THE LUNAR OBSERVER

Association of Lunar & Planetary Observers (ALPO) — Founded in 1947

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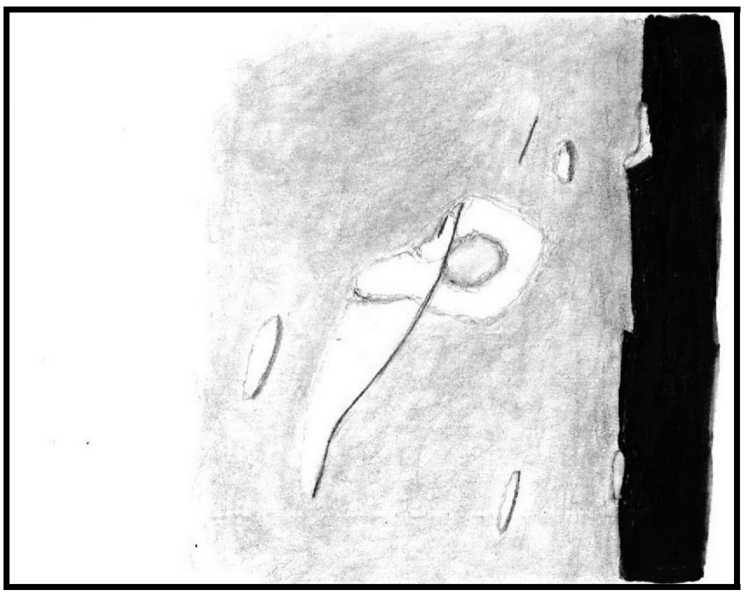
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – JANUARY 2011

REINER GAMMA



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
June 30, 2004 03:32-03:50 UT
15 cm refl, 170x, seeing 8/10

I observed this feature on the evening of June 29/30, 2004 after watching the moon hide 6th-magnitude ZC 2328. This feature was near the terminator this evening, so I decided to check it again (after having observed it before). It looked much as usual with a large, diamond-shaped area and a smaller eastern lobe. The larger portion has a dusky, oval interior patch; the edge of this patch is darker than the center. The eastern lobe has a grayish northern edge. There was a narrow, sharp strip of shadow that evening, appearing like a crack through Reiner gamma. From the south point of the diamond area, it went almost due north to the east edge of the dusky oval, then it angled northeasterly until it turned northerly again near its end. A relatively bright area extends northward from the eastern lobe, and adjoins this shadow. It is brighter than the surrounding mare, but not as bright as Reiner gamma. I have to wonder if this brighter area is a relief feature as well as an albedo feature. (Reiner gamma itself appears to be purely an albedo feature.) A small bit of shadow is just east of the long shadow's southern end in a slightly brighter area within Reiner gamma. I had not seen this sharp, narrow shadowing previously; the terminator's proximity must have made the difference. There are a few low hills in the area, some of them causing irregularities in the terminator.

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LUNAR CALENDAR

JANUARY 2011-FEBRUARY 2011 (UT)

Jan. 02	10:06	Extreme South Declination
Jan. 02	16:00	Moon 3.9 Degrees SSE of Mercury
Jan. 03	20:00	Moon 4.3 Degrees SSE of Pluto
Jan. 04	09:03	New Moon (Start of Lunation 1089)
Jan. 04	24:00	Moon 2.7 Degrees N of Mars
Jan. 06	12:00	Moon 0.71 Degrees SSE of asteroid 15 Eunomia
Jan. 07	21:00	Moon 4.8 Degrees NNW of Neptune
Jan. 10	05:39	Moon at Apogee (404,975 km – 251,640 miles)
Jan. 10	09:00	Moon 6.0 Degrees NNW of Uranus
Jan. 10	11:00	Moon 6.5 Degrees NNW of Jupiter
Jan. 12	11:32	First Quarter
Jan. 16	22.54	Extreme North Declination
Jan. 19	21:22	Full Moon
Jan. 22	00:11	Moon at Perigee (362.792 km – 225,428 miles)
Jan. 25	04:00	Moon 7.6 Degrees SSW of Saturn
Jan. 26	12:58	Last Quarter
Jan. 29	16:30	Extreme South Declination
Jan. 30	03:00	Moon 3.5 Degrees S of Venus
Jan. 31	02:00	Moon 4.1 Degrees S of Pluto
Feb. 01	17:00	Moon 3.5 Degrees N of Mercury
Feb. 03	02:00	Moon 4.5 Degrees NNW of Mars
Feb. 03	02:31	New Moon (Start of Lunation 1090)
Feb. 04	04:00	Moon 4.8 Degrees NNW of Neptune
Feb. 06	20:00	Moon 5.9 Degrees NNW of Uranus
Feb. 06	23:14	Moon at Apogee (405,923 km – 252,229 miles)
Feb. 07	04:00	Moon 6.3 Degrees NNW of Jupiter
Feb. 11	07:19	First Quarter
Feb. 13	09:00	Extreme North Declination
Feb. 18	08:36	Full Moon
Feb. 19	07:28	Moon at Perigee (358,246 km – 222,604 miles)
Feb. 21	12:00	Moon 7.5 Degrees SSW of Saturn
Feb. 24	23:27	Last Quarter
Feb. 25	22:12	Extreme South Declination
Feb. 27	09:00	Moon 3.9 Degrees S of Pluto
Feb. 28	00:00	Moon 0.88 Degrees SSE of asteroid 4 Vesta

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: Central Peaks with Craters

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the **March 2011** edition will be central peaks that have craters superimposed on them. Rik Hill pointed out three examples (Plinius, Walther & Regiomontanus), but there are others. 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 area to your observing list and send your favorites to:

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

Deadline for inclusion in the Central Peaks with Craters article is February 20, 2011

FUTURE FOCUS ON ARTICLES:

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

Alphonsus	**TLO Issue: May 2011**	**Deadline: Apr. 20, 2011**
Plato	**TLO Issue: July 2011**	**Deadline: June 20, 2011**

FOCUS ON: Marius-Reiner Gamma Area

By Wayne Bailey
Acting Coordinator: Lunar Topographical Studies

This month's Focus On covers a fairly large area on Oceanus Procellarum (Fig. 1). To the casual observer, the area appears rather bland: two somewhat similar, moderate sized craters (Marius & Reiner) on the mare surface. However, on closer inspection, some of the most interesting features on the moon are revealed. Although Marius and Reiner are similar size craters, there are distinct differences between them. West of Marius is the area known as the Marius Hills, an unusual volcanic area with numerous domes, cones, small hills and rilles among multiple lava flows on a low plateau (Fig. 2). Multiple wrinkle ridges and rilles cross the area, and west of Reiner lies the enigmatic bright, magnetic patch known as Reiner Gamma. We'll discuss each of these features below.

Figure 1: Kepler to Reiner Gamma – *Ed Crandall – Lewisville, North Carolina, USA. July 6, 2010 09:36 UT. Seeing AIII. Colongitude 206.8º. 110 mm f/6.5 APO, 2.4x barlow, ToUcam.*

Marius and Reiner are both moderate sized craters that appear young with sharp rims. Marius is the larger of the two, with a flat, apparently flooded, floor (Fig. 3). Reiner lies on a wrinkle ridge south of the Marius Hills. It has a rough floor, with a distinct, double central peak. There are several gorges and small ridges on the floor.

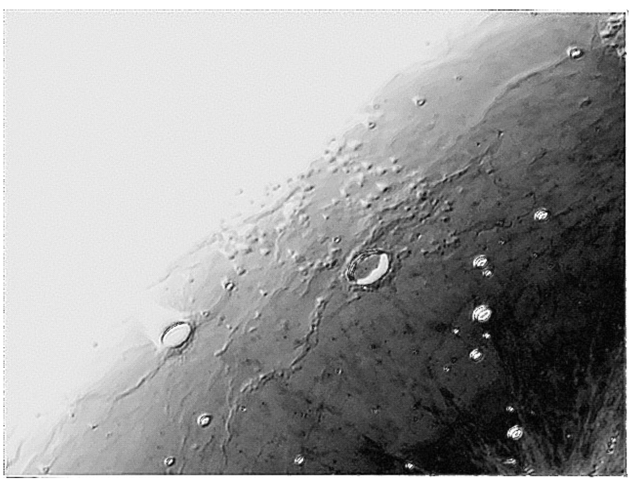
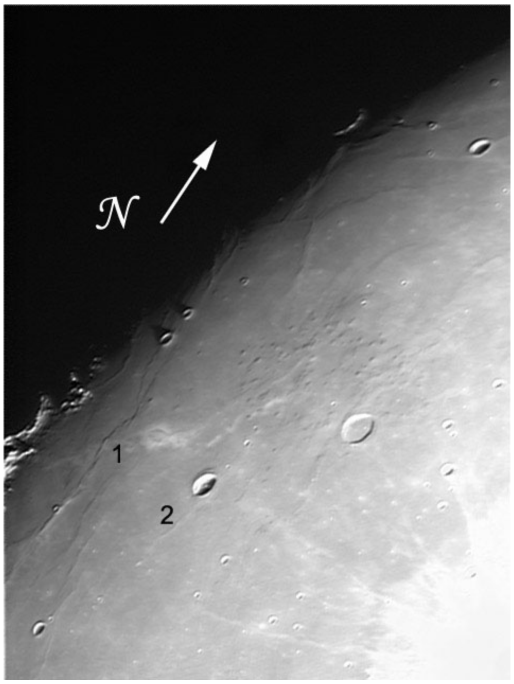


Figure 2: Marius-Reiner Area (Heavily processed) - *Klaus Petersen – Glinde, Germany. December 28, 2009 22:47 UT. Seeing 6/10, transparency 5/6, Meade 8" SCT, f/10, DMK 21AF04.AS, UV/IR blocking filter.*

The Marius Hills may be one of the geologically simplest volcanic areas on the moon (other volcanic candidates include the Gruithuisen domes, Aristarchus plateau and the Kant plateau). The area is situated on a south sloping plateau that's a few hundred meters higher than the adjacent mare. The most obvious characteristic is the existence of hundreds of small domes. These appear rougher than typical domes elsewhere on the moon. They're also a mixture of round domes, and steeper cones. The cones often appear on round domes. The cones are probably formed by lava outflows that are more viscous than, and thus don't flow as far as, the lava that produced the round domes. So cones appearing superimposed on domes would indicate that later erupting lavas were more viscous than the earlier flows that formed the round domes. Spectroscopic analysis shows that the entire plateau is a complex mix of multiple, chemically distinct flows. A positive gravity anomaly indicates that a large, dense magma body underlies the plateau. The entire plateau may be made up of thin layers produced by the outflow from numerous vents. The intruding magma may also have contributed to uplift of the plateau.

Two large rilles border the Marius Hills; Rima Marius winds from north of Marius around the northeast side of the hills area, and Rima Galilaei lies along the southwest border of the hills. Numerous small rilles are visible criss-crossing the plateau in spacecraft images.



At least two large systems of wrinkle ridges intersect in the area of the Marius Hills, which may be related to the source of the area's volcanic activity.

There are fewer small craters in the Hills than on the adjacent mare surface, which indicates that the plateau is younger than the Oceanus Procellarum surface (i.e. it is younger than Imbrian age).

Figure 3: Reiner Gamma, Reiner & Marius **-** Antonius J Schalken – ‘Luar’ Observatory, Melbourne, Victoria, Australia. September 24, 2007 12:45 UT. Colongitude 64.6º, Rumak-Maksutov 6” f/10, ToUcam Pro II 740K.

Rays from Kepler and Aristarchus overlay the Hills area, so it is older than Copernican age, which makes it Eratosthenean age. The Marius Hills were a candidate target for the Surveyor program, and also for an Apollo landing, but other sites were higher priority and the Apollo program was cancelled before the Hills area could be visited. The Russian Luna 8 & 9 missions landed southwest of the Marius Hills, on the mare and near the mare edge respectively.

South of the Marius Hills and west of Reiner, one of the most enigmatic features on the visible face of the moon lies on a wrinkle ridge that runs south from the Hills. This bright feature, known as Reiner Gamma (Fig. 4) because of it's vague resemblence to the Greek letter gamma, is the only obvious example on the visible lunar hemisphere of the features known as swirls. Swirls are bright, usually curvilinear markings that are apparently unrelated to their surroundings. My impression of Reiner Gamma is a ghost version of Reiner surrounded by a bright halo. The main portion is an oval, with an irregular, discontinuous tail extending north to the Marius Hills, and less distinct, splotchy arms extending to the south. The bright feature is also surrounded by a darker, somewhat reddish halo. The bright markings appear similar to bright rays, with two obvious differences: rays are typically linear features, not curved (but see the ray extending from Cardanus to Seleucus), and Reiner Gamma is visible at lower sun angles than typical rays (Fig. 5. compare Reiner Gamma to the rays near Seleucus in the upper left).

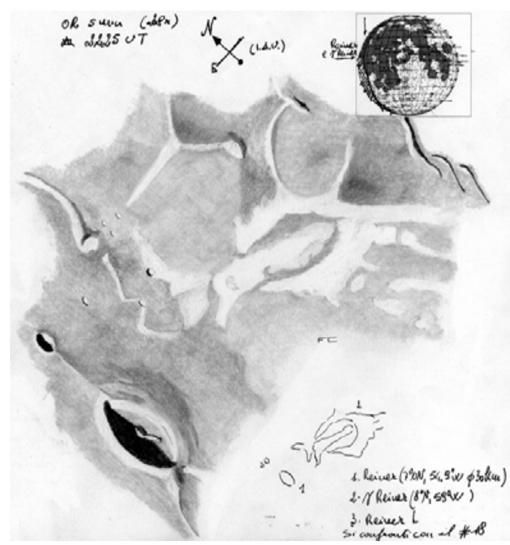


Figure 4: Reiner & Reiner Gamma *- Fred Corno-Settimo Torinese, Italy. December 18, 2010 22:16-22:58 UT. Seeing 6/10, light haze. 5" Apochromatic refractor, 208x.*
Between the Gamma and the main crater Reiner a ridge was fairly evident, to the point that the gamma appeared as sitting on a level higher than that the crater is. Other ridges were visible around the gamma as if radiating from it and to the West of it, crossing roughly in the N-S direction. To the north of the gamma a domelike structure was also discernible. Small craterlets were interspersed between the main crater and the Gamma.

Reiner Gamma is one of the strongest magnetic areas on the moon. All of the other recognized swirls are on the far side, not visible from the earth, and tend to be associated with areas of high magnetic field. Swirls also seem to be preferentially located opposite (anti-podal to) major impact basins, where seismic energy from the impact may be focused. But the statistical significance of this correlation has been questioned. Recently, there have been suggestions that smaller bright features are also related to swirls.

Several suggestions to explain the origin of Reiner Gamma and the other swirls have been made over the years. These fall into one or more of the following categories: 1. Internal emissions from the moon. 2. Unusal distribution of impact debris. 3. Modified weathering of the surface.

Figure 5: Reiner Gamma *-Howard Eskildsen-Ocala, Florida, USA. October 3, 2010 10:18 UT. Seeing 7/10, Transparency 4/6. 6" f/8 Explore Scientific refractor, 2x barlow, DMK 41AU02 AS, W8 Yellow filter.*

The swirling, curvilinear shape and lack of topographic relief suggests condensation from gaseous volcanic (or non-volcanic) emissions. Spectroscopic data, however, shows that the bright features appear to be a mixture of mare and highland basalt, not condensate minerals.

Impacts feature in several suggested explanations. The most popular probably is an impact by a small comet (rather than asteroidal type material), which scours the surface, revealing fresh surface in an irregular pattern. Deposits of coma and/or tail material could also contribute to the splotchy appearance. The scouring effect from the Apollo landing jets is reminiscient of swirls. The rarity of swirls may be inconsistent with the probable frequency of comet impacts on the moon, and the spectrographic data contains no evidence for cometary debris (although it doesn't exclude the possibility). The comet nucleus is assumed to have carried the associated magnetic field.

A more exotic suggestion is that a large impact on the opposite side of the moon, injected debris into low, moon circling orbits. Collisions of counter orbiting debris then rained pulverized material onto the surface, forming the swirl. The magnetic field may then influence the deposition pattern, or may protect the fresh debris from weathering, as described below.

The role of the magnetic field may not have been to influence the formation of the swirl pattern, but instead to protect the existing surface from weathering (darkening) by deflecting solar wind particles. In this case, the origin of the magnetic field is a separate problem. The swirl is simply the result of the existence of the magnetic field. Data from orbiting magnetometers are consistent with correlation between the albedo features and the magnetic field, but have insufficient spatial resolution to draw a firm conclussion. Weathering by micrometeoroid impact would not be influenced by the magnetic field, so it's not clear how much the shielding would slow weathering. In this case, the swirl is just a region of normal ray material that has been preserved by the magnetic field.

The nature and origin of Reiner Gamma, and swirls in general, is still a mystery, with adherents of several theories. Their true nature may not be revealed until an in-situ investigation is undertaken. Even then, it may be that there is no single, simple explanation.

In summary, this relatively small area on Oceanus Procellarum contains a multitude of interesting objects to examine; domes, rilles, impact craters, wrinkle ridges, lava flows, and the most enigmatic feature of all, the swirl Reiner Gamma.

ADDITIONAL READING

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Nicholas, J. B. etal. 2007. LPSC XXXVIII 1027. "The Reiner Gamma Albedo Marking on Earth's Moon: Old or Young?"

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

Wohler,C. 2008. LPSC XXXIX 1123. "Polarisation Angle Anomalies of Lunar Crater Rays and Reiner Gamma"

Wood, Charles. 2003. The Moon: A Personal View. Sky Publishing Corp. Cambridge.

Note: Journal articles can be found by searching at http://adsabs.harvard.edu/abstract_service.html

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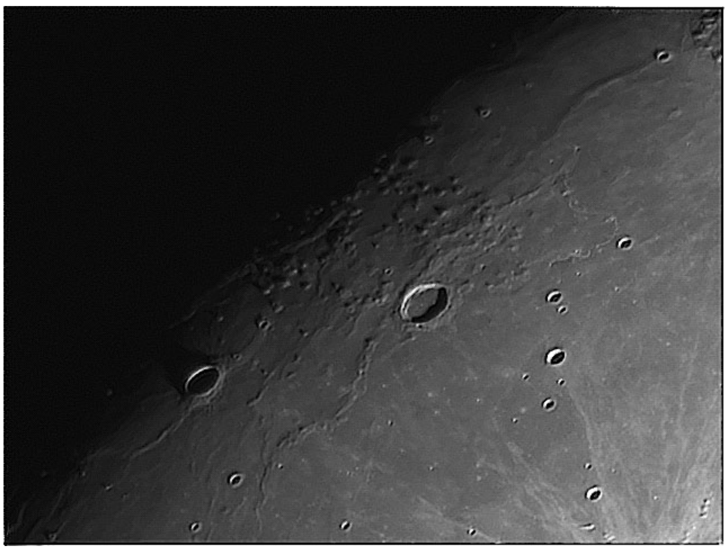
ADDITIONAL MARIUS-REINER GAMMA IMAGES

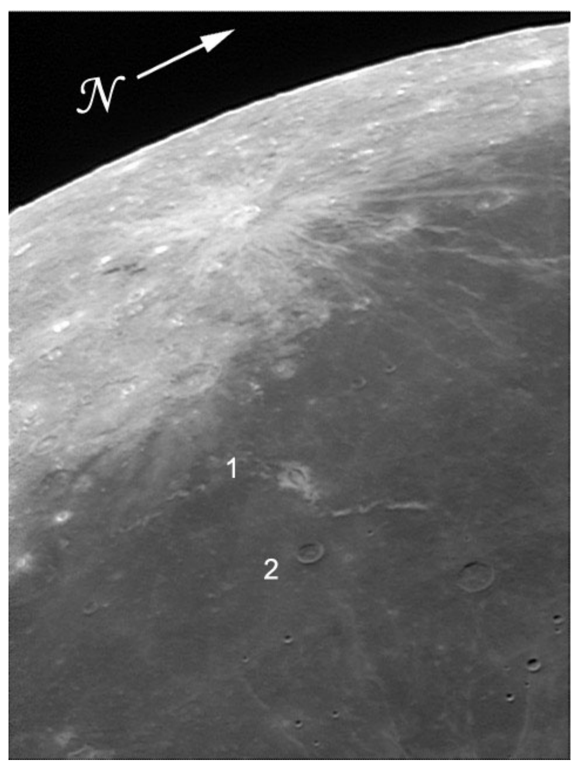
REINER GAMMA – Ed Crandall – Lewisville, North Carolina, USA. July 6, 2010 09:13 UT. Seeing AIII. Colongitude 206.6º. 110 mm f/6.5 APO, 3x barlow, ToUcam.

ADDITIONAL MARIUS-REINER GAMMA IMAGES

MARIUS-REINER GAMMA-Howard Eskildsen-Ocala, Florida, USA. October 2, 2010 10:08 UT. Seeing 6/10, Transparency 4/6. 6" f/8 Explore Scientific refractor, 2x barlow, DMK 41AU02 AS, no filter.



MARIUS-REINER AREA - Klaus Petersen – Glinde, Germany. December 28, 2009 22:47 UT. Seeing 6/10, transparency 5/6, Meade 8" SCT, f/10, DMK 21AF04.AS, UV/IR blocking filter.



REINER GAMMA, REINER & MARIUS - Antonius J Schalken – 'Luar' Observatory, Melbourne, Victoria, Australia. March 22, 2006 20:27 UT. Colongitude 187.6º, Rumak-Maksutov 6" f/10, ToUcam Pro II 740K.

Marius Rilles

By Howard Eskildsen

The region surrounding Marius is noted for volcanic landforms including domes, wrinkle ridges, and sinuous rilles. The domes and wrinkle ridges are not hard to spot in small telescopes under low angle lighting, but the rilles are more of a challenge. Four rilles that originate in the Marius Hills are a challenge to see visually, but can be imaged with medium size telescopes. Most images show them at relatively low sun angles, leaving the impression that they fade into the glare with high overhead lighting. I was surprised to discover that a relatively bright albedo causes them to stand out quite well against the basaltic background at a very high sun angle.

Images were obtained of the western moon illuminated with a solar altitude of 70°-80° across the region on Thanksgiving Day, November 11, 2010 (Fig. 1). Seeing was 6/10, and transparency 6/6. Images of the Marius region were obtained with a 6" f/8 refractor with Explore Scientific lens, JMI electric focuser and a Losmandy GM8 mount. Images were made between 10:41-11:03 UT with a DMK 41AU02.AS imager, W-15 yellow filter, 2X Barlow, and then made into a 3-image composite using Photoshop Elements 6.0

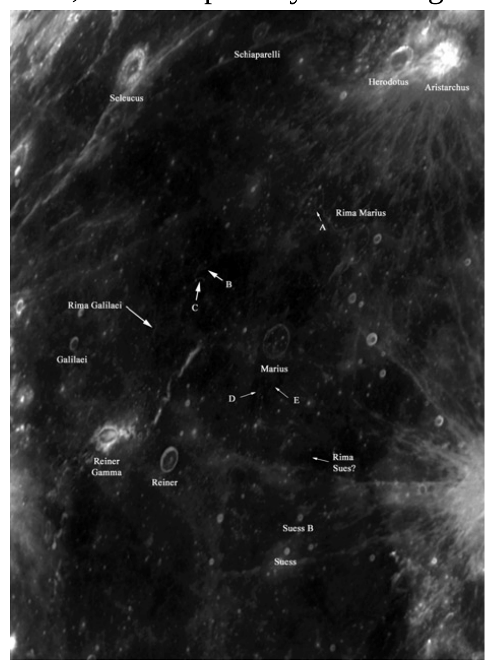


Figure 1: Marius Region: *Howard Eskildsen-Ocala, Florida, USA. November 11, 2010 10:41-11:03 UT.*

For comparison an image (Fig. 2) covering approximately the same area as my image was created using Map-a-Planet Explorer: Moon – Clementine Basemap V1 (http://astrogeology.usgs.gov/). This was used to verify that the features on the image were real and not artifacts of processing. Both were labeled for easy comparison.

Rima Marius winds its way along the northern edge of the Marius Hills. Towards its western end another thin, bright sinuous feature labeled "A" on both images is visible to the south that runs northward and on the Clementine image appears to parallel, then approach a bend in Rima Marius. On my image, only the southern portion is distinct, and the northern end becomes lost in surrounding bright albedo features. It is uncertain if feature "A" is a rille or the margin of a wrinkle ridge, but it might also be a crater chain.

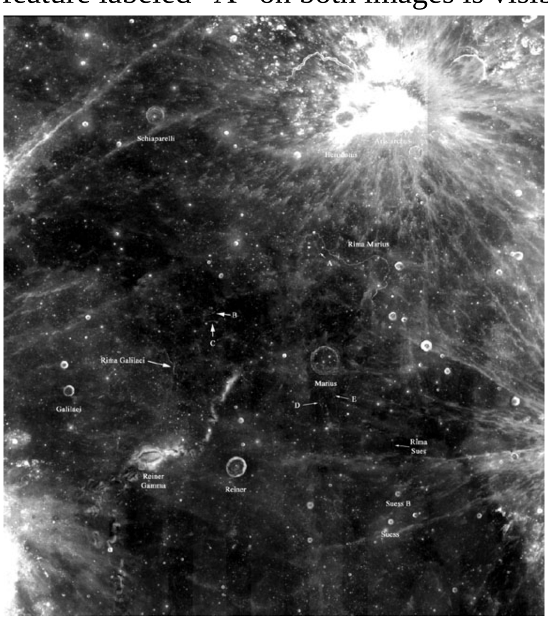


Figure 2: Marius Region: *from Map-a-Planet using Clementine Basemap V1.*

Moving counterclockwise on the image, arrows "B" and "C" point to short portions of rilles shown in the July 10, 2008, LPOD (http://lpod.wikispaces.com/July+10%2C+2008) as part of "…four major rilles that used to be nearly impossible to capture on images…" On the western edge of the Marius Hills, Rima Galilaei is visible running north-northwest and is the other rille mentioned in the July 10, 2008 LPOD. I have never seen these three rilles in other images that I have taken, but at this illumination their bright albedo makes them stand out.

Other rille-like features, labeled "D" and "E" are visible just south of Marius. It is uncertain if these are segments of sinuous rilles, crater chains, or bright albedo areas associated with wrinkle ridges, but comparison with the Clementine image shows them to be real features. On the other hand, it is uncertain if the short, bright area roughly corresponding to Rima Suess is actually a small segment of the rille or a processing artifact.

The question arises as to why the rilles are brighter than the surrounding areas. Might the rilles expose brighter layers below a dark surface layer? Possibilities could include: ordinary basalt underlying pyroclastics, highland material beneath basalt, or basaltic layers of slightly different compositions affecting albedo. Might cascading of material by gardening or by seismic events cause differences in soil maturity in the steep slopes versus more gently sloped or flat areas, and hence the albedo? What other factors need to be considered?

Regardless of the answers to these questions, observation of lunar areas under high altitude illumination is a rewarding endeavor that holds a number of surprises and places our understanding of the surface of the moon in a whole new light.

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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

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 3, 13 & 19 day moon, Gibbous Moon(2), Full Moon, Bailly, Eclipse(4), Mare Humarum, Mare Nectaris(2), SW Terminator, & Theophilus(2)

FRED CORNO – SETTIMO, TORINESE, ITALY. Drawing of Reiner Gamma.

ED CRANDALL – LEWISVILLE, NORTH CAROLINA, USA. Digital images of Clavius, Eratosthenes, Plato, Proclus, Sinus Iridum, Straight Wall & Tycho.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of Aristarchus, Billy, Brayley, Byrgius, Clavius, Copernicus, Cruger, Damoiseau, Euler, Gassendi, Guericke, Kepler, Lictenberg, Mare Imbrium, Mersenius, Palus Epidemiarum, Prinz, Riphaeus, Schickard, Selucus, SW Highlands(2), Tycho, Western Moon & Wolf.

PETER GREGO – ST. DENNIS, CORNWALL, UK. Drawings of Bailly(2), Plinius(3), Rocca(2) & Timocharis(2).

ROBERT HAYS – WORTH, ILLINOIS, USA Drawings of Drebbel, Langrenus & Reiner Gamma.

RICHARD HILL – TUCSON, ARIZONA, USA Digital image of Eclipse.

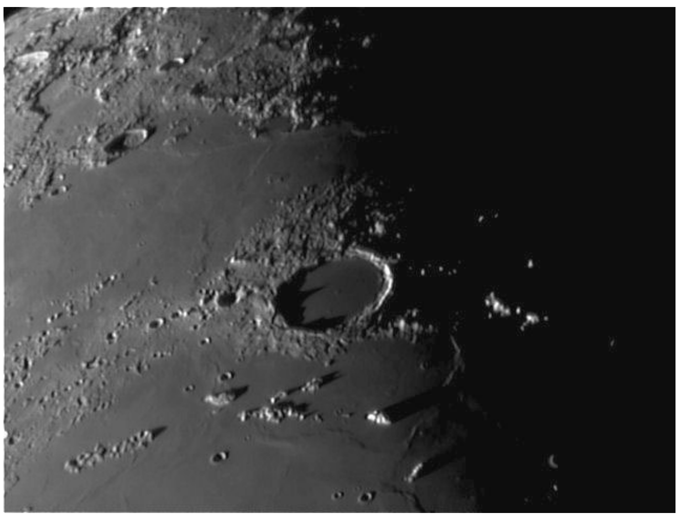
PHILLIP MORGAN –LOWER HARTHALL-TENBURY WELLS, WORCESTERSHIRE, ENGLAND. Drawings of Gassendi(2).

KLAUS PETERSEN-GLINDE, GERMANY Digital images of Rima Marius(2).

ANTONIUS J SCHALKEN – MELBOURNE, VICTORIA, AUSTRALIA Digital images of Reiner Gamma(2).

RECENT TOPOGRAPHICAL OBSERVATIONS

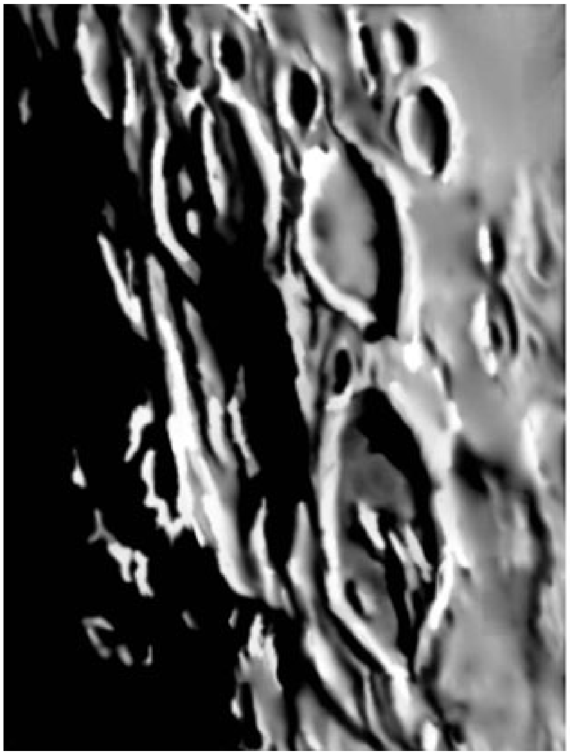
THEOPHILUS-Maurice Collins - Palmerston North, New Zealand. December 25, 2010 12:45 UT. C8, 3x barlow.

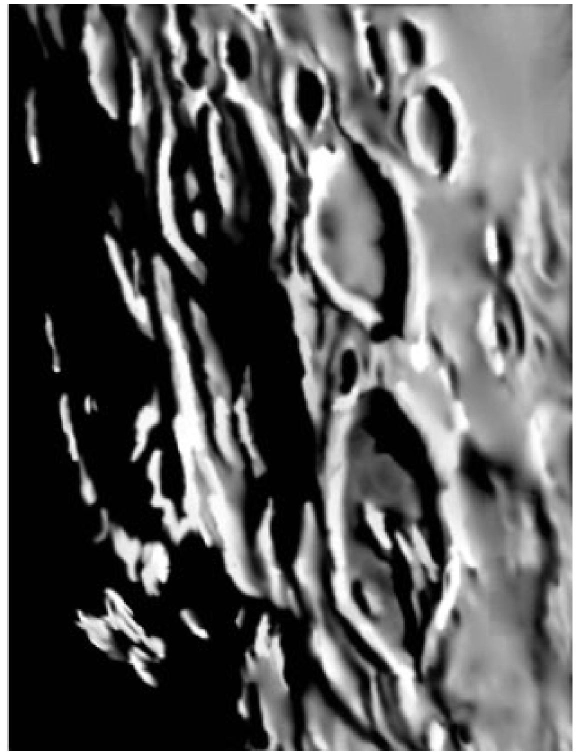


PLATO – Ed Crandall – Lewisville, North Carolina, USA. September 1, 2010 09:45 UT. Seeing AIII. Colongitude 183.2º. 110 mm f/6.5 APO, 3x barlow, ToUcam.

WOLF-Howard Eskildsen-Ocala, Florida, USA. November 25, 2010 11:09 UT. Seeing 6/10, Transparency 66. 6" f/8 Explore Scientific refractor, 2x barlow, DMK 41AU02 AS, W-15 Yellow filter.

RECENT TOPOGRAPHICAL OBSERVATIONS

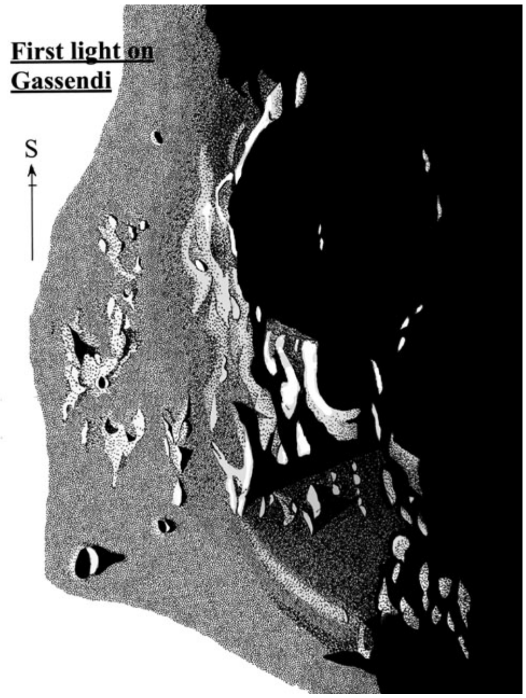


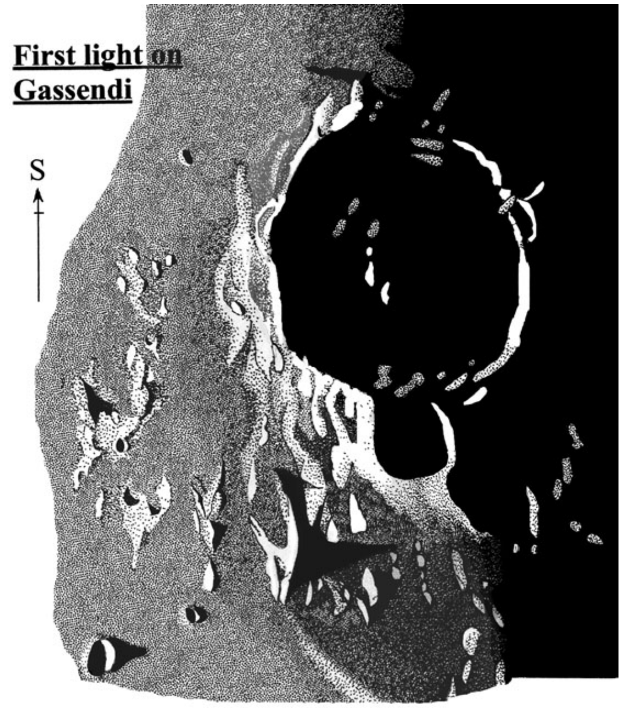


ROCCA & LACUS AESTATIS– Peter Grego, St. Dennis, Cornwall, UK. December 19, 2010. Seeing AII, no wind, clear, cold (-3 ºC), 200 mm SCT, 250X, no filter.
Left: 18:40-19:10 UT. Colongitude 75.6-75.8º.
Right: 19:30-19:40 UT. Colongitude 76.0-76.1º.

Libration favoured the Rocca area at this particular time; because the crater was on the morning terminator of the 14 day old (waxing gibbous) Moon, with regions further west in the Montes Cordillera region promising to be revealed as the terminator rolled back, I chose to portray the area, centring on Rocca but including the unusual Lacus Aestatis to its southeast and a portion of southwestern Rocca W. For this observation, owing to its complexity, I departed from my usual procedure and prepared a libration-corrected outline blank before making the observation using Virtual Moon Atlas, in order that the correct shapes and relative positions of features might be shown. Rocca itself was half full of shadow cast by its eastern rim, but a number of north-south ridges were discerned along the foot of the western wall and the floor. A bright area lay mid-way along the western rim. Shadow joined northern Rocca to the craters Rocca P and Rocca R. East of these was Rocca E, whose floor appeared smooth. A brilliant area lay on Rocca E's northern rim, in the location of a small unnamed crater (north of Rocca N). Lacus Aestatis (Summer Lake), adjoining the southeast of Rocca, is a feature that I had never before observed. It appeared to be a regular crater with a darkly mottled floor interspersed with a number of hills on its southern floor – it is perplexing to me why this crater was esignated a Lacus, seeing that it is so clearly crateriform. The terrain east of Lacus Aestatis was darkly mottled. Several high features were catching the rising Sun in the darkeness west of Rocca; by the time the second observing session was underway, these illuminated features had spread north-south somewhat, marking first light amid the outer foothills of Montes Cordillera.

RECENT TOPOGRAPHICAL OBSERVATIONS

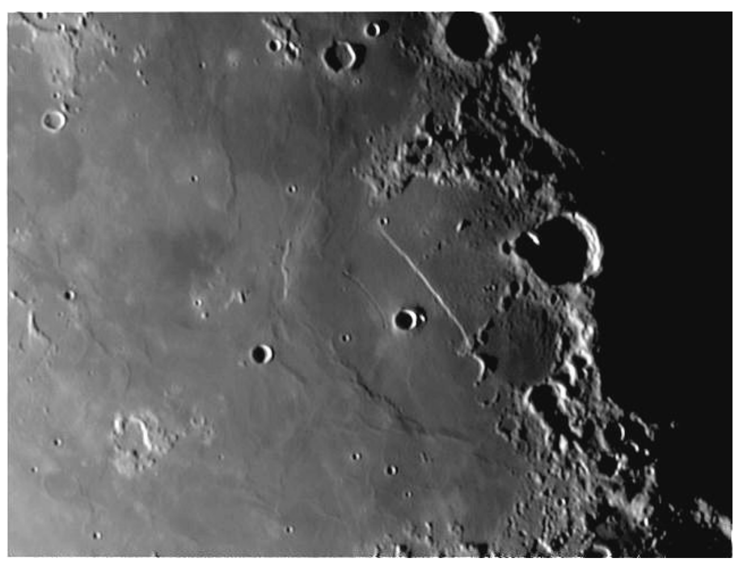




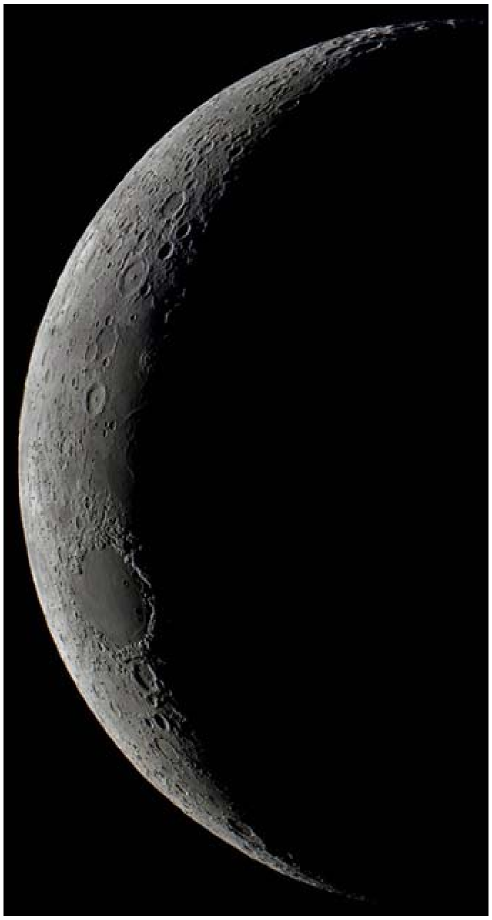
GASSENDI –Phillip Morgan –Lower Harthall-Tenbury Wells, Worcestershire, England. December 16, 2010. Seeing 6/10, Transparency 4/5. 305mm, f/5, Newtonian, 400x.
Left: 18:20-18:45 UT, Colongitude 39.0-39.2º
Right: 21:00-21:30 UT, Colongitude 40.3-40.6º

ADDITIONAL TOPOGRAPHICAL OBSERVATIONS

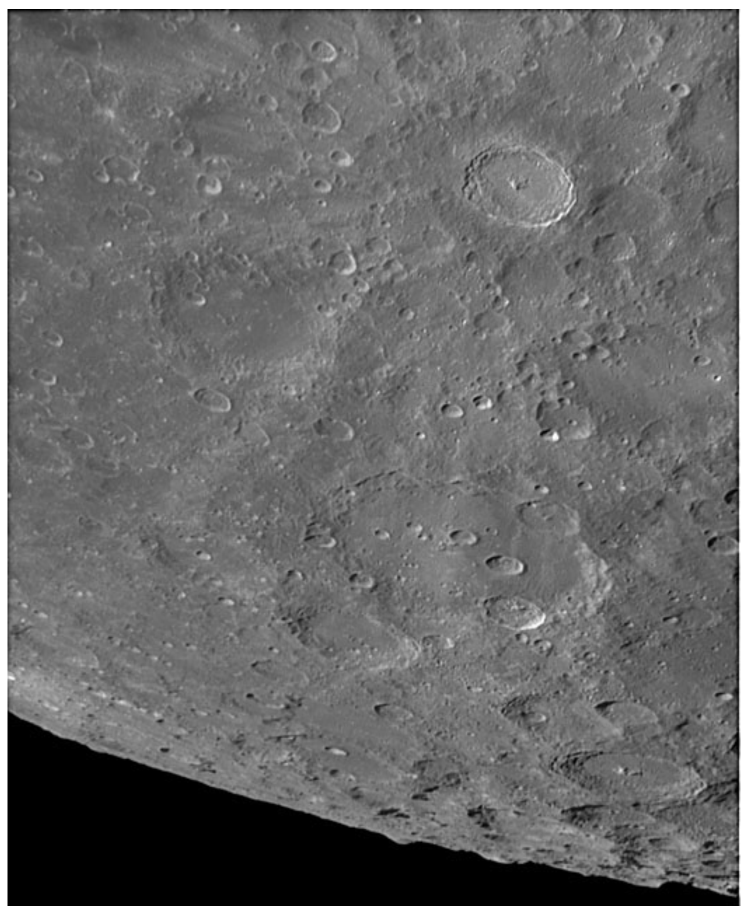
STRAIGHT WALL – Ed Crandall – Lewisville, North Carolina, USA. September 1, 2010 09:48 UT. Seeing AIII. Colongitude 183.2º. 110 mm f/6.5 APO, 3x barlow, ToUcam.



ADDITIONAL TOPOGRAPHICAL OBSERVATIONS

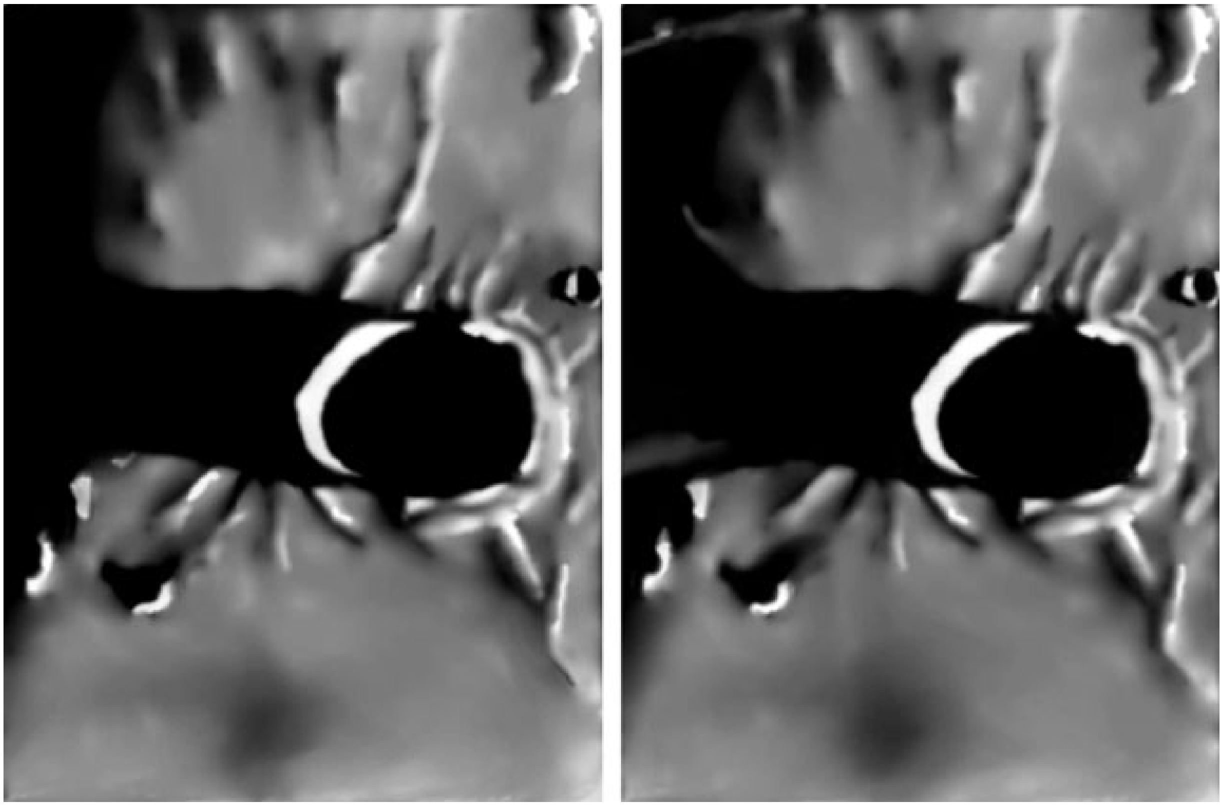


3 DAY MOON-Maurice Collins - Palmerston North, New Zealand. December 9, 2010 07:58-08:21 UT. C8.



CLAVIUS - Howard Eskildsen-Ocala, Florida, USA. November 25, 2010 11:26 UT. Seeing 6/10, Transparency 6/6. 6" f/8 Explore Scientific refractor, 2x barlow, DMK 41AU02 .AS, W-15 Yellow filter.

ADDITIONAL TOPOGRAPHICAL OBSERVATIONS



TIMOCHARIS – Peter Grego, St. Dennis, Cornwall, UK. December 14, 2010. Seeing AII, no wind, some patchy clouds, 200 mm SCT, 250X, no filter.
Left: 19:20-19:40 UT. Colongitude 15.3-15.5º.
Right: 19:50-20:00 UT. Colongitude 15.6-15.7º.

Timocharis was some distance from the morning terminator, but its shadow extended across the mare to join with the terminator. Most of the crater's interior was in shadow, save for a narrow crescent of the upper inner western wall. The outer northern, eastern and southern glacis appeared complex, with radial ridges and an external terrace. One large ridge extended from the shadow northwest of Timocharis northward across the mare, parallel with the terminator. Several shorter ridges could be discerned extending south of Timocharis' shadow, a couple of which extended towards Timocharis C. The crater Heinrich was visible on the terminator, its outer eastern wall brightly illuminated; to its north, also on the terminator, could also be discerned the outer eastern wall of Timocharis AA. The general terrain south of Timocharis was smooth in appearance and showed some dusky mottling. Northeast of Timocharis was Timocharis B, whose interior was shadowed. During the second session the terminator has moved on, revealing a ridge along the northern margin of Timocharis' shadow and illuminating a patch of land north of Timocharis AA. Not depicted in this sketch, but located in the shadow of the terminator ENE of Timocharis, a little distance beyond the edge of the area depicted, was a bright spot whose identity was probably the mountain near Dorsum Higazy on Rukl Map 21.

BRIGHT LUNAR RAYS PROJECT

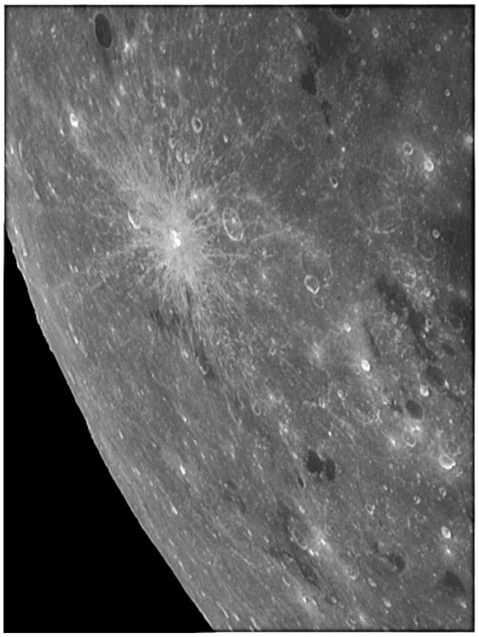
Coordinator – Wayne Bailey – wayne.bailey@alpo-astronomy.org

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

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

RECENT RAY OBSERVATIONS

PROCLUS – Ed Crandall – Lewisville, North Carolina, USA. November 13, 2010 23:01 UT. Seeing AIII. Colongitude 0.2º. 110 mm f/6.5 APO, 3x barlow, ToUcam.



BYRGIUS A - Howard Eskildsen-Ocala, Florida, USA. November 25, 2010 11:18 UT. Seeing 6/10, Transparency 6/6. 6" f/8 Explore Scientific refractor, 2x barlow, DMK 41AU02 .AS, W-15 Yellow filter.

OLBERS-SELEUCUS - Howard Eskildsen-Ocala, Florida, USA. November 25, 2010 10:29 UT. Seeing 6/10, Transparency 6/6. 6" f/8 Explore Scientific refractor, 2x barlow, DMK 41AU02 .AS, W-15 Yellow filter.

LUNAR TRANSIENT PHENOMENA

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

LTP NEWSLETTER – JANUARY 2011

Dr. Anthony Cook - Coordinator

Firstly I would like to wish you all a happy new year with lots of clear sky. Observations for Nov 2010 were received from the following observers: Jay Albert (Lakeworth, FL, USA) observed Aristarchus, Eratosthenes, Gassendi, Maginus, Mare Nectaris, Moltke, Pallas, and Plato. Maurice Collins (New Zealand) observed Alphonsus, Clavius, Eratosthenes, Fra Mauro, Langrenus, Petavius, Plato, and took whole Moon images. Marie Cook (Mundesley, UK) observed several lunar features. Myself (Aberystwyth University Robotic Telescopes and from Newtown) observed Alphonsus, Birt, Theaetetus, Earthshine, and took time lapse video of the Moon in various spectral wavebands. Steve Lang (New Zealand) observed Clavius, Copernicus, Mare Imbium, and took whole Moon images. Brendan Shaw (UK) observed Aristarchus, Atlas, Copernicus, Goldschmidt, Herodotus, Plato, Proclus, Ross D, and Tycho. Mike White (New Zealand) observed Archimedes. Boussingault, Clavius, Moretus, Rupes Recta, Vallis Alpes, and took whole Moon images.

News: Chuck Wood (LPOD founder), has been invited to give a talk at this year's Astrofest in London, England, in Feb on his views on the past history of LTPs, though I gather he has also some interesting comments to make about recent results from NASA's LRO on the relatively geologically young nature of certain parts of the lunar surface. In the mean time, in Apr I will be attending the BAA Lunar Section meeting at Winchester, England and will give an account of LTP observations, observing techniques, science and statistics as they stand at present.

In December I took part in a European campaign (organized by Europlanet) to look for impact flashes in lunar Earthsine during the Geminid meteor shower. This entailed observers in Armagh, Northen Ireleand, near Athens, Greece, and myself from Wales in the UK. Alas cloud intervened a lot, and even during the clear intervals at the different sites, we do not appear to have recorded any flashes, although we are still examining some of the recordings.

Routine Reports: On 2010 Nov 15th, Brendan Shaw imaged Aristarchus under similar conditions for the following LTP events. Note that first, and the last, are under the same illumination and libration conditions, to within +/-1°. The Foley observation matches to illumination only, but within +/-0.5°.

On 1967 Mar 23 at UT 18:40-20:47 The Cobra Head area was observed by Sartory, Moore, Moseley (Farnham, England, 15" reflector (Sartory) seeing very poor & 10" refractor in Armagh, N. Ireland (Moore & Mosely) x360 - seeing Fair to Poor) "Red patch seen intermittently; moon-blink from 1916-2047h. Position agreed with Sartory who alerted them to Aris. area; checks on others were neg." NASA catalog weight=5 (very high). NASA catalog ID 1020. Then Aristarchus 1967 Mar 23 UT 18:40-20:30, 21:30 by Marsh and Farrant (Cambridge, England, 8" reflector, x330). "Suspected color on SW (ast.) wall. Farrant saw color in crater, completely independently, (inform. suggests same phenom. as seen by Moore & Moseley tho they said Cobra head). NASA Catalog weight=5 (very high). NASA catalog ID #1021. ALPO/BAA weight=3.

On 1978 May 19 at UT 21:45-03:30 P. Foley of Kent, UK, using a 12" reflector, seeing=III-II, noticed initially that the crater was pretty dull and that the floor was a slate blue-gray in color at 22:45UT. A noticeable green spot inside the crater on the south east appeared at 22:25UT and vanished at 00:50UT. Cameron notes that one doesn't get green with spurious color. Crater Extinction brightness measurements were made at 22:00 UT (reading=2.8) and at 23:45UT (reading=3.7). The crater dropped in brightness from 3.7 to 2.8 at 23:50UT and remained lower until 3.0 at 23:50-03:15 UT. A graph was produced and showed Proclus and Censorinus at similar brightnesses, but Aristarchus variable. The Earthshine was 0.3. Cameron 2006 Extension catalog ID=31 and weight=5. ALPO/BAA weight=3.

On 1990 Nov 30 at UT 01:54-01:05, D. Darling of (Sun Praire, WI, USA, using a 12.5" reflector at x150, noticed a hint of red? color on the south west rim of Aristarchus. Brightness measurements were normal for Aristarchus and Herodotus. No color seen elsewhere e.g. Prom. LaPlace. The color on Aristarchus had gone by 01:15UT. Cameron 2006 catalog extension ID=414 and weight=3. ALPO/BAA weight=3.

Figure 1. Aristarchus false color composite (blue (=blue), red (=green) and near IR(=red)), by Brendan Shaw, taken on 2010 Nov 15 UT 23:31-23:36. Image has been sharpened and color enhanced to bring out more detail. North is at the top. Some red spurious color is present on W. edges.

None of the key attributes of the above LTPs appear in Brendan's image, although he was working in the near IR in one of the channels. So this adds some importance to the original reports as they that they failed to repeat. There is a chance that accounts of color on the SW rim could have been due to spurious color in two of the original LTPs, although Darling checked for this elsewhere and saw none and a Moon Blink was used in 1967.

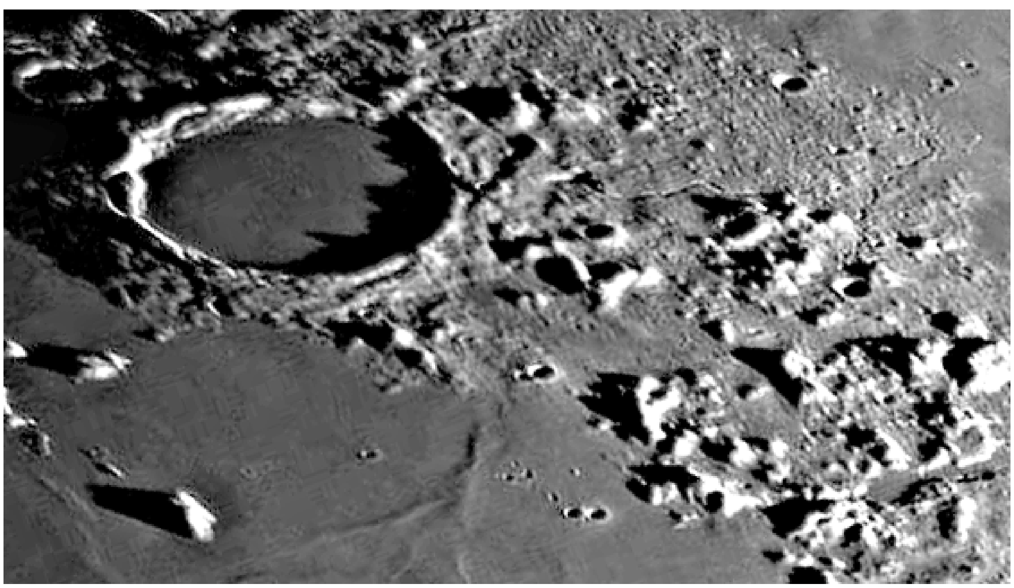


Figure 2. Plato as imaged by Mike White on 2010 Nov 15th at 08:22 with north at the top. This image has been sharpened and contrast stretched to bring out detail on the floor of Plato. Please be aware that some of the apparent detail on the floor may be image compression artifacts.

On 2010 Nov 15th, Mike White obtained an image of Vallis Alpes, but which also contained Plato. Although this was a couple of hours before the prediction for similar illumination to a 1952 Nov 26 LTP, I thought that I would include it here because it does at least just show the central craterlet, but illustrates how difficult it normally is to see any craterlets at this stage in the illumination. For comparison here is the original LTP report:

In 1952 Nov 26 at UT 01:00? Carle (USA, 8" reflector, x700, seeing = poor) observed the following in Plato: "Sketch shows 8 spots -- 5 craters showed interior shad., 1 completely filled, but no others seen despite several hrs. of study. Spots that should have been seen were missing. poor seeing converts floor into shimmering shapeless blob. Has observed it under good seeing & seen nothing on fl. as others have noted". The Cameron 1978 catalog ID=555 and weight=3. The ALPO/BAA weight=2.

The visibility of craterlets on the floor of Plato has been a major feature of many past LTP reports about this crater. The odd thing about this LTP report is that craterlets were visible despite the poor seeing, however as Mike's very sharp image illustrates, these craterlets would normally be difficult to see. For now I will leave the weight for this report at a 2, but I have a hunch that most of the LTPs that involve the visibility of craterlets on the floor of Plato can be put down to a combination of seeing conditions, image contrast, shadow visibility, and viewing angle (libration). These craterlets are often on the limits of visibility and this kind of detectability issue has led to problems before in astronomy, such as the case of the so-called canals on Mars.

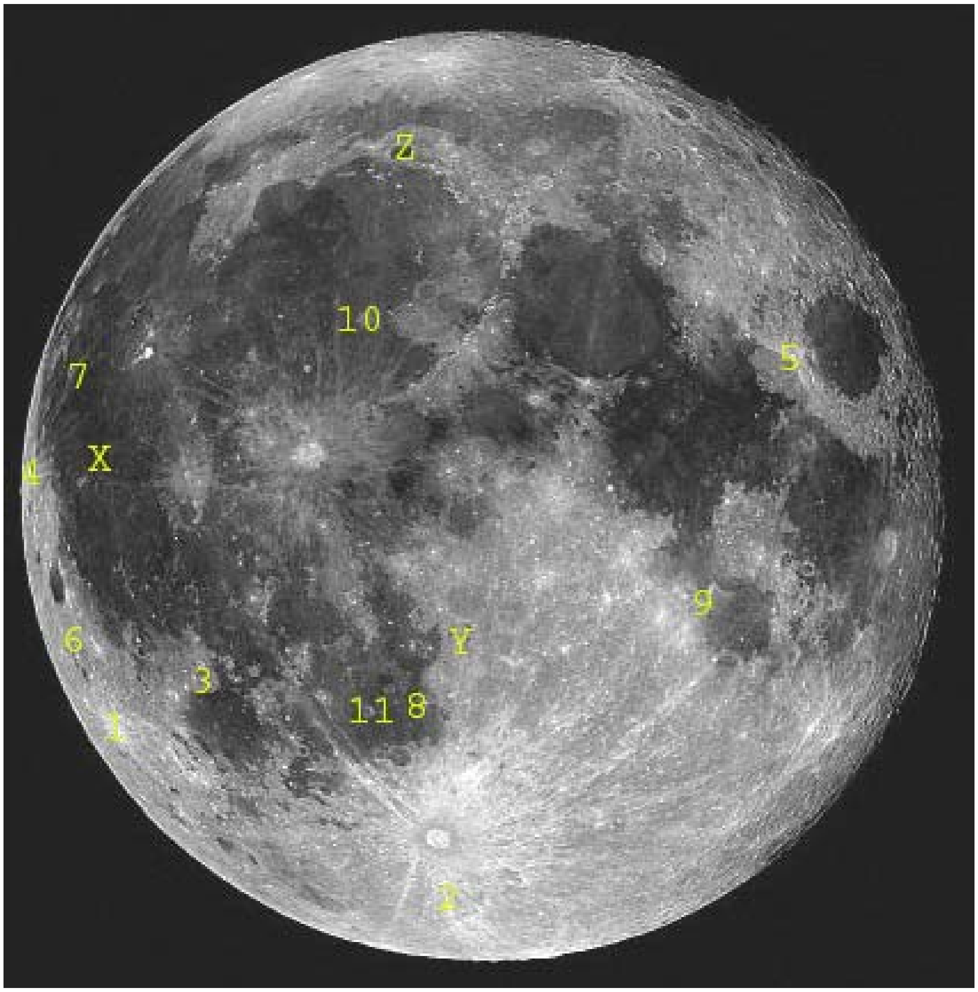
Although page space does not permit additional reports, I just wanted to say that the visual and imaging efforts of other observers: Jay Albert, Maurice Collins, Marie Cook, and Steve Lang have been incredibly useful this month in helping to eliminate additional past LTP reports. Do please keep on sending in your report!

LTP Reports: No LTPs were reported in November.

For repeat illumination (only) 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 - currently 21 followers.

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. **Byrgius A**
2. **Clavius**
3. **Gassendi**
4. **Olbers**
5. **Proclus**
6. **Rocca**
7. **Seleucus**
8. **Straight Wall**
9. **Theophilus**
10. **Timocharis**
11. **Wolf**

FOCUS ON targets

X = Marius-Reiner gamma (January)
Y = Alphonsus (May)
Z = Plato (July)