THE LUNAR OBSERVER

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.
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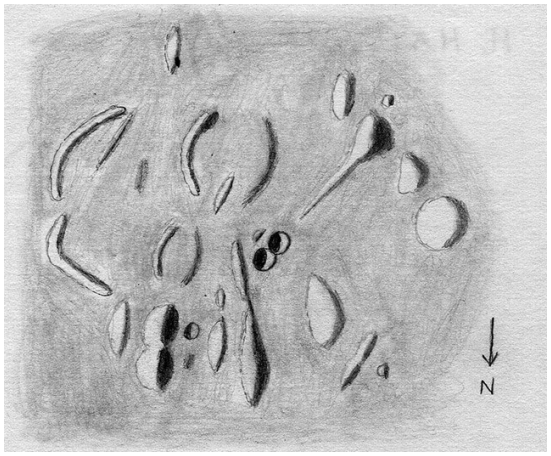
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – MAY 2019

FRA MAURO H & HA



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
March 16, 2019 02:27-03:07, UT, 15 cm refl, 170x,
seeing 8-6/10, transparency 6/6.

.I observed these craters and vicinity on the evening of March 15/16, 2019. This area is northeast of Fra Mauro itself. These are two small crisp craters surrounded by a jumble of peaks, hills and ridges. Fra Mauro H is the southwest one of the pair, and Fra Mauro HA is northeast of Fra Mauro H. A long ridge extends southwestward from Fra Mauro H, ending with a substantial peak having moderate shadowing. This is probably Fra Mauro alpha, according to the Lunar Quadrant map. A small peak is just to its south, and three large hills with lighter shadowing are nearby. A large low mound is just northwest of the crater pair, and a ridge and peak are farther away. The map depicts a fault east and north of the crater pair, but I saw a broken ridge there. This ridge is widest near its north end. It is definitely not like Rupes Recta. Two curved arcs of shadow south of the crater pair resemble parentheses. The eastern arc showed a sunlit side at this time, but the western arc did not. A smaller similar 'parentheses' is to its north. These 'parentheses' may be remnants of old rings. Farther to the north are two large peaks in contact with substantial shadowing. Between these peaks and the aforementioned fault is another ridge and some bits of shadow. One of them may be Fra Mauro Z. This crater is not as obvious as Fra Mauro H and HA. A low mound is east of the double peak, and two curved ridges are south of it. A straight ridge or wrinkle is within the southerly arc. This is overall a complicated area which I tried to draw as well as possible.

LUNAR CALENDAR

2019	U.T.	EVENT
May 02	11:39	Moon-Venus: 3.9° N
04	22:45	New Moon
07	23:36	Moon-Mars: 3.3° N
09	05:46	Moon North Dec.: 22.2° N
09	18:50	Moon Ascending Node
12	01:12	First Quarter
13	21:53	Moon Perigee: 369000 km
18	21:11	Full Moon
20	16:54	Moon-Jupiter: 1.8° S
22	06:41	Moon South Dec.: 22.3° S
22	21:12	Moon Descending Node
22	22:25	Moon-Saturn: 0.6° N
26	13:27	Moon Apogee: 404100 km
26	16:33	Last Quarter

2019	U.T.	EVENT
Jun 01	18:15	Moon-Venus: 3.4° N
03	10:02	New Moon
05	12:58	Moon North Dec.: 22.4° N
05	15:05	Moon-Mars: 1.6° N
05	22:46	Moon Ascending Node
07	23:21	Moon Perigee: 368500 km
10	05:59	First Quarter
16	18:50	Moon-Jupiter: 2.1° S
17	08:31	Full Moon
19	15:33	Moon South Dec.: 22.4° S
18	05:49	Moon Descending Node
19	03:58	Moon-Saturn: 0.5° N
24	07:50	Moon Apogee: 404500 km
25	09:46	Last Quarter

LUNAR ATLASES AVAILABLE (FREE)

I have a number of Lunar Atlases that I would like to give to a younger Lunar observer or an Amateur Observatory for free to do Lunar studies. I will pay for shipping only in the U.S
I will pack and ship in the U.S. only by truck, they are heavy.

There are 6 all together and are in excellent condition, they are:

1 complete Kuiper Photo Lunar Atlas.
1 Lunar Atlas, by U.S. Air Force.
1 Orthographic Atlas of the Moon Supplement.
1 Lunar Orbiter Photo Atlas of the Moon.
2 Rectified Lunar Atlases, one is second edition.

Contact Mike Mattei at this email address: micmatt@hughes.net

I would like them to be used by some one who can put them to good use.

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 nonmembers free of charge, but there is more to the A.L.P.O. than a monthly lunar newsletter. If you are a nonmember 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.

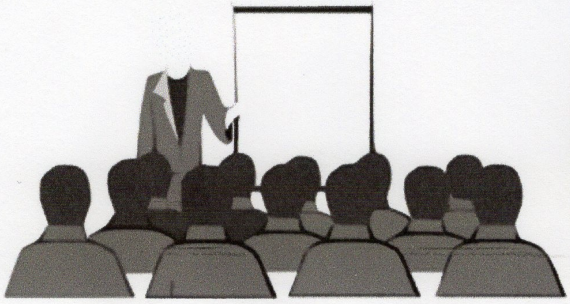
Our quarterly journal, **The Journal of the Association of Lunar and Planetary Observers-The Strolling Astronomer**, contains the results of the many observing programs which we sponsor including the drawings and images produced by individual amateurs. Additional information about the A.L.P.O. and its 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.

ALPO '19

July 12-13, 2019

A joint conference of the
Assn of Lunar & Planetary Observers and the
Southeast Region of the Astronomical League



Venue: Gordon State College, in picturesque
Barnesville, Georgia (near Atlanta)
Look for conference details via regular and e-mail soon!

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 both
Wayne Bailey – wayne.bailey@alpo-astronomy.org
and Jerry Hubbell –jerry.hubbell@alpo-astronomy.org

Hard copy submissions should be mailed to Wayne Bailey at the address on page one.

CALL FOR OBSERVATIONS:
FOCUS ON: Apollo 11 Region – Sea of Tranquility

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 2019** edition will be the Apollo 11 Region – Sea of Tranquilty**. This is the 50th Anniversary of the Apollo 11 flight.** 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
Wayne Bailey - wayne.bailey@alpo-astronomy.org

Deadline for inclusion in the Apollo 11 Region – Sea of Tranquility article is June. 20, 2019

FUTURE FOCUS ON ARTICLES:

In order to provide more lead time for contributors the following future targets have been selected: The next series of three will concentrate on subjects of the Selected Areas Program.

Subject	TLO Issue	Deadline
Alphonsus & Aristarchus	September 2019	August 20, 2019
Atlas & Copernicus	November 2019	October 20 ,2019
Plato & Theophilus	January 2020	December 20, 2019

Focus On: Apollo 12 – The Ocean of Storms

Jerry Hubbell
Assistant Coordinator, Lunar Topographical Studies

This is the fifth in a series of six TLO Focus On articles on the Apollo lunar landing missions that will end on the 50th anniversary of the Apollo 11 mission in the July 2019 issue of TLO. To learn about the background and thinking behind this series of articles to commemorate the Apollo program see the September 2018 TLO Focus On article.

Figure 1. Apollo 12 Mission Patch, NASA image.

Apollo 12 was launched on November 14, 1969 at 11:22 AM EST from the Kennedy Space Center. The crew consisted of Commander Charles "Pete" Conrad, Command Module Pilot Richard F. Gordon, and Lunar Module Pilot Alan L. Bean. (Figure 2.) After landing on November 19, 1969 at 1:54 AM EST in the Ocean of Storms (Oceanus Procellarum) (Figure 5) 81 miles (130 km) southeast of the crater Lansberg 24 miles (40 km) in diameter, and 132 miles (212 km) northwest of crater Fra Mauro 58 miles (96 km) in diameter, the lunar module crew spent a little more than 1.3-days on the surface and performed 2 EVA's during their stay.

Figure 2. Apollo 12 Astronauts. (from left to right, Charles "Pete" Conrad, Richard F. Gordon, and Alan L. Bean. NASA image.

Apollo 12 was an "H mission"; these missions were designed to demonstrate targeted landings with two-day stays on the Moon with two lunar EVAs. This mission targeted and landed in an area where several other spacecrafts had landed to gather information prior to the manned Apollo missions, including Luna 5, Ranger 7, and Surveyor 3. The Apollo 11 landing target was adjacent to the Surveyor 3 spacecraft at selenographic coordinates 3.2° S, 23.3° W. (Figure 4) The area a few degrees south of there was recognized by the International Astronomical Union (IAU) by naming it Mare Cognitum (Known Sea) located at selenographic coordinates 10.5° S,

22.3° W. The Apollo 12 lunar lander "Intrepid" piloted by Conrad and Bean achieved a precise landing within walking distance, about 540 feet (165 meters) from the Surveyor 3 spacecraft (Figure 3 and 4.)

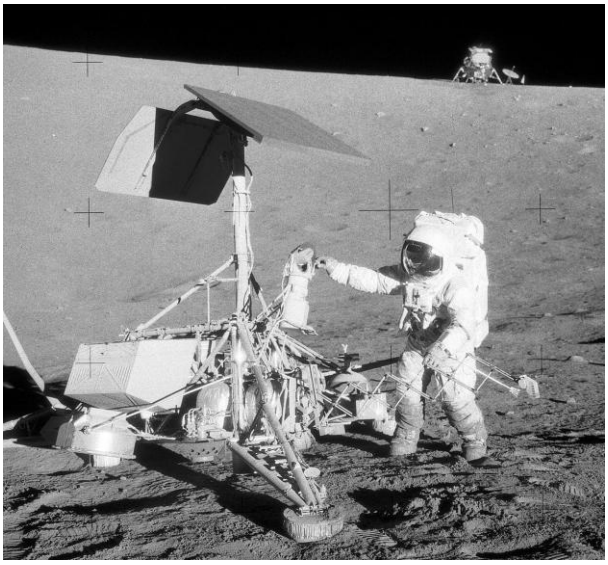


Figure 3. Apollo 12 Astronaut Pete Conrad examines Surveyor 3 after a precise landing of the lunar module Intrepid seen in the background. NASA image.

The mission objectives were to explore the southeast region of the Ocean of Storms and set up and activate lunar surface scientific experiments (ALSEP), develop and demonstrate precision landing techniques, and conduct lunar orbital experiments and photograph the lunar surface from orbit.

The early Apollo mission site selection criteria was based on the need to sample sites that were representative of the lunar surface and could provide materials to start to understand the origin of the moon.

According to the *Criteria for Lunar Site Selection*, Report No. P-30 (reference)

> *"…According to the rationale of level 2, the individual mission sites must be chosen to represent homogeneous provinces and/or scientifically significant features. The homogeneous sites must have characteristics, in so far as can be determined from the orbital reconnaissance of level 1 which are typical of the province in which they lie, so that the information obtained from each site is of significance regarding a large portion of the Moan, or hopefully the entire Moon. By this definition it is to be understood, once such a homogeneous province has been defined, that the actual location of the landing site within the province is not critical and that from a scientific stand point extensive traverse capability is not require. Large fractions of the various lunar maria, the majority of exposed ejecta from Imbrium or Oriental, and portions of the cratered upland plains between Maurolycus and Janssen are examples of areas where level 2 landing sites would yield the desired scientific information."*

As such for the Apollo 12 mission, the Lunar and Planetary Institute report on Apollo 12 provides the following:

> *"The Apollo 12 mission provided the first opportunity to study the Moon extensively within a radius of 0.5 kilometers of the landing site. Lunar surface activities were performed essentially as planned within the allotted time periods. Three hours after landing, the crew began preparations for egress and the first traverse of the lunar surface. During the two extravehicular activity periods, a total duration of 7.5 hours, the*

astronauts were given very specific tasks to complete. Among these were to collect lunar samples, to deploy several experiments, and to examine and photograph the lunar surface. The following map of the landing area shows where these activities took place."

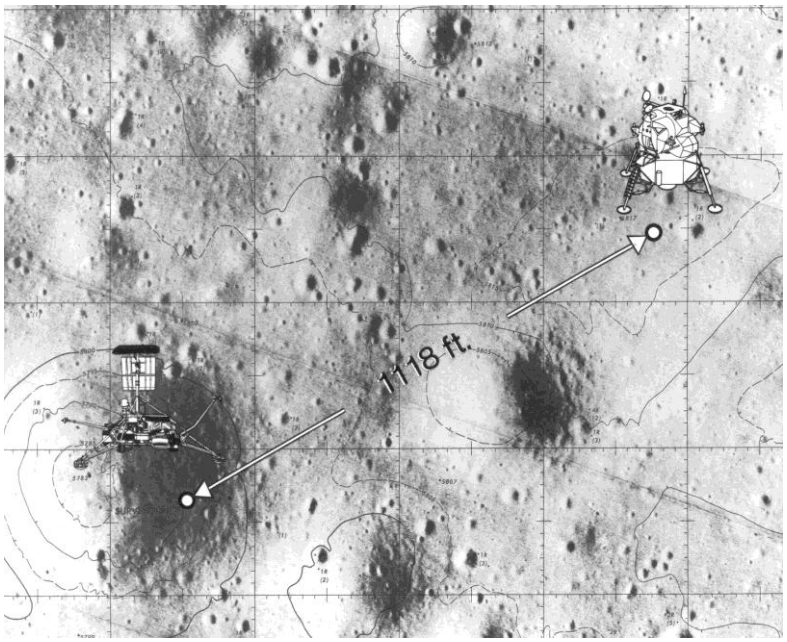


Figure 4. Preliminary Apollo 12 Landing Site – Precision Landing Location near Surveyor Crater, Apollo Lunar Surface Map 69-H-1549. NASA ALSM.

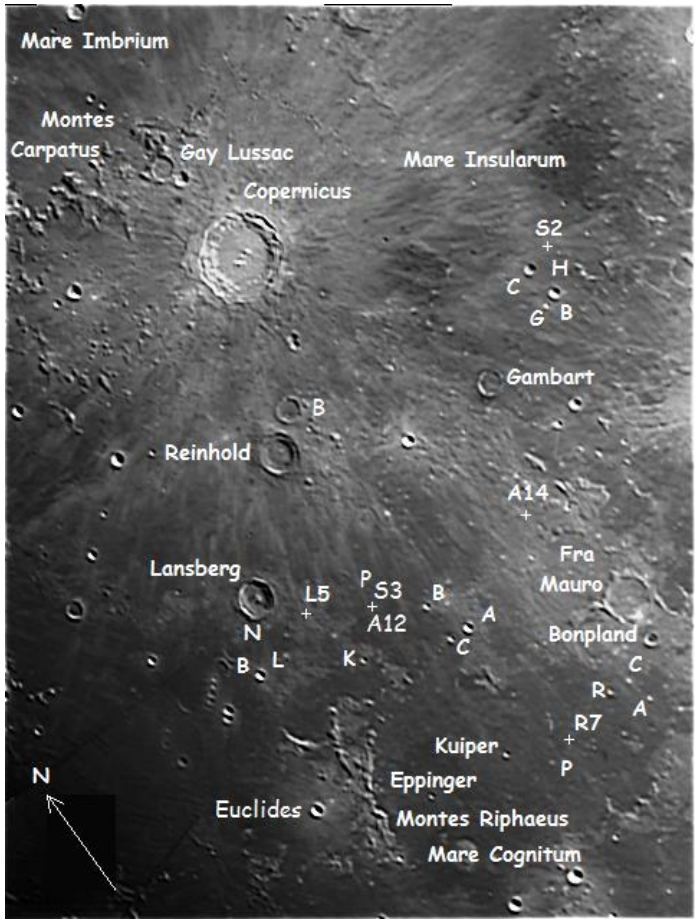


Figure 5. Apollo 12 Landing Site and Surrounding Area, Alberto Martos, et al., Lunar Group of the Madrid Amateur Astronomy Society, Madrid, Spain. 29 October 2009, 1926 UT. Colongitude, 47°, Telescope, 20-cm f/7.3 Newtonian reflector, Philips TouCam Pro. Visibility, 4/5 Transparency, 3/5

The southeast region of Oceanus Procellarum around Mare Cognitum has plenty of craters, rimae or rilles and other interesting features to observe and image with the small telescope. Several craters within a few hundred miles of the Apollo 12 landing site include Copernicus, Reinhold, Lansberg to the north, Ptolemaeus, Alphonsus, Arzachel to the east, Bullialdus to the south and Montes Riphaeus to the west. Closer to the landing site to the northeast and east are the craters Fra Mauro (site of Apollo 14), Parry, and Guericke. (Figure 5)

Fra Mauro crater is 58 mi. (96 km) in diameter and located at Selenographic coordinates, Lat 6.061° S, Lon 16.974° W. Companion craters Parry, diameter 29 mi. (48 km), Bonpland, diameter 36 mi. (60 km), and Guericke, diameter 35 mi. (58 km), further to the south, are all very interesting objects to observe. Rimae Parry is a well developed rille system that stretches across Parry, Bonpland, and Fra Mauro for 182 mi. (300 km). (Figure 6)

Alberto Martos, and Angel Martinez, members of the Lunar Group of the Madrid Amateur Astronomy Society provide the following comments (extracted from their extensive report on the Apollo 12 Landing).

> *"…When we planned our first observation of Apollo 12 landing site for this paper, on March 16th under waxing Moon, we were well aware about the difficulty of observing a difference of colors in magmas among the different landing sites that were selected by the GLEP. And of course, we failed to distinguish colors of the lavas, probably because we were using telescopes of small aperture. Yet we succeeded identifying the landing site of Apollo 12, following a Copernicus ray that passes close to crater Lansberg. These rays are so bright…*
>
> *But tracing down the Copernicus ray and looking for some craterlets which could help locate the landing point, consumed much of our available time, so no picture could be taken during this session. Fortunately, when checking our files, we managed to find another picture of the same area, taken under similar observing conditions, on 10-29-2009 (ten years ago!). Moon ages were respectively 11.62 and 10.08 days and Colongitude, 47.0' and 35.1º. This is picture 1.*
>
> *On next waning phase, March 30th early in the morning before twilight, I tried to see the lava colors using a 20 cm f/7.2 refractor, with the same disappointing result. The most I could distinguish was the difference in brightness of lavas, no colors at all. And the Moon escaped away while I was trying to use color filters to enhance the contrast, without success. Again, no picture could be taken… but again, checking our files I got a good substitute. A picture taken on 10-12-2009, still ten years ago and in the waning phase! Therefore, under very same viewing conditions: Moon ages were respectively 23.40 and 23.41 days and Colongitude were respectively 190º 48' and 197º 06'. This is picture 2.*
>
> *Our third attempt was supposed to be carried out on the last opportunity before the dead end for this article, on Sunday April 4th. For this occasion, we planned to use the largest telescope in our observatory, a 25 cm f/4.7 reflector, normally used for observing deep sky objects. But regrettably, our hopes to see colors on the Moon vanished, because a period of bad weather (good weather for farmers) invaded Spain and our observation had to be cancelled.*
>
> *So, we must deal with the weather. Picture 3* [Figure 4] *shows the same panorama as picture 1, but we have added in it the labels we need to guide the reader towards Apollo 12 landing site. As this picture may seem cluttered with labels, the reader can make use also of pictures 1 and 2 to identify the markings on a clean image..."*

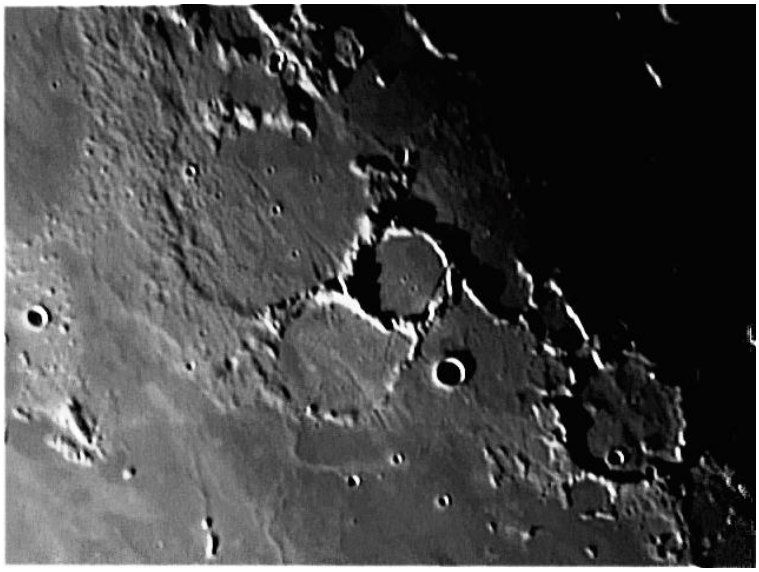


Figure 6. Fra Mauro at sunset, Alberto Martos, et al., Lunar Group of the Madrid Amateur Astronomy Society, Madrid, Spain. 10 December 2009 0425 UT. Colongitude, 191°, Telescope, 20-cm f/7.3 Newtonian reflector, Philips TouCam Pro. Visibility, 4/5 Transparency, 4/5

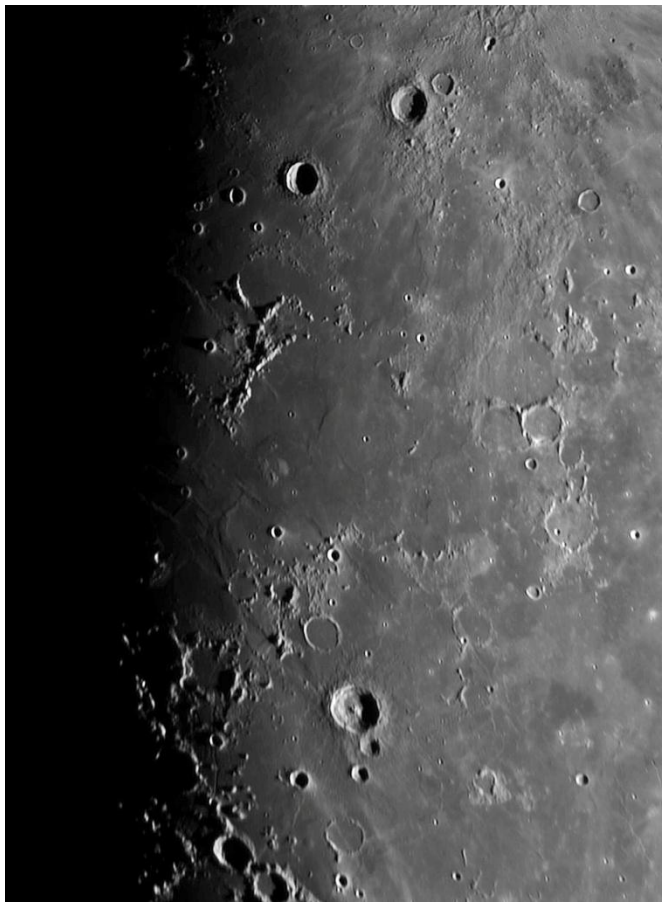


Figure 7. Region around Apollo 12 Landing Site, David Teske, Louisville, Mississippi, USA, 18 November 2018 at 0219 UT. Colongitude 29.2 degrees, Seeing 9/10, 102 mm f/7 APO refractor, 2.5 x Power Mate, ZWOASI120mms, 500 frames, Firecapture, Registax, Photoshop.

Jay Albert submitted this observation of Oceanus Procellarum:

> *"Attached is a handheld iPhone shot of Oceanus Procellarum* [Figure 7] *for the Ocean of Storms "Focus On" article. I took this last night following my visual lunar observations. The date and time are shown in the filename. At that time, I noticed clouds headed my way from the ocean to the east, so I didn't take the time to get back in the house to get my cellphone adapter. I shot this from my driveway west of Lake Worth in Palm Beach*

County, Florida. I used my Celestron 8" NexStar Evolution with a 40mm Plossl eyepiece and my iPhone 6s. The photo was rotated with north up, cropped, changed from color to black & white and sharpened in Photoshop Elements. The sky was partly cloudy, but not hazy for a change. Because of the bright, nearly full moon, however, I couldn't see stars fainter than 2nd magnitude. At the time I took the photo, the seeing had improved from a poor 3/10 at the start of my visual observing session to a fairly decent 5/10."

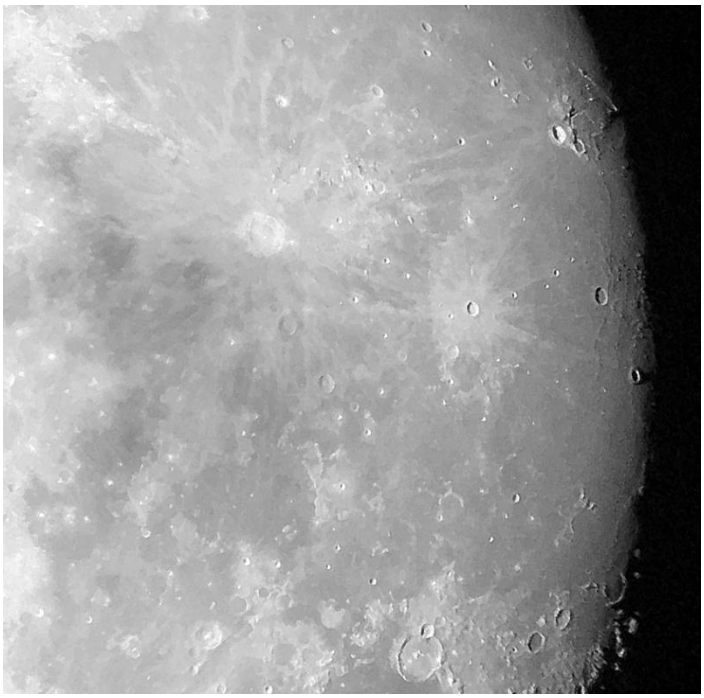


Figure 8. Oceanus Procellarum, Jay Albert, Lake Worth, Florida, USA, 17 April 2019 at 1052 UT. Colongitude 61.6 degrees, Seeing 5/10, 200 mm f/10 Celestron 8" NexStar Evolution SCT , 40mm Plossl eyepiece projection, iPhone 6s Camera.

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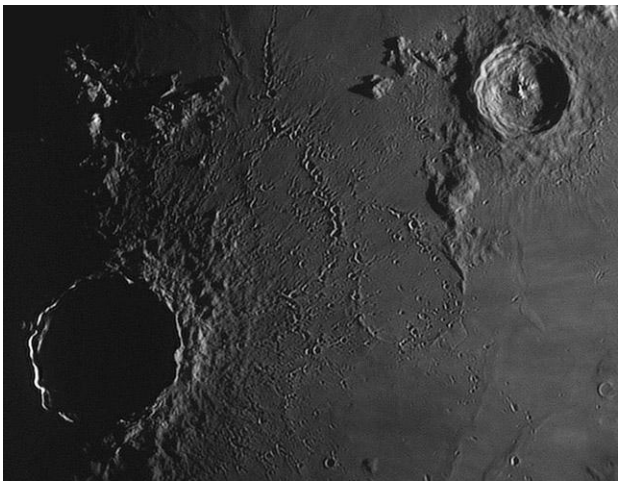
GOOOOD MORNING NICOLAUS!

Rik Hill

Some people ask, why image the moon, hasn't it been done already? It depends on how you mean that. Has every square meter been imaged? Yes. At all lightings and librations? NO! This image is a good example of that. This scene made me gasp when it slew into view. What drama! Here we have the mighty Copernicus (95km diameter) on the left just catching the first rays of morning light. I've always enjoyed that one peak on the eastern rim that juts up higher than the rest of the rim. Note the wonderful hummocky terrain immediately surrounding the eastern wall with the ejecta splash reaching further out to the secondary craters created from low velocity ejecta thrown out of the grand impact crater. The larger members of these secondaries are named subordinate to the main crater of Copernicus. Such impact ejecta form craters that can take on a variety of shapes as these do.



COPERNICUS-ERATOSTHENES – *Richard Hill – Tucson, Arizona, USA April 14, 2019 02:33 UT. Colongitude 21.1°. Seeing 8/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 610 nm filter.*

In the upper right corner is another superb crater, Eratosthenes (60km) with its well terraced inner slopes and a collar of hummocky terrain. There is a small chain of the Copernican secondary craters that curls around Eratosthenes ***on top*** of the the hummocky terrain. This tells us that in relative terms, the Copernicus impact took place more recently than the Eratosthenes impact. These were the kind of things that were used to establish relative ages for many lunar features before the Apollo sample returns that gave us absolute ages that could be used to date features more accurately.

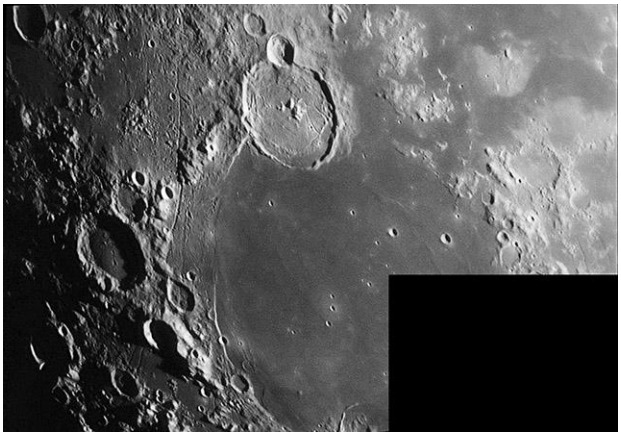
Between these two great craters is the ghost crater Stadius (71km) peppered with the Copernicus secondary cratering. I've always enjoyed the patch of mountains between Stadius and Eratosthenes and the ones to the upper left of the latter crater. What a great sunrise! ***FIGURE 1. J.***

****

NORTH END OF HUMORUM

Rik Hill

Due east (right) near the image edge is the ruined crater Agatharchides (51km) even older than Gassendi or Humorum. To the west of Gassendi ar the lovely Rimae Mersenius named after the crater Mersenius half in shadow at the south end of the largest rima, displaying a very convex floor. One of the smaller rimae passes through a 34km crater Mersenius D just below and right of Mersenius. To the left of that is the shadow filled Liebig (37km). To the left of Liebig are more of the southern end of the rimae leading into the crater De Gasparis (31km) also filled with shadow.



To the right of these craters, in the mare and overlain by a small crater, is a bright scarp, Rupes Liebig. Then further into the mare is the thin Rima Doppelmayer though Doppelmayer itself is south of the lower edge of this image.

GASSENDI – *Richard Hill – Tucson, Arizona, USA September 29, 2018 04:07 UT. colongitude 52.9°. Seeing8/10. TEC 8" f/20 Mak-Cass, SKYRIS445M, 610 nm filter.*

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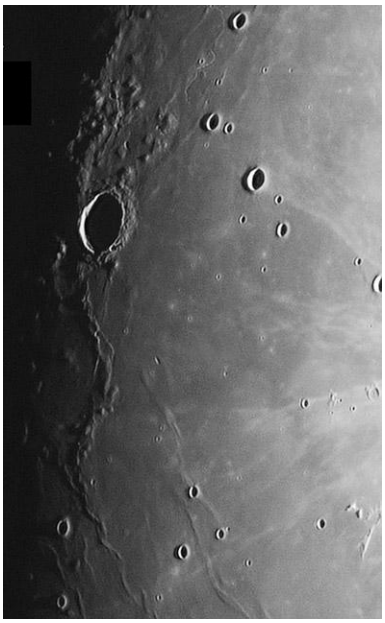
A POX ON THE MOON

Rik Hill

A day after Kepler comes into view you'll see another crater about the same latitude on the terminator surrounded by quite rugged terrain. This is 43km diameter Marius with its herringbone ejecta blanket well displayed. Seen here it has a large unnamed dorsum tail to the south ending just west of a right triangle of craters the southernmost of which is Seuss (10km). The western rays from Kepler can be seen coming in from the right side of the



MARIUS – *Richard Hill – Tucson, Arizona, USA March 18, 2019 04:38 UT. colongitude 52.2°. Seeing 8/10. TEC 8" f/20 Mak-Cass, SKYRIS445M, 610 nm filter.*

image. Northeast of Marius (upper right) are three fairly good sized craters from bottom to top are Marius A (15km), Marius C (11km) and Marius B (12km) all bigger than Seuss! Between Marius C and B you can see the sinuous Rima Marius running off the north edge of this image. To the north of Marius you can see the eastern end of the field of domes Marius also called the "Marius Hills". These are a real treat to see as the moon gets more and more gibbous.

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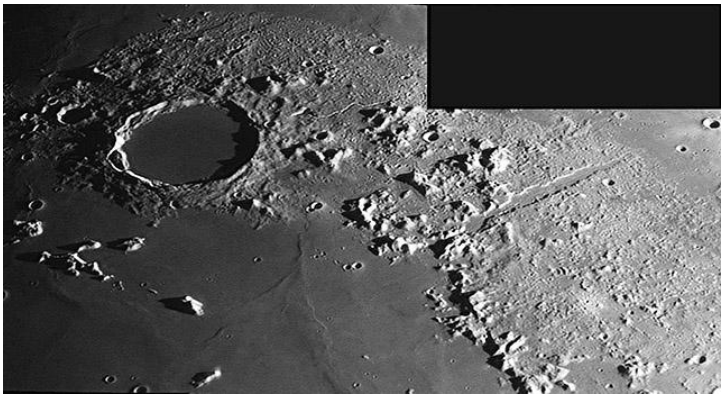
HIKING IN THE ALPES

Rik Hill

There are few places on the moon where you can observe more spectacular features in one view than the area around the Montes Alpes. Here we see the scene is dominated by the larged walled plain, Plato (104km diameter). When the sun is higher here you can make out a series of small craters on the floor. On the west wall is a slumped area about 4 times the size of the island of

Manhattan. Then on the east side there is a little flagellum of a rima. Believe it or not, this prominent feature is unnamed even though it's 2-3km wide! Rimae Plato are the hair like rimae south of this barely resolved in this image.



MONTES ALPES – *Richard Hill – Tucson, Arizona, USA April 14, 2019 02:48 UT. colongitude 21.1°. Seeing 8/10. TEC 8" f/20 Mak-Cass, SKYRIS445M, 610 nm filter.*

The other spectacular feature here is the big ditch that is Vallis Alpes (134km long). Seen clearly in this image is the rille running it's length. On the west side, at the mouth of this valley, are a pair of craters that bear watching throughout the lunation. During high sun there's a fascinating ejecta splash between these two.

Going further west into Mare Imbrium we see the ramparts of Mons Pico. It looks so tall and formidable here but go to the KAGUYA "Mons Pico" and "Plato" video on YouTube and you will be shocked at what it really looks like. Terminator lighting can really be deceiving. Moving further out into Imbrium we see the see the isolated range of Montes Teneriffe sparkling in the morning sunrise.

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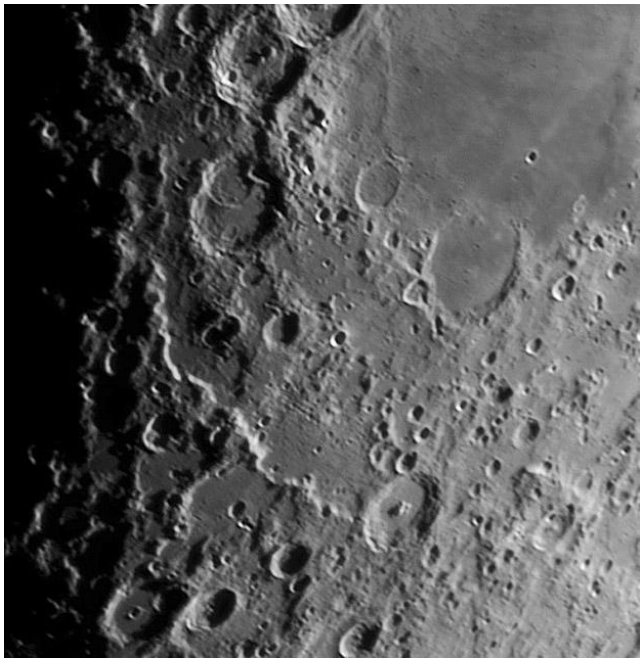
RUPES ALTAI

David Teske

Southwest of Mare Nectaris lies Rupes Altai (Altai Scarp) seen as a curving, scalloped cliff of staggering proportions, stretching from Catharina to Piccolomini and beyond. In fact, Rupes Altai proceeds eastward under the crater Piccolomini and then northeast past the crater Borda a few tens of kilometers. The entire escarpment spans around 500 km in length and is part of the Nectaris basin ring that is 860 km in diameter. Nectaris is the best preserved multi-ring impact basin on the Earth facing side of the Moon. Rupes Altai is a segment of a rim that curves around 30% of the southwestern side of the basin in the highlands. West of the scarp are ancient highlands, whereas features east of the scarp were created since the formation of the Nectaris Basin, 3.92 billion years ago. Rupes Altai is a surviving clear section of an outer ring that must have surrounded the Nectaris Basin that in its pristine state, the basin must have looked like a multi-ring bulls-eye. The origins of Rupes Altai are linked to the stresses set up in the lunar crust by asteroid impact that made the Nectaris Basin. After an asteroid formed the Nectaris Basin 3.92 billion years ago, shock waves rapidly expanded through the surrounding terrain and became frozen in place, producing a multi-ring basin. The inner part of the basin has dropped exposing the scarp face along the line of a deep seated fault. The east facing Rupes Altai is by far the most prominent section of the Nectaris multi-ring impact basin. This is an escarpment rather than a mountain range as its peaks are elevated very little above the ground to the west. As such, it seems Rupes Altai is a slump-fault rather than a mountain range of uplifted crustal rocks. The scarp is fairly continuous but there are a number of breaks along it. Rupes Altai rises an average of 1,200 to 1,800 m above the basin interior. Its greatest height difference between the mountain peaks and



the surrounding terrain is near the craters Pons (44 x 31 km diameter) and Fermat (39 km diameter), and west of the crater Polybius (41 km diameter). The slope of Rupes Altai is much steeper than that of Rupes Recta and Rupes Cauchy. Rupes Recta and Rupes Cauchy also have much smaller differences in height compared to the surrounding terrain.

RUPES ALTAI – *David Teske, Louisville, Mississippi, USA, March 23, 2018 01:32 UT. Colongitude 339.2°, seeing 5/10, 102 mm APO refractor, 2.5 x Power Mate, zwoASI120mms*

Piccolomini with a diameter of 87 km is a beautiful crater of Upper Imbrian age, 3.75 to 3.2 billion years old where Rupes Altai terminates on its southern end. This complex crater has a substantial central mountain, terraces, and a smooth, convex floor. Its cluster of central peaks reaches a height of 2,000 m. Its terraced walls tower 4.5 km above the crater's floor.

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LUNAR TOPOGRAPHICAL STUDIES

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OBSERVATIONS RECEIVED

JAY ALBERT - LAKE WORTH, FLORIDA, USA. Digital images of Oceanus Procellarum.

JUAN MANUEL BIAGI - ORO VERDE, ARGENTINA. Digital image of Mare Crisium.

FRANCISCO CARDINALLI - ORO VERDE, ARGENTINA. Digital image of Oceanus Procellarum.

JAIRO CHEVEZ - POPAYÁN,COLUMBIA. Digital image of waxing gibbous Moon.

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 12, & 14 day Moon, Aristarchus, Bailly & Schickard.

WALTER ELIAS - ORO VERDE, ARGENTINA. Digital images of Alphonsus, Aristotteles, Montes Carpatus, Moretus, Plato, Procclus, Ross D(2), south pole region, Torricelli B & Tycho(2).

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of 1st qtr. Moon, Altai Scarp, Aristarchus, Cleomedes, Flamsteed, Harpalus, Licetus, Macrobius, Mare Vaporum, Marius Hills, Meton, Montes Alpes, Ptolemaeus, Rheita & Scoresby.

ROBERT HAYS - WORTH, ILLINOIS, USA. Drawings of Fra Mauro H & HA, & Wichman ρ & δ.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Copernicus, Gassendi, Hadley, Marius & Montes Alpes.

ALBERTO MARTOS & ANGEL MARTINEZ - MADRID, SPAIN. Digital images of Apollo 12 landing region(2).

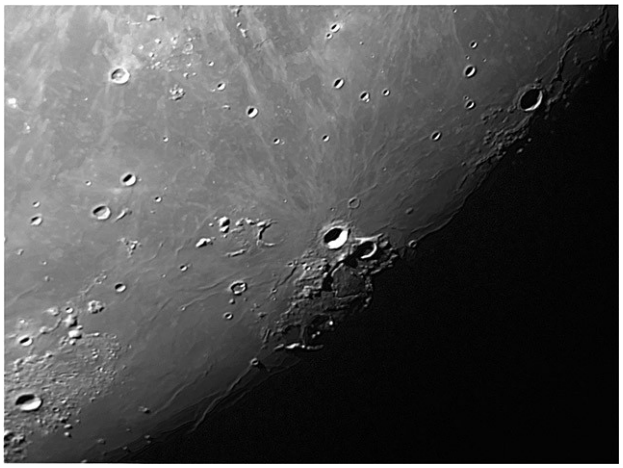
JORGELINA RODRIQUEZ - ORO VERDE, ENTRE RIOS,ARGENTINA. Digital image of Censorinus(6).

MICHAEL SWEETMAN – TUCSON, ARIZONA USA. Digital images of Copernicus, Longomontanus & waxing gibbous moon.

DAVID TESKE - LOUISVILLE, MISSISSIPPI, USA. Digital images of Apollo 12 region(3) & Rupes Altai.

RECENT TOPOGRAPHICAL OBSERVATIONS

MARE CRISIUM- Juan Manuel Biagi - Paraná, Argentina. March 23, 2019 04:51 UT. Meade EX-105 Mak-Cass, Canon EOS 400 Rebel



Dorsa in Oceanus Procellarum - Luis Francisco Alsina Cardinalli, Oro Verde, Argentina, December 11, 2016, 03:17 UT, 20mm LX200 SCT, Canon EOS Digital Rebel XS, Astronomik ProPlanet 742 IR-pass filter.

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WAXING GIBBOUS MOON– Jairo Chavez,- Popayán Columbia. April 16, 2019 02:52 UT. 10" Dobsonian, Sony DSC-WX50.

RECENT TOPOGRAPHICAL OBSERVATIONS

14 day MOON - Maurice Collins,- Palmerston North, New Zealand. April 19, 2019 09:18-09:20 UT. FLT-110. ASI 120MC.

BAILLY - Maurice Collins,- Palmerston North, New Zealand. April 197 2019 10:18 UT. FLT-110. ASI 120MC.

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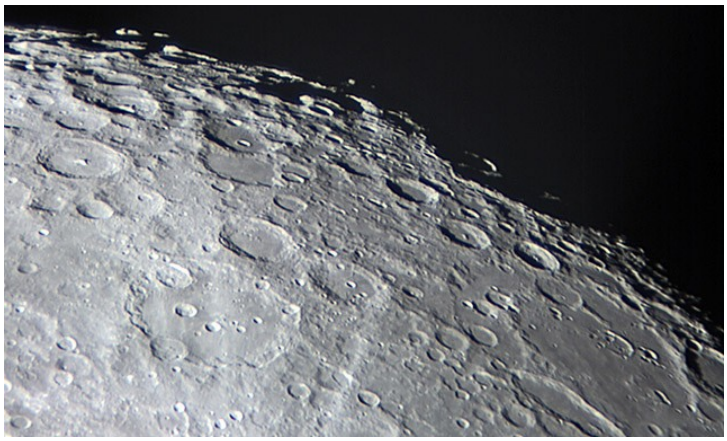
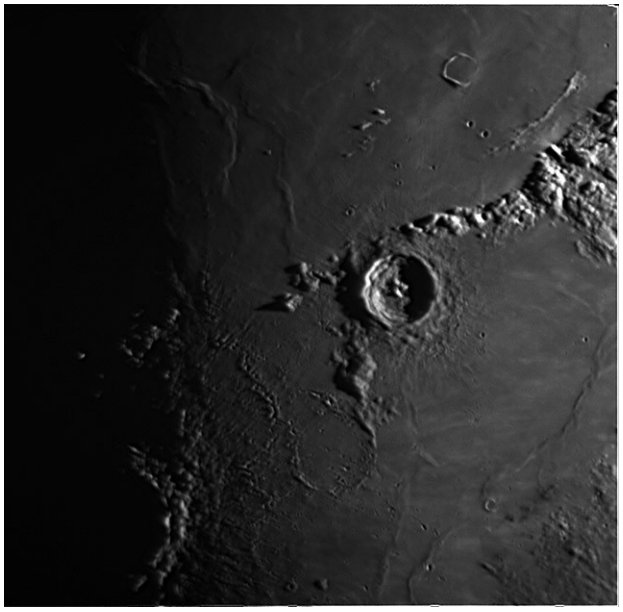
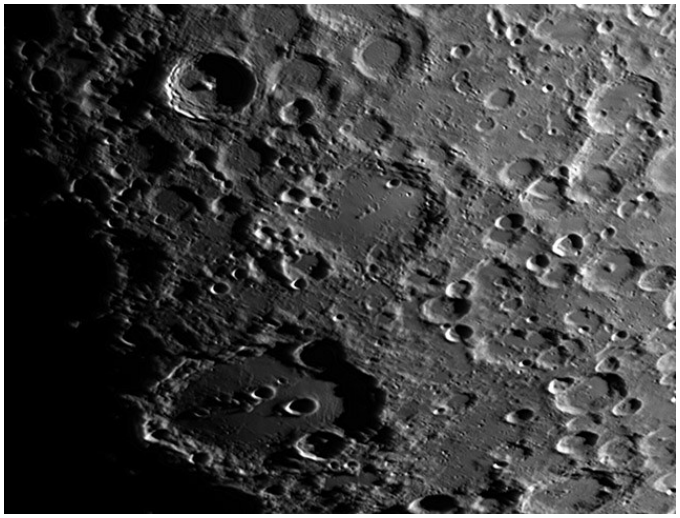


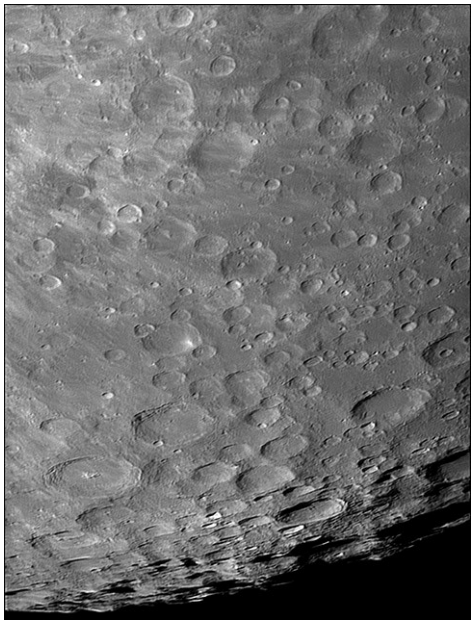


MONTES CARPATUS - Walter Elias, Oro Verde, Entre Rios, Argentina. April 13,, 2019 22:08 UT. Celestron CPC-1100, ZWO ASI 120 MM/S

RECENT TOPOGRAPHICAL OBSERVATIONS



TYCHO - Walter Elias, Oro Verde, Entre Rios, Argentina. April 13,, 2019 22:19UT. Celestron CPC-1100, ZWO ASI 120 MM/S



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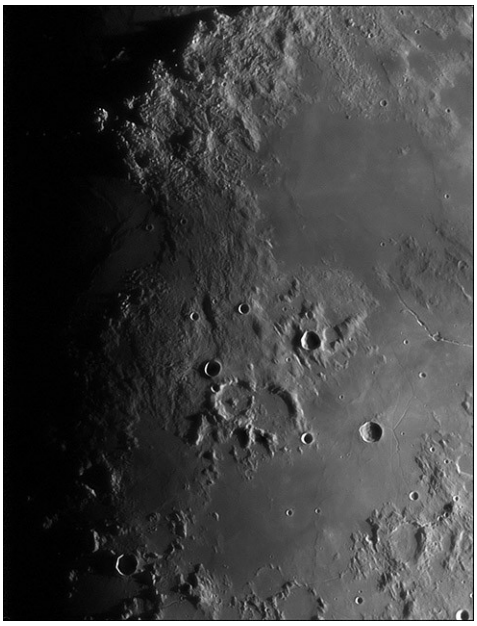
LICETUS- Howard Eskildsen, Ocala, Florida, USA. March 23, 2019 09:56, UT. Seeing 6/10, transparency 6/6. 6" f/8 refractor, 2x barlow, W-8 yellow filter, DMK 41AU02.AS.

MARE VAPORUM- Howard Eskildsen, Ocala, Florida, USA. April 13, 2019 01:30 UT. Seeing 7/10, transparency 5/6. 6" f/8 refractor, 2x barlow, W-8 yellow filter, DMK 41AU02.AS.

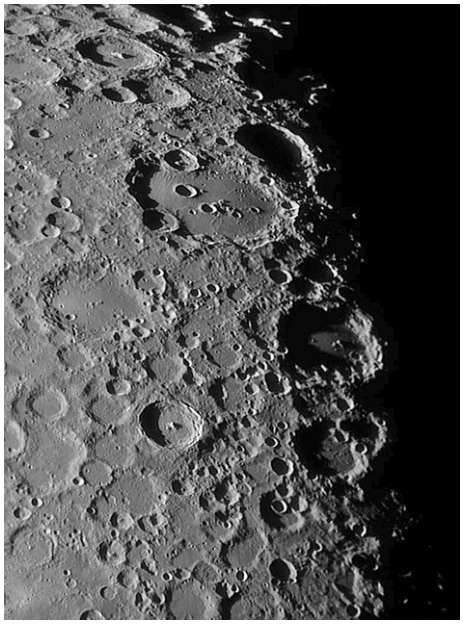
This image perplexes me. Note "The Wad," my term for the rubble that extends form Montes Apenninus at the upper image to the battered pair of craters, Pallas and Murchison, which lie just below the center of the image. Obviously this is ejecta that came from Imbrium, but on the right margin of it are rounded mounds that appear to have been scoured by Imbrium ejecta that traveled far beyond "The Wad." Why did some of the ejecta pile up just past the Apennines, and what was the cause of the scoured mountains (resembling the Haemus mountains) that presumably predated Imbrium? Were they part of another, now-obliterated, impact basin? Lots to ponder.
Also note the mounds in the battered crater Murchison (the right one of the crater pair below center of image), some of these are volcanic domes.



RECENT TOPOGRAPHICAL OBSERVATIONS

CENSORINUS - Jorgelina Rodriguez, Oro Verde, Entre Rios, Argentina. April 11, 2019 23:55UT. Celestron CPC-1100, ZWO ASI 120 MM/S

COPERNICUS - Michael Sweetman - Tucson, Arizona, USA, April 14, 2019 06:55 UT. Seeing 3-4/10, transparency 3/6. 4" achromatic refractor, f/8.6. Skyris 132M, Baader fringe killer filter.



LONGOMONTANUS - Michael Sweetman - Tucson, Arizona, USA, April 14, 2019 07:00 UT. Seeing 3-4/10, transparency 3/6. 4" achromatic refractor, f/8.6. Skyris 132M, Baader fringe killer filter.

LUNAR GEOLOGICAL CHANGE DETECTION PROGRAM

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

Reports have been received from the following observers for March: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Alphonsus, Aristarchus, Atlas, Eratosthenes, Mutus F, Pallas, Taruntius, and the west limb. Alberto Anunziato (Argentina – SLA) observed: Alphonsus, Eratosthenes, Furnerius, Gassendi, Plato and Torricelli B. Juan Manuel Biagi (SLA) imaged several features. Jario Andres Chavez (Columbia – LIADA) imaged: Copernicus and several features. Marie Cook (Mundesley, UK – BAA) observed Aristarchus. Valerio Fontani (Italy – UAI) imaged Copernicus, Godin and several features. Rik Hill (Tucson, AZ, USA – ALPO/BAA) imaged Clavius, Gassendi, Marius and several features. Trevor Smith (Codnor, UK - BAA) observed: Alphonsus, Aristarchus, Bullialdus, Censorinus, Copernicus, Cruger, Eimmart, Encke/Kepler region, Eratosthenes, Gassendi, Lichtenberg, Mare Crisium, Mersenius, Mons Piton, Plato, Proclus, Promatorium Aeracalides, Promontorium Laplace, Ross D, Theophilus, and Torricelli B. Franco Taccogna (Italy – UAI) imaged Copernicus, Godin, and several features. Aldo Tonon (Italy-UAI) imaged several features. Ivor Walton (UK - CADSAS) imaged several features..

LTP reports: No LTP were observed in March. But On 2019 Apr 10 UT 22:42:40 Marcelo Zurita (Brazil – APA / BRAMON / SAB) video recorded earthshine and detected a candidate impact flash, lasting 2 TV fields(?) in the approximate vicinity of Copernicus. Was anybody else observing then so that we can confirm this?

News: It was a great pity to hear that the first privately funded lunar lander, Beresheet (made by SpaceIL), did not make a survivable landing in the northern Mare Serenitatis on 2019 Apr 11. Just out of curiosity, I decided to video the landing site, at the time, through my 8" Newtonian – though not expecting to see anything as the resolution would not have been sufficient. SpaceIL had a live broadcast on the Internet so I sat outside watching this and the live video from my telescope. It was a bit difficult to understand what was going on as at least half of the commentary from SpaceIL Mission Control was in Hebrew. Fig 1 (Right) shows the landing site around the time that they lost contact. I have examined the video carefully, and despite an impact velocity of just under 1 km/s (mostly sideways) have not seen any evidence of an impact cloud. You can compare a slightly later higher resolution image of the area (Fig 2 - Right) taken by Bob Stuart. It probably would help if we had a more precise knowledge of the trajectory and impact site to be sure that nothing has been missed in the video. Hopefully SpaceIL will get a Beresheet II lander built and launched in the near future.

Routine Reports: Below are a selection of reports received for March that can help us to re-assess unusual past lunar observations – if not eliminate some, then at least establish the normal appearance of the surface features in question.

Copernicus: On 2019 Mar 15 UT 19:12 Valerio Fontani (UAI) and UT 1926-19:27 Franco Taccogna (UAI) imaged the crater under similar illumination and topocentric libration (to ±1°) to the following report:

Copernicus: On 1995 Jul 07 at UT 04:22 R. Spellman (Los Angeles, CA, USA) noted that the floor of Copernicus was slightly darker in blue light. The ALPO/BAA weight=1. This report came from R. Spellman's web site.

Also to within ±0.5°, in terms of similar illumination, to the following report:

Copernicus 1969 Nov 18 UT 21:10-21:11 Observed by Hedervari(Budapest, Hungary, 3.5" refractor) "Yellowish-red stripe on inner W. wall (chrom. aberr.? Apollo 12 watch)." NASA catalog weight=2. NASA catalog ID No. 1217. ALPO/BAA weight=1.

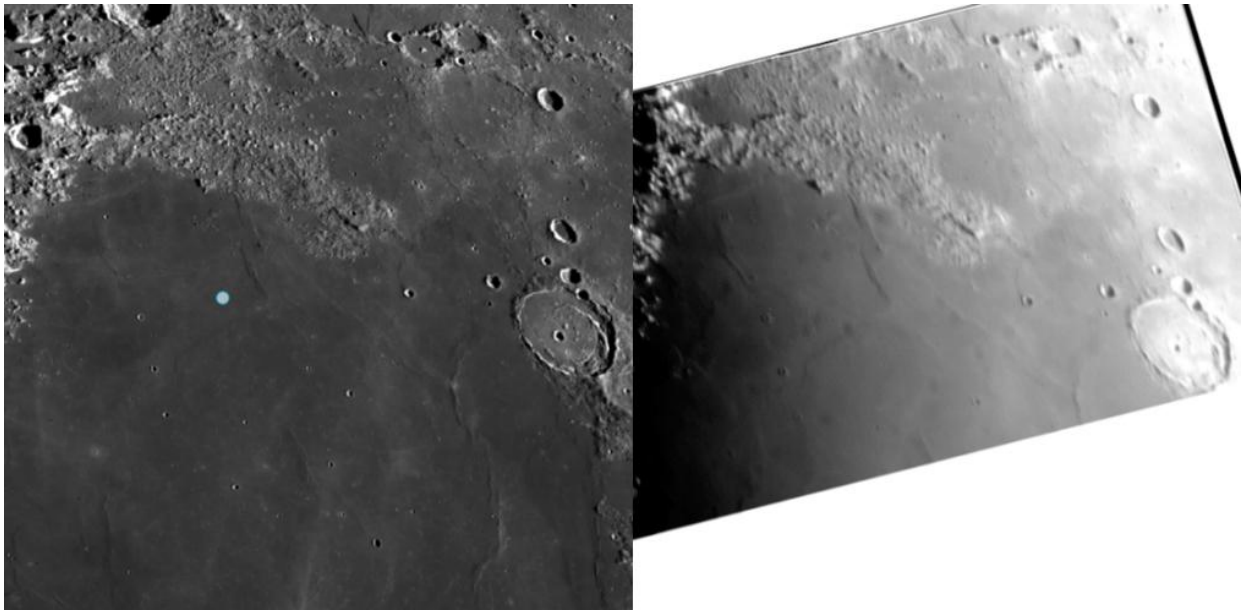

Figure 1. Northern Mare Serenitatis. **(Left)** A LROC/QuickMap view with the planned landing coordinate of SpaceIL's Beresheet-I lander marked by a blue dot. **(Right)** A Registax'ed image of the landing site, by Anthony Cook (ALPO/BAA) made using video frames from ±5 sec either side of the loss of contact on 2019 Apr 11 UT 19:23:01 – This time of impact came from a Tweet. Note that some of the small faint dark smudges are due to dust diffraction rings on the Watec 902H camera being used in conjunction with a 3x Barlow and a Wratten 87C near IR filter.

In order to check out these reports, we can look at the blue and red components in Franco's images, which were taken through blue (Fig 3 – Top Left) and red (Fig 3 – Top Right) filters. Also, a color normalised and saturation (50%) increased version of Valerio's image (Fig 3 - Bottom). If the floor had some blueness to it then in the red filter it will be little darker and in the saturated enhanced image, the blue color should be present. There is no sign of any of this in Fig 3. Therefore, what Robert Spellman saw in 1995 does not appear to be normal – though it should be said that he saw a similar effect in Godin crater – so maybe it was atmospheric related? With regard to the Hedervari observation, there is no sign of a yellow red stripe on the inner west rim, so again this is not normal, though as Cameron points out in her description it could perhaps be chromatic aberration? We shall leave the weights of both these reports at 1 for now.

Mons Piton: 2019 Mar 15 UT 21:35 Trevor Smith (BAA) sketched this mountain peak 31 min prior to the start of the ±0.5°similar illumination window that corresponded to the following report:

Piton 2004 Jan 30 UT 15:52 Observed by a GLR observer (Italy) "CCD image shows a point of light in the NW shadow - possibly highland starting to emerge from the shadow?" A GLR report. ALPO/BAA weight=1.

Trevor, who was observing several features (including Mons Piton) from 21:15-22:00 using a 16" reflector (seeing Antoniadi III-IV) described the mountain (2.3 km high) as casting a black shadow westward for approximately 25 km. He could see three main illuminated parts to the mountain peak. At 21:35 (See Fig 4) a very faint point source of white light could be seen emerging from the shadow to its SW. The point was so faint to begin with that it came and went in the atmospheric seeing conditions – perhaps inferring the top of a local peak just starting to catch the sunlight. By 21:45 UT the point of light in the shadow could be seen for several seconds at a time in the seeing conditions. Observations ceased at 22:00 due to cloud cover. I have examined Trevor's sketch carefully and compared it to the GLR image – the latter of which I cannot show here as I was asked to keep it (and the original observer) confidential. However, it is very clear to me that what was imaged in 2004 and what Trevor saw are identical. We can therefore remove this GLR report from our database by assigning a weight of 0.

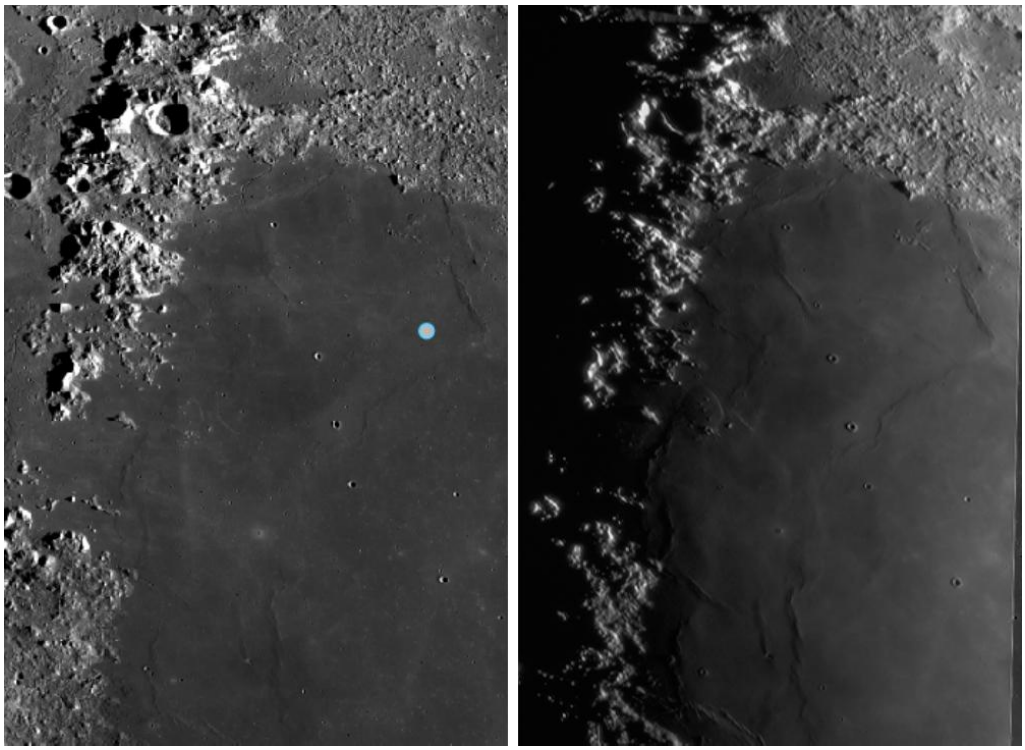

Figure 2. The north of Mare Serenitatis, orientated with north towards the top. **(Left)** LROC/Quickmap view. With the expected landing site marked. **(Right)** Image by Bob Stuart (BAA) taken on 2019 Apr 11 UT 20:18.

Eratosthenes: On 2019 Mar 15 UT 00:45-01:00 Alberto Anunziato (SLA) and UT 00:55-01:35 Jay Albert (ALPO) observed visually this crater under similar illumination (±0.5°) to the following two LTP:

Eratosthenes 1952 Nov 25 UT 16:30 A.P. Lenham (Swindon, UK, 3inch refractor x150, Definition Good) noted that there was faint/slightly bright detail inside the interior shadow - observer comments "presumably peaks of central mountains & W. Wall ridge, but very faint" - however this is worth checking out. ALPO/BAA weight=1.

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.

Alberto comments that there were no tinges, nor bright peaks in the shadows. Jay Albert also saw no "brownish tinge on the northwest rim". The crater floor was in complete shadow and the central peak was not visible. The W wall and rim were intricately terraced and very bright with no color. The ejecta blanket was very sharply detailed. Jay did however take an iPhone image at 01:28 UT (See Fig 5), but this also shows no color or detail in the interior shadow. We shall therefore leave the Lenham report at a weight of 1 and the Abel report at a weight of 3. If you are interested in previous attempts at repeat illumination of the 2009 observation, take a look at past newsletters from 2012 Oct, 2016 Feb, 2017 Sep & Oct and 2017 Dec. Some of these have not been so normal in appearance as Jay and Alberto saw in March.

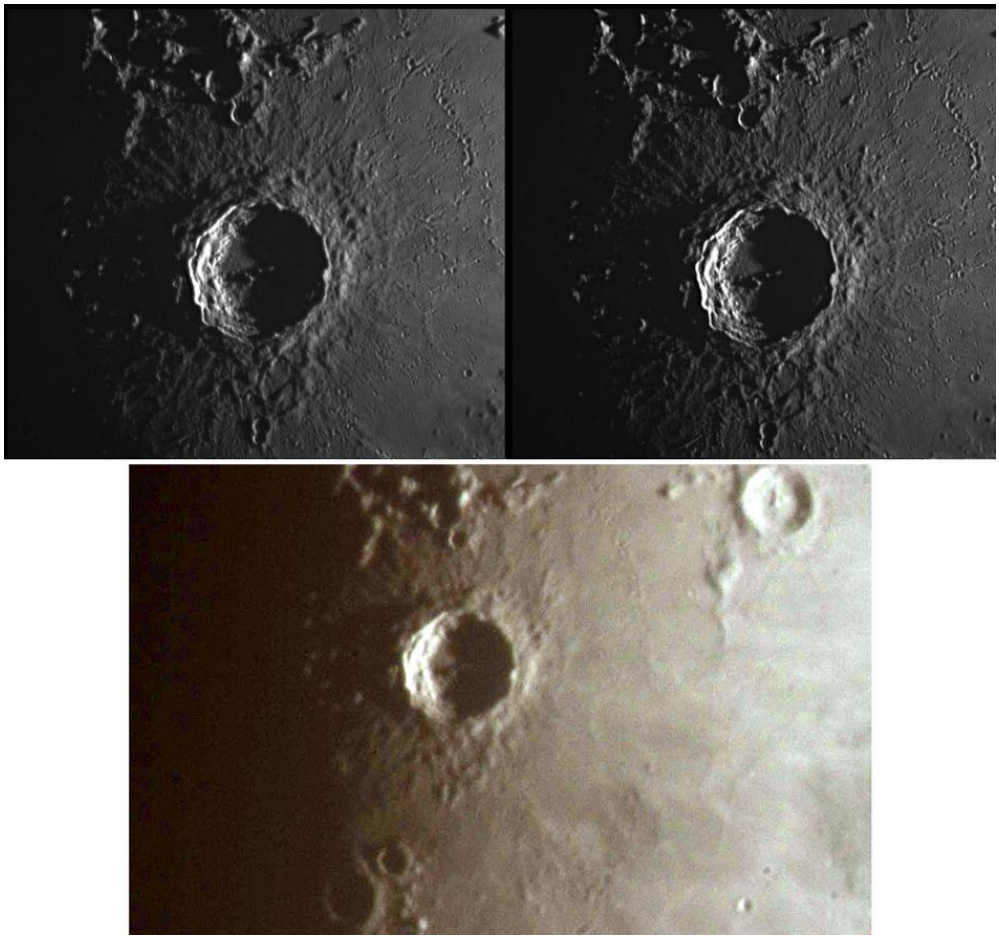

Figure 3. Copernicus orientated with north towards the top on 2019 Mar 15. **(Top Left)** A blue (#80A) filter image taken by Franco Taccogna (UAI) at 19:26UT. **(Top Right)** A red (#21) filter image taken by Franco Taccogna (UAI) at 19:27UT. **(Bottom)** A color image by Valerio Fontani taken at 19:12 UT – this has been color normalized and then its color saturation increased to 50%.

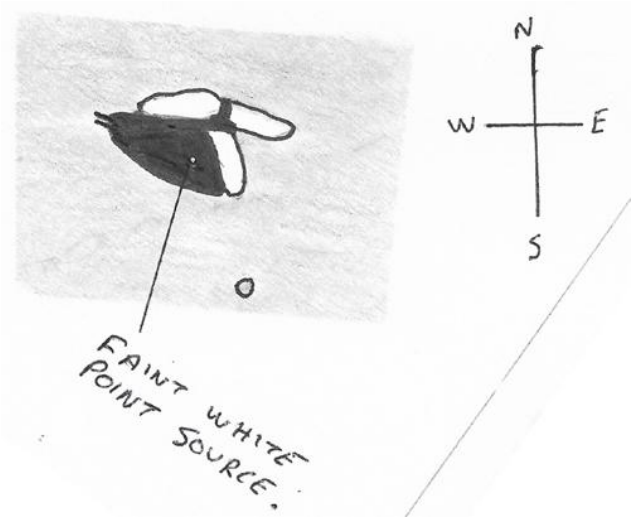

Figure 4. Mon Piton as sketched by Trevor Smith (BAA) on 2019 Mar 14 UT 21:35.

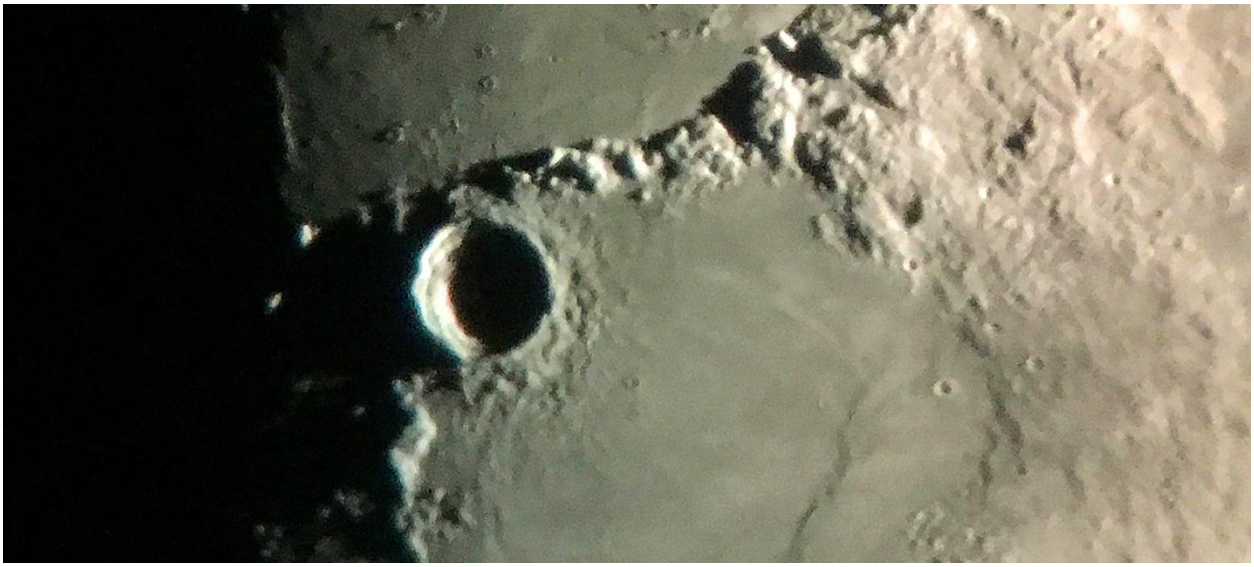

Figure 5. A color image of Eratosthenes taken by Jay Albert on an iPhone and orientated with north towards the top. Color saturation increased to 50%.

Plato: On 2019 Mar 16 UT 02:34, Jario Andres Chavez (LIADA) imaged the whole Moon under similar illumination (±0.5) to the following report:

> *Plato 2005 Dec 10 UT 20:46 Observed by Brook (Plymouth, UK, 4" refractor. Conditions excellent with the Moon at a high altitude) "2 second duration white flash seen on the floor of the crater" - BAA Lunar Section Report. ALPO/BAA weight=3.*

Whilst Jario's image does not solve what Clive Brook saw (perhaps an impact flash?), at least it provides a context image (Fig 6). We shall leave the weight at 3.

Figure 6. Plato on 2019 Mar 16 UT 02:34 from a larger image of the Moon by Jario Andres Chavez (LIADA).

Gassendi: On 2019 Mar 18 UT 04:07 Rik Hill (ALPO/BAA) imaged the crater 26 min after the end of a ±0.5° similar illumination window for the following report:

On 1990 Oct 1st at 00:44-01:24UT D Darling (Sun Praire, WI, USA) observed that Gassendi still had a blink effect when viewed through blue (Wratten 38A) and red (Wratten 25A) filters. No effect was seen on Aristarchus. Gassendi was brighter in the red filter and this was confirmed by Weier. Sketches were made and brightness measurements taken. Both observers used a 12.5" reflector x159. At 01:00UT the NW wall was 7.5, the SW wall 8.0, the S. wall 7.5, the floor 6.0, the outer E. wall 8.0, the N. floor 5.5. Gassendi A W. wall was 9.5,l Aristarchus W. floor was 8.0, NW wall 8.0, shadowed floor 0.0, E. outer wall 7.0, NBP 5.5, area between Aristarchus and Herodotus 6.0, and the comet like tail: 8.2 on the E. and 8.5 on the W. The Cameron 2006 catalog extension LTP ID=412 and weight=5. The ALPO/BAA weight=4.

Figure 7. Gassendi as imaged by Rik Hill on 2019 Mar 18 UT 04:07 with a 610 nm filter. Orientated with north towards the top.

Although Rik's image (Fig 7) is in monochrome, we can at least check out those visual intensity readings that Darling and Weier give in their description. We have covered this 1990 observation before in the 2015 Sep and 2018 Jun newsletters.

Aristarchus: On 2019 Mar 18 UT 21:40-21:55 Marie Cook (BAA) observed this crater under similar illumination, to within ±0.5° to the following report:

1978 May 19 UT21:45-03:30. P. Foley of Kent, UK, using a 12" reflector, seeing=III-II, noticed that initially that the crater was pretty dull and that the floor was a slate blue-gray in color at

22:45UT. A noticeable green spot inside the crater on the south east appeared at 22:25UT and vanished at 00:50UT. Cameron notes that one doesn't get green with spurious color. Crater Extinction brightness measurements were made at 22:00 UT (reading=2.8) and at 23:45UT (reading=3.7). The crater dropped in brightness from 3.7 to 2.8 at 23:50UT and remained lower until 3.0 at 23:50-03:15 UT. A graph was produced and showed Proclus and Censorinus at similar brightness's, but Aristarchus variable. The Earthshine was 0.3. Cameron 2006 Extension catalog ID=31 and weight=5. ALPO/BAA weight=3.

Observing with a 9 cm aperture Questar telescope (x80 & x130, seeing Antoniadi III, transparency moderate) Marie found that the crater detail was sharp and clear. The crater brightness was normal and there was no sign of any slate blue-grey color on the floor or elsewhere. Neither was a green spot visible. Everything appeared normal. We shall therefore leave the weight of this 1978 report at 3. We have covered this LTP before in the 2014 Nov and 2018 Jun newsletters.

Aristarchus: On 2019 Mar 20 UT21:50 Aldo Tonon (UAI) imaged the whole Moon under similar illumination (to within ±0.5°) to the following two reports:

G. Amery (Reading, UK, seeing=II) saw a brilliant white rim, bands and central peak. There was also a clearly seen white glare like feature over the ESE wall that had a direction opposite to the crater interior bands. Cameron states that Foley says that this is usual. High CED brightness readings obtained. M. Cook of Frimley, UK, took CED measurements at 23:35UT and recorded a brightness of > 4.9. Reported a reversal of spurious color - Cameron suspects that this was a local effect. No spurious color noticed by anyone else. However, the brightness of the crater was confirmed by other observers. Mosely suspected a brightness change on the inner east wall at a relative position of 8 O'clock. Cameron 2006 extension catalog ID=259 and weight=4. ALPO/BAA weight=3.

Aristarchus 1973 Sep 11 UT 20:48-21:06 observed by Pasternak (53deg 20'N, 7deg 30'E, 75mm reflector T=1, S=3) "reddish colors at the S of Aristarchus from 20.48-21.00 U.T., area spread to the region E of the crater at 20.57 U.T., disappeared there at 21.04U.T., no colors after 21.06 U.T." - Hilbrecht and Kuveler, Earth, Moon & Planets, 30 (1984), p53-61. ALPO/BAA weight=1.

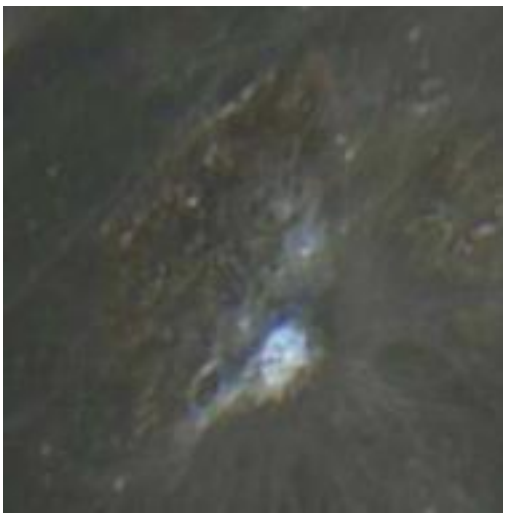

Figure 8 A subsection Aristarchus of Aldo Tonon's image of the whole Moon, obtained on 2019 Mar 20 UT 21:50 and orientated with north towards the top. The color saturation has been increased to 60%.

Fig 8 shows a hint of red to the south of Aristarchus which Pasternak mentions, but this does not explain the change in color unless the 1973 report was affected by atmospheric spectral dispersion. You can certainly see the ESE glare like feature that Amery mentions protruding outside the crater, so this is normal as Foley suggests. In terms of brightness, the absolute brightness of different craters were as follows (their brightest parts): Bright patch near Hell: 235, Censorinus: 230, Proclus: 229, Tycho: 194, Aristarchus: 192, and Copernicus: 166. Please note that as we have mentioned in the past, eye estimates, using CED devices can be affected by contrast with respect to surrounding background terrain – this could explain the difference between Marie Cooks high CED reading, and the CCD values above. We shall leave the weights of these two reports as they are for now.

Aristarchus: On 2019 Mar 21 UT 07:47 Ivor Walton (CADSAS) imaged the whole Moon during the following repeat illumination event:

Aristarchus 1973 Feb 15 UT 17:07-19:31 Observed by Theiss (located at 51N 5.67E) "area 4-5 diameters of Aristarchus were colored clearly yellow-red" 120mm reflector used. Ref Hilbrecht & Kuveler (1984) Moon and Planets Vol 30 p53-61. ALPO/BAA weight=1.

Although the image (Fig 9) is not in color, we can at least see the general appearance that the Moon would have had on 1973 Feb 15. Although just past Full Moon, measurements of the brightness of craters present in the image show Aristarchus, Proclus and Tycho saturate at 255, but all are brighter than other reference craters such as Censorinus, Copernicus and Kepler. We shall leave the weight at 1 for now.

Figure 9. The lunar disk as imaged, in monochrome, by Ivor Walton (CADSAS) on 2019 Mar 21 UT 07:47.

Furnerius: On 2019 Mar 23 UT 06:28 Juan Manuel Biagi (SLA) imaged a large region of the lunar disk, part of which contained Furnerius, under similar illumination (±0.5°) to the following report:

On 1986 Feb 26 at 05:00UT a photograph was obtained by T. Kohman of Pittsburgh, PA, USA (3.5" Questar and 0.25 sec exposure) that had two bands above the limb, resembling ejecta plumes. Cameron suspects that these are probably flare from the eyepiece optics. Cameron 2006 extension catalog ID=282 and weight=0. ALPO/BAA weight=1.

Winnie Cameron is almost certainly right about eyepiece flare, but alas we do not have a copy of Kohman's photograph to check this. Fortunately, with Juan's image (Fig 10), we can safely say that there are no natural features in the area that would exhibit this effect. We will leave the weight at 1 for now.

Figure 10. Furnerius crater from a portion of a larger image taken by Juan Manuel Biagi (SLA) on 2019 Mar 23 UT 06:28. Orientated with north towards the top.

General Information: For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: http://users.aber.ac.uk/atc/lunar_schedule.htm . By re-observing and submitting your observations, only this way can we fully resolve past observational puzzles. To keep yourself busy on cloudy nights, why not try "Spot the Difference" between spacecraft imagery taken on different dates? This can be found on: http://users.aber.ac.uk/atc/tlp/spot_the_difference.htm . If in the unlikely event you do ever see a LTP, firstly read the LTP checklist on http://users.aber.ac.uk/atc/alpo/ltp.htm , and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter LTP alerts can be accessed on https://twitter.com/lunarnaut .

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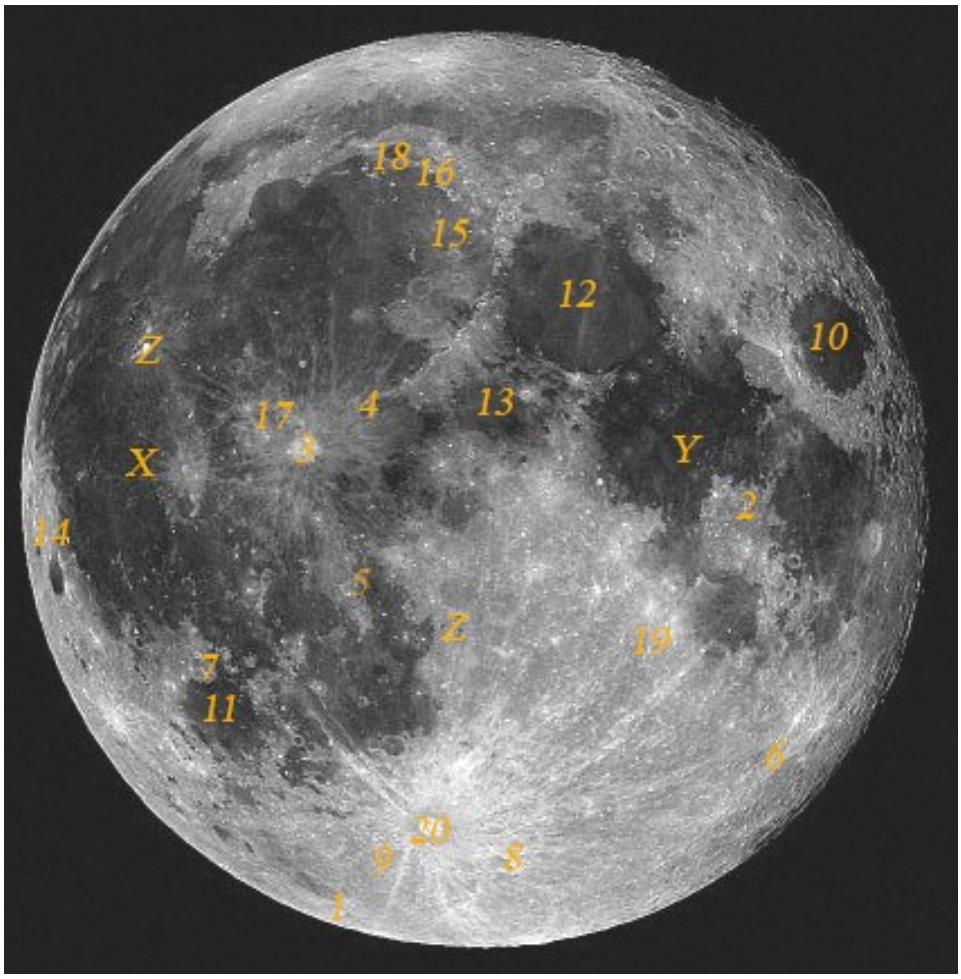
KEY TO IMAGES IN THIS ISSUE

1. **Bailly**
2. **Censorinus**
3. **Copernicus**
4. **Eratosthenes**
5. **Fra Mauro**
6. **Furnerius**
7. **Gassendi**
8. **Licetus**
9. **Longomontanus**
10. **Mare Crisium**
11. **Mare Humorum**
12. **Mare Serenitatis**
13. **Mare Vaporum**
14. **Marius**
15. **Mons Piton**
16. **Montes Alpes**
17. **Montes Carpatus**
18. **Plato**
19. **Rupes Altai**
20. **Tycho**



FOCUS ON targets

X = Apollo 12 Ocean of Storms
Y = Apollo 11 Sea of Tranquility
Z = Alphonsus & Aristarchus