THE LUNAR OBSERVER

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.
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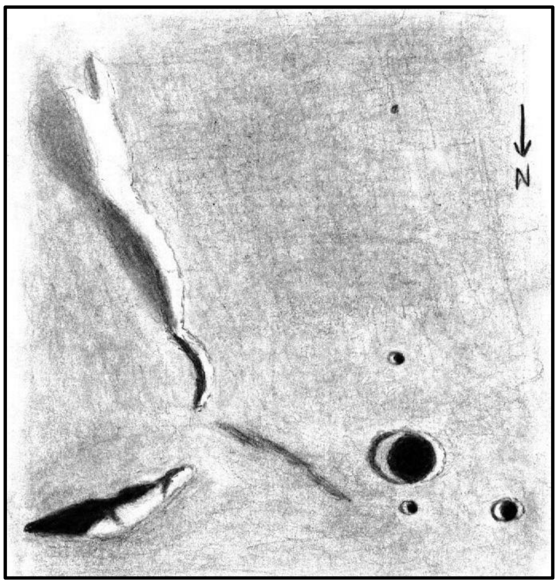
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – NOVEMBER 2015

PICO E & β



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
August 7, 2015 08:50-09:10, 09:25-09:40 UT, 15 cm refl, 170x, seeing 8/10

I drew this area on the morning of August 7, 2015 after 6th-magnitude ZC 454 reappeared from occultation. These features are in northern Mare Imbrium, south of the associated peak. Pico E is the largest crater in this sketch. Pico EA is the small pit just to the north, while Pico F is the similar pit somewhat farther to the south. The larger crater northwest of Pico E is Pico D. All four of these craters appear quite crisp, though none have halos. Pico beta is the large, elongated mountain east of Pico E. At observation time, it cast substantial black shadow, tapering to a point. The northwest side of Pico beta looks smooth, but the southeast side is irregular, probably from shadowing. There is modest wrinkling between Pico E and beta. A large wrinkle extends southward from near Pico beta. The northern end of this wrinkle is a curved segment near the aforementioned modest wrinkling. Its shadow was fairly dark, but not black. The large wrinkle is wider and less curved farther to the south, and cast lighter shadow. It spread out and became indistinct at its southern end. A low ridge protrudes from it in this area. The area of Mare Imbrium west of the large wrinkle appears very smooth except possibly for a minute pit. The Lunar Quadrant Map shows a craterlet labelled Kirch M in that area. This pit could not always be glimpsed; it must be smaller than Pico EA or F.

LUNAR CALENDAR

NOVEMBER-DECEMBER 2015 (UT)

2015		UT	
Nov	03	12:24	Last Quarter
	06	15:49	Moon-Jupiter: 2.5° N
	07	09:56	Moon-Mars: 2° N
	07	13:54	Moon-Venus: 1.4° N
	07	15:53	Moon Ascending Node
	07	21:48	Moon Apogee: 405700 km
	11	17:47	New Moon
	15	00:39	Moon South Dec.: 18.3° S
	19	06:27	First Quarter
	21	13:56	Moon Descending Node
	23	20:06	Moon Perigee: 362800 km
	25	22:44	Full Moon
	26	09:33	Moon-Aldebaran: 0.7° S
	27	20:13	Moon North Dec.: 18.4° N
Dec	03	07:41	Last Quarter
	04	06:21	Moon-Jupiter: 2° N
	04	18:33	Moon Ascending Node
	05	14:56	Moon Apogee: 404800 km
	06	02:40	Moon-Mars: 0.1° N
	07	16:55	Moon-Venus: 0.7° S
	11	10:29	New Moon
	12	08:15	Moon South Dec.: 18.4° S
	18	15:13	Moon Descending Node
	18	15:14	First Quarter
	21	08:53	Moon Perigee: 368400 km
	23	19:09	Moon-Aldebaran: 0.7° S
	25	07:30	Moon North Dec.: 18.4° N
	25	11:11	Full Moon
	29	20:30	Moon-Regulus: 2.9° N
	31	17:55	Moon-Jupiter: 1.6° N
	31	20:19	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
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: Mare Nubium

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the **January 2015** edition will be **Mare Nubium** and surroundings**.** 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):

Wayne Bailey - wayne.bailey@alpo-astronomy.org
Jerry Hubbell –jerry.hubbell@alpo-astronomy.org

Deadline for inclusion in the Mare Nubium article is December 20, 2015

FUTURE FOCUS ON ARTICLES:

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

Subject	TLO Issue	Deadline
Your Favorite Feature (Photogenic, curious, strange, ?)	March 2016	February 20, 2016

FOCUS ON: DESLANDRES

By Wayne Bailey

Coordinator: Lunar Topographical Studies

Deslandres is a large, decrepit crater bordering the southeast corner of Mare Nubium (fig. 1). Eduardo Adarve has provided a good overall description of the crater in his article in this issue, so I'll try not to repeat his information. Figure 1 shows the waxing gibbous moon. Deslandres is marked by the bright spot northeast of Tycho (Cassini's bright spot). Dark albedo spots mark the north and south inner walls. Figure 2 gives a closer view, still showing the surroundings, with a lower sun angle Cassini's bright spot is visible near the border with Walther, although it isn't as bright as in fig. 1.

Figures 3 & 4 show higher resolution views at lower sun angles, which emphasize the details on the floor. The sunrise terminator is approximately at the western wall of Deslandres in both images although they were taken more than four years apart. The lighting conditions are similar, but not identical, so differences can be seen between the two images, particularly

***FIGURE 1* - 11 DAY MOON** - Maurice Collins, Palmerston North, New Zealand. August 26, 2015 07:26 -07:31UT. FLT-110.

near the terminator. There is a tremendous amount of detail visible on the floor when the illumination angle is low; several flooded craters, crater chains, small craters, and mounds. Parts of the floor are relatively smooth, while others, particularly the area between Ball and Hell, are hummocky. Figure 5 is a chart of Deslandres from the International Astronomical Union Gazetteer of Planetary Nomenclature showing all named craters (planetarynames.wr.usgs.gov/).

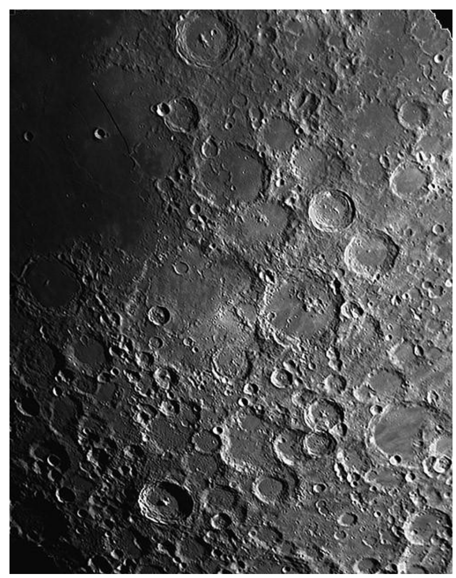


***FIGURE 2* - DESLANDRES** - *Michael Sweetman, Tucson, Arizona, USA, November 23, 2012 06:34 UT. Seeing poor. 6" f/12 Mak.. 742nm filter.*

The degree of degradation of Deslandres is illustrated by comparing it to the well known crater Clavius (figs 1 & 6) which is only slightly smaller. Clavius stands out from the rugged southern highlands, but Deslandres was originally simply known as Hell Plain, named for the most obvious crater on what is now considered the crater floor. Regiomontanous, Walther, Walther W, Lexell, Ball and Ball A are all significant,

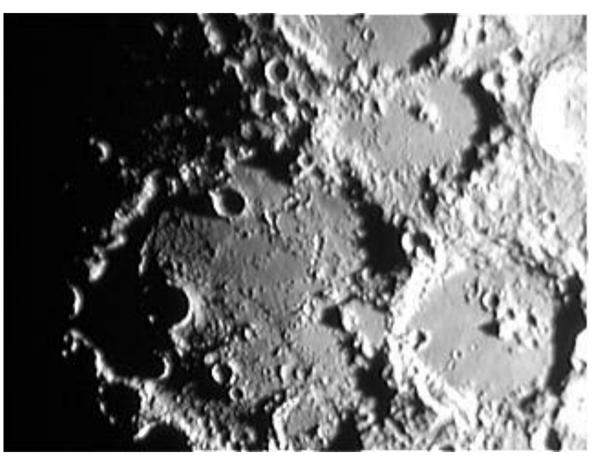


***FIGURE 3* – SUNRISE AT DESLANDRES** - *Mike Mattei, Littleton, MA, USA. March 6, 2006. Seeing 8/10. 14" LX200, f/10. Toucam. 807nm filter.*

easily recognized craters that impinge on what is left of Deslandres' walls. Ball, Ball A and Hell appear relatively fresh. Ball and Hell each have central peaks.

A gap in Lexell's wall opens into Deslandres. The surface appears to be continuous; no indication of the former Lexell wall is seen. O'Meara (2006b) pointed out a shallow, fairly broad, straight trough that passes in front of the gap, continuing to the east of Hell, where it terminates in a linear ridge that curves toward Hell. This seems unlikely to be a lava drainage channel, so probably marks a fault, possibly a down-dropped block (a graben). It is roughly aligned with the nearby Straight Wall (Rupes Recta).

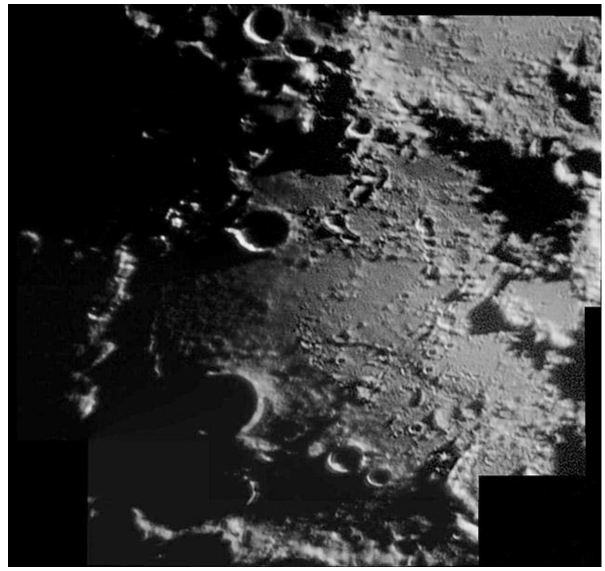
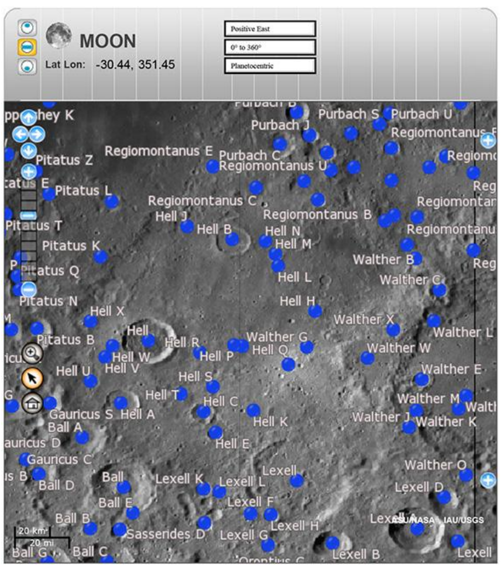


***FIGURE 4* – DESLANDRES SUNRISE** – *Richard Hill, Tucson, Arizona, USA June 20, 2010 03:07 UT. Seeing 8/10. C14+2x barlow, f/22, DMK21AU04, 656.3 nm filter.*

A small gap in the west wall of Walther connects it to Walther W. In turn, the northwest wall of W has a wider gap, which is not completely open because the smooth floor of W is higher than the adjacent floor of Deslandres.



Comparison of the low and high sun images shows that Cassini's Bright Spot is in the area of the T-shaped ridge near Hell Q. No crater or vent appears to be directly associated with it.

***FIGURE 5* – CHART OF DESLANDRES.** *From IAU Gazetteer of Planetary Nomenclature (planetarynames.wr.usgs.gov/)*

At various times it has been considered as part of the Tycho ray that passes over this area, or to be associated with Hell E or Q. Whatever its origin, Cassini's Bright Spot is one of (if not the) brightest spots on the moon, rivaling the better known Aristarchus (see fig. 6). O'Meara (2006a) has claimed that the bright spot on the southern part of the naked eye moon that is usually attributed to Tycho, is actually Cassini's Bright Spot. He suggests examining the full moon by naked eye, then by binoculars or low-power telescope to reveal a shift in the position of the bright spot. The explanation is that the dark nimbus around Tycho cancels out the bright crater when it is unresolved by the naked eye. Try it and see what you think.

***FIGURE 6* – CASSINI'S BRIGHT SPOT *vs* ARISTARCHUS, 14 day Moon -** Maurice Collins, Palmerston North, New Zealand. June 1, , 2015 07:23 UT. FLT-110.

And just in case you're wondering, the crater Hell is named for the founder of Vienna Observatory, Maximilian Hell. It's not a descriptive term.

ADDITIONAL READING

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O'Meara 2006b S&T Mar Pg_64 Charon's Canal.

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Wlasuk, Peter. 2000. Observing the Moon. Springer-Verlag, London.

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ADDITIONAL DESLANDRES IMAGES

SUNSET AT DESLANDRES- Alberto Anunziato-Oro Verde, Argentina. September 6, 2015 07:26 UT. LX200 2500mm SCT, Phillips SPC900NC

DESLANDRES- Juan Manuel Biagi-Oro Verde, Argentina. October 4, 2015 07:50 UT. LX200 2500mm SCT, Phillips SPC900NC

ARZACHEL-ORONTIUS – Richard Hill – Tucson, Arizona, USA September 10, 2007 02:17 UT. Seeing 6/10. C14, f11, SPC900NC webcam, UV/IR block filter.

DESLANDRES

Eduardo Adarve

I made this drawing (fig. 1) on August 22nd 2015, under a clear and calm atmosphere, starting observation at 21:00 UT from a place near Madrid (exact location: 4º 24' 30'' N / 3º 52' 38'' W / 691m high), using a refractor telescope SW 120ED / 900, with a Williams Optic binoviewer fitted with two 7.5mm Takahashi eyepieces (approx. 194X). Along the observation, the Sun was just rising over Deslandres, so that all lands West of the crater were still in darkness. Table 1 gives additional information.

Deslandres is a huge crater (227 Km / 141 miles) located Southeast of Mare Nubium, its coordinates are Lat 32.55º S and Long 5.77º E (Moore 2014, p 187). It was previously known as crater Horbiger, but was officially named Deslandres in 1942, after Henry A. Deslandres (1853-1948), a French astronomer who invented the spectroheliograph (Grego 2007).

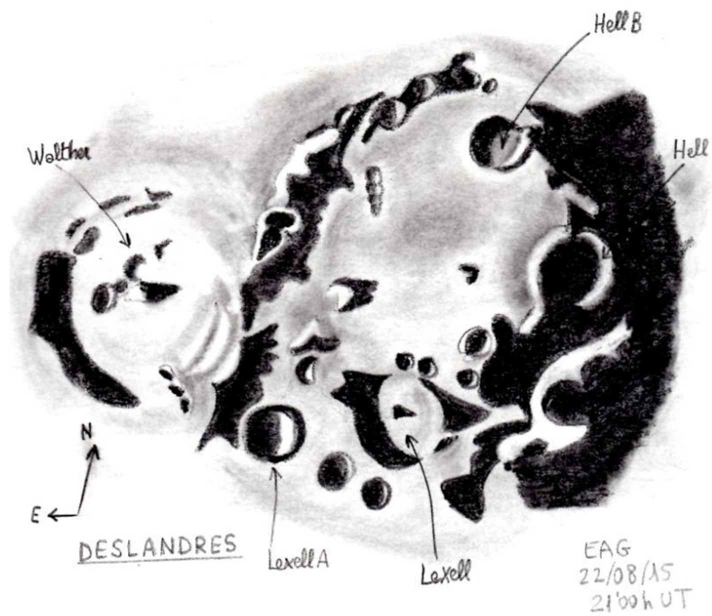

***Figure 1**. Deslandres.*

This crater is of pre-Nectarian age (4.6 to 3.92 thousand millions years ago) and similarly to other ancient craters of this age, it has a severe degradation all around its wall, triggered by heavy impact cratering. Besides that, several fractures are seen that may have been carved by ejecta hurled from neighboring impact basins. Consequently, Deslandres is difficult to be unambiguously recognized as a pre-Nectarian crater (Wilhelms 1987) and due to this reason, it was not ranked as a crater until well into the 20th century (Plank 2015). Before it was accepted as a crater, it was informally known as the Hell Plain (Wood 2003, pg 130) because the well known crater Hell lies on its surface.

Table 1: Ephemeris

Lunation	Colong.	Angular size	Libration Latitude	Libration Longitude	**SW 120ED refractor telescope f 7.5**
8.23 days	7.6º	30º45'	-4º 54’	-7º 11’	**WO binoviewer Barlow lens 1.6X Takahashi 7.5mm eyepieces**

As the floor of Deslandres is also overlaid by multiple impacts, it is possible to observe several minor craters, craterlets, crater chains and hills all over the surface. The largest crater in Deslandres's floor is Hell (33 Km / 20.5 miles and 2,200 m deep) (Grego 2005) which is located at the mid-western part of Deslandres. Its whole floor was dark during my observation and drawing. Other craters were Hell B, Lexell (63.7 Km / 39.6 miles) (Moore 2014, p 373) which seems to be a subsidence of Deslandres floor (Plank 2015), and Lexell A.

It is also interesting to observe a short craterlet chain crossing N-S at the northeastern part of Deslandres' floor. Charles Wood mentions (Wood 2003, pg 131) this chain as being composed by 5 small craters, but during my observation only 4 were visible. Wood also alludes to a second chain North of Deslandres, which nevertheless was not visible during my observation and drawing.

East of Deslandres is crater Walther (134 Km / 83.3 miles), which presents a conspicuous central peak (2.5 Km High) (Moore 2014, p 648) with several minor craters on the floor, which were best observed around the North and East sides if the peak.

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Wilhelms, Don E. 1987 ***The Geologic History of the Moon.*** U.S. Geological Survey Professional Paper 1348, United States Government Printing Office, Washington. Chapter 8, Pre-Nectariam System, page 149.

Plank, Andrew. 2015. ***What's Hot on the Moon Tonight? The Ultimate Guide to Lunar Observing.*** *MoonScape Publishing, LLC, 2015, page 91*.

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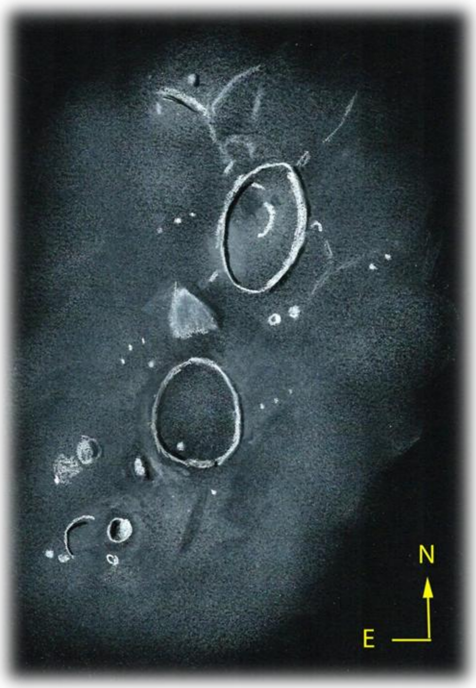
HANSTEEN AND BILLY

David Teske



I made this sketch on the early evening of 25 September 2015 (26 September 2015 UT) in Starkville, Mississippi using a 60 mm f/16.7 fl 1000 mm Moon Raker refractor telescope. An 8 mm Baader Planetarium Hyperion eyepiece was used with a magnification of 125. The telescope was mounted on a Losmandy GM8 mount. The observation was made between 0134 and 0225 UT. Seeing was 7/10 under mostly clear skies. The moon was waxing gibbous phase. Medium was white and black pastel on black Strathmore Artagain drawing paper. The observation was made.

Hansteen is the large (45 km diameter) crater in the north of the drawing. The walls are not high as indicated by the shadow. The interior has a crescent shaped hill near its center. There were two darker areas on its floor, as well as a light area on the northeast wall. Northeast of Hansteen is a series of hills that form a “Y” shape. This forms a very broken crater E northeast of Hansteen, southwest of the “Y”. Northwest of Hansteen is a ridge pointing to the northwest. West of Hansteen is a light “Y” shaped area and two tiny light areas. South of Hansteen is A, 6.5 km appearing as a fresh crater, and B to its west, 5.3 km, and not as deep. Southeast of Hansteen is Mt. Hansteen or “The Arrow”. At 31 km across, the arrow shows some relief.

Billy is the large, 46 km diameter, dark crater to the south of Hansteen. Billy has thin walls, is shallow, and has a smooth, dark floor. On the southeast floor is a small bright area, likely a craterlet. On the south wall is a tiny crater. East of Billy is a small hill. Further east is a dome-like hill then a smaller hill. Southeast of Billy is crater D, a fresh crater 11 km in diameter. East of that is a crescent shaped hill with two small bright areas southeast of that hill. A darker surface is south of Billy.

TYCHO CRATER IN THE EARLY WAXING PHASES

Stephen Tzikas

During a full Moon, Tycho is perhaps the most noticeable crater shining brilliantly and manifesting radiant long rays. Yet, even when those rays are not fully dominant in the early waxing phases, Tycho crater offers some pleasant detailed views. Tycho hosts some impressive complex morphology such as being sharply defined, slumped terraced inner walls, a smooth-like flat floor, and a nice double central peak. The crater is 85 kilometers wide, and hence easily viewed. Much of Tycho's impressive view is due to it being a relatively young crater of about 108 million years in age. Ejecta from this crater was spread across much of the nearside of the Moon and is visible in the form of bright rays at full Moon. Because Tycho is so young, its deposits have not been pulverized and mixed in with surrounding rocks by myriads of small impacts.

Figure 1 presents my four observational sketches of Tycho during the early waxing phases. My observations were completed with an 8" Meade Starfinder. A 9 mm eyepiece was usually used for a magnification of 133x. Occasionally a 6 mm eyepiece was used to extract additional details. My observing location was Reston, VA of coordinates: 38.95 degrees North; and 77.35 degrees West. Dates (UT), calculated colongitudes and observing notes are given in Table 1.

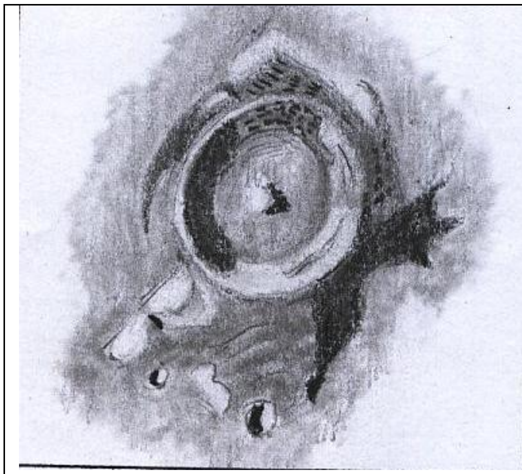
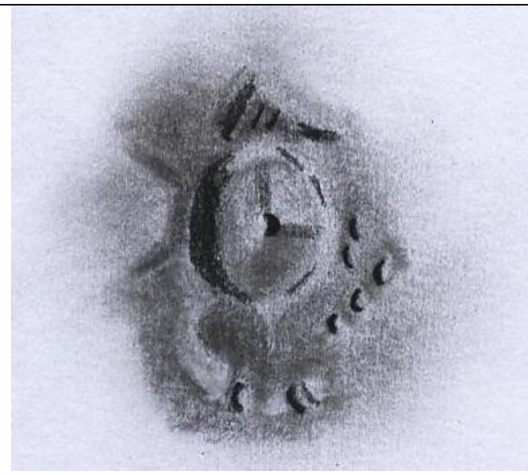
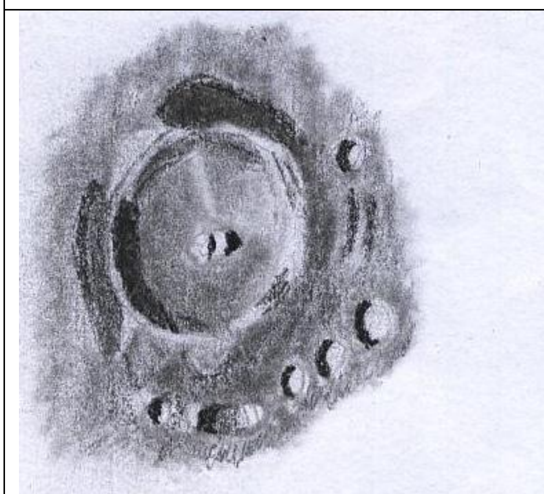
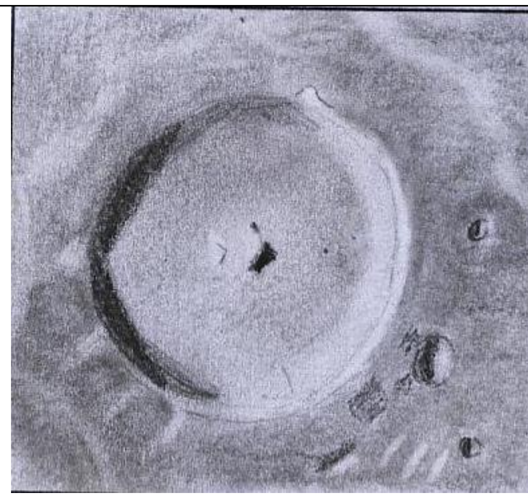
Tycho is in the lunar highlands, and the terrain surrounding the crater is quite rugged. Notice the triangular shaped area to Tycho's south in the December and March sketches. It almost gives the impression of hilly lines of ejecta radiating outwards. I have noticed that the wall structure of Tycho contains numerous rough, bright and elongated spot layering effects. Tycho has a large grouping of satellite craters ranging in size from 3 to 29 km. These satellites craters include those designated by the letters A, B, C, D, E, F, H, J, K, P, Q, R, S, T, U, V, W, X, Y, and Z. The USGS Digital Atlas of the Moon provides two charts (Quadrangles 111 and 112) that show of the satellite crater locations around Tycho. By convention these features are identified on lunar maps by placing the letter on the side of the crater midpoint that is closest to Tycho. The charts are part of the Lunar Astronautical Chart (LAC) series which are available online (www.lpi.usra.edu/resources/mapcatalog/LAC/)

Table 1: Tycho Observational Notes

Date (UT)	CoL.	Tycho Observational Notes
Dec. 30, 2014	22.53	Tycho is near the terminator and offers a lot of contrasting features. The crater walls have layering effects and roughness in texture. The crater floor appears smooth around its central peak. A lot of layering effects on the north exterior side of the crater.
Mar. 1, 2015	32.81	The large crater to the left is Pictet. The bottom right chain of small craters includes U (largest), F (middle), and a smaller crater. A small crater rim to right is satellite E. On the top are formations of linear hills running parallel to each other and perpendicular to Tycho's rim. To the bottom and right is a complex and rough terrain, which are also the directions with numerous satellite craters extended for a distance at least comparable to Tycho's diameter. I usually clearly see Tycho's double peak, but it wasn't so conspicuous in this colongitude.
Jan. 1, 2015	35.19	The usual layering, elevation, and rough texture effects are evident. Perhaps this is why surveyor 7 landed nearby in 1969. For the first time I see what appears to be a bright ridge between the central peak and the south wall.
Oct. 5, 2014	44.44	The north-east quadrant of Tycho's external wall seems to show a complex structure with a steep decline in height that is difficult to capture in a two dimensional sketch. Much more detail and tone came out using my 6 mm eyepiece, rather than my standard 9mm one. Depth perception too is observed by subtle shadowing in the north-west quadrant of the external wall of Tycho. Tycho crater rays were visible but not prominent. A system of craters surrounds Tycho, and all is connected a very delicate manner.

Figure 1: Tycho Crater Sketches

Basic direction: Left (Western sky), Right (Eastern sky), Top (South), Bottom (North)

	
December 30, 2014	March 1, 2015
	
January1, 2015	October 5, 2014

SEPTEMBER LUNAR ECLIPSE

Alexander Vandenbohede

Here are some results of the lunar eclipse of 28/09. I could follow it at Brugge, Belgium, under excellent conditions. Pictures of the complete lunar disk were made with a 500 mm zoom lens. Pictures of lunar details were made with a Celestron C8 and webcam in prime focus. Time taken is on each image.

I think the two last pictures give an unusual feeling. We are used to seeing parts of the Moon in shadow but this is different. Normally shadow stresses the topography along the terminator. Here, there is no expression of topography (full moon!); there is just a blanket of shadow moving over a flat but albedo-rich terrain.

Overview of different stages

Compilation from just before to just after the total phase

Just after total phase, different shutter speeds

Three different phases aligned on background stars showing how much the Moon has moved during the total phase

The Earth shadow nearing a number of well-known lunar landmarks

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

EDUARDO ADARVE – MADRID, SPAIN Digital image of Deslandres.

ALBERTO ANUNZIATO - ORO VERDE, ARGENTINA. Digital images of Mare Nubium & Pallas.

JUAN MANUEL BIAGI - ORO VERDE, ARGENTINA. Digital images of Plato & Deslandres.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Altai Scarp, Copernicus rays, Fracastorius & Wargentin.

DAVID JACKSON - REYNOLDSBURG, OHIO, USA. Drawing of Copernicus & Palus Somni.

JAMEY JENKINS – HOMER, ILLINOIS, USA. Digital image of Mare Nectaris.

MICHAEL MATTEI – LITTLETON, MASSACHUSETTS, USA. Digital image of Deslandres.

MICHAEL SWEETMAN – TUCSON, ARIZONA USA. Digital images of Langrenus & Mare Tranquilitatis.

DAVID TESKE - STARKVILLE, MISSISSIPPI, USA. Drawing of Hansteen & Billy.

STEVE TZIKAS - RESTON, VIRGINIA, USA. Drawings of Tycho(4).

ALEXANDER VANDENBOHEDE-ASSEBROEK, BELGIUM. Digital images of Lunar eclipse(19).

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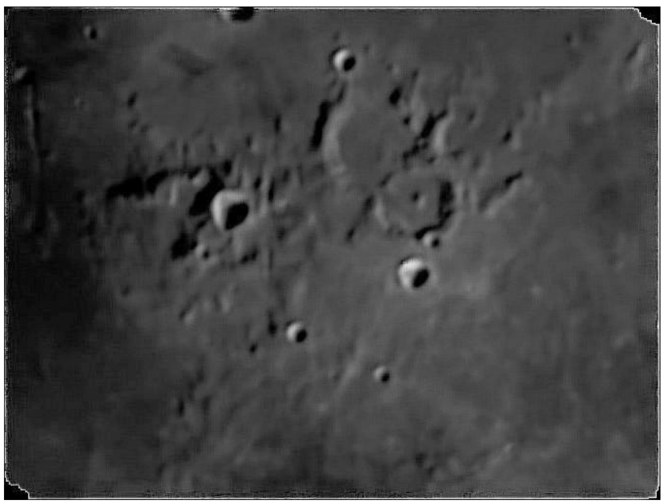
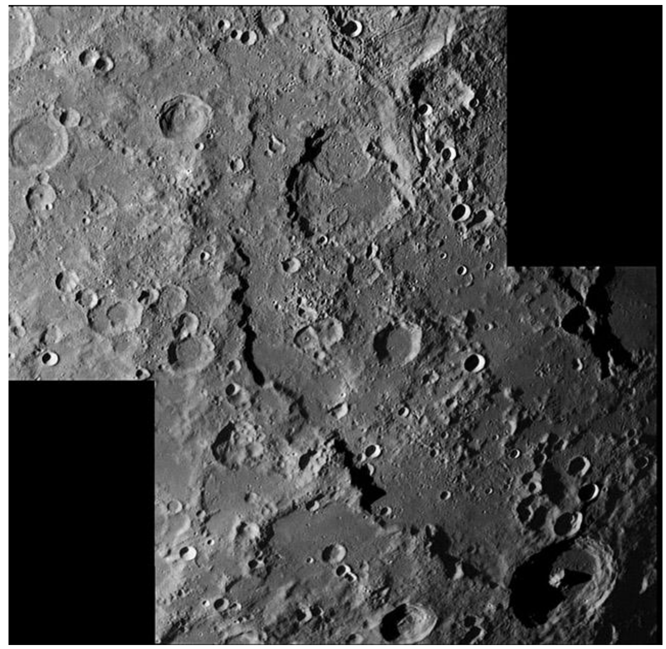
RECENT TOPOGRAPHICAL OBSERVATIONS

PALLAS- Alberto Anunziato-Oro Verde, Argentina. October 4, 2015 07:56 UT. LX200 2500mm SCT, Phillips SPC900NC



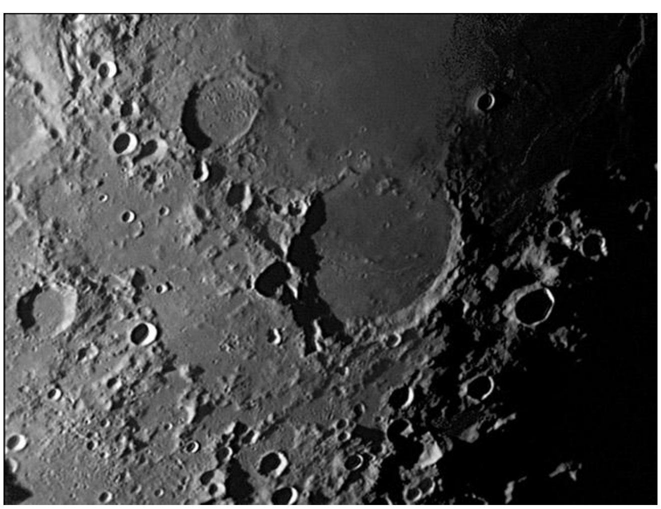
PLATO- Juan Manuel Biagi-Oro Verde, Argentina. October 4, 2015 07:49 UT. LX200 2500mm SCT, Phillips SPC900NC



ALTAI SCARP – Richard Hill – Tucson, Arizona, USA October 3, 2015 09:10 UT. Seeing 9/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.

The 90km diameter crater, Piccolomini (lower right), leads us to a spectacular feature you can see when the moon is only 5 days past new moon or, as in this case, about 4 days after full moon (colong. ~140). This is the great Rupes Altai or "Altai Scarp" for those of us that grew up in the 1950s and 1960s. It is the arc going to the upper left from Piccolomini for some 500km ending in the 41km crater Tacitus and is a line of cliffs of some 1000m in height. It is a pressure ridge from the Mare Nectaris impact (off the image to the right). Note the oncentric arc of secondary craters just inside this rupes. This image easily shows them to 2km and possibly below. Just south of Tacitus you can see another diagonal line of secondary craters that stretches for over 100km nearly orthogonal to the scarp itself passing just to the north of the 51km crater Almanon on the left edge of this montage.

Halfway down and to the left of Altai is an unusual crater that looks for all the world like a paw print. This is Pons at 46km diameter. Up Altai from that is the 41km crater Fermat, identical in measured diameter to Tacitus. Straight over to the right is a 43km crater, Polybius. Polybius, Fermat and Pons are all about the same age, just over 4 billion years old, while Tacitus and Piccolomini are about half a billion years younger. Another crater of the same age is 104km crater
Catherina just north of Polybius and above it we can see half of a similarly sized crater Cyrillus.

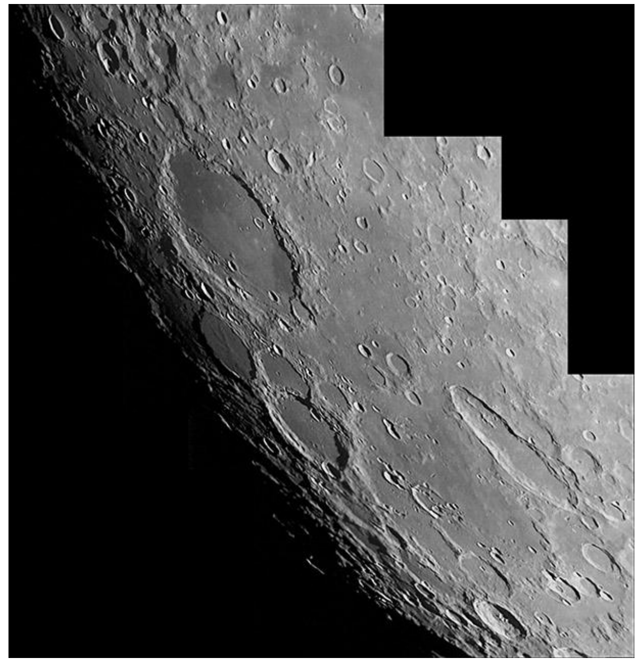


FRACASTORIUS – Richard Hill – Tucson, Arizona, USA October 3, 2015 09:03 UT. Seeing 9/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.

What a sight it is when both the 128km diameter Fracastorius and it's little look alike, the 54km Beaumont to the upper left of Fracastorius are both on the terminator. Here we see the post-full moon sunset terminator heading towards them. This is when you can get a good look at low elevation features on the floors of these features. Note the cat-smile rima on the floor of Fracastorius itself. It's odd that it does not have the name Rima or Rimae Fracastorius in either the Virtual Moon Atlas or Rukl. Is it so named? There are several domes there as well.

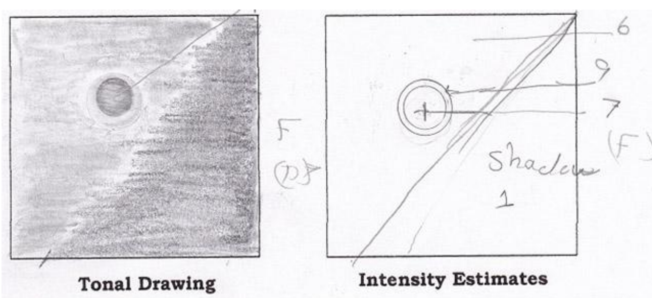
The southern wall of Fracastorius also has some very interesting features. There is the oddly shaped Fracastorius Y to the south and just slightly east. Before the era of Lunar Orbiter and Apollo, the origin of this feature, with it's starkly flat wall to the south, was the subject of much speculation. Above this feature is another odd crater, Fracastorius D some 28km in 'diameter'. These bear study during the whole lunation.

WARGENTIN – Richard Hill – Tucson, Arizona, USA September 26, 2015 04:11 UT. Seeing 8/10. TEC 8" f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.



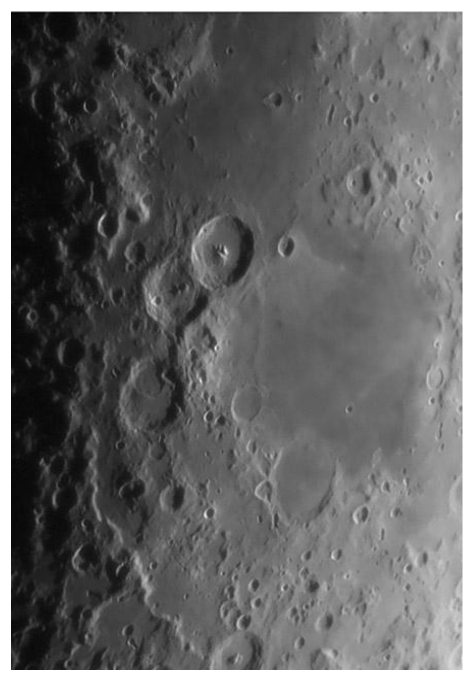
We finally got some clear sky and good seeing the other night so I could get on the moon. There was the good ol' 233 km diameter Schickard near the terminator with its delicate shadings on its floor. Below and to the left is the flooded 87 km diameter crater Wargentin, one of the earliest craters I learned about in Patrick Moore's book The Moon back in the early 1960s. I like the wrinkles in the middle of that crater only see well when it's on the terminator. I cannot think of another crater filled to the brim like this one. Adjacent and below this is the ruined 80 km crater Nasmyth and below that is Phocylides at 117 km diameter. A careful look at Nasmyth shows that it is very polygonal from the surrounding overlapping craters. I have a hunch if we got a view from directly overhead (which you can do with LROC Quickmap) that you would see a startlingly polygonal crater. Notice the softness of the ejecta from the southern end of Phocylides.

Directly right of Phocylides is the giant foot print (approximately 80x180 km) Schiller. This is an easy one to spot even in a small telescope due to it's shape. Then at the very bottom of the image is the fairly young 66 km crater Zucchius. At only 1 billion years age, it's the youngest feature discussed here.



COPERNICUS – David Jackson – Reynoldsburg, Ohio USA October 6, 2015 16:21-16:31 UT. Seeing 5/10. Transparency 4.5/6, colongitude196.2º , 20x80 binoculars. Observation in daylight..

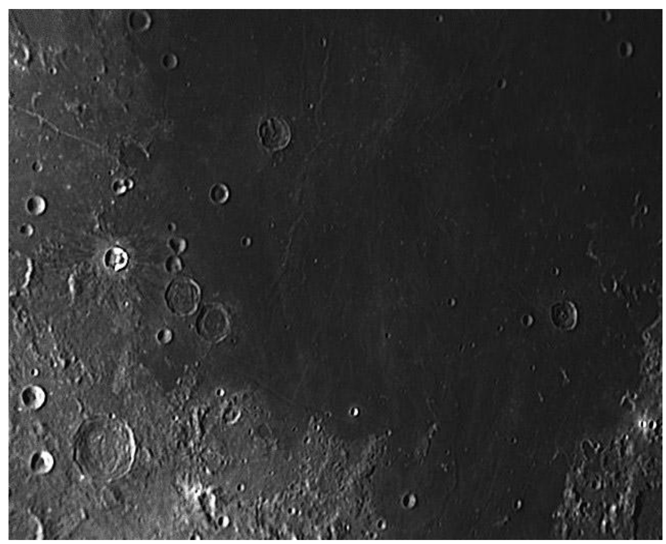
THEOPHILUS – Jamey Jenkins – Homer, Illinois, USA. October 19, 2015 00:01 UT. Seeing 5/10, Transparency 8/10. 125mm, f/18 refractor, DMK41 mono, 653.6nm + IR block filter.



LANGRENUS. Michael Sweetman, Tucson, Arizona, USA, January 19, 2013 04:41 UT. Seeing 4/10, transparency 3/6. 5" f/22.5 APO refract.. DMK21, Orion IR cut-off filter.

I rarely am out for the sunset on lunar features. I will try to spread my self out more in the future there are so many features and those during sunrise take on some different features at sunset. This one of Langrenus caught my eye as during sunrise you never see the western rim to have this much in ejecta material.

MARE TRANQUILITATIS. Michael Sweetman, Tucson, Arizona, USA, January 19, 2013 04:41 UT. Seeing 4/10, transparency 3/6. 5" f/22.5 APO refract.. DMK21, Orion IR cut-off filter.



BRIGHT LUNAR RAYS PROJECT

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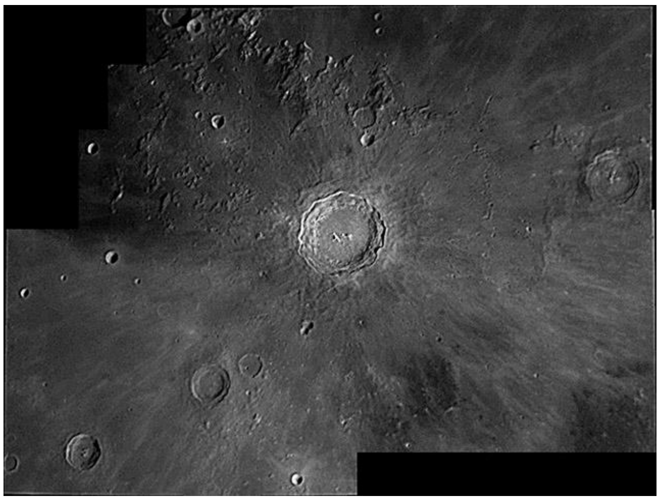
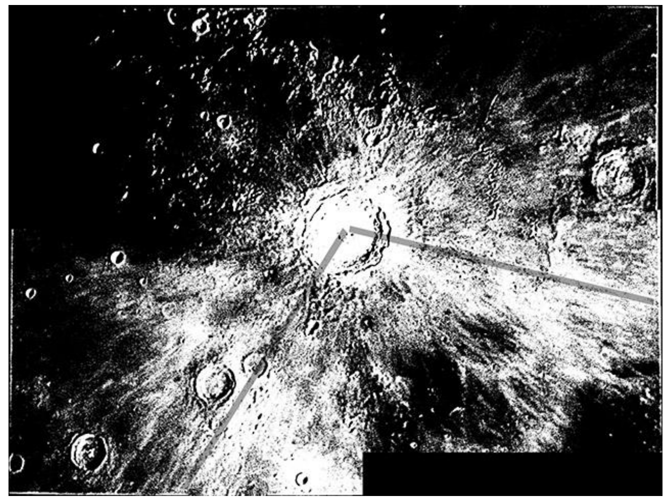
Bright Lunar Rays Website: http://moon.scopesandscapes.com/alpo-rays.html

RECENT RAY OBSERVATIONS





COPERNICUS – Richard Hill – Tucson, Arizona, USA July 26, 2015 02:52 UT. Seeing 9/10. TEC 8” f/20 Mak-Cass, SKYRIS 445M, 656.3 nm filter.

It's so difficult to NOT image this 95km monster on Oceanus Procellarum when it is nicely presented. The beautifully terraced walls of Copernicus, the rumpled floor, radial ejecta scars and rays and secondary cratering make this a study in impact science. Just below the big crater here is a double crater Fauth (12km) and to its immediate south, Fauth A (9.6km). These two craters have held my attention ever since I first really noticed them in the foreground of the lunar orbiter image of Copernicus that appeared in the newspapers back in Nov. 1966. When I saw them in the image I immediately looked them up in my Dinsmore & Alter , **Lunar Atlas**.

Going further out and to the left is the splendid 49km, double walled Reinhold. The inner wall appears to have been formed when the outer wall slumped fairly symmetrically. Further out radially from Copernicus is another double walled crater, though not as pronounced, the 41km Lansberg.

To the right of Copernicus, on the right edge of this image, completely outmatched by its bigger brother, is the 60km Eratosthenes. Between these two is a vertical line of secondary craters created during the Copernicus impact event. As a kid I would strain with my 2.4" telescope, to see these, a tail coming north out of Stadius (nearly invisible at this sun angle). I never got a good look until I had my 6" f/9 RV-6 telescope.

Looking at this region I decided to change contrast/brightness settings to bring out the ray system about Copernicus. I post it here. Note how there seems to be two distinct clusterings noted by the grey lines radiating from the main crater. Could this be an indication of the direction and angle of the impact itself?

LUNAR GEOLOGICAL CHANGE DETECTION PROGRAM

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

Observations/Studies for September were received from: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Copernicus, Fracastorius, Mare Crisium, Mons Piton, Picard, and Plato. Alberto Anunziato (Argentina – AEA) observed Deslandres, Mare Crisium, Mare Nectaris, Plato and Proclus. Kevin Berwick (Ireland – ALPO) observed Gassendi and Proclus. Juan Biagi (Argentina – AEA) imaged: Alphonsus and Copernicus. Francisco Cardinali (Argentina – AEA) imaged: Aristarchus and Tycho. Marc Charon (Reading Astronomical Society, UK) obtained some whole Moon images, and imaged the lunar eclipse. Anthony Cook (Newtown, UK, ALPO/BAA) took video of the umbra, during the lunar eclipse, looking for impact flashes. Marie Cook (Mundesley, UK) observed Aristarchus, Gassendi, Grimaldi, Herodotus, Proclus, and Romer. Brain Halls (Lancing, UK – BAA) imaged Messier. Rik Hill (Tucson, AZ, USA- ALPO) imaged Wargentin. Giovanni Perna (Italy – UAI) imaged the whole Moon. Mike Pyka (Poland – BAA) imaged the lunar eclipse.

News: Due to my very heavy lecturing workload, for this semester, this article is again a stripped down version of what I would normally produce, so unfortunately I do not have time to do the analysis. However I will present examples of observations received, and summarized transcripts of what repeat illumination LTP they coincide with. I will leave it up to the reader to decide what to make of the repeat illumination observations. This format may possibly continue for the next month or two, until I get some spare time on my hands again. I have added REF No's, and may do the analysis on these early next year – so you can refer back to the original observations in this and the next newsletters.

At the end of September, I attended the European Planetary |Science Congress in Nantes, France. The only paper I came across, that was relevant to our studies, was a poster on Lunar impact flashes: "Results from 56 hours of video survey data observed by using one telescope". However the rest of the conference was still amazing, hearing the latest news and theories about Ceres, the Rosetta mission, and various interesting ideas about sending low cost Cube-Sats to the Moon. I also bumped into John Rogers, director of the BAA's Jupiter Section, who had a poster on display there. Unlike the US counter-part, the Lunar and Planetary Science Conference, the EPSC readily lets amateur astronomers in at a highly discount conference rate; indeed French amateur societies, and educational displays for the public, were very well represented.

LTP Reports: Only one suspected LTP was reported. The image taken by Giovanni Perna (Naples, Italy, UAI observer): and is from the late part of the lunar phase that most of us are unfamiliar with. Giovanni's image (See Fig 1) appears to show a bright cloud and a shadow beneath it. Giovanni was correct in sending this observation to me, and also to Brian Cudnik, on the off chance that it might have been an impact plume and its shadow. However we can safely say that the bright feature is the high albedo feature Reiner Gamma, and the dark marking is just the shadowed crater Reiner to the East. So I think this is one further thing we should add to our list of appearances which are not LTP.

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

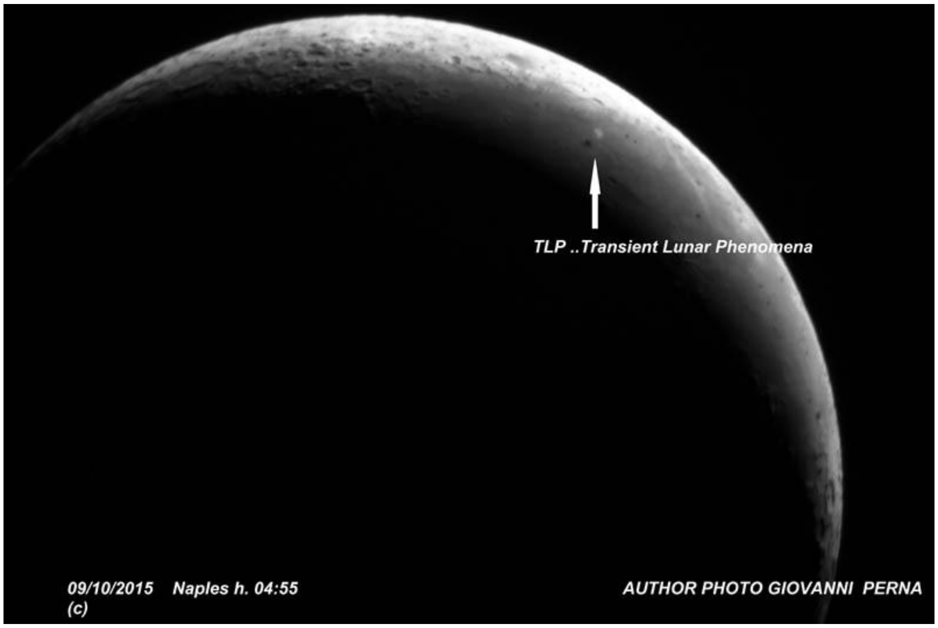

Figure 1. Reiner Gamma and Reiner as imaged by Giovanni Perna (UAI) – arrowed at the centre. We can safely say that this was NOT a LTP. North is orientated towards the bottom right.

Plato: On 2015 Sep 06 UT 07:30 Alberto Anunziato (AEA) imaged Plato, about 1.5 hours before the repeat illumination conditions for a LTP from 1916:

> *On 1916 Jan 27 at 22:00? Markov (Russia) noticed that a light sector was visible at the bottom of Plato, in shadow, and contained 3 bright spots, reminiscent of phosphorescent bodies. The Cameron 1978 catalog ID=362 and weight=3. The ALPO/BAA weight=3.* – **[REF 08]**

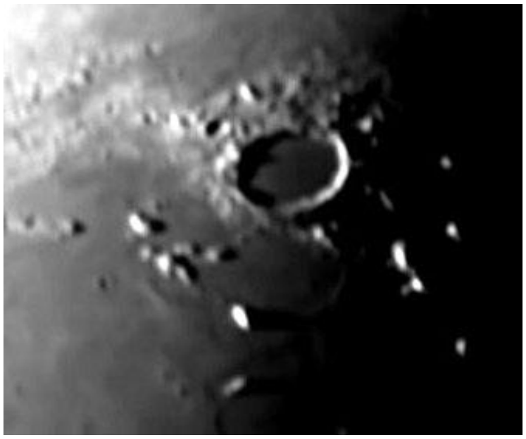

Figure 2. Plato on 2015 Sep 06 UT 07:30 as imaged by Alberto Anunziato (AEA) orientated with north towards the top, taken using a Meade LX200 under below average seeing conditions.

Messier: On 2015 Sep 22 UT 18:59-19:23 Brian Halls (BAA) observed and imaged Messier and Messier A under the same illumination conditions, and topocentric libration conditions, to within ±1˚ to a LTP report from 1968:

> *Messier 1968 May 05 UT 01:35-03:35 Observed by Delano (USA). No color noticed with Moon blink device, but Messier A's W. wall did brighten slightly over the 2 hours of observations compared to Messier's W wall. The effect was less marked in the 2nd hour. ALPO/BAA weight=1.* – **[REF 09]**

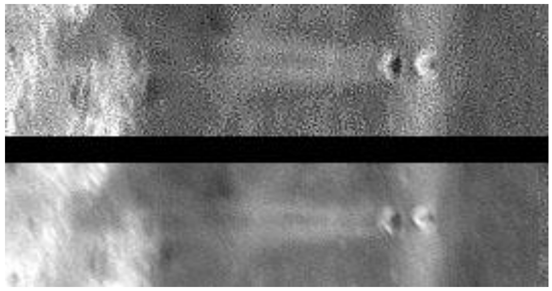

Figure 2. Messier as imaged by Brian Halls (BAA) on 2015 Sep 22, orientated with north towards the top. Images have been sharpened. **(Top)** Taken at 18:59 UT. **(Bottom)** taken at 19:23 UT.

Brian comments: *"I checked the crater over a period of 40 minutes or so – seeing was slowly worsening by the end as one might expect – and noticed no changes in brightness. The depth of shadow in the crater, and the illumination on the sunlit wall, was compared with other similar sized spots in the FOV - and there was a uniformity with Messier A and these other spots".* He used a 152mm refractor and imaged (See Fig 2) at high magnification to record the Messier pair.

Aristarchus: 2015 Sep 24 UT 19:25-19:35 Marie Cook (BAA) observed this crater under the same illumination conditions to ±0.5˚ to the following 1966 LTP:

Aristarchus 1966 May 01 UT 21:55-22:45 Observed by Paterson, Brown, Sartory, Ringsdore (England, 12" reflector x252 for the former and 8.5"? reflector for the latter) "Eng. moon blink system detected red spots which were vis. by all but Ringsdore. Brown saw intense white spot NW of crater wall" NASA catalog weight=5. NASA catalog ID 933. ALPO/BAA weight=4. – **[REF 10]**

Marie was using a 90mm Questar telescope (x80-130, seeing II, transparency very poor), but did not see any sign of red spots, or the intense white spots mentioned – everything looked perfectly normal.

Gassendi: On 2015 Sep 26 UT 22:01-22:38 Kevin Berwick (ALPO) observed and sketched (See Fig 3) Gassendi under the same illumination conditions (to within ±0.5˚) as Winnie Cameron did back in 1961:

Gassendi 1961 Aug 25 UT 01:00-02:00 Observed by Cameron (Adelphi, MD, USA, 3.5" reflector x160) "Crater had a capital gamma-shaped string of star-like pts. (only abnormal thing noted)." NASA catalog weight=1. NASA catalog ID #745. ALPO/BAA weight=1. – **[REF 11]**

Kevin comments: *"Seeing quite good and no cloud after poorer conditions earlier. Potential Gamma formation seen almost immediately. Some points could possibly be described as 'star-like', while the larger ones could not. To me, they simply look like a chain of mountains on the floor, nothing unusual. Not really a Greek Γ either, since not at right angles."*

Lunar Eclipse: On 2015 Sep 28 Jay Albert (ALPO), Marc Charon (Reading Astronomical Society), myself and Michael Pyka (BAA) all observed the total lunar eclipse, despite it being very early in the morning for the European of us. There are frequent accounts of LTP seen during lunar eclipses, but were they simply observers making judgement errors when seeing/attempting to measure things under very low light levels, or were these real phenomena – perhaps something to do with the Moon passing through the centre of the Earth's magnetotail, as some authors have suggested? Below are a number of past LTP reports under same illumination conditions to within +/-0.5˚, and where a "*" is present under the same illumination and topocentric libration to within ±1˚. The square brackets at the start, show the time span on the night of the Sep 27/28 when these applied.

Figure 3. Gassendi as sketched by Kevin Berwick (ALPO) on 2015 Sep 26 UT 22:01-22:38 - made through a 4" Achromatic refractor. Sketch has been orientated with north towards the top.

***[21:47-01:42] -On 1961 Aug 26 at UT 01:25-01:41 Chernov (Russia, 6x binoculars) found that during a penumbral phase of a lunar eclipse Aristarchus appeared as a bright white point easily seen in 6x binoculars. At the same time the fissure near Aristarchus and Herodotus. (Schroter's Valley?) could be seen, but not easily. The Cameron 1978 catalog ID=746 and weight=2. The ALPO/BAA weight=1.* – [REF 12] ***

***[22:10-00:07] On 1927 Dec 08 at 20:00 Bogdanovich (Russia) Picard: "Picard crater, after coming out of shadow after eclipse. was unusually hazy. next FM it was back to normal". The Cameron 1978 catalog ID=? and weight=3. The ALPO/BAA weight=2.* – [REF 13]**

***[22:35-00:32] - On 1982 Jan 09 at UT21:37 P. Moore? (Selsey, UK) observed that Copernicus was brighter than or equal to Aristarchus. However this was during a total eclipse of the Moon. Cameron 2006 catalog ID=162 and weight=5. ALPO/BAA weight=2.* – [REF 14]**

***[22:44-00:35] On 1898 Dec 27 at UT 23:00-00:00 Stuyvaert (France?) found that Aristarchus was brilliant during an eclipse. The Cameron 1978 catalog ID=302 and weight=1. The ALPO/BAA weight=1.* – [REF 15]**

***[22:48-00:41] - On 1889 Jul 12 at 20:52-21:00UT, Kruger of Gotha? or Kiel? Germany, using a 6" reflector (x33), saw a brilliant Aristarchus in the surrounding gloom during an eclipse. The brilliance was striking. Cameron 1978 catalog ID=263 and weight=2.* – [REF 16]**

***[22:49-00:38] - Thaetetus 1902 Oct 16 UT 18:10? Observed by Cherboneaux (Meudon, France, 33" refractor) "Unmistakable white cloud formed close to it." NASA catalogue weight=3. NASA catalogue ID #313.* – [REF 17]**

***[22:49-00:40] - On 1917 Jan 08 at UT 07:30-08:30 Ellison (England?) observed a point on the rim of Dionysius that shone like a star for some time after entering the shadow during an eclipse (mid eclipse at 07:42. date given as 1/7/17 19:30-20:30 local time). The Cameron 1978 catalog ID=366 and the weight=2, The ALPO/BAA weight=2.* – [REF 18]**

***[22:58-00:47] - On 1989 Feb 20 at UT 16:55 G. Kolovos (Thessolonki, Greece) captured in one photograph (out of 3) during a lunar eclipse, some bright patches below (south?) of the crater Plato that were not in the other photographs (UT16:56:32 or 16:58:56). Foley commented that the photographs were grainy so cannot tell for sure. The Cameron 2006 Catalog ID=356 and the weight=1. The ALPO/BAA weight=1.*– [REF 19]**

***[23:11-02:22] - In 1790 Oct 22/23 at UT 23:00-02:00 W. Herschel (Windsor, UK) observed during a total lunar eclipse at least 200 small, round (spots?). The Cameron 1978 catalog ID=69 and weight=4. The ALPO/BAA weight=1.*– [REF 20] ***

***[23:14-02:11] - On 1962 Jun 12 at UT 06:19 an unknown observer in France? during an eclipse, on the west side -- dark brick red -- & something seemed to oscillate before it. A mid-eclipse on S. side "a very small meniscus was seen nearly the color of the uneclipsed Moon". The Cameron 1978 catalog ID=133 and the weight=0. The ALPO/BAA weight=1.* – [REF 21]**

***[23:22-01@09] - On 1967 Apr 24 at UT 11:47-12:08 Osawa (Hyogo, Japan, 6" reflector, x50) observed during totality, two luminescent spots (started 20 min after beginning of totality) near Grimaldi. Location not certain because of dimnesa of umbral shadow and lunar features. (bright spots in Sven Hedin?). Color was bluish rather than yellowish and magnitude < 9. The Cameron 1978 catalog ID=1035 and weight=3. The ALPO/BAA weight=2.* – [REF 22]**

***[23:43-01:35] - In 1902 Apr 22 at UT 22:00 (Cameron estimated UT) Zlatinsky (Russia, 3" refractor?) observed Aristarchus to have some luminescence during a total lunar eclipse. Mid eclipse was at 18:53. The weight=2. The ALPO/BAA weight=1.* – [REF 23]**

[00:03-01:48] - On 1985 May 04/05 at UT19:52-00:30 during the lunar eclipse V.V., Kurchin (Volgorad, Russia, 2" reflector, x88) found that Alphonsus, Aristarchus, Atlas, Copernicus, Endymion, Herodotus, were abnormally bright. They also saw some flashes in Mare Tranquilitatis. Cameron 2006 catalog ID=270 and weight=2. ALPO/BAA weight =1. – **[REF 24]**

[00:06-01:54] - In 1949 Apr 13 at UT 05:00 Vreeland and others (Mill Valley, CA, USA, 4.5" refractor) observed in Aristarchus a brilliant star-like point just after 3rd contact. This was not seen before or during totality. He thinks that it was a high peak catching the sunlight before the rest of the surface. It remained bright but larger as the sun hit it. The Cameron 1978 catalog ID=517 and the weight=1. – **[REF 25]**

[00:08-03:56] - On 1910 Nov 16/17 UT 22:50-00:10 Albright (Edgebaston, England, UK) observed in Stofler crater "A luminous pt. on Moon dur. ecl. (mid-ecl 0025) Others saw a meteor on Moon from widely separated places". The Cameron 1978 catalog ID=333 and the weight=3. The ALPO/BAA weight=3. – **[REF 26] ***

[00:39-01:42] - Picard observed by Ingall on 1865-4-10 East of Picard, Ingall (Camberwell, UK) observed a minute point of light glittering like a star. Whole of Mare Crisium intersected with bright veins mixed with bright spots (4h before PM). Cameron 1978 catalog ID 138 and weight=2. – **[REF 27]**

[01:05-04:59] - Plato observed by Bianchini on 1685-12-10 Red streak seen on floor of Plato during an eclipse. The Cameron 1978 catalog assigns a LTP ID of 14 and a weight of 1. The ALPO/BAA catalog assigns a weight of 1 too. – **[REF 28]**

[01:34-03:31] - Proclus: On 1898 Jul 03 at UT 21:35 Moye (France) noted that 30 minutes after mid eclipse, Proclus shone with a reddish light in shadow. The Cameron 1978 catalog ID=301 and the weight=2. The ALPO/BAA weight=2. – **[REF 29]**

[01:05-04:59] - On 1772 Oct 11 Beccaria saw a bright spot (4th magnitude), i.e. Copernicus, seen on eclipsed Moon and glimmering specks. Seen by nephew and niece of Beccaria. Cameron 1978 Catalog weight=4. ALPO/BAA Catalog weight=2. – **[REF 30] ***

[01:54-05:02] - On 1970 Aug 17 at UT 02:40 Pedler (England) noted that the shadow flowed around, instead of over, Plato. Wondered if shadow matched the gray of the crater. Within minutes the shadow line looked normal again. At 04:41UT Claudio Pamplona (Brazil) saw a pulsation in Plato during a lunar eclipse. He thought that this was due to falling temperatures. The Cameron 1978 Catalog ID=1274 and the weight=0. The ALPO/BAA weight=1. – **[REF 31]***

[02:20-03:47] - Eratosthenes 1949 Oct 07 UT 04:14-05:22 W.Haas (USA) and O'Toole (USA) observed some changes in intensity of features inside this crater - after a lunar umbral passage. The effect lessened over time. Comparisons had been made with measured intensities on the previous and subsequent nights and on other months around the time of Full Moon. The ALPO/BAA weight=1. – **[REF 32]**

[03:09-04:53] *On 1982 Dec 30 at UT10:09-10:58 D. Darling (Sun Prairie, WI, USA, 12.5" reflector, x342, S=9/10) found that when the umbra of the eclipse shadow transited across Aristrachus, the crater was a bright blue this effect lasted until 10:14UT. Flashes/flickers (~0.1 sec duration) were seen at 10:15UT. He saw another flash at 10:24UT. Another observer, Harris (Sun Prairie, WI, USA, 6" reflector, S=9/10) saw flashes at 10:18 (9 or 10 magnitude) - he saw another 2 flashes at 10:34 - though the Cameron catalog does not state where on the Moon - Aristarchus??. The Cameron 2006 catalog ID=194 and weight=5. The ALPO/BAA weight=3.* – **[REF 33]**

Michael Pyka (BAA) and Marc Charon (Reading) both obtained some color images from 00:15-02:26UT, two examples of which are shown in Fig 4. I was running color web cameras on a 20cm Newtonian, and a Watec 902HS camera on a 15cm Newtonian – both looking for impact flashes. My color web camera covered the periods: 02:24-02:45UT, 03:32-03:35UT, and 03:43-03:44UT – eventually losing sight of the eclipse in some fog that had rolled down the valley. Unfortunately the individual image frames were too noisy to show here under the low light levels, especially from the color Skyris camera I was using. Over in Florida, Jay Albert made some valuable visual observations with his Celestron NexStar 6” SCT, despite the Moon being low in his east with some cirro-stratus and thick haze present. Jay observed from 01:45-03:30UT, but had to stop observing when thicker cloud rolled in. Anyway his visual report is as follows:

Figure 4. Lunar Eclipse images from 2015 Sep 28 orientated with north towards the top. **(Left)** taken by Marc Charon (Reading Astronomical Society) at 02:09UT with good representation of the darkness of the Moon as seen by our eyes, and a blue fringe on the eastern edge of the umbra. **(Right)** Taken by Michael Pyka (BAA) at 02:26UT with exposure adjusted to see inside the umbra.

"Mare Crisium [Cameron #138] - I saw no "star-like" points, no "bright veins" or bright spots.

Picard [Cameron #138]- I saw no bright point of light or bright spots before or during totality. I used 38x and 83x in a wide field eyepiece and observed Crisium and Picard from 01:45 until 02:15UT, by which time I could no longer see any surface features on the lunar disk. Totality began at 02:11UT.

Some surface detail was seen again, mostly in the E, by about 02:30UT. The Moon was very dark with a coppery reddish color. At times I could see first one, then two faint stars off the E limb. Most maria were visible by 02:35UT. At 02:43UT the cloud suddenly thickened again, surface detail vanished and the Moon's color changed to blue-gray. The Moon turned deep copper again at 02:57UT and Grimaldi was spotted very shortly thereafter.

Copernicus [Cameron 1978, no ID# shown, by Beccaria on 1772-10-11]- the crater was visible by 03:00UT at 38x and 83x. No "glimmering specks" were seen.

Aristarchus [Cameron 2006 #194]- I saw the crater as a flickering, gray-bluish smudge against the coppery background at 83x in the same field as Copernicus. I saw no bright flashes during my observation. Aristarchus gradually brightened, became much brighter as totality ended and was the brightest feature on the lunar disk before 03:30UT. I observed Copernicus and Aristarchus in the same eyepiece field from 03:00 to 03:30UT".

Suggested Features to observe in November: 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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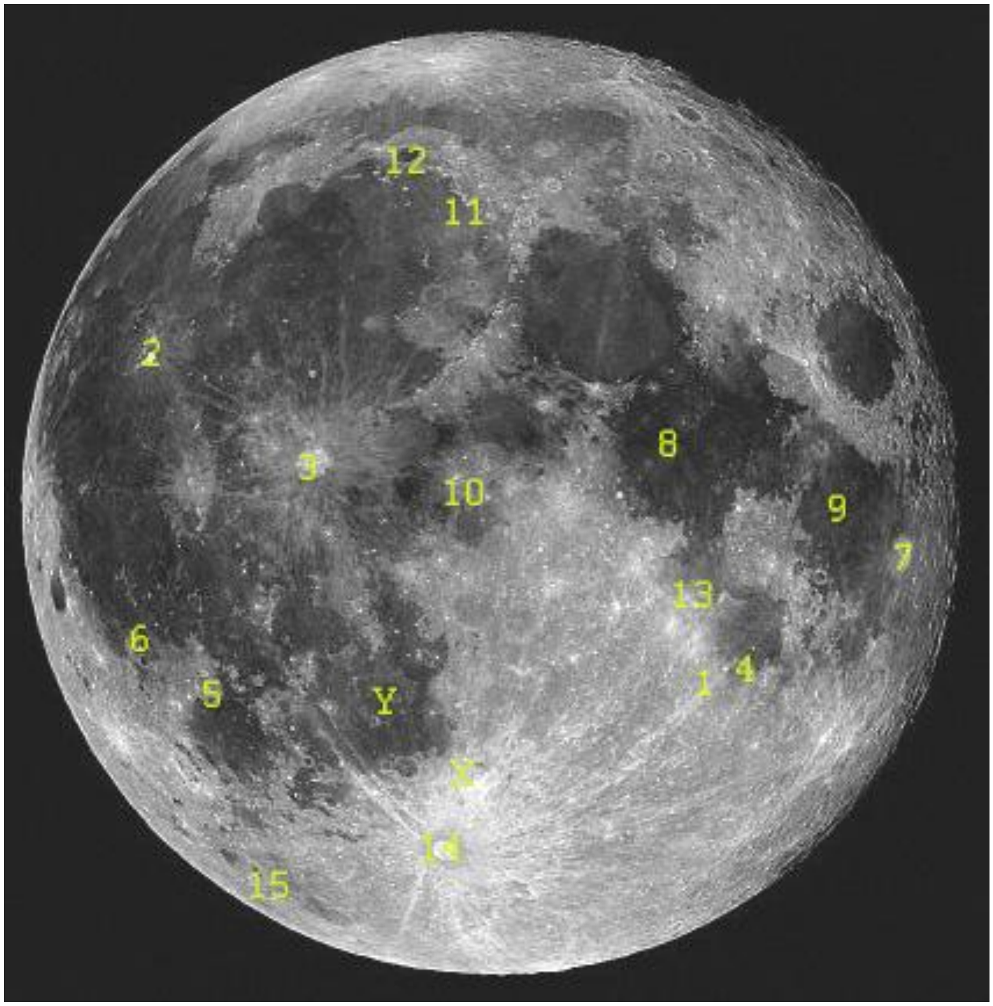
KEY TO IMAGES IN THIS ISSUE

1. **Altai Scarp**
2. **Aristarchus**
3. **Copernicus**
4. **Fracastorius**
5. **Gassendi**
6. **Hansteen**
7. **Langrenus**
8. **Mare Tranquilitatis**
9. **Messier**
10. **Pallas**
11. **Pico**
12. **Plato**
13. **Theophilus**
14. **Tycho**
15. **Wargentin**



FOCUS ON targets

X = Deslandres
Y = Mare Nubium