



THE LUNAR OBSERVER

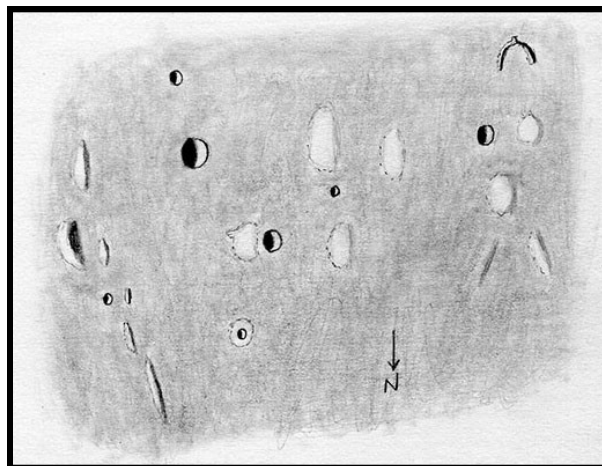
A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.

EDITED BY: David Teske david.teske@alpo-astronomy.org

2162 Enon Rd, Louisville, MS 39339

BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – AUGUST 2019 LIPPERSHEY



LIPPERSHEY. Robert Hays, Jr. Worth, Illinois USA.

May 14, 2019 02:00-02:30 UT. Seeing 8/10, Transparency 6/6.

15cm Reflector, 170X.

I drew this crater and vicinity on the evening of May 13/14, 2019 after the moon hid ZC 1669. Lippershey is the largest of several crisp craters in the southeast corner of Mare Nubium. This crater is flanked by Lippershey R to the south and Lippershey T to the northwest. Lippershey M is north of T, and has a modest halo. The tiny pit Lippershey N is east of M and well northeast of Lippershey itself. Lippershey N is much like M, except that it doesn't show a halo. A group of low ridges or mounds flanks Lippershey N. These elevations are aligned roughly north-south. A bright patch is just east of Lippershey T. This patch has a small bump on its southeast side, and showed little if any shadowing at this time. Lippershey L is southwest of T. This is another tiny pit much like Lippershey N. Three vague relatively light areas are nearby. These are much like the patch near Lippershey T in showing little if any shadowing. Pitatus J is farther to the west. This crater appears very similar to Lippershey T. More light patches and weak shadowings are nearby. Two of them give the appearance of being low domes. Pitatus S is the half-crater southwest of Pitatus J. This feature shows only a south rim; the north rim may have been obliterated by mare flooding. Pitatus S is simply a horseshoe-shaped feature with a small bump protruding from its center.

COORDINATOR CHANGE

At the ALPO annual meeting in Georgia, I stepped down as Lunar Topographic Studies and Selected Areas Programs coordinator. The new coordinator is David Teske whose contact information is on page 1 of this issue. I will continue as an Assistant Coordinator for the immediate future. Effective immediately, all submissions should be sent to David, Jerry Hubbell and me. As described in the note on How to Submit Observations in each issue, the simplest way to do this is to email them to lunar@alpo-astronomy.org. Alternatively, they can still be emailed to our individual email addresses. Hard copy submissions should be mailed to David at the address on page 1. (Contact information for all coordinators is also available on the ALPO website alpo-astronomy.org, in each issue of the JALPO, and on the Lunar Topographic & Selected Areas website moon.scopesandscapes.com.)

I have enjoyed my 10+ years as coordinator and TLO editor. I expect that David, with your support, will continue to encourage lunar observing and introduce some new directions.

Wayne Bailey

LUNAR CALENDAR

2019	U.T.	EVENT
Aug 01	03:12	New Moon
02	07:08	Moon Perigee: 359400 km
07	17:31	First Quarter
09	22:53	Moon-Jupiter: 2.6° S
12	04:28	Moon South Dec.: 22.4° S
12	10:05	Moon-Saturn: 0°
12	14:45	Moon Descending Node
15	12:29	Full Moon
17	10:50	Moon Apogee: 406200 km
23	14:56	Last Quarter
26	17:53	Moon North Dec.: 22.5° N
27	01:50	Moon Ascending Node
30	10:37	New Moon
30	15:57	Moon Perigee: 357200 km

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 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.

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 may be used to preserve photometric accuracy, but may be converted to jpg at the discretion of the coordinator. For jpg images use the minimum file size that retains image detail (use jpg quality settings). Most single frame images are adequately represented at 200-300 kB..

Images may still be submitted directly to the coordinators:

David Teske - david.teske@alpo-astronomy.org

Jerry Hubbell - jerry.hubbell@alpo-astronomy.org

and Wayne Bailey – wayne.bailey@alpo-astronomy.org

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

**HARD COPY SUBMISSIONS SHOULD BE MAILED TO DAVID
TESKE AT THE ADDRESS ON PAGE ONE.**

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.**

CALL FOR OBSERVATIONS:

FOCUS ON: Alphonsus & Aristarchus

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 **September 2019** edition will be **Alphonsus & Aristarchus**, two of the ALPO Selected Areas. 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):

David Teske - david.teske@alpo-astronomy.org

Jerry Hubbell - jerry.hubbell@alpo-astronomy.org

Wayne Bailey - wayne.bailey@alpo-astronomy.org

Deadline for inclusion in the Alphonsus & Aristarchus article is August. 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.

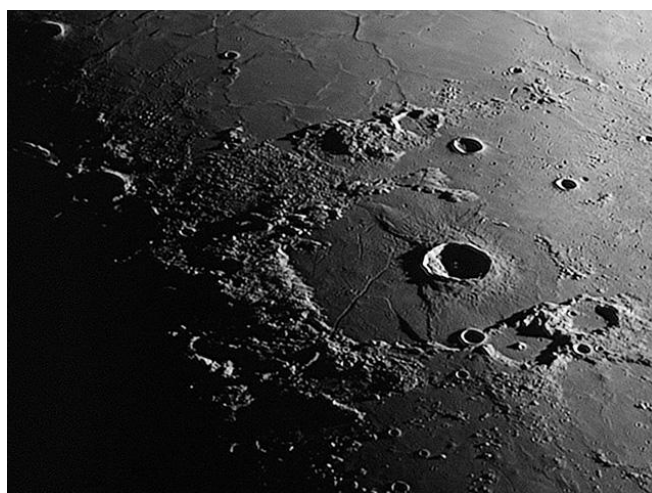
<u>Subject</u>	<u>TLO Issue</u>	<u>Deadline</u>
Atlas & Copernicus	November 2019	October 20, 2019
Plato & Theophilus	January 2020	December 20, 2019
Tycho & Herodotus	March 2020	February 20, 2020

LACUS MORTIS IN THE MORNING

Rik Hill

Sometimes unfavorable circumstances give you a fresh look at old features on the Moon. Such was the case for Lacus Mortis on this night when the libration was about as unfavorable as could be. Experienced lunar observers will immediately notice the foreshortening of this 155km diameter hexagonal lake with Burg (41km diameter) not quite in the middle. In this image the central peak of Burg is just starting to catch the first rays of morning light. The hexagonal shape is most notable on the west (left) side of the lake while the east side is more ruined by flooding lavas. The craters on the south shore of the lake are Plana (46km) on the left with a small central peak and Mason (44km) which are likewise notably foreshortened. Notice the interesting "V" shaped shadow on the floor of Plana. You can see the notch in the mountains that created this pattern by letting the sunlight through its valley. South of these two craters is a small bit of Lacus Somniorum. Notice the dome-like swelling below Mason. Even on the LROC Quick Map this appears much like a dome.

FIGURE 1. LACUS MORTIS – Richard Hill – Tucson, Arizona, USA July 8, 2018 02:22 UT. Colongitude 339.0°. Seeing 8/10. TEC 8" f/20, Mak-Cass, SKYRIS 445M, 610 nm filter.



The floor of L. Mortis has a fabulous collection of rimae of different origins. On the bottom, about 40km west (left) of Plana is one rima casting a significant shadow. This is a give away that it is a fault with vertical displacement, higher on the east side. Above it is one long rille or rima that runs from the southwest corner of the hexagonal walls to a mound north of Burg. In Wood's 21st Century Atlas of the Moon this is dubbed Burg Rille. And above this is a fragmentary rille of a different structure that is a line of small craterlets similar to Rima Hyginus but not as fresh. Careful examination will reveal other rimae in this area.

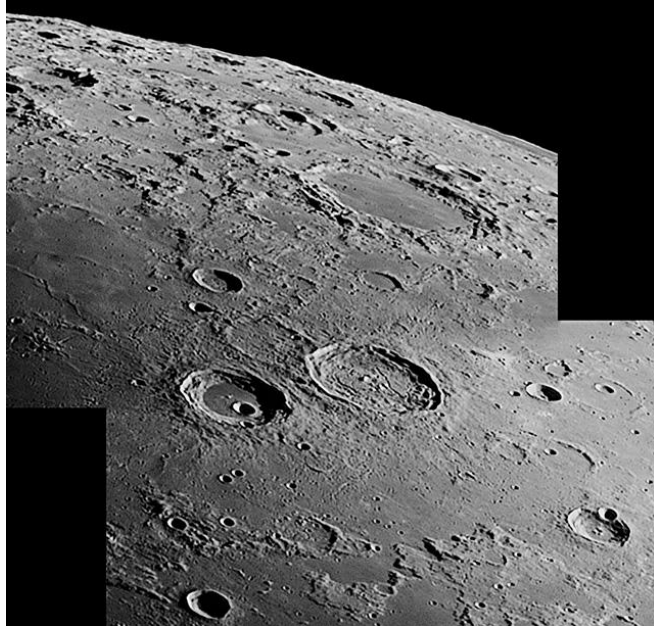
Before leaving this wonderful area note the crater directly above Burg. This is Bailly (41km) and it too sports a fine unnamed rima on it floor. Above this are the many snake-like dorsa of a small portion of Mare Frigoris.

REALM OF THE STRONGMEN

Rik Hill

Four days into a lunation two craters are seen prominent in the northern hemisphere inviting further scrutiny. Seen here in the middle of the image (fig. 1) they are Atlas (87km diameter) and west of it (left) and a little smaller is Hercules (71km) with the conspicuous 13km Hercules G on its smooth floor, the two strongmen of ancient mythology. The floor of Atlas is anything but smooth! Note the rimae that form a "V" around what passes for a cluster of low central peaks. To

the northwest (upper left) of these two craters is a smaller one that forms a rough equilateral triangle. this is Keldysh (32km). Above all three of these is the great Endymion, a 122km walled plain, as they used to be called, with interesting mottlings on its floor. To the west of it can be seen the ruined crater De La Rue (135km) with the 14km crater De La Rue J near its center. Further, on its northwestern wall is Strabo (55km) at the upper left corner of this image. In the southeast



corner of this image is the crater Cepheus (39km) with the smaller, younger Cepheus A (13km) on it's northeastern wall. Then in the southwestern corner is the crater Grove (27km) looking youngish but actually is Pre-Imbrium, much older than the Eratosthenian aged Cepheus.

FIGURE 1. ATLAS-HERCULES –
Richard Hill – Tucson, Arizona, USA July 8, 2018 02:27 UT. Colongitude 339.0°. Seeing 8/10. TEC 8" f/20, Mak-Cass, SKYRIS 445M, 610 nm filter.

Before leaving we need to locate a some ghostly craters. Just above Cepheus, is the 41km diameter Oersted with the 7km Oersted A crater on its floor. To the northeast is a similar slightly larger ghost crater, Chevallier (54km) with a 13km crater

on its floor. Then, between Atlas and Grove is a crater with a square shaped wall called Williams (36km). It sits in a relatively recently named feature, the Shannon Ridge, a fragmentary line of mountains stretching from near Cepheus off the left edge of this image above Grove and on to near Eudoxus some 630km total length.

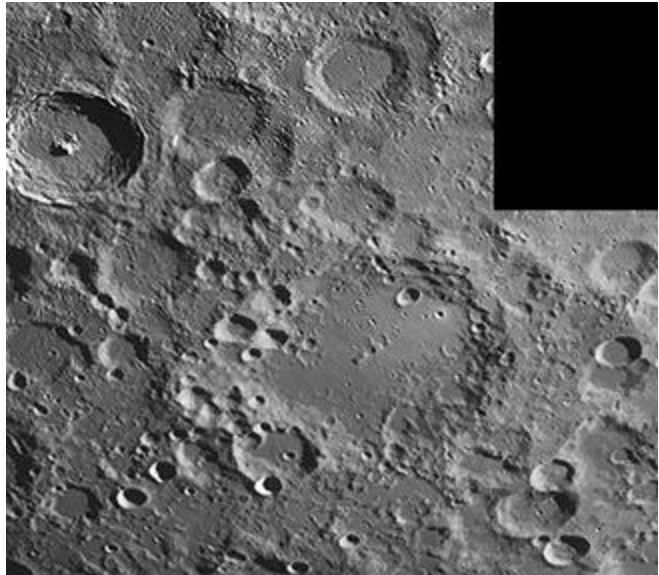
STUCK BETWEEN

Rik Hill

Stuck between two spectacular craters, Tycho and Clavius, poor old Maginus (fig. 1) is usually ignored. This 168km diameter Pre-Nectarian aged crater is very old, possibly as old as 4.55 billion years, more than four times older than Tycho, seen here on the top left edge of this image. But this is a region of old craters. Below and right (east) of Tycho is the crater Street (60km) and farther east is the slightly smaller Proctor (54km), adjacent to the north wall of Maginus. Due east of Tycho is the crater Pictet (65km) and the next one east is Saussure (56km). All four of these are Pre-Imbrian age, a very similar in age to Maginus. In the southeast corner of this image (lower right) is a trio of craters. The largest, middle one, is Deluc (49km), just north of Clavius. There are some special things to notice in this view. First the peppering of tiny secondary craters 1-4km in size east of Tycho between and around Pictet and Saussure. Notice that Pictet has a softer appearance compared to Saussure. It is overlain with eject from the Tycho impact. The same is true for Street, below Tycho. Notice also, the unusual crater groupings on the western wall of Maginus. There are some very interesting morphologies here!

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FIGURE 1. MAGINUS – Richard Hill – Tucson, Arizona, USA May 14, 2018 02:21 UT. Colongitude 27.0°. Seeing 8-9/10. TEC 8" f/20, Mak-Cass, SKYRIS 445M, 610 nm filter.



INSIDE ANCIENT THEBIT

David Teske

The image here (fig.1) centers on the giant ruined crater with the informal name of Ancient Thebit. Its dilapidated wall spans around 200 km. Starting on the east or right hand side of the image we see the wonderful triple crater Thebit. Named after Thebit ben Korra who lived from 826-901, he was the Arabian astronomer who translated the *Almagest* into Arabic. When formed by impact in the upper Imbrian age some 3.75 to 3.2 billion years ago, Thebit with a diameter of 56 km formed on the main rim of the Nubium Basin and also on an older, larger crater, Thebit P.



Thebit P with a diameter of 80 km lies to the southwest of Thebit. It is a lava flooded crater with a dark floor that opens its western portion to Mare Nubium. Thebit is 3.3 km deep, with a floor scoured in numerous places by short, deep trenches that encircle the central part of the floor. A small isolated hill arises on the northeast floor. Thebit has a large landslip visible on its southwest wall and

FIGURE 1. ANCIENT THEBIT – David Teske, Louisville, Mississippi, USA, May 14, 2018 03:25 UT. Colongitude 25.2°, seeing 7/10, 180mm Takahasi Mewlon, ZWO ASI 120mms

fine terracing on its eastern wall. The most obvious feature of Thebit is that its western wall is broken by the 20 km wide crater Thebit A. This 2.7 km deep crater has a central peak or ridge and very obviously formed after Thebit formed. Thebit A has a northwestern wall that is broken by Thebit L,

a 10 km diameter shallow crater. Some sources say Thebit L has a central peak, which would be unusual for such a small crater. Other sources refer to this as a tiny central crater. Most sources say that the ages of these craters is Thebit formed first, then Thebit A, then Thebit L. Others say that Thebit A impacted between both Thebit and Thebit L. Though the shapes seem to show Thebit L intruded into Thebit A, it seems Thebit L should be deeper than it is for being the younger crater.

West of Thebit near the center of Ancient Thebit is Rupes Recta, the Straight Wall. Though neither straight nor much of a wall, Rupes Recta is the finest and most clear-cut example of a normal fault on the Moon. Its length is given between 110 and 130 km, and differences in height between the higher eastern side and lower western side range from 250 m to 300 m. With a width of 2.5 to 3 km, the slope is between 10 and 40 degrees. Not a sheer cliff, but not a very comfortable climb either. At the southern end of Rupes Recta is a 580 m tall group of mountains called the Stag's Horn Mountains. These "mountains" are really part of the destroyed western rim of crater Thebit P. The Stag's Horn mountains and Rupes Recta combine to form the shape of a sword slicing across Ancient Thebit.

Just west of Rupes Recta is the wonderful crater Birt. Named after the English selonographer William Birt who lived from 1804 to 1881, Birt is a small funnel shaped crater with interior bands running up its wall. At 16 km in diameter, Birt has some rays near Full Moon. Craterlet Birt A is a 6.8 km wide crater breaking the eastern wall of Birt.

Just west of Birt is Rima Birt, a linear rille that runs about 50 km approximately parallel to the Straight Wall. Not always easy to see, it is 1.5 km wide. This rille starts on its north end at Birt E, an irregular crater 4.9 x 2 km that lies on a small, elongated and rounded ridge 4.9 km long and 600 m tall. The rille ends at Birt F to the south with a diameter of 3 km. It clearly appears that Rima Birt is an ancient lava channel.

The last of the major features inside Ancient Thebit on its western side is the crater Nicollet, named for French selonographer Jean Nicollet who lived from 1788 to 1843. The crater Nicollet is a circular crater with a diameter of 15 km and a flat floor 1.2 km below its crater rim. Note the difference is nearby Birt, though similar in size.

So what is happening in Ancient Thebit? A key lies in the Nicollet area. There are several wrinkle ridges in eastern Mare Nubium that converge near Nicollet. These ridges seem to indicate the position of the submerged western wall of the 200 km wide Ancient Thebit. As the Nubium basin filled with lava, it sunk the area around the crater Nicollet. As a result, Ancient Thebit is buried on its western rim. This sinking of the basin explains the irregular pattern of wrinkle ridges around Nicollet. Though Rupes Recta is roughly radial to the Imbrium basin and thus possibly related to that impact, it has a much closer relationship with Ancient Thebit. As the Nubium Basin was buried in lava, the basin-ward portion of Ancient Thebit's floor faulted downward to accommodate the basin's sinking. As for Rima Birt, the tiny pit at the northern end is located near the rim of Ancient Thebit. Fractures associated with the rim can provide easy pathways for lava to erupt onto the lunar surface, producing a dome, collapse pits, a lava channel, and perhaps a pyroclastic deposit.

References

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LUNAR TOPOGRAPHICAL STUDIES

Coordinator – Wayne Bailey - wayne.bailey@alpo-astronomy.org

Assistant Coordinator – William Dembowski - dembowski@zone-vx.com

Assistant Coordinator – Jerry Hubbell – jerry.hubbell@alpo-astronomy.org

Website: <http://moon.scopesandscapes.com/>

OBSERVATIONS RECEIVED

SERGIO BABINO - MONTEVIDEO, URUGUAY. Digital image of Saturn Occultation-Posidonius.

JAIRO CHEVEZ - POPAYÁN, COLUMBIA. Digital images of 1st Qtr Moon(2) & Theophilus.

ABEL GONZALEZ CIAN - ORO VERDE, ENTRE RIOS, ARGENTINA. Digital image of Picard.

AVRIL MICAELA ELLIAS - ORO VERDE, ENTRE RIOS, ARGENTINA. Digital image of Schmidt.

WALTER ELIAS - ORO VERDE, ARGENTINA. Digital images of Aristarchus(2), Boussingault(2), Censorinus, Gassendi(2), Kepler(2), Mare Fecunditatis, Mare Nectaris,(2), Menelaus(2), Mons Pico, Plato, Proclus(2), Theophilus(3) & Tycho.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of Mason, Posidonius, Theophilus & Tycho.

FACUNDO GRAMER - ORO VERDE, ENTRE RIOS, ARGENTINA. Digital image of Promontorium Fresnel.

ROBERT HAYS, Jr - WORTH, ILLINOIS, USA. Drawings of Gemma Frisius & Lippershey.

RICHARD HILL - TUCSON, ARIZONA, USA. Digital images of Atlas, Lacus Mortis & Maginus.

WALTER LATRONICO - ORO VERDE, ENTRE RIOS, ARGENTINA. Digital image of Aristarchus.

ROBERTO PODESTA - FORMOSA, ARGENTINA. Digital image of waning gibbous Moon.

DAVID TESKE - LOUISVILLE, MISSISSIPPI, USA. Digital image of Rupes Recta.

ALAN TRUMPER - ORO VERDE, ENTRE RIOS, ARGENTINA. Digital image of Plato.

ROMAIN GARCIA VERDIER - PARANÁ, ARGENTINA. Digital images of Alphonsus, Deslandres, Menelaus & Tycho.

RECENT TOPOGRAPHICAL OBSERVATIONS

Northeast MOON & SATURN – Sergio Babino, Montevideo, Uruguay. June 19, 2019 02:27 UT. 8” Astrotech Ritchey-ChretienC, ZWO 174mm.



1st Qtr. MOON– Jairo Chavez,- Popayán Columbia. June 11, 2019 1:23 UT. 10” Dobsonian, Sony DSC-WX50.

SCHMIDT - Avril Micaela Elias,- Oro Verde, Entre Rios, Argentina. July16, 2019 20:12 UT. 280mm Celestron CPC-1100, ZWO ASI 120MM/S

During lunar eclipse..



RECENT TOPOGRAPHICAL OBSERVATIONS



BOUSSINGAULT - Walter Elias, Oro Verde, Entre Rios, Argentina. July 5, 2019 22:26 UT. Celestron CPC-1100, f/6.3, ZWO ASI 120 MM/S

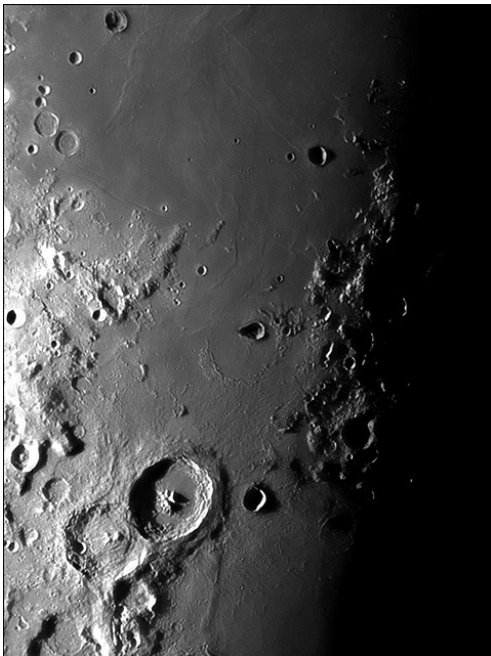
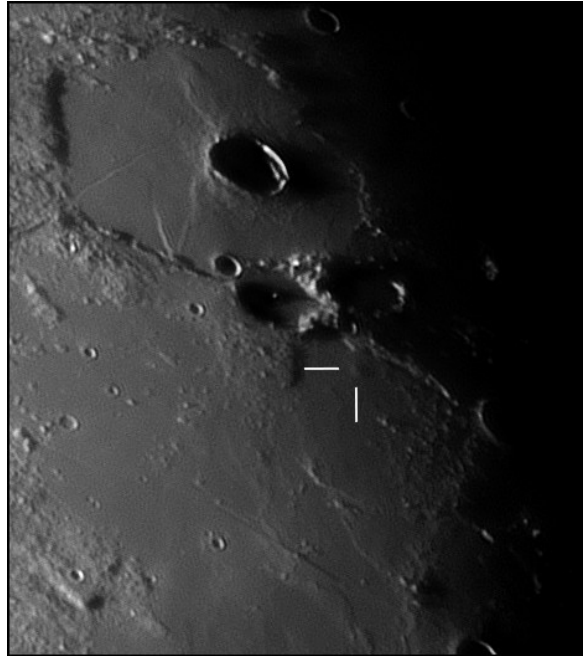
THEOPHILUS - Walter Elias, Oro Verde, Entre Rios, Argentina. July 8, 2019 23:02 UT. Celestron CPC-1100, f/6.3, ZWO ASI 120 MM/S



TYCHO - Walter Elias, Oro Verde, Entre Rios, Argentina. May 16, 2019 19:09 UT. Celestron CPC-1100, f/6.3, ZWO ASI 120 MM/S

RECENT TOPOGRAPHICAL OBSERVATIONS

MASON B1 dome - Howard Eskildsen, Ocala, Florida USA. April 24, 2019 09:41 UT. 6" f/8 refractor, 2X barlow, seeing 6/20, transparency 4/6. W8 yellow filter. DMK 41AU02.AS.

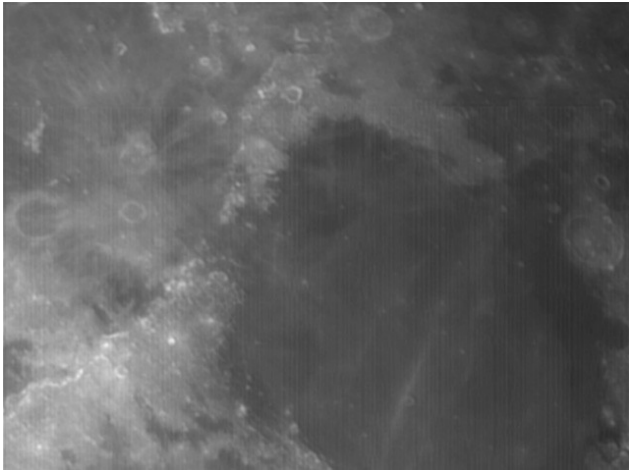


THEOPHILUS - Howard Eskildsen, Ocala, Florida USA. April 24, 2019 09:39 UT. 6" f/8 refractor, 2X barlow, seeing 6/20, transparency 4/6. W8 yellow filter. DMK 41AU02.AS.

PICARD - Abel Gonzalez Cian, Oro Verde, Entre Rios Argentina. July 16, 2019 20:02 UT. 280mm Celestron CPC-1100, ZWO ASI 120 MM/S.



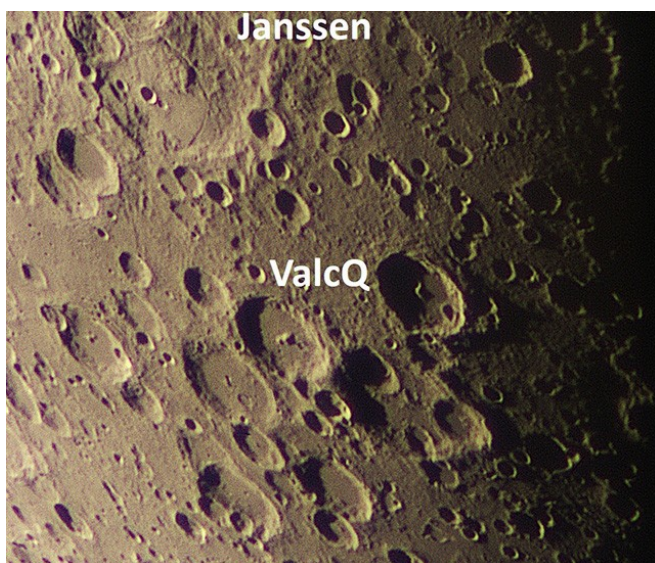
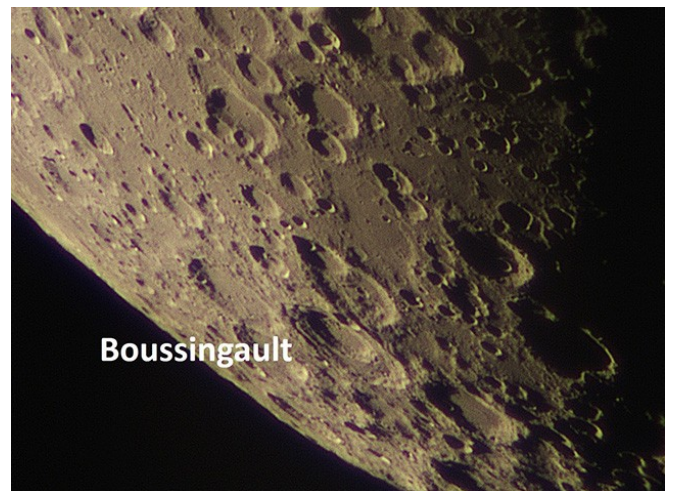
RECENT TOPOGRAPHICAL OBSERVATIONS



Promontorium FRESNEL - Facundo Gramer, Oro Verde, Entre Rios Argentina. July 16, 2019 20:08 UT. 280mm Celestron CPC-1100, ZWO ASI 120 MM/S.

During lunar eclipse.

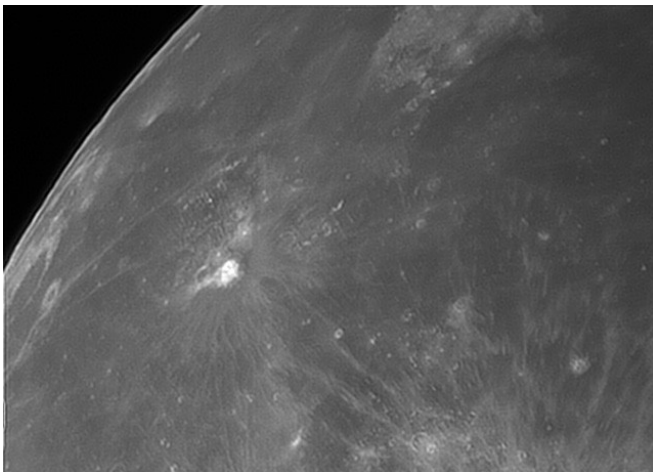
BOUSSINGAULT - Marcelo Gundlach, Cochabamba, Bolivia. July 7, 2019 23:33 UT. 150mm refractor stopped to 100mm, 2X barlow. Seeing 6/10, transparency 4./6 ZWO 120 color CMOS camera.



JANSSEN - Marcelo Gundlach, Cochabamba, Bolivia. July 7, 2019 23:33 UT. 150mm refractor stopped to 100mm, 2X barlow. Seeing 6/10, transparency 4./6 ZWO 120 color CMOS camera.

RECENT TOPOGRAPHICAL OBSERVATIONS

PICCOLOMINI - Marcelo Gundlach, Cochabamba, Bolivia. July 7, 2019 23:32 UT. 150mm refractor stopped to 100mm, 2X barlow. Seeing 6/10, transparency 4./6 ZWO 120 color CMOS camera.



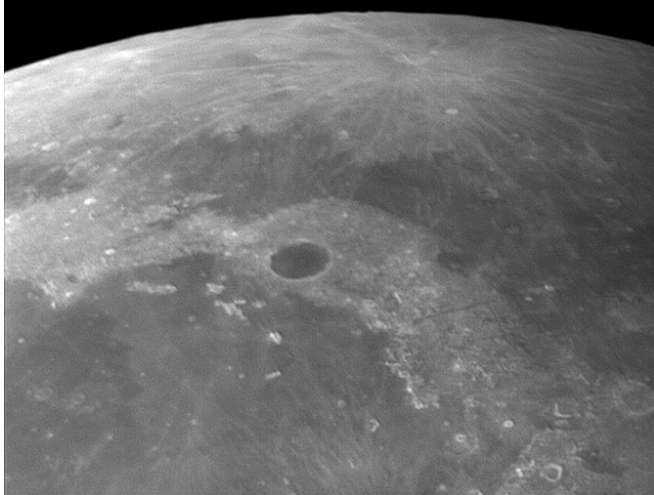
ARISTARCHUS - Walter Latrónico, Oro Verde, Argentina. July 16, 2019 19:58 UT. CPC-1100, ZWO ASI 120 MM/S..

During lunar eclipse.

Waning Gibbous MOON– Roberto Podesto, Formosa, Argentina. June 23, 2019 05:00 UT. 127mm Mak, 1500mm focal length. DSLR.



RECENT TOPOGRAPHICAL OBSERVATIONS



PLATO - Alan Trumper, Oro Verde, Entre Rios Argentina. July 16, 2019 20:06 UT.
280mm Celestron CPC-1100 SCT. ASI ZWO
120 MM/S.

DESLANDRES - Román García Verdier,
Paraná, Argentina. July 10, 2019 22:11 UT. 180
mm reflector, ZWO ASI 120MC.



TYCHO - Román García Verdier, Paraná,
Argentina. July 10, 2019 22:29 UT. 180 mm
reflector, ZWO ASI 120MC.

BRIGHT LUNAR RAYS PROJECT

Coordinator – Wayne Bailey – _wayne.bailey@alpo-astronomy.org

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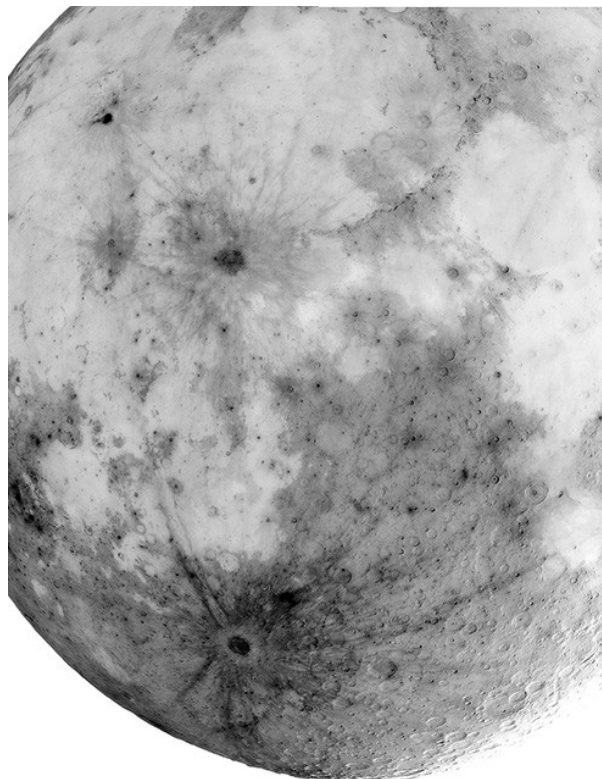
Bright Lunar Rays Website: <http://moon.scopesandscapes.com/alpo-rays.html>

RECENT RAY OBSERVATIONS



TYCHO– Howard Eskildsen,- Ocala, Florida USA.
July 19 2019 09:43-09:49 UT. Seeing 6/10,
transparency 3-4/6. 6" refractor, f8, W25 red filter,
DMK 41AU02.AS.

Here is a four-image composite showing rays of Tycho, Copernicus, Kepler, Aristarchus and others. The inverted view seems to enhance the rays better than the normal view. There even appear to be a few short, minor rays in Tycho's "zone of avoidance."



LUNAR GEOLOGICAL CHANGE

DETECTION PROGRAM

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

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

Reports have been received from the following observers for Jun: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Agrippa and Alphonsus. Alberto Anunziato (Argentina – SLA) observed Aristarchus, Kant, Mare Crisium, and Proclus. Maurice Collins (New Zealand – ALPO/BAA/RASNZ) captured some whole disk images of the Moon. Valerio Fontani (Italy – UAI) imaged: Censorinus, Plato and Tycho. Trevor Smith (Codnor, UK – BAA) observed earthshine, Hecataeus, Kant, Mare Crisium, Messier, Picard, Proclus and several other features. Franco Taccogna (Italy – UAI) imaged Plato. Aldo Tonon (Italy – UAI) imaged Censorinus, Plato, and several features.

News: The launch of [Chandrayaan-2](#), India's 2nd lunar mission, was delayed a few days until 2019 Jul 22nd. However, it is now enroute to the Moon, due to arrive in September time. It consists of an orbiter, a lander and a rover. The latter two should land on Sep 6/7. They are intended to explore the primary site midway between Simpelius and Manzius (or between Manzius C and Boguslawsky C), or if decided otherwise aim for a backup site further to the west, midway between Klaproth and Gruemberger. Keep an eye open for details of when the landing will be as its always worth monitoring such events using a telescope, just in case dust clouds get kicked up for some reason.

Kevin Kilburn (BAA) has sent in an image showing how it is possible to drape a color image (without shadow) over a monochrome image (with shadow) in order to compare the location of color with topography. He reminds us that a special technique for this “color draping” was devised by Drs Phil Masding and Andrew Fearnside, some eight to nine years ago, and even took into account the difference in viewing angles (libration) between the color and monochrome images.

Peter Anderson (Australia – BAA) has emailed me a set of PowerPoint slides which illustrate what we talked about last month, namely how atmospheric seeing can play havoc with brightness estimates of small bright mountain peaks and slopes.

The Amateur Astronomy Outreach ([AAO](#)) web site that I encourage my observers to upload their images to, so that they can go straight into an addressable database, has been down for days. I apologize for the inconvenience, but it seems that it was still using PHP programming language instructions that had become obsolete. Fortunately, we have a new brilliant systems person at Aberystwyth University and he has fixed the problem in a few days and its up and running again!

Jason Wentworth (ALPO) emailed about the possibility of using Rocket Lab's new [Photon modular spacecraft](#), with a tiny optional; third stage, to put a home-made CubeSat into a figure of “8” orbit around the Moon – the idea being the probe takes images at the Moon and every figure of “8” pass by the Earth dumps images to the ground using a relatively small low power antenna. The figure of “8” type of orbit has been used quite successfully in the past by Apollo 8 and the Soviet Zond missions. Apart from the launch cost, the CubeSats are now down

to just a few thousand pounds/dollars to purchase. I guess it won't be that many years before the Lunar Section has its own Moon mission!

LTP reports: No LTP were observed in Jun-Jul, though there was one report of a binocular sighting of a flash on the Moon, seen with binoculars on 2019 Jul 08 UT 01:35 by R.A. Jiménez (Venezuela – LIADA) - near Pickering crater. The flash was about 4th magnitude, the color was white and the duration 1/10th sec or shorter. This was either an impact flash, sun-glint off some space junk, or possibly just the detection of a cosmic ray air-shower event by the human eye. Was anybody else observing then? Thanks to Alberto Anunziatio (SLA) for alerting me about this report.

I also received some images from Walter Elias, and other AEA observers, which appear to show some shadow (or at least shading) on sides of some lunar features, during the lunar eclipse. The effect is not present on all features – in fact less so the further away one gets from the umbral edge. Of course, during a lunar eclipse, we have effectively Full Moon (zero phase angle) illumination, which means no shadow apart from the Earth's umbra/penumbra – but nevertheless you can see some shadows mostly to the east of some features in Fig 1 e.g. Messier & Messier A. The effect was visible in other images supplied by the AEA which I will show next month. Although I cannot rule out over-sharpening, it is curious that the effect is directional. Walter says that “Autostackert” was applied to 30 sec worth of video, followed by wavelet application from “Registax”. Possibly what is happening here was that because image stacking was used from 30 sec worth of video, the Earth's shadow has moved several km during this time and this confuses the stacking software. However, Walter also found that the effect is visible when he processed just 3 frames? So, I would be interested to see if other observers have found similar effects during this eclipse, or past ones, where they have taken high resolution video/imagery of the surface. Please let me know what you find?

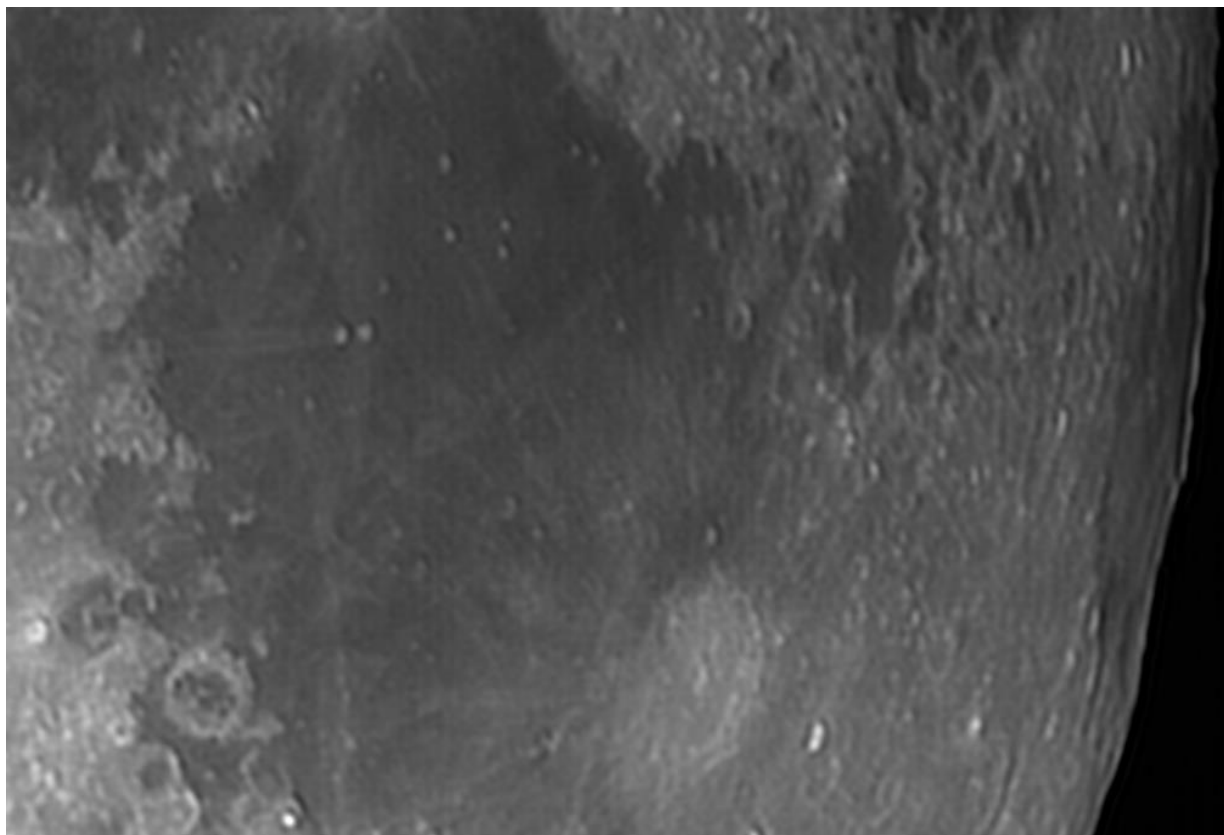


Figure 1. Mare Fecunditatis as imaged by Walter Elias (AEA) on 2019 Jul 16 UT 23:15 Image is orientated with north towards the top.

Lastly, again, not an LTP but K.C. Paul (Hong Kong) sent in a high-resolution image of Petavius which apparently shows a 2nd rille (Fig 2 – Center) almost (but not exactly) parallel to the main rille. I used our archive of ALPO/BAA observations and came up with a similar illumination image (Fig 2 – Left) by Bill Leatherbarrow (BAA) and this just about shows the parallel rille. There is of course the possibility that this might be due to over processing, but you can see an intersection with the rim in the west quite clearly on K.C.’s and Bill’s image. The 2nd rille is not quite parallel and if it was due to over processing it should be stronger in higher contrast areas, which it is not. K.C. also provided a raw image (not shown here) which also shows the 2nd rille quite plainly. Oddly if you look at LRO LOLA topographic data in a perspective view from the north east, looking south west, you see no obvious sign of the 2nd rille here, but instead a drop in level the floor of the crater - going from high south of the main rille to low north of the main rille. However, there are some hill crests present which might form one side of the secondary rille. Using the observations mentioned above, and another mentioned by Raffaello Lena (2019 Mar 23 UT 00:53), the secondary rille seems to appear between selenographic colongitudes of 108°-113°. Please check your past imagery and see if you have detected something here or not? I will be adding Petavius to the [Lunar Schedule website](#) to encourage more high-resolution imagery of this area so we can establish for sure if the secondary “parallel” rille is there or is an artifact of processing.

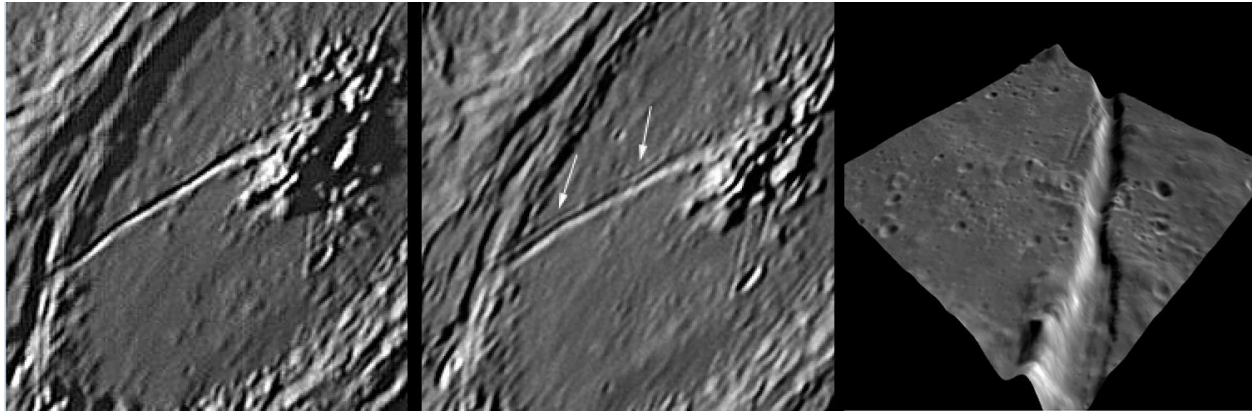


Figure 2. Petavius **(Left)** an image by Bill Leatherbarrow taken on 2015 Nov 28 At UT 03:29. **(Center)** an image taken by K.C. Paul on 2019 Jul 18 UT 17:15 – the two arrows indicate the position of a possible 2nd parallel rille. **(Right)** A NASA Quickmap LRO 3D view with vertically exaggerated terrain, looking along the main rille in Petavius in the direction towards the south west.

Routine Reports: Below are a selection of reports received for Jun and Jul 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.

Censorinus: On 2019 Jun 08 UT 21:16 Valerio Fontani (UAI) and at 21:39 Aldo Tonon (UAI) took color images of this crater to match the [Lunar Schedule](#) colongitude criteria to see how early the blueness to the ejecta blanket of Censorinus starts to appear.



Figure 3. Censorinus on 2019 Jun 08, orientated with north approximately towards the top. Images have been color normalized and then had their color saturation increased to 50%. **(Left)** Image taken at 21:16 UT by Valerio Fontani (UAI). **(Right)** Image taken by Aldo Tonon (UAI) at 21:39.

Censorinus, just like Aristarchus, has a blue color to it. Although the color is less well known by visual observers, it can often be detected in color CCD images. The big question is at what colongitude range does the blue ejecta color start to become visible and does it appear consistently? The [Lunar Schedule](#) web site currently requests observers to look over the Selenographic Colongitude range of 340.0° to 342.7°. However, in both of the images in Fig 3 we cannot see any obvious signs of color. I shall therefore adjust the colongitude range we intend to search for color to between 342.0° and 342.7°.

Kant: On 2019 Jun 08 UT 21:45-21:50 Alberto Anunziatio (SLA) and at UT 21:58-22:02 Trevor Smith (BAA) observed this crater visually under similar illumination conditions, to within $\pm 0.5^\circ$, the following report:

Kant 1873 Jan 04 UT 23:00? Observed by Trouvelot (Cambridge, Mass, 8" refractor) "Luminous purplish vapors" NASA catalogue weight=3. ALPO/BAA weight=3. NASA catalogue ID #180.

Alberto, was using a 105 mm. Maksutov-Cassegrain (Meade EX 105) from the southern hemisphere and reported the crater as looking perfectly normal to his eyes. Trevor, using a 16" reflector (x94 & x247) under poor (Antoniadi IV) seeing conditions, examined the crater just a few minutes later, from the Earth's northern hemisphere, and noted that no luminous vapours were visible or anything else unusual! According to Patrick Moore ("The Moon", Vol 6, No. 1, p008), Kant's "vapours" were more like a mist obscuring details in the crater, but unfortunately nobody else was observing at the same time in order to be able to confirm Trouvelot's account. We have covered repeat illumination observations of this crater before in the [2012 Aug](#) (p16) and [2018 May](#) (p22-23) newsletters.

Readers who are unfamiliar with this French Astronomer, maybe interested to learn that Trouvelot was involved in politics in France but fled to the US when Napoleon III came to power. Apart from being an astronomer he was also interested in silk production and introduced the Gypsy Moth to the States, which then ended up becoming an invasive species. He then worked at Harvard College Observatory and the US Naval College Observatory, before returning to France to the Meudon Observatory, by which time the severe crop damage caused by the release of the Gypsy moth was beginning to become apparent. Readers interested in a more detailed history of Trouvelot would do well to read Nigel Longshaw's [BAA Journal article](#). We shall leave the weight of this report at 3 for now as it is not apparent what might have caused this effect seen in 1873.

Alphonsus: On 2019 Jun 10 Jay Albert (ALPO) observed visually this crater under similar illumination, to within $\pm 0.5^\circ$ to the following report:

Alphonsus 1965 May 08 UT 05:47-05:59 Observed by McLaria (Huntsville, Alabama, USA, 16" reflector, S=9) "Light flashes on c.p. color detected by Trident M.B." NASA catalogue weight=5. NASA catalogue ID #875.

Jay was using a Celestron NexStar Evolution 8" SCT (x51, x226 & x290) with the Moon high in the sky and seeing at 7/10, however the transparency was quite poor. He found that the floor of the crater was completely in shadow, the west rim was just catching the sunlight, and the central peak was visible and bright with a fainter peak within the shadow and to the south. No flashes were seen in the central peak area or elsewhere around the crater. He did however

notice that using Wratten 25 (red) and 44A (blue/green) filters that both of the visible central peaks were significantly brighter through the red filter. A visual check without filters though showed that no color was visible. I think in view of the really poor transparency, there must have been a lot of scattered light and this affects shorter wavelengths (blue) more than longer wavelengths (red), therefore the effect was caused on our side of the atmosphere. We shall leave the weight of this report at 5 as the 1965 report was made with a Trident Moon Blink device.

Plato: On 2019 Jun 13 UAI observers imaged the crater under both similar illumination and viewing angle (to within $\pm 1.0^\circ$) to the following reports:

Plato 1982 Jun 02 UT 22:00. Mobberley could not see the central craterlet on the floor of Plato tonight. Foley notes that he could only just see the central craterlet on nights of 2-5th Jun and it was of reduced in brightness from normal. North reported that the floor seemed nearly black, but brighter in a green filter (x144 magnification used). All three observers compared the Plato area to other areas for reference. All the above seems normal, apart from the floor being brighter in the green filter. Cameron 2006 extension catalogue ID 170 and weight=5. BAA/ALPO weight=2.

We have covered repeat illumination for this feature before in the [2015 Oct \(p12-13\)](#), and [2016 Oct \(p18-19\)](#) newsletters. In Franco's images we can see a nice relationship between seeing conditions and the visibility of the central craterlet in Fig 4 – so the sharper the seeing, the more visible the central craterlet, though even in the sharpest of the images it is still not that prominent, in agreement with what Martin Mobberley and Peter Foley reported.



Figure 4. 2019 Jun 13 monochrome red #21 filter images of Plato taken by Franco Taccogna (UAI), and orientated with north towards the top. **(Left)** 19:21 UT. **(Center)** 20:08 UT. **(Right)** 20:35 UT.

So that nicely clears up the mystery over the poor visibility of the central craterlet. What about: Gerald North reporting the floor as being black visually, but brighter in a green filter? Again, we have the UAI to help us clarify what the color ought to be like. Firstly, Franco Taccogna captured the crater through four color filters: red #21, green, blue and near IR 685. In Fig 5 you can see Franco's images in red, green and blue light respectively, showing no obvious difference in the darkness of the floor – so its doubtful that color difference would be detected visually under normal circumstances. However just to check I have color normalized, then saturation enhanced, images of the area by Aldo Tonon and Valerio Fontani, and as you can see in Fig 5 there is not the slightest hint of a green tinge to the floor that we would expect if the floor was more reflective in green light, and so therefore we can regard Gerald North's observation as unusual. In terms of the floor appearing nearly black, in Fig 6 (Left) this is not the case, but in Fig 6 (Right) where the contrast has been turned up considerably, then the floor of Plato is definitely darker than the Mare Imbrium to the south. In view of these findings, I shall amend the report of the 1982 event to a weight of 1, and note that the only oddity was the floor

appearing brighter in green light. The Foley and Mobberley reports are basically just normal.



Figure 5. 2019 Jun 13 color filter images of Plato taken by Franco Taccogna (UAI), and orientated with north towards the top. **(Left)** 19:21 UT taken through a red #21 filter. **(Center)** 19:22 UT taken through a green filter. **(Right)** 19:25 UT taken through a blue filter.



Figure 6. Images of Plato taken on 2019 Jun 13 and orientated with north towards the top. The images have been color normalised and then had their color saturation increased to 30%. **(Left)** Image by Aldo Tonon (UAI) taken at 19:43. **(Right)** Image by Valerio Fontani (UAI) at 20:28UT.

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/ltip.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. Boussingault
2. Censorinus
3. Deslandres
4. Janssen
5. Lacus Mortis
6. Lippershey
7. Maginus
8. Mare Fecunditatis
9. Mason
10. Petavius
11. Picard
12. Piccollomini
13. Promontorium Fresnel
14. Schmidt
15. Thebit
16. Tycho



FOCUS ON targets

X = Alphonsus & Aristarchus

Y = Atlas & Copernicus

Z = Plato & Theophilus