THE LUNAR OBSERVER

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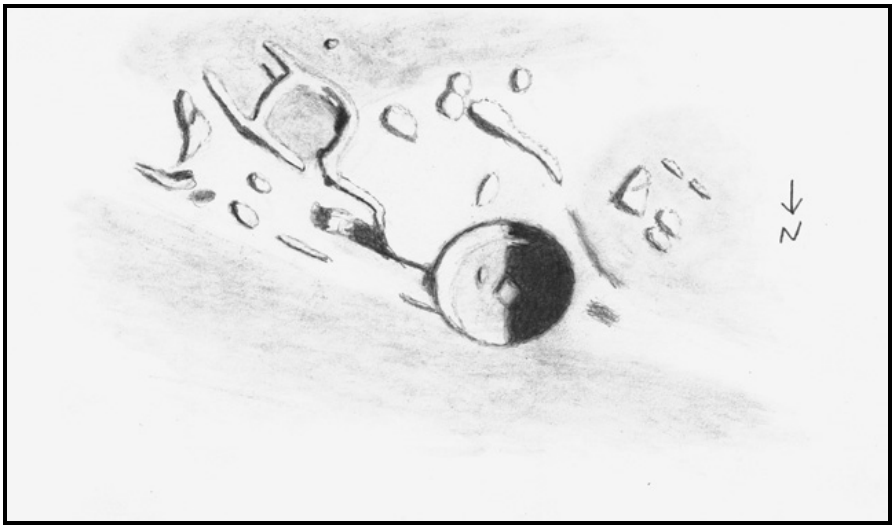
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – NOVEMBER 2009

MENELAUS



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
November 28, 1999 6:25-7:00 UT
15 cm refl, 170x, seeing 7

I observed this crater and environs on Nov. 27/28, 1999. This crater on the south edge of Mare Serenitatis is bright at full moon and, like its near neighbor Manilius, is a favorite target for lunar eclipse crater timings. Menelaus has a conspicuous peak slightly north of center and a smaller peak to its east. The rim of this crater is unremarkable except for a high area on the east edge. A sunlit strip extending into the interior shadow may hint at terracing. Nearby are an assortment of elevations; this is where the Montes Haemus peter out toward Mare Tranquillitatis. Auwers is the broken, squarish feature southeast of

Menelaus. There are no other craters depicted on this sketch. The edge of Mare Serenitatis is sharply defined near the north rim of Menelaus. The sketch depicts my view better than words can.

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LUNAR CALENDAR

NOVEMBER-DECEMBER 2009 (UT)

Nov. 02	19:14	Full Moon
Nov. 07	07:31	Moon at Perigee (368,899 km - 229,223miles)
Nov. 09	04:00	Moon 3.2 Degrees SSW of Mars
Nov. 09	15:57	Last Quarter
Nov. 12	20:00	Moon 6.8 Degrees SSW of Saturn
Nov. 15	16:00	Moon 6.1 Degrees SSW of Venus
Nov. 16	19:13	New Moon (Start of Lunation 1075)
Nov. 17	10:00	Moon 2.8 Degrees S of Mercury
Nov. 22	20:08	Moon at Apogee (404,734 km - 251,490 miles)
Nov. 23	19:00	Moon 3.4 Degrees NNW of Jupiter
Nov. 24	03:00	Moon 3.1 Degrees NNW of Neptune
Nov. 24	21:38	First Quarter
Nov. 26	13:00	Moon 5.2 Degrees NNW of Uranus
Dec. 02	07:31	Full Moon
Dec. 04	14:13	Moon at Perigee (363,478 km - 225,855 miles)
Dec. 06	23:00	Moon 5.1 Degrees SSW of Mars
Dec. 09	00:15	Last Quarter
Dec. 10	05:00	Moon 7.1 Degrees SSW of Saturn
Dec. 15	23:00	Moon 3.1 Degrees S of Venus
Dec. 16	12:02	New Moon (Start of Lunation 1076)
Dec. 18	07:00	Moon 1.4 Degrees NNW of Mercury
Dec. 20	14:55	Moon at Apogee (405,730 km - 252,109 miles)
Dec. 21	12:00	Moon 3.8 Degrees NNW of Jupiter
Dec. 21	12:00	Moon 3.3 Degrees NNW of Neptune
Dec. 23	21:00	Moon 5.4 Degrees NNW of Uranus
Dec. 24	17:35	First Quarter
Dec. 31	12:00	Full Moon (Partial Lunar Eclipse)

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 non-member 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 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 can be found on-line at: **http://www.alpo-astronomy.org/index.htm** 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.

Note: The published images now contain links to the original, full resolution images. Clicking on an image while connected to the internet, will download the original image, which in some cases is significantly higher resolution than the published version.

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 always be included:

Name and location of observer
Name of feature
Date and time (UT) of observation
Size and type of telescope used
Orientation of image: (North/South - East/West)
Seeing: 1 to 10 (1-Worst 10-Best)
Transparency: 1 to 6
Magnification (for sketches)
Medium employed (for photos and electronic images)

CALL FOR OBSERVATIONS:
FOCUS ON: Atlas & Hercules

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 2010** edition will be Atlas & Hercules. Observations 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 pair of craters to your observing list and send your favorites to:

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

Deadline for inclusion in the Atlas-Hercules article is December 20, 2009

FUTURE FOCUS ON ARTICLES:

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

Snellius-Furnerius	**TLO Issue: Mar. 2010**	**Deadline: Feb. 20, 2010**
Ray Craters (at all Phases)	**TLO Issue: May 2010**	**Deadline: Apr. 20, 2010**

FOCUS ON: Menelaus

By Wayne Bailey

Acting Coordinator: Lunar Topographical Studies

Menelaus is a prominent, 27 km (17 mile) diameter, sharp rimmed crater with central peaks, located on the southern rim of Mare Serenitatis at 16.3º N, 16.0º E (figure 1). It is named after the Greek geometer and astronomer Menelaus of Alexandria. His text

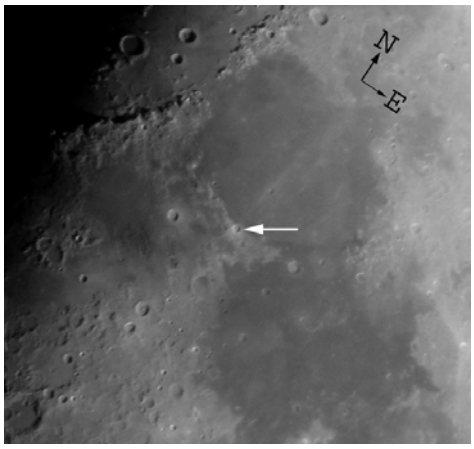


Figure 1: Menelaus (arrow). Aleksander Božič – Slovenija, April 13, 2008.

"Spherica" dealt with spherical trigonometry, a subject that is used for transformations between coordinate systems (RA/Dec to Ecliptic Lat/Long for instance) among other things.

It is a fairly young crater whose terraced walls rise 3 km (9800 feet) above the floor to a sharp rim. Under high angle solar illumination, it brights considerably and shows bands and rays (figures 2 & 3). The bands are radial, alternating light and dark streaks on the inner walls, formed by slumping of the loose wall material. The older, undisturbed material has darkened from

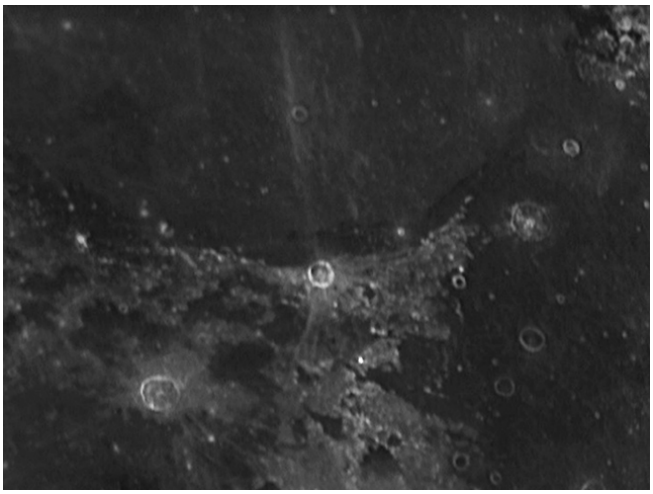


Figure 2: Menelaus, showing rays and bands. William M. Dembowski, FRAS, Elton Moonshine Observatory,. September 2, 2009, 01:06 UT. Colongitude 61.9º, seeing 4/10. Celestron 9.25", f/10 SCT, DMK41 UV/IR filter.

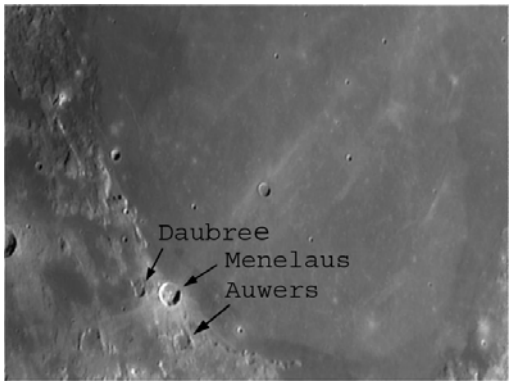
exposure, so it contrasts with the lighter, more recently exposed material.

At full moon, the walls form a brilliant ring at the edge of Mare Serenitatis, with a bright streak extending from Menelaus to the north, past Bessell, across the Mare. This long, prominent ray would seem to indicate that the object that formed Menelaus approached from the Southeast at a low angle. There are also shorter, less prominent

Figure 3: Menelaus showing bands and rays. Howard Eskildsen, Ocala, Florida, USA. August 9, 2009 09:59 UT. Colongitude 135º, Seeing 8/10, Transparency 5/6. Meade 6" f/8 refractor, 5x barlow, Orion Starshoot II.

rays that are most visible to the South and Southwest (across Lacus Hiemalis), but also occur to the Southeast and East. The rayless sector seems to surround the Montes Haemus to the Northwest, indicating the projectile approached from the Northwest at a low angle. Since the north wall appears to be lower in the direction of the long ray (figure 4), was the ray geometry influenced by the topography at the impact point?

Two partial craters, Daubree and Auwers are southwest and southeast of Menelaus (figure 4). There's also an area of linearly textured terrain to the north of Daubree. In an unusual twist, both of these are



easily visible under high sun illumination, but become very difficult to recognize as craters among the predominantly linear structures prominent under lower angle lighting (figure 5). The complexity of the area surrounding

Figure 4: Ed Crandall – Lewisville, North Carolina, USA. January 4, 2009 23:48 UT. 110 mm f/6.5 APO, Toucam.

Menelaus can also be seen in the drawing by Robert Hays on page 1 of this issue. The linear structures are oriented almost parallel to the Mare shore here, but point back to Mare Imbrium.

Offshore from Menelaus, two more types of features are visible in figure 6: rilles and domes. Domes are volcanic features, either the cone resulting from lava eruption, or possibly surface uplift from a magma chamber that didn't erupt. Often, there is a small pit at top of a dome that may be the volcanic vent. Rilles

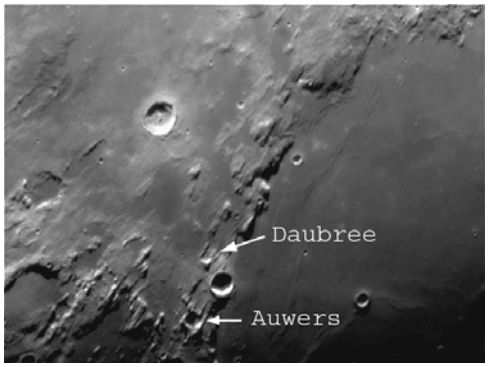
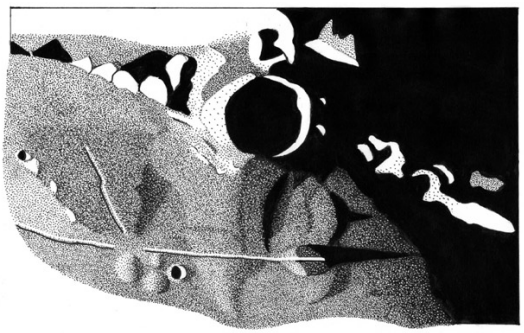


Figure 5: Ed Crandall – Lewisville, North Carolina, USA. October 9, 2009 UT. Seeing A III. 110 mm f/6.5 APO, 3x barlow, Toucam.

that are parallel to the edge of maria are usually stress cracks from settling of the marial lava fill. Other rilles appear to be collapsed lava tubes. The longer rille in Figure 6 is approximately parallel to the mare edge, but the shorter one extends from near the domes towards the shore. The shading of the mare surface also indicates considerable low-relief structure around Menelaus and the rilles.



Several wrinkle ridges are visible on the mare around Menelaus and Bessell (figure 5). The mare surface, especially northeast of Menelaus, also shows albedo differences.

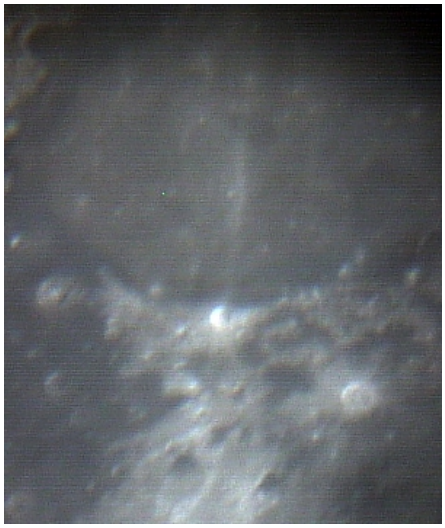
Figure 6: Phillip Morgan –Worcestershire, England. December 29, 2003 17:14-18:20 UT. Seeing 6-7/10, Transparency 4/5, Colongitude 345.04-345.36. 305 mm Newtonian, 400x.

Overall, Menelaus and the surrounding area include a variety of features that will reward careful study under a variety of lighting conditions. Keep in mind that even the small north-south changes in solar direction between lunations can significantly change the appearance and visibility of small features.

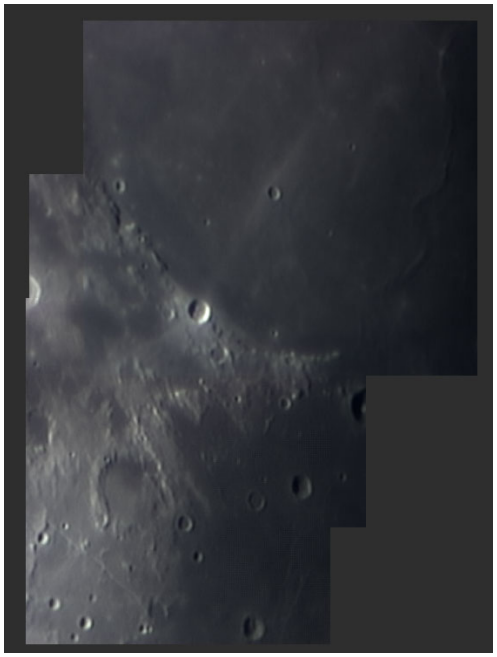
ADDITIONAL READING

Bussey, Ben & Paul Spudis. 2004. The Clementine Atlas of the Moon. Cambridge University Press, New York.
Byrne, Charles. 2005. Lunar Orbiter Photographic Atlas of the Near Side of the Moon. Springer-Verlag, London.
Grego, Peter. 2005. The Moon and How to Observe It. Springer-Verlag, London.
North, Gerald. 2000. Observing the Moon, Cambridge University Press, Cambridge.
Rukl, Antonin. 2004. Atlas of the Moon, revised updated edition, ed. Gary Seronik, Sky Publishing Corp., Cambridge.
Wlasuk, Peter. 2000. Observing the Moon. Springer-Verlag, London.

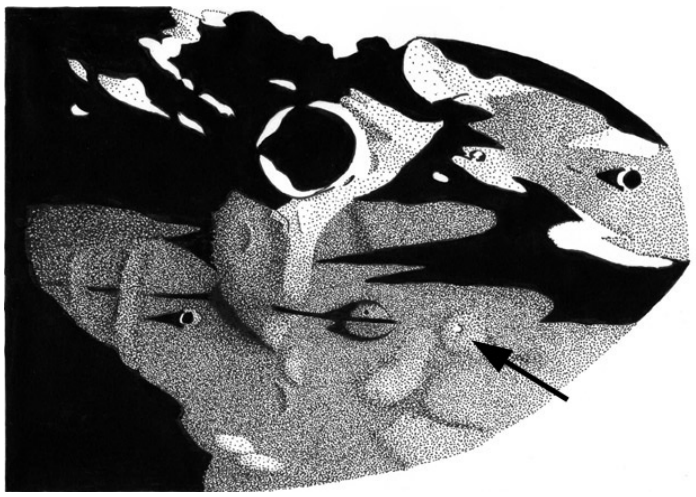
ADDITIONAL MENELAUS OBSERVATIONS



MENELAUS – Michael Boschat- Halifax, Nova Scotia, Canada. September 7, 2009 00:35 UT. Seeing 7/10, Transparency 4/6, North up, East left. Celestron 8" SCT, f/10, 134x, eyepiece projection, Centrios DSC-3020 digital camera, 1.6x zoom.



MENELAUS – Axel Tute – Küssaberg, Baden-Württemberg, Germany. September 9, 2009 22:00 UT. Colongitude 144.5°, Seeing 5/10, Transparency 5/6. 70mm FH Refractor, 2x barlow, ToUCam 740k.



MENELAUS - Phillip Morgan –Worcestershire, England. September 17, 2003 02:05 UT. Seeing 4-8/10, Transparency 4/5, Colongitude 162.94-163.31. 305 mm Newtonian, 400x. Note summit pit on dome (arrow).

HIGH-SUN OBSERVING: POSIDONIUS

William M. Dembowski, FRAS
Assistant Coordinator, Lunar Topographical Studies

Posidonius, a 95 km crater in northeastern Mare Serenitatis (Figure 1), is one of the most interesting craters on the near side of the Moon and its system of rilles and ridges is a favorite target of lunar imagers. Unfortunately, when Posidonius moves too far from the terminator to show the fine details of its flooded and fractured floor, it is frequently ignored.

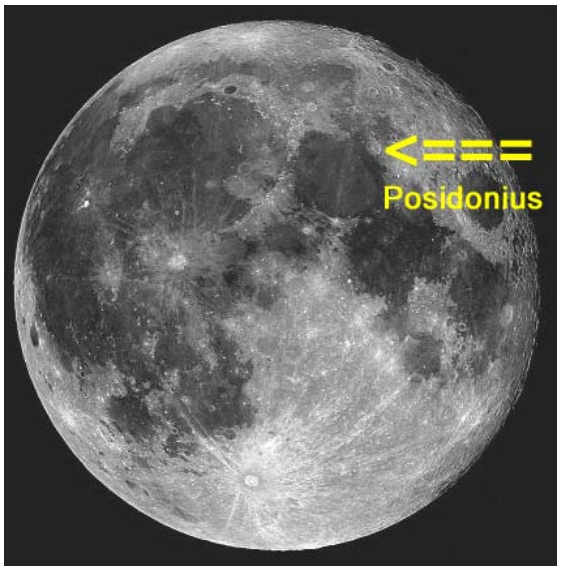


FIGURE 1: Full Moon with Posidonius.

Granted, under a high-sun you cannot see the finely detailed features you can under more oblique lighting, but there is more to lunar observing than finding small shadows. And, in fact, there are features which only reveal themselves close to "lunar noon".

Notice the dark areas on the crater floor (Figure 2). The large strip along the western edge appears to be bounded on the east by one of the major rilles and a line of ridges. Although not visible in this image, a small gap in the western wall of Posidonius may have allowed the dark basaltic lava from Mare Serenitatis to flood this section of the crater floor. Under a high sun you can plainly see the tonal differences of the mare surface and this dark patch on the crater floor matches that of the mare beyond the western rim. While scanning the mare surface keep in mind that, as a rule of thumb, the darker the lava the older the flow.

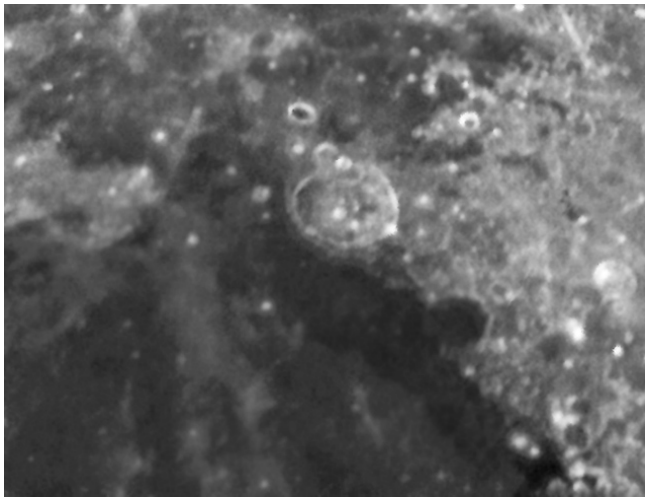


FIGURE 2: POSIDONIUS William M. Dembowski, FRAS, Elton Moonshine Observatory,. July 6, 2009, 02:37 UT. Colongitude 73.6º, seeing 3/10. Celestron 8", f/10 SCT, DMK41 UV/IR filter.

The smaller dark spots near the center do not seem to correlate with any specific floor features. Likewise, although the bright spots near the center are obviously the small craters Posidonius A and C and the one on the northern rim is Posidonius B, several other bright areas on the rim cannot easily be matched to any specific topographical features. One of those particularly bright spots is near the junction of Posidonius and Chacornac to the southeast.

Finally, and most obviously, the entire crater rim is brightly outlined even against the relatively light highlands to the south and east.

REFERENCES:

Rukl, Antonin – "Atlas of the Moon", Paul Hamlyn Publishing (1990)
Wood, Charles A. – "The Modern Moon: A Personal View", Sky Publishing (2003)

LOOKING AT THINGS UNDER A DIFFERENT LIGHT

Fred Corno

Different light conditions on the Moon highlight different details of the surface: albedo patterns are usually better visible under high sun illumination, while fine details of the surface are better shown when the low sun casts long shadows behind them.

Observing the same features under different lighting conditions may therefore allow the recognition of different class of details in the same spot, as it happened to me in a series of two subsequent observations of the same crater, spaced approximately 24 hours from each other.

The crater I considered is Timocharis, a well-defined 34 km wide circle in the Southern Mare Imbrium (figure 1): according to Moon Geologic Map I-462, Timocharis belongs to the Eratosthenian System (3 to 1.2 billion years ago). Even if not among the largest craters on the Moon, it is mostly evident, since it is piercing through the Imbrian System (between 3.85 and 3 billion years ago) flat basaltic plains of the Mare Imbrium. It is surrounded by a coarse terrain, made of the ejecta radially projected upon its formation. Its age is such to allow great details in its shape being still conserved as almost fresh in the ejecta mantle, to a level such to allow in full light the recognition of a faint ray system. From the crater rim, ridges proceed radially to merge in the lava plain, crossing the rough surface of the ejecta mantle in the immediate surroundings of the crater: such details were easily recognized in the first of the two observations of mine, taken at 208x on the 27th of September 2009, starting from 19.45 UT (figure 2). In the same observation, the relatively young rim shone bright, as the exterior of the walls on the sun-facing side. In the inner rim, where visible, some terracing and complex structure were recognizable (for example, see the grey-shaded detail to the WSW, in the drawing in figure 2). To the North-East the small crater Timocharis B stood: it is by far younger, since it belongs to the Copernican System (maximum age 1.2 billion years ago), but its small size does not allow the recognition of a complex ray/ejecta system.

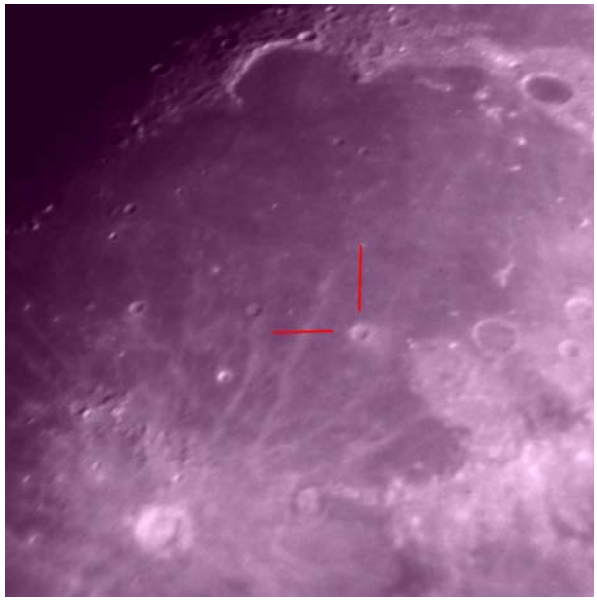


FIGURE 1: Crop from a photo showing position of Timocharis in Mare Imbrium (100 iso Kodak Elite slide, 1/4", Vixen VMC 200L, eyepiece projection of a 26 mm Plossl) on the 3rd of January 2004.

Dark streaks in the hue of the surrounding terrain were also visible, particularly to the North and South of the crater.

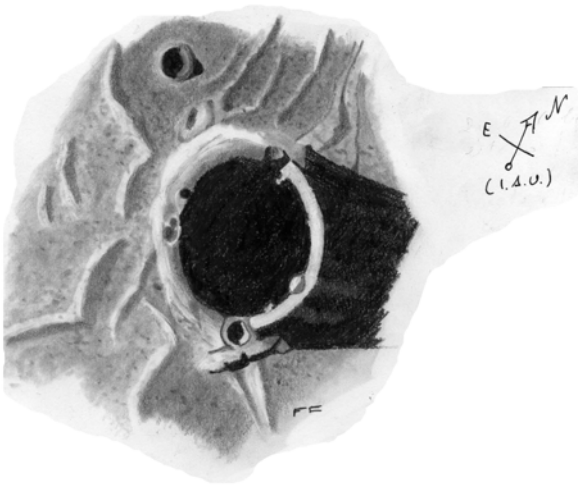
The day after (figure 3), light flooded from a higher angle the scenery, and most of the details of the ejecta mantle were washed out: just vestiges of the ridges were showing, as much more faint was the darkening of the lava plain in the surrounding. A large part of both the floor and the internal walls were in full light: walls demonstrated to be extensively terraced, and the floor was clearly bi-toned in colour. The South-western side was in fact darker than the remnant of it. All the crater floor was granular in appearance, regardless the tone of colour.

The crater is large enough to carry a central peak, that by change it has been obliterated by a further impact, again in the Copernican era. Vestiges of the central peak are probably represented by the large annular

structure surrounding the central crater, and its own ejecta mantle is covering the floor of the main crater with its rough appearance.

Dividing the observation in two sessions held on following days, fine details both of the external and internal part of Timocharis were noticed, allowing to frame the crater within the geological structures it belongs to.

FIGURE 2: Drawing of Timocharis by the author, made at 19.45 UT on the 28th of September 2009, Takahashi FS 128 at 208x (ortho 5 mm).



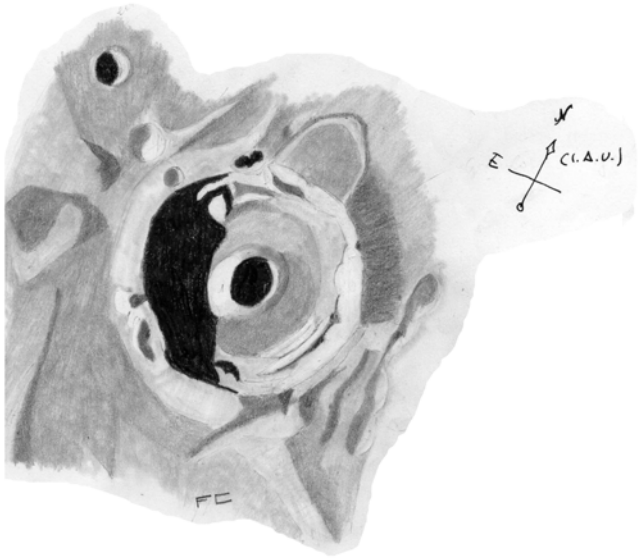


FIGURE 3: Drawing of Timocharis by the author, made at 19.55 UT on the 29th of September 2009, same optical configuration as figure 2.

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LCROSS STATUS

Both LCROSS vehicles successfully impacted the moon on schedule October 9th. The nine LCROSS instruments captured all three phases of the Centaur impact: flash, ejecta plume, and crater. Thermal & mid infrared cameras showed the Centaur crater is about 28m (92 feet) diameter. Ultraviolet and near infrared cameras and spectrometers detected a faint debris plume. The LRO Diviner thermal mapping instrument scanned the Centaur impact site about 2 hours before impact, 90 seconds after impact, and again about two hours after impact, clearly detecting the impact site in all four thermal infrared channels.

I received three images from Ed Crandall (one prior to impact, and one after each impact). Ed stated that he couldn't see any evidence of a debris plume. I've tried ratios, differences, and blinking the images and also can't find any indication of a plume.

Early results from the LCROSS instruments are summarized at www.nasa.gov/mission_pages/LCROSS/main/LCROSS_impact.html and www.nasa.gov/mission_pages/LCROSS/main/LCROSS_impact_images.html.

More results will be presented at the Lunar Exploration Analysis Group (LEAG) meeting currently planned for Houston, Texas, November 15-19, 2009.

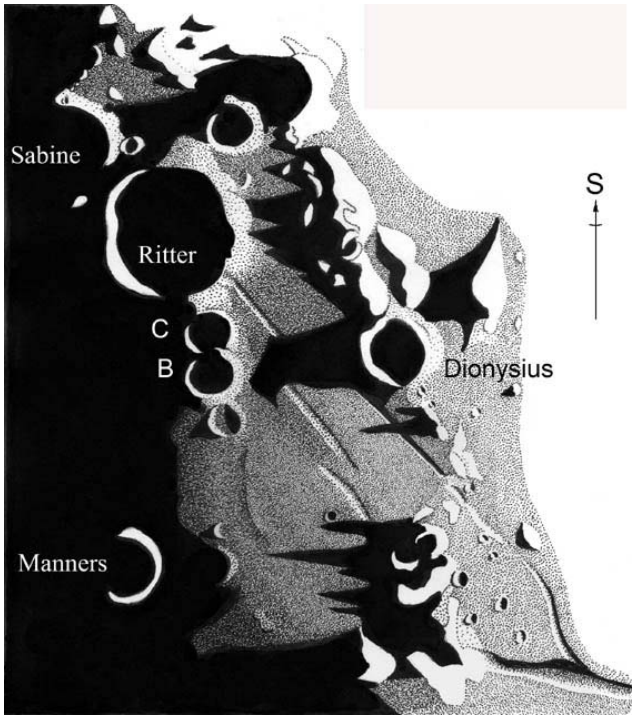
Tony Cook has more information in the Lunar Transient Phenomena Newsletter below.

CROSSING THE LINES

Phil Morgan

Editors Note: Portions of the following article were published in the September 23, 2009 LPOD.

Like a pair of converging railway lines, the rilles, Ritter ll and lll head southeastwards across the shores of the Mare Tranquillitatis towards their parent crater. Just to the west is the crater Dionysius, and on this occasion it was casting a long shadow over these rilles towards the pair, Ritter B and C.



When marial rilles are overlain by the shadows cast from nearby peaks and craters, detail about their surface topography often becomes apparent that is not normally visible. Whilst

RITTER-SABINE - Phillip Morgan –Worcestershire, England. September 10, 2009 02:50-03:30 UT. Seeing 6-8/10, Transparency 4/5, Colongitude 160.0-160.4. 305 mm Newtonian, 400x.

making this observation it seemed clear from the Dionysius shadow profile that the surface under the more easterly rille, Ritter ll, was domed upwards slightly, and as if to balance this, the Ritter lll (nearest to Dionysius) was depressed. Whether or not this uplift and collapse was subsequent, prior or contemporaneous with the rilles formation is impossible to say, but it could be that the Ritter rilles are situated over a dike like intrusion, and later movement of the magma brought about a subsequent uplift of the Ritter ll rille.

On this occasion the southeasterly continuation of the Rille Ritter lll, seemed to cut into the outer northwest rampart of Ritter, indicating that it may have formed later than this crater. At the northern termination of the Ritter lll, there appeared to be a faint connection of this rille with the Ariadaeus l. This is the short southeastern branch of the great rille shown at the extreme bottom right of my drawing.

To the east of this rille system, and just north of Ritter, is the small pair, Ritter B and C. It is interesting to note that the southern cusp of B appears to actually intrude into its twin, C. This, however is an illusion, and is caused by the west wall of a very small craterlet, that sits just between, and links the pair.

This interesting little crater was missed by some of the early Moon mappers such as Neison, Goodacre and Schmidt, but is shown on Wilkins' 300-inch chart. It appears that the first lunar observer to chart this tiny object in its correct location was J.N. Krieger, who shows it on a drawing in Volume 2 of his Moon Atlas, dated 1899.

Just to the south west of Ritter is the small bright crater named after Schmidt. This is only about 8 miles in diameter, and as Walter Goodacre commented: "An utterly unsuitable object with which to commemorate the great Selenographer."

LUNAR TOPOGRAPHICAL STUDIES

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

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

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

OBSERVATIONS RECEIVED

ALEKSANDER BOŽIČ – SLOVENIJA Digital images of Menelaus(12)

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND Digital images of 2, 3, 5, 6, 7, 8, 15 day moon, 1st Quarter Moon, Earthshine on Crescent Moon, Terminator mosaic(2), Janssen & Fracastorius, Lacus Mortis, Posidonius, Southern Highlands, Theophilus region, and Torricelli & Theophilus.

FRED CORNO – SETTIMO TORINESE, ITALY Drawings(2) & scanned film image of Timocharis.

ED CRANDALL – WINSTON-SALEM, NORTH CAROLINA, USA Digital images of South Polar Region (3, LCROSS), Aristarchus, Gassendi, Menelaus, Moretus(3), and Schiller.

WILLIAM DEMBOWSKI – WINDBER, PENNSYLVANIA, USA Digital images of Janssen, Tycho-South Pole, Menelaus, Petavius, and Pytheas. Banded crater reports for Menelaus, and Pytheas.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA Banded crater reports for Agatharchides A, Ariadaeus(2), Aristarchus, Aristillus, Birt, Bode, Conon, Davy A & G, Dawes, Menelaus (2), Nicollet, Proclus, Pytheas, Silberschlag and Theaetetus. Digital images of Agatharchides A, Albategnius, Anaxagoras, Ariadaeus, Aristarchus, Aristillus(2), Bode, Burg, Conon, Deslandres, Hyginus, Kepler, Licetus, Mare Humboldtianum, Messier, Meton, Ptolemaeus, Rosse, Stofler, and MontesTaurus.

LAWRENCE GARRETT – FAIRFAX, VERMONT, USA Scanned film image of Gibbous Moon.

ROBERT HAYS – WORTH, ILLINOIS, USA Drawings of Menelaus and Haidinger.

RICHARD HILL – TUCSON, ARIZONA, USA Digital image of Atlas-Hercules to Macrobius.

PAOLO LAZZAROTTI – MASSA, ITALY Digital image of Southeastern Limb.

PHILLIP MORGAN –WORCESTERSHIRE, ENGLAND Drawing of Sabine & Ritter.

AXEL TUTE – KÜSSABERG, BADEN-WÜRTTEMBERG, GERMANY Digital image of Menelaus.

RECENT TOPOGRAPHICAL OBSERVATIONS

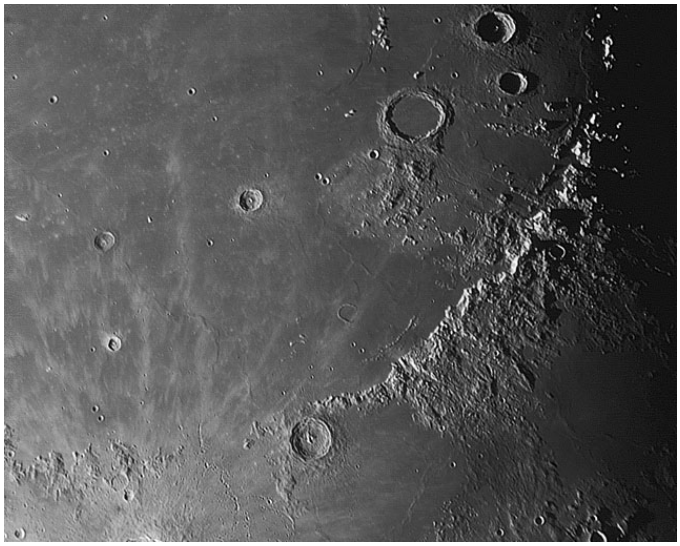
POSIDONIUS - Maurice Collins - Palmerston North, New Zealand, October 24, 2009 08:19-08:27 UT. C8, 3x barlow, LPI.

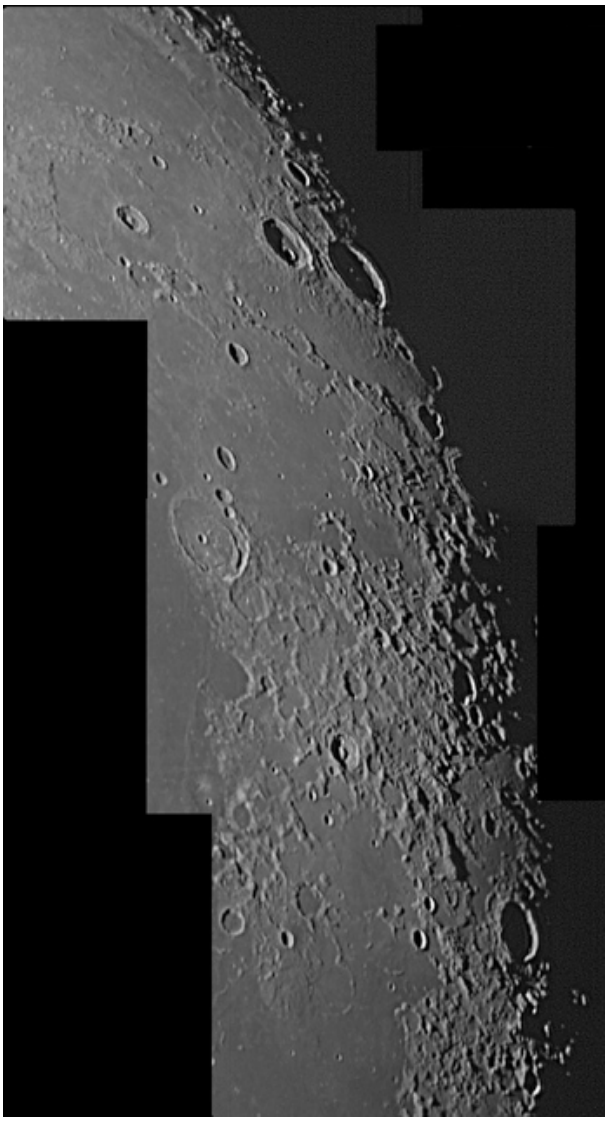
GASSENDI - Ed Crandall – Lewisville, North Carolina, USA. October 1, 2009 01:04 UT. Colongitude 55º, Seeing A III. 110 mm f/6.5 APO, 3x barlow, Toucam.

JANSSEN – William Dembowski, Windber, Pennsylvania, USA, October 6, 2009 01:14 UT, Seeing 5/10, Colongitude 116.4º. Celestron 9.25", f/10 SCT, DMK41, UV/IR filter.

RECENT TOPOGRAPHICAL OBSERVATIONS

CONON – Howard Eskildsen, Ocala, Florida, USA. May 16, 2009 09:20 UT. Seeing 8/10, Transparency 5/6. Meade 6" f/8 refractor, 2x barlow, Orion Starshoot II, W-15 Yellow filter.

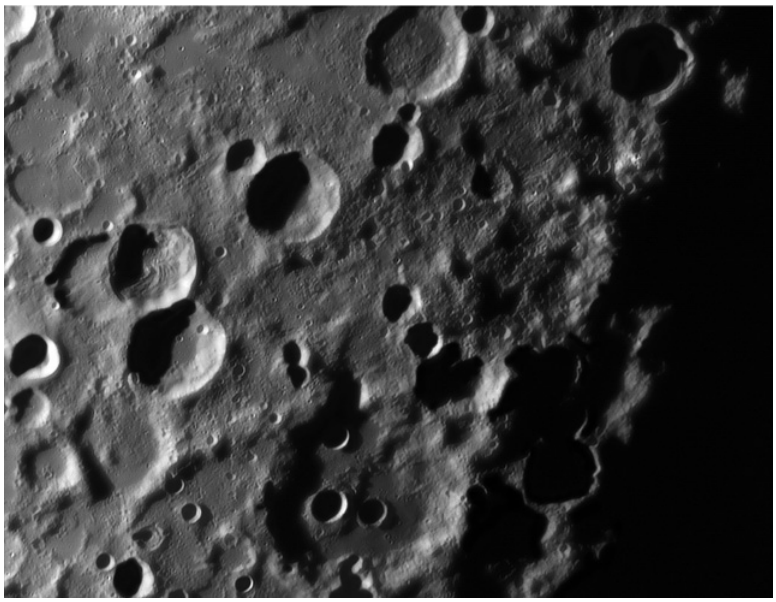




ATLAS-HERCULES to MACROBIUS – Richard Hill, Tucson, Arizona, USA. October 7, 2009 07:00 UT. Seeing 8/10, Questar 3.5", 2x barlow, DMK21AU04, UV/IR blocking filter.

GIBBOUS MOON – Lawrence Garrott, Fairfax, Vermont, USA. 12.5" Newtonian, f/6. SX-70, W-80A blue filter.

RECENT TOPOGRAPHICAL OBSERVATIONS



SOUTHEASTERN LIMB - Paolo Lazzarotti – Massa, Italy. August 22, 2008, 04:29 UT. Seeing 4-6/10, Transparency 4/6. Gladius CF-315 Lazzarotti Opt. Scope, LVI-1392 PRO experimental camera, Edmund R filter.

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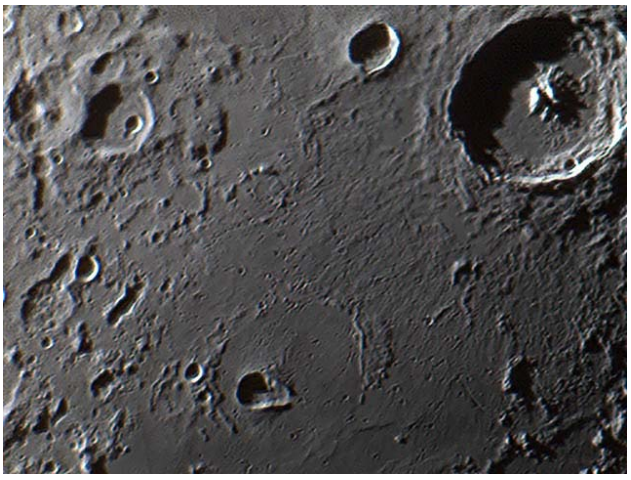
ADDITIONAL TOPOGRAPHICAL OBSERVATIONS



TORRICELLI & THEOPHILUS - Maurice Collins - Palmerston North, New Zealand, October 24, 2009 08:06 UT. C8, 3x barlow, LPI.

SCHILLER - Ed Crandall – Lewisville, North Carolina, USA. October 1, 2009 00:53 UT. Colongitude 55º, Seeing A III. 110 mm f/6.5 APO, 3x barlow, Toucam.

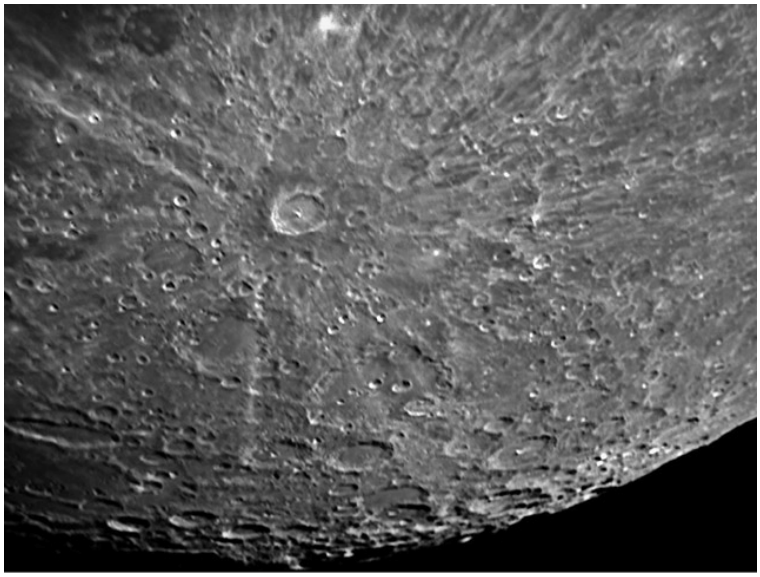
BRIGHT LUNAR RAYS PROJECT

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

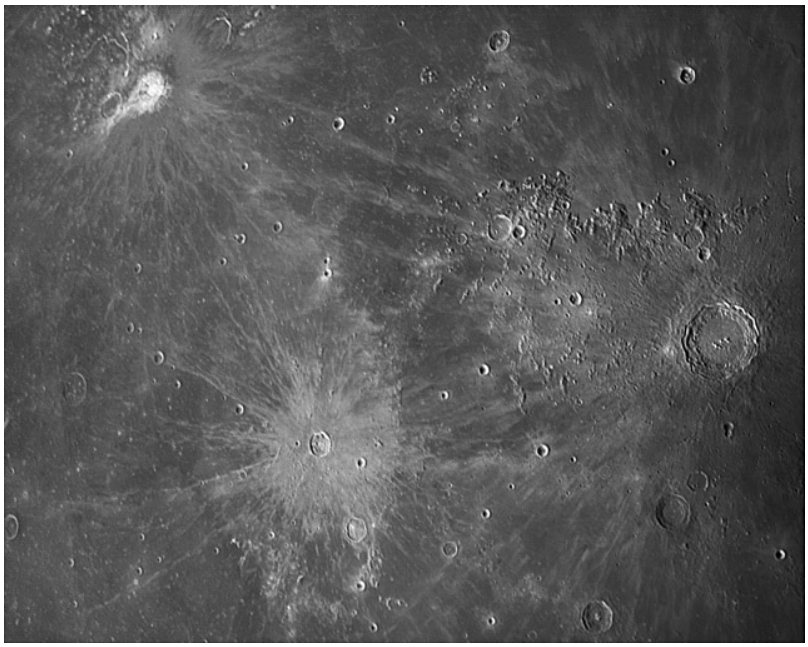
Assistant Coordinator – William Dembowski – dembowski@zone-vx.com

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

RECENT RAY OBSERVATIONS



TYCHO to SOUTH POLAR REGION - William Dembowski, Windber, Pennsylvania, USA, September 2, 2009 01:02 UT. Seeing 5/10, Colongitude 61.9º. Celestron 9.25", f/10 SCT, DMK41, UV/IR filter.



KEPLER - Howard Eskildsen, Ocala, Florida, USA. May 16, 2009 09:30 UT. Seeing 8/10, Transparency 5/6. Meade 6" f/8 refractor, 2x barlow, Orion Starshoot II, W-15 Yellow filter.

BANDED CRATERS PROGRAM

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

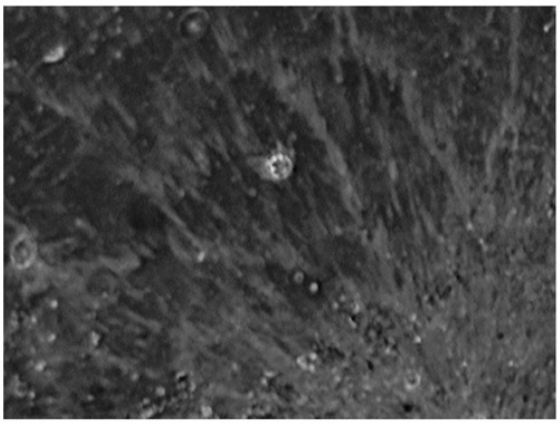
Assistant Coordinator – William Dembowski - dembowski@zone-vx.com

Banded Craters Program Website: http://moon.scopesandscapes.com/alpo-bcp.html

A.L.P.O. Lunar Section - Banded Craters Observing Form

Crater Observed: Pytheas
Observer: William M. Dembowski Observing Station: Elton Moonshine Observatory
Mailing Address: 219 Old Bedford Pike, Windber, PA 15963
Telescope: Celestron SCT 2.35 cm f/10
Imaging: ImagingSource DMK41 Filters: UV/IR
Seeing: 5/10 Transparency: 3/6
Date (UT): 2009/10/06 Time (UT): 02:10
Colongitude: 116.9

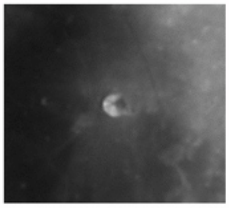
Image: (North up) (East right)



A.L.P.O. Lunar Section: Selected Areas Program Banded Craters Observing Form

Crater Observed: Birt
Observer: Howard Eskildsen Observing Station: Ocala, Florida
Mailing Address: P.O. Box 830415, Ocala, Florida, 34483
Telescope: Meade Refractor 15.2 cm f/8
Imaging: DMK 41AU02.AS, 2X Barlow Filters: None
Seeing: 5/10 Transparency: 4/6
Date (UT): 2009/10/01 Time (UT): 0:42
Colongitude: 58°
Position of crater: Selen. Long. Selen. Lat.
8.5° West 22.4° South
Lunar Atlas Used as Reference: Virtual Moon Atlas Expert Version 2.1 2004-11-07

Image (north up): Comments:



Dark bands noted across crater mixed with bright albedo features.

LUNAR TRANSIENT PHENOMENA

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

LTP NEWSLETTER – NOVEMBER 2009

Dr. Anthony Cook - Coordinator

Observations for Sep 2009 were received from the following observers: Jay Albert (Lakeworth, FL, USA), Clive Brook (Plymouth, UK), Maurice Collins (Palmerston North, New Zealand), Marie Cook (Mundesley, UK), Peter Grego (St Dennis, UK), Steve Lang (Stanley Bay, New Zealand), and Robert Lunsford (Chula Vista, CA, USA). The Twitter LTP alert page – http://twitter.com/lunarnaut has 5 followers now - a bit of a slow start. However I would really like to encourage other observers to join up so that we can get more people out observing a LTP shortly after I hear about one. To join you need basically to set up a twitter account, and then just request to have access to the LTP alert page. On another topic, please remember to keep a look out for a faint points of light, or flashes, off the night side of the lunar terminator, and especially within 100 seconds of arc of the lunar poles – this will help the Chandrayan-1 sun glint project in trying to locate where this defunct spacecraft is presently located?

LTP reports: Five tentative LTP reports have been received since last month, however as you will see from below, only one of these have received an ALPO/BAA weight of 2, and the rest are 1's. This is not intended to denigrate the care and attention of the observers concerned in making these observations, and bringing these reports to my attention, indeed some of the observers have expressed uncertainty themselves in what they saw. However I must assign a weight from 0 to 5, and in all the cases concerned I felt that none had enough evidence to rate above 2 this month. A weight of 1 is often preliminary anyway until we get some repeat observations, under similar illumination, from which we may judge the original LTP description to see whether it was abnormal or now.

Shavarsh Khachatryan (Yaravan, Armenia) sent in the following report, from last year, from 2008 Aug 11 UT 17:40-18:20, concerning the appearance of Mons Undest (a non IAU name), a mountain near Lambert. 127mm f/12 GoTo telescope used at x62-x154, seeing=best and transparency=6. Mons Undest observed to have a "very strong glow", especially the part that was facing the line of the terminator - this was brighter than the side facing away. No other nearby object was casting as much light, even Mons La Hire. The glow was present throughout the 40 minutes observing session. Although I would not normally expect to see the side facing the terminator to be brighter, than the side facing away, I am tempted to offer only an ALPO/BAA weight=1, on the grounds that the effect did not change over time.

On 2009 Sep 03 UT 23:15-23:17 Barry Gibbs (UK) used a hand held SLR digital camera to take some telephoto images of the Moon, and observed that Aristarchus was changing in brightness, whilst other features were not fluctuating so much. Four images were supplied to me for examination and I measured the brightness of six features, including Aristarchus as can be seen in figure 1.

Now although there looks like a +/- 10% variance in the brightness of Aristarchus, one has to be extremely careful in interpretation, and I will assign a weight of 1 for the following three reasons: a) this was a hand held camera with telephoto lens and subject to camera shake (convolution) – this can have a dramatic effect on the peak brightness of point-like features, and yet more extended features, spanning several pixels, will be unaffected; b) the Moon's diameter in the images was about 285 pixels, or 13km/pixel, so at such an image scale contrasty or bright features with similar spatial sizes can accidentally have their light split between 2 or even 4 pixels, thus causing a dimming, whereas larger features are again

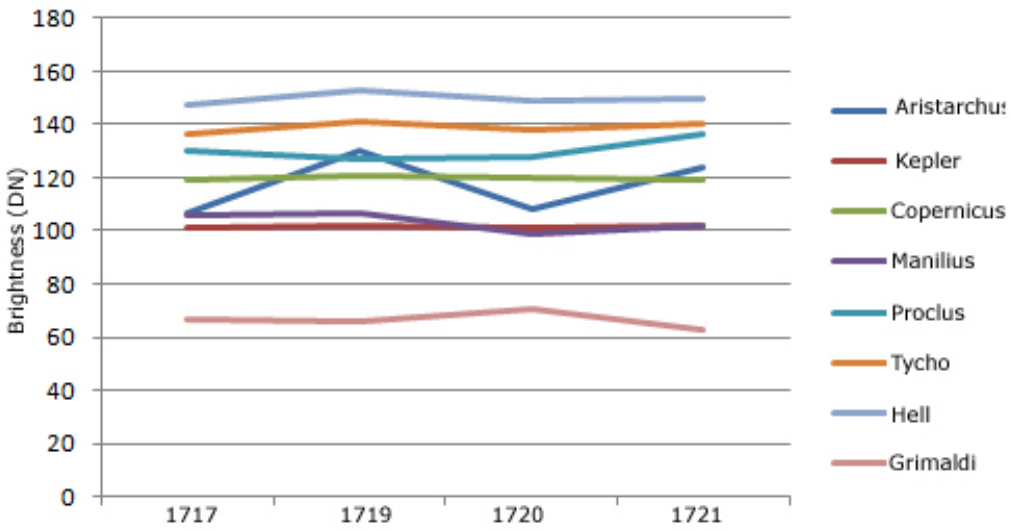


Fig. 1. Relative digital number brightness of pixels (vertical axis) versus sequential image number (in the time direction) from images by Barry Gibbs from 2009 Sep 03.

unaffected, c) there is a matrix of red, green blue filters placed over the CCD pixels, again if an object is brighter in one color than another and small enough to be similar in size to this matrix of filters, this can cause some apparent fluctuations, though this may well show up as enhanced color. So how do we test out these theories? Try using a telephoto digital SLR camera yourself and take hand held images of the Full Moon – do you see similar variations in Aristarchus through a series of images? If not then maybe I should consider increasing the weight of this observation?

On 2009 Sep 9 UT 23:32 Peter Grego (St Dennis, Cornwall, UK, seeing II-III) whilst observing the south pole area (perhaps becoming familiar with the area prior to the LCROSS impact?), suspected a flash south of Cabeus, that lasted a fraction of a second (see his sketch in figure 2). He suspects the nature of this flash though as he did see some further flashes, albeit less prominent, later elsewhere on the Moon (possibly cosmic rays?). The ALPO/BAA weight=1, again just in case, because Peter did mention a duration for the flash where as cosmic ray events should appear pretty much instantaneous? Other possibilities could be: a) a faint star that is normally too faint to see against the glare of the Moon, that is brought into focus by a brief excellent moment of seeing; b) a distant mountain peak that again is faint, but brought into focus and visibility by a brief excellent moment of seeing; c) an impact flash on a distant peak, or d) could it be sun glint off of the lost Chandrayan-1 spacecraft's solar panel? I can confirm that the latter is however unlikely because according to the predictions given to me, it was not due to passage past the south pole area until 23:05:37UT, or 01:13:55UT the following day.

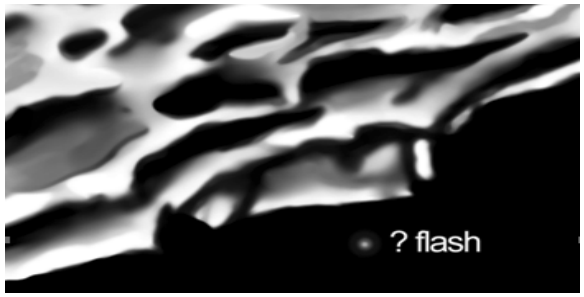


Fig. 2 Peter Grego's sketch of Cabeus with the flash seen Off the limb on 2009 Sep 9. North is at the top.

On 2009 Sep 11 UT 00:15-0105 Clive Brook (Plymouth, UK, 5" refractor, x100, seeing tremors but improving over time) noticed that the central peaks of Alphonsus appeared to be brightening gradually, however Clive has doubts that this was a LTP. Just in case I am assigning a low weight of 1 to this report.

On 2009 Sep 11/12 UT 23:28-00:00 Marie Cook (Mundesley, UK, 90mm Questar telescope, x80 and x190, seeing II, transparency moderate-poor) observed pink on the north west rim of Tycho and green-blue on the inner SW rim. No sign of color seen elsewhere on the Moon except for the S-E rim of Plato that was red. By 00:00UT though, the color had gone. The Moon was about 20 deg in altitude at the time. Using an image under similar illumination from an RAE (Brazil) observer, Carvalho, I was able to add artificial spurious color. However as you can see, although this places some red on the NW rim, and blue on the SE rim, there are stronger colors elsewhere in the crater that Marie did not observe. Furthemore she reported that the color had gone by the end of the observation. Although tempted to say that having red and blues on opposite sides of a crater is indictative of spurious color (spectral dispersion), the model does not explain why other colors were not seen elsewhere, or why the color had gone in the end. As we have only part of an explanation here, I will assign an ALPO/BAA weight of 2.

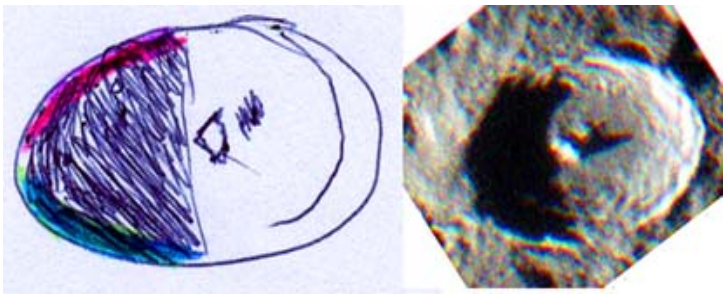


Fig 3. (Left) Marie Cook's sketch of Tycho from 2009 Sep 11. (Right) at a similar illumination, image obtained by an RAE (Brazil) observer, Carvalho, to which I have added "artificial" spurious color. Note North is at the top in both the sketch and image.

The LCROSS Impact: At present, I know of only two attempts, from ALPO and BAA observers, to try to observe the LCROSS impact. From the UK I was hoping to use a 10" robotic telescope under day light conditions, and a narrow band filter to help cut out scattered daylight. Needless to say I was clouded out. Jay Albert, over in Florida, was observing too, but under more darker conditions, however like practically all other observers here on Earth, saw nothing.

To be honest, although the lack of anything visible to Earth-based amateur telescopes was a big disappointment, especially after many of you might remember seeing a big optical brightening from NASA's Deep Impact striking comet Tempel-I back in 2005, we must look at what transpired in context. There were various computer models to suggest the outcome of the impact, and the most favorable inferred optical detection in amateur sized scopes. NASA requested as many observations as possible and 14 major international observatories joined in, as well as several space based telescopes, including Hubble. Amateurs could not complete with these larger scopes, but did provide supportive backup in case the models were overly pessimistic and the plume had been brighter than expected – perhaps even blinding the bigger observatories? In addition, having extra amateur back up would cater for disruption from the weather, and offer increased time resolution that was not possible with bigger telescopes. The area selected was hand picked with the best available evidence, from independent space missions, for the presence of water, permanent shadow, very low temperatures, and hydrogen. So everything possible to make suitable and comprehensive observations was in place and for those of you participating, you were in effect part of a very large collaborative project, and I am sure that this will be acknowledged in the numerous papers that NASA funded scientists will eventually produce. In the mean time, if you have gone to the effort of observing during the event, please submit your observations to LCROSS anyway, but also send copies into ALPO as we can use them to study south polar limb region. One last word, before going onto the science announced

so far, is that if NASA has not asked for public participation, and something bright had been seen, then they probably would have been heavily criticized too!

Anyway here is what I have managed to glean from the limited information presented at the televised NASA press conference, shortly after the impact, and subsequent web news releases since then.

1) As the press conference was just a few hours after the impact, the scientists had not had time to comprehend what had occurred – the pictures came in very fast and were auto contrast enhanced for the TV audience. There was no obvious impact flash, and no obvious plume.
2) Later analysis showed a thermal image of a warm impact crater about 18-20m in diameter, and this agreed with predictions. This was later imaged from NASA's LRO mission on subsequent orbits.
3) Only the LCROSS shepherding satellite (with TV camera) managed to record any sign of an image of a plume, and this was only after they had co-added some images to improve the signal to noise ratio.
4) No Earth-based telescopes were able to image an ejecta plume, even in the thermal infrared.
5) The LCROSS shepherding satellite detected a change in the spectrum immediately after the impact, and likewise at Kitt Peak observatory – at the press conference Kitt Peak astronomers were reported to have seen the clear presence of Sodium, and upon that news, LCROSS scientists piped up that they too had seen this. There was no mention of water or OH – however it was pointed out that they really had not had time to look.
6) Many days later preliminary findings from the Hubble Space Telescope were announced, namely that they had not found evidence for an increase in water, OH, or hydrogen in the Moon's exosphere following the impact.
7) At the NASA press conference, several hypothetical theories were suggested to explain the lack of an obvious plume:
   a) The impact was on a boulder field, and these soaked up the energy that would have gone into a plume
   b) The height of the impact point was much deeper, and so the plume never made it into sun light
   c) The impact was on a slope and the plume went off side ways
8) It was pointed out that either way, whether water was detected or not, the results from the LCROSS impact will have important constraints in models of the amount of volatiles present in permanently shaded areas of the Moon.

So please watch this space for further details in the months to come!

Routine reports: Just to show you the value of routine non-LTP observations, I have dug out routine observations that match three Plato LTPs reported in 1969, 1970 and 2004 respectively. Here are the original LTP reports:

Plato 1969 Nov 18 UTC 19:00-19:30 Observed by Mackay (Scotland, 6" reflector x40, x144) "Obs. shadings in crater at low power, but less apparent at higher power (less contrast). Not shadows as they were not uniform black (Apollo 12 watch)." NASA catalog weight=1 and ID #1215. The ALPO/BAA weight=1.

Plato 1970 Nov 8 UT 01:31-01:47 Observed by Bartlett (Baltimore, MD, USA, 3" refractor x59-300) "Only crater A seen, all others obscured. Floor=3deg albedo, very smooth. A had a minute shadow & no obscur. On Nov. 22 1966 at nearly same colong. 5 spots incl. A were vis." NASA catalog weight=4 (high). NASA catalog ID #1278. ALPO/BAA weight=2.

Plato 2004 Jan 01 UT 19:55-20:13 Observed by Brook (Plymouth, England, 60mm refractor x120, seeing very steady, slight haze) "Could not see small white dots previously observed with this instrument under good conditions, that represent central craterlets. Crater floor appeared a

plain steely grey with little or no albedo features, The rille to the west of Plato well seen." BAA Lunar Section report. The ALPO/BAA weight=1.

Now running through our database of routine observations I came across the following photographs, images (see Fig 4) and reports...

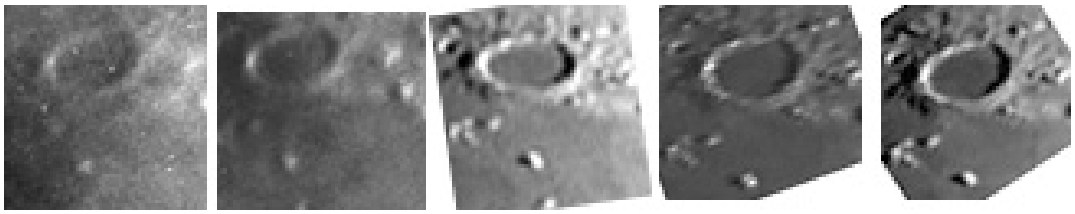


Fig 4. (Far left & left) 1976 Aug 04 UT 20:29-20:30 photographs taken by Tony Cook (Frimley, UK). (Centre) 2009 Jan 5 UT 17:01 Aberystwth University CCD image taken through a 10.5" reflector at an image scale of ~2"/pixel at 656nm. (Right and far right) 2009 Sep 28 UT 06:00-06:40 (under twilight) and UT 08:30-08:39 from CCD image mosaics by Steve Lang (New Zealand). North is at the top in all these images.

Here are some corresponding descriptive reports and one sketch…….

2001 May 31 UT20:19-20:27 Gerald North (Narborough, UK, 216mm reflector, x93 and x134,seeing IV/V transparency good, slight spurious color, sky still brightly twilit)"the floor of Plato looks bland gray – no floor craterlets visible except perhaps, the near-central one glimpsed on a couple of occasions. All seems normal."

2002 Apr 21 UT 20:50-21:15 Marie Cook (Frimley, UK, seeing II, transparency good, no spurious color) observed that Plato looked "normal."

2006 Nov 29 UT 19:20 Marie Cook (Mundesley, UK, 90mm Questar, x90, seeing III-IV and transparency good) observed no floor craterlets seen, but a dark spot was seen on the floor to the west which may have been a craterlet, or just an indentation into the wall. An unusual triangular lighter area was seen on the floor, but was very faint. A small valley, or rille was seen to the NNE. A thin shadow was on the floor from the NNE to the SE.

Fig 5. Sktech of Plato by Marie Cook on 2006 Nov 29 at UT 19:20. North is at the top.

2006 Dec 29 UT 08:35? Maurice Collins (Palmerston North, New Zealand, 3.5" Mak, seeing II)" observed no detail on the floor of Plato. The western rim was lit nicely"

2009 Jan 05 UT 18:56-19:00 Marie Cook (Mundesley, UK, 90mm Questar, seeing IV, transparency very poor) "Plato looked normal".

So what do the above past reports tell us about the three Plato LTPs? The set of images available are unfortunately of low resolution, because they were either from early days in photography experiments (in

my case), or parts of larger image mosaics. They do however at least give us an overview of the relative darkness of the floor, and the location and extent of the shadows etc. Some contrast enhancement (not shown here) does reveal floor shadings, perhaps pertaining to the 1969 LTP description – but we cannot be sure? The routine descriptive reports of the crater often refer to a lack of detail (craterlets) visible on the floor. Therefore perhaps this is normal at this solar colongitude range of 21º-23º? I guess to be sure I would like to ask that if anybody has higher resolution images or sketches of Plato under that colongitude range, that they send them into me. If you do not have observations of Plato at these colongitudes, then please look at the LTP predictions web aite and go out and observe if you see any of these reports cropping up, I think all I would want to do over the 3 LTP reports is to drop the ALPO/BAA weight of Bartlett's 1970 LTP from a 2 to just 1; the other two LTPs are rated as 1's already. A weight of 1 means that they will not affect the statistical analysis too much if they are just normal appearances of the crater, but we will still retain them in the database just in case.

For repeat illumination LTP predictions for the coming month, these can be found on the following web site: http://users.aber.ac.uk/atc/tlp/tlp.htm .For members who do not have access to the internet, please drop me a line and I will post predictions to you. If you would like to join the LTP telephone alert team, please let me know your phone No. and how late you wish to be contacted. If in the unlikely event you see a LTP, 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 http://twitter.com/lunarnaut but you will need to contact me to ask for permission to access these.

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. **Birt**
2. **Cabeus**
3. **Conon**
4. **Gassendi**
5. **Janssen**
6. **Kepler**
7. **Macrobius**
8. **Plato**
9. **Posidonius**
10. **Pytheas**
11. **Ritter-Sabine**
12. **Schiller**
13. **Timocharis**
14. **Torricelli-Theophilus**
15. **Tycho**

FOCUS ON targets
X = Menelaus (November)
Y = Atlas & Hercules (January)
Z = Snellius & Furnerius (March)