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THE LUNAR OBSERVER

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.
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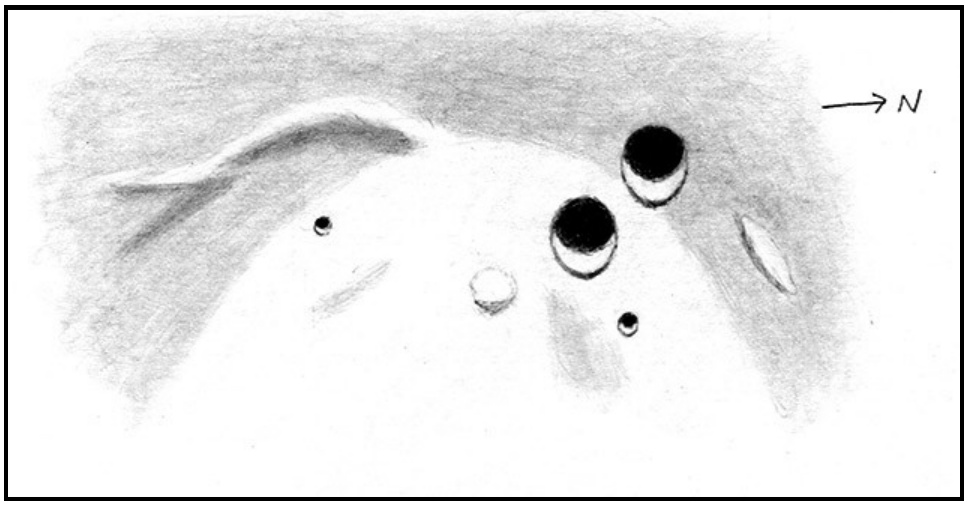
17 Autumn Lane, Sewell, NJ 08080
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – JANUARY 2017
BEER & FEUILLEE



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
October 23, 2016 09:04-09:24 UT, 15 cm refl, 170x, seeing 7-8/10, transparency 6/6-clear,

I sketched these craters and vicinity on the morning of Oct. 23, 2016 after the moon uncovered ZC 1284. These craters are practically identical twins near the eastern edge of Mare Imbrium. Beer is the southeastern one of this pair, and Beer A is the small pit east of Beer. There is a conspicuous dome southeast of Beer, and a wedge-shaped dusky area is nearby. Beer B is the small, bright pit well south of Beer. A vague shadowy patch is east of Beer B. Beer and its associated features are within a tongue of relatively light terrain protruding into the darker mare. The boundary between the light and dark areas is fairly well defined. This curved edge passes just west of Beer B and grazes the east edge of Feuillee. It then goes between Beer A and a low ridge northeast of Feuillee. A wide wrinkle begins at the light-dark boundary west of the dome, then extends southward, paralleling the boundary west of Beer B. This wrinkle has a thin area or gap near where it forks. Those prongs peter out farther to the south.

LUNAR CALENDAR

JANUARY-FEBRUARY 2017 (UT)

2017		UT	EVENT
Jan	02	09:20	Moon-Venus: 2° S
	03	06:47	Moon-Mars: 0.3° S
	05	19:47	First Quarter
	09	14:07	Moon-Aldebaran: 0.4° S
	10	06:07	Moon Perigee: 363200 km
	11	09:32	Moon Extreme North Dec.: 18.9° N
	12	11:34	Full Moon
	15	04:07	Moon-Regulus: 0.9° N
	19	05:26	Moon-Jupiter: 3° S
	19	22:14	Last Quarter
	22	00:14	Moon Apogee: 404900 km
	24	10:37	Moon-Saturn: 4° S
	25	11:59	Moon Extreme South Dec.: 18.9° S
	26	00:46	Moon-Mercury: 4° S
	28	00:07	New Moon
	31	14:34	Moon-Venus: 4.2° N
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

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: 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
Wayne Bailey - 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

FOCUS ON: Montes Taurus & Taurus-Littrow Valley

By Jerry Hubbell
Assistant Coordinator: Lunar Topographical Studies

Located on the southeastern edge of Mare Serenitatis (Sea of Serenity) the Taurus-Littrow Valley and associated Montes Taurus provide an awe-inspiring landscape to explore and photograph. This area was visited by the Apollo 17 astronauts in December 1972 and was the final manned mission to the moon in the Apollo program. It is interesting to note that on the western shore of the Sea of Serenity lies the location of the Apollo 15 landing site near Mons Hadley and the Hadley rille. Apparently, NASA had decided that the mountains surrounding the Sea of Serenity were particularly interesting in their topography and formation. (Figure 1) Located at selenographic coordinates 20.0°N 31.0°E, this area of the moon was formed between 3.8 and 3.9 billion years ago, when a large object impacted and formed Mare Serenitatis and the surrounding mountain ranges.

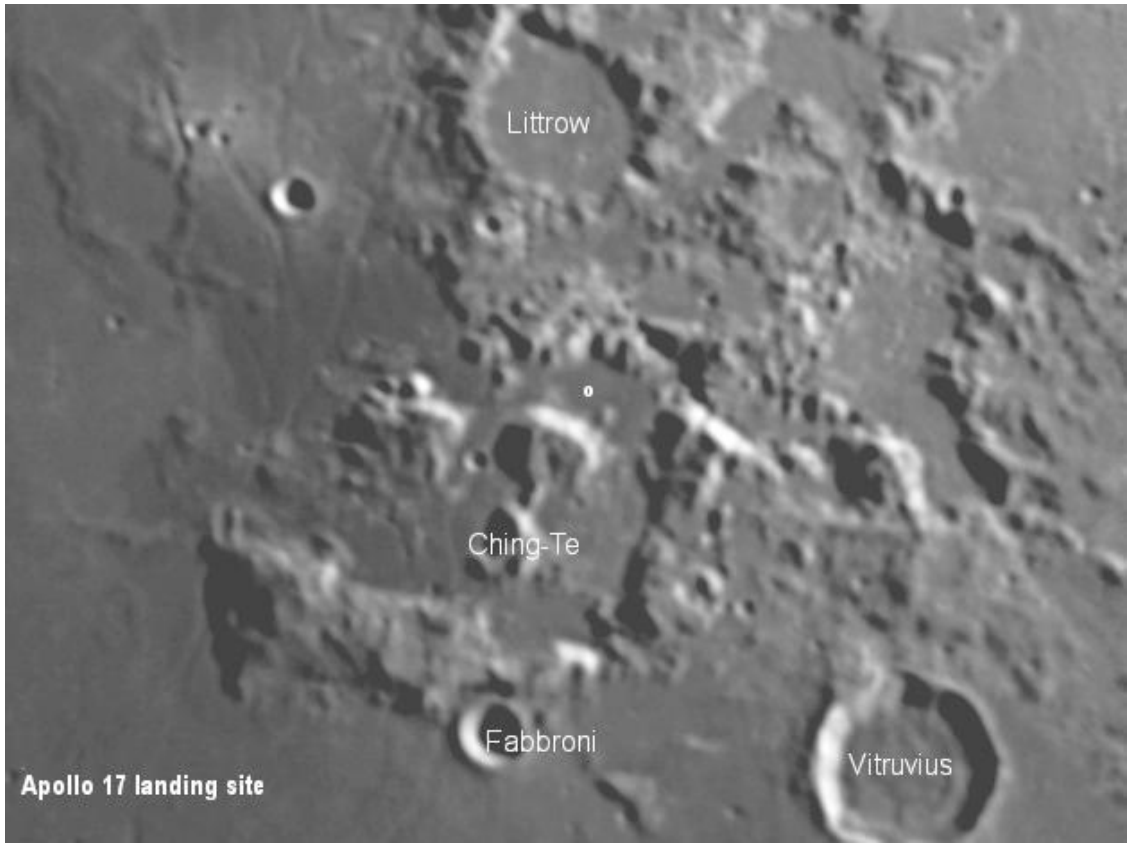


Figure 1. TAURUS-LITTROW, Tucson, AZ, June 10, 2008 – Rik Hill, 03:53 UT. C14 SCT, 2x Barlow, UV/IR Blocking Filter, SPC900NC CCD, Seeing 8/10.

North of the crater Romer lies the tortuous region called Montes Taurus, located at selenographic coordinates 27.3°N, 40.3°E. This area stretches 100 mi (165 km) across the moon's surface and reaches a height of about 16,000 ft. (4900 m) above the level of Mare Serenitatis. The Taurus-Littrow Valley lies on the southwest edge of this region. The mountains in this area are a result of the bombardment of objects

billions of years ago, which has resulted in a highland area that averages nearly 7000 ft. (2100 m) above the average lunar surface height. (Figure 2)

Figure 2. Late Afternoon MONTES TAURUS Region, Starkville, MS, September 20, 2016 – David Teske, 09:39 UT. 60mm Moonraker f/16.7 refractor, Mallincam GMTm CCD, clear sky, seeing 6/10.

Although this region is overshadowed by the large open area of the Sea of Serenity, it deserves close scrutiny as the area just west of where Apollo 17 landed, at selenographic coordinates 20.1N, 30.8E, contains a nice series of rilles, Rimae Littrow. This system just north of Mon Argaeus is an interesting area for high-resolution lunar imaging. If you examine the lower right corner of LAC Chart LAC-42 Mare Serenitatis, you can identify the various Rimae and Mons in the area. LAC Chart LAC-43 Macrobius contains the location of the Apollo 17 landing zone.

This excellent image of the Montes Taurus Region (Figure 3) really brings to great relief this pummeled area of the moon. There are plenty of interesting features here to peak you interest in lunar topography and the formation of the moon.

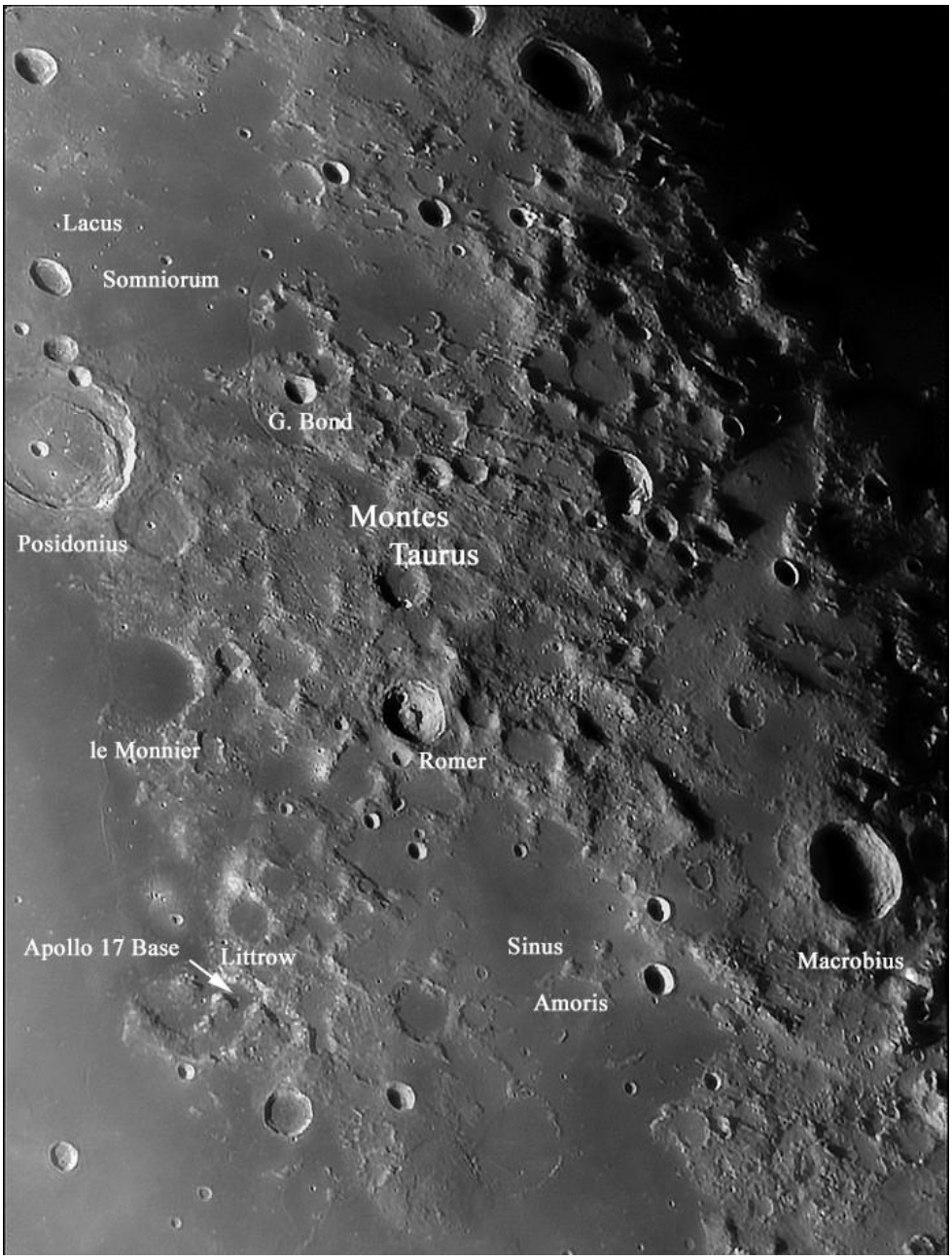


Figure 3. MONTES TAURUS, TAURUS LITTROW, Ocala, FL, December 17, 2016 – Howard Eskildsen, 11:14 UT. 6" f/8 refractor, 2x Barlow, DMK41AU02.AS CCD, seeing 8/10, transparency 4/6

In his submission, Howard included these notes on Figure 3:

"Taurus Mountains

Between the Lake of Sleep (upper left) and Bay of Love (lower right) the battered highlands of the Taurus Mountains rise, pocked and scarred. Much is said about surrounding landmarks such as the floor-fractured Posidonius, the flooded arc of le Monnier, the Apollo 17 landing site in the Taurus-Littrow Valley, and so on. Little, however, seems to be said about the mountains themselves.

This battered section of highlands shows remains of ancient craters that pocked the original lunar crust, and were in turn scarred and partly-filled by subsequent impacts. Roughly parallel scars etch the northeastern portion of the Taurus Mountains, perhaps from a remote basin-forming impact. The two freshest-appearing craters, G. Bond and Romer are just east of rilles that bear their names. (Neither rilles are labeled on image to avoid clutter). Rima G. Bond is a graben caused by uplift that split part of the crust that allowed a section to drop downwards to form a narrow, flat floor within the crack. It appears to be older than its namesake crater based on albedo differences seen on the LROC QuickMap. The Rimae Romer are also grabens and are older than the crater since crater ejecta partly obliterates the southern portion. Though given less attention than other areas, The Taurus Mountains are worthy of study and contemplation of the events that created and sculpted them. "

It is assured that this region will continue to receive a focus in future missions to the moon if not only due to the historical association with Apollo 17, but also for its rich source of scientific data.

REFERENCES:

Lunar Aeronautical Charts (LAC), Lunar and Planetary Institute, LAC-42 Mare Serenitatis, LAC-43 Macrobius, http://www.lpi.usra.edu/resources/mapcatalog/LAC/, retrieve 2017-JAN-05.

ADDITIONAL READING:

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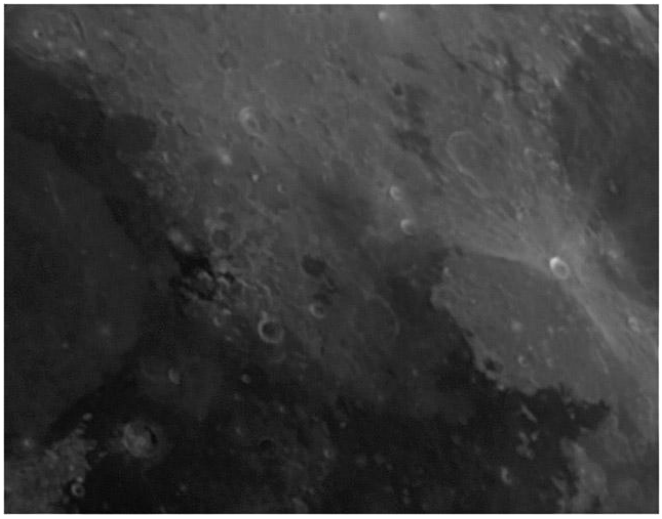
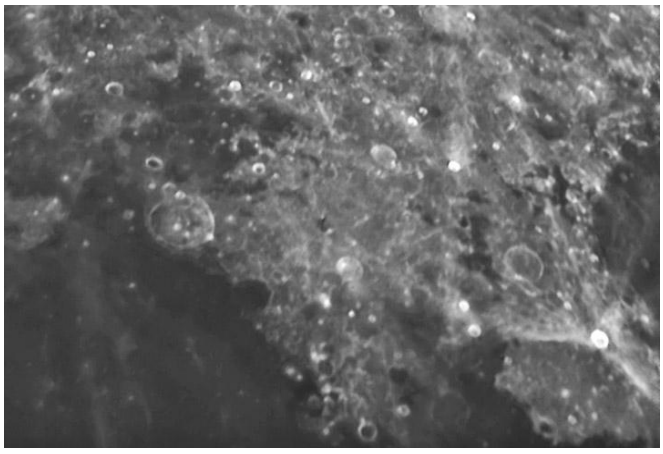
ADDITIONAL OBSERVATIONS

TAURUS MOUNTAINS-LITTROW - Jay Albert, Lake Worth, Florida USA. November 17, 2014 05:50 UT. Seeing 3/10, C-11 SCT, NextImage 5.



LITTROW - Francisco Alsina Cardinali-Oro Verde, Argentina. December 9, 2016 04:00 UT. 250mm LX200 SCT.



MONTES TAURUS. William Dembowski, Windber, Pennsylvania, USA. July 6, 2009 02:37UT. Colongitude 73.6º, Seeing 3/10. C8 SCT f/10, DMK41, UV/IR filter.

MAKING THE MOST OF A MEDIOCRE NIGHT

Richard Hill

It was a good night but not good enough for the 8", so I took the Questar (3.5") out and enjoyed myself. Right in the middle of this image (fig. 1) just coming out of shadow on the terminator, is the 155km diameter Hipparchus with the much smaller 31km Horrocks on the northside floor. Below Hipparchus is another big crater, Albategnius (139km) with Klein (46km) on its floor at about 8 o'clock. Below and to the right of Albategnius is an odd looking feature. It appears to be tw craters with a valley cutting through them. It could well be two craters that were formed on a pre-existing valley, or it could be two craters merged with smaller craters on either end. It's not clear form LROC QuickMap.

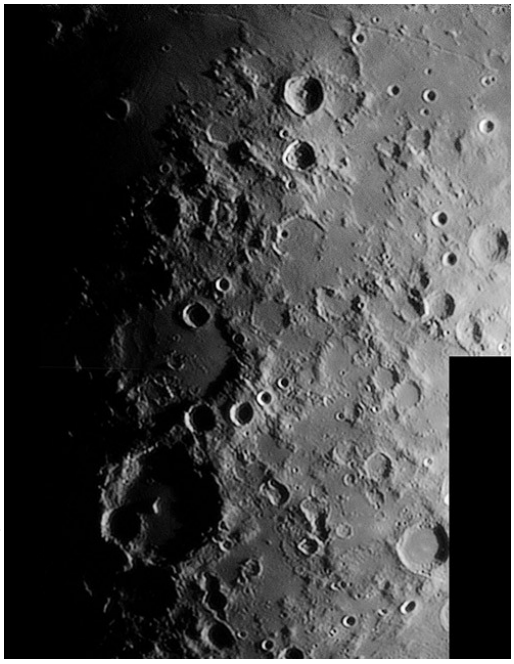


FIGURE 1. HIPPARCHUS *- Richard Hill – Tucson, Arizona, USA May 14, 2016 02:23 UT. Seeing 8/10. 3.5" Questar & 1.7X barlow, SKYRIS 445M, 656.3 nm filter.*

Between Hipparchus and Albategnius is an arc of craters of decreasing size. The largest, almost directly between the big craters is Halley (37km) and moving further right is Hind (31km) and the other two are Hipparchus C (17km), a very fresh crater, and the last one is not named. To the right of Horrocks is a shallow polygonal crater, Saunder (46km). Above Saunder is another partial polygonal crater, Lade (58km). There are a number of other polygonal craters in this field.

At the top of this image is the crater Agrippa (48km) and below it the odd shaped Godin (36km) where the one wall has slumped badly. This is well shown in the LROC images. Above these craters you can see about half of the Rima Ariadaeus. Lastly, in the lower right corner of this image is a nice flat bottomed crater, Abulfeda (65km). Before leaving notice the scars over the whole region that go from lower right to upper left. One of the better ones is on the wall of Hipparchus cutting through the forementioned arc of craters. These are impact scars from the formation of one of the great mare when mountain sized "rocks" gouged out the surface while being ejected.

LOOKING SOUTH AGAIN

Richard Hill

The eye is immediately drawn to the perfectly formed crater Tycho just above center (fig. 1). At this lighting the 88km diameter crater is seen sans rays but you can see another feature well. Note that for one crater diameter around Tycho there is a slightly darkened ring. This is ejecta from the crater formed only in the last billion years. To the lower left of Tycho is Wilhelm (111km) and below that Longomontanus (150km). Further down and a little right is Clavius (231km) the largest crater in this image with its contained arch of smaller craters that decrease in size starting with Rutherfurt (56km) on the southern wall of Clavius. Off of the lower left side of Clavius are two more sizable craters, Scheiner (114km) half in shadow on the left and Blancanus (109km) on the right. While these are nice landmarks for you to navigate this image, they are not the most interesting features.

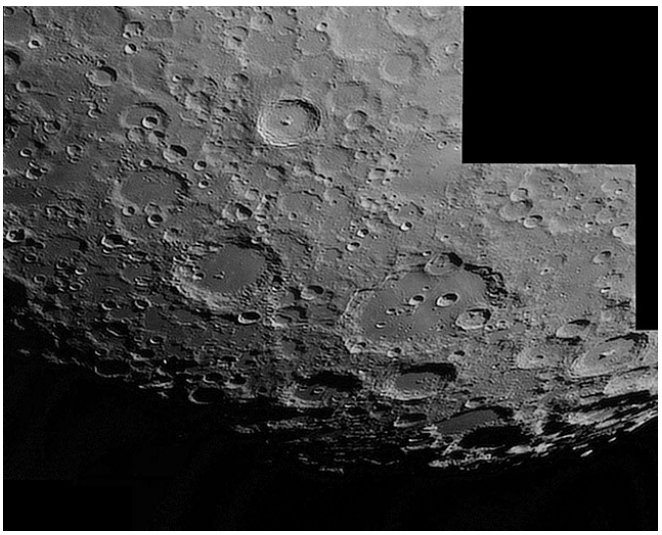


FIGURE 1. TYCHO-SOUTH POLE *- Richard Hill – Tucson, Arizona, USA May 17, 2015 02:39 UT. Seeing 8/10. TEC 8" Mak-Cass, f/20, SKYRIS 445M, 656.3 nm filter.*

Down in the lower right corner is a well formed crater with clear central peak. This is Moretus (117km) usually seen more foreshortened but shown well at this libration. Below and adjacent to it is the crater Short (51km) and below it is Newton (82km). Left of Newton is a shadow filled crater Casatus (114km) and above it the flat bottomed Klaproth (122km). While this was a good libration for looking south it was not the best but whenever you can see past (south) Newton, it's a good night!

LUNAR TOPOGRAPHICAL STUDIES

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

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

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

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

OBSERVATIONS RECEIVED

JAY ALBERT – LAKE WORTH, FLORIDA, USA. Digital image of Montes Taurus-Littrow.

ALBERTO ANUNZIATO—ORO VERDE, ARGENTINA. Digital images of Agrippa(3), Alphonsus, Copernicus, Gassendi(3), Herodotus, Plato, Proclus, Schiler, & Sinus Iridum.

FRANCISCO ALSINA CARDINALI - ORO VERDE, ARGENTINA. Digital images of Aristarchus(2), Alphonsus, Bullialdus, Eratosthenes(2), Littrow, Pytheas(2) & Rupes Recta.

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 3, 4, o(2) & 10 day moon..

WILLIAM DEMBOWSKI – WINDBER, PENNSYLVANIA, USA. Digital images of Montes Taurus(2).

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of Gutenberg-Santbach, Macrobius-Taruntius, Marius-Grimaldi, Philolaus-Plato, Pythagoras-Sinus Iridum, & Tarunthius-Gutenberg..

DESIREÈ GODOY - ORO VERDE, ARGENTINA. Digital images of Atlas, Alphonsus, Eratosthenes, Gassendi, Promontorium Agarum(4), & Theophilus.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Montes Alpes & Caucasus, Atlas, Hipparchus, & Tycho-South Pole.

DAVID TESKE - STARKVILLE, MISSISSIPPI, USA. Digital image of Montes Taurus.

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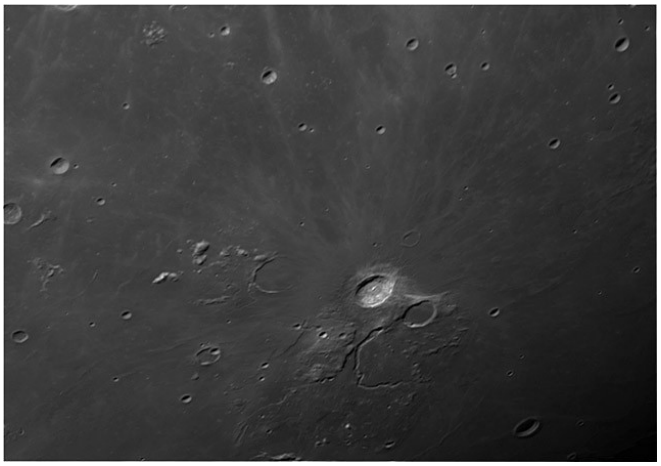
RECENT TOPOGRAPHICAL OBSERVATIONS

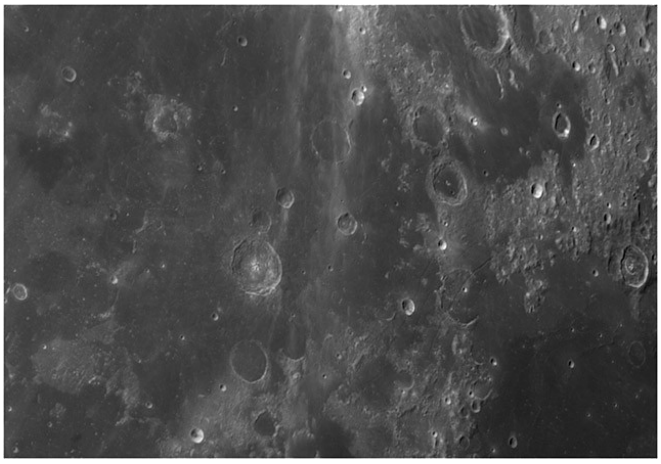
HERODOTUS– Alberto Anunziato-Oro Verde, Argentina. December 11,, 2016 03:17 UT. 250 mm LX-200 SCT, Astronomik 742 IR-pass.

RECENT TOPOGRAPHICAL OBSERVATIONS

SCHILLER– Alberto Anunziato-Oro Verde, Argentina. December 11,, 2016 03:33 UT. 250 mm LX-200 SCT, Astronomik 742 IR-pass.filter.

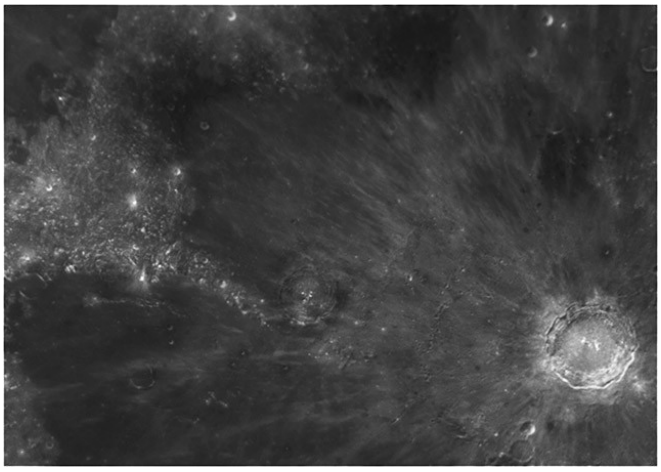
ARISTARCHUS - Francisco Alsina Cardinali-Oro Verde, Argentina. December 12, 2016 00:34 UT. 8" Meade Starfinder Refl., Astronomik 742 IR-pass filter.



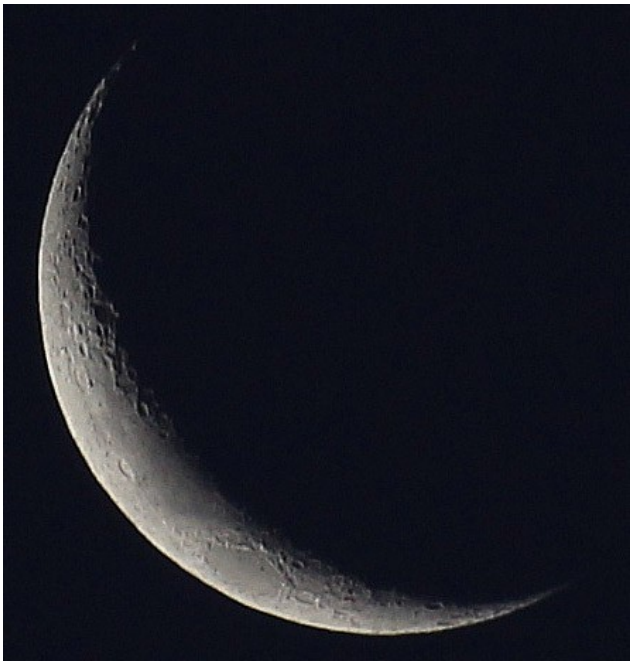


BULLIALDUS - Francisco Alsina Cardinali-Oro Verde, Argentina. December 12, 2016 00:30 UT. 8" Meade Starfinder Refl., Astronomik 742 IR-pass filter.

RECENT TOPOGRAPHICAL OBSERVATIONS



ERATOSTHENES - Francisco Alsina Cardinali- Oro Verde, Argentina. December 12, 2016 01:18 UT. 8" Meade Starfinder Refl., Astronomik 742 IR -pass filter.

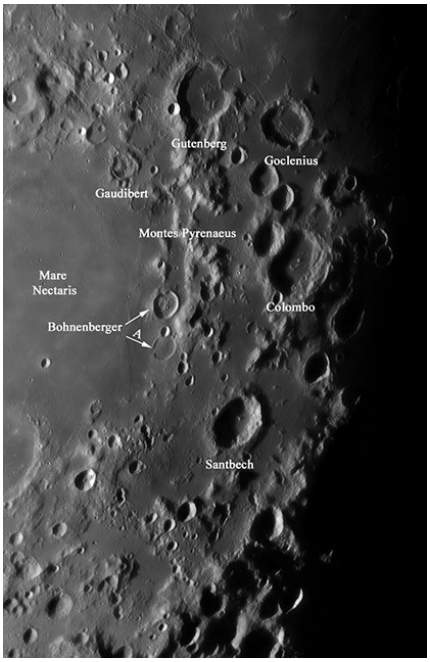


4 day Moon - Maurice Collins,- Palmerston North, New Zealand. December 3, 2016 06:54 UT. Canon DSLR, 55-250mm FL image stabilized lens.

9 day Moon - Maurice Collins,- Palmerston North, New Zealand. December 8, 2016 08:54 UT. Canon DSLR, 55-250mm FL image stabilized lens.

RECENT TOPOGRAPHICAL OBSERVATIONS

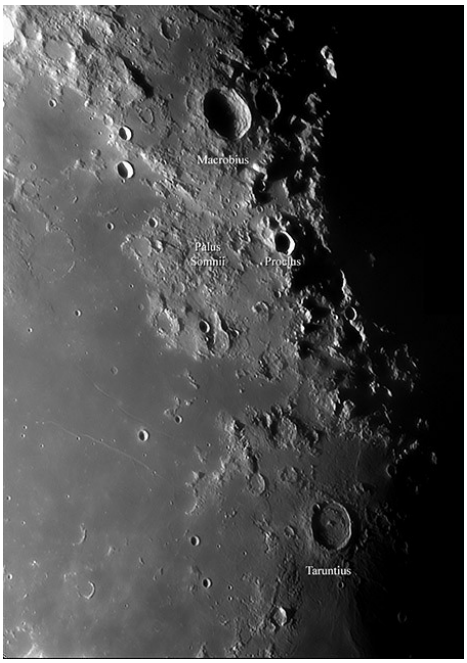
GUTENBERG-SANTBACH - Howard Eskildsen, Ocala, Florida, USA. December 17, 2016 11:05 UT. Seeing 8/10, Transparency 4/6. 6" Refractor, f/8,. 2x barlow, W8 yellow filter, DMK 41AU02.AS.



Gutenberg and Goclenius are familiar sights with their respective rilles angling upwards and to the left on this image. On the lower central image Santbech pocks an otherwise flat area between two mountainous arcs curve around part of Mare Nectaris. The arc south of Gutenberg is known as Montes Pyrenaeus. Farther south, the floor-fractured Bohnenberger was distorted by rising magma that pushed up its floor, and just below it Bohnenberger A was flooded and nearly obliterated by basaltic lava flows.

Colombo, named after the European discoverer of the Americas, resembles a mirror image of Gutenberg, with a bite taken out of its rim by a later impact crater. Both appear very old and eroded with floors partly filled with lava from later flows.

To me, the strangest crater on this image is Gaudibert, with its severely uplifted or else partly filled floor. With the craterlets on its south margin, it looks like a huge bear paw.

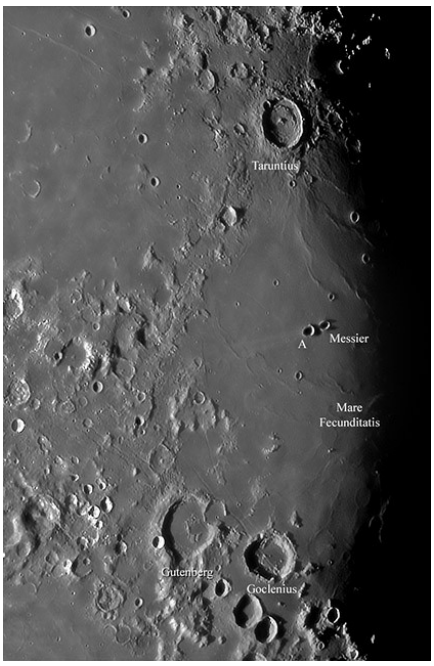


MACROBIUS-TARUNTIUS - Howard Eskildsen, Ocala, Florida, USA. December 17, 2016 10:59 UT. Seeing 8/10, Transparency 4/6. 6" Refractor, f/8,. 2x barlow, W8 yellow filter, DMK 41AU02.AS.

The sun is setting on the eastern Moon in this view of the lands west and south of Mare Crisium, which lies in the darkness to the upper right of the image. Macrobius and Proclus lie in debris ejected from Crisium. Palus Somnii consists of rubble ejected from the ancient, massive impact. This "sleepy swamp" appears as little more than jumbled terrain, but when seen under higher solar illumination seems to have a different albedo than the surrounding mountains and the basaltic plains to the west. To Riccioli and other 17th century observers using their small scopes it indeed looked like a marsh on the edge of an ocean. The contrast from the other bright highlands was accentuated by bright rays from the crater Proclus, which are hardly visible on this low sun-angle.

On the lower left, two roughly parallel markings reveal a rille and fault in the dark basalt that bracket the small crater Cauchy. On the lower right the floor-fractured crater Taruntius lies near the terminator with the fractured central section of its floor, which was elevated by rising subsurface magma, clearly visible. All the features discussed, except for Cauchy, were named by Riccioli in the mid-17th century.

RECENT TOPOGRAPHICAL OBSERVATIONS

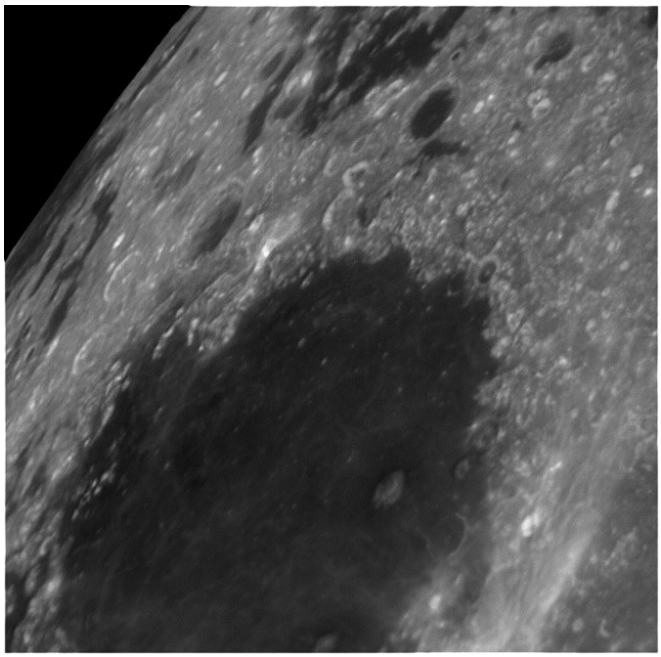


TARUNTIUS-GUTENBERG - Howard Eskildsen, Ocala, Florida, USA. December 17, 2016 11:02 UT. Seeing 8/10, Transparency 4/6. 6" Refractor, f/8,. 2x barlow, W8 yellow filter, DMK 41AU02.AS.

Mare Fecunditatis occupies the right central portion of the image and disappears beyond the terminator. Messier and Messier A form a curious pair with the shadow from Messier radiating away like a pair big floppy ears reminiscent of the space alien "Stitch." Faint white streaks can be seen radiating the opposite direction from Messier A (designated simply as "A" on the image) and were caused by material ejected from the impact that created both craters. This pair was caused by a single impactor that came in at a very low angle, perhaps 3 degrees or less.

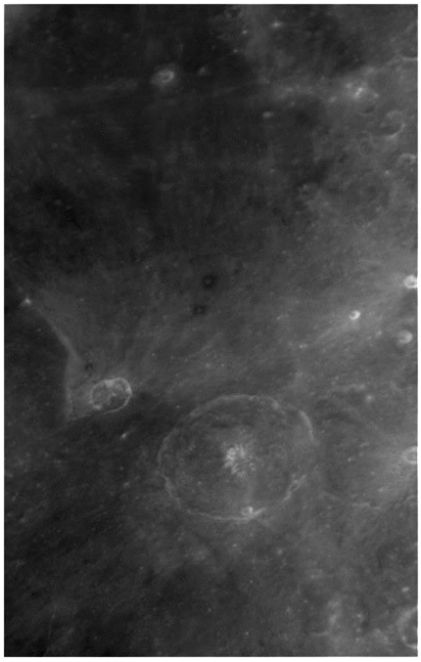
The fractured floor of Taruntius is visible in on the upper image, raised by ascending subsurface magma after the crater was formed. Fractures of another sort are seen coursing into craters Gutenberg and Goclenius. Both crates have been heavily eroded by impact debris in eons past, then partly flooded with mare basalt and finally breached by the Gutenberg Rilles and the Goclenius Rilles.

The battered highlands on the lower left half of the image have no official name, but were once designated as the Colchis Highlands by a Hevelius in 1647. For some reason the name never made it to the modern era, which I think is a shame. Too many notable areas on the Moon go unnamed, or are given only a letter designation, such as Messier A (once it bore the name W.H. Pickering).

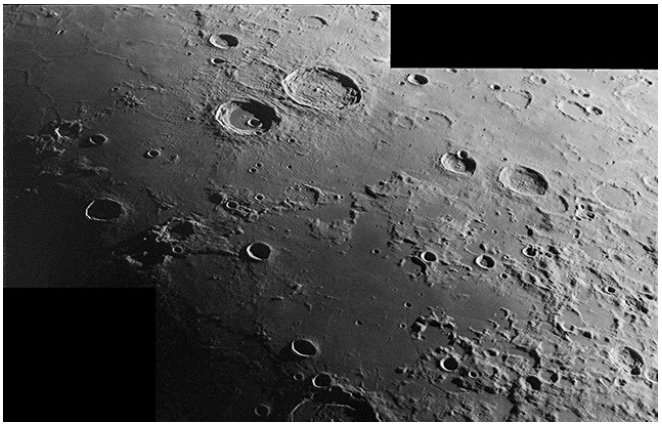


PROMONTORIUM AGARUM - Desireé Godoy -Oro Verde, Argentina. December 12, 2016 00:03 UT. 8" Meade Starfinder Refl., Astronomik 742 IR -pass filter.

RECENT TOPOGRAPHICAL OBSERVATIONS



THEOPHILUS- Desireé Godoy -Oro Verde, Argentina. December 12, 2016 00:19 UT. 8" Meade Starfinder Refl., Astronomik 742 IR-pass filter.



ATLAS – Richard Hill – Tucson, Arizona, USA July 10, 2016 02:39 UT. Seeing 8/10. 8" Mak-Cass, f20, SKYRIS 445M.

On the north end of the fat 4 day crescent moon is the stark pair of large craters, Atlas and Hercules (90km and 71km diameters respectively). They catch the eye because of the relatively featureless surroundings at that time. The larger crater, Atlas, has some wonderful detail on its floor including a 'V' shaped rille system with rimae 1-2 km across. Note the off center "central peak" and the cluster of other much smaller peaks below it. There is a central 2.5km crater as well. Using LROC QuickMap it was possible to see craters just nder 2km on this image which was the limit since the moon was near apogee and the seeing less than ideal. In Hercules we see the 13km crater Hercules G and another off center "central peak". There is a nice ejecta blanket surrounding each of these craters. Above Atlas and Hercules is the 34 km crater Keldysh, and between Atlas and Keldysh is Atlas E, an ancient remnant of a once great 58 km crater.

To the lower right of Atlas and Hercules are two craters that point right to the former pair. They are Cepheus (41 km) and Franklin (58 km). Then to the left of Atlas and Hercules is a crater in the shade halfway up the image. This is Burg (41 km) the youngest large crater in the image. It sits in the middle of Lacus Mortus that is much older. Below Burg are two craters mostly in shadow. These are Plana (46 km) on the left and Mason (44 km) on the right. It looks like there is a flow of material coming out of this crater to the lower right but actually this is a deformed mountain range that was overlain by ejecta probably from the Burg impact. This flow points to the crater Grove (29km) and below that on the other side of Lacus Somniorum, is Daniell (31 km) just above the northern rim of Posidonius.

LUNAR GEOLOGICAL CHANGE DETECTION PROGRAM

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

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

Firstly I would like to wish our readers a Happy 2017. Observations for November were received from the following observers: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Birt, Clavius, Copernicus, Herodotus, Janssen K, Plato, Posidonius, Taurus Littrow, Tycho and several other features. Alberto Anunziato (Argentina – AEA) observed: Atlas and several other features. Marie Cook (Mundesley, UK – BAA) observed: Aristarchus, Atlas, Cassini, Eratosthenes, Mare Imbrium, and Plato. Fernado Ferri (Italy – UAI) imaged the whole lunar disk. Valerio Fontani (Italy – UAI) imaged the whole lunar disk. Brian Halls (Lancing, UK - BAA) observed Herschel. Rik Hill (Tucson, AZ, USA – ALPO/BAA) imaged Aristarchus and the whole lunar disk. Franco Taccogna (Italy – UAI) imaged Aristarchus, Plato and Torricelli B. Aldo Tonon (Italy – UAI) imaged Plato. Garry Varney (Pembroke Pines, FL, USA – ALPO) imaged the whole lunar disk. Ivan Walton (Cranbrook, UK - CADSAS) imaged Clavius – though this was outside the repeat illumination window, so the observation will be placed into the archival database.

2016 Catch up: Due to my university teaching workload during the past three months, I have had to postpone analysis of repeat illumination observations submitted for September- October. However in table 1 you can see the observations received, their previous weights, and newly allocated weights. Although there has not been too much change, either because the effects seen originally, did not repeat, or because insufficient new information could be gathered, there are two observations of especial note, both made by AEA observer Desireé Godoy. Firstly the Linne LTP from 1866 Oct 16 [Ref 12] is the normal appearance of this crater. Perhaps no surprises to learn here, as it has been long known that most LTPs in Linne were related to mis-identification from earlier sketches during the Victorian era, and mis-judgement over the normal appearance of this ray crater, at different selenographic colongitudes. However we do like to check up on individual observations, and the 1866 Oct 16th event was seen under both repeat illumination and repeat viewing angle to within ±1˚and matches closely what was in the original description by Schmidt. Secondly the Langrenus 1993 Jan 02 LTP [Ref 4] report by Audouin Dollfus was a very high weight=5 LTP because the evidence was two fold: a unique polarization map image that was difficult to account for, and secondly a white cloud was seen inside the crater floor. Well Desireé's image showed that the white light appearance of Langrenus in 2016 was very similar to that imaged in 1993, therefore we can lower the weight of this important LTP from 5 to 4.

Please note that all the observations received above, and others, are incorporated into the ALPO/BAA database of observations which can be used for additional ALPO/BAA studies.

LTP Reports: No LTP report were received during November, and only five reports were received during the whole of 2016, and of these three were allocated a weight of 0, i.e. eliminated as LTP, leaving just two low weight LTP.

Routine Reports: Below is a selection of reports received for November that can help us to re-assess unusual past lunar observations.

Herschel: On 2016 Nov 07 UT 17:06 Brian Halls (BAA) imaged the crater under the same illumination conditions, (to within ±0.5˚) to the following report:

Herschel 2005 Aug 13 UT 00:07-00:29 Observed by Daniel del Valle Hernandez (Aguadilla, PR, 8"SCT, x225, S=7, T=4) "Interesting configuration of shadows with umbra and penumbra. Effect

seemed to reduce over time." An ALPO report. The ALPO/BAA report=2.

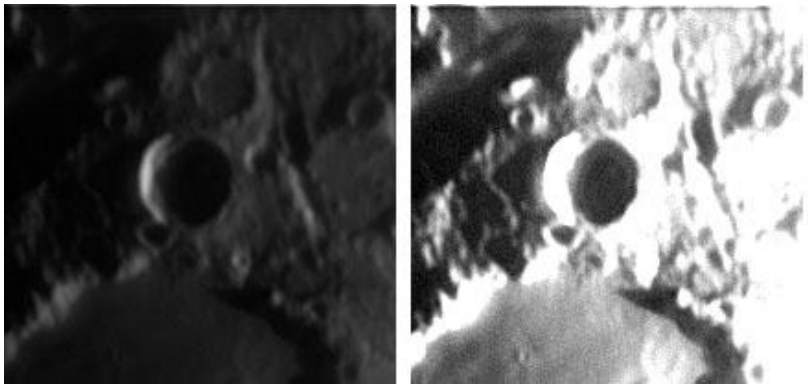


Figure 1. *Herschel as imaged by Brian Halls on 2016 Nov 07 UT 17:06, and orientated with north towards the top.* ***(Left)*** *part of the original image.* ***(Right)*** *Contrast stretched to bring out detail inside the shadow.*

Ref No.	LSC	Page	Feature	LTP Date	Repeat Obs	Observer	Society	Old Weight	New Weight
1	2016 Nov	20	Agrippa	1966 Nov 19/20	2016 Sep 08	Valerio Fontani	UAI	3	3
2	2016 Nov	20-21	Copernicus	1932 Mar 16	2016 Sep 10	César Fornari	AEA	2	2
3	2016 Nov	21-22	Proclus	1980 Jan 26	2016 Sep 11	Franco Cardinali	AEA	3	2
4	2016 Nov	22-23	Langrenus	1993 Jan 02	2016 Sep 11	Desireé Godoy	AEA	5	4
5	2016 Nov	23-24	Archimedes	1973 Jan 13	2016 Sep 11	Alberto Anunziatio	AEA	1	1
6	2016 Nov	24	Philolaus	1948 May 20	2016 Sep 14	Jay Albert	ALPO	3	3
7	2016 Nov	24-25	Timocharis	1955 Jun 4-5	2016 Sep 15	Cook/Taccogna	BAA/UAI	3	3
8	2016 Nov	25-26	Lunar Eclipse	1959 Mar 24	2016 Sep 16	Colin Henshaw	BAA	1	1
9	2016 Dec	17-18	Maurolycus	2000 Aug 06	2016 Oct 08	Alberto Anunziatio	AEA	1	1
10	2016 Dec	18-19	Alphonsus	1958 Nov 19	2016 Oct 09	Franco Cardinali	AEA	2	2
11	2016 Dec	18-19	Alphonsus	1966 Jun 26	2016 Oct 09	Franco Cardinali	AEA	5	5
12	2016 Dec	19	Linne	1866 Oct 16	2016 Oct 09	Desireé Godoy	AEA	1	0
13	2016 Dec	20	Plato	1970 Apr 15	2016 Oct 10	Jay Albert	ALPO	2	2
14	2016 Dec	20	Plato	1966 Jun 27	2016 Oct 10	Marie Cook	BAA	3	3
15	2016 Dec	20-21	Anaximander	1963 Nov 27	2016 Oct 12	Rik Hill	ALPO/BAA	3	3

Table 1. *Summary of repeat illumination observations covered in the LSC for Nov-Dec 2016.*

Unfortunately I do not have a copy of Daniel del Valle Hernandez's report from 2005, just the description. Now you may be able to see some detail inside the interior shadow of Herschel in Brian's image (Fig 2 Right) however whether this corresponds to the umbra and penumbra of the shadow, as seen by Daniel, or is some CCD image glare artefact, remains an open question. But at least Brian has a good attempt to image inside the shadow. I will leave this weight at 2, and if anyone knows Daniel del Valle Hernandez, in Puerto Rico, then I would be grateful if they could get them to email me as I would like to find out more about this observation?

Eratosthenes: On 2016 Nov 08 UT 17:55-18:05, Marie Cook observed this area visually under the same illumination conditions, to within ±0.5˚, to the following report by a British Planetary Geologist: Peter Cattermole:

Eratosthenes 1954 May 11 UTC 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.

Marie observed under Antoniadi II seeing conditions, transparency: moderate to poor, using a 9 cm Questar scope. She commented that the detail was sharp and clear and that she could plainly see the central peak – hence everything looked normal. The ALPO/BAA weight of the Cattermole report shall therefore stay the same.

Tycho: On 2016 Nov 09 UT 01:46 Gary Varney (ALPO) took a color image of the Moon, which included Tycho under similar illumination (to within ±0.5˚) to the following LTP report by Paul Abel:

> *On 2009 May 03/10 UT23:20-00:11 P. Abel (Leicester, UK, 20cm reflector, x312, seeing III-IV) observed that the north east wall was slightly brighter than would have been expected, slightly blurred (not seeing related blurring) and had a strong orange-brown color. No spurious color seen elsewhere. A change in eyepieces showed the same effect. No luck in alerting other observers. A drawing was made at 23:20UT and finished at 00:12UT. At 23:12UT part of the inner NW floor had a dull brown color, whereas before it was grey. By 00:11UT the color effect was fading and by 00:18 seeing conditions were too bad to continue. M. Cook (Mundesley, UK, 9cm Questar telescope, x80, x130, seeing III, transparency moderate to good) had observed Tycho earlier in the evening at 22:15UT, but had seen no signs of color. W. Leatherbarrow (Sheffield, UK, 8cm scope, high cloud interruptions and bad seeing) had taken monochrome images at UT 20:07 and 20:10, but these showed nothing unusual, and he checked the crater visually at 00:00-00:30, but detected no color, although the Moon's low altitude contributed to poor seeing conditions and some spurious color was seen. CCD images from M. Collins (Palmerston North, New Zealand) taken at 00:46UT showed no color apart from spurious color on contrasty edges, in no way reflecting what was seen early by P. Abel. The ALPO/BAA weight=2.*

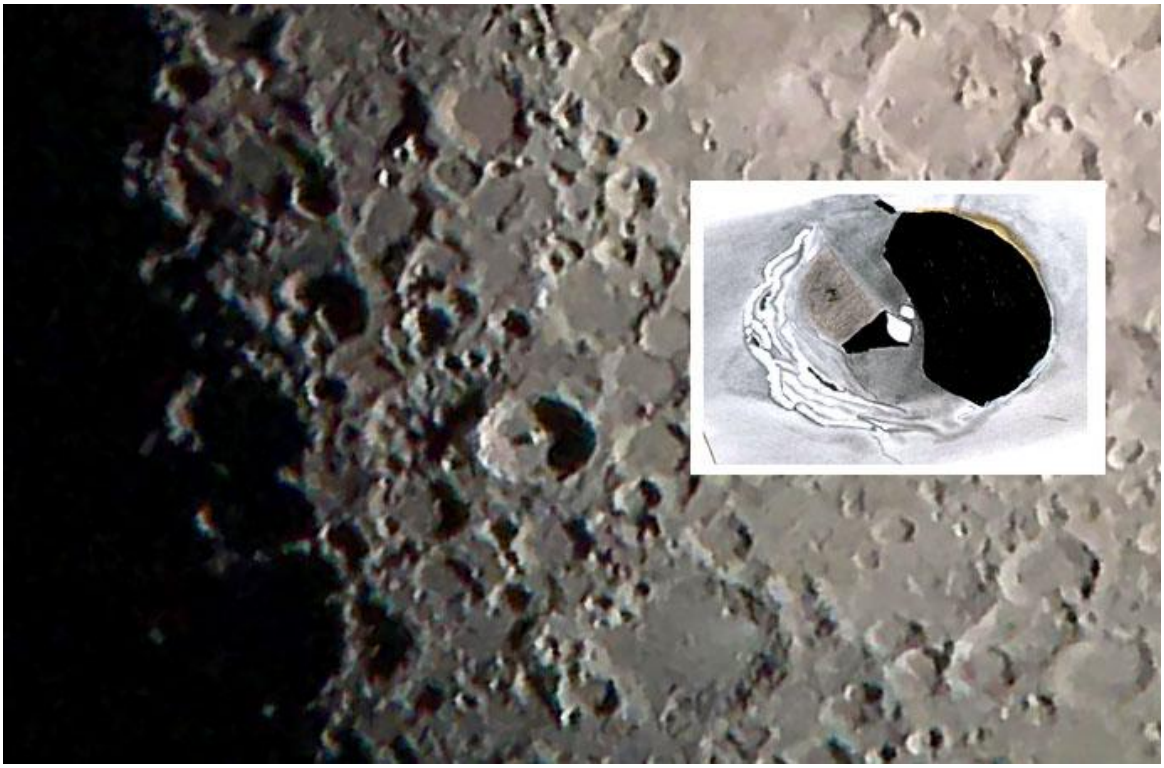


Figure 2. *Tycho from a subsection of an image of the whole Moon, taken by Gary Varney (ALPO) on 2016 Nov 09 UT 01:46. The inset sketch was made by Paul Abel (BAA) on 2009 May 03 and shows a colored LTP.*

Gary's image (Fig 2) shows no sign of a brown color on the NE rim, or a brownish cast on the NW floor. It does however show a slight hint of green on the NW rim, but other colors are present on other craters (shown in and out of this sub-section image) and are attributed to camera color noise. Although slightly outside of the observing window, Jay Albert observed visually at

02:20-02:35 but contrary to Paul's 2009 observation, found the NE wall not especially bright and saw no brown, or indeed any other color on the crater. Although the W wall was very bright with sharply detailed terracing, no blurring was seen at the NE wall or other parts of Tycho. I will keep the weight at 2. Previous analysis of Paul's 2009 observation can be found in the 2009 Jun newsletter.

Birt: On 2016 Nov 09 UT 02:55-03:06 Jay Albert observed visually, and at 03:21UT imaged, this area to within ±0.5˚ of the following LTP report:

Birt 1955 Apr 15 UT 03:20-05:00 Observed by Capen (California Seeing=Excellent) "Small craters between Birt & wall were invis. at times under excellent seeing, while craterlets on W. side were continually obs." NASA catalog weight=4. NASA catalog ID #586. ALPO/BAA weight=3.

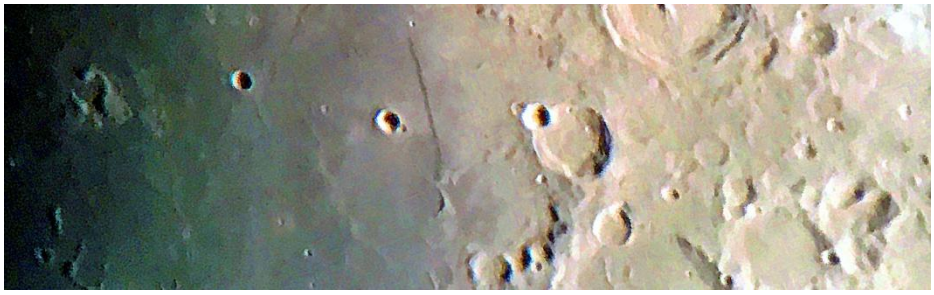


Figure 3. *Birt and the Rupes Recta as imaged in color by Jay Albert on 2016 Nov 09 at 03:21 UT, orientated with north towards the top. The image has been color normalized and had its color saturation increased to 75%.*

Jay commented that visually Birt A was easily seen between Birt and Rupes Recta, and between these two features was seen a tiny, faint dot. He considers that this might possibly have been an unresolved craterlet. A tiny craterlet was also suspected well S of Birt and W of Rupes Recta, but no other craterlets were seen in the designated area mentioned in the LTP report. Fig 3 shows the general appearance of the area. The weight of the 1950 report shall stay at 3.

Plato: On 2016 Nov 10 UT 21:16-21:17 Aldo Tonon (UAI) Imaged Plato under the same illumination conditions (to within ±0.5˚) to the following Victorian era report:

Plato 1872 Jul 16 UTC 21:00? Observed by Pratt (England?) "NW portion of floor was hazy" NASA catalog weight=3. NASA catalog ID #179. ALPO/BAA weight=2.

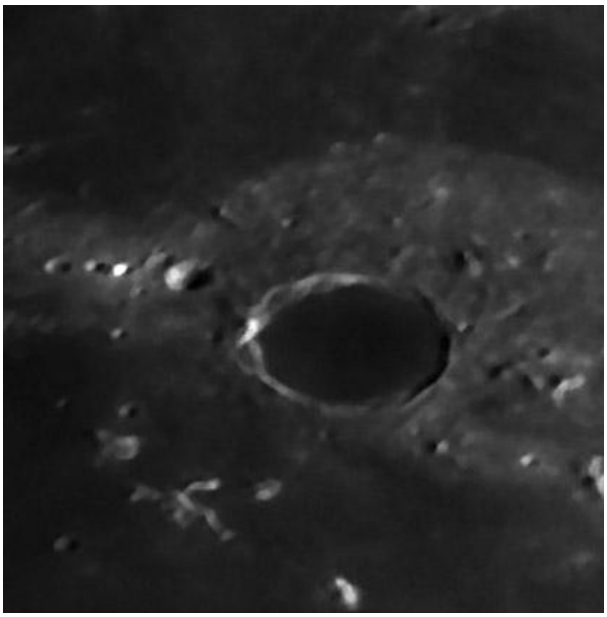


Figure 4. *Plato as imaged by Aldo Tonon (UAI) on 2016 Nov 10 UT 21:16-21:17, and orientated with north towards the top.*

According to Aldo's image (Fig 4) there is not too much detail to be seen on the whole of the floor at this selenographic colongitude. Though it is possible that this is related to seeing conditions, or even the camera/processing software being used, as other features do not exhibit much detail either. We shall keep the weight at 2.

Aristarchus (and Herodotus): On 2016 Nov 12 UT 04:24 Rik Hill (ALPO/BAA) imaged Aristarchus under the same illumination and viewing angles (to within ±1˚) to the following:

On 2006 Jun 08 at UT 20:30-20:45 C.Brook (Plymouth, UK, 60mm refractor x75) found that Aristarchus was "shining exceptionally bright during daylight on a gibbous moon". The ALPO/BAA weight=1.

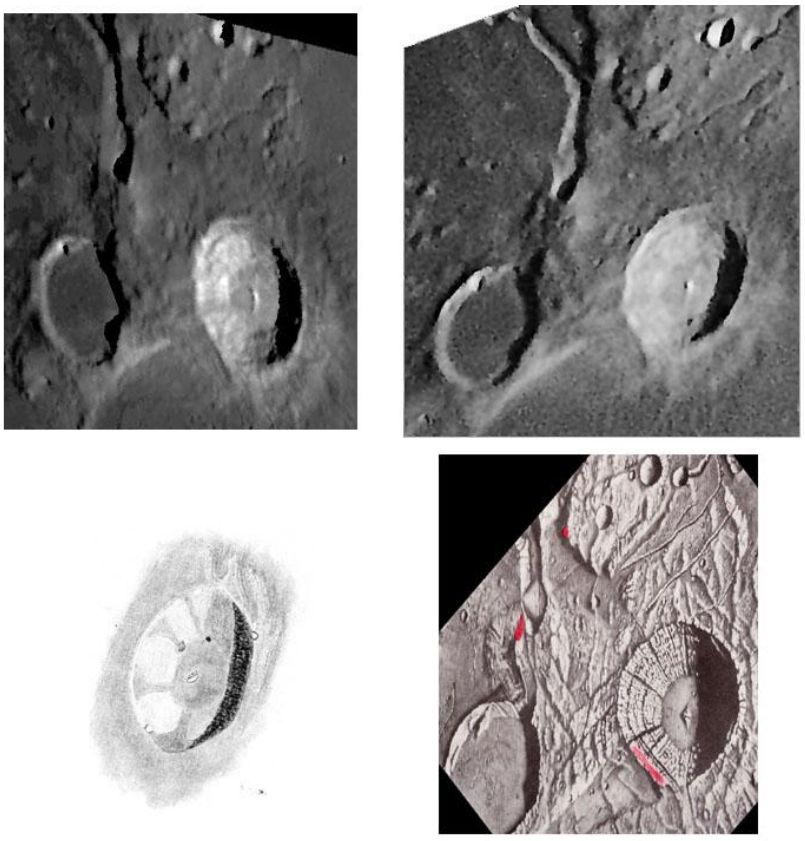


Figure 5. *Aristarchus orientated with north towards the top, but under different topocentric librations.* ***(Top Left)*** *An ALVIS simulation of the normal appearance of Herodotus as it should have appeared to Bartlett in the 1950 report above.* ***(Top Right)*** *A small subsection from Rik Hill's image from 2016 Nov 12 UT 04:24, taken in monochrome light at 656 nm.* ***(Bottom Left)*** *A sketch made by Robin Gray (ALPO) made on 2002 Sep 19 UT 06:31-07:22.* ***(Bottom Right)*** *The location of the 1963 Oct 30 colored red glows as seen from Lowell Observatory - see http://www.the1963aristarchusevents.com/ for detailed documentation about this event.*

Also under the same illumination angles, to within ±0.5˚, to the following reports (one of which is for Herodotus):

On 2002 Sep 19 at UT 06:31-07:22 R. Gray (Winnemucca, NV, USA) found that the bright areas of the crater floor, and the east facing part of the west rim, were brighter noticeably in red (Wratten 25) or white light, than in blue (Wratten 38A). The observer suspects that the apparent LTP was more to do with the relative densities of the filters and the contrast in Aristarchus than a real event. This was partly confirmed after checks on other craters, though it did not work everywhere. The ALPO/BAA weight=1.

Aristarchus 1963 Oct 30 UT 01:50-02:15 Observed by Greenacre and Barr (Flagstaff, AZ, USA, 24" Clark Refractor) observed 2 ruby red spots - one just to the SW of the cobra's Head and the other on a highland area east of Vallis Schroteri. A pink color formed covering the SW rim of Aristarchus. Effects present with or without Yellow Wratten 15 filer. Similar effects checked for elsewhere on other craters

but not seen. So presumed not to have been due to chromatic aberration or atmospheric dispersion. Effect not seen in 12" refractor, but this may have been a resolution issue. The NASA catalog ID No. is #778. The NASA catalog weight is 5 (highly reliable). ALPO/BAA weight=4.

In 1962 Dec 09 at UT 07:42 Wildey and Pohn (Mt Wilson, CA, USA, 60" reflector) observed that Aristarchus was 0.80 magnitudes (x2) fainter than average for this age (photometric measurement) Vmag=3.80, average=3.0. The Cameron 1978 catalog weight=5. The ALPO/BAA weight=2.

Herodotus 1950 Jul 27 UT 03:56 Observed by Bartlett (Baltimore, MD, USA) described in the NASA catalog as: "Pseudo c.p. in Herod. Drawings. (Similar to NASA catalog event #523)" 5" reflector used at x100, NASA catalog weight=4 (high). ALPO/BAA weight=3.

Concerning the Brook and Widley and Pohn observational reports, it is difficult to tell from Rik's original image as this was fairly localized in coverage (difficult to compare with other bright features elsewhere on the Moon), even before the subsection from Fig 5 (Top Right) was made. So we had better leave these weights as they are. Although Rik's image was monochrome, and hence only suitable for detecting color from broadband red (or not red), or hydrogen alpha emissions, it is an instructive comparative tool in helping to narrow down the locations of the red glows sighted at Flagstaff in October 1963. For the Robin Gray report from 2002 (Fig 5 Bottom Left), again a monochrome image does not tell us much about the color filter reactions, however it does re-enforce our existing knowledge that Robin Gray is a skilled visual observer – as you can see by comparing his sketch with Rik's image. So all these reports will stay the same weight. For the Herodutus repeat illumination event, this was also observed by Alberto Anunziato (AEA) visually sometime between 05:00 and 05:52 and he reported, as was confirmed in Rik's image (Fig 5 Top Right) that there was no sign of a central pseudo peak. The ALVIS simulation (Fig 5 Top Left) backups the conclusion that whatever Bartlett saw on 1950 Jul 27, was in no way the normal appearance and so shall remain at a weight of 3.

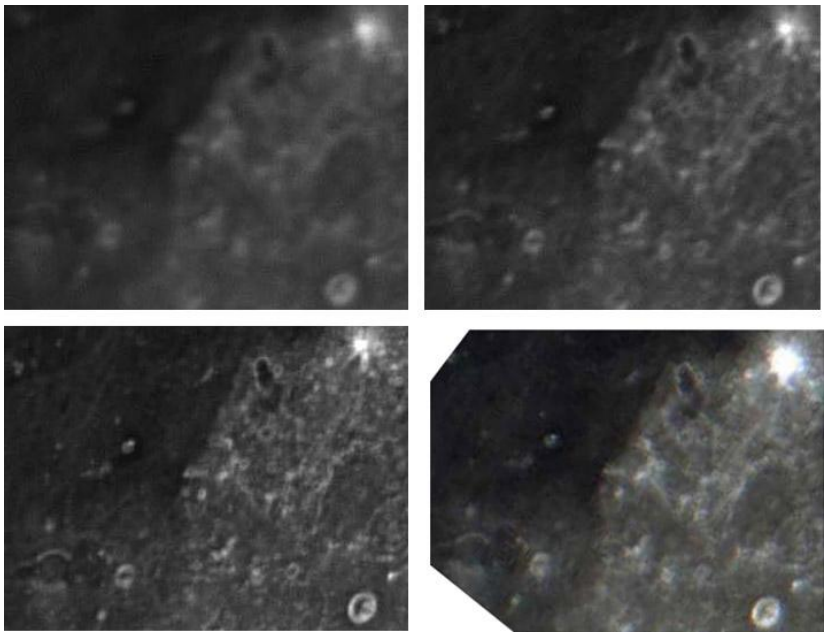


Figure 6. *Images of Torricelli B – the white spot with a dark halo, just to the left of the centre. Images taken by Franco Taccogna (UAI) and are orientated with north towards the top.* ***(Top Left)*** *2016 Nov 12 UT 18:05.* ***(Top Right)*** *2016 Nov 12UT 17:34.* ***(Bottom Left)*** *2016 Nov 12 UT 18:29.* ***(Bottom Right)*** *2014 Mar 13 UT 18:17.*

Torricelli B: On 2016 Nov 12 UT 17:04-18:29 Franco Taccogna (UAI) observed this crater under similar illumination to the following reports:

On 1985 Jul 01 at 02:00-03:00 UT K. Marshall (Medellin, Columbia) observed that Torricelli B was very bright - verified using a C.E.D. No color was seen though. the Cameron 2006 catalog ID=279 and the weight=4. The ALPO/BAA weight=3.

As you can see from the images taken by Franco (Fig 6 Top Left, Top Right, and Bottom Left) Torricelli B is not especially bright, and when you compare it with an image he took in 2014 (Fig 6, Bottom Right) under a slightly different selenographic colongitude, it has not changed much in appearance. As Kevin Marshall was using a Crater Extinction Device (C.E.D.) in 1985, I think we must assume that his comment about Torricelli B was very bright is probably correct and we should keep the weight at 3. Franco's 2016 images though do show that Torricelli B can be dimmed if the seeing conditions are poorer, as they were at 18:05 (Fig 6 Top Left).

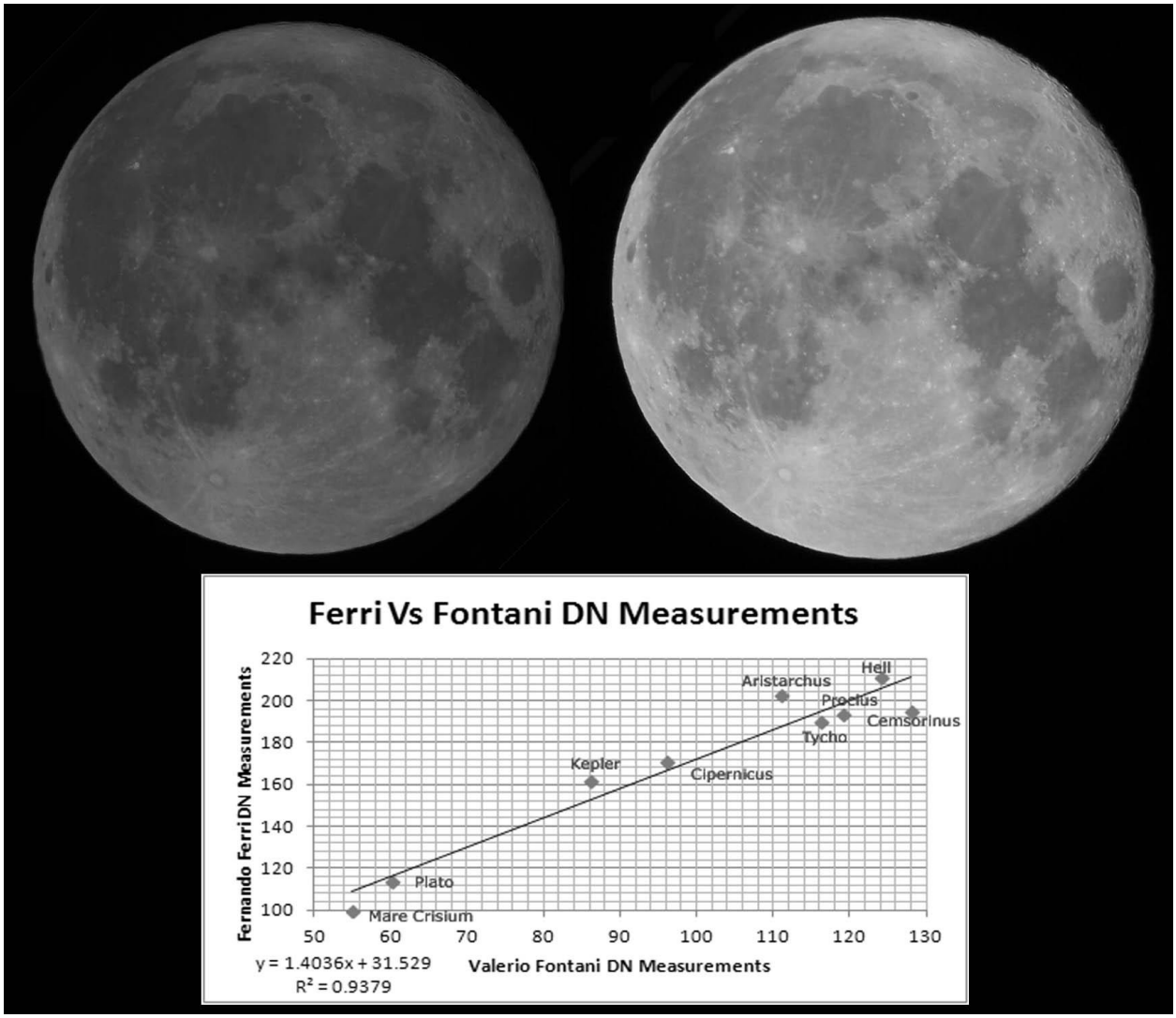


Figure 7*. Full Moon images orientated with north towards the top, being used to compare the relative brigtness of different features.* ***(Top Left)*** *An image by Valerio Fontani taken on 2016 Nov 14 UT 21:05-21:09.* ***(Top Right)*** *An image by Fernado Ferri (UAI) taken on 2016 Nov 15 UT 06:10.* ***(Bottom)*** *A comparison of the relative brightness (Digital Number or DN values) for nine key features.*

Aristarchus: On 2016 Nov 14/15 Valerio Fontani (UAI) and Fernado Ferri (UAI) imaged the whole Moon for the purposes of helping out in a project to compare the relative brightness of Aristarchus in earthshine with that during the Full Moon. There are many reports of Aristarchus being exceptionally bright in earthshine, but sometimes it is hardly visible to visual observers (despite other features being seen). As earthshine is essentially zero phase angle illumination, if this presumably "photometric" effect occurs in earthshine then it should recur under Full Moon conditions. The only variable should be the libration. We are therefore encouraging members to send in images of the Full Moon or earthshine which show Aristarchus (unsaturated) so that we can take relative measurements with respect to other features. This is a long term project and you can take part, even using small telescopes or telephoto images. Fig 7 is a test to see how similar a selection of

lunar features are, taken 9 hours apart, around Full Moon time. As you can see, there is some variation of just under 10% between the two images. This could be due to a number of reasons, for example it is around Full Moon time that there is a maximum rate of change of the apparent brilliance of lunar features, so a separation of 9 hours may make a lot of difference. There may also be glare effects from scattered light from the local sky conditions. I will present some more examples of the archives we have of Full Moon and earthshine imagery held in our database in future newsletters.

Janssen K: On 2016 Nov 17 UT 0455-05:25 Jay Albert (ALPO) observed visually this crater under the same illumination conditions, to within ±0.5˚, of the following LTP report:

> *On 1992 Feb 21 at 03:00-03:55UT C. Brook (Plymouth, UK, 3" refractor x116, seeing II) found that Janssen K was very bright. Cameron 2006 catalog extension ID=441 and weight=2. ALPO/BAA weight=1.*

Jay used a Celestron C 11" SCT (x224), under mostly clear sky conditions with transparency at 3rd magnitude, and seeing at a poor 3 out of 10. He found indeed that Janssen K was very bright. Its E wall was the brightest feature in the Janssen area. K's W wall cast a shadow that covered most of its floor. The Rima Janssen was easily seen, even in the bad seeing. I will therefore remove the 1992 report from the database by changing the weight from 1 to 0.

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

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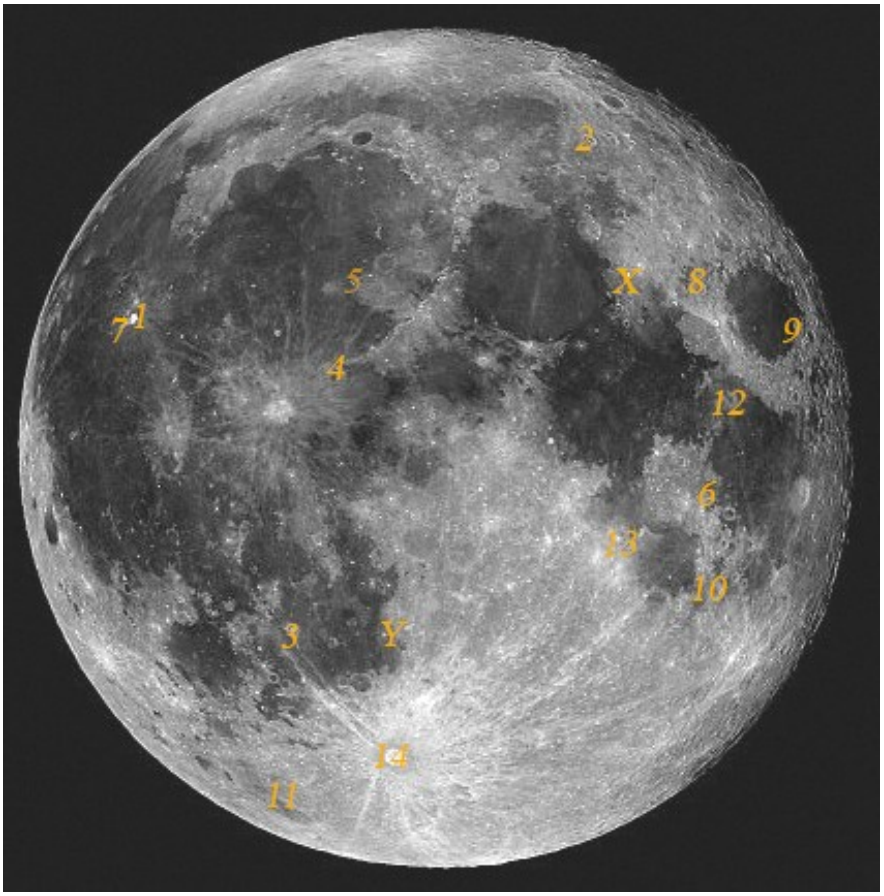
KEY TO IMAGES IN THIS ISSUE

1. **Aristarchus**
2. **Atlas**
3. **Bullialdus**
4. **Eratosthenes**
5. **Beer**
6. **Gutenberg**
7. **Herodotus**
8. **Macrobius**
9. **Promontorium Ararum**
10. **Santbach**
11. **Schiller**
12. **Taruntius**
13. **Theophilus**
14. **Tycho**



FOCUS ON targets

X = Montes Taurus & Taurus-Littrow Valley
Y = Rupes Recta