THE LUNAR OBSERVER

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

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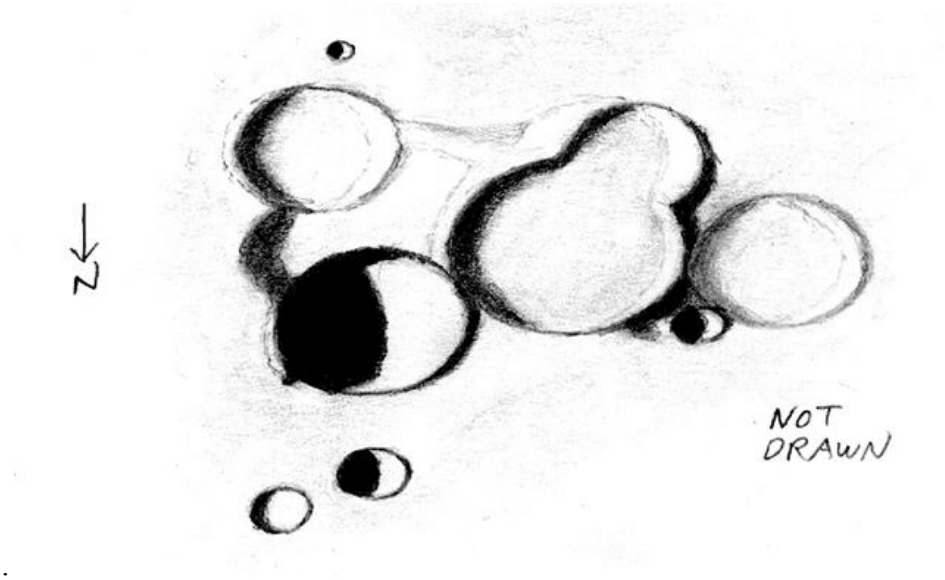
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – NOVEMBER 2014

CUVIER D



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
September 3, 2014 01:12-01:46 UT, 15 cm refl, 170x, seeing 7/10

I observed this area on the evening of Sept. 2/3, 2014 before the moon hid ZC 2463. Cuvier D is the most conspicuous of a compact group of craters west of Cuvier. This is a deep crater that is fairly symmetrical except for a bit of shadow protruding from its northeast rim. Cuvier G to the north is a smaller version of D. (Those are the only two labeled craters on this sketch.) A shallow saucer is just east of G. Another shallow crater to the south is about as wide as Cuvier D. A small, crisp pit is just south of this crater. A curved strip of shadow between Cuvier D and its southern neighbor is obviously part of an old ring, but its other side is not apparent. The largest feature on this sketch is the north lobe of a double ring west of Cuvier D. Both lobes are similar in depth to the shallow ring south of Cuvier D. The west rim of the south lobe, however, is wider than the corresponding rim of the north lobe. A relatively bright area with modest shadowing is between the double crater and the ring south of Cuvier D. This may be related to the old ring between Cuvier D and its southern neighbor. Another saucer, even shallower than its neighbors, is west of the double crater. A deeper crater, much like Cuvier G, is just north of these craters. All of the obvious craters on this sketch have smooth interiors and intact rims.

LUNAR CALENDAR

NOVEMBER-DECEMBER 2014 (UT)

Nov	03	00:21	Moon Perigee: 367900 km
	05	03:13	Moon Descending Node
	06	22:23	Full Moon
	08	19:41	Moon-Aldebaran: 1.5° S
	09	23:12	Moon North Dec.: 18.6° N
	14	15:16	Last Quarter
	15	01:56	Moon Apogee: 404300 km
	19	08:18	Moon Ascending Node
	19	16:01	Moon-Spica: 2.8° S
	22	12:32	New Moon
	24	08:17	Moon South Dec.: 18.6° S
	27	23:11	Moon Perigee: 369800 km
	29	10:06	First Quarter
Dec	02	08:32	Moon Descending Node
	06	04:35	Moon-Aldebaran: 1.5° S
	06	12:27	Full Moon
	07	09:06	Moon North Dec.: 18.7° N
	12	23:02	Moon Apogee: 404600 km
	14	12:51	Last Quarter
	16	13:27	Moon Ascending Node
	19	20:55	Moon-Saturn: 1.6° S
	21	18:25	Moon South Dec.: 18.7° S
	22	01:36	New Moon
	24	16:43	Moon Perigee: 364800 km
	28	18:31	First Quarter
	29	09:27	Moon Descending Node

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

The Lunar Observer is a publication of the Association of Lunar and Planetary Observers that is available for access and participation by non-members free of charge, but there is more to the A.L.P.O. than a monthly lunar newsletter. If you are a nonmember you are invited to join our organization for its many other advantages.

We have sections devoted to the observation of all types of bodies found in our solar system. Section coordinators collect and study members' observations, correspond with observers, encourage beginners, and contribute reports to our Journal at appropriate intervals.

Our quarterly journal, **The Strolling Astronomer**, contains the results of the many observing programs which we sponsor including the drawings and images produced by individual amateurs. Additional information about the A.L.P.O. and its Journal is on-line at: **http://www.alpo-astronomy.org.** I invite you to spend a few minutes browsing the Section Pages to learn more about the fine work being done by your fellow amateur astronomers.

To learn more about membership in the A.L.P.O. go to: **http://www.alpo-astronomy.org/main/member.html** which now also provides links so that you can enroll and pay your membership dues online.

When submitting observations to the A.L.P.O. Lunar Section

In addition to information specifically related to the observing program being addressed, the following data should be included:

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

Full resolution images are preferred-it is not necessary to compress, or reduce the size of images. *Additional commentary accompanying images is always welcome.* **Items in bold are required. Submissions lacking this basic information will be discarded.**

Digitally submitted images should be sent to both
Wayne Bailey – wayne.bailey@alpo-astronomy.org
and Jerry Hubbell –jerry.hubbell@alpo-astronomy.org

CALL FOR OBSERVATIONS:

FOCUS ON: Oceanus Procellarum-Reiner gamma

Focus on is a bi-monthly series of articles, which includes observations received for a specific feature or class of features. The subject for the **January 2015** edition will be **Oceanus Procellarum-Reiner gamma.** Observations at all phases and of all kinds (electronic or film based images, drawings, etc.) are welcomed and invited. Keep in mind that observations do not have to be recent ones, so search your files and/or add this to your observing list and send your favorites to (both):

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

Jerry Hubbell –jerry.hubbell@alpo-astronomy.org

Deadline for inclusion in the Oceanus Procellarum-Reiner gamma article is December 20, 2014

FUTURE FOCUS ON ARTICLES:

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

Subject	TLO Issue	Deadline

ATLAS OF LUNAR SINUOUS RILLES

The November 2014 issue of the Lunar and Planetary Information Bulletin (#138, page 26, www.lpi.usra.edu/lpib) contains an announcement that an online "Atlas of Lunar Sinuous Rilles" is available at http://www.lpi.usra.edu/lunar/rilles. The atlas is the result of collaboration between NASA Solar System Exploration Research Virtual Institute (SSERVI) teams at the LPI-JSC Center for Lunar Science and Exploration and Brown University. It includes images of 195 rilles distributed around the moon and links to additional information.

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LUNAR TOPOGRAPHICAL STUDIES

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

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

Assistant Coordinator – Jerry Hubbell – jerry.hubbell@alpo-astronomy.org

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

OBSERVATIONS RECEIVED

JAY ALBERT – LAKE WORTH, FLORIDA, USA. Digital images of Aristarchus, Daguerre, Eratosthenes(2), Lick-Yerkes, Mare Insularum, Mare Nectaris, Marldi D & Torricelli R(3).

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 7 day Moon, Hipparchus & Montes Caucasus.

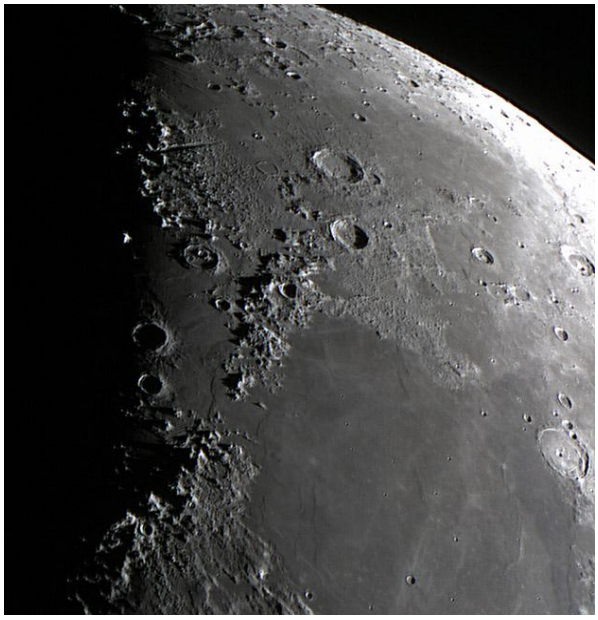
HOWARD ESKILDSEN - OCALA, FLORIDA, USA. Digital images of Aristillus(2), Birt, Bullialdus(2), Jansen, Madler(2), Mare Tranquilitatis & Wargentin.

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Albategnius, Apianus, Cassini, Copernicus, Sinus Iridum, South Pole & Wilhelm.

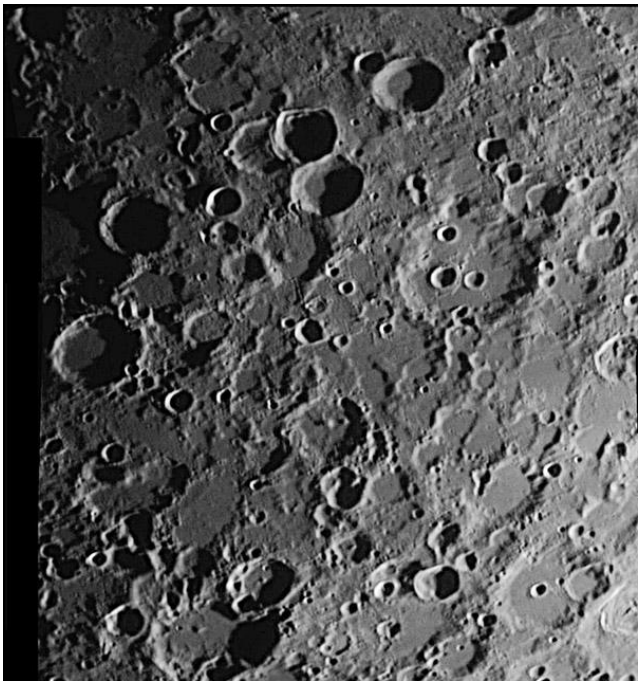
PAOLO LAZZAROTTI – MASSA, ITALY. Digital images of Clavius & Philolaus-Anaxagorss.

RECENT TOPOGRAPHICAL OBSERVATIONS

HIPPARCHUS - Maurice Collins-Palmerston North, New Zealand. October 1, 2014 09:42 UT. ETX-90.



MONTES CAUCASUS - Maurice Collins-Palmerston North, New Zealand. October 1, 2014 08:43 UT. ETX-90.

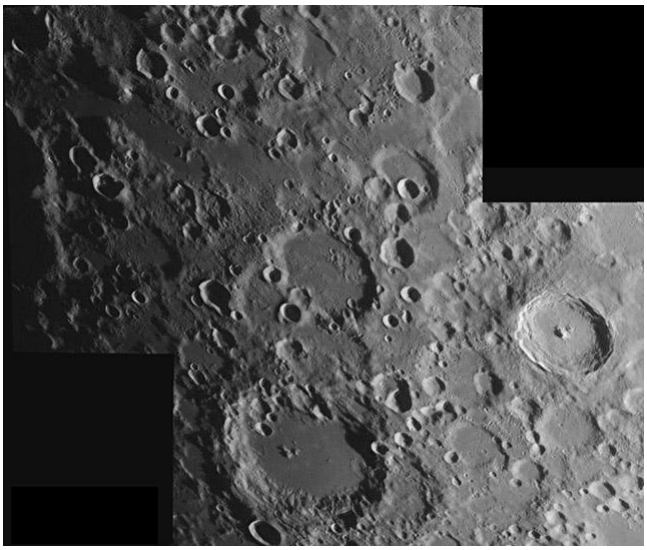


.**APIANUS** – Richard Hill – Tucson, Arizona, USA October 1, 2014 01:49 UT. Seeing 8/10. TEC 8" f/20 MAK-CASS, DMK21AU04. 656.3 nm filter.

This is a very busy portion of the moon. Apianus is the crater on the left edge with the nice shadows on its floor. Above it in full shadow is Playfair and above to the right are Azophi (lower) and Abenezra with Abenezra C partially covered. Further to the right is Geber making for an eye catching trail of craters across the upper part of this image. Below Geber with three crisp 13-17km craters contained within its walls is Sacrobosco. Just below center is the crater Pontanus with the strange central peak and further down to the left is Goodacre and below that Gemma Frisius. To the right of Pontanus and slightly below is the crater Wilkins with the ridge cutting the crater in half. Note the keyhole shaped crater (overlapped craters) next to Wilkins. At the bottom, just a little right and below Wilkins is Zagut with a 11km crater in its floor, and below left of that is Celsius.

Now that we have the landmarks (selenomarks?) noted back your vision out and note the almost vertical scratches best seen between Apianus and Sacrobosco. I wonder what impact caused mountain sized boulders to scour the land here?

RECENT TOPOGRAPHICAL OBSERVATIONS



WILHELM – Richard Hill – Tucson, Arizona, USA October 4, 2014 02:07 UT. Seeing 8/10. TEC 8" f/20 MAK-CASS, SKYRIS 445M. 656.3 nm filter.

Too often one of the eye-popping sites on the moon will overshadow features that would normally stand out on their own. Such is the case of the region around Tycho, seen here on the right side of the image. To the selenographic south and east of Tycho is the 80km diameter crater Longomontanus with the curious few mountains on the flat floor, well off center. I like the detail in the southern interior wall and the double crater Brown to the north and east. Above Longomontanus, in the middle of this montage, is Wilhelm with Lagalla on the lower left wall and the poorly defined crater, Montanari, between Wilhelm and Longomontanus. Look at how so many of these craters have been modified by impacts subsequent to their formation.

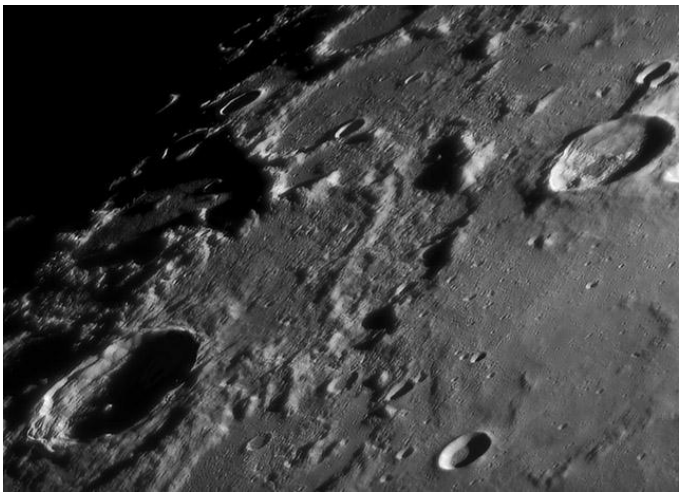
Northeast of Wilhelm are 4 similar sized craters that form a "Y" with the upper end in the crater Heinsius. Notice how soft the walls of this crater are compared to the ones that form the "Y". It is overlain by a blanket of ejecta from the Tycho impact, as are many features in this image. To the northwest of Wilhelm is what looks like an outwash plain. This is Lacus Timoris with the crater Haidinger on the north "shore" and Epimenides full of shadow on the south.

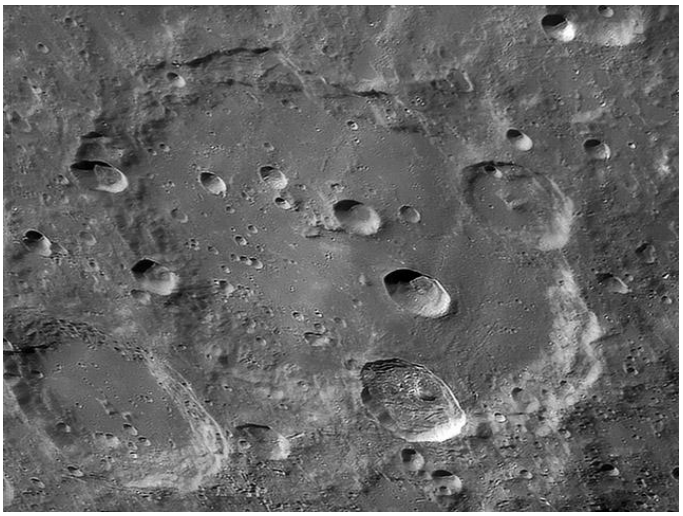
There is so much going on here with unnamed rimae, loads of 1-3 km secondary pits and more features formed or modified by ejecta. Enjoy the view!

PHILOLAUS-ANAXAGORAS– Paolo Lazzarotti – Maaciano (GR), Tuscany, Italy. May 13, 2011 18:57 UT. Seeing 5-7/10, Transparency 4/5. Gladius XLI 400mm Cassegrain f/16, 2x barlow, 0.107 "/px. Experimental Sony ICX285 camera, Baader R filter.

http://www.lazzarotti-hires.com/2014/10/da-philolaus-ad-anaxagoras.html

This area close to the eastern limb taken under grazing light is showing 2 interesting features: the weird albedo difference with Anaxagoras crater (the main crater on the top-right corner) and a possible craterlet chain starting off Mouchez (the big crater on the top-middle part of frame) and running across the whole ground. It would be interesting to learn if it's real or just an optical illusion. Thank you for letting me know!





CLAVIUS in daytime– Paolo Lazzarotti – Maaciano (GR), Tuscany, Italy. August 19, 2011 04:33 UT. Seeing 6-7/10, Transparency 4/5. Gladius XLI 400mm Cassegrain f/16, 2x barlow, 0.107 "/px. Experimental Sony ICX285 camera, Baader R filter.

http://www.lazzarotti-hires.com/2014/10/clavius-di-giorno.html?lan=english

FOCUS ON: GHOST CRATERS

By Wayne Bailey

Coordinator: Lunar Topographical Studies

Ghost craters are unlikely to catch your eye during a casual view of the moon. By their nature, they're inconspicuous. A ghost crater is any crater that has been buried so that at most a protruding central peak and/or rim top, and often no more than albedo markings or slight topographic relief, mark its presence. Is there any reason to look for them, other than as a curiosity? As we'll see, they do provide some information that otherwise can't be determined remotely.

Ghost craters form on low lying areas that were subsequently flooded by lava. Therefore they're a feature of mare areas and flooded crater interiors. Also, the overlying lava can't be so thick that no trace of the underlying crater remains at the surface. Since the depth of a crater is related to its diameter, ghost craters provide an estimate of the thickness of the lava layer overlying them.

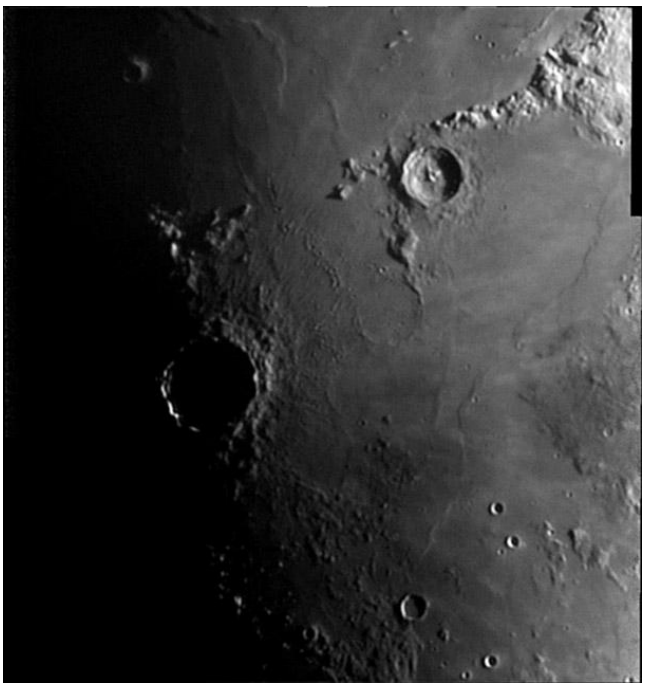


Figure 1. ***Stadius*** *– Richard Hill – Tucson, Arizona, USA August 5, 2014 02:14 UT. Seeing 7/10. Questar 3.5" +1.7x barlow Skyris 445M. 656.3 nm filter.*

Stadius (fig. 1), between Copernicus and Eratosthenes is probably the best known ghost crater. The only list of ghost craters that I know of is on The-Moon Wiki, which doesn't claim to be complete. A Google search for ghost crater turned up some individual references along with a significant number of pseudo-science sites. However, a search along the terminator will reveal several examples if you pay attention to the less spectacular objects. A few are visible as albedo features under a high sun.

Since ghost craters are almost entirely hidden, the reality of individual craters can be questionable. There is no fool-proof method to distinguish fortuitous combinations of wrinkle ridges, isolated peaks and albedo features from real buried craters. There are also questions of terminology: How much of a crater can be visible and still call it a ghost crater? Lamont is only marked by wrinkle ridges, Stadius exhibits some protruding peaks around its rim, Prinz (fig. 2) has a significant portion of its rim exposed, while the majority of Fracastrorius' rim is exposed. Where is the boundary between a ghost crater and a flooded or ruined crater? And what about Wargentin (fig. 3) whose interior is flooded to the rim, but the exterior walls are exposed? At the other extreme, only a shallow depression marks the interior of other ghost craters There's a continuous range of states of burial, so is it even necessary to have separate names? My

Figure 2. ***Prinz*** *- Jay Albert, Lake Worth, Florida USA. December 15, 2013 03:31 UT. C-11 SCT, NexImage 5.*

own feeling is that it's not necessary (and probably meaningless) to force rigid bounds on the terminology, but it is necessary to make clear the limits intended in any discussion. As you may have guessed, I'll use a very loose interpretation in this article, including all of the above. Some ghost craters have been given official names (examples include Stadius, Torricelli, Madler), others are un-named, and some that have been assigned names (for instance Lamont) are likely to be illusions.

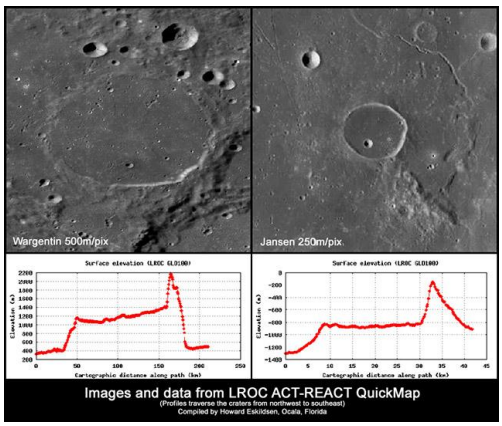
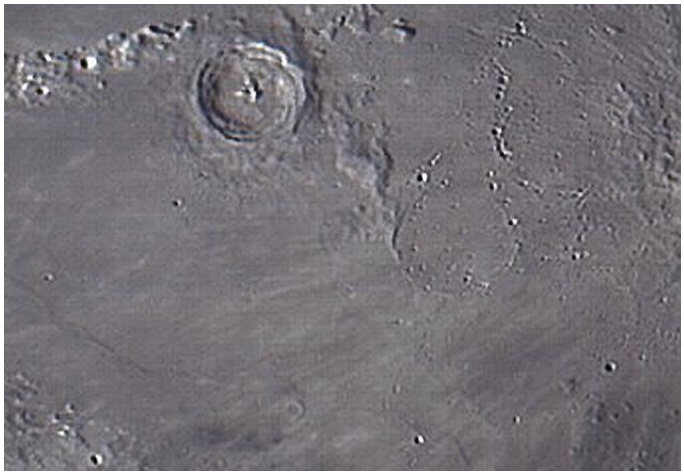


Figure 3. ***Wargentin*** *- Howard Eskildsen-Ocala, Florida, USA. LROC images*

Enjoy the images submitted for this article. There are likely to be many more unrecognized ghost craters waiting to be found either by carefully looking for low relief features in images or elevation maps of the moon.

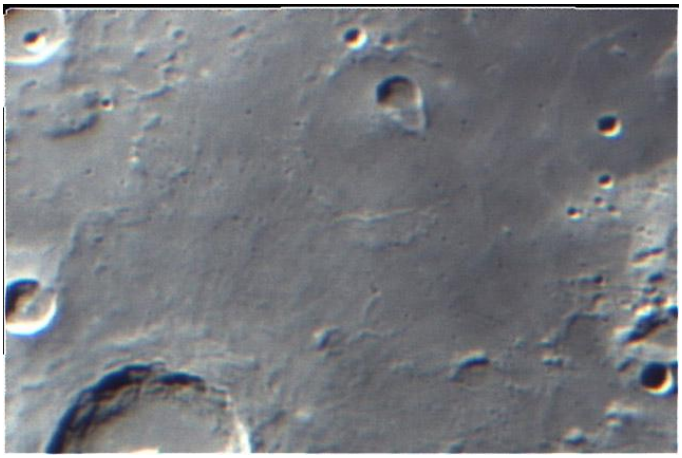
Stadius *- Jay Albert, Lake Worth, Florida USA. September 3, 2014 01:47 UT. C-11 SCT, NexImage 5.*



Stadius-full sun *- Jay Albert, Lake Worth, Florida USA. March 22, 2013 03:06 UT. C-11 SCT, NexImage 5.*

Maraldi D *- Jay Albert, Lake Worth, Florida USA. September 2, 2013 01:40UT. C-11 SCT, NexImage 5.*

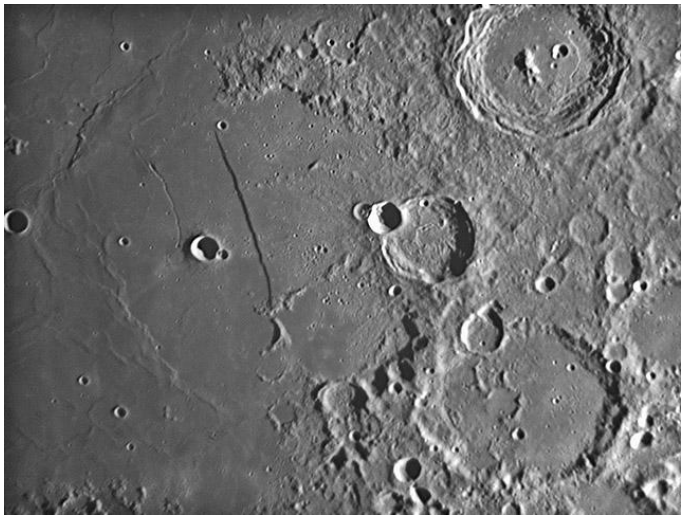
Daguerre, Torricelli R *- Jay Albert, Lake Worth, Florida USA. November 3, 2012UT. C-11 SCT, NexImage 5. Possible un-named ghost crater between Mädler and Daguerre.*



Torricelli R *- Jay Albert, Lake Worth, Florida USA. December 19, 2012 21:30 UT. C-11 SCT, NexImage 5.*

Lick, Yerkes *- Jay Albert, Lake Worth, Florida USA. August 12, 2014 04:49UT. C-11 SCT, NexImage 5.*

Rupes Recta *- Maurice Collins-Palmerston North, New Zealand. August 4, 2014 09:10 UT. C-8. The Straight Wall appears centered on a ghost crater.*

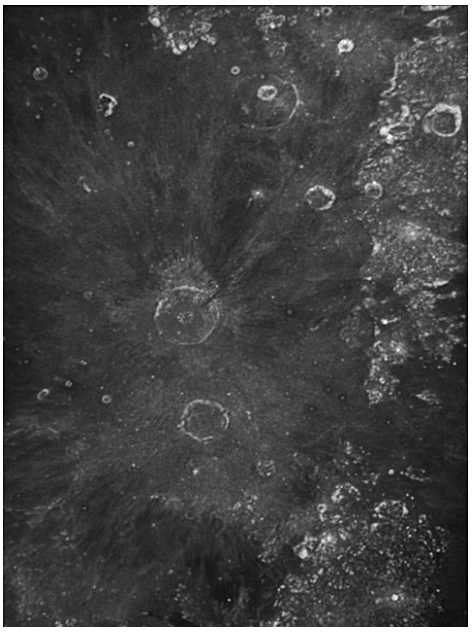


Ancient Thebit *- Howard Eskildsen-Ocala, Florida, USA. June 6, 2014 23:57 UT. Seeing 8/10, Transparency 4/6. Mewlon 250, 1.4x Barlow, DMK 41AU02.AS.*

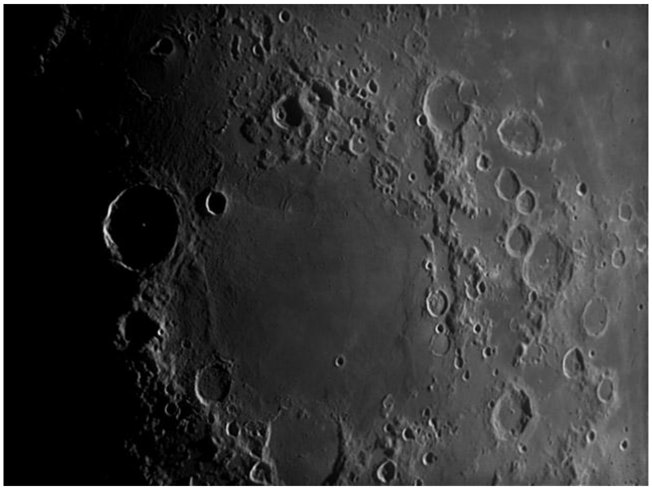
Birt and Rupes Recta lie within the ghost crater west of Thebit. It is sometimes referred to as Ancient Thebit.

Bullialdus area *- Howard Eskildsen, Tippy D'Auria-Ocala, Florida, USA. April 24, 2010 00:26 UT. Seeing 4-5/10, Transparency 3/6. Meade 14" SCT, f/10, DMK 41AU02.AS, no filter.*

Bullialdus-Capuanus area *- Howard Eskildsen, Jose Olivarez -Ocala, Florida, USA. May 29, 2004 01:08 UT. 10" f/15 refractor, Nikon Coolpix 4500.*

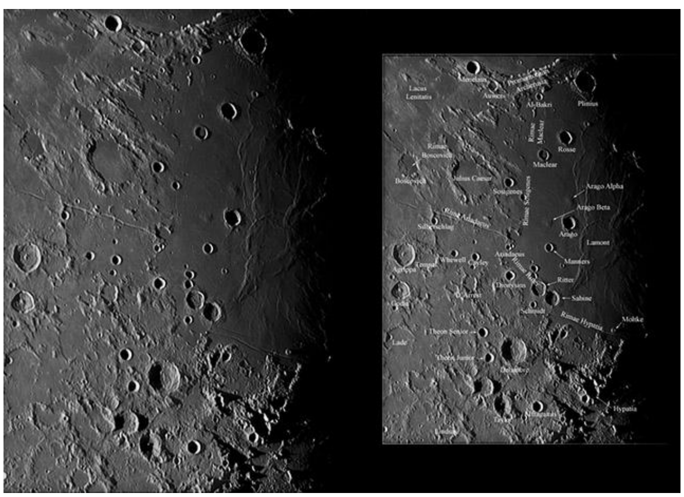


Ghost crater north of Aristillus *- Howard Eskildsen -Ocala, Florida, USA. April 18, 2011 03:18UT. Seeing 7/10, Transparency 5/6. 6" refractor, Explore Scientific Lens, f/8, 3x barlow, DMK 41AU02.AS, IR block & V block filters.*

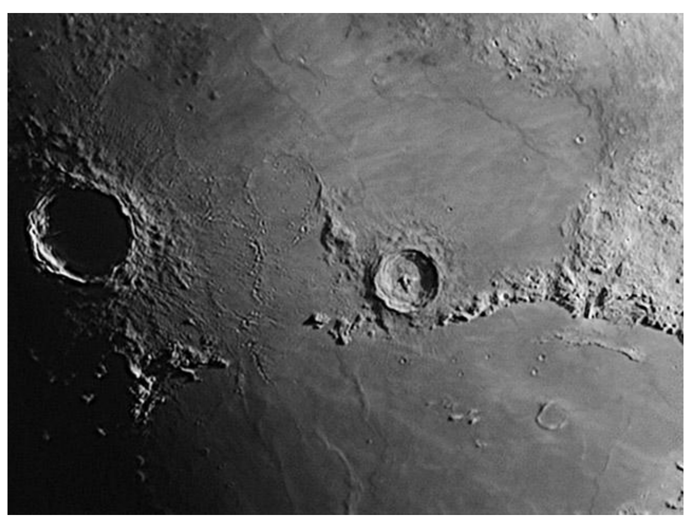


Daguerre-Fracastorius - *Howard Eskildsen -Ocala, Florida, USA. January 29, 2012 00:57UT. Seeing 7/10, Transparency 4/6. 6" refractor, Explore Scientific Lens, f/8, 2x barlow, DMK 41AU02.AS, no filter.*

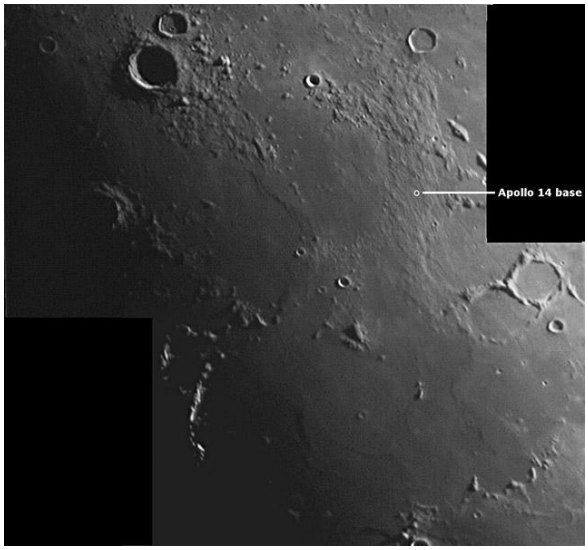
Daguerre-Fracastorius - *Howard Eskildsen -Ocala, Florida, USA. January 31, 2012 00:27UT. Seeing 8/10, Transparency 5/6. 6" refractor, Explore Scientific Lens, f/8, 2x barlow, DMK 41AU02.AS, IR & V block filters.*



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



Stadius – *Richard Hill – Tucson, Arizona, USA October 3, 2014 03:48 UT. Seeing 8/10. C5, 2.5x powermate, f/25, Skyris 445M. 656.3 nm filter.*

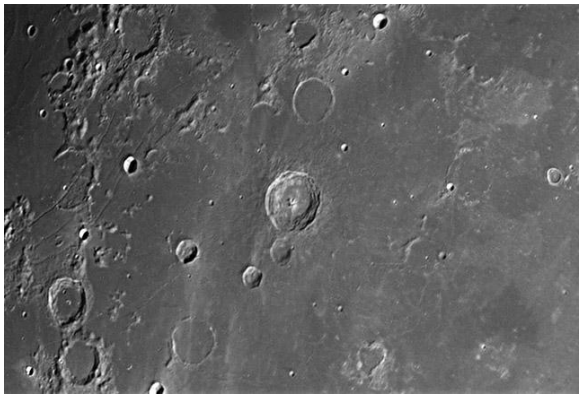


Fra Mauro area *– Richard Hill – Tucson, Arizona, USA May 9, 2014 03:59 UT. Seeing 8/10. TEC 8 Mak-Cas", f/20, Skyris 445M.*

This is the region from Reinhold (just south of Copernicus) to Mons Moro including the Apollo 14 base where Antares landed on Feb. 5, 1971. You may recall this mission for Alan Shepard's famous Tee Time when with an improvised 6 iron he drove a couple golf balls a few hundred yards.

In this image we have Reinhold at top filled with shadow catching the early rays of morning sunlight on it's interior walls. The crater in the top right corner is Gambart and if you're sharp eyed you spot some a couple domes in the area. Most of them are north of this image.

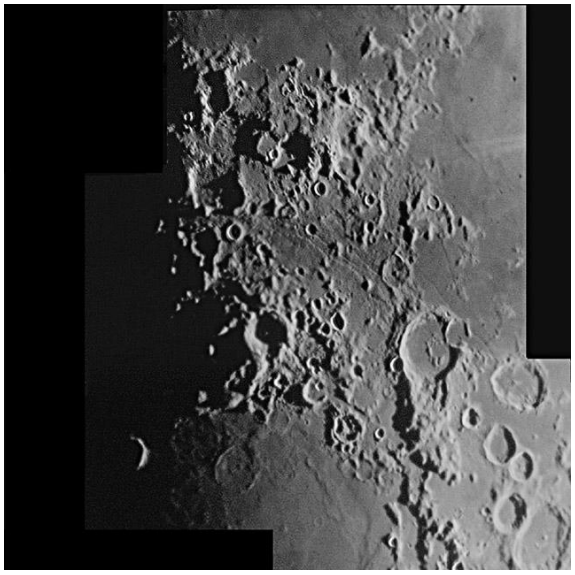
Apollo 14 base is marked on the image just north of Fra Mauro. Below that are the two craters Bonpland (left) and Parry (right). I particularly like that V-shaped mountainous feature in the middle of the image named Bonpland L. Note the rima that comes off the northernmost point. Below this feature is Mare Cognitum with Mon Maro at the bottom. On the left bottom edge of the image we see the Montes Riphaeus in sunrise.



Bullialdus area *– Richard Hill – Tucson, Arizona, USA October 26, 2012 04:02 UT. Seeing 8/10. TEC 8 Mak-Cas", f/20, Skyris 445M, 656.4nm filter.*

Here is Bullialdus sitting in the middle of a crater graveyard. Every morphology of ancient weathered crater exists in this image. From Kies, at the very bottom, to Lubiniezky above Bullialdus we see the tips of the old rims showing above Mare Nubium. Gould and Opelt, off to the right, are even more fragmentary as mountainous arc islands on the Mare. Below Bullialdus and to the right is the horseshoe shaped Wolf. This crater really changes its appearance with the changes in lighting during the lunar day. Between Wolf and Bullialdus is one crater filled with mare material, Wolf T, like a small Wargentin. Between Gould and Opelt there appears to be the fragmentary portions of yet another crater wall now all but buried.

There are some other features I like too. To the left of Bullialdus the Rimae Hippalus can be seen catching the first rays of the sun and if you are sharp eyed you can see Rima Agatharchides. just above them.



Capella area *– Richard Hill – Tucson, Arizona, USA October 20, 2012 01:21 UT. Seeing 8/10. TEC 8 Mak-Cas", f/20, Skyris 445M, 656.4nm filter.*

The crater in the center of this image, with the central peak just catching the first ray of sunlight, is Capella, located just north of Mare Nectaris seen at the bottom of this image. It looks to be a well defined crater here but under higher sunlight you can see the eroded walls and terraces of this 48km diameter crater. Note Vallis Capella, the scar that runs diagonally from the lower right to the upper right through the crater Capella. It too is more obvious with lighting about a day after this time. Directly below Capella is the ghost crater Daguerre with some small domes around it. To the left is another crater with one wall catching the morning sun. This crater is Madler, named after the 19th century selenographer.

To the right of Capella is a pear-shaped crater (actually two merged craters) named Gutenberg. You will see Rimae Goclenius to the right of the crater trailing off to the upper left, with the crater Goclenius a little further right and below. To the upper right from Capella are the quasi-parallel Rimae Gutenberg. These are only about 1.5-2 km wide and run for over 200 km. At the northern end of these cracks is a nice little plateau between Censorinus D and U.

Lastly, notice the two bright streaks coming in from the right in the upper right of this image. That's the twin tails of Messier and Messier A.

Isidorus, Capella, Gutenberg *– Paolo Lazzarotti – Maaciano (GR), Tuscany, Italy. August 18, 2011 01:54 UT. Seeing 6-7/10, Transparency 4/5. Gladius XLI 400mm Cassegrain f/16, 2x barlow, 0.107 "/px. Experimental Sony ICX285 camera, Baader R filter.*
http://www.lazzarotti-hires.com/wp/wp-content/uploads/2014/09/isidorus-capella-gutenberg20110818_0154_lazz.jpg

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LUNAR TRANSIENT PHENOMENA

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LTP NEWSLETTER – NOVEMBER 2014

Dr. Anthony Cook - Coordinator

Observations from the following observers were received in September: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Censorinus, Eratosthenes, Gassendi, Lalande, Manilius, Mons Piton, Pallas, the SE limb, Torricelli B, and Vendelinus. Maurice Collins (New Zealand - ALPO) imaged: Aristarchus, Hevelius, Humboldt, Mare Crisium, Mare Humorum, Schickard, Mare Smythii, Tycho, Wargentin, and obtained image mosaics of the whole lunar disk. Marie Cook (Mundesley, UK - BAA) observed Aristarchus and Plato. Brendan Shaw (UK – BAA) imaged: Mons Piton. Thiery Speth (France) imaged: Aristarchus, Gassendi, Macrobius, Picard, and Polybius. Franco Taccogna (Italy – UAI) imaged: Aristarchus, Gassendi, Plato, and Promontorium Laplace.

News: A rather interesting paper has been published in Nature (Geoscience – Letters) and is entitled: "*Evidence for Basaltic Volcanism on the Moon within the past 100 million years*". The authors come from Universities in Arizona, USA, and Munster in Germany, and some are veterans of past lunar and planetary space probes, and are currently involved heavily in data analysis of NASA's Lunar Reconnaissance Orbiter imagery. To sum up, they have completely over turned the decades old notion that mare lava flow volcanism effectively ended on the Moon 3.9 to 3.3 billion years ago (though some evidence suggested the last throws were as late as 2.9 b.y.). Admittedly, there have been some examples of more recent impact melt ejecta volcanism, but these had a clear exogenic origin - not produced internally by the Moon. The authors studied the density of craters on the floors of some 70 surface anomalies of "Irregular Mare Patches" (IMPs), similar to the Ina formation – see Fig 1 (left). Crater densities, like tree rings, can be used to date the age of the surface – the more craters visible, the longer the surface has been exposed, and the older it is. What they found was that for these 70 areas (there may be others elsewhere, not found yet for this study) was that the IMPs were younger than 100 million years old. This might sound a long time, after all 100 million years ago was the dinosaur era, but in terms of the geological history of the Moon, they are "very recent", If you read the LROC web page (http://lroc.sese.asu.edu/posts/818), it says that the Ina formation, may be as young as 33 million years, and this suggests that parts of the Moon, deep below the surface: to the interior, could still be hot enough to induce surface volcanism (lava and other forms) today!

Now the paper makes no mention of LTP, though it does refer to the Shultz paper on an out gassing origin for Ina, and as far as I am aware no one has shown any examples of active volcanism in spacecraft imagery, lunar exospheric gas measurements, or thermal maps of the surface. Therefore we cannot use this paper to link LTP to the newly discovered IMPs (even though three are in the Aristarchus-Prinz area), but it does shoot a hole in arguments by LTP critics, who will often say that LTPs do not exist because the Moon is "Geologically Dead". The above paper about IMPs, and an earlier one on lobate scarps, – show that the Moon may not be not geologically dead after all.

Prof Arlin Crotts' book "*The New Moon: Water, Exploration, and Future Habitation*" has now been published by Cambridge University Press. I am presently reading through it and will give you a review at later date. But is definitely has a chapter on LTP and a really good set of references about many historic observations. If you like reading about the history of unmanned and manned exploration, the US government's space policy (or present lack of), then this could make a good present for holidays coming up at the end of December?

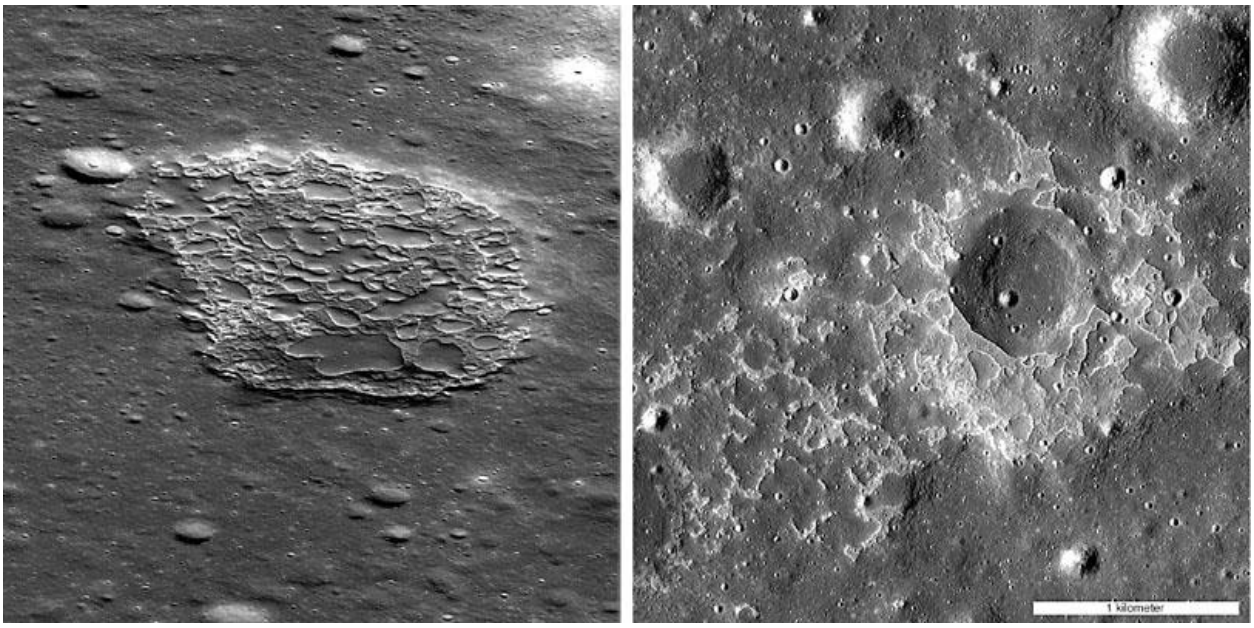

Figure 1. *The following two images have come off of the NASA LROC website: http://lroc.sese.asu.edu/posts/818* ***(Left)*** *An oblique view of the Ina formation, known about since Apollo days.* ***(Right)*** *Young volcanic deposit discovered near (33.75°E, 4.33°N) the crater Maskelyne.*

For those of you using the Amateur Astronomy Outreach website, to upload observations of repeat illumination observations onto, there was an outage between Oct 6-11, when the system may have failed to record uploaded observations properly. I have tried to contact all observers who may have logged in over this time, but if you do not see your observations listed in this, or next month's newsletter, please let me know.

LTP Reports: No LTP reports were received in September.

Routine Reports: Below is a selection of reports received for September that can help to re-assess some past LTP observations. As you will see in some cases, analysis of repeat illumination observations help to lower the weights of some past LTPs, but in other cases I have used present day repeat illumination observations to check up on earlier past repeat illumination observations, or had to dig deeper into the archives, in order to pull out more information than is given in the summaries in the Cameron catalogues.

Gassendi: On 2014 Sep 05 UT 18:27-21:30 Franco Taccogna (UAI) observed this crater under similar illumination to J-Hedley Robinson's LTP in Gassendi from 1976 Oct 04 as described below:

> *Gassendi 1976 Oct 04 UT 20:55-20:58 Observed by Robinson (Devon, England) - observer noted that the east outside wall was bright in red and normal in blue. Note that the Moon was 30 deg above the horizon at the time of the observation. The crater returned to normal at 20:58. Also seen by Moore (Selsey, UK) and Foley (Kent, UK). At 21:25-21:50 D. Sims (Dawlish, UK, 25cm reflector, x300, seeing IV and some cloud at times) noticed a possible obscuration over the southern part of Gassendi. He had been observing earlier at 18:40-19:30 but had not detected a LTP in Gassendi then. 22:11UT Robinson notices that the spot outside the east wall is again bright in red., though by 22:25 it had faded and was gone by 22:28UT. The Cameron 1978 catalog further quotes: "Vivid red spots & general red color seen around rim by 2 obs. At 2209h blood red small area was seen. 1h later the most westerly (IAU?) of the peaks had become hazy white all other areas were sharp. (Indep. confirm.)." Cameron 1978 catalog weight=5 and catalog ID #1454. The ALPO/BAA weight=4.*

Franco obtained color images periodically during his observing run on the night of 2014 Sep 05, and the centre image in Fig. 2 is typical of these in terms of detail visible. I have included a couple of the sketches made in 1976 in order to show the location of the reported colors seen. On none of Franco's images are there colors of the sorts seen back in 1976 – so something interesting must have been happening in 1976, and it was not entirely spectral dispersion in nature as the colors came and went. However, despite the Cameron catalog inferring agreement between the reports by different observers, having looked through the archive material (too

much to show here), I see less agreement, and so will lower the ALPO/BAA weight from 4 to 3.

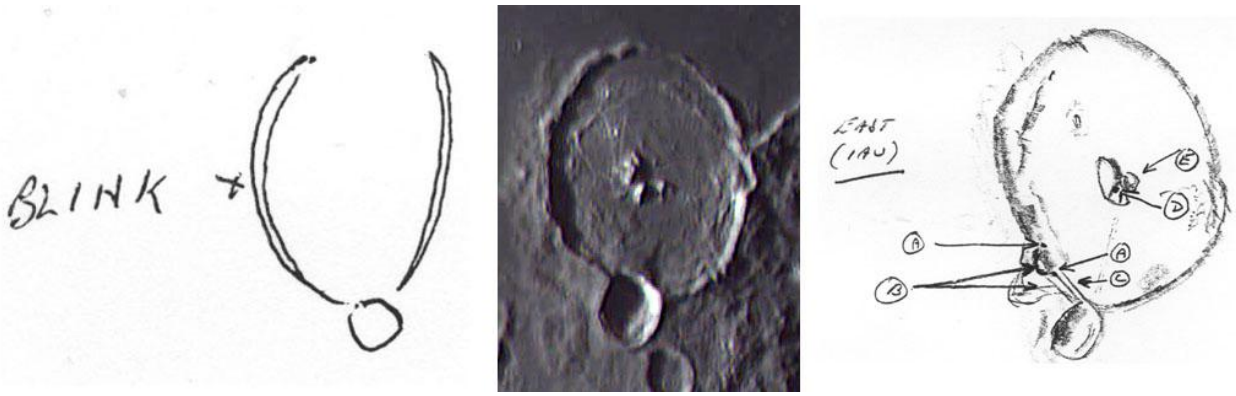

Figure 2. *The above images/sketches of Gassendi are orientated with north towards the bottom to preserve writing orientation.* ***(Left)*** *Sketch by J-Hedley Robinson from 1976 Oct 04 UT 20:56-20:58.* ***(Centre)*** *2014 Sep 05 UT 19:24 color image by Franco Taccogna (UAI).* ***(Right)*** *Sketch by Peter Foley from 1976 Oct 04 to illustrate the LTP events he saw between ~21:00-01:35 UT, where A/B=red glows, C=dirty mustard color intermingled with violet, D=small dense red spot, E=possible obscuration – note that events in these lettered areas were not visible continuously, nor at the same time during the night.*

Aristarchus: On 2014 Sep 06 UT 22:04-22:10 Thiery Speth, observed this crater under the same illumination conditions (to within +/-0.5°) to two past LTP reports:

Cobra Head 1967 Mar 23 UT 18:40-20:47 Observed by Sartory, Moore, Moseley (Farnham, England, 15" reflector (Sartory) seeing very poor & 10" refractor in Armagh, N. Ireland (Moore & Moseley) 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. 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. NASA catalog ID #1021. ALPO/BAA weight=3.

Aristarchus 1978 May 19 UT 22:45-23:50 P. Foley of Kent, UK, using a 12" reflector, seeing=III-II, noticed that initially 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.

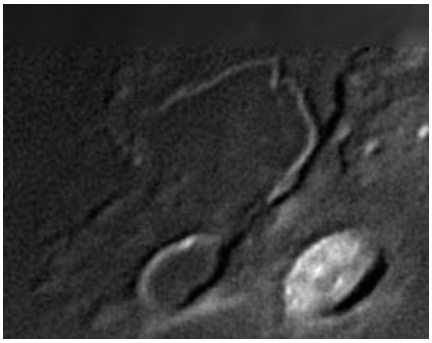

Figure 3. *Aristarchus by Thierry Speth, with north towards the top, taken on 2014 Sep 06 UT 22:10.*

Thierry's image, shown in Fig 3., is in monochrome, but at least gives us some idea of the general appearance of Aristarchus and Vallis Schroteri. There is a smooth area on the floor, which might correspond to Peter Foley's "slate blue-gray" area? It is uncertain which spot on the south east might relate the green spot seen by Foley, but at least we have a choice now. The crater does not appear bright at this stage in the illumination –

which is at odds with what Foley describes. At least with this monochrome image we will be able to simulate spectral dispersion effects to see if these could account for some of the colors seen in 1967 and 1978. I will leave the ALPO/BAA weight at 3 for these two LTPs, but would encourage color repeat illumination observations of this crater in future.

Plato: On 2014 Sep 07 UT 20:30-20:40 Marie Cook (90mm Questar scope, x80 to x130, Seeing III, sky conditions, rather hazy) observed this crater under the same illumination, and topographic libration conditions (to within +/-1°) to a 1981 LTP report by Amery:

> *Plato 1981 Jun 15 UT 21:30 Observed by Amery (Reading, England, 25cm reflector, seeing Antoniadi IV-V) At the 4 O'Clock position on the North West corner?, there was a dark smudge which reached from the floor across and over the wall and onto the terrain outside the crater. Amery comments that it was a rather obvious effect, even under the poorer moments of seeing. Foley, alerted by Amery, saw a dark like patch in the crater's north west corner, again lying across the rim. 2006 Cameron catalog extension ID=148 and weight=4. Foley used a 12" reflector and seeing was III-V. ALPO/BAA weight=4.*

Marie saw, during moments of clearer seeing, that there was no dark smudge/patch seen on the floor of Plato. The floor surface looked normal, and the walls showed no dark mark either to the north west, or on any other area of the wall. This is at odds with the Amery description, and even with others below – however her atmospheric transparency conditions were really quite poor, which may have lowered the image contrast, making it difficult to see even the dark mark on the NW wall? I checked some past repeat illumination observations – on 2013 Jun 06 UT 02:02-02:25 Jay Albert saw a dark smudge on the NW wall of Plato, but not extending onto the floor or extending over the rim outer wall. There have been lots of other images and sketches too at similar illumination, take for instance plate 6B from the Hatfield Lunar Atlas shown in Fig 4 (Left). - I have placed this next to Geoff Amery's sketch in Fig 4 (Right). The Hatfield plate clearly shows that there is a smudge on the north west rim, but it does not extend onto the floor, or over the rim, unlike what Amery describes. The LTP reports describes Amery's observation as being confirmed by Foley, however I have unearthed a report by Patrick Moore, made at 21:38 and 23:05 UT stating that nothing unusual was seen – however despite using his 15" reflector, his seeing was very poor – so that there is some doubt whether he would have been able to have made an objective observation. Presently the ALPO/BAA weight is at 4 for the Amery LTP. However the Moore observation may make a dent in the evidence – remember that Amery's seeing was IV-V, and Foley's was III-V – these are non-ideal conditions for confirming a LTP. I will therefore lower the weight to 3 to reflect this as Amery says that he could still see it under V conditions, and Moore was experiencing V seeing too, but makes no mention of the smudge effect?

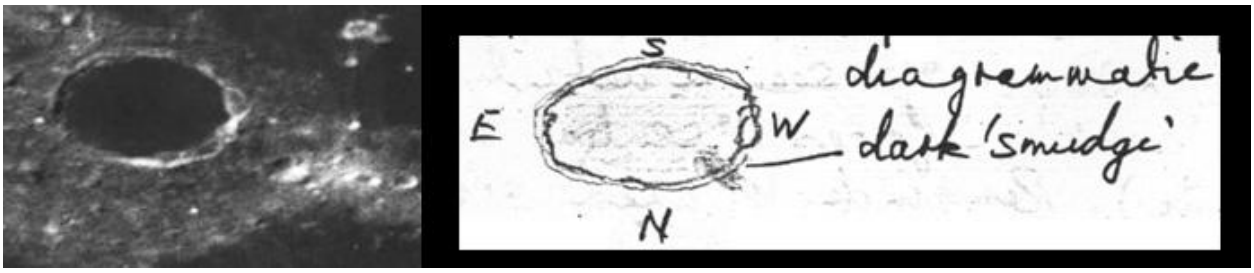

Figure 4. *The following images are orientated with north towards the bottom to preserve writing orientation.* ***(Left)*** *Extract from Plate 6B of the Hatfield Lunar Atlas, by Anthony Cook, Springer © 2012 – taken on 1966 Dec 25 UT 20:40 by Commander Henry Hatfield.* ***(Right)*** *sketch by Geoff Amery from 1981 Jun 15 UT 21:30.*

Vendelinus: On 2014 Sep 11 UT 04:30-04:40 Jay Albert (ALPO) observed this crater under the same illumination conditions, to within +/-0.5°, to the following LTP report which comes from p121 of: "The Moon and the Planets: A Catalogue of Astronomical Anomalies", compiled by W.R. Corliss.

> *In 1891 Dec 17 UT 21:15 T.G. Elger observed an obvious cleft on the northern wall of Vendelinus. However a search in 1954, using the Mount Wilson 60" telescope could not find this cleft. See Sky and telescope, 1955 Apr, p254. The ALPO/BAA weight=2.*

Jay was using an 8" SCT scope, transparency was magnitude 2 and seeing was quite good at 8 out of 10.

He could not see the reported cleft in the north wall, but did see a small ridge extending south from the craterlet labeled K, to a shadow filled craterlet close to the edge of the north wall. He also saw a thin shadow line behind the northern end of the ridge. Jay comments that if he had observed Vendelinus later, the shadow might have extended further south and appeared like a cleft perhaps? Jay's report got me interested in the original LTP, especially as Elger was a renowned selenographer from the Victorian era. I looked up the Sky and telescope article, that Corliss mentions, and find that it was not Elger who said that the cleft (See Fig 5. (Left)) he saw was unusual, but our old friend Percy Wilkins, who in a 1954 edition of the British Interplanetary Society Journal discusses when he failed to detect Elger's cleft using the 60" Mt Wilson reflector, and hence made the reasonable (at that time, using such a large scope) assumption that a change had taken place on the Moon sometime between 1891 and 1954.

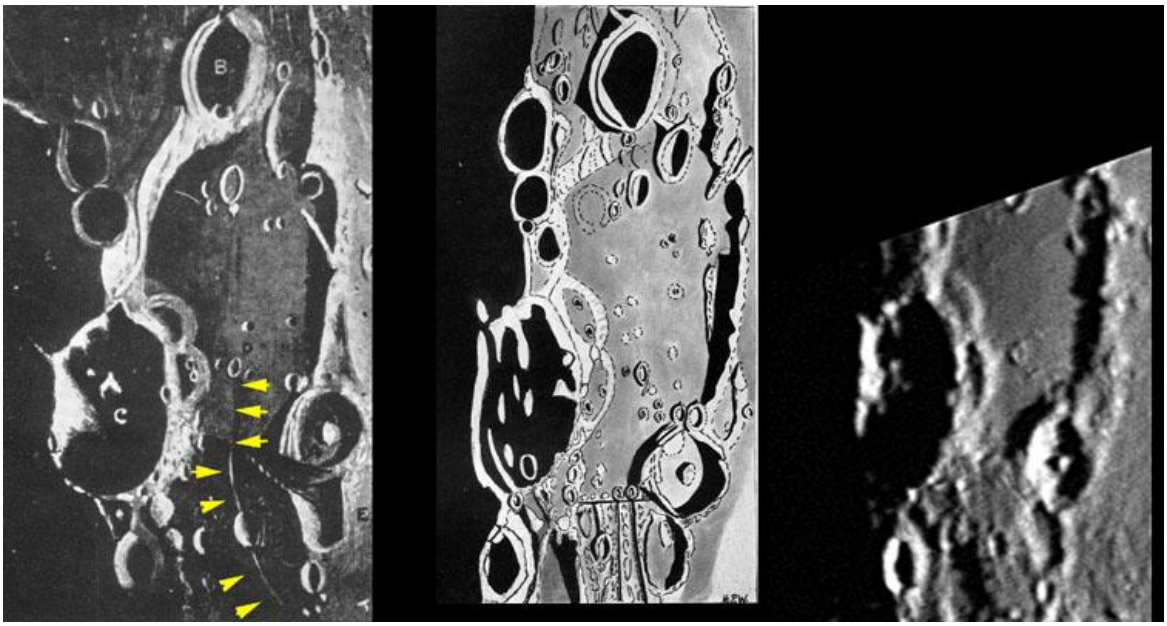

Figure 5. *Vendelinus Crater orientated with north towards the bottom in order to preserve the annotations in the two sketches.* ***(Left)*** *Sketch by Elger from 1891 Dec 17 UT 21:00-21:30 (Col. 113.7°-114.0°) – note that the cleft that Elger spotted has been highlighted with arrows – the crater that he labels as "c" is called Lame,* ***(Centre)*** *Sketch by Wilkins from 1952 Dec 03 UT 22:15-23:00 (Col. 114.0°-114.4°) not showing the Elger cleft.* ***(Right)*** *Image from Maurice Collins from 2014 May 16 UT 09:22 (Col. 114.3°).*

Now what do other repeat illumination observations, that we have collected in the ALPO/BAA archives, tell us? Fig 5 shows some examples, and have been sorted by increasing selenographic colongitude. I have excluded some examples by Moseley, Speth, Hill, and Wheatley, as these all have later colongitudes, and do not show the so called cleft very well. Fig 5 (centre) is a sketch by Wilkins, which although was not made with a 60" telescope, surprisingly does not show the "cleft". Fig 5 (right) by Maurice Collins does show the northern half of the so called "cleft", and the southern half is just perhaps visible as a shaded slope on the floor of Vendelinus leading upto what Elger designates as crater D, but which the IAU calls Vendelinus H. Harold Hill, on p219 of A Portfolio of Lunar Drawings, mentions the "cleft-like" feature was depicted by Maw, Goodacre, and Wilkins (early on), but Barker, and Moore, and later Wilkins too, apparently denied its existence, hence suspected some change. Harold Hill then goes onto say that the issue of the cleft-like feature was settled by Thornton, and Haas, both using 18" refractors, and both saw it was there. But he also says that he has never seen any sign of the rille at favorable opportunities, though he does suggest a graben feature instead of a rille. It is quite possible that the range in colongitudes to see this "cleft-like" effect is so narrow (perhaps only a few minutes of time), that this is why many have not seen it, and it requires very good observing conditions, or a large scope. Jay Albert was probably correct in saying that if he had been able to observe a little later, that he may have seen the "cleft" – Jay was observing at a colongitude range of 113.5°-113.6°, just before Elger (Fig 5

(Left)) in terms of colongitude. Another interesting point to note is that if you look at the centre image in Fig 5, some of the shadows look less than they do in Maurice's image to the right – for example there are several pieces of terrain making it into sunlight in the crater Lame in Wilkins' sketch that do not show up in Elger's, or Maurice Collins', sketch. Could Wilkins have written down the wrong time? However some of the shadows also look longer in a few craters than they should, in his sketch – it is all rather confusing, plus the fact that there is actually a very short section of "cleft" that Wilkins does appear to depict. I have decided to declare this not to be a LTP any longer by giving it a weight of 0!

Mons Piton: On 2014 Sep 14 UT 00:43-00:48 Brendan Shaw (BAA) imaged Mons Piton (Fig 6) under the same illumination conditions to the Louderback LTP report below:

> *On 1991 Jul 31 at UT 07:50 D. Louderback (South Bend, WA, USA, 3" refractor) found that all of Mons Piton was "unusually dark". Points D, C (E and S resp), usually brightest points, but this time were not bright. "Whole mt was as dark as W wall usually is at this time. In violet filter Piton disappeared completely, but was a little brighter in red filter and points D & G showed. Color not seen by eye. No albedo measured. Suggests red event." Cameron rules out chromatic aberration from Louderback's refractor. The Cameron 2006 catalog ID=431 and the weight=3. The ALPO/BAA weight=2.*

Fig 6 is a three color composite of the Mons Piton area made using images by Brendan Shaw. It shows that indeed Mons Piton is not very bright – so the Louderback presumption that this was unusual is clearly not the case. However there is no obvious color on Mons Piton, so the color that Louderback reports remains a mystery. Cameron has already said that she had ruled out chromatic aberration. In view of the fact that we have demolished one of the oddities reported for this LTP, namely its brightness, the associated LTP weight will be reduced from 2 to a 1.

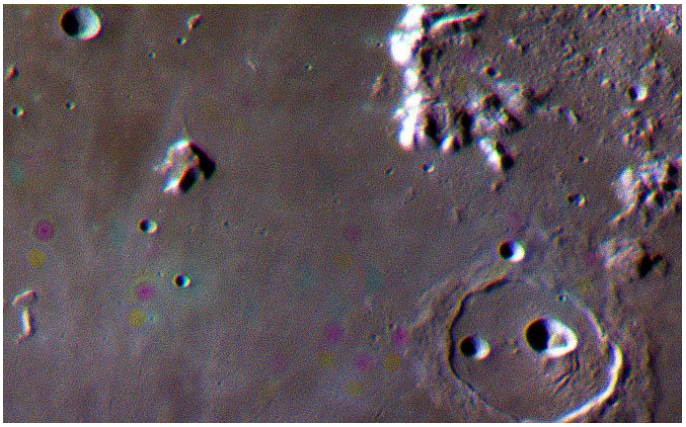

Figure 6. *Color composite of the Mons Piton area (Red=IR filter, Green=R filter, B=blue filter) with north towards the top. Note that the magenta, yellow, and cyan blobs are dust specks and should be ignored. Individual wave band images have been auto-stretched and then the result was color saturation enhanced by 60%.*

Censorinus and Messier: On 2014 Sep 30 UT 06:49-07:05 Maurice Collins (ALPO) imaged the whole lunar disk (using an ETX-90 scope) and this was at the same illumination conditions to the following two LTPs:

> *Censorinus 1959 Sep 08 UT 22:45-23:50 Observed by a friend of Nicolini (Brazil) "Much brighter than Proclus" NASA catalog weight=2 and catalog ID #721. ALPO/BAA weight=1.*

> *Messier 1981 Feb 10 UT 19:20-20:10 LTP discovered by Hedley Robinson (Devon, England) "Messier was brighter than Messier A in both red and blue filters and also appeared indistinct, later becoming invisible - lost in a bright streak. In comparison Messier A was clear. Another observer, Amery confirmed that Messier A was sharp in appearance but Messier certainly was not. Cook likewise found Messier not to be as sharp as Messier A due to a big shadow in Messier A. Pedler found that the sun facing wall of Messier was OK but that the shadow was changing from black to grey periodically at intervals of 2-3 minutes to a few seconds. By contrast he found that Messier A remained quite well defined. He tried red and blue filters but found no blink effect. At 20:23UT Pedler found that the shadow had stabilized*

to a shade of "mid grey" although remaining ill-defined. North also found that Messier A was distinct but Messier itself was ill-defined. Moore found the same thing but thinks that this is normal for Messier under this illumination to appear indistinct. Moore also saw the grey interior shadow. Price saw similar appearance to Moore and suspected that this was normal for this stage in illumination. Ratcliffe suspected everything normal - just commenting that Messier was smaller and no detail in comparison to Messier A. Madej and Taylor provided a sketch that showed again a grey interior and merging with the east wall/mare. Foley found Messier's pale grey interior to be un-focusable but in comparison Messier A was sharp. He says that he would expect a grey interior and the east wall to merge with the mare. However the complete loss of detail and variability were not normal. Cameron comments that the Kuiper atlas confirms the fuzzy indistinct appearance of Messier and that a Lunar Orbiter picture shows a grey shadow. The Cameron extended catalog weight=5. The ALPO/BAA weight=3.

Figure 7. *An image mosaic of part of the Moon with north towards the top, taken by Maurice Collins (ALPO) on 2014 Sep 30 UT 06:49-07:05. The comet-like Messier crater pair at the bottom has Messier on the right and Messier A on the left.*

The Nicolloni (friend) report that Censorinus was brighter than Proclus was made under a colongitude range of 346.4°-346.9°, and Maurice Collins' image mosaic in Fig 7. was taken over a similar colongitude range of 346.6°-346.8°. However as you can see in Maurice Collins' image, Censorinus was not much brighter than Proclus. Therefore I am increasing the ALPO/BAA weight of this Brazilian LTP report from a 1 to a 2, back to what it was in the Cameron catalog.

Maurice's' image scale for the interpretation of the 1981 Messier LTP is not optimal, but at least one can see that the shadow in Messier is not as substantial as in Messier. colongitude range 346.6-347.0. Several of the observers in 1981 considered the appearance normal, but others saw some variability (not everybody did). I will therefore lower the ALPO/BAA weight from 3 to 2 to compensate for this.

Suggested Features to observe in November: For repeat illumination (and a few repeat libration) LTP predictions for the coming month, these can be found on the following web site: http://users.aber.ac.uk/atc/tlp/tlp.htm. 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.

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, firstly read the LTP checklist on http://users.aber.ac.uk/atc/alpo/ltp.htm, and if this does not explain what you are seeing, please give me a call on my cell phone: +44 (0)798 505 5681 and I will alert other observers. Note when telephoning from outside the UK you must not use the (0). When phoning from within the UK please do not use the +44! Twitter LTP alerts can be accessed on .

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3. **Aristillus**
4. **Bullialdus**
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8. **Cuvier**
9. **Daguerre**
10. **Fra Mauro**
11. **Fracastorius**
12. **Gassendi**
13. **Hipparchus**
14. **Lamont**
15. **Lick**
16. **Maraldi**
17. **Messier**
18. **Mons Piton**
19. **Montes Causasus**
20. **Philolaus**
21. **Plato**
22. **Prinz**
23. **Stadius**
24. **Thebit**
25. **Torricelli**
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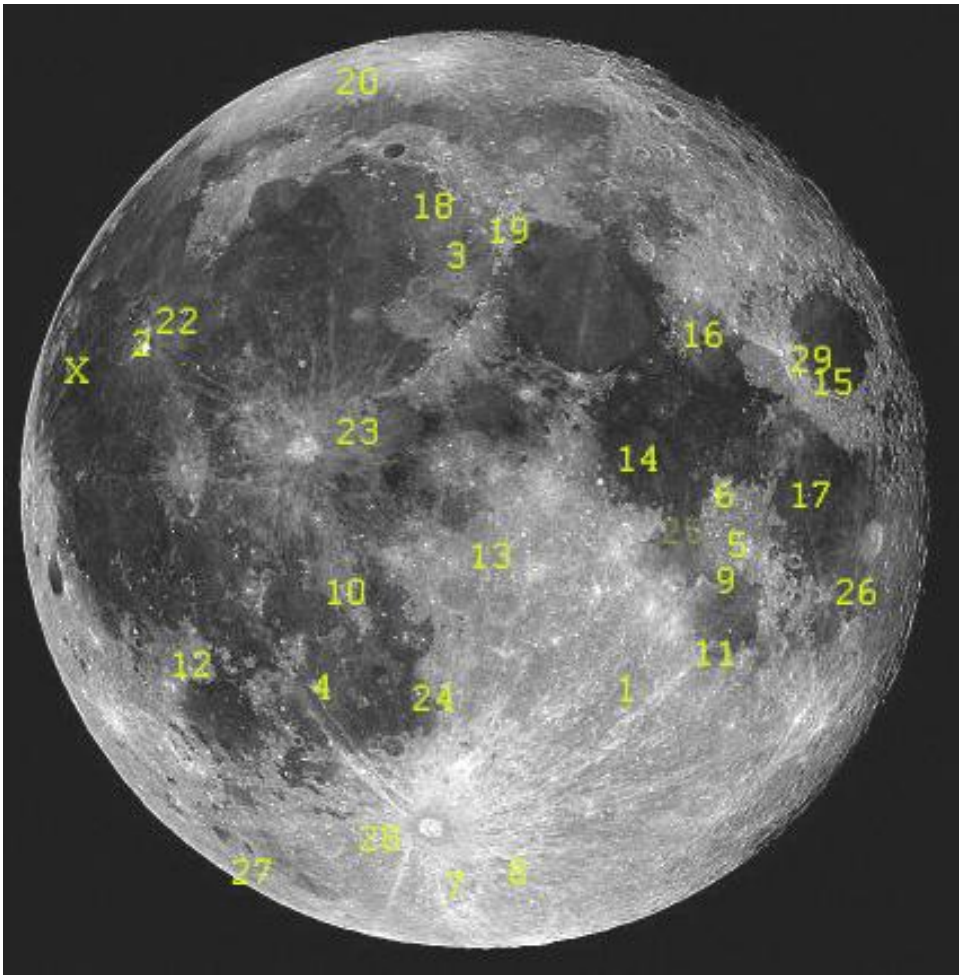
27. **Wargentin**
28. **Wilhelm**
29. **Yerkes**



FOCUS ON targets

X = Oceanus Procellarum-Reiner gamma (January)