



# THE LUNAR OBSERVER

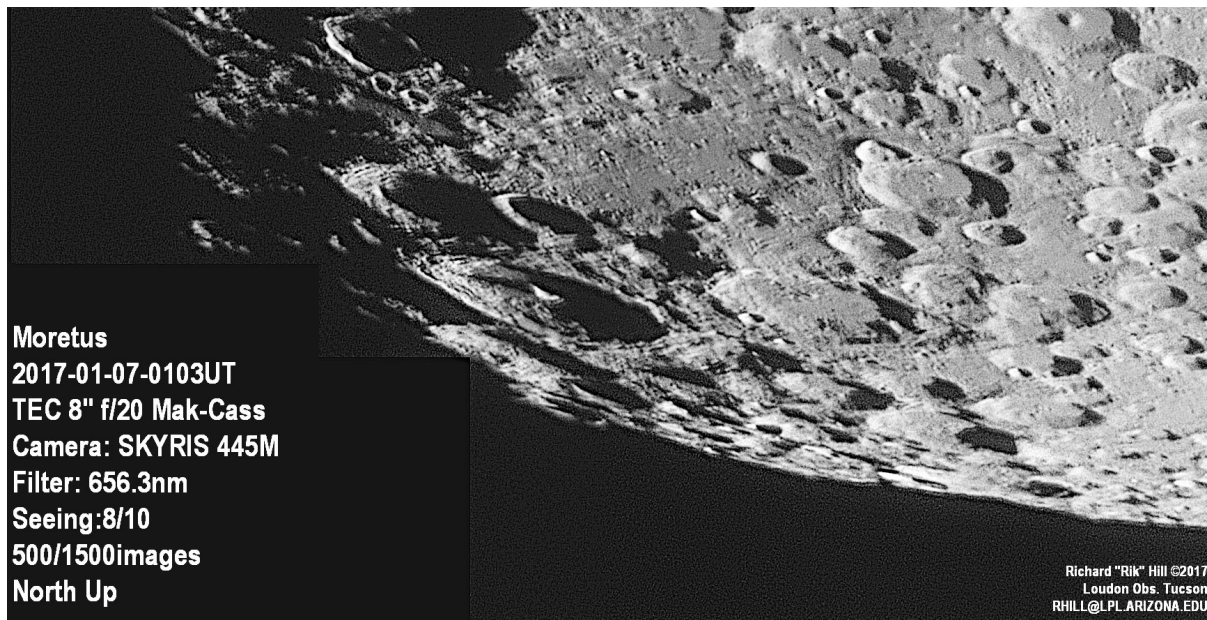
A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.

EDITED BY: Wayne Bailey [wayne.bailey@alpo-astronomy.org](mailto:wayne.bailey@alpo-astronomy.org)

17 Autumn Lane, Sewell, NJ 08080

RECENT BACK ISSUES: [http://moon.scopesandscapes.com/tlo\\_back.html](http://moon.scopesandscapes.com/tlo_back.html)

## FEATURE OF THE MONTH – FEBRUARY 2017 MORETUS



Moretus  
2017-01-07-0103UT  
TEC 8" f/20 Mak-Cass  
Camera: SKYRIS 445M  
Filter: 656.3nm  
Seeing: 8/10  
500/1500images  
North Up

Richard "Rik" Hill ©2017  
Loudon Obs. Tucson  
RHILL@LPL.ARIZONA.EDU

It was a rather unfavorable libration that made for this dramatic presentation of the 117km diameter crater Moretus with the shadow of the central peak crossing its floor. Above Moretus you can see the shadow filled Gruemberger (97km) with Cysatis (51km) on its right wall. Note the terracing detail in the walls of these craters. Directly right of Moretus is Curtius (99km) and beyond that is Pentland (58km). Above Curtius is Zach (73km) and on the upper edge of the image is Lilius (64km) with it's conical central peak. Below Moretus is the crater Short (51km) looking square in this image due to the lighting. To the right of that is Simpelius (71km) about the same distance from the limb. The whole region is peppered with secondary cratering and gashes from some of the large impacts to the north.

# **LUNAR CALENDAR**

## **FEBRUARY-MARCH 2017 (UT)**

2017		UT	EVENT
Feb	01	01:09	Moon-Mars: 2.4° N
	04	04:19	First Quarter
	05	21:14	Moon-Aldebaran: 0.2° S
	06	13:59	Moon Perigee: 368800 km
	07	18:34	Moon Extreme North Dec.: 18.9° N
	11	00:33	Full Moon
	11	00:45	Pen. Lunar Eclipse
	11	14:04	Moon-Regulus: 0.8° N
	15	14:55	Moon-Jupiter: 2.9° S
	18	19:33	Last Quarter
	18	21:14	Moon Apogee: 404400 km
	20	23:44	Moon-Saturn: 3.9° S
	21	20:50	Moon Extreme South Dec.: 18.8° S
	26	14:58	New Moon
Mar	01	18:58	Moon-Mars: 4.4° N
	03	07:24	Moon Perigee: 369100 km
	05	02:38	Moon-Aldebaran: 0.2° S
	05	11:32	First Quarter
	07	00:43	Moon Extreme North Dec.: 18.9° N
	10	22:20	Moon-Regulus: 0.9° N
	12	14:54	Full Moon
	14	20:04	Moon-Jupiter: 2.7° S
	18	17:25	Moon Apogee: 404700 km
	20	10:49	Moon-Saturn: 3.8° S
	20	15:58	Last Quarter
	21	05:22	Moon Extreme South Dec.: 18.9° S
	28	02:57	New Moon
	30	12:39	Moon Perigee: 363900 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.

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### **ERRATUM**

Feature of the Month - January 2017

The subject of the January 2017 Feature of the month was incorrect in the article title. The correct feature was Beer & Feuillée. The online version of the TLO has been corrected. Only the title on the first page and location map on the last page of the issue are effected. The text, image and image caption are unchanged.

## 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](mailto:wayne.bailey@alpo-astronomy.org)

and Jerry Hubbell – [jerry.hubbell@alpo-astronomy.org](mailto: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: Rupes Recta (the Straight Wall)

*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 **March 2017** edition will be **Rupes Recta (the Straight Wall)**.

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 this to your observing list and send your favorites to (both):

**Jerry Hubbell** – [jerry.hubbell@alpo-astronomy.org](mailto:jerry.hubbell@alpo-astronomy.org)

**Wayne Bailey** - [wayne.bailey@alpo-astronomy.org](mailto:wayne.bailey@alpo-astronomy.org)

**Deadline for inclusion in the Rupes Recta (the Straight Wall) article is February 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**

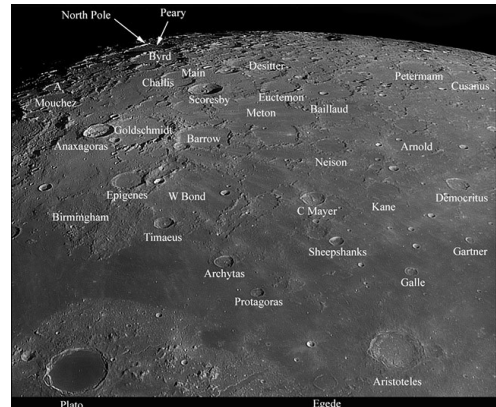


# PEARY TO ARISTOTELES

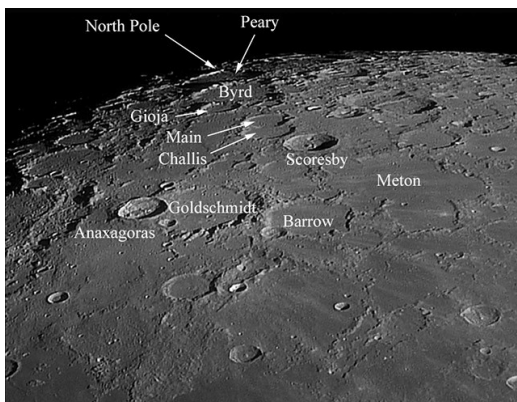
Howard Eskildsen

The right portion of fig. 1 is one of the most neglected areas of the Moon. Its scattered craters lay across a bland terrain of difficult to distinguish features. Does anybody ever think about any of those craters? In contrast the left upper portion of the image is much more distinct.

**FIGURE 1 - Northern Moon** - Howard Eskildsen, Ocala, Florida, USA. January 9,, 2017 00:24 UT. Seeing 7/10, Transparency 6/6. 6" Refractor, f/8,. 1.5x barlow, W8 yellow filter, DMK 41AU02.AS.



The digitally enlarged portion (fig. 2) shows craters that form steps to the north pole of the moon. Scoresby is the first step and lies north of a line between the fresh, rayed crater Anaxagoras and the odd Meton, which resembles a cluster of elephant footprints. Above it Challis and Main lead to Byrd with its cohort, Gioja. Above Bird, the north pole resides on the rim of Peary. It is a distinctive pattern that leads to the pole and can be used under many illuminations.



**FIGURE 2 - Enlargedd section of fig. 1.**

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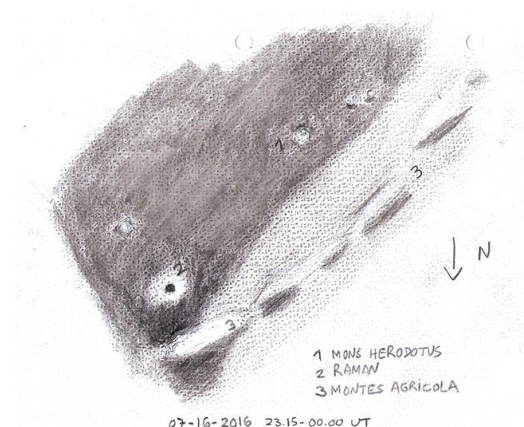
# MONTES AGRICOLA

Alberto Anunziato

This sketch (fig. 1) tries to record the lighting conditions of the Montes Agricola on the twelfth day of lunation (illumination 90.8%, colongitude 58.6). The observation was made in the minutes prior to the observation of the adjacent Aristarchus crater under the same conditions of illumination of a past Lunar Transient Phenomenon report for the Lunar Geological Change Detection Program (ALPO-BAA).

**FIGURE 1- Montes Agricola**– Alberto Anunziato, Paraná, Argentina. July 16, 2016 23:15-23:45 UT. ETX-105 Mak-Cass, 154x.

Eclipsed by the neighboring Aristarchus Plateau, Montes Agricola is a little-known accident, which is not surprising with as many beauties in its vicinity as the magical Schröteri Vallis. The seeing of that night was particularly good (8/10) and allowed an astounding degree of detail for a small



telescope. The linear ridge of peaks appears extremely bright. The dark material of the western margin of the Aristarchus Plateau, formed by lava flows, is clearly distinguishable from the clearer and more ancient material that forms the Agricola Straits, made up of pyroclastic material.

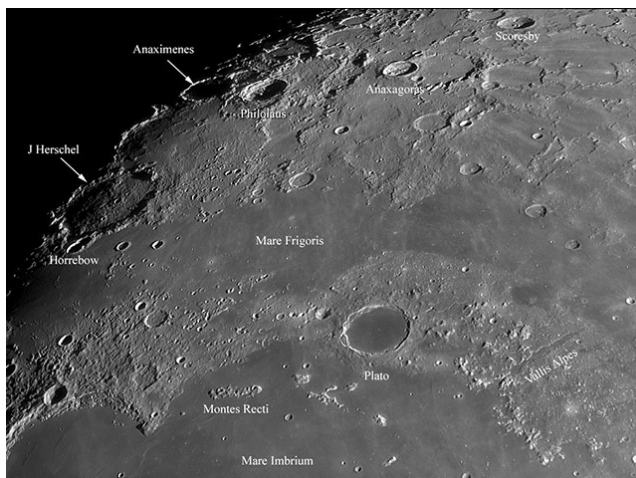
The low-angle sunlight illuminated the highest zones: the Montes Agricola itself, the height on which is the Raman crater (12 km in diameter), whose interior appeared very dark, Mons Herodotus and the two small unnamed hills at the east end of the area included in the sketch. The darkest shadows appear at the western end of the Aristarchus Plateau, from Raman to the westernmost peak of the Agricola Mountains, the shadows cast by the heights of the Aristarchus Plateau conceal us the Agricola Straits. The shadows are interrupted by the westernmost peak of the Montes Agricola, bright in the sunlight, and then resume to the north. In the rest of the mountainous sections located towards the east, the shadows are shorter, which supposes that these peaks are lower than the westernmost peak.

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## SCORESBY TO IMBRIUM

Howard Eskildsen

The violent nature of the creation of lunar features lays strewn across the field of view (fig. 1). The ground looks coarse, battered, and scarred. Scoresby lies above white streaks emanating from Anaxagoras. These rays diverge towards the right, crossing multiple ancient, distorted, and partly filled craters with broken walls. The changes and demolition were caused by impacts, including the massive impact that created the basin containing Mare Imbrium around 3.85 billion years ago. The most battered crater remnants were present prior to Imbrium and were devastated by the great impact. The



fresher craters obviously formed later. The youngest craters with still-visible rays are likely less than a billion years old.

### **FIGURE 1 - Scoresby to Mare Imbrium -**

*Howard Eskildsen, Ocala, Florida, USA.*

*January 9,, 2017 00:21 UT. Seeing 7/10, Transparency 6/6. 6" Refractor, f/8,. 1.5x barlow, W8 yellow filter, DMK 41AU02.AS.*

J Herschel and Anaximenes are examples of craters battered by the Imbrium impact and there is the slightest hint of buried craters between them, hidden underneath the solidified slurry from that colossal impact. Horrebow, Philolaus, Anaxagoras,

and Scoresby obviously formed later and bear far fewer scars.

Mare Frigoris arcs completely across the center of the image and is crossed by multiple faint rays from who-knows-where. Its floor is mostly flat basalt that flooded part of the Imbrium ejecta and has much less cratering than the northern regions. Obviously there have been far fewer impacts on the Moon since the basalt solidified.

Plato pocked part of the Imbrium rim and later filled with lava from deep faults in a similar manner to the maria above and below it. The Alpine Valley lies radial to the Imbrium basin, likely a remnant crack from the impact; the only one of many fissures that is visible on the surface. Finally, the straight mountains, Montes Recti arise from the flat Imbrium floor, part of rim fragments from the ancient impact. What a wild and tumultuous region this was so many eons ago.

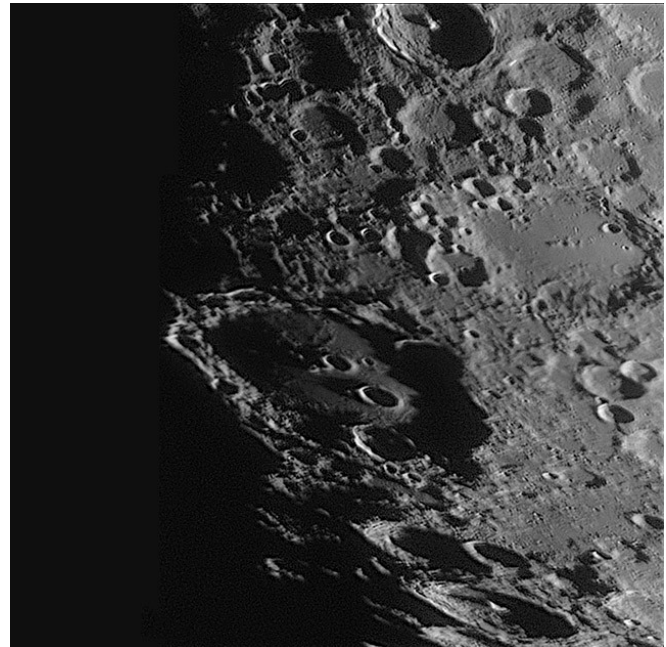
# CLAVIUS SUNRISE

Richard Hill

One of the lunar craters that changes its appearance the most as the lighting conditions change, is the great 231km diameter Clavius. This monstrous "walled plain" (fig. 1) has sizable craters on its rim and floor that cause dramatic changes in shadows as the sun rises and sets over its walls. Here you can see Rutherford (56km diameter) on the southern wall, Porter (54km) on the northern wall and the arc of smaller craters on the floor ranging from Clavius D (28km) to Clavius J (12km) lost in shadow in this image.

**FIGURE 1** - *Clavius* - Richard Hill – Tucson, Arizona, USA January 7, 2017 00:59 UT. Seeing 8/10. 8" Mak-Cass, f/20, SKYRIS 445M, 653.6nm filter.

At the top of this image you can see most of Tycho (88km) and at bottom Moretus (117km) with Gruemberger (97km) mostly in shadow above it and Cysatus (51km) to the right. To the upper right of Clavius is the large older crater Maginus (168km) possibly as old as 4.5 billion years, compared to Tycho's less than 1 billion year age and Clavius' 3.9 billion years. Notice how tiny craterlets are visible all around Tycho and Moretus but to the right of Clavius, just below Maginus, everything seems smoother and soft. This is a layer of ejecta from Clavius that was thrown out from the tremendous Clavius impact.

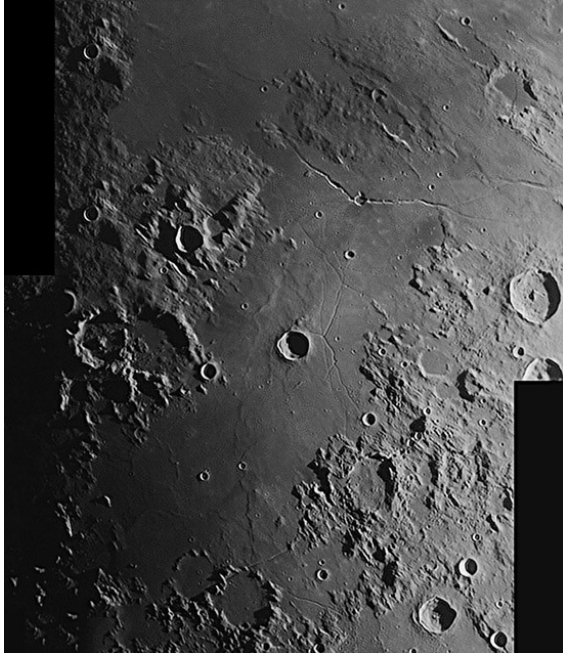


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# SINUS MEDII REVISITED

Richard Hill

When the colongitude is just a few degrees past zero this remarkable region is on the terminator. Sinus Medii dominates the lower half of this two image montage (fig. 1) while the upper half features the spectacular Triesnecker (27km dia.) and it's rimae in the center and Hyginus (10km dia) and it's rima above. My interest in these two, especially Hyginus, dates back to the early 1960s when I first observed them after reading the end of Chapter 7 in Patrick Moore's "A Survey of the Moon". That book was very inspirational to a young lunar tyro!



**FIGURE 1** - *Sinus Medii* - Richard Hill – Tucson, Arizona, USA June 13, 2016 02:36 UT. Seeing 8/10. 8" Mak-Cass, f/20, SKYRIS 445M, 653.6nm filter.

At the very top is the non-round crater Boscovich (roughly 48km diameter) with a thin dark rima running north-south across its floor. I like the elongated feature to the upper left of Boscovich, probably the result of 3 or 4 merged craters, and a parallel similar feature about halfway back to Hyginus. I will not discuss the rimae and their formation except to say that to the right of Triesnecker, in the foot hills of the mountains is a very thin rille that is barely seen in this image. According to LROC QuickMap this has a width of only 0.8km! It is much easier to record a thin rille or rima than a crater of like size and this stands as proof since I could not identify a 1km crater on this image taken near apogee.

Two craters that always catch my eye when they are anywhere near the terminator are left of Triesnecker. They are Murchison (60 km) and adjacent but farther into the terminator is Pallas (51 km). They are very identifiable and have some attractive details contained in their walls. Below Murchison are two isolated craters in the middle of Sinus Medii. The right one is Blaag (5 km) and Bruce (7 km) on the left

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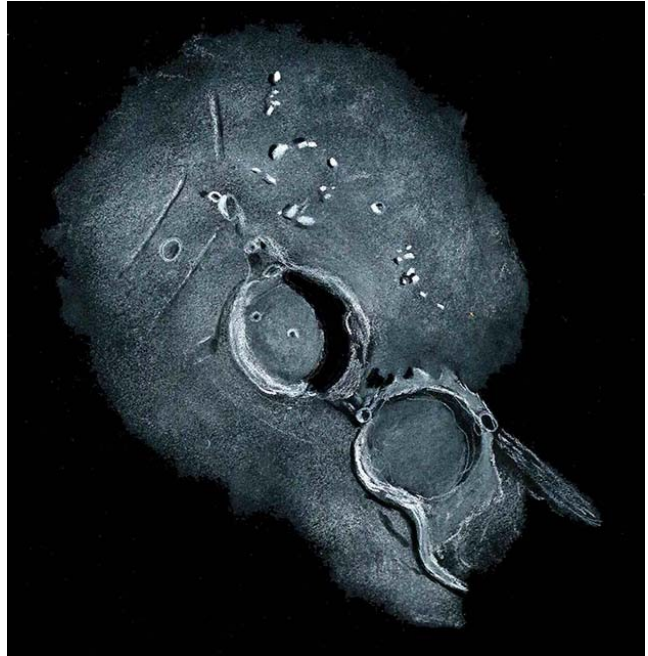


# MERCATOR AND CAMPANUS

David Teske

The craters Mercator and Campanus are similar prominent craters at the edge of Palus Epidemiarum and Mare Nubium. The drawing of these two craters (fig. 1) was made on the evening of 09 December 2016 between 5:50 PM and 7:26 PM CST (colongitude 39.5° to 40.4°) using a 140 mm Maksutov Cassegrain telescope with an 8 mm Baader Hyperion eyepiece for 250 x. The skies were clear and seeing was very good, 8/10 (10 being perfect). North is up; east is to the right, so this is correct orientation as seen with the unaided eye.

**FIGURE 1– Mercator & Campanus–** David Teske, Starkville, Mississippi USA. December 9, 2016 11:50-01:26 UT. 140 mm Mak-Cass, 250x. Colongitude 39.5°-40.4°. Seeing 8/10.



Campanus is the more northerly of the two large craters depicted. With a diameter of 48 km, it was a round, flat-floored crater. The western wall was well terraced and lit up in morning sunlight. Rather than a normal central peak, there was a semi-circular central hill that was actually two central peaks. It was almost like a crater rim. On the floor to the northwest of this central peak was a small crater, Campanus Y with a diameter of 4.4 km. Campanus is of the early Imbrium Period, 3.85 to 3.75 billion years old. It was formed on a sector of ejecta from the Nubium basin's southwest rim and just touches ejecta that were from the Humorum basin's southeast ring, which is now missing due to subsidence. The rim of Campanus is relatively sharp, and its terraces are well worn. A small part of its southern wall appears lower and more eroded than the rest of the wall. Its floor with a depth of 1.5 to 2 km is slightly darker than the surrounding mare lavas. Since the walls of Campanus are unbroken, magma from the lunar mantle must have risen up through fractures under the crater to erupt onto its floor.

The northern glaxis of Campanus extended further than the rest of the walls of this crater. Near its northern terminus was the shallow small crater Campanus K with a diameter of 4.8 km. North of this is a fresher crater, Campanus A with a diameter of 11.1 km. A small attached crater to Campanus A extended to the northwest. West of Campanus A was a larger but much shallower depression. North and east of Campanus A were three rilles associated with Rimae Hippalus. To the east of Campanus A and Campanus were three clusters of small mountain peaks. The central of these clusters of mountain peaks was rather round though it did not look like it was related to a crater. A small crater was southeast of these peaks.

Mercator was the flat-floored crater with a diameter of 47 km to the south of Campanus. Its floor was more flooded and smooth than that of Campanus. Its western wall was brightly lit up by sunlight. The wall was nicely terraced and continued to the south with a curve. Mercator is a bit older than Campanus, of Nectarian Age, 3.92 to 3.85 billion years old. Mercator's wall is a bit more worn than that of Campanus. Both craters have internal flooding. Mercator's darker floor level is 1 km above that of Campanus's. This difference explains why Mercator does not have a central peak, it is buried.

The walls of Mercator have a polygonal shape with steep walls of irregular height. At least four craters are embedded in its walls, including Mercator B with a diameter of 7.7 km.

The area between Campanus and Mercator was rough and complicated. Mercator C with a diameter of 7.7 km was in this area. The northeastern glaxis of Mercator had three promontory that displayed shadows. The southern wall of Mercator had a broad glaxis, much more so than the rest of the crater. From outside the south wall ran a high mountain arm, rising 1.8 km. A hill extended southeast from Mercator. This hill was Rupes Mercator, the Mercator Scarp, a line of hills that run southeast from the eastern wall of Campanus and Mercator for a distance of 150 to 180 km. The scarp is a remnant part of the western rim of the Nubium basin. This marks the inner edge of one of the Nubium Basin's original mountain rings.

Campanus was named after Gioanni Campano, a 13<sup>th</sup> century Italian theologian, astronomer, and astrologer. Mercator was named after Gerald de Kremer Mercator, who lived from 1512 to 1594. He was a Belgian cartographer.

## **References**

- Grego, Peter. 2005. The Moon and How to Observe It. Springer-Verlag, London.
- Moore, John. 2014. Craters of the Near Side Moon. CreateSpace Independent Publishing Platform.
- Moore, Patrick. 2001. On the Moon. Cassell & Co. London.
- Rükl, Antonin. 1990. Atlas of the Moon, ed. Dr. T. W. Rackham, Kalmbach Publishing Co. Waukesha.
- Shirao, Motomaro & Wood, Charles A. 2011. The Kaguya Lunar Atlas. Springer. New York.
- Wilkinson, John. 2010. The Moon in Close-Up. Springer-Verlag, Berlin.

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# LUNAR TOPOGRAPHICAL STUDIES

Coordinator – Wayne Bailey - [wayne.bailey@alpo-astronomy.org](mailto:wayne.bailey@alpo-astronomy.org)

Assistant Coordinator – William Dembowski - [dembowski@zone-vx.com](mailto:dembowski@zone-vx.com)

Assistant Coordinator – Jerry Hubbell – [jerry.hubbell@alpo-astronomy.org](mailto:jerry.hubbell@alpo-astronomy.org)

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

## OBSERVATIONS RECEIVED

ALBERTO ANUNZIATO—PARANÁ,, ARGENTINA. Drawing of Agricola.

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 7 day moon, Albategnius, Autolycus, Cassini, Heraclitus, Hipparchus, Janssen, Lacus Mortis, Manilius, Mare Tranquillitatis, Plinius, Posidonius, Proclus, Stöffler, Theophilus, Triesnecker, Vallis Alpes, W. Bond & Werner.

JOHN DUCHEK – St. LOUIS, MISSOURI, USA. Digital image of Straight Wall.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of Aristoteles-Peary, Arnold-Grove, Meton-Lacus Mortis, Montes Taurus, Pitatus & Scoresby.

DESIRÉE GODOY - ORO VERDE, ARGENTINA. Digital images of Anaxagorus(2) & Plato(6).

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Bullialdus, Clavius, Hyginus, Moretus & Rupes Recta(4).

DAVID TESKE - STARKVILLE, MISSISSIPPI, USA. Drawing of Mercator..

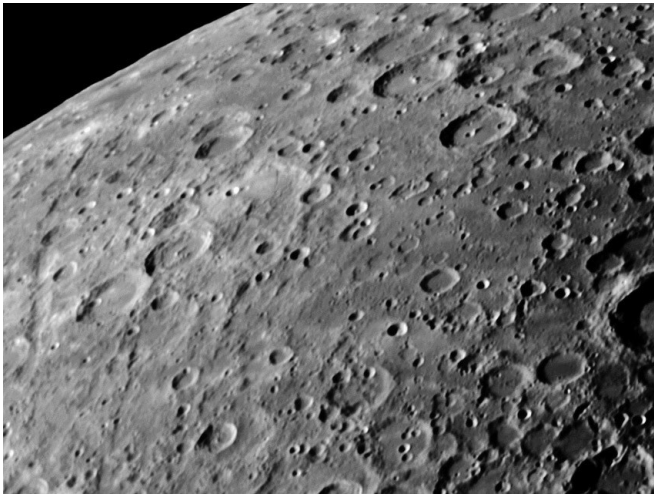
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## RECENT TOPOGRAPHICAL OBSERVATIONS

**HERACLITUS** - Maurice Collins,- Palmerston North, New Zealand. January 5, 2017 09:18 UT. FLT-110, f/21.



## RECENT TOPOGRAPHICAL OBSERVATIONS



**JANSSEN** - Maurice Collins,- Palmerston North, New Zealand. January 5, 2017 09:17 UT. FLT-110, f/21.

**PLINIUS** - Maurice Collins,- Palmerston North, New Zealand. January 5, 2017 09:29 UT. FLT-110, f/21.

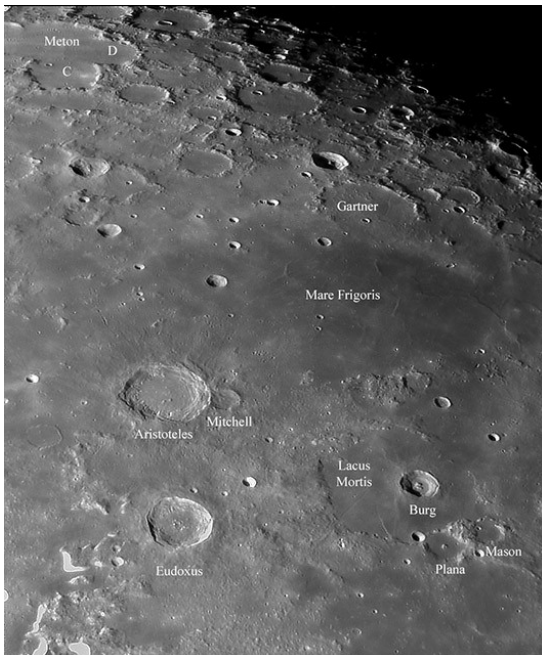


**STÖFFLER** - Maurice Collins,- Palmerston North, New Zealand. January 5, 2017 09:19 UT. FLT-110, f/21.



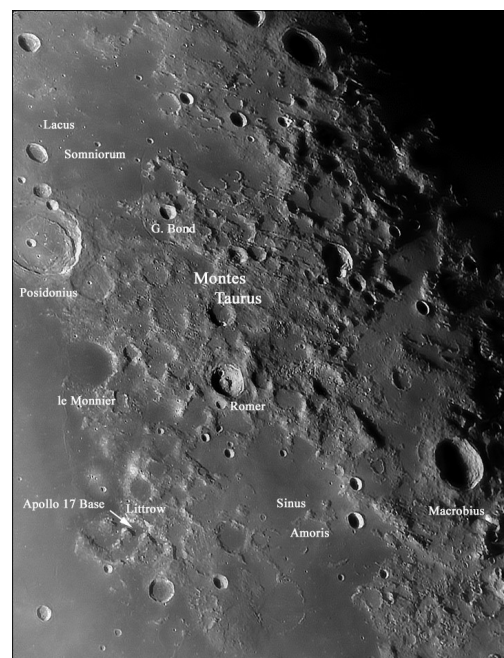
# RECENT TOPOGRAPHICAL OBSERVATIONS

**W. BOND** - Maurice Collins,- Palmerston North, New Zealand. January 5, 2017 09:42 UT. FLT-110, f/21.



**METON-LACUS MORTIS** - Howard Eskildsen, Ocala, Florida, USA. December 17, 2016 11:11 UT. Seeing 8/10, Transparency 4/6. 6" Refractor, f/8,. 2x barlow, W8 yellow filter, DMK 41AU02.AS.

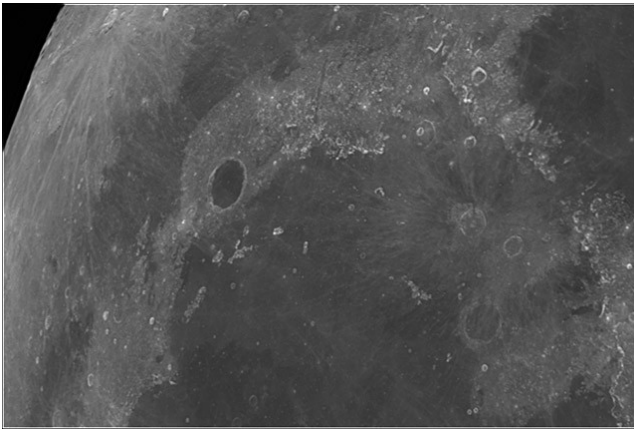
**MONTES TAURUS** - Howard Eskildsen, Ocala, Florida, USA. December 17, 2016 11:14 UT. Seeing 8/10, Transparency 4/6. 6" Refractor, f/8,. 2x barlow, W8 yellow filter, DMK 41AU02.AS.





# RECENT TOPOGRAPHICAL OBSERVATIONS

**ANAXAGORAS** - Desireé Godoy -Oro Verde, Argentina. January 13, 2017 03:25 UT. 8" Meade Starfinder Refl., QHY5-II.



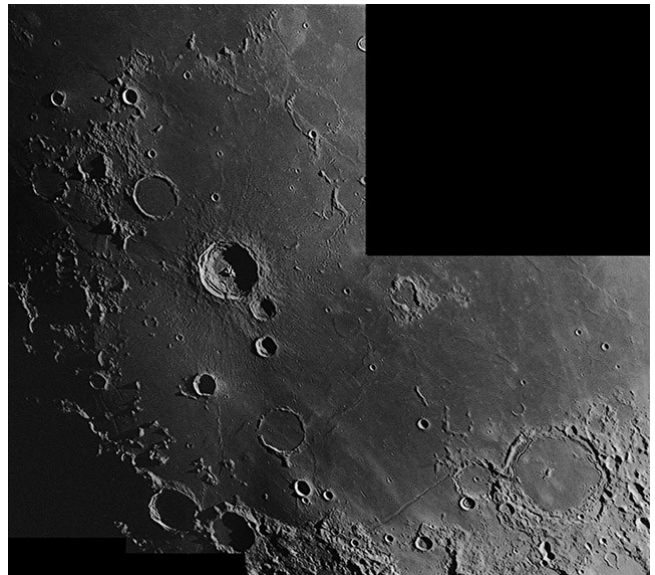
**PLATO** - Desireé Godoy -Oro Verde, Argentina. January 13, 2017 03:02 UT. 8" Meade Starfinder Refl., QHY5-II.

**BULLIALDUS** – Richard Hill – Tucson, Arizona, USA June 15, 2016 02:28 UT. Seeing 8/10. 8" Mak-Cass, f20, SKYRIS 445M.

The large relatively fresh crater near the center of this image is Bullialdus (63km across), possibly as recent as 1 billion years old. It has a distinctive triangle of craters below with the leftmost being Konig (24km). Below this triangle is a ghost crater, Kies (46km), older than 3 billion years. Notice that on the opposite side of Bullialdus is another so-called ghost, Lubiniezky (also 46km) almost a billion years older than Kies.

To the lower left of Kies are two craters, still in shadow, on the bottom edge of this image. The lower one is Mercator (49km) and above it is Campanus (also 49km) both of these are the same age, just shy of 4 billion years. From these go to the right edge of this image and we see the largest crater in this region, Pitatus (100km). There are some great rimae visible on the floor of this 'ringed plain', as they used to be called. Adjacent to the left is another smaller such plain with what appears to be a central crater. This is Hesiodus (44km) with the odd-ball double walled Hesiodus A (15km) just below it. A little further on is the beautiful Rima Hesiodus, which appears to be a graben similar to, but smaller than the Rima Ariadaeus.

Lastly is one of my favorite lunar features, Wolf. It is the pear-shaped crater to the right of Bullialdus. Its diameter is listed as 26km but it is a larger feature than that with the unusual ejecta blanket surrounding. It has been through a lot of reworking in its 4 billion years of existence. In different lighting conditions it appears very different and bears watching throughout a lunation.



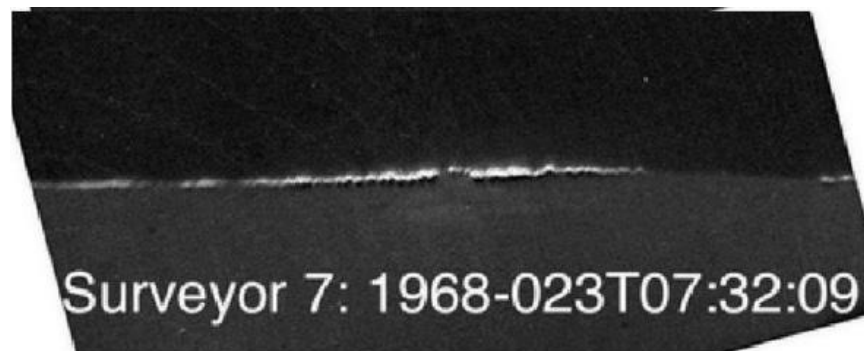
# **LUNAR GEOLOGICAL CHANGE**

## **DETECTION PROGRAM**

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Observations for December were received from the following observers: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Gassendi, Plato and Ross D. Alberto Anunziato (Argentina – AEA) observed: Agrippa, Alphonsus, Aristarchus, Copernicus, Gassendi, Littrow, Picard, Plato, Rupes Recta, Schiller, Sinus Iridum, and Theophilus. Francisco Cardinalli (Argentina - AEA) imaged Alphonsus, Aristarchus, Bullialdus, Copernicus, earthshine, Eratosthenes, Herodotus, Proclus, and Pytheas. Francesca and Maurizio Cecchini (Italy - UAI) imaged several features. Maurice Collins (New Zealand – ALPO) imaged the Moon and several features. Anthony Cook (Aberystwyth University & Newtown, UK – ALPO/BAA) videoed earthshine. Marie Cook (BAA – Mundesley, UK) was unable to observe due to a fall, but is back in operation during January. Desiré Godoy (Argentina – AEA) imaged Alphonsus, Atlas, Gassendi, Promontorium Agarum, and several other features. Howard Eskildsen (Ocala, FL, USA - ALPO) imaged several features. Jean Marc Lechopier (France – UAI) imaged Cichus. Franco Taccogna (Italy – UAI) imaged Aristarchus, Cichus, earthshine, the Moon, and several features. Aldo Tonon (Italy – UAI) observed imaged and several features.



**Figure 1.** A Surveyor 7 [image](#) of horizon glow, as imaged from a landing site on the outer slopes of Tycho's rim.

**News:** The only news I have this month is that there has been an interesting [paper](#), describing a laboratory simulation of lunar dust particle levitation. This explains neatly what was observed during the robotic Surveyor VII mission on the slopes of Tycho in 1968. On that occasion a thin band was seen just above the horizon, as late as 90 minutes after local sunset. This horizon glow effect was also detected by the Russians using photometers on the lunar surface during their later Lunokhod missions too. The paper describes laboratory experiments in a vacuum chamber with lunar stimulant dust. Unlike previous studies, which had assumed uniform charge distribution on particles and the cavities in the lunar top soil, this study shows that extreme negative charging could occur in “patches” under the influence of solar UV or space plasma, and would result in the repelling of negatively charged dust particles to a height of a few tens of cm above the lunar surface. This would be enough to create the horizon banding effect (due to forward scattering of sunlight, from below the horizon), shown in Fig 1. The new “patch charge” model could lift particles from anywhere from < 1 micron, to several microns in size, somewhat larger than previous models had assumed. The paper also describes how conglomerates of charged dust particles can form and be levitated too. Note that this does not explain the higher altitude horizon glow seen by Apollo 17 from orbit – though recent LADEE results suggest that there should not be enough dust at 100 km altitude to explain that specific Apollo glow effect.

**LTP Reports:** No LTP report were received during December.

**Routine Reports:** Below is a selection of reports received for December that can help us to reassess unusual past lunar observations.

**Boussingault:** On 2016 Dec 03 UT 06:54, Maurice Collins, imaged the Moon within 35 minutes of the start of a repeat illumination/topocentric libration prediction slot, to within  $\pm 1^\circ$ , to the following report:

*Boussingault 1860 Apr 24 UT 20:00? Observed by Schmidt (Athens, Greece, 7" refractor)  
"Noted weak glows on the crater he tho't prob. due to wall reflections on floor" NASA  
catalog weight=0. NASA catalog ID #132. ALPO/BAA weight=1.*

Although Maurice was using a Canon 55-250mm telephoto lens to take this shot, at least we have some sort of view as to what Schmidt would have seen from Athens back in 1860 - repeat illumination/topocentric libration views do not recur too often! Bousingault is a little above the southern tip of the crescent (See Fig 2) I will leave the ALPO/BAA weight at 1 for now.

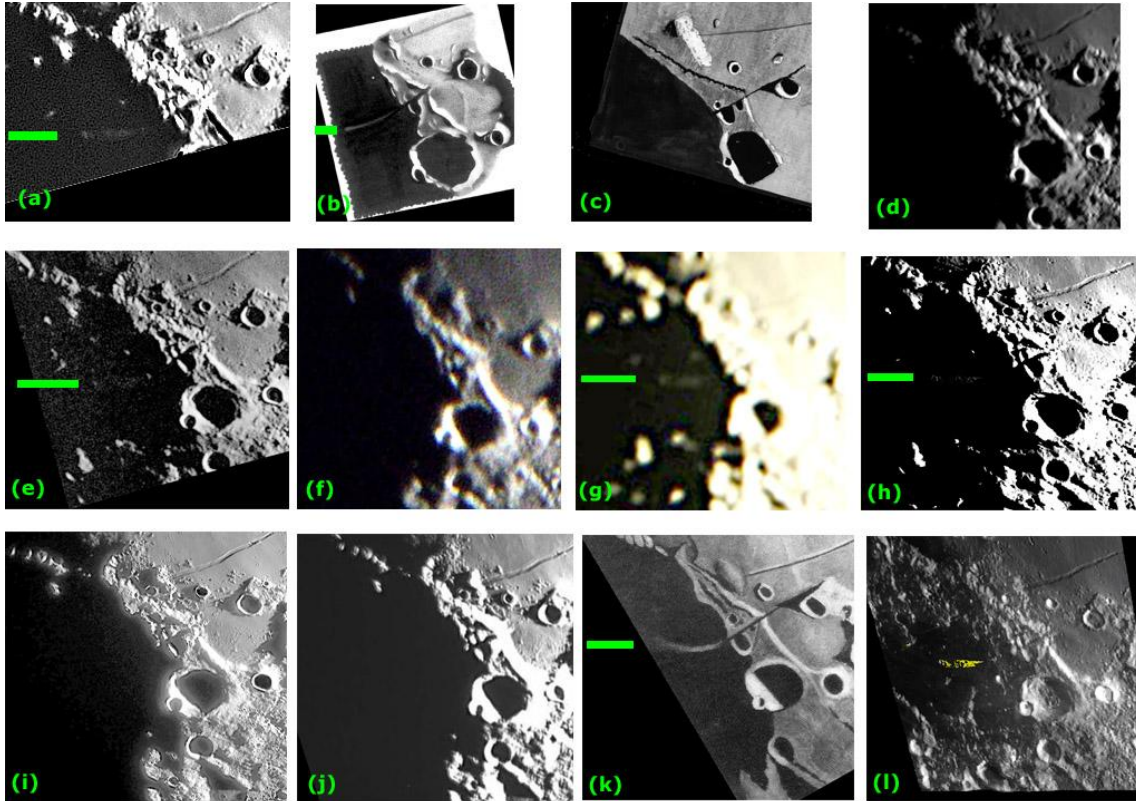


**Figure 2.** The southern part of the Moon, clipped from an image by Maurice Collins taken on 2016 Dec 03 UT 06:54, using a Canon 55-250mm telephoto lens. The image is orientated with north towards the top.

**Cichus:** On 2016 Dec 08 UT 16:58-20:30 UAI observers, Francesca and Maurizio Cecchini, Jean Marc Lechopier, Franco Taccogna, and Aldo Tonon all attempted to observe a curved thread of light extending beyond the terminator between the craters Cichus and Weiss. Although thought probably to be just an illumination effect, it had been seen by Thomas Elger in 1888 (See Fig 3k), and highlighted by Nigel Longshaw's 2015 June BAA Journal article "*A Seldom Reported Lighting Phenomenon in the Cichus-Weiss Region of the Moon*" (p154-157). I have been curious about this as there are sometimes LTP with similar description, so it seemed appropriate to investigate, just to confirm that it was an illumination effect? According to Nigel's paper, observers were supposed to be able to see the effect in the area between Selenographic Colongitudes of  $23.0^\circ$ - $24.0^\circ$ . The UAI observers spanned a colongitude range from  $23.33^\circ$  to  $24.1^\circ$ , but despite their very best efforts and observing skills, their images (Fig 3d, i, and j) failed to detect the thread of light beyond the terminator? I therefore conducted a search through the nearly 22 thousand observational records held in the ALPO/BAA database to see if I could find any similar illumination images/sketches, and shed some sort of explanation as to why sometimes it could be seen and sometimes not? More than 40 observations were found, however some had to be rejected because the resolution was too low, and we are left with what we can see in Fig 3.

An ALVIS simulation (Fig 3h), shows that the "thread of light" effect is clearly just an illumination effect from a thin sliver of the Sun illuminating the floor of the Palus Epidemiarum as its position agrees with the location in the observational sightings. What is interesting is the range of colongitudes it is either visible, or invisible over. Assuming the cameras and equipment that the UAI

observers used were sensitive enough, then some of these colongitudes of the non-sightings (blue dots in Fig 4) overlap with the colongitudes of the occasions where it was sighted (red dots in Fig 4). The only explanation I can think of is that the UAI observers were observing during the lunar summer (high sub-solar latitude), where as when the thread was seen, it was lunar winter (low sub-solar latitude), and maybe the apparition occurs early or late depending upon the lunar seasons? We could of course use some visualization tools, however as these are very dependent upon a very precise knowledge of the topography, knowing which part of the  $0.5^\circ$  angular diameter solar disk is illuminating the lunar surface, and the effects of diffraction and light scattering, then getting a very accurate visualization may not be reliable. ALVIS currently does not take into account the diameter of the Sun, but assumes a point source of illumination. We clearly need more observers attempting to see if they can detect this thread of light effect in order to see if the seasonal illumination theory explains the diversity of first sightings of the thread in colongitude.

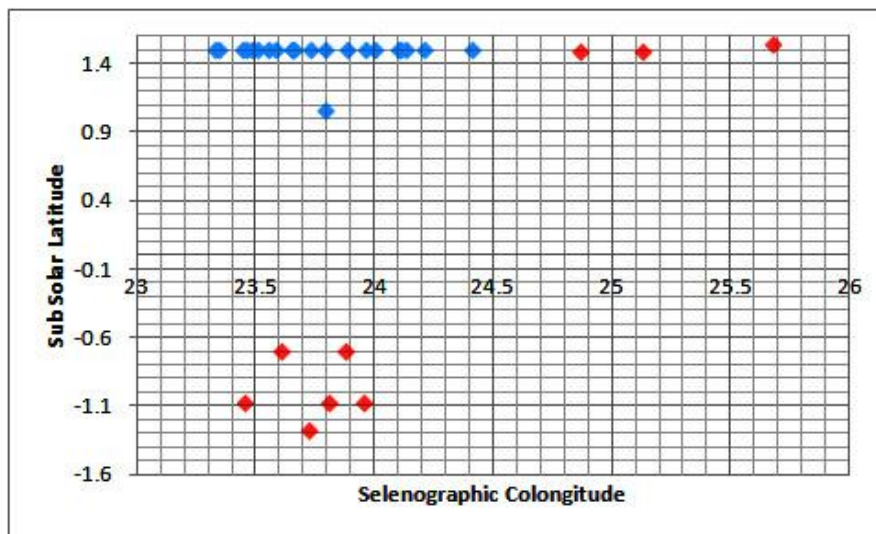


**Figure 3.** A variety of images/sketches/simulations of the region between Cichus and Weiss, orientated with north towards the top, and ordered by increasing illumination or Selenographic Colongitude. These have all been cut out from much larger, and more spectacular images supplied by the original observers concerned (with the exception of the simulations), and have also been excessively contrast stretched (when necessary) in order to bring out detail in the terminator area. The horizontal green ticks point to the “thread of light” effect, when it is present. (a) This image is from Nigel Longshaw’s Fig 4, and came originally from an image by posted on Chuck Wood’s [Lunar Photo of the Day](#) web site. It was taken by Jocelyn Sérot (France) on 2010 Nov 15 UT 20:59, Col. =  $23.45^\circ$ , Lat. $_{\odot}$  =  $-1.06^\circ$ . (b) A sketch made by Nigel Longshaw (BAA) on 2009 Jan 5 UT 19:20-20:00 – note that Nigel comments on seeing the thread of light form from 19:20-19:45 UT, or Col. =  $23.60^\circ$  to  $23.87^\circ$ , Lat. $_{\odot}$  =  $-0.68^\circ$ , after which it spreads out into a fan shape. (c) A sketch by Thomas Elger on 1883 Feb 16 UT 19:00-20:30, or spanning selenographic colongitudes of : Col. =  $23.65^\circ$  to  $24.41^\circ$ , Lat. $_{\odot}$  =  $+1.51^\circ$ . (d) An image by Aldo Tonon (UAI) taken on 2016 Dec 08 UT 17:37, Col. =  $23.66^\circ$ , Lat. $_{\odot}$  =  $+1.51^\circ$ . (e) An image by Rik Hill (ALPO/BAA) taken on 2016 Jul 14 UT 03:07, Col. =  $23.72^\circ$ , Lat. $_{\odot}$  =  $-1.27^\circ$ . (f) An image by Maurice Collins (ALPO) taken on 2010 Feb 23 UT 08:42. Col. =  $23.79^\circ$ , Lat. $_{\odot}$  =  $+1.07^\circ$ . (g) An image by Norman Izett (RASNZ) taken on 2006 Oct 31 sometime between 08:23-08:40 UT, Col. =  $23.80^\circ$  to  $23.94^\circ$ , Lat. $_{\odot}$  =  $-1.06^\circ$ . (h) Simulation using ALVIS for the end of Nigel Longshaw’s visual observation of a thread of light on 2010 Nov 15 UT 19:45, or Col. =  $23.87^\circ$ , Lat. $_{\odot}$  =  $-0.68^\circ$ . (i) An image by Francesca and Maurizio Cecchini (UAI) taken on



2016 Dec 8 UT 18:30. Col. = 24.10°, Lat.<sub>☉</sub> = +1.51°. **(j)** An image by Franco Taccogna (UAI) taken on 2016 Dec 8 UT 18:33. Col. = 24.13°, Lat.<sub>☉</sub> = +1.51°. **(k)** A sketch made by Thomas Elger on 1888 Oct 14 UT 20:00, Col. = 25.67°, Lat.<sub>☉</sub> = +1.55°. **(l)** A graphical overlay, on an ALVIS graphic, showing the location of the “thread of light” effect, highlighted in yellow.

Jean Marc Lechopier (UAI) made an entirely visually observation on 2016 Dec 8 UT 20:00-20:30UT, or Col. = 24.86° to 25.12°, Lat.<sub>☉</sub> = +1.50°, and commented : *that they thought they saw the "thread of light" immediately. It was visible on the bottom of Palus Epidemiarum, at the western foots of the topography that borders the eastern boundary of Epidemiarum. On the eastern side of these reliefs, one could see one ridge, one channel, that seemed to from a big landslide. Its size is about 35km long and 4/6 km wide. It seemed to unite Palus Epidemiarum and the Weiss crater. This ridge seemed to demolish the wall NW of Cichus J and was 30 km from the northern edge of Cichus. It seemed evident to slope to East. From the Virtual Moon Atlas its coordinates were: 20,50/-31,40 until -21,70/-31,96. It seemed equally evident that the ridge, at the moment of observation, was not where the passage of the Sun's rays pass. The "thread of light" at the moment of observation seemed to have an origin at about 20 km south of the same ridge and 15 km NW of Cichus; it was about 30 km long on dark basalts of Epidemiarum. Jean's first impression has been that it required a tight alignment of illuminated summits on the floor. At the start of observation the contrast with the bottom of Epidemiarum was suggestive, despite the conditions of observations being not particularly good. After about 15 minutes, with the sunrise on the lunar horizon, the surrounding zone become grey and the thread of light lost contrast and dissipates. Some little hills could be seen and the thread effect became less visible under greater illumination. Please note that this was translated by Antonio Mercatali (UAI Lunar Section Director) initially, and subsequently edited by myself – so there may have been some loss in translation!*



**Figure 4.** A plot of observations of the Cichus-Weiss region on a Sub Solar Latitude versus Selenographic Colongitude graph. Each grid cell corresponds to 0.1°. The blue points are non-sightings of the thread-like formation on the night side. The red dots are sightings.

**Agrippa:** On 2016 Dec 09 UT 03:51-03:54 Alberto Anunziato (AEA) imaged this crater under the same illumination conditions, to within  $\pm 0.5^\circ$ , to the following reports:

*Agrippa 1966 Aug 26 UTC 01:52-02:24 Observer: Bartlett (Baltimore, MD, USA, 5" reflector x437) "Shadow of C.p. was grayish, wall shad. was normal black, C.p. itself barely disting. from floor" S=5, T=3. NASA catalog weight=4 (high). NASA catalog ID #966. ALPO/BAA weight=1.*

I enclose a combination of three of the images that Alberto took (See Fig 5). The shadow of the central peak is about the same darkness of that of the wall shadow. Although this is at odds with the 1966 description, as the shadows are not very strong, and we are not given Bartlett's transparency or seeing conditions (these can affect the darkness of small shadows easily), I will leave the weight at 1.





**Figure 5.** Agrippa as imaged by Alberto Anunziato (AEA) on 2016 Dec 09 UT 03:51-03:54, orientated with north towards the top. A combination of three images provided, covering this time span.

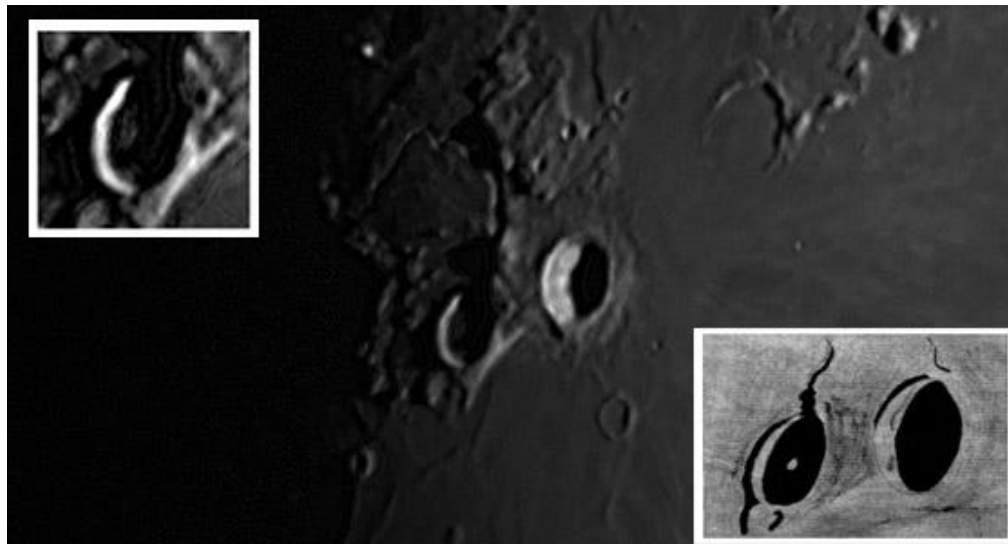
**Vallis Schröteri and Herodotus:** On 2016 Dec 11 UT 03:17 Francisco Cardinalli (AEA) observed these under the same illumination conditions, to within  $\pm 0.5^\circ$  to the following three reports:

*Herodotus 1950 Jun 27 UT 02:30 James C. Bartlett, Jr (Baltimore, MD, USA, 3.5" refractor, seeing=4, transparency=3) reported a bright point in crater. This is mentioned in the Middlehurst LTP catalog but not in the Cameron catalog. The source comes from a Strolling Astronomer article. ALPO/BAA weight=3.*

*Herodotus 1966 Jun 30 UT 03:10-03:35 Observed by James C. Bartlett, Jr (Baltimore, MD, USA) described in the NASA catalog as: "Bright pseudo-peak again vis. within floor shadow. Peak est. 5 bright. Had seen it at successive lunations in '66" 4" x280 refractor used. NASA catalog weight=4. NASA catalog LTP ID No. #950. ALPO/BAA weight=3.*

*Aristarchus 1992 Mar 16 at UT 00:39-01:14 D. Weier and D. Darling (Sun Prairie, WI, USA, 11" reflector) at 00:39UT noted some soft, diffused, faint illumination within the shadow projected over the Cobra Head area, though it had a sharp appearance to the edge of the shadow. D. Darling (Sun Prairie, WI, USA, 11" reflector) was taking photographs from UT 00:51 and making drawings and visual descriptions. The first 3 photographs in the sequence have the crater as normal. Four other photographs reveal an abnormality. Seeing conditions were excellent and a great deal of surface detail was seen inside Aristarchus crater - however the appearance of the Cobra's Head was "washed out" and again shadows near to this were illuminated. The NASA catalog ID=442 and the weight=5. The ALPO/BAA weight=3.*

Concerning the two past Herodotus reports, Francisco's image (Fig 6) shows the floor beginning to emerge into sunlight on the west and south west. Although there are some contour like effects near contrasty edges, which are due to image processing, on the right most part of the western sunlit patch on the floor of Herodotus, there is a faint hint of a spot, and perhaps slight shadow to the west. However as it is just a few pixels across, it could either be image noise, or an artifact of the image processing. I doubt if Bartlett would have been able to see this visually through his 3.5" refractor, as it is not bright, nor central to the crater floor as most of Bartlett's pseudo-peaks were. Alas we do not have a sketch from Bartlett of his 1966 sighting of a pseudo peak in Herodotus. There was another modern day candidate image of a pseudo-peak effect back on 2016 Jul 17 (See Fig 2 in the Dec 2016 newsletter), however like Fig 6, we are really into the image noise levels here, so they are probably nothing. I will keep the original weights at 3 respectively as the 1950 and 1966 reports sound substantial, though there were no independent observations at the time.



**Figure 6.** An image of Aristarchus taken by Francisco Cardinalli (AEA) on 2016 Dec 11 UT 03:17 and orientated with north towards the top. An enlarged inset view of Herodotus can be seen on the **top left corner** – this has been overly contrast stretched to bring out detail on the floor, but also shows up some imaging artefacts. An inset in the **bottom right** corner shows a sketch of the region made by Bartlett on 1950 Jun 27, showing a pseudo peak effect in Herodotus crater.

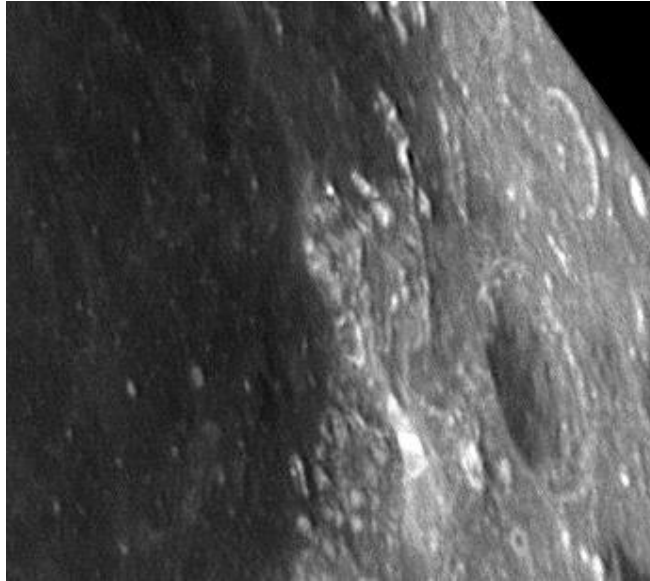
Concerning David Weier and David Darling's report from 1992, I cannot find anything in our digital archives, and no mention in the Strolling Astronomer's from that year, however there is an entry on p56 from the June 1992 BAA Lunar Section Circular in a summary report by Patrick Moore, who received a letter from David Darling: *"I want to give you another report of March 16, 1992, at 00.55 UT David Weier of Madison, Wisconsin, and myself were observing with the Carl Fosmark Observatory, which has a Celestron 11in. telescope. When we began our observing session that evening, both Weier and myself noticed that the shadow being cast over the Cobra-head appeared abnormal and fuzzy. Weier mentioned that he could see some luminescence in the shadow where the Cobra-Head was located. It was shortly after this that we attached our Minolta SRT 101 and began taking photographs. One photograph shows an unusual appearance of the shadow over the Cobra-Head. I am getting the slides reproduced and will send copies to you as soon as possible. I am really excited about these photographs, since they really appear to show a temporary change of the lunar surface. I will be sending copies to Dr. Cameron of Sedona, Arizona, at the same time"*. Unfortunately I can find no further record of the observation in the ALPO/BAA digital archives, no sign of those slides, no mention in subsequent BAA Lunar Section Circulars, and nobody else appears to have been observing at the time, though I was videoing the Moon about 2.5 hours earlier from the UK. Sometime this month I will pay a visit to Bill Leatherbarrow (BAA Lunar Section Director), as he has been given some observations from Patrick Moore's tenure as LTP coordinator, so we shall see if there are any sign of the 35 mm slides, or relevant correspondence in these? But for the moment, as Francisco's image of the "Cobra-Head" part of Vallis Schröteri, looks normal, I think we had better keep the 1992 weight at 3.

**Promontorium Agarum:** On 2016 Dec 12 UT 00:00-00:03, 00:09, and 00:20, Desiré Godoy (AEA) imaged this feature under the same illumination conditions, to within  $\pm 0.5^\circ$  to the following report:

*On 1980 Sep 22 at UT05:00? D. Louderback (South Bend, WA, USA, 8" reflector, x140 and 2.5" refractor) observed in Pr. Agarum that one of his pre-designated points, called "A", through to "C" and "D" was at least 5 brightness points brighter in red than in blue light. The reverse was true on Sep 25th. Tonight the red seemed to be on a narrow strip on the western edge. The Cameron 2006 catalog ID=109 and the weight=3. The ALPO/BAA weight=3.*

We covered this before in the Jan 2016 newsletter when Jay Albert re-observed this area visually and found that *"that the promontory appeared slightly brighter in red light than in blue. However, the effect was not limited to the narrow edge as described in the original LTP report but was evident in the overall area. He saw no*

color whatsoever in white light. It is interesting that Jay detected color and not anywhere else that night". With Desiré's monochrome image (Fig 7), we now at least have a detailed view of what the general appearance of Promontorium Agarum would have looked like to Louderback in 1980. Unfortunately I do not have any information on what Louderback refers to as points: A, B, C, and D. We had better leave this report at a weight of 3.



**Figure 7.** Promontorium Agarum as imaged by Desiré Godoy (AEA) on 2016 Dec 12 UT 00:09 using a 200 mm. reflector (Meade Starfinder 8) and an Astronomik ProPlanet 742 IR-pass filter. The image has been clipped from the original image, rotated so that north is towards the top, and has had its contrast changed.

**Ross D:** On 2016 Dec 13 UT 01:38-02:00 Jay Albert (ALPO) observed this crater under the same illumination conditions, to within  $\pm 0.5^\circ$ , to the following 1964 report:

*Near Ross D 1964 Sep 20 UTC 04:55-05:00 - Observers: Harris & Cross (Whittler, CA, USA, 19" reflector x250) "Opaque, outgassing, obscuration" NASA catalog weight=5. NASA catalog ID #850. ALPO/BAA weight=4.*

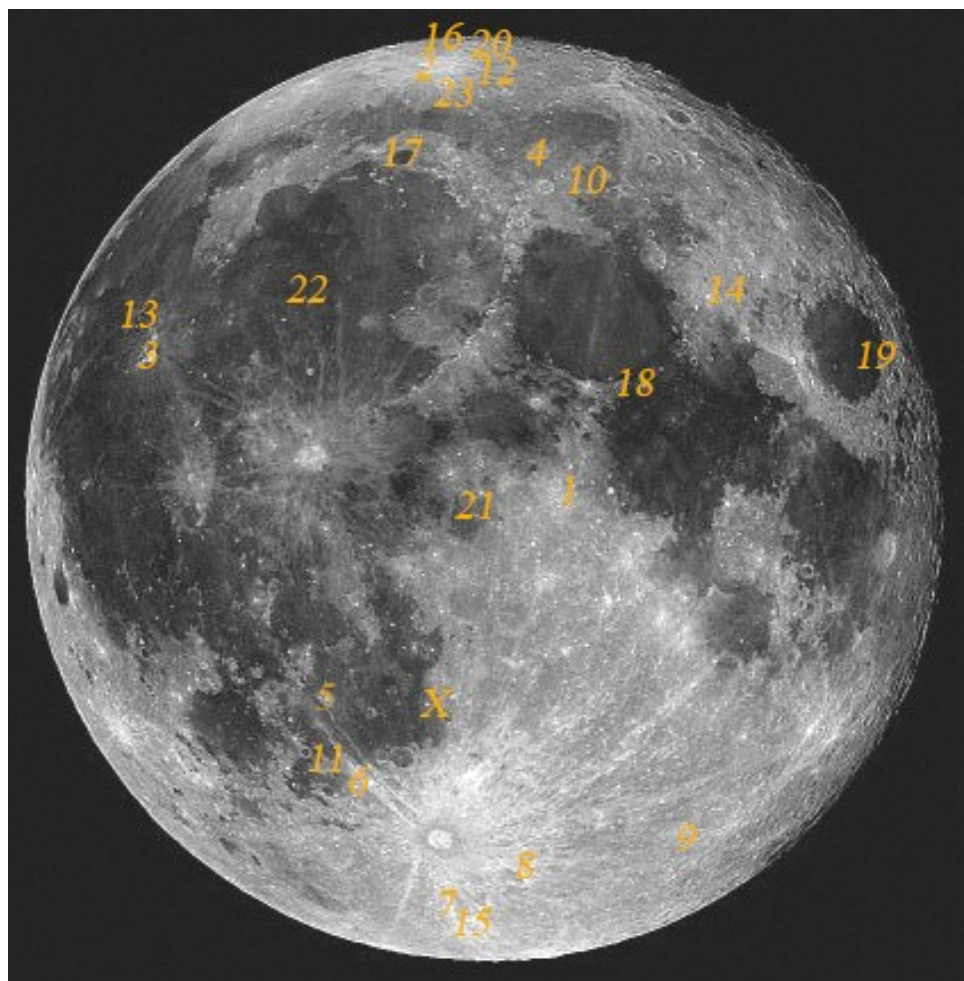
Jay used a 6" Celestron SCT (x214) under good 8/10 seeing, but with a very hazy sky. He noted that the crater was clearly seen as a bright ring with its interior the same shade of gray as the surrounding mare floor. The two tiny craterlets NE of Ross D were also easily seen. Contrary to the original LTP report, there was nothing resembling an: "*opaque, outgassing, obscuration*". The central peak of Ross crater was also easily seen. In view of the extraordinary description given back in 1964, we shall keep the weight at 4.

**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](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](http://users.aber.ac.uk/atc/tlp/spot_the_difference.htm) . If in the unlikely event you do ever see a LTP, firstly read the LTP checklist on <http://users.aber.ac.uk/atc/alpo/ltp.htm> , and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter LTP alerts can be accessed on <https://twitter.com/lunarnaut> .

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## KEY TO IMAGES IN THIS ISSUE

1. Agrippa
2. Anaxagoras
3. Aristarchus
4. Aristoteles
5. Bullialdus
6. Cichus
7. Clavius
8. Heraclitus
9. Janssen
10. Lacus Mortis
11. Mercator
12. Meton
13. Montes Agricola
14. Montes Taurus
15. Moretus
16. Peary
17. Plato
18. Plinius
19. Promontorium Agarum
20. Scoresby
21. Sinus Medii
22. Stoffler
23. W. Bond



**FOCUS ON targets**

**X = Rupes Recta**