ASSOCIATION OF LUNAR & PLANETARY OBSERVERS
ALPO
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THE LUNAR OBSERVER

A PUBLICATION OF THE LUNAR SECTION OF THE A.L.P.O.
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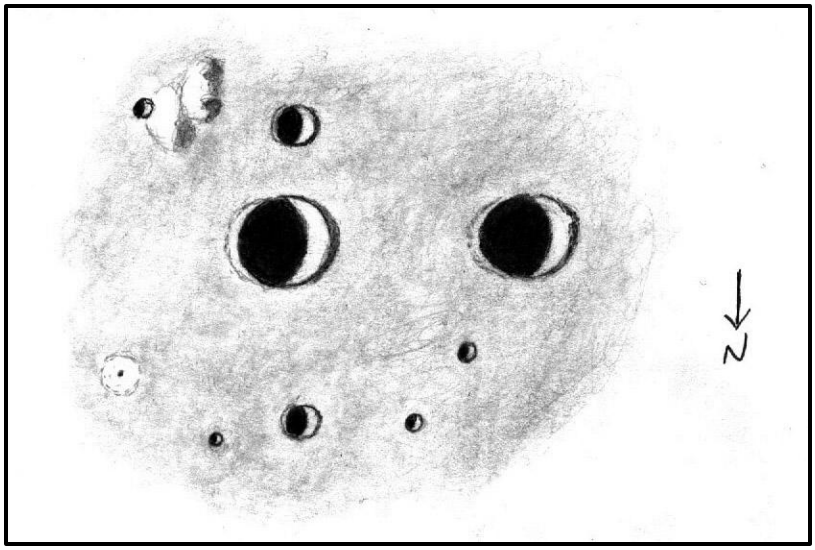
17 Autumn Lane, Sewell, NJ 08080
RECENT BACK ISSUES: http://moon.scopesandscapes.com/tlo_back.html

FEATURE OF THE MONTH – APRIL 2015

CAYLEY&WHEWELL



Sketch and text by Robert H. Hays, Jr. - Worth, Illinois, USA
December 28, 2014 23:23-23:43 UT, 15 cm refl, 170x, seeing 8-9/10

I drew these craters and nearby detail on the evening of Dec. 28/29, 2014. These are the largest of a group of craters between Mares Tranquillitatis and Vaporum near the center of the visible side. Cayley appears round and symmetrical, but Whewell to its west is slightly elongated east-west. Whewell also has a bright point protruding from its western rim, intruding into its exterior shadow. De Morgan is just south of Cayley, and is the third largest crater in this drawing. It is a smaller version of Cayley. Two irregular mounds are east of de Morgan, and the pit Dionysius B is huddled among them. The largest crater north of Cayley is Ariadaeus B. The interior of this crater is not as bright as those of the three larger craters shown here. Whewell A is the small crater northeast of Whewell, and Whewell B is northeast of A, and has the same appearance. A vague dusky patch is near Whewell B and A. The small pit east of Ariadaeus B is Ariadaeus BA. This pit is not as obvious as Whewell A and B, and is probably smaller than either of them. A modest bright spot is northeast of Cayley. A bit of shadow could be glimpsed within it, so it may be a tiny craterlet.

LUNAR CALENDAR

APRIL-MAY 2015 (UT)

2015		UT	
Apr	01	12:59	Moon Apogee: 406000 km
	04	03:17	Moon Ascending Node
	04	12:01	Lunar Eclipse
	04	12:06	Full Moon
	08	13:08	Moon-Saturn: 2.3° S
	10	07:46	Moon South Dec.: 18.2° S
	12	03:44	Last Quarter
	17	03:53	Moon Perigee: 361000 km
	17	13:07	Moon Descending Node
	18	18:57	New Moon
	21	16:35	Moon-Aldebaran: 0.9° S
	21	18:09	Moon-Venus: 6.8° N
	22	23:26	Moon North Dec.: 18.3° N
	25	23:55	First Quarter
	29	03:55	Moon Apogee: 405100 km
May	01	09:50	Moon Ascending Node
	04	03:42	Full Moon
	05	16:18	Moon-Saturn: 2.1° S
	07	13:39	Moon South Dec.: 18.3° S
	11	10:36	Last Quarter
	14	20:37	Moon Descending Node
	15	00:23	Moon Perigee: 366000 km
	18	04:13	New Moon
	20	09:41	Moon North Dec.: 18.4° N
	25	17:19	First Quarter
	26	22:12	Moon Apogee: 404200 km
	28	14:40	Moon Ascending 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.

2015 ALPO CONVENTION

The 2015 ALPO Convention will be held in Las Cruces, NM Monday –Saturday, July 6-11, 2015.in conjunction with the Astronomical League's ALCON2015. Details will be available in the next issue of the Journal of the ALPO. Registration, schedule and accomodation information is available on the ALCON2015 website (alcon2015.astroleague.org). Las Cruces is the home of Walter Haas, the ALPO's founder.

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: Rimae Sirsalis

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 **May 2015** edition will be **Rimae Sirsalis.** 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 Rimae Sirsalis article is April 20, 2015

FUTURE FOCUS ON ARTICLES:

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

Subject	TLO Issue	Deadline

BEHEMOTH OF THE GIBBOUS MOON

Richard Hill

As the moon approaches full the terminator seems to offer less than it did when we were at a perpendicular sun angle. But there are still many treats in store. Figure 1 shows some of them. i was cleaning out some files from a couple years ago and ran across this one

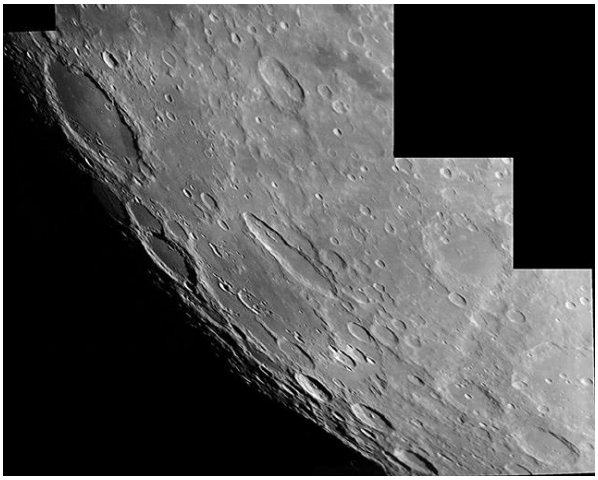


Figure 1. Shickard to Scheiner. *Richard Hill – Tucson, Arizona, USA October 17, 2013 02:25 UT. Seeing 8/10. TEC 8" f/20 MAK-CASS, SKYRIS 445M. 656.3 nm filter.*

The "behemoth" is in the upper left corner of this image, the 233km diameter Schickard. Note the interesting discoloration on the southern floor of this crater. Just above it is what appears to be a dome. Just below is Nasmyth and Phoclydes with Wargentin still largely in shadow to the left.

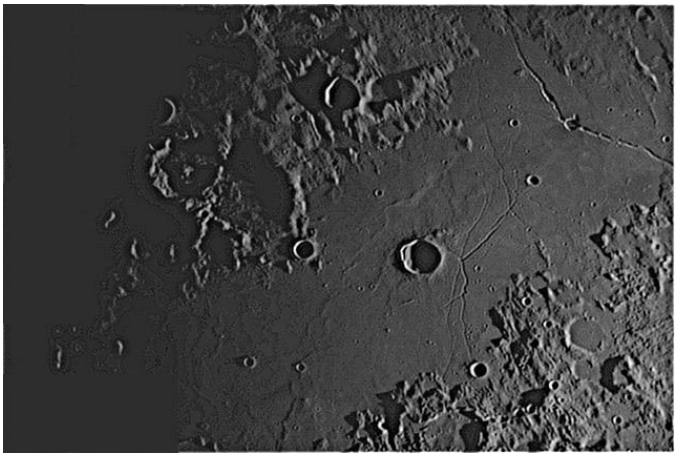
In the middle of this image is a footprint, Schiller, the result of several merged craters with an odd ridge of central mountains in the north end. Another smaller "footprint" is right above. This is Hainzel which owes it's appearance to a similar merging of several craters. Look for the large shallow depression to the south of Hainzel. This is the remnant of the much older 136 km diameter Mee crater, possibly as old as 4.6 billion years. On the other side of Hainzel is Lacus Timoris an oddly shaped dark region with what looks like a cat's head on the northern end.

The three roughly 70 km diameter craters on the terminator at the bottom of this image are in order from north to south, Zucchius, Bettinus and Kircher all about the same age as Schiller or "Nectarian" or approximately 3.9 billion years old. To the right of these is the 114km diamer crater Scheiner with a central craterlet. Lastly, below Scheiner is Blancanus at 109 km diameter. Believe it or not the well preserved Scheiner is older than all the craters but Mee! That's a bit surprising considering that the huge Clavius is just to the right of it.

Can you find Longomontanus here, under high sun?

DOS EQUIS

Richard Hill



So much of the moon has been imaged and seen that some think there is nothing new to see. Most lunar observers know about the "X" near Apianis. So imagine how surprised I was when imaging Triesnecker (fig. 1) the other night and I look up to the laptop monitor and

Figure 1. Triesnecker X *Richard Hill – Tucson, Arizona, USA. March 28, 2053 02:01 UT. Seeing 9/10. TEC 8" f/20 MAK-CASS, SKYRIS 445M. 656.3 nm filter.*

and see a clear "X" that I had never heard about. You can see Triesnecker and its famous system of rimae in the center. Off to the upper right is Hyginus and it's rima. But look to the left of Triesnecker and Chladni and you'll see there is a clear X with a crater at the vertex. In the two upper arms of the "X" is nestled the ruined crater Pallas. In total shadow between Pallas and Chladni is Murchison

Down below Triesnecker and extending to the left is Sinus Medii in the middle of that expanse is the 7km crater Bruce and the 5km. It's funny how these two craters are named while the a much larger crater on the right side of Sinus Medii straight to the right from Bruce and Blagg is only know as Rhaeticus A. It's just not fair.

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Where the Eagle landed

Richard Hill

Well, I probably don't need to say much about this image (fig. 1). Way over on the upper left edge just below the label is the largely ruined crater D'arrest. Below it is a much younger crater Theon Senior. The northern wall of Delambre is a little further south. The two large (31km) twin craters just left of center are Sabine (south) and Ritter (north). North of center is the very interesting crater Arago. Slumping of the walls have given this crater its distinctive look.

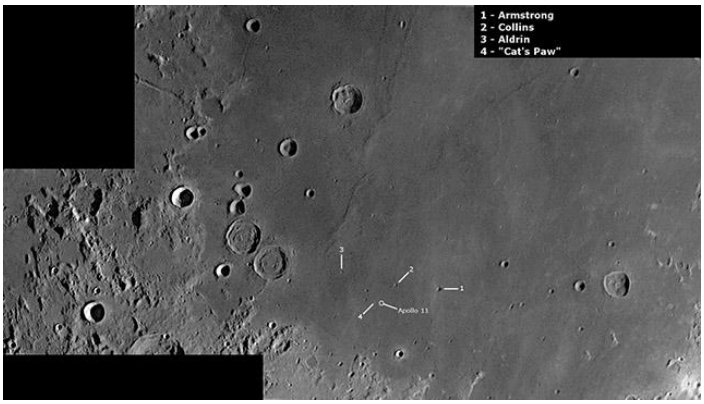

Figure 1. Apollo 11 Landing Site. *Richard Hill – Tucson, Arizona, USA February 26, 2015 02:44UT. Seeing 8/10. TEC 8" f/20 MAK-CASS, SKYRIS 445M. 656.3 nm filter.*

On the right side of this image is the crater Maskelyne. If you have this plus Sabine and Ritter in the field of view you are staring right at the Apollo 11 (Eagle) landing site "Tranquility Base". Have you ever looked at it in the eyepiece. Most of the time it's hard to just see Armstrong, Collins and Aldrin. On an excellent night with something over 8" aperture, you might even make out the Cat's Paw. A curious cluster of what are probably secondary craters. If you can resolve these you'll see lots of weird shaped depressions in that mare.

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

MAURICE COLLINS - PALMERSTON NORTH, NEW ZEALAND. Digital images of 4, 7, 10(4), 12 & 14 day Moon, Altai Scarp, Aristarchus(3), Gassendi, Langrenus, Mare Humboldtianum, Mare Orientale, Mare Crisium, Mare Smythii, Marius, Schickard, Sinus Iridum, Sinus Roris & Tycho(3).

RICHARD HILL – TUCSON, ARIZONA, USA. Digital images of Mare Tranquilitatis-Apollo 11, Fracastorius, Maurolycus, Rima Ariadaeus, Schickard & Triesnecker.

PAOLO LAZZAROTTI – MASSA, ITALY. Digital image of Theophilus-Fracastorius

STEVE TZIKAS-RESTON, VIRGINIA, USA. Drawings of Gassendi & Montes Jura..

ALEXANDER VANDENBOHEDE-ASSEBROEK, BELGIUM. Digital images of Copernicus-Aristarchus, Godin, Mare Humboldtianum & Mare Humorum.

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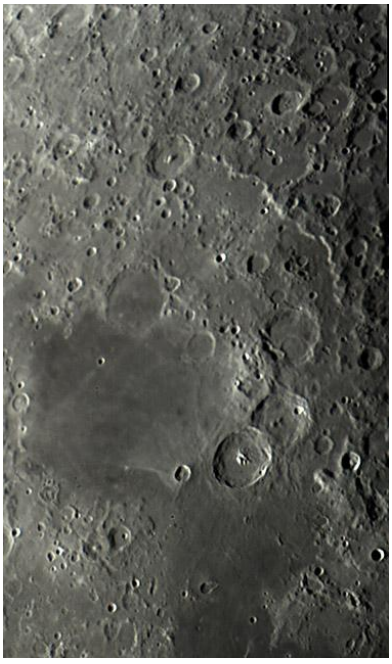
RECENT TOPOGRAPHICAL OBSERVATIONS



ALTAI SCARP - Maurice Collins, Palmerston North, New Zealand. March 27, 2015 07:23 UT. Seeing A-IV, FLT-110 APO, f/21, Refrac.

RECENT TOPOGRAPHICAL OBSERVATIONS

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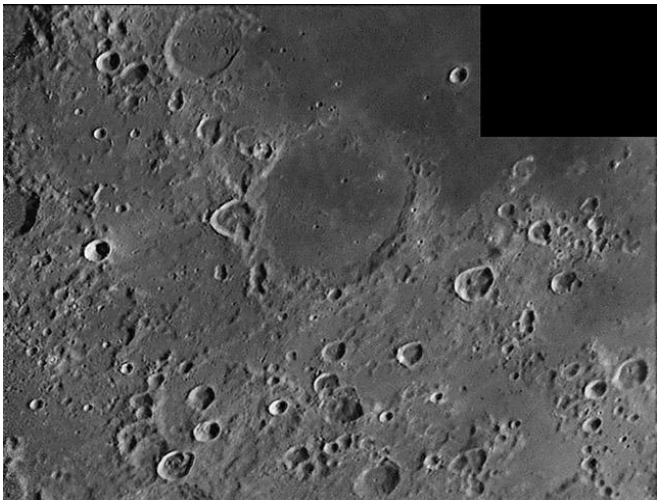
LANGRENUS - Maurice Collins, Palmerston North, New Zealand. March 24, 2015 07:27 UT. ETX-90,.



FRACASTORIUS – Richard Hill – Tucson, Arizona, USA February 26, 2015 02:13 UT. Seeing 8/10. TEC 8" f/20 MAK-CASS, SKYRIS 445M. 656.3 nm filter.

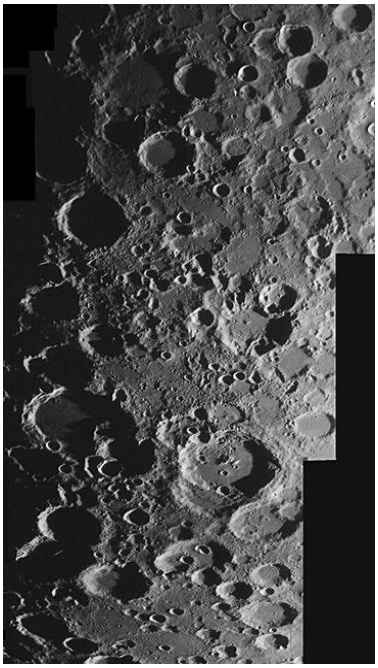
Opening onto Mare Nectaris to the north are the remnants of a 128km crater, Fracastorius in the center of this image with a smaller very similar crater to the north, the 54km Beaumont. These once great craters were flooded as a result of the Nectaris impact event. More recent craters are very obvious by comparison, like the 12km Rosse, above and to the right of Fracastorius, and Polybius A to the left. Polybius itself is split by the left edge of this image. There are several rimae on the floor of Fracastorius but they are not well seen at this high sun angle.

There are a number of oddities in this region. First, and almost dead center, is the fish-shaped formation on the southern edge of Fracastorius known as Fracastorius Y. Before the days of spacecraft mapping and the high quality images coming from our high speed cameras, the origin of this feature and the other unusual features just to the north, were the topic of some discussion in the popular astronomical publications like Sky and Telescope and Review of Popular Astronomy. While there is plenty of descriptive material on these, I find little on how these formed. It's probably the result of secondary impacts from the Nectaris impact event.

Due south of Fracastorius is the small crater Fracastorius K and further south is Winek on the bottom edge of this image. But btween them is a more interesting region. It appears to be a cluster of shallow secondary impacts that may have largely destroyed several preexisting craters one that had a central peak. I'm a little surprised this was not given a name.

There's a lot more on this image, most of it the result of the Nectaris impact.

RECENT TOPOGRAPHICAL OBSERVATIONS

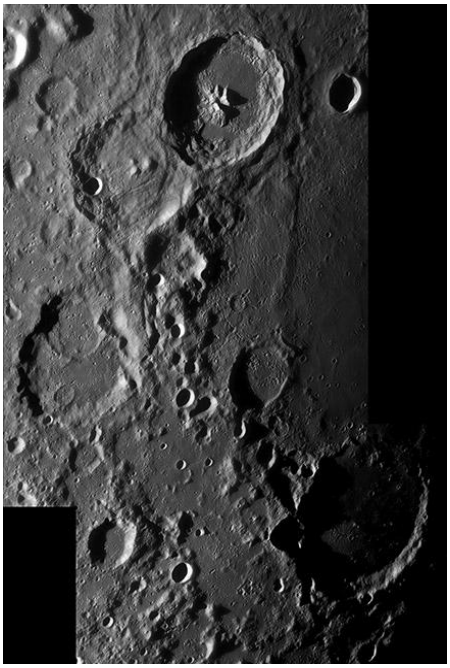


MAUROLYCUS – Richard Hill – Tucson, Arizona, USA February 26, 2015 02:21 UT. Seeing 8/10. TEC 8" f/20 MAK-CASS, SKYRIS 445M. 656.3 nm filter.

This terminator image extends all the way from Geber in the upper right corner to Jacobi, cut in half at the bottom. I usually try to stay away from large sections of the moon, especillay highlands, because there is too much going on to analyze and describe in just a few paragraphs. But it's the majesty of this tortured selenoscape that is featured here. Maurolycus is the 117km diameter crater just below center with the small interior craters. Even though this crater is around 3.9 billion years old, it sits on top of a much older crater sticking out to the south. To the left of Maurolycus is a larger 129 km crater, Stofler, still mostly in darkness with great jagged shadows still crossing the floor. North of Maurolycus is the very old (4 billion years old) remnants of Gemma Frisius with the smaller crater Goodacre on it's norther wall. Note the odd looking double walled feature (secondary crater?) on the south side of the floor of Gemma Frisius.

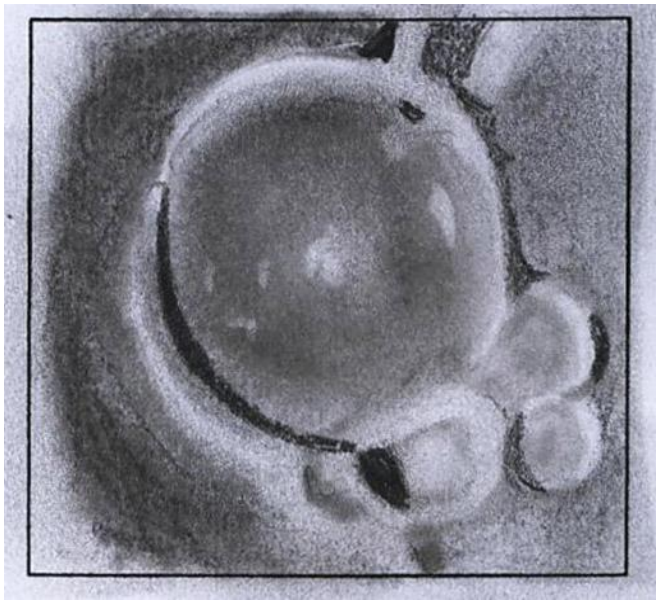
Geber, as stated before, is in the upper right corner of this image with two more craters just to the left, Abenezra north with the flat north wall, and Azophi south. Abenezra is a 3.2-3.8 billion year old crater and it too partially obscures a much older crater known as Abenezra C. Moving further left we see a diagonal of 3 craters, north to south, Playfair, Apianus and Aliacensis. Just above the latter and completely filled with shadow is Werner. On the full resolution image you see this area from Aliacensis to Maurolycus is completely covered with secondary craterlets while the area south of Geber more smooth ejecta covers everything.

Just south of Aliacensis between it and Stofler is a trio of craters, again north to south, Nonius, Kaiser and Fernelius. I like the shadow on the floor of Kaiser like a sideways "V". South of Stofler is the shadow filled crater Licetus with great detail in its illuminated wall. Contiguous to Licetus to the south is the elongated crater Heraclitus. The central mountain ridge of this odd crater can be seen just catching the first rays of sunlight on the uppermost summits. I've never caught this before. To see new things like this you have to be persistent in your observing.

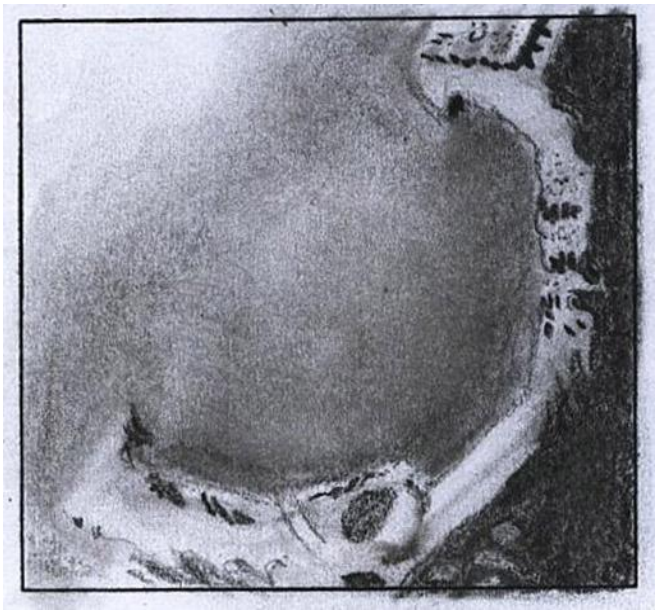


THEOPHILUS-FRACASTORIUS– Paolo Lazzarotti – Maaciano (GR), Tuscany, Italy. September 17, 2011 04:16-04:25 UT. Gladius XLI 400mm Cassegrain f/16, 2x barlow, 0.107 "/px. Experimental Sony ICX285 camera, Baader R filter.

RECENT TOPOGRAPHICAL OBSERVATIONS



GASSENDI-Steven Tzikas, Reston, Virginia, USA. November 4, 2014, 00:10-00:58 UT. Seeing 7, transparency 4. Colongitude 49.9º. 10" Newton, 120x.

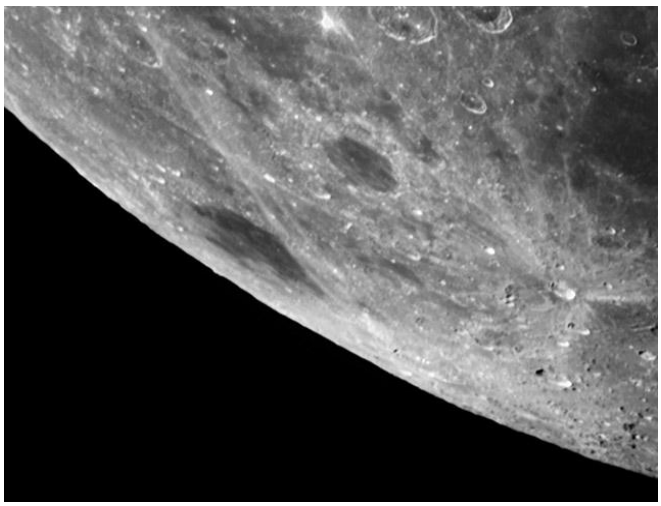


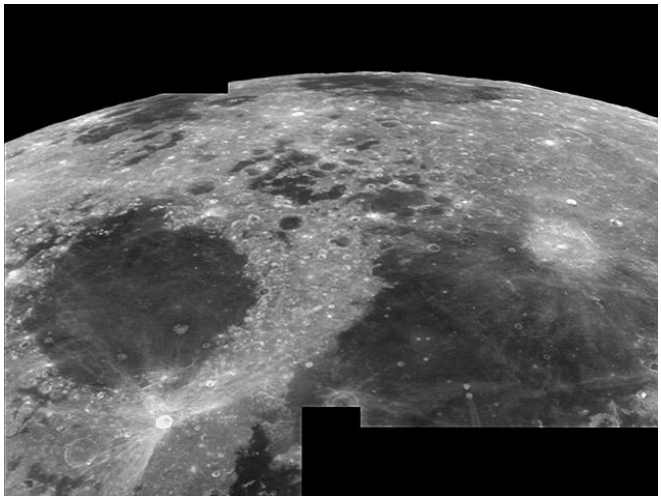
MONTES JURA-Steven Tzikas, Reston, Virginia, USA. November 3, 2014, 23:30-00:31 UT. Seeing 8, transparency 4. Colongitude 37.4º. 10" Newton, 120x.

GODIN– Alexander Vandenbohede, Brugge, Belgium. March 2, 2015 20:00 UT. C-8 SCT, webcam.

RECENT TOPOGRAPHICAL OBSERVATIONS

MARE HUMORUM– Alexander Vandenbohede, Brugge, Belgium. March 6, 2015 20:50 UT. C-8 SCT, webcam.





FOUR MARIA - Maurice Collins, Palmerston North, New Zealand. **Upper left:** MARE CRISIUM, March 24, 2015 07:32 UT, ETX-90. **Upper right:** MARE HUMBOLDTIANUM, March 1, 2015 09:05 UT, FLT-110 APO, f/21, Refrac. **Lower left:** MARE ORIENTALE, March 5, 2015 11:03 UT, FLT-110 APO, f/21, Refrac. **Lower right:** MARE SMYTHII, March 1, 2015 09:05 UT, FLT-110 APO, f/21, Refrac.

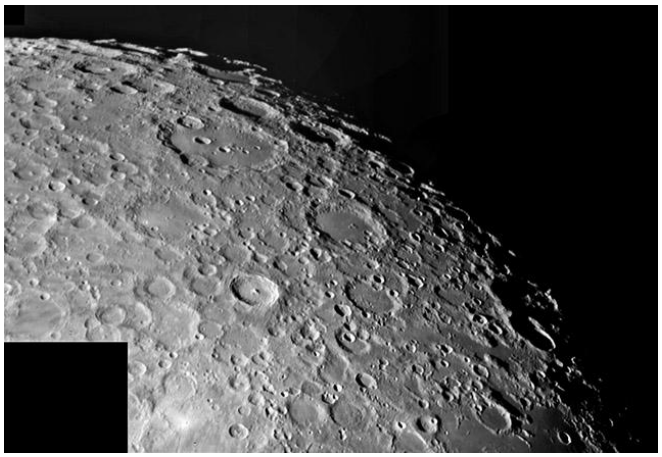
BRIGHT LUNAR RAYS PROJECT

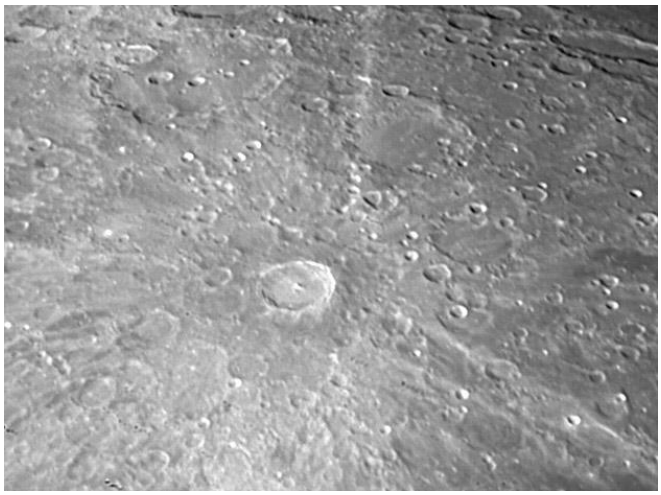
Coordinator – Wayne Bailey – wayne.bailey@alpo-astronomy.org

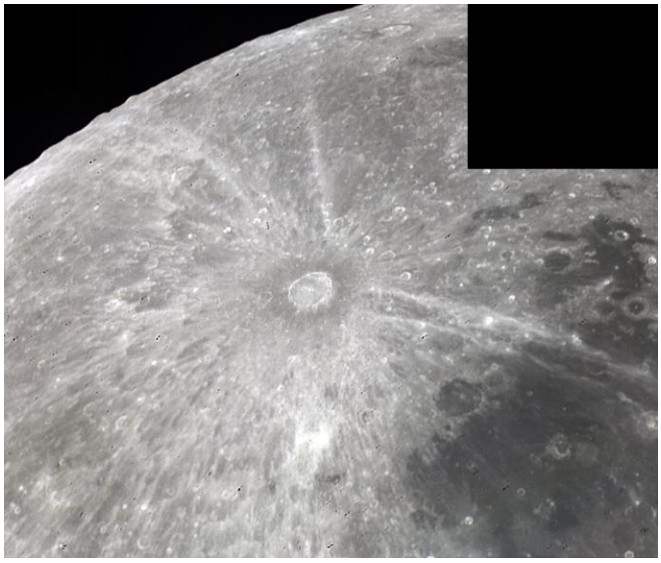
Assistant Coordinator – William Dembowski – dembowski@zone-vx.com

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

RECENT RAY OBSERVATIONS







TYCHO - Maurice Collins, Palmerston North, New Zealand. **Upper left:** March 1, 2015 08:55 UT, FLT-110 APO, f/21, Refrac. **Upper right:** March 3, 2015 08:34 UT, Seeing A-III, FLT-110 APO, f/21, Refrac. **Lower right:** March 5, 2015 11:09 UT, FLT-110 APO, f/21, Refrac.

LUNAR TRANSIENT PHENOMENA

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

LTP NEWSLETTER – APRIL 2015

Dr. Anthony Cook – Coordinator

Observations from the following observers were received in February: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Albategnius, Cassini, Censorinus, Mare Crisium, Mons Piton, Proclus and Rimae Triesnecker. Maurice Collins (New Zealand, RASNZ) imaged Clavius, Copernicus, Plato, and several features. Marie Cook (Mundesley, UK – BAA) observed Eratosthenes, Messier, and Theophilus. Rik Hill (Tucson, AZ, USA) imaged Fracastorius, and Maurolycus, and Rima Ariadaeus.

News: The Japanese TV company, NHK, are producing a one hour documentary about LTP for their Cosmic Front Science series. It is due to shown on the NHK BS Premium channel, on April 9th at 10PM in Japan (Details will be available on: http://www.nhk.or.jp/space/program/cosmic.html). If I hear about it being re-broadcast on NHK World, which we can receive here on a free satellite channel in western Europe, and elsewhere in the world, then I will let you know.

Changes to the LTP Program: After some discussion with a few of our observers, a statistical analysis of the LTP database, and recent spacecraft results, I have decided to make some changes to the way that we observe, and hopefully make our observing program more acceptable to main stream observers.

From statistical analysis, by comparing the frequency of observation of LTP to routine non-LTP observations, LTP, if they exist, must be extremely rare i.e. one per hundreds – one per thousands of hours observing. Geological processes on the Moon are generally either incredibly slow (in the case of lobate scarps), or infrequent (telescopic impact flashes occur approximately once per ~12 hours on the night side). There may be evidence of geologically recent volcanism, but as the last occurrence was several million years ago we cannot expect the Moon to put on a show for us any time soon! Electrostatic dust levitation, although recorded by cameras and instruments at the surface of the Moon, and in laboratory and computer simulations, did not populate the lunar exosphere during the few months that NASA's LADEE mission operated. Any electrostatic dust levitation must be therefore be confined to a few cm to metres above the lunar surface. Lunar endogenic Argon gas is known to leak out of the lunar interior, and freeze out on the night side, causing a very weak Argon breeze at dawn, and Radon is in found in higher concentrations near Aristarchus than at other locations on the Moon, but in general there is no evidence so far for explosive outgassing that has been proposed for some LTP. Detection of impact flashes on the night side of the Moon now number many hundred, thanks to Earthshine monitoring team at NASA's Marshall Space Flight Center. Impact flash observing is now main stream science, however more than 16 years ago the thought of anyone seeing an impact flash on the Moon was laughable and in the realm of LTP. We now know that very occasionally, some flashes may be bright enough to see on the day side of the Moon, and last several seconds and this could explain the Stuart flash from 1953, and the earlier Thornton flash from 1945. However they do not explain the longer duration of most LTP reports, nor why LTPs seem to be associated with certain lunar features – even after taking into account observational selection effects.

Most LTP reports now come from unsuspecting people who are not part of our regular LTP observers, increasingly with imagery, and often I learn of these many hours and days after the original observations, so we cannot easily carry out observational verification checks. Although observing has increased for the Moon, and the image quality is now quite remarkable, I suspect that people are not studying surface of the Moon in the images they take, unlike when visual observers look through telescopes. So we may have a loss in our detection

capability. Also although we now have many millions of new spacecraft imagery, some so detailed that they show the footpath trails left behind by the Apollo astronauts, most of these have not been examined for changes over time – though interestingly a team examining NASA LRO images using automated image analysis software has found ~24 thousand low reflectance changes, ~2 thousand high reflectance changes, and discovered 225 impact craters that were not present in earlier images, but found in more recent ones. They have also found landslide features on steep slopes, one of which was at least 2 km long, and evidence for an ejecta pattern from a 18m diameter fresh crater lying up to 30km away. So you see it is not beyond the realms of possibility that we might be able to detect permanent changes visible in Earth-based imagery taken many years apart. For details about small scale changes detected in LROC imagery that can be attributed to meteorite impacts, landslides etc – see: http://www.hou.usra.edu/meetings/lpsc2015/pdf/2325.pdf . Note that this paper does not discuss the possibility that some of these apparent changes are false detections due to cosmic ray effects. Anyway, Fig 1 shows a couple of changes that I found in imagery of an area just south of the Apollo 14 landing site.

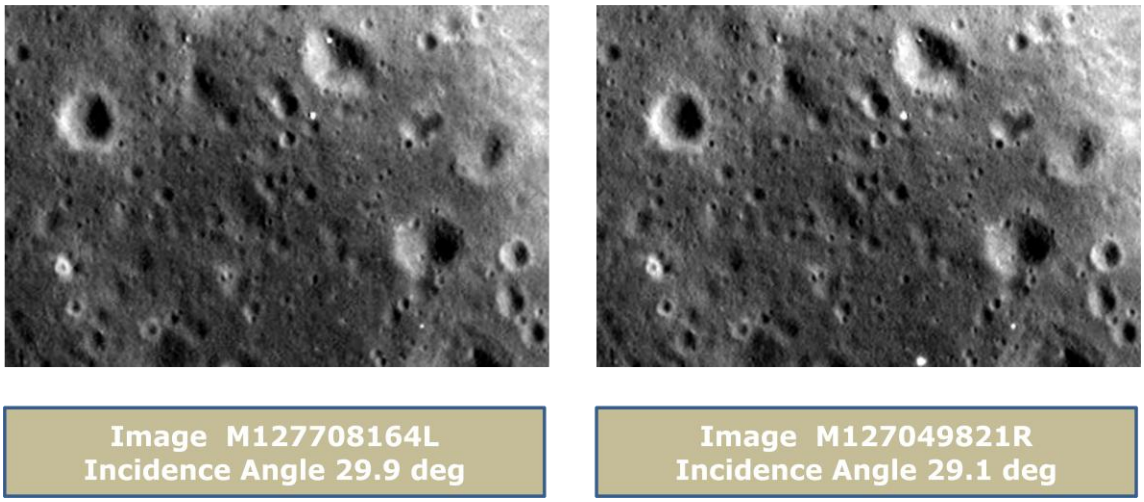


Figure 1. *Region just to the south of the Apollo 14 landing site. Images taken on 2009 Nov 1* ***(Left)*** *and 2010 Apr 27* ***(Right).*** *If you cross your eyes, apart from seeing the area in 3D you may be able to detect a couple of bright spots which appear in one image and not in the other. Whether these are due to meteorite damage, shadows, or even sun glint off reflective heat blanket material distributed across the surface, remains unknown.*

So what I propose are the following changes to the observing programme – namely that we should always try to have dual uses for our observations within the Lunar Section. That way if LTPs eventually are shown not to exist, then dual use observations can benefit the other observing programmes.

a) The repeat illumination/libration work and prediction web pages will continue. This has been the most successful area of the LTP observing program over the last few years in eliminating many past LTP, but also shows that a few LTP cannot be easily explained. However I will only put up features to observe if I am sure that there is a chance that we can disprove/prove them. This will lead to a dramatic reduction in the number of objects to study each month (starting from May onwards). But it does mean that your observations of these few selective features will pack more of a punch, i.e. have a greater scientific contribution. I will also open up the prediction pages to other section coordinators who for example might want repeat illumination observations that match some past famous astronomer's sketch, in order to check out their cartographic accuracy.

b) I will include some specific study areas that have peaked my interest in the last few years for example, (i) it would be nice to have time lapse imaging of the twilight effect on the floor of Plato at sunrise caused by scattered light of the inner illuminated walls, (ii) what is the earliest selenograpic colongitude that anyone can see/image the central peak in Tycho in shadow, (iii) at what selenographic colongitudes ranges do some craters exhibit natural surface color e.g. Censorinus, Geminus, (iv) verify that one of the factors that influences the visibility/brightness of Aristarchus in Earthshine is the libration (viewing angle).

c) Impact flash studies on the night side of the Moon should continue, however as you can see from the GLR report described below, we could consider observing at phases beyond first quarter if we concentrate on the terminator region and do time lapse imaging. Please bear in mind though that the effect seen by the GLR group is extremely rare. So in terms of dual purpose use we could argue that time lapse imaging of the terminator could be useful for telling us the precise time that shadow spires appear on crater floors. It is true that we can simulate sunrise/set in programs like LTVT, but this is not as accurate as real life observations.

d) There are some areas of the Moon where there have, or could likely be recent geological change, for example: i) very steep slopes, ii) smooth areas, especially with large dust deposits, that are geologically young, iii) bouldery areas - these boulders have a finite lifetime because they are broken up each time a meteorite strikes them, iv) crustally thin areas, v) sites with Ina-like formations, vi) locations of shallow Moonquakes (more energetic than deep quakes), vii) lobate scarps, viii) magnetic anomalies such as Reiner Gamma, where dust has been swept away, ix) the youngest volcanic domes, x) areas with a high number of cracks, which could offer a conduit for internal gas to seep towards the surface. So if LTP were to be a real phenomenon, then these would be areas that we should study. But it also would be interesting to observe these anyway at highest resolutions possible, just for their geological context. Spacecraft imagery offer higher resolutions still, but Earth-based imaging can reveal subtle surface texture effects at a wider range of sun angles than have been covered by spacecraft.

e) Finally we can look for surface change directly, at the very small scale, by comparing similar illumination spacecraft imagery, taken several year apart. I plan to put up a different example (e.g. akin to Fig 1, but covering a much larger area) on a web site each month and encourage users to copy these and spot any differences, and send me the image coordinates of any changes they find. You can do this by eye, or for the computer programmers amongst you, you could try writing some computer vision software. The latter would be better as it would be faster, but the human eye is more robust in identifying effects caused by shadow, surface slope brightness changes caused by illumination.

I will introduce these projects gradually over the next few months – some, quite likely will be dropped if there is a lack of interest. But I hope that these will encourage more observations for the Lunar Section, especially if they have dual or multiple applications. All observations received, do eventually get passed to the Lunar Section director, and other coordinators – periodically.

LTP Reports: Last month we discussed the dull red color imaged on the northern rim/floor boundary of Plato on 2015 Feb 01 UT 22:41 by Kevin Taylor (Leeds, UK). No further imagery has come forward, and I still think it is an imaging artifact, however this remains on a weight of 1 until we get some repeat illumination images to show that there is at least a dark region in this area.

West of Picard: On 2013 Feb 17 UT 18:50 Giuseppe Macalli (Italy – UAI) observed an orange cloud

form just to the west of Picard, and then disappear. The effect lasted about 1 minute. Thanks to Antonio Mercatali (UAI) for forwarding this old LTP report onto me. Was anybody else observing this region on that date two years ago?

Near Lippershey P: On 2015 Feb 26 UT 21:35, Marco Iten (Italy, GLR) was videoing the terminator area/earthshine, and recorded a magnitude +5 to +6 flash (it was saturated in the image), typical in appearance to an impact flash, and of duration ~0.2 seconds. The preliminary measured coordinates of the flash were at 7.9±0.6°W, 26.1±1.6°S. What was rather startling was that a diffuse cloud effect spread out westwards from the flash and moved/drifted(?) further onto the night side of the until it became too diffuse and faint to see . The cloud was visible for about 10 seconds and the effective speed of the spread was about 4 km/s, which is a little higher than typical lunar impact ejecta velocities you find quoted in books, and was nearly double the lunar escape velocity. You can see four versions of the video on these animated GIF web links, provided by GLR:

http://digilander.libero.it/glrgroup/2015_02_26_213522_Iten_black.gif
http://digilander.libero.it/glrgroup/2015_02_26_213522_Iten_white.gif
http://digilander.libero.it/glrgroup/2015_02_26_213522_Iten_4x.gif
http://digilander.libero.it/glrgroup/2015_02_26_213522_Iten_4x_scaled512.gif

A preliminary write up, of the observation, in GLR's Selenology journal, can be found here: http://www.lunar-captures.com//Selenology_Today/ST_preliminary report_2015.pdf . The authors checked out the possibility of Earth orbiting satellites, and head on meteors in our atmosphere and believe that they have eliminated both of these being a cause. I am giving this a weight of 4 for now, because we have good documentary evidence, but from one observer only. Because the event is probably impact, and not LTP related, I will probably drop the weight down to 0, when the GLR group have completed their final analysis.

Aristarchus: 2015 Mar 03 UT23:38 Brendan Shaw (UK – BAA) whilst looking at the Moon on his computer screen, in between imaging the crater, noticed a flash on the NW rim of Aristarchus when his camera had an IR pass band filter in place . The seeing was not very good at the time – so it was either a bright small craterlet just coming into view, during a brief moment of good seeing, an impact flash, or more likely it was a cosmic ray air shower decay particle impinging on the camera chip. Either way, it is worth checking under the same illumination conditions in future, and so I shall assign this report weight of 1.

Moon: 2015 March 08 UT 01:25-01:30 Alex Abbinante (Ames, Iowa) saw, with the naked eye, a dark line move across the Moon very slowly. After some email correspondence with him, I think we came (or were coming to) a similar conclusion, that because the Moon was very low down, and there is a large atmospheric path length between him and the Moon, that it probably was an aircraft contrail. I have both seen, and videoed, these on a number of occasions. They can be quite spectacular, but are clearly not really lunar related. This has received a weight of 0.

Routine Reports: Below is a selection of reports received for February that can help to re-assess past LTP observations.

Cassini: On 2015 Feb 26 UT 02:23-02:35 Jay Albert (ALPO) observed the crater Cassini under the same illumination conditions as the following LTP report from Uruguay from 1885:

Knopp of Paysandu, Uruguay on 1885 Feb 21 at 23:00-23:30? UT saw red patches in the crater. Reddish smoke or mist. The observer says several others had seen a star like point there that night. Cameron's 1978 catalog ID=348 and weight=4. ALPO/BAA weight=3.

Jay comments that when he observed, that the crater's floor was mostly in shadow and he saw no red, or indeed any other, color, in or outside the crater. He observed with a 6" SCT at x214. I will therefore keep the 1885 observation at a weight of 3, though note that the UT given in the Cameron catalog has some associated uncertainty.

Fracastorius and Mare Crisium: On 2015 Feb 26 UT 08:43-08:45 Maurice Collins (ALPO) imaged the whole Moon in color, and this was at the same illumination to a couple of visual surface color detections by J.Hedley Robinson from 1975:

Fracastorius 1975 Apr 19 UT 19:47, 20:40, 20:45 Observed by Robinson (Teignmouth, UK, 26cm reflector) "Fracastorius had a blink - it was bright in red and darker in blue at these three times, and probably in between. This was possibly natural surface color being detected?". ALPO/BAA weight=1.

Mare Crisium 1975 Apr 19 UT 19:47-20:37 Observed by Robinson (Teignmouth, UK, 26cm reflector) "Mare Crisium N. end of floor - blink (red and blue filters) in patches, bright in red. Blink stops at 20:37". ALPO/BAA weight=1.

These two observations were never regarded by Hedley Robinson as LTP. Although the Moon Blink device (English style) was introduced to help differentiate colors caused by atmospheric spectral dispersion (or even chromatic aberration), from colors due to LTP, it was claimed that it could also detect natural surface color on the Moon. Fracastorius was claimed to be one such "Permanent Blink" area caused by natural surface color. However in figure 2, an extract from Maurice Collins' whole Moon mosaic, I have increased color saturation, and if the Hedley Robinson blink effects were due to natural surface color, then they should show up as slightly reddish in Fig 2. However as you can see we have no red tinge either on the northern floor of Mare Crisium, nor the floor of Fractorius. It is tempting to up the weights of these observations, but Hedley Robinson was doubtful of them being LTP. Therefore I shall leave these both at weights of 1 for now.

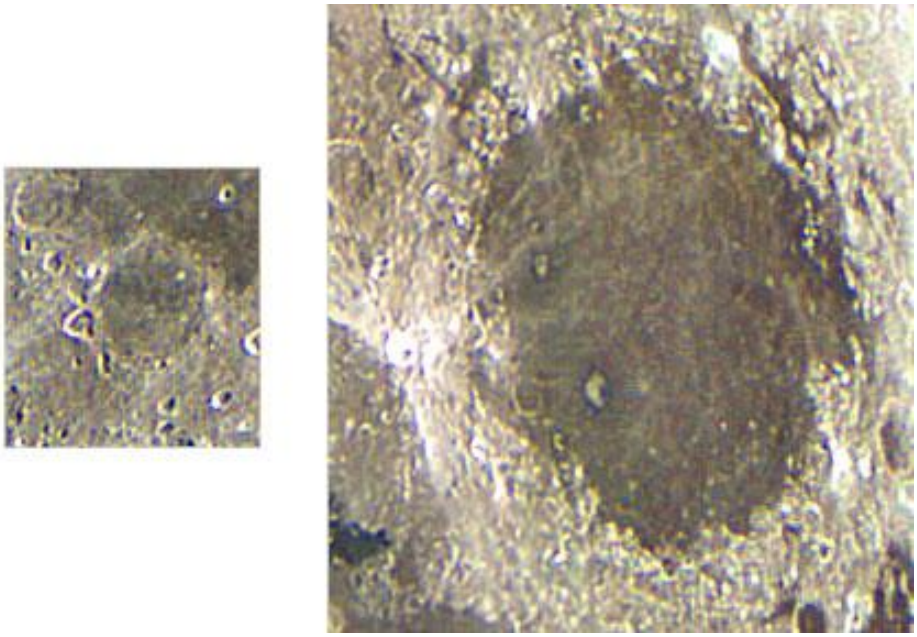


Figure 2. *Subsets of an image mosaic taken my Maurice Collins (ALPO) on 2015 Feb 26 UT 08:43-08:45 with north towards the top. The mosaic has had it color saturation increased to bring out color.* ***(Left)*** *Fracastorius.* ***(Right)*** *Mare Crisium).*

Eratosthenes: On 2015 Feb 27 UT 21:10-21:20 Marie Cook (Mundesley, UK – BAA) observed this crater under the same illumination conditions to a LTP report by Peter Catermole from 1954:

Eratosthenes 1954 May 11 UT 20:00 Observer: Catermole (UK, 3" refractor) "Central peak invis. tho surroundings were sharp". NASA catalog ID #563, NASA weight=4. ALPO/BAA weight=2.

Marie was using a 90mm aperture Questar telescope, only slightly bigger than Peter Cattermole's telescope in light collecting power. However she recorded the interior detail as sharp and the central peak was clearly seen. The floor shadow was about a ¼ of the way across the floor, with a small shadow seen beyond the central peak. It is tempting to put the weight of Peter Catermole's report up to a 3, however the UT given in Cameron's catalog looks somewhat like one of her estimated times, which invariably end up at 20:00. Therefore, unless someone can provide me with a good report of Peter's observation, confirming the 20:00 time, I will leave the weight at a 2.

Suggested Features to observe in April: 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 LTP, 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 http://twitter.com/lunarnaut.

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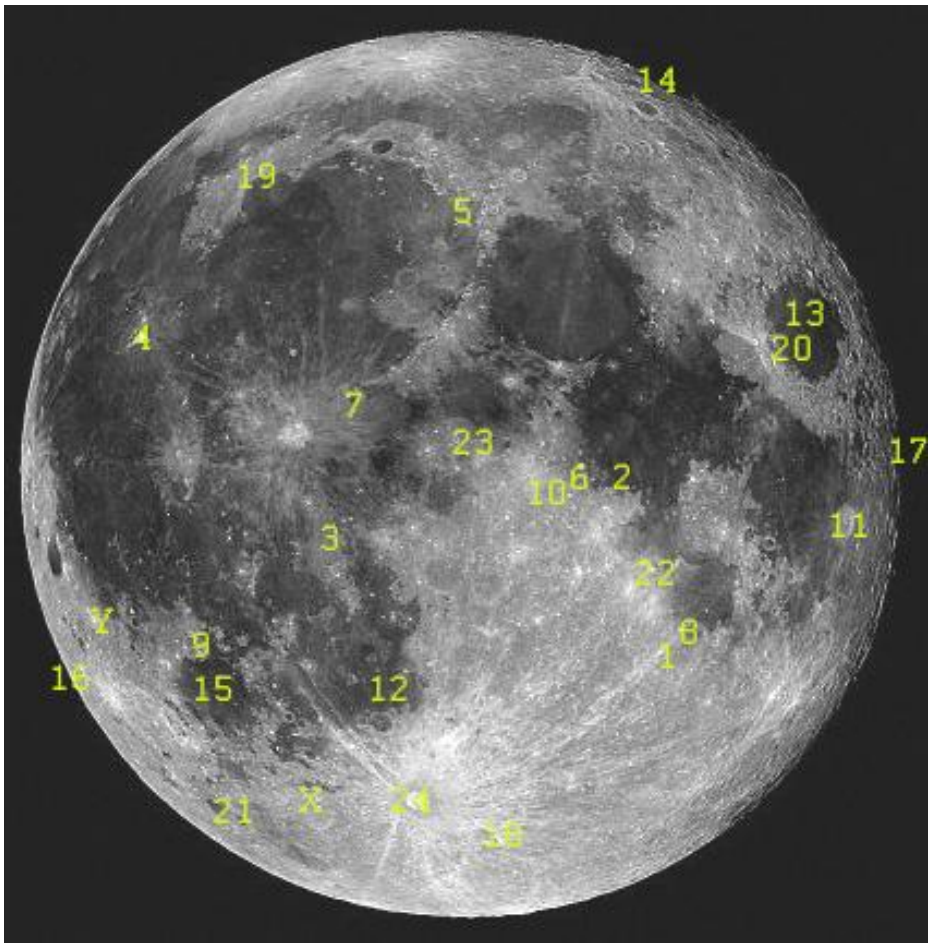
KEY TO IMAGES IN THIS ISSUE

1. **Altai Scarp**
2. **Apollo 11**
3. **Apollo 14**
4. **Aristarchus**
5. **Cassini**
6. **Cayley**
7. **Eratosthenes**
8. **Fracastorius**
9. **Gassendi**
10. **Godin**
11. **Langrenus**
12. **Lippershey**
13. **Mare Crisium**
14. **Mare Humboldtianum**
15. **Mare Humorum**
16. **Mare Orientale**
17. **Mare Smythii**
18. **Maurolycus**
19. **Montes Jura**
20. **Picard**
21. **Schickard**
22. **Theophilus**
23. **Triesnecker**
24. **Tycho**



FOCUS ON targets

X = Rimae Sirsalis