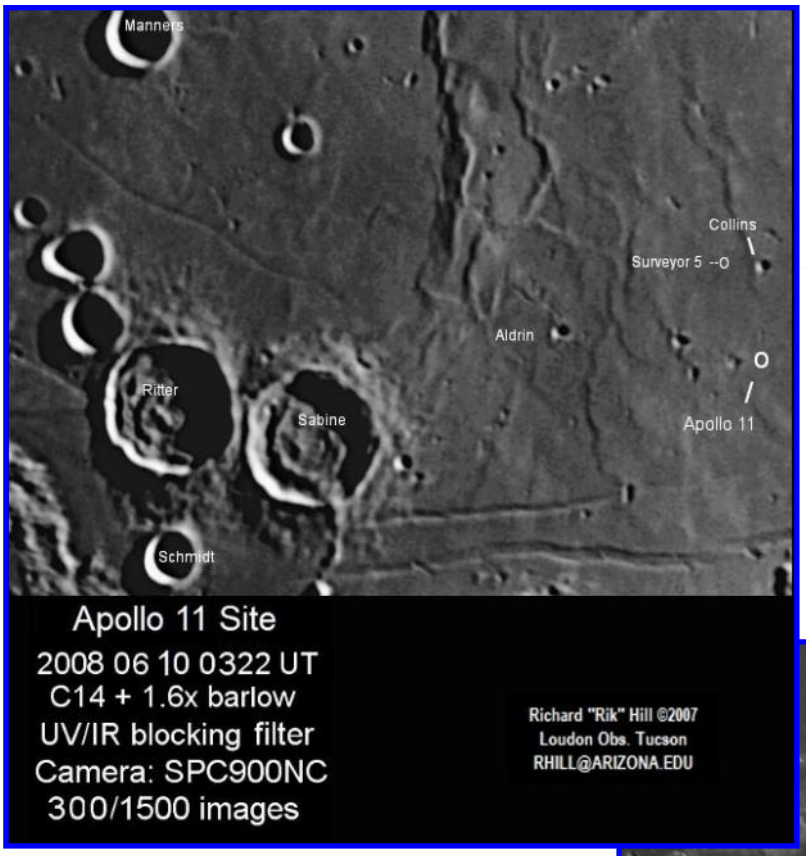


Armstrong, Aldrin and Collins, *David Teske, Louisville, Mississippi, USA. 2020 August 08 09:57 UT, colongitude 140.9°. 180 mm Takahashi Mewlon Dall-Kirkham telescope, IR block filter, ZWO ASI120mm/s camera. Seeing 7/10.*



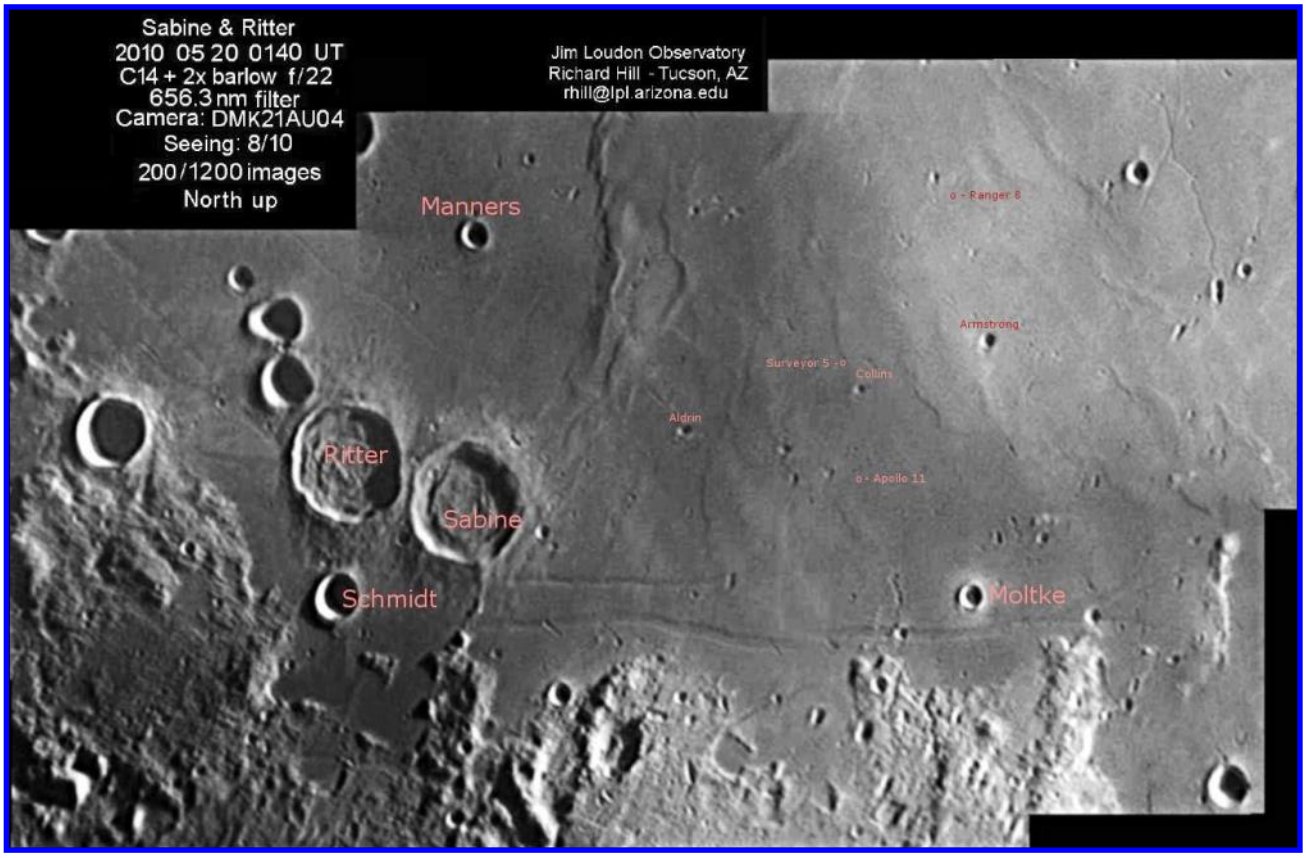
Tranquility Base, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2015 February 26 02:44 UT. 8 inch f/20 TEC Maksutov-Cassegrain telescope, 656.3 nm filter, SKYRIS 445M camera. Seeing 8/10.*

Armstrong, Aldrin and Collins, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2016 August 21 04:21 UT. 10 inch Meade LX200 Schmidt-Cassegrain telescope, Astronomik Pro-Planet 742 nm IR-pass filter, QHY5-II camera.*



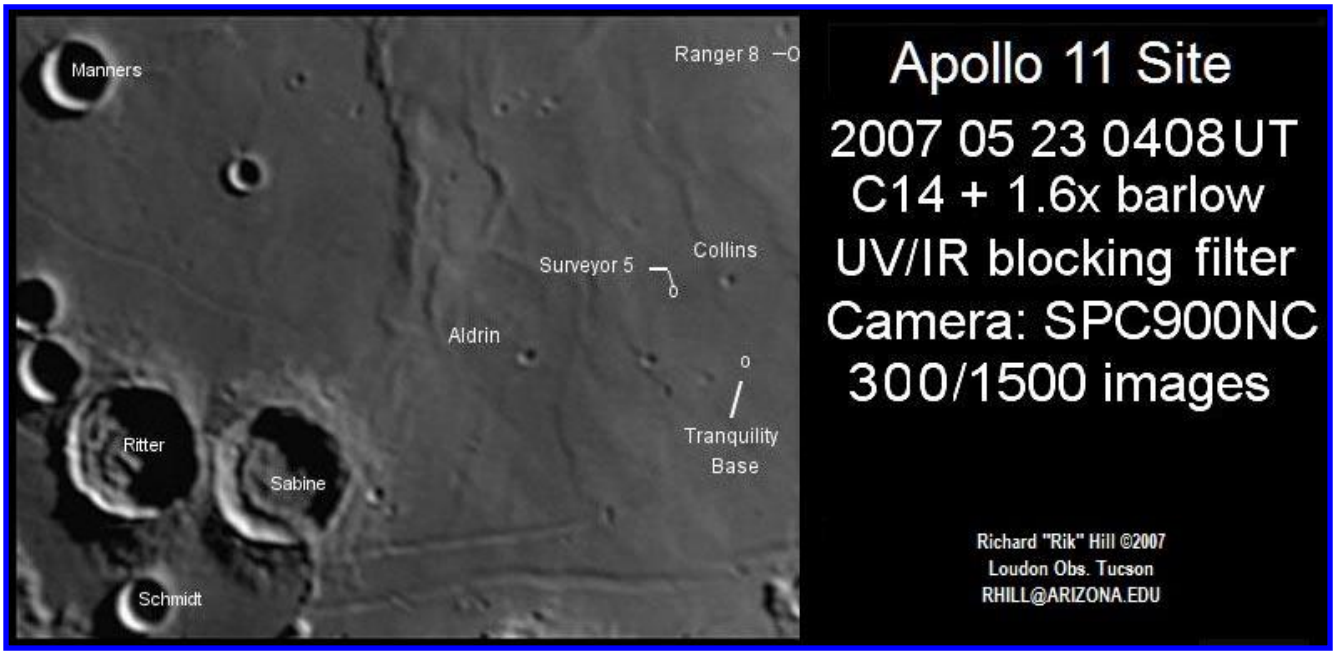
Apollo 11 Site, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2008 June 10 03:22 UT. Celestron 14 inch Schmidt-Cassegrain telescope, 1.6x barlow, UV/IR blocking filter, SPC900NC camera.*

Armstrong, Aldrin and Collins, *Francisco Alsina Cardinalli, Oro Verde, Argentina. 2018 February 25 00:48 UT. 8 inch refractor telescope, QHY5-II camera.*



Sabine to Ritter, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2010 May 20 01:40 UT. Celestron 14 inch Schmidt-Cassegrain telescope, 2x barlow, f/22, 656.3 nm filter, DMK21AU04 camera. Seeing 8/10.*

Apollo 11 Site, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 2007 May 23 04:08 UT. Celestron 14 inch Schmidt-Cassegrain telescope, 1.6x barlow, UV/IR blocking filter, SPC900NC camera.*



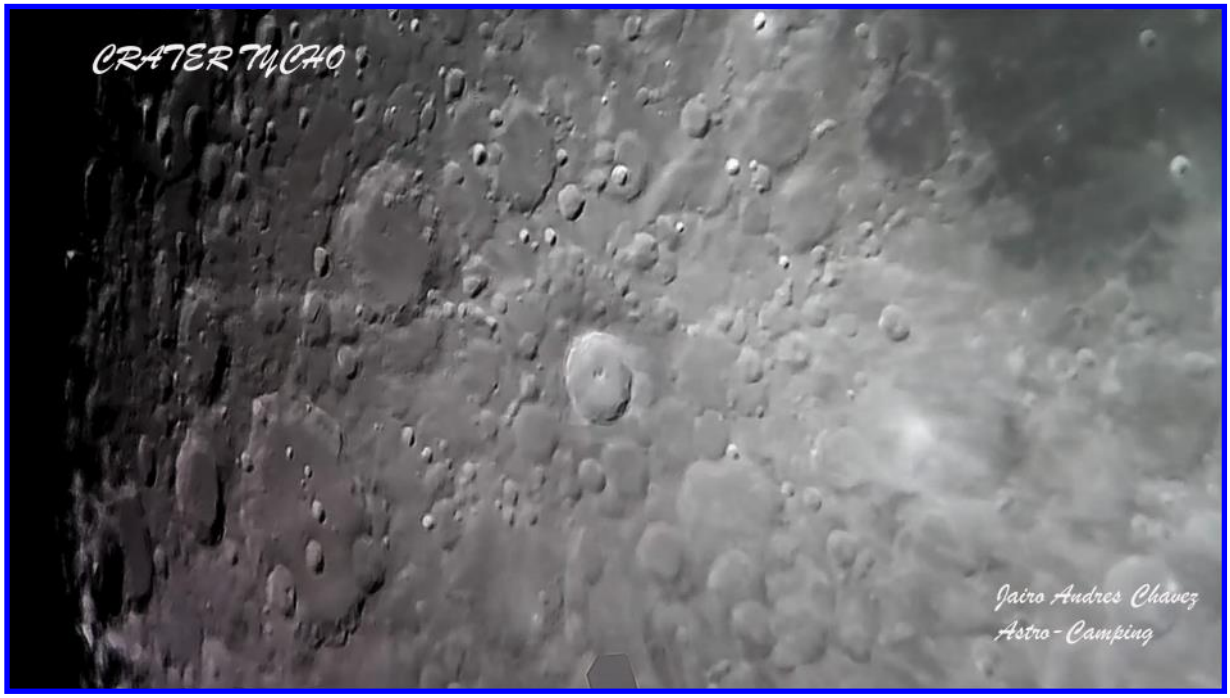
Aristarchus, *Eduardo Horacek-Esteban Andrada, Mar del Plata, Argentina. 2021 July 22 00:16 UT. 150 mm Maksutov-Cassegrain telescope, Canon EOS Digital Rebel T5i camera.*

Copernicus, *Jairo Chavez, Popayán, Colombia. 2021 August 18 01:42 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Petavius, *Jairo Chavez, Popayán, Colombia. 2021 August 17 04:14 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Plato, *Jairo Chavez, Popayán, Colombia. 2021 August 19 02:22 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

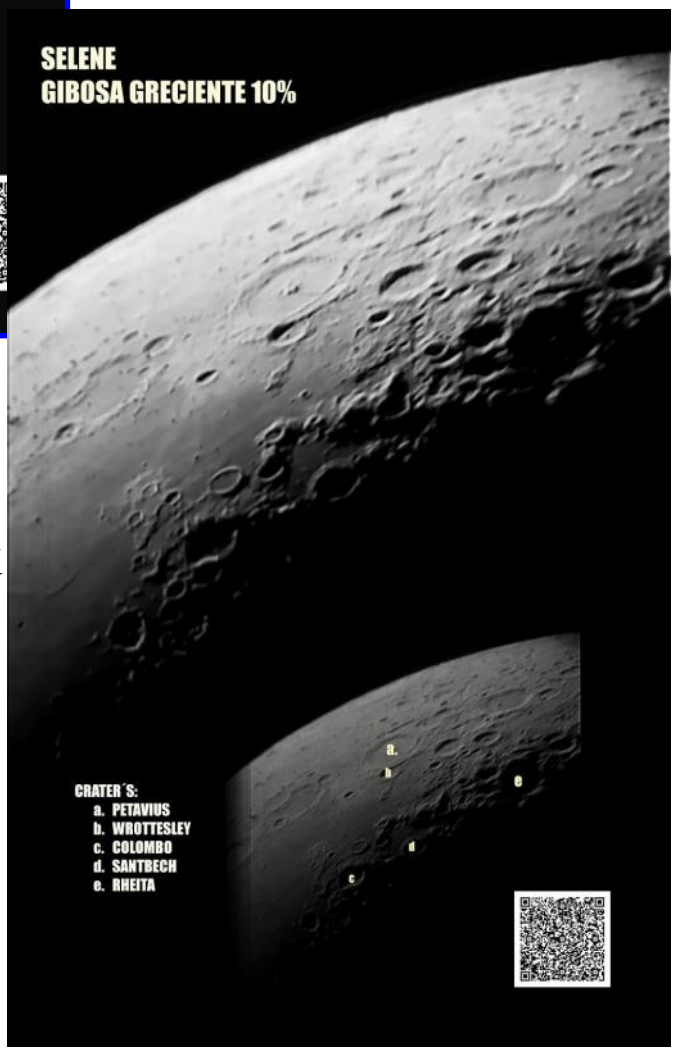
Tycho, *Jairo Chavez, Popayán, Colombia. 2021 July 21 00:02 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*



Tycho, *Jairo Chavez, Popayán, Colombia. 2021 August 19 02:21 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Gassendi, *Jairo Chavez, Popayán, Colombia. 2021 July 21 00:01 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Mare Crisium, *Jairo Chavez, Popayán, Colombia. 2021 August 12 00:28 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*



Petavius, *Jairo Chavez, Popayán, Colombia. 2021 August 12 00:23 UT. 311 mm reflector telescope, MOTO E5 PLAY camera.*

Lunar Geologic Change Detection Program

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Assistant Coordinator David O. Darling -DOD121252@aol.com

2021 September

Introduction: In the set of observations received in the past month, these have been divided into three sections: Level 1 is a confirmation of observation received for the month in question. Every observer will have all the features observed listed here in one paragraph. Level 2 will be the display of the most relevant image/sketch, or a quote from a report, from each observer, but only if the date/UT corresponds to: similar illumination (±0.5º), similar illumination and topocentric libration report (±1.0º) for a past LTP report, or a Lunar Schedule website request. A brief description will be given of why the observation was made, but no assessment done – that will be up to the reader. Level 3 will highlight reports, using in-depth analysis, which specifically help to explain a past LTP, and may (when time permits) utilize archive repeat illumination material.

LTP reports: No LTP reports were received in August.

Level 1 - Reports received for July included: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Birt, Copernicus, Hevelius, Plato, Posidonius, and Proclus. Alberto Anunziato (Argentina – SLA) observed/sketched/imaged: Bessel, Censorinus, Copernicus, Mons Piton, Theophilus, and Tycho. Kevin Berwick (Ireland – ALPO): observed: Proclus. Anthony Cook (Newtown, UK – ALPO/BAA) imaged several features in the color, and the lunar surface in thermal IR. Les Fry (West Wales – NAS) imaged: Babbage, Blancanus, Capuanus, Longomontanus, Moretus, Promontorium Kelvin, Schickard, T. Mayer and Vieta. Leandro Sid (Argentina – AEA) imaged: Cassini, Mare Anguis, Plato and several features. Trevor Smith (Codnor, UK – BAA) observed Plato.

Level 2 – Example Observations Received:

Theophilus: On 2021 Jul 17 UT00:15-00:35 Alberto Anunziato (SLA) observed this crater under similar illumination to the following report:

Theophilus 1969 Jul 21 UT 19:30-21:45 and 21:00-22:00 Observed by Fox (Newark, England, 6.5" reflector,) and Baum (Chester, England, 4.5" refractor) (S=6, T=4) "At wall, adjacent to Cyrillus was a reddish glow, then obscur. (Fox). Baum saw intermittent white-blue shimmering as if glowing thru dust glowing & upsurge in brightness on c.p. Gradually faded to normal at 21:20. 1st time ever seen by him tho. obs. since 1947. Image sharp, no haziness. (indep. confirm. of activity, but details differ, but same time, Apollo 11 watch)." NASA catalog weight=5. NASA catalog ID #1180. ALPO/BAA weight=3.

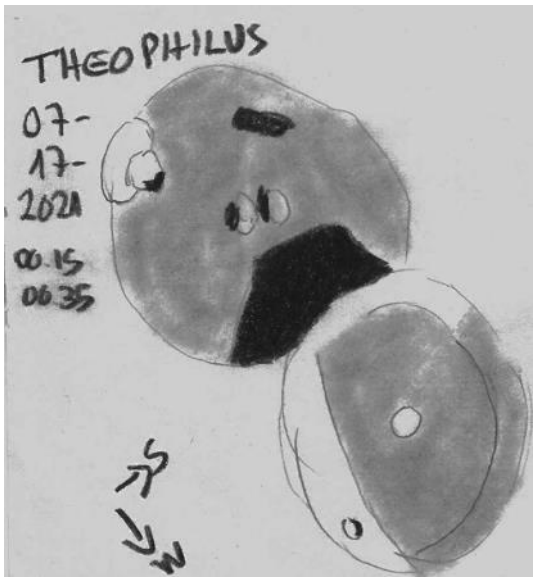


Figure 1. Theophilus and Cyrillus as sketched by Alberto Anunziato on 2021 Jul 17 UT 00:15-00:35. Sketch orientated according to the directions shown.

Alberto was using a 105 mm. Maksutov-Cassegrain (Meade EX 105) at a magnification of 154x. He found that the southeast wall of Theophilus was quite bright, also the central peaks were bright, to the point that the details could not be discerned. No color nor brightness changes seen. Clear contrast with the dark spots (volcanic features) in Cyrillus.

Plato: On 2021 Jul 17 UT 20:15-21:15 Trevor Smith (BAA) Observed this crater under similar illumination to the following report:

Plato – On 1725 Aug 16 Bianchini noticed a track of reddish light, like a beam, seen crossing the shadowed floor of Plato. This LTP has an ID No. of 17 in Cameron's 1978 catalog and a weight of 3. It has an ALPO/BAA weight of 2.

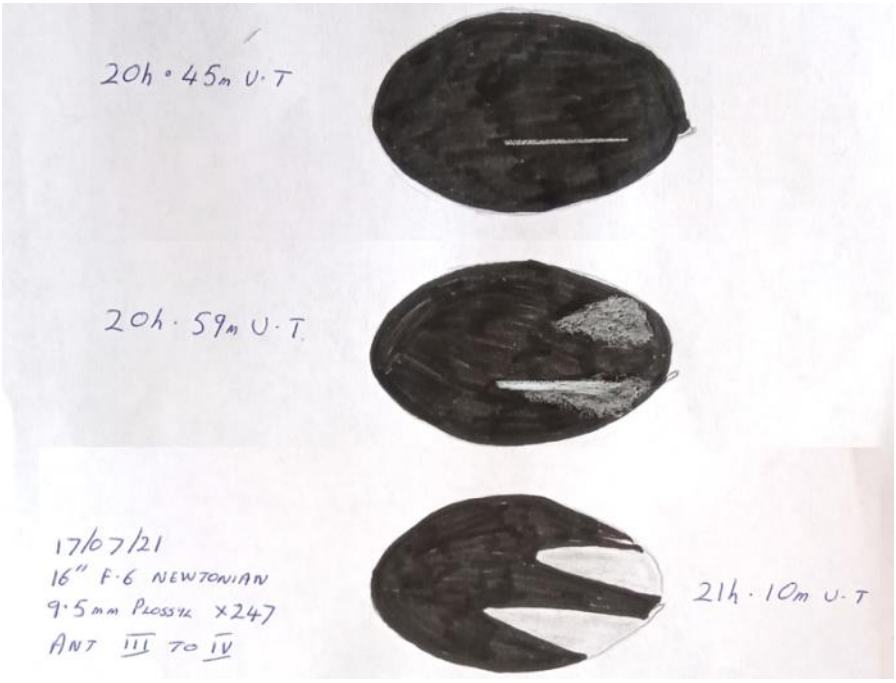


Figure 2. *Plato as sketched by Trevor Smith (BAA) on 2021 Jul 21 and orientated with north towards the bottom. Sketches made at the UTs given.*

Trevor noted a thin slither of light appear in less than a minute at 20:45UT. It was first only seen with averted vision, but later became seen with direct vision. Its eastern end was wider than its western end at 20:48UT. By 20:55UT the SW shadow filled interior of Plato now had a slightly milky appearance and by 20:59 the NW floor was taking on a similar appearance. By 21:06UT the milky appearance of the floor was vanishing. Trevor was using a 16" F/6 Newtonian at x247 under Antoniadi III-IV seeing conditions.

Proclus: On 2021 Jul 17 UT 21:50-21:51 Kevin Berwick (ALPO) observed this crater under similar illumination to the following report:

Proclus 1984 Jul 06 UT 20:29-20:43 light green spot observed by Madej (England) in the central region. No color seen elsewhere. At 20:10 Foley (Kent, UK, 12" reflector) had seen a small extending of darkening in the south east floor (not present 2 hours before) and a lot of fine detail - though everything was normal again by 22:50UT. At 22:15 Amery (Reading, UK) found a large dark spot on the south east floor. Other observers: J and A. Cook (Frimley, England) could not confirm but their seeing was IV and transparency was poor" Mobberley found no color and also no detail on the floor. BAA Lunar Section Report. Cameron 2006 catalog ID=248 and weight=3. ALPO/BAA weight=3.

Kevin looked at Proclus intermittently starting at 21:50UT. He saw a dark spot approximately 1/10th of the width of the crater diameter at the southern end of Proclus. It looked like a shadow, particularly since it was opposite a bright area at the northern end of the crater. The spot was visible using both the 7 mm and 3 mm millimeter eyepieces. It was a beautiful night, which truly amazing seeing early on due to the balmy summer weather. A TV101 refractor was used with a 7mm Nagler eyepiece at x77 and a 3mm Radian at x180. The seeing was Antoniadi I-II.

Level 3 - In Depth Analysis:

Cassini: On 2021 Jul 17 UT at 21:49-21:50 Anthony Cook (ALPO/|BAA) and at 22:25UT Leandro Sid (AEA) imaged this crater under similar illumination to the following report:

Knopp of Paysandú, Uruguay on 1885 Feb 22 at 23:00-23:30? UT saw a definite light, looking like Saturn in Cassini? The previous night he had seen red patches in the crater. Cameron's 1978 catalog ID=348 and weight=4. ALPO/BAA weight=3.

Figure 3. *Cassini on 2021 Jul 17 and orientated with north towards the top.* ***(Left)*** *Image by Anthony Cook (ALPO/ BAA) taken at 21:49-21:50UT.* ***(Right)*** *Image by Leandro Sid (SLA) taken at 22:25UT.*

Now the Cameron catalog has a "?" for the UT given. There were actually two events observed. On 1885 Feb 21 red spots were seen. The following night a Saturn-like feature in Cassini crater. Now take a look at the images by myself and Leandro – both were made under poor observing conditions. Take a look at Cassini A, the larger of the two craterlets inside Cassini in Fig 3 – can you see a light diagonal area coming off the SE of Cassini A? With a bit of seeing flare (image ghosting) and imagination there is potentially a more stubby/shorter lighter projection coming off the NW of Cassini A. Taken together, with Cassini A slightly offset from the center, it could be argued that these look like a blurry view of a nearly edge-on ring aspect of Saturn. This is perhaps more clearly visible in Fig 3 (Right). We cannot be too sure over this, but it is certainly plausible. I will therefore lower the ALPO/BAA weight from 3 to 2.

Proclus: On 2021 Jul 20 UT 01:10-01:50 Jay Albert observed crater under similar illumination to the following report:

Proclus 1989 Jul 13 UT 21:04-21:13 Observed by M.Cook (Frimley, UK, 90mm Questar Cat., Seeing III, transparency hazy) and by Moore (Selsey, England) "Following an alert call by Miles concerning the crater Proclus looking different, Cook observed a circular dark patch that filled about half of the eastern half of the crater floor. To cut down the glare a blue filter was then used and a slightly less dark area was seen extending from this in a southerly direction. 8 rays were seen. The dark patch was confirmed by Patrick Moore. However, David Darling (USA) who observed a few hours later on 1989 Jul 14 at 03:28 UT could not see this dark patch." BAA Lunar Section observation. The Cameron 2006 catalog ID=370 and weight=? The ALPO/BAA weight=2

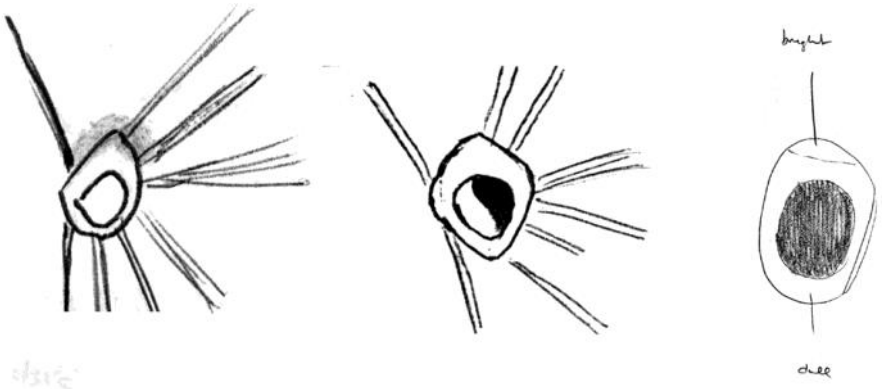


Figure 4. *Sketches of Proclus, orientated with north towards the top and west on the left.* ***(Left)*** *A sketch by Marie Cook (BAA) made on 1984 Nov 03 UT 23:06 with a 12" Newtonian.* ***(Center)*** *A sketch by Marie Cook (BAA) on 1989 Jul 13 UT 21:04-21:17 with a 90mm Questar.* ***(Right)*** *A sketch by Jeremy Cook (BAA) on 1989 Jul 13 UT 22:31 with a 90mm Questar.*

Jay was using a Celestron NexStar Evolution 8" SCT at 226x and 290x. The Moon high in altitude (compared to the 1989 observation. Transparency was poor though with only 1st magnitude stars visible and seeing was 7-8/10. He saw the dark gray, roughly circular dark patch taking up half of the E floor of the crater. The patch appeared to be somewhat elongated N-S. He tried an 80A blue filter which slightly improved the contrast and a 23A red filter which improved the contrast slightly more. The filters didn't change the overall appearance of the crater though. Jay noticed the usual prominent ejecta rays extending NW and SW from the crater, plus a few faint ejecta rays extending E over Mare Crisium.

Checking back through the archives I came across sketches by Marie and Jeremy Cook (Fig 4 – Center and Right) showing the dark appearance to the floor. Then in Fig 4 (Left) we see a sketch by Marie Cook, from about five years earlier, but taken under the same illumination, which shows a very similar number of rays, but doesn't indicate a dark floor. Although no sketch was made by Patrick Moore during the LTP in 1989, he did make a comment that Proclus had a bright patch on its north wall (agreeing with Jeremy's sketch – Fig 4 Right) and the floor was unusually dark – similar to the darkness of Mare Crisium

.

Jay's 2021 observation agrees with the appearance of the dark interior seen by Marie in 1989, but not with the appearance in 1984. I suppose by the time that Jeremy and Patrick were observing in 1989 the Moon must have been much lower and so definition must have been worse. At least Patrick and Jeremy agreed that the floor of the crater was dark and the north rim was bright. Perhaps it was the 1984 observation that was unusual and the 1989 appearance was normal? Now in view of some slight differences in descriptions between the 1989 observations, small aperture instruments were being used, and the fact that the Moon was only 13° to 11° above the horizon when Marie observed the LTP, I will lower the weight from 2 to 1. But we do need to keep it on the system as images are needed to verify the darkness of the floor of Proclus in comparison to Mare Crisium.

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? If you would like your observations to be considered for mention in the next newsletter, then they should be submitted by 17:00UT on the 24th of July, covering observations for June. Please send observations in, even if older than this as they are still very useful for future repeat illumination studies. 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 September 2021

Date	UT	Event
1	1000	Moon 1.3° north of M35
2		Greatest northern declination +25.9°
5		West limb most exposed -5.3°
6		South limb most exposed -6.5°
7	0051	New Moon lunation 1221
10	0200	Venus 4° south of Moon
11	1000	Moon at perigee 368,461 km
13	2039	First Quarter Moon
15		Greatest southern declination -26.0°
17	0300	Saturn 4° north of Moon
18	0700	Jupiter 4° north of Moon
19		North limb most exposed +6.6°
20		East limb most exposed +5.2°
20	2354	Full Moon
26	2200	Moon at apogee 404,640 km
28	1800	Moon 1.6° north of M35
29		Greatest northern declination +26.0°
29	0157	Last Quarter 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
Jerry Hubbell –jerry.hubbell@alpo-astronomy.org
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: Lunar 100

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 2021 edition will be the Lunar 100 numbers 91-100. The subject for the January 2022 Focus-On will be Mare Crisium. 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):
Jerry Hubbell –jerry.hubbell@alpo-astronomy.org
David Teske – david.teske@alpo-astronomy.org

Deadline for inclusion in the Lunar 100 numbers 91-100 article is October 20, 2021

FUTURE FOCUS ON ARTICLES:

In order to provide more lead time for contributors the following future targets have been selected: The series of the Lunar 100 will follow on the schedule below:

Subject	TLO Issue	Deadline
Lunar 100 (numbers 91-100)	**November 2021**	**October 20, 2021**
Mare Crisium	**January 2022**	**December 20, 2021**

Focus-On Announcement

We are pleased to announce the future Focus-On topics. These will be based on the Lunar 100 by Charles Wood. Every other month starting in May 2020 , the Focus-On articles will explore ten of the Lunar 100 targets. Targets 91-100 will be featured in the September 2021 *The Lunar Observer*. Submissions of articles, drawings, images, etc. due by October 20, 2021 to David Teske or Alberto Anunziato.

L	FEATURE NAME	SIGNIFICANCE	RUKL CHART
91	De Gasparis Rilles	Area with many rilles	51
92	Gyldén Valley	Part of Imbrium radial structure	44
93	Dionysius Rays	Unusual and rare dark rays	35
94	Drygalski	Large south-pole region crater	72, VI
95	Procellarum Basin	The Moon's biggest basin?	---
96	Leibnitz Mountains	Rim of South Pole-Aitken Basin	73, V
97	Inghirami Valley	Orientale basin ejecta	61
98	Imbrium lava flows	Mare lava-flow boundaries	10
99	Ina	D-shaped young volcanic caldera	22
100	Mare Marginis swirls	Possible magnetic field deposits	27, III

Explore the Lunar 100 on the link below:

https://www.skyandtelescope.com/observing/celestial-objects-to-watch/the-lunar-100/

The Lunar 100: Features 1-10	May 2020 Issue – Due April 20, 2020
The Lunar 100: Features 11-20	July 2020 Issue – Due June 20, 2020
The Lunar 100: Features 21-30	September 2020 Issue – Due August 20, 2020
The Lunar 100: Features 31-40	November 2020 Issue – Due October 20, 2020
The Lunar 100: Features 41-50	January 2021 Issue – Due December 20, 2020
The Lunar 100: Features 51-60	March 2021 Issue – Due February 20, 2021
The Lunar 100: Features 61-70	May 2021 Issue – Due April 20, 2021
The Lunar 100: Features 71-80	July 2021 Issue – Due June 20, 2021
The Lunar 100: Features 81-90	September 2021 Issue – Due August 20, 2021
The Lunar 100: Features 91-100	November 2021 Issue – Due October 20, 2021

Jerry Hubbell –jerry.hubbell@alpo-astronomy.org
David Teske – david.teske@alpo-astronomy.org

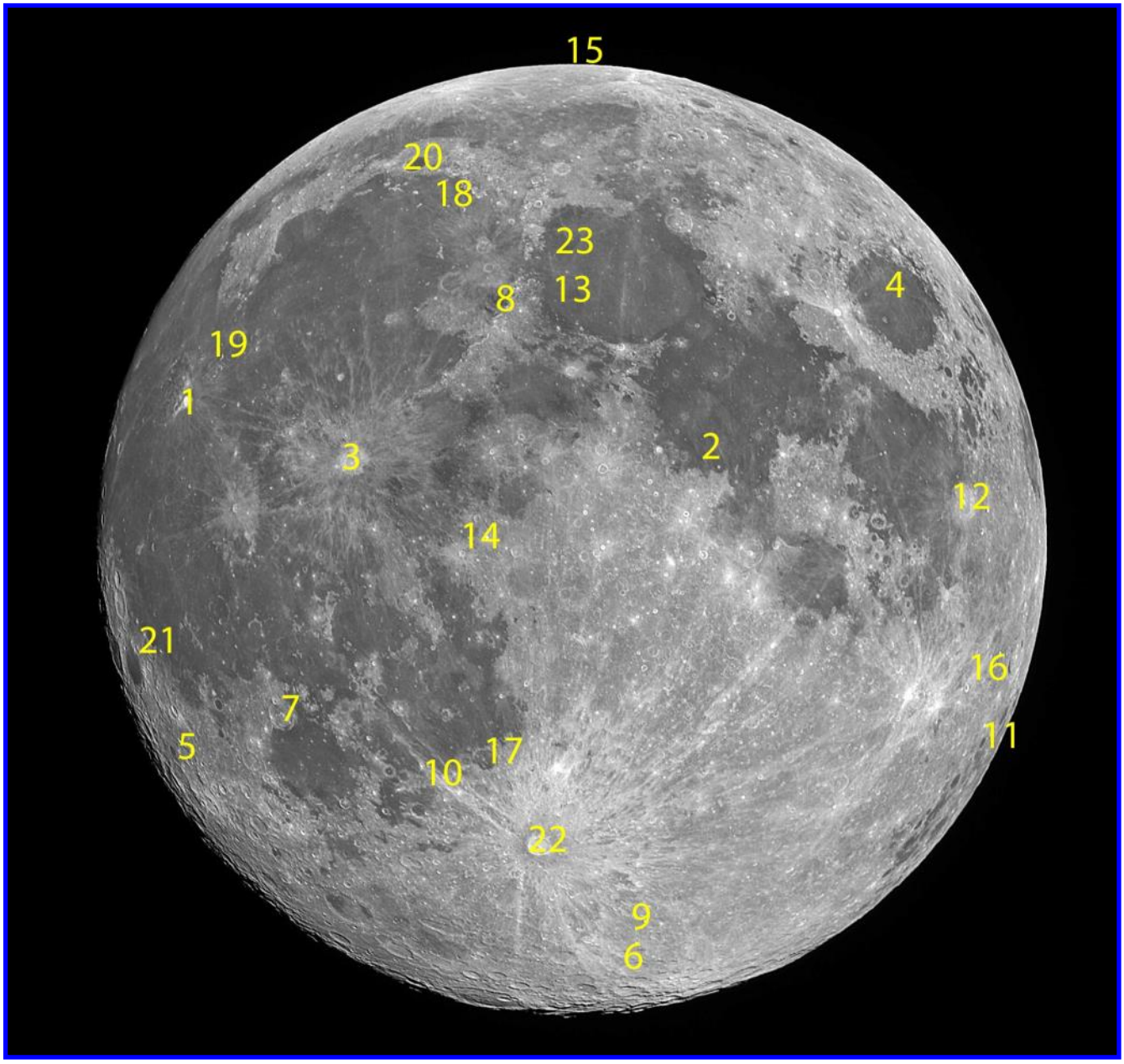
Focus-On Announcement

TAKE A TRIP TO CRISIUM COUNTRY

Mare Crisium is a place worth studying, that's why we include it as a target to FOCUS ON. It is the only basin that is not connected to the others, which makes it easily recognizable with the naked eye, its almost completely flooded interior has a fascinating, and a bit disturbing, dark hue, it is also probably the deepest in relation to the highlands. . And the trip couldn't be more attractive: one of the brightest craters with the strangest ray system (Proclus), domes, wrinkle ridges, little elusive craters. And a curiosity: the Soviet probe Luna 24 collected in Mare Crisium the last lunar sample that we have on Earth and probably the first sample of lunar water was discovered there. We're going on a trip to Mare Crisium!

Please send articles, drawings, images, etc. to Alberto Anunziato and David Teske by **December 20, 2021** for the January 2022 issue of The Lunar Observ-

Key to Images In This Issue



1. Aristarchus
2. Armstrong…
3. Copernicus
4. Crisium, Mare
5. Crüger
6. Cysatus
7. Gassendi
8. Hadley Rille
9. Heraclitus
10. Hesiodus
11. Humboldt
12. Langrenus
13. Linné
14. Mösting A
15. Perry
16. Petavius
17. Pitatus
18. Piazzi Smyth
19. Plato
20. Prinz
21. Sirsalis E
22. Tycho
23. Valentine Dome