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
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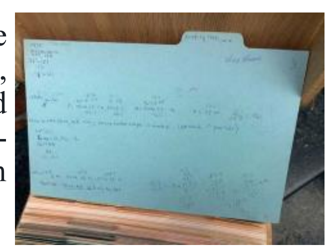
In This Issue



I always learn so much putting *The Lunar Observer* together. In this issue, there are insightful articles about the lunar terrain by Alberto Anunziato, Rik Hill, Howard Eskildsen and David Teske. Howard again analyzes his images and finds some new (to him and I) concentric craters. What is hiding in your observations waiting to be discovered? As always, Tony Cook provides a thorough investigation of Lunar Geologic Change.

This past month I began the long process of scanning the many index cards by Winnie Cameron of Lunar Transient Phenomenon. Tony Cook will comment much more about these observations in the months ahead. He reported that already with limited scans of cards, that there were already new observations not recorded before. As I handle these cards dating back more than 55 years, I can't help but wonder who will be looking at our observations, notes and images 55 years from now? Will our data help somebody connect the dots on some lunar mystery many years from now?

Please send in your observations for the next Focus-On article to myself and Alberto Anunziato by June 20, 2021. This will feature numbers 71-80 of Charles Woods Lunar 100 targets.

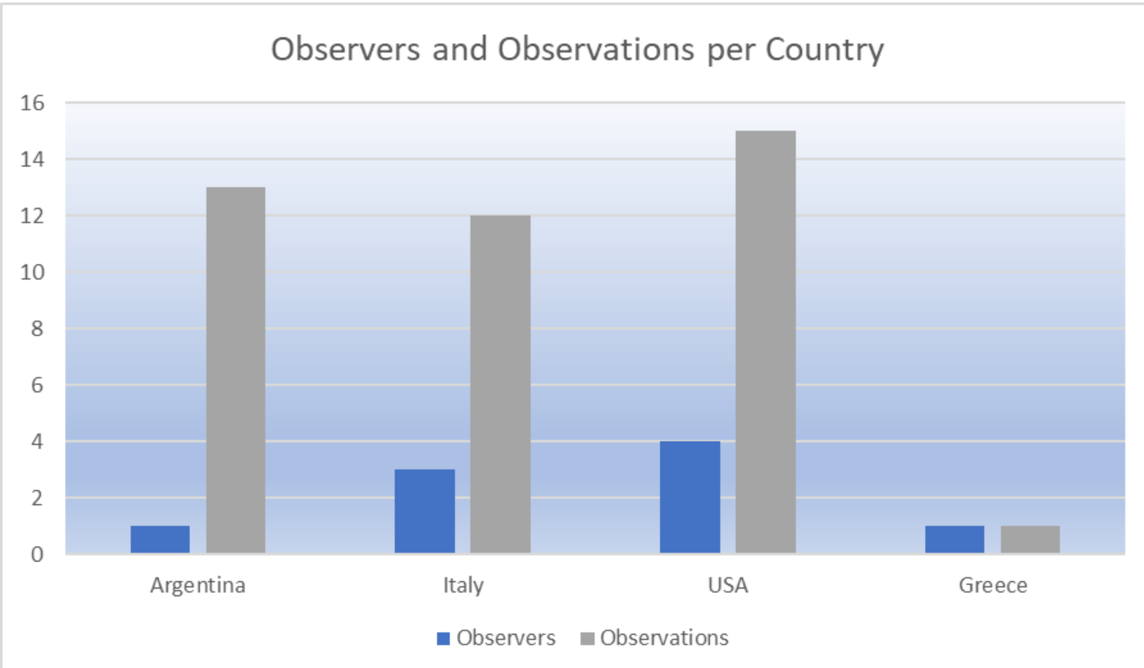
Lunar Topographic Studies

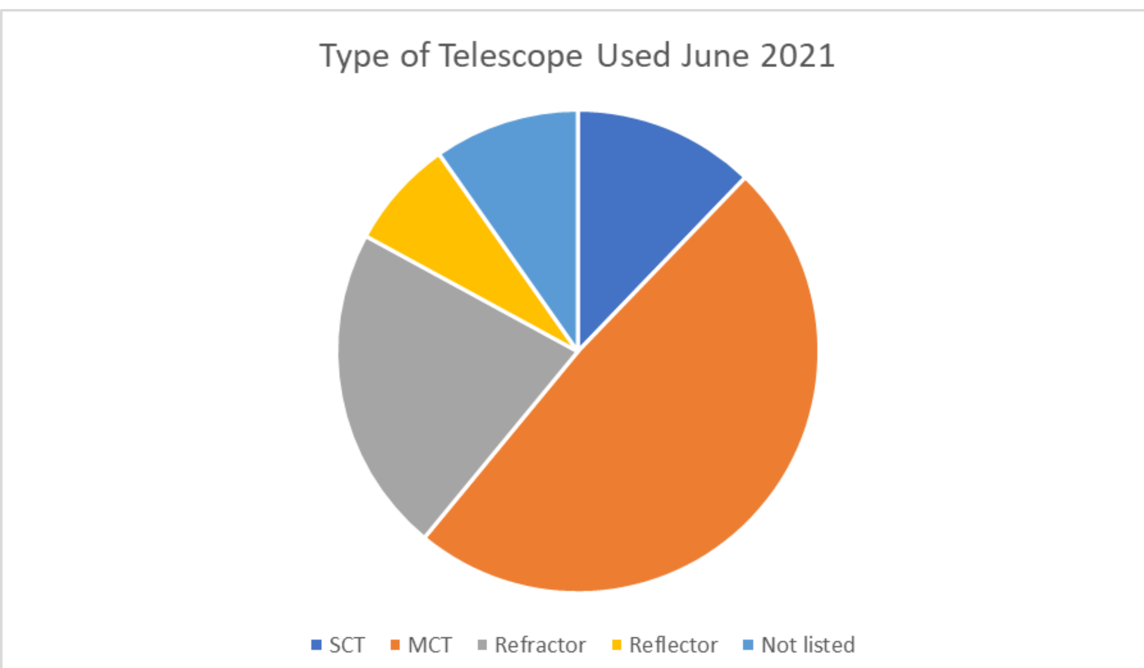
Coordinator – David Teske - david.teske@alpo-astronomy.org
Assistant Coordinator– Alberto Anunziato albertoanunziato@yahoo.com.ar
Assistant Coordinator – William Dembowski - zone-vx@comcast.net
Assistant Coordinator – Jerry Hubbell – jerry.hubbell@alpo-astronomy.org
Assistant Coordinator-Wayne Bailey–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

Name	Location and Organization	Image/Article
Bianchi Massimo Alessandro	SNdR, UAI, Milan, Italy	Drawings of Gassendi and Aristarchus.
Alberto Anunziato	Paraná, Argentina	Articles and images *Southern Mare Imbrium, Some Secondary Craters of Copernicus in the Terminator* and *Three Wrinkle Ridges Southwest Mons Rümker.*
Ioannis (Yannis) A. Bouhras	Athens, Greece	Image of the Full Moon.
Francisco Alsina Cardinalli	Oro Verde, Argentina, SLA	Article and image Southern Mare Imbrium.
Leonardo Alberto Colombo	Córdoba, Argentina	Images of Earthshine and Waxing Crescent Moon.
Walter Ricardo Elias	AEA, Oro Verde, Argentina	Images of Aristarchus, Kant, Montes Apenninus, Tycho,
Howard Eskildsen	Ocala, Florida, USA	Article and image *Mare Crisium Region*, images of Messier, Leakey, Crozier H and, Endymion.
Rik Hill	Loudon Observatory, Tucson, Arizona, USA	Articles and images *Changes, A Channel Between the Seas, Little Ina* and *Overlooked*.
Raffaello Lena	Rome, Italy	Image of Clavius.
Rafael Lara Muñoz	Guatemala, Guatemala, SLA	Image of Mare Crisium.
Raúl Roberto Podestá	Formosa, Argentina	Image of the Waning Gibbous Perigee Moon.
Pedro Romano	San Juan, Argentina	Images of Mare Nectaris and Posidonius (2).
John D Sabia	Keystone College Thomas G Cupillari Observatory, Fleetville, Pennsylvania, USA	Image of one-day old Moon and Venus.
Guido Santacana	San Juan, Puerto Rico, USA	Images of Campanus, Copernicus, Montes Carpatus, Sinus Iridum and Mount Apenninus.
Fernando Surà	San Nicolás de los Arroyos, Argentina	Image of Copernicus.
David Teske	Louisville, Mississippi, USA	Article and image *In and Around Ancient Thebit.*
Fabio Verza	SNdR, UAI, Milan, Italy	Images of Copernicus, Clavius, Plato, Mare Imbrium, Mare Australe, Mare Fecunditatis, Clavius, Rupes Recta and Monte Apenninus.

2021 *The Lunar Observer* By the Numbers

This month there were 41 observations by 16 contributors in 4 countries.





Overlooked

Rik Hill

Here we have an image of a region that is often overlooked. Certainly, it was to me. At the bottom middle of the image is the crater Manilius (41 km). To the right f this crater is the flat are Lacus Lenitatis and a little further on is Lacus Hiemalis and above them is Lacus Gaudii. Just above Manilus is another flat area, Lacus Doloris and further on another Lacus Felicitatis to the left and Lacus Odii to the right. Of the 20 features listed as “lacus” on the Moon, this little region has over a quarter of them! Notice to the left of Manilius there is a mountain sitting in northern Mare Vaporum and a nice fat dome next to that mountain. I could find no identification for that dome.

Directly above Manilius near the middle of this image is the smallish crater Sulpicius Gallus (12 km) on the shores of Mare Serenitatis. To the right of this crater are the Rimae Sulpicius Gallus. Just above this is the wrinkle ridge Dorsum Buckland. Way over to the right is another sizable crater, Menelaus (27 km). Who thought it was a good idea to put Manilius and Menelaus next to each other?! Above Menelaus in the Mare is the isolated crater Bessel (17 km). Lastly, way over on the left edge is the crater Conon (22 km) which is near Hadley Rille in the Montes Apennine.

So much going on in this overlooked region!

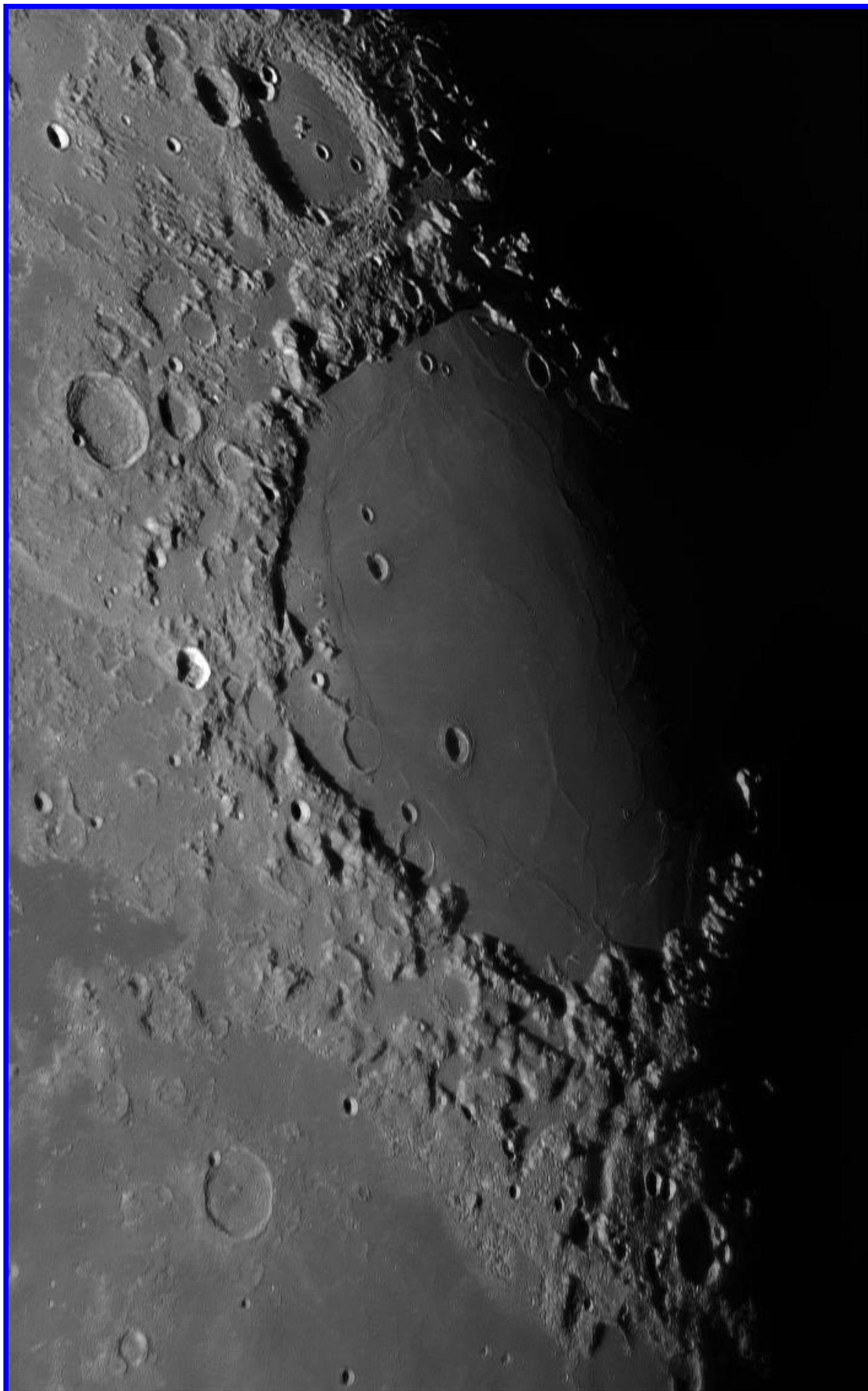
Sulpicius Gallus *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 19 May 2020 02:03 UT, colongitude 11.1^o. TEC 8 inch f/20 Maksutov-Cassegrain telescope, barlow, 610 nm filter, Skyris 132M camera. Seeing 7-8/10.*

Mare Crisium Region
Howard Eskildsen

If I were to name the basin now known as Mare Crisium, I would name it "The Carapace," since it reminds me of the back of a crab. I am a little surprised that none of its mountainous margin has given a name. How about "Montes Marginis Crisium?" Perhaps it is a good thing that I have no access the committees that name such things.

Only a few small craters mark the interior, but several dorsa, or wrinkle ridges betray the crustal forces upon its basalt fill. Hints of rays from Proclus cross the western margin of the mare and point back to the young, bright crater just outside the mare's rim.

At the top of the image, Cleomedes has a flat floor filled with a combination of basalt and ejecta from nearby craters. Some fine rilles reveal that its floor has experienced uplift forces in the distant past. To the southwest of Cleomedes, Macrobius lies near the left margin of the image and is pocked with a small crater on its SW rim. Farther south, near the lower left image, a similarly sized crater, Taruntius, lies with a small crater on its NW rim. Its floor is fractured and uplifted along with its central peak. LROC measurements show that the central peak is nearly as high as the southwest crater rim and is actually higher than the terrain beyond that portion of the rim.



Mare Crisium, 2021/04/29, 07:32 UT
Colongitude 117.6, Seeing 6/10, Transparency 3/6
C9.25 Schmidt-Cassegrain, f/10, FL 2395mm, Celestron Skyris 236M, No Filter
Howard Eskildsen, Ocala, Florida, USA

Mare Crisium, *Howard Eskildsen, Ocala, Florida, USA. 29 April 2021 07:32 UT, colongitude 117.6°. Celestron 9.25 inch Schmidt-Cassegrain telescope, Skyris 236 M camera. Seeing 6/10, transparency 3/6.*

In and Around Ancient Thebit

David Teske

Readers of this newsletter are likely familiar with the Straight Wall, a lunar fault also known as Rupes Recta. It is the black line in the middle of this image that stretches 110 km in a roughly north-south direction. Look carefully, is it straight? Short answer, no. In fact, it is not even much of a wall, it slopes about 7 degrees. That is a steep highway grade, but no wall. As this image was taken in the morning for Rupes Recta, the wall is slanted to the left (west) and is in shadow. Imaged two weeks later, and Rupes Recta would be a bright (but not quite straight) line. These observations mean that the left (west) side of Rupes Recta is about 300 m lower than the right (east) side. Just east of Rupes Recta is the triple crater Thebit. Thebit itself is pretty crisp crater 58 km in diameter. On the west rim of Thebit is a younger crater, Thebit A (20 km) and on the west rim of Thebit is a smaller crater, Thebit C (6 km). Look closely, which is older, Thebit A or Thebit C? Though these are both "young" craters on the Moon (likely Copernican age, up to 1.1 billion years old), nearby, you can see a much older crater. Just to the southwest of Thebit is Thebit P, a much-degraded crater 78 km across. The northwest rim of Thebit P is near the southern end of Rupes Recta. With some imagination, this area can be imagined as the handle of a sword with the sword blade being the Straight Wall itself. This handle area was once called the 'Stag's-Horn Mountains". Moving from Thebit westward past the Straight Wall, we come upon another multiple crater, a smaller version of Thebit. This is the crater Birt, a Copernican age crater 17 km across. On the eastern rim of Birt is a smaller crater, Birt A (6.8 km). Just northwest of Birt is Rima Birt, tough to see but visible here. This rima is 50 km long but only 1.5 km wide. This likely was a lava tube that once carried lava but long since has collapsed. If you look carefully, this rima begins at a dome (named Birt E (5 km)) on its north end and ends at another dome (named Birt F (3 km)) on its south end. Domes such as these were formed from magma pushing the lunar surface upwards. These domes are likely named as craters because the rima bisects these domes and the craters are actually vents on the domes.

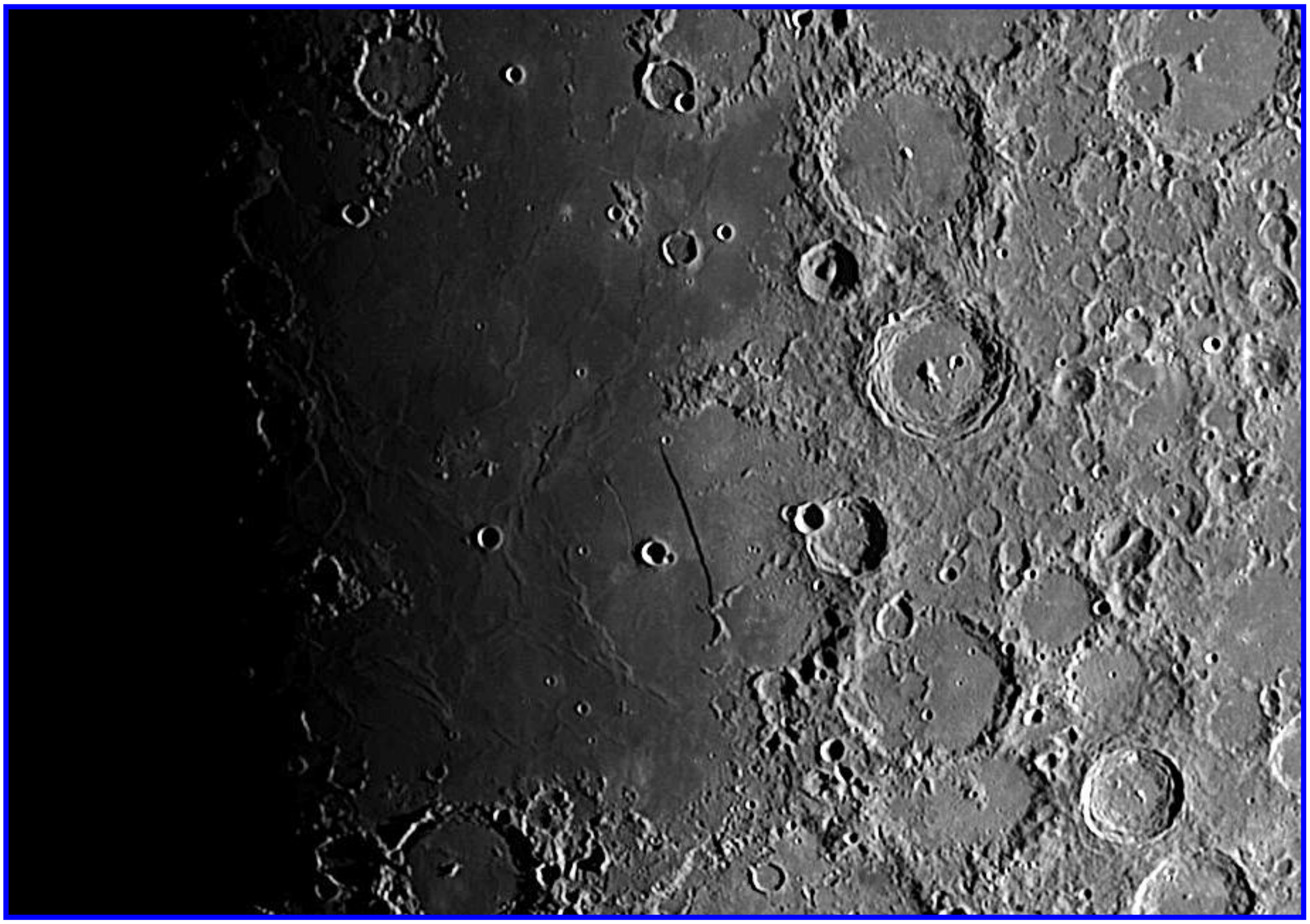
Under this early morning light, a giant but unnamed crater can clearly be seen. This is "Ancient Thebit". Can you see it? Thebit makes up its eastern side, Rupes Recta is in the middle, and to the west, past Birt and its Rima, are wrinkle ridges that make this crater's western wall. If this area was imaged a day or two later, Ancient Thebit would not be seen. If you are still having trouble seeing it, draw a line from Thebit, through Birt to another crisp crater, Nicollet (15.2 km). The western wall of Ancient Thebit lie between Nicollet and Birt.

So, what happened here to make this varied moon-scape with ancient craters, craters, domes, fault lines and such? In the Pre-Nectarian age (over 3.92 billion years ago) the basin of this area, Mare Nubium was formed by an asteroid impact. Not long after (relatively speaking) another large asteroid formed the mighty crater Ancient Thebit. Over time, lavas oozed up and filled Mare Nubium and Ancient Thebit with layers of basalt, thickest in the middle, thinnest near the edge of the basin. This caused the western side of Ancient Thebit to be almost submerged under lava, leaving only wrinkle ridges were once mighty crater walls climbed. Rupes Recta is a fault that likely formed when the weights of the lava on the western side of Ancient Thebit caused a slump in the surface. The domes of Rima Birt formed when remaining pools of magma upwelled under the lunar surface, forming these small bumps on the Moon. Rima Birt likely carried lava hat helped to finish the basalt coating of the area.

This is such a rich area of the Moon to explore. Cut off the top of the image is the magnificent Ptolemaeus. Below that is Alphonsus (118 km) with unusual central ridge and in this image, four dark areas. These are likely ash from pyroclastic flows that produced these darker areas. Below that is the crater Arzachel (97 km), another beautiful crater. Between Arzachel and Alphonsus on the shores of Mare Nubium is the crater Alpetragius (40 km) with its massive central peak. These craters are familiar to many Moon-gazers.

After this, our route will take some turns. Below Thebit is the degraded crater Purbach. At 118 km in diameter, this ancient crater was once called a 'walled plain'. Directly below Purbach is an irregularly shaped crater, Regiomontanus (126 by 110 km). It is most notable for its central peak with the small crater Regiomontanus A (5.6 km) on its top. Back when the debate raged whether or not lunar craters were formed by volcanic or impact forces, this central peak looked like a volcano and gave brief hope to the volcanologists. Alas, it was not to be, it looks like a lucky hit by a small asteroid.

Along the bottom of the image is the large crater Pitatus (97 km). Immediately west of there is the crater Hesiodus. The light was spectacular at the time of this observation. There is a break between these two craters mutual wall that allows a shaft of sunlight to cross shadow-filled Hesiodus. With close inspection, that shaft of morning light just might be seen.

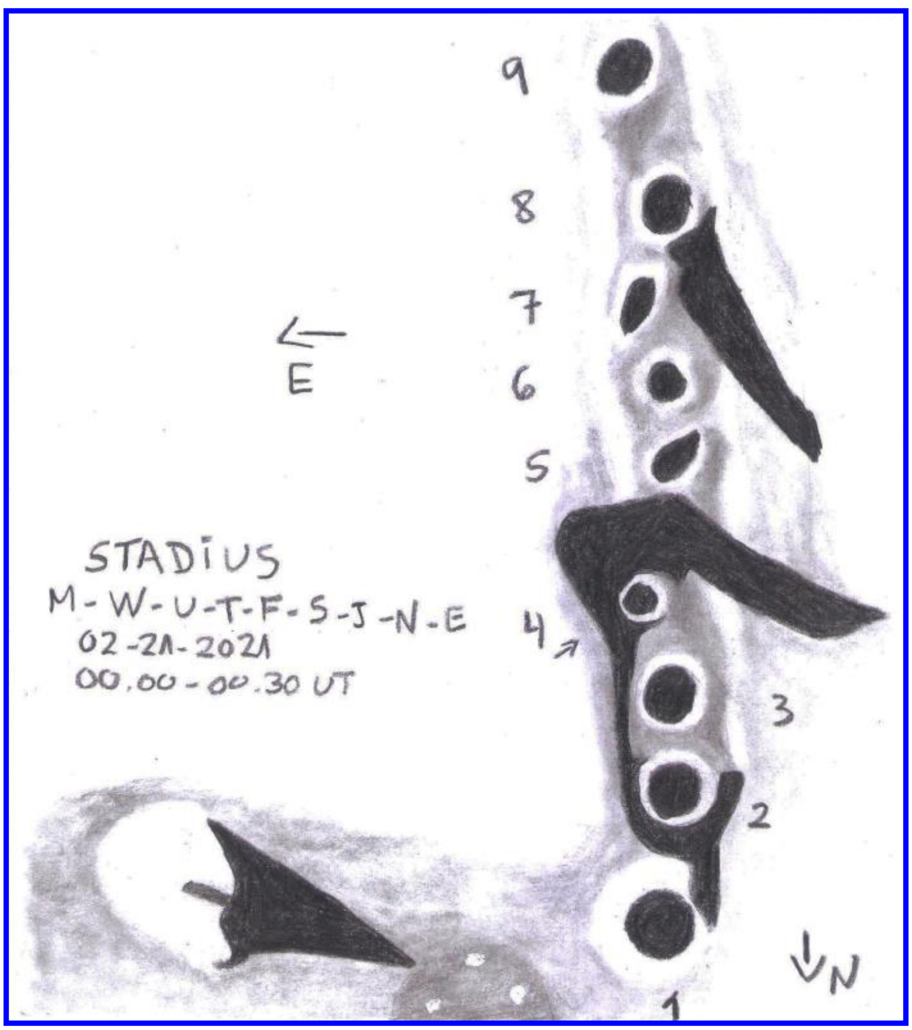


Ancient Thebit, *David Teske, Louisville, Mississippi, USA. 21 April 2021 02:25 UT, colongitude 15.3°. 4 inch f/15 refractor telescope, ZWO ASI120mm/s camera. Seeing 8/10.*

Some Secondary Craters of Copernicus in the Terminator

Alberto Anunziato

What we see is a chain of secondary craters from the Copernicus crater impact. Because Copernicus is a geologically recent crater, craters that were formed by fragmentation of impactor fragments or material ejected from the main impact are better preserved than older secondary impact craters. In last month's issue of our TLO we were able to see in detail the secondary craters of Copernicus in the images that illustrated the number 69 of the Lunar 100 list in the Focus-On Section. What I want to share now is an observation experience of some of these secondary craters very close to the terminator. I had never looked at the details of the terrain around secondary craters so clearly. We are talking about the craters called Stadius M (1) W (2) U (3) J (4) T (5) F (6) S (7) E (8) and R (9). Of course, they are very small, 5 kilometers in diameter, except for Stadius M (7 km) and Stadius J (4 km), which means that we only see their interior in shadows and their bright edges. Yes, we can perceive that Stadius T (5) and Stadius S (7) appear oval, which would not imply that they were produced by an oblique impact (like Schiller, for example), since it is evident that all of them were formed simultaneously from the same direction. The oval shape is likely nothing more than two overlapping craters. What struck me about the observation, and perhaps I was unable to convey in the drawing, is that the craters are united as in a kind of sheath, with common outer edges of with a pale glow, which would indicate that east and west the terrain is elevated. It is not that the east and west walls of the 9 craters are united, but at short distance from them the terrain rises. In addition, between the western walls of some craters and the common bright rim there were shadows indicating a certain depth of the terrain (craters 3, 5 and 6, as well as north of 9). Personal hypothesis: fragments 2 to 8 all impacted very close to each other, so that the terrain to the sides and to the south (since they were coming north) rose and formed a unit, craters 1 and 9 are further apart. I tried to carefully record the very dark shadows that are seen between 1 and 2, between 4 and 5 and north of 8. I estimate that they correspond to small rilles or craterlets, probably indicating the separation, a low ground, between two zones: between crater 1 (Stadius M) and the elevation that would form Stadius W to J, and between this elevation and the craters further south. The mountain peaks seen at the bottom, barely outlined, belong to the final foothills of the Montes Apenninus in the direction of Eratosthenes: a very high peak with a cleft to the west and an intense circular glow on the southwest slope and an elevation with numerous bright spots (which I schematized at 3 due to lack of time when recording the observation).



Copernicus Secondary Craters, *Alberto Anunziato, Paraná, Argentina. 21 February 2021 00:00-00:30 UT. Meade EX105 mm Maksutov-Cassegrain telescope, 154 x.*

Changes

Rik Hill

When I give talks on lunar imaging, I frequently get the question: "Why the Moon? Nothing changes there. It's all been seen!" Well, things change with slight changes in lighting. Most of the spacecraft that have orbited and imaged the Moon do so to maintain a specific distance from the terminator in their pole-to-pole orbits, as a compromise lighting condition. As a result, you might not see a spacecraft image of the Blanchinus "X" shown in the left image, a feature that only lasts a few hours before the rising Sun hides it. The circular shadow filled crater below and to the right of Werner (71 km) with Blanchinus (70 km) itself lost in the pool of darkness above immediately right of the "X". In fact, the walls of Blanchinus makes up he right side of the "X". On the right edge of this image is a nicely shown flat floored crater Apianus (65 km) with Playfair (49 km) above it half in shadow.

The right-hand image is at a colongitude equivalent to a day later (though actually 355 days later). The large crater at the top of the image is Arzachel (100 km) with Werner being the very circular crater at the bottom. Blanchinus is just above it, a shallow oval crater and above that is La Caille (70 km). The large crater on the terminator to the left of Blanchinus is Purbach (121 km). Can you see the "X"? It takes a bit of work, but I've given you lots of clues. One feature I used as a landmark for myself is the odd crater to the upper right of La Caille that looks like a deer footprint, Delaunay (48 km). In the left image it is in full shadow but is identifiable with the small crater below. This is pretty much how the "X" looks, in most spacecraft images. This is one reason "Why the Moon." To look for transient feature like this "X" and watch them change with different Sun angles.

***Blanchinus "X". Left**, Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 30 April 2020 02:24 UT, colongitude 355.3°. Dynamax 6 inch Schmidt-Cassegrain telescope, barlow, 665 nm filter, Skyris 445M camera. Seeing 8/10. **Right**, Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 20 April 2020 02:35 UT, colongitude 5.4°. TEC 8 inch f/20 Maksutov-Cassegrain telescope, barlow, 610 nm filter, Skyris 132M camera. Seeing 8/10.*

Southern Mare Imbrium

Francisco Alsina Cardinalli-Alberto Anunziato

The Mare Imbrium to the north of Copernicus is quite depopulated with craters and for this reason a trio of medium size craters stands out, the one formed by Timocharis, Lambert and Pytheas. Browsing through "The Moon and How to Observe It" by Peter Grego I found an insurmountable description of what we observe in our image: "In the northeast of this area, south of Archimedes, lies the sizable rectangular upland plateau of Montes Archimedes," (top right in our image) "measuring about 150 km from east to west, which rises from the surrounding plain to a jumbled mass of peaks that rise to heights of 2,000 m. To their west are the little, bowl-shaped twin craters Feuillée (9.5 km) and Beer (10.2 km), notable for a nearby dome and a tiny crater chain to the east, the latter only visible in a 150mm telescope. Wallace (26 km), 310 km from the southern mare border, has a thin, narrow ring representing the rim of a nearly completely submerged crater (...) Timocharis (34 km), 85 km west of Beer, has a sharp polygonal rim, substantial terraced walls and a 6-km diameter crater in the middle of its floor. Lambert (30 km), 180 km to its west, is a similar looking sort of crater, though it is smaller and more eroded than Timocharis". Further to the right (west) we find the third member of the trio, Pytheas, 20 km diameter and very recent (in geological terms). We can see how brightly the interior of the west wall shines despite being so close to the terminator. In the center of the image, we see the Dorsum Zirkel running between Timocharis and Pytheas in the direction of Lambert. Its arch is very wide, as we can deduce if we know that the crater above the ridge is 3.4 kilometers in diameter (Pytheas G, clearly visible). Passing Lambert, the arch of the ridge is thinner and its slope steeper to the west (left), as we can deduce from its shadow. Throughout this area we can see isolated peaks protruding from the basaltic lava that formed the mare. To the left of Lambert, we see the most prominent, Mons La Hire, a complex of peaks that are perceived as points of light in the shadows. Further to the left we can guess the brightness of what is unofficially known as Mons Whipple or La Hire Alpha. The very bright peak to the right of Lambert is unnamed (or we couldn't reach its name). In the shadows (in the lower right corner) the Carpatus Mountains shine. The illuminated part of the image is crossed by the bright rays of Copernicus, which are prominent even in a very oblique illumination.

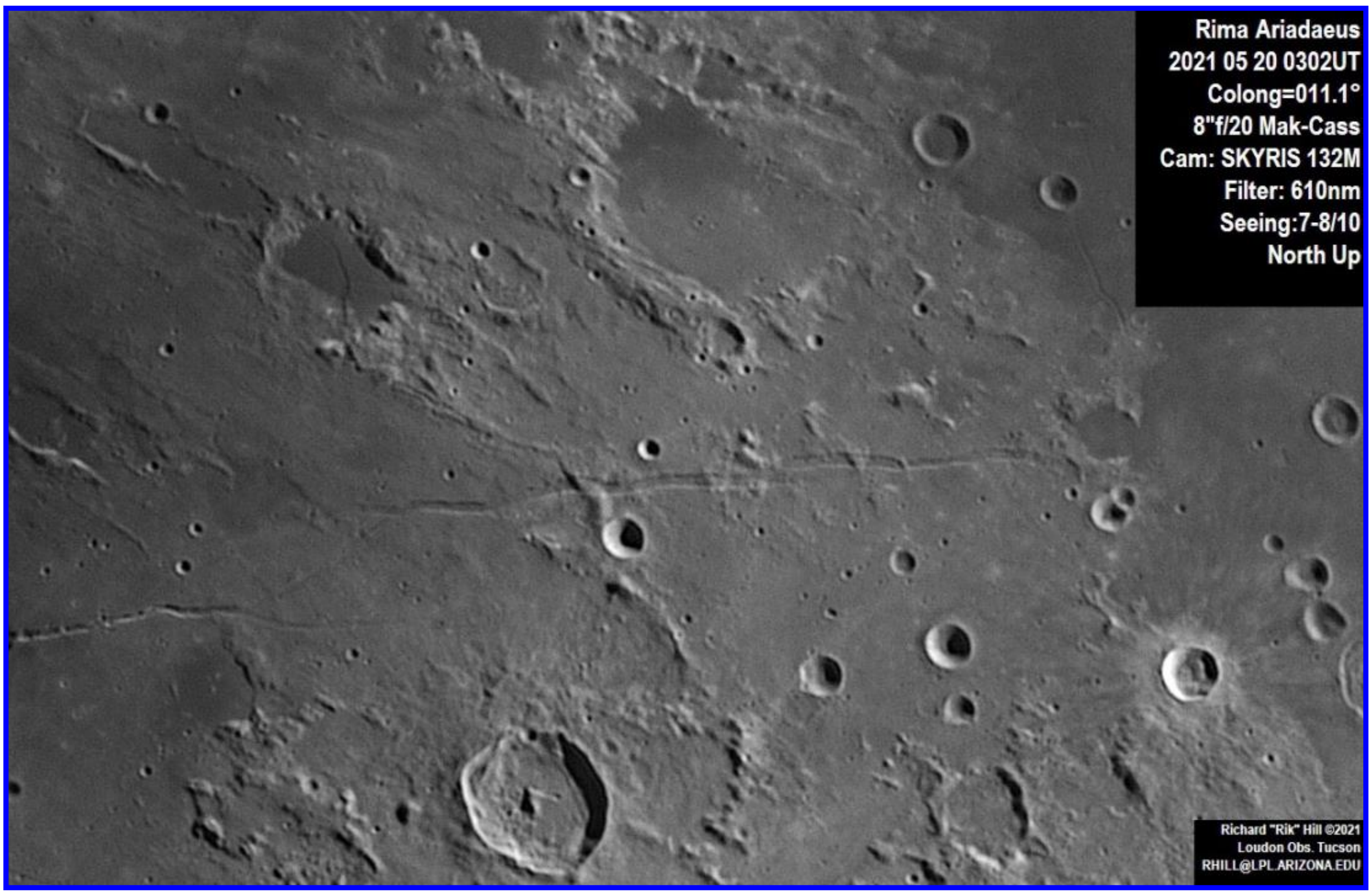
Lambert, *Francisco Alsina Cardinalli, Oro Verde, Argentina, SLA. 24 February 2018 23:28 UT. 200 mm refractor telescope, QHY5-ll camera.*

A Channel Between the Seas

Rik Hill

Like a canal between Mare Tranquillitatis and Mare Vaporum, Rima Ariadaeus can be seen here roughly as a 300 km long horizontal graben-like trench. A graben is where blocks of rock drop down inside a spreading fault. In this case, the blocks are 3-5 km wide. Note that the fault passes through whole mountains! At the left end of this image, we can see a portion of Rima Hyginus. The crater just left of center is Silberschlag (14 km) and just above Rima Ariadaeus is the smaller crater Silberschlag A (7 km). On the lower edge of this image is the much larger oval crater Agrippa (48 km) with a nice ejecta blanket on the north side. To the right of Agrippa are two craters of the same diameter, Whewell (15 km) and Cayley (15 km), although to my eye Cayley looks slightly larger. They point to the beautiful Dionysius (19 km) with an impressive ray system, the only such crater with rays of any size in this field. Above Dionysius is the double crater Ariadaeus (12 km) and Ariadaeus A (8 km).

Above the rima are several large impressive formations. The large oval crater in the middle near the top edge is the Julius Caesar listed as 94 km in diameter (85 km in some sources) that is anything but round! The darker material in the northern end of Julius Caesar probably indicates infill from material from the Tranquillitatis impact event. To the right is the very circular crater with a flat floor, Sosigenes (19 km). Then left of Julius Caesar is a strange crater, almost rectangular, Boscovich with a nice system of rimae crossing its floor. It is listed as 48 km "diameter" but I measured 30 x 48 km on LROC Quick Map. Notice the out-flow material on the southern end from a time when things were a lot hotter here.



Rima Ariadaeus, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 20 May 2020 03:02 UT, colongitude 11.1°. TEC 8 inch f/20 Maksutov-Cassegrain telescope, barlow, 610 nm filter, Skyris 132M camera. Seeing 7-8/10.*

Three Wrinkle Ridges Southwest Mons Rümker

Alberto Anunziato

Mons Rümker near the terminator is a splendid landscape to admire, but very difficult to draw. It is an extremely complicated elevation to record all the details. That is why I decided that it would be more interesting to record in more detail other areas that may be less well known. And what was emerging very conspicuously were 3 wrinkle ridges clearly associated with three small craters. The relationship between wrinkle ridges and craters has always intrigued me. Elger had already noted this relationship: “It is suggestive peculiarity of many of the lunar ridges, both on Maria and elsewhere, that they are very generally found in association with craters of every size. Illustrations of this fact occur almost everywhere. Frequently small craters are found on the summits of these elevations, but more often on their flanks and near their base. Where a ridge suddenly changes its direction, a crater of some prominence generally marks the point, often forming a node, or crossing-place of other ridges, which thus appear to radiate from it as a center”. It should be borne in mind that Elger's book belongs to the time when most astronomers attributed a volcanic origin to lunar craters, so the spatial relationship between craters and wrinkle ridges that the author marks seem to suggest that the craters would be geologically prior to, and would have given rise to, the wrinkle ridges. Now we know that the relationship between craters and wrinkle ridges, which every observer knows, is not causal, it can be a crater impacting on a wrinkle ridge or a wrinkle ridge deforming a pre-existing crater. But it is quite common to observe a wrinkle ridge that appears to end in a crater or that changes direction when it reaches a crater. This area of the Oceanus Procellarum is particularly marked by wrinkle ridges that run concentrically in a north-south direction, as can be seen in Chart No. 8 of Rükl's Atlas (more specifically between 39º and 37º North and 62º and 56º West). The craters that we observe are, from north to south, Rumker E (7 km diameter), Rumker F (5 km diameter) and Naumann B (10 km diameter). The wrinkle ridges are proportional to the size of the craters, the larger the crater the brighter the wrinkle ridge and the more shadow it casts. Naumann B stands in the center of a wrinkle ridge that seems to widen around him, the brightest of the three and the one that casts the darkest shadows, especially to the west. The wrinkle that appears to end in Rumker E is not as bright and casts a shadow only to the west and considerably less dark than the first. The wrinkle ridge that appears to end in Rumker F has a very slight glow and a very diffuse shadow. The reader can find a landscape very similar to the one we present in Plate 56 of the Lunar Atlas of the Japanese mission Kaguya (famous for the beauty of its images). That image shows an intricate set of wrinkle ridges located a little further north than the ones we see in our drawing (although included in the same Letter 8 of Rükl's Atlas). A singular landscape in an interesting image, few images obtained in lunar orbit show wrinkle ridges with that degree of detail, which is very useful to understand how misleading is the supposed monotony of the smooth surfaces of the maria, actually full of small elevations that we briefly observe when oblique illumination near the terminator allows it.

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Motomaro, Shirao-Wood, Charles (2011). The Kaguya Lunar Atlas, Springer, New York.

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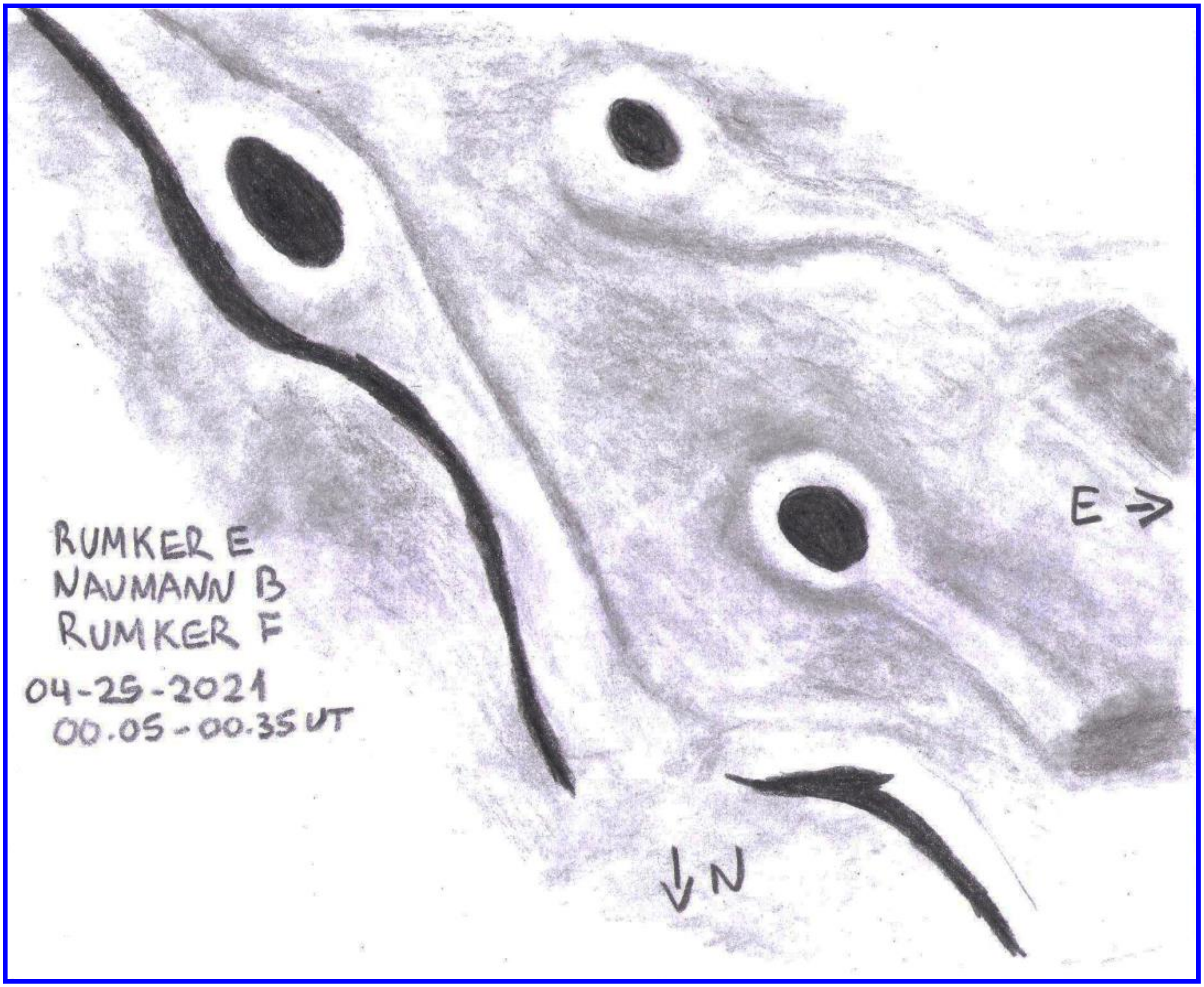


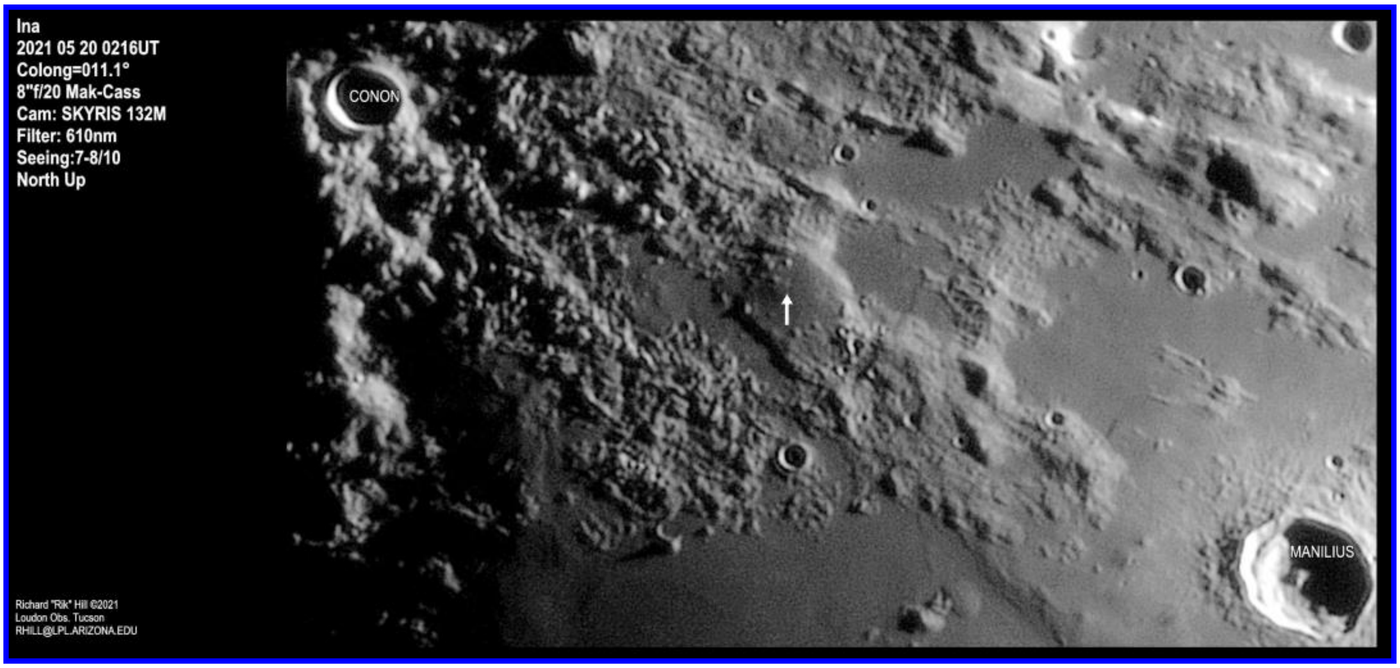
Dorsa Near Mons Rümker, *Alberto Anunziato, Paraná, Argentina. 25 April 2021 00:05-00:35 UT. Meade EX105 mm Maksutov-Cassegrain telescope, 154 x.*

Little Ina

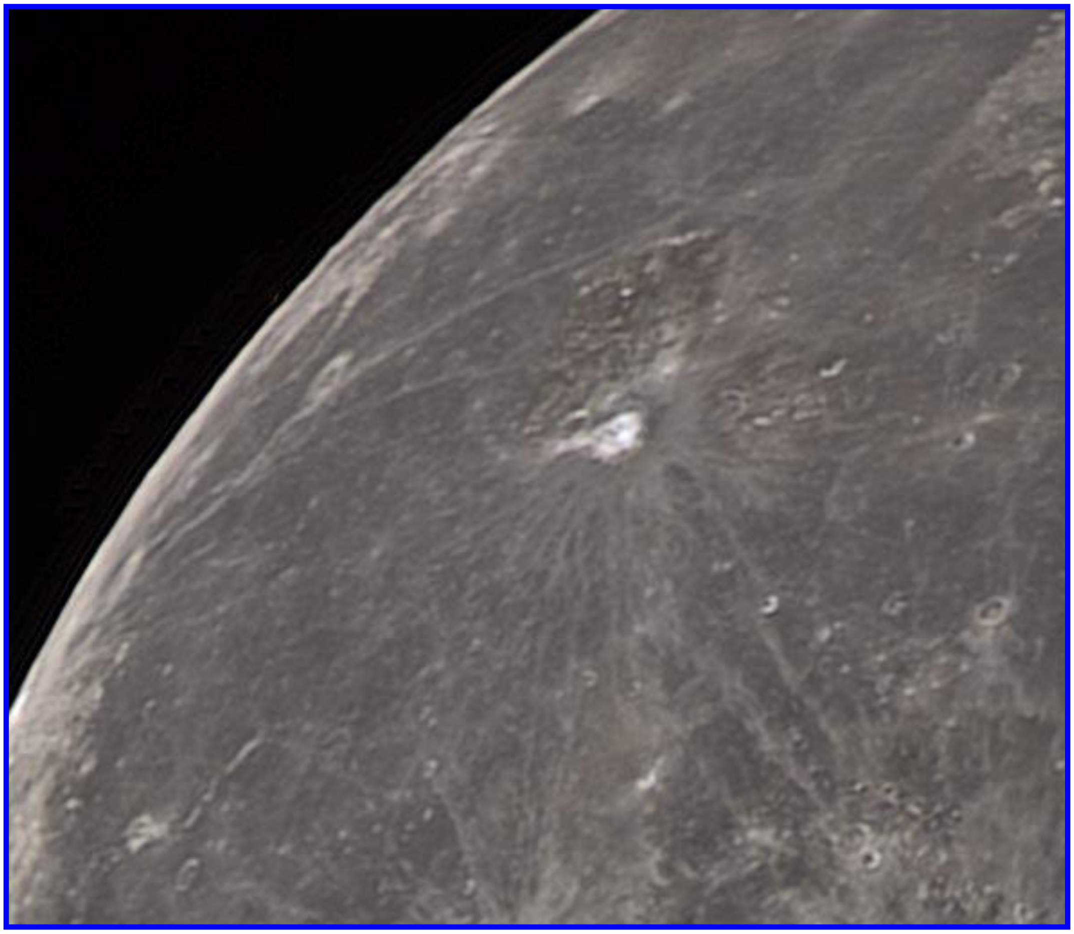
Rik Hill

Before he died, I was at the home of Ewen Whitaker when he challenged me to find the lunar feature Ina. He showed me a spacecraft image but never told me the size, just that it was "very small". This year I gave it a go, hunted down the location of it and was doubtful I could really see the "D" shaped volcanic feature. Its only 1.9 x 2.9 km in size on a plateau in the middle of Lacus Felicitatis. It took a while but I did manage to find it as a smudge on my image which is pretty much all you're going to see in an 8-inch aperture. It shows up very well on the LROC Quick Map as a sideways "D". There is nothing else like it on the Moon and its slightly blue tint would make the use of filters to find it which I will do in the future. Several larger craters are labeled in this image for easy reference.

Happy hunting!



Ina, *Richard Hill, Loudon Observatory, Tucson, Arizona, USA. 20 May 2020 02:16 UT, colongitude 11.1°. TEC 8 inch f/20 Maksutov-Cassegrain telescope, barlow, 610 nm filter, Skyris 132M camera. Seeing 7-8/10.*



Aristarchus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 01 May 2021 22:34 UT. 114 mm reflector telescope, QHY5 ll C camera.*

Eastern Mare Imbrium, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 19:45 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

Kant, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 01 May 2021 22:33 UT. 114 mm reflector telescope, QHY5 ll C camera.*

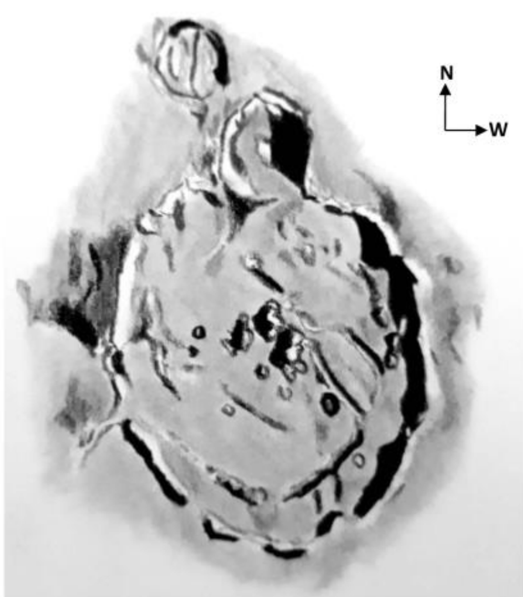
Plato, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 18:12 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

Montes Apenninus, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 01 May 2021 22:31 UT. 114 mm reflector telescope, QHY5 ll C camera.*

Campanus and Mercator, *Guido Santacana, San Juan, Puerto Rico, USA. 23 March 2021 02:50 UT. 120 mm f/8 refractor telescope, 2 x barlow, ZWO ASI224mc camera. Seeing 8/10, transparency 3.5/6.*

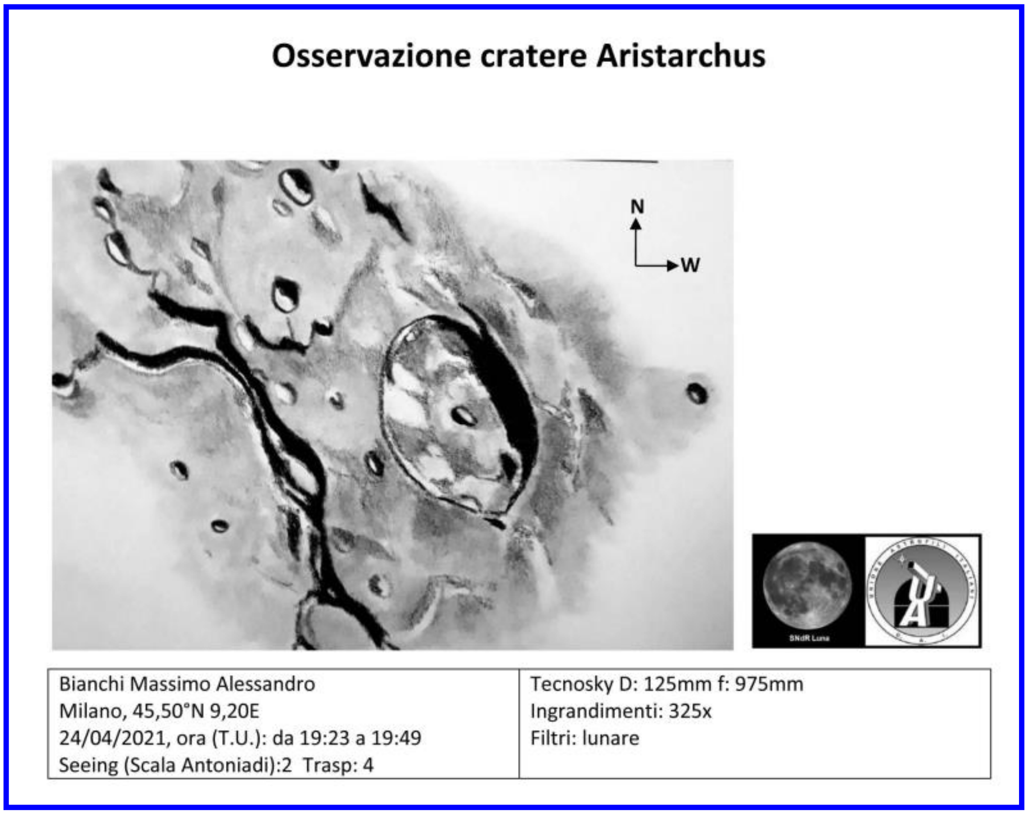
Tycho, *Walter Ricardo Elias, AEA, Oro Verde, Argentina. 01 May 2021 22:37 UT. 114 mm reflector telescope, QHY5 ll C camera.*

Osservazione cratere Gassendi



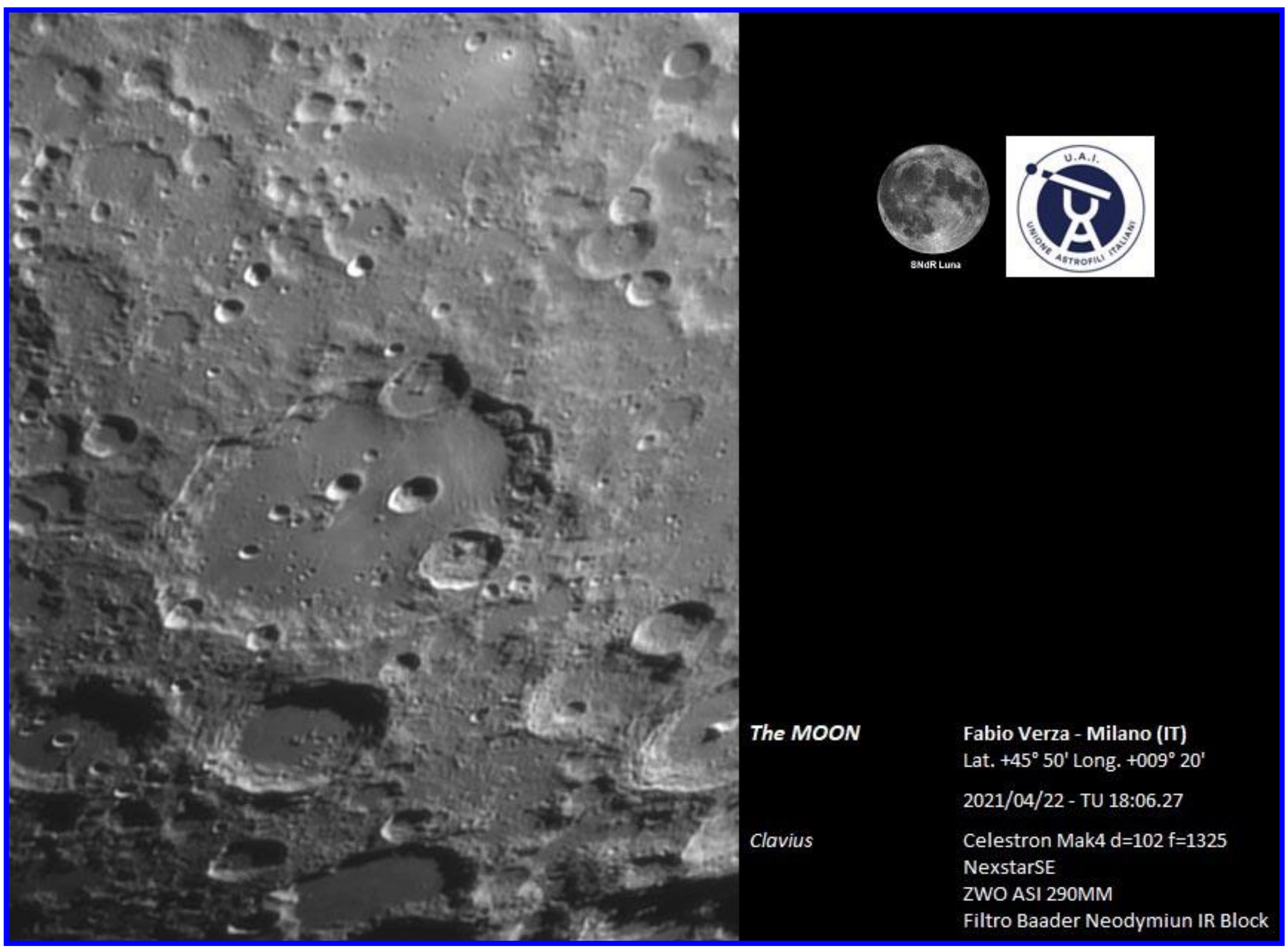
Bianchi Massimo Alessandro Milano, 45,50°N 9,20E 23/04/2021, ora (T.U.): da 19:03 a 19:25 Seeing (Scala Antoniadi):2 Trasp: 4	Tecnosky D: 125mm f: 975mm Ingrandimenti: 325x Filtri: nessuno

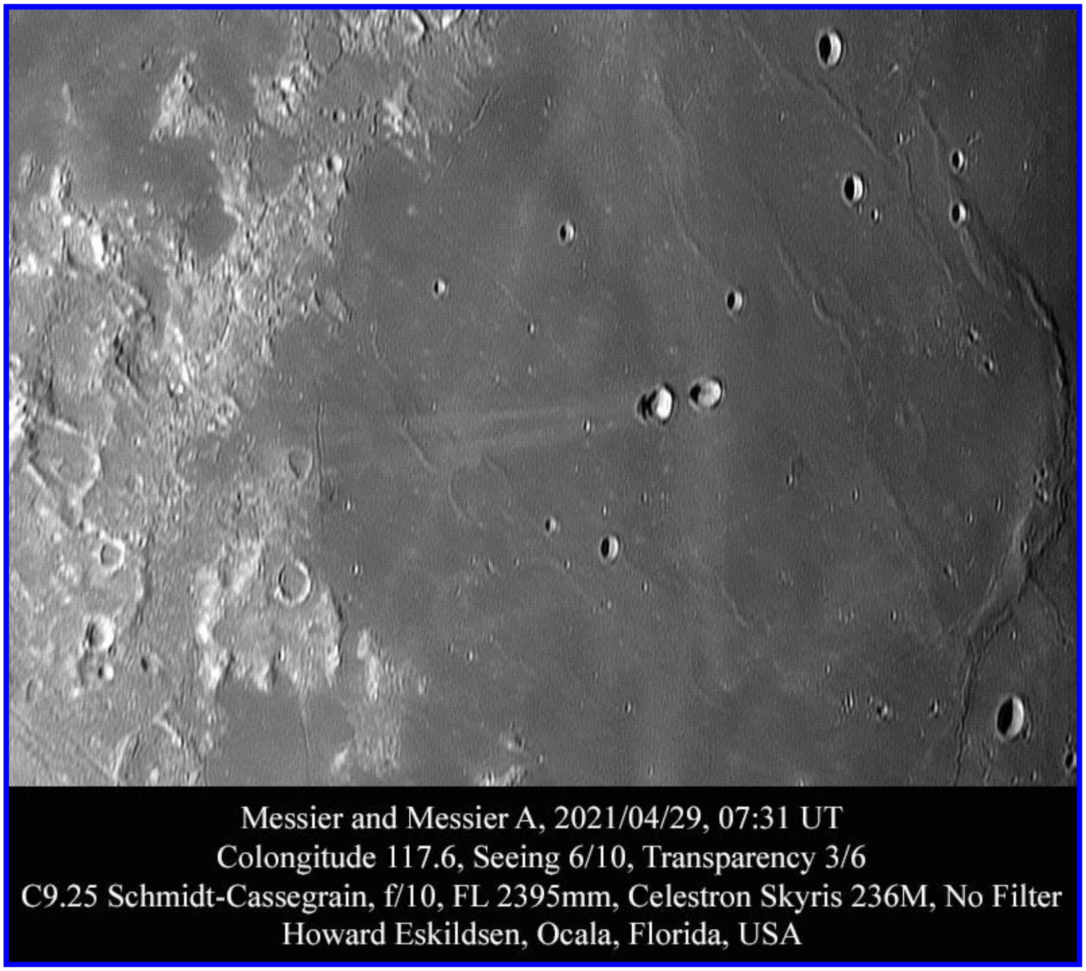
Gassendi, *Bianchi Massimo Alessandro, SNdR, UAI, Milan, Italy. 23 April 2021 19:03 to 19:25 UT. 125 mm telescope, 325x.*



Aristarchus, *Bianchi Massimo Alessandro, SNdR, UAI, Milan, Italy. 24 April 2021 19:23 to 19:49 UT. 125 mm telescope, 325x.*

Clavius, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 18:06 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*



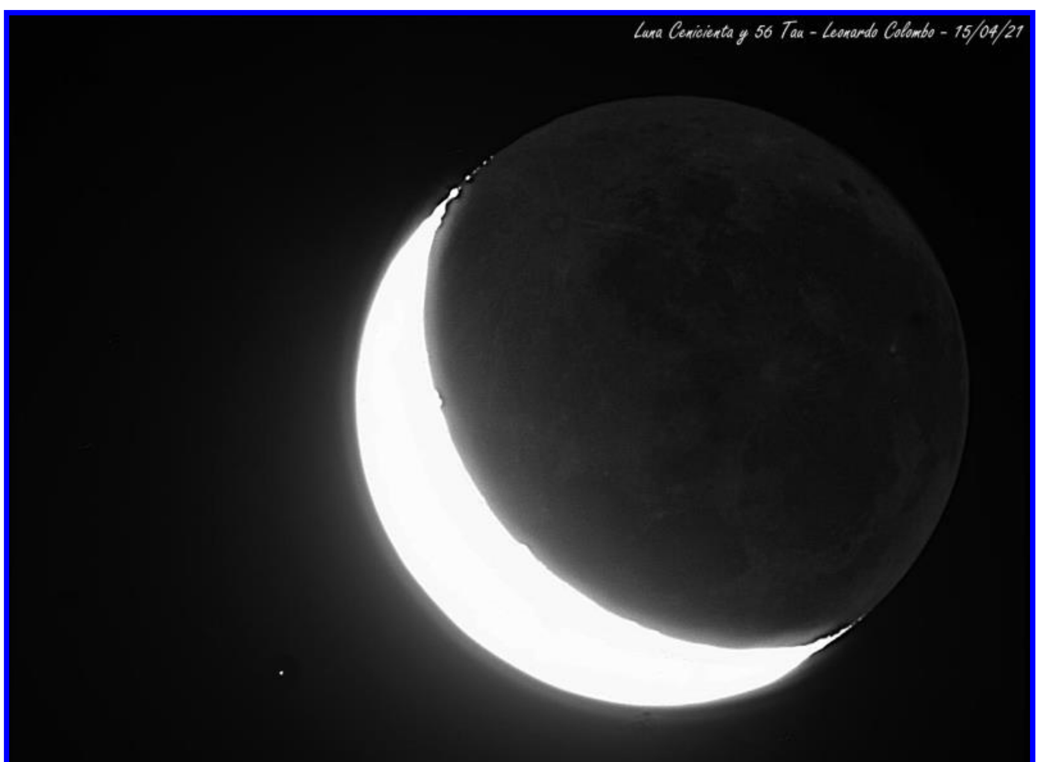


Messier and Messier A, *Howard Eskildsen, Ocala, Florida, USA. 29 April 2021 07:31 UT, colongitude 117.6º. Celestron 9.25 inch Schmidt-Cassegrain telescope, Skyris 236 M camera. Seeing 6/10, transparency 3/6.*

Howard adds:

This image shows the pair Messier and Messier A (formerly W. H. Pickering). Messier has a dark streak across its floor, and Messier A has a complex western limb. Either it formed over an earlier crater, or dynamics of this low angle impact nearly created a third crater. I wish conditions would have allowed higher magnification. Downrange rays can be seen stretching to the left of the crater pair, and vertical rays are visible north and south of Messier. It's fun to see at this angle.

Earthshine, *Leonardo Alberto Colombo, Córdoba, Argentina. 15 April 2021 23:04 UT. 35 mm objective, QHY5Lll-M camera.*



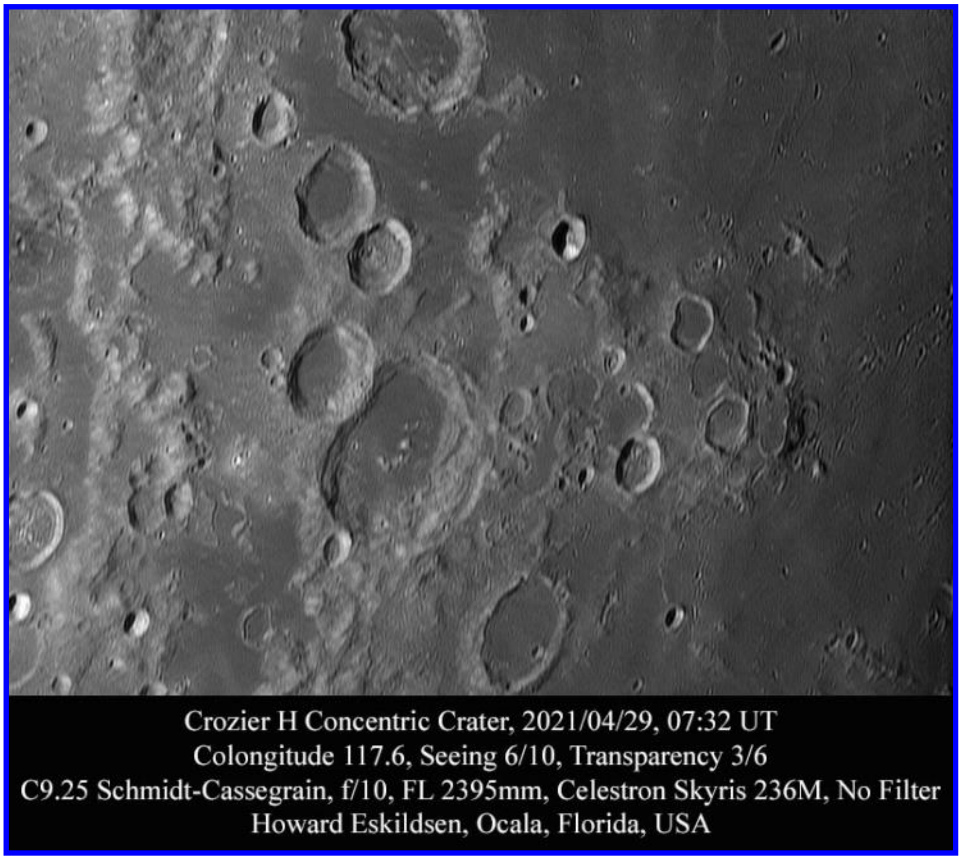
Leakey Concentric Crater, *Howard Eskildsen, Ocala, Florida, USA. 29 April 2021 07:32 UT, colongitude 117.6º. Celestron 9.25 inch Schmidt-Cassegrain telescope, Skyris 236 M camera. Seeing 6/10, transparency 3/6.*

Howard adds:

The crater at the center of the image, Leaky, has a concentric appearance that was confirmed by comparison with LROC QuickMap. I was not aware that it was a concentric crater before this, so this is the second concentric crater that I have "discovered" (new to me) in as many observing sessions. I will be looking for more.

Leakey Concentric Crater, 2021/04/29, 07:32 UT
Colongitude 117.6, Seeing 6/10, Transparency 3/6
C9.25 Schmidt-Cassegrain, f/10, FL 2395mm, Celestron Skyris 236M, No Filter
Howard Eskildsen, Ocala, Florida, USA

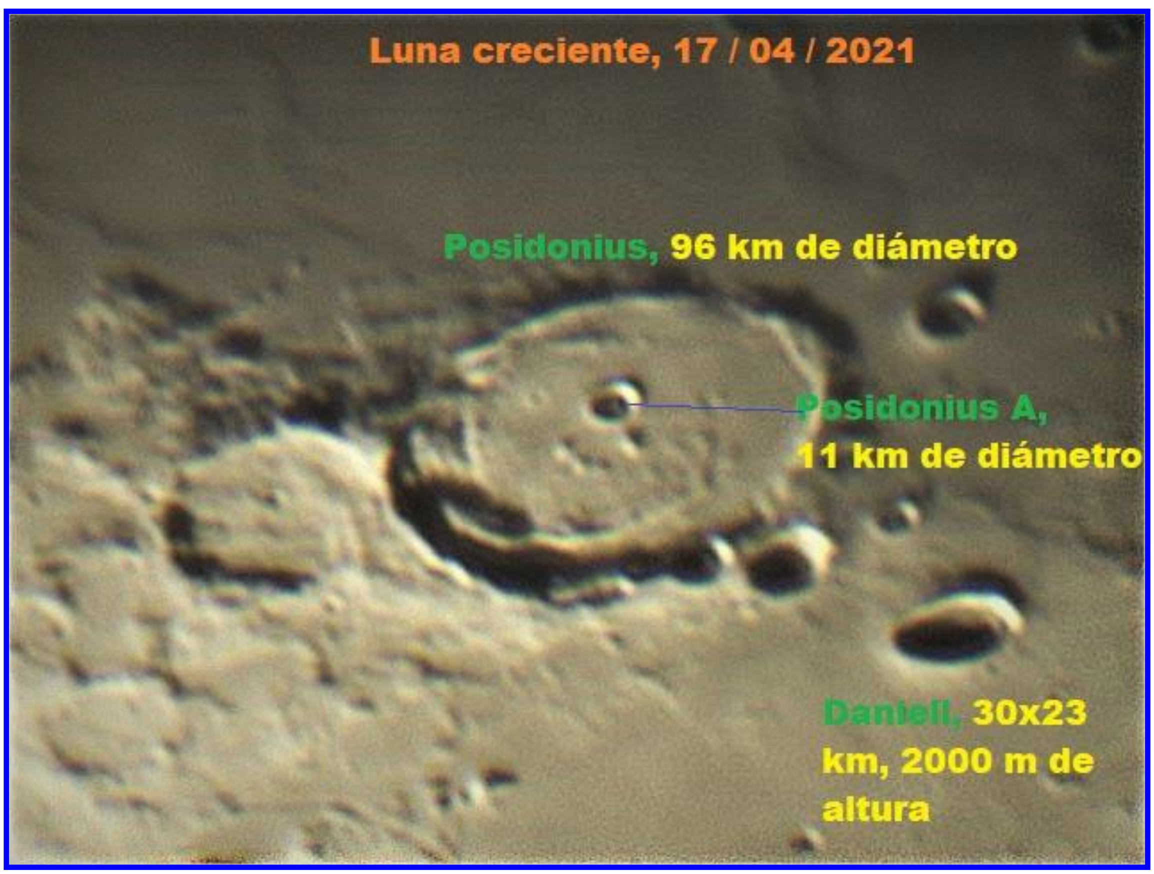
Waxing Crescent Moon, *Leonardo Alberto Colombo, Córdoba, Argentina. 15 April 2021 23:04 UT. 35 mm objective, QHY5Lll-M camera.*



Crozier H Concentric Crater, *Howard Eskildsen, Ocala, Florida, USA. 29 April 2021 07:32 UT, colongitude 117.6°. Celestron 9.25 inch Schmidt-Cassegrain telescope, Skyris 236 M camera. Seeing 6/10, transparency 3/6.*

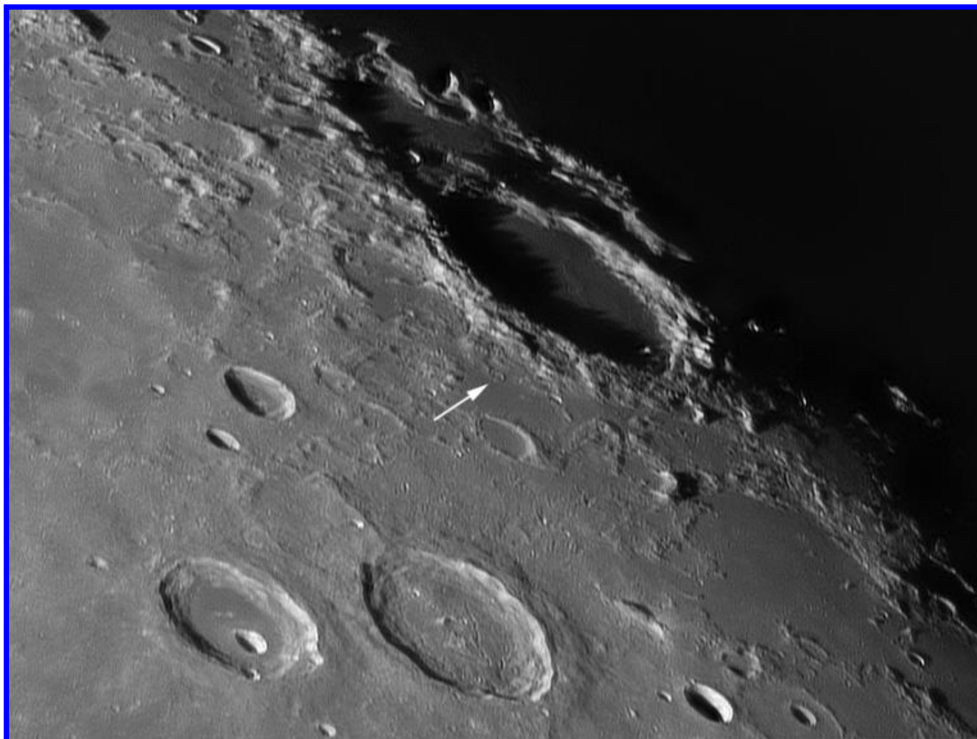
Howard adds:

This well-known concentric crater is visible just to the right of center of the image. Its namesake crater, Crozier, is to its right, an amoeboid-appearing rim with its floor filled nearly to the rim. Two similar sized craters south of Crozier complete a three-crater chain of floor-filled craters. At the top of the image Goclenius can be seen with rilles crossing its floor, while Colombo is the largest crater just to the lower left of center. The tops of its central peaks seem to be barely peeking over the fill of the crater floor. The crater ring at the bottom of the image is Cook, named after the famed 18th century captain whose attempts to precisely measure the transit of Venus from Tahiti were thwarted by the black-drop effect.

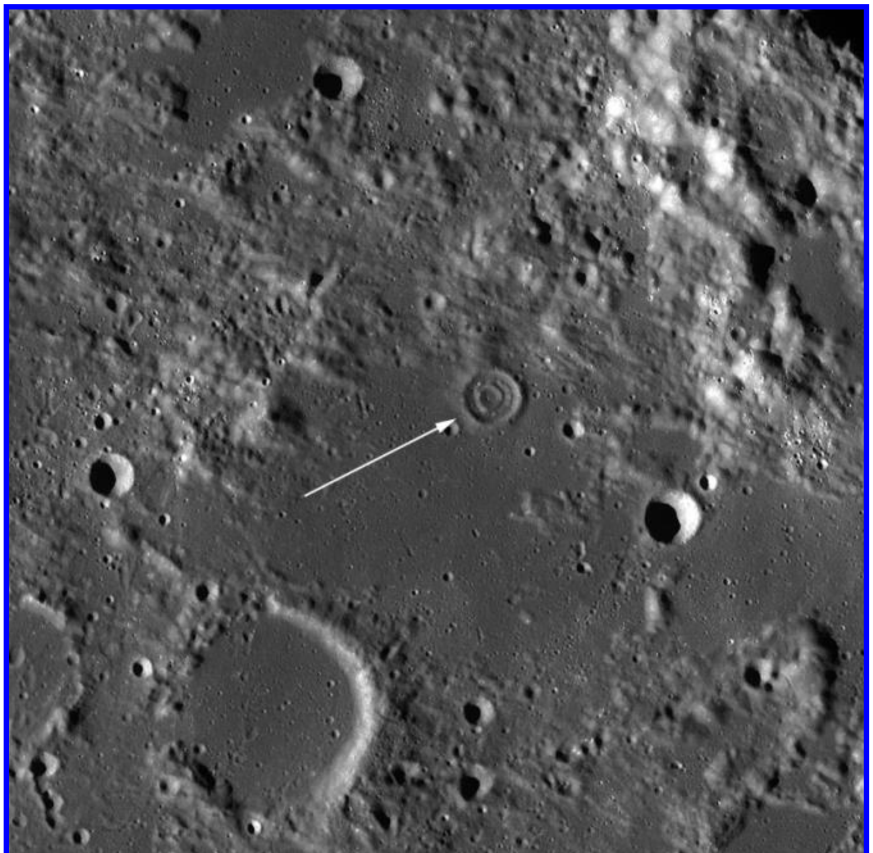


Posidonius, *Pedro Romano, San Juan, Argentina. 17 April 2021 22:34 UT. 102 mm Maksutov-Cassegrain telescope, ZWO ASI120 camera.*

Endymion Concentric Crater, *Howard Eskildsen, Ocala, Florida, USA. 29 April 2021 07:34 UT, colongitude 117.6°. Celestron 9.25 inch Schmidt-Cassegrain telescope, Skyris 236 M camera. Seeing 6/10, transparency 3/6.*



Mare Crisium, 2021/04/29, 07:34 UT
Colongitude 117.6, Seeing 6/10, Transparency 3/6
C9.25 Schmidt-Cassegrain, f/10, FL 2395mm, Celestron Skyris 236M, No Filter
Howard Eskildsen, Ocala, Florida, USA



Concentric Crater SE of Endymiun--LROC WMS Image Map

Howard adds:

Endymion Concentric Crater
Southwest of Endymion at 51.06E, 51.68N, lies an unnamed 6.8 km concentric crater with a depth to diameter ratio of 0.036. It has a 2.8 km inner toroid (inner ring) with a toroid to crater diameter ratio of 0.41. My recent telescopic image marks the crater with an arrow, and hints at a complex interior, but does not definitely show it to be concentric. The LROC WMS Image Map image shows the complex detail of this crater. I am hopeful that with more favorable libration and seeing conditions, and with higher magnification, that I will be able to image the true concentric nature of the crater.

(Coordinates and other data above are from measurements I did using LROC QuickMap in 2013 and were among the data presented at the 2013 ALPO Conference.)

Copernicus, *Guido Santacana, San Juan, Puerto Rico, USA. 23 March 2021 03:21 UT. 120 mm f/8 refractor telescope, 2 x barlow, ZWO ASI224mc camera. Seeing 8/10, transparency 3.5/6.*

Copernicus, *Fernando Surà, San Nicolás de los Arroyos, Argentina. 26 April 2021 23:37 UT. 127 mm Maksutov-Cassegrain telescope, Wratten Kodak 56 filter, J7 cell phone camera.*

One-Day Old Moon and Venus, John D. Sabia, Keystone College Thomas G Cupillari Observatory, Fleetville, Pennsylvania, USA.

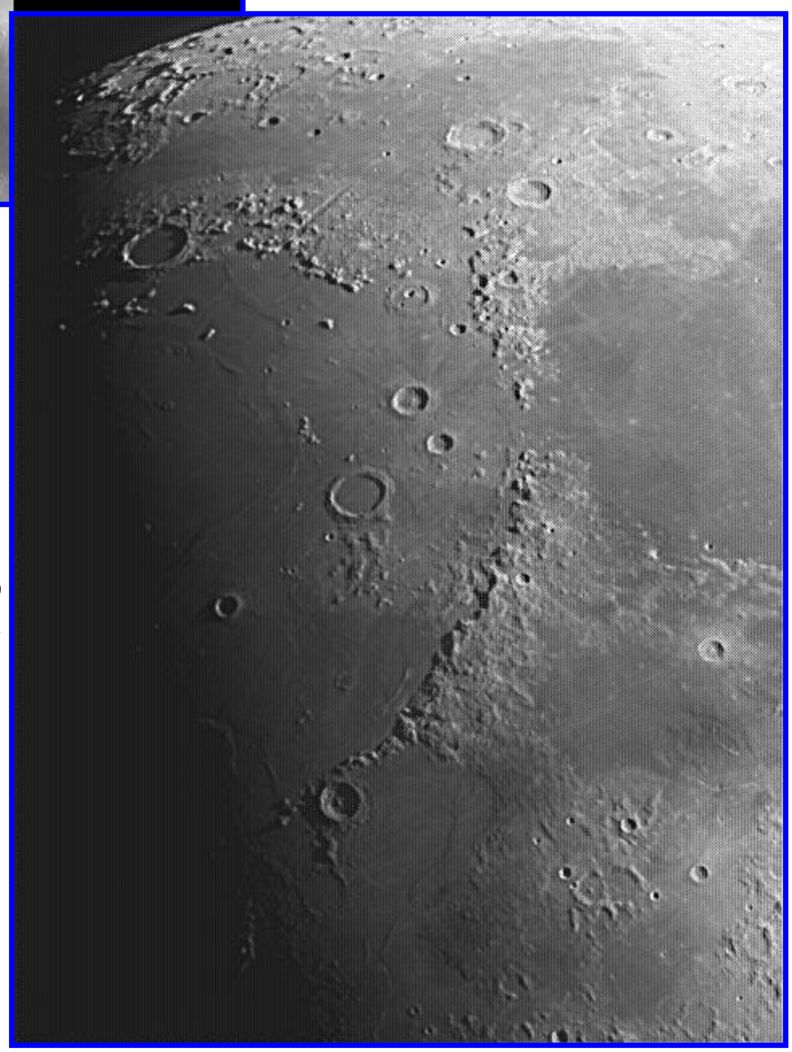
John writes:

My attempts to image the planet Venus and Mercury together in the evening skies were met with mostly clouds or days of rain. Have been photographing these two when they appear together in the evening sky for many years, starting with a point and shoot camera on a tripod to my current Canon T5 DSLR. A very good pattern of clear began on Wednesday May 12, 2021 EDT; which was also a public viewing night at Keystone College Thomas G. Cupillari Observatory in Fleetville Pa. I arrived early at the observatory to setup may camera with the 75 - 300 mm stock lens on my tripod in the parking lot and start scanning the western sky for Venus with 7 x 50 binoculars. I check of planetarium software at home showed the Moon near by Venus. I did not expect to see the very young Moon . As the sunset, the western sky lost most of the red haze, aiding me to locate Venus in the sky. After a few test exposures I notice the faint crescent moon in the images in the with lens set at 75 mm f/4 and exposures of 1/3 sec at ISO 200 longer exposures. I alerted the Observatory Director Jo Ann Kamichits next to me, who was showing Venus to the arriving public using her home made 8 inch f/5 DOB reflector. Many of the public had a once in a life time view of the one day old Moon, include myself.

Mare Imbrium, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 19:55 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

Copernicus, *Guido Santacana, San Juan, Puerto Rico, USA. 23 March 2021 03:09 UT. 120 mm f/8 refractor telescope, 2 x barlow, ZWO ASI224mc camera. Seeing 8/10, transparency 3.5/6.*

Copernicus, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 18:02 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

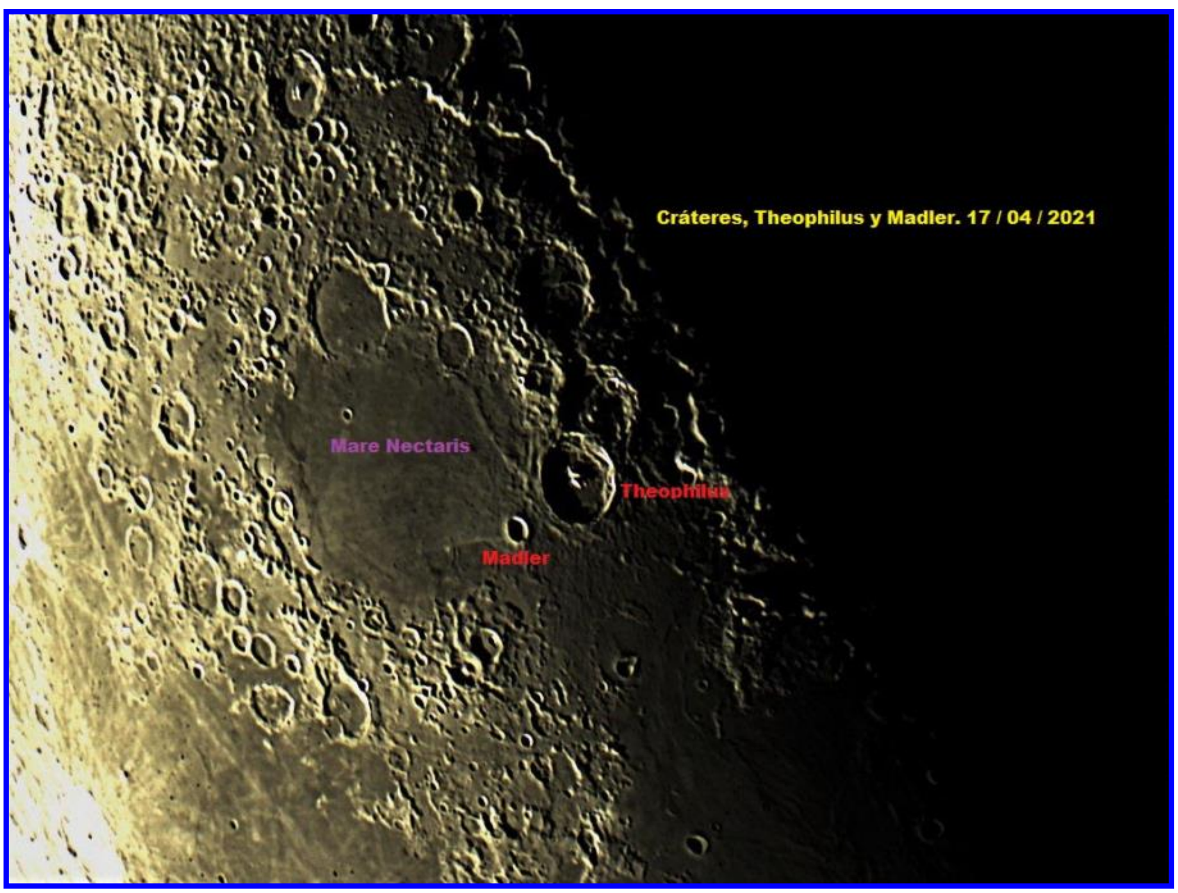


Montes Apenninus, *Guido Santacana, San Juan, Puerto Rico, USA. 23 March 2021 03:09 UT. 120 mm f/5 refractor telescope, ZWO ASI224mc camera. Seeing 8/10, transparency 3.5/6.*

Mare Fecunditatis, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 19:55 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

Waning Gibbous Perigee Moon, *Raúl Roberto Podestá, Formosa, Argentina. 28 April 2021 04:05 UT. 127 mm Maksutov-Cassegrain telescope, Hokenn CCD Imager.*

Clavius, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 19:48 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

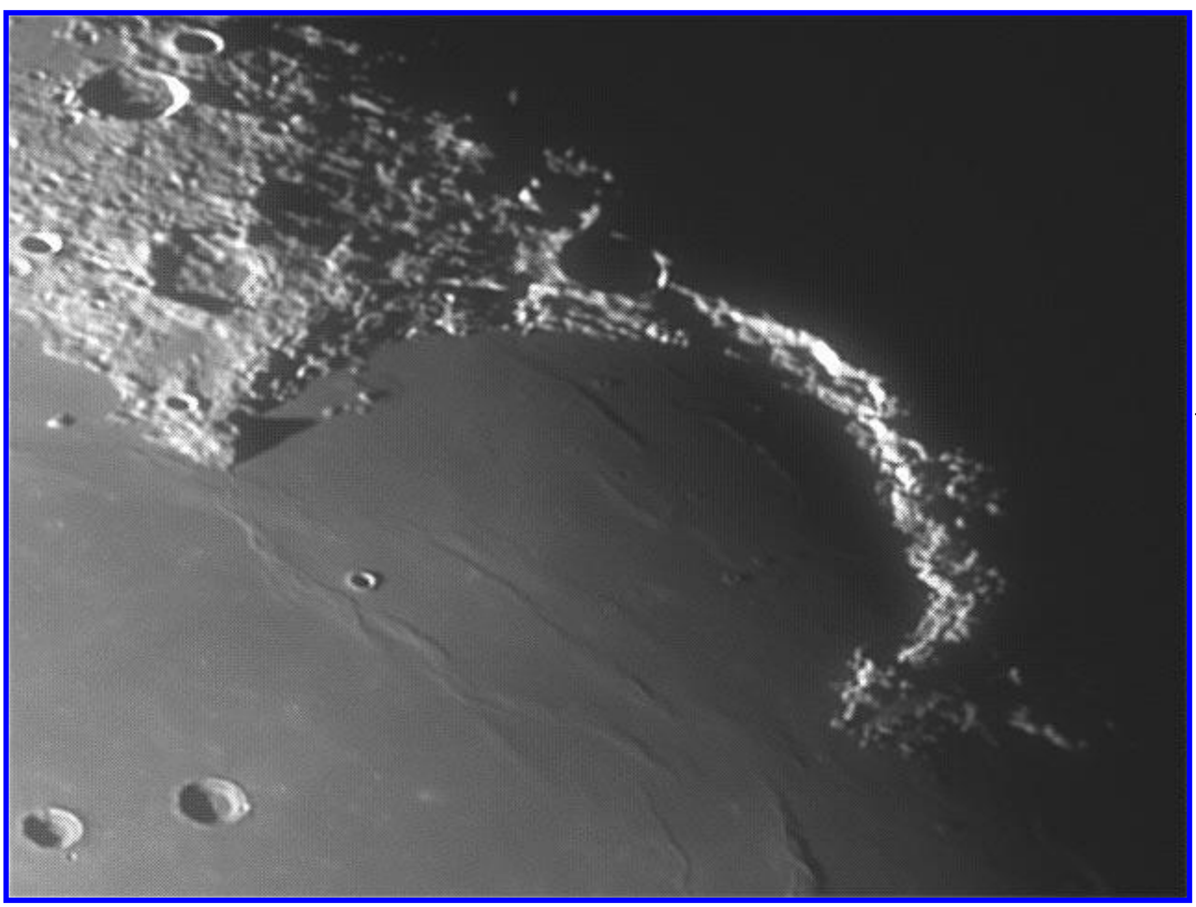


Mare Nectaris, *Pedro Romano, San Juan, Argentina. 17 April 2021 22:24 UT. 102 mm Maksutov-Cassegrain telescope, ZWO ASI120 camera.*

Rupes Recta, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 19:51 UT. Celestron 4 inch NexstarSE Maksutov -Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*

Full Moon, *Ioannis (Yannis) A. Bouhras , Athens, Greece. 25 May 2021 23:35 UT.*

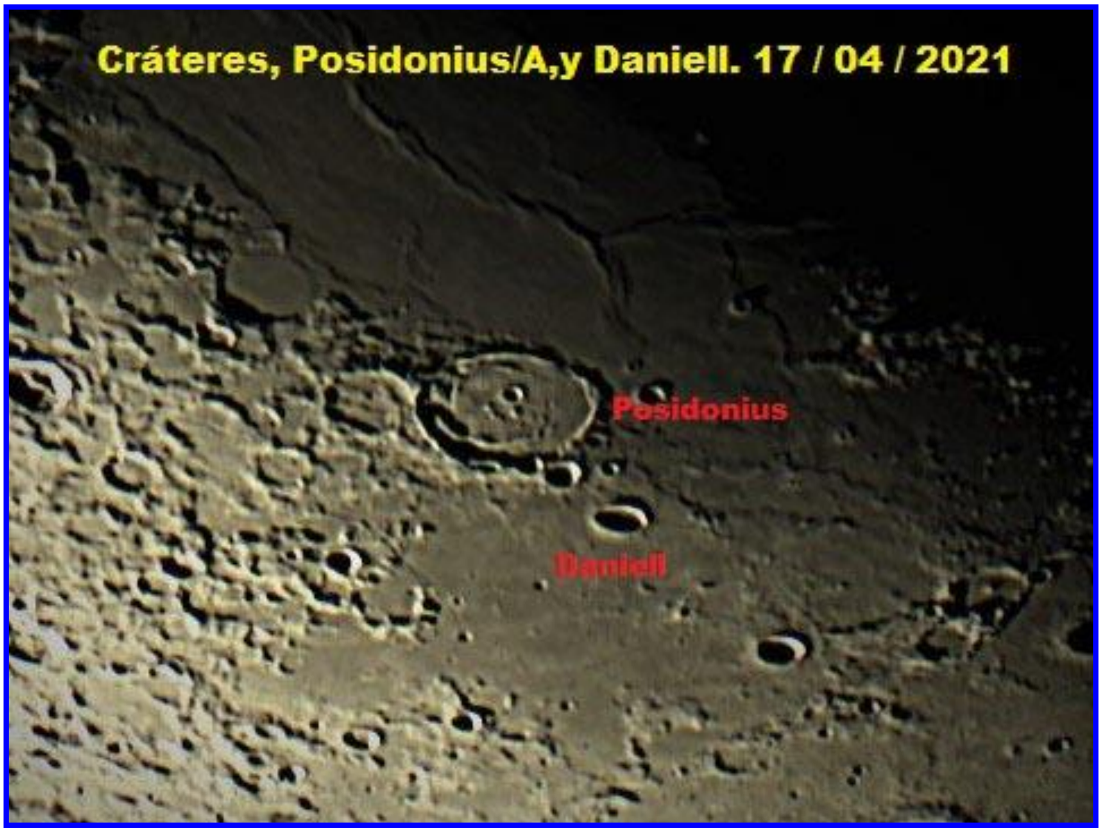
Monte Apenninus, *Fabio Verza, SNdR, UAI, Milan, Italy. 22 April 2021 20:43 UT. Celestron 4 inch NexstarSE Maksutov-Cassegrain telescope, Neodymium IR block filter, ZWO ASI290 MM camera.*



Sinus Iridum, *Guido Santacana, San Juan, Puerto Rico, USA. 23 March 2021 03:03 UT. 120 mm f/8 refractor telescope, 2 x barlow, ZWO ASI224mc camera. Seeing 8/10, transparency 3.5/6.*

Clavius, *Raffaello, Lena, Rome, Italy. 21 May 2021 22:28 UT. 18 cm Maksutov-Cassegrain telescope.*

***Mare Crisium**, Rafael Lara Muñoz, Guatemala, Guatemala, SLA . 28 April 2021 21:30 UT. 114 mm reflector telescope, Samsung Note 20 cell phone camera.*



***Posidonius,** Pedro Romano, San Juan, Argentina. 17 April 2021 22:34 UT. 102 mm Maksutov-Cassegrain telescope, ZWO ASI120 camera.*

Lunar Geologic Change Detection Program

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

2021 June

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.

News: David Teske, ALPO Lunar Section director has made a start on digitizing the Cameron LTP cards, that were very kindly sent in by David Darling. An example can be seen in Fig 1, and it is an interesting example as it states that this particular LTP was not confirmed by Cameron when she observed using a scope in Tucson, whilst attending an ALPO conference.

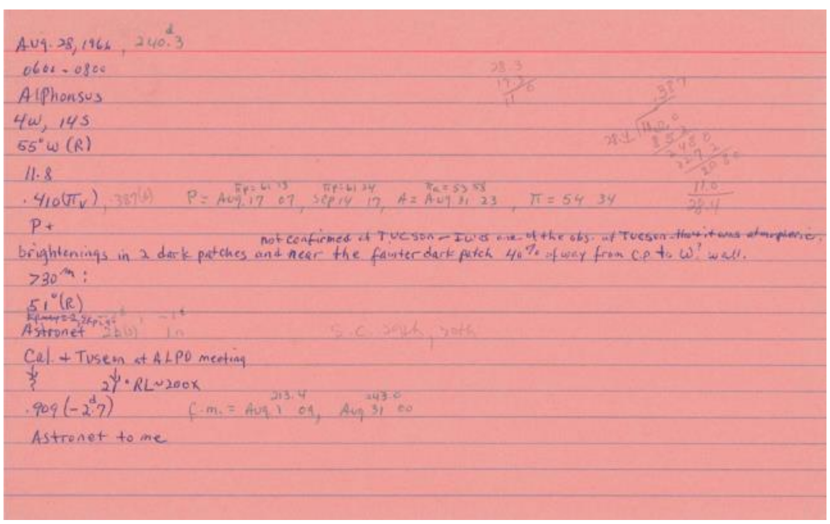


Figure 1. An index card that was used to compile the Cameron LTP catalog for NASA. This one is from a LTP in Alphonsus on 1966 Aug 28.

Nigel Longshaw (BAA) has been in touch with me over an earlier report/writeup of mine on Eudoxus. With the information Nigel has given me, I have updated dates colongitudes for the Lunar Schedule programme, to see if we can capture the “thread effect” that Trouvelot originally reported.

It was sad news that I learnt of Eugene Cross passing way, Gene was a very active LTP observer during the 1960's and early 1970's and was involved in a lot of the Ross C LTP observations, including a recent one using a 60-inch Mt Wilson telescope on 2018 Jun 19.

LTP reports: No LTP reports were received in April – the Riccioli report from 2021 Apr 25 UT 19:42-20:32 by Franco Taccogna (UAI) was concluded by Franco and myself to probably have been due atmospheric spectral dispersion, and so was not an LTP. Thanks to the other observers who followed this alert up.

Level 1 – All Reports received for April: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Cichus, Plato and Torricelli B. Alberto Anunziato (Argentina – SLA/ALPO) observed: Alphonsus, Aristarchus, Bullialdus, Eimmart, Gassendi, Promontorium Laplace, Schickard and Vallis Schroteri. Massimo Alessandro Bianchi (Italy – UAI) observed: Aristarchus and Gassendi. Maurice Collins (New Zealand – ALPO/BAA/RASNZ) imaged: Airy, Alphonsus, Aristarchus, Boussingault, Bullialdus, Clavius, Copernicus, Descartes, Dionysius, Langrenus, Mare Crisium, Moretus, Petavius, Plato, Posidonius, Proclus, Reiner Gamma, Rupes Altai, Theophilus, Tycho and imaged the whole lunar disk. Anthony Cook (Newtown, UK – ALPO/BAA) obtained video of earthshine in monochrome, the illuminated side in color, and the lunar surface in thermal IR. Marco Di Francesco (Italy – UAI) imaged Eratosthenes. Walter Elias (Argentina – AEA) imaged: Aristarchus, Birt, Gassendi, Lichtenberg, Mare Humboldtianum, Plato, Riccioli, and obtained a whole Moon image. Les Fry (West Wales, UK – NAS) imaged: Alphonsus, Clavius, earthshine, Guericke, Longomontanus, Montes Recti, Montes Riphaeus, Moretus, Paulus Epidemiarum, and Rupes Recta. Rik Hill (Tucson, AZ, USA – ALPO/BAA) imaged: Archimedes, Barrow, and Blanchinus. Bill Leatherbarrow (Sheffield, UK – BAA) imaged: Ptolemaeus. Jean Marc Lechopier (France – UAI) imaged: Mutus F and Ptolemaeus. Leandro Sid (Argentina – AEA) imaged: Eratosthenes, Tycho and several features. Trevor Smith (Codnor, UK – BAA) observed: Promontorium Agarum, Alphonsus, Aristrachus, Atlas, Bullialdus, Copernicus, earthshine, Eratosthenes, Gassendi, Littrow, Mare Crisium, Mersenius (& C), Mons Piton, Plato, the SE limb, Sinus Iridum, Taruntius, Vallis Schroteri, the W limb, and several features. Thierry Speth (France – BAA) imaged Aristarchus and observed: Arago_B, Linne, Moltke and Torricelli B. Franco Taccogna (Italy – UAI) imaged: Riccioli. Aldo Tonon (Italy – UAI) imaged: Ptolemeaus. Ivan Walton (Cranbrook, UK - BAA) imaged Eratosthenes. Paul Zellor (Indianapolis, IN, USA – ALPO) imaged: Riccioli.

Level 2 – Example Observations Received:

Ptolemaeus: On Apr 19 UT19:41-21:24 Jean Marc Lechopier (UAI) and Bill Leatherbarrow (BAA) obtained image coverage for this this crater, at high resolution, under similar illumination to the LTP report below. In addition, Aldo Tonon (UAI) obtained images that covered an earlier Lunar Schedule request for the same event:

Ptolemaeus 2020 Feb 01 UT 19:40-19:50 P. Sheperdson (York, UK, 102mm Mak - BAA) saw an "ashen" sliver of bright light across the floor. Images taken. This maybe normal appearance - though observer re-observed in May and found the effect different in that there was no "ashen" like effect. Visual sketches and time lapse image sequences welcome. If doing visual work - try using a polaroid filter and rotate it to see if that makes any difference. For imaging work, please over-expose slightly to bring out detail on the floor; you could also try color imaging of the floor as an interesting experiment - though for comparison purposes image other terminator features exhibiting shadow spires. ALPO/BAA weight=1.

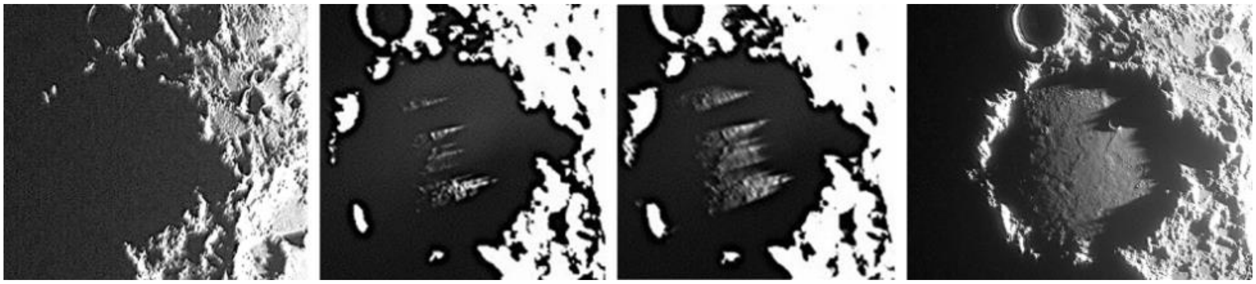


***Figure 2**. Intentionally contrast stretched images of Ptolemaeus, taken on 2021 Apr 19 and orientated with north towards the top. **(Far Left)** Image by Aldo Tonon at 18:25 UT. **(Left)** Image by Jean Marc Lechopier (UAI) at 19:36UT. **(Right)** Image by Jean Marc Lechopier (UAI) at 20:04UT. **(Far Right)** image by Bill Leatherbarrow (BAA) at 21:24 UT.*

Aldo's image (Fig 2 – Far Left) was outside the ±0.5° similar illumination window, but was within a requested longitude range window from the Lunar Schedule web site. It is a good check for any ashen light effect, but as you can see, none was visible here. Fig 2 (Left and Right) show the center of the floor emerging from shadow and the needle-like shadow spires. Fig 2 (Far Right) shows some of the underlying topography that the needle like shadows moved across. Whether this counts as ashen light (perhaps if seen under poorer seeing conditions) remains in question. What is interesting is the brightness in between the dark shadow spires. There could be five reasons for these: 1) it is simply small scale topographic sunward facing slopes catching the sunlight, 2) it could be an image processing/sharpening artifact, 3) it might normally be bright, but elsewhere there are micro-shadow spires cast from the eastern rim, that are not fully resolved, but darken sunlit areas of the floor, giving the impression that the areas where there are no micro-shadow spires, are brighter, 4) it might be diffraction effects off of the gaps in the crater rim in the east, 5) saving the least likely option till last – could this be light scattered off electrostatically charged levitated dust particles moving from shadowed into sunlit areas? The Occam's Razor principle suggests the least exotic explanation(s) are the most likely. But anyway, it's a very good reason to observe flat floored craters at sunrise/set and study the appearance of shadow spires. It is even more revealing when a time lapse movie is made – I have done this already, but cannot show it in this PDF! I may put it on-line some time, but need to work a bit more on image registration and normalisation, as its currently a wobbly to watch.

Interestingly we also have a visual report from Trevor Smith (BAA) who noted the appearance of Ptolemaeus, whilst he was observing Alphonsus from 21:03-21:24UT: "*Ptolemaeus was a fine site tonight with much detail on it's floor. The eastern ramparts cast needle-like shadows across the eastern floor. The floor looked like pumice. The extreme western floor was also in a lighter shadow for approx. one quarter of the crater's width. This gave a distinct impression that the floor must be slightly dome-like and/or the floor to the east maybe higher and sloping downwards to the west! No other craters showed this effect tonight!"* Actually, checking the LROC Quickmap website, it looks like the floor is a depression (with lunar curvature removed) and not a dome, about 80m deeper at the center than at the edges, though there is a gradient to the floor, with its western side sloping to the eastern side. A slightly raised area can be found near the crater center and of course lunar curvature might make the whole floor look like a dome anyway.

Eratosthenes: On 2021 Apr 20 UT Marco Di Francesco (Italy – UAI), Ivan Walton (BAA), and Leandro Sid (AEA) imaged this crater under similar illumination and/or ALPO/BAA schedule request to the following reports:

Eratosthenes 1947 Jan 30 Mean Col. 16deg. Observed by Hill (UK) "Main peak of massive central mountain group appeared to be in a shadowless condition, having regard to its claimed height of 6,600 ft. The whole of the floor to the west should have still been in darkness. Instead, immediately to the west was a dark (intensity 1.5-2) region extending almost to the foot of the bright inner wall and very diffuse in outline. The observation could not be followed through due to increasing cloud, but on the following night all was normal.

On 2009 Nov 25 UT18:42-21:03 P.Abel, T.Little and C.North (Selsey, UK, 15" reflector, seeing II-III, transparency very good), all saw visually a brownish tinge on the north west rim of Eratosthenes crater. P.Abel made a sketch and T.Little took some high resolution CCD images, some of which were through colored filters. Checks were made for spurious color, but none was seen elsewhere on the Moon. The eyepiece was changed but this made no difference. M.C.Cook (Mundesley) was observing with a smaller scope at the same time, but saw no color, however observing conditions were worse. W.Leatherbarrow (Sheffield, UK) was observing with an instrument mid-way in size, and saw a brownish tinge in the NW rim area, but saw a similar color elsewhere and put this down to spurious color. Normally multiple observers seeing the same thing would result in a weight of 4, however as this was only observers at Selsey and some of the evidence contradicts, I am allocating an ALPO/BAA weight=3.

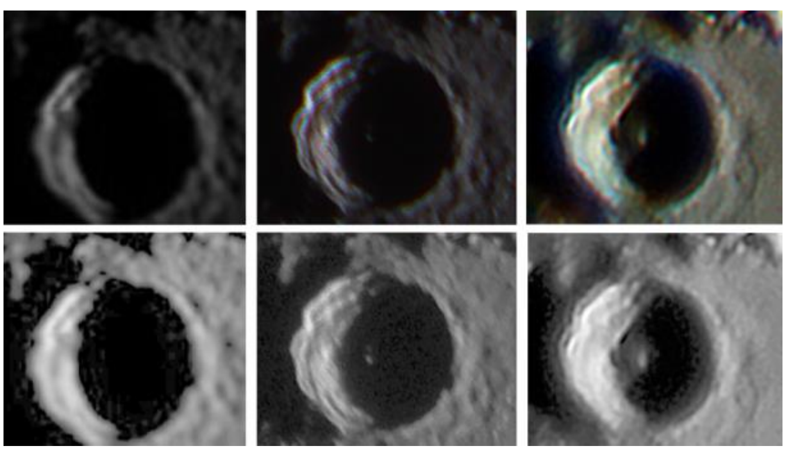


Figure 3. *Eratosthenes as imaged on 2021 Apr 20 and, orientated with north art the top. The top images have not been contrast stretched. The bottom images have had a non-linear contrast stretch applied to see if there is any detail in the shadow.* ***(Left)*** *Monochrome image by Ivan Walton (BAA) taken at 21:10UT.* ***(Center)*** *Color image by Marco Di Francesco (UAI) taken at 21:35, with color saturation increased to 65%.* ***(Right)*** *Color image by Leandro Sid (AEA) after color normalization and color saturation increased to 65%.*

Fig 3 (Left and Center) are similar colongitudes to the Abel LTP report. Marco's image is in color and shows two central peaks, as did the original sketch by Abel, however there is no obvious orange/brown color on the terraces on the western rim. Fig 3 (Right) does show some color, but not in the same locations as in the original Abel sketch. Fig 3 (Center and Right) correspond to similar illumination to the Hill report to within ±0.5°, however a lot can happen within the space of ±0.5° at sunrise. It's interesting in Fig 3 (Lower Right) that there is a not completely black area to the west of the central peak and up until the illuminated western rim/floor.

Cichus: On 2021 Apr 22 UT01:15-01:26 Jay Albert observed the crater under similar illumination to the following report:

Cichus 1975 Sep 15 UT 11:15-11:30 G.Ryder (Corinda, Australia, 25cm reflector, x250 & x380, seeing good but with some cloud). The interior W. wall of this crater (on the lip) appeared hazy - difficult to bring detail into focus. Neighbouring craters/detail were sharp. Details in the crater wall interior were starting to become visible as time went on, but it had clouded over by 11:30. A Moon Blink was used but no color was detected. ALPO/BAA weight=1.

Jay, using an 8" SCT (x226) with transparency at magnitude 1 and seeing varying from 2-3 to 6/10, found: *"The crater's W wall was bright and detailed with a prominent, very bright strip along the W rim. The craterlet Cichus C was also bright and detailed with its interior in shadow. There was no haziness on the interior W wall. The E wall shadow covered at least half of Cichus' floor. No color was seen"*. So, quite a marked difference in the description of the western wall, between these two reports. There is a possibility that Ryder got the date wrong by one day – this will need to be checked. In the mean time we shall leave the weight at 1 for now.

Gassendi: On 2021 Apr 23 UT 19:03-19:25 Massimo Alessandro Bianchi (UAI) sketched and from 20:00-20:20 Trevor Smith observed this crater under similar illumination and topocentric libration to the following LTP report from Northern Ireland:

Gassendi 1967 Mar 22 UT 19:39-19:43 Observed by Mosely (Armagh, N. Ireland, 10" refractor, x360) "Red color & blink strongly suspected in small area centerd on junction of 3 clefts 1/2 way from c.p. & ESE wall. Well-defined & did not note change during obs. period. Clouds terminated obs. till 2120 when it was not seen." NASA catalog weight=3. NASA catalog ID #1018.

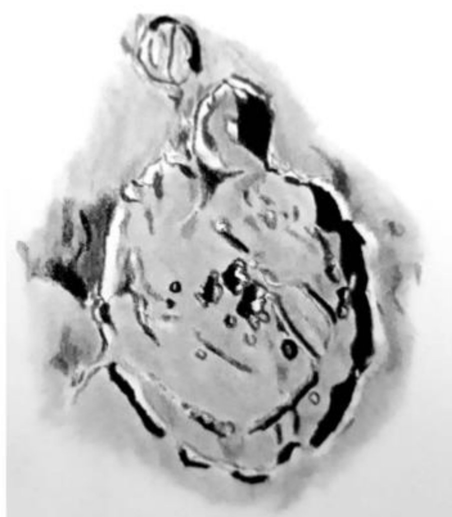


Figure 4. *Gassendi as sketched by Massimo Alessandro Bianchi (UAI) on 2021 Apr 23 UT 19:03-19:25.*

So, Fig 4 is what Mosely should have seen if all had been normal in 1967 – so is quite a useful context sketch. We also have Trevor Smith's visual description: *"No ink black spot was seen on ramparts of the crater. No red color was seen in interior of crater. All looked normal"*. There is a chance that the "ink black spot" might have referred to the triangular shaded/shadow area to the SW of Gassendi A – though it definitely is not ink black in Massimo's sketch. We shall leave the weight as it is.

Promontorium Laplace: On 2021 Apr 25 UT 01:20-01:30 Alberto Anunziato 9ALPO?SLA) observed this area under similar illumination to the following report:

On 1978 Nov 20 Peter Foley observed a tiny yellow-brown region close to the tip of the cape, north east of the precipitous west edge, in the face of the north facing slope. The area concerned was diffuse and varied in density despite the surroundings not varying. Foley noticed no color elsewhere on the Moon, though Amery thought that he saw some in Aristarchus, but Foley thinks this was spurious. Cameron 2006 catalog extension ID=27 and weight=5. ALPO/BAA weight=3.

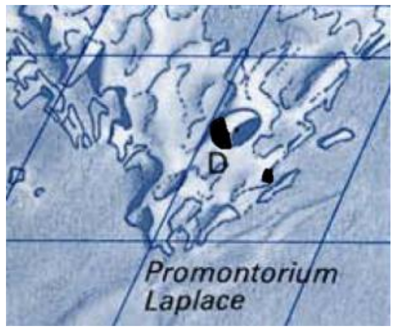


Figure 5. *The location of dark shadows in Promontorium Laplace, as depicted by Alberto Anunziato against a background map, on 2021 Apr 25 UT 01:20-01:30.*

Alberto, using a 105 mm. Maksutov-Cassegrain (Meade EX 105), at a magnification of x154, saw no color, and the areas in shadow were to the NW of the promontorium and on the east rim of Laplace D (see Fig 5).

Riccioli: On 2021 Apr 25 Anthony Cook (ALPO/BAA), Franco Taccogna (UAI), and Walter Elias (AEA) imaged this crater under similar illumination and topocentric libration to the following report and also for a lunar schedule request:

On 1979 Aug 06 at 22:24-22:54 P.Madej (Huddersfield, UK, 6" reflector. Purple Wratten 35, and Yellow Wratten 15 filters used) Orange glow seen (at x73) on west side of crater, near the central peak. The central peak was colored too at x110. At 22:32 (x75) the central peak was brighter than the rest of the area through the yellow filter. At 22:34UT at x73 everything looked OK through the purple filter. The LTP was still visible at 22:54. ALPO/BAA weight=1.

ALPO Request: Either visually observe or obtain a color image of this crater shortly after it has emerged from the sunrise terminator. Minimum sized aperture scope needed: 5". Any observations or images should be emailed to: a t c @ a b e r . a c . u k

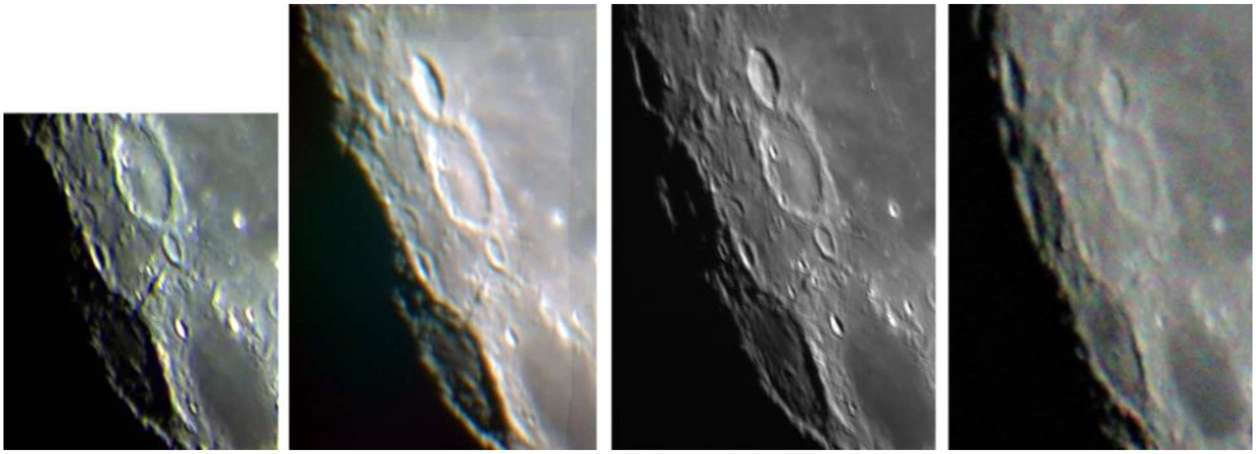


Figure 6. *Images of Riccioli captured on 2021 Apr 26/26 and orientated with north towards the top.* ***(Far Left)*** *A Color image by Franco Taccogna (UAI), taken at 20:00UT with color saturation increased to 70%. An image by Anthony Cook (ALPO/BAA) taken at 20:26 UT with color saturation increased to 70%.* ***(Right)*** *A monochrome image taken by Walter Elias (AEA).* ***(Far Right)*** *A cell phone color image taken by Paul Zellor (ALPO) with color saturation increased to 70%.*

The images in Fig 6 do not really show much of what the Madej observation describes, through there is some evidence of atmospheric spectral dispersion, especially in Fig 6 (Left) which was taken when the Moon was low in the sky. Concerning the Lunar Schedule request – this refers to an earlier image taken a few months ago, when a green/brown cast was visible on the floor of Riccioli. There is perhaps a hint of color on Fig 6 (far Left and Left), on the floor, but it is by no means certain.

Although not part of the above repeat illumination/lunar schedule requests, in response to Franco Taccogna detecting color (see last month's newsletter), an alert was put out via Twitter and Paul Zeller made a visual observation a few hours later on 2021 Apr 26 UT 02:03-02:09 and obtained some images. He was using a Meade 8" LX10 SCT (f/10) x77 magnification, seeing: 2, transparency: magnitude 3.5. He found that *"Riccioli stood out clearly near the lunar limb. The rim of the walled plain near the limb was bright while the limb closest to Grimaldi still showed a very thin shadow. The darker northern floor of the walled plain was in sharp contrast to the brighter floor to the south. There were occasional ripples and shimmering when the seeing was troublesome. However, the view was usually sharp and still"* He saw no noticeable unusual color on either limb of Riccioli or any of the surrounding craters, and this is borne out in Fig 6 (Far Right).

Level 3 - In Depth Analysis:

Aristarchus: On 2021 Apr 27 UT 22:32-23:30 Thierry Speth (BAA) imaged the carter under similar illumination to the following report:

Aristarchus: On 1983 May 28 at UT 01:50-03:00 K. Marshall (Medellin, Columbia) observed the whole region of Aristarchus, Herodotus and Schroter's Valley all to have a brightness of 3 and all blue and impossible to focus on (he had never seen it like this before). Also, the interior of Aristarchus was invisible. Brightness measurement taken and a sketch was made. The Cameron 2006 catalog ID=222 and the weight=3. The ALPO/BAA weight=3.

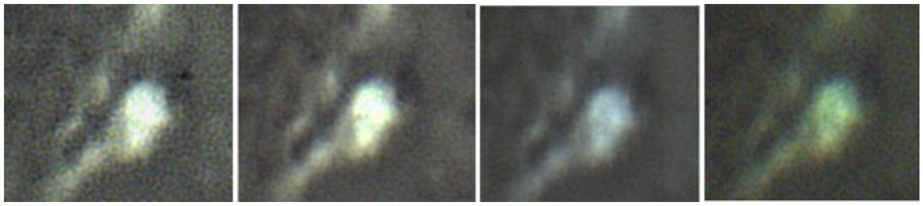


***Figure 7.** Aristarchus as imaged in color by Thierry Speth on 2021 Apr 27 – orientated with north towards the top. **(Far Left)** UT22:54. **(Left)** 22:59UT. **(Right)** 23:01UT. **(Far Right)** 23:03UT.*

Thierry was using a Maksutov Cassegrain 127 ETX, under seeing 5 conditions. He noticed that the crater appeared very bright with no visible detail inside at 22:32UT, but by 23:00UT some detail was visible and the crater was less bright and slightly blue/violet. Re-reading the Marshall report, I note that his seeing was Antoniadi III-IV (moderate-poor). Thierry's images (Fig 7) also show mostly no detail inside the crater under the atmospheric conditions present. So, in realty the LTP that Marshall saw (under poor observing conditions) is really dependent upon the CED (Crater Extinction Device) brightness value he gave of 3.2 – which may or may not be normal – this remains to be investigated. I will lower the ALPO/BAA weight from 3 to 2.

Aristarchus: On 2021 Apr 28 UT 10:01 Maurice Collins (ALPO/BAA/RASNZ) imaged this area in color under similar illumination to the following report:

On 1992 Jul 16 at UT 03:32-09:31 D. Louderback (South Bend, WA, USA, 3" refractor, x134) detected yellow on the southern rim of Aristarchus, and the color looked "darker" through a yellow filter and the region was "duller" than normal. The region was 1 intensity step brighter on the 2nd measurement, "on all points in it". The comet tail-like ray had 3 sections and was "mottled" in appearance. Finally, the Cobra Head region had possible variations in brightness. The Cameron 2006 catalog ID=451 and the weight=3. The ALPO/BAA weight=2.

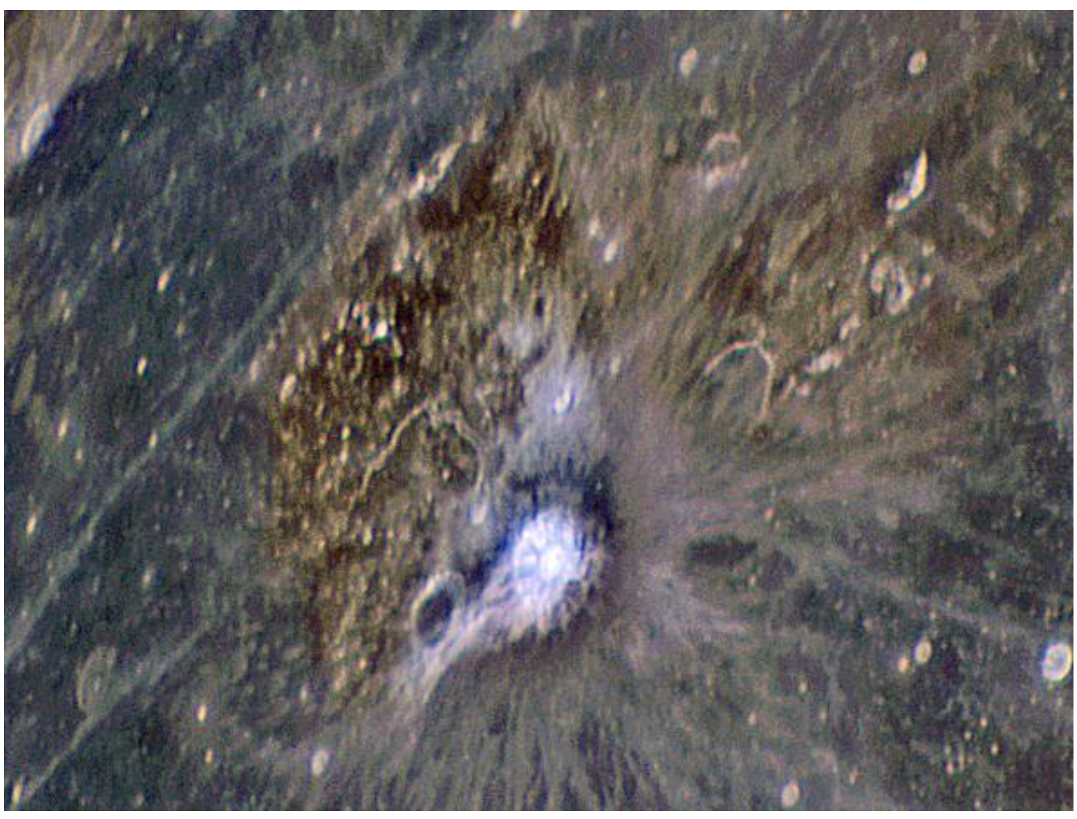


***Figure 8.** Aristarchus as imaged by Maurice Collins in color on 2021 Apr 28 UT 10:10 and orientated with north towards the top. The image has had its color saturation increased to 65%.*

As you can see from the color enhanced image that Maurice took, (Fig 8) the southern rim is certainly not yellow. It is blue and just outside there is a pink or mauve colored ejecta. The SW ray, which Louderback describes as comet-like, does indeed have components to it, possibly three (depending upon how closely you look at it), and I suppose it could be described as mottled, though not as mottled as the famous "Wood's Spot" brown rectangular plateau to the NW. We cannot comment on the variations in brightness that Louderback reported as we only have one image here to study, but the crater looks bright. We shall leave the weight at 2 for now.

General Information: For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: http://users.aber.ac.uk/atc/lunar_schedule.htm . By re-observing and submitting your observations, only this way can we fully resolve past observational puzzles. 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

ALPO 2021 Conference News

Overview
Due to the continuing nearly worldwide quarantining caused by the Covid-19 pandemic and the great success we had with last year's online conference, the 2021 Conference of the ALPO will once more be held online on Friday and Saturday, August 13 and 14. (This is to prevent a scheduling conflict with the 2021 Astronomical League Convention (ALCon 2021) which will be held in Albuquerque, NM, on August 4 thru 7, 2021.)

The ALPO conference times will be:

- Friday from 1 p.m. to 5 p.m. Eastern Time (10 a.m. to 2 p.m. Pacific Time)

Saturday from 1 p.m. to 6 p.m. Eastern Time (10 a.m. to 3 p.m. Pacific Time).
The ALPO Conference is free and open to all via two different streaming methods:

- The free online conferencing software application, *Zoom*.

On the ALPO YouTube channel at https://www.youtube.com/channel/UCEmixiL-d5k2Fx27Ijfk41A
Those who plan to present astronomy papers or presentations must (1) already be members of the ALPO, (2) use Zoom, and (3) have it already installed on their computers prior to the conference dates. *Zoom* is free and Available at https://zoom.us/.

Those who have not yet joined the ALPO may do so online, so as to qualify to present their work at this conference. Digital ALPO memberships start at only $18 a year. To join online, go to http://www.astroleague.org/store/index.php?main_page=product_info&cPath=10&products_id=39 , then scroll to the bottom of that page, select your membership type, click on "Add to Cart" and proceed from there.

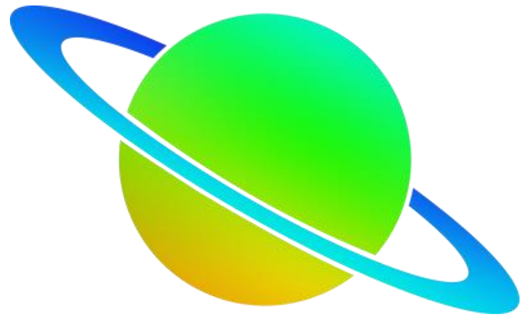
There will be different *Zoom* meeting hyperlinks to access the conference each of the two days of the conference. Both links will be posted on social media and e-mailed to those who wish to receive it that way on Thursday, August 12, 2021. The *Zoom* virtual (online) "meeting room" will open 15 minutes prior to the beginning of each day's activities.

Those individuals wishing to attend via *Zoom* should contact Tim Robertson at cometman@cometman.net as soon as possible.

Agenda
The conference will consist of initial welcoming remarks and general announcements at the beginning each day, followed by papers and research findings on astronomy-related topics presented by ALPO members with Short breaks between the various presentations.

Following a break after the last astronomy talk on Saturday will be presentations of the Walter Haas Observing Award, the Peggy Haas Service Award and the Michael D. Reynolds Astronomy Award. The last one is brand new and was presented to Ms. Pranvera Hyseni several months ago in recognition for her work over the past several years to advance the public's awareness and appreciation of astronomy.

A keynote speaker will then follow the awards presentations on Saturday. The selection of a keynote speaker is in progress and the final decision will be announced in the summer issue (JALPO63-3) of our journal, *The Strolling Astronomer.*



Presentation Guidelines

All presentations should be no more than 15 minutes in length; the preferred method is 12 minutes for the presentation itself plus 3 minutes for follow-up questions. The preferred format is Microsoft PowerPoint.

Send all PowerPoint files of the presentations to Tim Robertson at cometman@cometman.net .

Suggested Topics

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

- New or ongoing observing programs and studies, specifically, how those programs were designed, implemented and continue to function.
- Results of personal or group studies of solar system or extra-solar system bodies.
- New or ongoing activities involving astronomical instrumentation, construction or improvement.

Challenges faced by Earth-based observers such as changing interest levels, deteriorating observing conditions brought about by possible global warming, etc.

Information about paper presentations, the keynote speaker and other conference data will be published in our journal, *The Strolling Astronomer*, and online as details are learned.

Lunar Calendar June 2021

Date	UT	Event
1	0900	Jupiter 5° north of Moon
1		East limb most exposed +7.4°
2	0724	Last Quarter Moon
2		North limb most exposed +6.8°
8	0200	Moon at apogee 406,228 km
10	1052	New Moon, Lunation 1218, Annular eclipse Canada to Russia
12	0700	Venus 1.5° south of Moon
12		Greatest northern declination +25.6°
13	2000	Mars 3° south of Moon
17		West limb most exposed -6.9°
17		South limb most exposed -6.8°
18	0354	First Quarter
23	1000	Moon at perigee 359,956 km
24	1839	Full Moon
25		Greatest southern declination -25.6°
28	1900	Jupiter 4° north of Moon
29		East limb most exposed +7.0°
30		North limb most exposed +6.7°

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 July 2021 edition will be the Lunar 100 numbers 71-80. 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 71-80 article is June 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 71-80)	**July 2021**	**June 20, 2021**
Lunar 100 (numbers 81-90)	**September 2021**	**August 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 71-80 will be featured in the July 2021 *The Lunar Observer*. Submissions of articles, drawings, images, etc. due by June 20, 2021 to David Teske or Alberto Anunziato.

L	FEATURE NAME	SIGNIFICANCE	RUKL CHART
71	Sulpicius Gallus	Dark mantle ash eruptions northwest of crater	23
72	Atlas dark-haloed craters	Explosive volcanic pits on the floor of Atlas	15
73	Smythii Basin	Difficult to observe basin scarp and mare	38, 49
74	Copernicus H	Dark halo impact crater	31
75	Ptolemaeus B	Saucer-like depression on the floor of Ptolemaeus	44
76	W. Bond	Large crater degraded by Imbrium ejecta	04
77	Sirsalis Rille	Procellarum basin radial rilles	39, 50
78	Lambert RA	Buried "ghost" crater	20
79	Sinus Aestuum	Eastern dark-mantle volcanic deposit	33
80	Orientale Basin	Youngest large impact basin	50

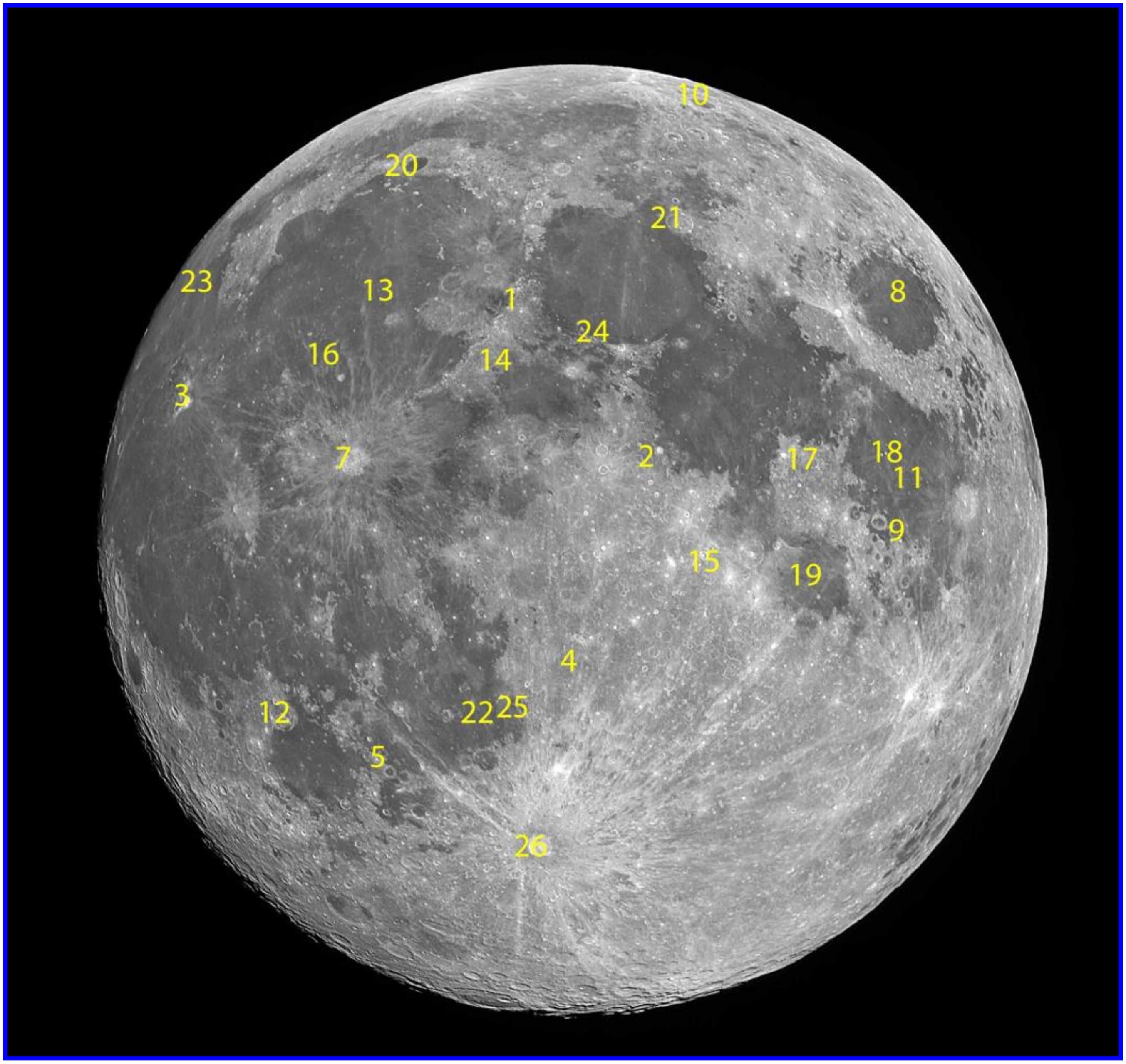
Explore the Lunar 100 on the link below:

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

Key to Images In This Issue



1. Apenninus, Montes
2. Ariadaeus, Rima
3. Aristarchus
4. Blanchinus
5. Campanus
6. Clavius
7. Copernicus
8. Crisium, Mare
9. Crozier
10. Endymion
11. Fecunditatis, Mare
12. Gassendi
13. Imbrium, Mare
14. Ina
15. Kant
16. Lambert
17. Leakey
18. Messier
19. Nectaris, Mare
20. Plato
21. Posidonius
22. Recta, Rupes
23. Rümker, Mons
24. Sulpicius Gallus
25. Thebit
26. Tycho