



# THE LUNAR OBSERVER

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.

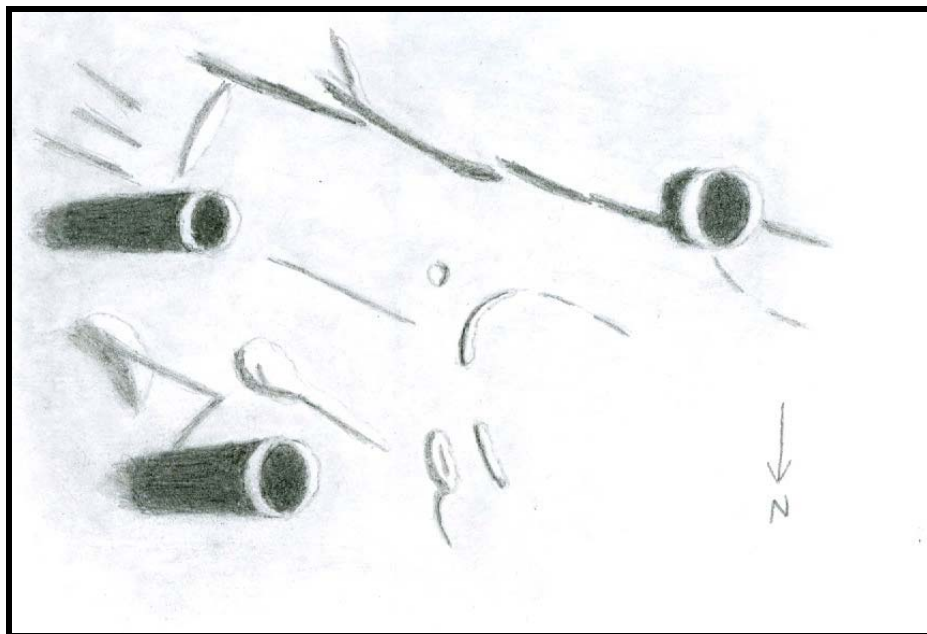
EDITED BY: Wayne Bailey [wayne.bailey@alpo-astronomy.org](mailto:wayne.bailey@alpo-astronomy.org)

17 Autumn Lane, Sewell, NJ 08080

RECENT BACK ISSUES: [http://moon.scopesandscapes.com/tlo\\_back.html](http://moon.scopesandscapes.com/tlo_back.html)

## FEATURE OF THE MONTH – OCTOBER 2011

### HERIGONIUS



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA

July 25, 2011 09:24-09:30, 09:40-10:06 UT, 15 cm refl, 170x, seeing 7-8/10

I sketched this crater and vicinity on the morning of July 25, 2011. This area is in southern Oceanus Procellarum, just north of Mare Humorum. Herigonius is a modest, deep, fresh-looking crater with substantial external shadow. Euclides C is the similar, but smaller crater east of Herigonius, and Euclides B is north of C, and nearly as large as Herigonius. These craters were not far from the terminator, so they had long external shadows. There is a very conspicuous wrinkle ridge extending eastward from Herigonius, ending south of Euclides C. This wrinkle ridge consists of several slightly curved segments with small gaps. This ridge had dark shadowing, perhaps due to its proximity to the terminator at the time. A short extension of this ridge is west of Herigonius. The modest curved ridge between Herigonius and Euclides B is

Herigonius tau. A small, shallow crater is just south of this feature. Herigonius tau, together with some narrow ridges and shadow strips nearby, could be part of an old ring. Some low swellings are south and west of Euclides B, and another ridge is south of Euclides C. There are several strips of shadow in this area parallel to each other, aligned northwest-southeast, and approximately parallel to the conspicuous wrinkle ridge east of Herigonius.

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## **LUNAR CALENDAR**

### **OCTOBER-NOVEMBER 2011 (UT)**

|         |       |                                              |
|---------|-------|----------------------------------------------|
| Oct. 02 | 11:42 | Extreme South Declination                    |
| Oct. 03 | 19:00 | Moon 2.8 Degrees SSE of Pluto                |
| Oct. 04 | 03:15 | First Quarter                                |
| Oct. 07 | 22:00 | Moon 5.4 Degrees NNW of Neptune              |
| Oct. 10 | 18:00 | Moon 5.7 Degrees NNW of Uranus               |
| Oct. 12 | 02:06 | Full Moon                                    |
| Oct. 12 | 11:44 | Moon at Apogee (406,434 km – 252,546 miles)  |
| Oct. 13 | 18:00 | Moon 4.7 Degrees N of Jupiter                |
| Oct. 17 | 02:06 | Extreme North Declination                    |
| Oct. 20 | 03:31 | Last Quarter                                 |
| Oct. 21 | 21:00 | Moon 6.1 Degrees SSW of Mars                 |
| Oct. 26 | 02:00 | Moon 6.4 Degrees SSW of Saturn               |
| Oct. 26 | 12:27 | Moon at Perigee (357,050 km – 221,861 miles) |
| Oct. 26 | 19:56 | New Moon (Start of Lunation 1099)            |
| Oct. 28 | 01:00 | Moon 0.57 Degrees WSW of Mercury             |
| Oct. 28 | 03:00 | Moon 2.0 Degrees SW of Venus                 |
| Oct. 31 | 02:00 | Moon 2.3 Degrees S of Pluto                  |
| Nov. 02 | 16:38 | First Quarter                                |
| Nov. 04 | 03:00 | Moon 5.6 Degrees NNW of Neptune              |
| Nov. 06 | 22:00 | Moon 5.8 Degrees NNW of Uranus               |
| Nov. 08 | 13:21 | Moon at Apogee (406,176 km – 252,386 miles)  |
| Nov. 09 | 17:00 | Moon 4.9 Degrees N of Jupiter                |
| Nov. 10 | 20:17 | Full Moon                                    |
| Nov. 13 | 07:24 | Extreme North Declination                    |
| Nov. 18 | 15:09 | Last Quarter                                 |
| Nov. 19 | 04:00 | Moon 7.2 Degrees SSW of Mars                 |
| Nov. 22 | 20:00 | Moon 6.3 Degrees SSW of Saturn               |
| Nov. 23 | 23:25 | Moon at Perigee (359,691 km - 223,502 miles) |
| Nov. 25 | 06:10 | New Moon (Start of Lunation 1100)            |
| Nov. 26 | 06:48 | Extreme South Declination                    |
| Nov. 26 | 09:00 | Moon 1.9 Degrees NNW of Mercury              |
| Nov. 27 | 03:00 | Moon 2.9 Degrees NNW of Venus                |
| Nov. 27 | 15:00 | Moon 2.1 Degrees SSE of Pluto                |

## **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 is on-line at: http://www.alpoastronomy.org/index.htm](http://www.alpoastronomy.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 has 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: Mare Humorum**

*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 **November 2011** edition will be **Mare Humorum**. Observations at all phases and of all kinds (electronic or film based images, drawings, etc.) are welcomed and invited. Keep in mind that observations do not have to be recent ones, so search your files and/or add this complex area including the crater Gassendi to your observing list and send your favorites to:

**Wayne Bailey** - [wayne.bailey@alpo-astronomy.org](mailto:wayne.bailey@alpo-astronomy.org)

**Deadline for inclusion in the Mare Humorum article is October 20, 2011**

### **FUTURE FOCUS ON ARTICLES:**

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

|                   |                                |                                    |
|-------------------|--------------------------------|------------------------------------|
| <b>Copernicus</b> | <b>TLO Issue: January 2012</b> | <b>Deadline: December 20, 2011</b> |
| <b>Archimedes</b> | <b>March 2012</b>              | <b>February 20, 2012</b>           |

# **ANNOUNCEMENTS**

## **Timing an Eclipse of the Moon with the Unaided Eye Lunar Eclipse Dec 10, 2011**

John E. Westfall, ALPO Science/Peer Reviewer  
P.O. Box 2447, Antioch, CA 94531-2447;  
[johnwestfall@comcast.net](mailto:johnwestfall@comcast.net)

In map-making and navigation it is essential to be able to find one's latitude and longitude. With GPS we now find these coordinates with ease. We thus may forget that, prior to the invention of the telescope, the only practical way to find longitude involved two observers at different places noting the local time of the phases of eclipses of the Moon. The difference of time between the two locations gave their longitude difference.

This procedure provided the only longitudes measured in ancient and medieval times. The results were not very accurate. Part of the error undoubtedly was due to the imprecision of timing events by "hours of the night". But some of the error was also attributable to the naked-eye timing of the events.

Naked-eye timings of the phases of a lunar eclipse are rarely done these days, so there are few published data on their accuracy. For this reason, the writer invites observers to time, without telescope or binoculars, the four umbral contacts of the total lunar eclipse of December 10, 2011.

Although the timings must be made without optical aid, this doesn't mean you can't observe most of the eclipse through binoculars or a telescope. However, to avoid any possible bias in the timings made with your unaided eyes, we recommend the following:

Beginning 10 minutes before the predicted time of an eclipse contact, view the Moon with the naked eye only. Also, during this period do not look at a timepiece or listen to time signals until the instant that you believe the eclipse contact has occurred. Then note that time to 0.1-minute precision. You can now resume viewing through binoculars or a telescope.

We hope that some observers will be interested in this minimal-technology way to observe an eclipse of the Moon. When the event is over, please send your results to the writer at the address above. Be sure to note any circumstances, such as clouds or haze, which may have affected your results.

The predicted Universal Times of the four umbral contacts on December 10 are:

|         |                                                              |
|---------|--------------------------------------------------------------|
| 12h 45m | First Contact; the dark umbral shadow first touches the Moon |
| 14h 06m | Second Contact; the Moon is now completely within the umbra  |
| 14h 58m | Third Contact; the umbra begins to leave the Moon            |
| 16h 18m | Fourth Contact; the Moon is now completely outside the umbra |

At least one of these events should be visible in central and western North America. All the umbral contacts should be visible in Hawaii, New Zealand, Australia, Japan and throughout central, southern and eastern Asia.

Link to Original Alert: <http://www.alpo-astronomy.org/eclipseblog/?p=34>

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## **LUNAR SWIRLS WORKSHOP WITHOUT WALLS September 7, 2011**

The NASA Lunar Science Institute has posted videos of the recent Lunar Swirls Workshop at <http://lunarscience.nasa.gov/events/lunar-swirls-workshop-without-walls> where the agenda and presenters are also listed. There are approximately six hours of video of the presentations and discussions, including the simultaneous on-line chat discussions. There's a short description of the workshop in Tony Cook's LTP report below. This is well worth viewing if missed the workshop itself and are interested in features like Reiner Gamma.

# WARGENTIN AND ENVIRONS

By Fred Corno

On the Southwestern limb of the Moon a nice cluster of craters is set, just to the South of the renowned Shickard: the northernmost is Wargentín (49.6° S, 60.2° W) (Fig. 1). Just South of it lays Phocylides and between them, on the Eastern side of the junction among the former two sits Nasmyth.

The three craters are conspicuous, with diameters ranging from 77 through 114 km: due to strong fore-shortening the three of them appear decisively elongated, as is the case for the satellite craters around them also.

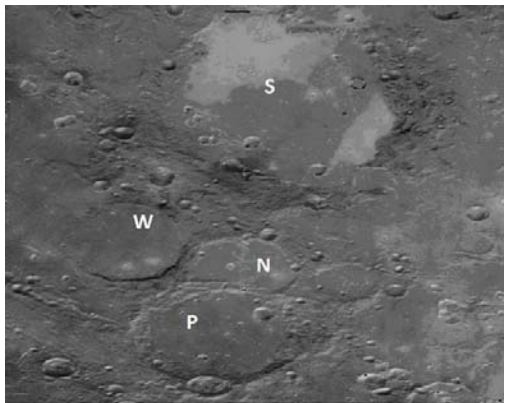
Two features of the set are peculiar. First, the terrain in the area is neatly two toned in colour, with dark streaks spanning across the floor of

***Figure 1:** Drawing by the author, from the night of the 10th of September 2011, 22.40 UT approximately. From top, clockwise, Wargentín (ridge at the center), Nasmyth (one craterlet in the middle), Phocylides C (dark and smooth floor) and Phocylides (the largest in the group). The drawing has been rotated and mirrored in order to match the Clementine image (see Figure 2).*



the three craters, completely covering the floor of the smooth and rounded Phocylides C and tinting the surroundings of the group. Then Wargentín appears completely filled with material, if not even overflowing: its rim is in fact barely outlined and surrounds a slab of rock otherwise flat except for a ridge crossing it in the middle.

The filling of Wargentín has long been a matter of debate: recently, Moon Geological Maps of the Western and Southern Side of Moon (publication year 1977 and 1979 respectively) claim a filling of the three craters made of ejecta from the Imbrium and Orientalis events. Nevertheless no explanations are in place for the differential filling level and its companions. In Clementine images (Fig. 2), the floor of the three craters appears iron-poor, but high iron content is recognizable in the haloes of craters piercing the floor. The same is true for titanium distribution even if at much less extent. Such an observation is compatible with a veneer of terra-like material covering a previous emplacement of mare-like lavas. Such a pattern is very easily recognizable on the striped floor of the large crater Shickard nearby: the central region is iron-poor terra material, while the northern and southern portions are mare basalts, iron rich.



***Figure 2:** Clementine image representing iron oxide density: the higher the iron content the lighter the hue. Capital letters identify the craters Wargentín, Nasmyth and Phocylides, as reported in figure 1. Shickard (S) is to the North, with a clearly two-toned floor: brighter areas are consistent with basaltic lava flooding, while the large dark streak is made of iron-poor terra material deposited as ejecta, probably originating in the Orientalis impact. The same hue is recognizable across the discussed craters to the South. Note that craterlets piercing through the veneer of ejecta have an iron-rich ejecta blanket around their rim in all the craters displayed.*

Current interpretation of the district therefore encompass the formation of the craters before the Imbrium and Orientalis events (3.92 through 3.84 billion years ago), followed by emplacement of lava filling through cracks in the floor. Then a light veneer of highland material probably originating in the Orientalis impact was deposited on the darker and iron richer lava. Still, the extraordinary thick filling of Wargentín, almost spilling over its rim, is unexplained.

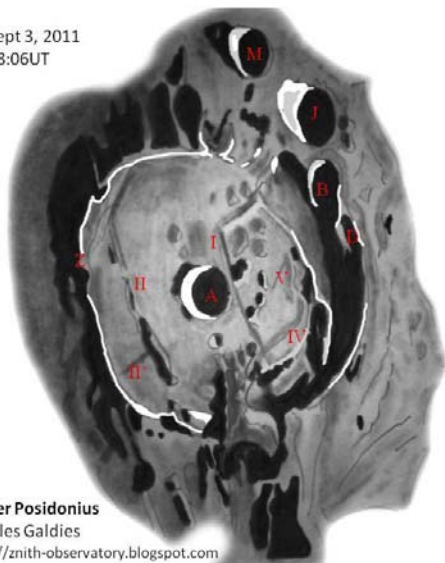


# POSIDONIUS

## by Charles Galdies

Posidonius (Fig. 1) is around 95 km in diameter and is located on the western edge of Mare Serenitatis. It has low and narrow western walls, which rapidly thin out, and end in a distinct break (Z). On the outer surface underneath the narrow walls are little hills. The eastern walls are broad.

Sept 3, 2011  
18:06UT



Crater Posidonius  
Charles Galdies  
<http://znith-observatory.blogspot.com>

To the southwest of the central crater A is a small round crater, while to the northeast are numerous hills and small craters. Located on the northeast wall are the deep craters B and D

**Figure 1.** Drawing of Posidonius. September 3, 2011.

The interior surface of Posidonius shows complex features. Particularly striking at a low sun elevation is the extended long cleft situated in the eastern portion of the Posidonius' floor. Its eastern side is rather narrow, steep and highly reflective.

I took this image (Fig. 2) on September 3rd at around 1800UT. It is made up of a stack of 4954 images taken using DMK camera attached to 8"SCT f/25.

Seeing conditions were moderate to good. IC Capture software was used to capture the video file which was then processed using registax 6 followed by slight processing using GIMP.

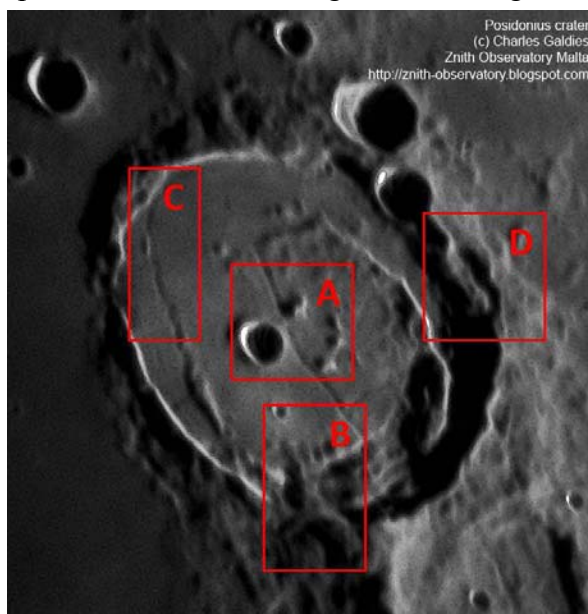
A close study of sectors A, B, C and D follows:

**Figure 2.** Posidonius. September 3, 2011 18:06 UT.

### Sector A

The remains of an inner ring which has been filled with lava is evident to the right of crater A.

Part of the relic of this inner ring features a twin peak which [according to Clark](#) this feature is resolvable as two peaks when the seeing is around 1.5" arc median or less.



Posidonius crater  
(c) Charles Galdies  
Znith Observatory Malta  
<http://znith-observatory.blogspot.com>

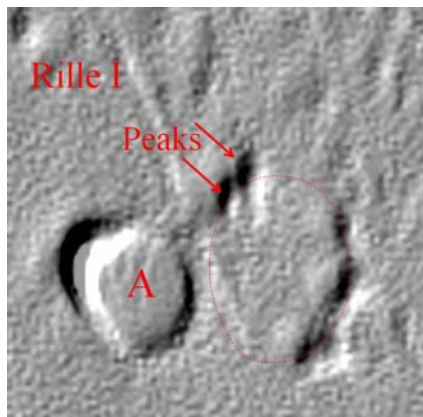


Figure 3 is an inverted subset of sector A. The twin peaks have been clearly resolved suggesting good atmospheric conditions. The circular ring outline in red refers to the remains of the inner ring. **Rille I** is seen passing between the ring fragment and A.

**Figure 3.** Enlargement of area A of figure 2.

Shown in the main image (Fig. 2) along the north-south orientation is the fine rille crossing Posidonius (I). Other fine rills are seen (II, III, IV and V). An unclassified hereby denoted as cleft "Iprime" seems to originate from rille II which then diverts westward to cut through part of the western rampart.

## **Sector B**

To the southwest of Posidonius is a large, interesting complex formation. The CCD image seems to show a connection that ‘bridges’ the interior with the exterior part towards crater Charconac in the form of a winding mountain ridge.

The subset image (Fig. 4) shows this feature as a sort of large uphill mountainous bridge stretching outwards towards the exterior.

**Figure 3.** Enlargement of area B of figure 2.

## **Sector C**

The subset shown in figure 5 follows the sinuous Posidonius **rille II** which approaches the northern wall almost at an angle of 60 degrees and which then turns and runs parallel to the wall towards the east.

Better atmospheric conditions would resolve this interesting rille

into a sinuous formation. [Images from the Lunar Reconnaissance Orbiter](#) show it as a remarkable feature which has formed from turbulent and highly viscous lava flow at high temperature able to erode the underlying surface. In turbulent fluid flows, eddies and vortices result in the twists and turns seen in this and other rille formation.

The tagged line shown in figure 5 follows the general sinuous rille II.

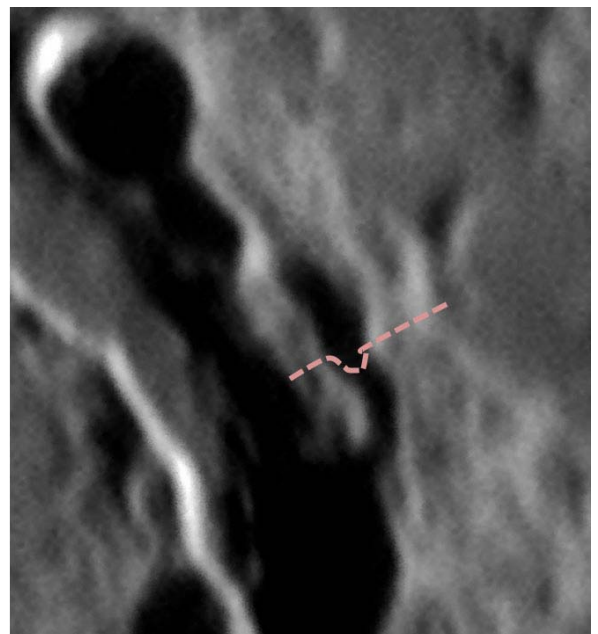
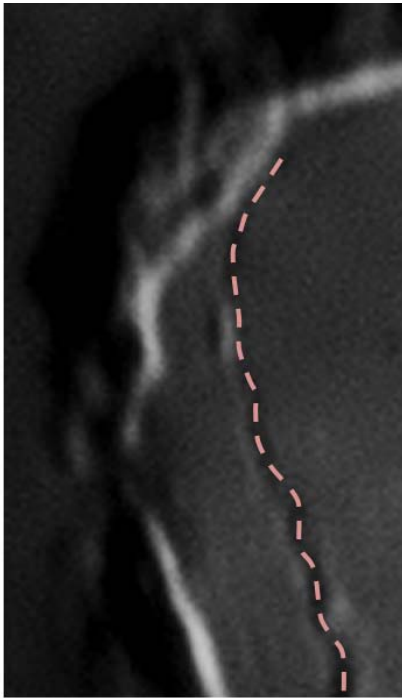
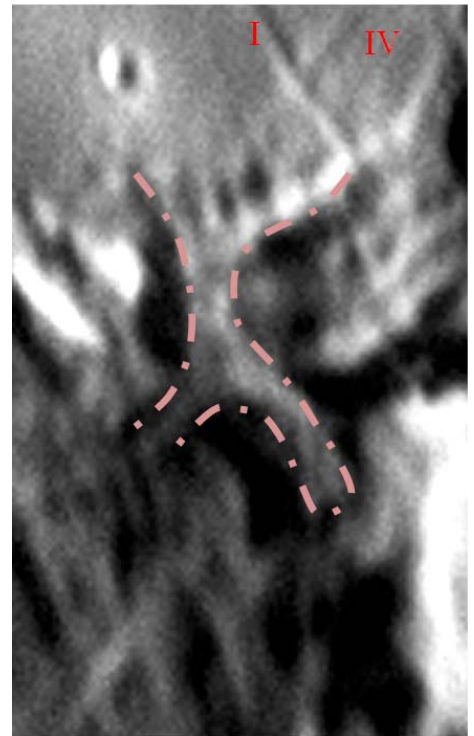
**Figure 5.** Enlargement of area C of figure 2.

## **Sector D**

Another interesting area arises from the prevalent shadows at the time of imaging this crater at 1806UT, specifically on part of the Eastern wall. Figure 6 shows part of the eastern wall having a major shadow embedded within itself, suggesting an extended sloping upward

wall with a large elongated crevice in between.

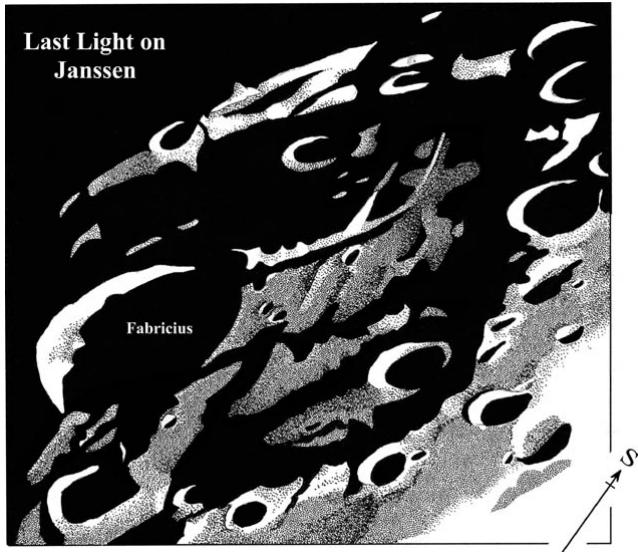
**Figure 6.** Enlargement of area D of figure 2.





# RILLES AND DOMES

by Phillip Morgan



At the onset of this last light observation of Janssen (figure 1) made in the early hours of 18th August, it was no surprise for me to still to be able to see illuminated the great rille-valley with its high leveed banks that strikes southwards from Fabricius. More unexpected though was the visibility of

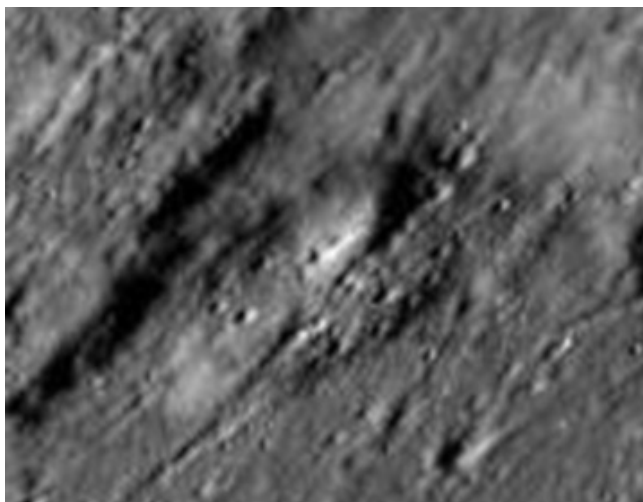
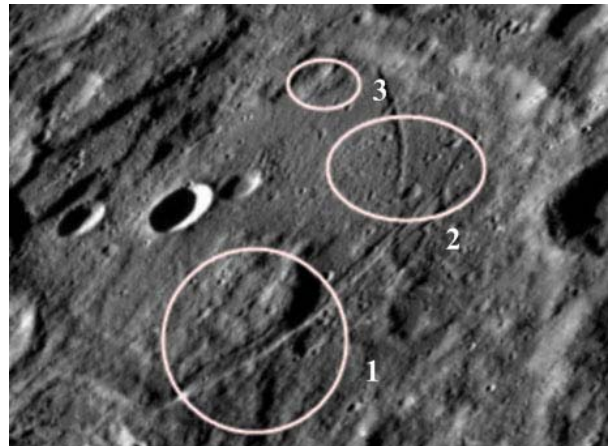
***Figure 1.*** Janssen. August 18, 2011.

most of the narrower south-eastern branch of the Rimae Janssen, indicating perhaps sunlight streaming through a low point in the western rampart. At this point I recalled an observation made many years ago, but made under slightly earlier lighting, when I noted that this branch rille cut across a large dome-like swelling on the southern floor area. High-resolution images taken with

better telescopes than mine show that this branch rille is composed of a chain of depressions much like the Rima Hyginus. This being the case a volcanic association is

***Figure 2.*** LROC image showing the 3 domes on the floor of Janssen.

implied, and so its connection with a large dome is not so unexpected! For those that may be interested there is a fine image of Janssen taken by Rik Hill showing this dome on LPOD for May 1st 2007. In fact there appears to be three domes on the floor area of Janssen (figure 2). The first and by far the largest is situated underneath the main rille-valley from Fabricius. The second one, mentioned above, is under



the finer south-east branch. And a possible smaller third one lies at the terminus of this south-east branch. All of which form a decreasing arc under the main Janssen rille system. The smallest of these (figure 3) could possibly be a landslide from the nearby rampart, but it looks too isolated for this to be the case; also its summit is heavily cratered and is bisected by a fracture or rille.

***Figure 3.*** Close up of dome 3.

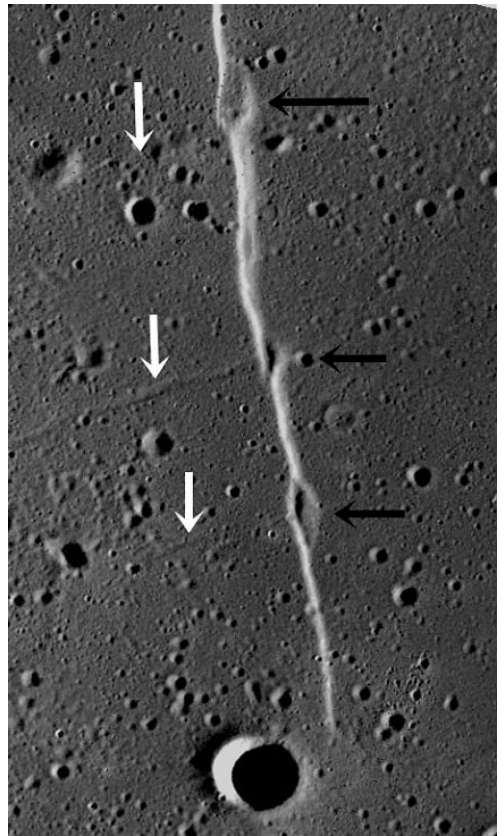
# Relay Ramps on the Rupes Recta

## by Phil Morgan

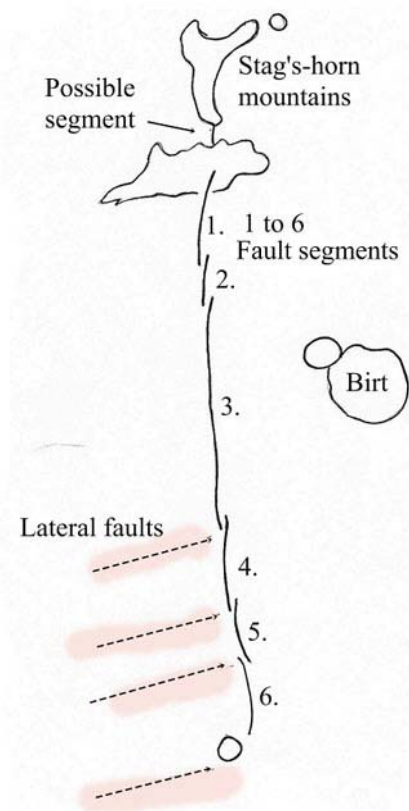
The latest LRO WAC mosaic images of the Straight Wall (Rupes Recta) processed by Maurice Collins (fig. 1), give us some stunningly detailed views of this interesting lunar feature and a new insight into the morphology of how the faulting developed over time. We also now have detailed close-ups of the faults associated relay ramps that run down the scarp face - features before only vaguely hinted at in visual observations.

Relay ramps usually occur in areas of active crustal extension. They are interactive with fault segmentation, fault linkage and any related seismic potential.

*Figure 1. The northern half of the Rupes Recta, Black arrows: relay ramps. White arrows: associated lateral faults. Image courtesy of Maurice Collins.*



To understand how relay ramps form it is important to consider a faults evolution over time. Most faults start out as small unconnected slip patches as the strata adjusts to regional and local stresses in the bedrock. As time progresses these small patches grow outwards and downwards until they connect at depth. As long as these local stresses remain constant they will continue to grow into fault segments that reach the surface and cause displacements that we call fault scarps.



These fault segments are still unconnected, but as the crustal stresses continue to grow and are released as moonquakes, they will extend outward, upward and downward until these fault segments grow close enough for their individual tendrils (tips) to mechanically interact with each other, resulting in the tips actually curving towards each other, rotating the material between, often with a decrease in throw towards the tips.

The underlying stratigraphy will not really have much effect on the relay ramp growth. They are more representative of the faults growth over time. These are the relay ramps.

*Figure 2. The six principal segments of the Rupes Recta.*

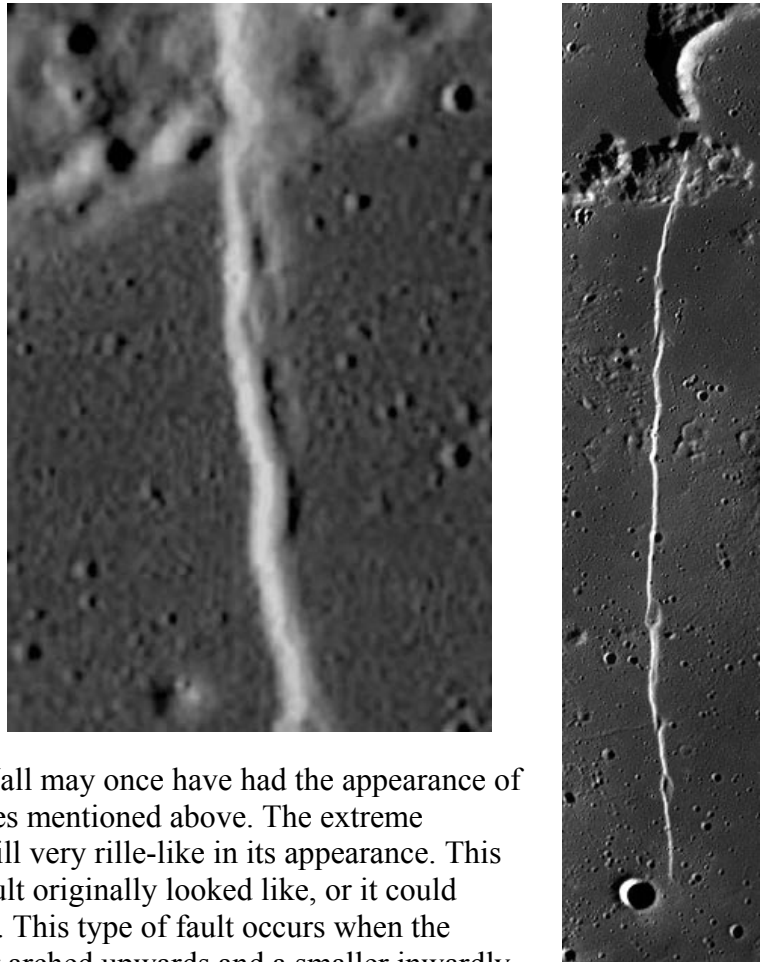
From this we can infer just how the Straight Wall developed throughout its history, and see that it is in fact composed of a series of individual fault segments that coalesced over a period of time, and are linked together by the relay ramps. There are five main ramps spaced along the length of the fault face, with the southern four ramps having a slope towards the south, and the remaining fifth and most northerly sloping to the north.

Each of the four most southerly fault segments is concave to the hanging wall (western) side of the fault face, whilst the remaining

single northern segment is concave to the footwall (eastern) side. Had this single most northerly fault segment formed concave to the western side like the others, then the whole curve of the Straight Wall would have been exaggerated even more and would have been even more concave to the Birt (western) side.

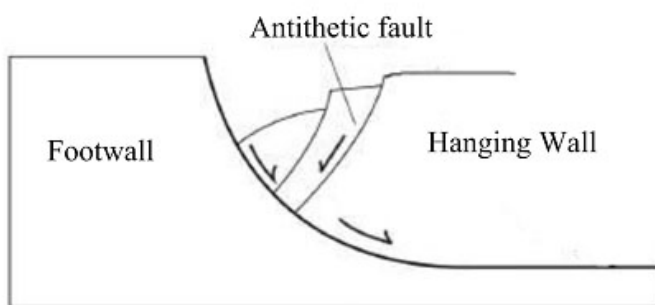
The Straight wall scarp face is at its highest at the midway point, (3. in Fig. 2.) about 300 + metres, so this greater displacement indicates that this was probably

**Figure 3a (left) & 3b (right).** The extreme southern section of the fault scarp has the appearance of a normal rille. Images a & b processed by Maurice Collins.



the first section of the fault face to form and propagate outwards to the north and south. Also being the longest segment it was probably also the first section of the fault to actually slide downwards to the west in response to isostatic uplift or magmatic intrusion, either in the underlying strata or perhaps into the region west of Birt.

As I have mentioned before, the Straight Wall may once have had the appearance of a normal rille that was later modified by the forces mentioned above. The extreme southern section of the fault face (see fig. 3) is still very rille-like in its appearance. This could be proof of how the whole length of the fault originally looked like, or it could indicate antithetic faulting at the foot of the Wall. This type of fault occurs when the ground at the base of a normal fault is buckled or arched upwards and a smaller inwardly dipping fault plane is produced with a throw in the opposite direction to the main fault. (Fig 4.).



**Figure 4.** Antithetic fault. Where a smaller fault grows in the opposite direction to the primary fault. In a normal fault the hanging wall is always situated above the fault face, also when it is a reverse fault. Similarly the footwall is always beneath the fault plane.

Each of the three northernmost ramps appears to have associated lateral faults. There may also be similar faults to the south, but these would be hidden by ejecta deposits from Thebit.

# LUNAR TOPOGRAPHICAL STUDIES

Coordinator – Wayne Bailey - [wayne.bailey@alpo-astronomy.org](mailto:wayne.bailey@alpo-astronomy.org)

Assistant Coordinator – William Dembowski - [dembowski@zone-vx.com](mailto:dembowski@zone-vx.com)

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

## OBSERVATIONS RECEIVED

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 2(2), 3, 4, 5, 6, 10, 11 & 12 day moon, Atlas-Hercules, Endymion, Full Moon, Humboldt, Langrenus, Mare Humorum, Petavius, Posidonius, Theophilus, & Triesnecker.

FRED CORNO - SETTIMO TORINESE, ITALY. Drawing of Wargentín.

WILLIAM DEMBOWSKI – WINDBER, PENNSYLVANIA, USA. Digital images of Montes Apenninus, Endymion-Posidonius, Gassendi-Schickard, Mare Nubium & Schickard-Schiller.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital image of Western Nectaris basin.

CHARLES GALDIES – NAXXAR, MALTA. Drawing & Digital image of Posidonius.

ROBERT HAYS, Jr. – WORTH, ILLINOIS, USA Drawings of Darney & Kunowsky.

PHILLIP MORGAN – LOWER HARTHALL-TENBURY WELLS, WORCESTERSHIRE, ENGLAND. Drawing of Jansen.

HAMISH WATCHMAN- via Maurice Collins. Digital image of 1<sup>st</sup> Qtr Moon.

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## RECENT TOPOGRAPHICAL OBSERVATIONS

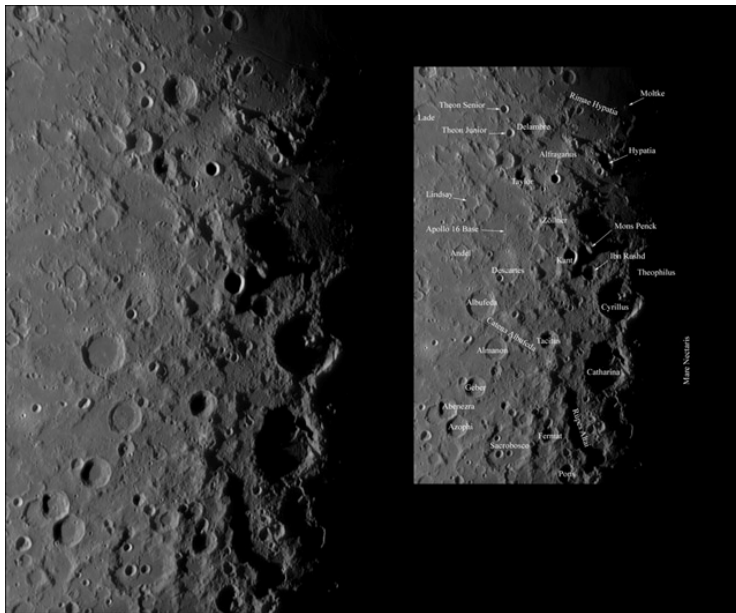


**HUMBOLDT** - Maurice Collins-Palmerston North, New Zealand. September 9, 2011 09:15 UT. ETX-90 SCT, 2x barlow.



# RECENT TOPOGRAPHICAL OBSERVATIONS

**MARE NUBIUM** – William Dembowski,  
Windber, Pennsylvania, USA. August 12, 2011  
02:06 UT Colongitude 65.3°, Seeing 4/10.  
Celestron 9.25" SCT f/10, DMK41 UV/IR filter.



**WESTERN NECTARIS BASIN** - Howard  
Eskildsen-Ocala, Florida, USA. August 19, 2011  
09:45 UT. Seeing 7/10, Transparency 4/6. 6" f/8  
refractor, Explore Scientific lens 2X Barlow,  
DMK 41AU02.AS, IR block & V block filters.

Sunset view of the area distinctly reveals the Altai scarp and gives the appearance that the basin rim continues through Mons Penck and past the eastern side of the odd crater Hypatia. I have other images with a circle connecting these areas that was drawn with LTVT. It fits nicely, but suggests a diameter about 90 km greater than the 860 km generally listed. I have to make more measurements at different illuminations before further challenging the true basin rim diameter.

The diminutive crater Moltke shows its rim distinctly; more often it is visible as fuzzy white spot. Rimae Hypatia caresses its margins.

The Apollo landing site is easy to locate between the

distinct light markings of north and south ray craters. The flat Cayley formation blankets the lowlands to the west and northwest of the landing site. The Cayley looks distinctly different than the rough area north of Descartes and just east of the Apollo 17 base, it is a very interesting juxtaposition.

Finally, curious Theon Senior and Theon Junior add to the curiosity of the region. Senior was named for astronomer Theon of Alexandria who lived around 380 B.C while Junior was a Greek mathematician and astronomer living around 100 B.C.; hence "junior." Who says cartographers lack a sense of humor.



## RECENT TOPOGRAPHICAL OBSERVATIONS



**FIRST QUARTER MOON** – Hamish Watchman, via Maurice Collins. September 5, 2011 06:20-06:40 UT.

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## ADDITIONAL TOPOGRAPHICAL OBSERVATIONS

**ATLAS-HERCULES** - Maurice Collins-Palmerston North, New Zealand. September 3, 2011 05:59 UT. C-8 SCT, 3x barlow.

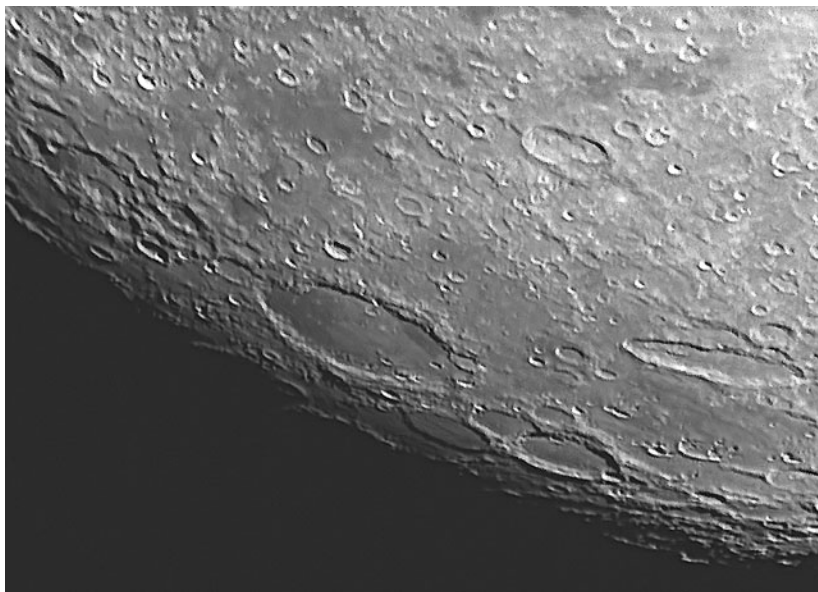


## ADDITIONAL TOPOGRAPHICAL OBSERVATIONS



**POSIDONIUS** - Maurice Collins-Palmerston  
North, New Zealand. September 3, 2011  
06:00 UT. C-8 SCT, 3x barlow

**SCHICKARD-SCHILLER** – William  
Dembowski, Windber, Pennsylvania,  
USA. August 12, 2011 01:19 UT  
Colongitude 64.9°, Seeing 4/10. Celestron  
9.25" SCT f/10, DMK41 UV/IR filter.



# **BRIGHT LUNAR RAYS PROJECT**

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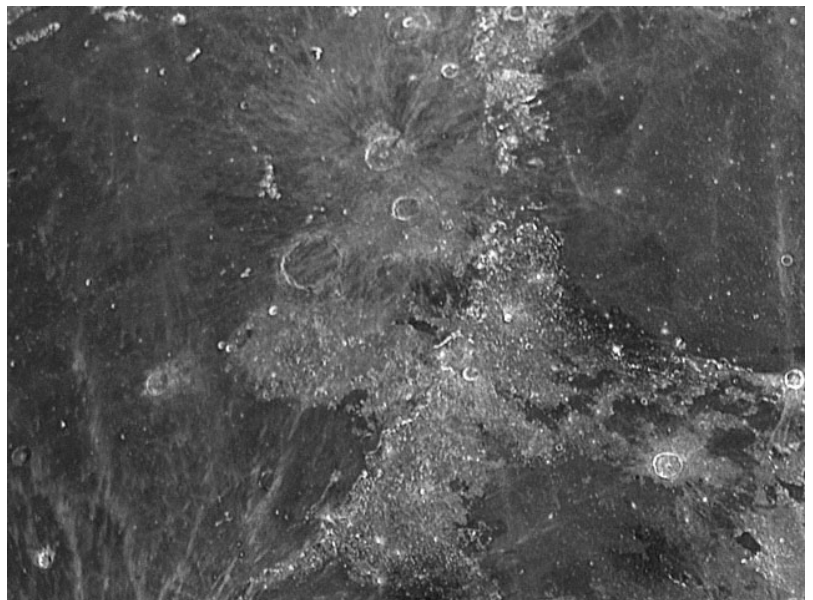
Bright Lunar Rays Website: <http://moon.scopesandscapes.com/alpo-rays.html>

## **RECENT RAY OBSERVATIONS**



**10 DAY MOON** - Maurice Collins-Palmerston North, New Zealand. September 8, 2011 06:18-06:34 UT. ETX-90, LPI.

**MONTES APENNINUS** - William Dembowski, Windber, Pennsylvania, USA. August 12, 2011 02:00 UT Colongitude 65.2°, Seeing 4/10. Celestron 9.25" SCT f/10, DMK41 UV/IR filter.



# **LUNAR TRANSIENT PHENOMENA**

**Coordinator – Dr. Anthony Cook – [atc@aber.ac.uk](mailto:atc@aber.ac.uk)**

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## **LTP NEWSLETTER – OCTOBER 2011**

**Dr. Anthony Cook - Coordinator**

Observations for August 2011 were hampered by bad weather conditions and the Moon's low altitude from the northern hemisphere. Nevertheless observations were received from the following observers: Jay Albert (Lake Worth, FL, USA) observed: Grimaldi, Jansen K, Messier, Plato, and the western limb. Maurice Collins (New Zealand) observed: Alphonsus, Bullialdus, Clavius, Copernicus, Plato, and took some whole disk images of the Moon.. Marie Cook (Mundesley, UK) observed: Alphonsus, Pitatus, Ptolemaeus, and Tycho. I took some time lapse imagery of the Moon through narrowband filters using the remotely operated telescopes at Aberystwyth University. Norman Izett (New Zealand) took some whole Moon images. Phil Morgan (UK) observed Posidonius. Kerry Koppert (New Zealand) took some whole disk images of the Moon.

**News:** On the 7<sup>th</sup> September 2011, NASA's Lunar Science Institute (Not to be confused with the Lunar and Planetary Institute in Houston) organized a unique workshop for planetary scientists (and even some amateur astronomers) via web casts over the internet (<http://lunarscience.nasa.gov/events/lunar-swirls-workshop-without-walls>). It is hoped that at least some of the 6 hours of lectures will be made available online sometime in the near future. What I found interesting was that despite more than a decade of study, and all the new results from the flotilla of international lunar missions, we still know very little about features such as Reiner Gamma. There are still three competing theories: 1) the morphology and magnetism of these features were caused by glancing cometary coma encroachments of the lunar surface. 2) swirls formed at the anti-podal points of large impact basins – the impact blast/shock magnetized these regions after travelling around and through the Moon. 3) there are subsurface magnetic fields and these protect the surface from space weathering by deflecting solar electrons. We now have radar data and that tells us that the swirls do not show up at radar wavelengths much, though there is a difference in particle sizes across the swirls. The features do not show up in topographic maps. Thermal imaging shows negligible difference between the swirls and their surroundings – so any surface layer must be so very thin. Color and spectroscopic imaging from orbit shows almost no compositional difference between the swirls and the material outside, though there is a hint of tiny differences in iron in Reiner Gamma. Magnetic field measurements from orbit do not tell us what the field strength is at the surface – presumably the field is much stronger here? They were really unsure about the ages of the swirls as well. Most swirls appear to lie inside mare areas, but some have been found inside highland areas too. Some swirls are not curved, but linear. Anyway there has been some advancement in computer models and also laboratory simulations. The magnetic field acts a little like the Earth's magnetic field and deflects solar wind particles, the electrons more so than the positively charged ions – the latter can penetrate slightly deeper into the magnetic field. It is speculated that this leads to an electric field and charging of lunar soil particles and these in turn are repelled out of the swirl areas over time – how quickly for Reiner Gamma they were not prepared to say. An experiment was performed in a laboratory by placing lunar stimulant dust in a vacuum, illuminating and then moving a shadow across the soil – some of the dust particles became charged, levitated slightly, and redistributed themselves into the shadowed area! The amount of levitation depended upon the electric field present, particle size, and how much space plasma was injected. I wonder if this could be a mechanism for some of the changes seen during LTP observations? Going from lab experiments at the cm scale to the km scale needed on the Moon in order to be seen from Earth maybe asking too much. We need to wait until NASA's Lunar Atmospheric Dust and Environment Explorer (LADEE <http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=LADEE>) is

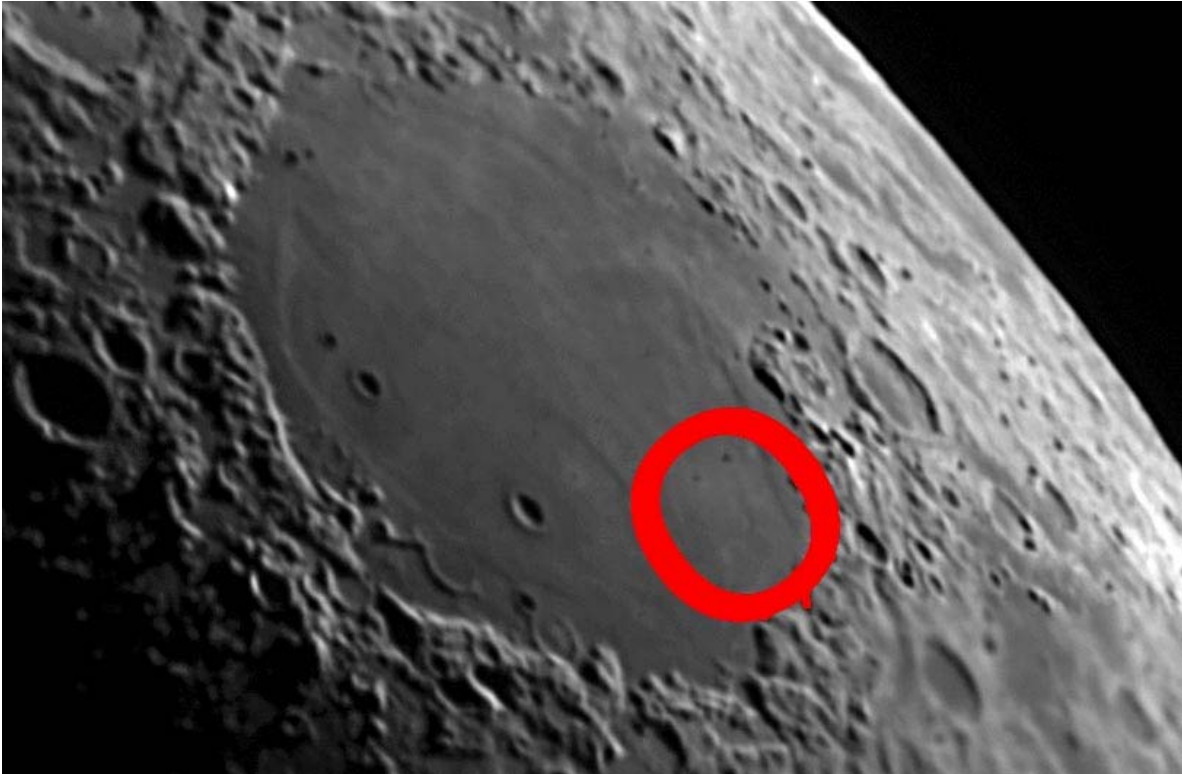


launched in 2013 in order to find out more about the distribution of dust in the lunar exosphere and to see if it has any weather patterns, or is just confined to within a few cm of the surface.

**LTP Reports:** No LTP reports were received for August.

**Routine Reports:** On 2011 Aug 03 Kerry Koppert took made an image mosaic of the crescent Moon. This happened to be very similar in illumination to a LTP seen by Sir Patrick Moore on 1949 Mar 03, which is described in italics below from the 1978 Cameron catalog.

*Mare\_Crisium: Barker's Quadrangle (26W, 34S) 1949 Mar 03 UT 20:00 Observed by Moore(England, 12" reflector) "Whole area hazy. (in Capuanus? see Wilkins and Moore), The Moon, p124) (It may not be this identification as 3 of 4 obs. are in dark, some nr. FQ so doubtful it could be seen)." NASA catalog weight=4 (high). ALPO/BAA weight=2. NASA catalog ID #516.*



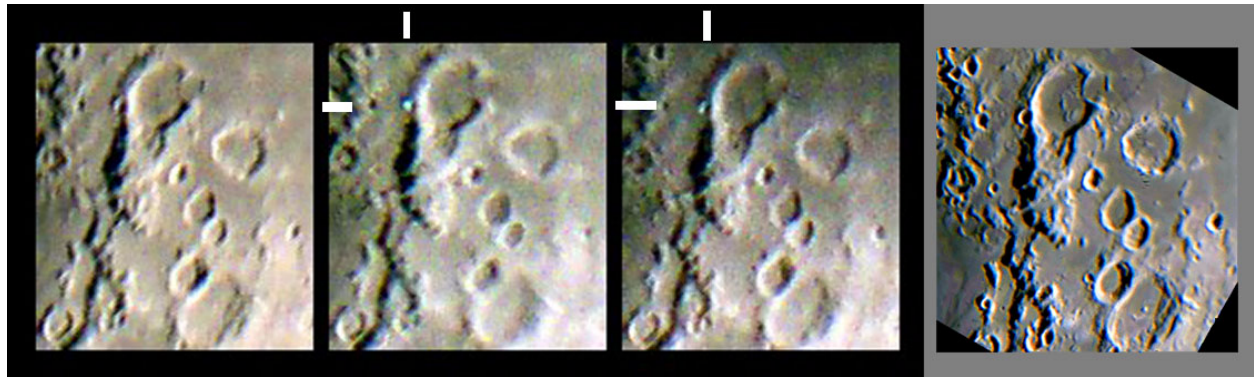
**Figure 1** Mare Crisium from an image mosaic by Kerry Koppert taken on 2011 Aug 03 at UT 06:10-06:17. The red ellipse shows the location of Barker's Quadrangle – only the two most northerly craterlets are visible. North is at the top.

In view of the fact that the area in Mare Crisium is lacking in apparent detail in Kerry's image, I am lowering the ALPO/BAA weight from a 2 to a 1, because it just seems to be the normal appearance under these illumination conditions. However I will not assign a weight of 0 just yet as I do not have any further details other than what appeared in the Cameron catalog. Maybe there is additional information from 1949 which would be more suggestive that this was a LTP?

On 2011 Aug 04, between UT05:54-08:20 both Maurice Collins and Kerry Koppert, were out imaging the Moon, and in a color mosaic supplied by Maurice Collins, it was possible to do a direct comparison with Tony Buick's images (See Figure 2) from a 2006 LTP (See description below). One thing I have always wondered was could Tony Buick's images be showing up natural surface color of this fresh crater? If the camera had suffered shake from wind, or the exposure button being pressed, in earlier images, then this could make the color more visible on this small crater in the sharpest images. However Maurice's image shows clearly that there is no natural surface color here, just some slight spurious color, none of which could explain Gutenberg C turning blue in 2006.



Gutenberg C 2006 Jan 04 UT 18:32 Observed by Tony Buick (UK, Celestron C8 + digital 3MP color camera) "Observer took a series of images (approx 30 sec apart) and in only two of them (in sequence) found that Gutenberg C had a green-blue cast at ~18:32UT. Imaging artifacts such as the color filter pattern on the CCD camera might explain this, but although there are other examples of color elsewhere, none are so strong as this, nor occur in sequence" BAA Lunar Section Observation. ALPO/BAA weight=4.



**Figure 2. Far Left:** Tony Buick color image from 2006 Jan 04 UT 18:32:05. **Left of Centre:** Tony Buick color image from 2006 Jan 04 UT 18:32:32 – position of Gutenberg C marked and colored LTP showing. **Right of Centre:** Tony Buick color image from 2006 Jan 04 UT 18:33:01 – position of Gutenberg C colored LTP marked. **Far Right:** For comparison, an extract from a Maurice Collins LPI color mosaic from a 2011 Aug UT05:54-07:07, showing that there is no natural surface color on Gutenberg C that could explain the color seen seven years earlier. Note that all images have undergone auto-color correction in Adobe Photoshop and then had a color saturation boost. The Maurice Collins image is under very similar illumination. North is at the top in all cases.

However I was still curious about this LTP, as I had given it such a high weight. Was there any mileage in the color filter mosaic theory? - many popular digital cameras, and one shot color CCD cameras, have a mosaic of filters over adjacent pixels e.g. R, G, B, then R, G, B, often arranged in “L” shaped tessellations. Instead of just concentrating on the region shown in Figure 2 that I had investigated before, I expanded the area covered to encompass a significantly larger part of the lunar surface. Figure 3 shows that when we do this there are indeed other craters with narrow illuminated rims that show up a similar green-blue color - but only in the last two images, which were the sharpest. This does not concur with the color filter mosaic theory, where artefacts of red, green or blue color should appear at random over very tiny but bright features, however there must be some other explanation, maybe to do with the way that the images are compressed? Whatever the reason, it is clear that this can no longer be regarded as a LTP, and therefore I am demoting the weight from a 4 to a 0. We need to be careful when interpreting one shot color cameras in future.

On 2011 Aug 14 at UT 08:36 Norman Izett took a whole Moon image (See Figure 4). This was at the same illumination a LTP report by Clive Brook from 2002. Although it does not add much more to the understanding of the original variable brightness LTP, it does confirm that Aristarchus should probably have appeared brighter than Proclus – though it does not mitigate any contributions from libration (viewing angle) effects. The original report is below

*Aristarchus: On 2002 mar 29 at 02:20-02:38UT C. Brook (Plymouth, UK, 60mm refractor, x120 - no cloud, slight haze, no wind, seeing good) noticed during first part of observing period that Aristarchus was getting steadily brighter, very much brighter than Proclus. This continued until 02:36UT when it dimmed suddenly over a period of about a minute or so. No color effects seen. ALPO/BAA weight=2.*



**Figure 3.** A larger area view of Tony Buick's UT 18:32:32 image showing blueness on other small scale features. Image has undergone auto color stretching and saturation boost. North is to the top.



**Figure 4.** Section of a whole Moon image by Norman Izett on 2011 Aug 14 at 08:36 UT. Aristarchus is on the left, Proclus on the right, and north is at the top.

On 2011 Aug 17 at UT 04:55-05:05 Jay Albert re-examined Messier and Messier A under the same illumination as a LTP observation from 1972 (See below) and reports: "Messier [1342]- The connecting shadow line in the LTP report was easily seen between the two craters. The black shadow line protrudes from about the middle of the black shadow of the E wall. This would not appear to be a LTP, but the normal appearance at this solar angle. Observed at 214x.

Messier & A 1972 Aug 27 UT 08:51-09:21 Observed by Hansen (LeMoore, CA, USA, 6" reflector, x200) "Peculiar thread of shadow connecting the 2 craters. Sun's elev. @ 6deg. Drawing (possibly a high peak on E.wall of A casting a shadow?)" NASA catalog weight=1 (very low). NASA catalog ID #1342.

This is an obvious case of normal appearance. Therefore I am reducing this LTP to a non-LTP status in future!

**Suggested Features to observe in October:** 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>.

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## KEY TO IMAGES IN THIS ISSUE

1. Atlas-Hercules
2. Herigonius
3. Humboldt
4. Jannsen
5. Mare Nectaris
6. Mare Nubium
7. Montes Apenninus
8. Posidonius
9. Rupes Recta
10. Schickard-Schiller
11. Wargentin

### FOCUS ON targets

X = Mare Humorum (November)

Y = Copernicus (January)

Z = Archimedes (March)

