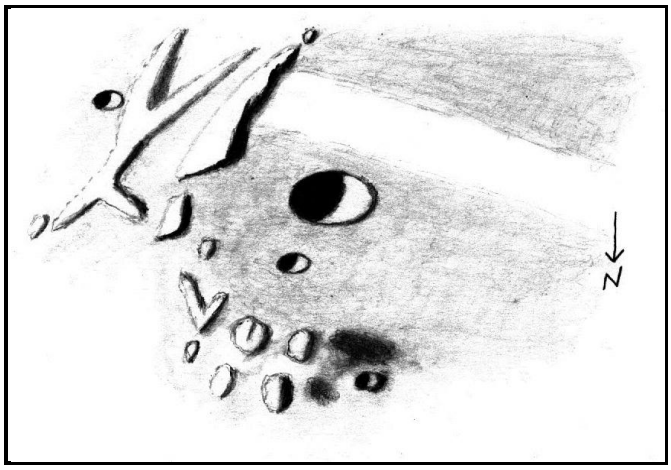
ASSOCIATION OF LUNAR & PLANETARY OBSERVERS
ALPO
Founded in 1947

# THE LUNAR OBSERVER

**A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.**
**EDITED BY: Wayne Bailey wayne.bailey@alpo-astronomy.org**
**17 Autumn Lane, Sewell, NJ 08080**
**RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html**

# FEATURE OF THE MONTH – AUGUST 2016

## W Bond B




**Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA**
**March 18, 2016 01:50-02:30 UT, 15 cm refl, 170x, seeing 8/10, transparency 6/6**

I drew this crater and vicinity on the evening of March 17/18, 2016 before the moon hid 1 Cancri. This crater is the most conspicuous feature within the large ruined ring W. Bond, north of Mare Frigoris. This is a very crisp crater with much interior shadow and slight exterior shadow at this time. The smaller crater W. Bond C is north of B, and is a miniature version of its neighbor. A wide, slightly curved ridge with dark shadowing is southeast of W. Bond B. It tapers almost to a point at its southern end, and a small peak is just off this tip. A large, blocky peak, also with dark shadowing, is north of this ridge, and a small peak with much lighter shadowing is between this block and W. Bond C. Another ridge is just east of the wide ridge and block. This ridge has two branches, and has relatively light shadowing except at the elbow formed by one of its branches. A low peak is just off this ridge's north end. The crater just east of this ridge is probably Archytas U. The interior of this crater and the nearby slope appeared quite bright at this time. These ridges may be part of W. Bond's broken east rim. A group of detached peaks north of W. Bond Band C may be part of the large ring's north rim. The crater seen in this mottled area is probably Barrow N. This crater showed extensive exterior shadowing, and a nearby dark area did not have an obvious sunward. slope adjacent to it. The interior of W. Bond itself appears to be very smooth, but there is a bright streak beginning near the wide ridge near W. bond B, and passing south of that crater.

# LUNAR CALENDAR

## AUGUST-SEPTEMBER 2016 (UT)

| 2016 | | UT | EVENT |
|---|---|---|---|
| Aug | 02 | 20:45 | New Moon |
| | 04 | 06:19 | Moon-Venus: 3.1° N |
| | 04 | 22:12 | Moon-Mercury: 0.6° N |
| | 05 | 07:48 | Moon Ascending Node |
| | 06 | 03:28 | Moon-Jupiter: 0.2° N |
| | 10 | 00:05 | Moon Apogee: 404300 km |
| | 10 | 18:21 | First Quarter |
| | 12 | 12:10 | Moon-Saturn: 4° S |
| | 14 | 13:05 | Moon Extreme South Dec.: 18.5° S |
| | 18 | 09:27 | Full Moon |
| | 19 | 14:14 | Moon Descending Node |
| | 22 | 01:20 | Moon Perigee: 367000 km |
| | 25 | 03:41 | Last Quarter |
| | 25 | 16:21 | Moon-Aldebaran: 0.2° S |
| | 27 | 11:17 | Moon Extreme North Dec.: 18.5° N |
| Sep | 01 | 09:03 | New Moon |
| | 01 | 09:08 | Annular Solar Eclipse |
| | 01 | 15:27 | Moon Ascending Node |
| | 03 | 10:33 | Moon-Venus: 1.2° S |
| | 06 | 18:44 | Moon Apogee: 405100 km |
| | 08 | 21:23 | Moon-Saturn: 4.2° S |
| | 09 | 11:49 | First Quarter |
| | 10 | 22:05 | Moon Extreme South Dec.: 18.5° S |
| | 15 | 23:55 | Moon Descending Node |
| | 16 | 18:56 | Pen. Lunar Eclipse |
| | 16 | 19:05 | Full Moon |
| | 18 | 17:00 | Moon Perigee: 361900 km |
| | 21 | 22:13 | Moon-Aldebaran: 0.2° S |
| | 23 | 09:56 | Last Quarter |
| | 23 | 16:44 | Moon Extreme North Dec.: 18.5° N |
| | 27 | 22:32 | Moon-Regulus: 1.8° N |
| | 28 | 22:06 | Moon Ascending Node |

# 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

# CALL FOR OBSERVATIONS:

## FOCUS ON: Montes Apennines-Palus Putredinis

***Focus on*** is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the **September 2016** edition will be **the Montes Apennines-Palus Putredinis area.** 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 Montes Apennines-Palus Putredinis article is August 20, 2016**

# FUTURE FOCUS ON ARTICLES:

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

| Subject | TLO Issue | Deadline |
|---|---|---|
| Schiller-Zuchius Basin | November 2016 | October 20, 2016 |

**********

# ANTONÍN RÜKL (1932-2016)

Noted lunar cartographer, selenographer, and prolific author, Antonín Rükl passed away on July 12, 2016. Former director of the Prague Planetarium, Czech Republic, lunar observers will most likely recognize him for his Atlas of the Moon. A more extensive obituary, written by Ken Poshedley, is available on-line at http://www.skyandtelescope.com/astronomy-news/antonin_rukl_255450885/.

**********

# ALCON 2016 & ALPO CONVENTION

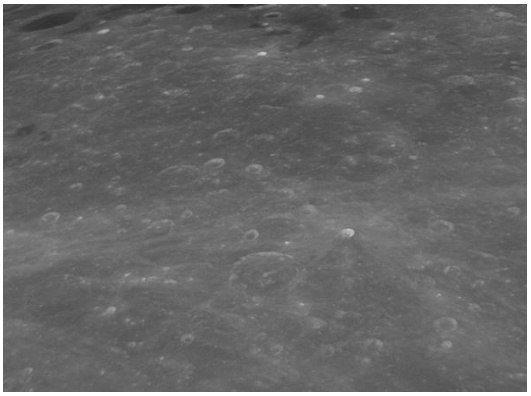
This year, the ALPO annual meeting will again be in conjunction with the Astronomical League's ALCON 2016, August 10-13, 2016 in Arrlington, VA (Washington, DC area). Additional information is on the Astronomical League ALCON website (https://alcon2016.astroleague.org/) and in the JALPO. Registration and accommodation information is on the AL website.

**********

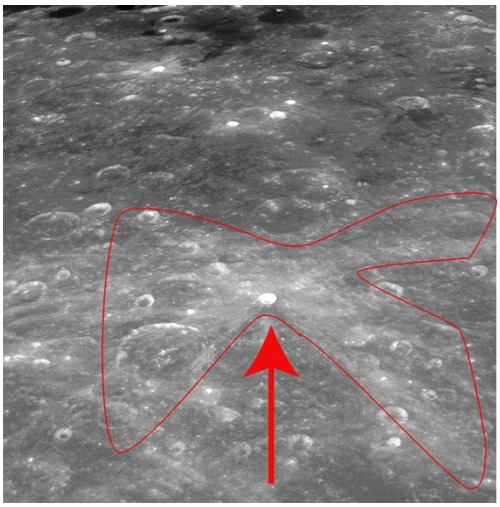
# RABBI LEVI H

## Alberto Anunziato

The full moon is a nightmare for lovers of deep space objects and astrophotographers, but is the janitor of a gallery of masterpieces that can only be seen under their strong light. When most of the craters become unrecognizable by the lack of contrast, it is right moment to contemplate the bright ray craters, usually unobserved.



We made this picture while we watched different areas of the Moon for the Lunar Geological Change Detection Program. We could not identify the crater at the time, only after several attempts we could get it, discarding names from ALPO's bright ray craters list. It is Rabbi Levi H, just 8 kilometers in diameter.



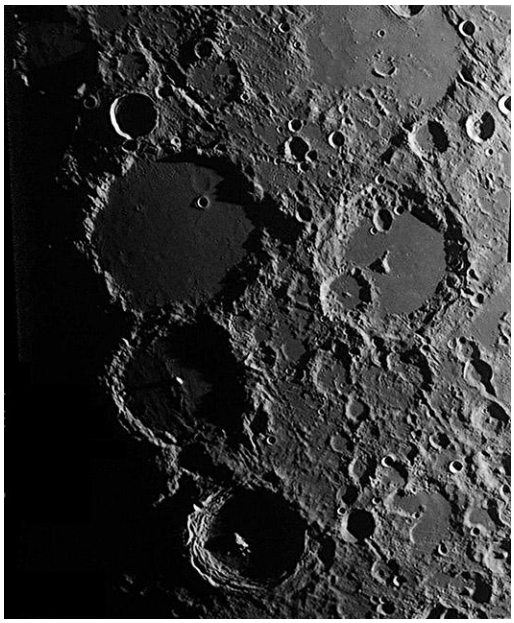
What made this image attractive, in my opinion, is that the rays from Rabbi Levi H appear prominent although they are not in contrast with the dark floor of some "mare" (as the brightest rays usually do) but with the bright floor composed of anorthosite of the highlands.

We modified a bit the image with Photoshop in order to see that the rays appear in the form of a fan (as a more conspicuous bright ray crater, Proclus), perhaps indicating an impact at an oblique angle from the north, as indicated by the red arrow.

Observer: Alberto Anunziato (Oro Verde, Argentina).
Name of feature: Rabbi Levi H.
Date and time (UT) of observation: 06-19-2016-05:29.
Filter: Astronomik ProPlanet 742 IR-pass.
250 mm. Schmidt-Cassegrain (Meade LX 200). QHY5-II.

# THE BIG THREE

## Richard Hill



About a day after first quarter (depending on libration to some extent) you can catch sunrise on this trio of craters (fig. 1) just southwest of the center of the moon. For lunar tyros these three are often the first craters identified. I know that was true for me. The largest crater at 158km diameter is Ptolemaeus. These big flooded craters used to be called walled plains. The little crater inside of

***FIGURE 1. Ptolemaeus-Arzachel-*** *Richard Hill – Tucson, Arizona, USA June 13, 2016 02:44 UT. Seeing 910. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.*

Ptolemaeus is Ammonius. Back in the 1960s when I was the tyro, this was Lyot which is now a large crater near Mare Australe. Below Ptolemaeus is the 121km crater Alphonsus. This crater has been famous several times over. Two astronomers at Pulkovo Observatory reported a emission flare near the central peak of this crater on Nov. 3, 1958. It was attributed to the escape of gas of a fluorescent nature. The observation has never been repeated and thus remains anomalous. Then on March 24, 1965, Ranger 9 impacted the floor of Alphonsus with live images being broadcast on television. I remember the excitement as we watched image after image come in. The bottom crater is the 100km Arzachel with its great terraced walls.

Just to the right of Ptolemaeus is the 139km Albategnius with the 46km Klien on the lower left wall. You can see most of Hipparchus (155km) at the top of this image. Notice the diagonal scaring (lower right to upper left) across the illuminated region to the right of the trio. These were carved by boulders, city sized boulders at that, that were thrown out during the great Imbrium impact. What a sight that must have been!

**********

# PLINIUS

## David Teske

Plinius (fig. 1)is the wonderful crater on the northern border of Mare Tranquillitatis near Mare Serenitatis. Plinius is a very distinct crater that is 43 km in diameter. The floor of Plinius is interesting. It has a crescent-shaped central mountain. Stretching northwest of the central peak is a Y-shaped ridge. South of the central peak on the floor of Plinius was another hill along the

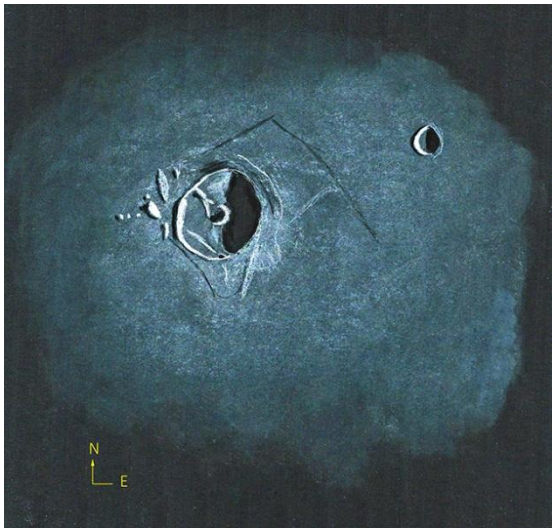



***FIGURE 1. Plinius-****David Teske – Starkville, Mississippi, USA. March 15, 2016 00:35-01:24 UT. Seeing 8/10, clear. 60mm, f/16.7 refractor. 167x.*

southwest of the floor. The walls of Plinius showed some terracing and were sharp and thin. The western interior wall was bright in sunlight. The eastern third of the floor of Plinius was in shadow. Outside of Plinius were ramparts visible to the east with some exterior terracing. South of Plinius there was a tongue of material. To the west of Plinius was a scattering of small hills. Northeast of Plinius was the 18 km wide sharp rimmed crater Dawes. The western wall was in

bright sunlight, the eastern half of the floor was is shadow. North of Plinius going from the western hills to the northeast was a dark shadow that was part of Rimae Plinius. This shadow took a $90^{o}$ turn to the southeast halfway between Plinius and Dawes. This was a mare wrinkle ridge perhaps associated with Dorsa Smirnov in Mare Serenitatis.

**********

# PETAVIUS-LANGRENUS

## Richard Hill

Inspired by a friend's image of Petavius on 7/8 and a favorable libration I took some images between storm clouds last night as they were clearing out. Usually this is a recipe for bad seeing but not this time. You can see the 182km Petavius below center with the stark rima on it's floor. I was only able to get a hint of the perpendicular rima. Its proximity to the limb lets us see just how shallow these craters really are. How early selenographers could think they were caldera is quite baffling. Below Petavius and just to the left is the 85km Snellius while below and to the right is Hase also listed at 85km. Just above center is the dark 151km diameter Vendelinus with Lame (87km) to the upper right and Lohse (43km) to the upper left. These lead further up to another breathtaking crater Langrenus (136km) at the upper edge of this image. A beautiful line up of great craters.

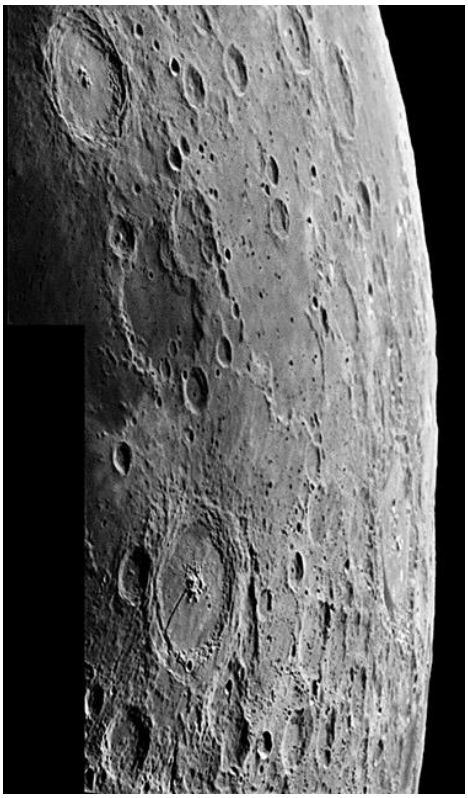


***Figure 1.*** ***Petavius-Langrenus*** *- Richard Hill – Tucson, Arizona, USA July 9, 2016 02:55 UT. Seeing 8/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.*

But that's not what is so interesting here. To the right of Petavius, almost on the limb is a large crater with a bright central peak and a couple small but bright contained craters. This is the huge 213km diameter Humboldt, not often seen so well thanks to the libration that let's us look around the limb so-to-speak. Above Humboldt can be made out another oval. This is 131km Hecataeus. Moving out to the right of Langrenus are two small craters, Barkla (44km) and Kapteyn (51km). These point us to a pair or even larger craters, La Perouse (80km) and further, Ansgarius (97km). Below these is a well defined 56km crater Behaim and a little closer to the limb is the barely discernible Gibbs (80km) just north of Hecataeus. Most of these are only visible at such a libration or tipping of the moon. You can watch for these opportunities with freeware like Virtual Moon Atlas:http://ap-i.net/avl/en/download

# 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 images of Apennine Mountains(2).

ALBERTO ANUNZIATO - ORO VERDE, ARGENTINA. Digital image of Rabbi Levi H.

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 6 & 7.8 day moon, Albategnius, Alpine Valley, Hyginus, North-central terminator, Palus Putredinus, Ptolemaeus, South-central terminator, Theophilus-Descartes, Triesnecker, & Walther.

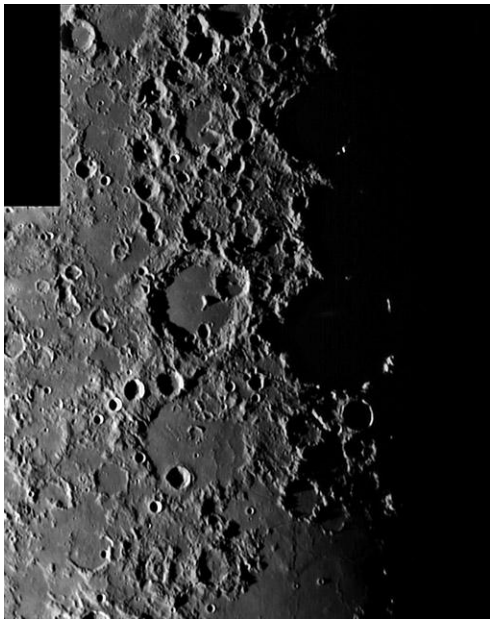
MARCELO GUNDLACH – COCHABAMBA, BOLIVIA. Digital images of Apennine Mountains-Palus Putredinus(3), Gassendi, Pythagoras & Schickard.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Apennine Mountains(2), Archimedes, Aristoteles, Messier, Petavius & Ptolemaus-Arzachel.

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

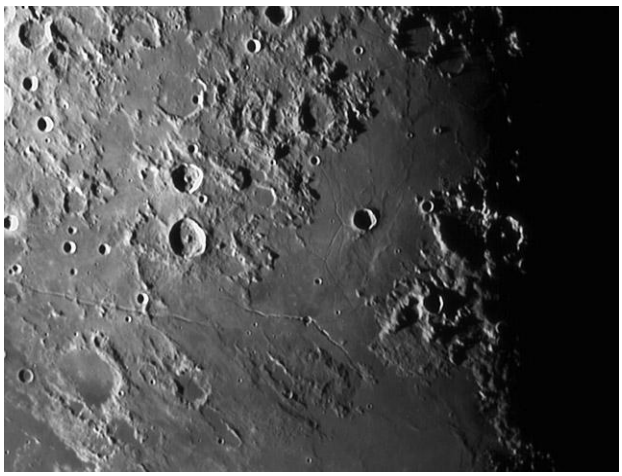
**********

## RECENT TOPOGRAPHICAL OBSERVATIONS



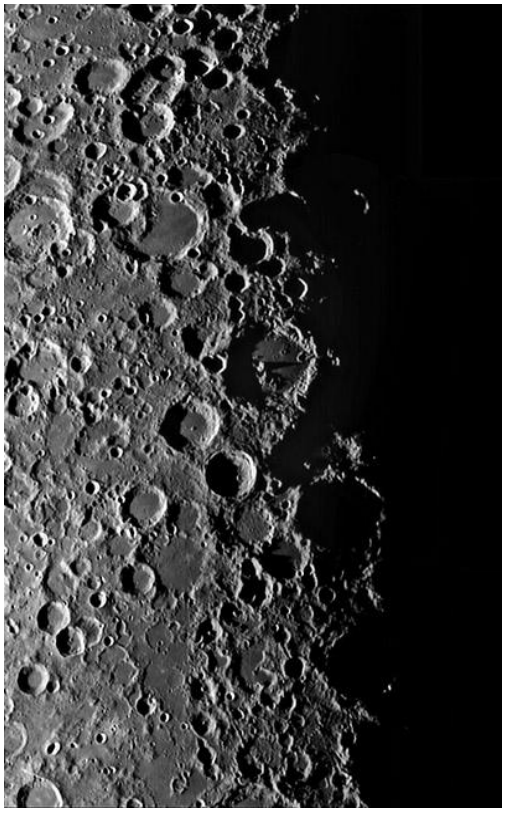
**ALBATEGNIUS** - Maurice Collins, Palmerston North, New Zealand. July 12, 2016 07:56 UT. FLT-110, f/21, ASI120MC (South up).

.



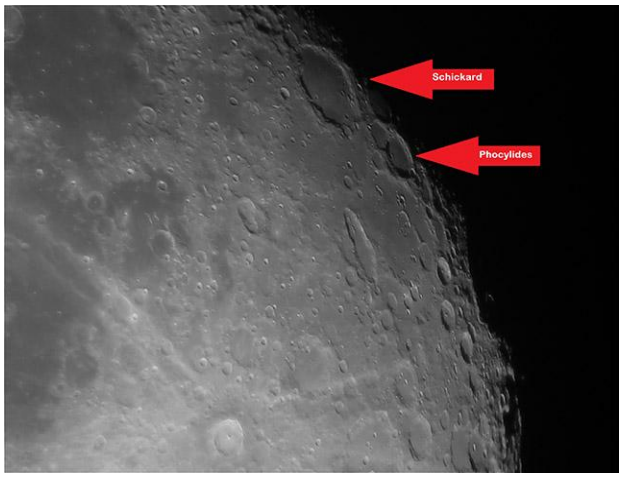
**TRIESNECKER** - Maurice Collins, Palmerston North, New Zealand. July 12, 2016 07:55 UT. FLT-110, f/21, ASI120MC (South up).

).



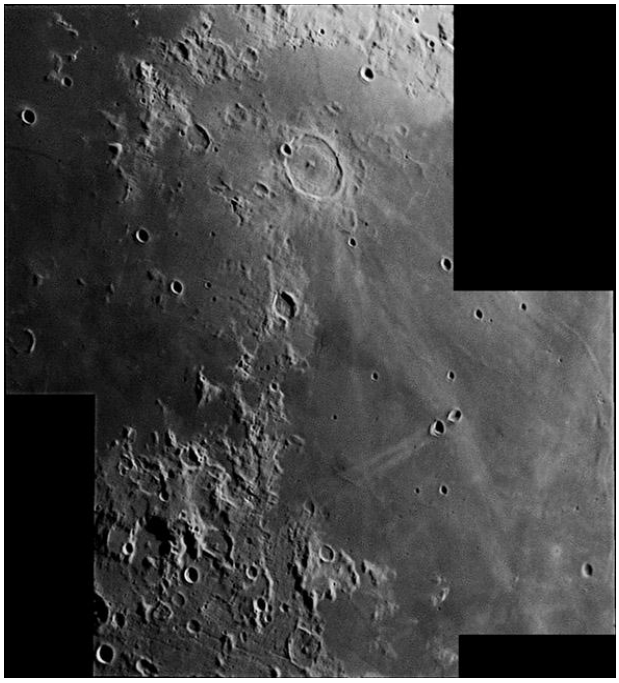
**WALTHER** - Maurice Collins, Palmerston North, New Zealand. July 12, 2016 07:57 UT. FLT-110, f/21, ASI120MC (South up).

**GASSENDI** – Marcelo Gundlach, Cochabamba, Bolivia. July 17, 2016 05:02 UT. Seeing 10/10, transparency 5/6. 150mm f/8 refractor, Canon Power Shot A-620, Orion 40mm Super-Plossl eyepiece. V-block filter.




**SCHICKARD**– Marcelo Gundlach, Cochabamba, Bolivia. July 17, 2016 05:10 UT. Seeing 10/10, transparency 5/6. 150mm f/8 refractor, Canon Power Shot A-620, Orion 40mm Super-Plossl eyepiece. V-block filter.

**MESSIER** – Richard Hill – Tucson, Arizona, USA July 10, 2016 02:51 UT. Seeing 7/10. TEC 8" Mak-Cass, f/20, SKYRIS 445M, 656.3 nm filter.



*A comet on the moon. That's how I thought of this pair of craters with a forked ejecta tail on the floor of Mare Fecunditatis, back in my formative days of lunar observing in the early 1960s. In those days these were known as Messier and (W.H.) Pickering as seen in books like Dinsmore Alter's "Lunar Atlas". The IAU renamed them Messier (12km diameter) on the right in this photo, and Messier A (11x13km) to the left. It is thought that this unusual pair of craters and the "tail" formed at their impact was due to a low angled impact where the impacting asteroid that formed Messier bounced forming Messier A. The large shallow crater above center is the 58km Taruntius. Left of this crater is the mostly ruined 26km crater Lawrence. Below Taruntius are the Montes Secchi and the 26km crater Secchi in those mountains.*

*At the end of the ejecta tail from the Messiers, is a large key-hole shaped crater. It is unnamed, but a little further on is a well defined smaller crater Leakey (14km). Below Leakey you can see a system of 4 parallel rimae. These are the Rimae Gutenberg (Gutenberg itself is below and off this image). This system of rimae is about 340 km long and the cracks themselves are about 1.5km* wide.

# LUNAR GEOLOGICAL CHANGE DETECTION PROGRAM

**Coordinator – Dr. Anthony Cook – atc@aber.ac.uk**
**Assistant Coordinator – David O. Darling - DOD121252@aol.com**

**Observations/Studies for June** were received from: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Capuanus, Carlini D, Censorinus, Eratosthenes, Gassendi, Messier, Mons Pico, Plato, Proclus and Torricelli B. Alberto Anunziato (Argentina – AEA) imaged/observed: Aristarchus, Atlas, Blancanus, Herodotus, Madler, Mare Crisium, Mare Humboldtianum, Palus Putredinis, and Plato. Maurice Collins (New Zealand, ALPO) imaged: Alphonsus, Archimedes, Deslandres, Hyginus, Maginus, Mare Crisium, Mare Imbrium, Moretus, Triesnecker, Valles Alpes, and several other features. Anthony Cook (Newtown, UK – BAA) imaged several features. Marie Cook (Mundesley, UK – BAA) observed Gassendi and Torricelli B. Rik Hill (Tucson, AZ, USA – ALPO) imaged: Gambart and several features. Italian UAI observers were unable to observe much at all in June due to poor weather conditions.

**News:** Gene Cross, a veteran LTP observer from the 1960's has sent me a copy of the Project Moonblink report. Project Moonblink was a NASA funded program to use electronic imaging cameras of the time to look through alternating red and blue filters, and to display the resulting image on a monochrome television screen. If any red or blue was present on the lunar surface, then this would show up as a rather obvious blink area on the lunar surface. This equipment was sent to several moderately sized professional observatories across the USA and three colored LTP were detected with this equipment. I also heard from Jack Eastman, who was one of the observers on this Moonblink program – but he never detected any colored LTP with this device when he used it.

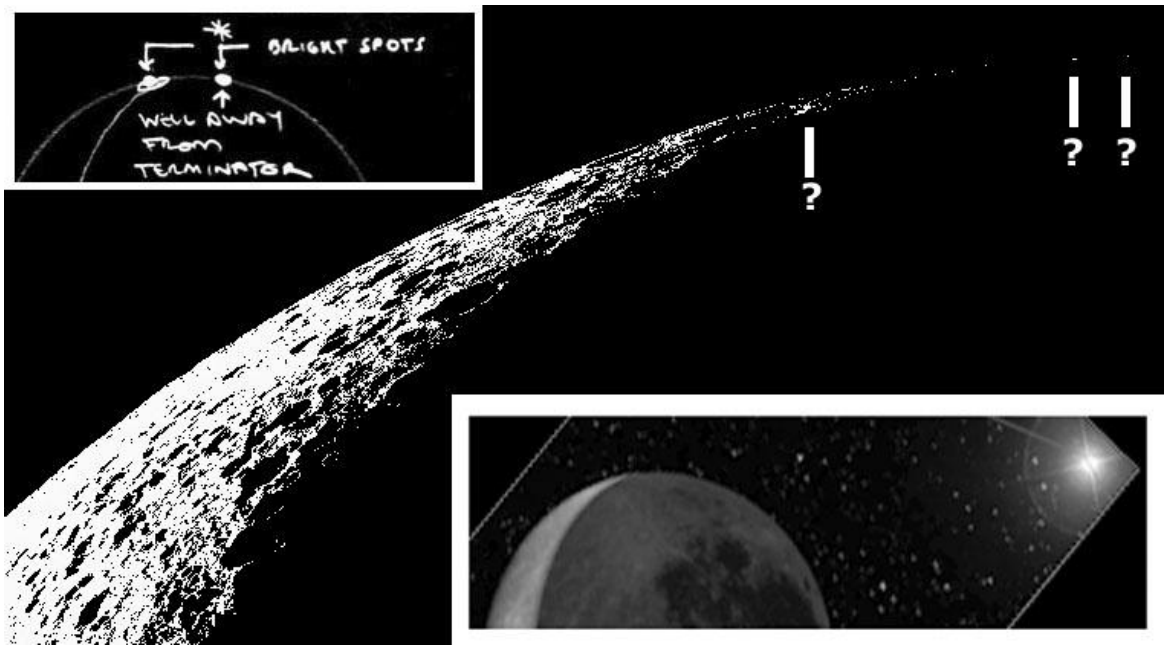



**Figure 1.** The south of the Moon from 1997 Apr 10 UT 20:45 as it would have been seen from Ron Livesey's (BAA) location in Edinburgh, but rotated so that south is towards the top. **(Top Left)** A negative image of Ron's observational sketch. **(Bottom Left to Top Right)** An LTVT simulation (https://ltvt.wikispaces.com/Downloads ) by Maurice Collins. Question marks have been added at locations of possible sunlit peaks which might have been seen by Ron. **(Bottom Right)** A simulated view of the sky near the Moon, for Ron's location, as generated with World Wide Telescope (http://wwtstories.org/ ).

I have received correspondence back from Ron Livesey, in Edinburgh, concerning his 1997 Apr 10 South. Pole observation (Fig 1 – Top Left) – we discussed this in last month's newsletter. He has now supplied me with his observing coordinates and I have run the World Wide Telescope program again. Alas I cannot find a star that would have been obviously visible to him at the date and UT given. The closest one I could find was Hyadum I ($\delta^1$ Tauri) at magnitude 3.8, as you can see in Fig 1 (Bottom Right). I also checked 20:45BST (British Summer Time), but no obvious star could explain the furthest apparent sunlit peak from the pole. The closest that Hyadum got to the Moon was an actual occultation at 21:37UT, but it was much too far around on the SW limb to resemble anything in Ron's sketch. An alternative explanation was that the two white spots on Ron's sketch were just sunlit peaks. We showed last month, that the east most one could easily have been a sunlit area, but the more distant one looked like it was quite further west than the south pole, which is a bit of a puzzle. I was very pleased to have received a visualization simulation from Maurice Collins, who used the LTVT program to show what the south pole area of the Moon would have looked like on the night/UT in question and from Ron's observing locality. As you can see from the central image in Fig 1, there are some isolated sunlit peaks as indicated by three question marks. The left most of these possibly is the east most of the bright spots in Ron's sketch. Either of the two right most question marks might be the most westerly spot in Ron's image, though they are apparently not far enough west? One explanation for this might be that Ron was observing under a thick haze Alto-Stratus conditions at the time, and so the light from the Moon would have been diminished. This might have made the visual detection of the southern tip of the crescent more difficult to see and appear to end further east, but the brightest isolated sunlit peaks would still be visible. Hence they might appear more separated. We should also take into account that the LTVT simulation tool, like most virtual reality programs are not perfect and sometimes have trouble giving true representation at shallow, almost grazing Sun angles. I would therefore like to keep this event at a weight of 1 as we need to see some more examples of repeat illumination/topocentric libration observations to confirm the appearance. But probably the sunlit peak theory is the correct one.

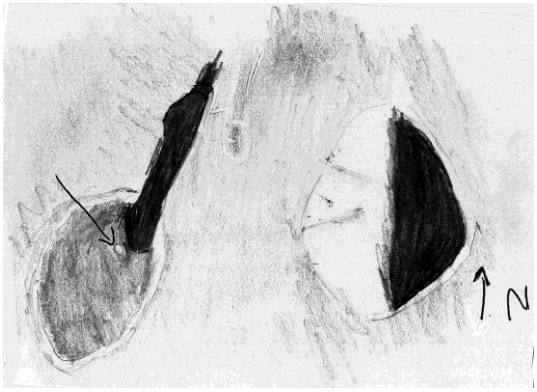



**Figure 2.** Herodotus and Aristarchus as drawn by Alberto Anunziato (AEA) on 2016 Jun 17 UT 05:00, orientated with north towards the top.

**LTP Reports:** One potential LTP was seen in June, although it may not have been realized at the time. On 2016 Jun 17 Alberto Anunziato (AEA) supplied a sketch that he had made of Herodotus and Aristarchus, during some repeat illumination events. Although it failed to show anything resembling what had been seen under repeat illumination, he did draw a white spot on the floor of Herodotus where the shadow from topographic relief to the south of Vallis Schroteri intersects with the northern inner floor of Herodotus (See the left most arrow in Fig 2). Alberto was using a Meade EX 105 scope, x154, and seeing was 7/10. He was observing visually from 05:00-06:00UT and in his notes says: *"I could discern a very tiny light spot on Herodotus off the center of the floor. It has the appearance of some high terrain emerging from the shadow."* I am not aware that there should be a white spot here? There is a prominent white craterlet on the NW inner rim of Herodotus, but it is not shown in the sketch, nor the shadow on the inner east rim of Herodotus, which makes me think the sketch is unfinished. Therefore I shall assign a weight of 1 to this event for the moment. Let us see

if we can pick up this white spot again during future repeat illumination events and prove that it is normal?

**Routine Reports:** Below is a selection of reports received for May that can help us to re-assess unusual past lunar observations. This month we have managed to eliminate some past LTPs, reduce the weights of others, and have also found some possible errors present in past LTP catalogs.

**Alphonsus:** On 2016 Jun 13 UT 08:09 Maurice Collins (ALPO) imaged this crater under identical illumination conditions (to within ±0.5˚) to a report from Patrick Moore from 1967:

> *Alphonsus 1967 Feb 17 UT 17:47-18:12 Observed by Moore and Moseley (Armagh, Northern Ireland, 10" refractor, x300) "Eng. moonblink suspected just inside SW floor on the elevation NW of famous dark patch. Feb 18 was cloudy, then on Feb 19, after some neg. results with blink, suddenly a bright glow in same place." NASA catalog weight=4. NASA catalog ID #1014. ALPO/BAA weight=4.*

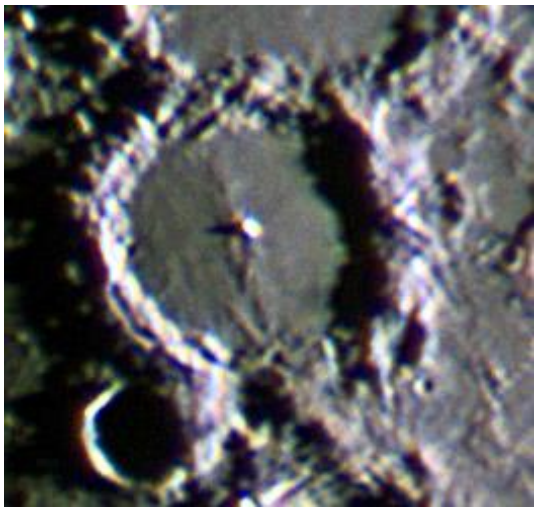


**Figure 3** A color image of Alphonsus, taken by Maurice Collins on 2016 Jun 13 UT 08:09. The image has been rotated so that north is towards the top, it has had atmospheric spectral dispersion effects removed by offsetting red and blue components so as to minimize color fringes. Then the image was color normalized, so that the red, green, and blue brightness histograms were scaled to one another. Finally the image had its color saturation increased to 70%.

Maurice's color enhanced image, in Fig 3, is surprising because it shows no dark patch on the south east floor, and indeed I cannot find a dark patch here in the Hatfield Atlas. What I think has happened was that it was a 1960's observation, and the BAA Lunar Section were using the Classical coordinate system i.e. N & S is the same in both the Classical and IAU system, but East in Classical is towards the Mare Orientale (Eastern Sea), which in IAU terms is actually on the western limb of the Moon. So although Cameron is fairly good at making sure all coordinates are expressed in IAU in her catalog, I think here she neglected to convert properly on this specific observation. So the above report should read: "*Eng. moonblink suspected just inside SE floor on the elevation NE of famous dark patch*". So now if you look on the SE floor of the crater, you can make out a faint dark marking, which although not well presented at this shallow solar illumination angle, is probably the one that Moore was referring to. Unfortunately there is no sign of any colored area to the north east of this. Normally I would do a set of artificial spectral dispersion simulated image, when color is involved in a LTP report, however as a Moonblink device was used, there is no point as this will automatically remove artificial color from the atmosphere, or from chromatic aberration present in refractors. Now it is possible that there may be some scattered light from our atmosphere which is more present at shorter wavelengths due to Rayleigh scattering, and this in turn can case a blink effect between filters. However as the region of the floor concerned is very similar to other parts of the floor, I do not see any reason why there should be color here and not

elsewhere. I shall therefore leave the weight of this 1967 report at 4 as it was seen by two observers, albeit with the same instrument.

**Gassendi:** On 2016 Jun 15 UT 20:20-20:35 & 20:40-20:45 Marie Cook (BAA) observed this crater under the same illumination conditions (to within ±0.5˚) to a report from Peter Greg from 2011:

> *On 2011 Oct 07 UT 21:45 Gassendi observed by P. Grego (St Dennis, UK,300mm Newtonian, x150, seeing III, intermittent cloud) - whilst producing some sketches of the crater - observer noticed a faint point of light inside the shadow filled interior, two thirds of the way out from where the central peaks should have been, towards the SE rim. Some uncertainty in being sure about this spot and after interruption by cloud it was not seen later that evening. ALPO/BAA weight=1 to reflect uncertainty of observer.*

Marie was using a 90 mm Questar telescope under Antoniadi III seeing, but through thin cloud. She could not see any point of light towards the SE-rim, and this was despite the observing conditions improving during the second session. I shall therefore leave the weight of the Grego report at 1.

**Censorinus and Proclus:** On 2016 Jun 14 UT 01:35-02:00 and 02:00-02:15UT these craters were observed respectively by Jay Albert (ALPO) under similar illumination conditions (to within ±0.5˚) to the following LTP reports:

> *On 1981 May 12 UT 22:00? M.C. Cook (Frimley, UK and using a 12" reflector, seeing IV-V), noticed that Censorinus was very bright, fuzzy and occasionally brighter than Proclus. However both Foley (Kent, UK) and Amery (Reading, UK) using a C.E.D. found that Proclus was brighter than Censorinus as it had been during April and May 1981. However Chapman obtained the reverse of this. Cameron 2006 extension catalog ID=138 and weight=3. ALPO/BAA weight=2.*
>
> *On 1989 Dec 06 at 23:09-23:34UT D. Darling of Sun Prairie, WI, USA (3" refractor x36 and x90, and then a 12.5" reflector at x64, S=7/10 and T=4, saw dark spots in Proclus (not as dark as those from 5th Dec 1989). Two telescopes were used and the bigger of these revealed some shading on the floor of Proclus approximately a third as intense as he had seen the previous night. A sketch was made. The LTP finished by 22:34UT. Cameron comments that the dark patches could not be due to shadow as the altitude of the Sun was too high at Proclus. The Cameron 2006 extension catalog ID=383 and the weight=0. The ALPO/BAA weight=2.*
>
> Jay comments that *"Censorinus was very bright and the crater was easily seen with minimum fuzziness. There was even the thinnest hint of shadow in the interior of Censorinus' E wall. The NW wall of Proclus, however, was still brighter than Censorinus (although the rest of Proclus wasn't). Both craters fit in the same field of the 11mm Nagler (255x). I did not notice any brightness fluctuations in either crater when observing at this power. Oddly enough, Censorinus did appear as bright as Proclus, and possibly marginally brighter, when viewed briefly at 70x. This effect may have been due to the large difference in the sizes of the craters with Censorinus appearing essentially as a compact bright patch at low power."*
>
> Concerning Proclus, Jay then goes on to say: "*I barely saw the usual dark patch on the SE floor at 70x. At 255x, the SE dark patch was much easier to see and I was able to see a second, smaller darkish spot near the SW wall. The NW wall was extremely bright and all the walls were sunlit, as is normal at this solar angle".*

Jay was using a 11" Celestron SCT under 7/10 seeing and this transparency magnitude 2 at the time of his observations. In view of Marie's poor seeing conditions in 1981 it is not surprising that Censorinus appeared fuzzy then. I concur with his comments explaining the differences of description in 1984 between the brightness of Proclus and Censorinus, and will lower the weight from 2 to 1, as I would still like to have a few more repeat illumination observations to be sure about this. For the Proclus LTP, which was originally weight 0 in the Cameron catalog, it is possible that the visibility of the dark spots varies with resolution (magnification), as Jay implies, but also because of libration (viewing angle). Certainly as David Darling was suggesting, the solar altitude at Proclus was high at the time he observed (59˚), therefore these were obviously not shadow, but certainly could be shadings. I think that I will leave the weight of this report at 2 for now.

**Aristarchus:** On 2016 Jun 19 UT 02:15 and 02:35 Alberto Anunziato observed this crater under the same illumination conditions (to within ±0.5˚) to a report by myself from 1989:

> *Aristarchus 1989 Oct 13 UT 21:00 Observed by Cook (Frimley, Surrey, UK, 8 inch reflector (visual and video), seeing III and transparency good) "Aristarchus had what appeared to be a outline of a ghost crater on its eastern side - quite large and bright". Cameron 2006 extended catalog LTP ID No=378 and weight=5.ALPO/BAA weight=3.*

There is a bit more to this 1989 observation than summarized in the above web description. On 1989 Oct 13 I went outside to make a quick visual check on Aristarchus, to see if conditions were worth the effort of taking the CCD video camera outside. Upon first glance, my attention was drawn immediately to a very bright blob projecting off the eastern exterior of the crater. This feature was much brighter than I had ever seen before, and was comparable in brightness to the central peak of Aristarchus. Also a lot of fine detail was visible around this blob, including a bright arc to the south east of the crater (attached to the blob and continued south of this). This was so prominent that it gave the impression that there was a second crater attached to the south east of Aristarchus. I went indoors, made an alert call, and brought out the camera – this was operational by 21:21UT. Unfortunately it appeared that I when I attempted to press the record and play buttons simultaneously on the VHS Video Cassette Recorder (VCR), as one is supposed to do on VCRs of that era, I did not press the record button fully and the VCR was just operating in play mode. In my haste to return outside and get the scope back on the Moon again I did not check this, and only discovered my error about 45 minutes later, by which time the effect was well on its way out. In the mean time a telephone alert was put out and a number of reports were received by visual observers, but mostly after the very high brightness levels had ceased.

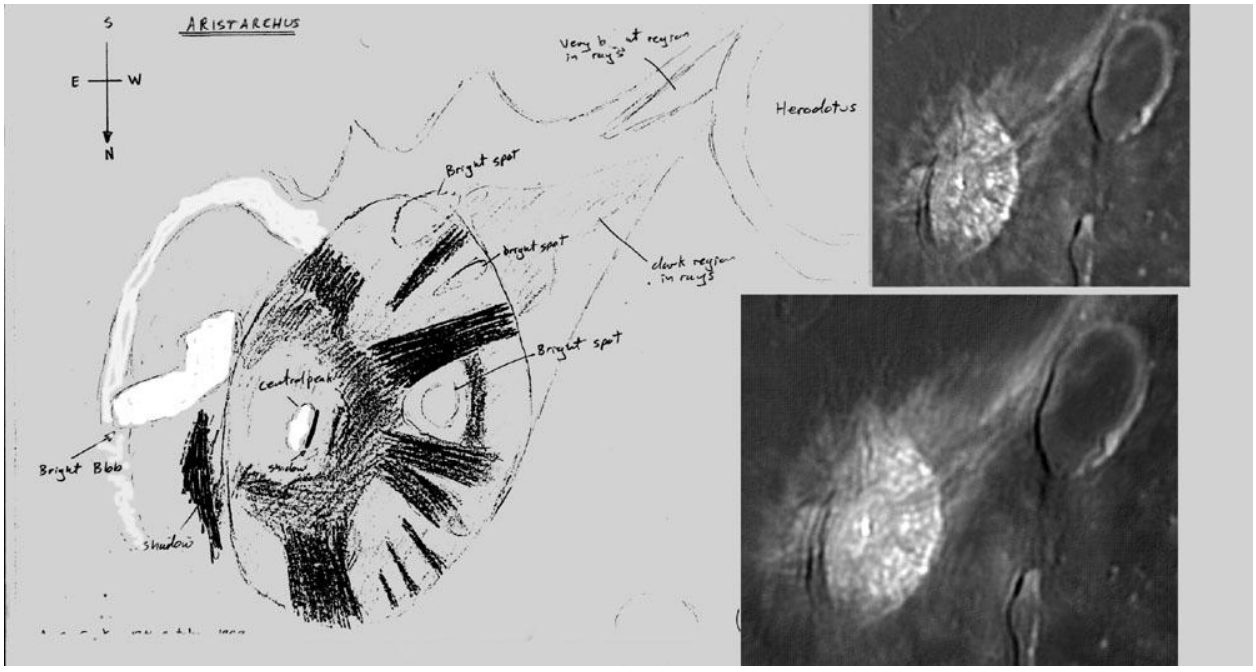



**Figure 4.** Aristarchus orientated with north towards the bottom. **(Left)** A sketch made 1989 Oct 13 from video recordings made between 22:04-22:06, 22:13-22:23, 22:25-22:32, 22:44-23:11UT. Note that the central peak, the elongated blob on the east rim, and exterior arc, mentioned in the text above, have been highlighted for illustrative purposes only to show the relative, more pronounced, brightnesses of these three aspects of the crater as were seen visually "earlier" in the evening, before the eventual successful VCR recordings started. **(Top Right)** Image by Alberto Anunziato (AEA) taken on 2016 Jun 19 UT 02:15. **(Bottom Right)** Image by Alberto Anunziato (AEA) taken on 2016 Jun 19 UT 05:40.

I have a copy of my surviving VHS recordings and have attempted to process them on Registax, however the image of Aristarchus is quite large and noisy and I have been unable to produce anything other than

a blurry image using the software (See Fig 5E). This maybe my inexperience of using Registax, or perhaps the digitizer saturated on the interior of the crater - though I have had some luck in the past with more contrasty decades old lunar VHS recordings of the Moon. If anybody else would like to have a try, then I can send you a copy of some of the video. Nevertheless, when I made the sketch from VCR recordings back in 1989 (See Fig 4 Left), there was enough dynamic range on the TV screen at the time to capture a lot of the interior detail – however the blob on the east was by that time fainter than the central peak. An image taken by Alberto, under similar illumination (Fig 4 Top Right) and a much higher resolution one (Fig 4 Bottom Right) that he took over three hours later, agree well in terms of interior detail visible inside Aristarchus, and the location of the arc and blob on the east of the crater. However like my video, made when the bright blob on the east was fading, the arc effect and the blob are not very pronounced in Alberto's image and would not have drawn a visual observer's attention!

In the BAA archives it seems that we have several other observers reports made during this night though there are some differences in what people have reported/drawn, which is interesting (See Fig 5), but this may be down to a combination of the progression of the event, seeing conditions, resolution? Firstly Peter Foley observed at 21:20UT and said "*Saw immediately what Tony meant when he said that the crater was of unusual appearance…. GAVE appearance of TWO CRATERS. The region was divided into two insofar that inner east and south east displayed much too much detail for this phase. The usual bright area (Blob) at nine o'clock on the eastern rim was elongated and very bright, in fact the brightest point within the region, even more so than the central peak. After a while I became aware that the blob was variable and dulled gradually until 01:40 on 14th when it brightened and remained variable for rest of period. The blob had a darkenining to the north of it which was also variable. A further brilliant spot lay on the south wall* " (See Fig 5F).

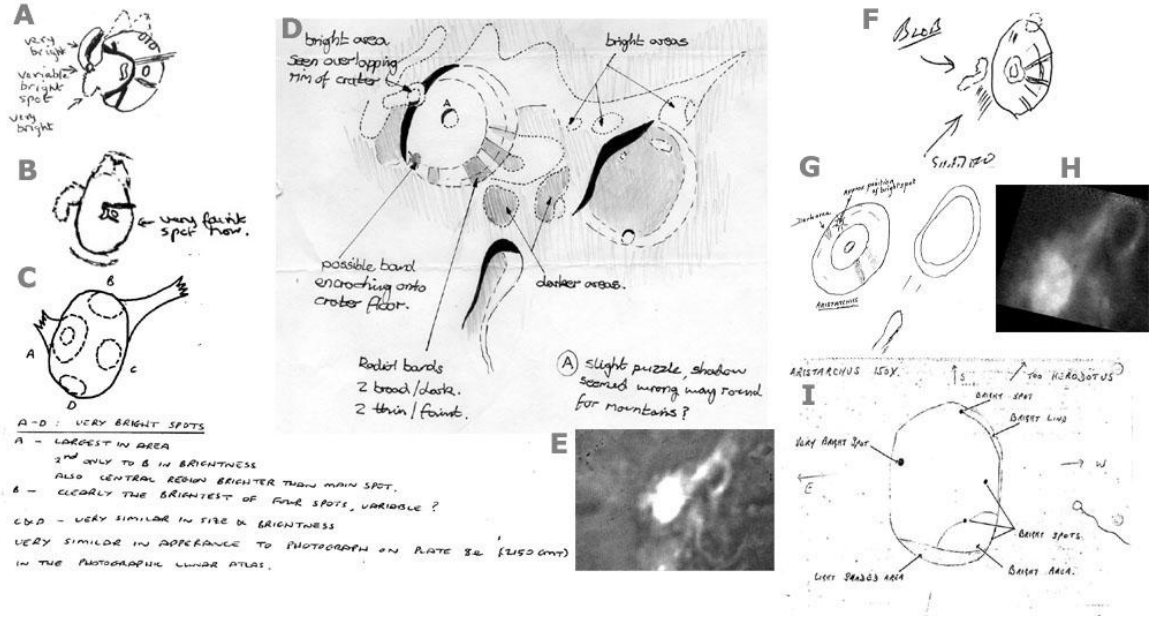



**Figure 5.** An assortment of sketches and images from 1989 Oct 13 (not in chronological order), orientated with north towards the top – all observations were made by BAA Lunar Section members. **(A)** A sketch made by Marie Cook (BAA) made during 21:00-20:20UT. **(B)** A sketch made by Marie Cook, made using a Questar 90mm scope, during 21:50-21:45UT. **(C)** A sketch by Mark Holmes made sometime between 21:35 and 22:45UT, using an 8" reflector, with a descriptive key underneath. **(D)** A detailed drawing by Andrew Johnson, made from 22:28 to 22:55UT. **(E)** An image from a video by Tony Cook with the centre of the crater overexposed, made sometime between 22:13 and 23:11 UT. **(F)** A sketch by Peter Foley, made, using an 11 reflector, sometime between 21:20 and 01:40UT. **(G)** A sketch by Bill Peters made between 21:15 and 22:18 UT, using a 8.5" reflector. **(H)** A single TV frame image from a video by Tony Cook, made sometime between 22:04 and 22:08 UT through cloud. **(I)** A sketch by Howard Davies, made sometime between 21:15 and 23:30 using a 15cm reflector.

Marie cook started observing shortly after 21:00 and apart from the central peak, could see four bright spots associated with the crater. The eastern most one lay to the east of the eastern wall, and was at least as bright as the central peak. It joined the spout feature on the ejecta apron on this side of the crater, and extending from the east to the south from this spot was what looked like a wall curving towards the southern apron diffuse region. There was a dark shading clinging to this wall, which made it resemble a "moat" partially around Aristarchus. Marie found that the eastern bright spot varied in brightness. It was very bright at 21:00, in fact equal to that of the central peak, but by 20:20 it was starting to fade: - 8 on the Pickering scale, where as the central peak was 10. Because the main 8 inch reflector was going to be used for video work, Marie moved over to a smaller Questar telescope and continued to observe from 21:40 to 22:3UT (See Fig 5B), but observing conditions were deteriorating.

Of the other observers, Bill Peters observed between 21:15 and 22:18 UT and using a C.E.D. (Crater Extinction Device) found the bright spot on the "south eastern" (I think this is really the "east" if you rotate his sketch appropriately) wall, to be of equal brightness to the central peak (See Fig 5G), but his sketch shows no spur protruding from the outer east of the crater rim. Howard Davies observed from 21:15 to 23:15, (with a break due to cloud) and his sketch shows too a very bright point closer to the upper part of the eastern rim, and although he comments that it was the brightest of the white spots, his sketch shows no spur like feature outside the rim here. It is unclear from his report if during the second of the observing sessions, whether the eastern bright spot was still the brightest. Mark Holmes observed from 21:35 to 22:45UT and noted that the bright spot on the east (Fig 5C) was now slightly fainter than the spot on the southern interior of Aristarchus, and fainter than the central peak – it was however the largest of all the bright spots in Aristarchus and looked like a spur sticking out of the eastern rim with a serrated easterly edge. Andrew Johnson observed from 22:28 to 22:55, making a shaded sketch, and showed a bright blob on the outer eastern rim at the start of the spur feature. This resembled well an accurate representation of the crater spots and bands as seen in my own "blurry" images (Fig 5E & 5H), but clearly differs from earlier observer descriptions. Interestingly Gerald North attempted to use a spectrographic telescope at Royal Greenwich Observatory's Herstmonceux Obsevatory, which the BAA had access to, but seeing conditions were pretty bad (Antoniadi V) at 21:39UT, when he started observing, and the two spectrographs obtained were effectively useless.

This is the first time I have had a chance to study all the observations made that night since 1989. It looks like the appearance of Aristarchus, on the east rim and further east onto its ejecta blanket perhaps evolved over time? The earliest observations had the bright spot on, or just over the eastern rim, as bright as the central peak- confirmed by Tony Cook, Marie Cook, Peter Foley and Bill Peters. However later observers say it was bright, but not quite as bright as the central peak. Only Peter Foley and myself describe the edge of the ejecta pattern as looking like a 2$^{nd}$ crater to the south-east of Aristarchus, though Marie Cook describes it instead as a "wall curving towards the southern apron diffuse region" and you can see this in Fig 5A, and is labeled as "very bright". The sprout effect coming off the outer east rim, is I believe just ray material from the inner part of the crater, which transitions from inside the crater rim to the ejecta blanket. It is shown in sketches by myself, Peter Foley, Marie Cook, Mark Holmes, and Andrew Johnson. You can also see it in my own images, and also in the repeat illumination images by Alberto, though it is not as bright in the 2016 observation. Interestingly Bill Peters and Howard Davies do not draw the sprout, but instead show a bright point actually just inside the eastern rim – though perhaps they were concentrating on the crater interior? Mark Holmes also puts the bright spot on the eastern rim and not outside. Peter Foley and Marie Cook comment on the variability of the bright spot. There are however some differences between overlapping observations of Peter Foley, Bill Peters and Howard Davies – perhaps this could be down to a combination of image resolution and seeing conditions? However now that we have Alberto's high resolution repeat illumination image, and we can see that the eastern spur or spot on the inner eastern rim is not especially bright and clearly not as bright as the central spot, I think we ought to raise the weight of this report from 3 to 4. This is justified if you consider that the illumination angle was high (at least 27˚ above the lunar horizon), and so shadow effects should not be coming into play- the only thing I can think about is a photometric effect with the surface, requiring precise viewing and illumination angle conditions.

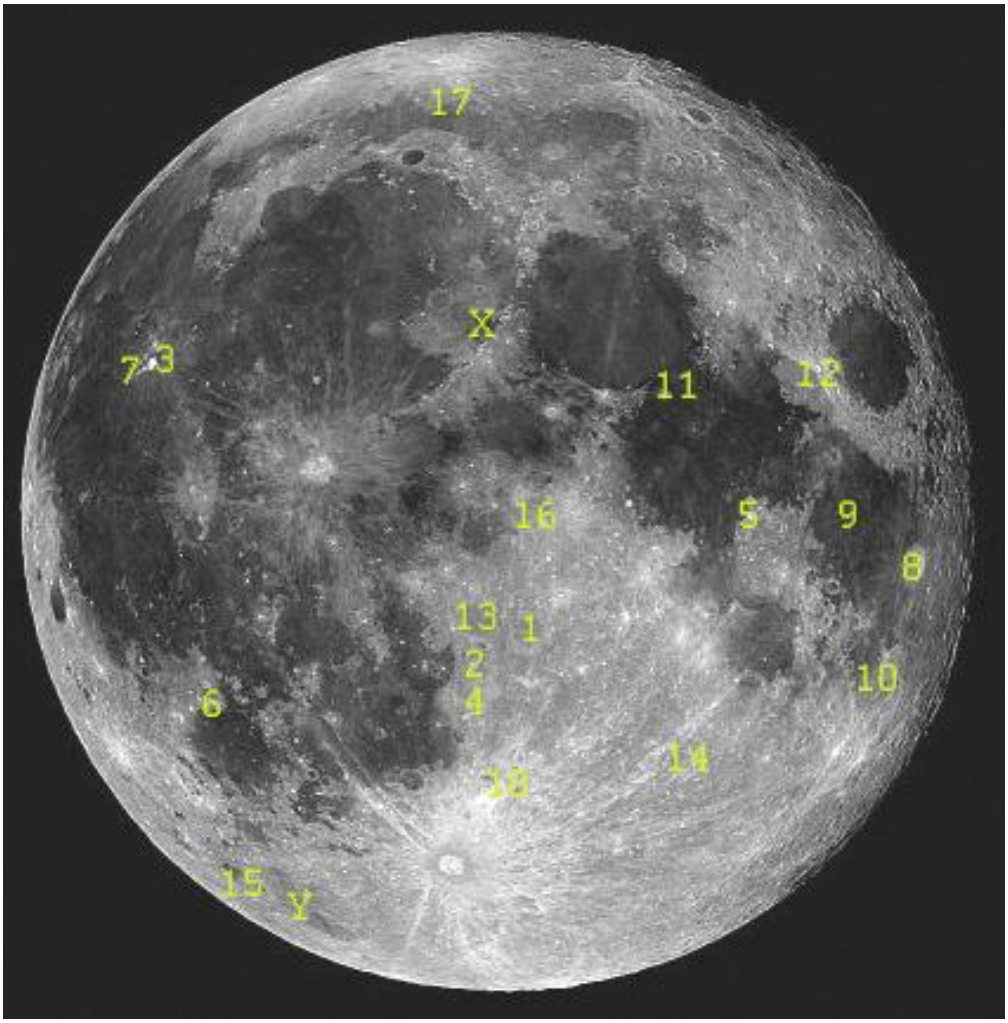
In terms of the lunar surface in this region on the east and south east of the rim, it is ejecta and impact melt material here. There are occasionally some very smooth areas close to the exterior of the rim, and some have cracks, but in general the lunar surface looks unremarkable for a ray crater. You can take a look yourself at the southeastern rim and exterior of Aristarcus by zooming into NASA's LROC Quickmap program: http://target.lroc.asu.edu/q3/ .

**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 .

Dr Anthony Cook, Institute of Mathematical and Physical Sciences, University of Wales Aberystwyth, Penglais, Aberystwyth, Ceredigion, SY23 3BZ, WALES, UNITED KINGDOM. Email: atc @ aber.ac.uk.

# KEY TO IMAGES IN THIS ISSUE

1. **Albategnius**
2. **Alphonsus**
3. **Aristarchus**
4. **Arzachel**
5. **Censorinus**
6. **Gassendi**
7. **Herodotus**
8. **Langrenus**
9. **Petavius**
10. **Plinius**
11. **Proclus**
12. **Ptolemaeus**
13. **Rabbi Levy**
14. **Schickard**
15. **Triesnecker**
16. **W Bond**
17. **Walther**




## FOCUS ON targets

**X = Montes Apennines-Palus Putredinus**
**Y = Schiller-Zuchius Basin**