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ALPO
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THE LUNAR OBSERVER

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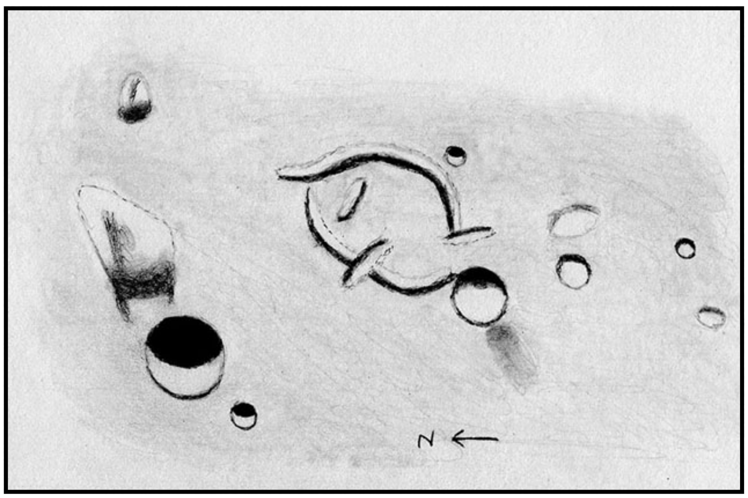
FEATURE OF THE MONTH – DECEMBER 2017
BURNHAM



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
July 2, 2017 02:18-02:46 UT, 15 cm refl, 170x, seeing 8-6/10.

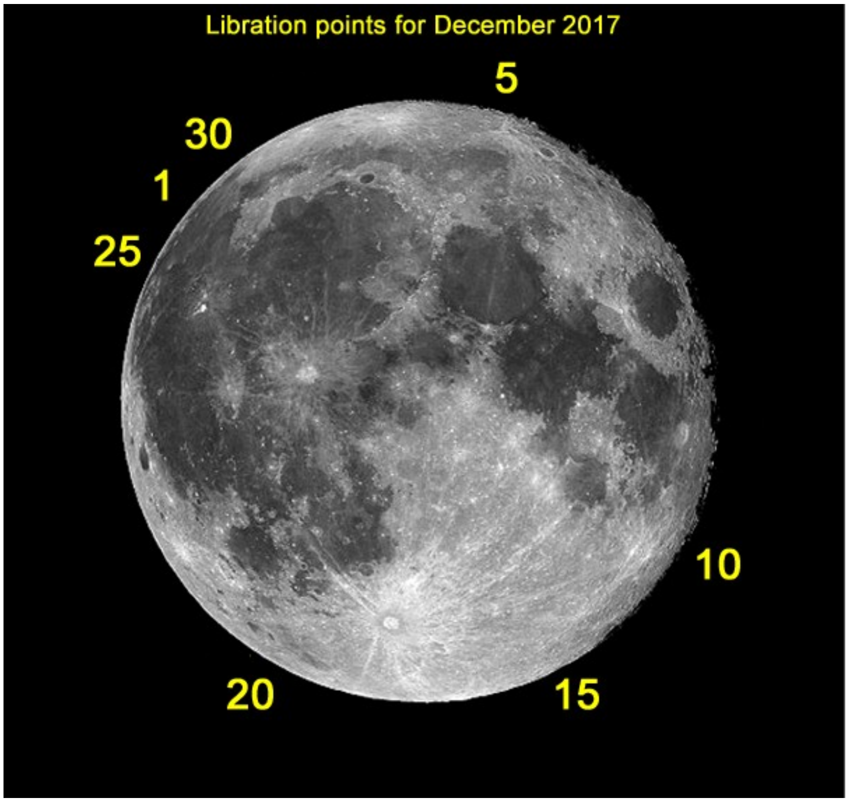
I drew this crater and vicinity on the evening or July 1/2,2017. This crater is located in a relatively uncrowded area southeast of Albategnius. Burnham's rim is broken into three segments that don't mesh with each other. Two short wide rills occupy gaps in the south and west rims, and the north rim bends outward at another gap. An interior ridge is north of center. This ridge is not parallel with either rille. The small crisp crater Burnham L is just southeast of Burnham, and Burnham F is the large, shallow ring near the southwest edge. Burnham A is the shallow crater south of F, and Burnham B farther to the south is a smaller version of A. A vague depression is just east of Burnham A and a similar feature is west of B. A dusky shadowy patch is southwest of Burnham F. The relatively large, deep crater northwest of Burnham is Albategnius E, and Albategnius S is just to its southwest. A large four-sided mound is northeast of Albategnius E, and a smaller mound is farther to the east.

LUNAR CALENDAR
DECEMBER 2017-JANUARY 2018 (UT)

2017		UT	EVENT
Dec	03	13:00	Moon-Aldebaran: 0.8° S
	03	15:47	Full Moon
	04	08:42	Moon Perigee: 357500 km
	05	11:43	Moon Extreme North Dec.: 20° N
	08	22:25	Moon-Regulus: 0.7° S
	10	07:51	Last Quarter
	13	16:27	Moon-Mars: 4.5° S
	14	14:26	Moon-Jupiter: 4.7° S
	18	06:31	New Moon
	19	01:27	Moon Apogee: 406600 km
	19	09:31	Moon Extreme South Dec.: 20.1° S
	26	09:20	First Quarter
	31	00:25	Moon-Aldebaran: 0.7° S
2018 Jan	01	16:54	Moon Perigee: 356600 km
	01	19:01	Moon Extreme North Dec.: 20.1° N
	01	21:24	Full Moon
	04	02:48	Moon Ascending Node
	08	17:25	Last Quarter
	11	00:59	Moon-Jupiter: 4.7° S
	14	21:09	Moon Apogee: 406500 km
	14	21:13	Moon-Saturn: 2.9° S
	15	11:28	Moon Extreme South Dec.: 20° S
	16	21:17	New Moon
	18	09:28	Moon Descending Node
	24	17:20	First Quarter
	29	06:32	Moon Extreme North Dec.: 20° N
	30	04:54	Moon Perigee: 359000 km
	31	08:27	Full Moon
	31	08:30	Total Lunar Eclipse
	31	13:46	Moon Ascending Node

LUNAR LIBRATION

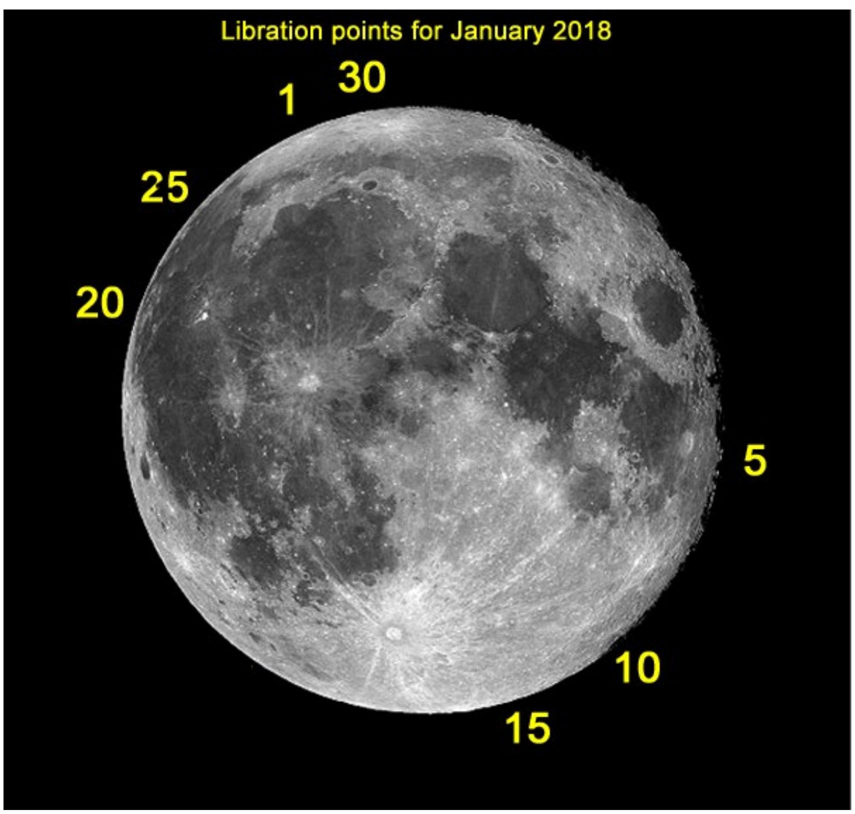
DECEMBER 2017-JANUARY 2018



Size of Libration

12/01	Lat +06°20'	Long -06°21'
12/05	Lat +04°42'	Long +01°11'
12/10	Lat -03°00'	Long +07°06'
12/15	Lat -06°38'	Long +04°34'
12/20	Lat -03°16'	Long -03°16'
12/25	Lat +03°28'	Long -07°33'
12/30	Lat +06°39'	Long -05°39'

NOTE:
Librations are based on a geocentric position at 0 hr. Universal Time.



Size of Libration

01/01	Lat +05°14'	Long -01°55'
01/05	Lat -01°07'	Long +05°33'
01/10	Lat -06°36'	Long +06°37'
01/15	Lat -04°39'	Long +00°56'
01/20	Lat +01°57'	Long -05°23'
01/25	Lat +06°45'	Long -07°14'
01/30	Lat +03°06'	Long -00°42'

NOTE:
Librations are based on a geocentric position at 0 hr. Universal Time.

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.

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, dd/mm/yyyy)
Size and type of telescope used Magnification (for sketches)
Filter (if used)
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

Full resolution images are preferred-it is not necessary to compress, or 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: Montes & Mons –Mountains and Mountain Ranges

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 **January 2018** edition will be **Mountains and Mountain Ranges.** 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 Montes & Mons article is December 20, 2017

FUTURE FOCUS ON ARTICLES:

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

Subject	TLO Issue	Deadline
Rima – Rilles	**Mar. 2018**	**Feb. 20, 2018**
Craters – Latest and Greatest	**May 2018**	**Apr. 20, 2018**

INTRODUCTION TO BRIGHT LUNAR RAYS

Bill Dembowski - ALPO Assistant Coordinator
Lunar Topographical Studies

Conventional wisdom says that the worst time for lunar observing is when the sun is high in the lunar sky. It is at these times that shadows disappear and lunar features are difficult, if not impossible, to observe. But conventional wisdom does not always apply. When the sun is high in the lunar sky some of the Moon's most fascinating features, the bright lunar rays, blaze into view.

Lunar rays, those beautiful splash patterns that cover the face of the Full Moon, were once quite a mystery. Some early observers thought that they were cracks in the lunar crust that were later filled by dust or ice; others considered them to be salt deposits from extinct oceans. One of the more persistent theories was that they were volcanic in origin, similar to the features known as Pele's Hair in Hawaii. We know now that they are the ejecta of meteor and asteroid impacts.

Rays appear to be distributed randomly across the lunar disc, although those on the dark maria tend to show up most dramatically because of the contrast effect. Although often quite extensive, they have no appreciable height and are never seen to cast a shadow. They typically are uninterrupted by mountains, crater walls, or rilles but there is some observational evidence that this may not always be the case.

As mentioned earlier, rays are best seen under high illumination. It is advisable to begin your observing session with a relative low power eyepiece (20X-50X) to get an overall view of the larger ray systems and their relationship to one another. Move next to a medium power (100X-200X) to study individual systems. Some observers, however, find that magnifications in excess of 200X are more of a hindrance than a help when studying the rays. Also, observing the brighter regions of the Moon will usually require some measures to reduce the glare. Reducing the aperture of your telescope is one method of glare reduction but most observers prefer the use of filters; either colored, neutral density, or polarizing. While employing such devices a few rays can actually be traced nearly to the terminator.

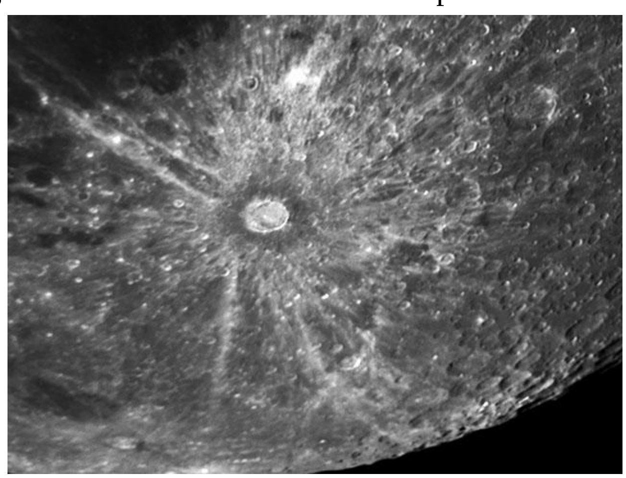
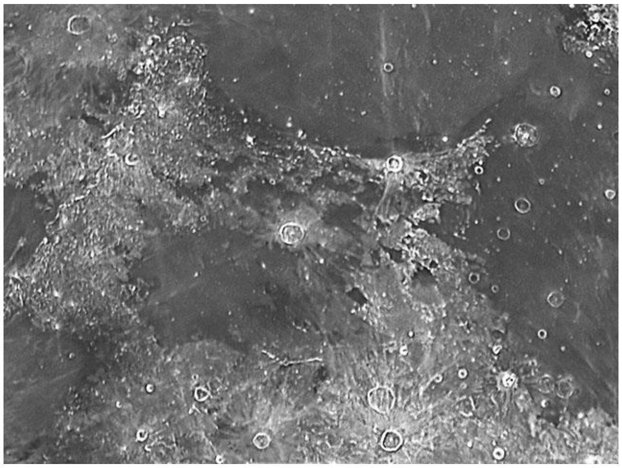


FIGURE 1. *Tycho rays. William Dembowski, Windber, Pennsylvania, USA. July 9, 2009 03:45UT. Colongitude 111.1º, Seeing 4/10. C8 SCT f/10, DMK41, UV/IR+W58 filter.*

The most extensive lunar ray system is the one associated with the crater Tycho (fig. 1). Long and straight, the rays of Tycho reach halfway across the face of the Moon and are so bright that they are highly visible even in the relatively bright highlands where they originate. One ray from Tycho appears to divide Mare Serenitatis in half. If this is in fact a ray from Tycho, and not from Menelaus (fig. 2) as some believe, the span of the Tycho system would exceed 2,000 km. Interestingly, the Tycho rays do not begin at the crater walls. There is a dark halo surrounding the crater which may be the result of darker, heavier ejecta piling up around the crater walls. It should also be noted that the Tycho ray system is far from symmetrical. Some of its longest rays do not radiate from the center of the



crater but rather from points on the crater walls. In addition, there is about a 120 degree gap in the system to the west. This gap is not totally devoid of rays but it lacks the major streaks that typify the rest of the system.

FIGURE 2. *Menelaus. William Dembowski, Windber, Pennsylvania, USA. August 12, 2011 01:27UT. Colongitude 64.9º, Seeing 4/10. C8 SCT f/10, DMK41, UV/IR filter.*

To the northwest of Tycho are the craters Copernicus and Kepler (fig. 3). Their ray systems, though prominent, are rather different than Tycho's. Whereas the rays of Tycho are straight and narrow, these are broader and more featherlike. They seem to spread like ostrich plumes, sometimes doubling back upon themselves to form oval loops. The two systems often overlap in a complex pattern that is difficult, if not impossible, to decipher. Both of these rays systems are also dimmer than that of Tycho, an indication that they predate their southern neighbor. It is generally accepted that rays are bright when originally formed but darken as they are bombarded by micrometeorites and cosmic rays. One puzzling aspect of the Copernicus rays is that they are brighter than their age suggests they should be. At 810 million years old, theory says that they should have faded by now but at Full Moon they are second only to Tycho in brilliance and extent.

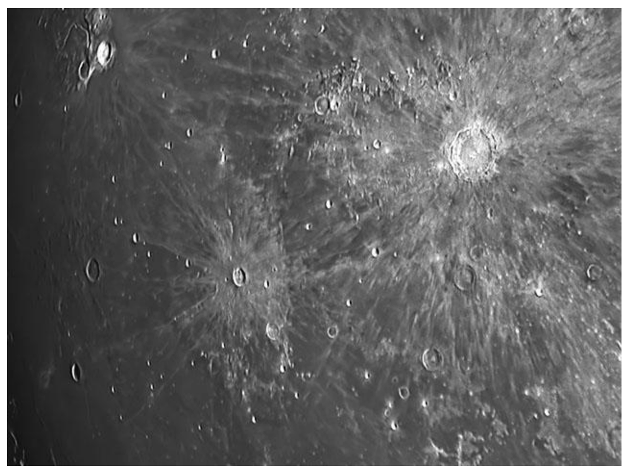


FIGURE 3. *Copernicus, Kepler & Aristarchus rays. William Dembowski, Windber, Pennsylvania, USA. August 12, 2011 01:24UT. Colongitude 64.9º, Seeing 4/10. C8 SCT f/10, DMK41, UV/IR filter.*

One of the more interesting ray systems is the one associated with the crater Proclus (fig. 4) on the western shore of Mare Crisium. This system has a most definite gap of nearly180 degrees that completely spares Palus Somni of any intrusion. There is some observational evidence to suggest that a ridge in the area interrupted the trajectory of the low flying ejecta, but the acceptance of this explanation is not universal. Regardless of the cause, this gap in the ray pattern is an echo, in miniature, of the Tycho system.

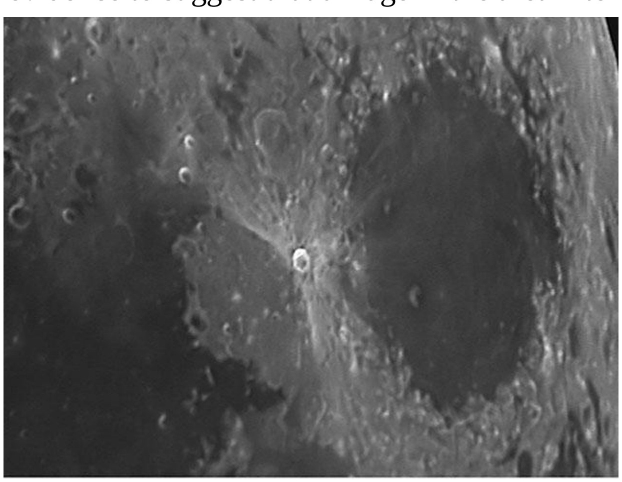


FIGURE 4. *Proclus. William Dembowski, Windber, Pennsylvania, USA. July 24, 2007 02:07UT. Colongitude 22.5º, Seeing 4/10. 8" SCT f/10, NexImage.*

There are, of course, many more ray systems than those covered in this brief article. Some of them large and some of them small (but interesting all the same). They will be covered in upcoming articles.

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Imbrium Sculpture near Ptolemaeus

David Teske

I took this image (fig. 1) on 10 November 2017 at 1102 UT with the Stellarvue 102T f/7 APO refractor telescope using a 2.5 x Power Mate. The camera was a Mallincam GMTm camera, exposure 25.544 ms exposure, 518 frames stacked in Registax and processed in Photoshop. Seeing was 6/10 with clear skies. The moon’s colongitude was 166.1^{o}, the moon’s age was 21.41 days, and the moon was 57.5% illuminated.

This image highlights the big three craters, Ptolemaeus, Alphonsus, and Arzachel, aligned north to south and their environs. Ptolemaeus is the large crater just upper left of center. It is a very prominent walled plain, 164 km in diameter. The crater walls which rise 2.4 km are slightly polygonal. Ptolemaeus is an ancient crater of Pre-Nectarian Period, with an age of 4.6 to 3.93 billion years old (byo). Material thrown out from the Imbrium impact landed inside Ptolemaeus, and because this material was still molten, it spread out within the crater walls. Unrelated are features such as the nameless crater chain directly outside the northeast wall that is not radial to the Imbrium Basin. The floor of Ptolemaeus has prominent crater, Ammonius, with a diameter of 8 km on its northeast floor. To the north of this is Ptolemaeus B, one of many shallow, saucer shaped depressions buried by the Imbrium ejecta. There is a gravitational anomaly, a mascon, over Ptolemaeus, likely caused by a body of mantle material pushing up from below the crater floor.

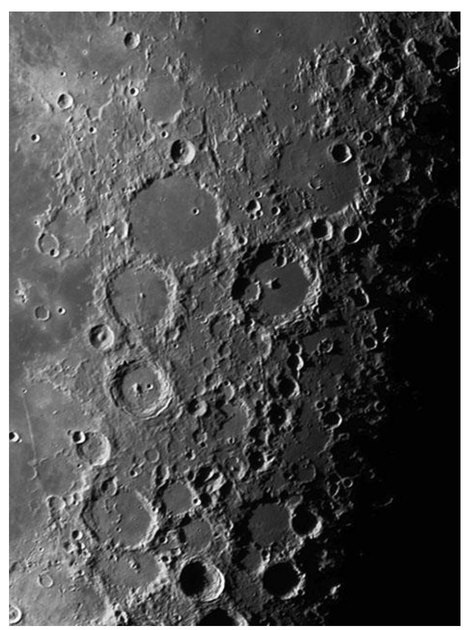

FIGURE 1. *Ptolemaeus. David Teske, Louisville, Mississippi, USA. November 10, 2017 11:02, UT. 102 mm APO Refractor, f/7. Seeing 6/10, colongitude was 166.1^{o}. Mallincam GMTm.*

Just south of Ptolemaeus is the younger crater Alphonsus. Alphonsus dates to the Nectarian Period, 3.93 to 3.85 byo. One of the most interesting craters on the moon’s nearside, Alphonsus has a rim that overlaps that of Ptolemaeus. The floor of Alphonsus lies 1 km lower than the floor of Ptolemaeus, and has been likewise covered with Imbrium ejecta. On the fascinating floor of Alphonsus lies a low ridge, similar to a mare ridge that crosses the entire floor north to south. This may be more ejecta from the Imbrium Basin. Being a floor-fractured crater, Alphonsus has Rimae Alphonsus that lies on the eastern crater floor. The central peak of Alphonsus rises 2,600 m above the floor. There are six areas of dark haloed craters on the floor near the east and west walls, which are likely of volcanic origin. These dark haloes consist of dark, vitreous glass, produced by eruptive pyroclastic volcanism with lava of high lava content. These are likely cinder cone volcanoes, though much more shallow in slope than those of Earth. The lavas may be like mare basalts based on their reflectance. These eruptions probably occurred 3 to 4 billion years ago. Of much more recent activity, the floor of Alphonsus is a frequent location of LTP. On 3 November 1958, Soviet astronomer Nikolai Kozyrev observed a gas eruption here. Based partially on this, the Ranger 7 spacecraft investigated this region in March 1965.

South of Alphonsus is Arzachel, a prominent crater with terraced walls with a diameter of 97 km and a depth of 3610 m. On the sharp, terraced crater walls are formations Arzachel E and F which are valleys parallel to and with the southern wall. These valleys likely formed from enormous landslides. Arzachel is the youngest of the three large craters, with an age of the Lower Imbrium Period, 3.85 to 3.75 byo. The floor of Arzachel is 1.5 km lower than that of Alphonsus. The floor is slightly domed towards its center. There is smooth material on the northern half of the floor, perhaps volcanic in origin. Arzachel is a floor fractured crater with an off center central peak that rises 1.5 km. From the central peak to the south wall is a low ridge. Rimae Arzachel is about 50 km long and follows the curvature of the eastern inner crater wall. This rille is unusual because at sunset, as is in this image, the rille casts a long shadow towards the eastern wall of Arzachel. This shows the crater floor west of the rille must be higher than the floor on the eastern side of the rille, so perhaps the rille is also a fault.

Southwest of Alphonsus and northwest of Arzachel lies the odd crater Alpetragius. This 40 km wide crater is 3,900 m deep. It has a large central peak that is conical in shape, looking like an egg in a nest. In all likelihood, this peak was created by the initial impact and then modified by subsequent volcanism.

Moving southeast of Ptolemaeus, very near the center of the image is the very large, prominent crater Albategnius. This crater of diameter 136 km with a depth of 4 km is of the Nectarian Period, 3.92 to 3.85 byo. Its smooth floor may be fluidized ejecta from the Imbrium formation. Under grazing illumination, numerous very shallow depressions are visible, similar to that of Ptolemaeus. These likely were pre-existing craters covered by the Imbrium ejecta. The inner walls of Albategnius have been heavily eroded by landslides. The floor contains a central peak that is 1.8 km tall. Also on the floor of Albategnius is the crater Klein, with a diameter of 44 km and a depth of 1460 m. The floor of Klein is 0.6 to 1.2 km below that of Albategnius and is again covered with Imbrium ejecta and perhaps volcanic material as well.

North of Albategnius is the ancient and considerably disintegrated walled plain Hipparchus. This crater of Pre-Nectarian Period, 4.6 to 3.92 byo has a diameter of 150 km and a depth of 3320 m. The southeast wall is broken by two broad, deep gaps. The floor of Hipparchus exhibits mountain peaks, small hills, crater pits, ghost craters, and the 30 km diameter well-preserved young crater Horrocks. Near the center of Hipparchus is a horseshoe shaped formation with low walls that opens to the north, which is the remains of a once complete crater. The light colored material that fills Hipparchus's floor is too light to be basaltic, so it is probably fluidized ejecta from Imbrium. This goes with the groove-like appearance from the Imbrium Basin around this area.

Moving north of Ptolemaeus is an interesting area of craters and rilles south of Sinus Medii.

Just north of Ptolemaeus is the young crater Herschel, with a diameter of 41 km and a depth of 3770 m. This crater of the Eratosthenian Period (3.15 to 1.1 byo) has a rough crater floor and an eccentric, small central peak that rises 1 km. Just north of Herschel is the shallow crater Spörer that has a diameter of 28 km and a depth of only 310 m, though it shows well in this image. Spörer is partially filled with lava. East of Spörer is the 47 km diameter disintegrated crater Glydén. Its western wall is breached by a wide valley, caused by secondary impacts and shock waves from the Imbrium impact. West of this is the crater Flammarion with a diameter of 75 km. This Nectarian Period crater has its northern wall completely submerged by lavas from Sinus Medii.

On the western wall of Flammarion is the small, sharp crater Mösting A. This 13 km, 2,700 m deep crater is the fundamental point in selenographic coordinates with a position of 3^{o}12'43.2" S, 5^{o}12'39.6"W. The crater Mösting is north of this, with a diameter of 26 km, a depth of 2,760 m and has a rough floor. To the northeast of Herschel is the 53 km diameter Réaumur that has partially submerged crater walls in its north again due to the formation of the Imbrium Basin. Northwest of this is the crater Oppolzer, with little of its north wall in existence. Careful inspection of this area reveals a few rilles. Rima Flammarion runs for 80 km, whereas Rima Réaumur is 45 km long. Rima Oppolzer is a rille that is 110 km long. This and Rima Réaumur meet at right angles. These linear rilles are probably associated with the lava surface of Sinus Medii.

West of Ptolemaeus is the crater Davy. Davy is a crater that is 35 km in diameter that adjoins the older and larger crater Davy Y with a diameter of 60 km to the north. Most interesting in this area is Catena Davy, a chain of about 20 non-overlapping individual craters with diameters 1 to 3 km across. The largest crater in the chain is Davy C with a diameter of 3.4 km and a depth of 550 m at the western end of the chain and Davy YA roughly at the chain's center. The crater chain was formed long ago either by a loosely held together asteroid that was broken up by gravity shortly before impact with Davy or else it was a swarm of small bodies with similar flight paths.

To the south of Davy and east of the Straight Wall is the wonderful triple crater Thebit. The 57 km diameter Thebit, formed in the Upper Imbrium Period, 3.75 to 3.2 byo, is intruded by Thebit A with a diameter of 20 km, which in turn is intruded by Thebit L with a diameter of 10 km. The crater Thebit P is an 80 km diameter highly degraded crater to the southwest of Thebit. This crater has a lava flooded dark floor.

The large crater south of Thebit is Purbach, an ancient walled-plain with a diameter of 118 km. Purbach is of the Pre-Nectarian Period. The inner slope of the western wall has a large landslide that has extruded onto the floor, with the inner slope of the eastern wall also showing evidence of a landslide. The floor material may consist of a mix of ejecta from several nearby craters and from the distant Imbrium Basin. The floor contains interesting features including a 20 km diameter horseshoe shaped crater, Purbach W with a ridge running to the north, numerous craterlets to the east, and Purbach A that is well preserved.

Immediately south of Purbach is the irregularly shaped crater Regiomontanus with a size of 130 by 108 km. This Pre Nectarian crater has a central peak near the edge of the crater Purbach that rises 1.2 km. On the top of this peak is a small impact crater, Regiomontanus A with a diameter of 5.6 km. Volcanologists had once attributed this as a volcanic cone.

South of Regiomontanus near the bottom center of the image is the very prominent, fresh-looking crater Werner. Werner, with a diameter of 70 km and a depth over 4 km is of Eratosthenian Period, 3.15 to 1.1 byo. This crater looks much like Tycho, but is older. Werner's floor is rough and furrowed, with much of its details such as central peaks in shadow.

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DOS EQUIS

Richard Hill

The dominant crater in this image (fig. 1) is 88 km diameter Tycho half filled with shadow and its central peak casting a nice shadow towards the west. North of Tycho, near the top of the image is an interesting crater with a central peak displaced to the north and terraced walls.

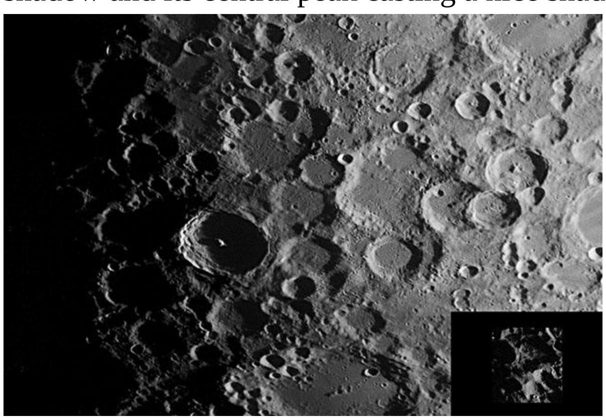

FIGURE 1. *Tycho - Richard Hill – Tucson, Arizona, USA October 29, 2017 01:41 UT. Seeing 8/10. 8" Mak-Cass, f20, 610 nm filter, SKYRIS 445M.*

As you know, I enjoy picking out the letter "X" wherever I find it on the moon. Well this image has several. The first one can be seen like a gossimer spiderweb above and left of Tycho. It existed in this image with a colongitude of 18.6 but one I took in Jan. with a colongitude of 20.8 the ridges that caused the "X" could be seen (insert).

Going right (east) from Tycho we see 4 to 5 similar sized craters. The first one almost sharing a wall with Tycho is Pictet (65 km). Further on we see Saussure (56 km) with a flat infilled bottom. Next we come to two overlapped craters. The larger one underneath is Huggins (66 km) overlain by Nasireddin (54 km) and above that is Miller (77 km) with my last "X" as it's central peak. Notice all the secondary cratering over the region centered on Saussure. The largely ruined crater above Saussure is Orontius (126 km). It's covered with these 3 km and smaller, craters and crater chains only the larger (2 km and up) are seen here.

A WHOLE SEA OF CRISES

Richard Hill

Early in every lunation one of the first naked eye features that comes into view is Mare Crisium (Sea of Crises). Listed diameters vary from 418 to 740 km but this latter is a "main ring diameter" listed on the Lunar Picture of the Day (LPOD) wikispaces so I would trust that. Until this image I never notice the polygonal shape of this sea (fig. 1). There is a ring of wrinkle ridges on the floor of this sea just inside the wall. In the lower right of the mare is Dorsa Harker next to a peninsula Promontorium Agarum with the flat bottomed crater Condorcet (77 km) next to it. In the upper right can be seen Dorsa Tetyaev. Across Crisium from that, in the upper left is Dorsum Oppel, then south is the prominent crater Picard (24 km) and further on, Dorsum Termier. The mountains that make up the walls of this sea are very distinctive and catch the early light like the Montes Jura on Sinus Iridum. Notice the flat bottomed crater just south of Crisium. This is Firmicus (58 km). Above it is a sinuous depression that runs from the small crater to the upper right of Firmicus, Auzout (34 km) down to a small crater Bombelli (10 km) to the lower left of Firmicus. The middle, darker portion of this ditch just to the left of Firmicus is Lacus Perseverantiae (Lake of Perseverance). Though this lake looks small it is not nearly the smallest such on the moon.

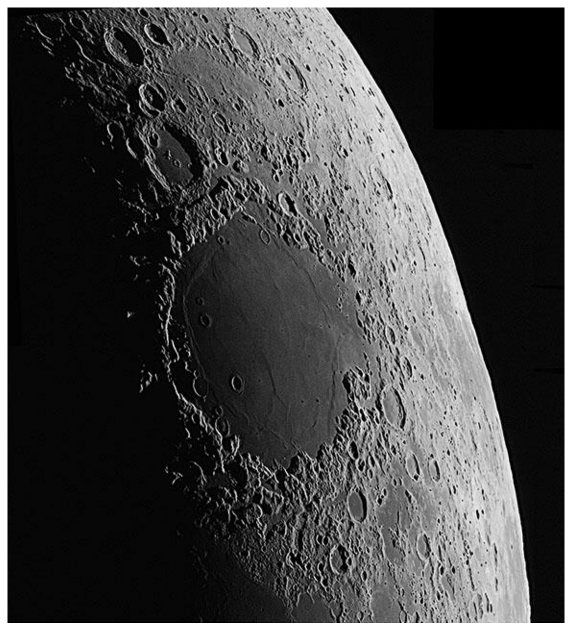

FIGURE 1. *Mare Crisium - Richard Hill – Tucson, Arizona, USA May 29, 2017 02:48 UT. Seeing 8/10. 8" Mak-Cass, f20, 610 nm filter, SKYRIS 445M.*

North of Crisium is the large crater Cleomedes (129 km) and near the top of the image is Geminus (88 km) with Burckhardt (60 km) between them. To the right of them are two similar sized craters, Berosus (77 km) and Hahn (87 km) with its small central peak. Before leaving this image I would point out the large crater difficult to see crater to the right of Condorcet halfway to the limb. This is Neper (141 km), visible at this libration. Just above it and going over the limb is another sea, Mare Marginis, another one of those features seen only at favorable librations

LUNAR TOPOGRAPHICAL STUDIES

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OBSERVATIONS RECEIVED

ALBERTO ANUNZIATO - ORO VERDE, ARGENTINA. Digital images of Clavius & Mons Piton. Drawings of Gutenberg & Madler.

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 4, 5 & 10 day moon.

WILLIAM DEMBOWSKI – WINDBER, PENNSYLVANIA, USA. Digital images of Copernicus-Aristarchus, Menelaus, Proclus & Tycho.

WALTER ELIAS - ORO VERDE, ARGENTINA. Digital images of Alphonsus & Anaxagoras.

ROBERT HAYS - WORTH, ILLINOIS, USA. Drawings of Burnham, Dechen-Harding, & Montes Spitzbergen.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Alpine Valley-Cassini, Apollo 17 site, Aristoteles-Archimedes, Hadley Rille, Langenus-Petavius, Mare Crisium(2), Montes Alpes, Montes Alpes-Montes Caucasus, Montes Alpes-Cassini, Montes Apenines, Montes Caucasus(2), Montes Caucasus-Plato, Sinus Iridum(2) & Tycho.

DAVID JACKSON - REYNOLDSBURG, OHIO, USA. Digital image of Full Moon

WALTER LATRONICO - ORO VERDE, ARGENTINA. Digital images of Clavius & Hell.

DAVID TESKE - LOUISVILLE, MISSISSIPPI, USA. Digital images of 3rd Quarter Moon & Ptolemaeus.

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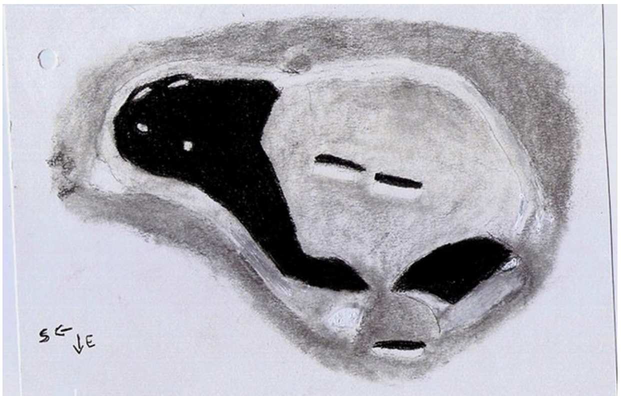
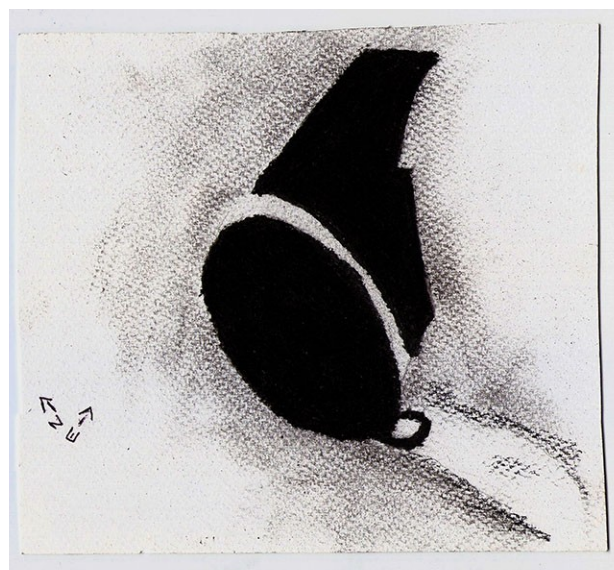
RECENT TOPOGRAPHICAL OBSERVATIONS



GUTENBERG– Alberto Anunziato, Paraná, Argentina. September 24 2017 23:25-23:55 UT. ETX-105 Mak-Cass, seeing 7/10, 154x.

Gutenberg is a very old crater (pre-imbrian) on the western shore of Mare Fecunditatis. When you look at the charts it is hard to imagine the shape of "odd lobster pincer" (in Peter Greggo's words) that it presents near the terminator with the light of an early morning Sun. The rim of Gutenberg is very eroded and irregular, as a rim of a pre-imbrian crater should appear. Gutenberg E is the overlapping crater with broken walls and flooded floor on the east. The lava that formed Mare Fecunditatis must have broken through a winding path between the broken southeast and southwest rims of Gutenberg E, flooding it completely and then partially flooding Gutenberg. The central peaks of Gutenberg survived and can be seen as small rectangular mountain ranges that cast shadows. To the south the shadows hide the part of the Pyrenai Mountains neighboring Gutenberg, the only bright points in the dark must correspond to the highest parts of this mountain range. The west rima appears illuminated by the sun and as part of the Pyrenai Mountains it is considerably higher than the eastern rim, destroyed by the impact that formed Gutenberg E and the subsequent eruption of lava.

MADLER– Alberto Anunziato, Paraná, Argentina. April 16 2017 04:40-05:00 UT. ETX-105 Mak-Cass, seeing 7/10, 154x.



With a colongitude of 145.3º and very close to the terminator (80% of illumination), no detail of Mädler was visible, only its characteristic oval shape. The lunar "magnificent desolation" invites us to dream and what impressed me at the eyepiece was the unsettling spectacle of the long shadows of Mädler and its unfathomable and dark depths. Black and White. Mädler's bottom was a black pit with no detail, the shadows swallowed even the west rim. The wall that shone illuminated by the Sun and cast a gigantic shadow that seemed to come from the impressionist photography of a film noir from the 40s. Knowing the important height inequality of Mädler's two walls I assumed that the highest wall was the east, the one that shone under the high sun, but no, the highest is the west wall, the one that is not seen in the sketch. To the south there was a black circle, which I presume could be the gap on the wall that is observed in the photographs of the Apollo and Lunar Orbiter missions. Southwards from the black circle lay out the characteristic bright zones that surround Mädler.

4 DAY MOON- Maurice Collins,- Palmerston North, New Zealand. November 22, 2017 08:03-08:08 UT. FLT-110, f/14, ASI120M. North down.

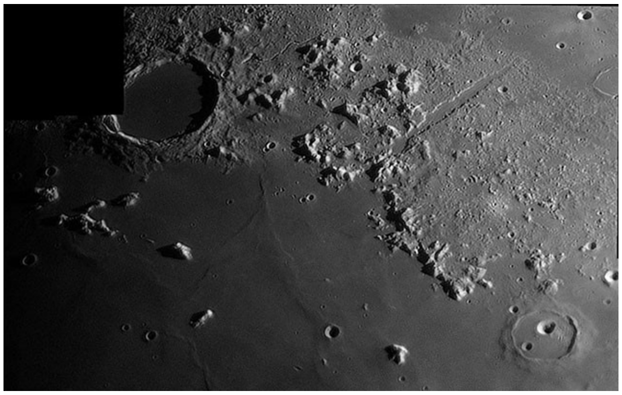
RECENT TOPOGRAPHICAL OBSERVATIONS

5 Day MOON- Maurice Collins,- Palmerston North, New Zealand. November 23 2017 07:55-08:00 UT. FLT-110, f/14 ASI120M. North down.

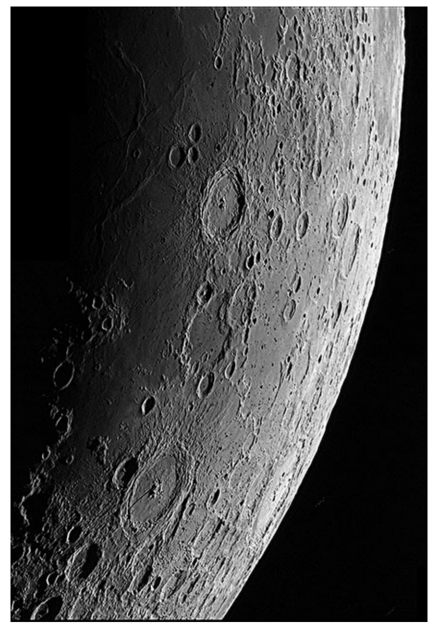
ALPHONSUS- Walter Elias, Oro Verde, Argentina. November 11, 2017 06:45 UT. CPC-1100, Canon EOS Digital Rebel XS.

HELL - Walter Latronico, Oro Verde, Argentina. November 11 2017 06:48 UT. CPC-1100, Canon EOS Digital Rebel XS.

RECENT TOPOGRAPHICAL OBSERVATIONS

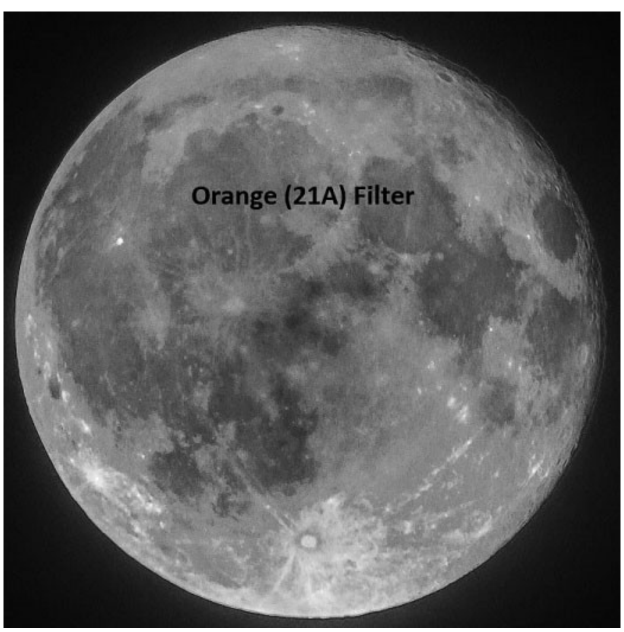


ALPINE VALLEY-CASSINI - Richard Hill – Tucson, Arizona, USA April 9, 2014 00:45 UT. Seeing 8/10. 8” Mak-Cass, f20, 656.3 nm filter, SKYRIS 445M.



LANGRENUS-PETAVIUS - Richard Hill – Tucson, Arizona, USA April 9, 2014 00:45 UT. Seeing 8/10. 8” Mak-Cass, f20, 656.3 nm filter, SKYRIS 445M.

Three to four days after new moon, if the libration is right, you can catch sight of thw two grand craters, the 136 km Langrenus (above center) and the 182 km Petavius (near bottom) with its splendid rille on its floor going from the central peaks to the southwest. I say if the libration is right because the maximum libration point on this night was at Mare Smythii which you can see on the limb at the top, half cut off. to the right of Petavius, near the limb, is the even greater crater Humboldt (213 km). Note how shallow it is yet if it were near the center of the earth facing side of the moon you would swear it was a deep depression. In between Langrenus and Petavius is another large crater, also not so deep is Vendelinus (151km). It's older than the other two by over a billion years.



Full MOON– David Jackson – Reynoldsburg, Ohio USA September 7, 2017 04:11 UT. Orion XT-10, 30mm eyepiece, Droid Razr camera, Orange 21S filter.

LUNAR GEOLOGICAL CHANGE DETECTION PROGRAM

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A Happy Holidays to our readers. Observations for October were received from the following observers: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, earthshine, Gassendi, Herodotus, Jansen, Mare Crisium, Plato, Prinz, Proclus, and Ross D. Alberto Anunziato (Argentina – AEA) observed: Agrippa, Aristarchus, Gassendi, Plato and Promontorium Laplace. Juan Manuel Biagi (Argentina – AEA) imaged Mare Imbrium and several features. Maurice Collins (New Zealand – ALPO/BAA/RASNZ) imaged several features. Anthony Cook (Newtown, UK, - ALPO/BAA) imaged several features. Marie Cook (Mundesley, UK – BAA) observed Aristarchus, Langrenus, Manilius, and Mons Pico. John Duchek (Carrizozo, NM, USA - ALPO) imaged Censorinus. Walter Elias (Argentina – AEA) imaged Alpetragius, Alphonsus, Archimedes, earthshine, Arzachel, Mare Crisium, Eratosthenes, Mons Pico, Montes Apenninus, Proclus, Secchi, Torricelli B, Vallis Schroteri, and several other features. Les Fry (Elan Valley, UK, NAS) imaged several features. Rik Hill (Tucson, AZ, USA – ALPO/BAA) imaged Clavius and Tycho. Shirley Parker-Nunn (Aberystwyth University, UK) imaged the Moon. Camilo Axel Satler (Argentina, AEA) imaged Plato and Tycho. Franco Taccogna (Italy – UAI) imaged earthshine and several features. Luigi Zanatta (Italy – UAI) imaged Campuanus.

News: I would encourage all observers with capability to video stars down to 10th magnitude through a telescope, to have a go at capturing video of the lunar Earthshine on the mornings of Dec 12-15. Our strength as amateur astronomers lies in our numbers. The more simultaneous videos of impact flashes that we can obtain, the more valuable the science that can be achieved, and the more we can learn. Please contact Brian Cudnik for further details with regard to equipment (many of you may already have the necessary cameras), and software I can provide. If you would like to see on what days/UTs to observe, please click on the following web site, http://users.aber.ac.uk/atc/lunar_schedule.htm , and find the observing times for your nearest geographical location. I was fortunate to be one of the few observers who captured Leonid impact flashes on the Moon in 2001, when I lived out in the US, and I was lucky to capture probably the first confirmed impact flash from the UK on New Year's Day 2017. The discovery of that impact flash came from Switzerland, and a 3rd observation now from the UAI in Italy, makes a triple confirmation. Let us make impact flash observing a new regular programme for the Lunar Section, in a similar way to which looking for impacts on Jupiter and Saturn have become a scientifically productive activity. The added bonus for impact flash observing on the Moon is that the flashes are a lot more frequent, one every few hours, and you can also do some useful occultation work at the same time!

I received an email on Nov 18th from Antonio Mercatali, the UAI's Lunar Section director, to say that the UAI had had three of the 2016 impact flashes observed by their observers Cantarella and Zanatta, listed in the NASA catalog of impact flashes.

It was of great sadness that I heard of the passing of one of our veteran observers, Richard Baum. Richard has observed a number of LTP over the years, including a blue mountain seen on the lunar limb, south east of Langrenus in 1948. We may have shown that this effect exists under certain libration conditions as was reported on p18 of the May 2014 newsletter. Richard had written several historical astronomy books, and the one I am most fond of was: The Planets: Some Myths and Realities, from 1973, which highlighted some past observational oddities about the Moon and planets.

Jason Wentworth has emailed to say that the Chinese Space Agency will be launching some amateur radio astronomy satellites to the Moon in 2018 along with experiments from Saudi Arabia.

LTP Reports: No LTP reports were received for October, though I was forwarded a non-LTP report, via Bill Leatherbarrow, from Peter Anderson (Australia –BAA), who on 2017 Nov 24 had been setting up his scope for an occultation run, but noticed a very strongly illuminated peak on the southern cusp at 09:05-09:10 UT. After successfully observing the occultation, he returned to the peak and managed to capture some images between 09:35 and 09:55 UT. However although still bright, the peak had faded, though you can see its location in Fig 1.

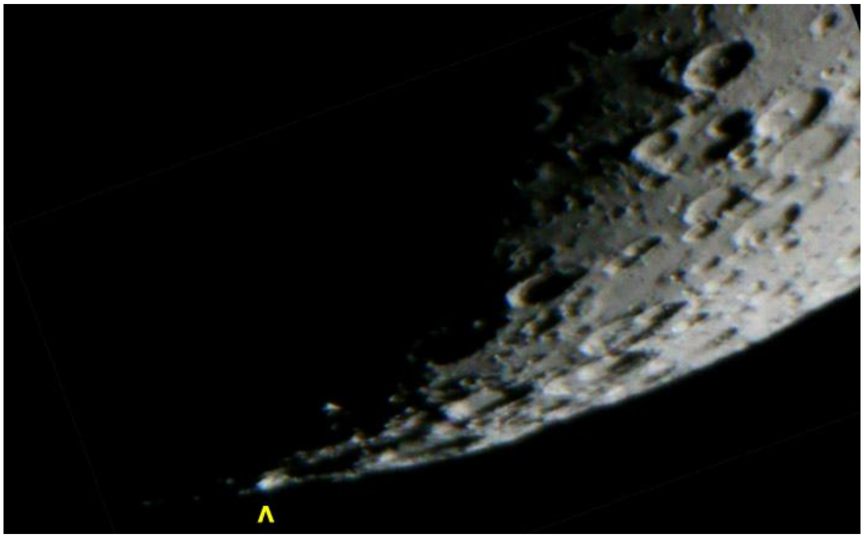

Figure 1. The southern cusp of the Moon, as imaged by Peter Anderson on 2017 Nov 24, centered around 09:45 UT. A bright spot near south pole area is highlighted with a yellow arrow.

Routine Reports: Below is a selection of reports received for October that can help us to re-assess unusual past lunar observations. Unfortunately due to pressure of academic teaching work at this time of the year, I will not have time to go into as much detail as I would like over each observation, so very little analysis will be done.

Gassendi: On 2017 Oct 02 Jay Albert at UT 00:50-01:35 and Alberto Anunziato (AEA) at UT 02:57 observed this crater at a similar illumination, to within ±0.5° to the following report from 1978:

On 1978 Jan 20 at UT19:10 P.W. Foley (Kent, UK, 12" reflector) observed a red spot at the southern edge of Gassendi C.P. Moore (Selsey, UK, 15" reflector, S=II-III) reported nothing unusual 17:00-17:50. Turner and others reported negative at 22:01. Pedler (UK, 12.5" reflector, S=III-IV) though detected a yellow-orange tint on the east floor of Gassendi A but the effect faded during poor seeing moments. Cameron 2005 catalog ID=24 and weight=5. ALPO/BAA weight=3.

Figure 2. Gassendi images from 2017 Oct 02, orientated with north towards the top. **(Left)** A cell phone image captured by Jay Albert at 01:18 UT, which has been color normalised and then had its color saturation increased to 70%. **(Right)** An image captured by Alberto Anunziato (AEA) on 2017 Oct 02 UT 02:57, which has been color normalised and then had its color saturation increased to 30%.

Jay comments that Gassendi was fully sunlit except for a thin strip of black shadow along the interior E wall. The central peaks and rilles on the E, SE and S floors were especially prominent and a rille on the NE floor was seen with difficulty. There was no "red spot" seen at the S edge of Gassendi and no "yellow-orange tint" on the E floor of Gassendi A, the floor of which was in shadow, except for the W most part of the floor. The N part of Gassendi A's central peak was visible at the inner edge of the floor shadow. Jay's image (Fig 2 – Left) confirms that there was no red spot and any tint on the eastern shadowed floor of Gassendi A is certainly not yellow. Alberto's image, (Fig 2 – Right) some 1h39m later also does not show these colors.

What is interesting about Jay's and Alberto's images are that there appears to be what looks like atmospheric spectral dispersion present in both, and that the red on the NE rim is in the same location on both images. This is despite the images being taken in North and South American continents respectively, with the Moon in different locations in the sky. So just out of interest I took a look at the altitude of the Moon above both observing sites. From lake Worth, FL, USA, the Moon was 46° elevation. From Paraná, Argentina, Alberto was imaging when the Moon was at an altitude of 58°. So it is odd that there are these atmospheric spectral dispersion-like effects occur in similar bright contrasty parts of the crater. Perhaps it has something to do with the Bayer matrix of color filter in front of the camera pixels? Or maybe it is just natural color? Anyway we shall leave the weight of the original LTP report at 3.

Cleostratus-Pythagoras: On 2017 Oct 03 UT 08:05-08:30 Maurice Collins imaged this region under the same illumination conditions, to within ±0.5°, to a 1974 report:

Pythagoras-Cleostratus 1974 Feb 05 UT 01:45,02:45 observed by Lord (St Anne's-on-Sea, Eng., 3" refractor, x135) "Event normal in integrated light. Light, full surface detail in red filter, dark, with full surface detail in blue filter. Other term. features did not show it. Only E.floor of Pythag., Babbage northern crater chain & NW floor of Cleostr. (According to Fitton's criteria this was a tenuous gas above the surface. Date given as 5th, but term. was at least 3deg E. Therefore these features were in the dark then. Ancill. data given for 6th)." NASA catalog weight=3. NASA catalog ID=#1387. ALPO/BAA weight=3.

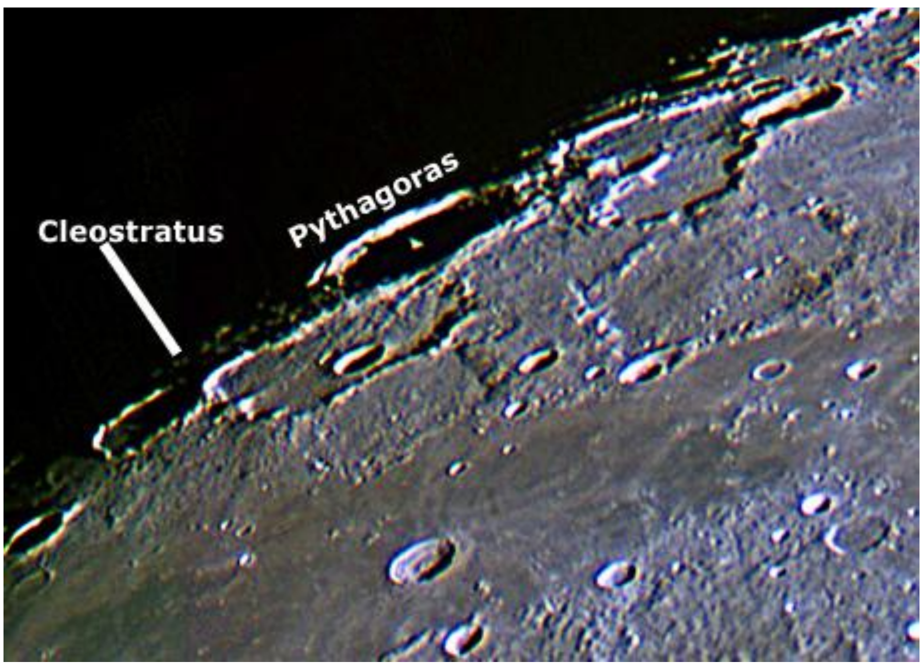

Figure 3. An image of the NNW terminator area of the Moon, taken by Maurice Collins on 2017 Oct 03 UT 08:05-08:30, orientated with north towards the top. The image has been color normalized and then had its color saturation increased to 70%.

In Fig 3, taken by Maurice, despite color saturation enhancement, no obvious sign of red color can be seen in this region. Therefore we shall leave the weight at 3.

Aristarchus: On 2017 Oct 05 UT 23:15 Shirley Parker-Nunn (Aberystwyth University) took a telephoto shot of the Moon under similar illumination and topocentric libration (viewing angle), to ±1°, to a LTP report from 1959:

On 1959 Jan 25 at UT00:00? An Unknown observer saw a LTP on the Moon. The reference for this is Palm's Icarus article from 1967. The Cameron 1978 catalog ID=713 and weight=0. The ALPO/BAA weight=1.

Figure 4. A monochrome image of the Moon as imaged by Shirley Parker-Nunn (Aberystwyth University), on 2017 Oct 05 UT 23:15, orientated with north towards the top.

Although Shirley's image (Fig 4) was just taken through a telephoto lens, it is a useful context image from which we can begin to get a better understanding of the 1959 report. To begin with I downloaded the paper referred to in Cameron's LTP catalog, namely "Enhanced Luminance on the Moon", by A. Palm, published in Icarus, 7, p188-192, in 1967. The mention of 1959 Jan 25 comes from table 1 and just has the date and no UT. Furthermore it does not mention Aristarchus by name but "Average of maria and craters", then a further reference to: a Kozyrev paper from 1959 from the Sky and Telescope, and also from Gerhals, T, Coffen, T, and Owings, D., from a 1964 Astronomical Journal paper. Having examined both papers, I cannot see anything anomalous about 1959 Jan 15 relating to Aristarchus. Therefore I will set the weight to 0 and remove the observation from the ALPO/BAA LTP catalog.

Aristarchus, Proclus and Menelaus: On 2017 Oct 07 UT 06:25 Juan Manuel Biagi (AEA) imaged the Moon under the same illumination conditions, to within ±0.5°, to the following multiple set of colored reports:

Aristarchus, Menelaus, and Proclus 1975 Feb 27/28 UT 22:00-01:00 Observers: Robinson (Teignmouth, England - 10" reflector), Fitton (Lancashire, England - 8" reflector), Amery (Reading, England - 8" reflector), Mills Observatory (Dundee, Scotland, 10" reflector) - NASA catalog states: "Robinson at 2200h got blink on E.wall, strong at 200x till 2225h. (Fitton) at2200h (moon low) at 200x saw vivid blue to N., vivid yellow & orange to S. in Aris., Proc., Menelaus, & many other bright craters till 2300h. Then Aris. less blue & mare obj. no colors. No blinks in these craters. No obscur. Polariz. normal till 2330h using many rotations. At 2330h Aris. blue in N. but fainter. Only Proc. remained blue till 0020h (28th). Photo-electric scan at 2340h was normal for Aris. (600 microamps) compared with Tycho (900 microamps), total of 10 scans. all neg. with 15km resolution. Blink neg. but blue still vis. in N. in white light till 0030h. At 0100h (S=III at 200x) Proc. clear of blue, Aris. nearly clear, blink neg. (Amery) at 2310h saw blue on N.rim of Aris., no color in other craters at 300x. No blink in Aris. S. part of Aris. indistinct but abnormal. No blink till 2350h. (Mills Observatory) at 0000h checking rep'ts got blink in S.part of Aris. Blue only in N.part. Similar blue in bright craters in E.hemisphere & blue halo on S.limb till 0020h. Concluded due to optical effects. Fitton says due to atm. effects from high press. sys. W. of obs (blue on one rim & red on other due to chrom. aberr. ? If spurious, should get no blink & similar crater conditions should exhibit same phenomena all over Moon). NASA catalog weight=5. NASA catalog LTP ID No. 1400. ALPO/BAA weight=3.

Figure 5. The northern part of the Moon as imaged by Juan Manuel Biagi (AEA) on 2017 Oct 07 UT 06:25, and orientated with north towards the top. **(Top)** Part of the original image with color saturation increased to 60%. **(Bottom)** The same image as the top, but this time with some artificial atmospheric spectral dispersion added, and color saturation further increased by 40%.

As you would probably expect, I am rather skeptical of multiple feature reports, especially with a distribution over such a large part of the Moon. It really is a strong contender for atmospheric spectral dispersion, and this is confirmed when you look at the simulation in Fig 5 (Bottom). The only things we have left are: J. Hedley Robinson getting a color blink reaction on the E. wall of Aristarchus at 20:00, some polarization measurements, which may or may not be significant, and color blinks seen by other observers at various times in Aristarchus and Proclus. Use of colored filters in a Moon Blink device helps to eliminate atmospheric spectral dispersion effects. I will therefore remove the Menelaus entry from the LTP database, and lower the weights for Aristarchus and Proclus to 2 for now as it is not clear that any observers saw the same effects simultaneously.

Aristarchus: On 2017 Oct 07 UT 22:10-22:25 Marie Cook (BAA) observed this crater under similar illumination, to within, ±0.5°, to the following LTP report from 1987:

Aristarchus 1987 June 14 UT 04:43-08:00 Observed by Curtis, Jacobs, and Manske (Yanna Research Station, Carl A. Fosmark Jr. Memorial Observatory, Madison Astronomical Society, WI, USA, 17" f4.5 Dobsonian and the 8" f10 SCT Celestron) "On the night 13/14 June 11:42 P.M. to 3:00 A.M. local time or 14 June 04:43 to 8:00 UT. Three people witnessed this event and all three of them observed with three different telescopes to rule out instrumental aberration. These three people were members of the Madison Astronomical. The three observers involved are Keith Curtis, Tom Jacobs and Robert Manske. Keith Curtis took detailed notes of the event as he observed it. The observations were made at the Yanna Research Station, Carl A. Fosmark Jr. Memorial Observatory of the Madison Astronomical Society following the annual picnic. This is MAS dark sky site and is located near Brooklyn, Wisconsin. As they were observing the night sky they saw the Moon rising and noted a strong orange color due to atmospheric effects. Approximately 1/2 hour after the

Moon rise they decided to turn one of the telescopes on it. It was at 04:43 UT, it was noted by Keith Curtis that as the Moon rose it began to lose the horizon color effect and return to its normal color, but he found that the red color was not leaving the crater Aristarchus. At first they all thought this was an atmospheric effect but decided it was a real event since they detected a second crater (Euler) showing red color on its rim. Keith Curtis said that the red color was very strong on the Western rim of Aristarchus with a strong blue/green or aqua green on the Eastern rim. Keith also reported that the glow opaque enough to prevent viewing of the interior of crater Aristarchus. He said they observed until 3:00 A.M. daylight saving time or 8:00 UT. and the red glow was still visible when they ended their observing session. Robert Manske description of the event was that he saw two craters glowing a strong red and blue giving it a rainbow effect. He said that the red glow was so strong he was unable to see the craters underneath during the entire observing session. Concerning the orientation of the red and blue on the crater, he stated that he did not remember since he failed to take any notes. Concerning whether there was any difference in appearance when they observed it with the 17" f4.5 Dobsonian and the 8" f10 SCT Celestron. He said that he could not detect any difference to the lunar formation or the color on it regardless of which telescope he used. He did mention that as the Moon was rising it had the appearance of one large Maria in the center of the disk. This illusion disappeared as the Moon rose higher into the sky. When talking to Tom Jacobs he said that he remembered that he did not see anything on the Moon until 1/2 hour after Moon rise. He said that he remembered that the entire Aristarchus region had a strong reddish or pinkish color. All three witness all reported variations in the type of color they were seeing. This would indicate that individuals color perception is a major factor during a color event. Keith Curtis saw a very strong coloration around the rim of the craters, where Robert Manske saw the entire region covered by this red and blue coloration and he could not see the interior of the craters underneath. Tom Jacobs reported that the glow covered the entire crater but he could see the crater underneath it. The Moon never achieved a height greater than 21 degrees so it could be that what the observers saw was caused by the Earth's atmosphere. ALPO observational report. Cameron 2006 catalog ID=303 and weight 5. ALPO/BAA weight=3.

Marie, using a 90mm Questar (Seeing III, Transparency –Moderate to good), found that the crater was clear and sharp, good detail seen, with no sign of color seen anywhere in the crater. I will therefore leave the weight at 3.

Censorinus: On 2017 Oct 26 UT 01:51-01:56 John Duchek (ALPO) imaged Censorinus in color, as part of our Lunar Schedule predictions page, in order to see how early one can pick up the blueness in Censorinus crater.

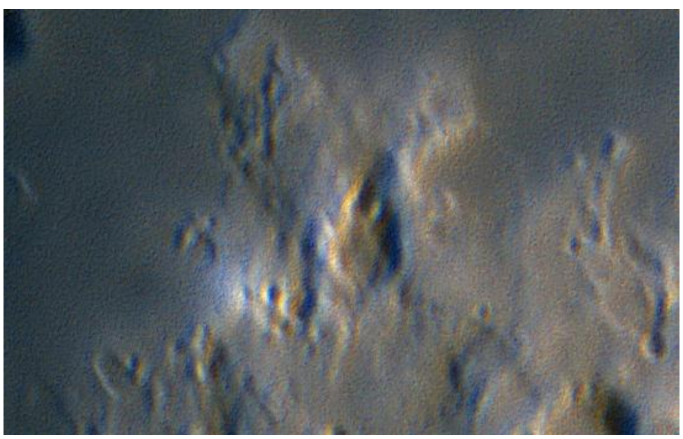

Figure 6. Censorinus and Censorinus A ray craters, just to the lower left of center. As imaged by John Duchek on 2017 Oct 26 UT01:56 and orientated with north towards the top. The image has had atmospheric spectral dispersion removed, and has its color saturation increased to 85%.

John's image (Fig 6) certainly shows up the bright ejecta blancket around Censorinus, and to a less extent that around Censorinus A to the right. There is a hint of blue present, but this may have an optical origin in our atmosphere, or in terms of chromatic aberration in the optics somewhere(?), as there appear to be similar reds and blues on contrasty edges elsewhere in the image.

Mare Crisium: On 2017 Oct 27 UT 21:09-21:1100:41 Les Fry Elan Valley, UK, NAS) imaged the Moon at low altitudes (sometime we have to make the most of when we can see the Moon from the UK).. The illumination was similar, to within ±0.5°, to the following observation from 2009:

On 2009 Apr 02 at UT 21:45-22:05 C. Brook (Plymouth, UK, 5" refractor, x40 and x100, using red and blue gelatine Edmund Optics filters (rose No. 47 and blue No. 80), transparency poor due to thick haze. seeing was excellent) observed that that the rays that crossed Mare Crisium from Proclus were brighter in red light than in blue. A similar effect was also observed, to a lesser extent south of the Mare. Non-mare Crisium rays from Proclus did not have this effect. The LTP was not seen at the higher magnification of x100. The ALPO/BAA weight=2.

Figure 7. A color image of Mare Crisium, orientated with north towards the top, captured by Les Fry (NAS), using a 120 m refractor on 2017 Oct 27 UT 21:09-21:11. Atmospheric spectral dispersion has been removed, the image auto-color normalized then its color saturation increased to 65%.

In Fig 7 I have taken Les' image and attempted to remove atmospheric spectral dispersion present. Although the image is still slightly blurry due to the Moon's low altitude, there is no obvious sign of the rays from Proclus showing any sign of color which would have made Clive Brook see them as brighter in red than in blue light. We shall therefore leave the weight at 2 for now.

Eratosthenes: On 2017 Oct 28 UT 16:00 Franco Taccogna imaged this crater in red, green, and blue wavebands under similar colongitude to an observation from Dr Paul Abel from 2009:

ALPO Request: This request comes about because of two observations. Firstly on 2009 Nov 25 Paul Abel and others detected some color on the inner W/NW illuminated slopes of this crater. No similar color existed elsewhere. On 2012 Aug 25 Charles Galdies imaged this crater and detected a similar color, approximately in the same location, though he also imaged color elsewhere. It is important to replicate this observation to see if it was natural surface color, atmospheric spectral dispersion, or some effect in the camera that Charles was using, namely a Philips SPC 900NC camera. The minimum sized telescope to be used would ideally be a 8" reflector.

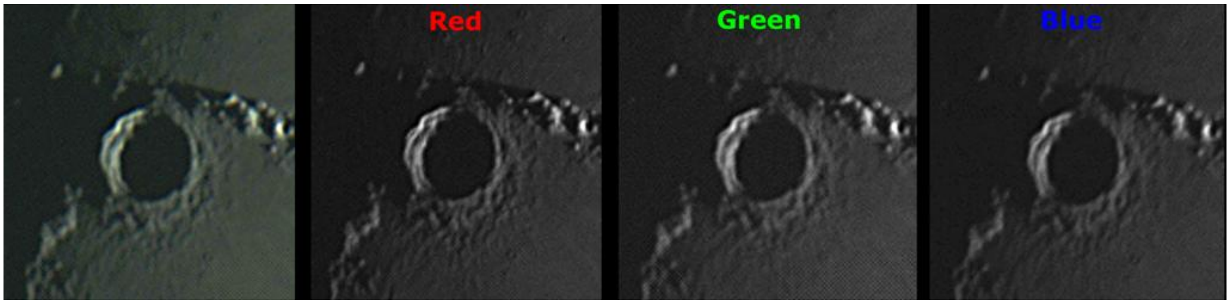

Figure 8. Eratosthenes as imaged by Franco Taccogna (UAI) on 2017 Oct 28 UT 16:00, and orientated with north towards the top. **(Far Left)** Color image. **(left)** Red component. **(Right)** Green component**.** **(Far Right)** Blue component.

Franco's color image (Fig 8) shows no sign of color on the inner NW/W terraces of the crater rim, and when the red, green, blue components are separated (akin to a visual moon blink device), there is no evidence of this area being bright in the red filter and dark in the green/blue filters. Therefore we shall leave the weight of the 2009 report at 3.

Tycho: On 2017 Oct 29 UT 01;41 Rik Hill (ALPO-BAA) imaged this crater just 10 minutes before, and Camilo Axel Satler (AEA), during, a repeat illumination opportunity (to within ±0,5°) for the following 1992 observation:

1995 Mar 10 UT 20:00-23:34 Tycho observed by G. North (UK) seen to have greyness inside parts of its shadow. Confirmed by J.D. and M.C. Cook. Possibly light scattered of illuminated wall into shadow or highland starting to break through the shadow. ALPO/BAA weight=1.

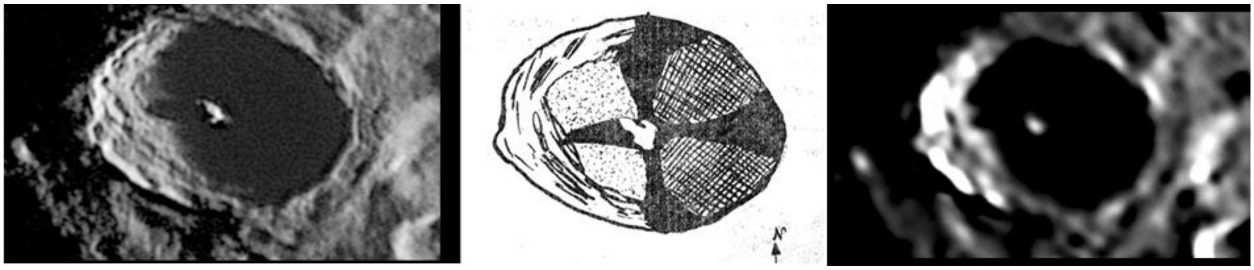

Figure 9. Tycho crater orientated with north towards the top. **(Left)** Image by Rik Hill (ALPO-BAA) from 2017 Oct 20 UT 01:41. **(Center)** Sketch by Gerald North (BAA) from 1996 Mar 10 UT 20:00. **(Right)** Image by Camilo Axel Satler (AEA) from 2017 Oct 29 UT 03:00.

It is interesting to compare Rik's observation (Fig 9 - Left) with Gerald's original sketch (Fig 9 – Center). There is nothing much to indicate that the floor of Tycho has a grey area in Rik's image. However in terms of Colongitude, Rik's image was slightly earlier in the morning on the Moon, so if scattered light from the sunlit rim of Tycho was an explanation, then clearly in Rik's image there is not enough of this yet to light up the floor. Though in a general sense shadows to the west of Tycho are a lot darker than those inside the crater. The time given for Camilo image (Fig 9 – Right) is during the repeat illumination window, but although of lower resolution than Rik's image, again shows no obvious sign of greyness inside the shadow. We shall therefore leave Gerald's report from 1996 at a weight of 1.

Eratosthenes: On 2017 Oct 29 UT 02:00 Walter Elias (AEA) imaged thus crater under similar illumination, to within ±0.5° to the following observation, by Planetary Geologist, Peter Cattermole:

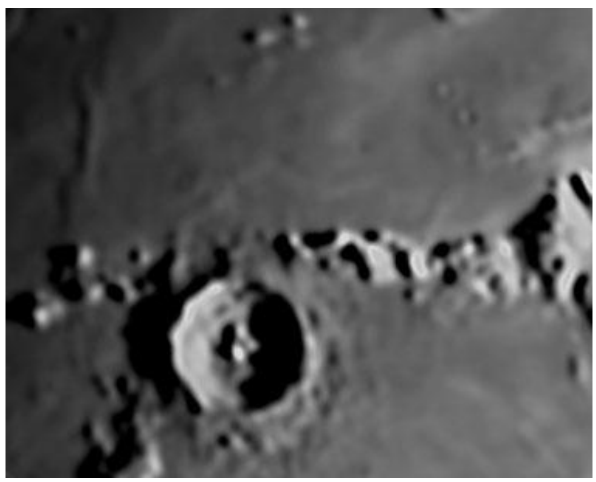

Figure 10. A monochrome image of Eratosthenes taken by Walter Elias on 2017 Oct 29 UT 02:00, orientated with north towards the top,

Eratosthenes 1954 May 11 UT 20:00 Observer: Cattermole (UK, 3" refractor) "Central peak invis. tho surroundings were sharp". NASA catalog ID #563, NASA weight=4. ALPO/BAA weight=2.

Walter's image (Fig 10) clearly shows the central peak area, so one must presume that Peter's observation was either of an obscuration of detail, as occasionally some LTP reports exhibit, else the 20:00 UT written down in 1954 was incorrect? Anyway we shall leave this weight at 2 for now.

Campuanus: On 2017 Oct 30 UT 21:05 Luigi Zanatta (UAI) imaged this crater, as part of our Lunar Schedule predictions page, in order to see how early one can pick up the blueness in Censorinus crater.

Campanus 2014 Jan 11 UT 22:00-22:30 S.Bush (UK, 6" SCT, x180, seeing average) made a sketch of the Campanus and Mercator craters. He found that the central peak of Campanus difficult to resolve and the floors of both craters were devoid of detail. Mercator was the lighter shade of the two floors. Earlier at 19:47 UT M.Brown (Huntingdon, UK) imaged this region and using Registax resolved details on the floors of both craters, though Mercator clearly was slightly lighter in floor shade and had less detail on its floor than Campanus. The most likely explanation was that it was just seeing effects blocking the visibility of detail - this of course is less of a problem for a Registax usid on the CCD image. However just to be sure this observation is being given an ALPO/BAA TLP weight of 1, to encourage visual observers to attempt this observation under similar illumination and seeing.

Luigi's image more resembles Mike Brown's image in that both show the central peak well and the normal lack of detail on the floor of Mercator. Steve's sketch appears to show less shadow on the western side of the crater, so as an alternative explanation, it may be that the explanation for Steve's barely visible central peak. We shall keep the weight at 1 and keep on looking until this gets resolved.

Figure 11. Campuanus and Mercator orientated with north towards the top. **(Left)** An image by Luigi Zanatta (UAI) taken on 2017 Oct 30 UT 21:05. **(Center)** A sketch by Steve Bush (SPA) made on 2014 Jan 11 UT 22:00-22:30. **(Right)** An image by Mike Brown (BAA) made on 2014 Jan 11 UT 21:14.

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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2. **Alpine Valle**
3. **Aristarchus**
4. **Burnham**
5. **Campuanus**
6. **Cassini**
7. **Censorinus**
8. **Copernicus**
9. **Eratosthenes**
10. **Gassendi**
11. **Gutenberg**
12. **Hell**
13. **Kepler**
14. **Langrenus**
15. **Madler**
16. **Mare Crisium**
17. **Menelaus**
18. **Petavius**
19. **Proclus**
20. **Ptloemaeus**
21. **Pythagoras**
22. **Tycho**