

THE LUNAROBSEREVR

# A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O. <br> EDITED BY: Wayne Bailey wayne.bailey@alpo-astronomy.org 17 Autumn Lane, Sewell, NJ 08080 

## RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

## FEATURE OF THE MONTH - JULY 2013

## DAMOISEAU-A



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA February 24, 2013 05:05-05:45 UT, 15 cm refl, 170x, seeing 7-8/10

I observed this area on the evening of Feb. 23/24, 2013 after the moon hid kappa Cancri. This area is just south-east of Grimaldi. Lunar librations were favorable for it that evening. Damoiseau A has a low but complete rim from its south end counter-clockwise around to its west side where it meets Damoiseau D. Southward from D, the rim of A becomes ill-defined and peters out, leaving a gap in its south end. Damoiseau D is an egg-shaped crater with its tapered end to the south. Damoiseau AA is the small pit inside the north rim of Damoiseau A, and Damoiseau AB is the similar pit to the east. The floor of Damoiseau A otherwise appears very smooth. Low ridges and strips of shadow protrude from various points on its rim. The southeast rim of Damoiseau A merges smoothly into a strip of dark shadow that ends at Damoiseau F. The Lunar Quadrant map shows a fault there. A small crater is just south of F and a larger shallower crater is to i s east. Neither of these two craters are shown on the Lunar Quadrant map. A shadowless bright spot and a tiny peak are also in this area. An attention-getting crater chain is farther south. From west to east, the three largest craters are Damoiseau C, BB and B. Damoiseau B and BB overlap, but no rim is evident between them. Two modest craters are between Damoiseau C and BB, and three smaller ones are east of Damoiseau
B. A low mound and a small bright spot are east of this group. Damoiseau CA is the small, shallow crater west of Damoiseau C. A low ridge is farther to the south. A dark strip of shadow starts south of Damoiseau C , winds between C and CA , and angles toward F , but peters out before reaching that crater. This strip is bright on its sunward side south of C, but not farther north. The Lunar Quadrant map actually shows a fault to be continuous between Damoiseau A and C, but I didn't see it that way. There is a dusky area between the crater chain and Damoiseau F, merging with the fault's interruption. More dusky areas are south of the crater chain.
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## LUNAR CALENDAR

JULY-AUGUST 2013 (UT)

| July 06 | $12: 00$ | Moon 3.7 Degrees S of Mars |
| :--- | :--- | :--- |
| July 07 | $00: 37$ | Moon at Apogee (406,491 km - 252,582 miles) |
| July 07 | $02: 00$ | Moon 3.6 Degrees SSW of Jupiter |
| July 08 | $07: 15$ | New Moon (Start of Lunation 1120) |
| July 08 | $12: 00$ | Moon 0.14 Degrees NW of Mercury |
| July 10 | $19: 00$ | Moon 6.7 Degrees SSW of Venus |
| July 16 | $03: 19$ | First Quarter |
| July 16 | $24: 00$ | Moon 3.2 Degrees SSW of Saturn |
| July 20 | $03: 12$ | Extreme South Declination |
| July 21 | $09: 00$ | Moon 1.2 Degrees NW of Pluto |
| July 21 | $20: 28$ | Moon at Perigee (358,401 km - 222,700 miles) |
| July 22 | $18: 15$ | Full Moon |
| July 25 | $02: 00$ | Moon 5.4 Degrees NNW of Neptune |
| July 27 | $22: 00$ | Moon 3.3 Degrees N of Uranus |
| July 29 | $17: 44$ | Last Quarter |
| Aug. 03 | $08: 54$ | Moon at Apogee (405,833 km - 252,173 miles) |
| Aug. 03 | $22: 00$ | Moon 4.0 Degrees S of Jupiter |
| Aug. 04 | $09: 00$ | Moon 5.2 Degrees SSW of Mars |
| Aug. 05 | $05: 00$ | Moon 4.3 Degrees SSW of Mercury |
| Aug. 06 | $21: 50$ | New Moon (Start of Lunation 1121) |
| Aug. 09 | $23: 00$ | Moon 4.8 Degrees SSW of Venus |
| Aug. 13 | $05: 00$ | Moon 3.0 Degrees SW of Saturn |
| Aug. 14 | $10: 56$ | First Quarter |
| Aug. 16 | $12: 12$ | Extreme South Declination |
| Aug. 17 | $20: 00$ | Moon 1.6 Degrees NE of Pluto |
| Aug. 19 | $01: 27$ | Moon at Perigee (362,264 km - 225,100 miles) |
| Aug. 21 | $01: 44$ | Full Moon |
| Aug. 21 | $12: 00$ | Moon 5.3 Degrees NNW of Neptune |
| Aug. 22 | $22: 00$ | Moon 1.9 Degrees SE of asteroid 324-Bamberga |
| Aug. 24 | $03: 00$ | Moon 3.2 Degrees NNW of Uranus |
| Aug. 28 | $09: 35$ | Last Quarter |
| Aug. 29 | $17: 06$ | Extreme North Declination |
| Aug. 30 | $23: 47$ | Moon at Apogee (404,882 km - 251,582 miles) |
| Aug. 31 | $17: 00$ | Moon 4.5 Degrees S of Jupiter |

## AN INVITATION TO JOIN THE A.L.P.O.

The Lunar Observer is a publication of the Association of Lunar and Planetary Observers that is available for access and participation by non-members free of charge, but there is more to the A.L.P.O. than a monthly lunar newsletter. If you are a nonmember you are invited to join our organization for its many other advantages.
We have sections devoted to the observation of all types of bodies found in our solar system. Section coordinators collect and study members' observations, correspond with observers, encourage beginners, and contribute reports to our Journal at appropriate intervals.
Our quarterly journal, The 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 I invite you to spend a few minutes browsing the Section Pages to learn more about the fine work being done by your fellow amateur astronomers.
To learn more about membership in the A.L.P.O. go to: http://www.alpo-astronomy.org/main/member.html which now also provides links so that you can enroll and pay your membership dues online.

| When submitting observations to the A.L.P.O. Lunar Section |
| :--- |
| In addition to information specifically related to the observing program being addressed, the |
| following data should be included (Bold items are required): |
| Name and location of observer |
| Name of feature |
| Date and time (UT) of observation |
| Size and type of telescope used |
| Magnification (for sketches) |
| Orientation of image: (North/South - East/West) |
| Seeing: 1 to 10 (1-Worst 10-Best) |
| Transparency: 1 to 6 |
| Medium employed (for photos and electronic images) |
| Additional commentary accompanying images is always welcome. |

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Orientation of image: (North/South - East/West)
Seeing: 1 to 10 (1-Worst 10-Best)
Transparency: 1 to 6 Medium employed (for photos and electronic images)
Additional commentary accompanying images is always welcome.

## CALL FOR OBSERVATIONS: FOCUS ON: Mons Rumker

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the September 2013 edition will be Mons Rumker. Mons Rumker is most visible on observations close to the terminator, although observations at all phases and of all kinds (electronic or film based images, drawings, etc.) are welcomed and invited. Keep in mind that observations do not have to be recent ones, so search your files and/or add this to your observing list and send your favorites to:

Wayne Bailey - wayne.bailey @alpo-astronomy.org
Deadline for inclusion in the Mons Rumker article is August 20, 2013

## FUTURE FOCUS ON ARTICLES:

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

Subject<br>Schickard-Wargentin Aristarchus

TLO Issue
November 2013
January 2014

## Deadline

October 20, 2013
December 20, 2013

## ALCon 2013 In Atlanta

This year, the annual ALPO meeting will again be held in conjunction with the Astronomical League's ALCon, Wednesday July 24, 2013 through Saturday July 27, 2013 at Fernbank Science Center, near Atlanta, GA. Detailed information can be found in the JALPO vol. 55, \#2, Spring 2013, which is freely available at http://www.alpo-astronomy.org/djalpo/55-2/JALPO55-2 - FREE with ALCon 2013 Registration.pdf or on the Astronomical League's website http://alcon2013.astroleague.org/.

A discounted room rate is available at the Emory Conference Center Hotel.
This year, all technical papers will be mainstreamed and presented at one location. Previously, the ALPO technical papers were presented separately from the others. Papers will be presented on Wednesday, July 24, and Thursday, July 25. If you would like to present a paper please submit by June 15, 2013, the following:

- Title of the paper being presented.
- A four- or five-sentence abstract of each paper.
- The format in which the presentation will be.
- A 100-word biography and a recent photograph of the presenter for posting on the ALCon 2013 website and inclusion in the printed program guide.
E-mail is the preferred method for contact: ken.poshedly@alpo-astronomy.org. If regular mail must be used, address all materials to:

ALCon 2013
c/o Ken Poshedly
1741 Bruckner Court
Snellville, Georgia 30078 USA
The preferred format is Microsoft PowerPoint, though 35 mm slides are also acceptable. The final presentation should not exceed 20 minutes in length, to be followed by no more than five (5) minutes of questions from the audience. A hard-copy version of the paper should be made available for future web site publication.

Three side-trips are also available: Deerlick Astronomy Village; Agnes Scott College Bradley Observatory for the Star BBQ; and the Atlanta Astronomy Club's Walter F. Barber Observatory. In addition to these attractions, vendors will be available to discuss their exhibits, wares and services. The ALPO board meeting, which is open to all members, will be held Friday morning.

## FOCUS ON: Domes

## By Wayne Bailey <br> Coordinator: Lunar Topographical Studies

Domes are possibly the least observed features on the moon. Although most are only visible when very close to the terminator, which puts them in the most popular area examined, with few exceptions they are small and inconspicuous. Craters, mountains, rilles and even wrinkle ridges attract the observers attention with their higher contrast. Most lunar charts show only a few of the most conspicuous examples, if they chart any at all. The most complete list of domes is currently that of the Geological Lunar Research group (see Additional Reading below) who are actively studying domes.

Most domes are a few kilometers in diameter, but only 100's of meters high, similar in color to the surrounding surface. The average surface slope is only a few degrees, so low sun angles are needed to produce surface shading that reveals them. The most prominent feature that may be called a dome is Mons Rumker on Oceanus Procellarum. It's much larger than most domes, and may be a composite structure with multiple overlapping domes, or domes superposed on a larger underlying structure. It will be the subject of the next Focus On article, so will not be discussed further here.

The best known, and easiest to observe, domes include those near Hortensius and Milichius (fig. 1) and Kies $\pi$ (fig. 2). The symmetry of most of these low domes is readily apparent, and summit pits are visible on many with moderate sized telescopes.

Figure 1. HORTENSIUS \& MILICHIUS DOMES - Robert Reeves, San Antonio, Texas, USA. April 20, 2013. Seeing-poor. C-8, f/25, Celestron Skyris 274C.

Several formation mechanisms have been proposed for domes, all of which are related to volcanism is some way. The most widely
 accepted mechanism appears to be eruption of low viscosity magma
 which spreads to form low, broad shield volcanoes. This nicely explains the typical dome profile, the occasional association of domes with linear rilles, and the existence of summit pits.

Figure 2. KIES $\boldsymbol{\pi}$-Joseph H. C. Liu, Salinas, California, USA. April 22, 2002 02:58 UT. 20.6cm f/7.7 Starfire EDF Refractor, Nikon Coolpix 990, $1 / 8 \mathrm{sec}$, Afocal.

Another suggestion has been that they are laccoliths, surface uplift caused by injection of subsurface magma from a deeper source. In this case, associated faults/rilles could be the conduits for rising magma that didn't reach the surface. This idea doesn't seem to explain summit pits, however there are domes with no apparent pit.

A third explanation has been explosive volcanism, which produces cinder cones. This typically produces steeper sided cones than the classical lunar dome. There are features that seem to fit this model also, so it's likely that all three formation mechanisms have operated.
While most known domes are located on the maria, some are found on the floor of lava filled craters, and a few are known in highland regions. Several domes can be seen on the flooded floor of Capuanus (fig. 3). These probably are similar to the maria domes, with the impact fractures within the crater providing the

conduits for magma to rise to form the domes. Highland domes, such as those north of Gruithuisen (fig. 4) seem to have formed from a different magma source since they are spectrally redder indicating a different composition. They also are steeper and less symmetrical indicating higher viscosity lava.

> Figure 3. CAPUANUS DOMES - Howard Eskildsen \& Tippy D'Auria-Ocala, Florida, USA. March 24, 2010 00:28 UT. Seeing 4-5/10, Transparency 3/6. Meade 14 " f/10 SCT, DMK 41AU02.AS, no filter.

The area around Marius, known as the Marius Hills, displays examples of many different types of domes and related volcanic features (fig. 5) such as cones and rilles.

The Valentine Dome (fig.6) and its smaller, less conspicuous northern neighbor provide an interesting comparison. The Valentine Dome is much larger than most domes, has a difficult to observe curving rille on its southeast flank, but no

Figure 4. GRUITHUISEN DOMES - Howard Eskildsen-Ocala, Florida, USA. October 2, 2010 10:12 UT. Seeing 6/10, Transparency 4/6. 6 " f/8 refractor, Explore Scientific lens, 2x barlow, DMK 41AU02.AS, no filter.
summit pit. It probably formed as a laccolith. Its companion is a more typical size, round outline, but also has no summit pit. Both have small, apparently non-volcanic hills on their surface.

Two nice domes can be seen in eastern Mare Tranquilitatis,
 south of Rupes
 Cauchy (fig. 7), but the string of domes southwest of Lucian is more interesting, although more difficult to see. This line of several domes oriented southeast-northwest points towards

> Figure 5. MARIUS - Howard Eskildsen-Ocala, Florida, USA. November 20, 2010 11:21 UT. Seeing 8/10, Transparency 5/6. 6 " f/8 refractor, Explore Scientific lens, $3 x$ barlow, DMK 41AU02.AS, V-block \& IR-block filters.

Mare Imbrium (or possibly Mare Serenitatis). Apparently the magma channels that formed the domes followed radial fractures caused by the basin forming impact.

This has been a quick tour of some of the easier domes to locate. Additional images of some less conspicuous domes and images under different illumination are shown in the addition

Figure 6. VALENTINE DOME - Howard Eskildsen-Ocala, Florida, USA. October 22, 2012 11:21 UT. Seeing 6/10, Transparency 5/6. 6" $f / 8$ refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS, V-block \& IR-block filters.
images section which follows. For more in depth information about domes, see the new book Lunar Domes, Properties and Formation Processes by Lena, Wohler, Phillips \& Chiocchetta.



Figure 7. EASTERN MARE TRANQUILITATIS DOMES - Howard Eskildsen-Ocala, Florida, USA. January 23, 2011 10:34 UT. Seeing 8/10, Transparency 5/6. 6" f/8 refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS, W-15 yellow filter.

## ADDITIONAL READING

Benton, Julius. 2002. A Manual for Observing the Moon: The ALPO Selected Areas Program. Association of Lunar \& Planetary Observers. Downloadable version at http://moon.scopesandscapes.com/sap-hdbk-5.pdf.
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Grego, Peter. 2005. The Moon and How to Observe It. Springer-Verlag, London.
Lena, Raffaello, ed. Selenology Today. Online journal. (current issue - http://digilander.libero.it/glrgroup/ ; back issues http://www.lunarcaptures.com/SelenologyToday.html )
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Wood, Charles. 2003. The Moon: A Personal View. Sky Publishing Corp. Cambridge.
Wood, Charles \& Maurice Collins. 2012. $21^{\text {st }}$ Century Atlas of the Moon. Lunar Publishing, UIAI Inc., Wheeling.
The-Moon Wiki. http://the-moon.wikispaces.com/Introduction
Current catalogs of lunar domes can be found at: http://digilander.libero.it/glrgroup/kapralcatalog.pdf and http://digilander.libero.it/glrgroup/consolidatedlunardomecatalogue.htm.
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## ADDITIONAL DOME IMAGES



ARAGO DOMES - Howard Eskildsen-Ocala, Florida, USA. August 19, 2011 09:48 UT. Seeing 7/10, Transparency 4/6. 6" f/8 refractor, Explore Scientific lens, 2x barlow, DMK 41AU02.AS, IR-block \& V-block filters.

## ADDITIONAL DOME IMAGES



CAPUANUS DOMES - Howard Eskildsen-Ocala, Florida, USA.
Above Left: October 2, 2010 09:54 UT. Seeing 6/10, Transparency 4/6. 6" f/8 refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS,, no filter.
Includes Kies $\pi$.
Above Right: March 3, 2012 Seeing7/10, Transparency 4/6. 6" f/8 refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS,, IR-block \& V-block filtesr.
Right: With Jose Olivarez. May 29, 2004 01:08 UT. 10" f/15 refractor. Nikon Coolpix 4300. Includes Kies $\pi$.


ARCHYTAS G - Howard EskildsenOcala, Florida, USA. 6" f/8 refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS.

Left: June 18, 2013 00:51 UT. Seeing 8/10, Transparency 4/6 , V-block \& IRblock filters.

Right: September 172010 00:44 UT. Seeing 5/10, Transparency 4/6. W-8 yellow filter.

## ADDITIONAL DOME IMAGES

EASTERN MARE TRANQUILITATIS DOMES - Howard Eskildsen-Ocala, Florida, USA. January 17, 2013 26:34 UT. Seeing 6/10, Transparency 5/6. 6" f/8 refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS, IR-block \& V-block filters.


GAMBART C - Howard Eskildsen-Ocala, Florida, USA. 6" f/8 refractor, Explore Scientific lens, $2 x$ barlow, DMK 41AU02.AS. Left: June 18, 2013 00:56UT. Seeing 8/10, Transparency 4/6 , V-block \& IR-block filters. Right: September 172010 00:36UT. Seeing 5/10, Transparency 4/6. W-8 yellow filter.


HORTENSIUS-MILICHIUS - Howard Eskildsen-Ocala, Florida, USA. 6" f/8 refractor, Explore Scientific lens, DMK 41AU02.AS.
Left: October 1, 2010 100:07 UT. 2x barlow. Seeing 8/10, Transparency 5/6, W-8 yellow filter.
Right: April 14, 2011 00:59 UT. 3x barlow. Seeing 9/10, Transparency 5/6. IR-block \& V-block filters.

## 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 5, 10 \& 14 day Moon, Alphonsus, Aristarchus, East limb, Mare Imbrium, Plato, South limb, Theophillus, \& Torricelli.

HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of Archimedes-Eratosthenes, Archimedes-Timocharis, Bullialdus-Capuanus, Capuanus(2), Cauchy(2), Gambart C, Gruithusen, Hortensius(2), Linne, Marius(2), Mons Rumker-Mairan, Mare Tranquilitatis, Palus Epidemiarum, \& Plato. RICHARD HILL - TUCSON, ARIZONA, USA. Digital images of Cassini, \& Montes Alpes. ANDRE MUNOZ- ABERYSTWYTH, CEREDIGION, UNITED KINGDOM. Digital image of Goldschmidt.

DAMIAN PEACH-SELSEY, WEST SUSSEX, UNITED KINGDOM. Digital images of Gassendi \& J. Herschel.

ROBERT REEVES-SAN ANTONIO, TEXAS, USA. Digital image of $1^{\text {st }}$ Qtr. Moon.

## RECENT TOPOGRAPHICAL OBSERVATIONS



TORRICELLI - Maurice Collins-Palmerston North, New Zealand. June 14, 2013 05:46 UT. Seeing A-III. WO FLT-110, Refr, f/21(3x barlow), LPI. North down.

## RECENT TOPOGRAPHICAL OBSERVATIONS

ARCHIMEDES-TIMOCHARIS - Howard Eskildsen-Ocala, Florida, USA. June 1, 2013 10:06 UT. Seeing 8/10, Transparency 2/6. 6" f/8 refractor, Explore Scientific lens, 2x barlow, DMK 41AU02.AS, IR block \& V block filters.


MONTES ALPES - Richard Hill - Tucson, Arizona, USA June 17, 2013 02:32 UT. Seeing 7/10. TEC 8" f/20 MAK-CASS, DMK21AU04. Wideband 656.3 nm filter.

Here we have sunrise on Montes Alpes and Plato. I believe this may be my best of this area with the 8 " yet. The rille in the bottom of Vallis Alpes is well shown. Have you ever visually seen this? I did once when my eyes were younger and not loaded with flloaters. I had a book by Chesley Bonestell I got at a book sale. His paintings of lunar landscapes so captured my imagination that it made me wonder what it would be like to stand on the mountains by Trouvelot G and look up the length of the Alpine Valley, as we called it then. Also nicely shown at the bottom is Mons Pico, Piazzi Smith and lato KAwith the wrinkle between the two craters. I love how Pico looks like it rises vertically from the surface at this lighting.

GOLDSCHMIDT- Andre Munoz, Aberystwyth, Ceredigion, UK. May 31, 2013 22:25 UT.


## RECENT TOPOGRAPHICAL OBSERVATIONS


J. HERSCHEL-Damian Peach -Selsey, West Sussex, United Kingdom. April 21, 2013.
$1^{\text {st }}$ QUARTER MOON-Robert Reeves-San Antonio, Texas USA. June 16, 2013 UT. C-8 SCT, f/10, QHY5LII.

Sunday before last was quite steady here (for a change) and I got off a series of shots with a new camera I wanted to try, a QHY5LII. Its a $1280 \times 960$ CMOS camera and it performed quite well. The star of the show was my 38-year old C-8. I have been thrashing it with Hotech Advanced SCT collimator to sort out some bugs that popped up from old age, and the C-8 was working great on June 16. The bottom line is the C-8 and the seeing both worked great and this is the first time I ever got the Alpine Valley central rille at Cassegrain focus only. Not too shabby for 2000 mm focal length.


## ADDITIONAL TOPOGRAPHICAL OBSERVATIONS



SOUTH LIMB - Maurice Collins-Palmerston North, New Zealand. June 25, 2013 19:4719:52 UT. ETX-90 SCT, ASI1200MC.

ARCHIMEDES-ERATOSTHENES- Howard EskildsenOcala, Florida, USA. June 1, 2013 10:12 UT. Seeing 8/10, Transparency $2 / 6$ cirrus. 6 " $\mathrm{f} / 8$ refractor, Explore Scientific lens, 2 x barlow, DMK 41AU02.AS, IR block \& V block filters.


CASSINI - Richard Hill - Tucson, Arizona, USA June 17, 2013 02:20 UT. Seeing $8 / 10$. TEC 8 " $\mathrm{f} / 20$ MAK-CASS.. DMK21AU04. Wideband 656.3 nm filter

This one covers from Mons Piton to Theaetetus and Montes Caucasus including Cassini. enjoy the great shadows here, especially of the Caucasus and Piton. At the bottom you can see the ray pattern and secondary cratering from Aristillus.

Do you see the shadow profile of a face in Calippus C?

## ADDITIONAL TOPOGRAPHICAL OBSERVATIONS

GASSENDI -Damian Peach -Selsey, West Sussex, United Kingdom. April 21, 2013.


# LUNAR TRANSIENT PHENOMENA <br> Coordinator - Dr. Anthony Cook - atc@aber.ac.uk Assistant Coordinator - David O. Darling - DOD121252@aol.com 

## LTP NEWSLETTER - JULY 2013 <br> Dr. Anthony Cook - Coordinator

Observations for May were received from the following observers: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Mons Piton, Plato, Prinz, Proclus, Ptolemaeus, Lick, the western limb, and several other features. Maurice Collins (New Zealand - RASNZ) imaged: Atlas, Mare Crisium, Petavius, Rupes Altai, Theophilus, observed a partial eclipse of the Sun, and took some whole Moon images. Marie Cook (Mundesley, UK) observed Theophilus. Rik Hill (Tucson, AZ, USA) imaged: Stofler and Torricelli. Norman Izett (New Zealand) imaged the whole lunar disk. Pawel Kaldonek (Poland) imaged several features. Andre Munoz (Aberystwyth University, UK) imaged the Goldschmidt area of the Moon. Michal Pyka (Poland) imaged several features. Brendan Shaw (UK) imaged Menelaus, Peirce, Picard, Proclus, the south pole area, and Theophilus. Franco Taccogna (UAI observer, Italy) imaged Agrippa, Bullialdus, Darney and Picard. Claudio Vantaggiato (UAI observer, Italy) sketched Picard. Observations for previous months have also been received from several observers, and will be used in ongoing analysis.

News: Although not directly to do with TLP, Avani Soares (Brazil) has emailed me about an article they have written on a ghost, or buried, 50 km diameter ( 120 m deep) crater they found near Wolllaston D. Avani has now confirmed their suspicions that it is definitely a ghost crater by doing some topographic profiles through it using the NASA LRO Quickmap tool. You can see some examples in the following PDF file, though you might want to cut and paste some of the text into Google Translate to convert the Portuguese into English. Considering that most LTP occur on, or near to, craters, one wonders whether we should also be looking for LTP in the mare areas, where lava may have covered up underlying craters. It would be difficult though to detect a common type of LTP, namely obscurations, here though as the mare areas look pretty bland and featureless anyway.

Antonio Mercatali has been emailing me about cameras for detecting impact flashes on the Moon's night side. He has taken some impressive images that can attain magnitude 12. But the SBIG ST7-XMEI camera that he is using has an image read out time of 1.5 seconds, which unfortunately is too slow for most impact flash work where TV frame rates of 25 fps or faster are needed to capture these usually short $<0.1$ sec impact flashes. He is considering instead a Chameleon CCD camera from PointGrey, or a ASI 120MM CMOS camera from ZWO, both of which have USB readout. My own experience is from using the Watec 902 H which produces composite video output and can record down to fainter than magnitude 11 in real time 30 fps ; although it does need a non-MPEG video capture card with firewire output to a PC to capture the video. If anybody has any comments on the above USB cameras, or indeed any other high frame rate USB cameras capable of videoing in real time down to magnitude 10-11 (30fps or faster), then I would gladly pass them on.

On the subject of impact flashes, on 2013 Mar 17 UT 03:50:54 two 14-inch telescopes run by NASA's Marshall Space Flight Center, recorded an impact flash that was so bright, it could have been seen as a $4^{\text {th }}$ magnitude star, with the naked eye, without the aid of a telescope. It lasted just under one second, and was located north of Kepler and Copernicus in Mare Imbrium, on the Moon's night side. You can watch this on the following You Tube video. Please check your records to see if you were observing at this time?

LTP Reports: No LTPs were reported in May, though I was grateful for Paul Campbell (Horbury, UK) for providing me with some images of a possible flash on the Moon from 2012 Oct 06 UT 23:10. This was visible in an image sequence, but turned out to be the crater Menelaus (a few high parts of which were
still illuminated) just on the night side of the evening terminator - it flared up in brightness as a result of atmospheric seeing conditions - so most of the time it was not visible.

Although not a LTP, I received a web link from Pawel Kaldonek, concerning a picture posted on a Katowice (Poland) airport Face Book site, which had a superb image (scroll down, past the exciting vacation destination, to the May $21^{\text {st }}$ entry) of a Ryan Air Boing 737 flying past the Moon in the line of sight at 19:23UT on that date. Pawel was curious though about the apparent bright point on the Moon's terminator. I was able to point out that this was none other than Aristarchus crater, whose western rim was just starting to catch the sunlight, and often appears like this.

Routine Reports: Here is a selection of reports received during May that can help to re-assess some past LTP observations. These are presented in chronological order:

Lick: On 2013 May 15 UT 00:10-00:25 Jay Albert observed this region, using a C11 scope, (seeing $6 / 10$, in twilight and under partly cloudy conditions). Below is a summarized version of the original LTP report, according to the NASA catalog:

```
Lick 1972 Jan 20 UT 18:45-20:45 S.Will (Edinburgh, UK, 60 mm refractor, xl16,
x35, conditions average to poor, a thin cloud covering giving a boiling image)
Observer reported a black fuzzy oval spot about 32 km across near Picard, and
was probably the crater Lick. The fuzziness extended towards the NW (AIU?). It
was observed periodically until cloud prevented further observation at 20:45.
The effect was confirmed by 2 other observers using a 6" reflector and a 40mm
refractor. The ALPO/BAA weight=1.
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Jay makes the following comments about what he saw: "Contrary to the LTP description, the black, oval spot near Picard was not fuzzy. It wasn't the Lick crater either. Lick was fully lit with its floor the same shade of light gray as the mare floor. Lick's low walls were bright, as was a very small central peak. The dark spot $S$ of Picard appears to be the crater Greaves on the $N$ edge of Lick. The floor of Greaves was in full, black shadow. This seems to be normal for this solar angle. I used 311x". In view of this, and the poor seeing and small scope used originally, I am changing this LTP from a weight of 1 , to a non-LTP status of 0 , and changing the crater name from Lick to Greaves.

Messier: On May 15 UT 19:20 Pawel Kaldonek, was experimenting with imaging the Moon through his telescope using a camera on a mobile phone, This date and UT matched similar illumination to the following LTP seen by Geoff Amery (A BAA Lunar Section Director):

```
On 1983 Jan 19 at UT 18:00-19:00 G.W. Amery (Reading, UK) found that Messier
was difficult to define. The Cameron 2006 catalog ID=197 and the weight=2. The
ALPO/BAA weight=1.
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Although the resolution that Pawel's camera obtained was not too great (he is just a beginner in lunar imaging), his image suggests that indeed Messier was probably difficult to see. I will therefore leave the weight at 1 of this former LTP for now though as I would really like to see a higher resolution image, at some time in the future, to confirm the appearance of the crater pair.

Theophilus: Marie Cook observed Theophilus on 2013 May 15 UT 20:15-20:25 and 20:40-20:45, and Brendan Shaw imaged the crater earlier at 19:56-20:02. These match the same illumination as the following LTP report from 1955:

```
Theophilus 1955 Jun 25 UTC 20:30 Observed by Firsoff (Somerset, UK, 6.5"
reflector, x240) "Blue mist. Both c.p. & ENE (IAU?) ridge appears misty,
slightly bluish & milky -- renders effect perfectly. Absent next nite". NASA
catalog weight= 4 (high). NASA catalog ID #596. ALPO/BAA weight=3.
```

Upon studying Theophilus on 2013 May 15, Marie Cook confirmed the shadow filled half the crater, and some additional area to the west of the central peak. However, no color was seen on the central peak, but there was some slight blue spurious color on the western rim and also on the west rim of Cyrillus too. She
found the crater similarly normal in the second observing session in red and yellow filters, but some deep blue was seen in the blue filter - returning to normal at 20:45. However the seeing was III to IV and transparency only moderate (thin cirrus cloud), so maybe atmospheric effects explain this? Figure 1 shows an earlier view of Theophilus taken by Brendan Shaw that night, showing everything normal in the crater, and nothing resembling the LTP seen by Firsoff in 1955 - therefore I shall leave the weight of this LTP at a 3 .


Figure 1. A color RGB image of Theophilus from 2013 May 15 UT 19:56-20:02 taken by Brendan Shaw with north towards the top. The image has undergone sharpening of the blue filter band, filter band normalization, and then had color saturation set to 70\%. Some minor atmospheric spectral dispersion color present.
Picard: On the evening of 2013 May 19, three observers observed the Mare Crisium area under similar illumination to what English astronomer Ingall, would have seen back in 1864 May 15/16:

```
East of Picard 1864 May 15-16 UT 23:00-01:00? Observed by Ingall (Camberwell,
England) "Remarkable bright spot" NASA catalog weight=3 (average). NASA catalog
ID #134. ALPO/BAA weight=3.
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According to the Royal Astronomical Society's Astronomical Register, from that era...

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In No. 23 of the Astronomical Register, November, 1864, p. 264, Mr. Herbert
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Ingall called attention to a spot on the moon of about $6^{\circ}$ or $7^{\circ}$ of brightness
and little to the "west" (east IAU) of Picard, which he saw on May 15, 1864,
and again on October 16, 1864. In the following number, December, 1864, $P P^{*}$
^95) 296) a careful description of the spot is inserted. In an article in the
English Mechanic, January 12, 1877, p. 425, entitled, "Telescopic Work for
Moonlight Evenings" mention is made of this spot, and also that on December 12,
1864. Knott discovered two minute craterlets on its site..... When at its
greatest apparent size it was generally estimated as double the size of
Picard.....

You can see the outcome of our modern day observations in Figure 2 - Picard is just to the east of Proclus and has a dark halo around it.. None of these observations show any evidence for a remarkably bright spot east of Picard, but Antonio Mercatali (UAI) relayed to me Claudio's comment, that he wonders if the "remarkable bright spot" would have been located at the 2.7 km diameter Curtis crater? This seems reasonable to me. I have checked Curtis out on the LROC image web site and it is just an unremarkable bowl shaped
simple crater with quite a few boulders on the inside - however though in on Clementine UVVIS color ratio maps it does appear to have an compositional ejecta area 15 km in diameter. However as Curtis is not remarkably bright in any of these three modern observations, the original LTP will stay at a weight of 3 as the mystery remains as to why it was so bright back in 1864? Perhaps we need to re-observe under similar libration too? I will also change the designation of this crater from Picard to Curtis as this more properly reflects the location of the original bright spot.


Figure 2. The following have been SCT mirror reversed to match Claudio's labeled drawing. You can use the labels in Claudio's drawing to identify the craters discussed above. North is to the top right and east is towards the top left. (Left) Brendan Shaw's monochrome image from UT20:03UT. (Centre) Claudio Vantaggiato's (UAI) sketch from 20:00-20:17 UT. (Right) Franco Taccogna's (UAI) image from 20:17 UT with color saturation enhancement.

Cusps: On 2013 May 19 UT21:34 Michal Pyka was able to image (see Figure 3) the southern area of the Moon under exactly the same illumination and libration, to within $+/-1^{\circ}$ to what the Californian based astronomer, Barcroft, would have seen back in 1941:

```
Cusps 1941 Mar 07 UT 04:00? Observed by Barcroft (Madera, CA, USA, 6"
reflector) "Prolongation suspected. (date reported =6th, but if loc. time =7th
UT). In this case we have assumed the 7th" NASA catalog weight=1 (very low)
NASA catalog ID #485. ALPO/BAA weight=1.
```

It is not apparent which cusps, north or south, he was referring to, but if it was on the south, then it is clear from Michal's image that there should be no appreciable cusp extension at the south pole, so one can only imagine that Barcroft was referring to the north pole? However there may be an ambiguity over the date, according to Cameron's NASA LTP catalog. Michal's image does show a blip effect on the south edge of Short crater, but according to plate 14d of the Hatfield Atlas, this is normal. If anybody else has images of the north polar area from the evening of 2013 May 19 , or indeed both poles from the $18^{\text {th }}$, then I would be very interested to see these.


Figure 3. Image of the Moon's southern area by Michal Pyka taken on 2013 May 19 UT 21:34 with north towards the top.
Lambert Gamma: On 2013 May 20 Maurice Collins imaged (See Figure 4 - left) this region under similar illumination conditions to $+/-0.5^{\circ}$ to the LTP report by Armenian astronomer, S. Khachatryan, below.

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On 2008 Aug 11 UT 17:40-18:20 S. Khachatryan (Yaravan, Armenia, 127mm f/l2 GoTo
scope, x62-x154, seeing: best and transparency=6) observed that an unofficially
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named mountain (Lambert Gamma or Mons Undest), near Lambert, had a "very strong
glow", especially the part that was facing the line of the terminator and this
was brighter than the side facing away. No other object nearby was casting as
much light, even Mons La Hire. The effect was seen for 40 minutes and the glow
was present throughout. The ALPO/BAA weight=1.
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Figure 4. 2013 May 20 - north is towards the top. (Left) UT05:0505:21 Maurice Collins. (Right) UT07:53 Norman Izett. The red arrows show the location of the unofficially named Lambert Gamma mountain.

Technically speaking, the name "Lambert Gamma" is no longer used, and nor is another name for the mountain, "Mons Undest", after being disallowed by the IAU. Therefore this 7 km wide mountain has no official name, and is located just to the east of Lambert at $18.5^{\circ} \mathrm{W}, 26.5^{\circ} \mathrm{N}$. On the Hatfield Atlas, you will see it just referred to as "Mt" in square E7 on Map 5. Although the image by Maurice (Figure $4-$ left) and a $2^{\text {nd }}$ image a little later by Norman Izett (Figure 4 - right) do not resolve the mountain well, it is clearly not very bright either, therefore I will raise the weight of this former LTP report from a 1 to a 2.

Suggested Features to observe in July: can be found on the following web site: http://users.aber.ac.uk/atc/tlp/tlp.htm. These contain lists of dates and UTs for repeat conditions for when a feature will exhibit the same illumination and libration as was seen for a historical LTP observation from the past. By re-observing and submitting your observations, we will get a clear understanding of what the feature ought to have looked like at the time. Only this way can we really fully analyze past LTP reports.

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 TLP, please give me a call on my cell phone: +44 (0)7985055681 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 TLP alerts can be accessed on http://twitter.com/lunarnaut.

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## KEY TO IMAGES IN THIS ISSUE

1. Arago
2. Archimedes
3. Archytas
4. Capuanus
5. Cassini
6. Damoiseau
7. Eratosthenes
8. Gambart
9. Gassendi
10. Goldschmidt
11. Gruithuisen
12. Hortensius
13. J. Herschel
14. Kies
15. Marius
16. Milichius
17. Montes Alpes
18. Timocharis
19. Torricelli
20. Valentine Dome


FOCUS ON targets
X = Mons Rumker (September)
Y = Schickard-Wargentin (November)
$\mathbf{Z}=$ Aristarchus (January)


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