The Lunar Observer

A publication of the Lunar Section of ALPO

Edited by David Teske: david.teske@alpo-astronomy.org
2162 Enon Road, Louisville, Mississippi, USA
Recent back issues: http://moon.scopesandscapes.com/tlo_back.html

April 2020

In This Issue

In the April 2020 issue of *The Lunar Observer*, amateur astronomers from across the globe continue to submit outstanding drawings, images, and articles about our nearest neighbor in space. Because of the Covid-19 outbreak and many people locked down, the number of observations is down some from previous months. Hopefully, people can continue to get out some to do some lunar observing. Be careful and safe out there!

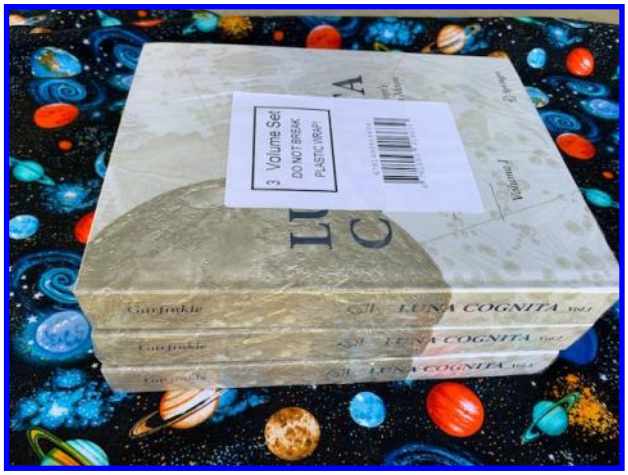
Robert Hayes Jr. takes us on a tour of the Fauth area while Alberto Anunziato and Sergio Babino explore the Tycho area. Read this and find a new "Lunar X"! David Teske had a nice look towards the far-side of the Moon in an article about the crater Bailly and beyond. As always, Tony Cook presented an interesting look at Lunar Geologic Change. Plus as said above, many spectacular images of the Moon are presented in the Recent Topographic Studies. Looking ahead, check out the ALPO conference details this coming November.

From the editor

I hope in these trying times throughout the world, each of you are safe and weathering the Covid-19 virus. Of course, I hope that your family and loved ones are in good health. I imagine that with the restrictions due to the pandemic, getting out to observe the Moon or anything else has been limited. I hope that if the opportunity allows that you can get out and enjoy some lunar observing.

On much better news, I just received my long-awaited copy of Luna Cognita by Robert A. Garfinkle. It is a massive three volume set about our Moon. It will obviously take some time to read through it all, but from what I have read of reviews, this is a very good book for those of us interested in our Moon. Perhaps somebody who is a faster reader than I might want to do a book review of this book.

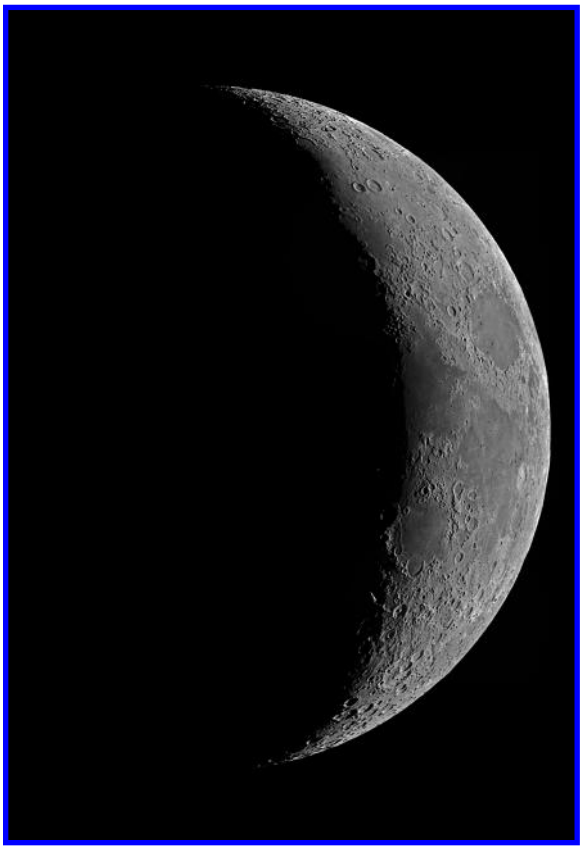
Many thanks are due for those behind the scenes. Theo Ramakers has updated the ALPO website. This includes the Lunar gallery page. If you go there, you will find all the past issues of *The Lunar Observer*, the indices to *The Lunar Observer*, Lunar Domes and The Lunar Topographic Studies Program. I have taken over uploading new lunar images into The Lunar Topographic Studies Program from Wayne Bailey. You will also see now that the hyperlinks in *The Lunar Observer* now go to the ALPO Lunar Gallery. Thanks much Theo!



Wishing you all the best in these trying times.

David Teske
Acting Coordinator, Lunar Topographic Studies Program
Assn of Lunar & Planetary Observers

david.teske@alpo-astronomy.org
drteske@yahoo.com



5.1 Day-Old Moon, *David Teske, Louisville, Mississippi, USA, 29 February 2020 at 0033 UT, colongitude 330.3°. 3.5 inch Questar telescope, IR blocking filter, ZWOASI120mms, 500 frames, Firecapture, Registax, Photoshop. Two panel mosaic. Seeing 8/10.*

ALPO Conference November 6-7, 2020

Interested parties are hereby invited to submit papers and research posters on the astronomy-related topics of their choice for presentation at the next ALPO conference to be held jointly with the Georgia Regional Astronomers Meeting (GRAM) when that group meets on November 6 and 7, 2020.

This will be the second time the ALPO has participated with the GRA group, the first time being the autumn of 2017.

Like last time, the was made after an online discussion and vote by the ALPO board of directors.

This year's conference will be at North Georgia College in Dalton, Georgia, approximately a one-and-a-half-hour drive north of downtown Atlanta. The ALPO portion of the conference will commence with the ALPO board meeting on Friday, November 6, to be followed by an informal gathering that evening with a lecture, social gathering with snacks and observing at the school's on-campus observatory.

All papers will be presented the following day, Saturday, November 7, between 9 a.m. and 5 p.m.

Also as we did in 2017, there will be an ALPO dinner on Saturday evening where the Walter Haas Observing Award and the Peggy Haas Service Award will be presented.

We have been allotted up to at least four (4) time slots for ALPO papers of no more than 15 minutes in length; the preferred method is 12 minutes for the paper presentation plus 3 minutes for follow-up questions. The preferred format is Microsoft PowerPoint.

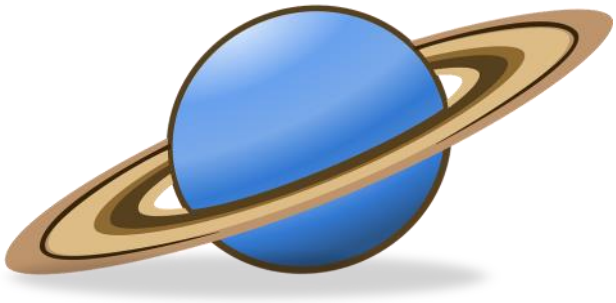
We have also been invited to participate with wall-mounted research posters which are also commonly done at academic and professional conferences everywhere.

Participants are encouraged to submit research papers, presentations, and experience reports concerning various aspects of Earth-based observational astronomy. Suggested topics for papers and presentations include the following:

- New or ongoing observing programs and studies, specifically, how those programs were designed, implemented and continue to function.
- Results of personal or group studies of solar system or extra-solar system bodies.
- New or ongoing activities involving astronomical instrumentation, construction or improvement.

Challenges faced by Earth-based observers such as changing interest levels, deteriorating observing conditions brought about by possible global warming, etc.
A hard-copy version of your paper should be made available for future web site publication.

More details about paper presentations and to whom they should be sent will be published in the Summer issue of the ALPO Journal for release in early June.



Date	Time UT	Event
April 2020 1		Moon greatest northern declination +23.6°
1	1021	First Quarter Moon
2		Lunar west limb most exposed -8.0°
3	0700	Moon 1.3° north of M44
7	1800	Moon at perigee, 356,907 km, large tides
7		Lunar south limb most exposed -6.5°
8	0235	Full Moon
14	2200	Pluto 1.2° north of Moon, occultation from Antarctic Peninsula
14	2256	Last Quarter Moon
14	2300	Moon 2° north of Moon
		Moon greatest southern declination -23.8°
		Lunar east limb most exposed +7.5°
15	0900	Saturn 2° north of Moon
16	0500	Mars 2° north of the Moon
20	1900	Moon at apogee, 406,462 km
20		Lunar north limb most exposed +6.6°
21	1700	Mercury 3° north of Moon
23	0226	New Moon, lunation 1204
26	1100	Vesta 0.1° south of Moon, occultation North Africa to Japan
27	2200	Moon 0.7° south of M35
29		Moon greatest northern declination +23.9°
30	1400	Moon 1.6° north of M44
30	2038	First Quarter Moon
30		Lunar west limb most exposed -7.2°

The Lunar Observer welcomes all lunar related images, drawings, articles, reviews of equipment and reviews of books. You do not have to be a member of ALPO to submit material, though membership is highly encouraged. Please see below for membership and near the end of *The Lunar Observer* for submission guidelines.

Comments and suggestions? Please send to David Teske, contact information page 1. Need a hard copy, please contact David Teske.

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 Journal of the Association of Lunar and Planetary Observers-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.

Lunar Topographic Studies

Acting Coordinator – David Teske - david.teske@alpo-astronomy.org
Assistant Coordinator – William Dembowski - dembowski@zone-vx.com
Assistant Coordinator – Jerry Hubbell – jerry.hubbell@alpo-astronomy.org
Assistant Coordinator-Wayne Bailey– wayne.bailey@alpo-astronomy.org
Website: http://moon.scopesandscapes.com/

Observations Received

Alberto Anunziato, Oro Verde, Argentina. Article and images *A Trip Around Tycho: The Cassini Bright Spot and the "X" in Longomontanus.*

Sergio Babino, Montevideo, Uruguay. Article and images *A Trip Around Tycho: The Cassini Bright Spot and the "X" in Longomontanus.* Images of Theophilus, Copernicus to Kepler, Gassendi, Clavius, Plato, and Tycho.

Gonzalez Cian, Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. Images of the Waning Gibbous Moon, Tycho, Petavius, Mare Crisium, Plato (3), Montes Apenninus, Moretus, Walter, Copernicus (2) and Aristarchus.

Leonardo Alberto Columbo, Cosquín, Argentina. Images of Purbach, Bullialdus, Copernicus and Tycho.

Howard Eskildsen, Ocala, Florida, USA. Images of Messier, Nectaris, Serpentine Ridge, Altai, Lamont, Domes Kies to Epidemiarum, Promontorium Laplace and Lansberg D Domes.

Michael É. Sweetman, Tucson, Arizona, USA. Images of Copernicus, Tycho and Clavius.

David Teske, Louisville, Mississippi, USA. Article and image of *In the Deep South* (Bailly), image of the 5.1-Day-Old Moon.

Many thanks for all these observations, images, and drawings.

SUBMISSION THROUGH THE ALPO IMAGE ARCHIVE

ALPO's archives go back many years and preserve the many observations and reports made by amateur astronomers. ALPO's galleries allow you to see on-line the thumbnail images of the submitted pictures/observations, as well as full size versions. It now is as simple as sending an email to include your images in the archives. Simply attach the image to an email addressed to

lunar@alpo-astronomy.org (lunar images).

It is helpful if the filenames follow the naming convention :

FEATURE-NAME_YYYY-MM-DD-HHMM.ext

YYYY {0..9} Year

MM {0..9} Month

DD {0..9} Day

HH {0..9} Hour (UT)

MM {0..9} Minute (UT)

.ext (file type extension)

(NO spaces or special characters other than "_" or "-". Spaces within a feature name should be replaced by "-".)
As an example the following file name would be a valid filename:

Sinus-Iridum_2018-04-25-0916.jpg
(Feature Sinus Iridum, Year 2018, Month April, Day 25, UT Time 09 hr16 min)

Additional information requested for lunar images (next page) should, if possible, be included on the image. Alternatively, include the information in the submittal e-mail, and/or in the file name (in which case, the coordinator will superimpose it on the image before archiving). As always, additional commentary is always welcome and should be included in the submittal email, or attached as a separate file.

If the filename does not conform to the standard, the staff member who uploads the image into the data base will make the changes prior to uploading the image(s). However, use of the recommended format, reduces the effort to post the images significantly. Observers who submit digital versions of drawings should scan their images at a resolution of 72 dpi and save the file as a 8 1/2"x 11" or A4 sized picture.

Finally a word to the type and size of the submitted images. It is recommended that the image type of the file submitted be jpg. Other file types (such as png, bmp or tif) may be submitted, but may be converted to jpg at the discretion of the coordinator. Use the minimum file size that retains image detail (use jpg quality settings. Most single frame images are adequately represented at 200-300 kB). However, images intended for photometric analysis should be submitted as tif or bmp files to avoid lossy compression.

Images may still be submitted directly to the coordinators (as described on the next page). However, since all images submitted through the on-line gallery will be automatically forwarded to the coordinators, it has the advantage of not changing if coordinators change.

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 (use month name or specify mm-dd-yyyy-hhmm or yyyy-mm-dd-hhmm)
Filter (if used)
Size and type of telescope used Magnification (for sketches)
Medium employed (for photos and electronic images)
Orientation of image: (North/South - East/West)
Seeing: 0 to 10 (0-Worst 10-Best)
Transparency: 1 to 6

Resolution appropriate to the image detail is preferred-it is not necessary to 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:
David Teske – david.teske@alpo-astronomy.org
Jerry Hubbell –jerry.hubbell@alpo-astronomy.org
Wayne Bailey—wayne.bailey@alpo-astronomy.org

Hard copy submissions should be mailed to David Teske at the address on page one.

CALL FOR OBSERVATIONS: FOCUS ON:

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 2020 edition will be the Lunar 100 numbers 1-10. 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 these features to your observing list and send your favorites to (both):
Jerry Hubbell –jerry.hubbell@alpo-astronomy.org
David Teske – david.teske@alpo-astronomy.org

Deadline for inclusion in the Lunar 100 numbers 1-10 article is April. 20, 2020

FUTURE FOCUS ON ARTICLES:

In order to provide more lead time for contributors the following future targets have been selected: The next series of three will concentrate on subjects of the Selected Areas Program.

Subject	TLO Issue	Deadline
Lunar 100 (numbers 1-10)	May 2020	April 20, 2020
Lunar 100 (numbers 11-20)	**July 2020**	**June 2020**

Focus-On Announcement

We are pleased to announce the future Focus-On topics. These will be based on the Lunar 100 by Charles Wood. Every other month starting in May 2020 , the Focus-On articles will explore ten of the Lunar 100 targets. Please search your archives for the following targets. The first batch of 10 are due by April 20, 2020 for the May 2020 The Lunar Observer. Please send your images, photos, drawings and reports to both Jerry Hubbell and David Teske. The first 10 targets are:

L	FEATURE NAME	SIGNIFICANCE	RUKL CHART
1	Moon	Large Satellite	
2	Earthshine	Twice reflected sunlight	
3	Mare/Highland dichoto-my	Two materials with distinct compositions	
4	Apennines	Imbrium basin rim	22
5	Copernicus	Archetypal large complex crater	31
6	Tycho	Large rayed crater with impact melts	64
7	Altai Scarp	Nectaris basin rim	57
8	Theophilus, Cyrillus, Catharina	Crater sequence illustrating stages of degradation	46, 57
9	Clavius	Lacks basin features in spite of its size	72
10	Mare Crisium	Mare contained in large circular basin	26, 27, 37, 38

Explore the Lunar 100 on the link below:

https://www.skyandtelescope.com/observing/celestial-objects-to-watch/the-lunar-100/

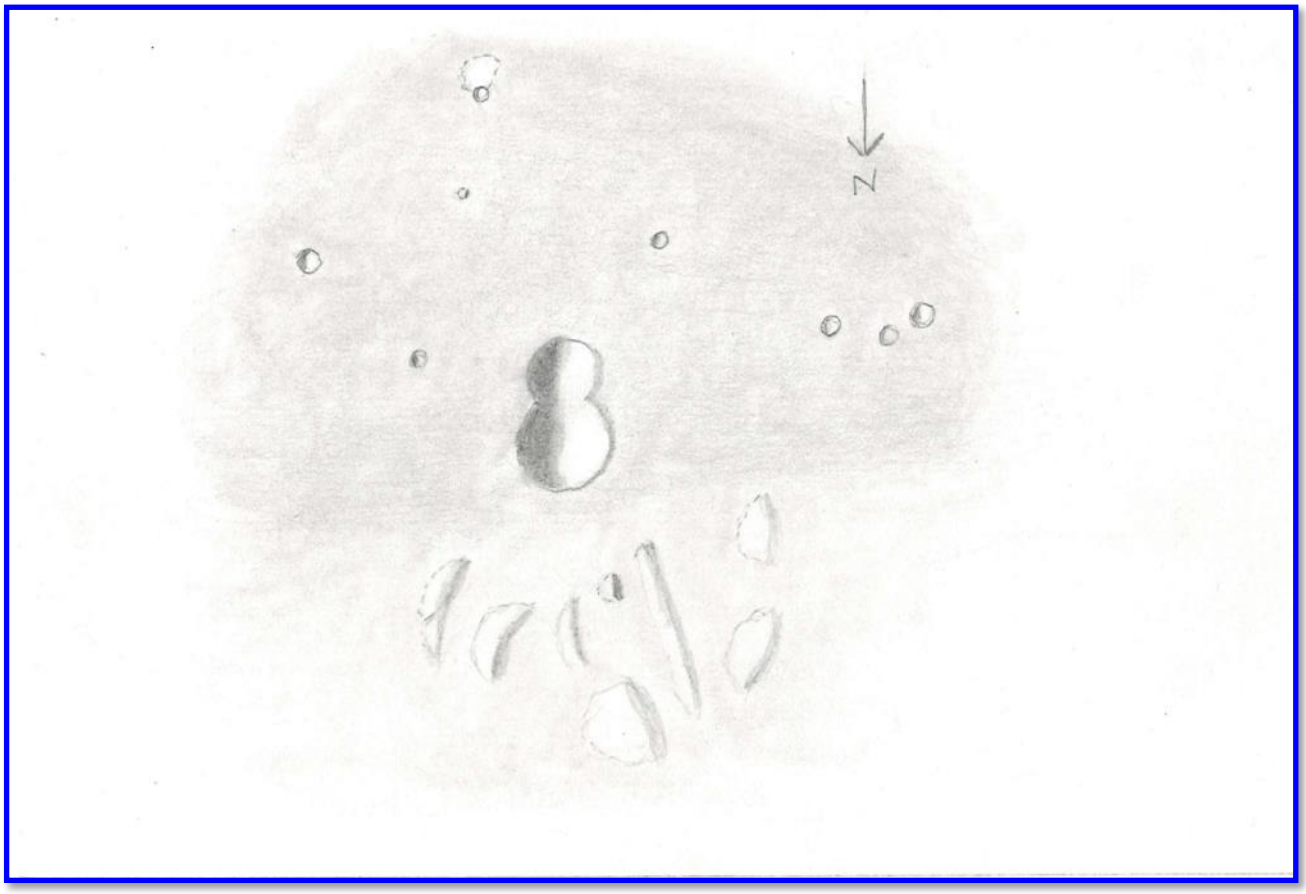
The Lunar 100: Features 1-10	May 2020 Issue – Due April 20, 2020
The Lunar 100: Features 11-20	July 2020 Issue – Due June 20, 2020
The Lunar 100: Features 21-30	September 2020 Issue – Due August 20, 2020
The Lunar 100: Features 31-40	November 2020 Issue – Due October 20, 2020
The Lunar 100: Features 41-50	January 2021 Issue – Due December 20, 2020
The Lunar 100: Features 51-60	March 2021 Issue – Due February 20, 2021
The Lunar 100: Features 61-70	May 2021 Issue – Due April 20, 2021
The Lunar 100: Features 71-80	July 2021 Issue – Due June 20, 2021
The Lunar 100: Features 81-90	September 2021 Issue – Due August 20, 2021
The Lunar 100: Features 91-100	November 2021 Issue – Due October 20, 2021

Jerry Hubbell –jerry.hubbell@alpo-astronomy.org
David Teske – david.teske@alpo-astronomy.org

Fauth

Robert H. Hays Jr.

I drew this double crater and vicinity on the evening of 7/8 November 2019. This area is just south of Copernicus. Fauth actually refers to this feature's larger north portion. The southern part is Fauth A. The two parts appear to be equally crisp and deep with no rim between them. A group of elevations lie north of Fauth. Three slightly curved ridges are at the east end of this group. A bright peak and a large low mound are nearby. A long straight ridge and two low hills are farther west. A tiny peak is just south of Fauth A. Several small craters are in the vicinity. Fauth B is east of Fauth A, and Fauth C is to its southeast. Fauth C also has a bright interior. Reinhold G is almost due south of Fauth, and has a small bright patch at its south end. A tiny peak could be glimpsed at times north of Reinhold G. Fauth E is the very small pit southwest of Fauth A. Fauth G, GA and F are a compact trio west of Fauth; F is the largest and westernmost of this group. Fauth GA appears to be shallower than its neighbors. The area around Fauth and the craterlets is at the edge of Oceanus Procellarum, and is somewhat darker than the terrain to the north.



Fauth *Robert H. Hays, Jr., Worth, Illinois, USA. 08 November 2019 0110-0138 UT. 15 cm reflector, 170 x. Seeing 6-8/10, transparency 6.*

A Trip Around Tycho: the Cassini's Bright Spot and the "X" in Longomontanus

Sergio Babino and Alberto Anunziato

Tycho is always fascinating. In these times of forced seclusion due to the Coronavirus, we allow ourselves to dream of a trip around the Emperor of the South. Clearly, we can differentiate the different levels on Tycho's terraced walls. What will it be like to climb those steep walls, where there could still be landslides? The brightest areas are the highest points of the terraces on the north wall and the south summit of the central peak. Towards the north (top of the image), the ruined walls of the Pre-Nectarian Deslandres make it almost impossible to distinguish it in this image with frontal light (which allows, in compensation, to distinguish the beautiful and complex system of bright rays of Tycho). But this walled plain gives us very interesting views. The Hell crater shows us the dark bands that define it as a "banded crater" and the small elevation that, instead of being central is displaced to the north, as well as a series of pyroclastic deposits recognizable by their dark color. But in our opinion, Deslandres' jewel is what is known as Cassini's Bright Spot (Image 2), based on an observation by the brilliant astronomer (and expert selenographer) Giovanni Cassini of a transient "white cloud" in the area that would be actually the ray system of the small Hell Q crater, just 4 kilometers in diameter and a few million years old, since the micro-crater density of this bright area has been compared to the rays of Tycho, which is older (100 million of years). The identification of Cassini's bright spot with Hell Q rays seems evident in the image obtained by the Lunar Reconnaissance Orbiter (Image 3), at: https:// moon.nasa.gov/resources/175/hell-q- crater /, in which it is observed the separation of the bright material that constitutes the Cassini spot from the Hell Q contour is due to the existence of dark material ejected by the same impact: "What is that black material? Most likely it is impact melt that cooled so fast that most turned to glass rather than minerals. Right along the rim of the crater you can see small tongues of the black material, indicating that it was a fluid when sited (and now hardened into glass). Its low reflectance is caused by the light-absorbing properties of glass". Last but not least, towards the southwest (below Tycho), there are the intriguing bright spots of the Nectarian age Longomontanus, which towards the east seem to form an X (Image 4), 4 small and defined spots at the four ends and in the center a more diffuse one.

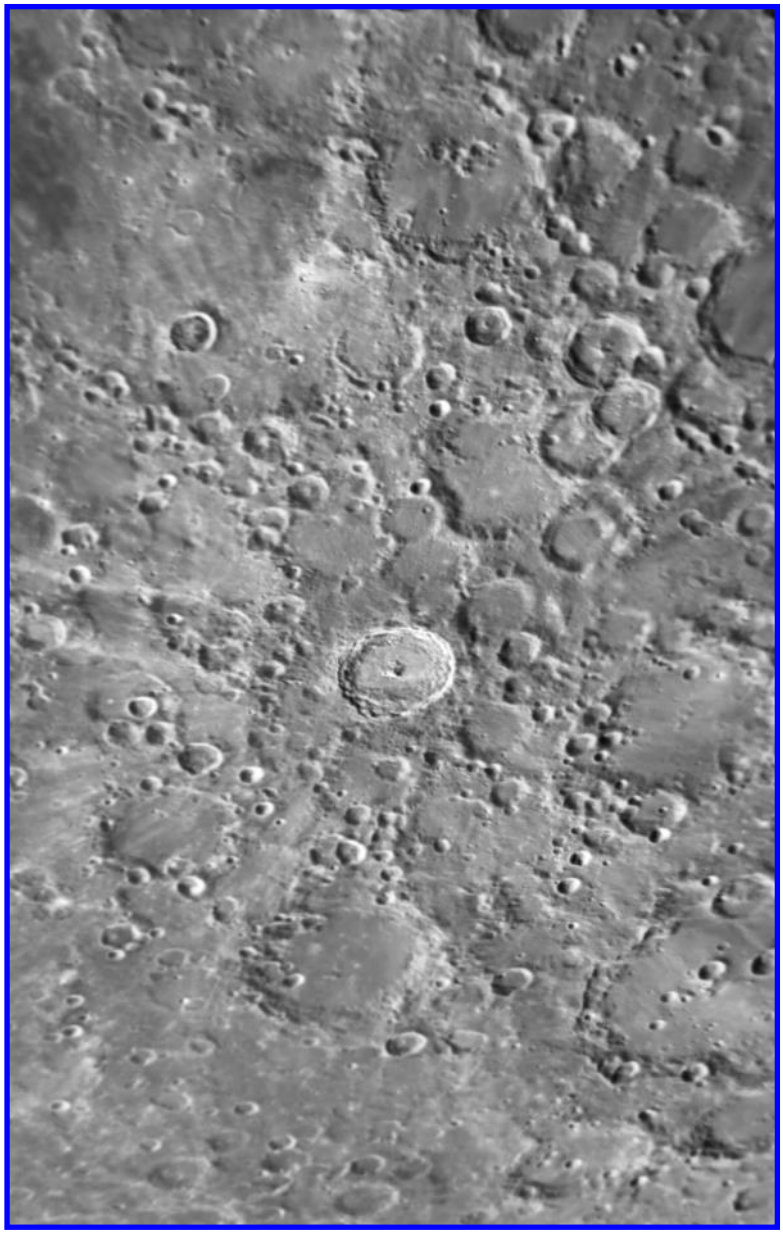


Figure 1. Tycho, *Sergio Babino, SAO, Montevideo, Uruguay. 14 March 2020 0504 UT. 203 mm catadioptic telescope, 2.5 x Power Mate, ASI ZWO ASI 174 mm camera.*

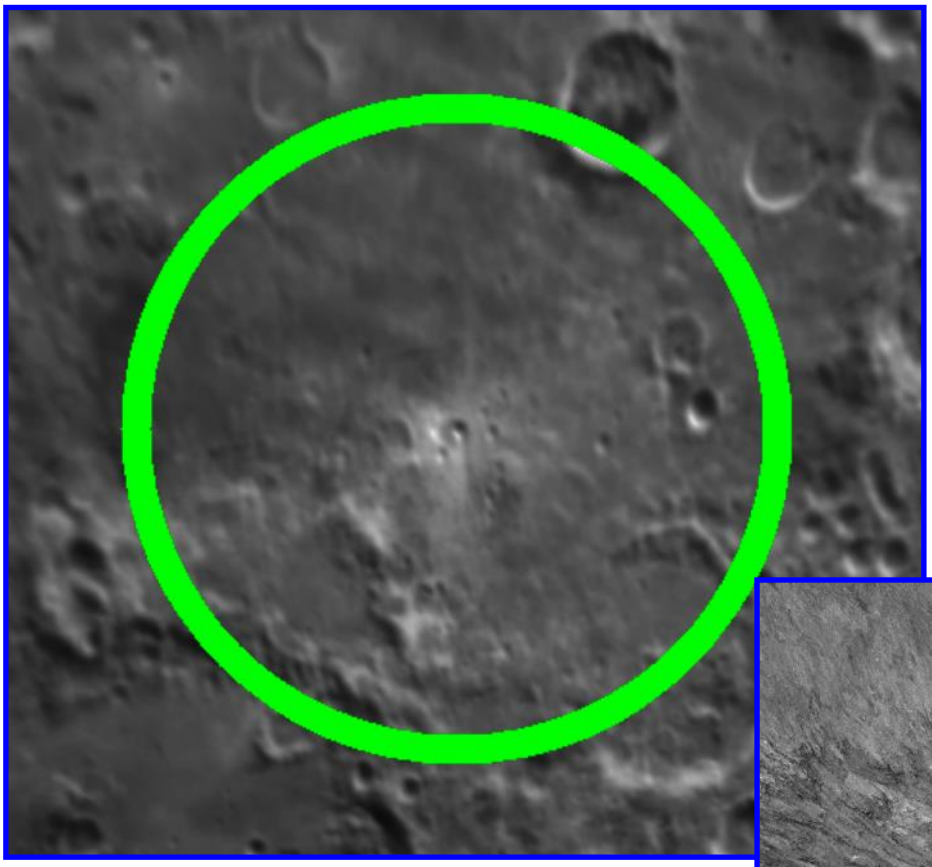


Figure 2. Tycho, *Sergio Babino, SAO, Montevideo, Uruguay. 14 March 2020 0504 UT. 203 mm catadioptic telescope, 2.5 x Power Mate, ASI ZWO ASI 174 mm camera.*

Figure 3 Hell Q. *Above, NASA.*

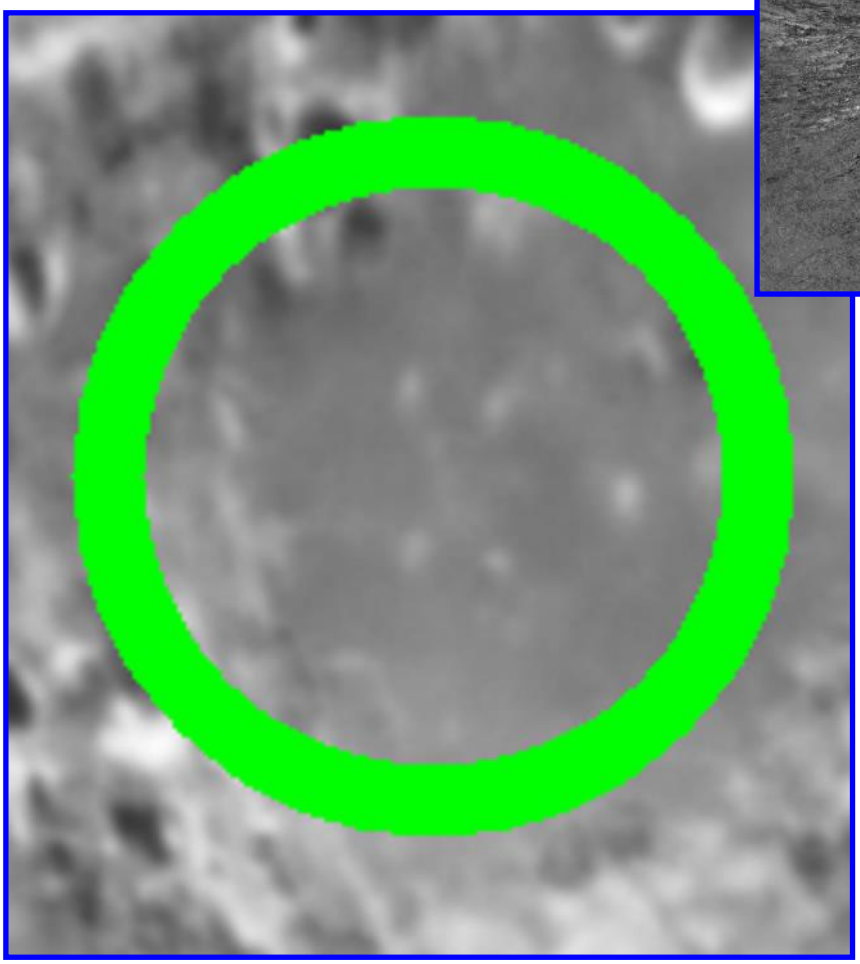
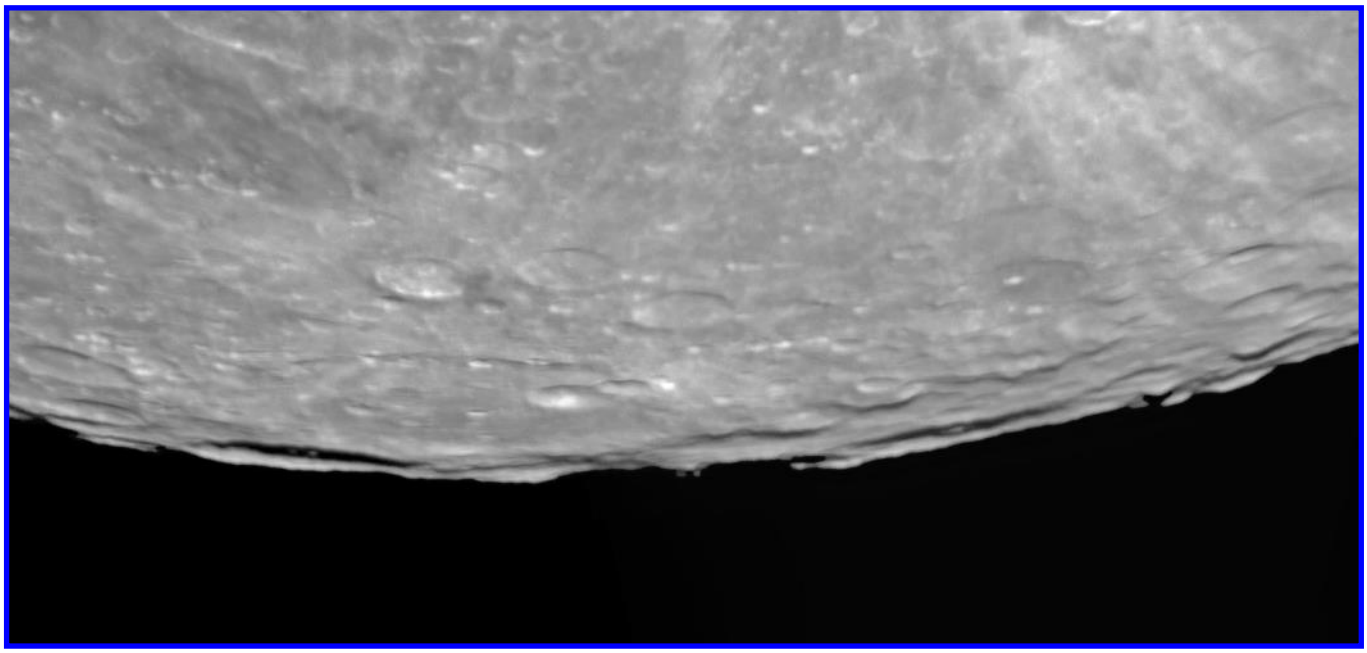


Figure 4. Tycho, *Sergio Babino, SAO, Montevideo, Uruguay. 14 March 2020 0504 UT. 203 mm catadioptic telescope, 2.5 x Power Mate, ASI ZWO ASI 174 mm camera.*

In the Deep South

David Teske



Bailly to Drygalski, *David Teske, Louisville, Mississippi, USA, 09 February 2020 at 0345 UT, colongitude 88.9°. 180 mm Takahashi Mewlon, IR blocking filter, ZWOASI120mms, 500 frames, Firecapture, Registax, Photoshop. Two panel mosaic. Seeing 6/10.*

On 09 February 2020 I was out viewing the almost Full Moon when my attention was grabbed by craters in the deep south of the Moon. The largest crater in the image is the largest crater on the lunar nearside, Bailly. With a diameter of nearly 300 km, Bailly is classified as a medium-sized impact basin. As a sizable multi-ringed impact basin of Nectarian age, it has a low, eroded outer wall that is up to 4130 m deep. Its rough and cratered floor has traces of an inner ring about 150 km in diameter. The relatively fresh craters on the eastern (left) floor of Bailly are Bailly A (38 km) and Bailly B (65 km). The area of Bailly is more than half that of Mare Humorum, but has a lighter floor. Bailly is not lava covered because the projectile that formed it did not have enough kinetic energy to cause sufficient fracturing of the Moon's crust to drive fissures deep enough to reach through to the upper mantle and the crust may be thicker in this region, much like the lunar far side. This huge crater was named after Sylvain Bailly, a French astronomer and politician who lived from 1736 to 1793. Being the French politician that he was, Mr. Bailly met his end at the guillotine.

Above Bailly is the prominent, fresh crater Zucchius. Named after Niccolo Zucchi, the Italian mathematician and astronomer who lived from 1586 to 1670, Zucchius is 64 km in diameter, has a depth of 3.2 km, terraced inner walls and has rays. At Copernican age, (less than 1.1 billion years old), the central peak of Zucchius rises over 1 km.

As the libration was so good this night (-4°17'), I could see beyond Bailly to the crater Hausen. This is the crater on the lunar limb on a line from Zucchius through western Bailly. Named after Christian A. Hausen, the German mathematician, astronomer and physicist, this crater is 167 km in diameter. Its central peak is just poking out from the shadows. Hausen's depth is 6 km, making it one of the deepest craters on the Moon. Comparing its diameter of 167 km to its depth of 6 km, we find that Hausen has a depth of only 4% compared to its width.

To the east (right) of Bailly and Hausen along the limb is another large crater on the limb with a large central peak. This crater is Drygalski with a diameter of 163 km. Named after Erich D. von Drygalski, the German geographer, geophysicist and polar explorer who lived from 1865 to 1949, Drygalski has central peaks 2 km high. It is likely of pre-Nectarian age (4.6 to 3.92 billion years old). Though its floor is barely visible in my image, its floor is smooth, perhaps from fluidized ejecta from the formation of the Orientale Basin 3.8 billion years ago. In his book Map of the Moon, H. Percy Wilkins, FRAS has a delightful drawing of Drygalski is depicted in figure 2.

Between Hausen and Drygalski and just a bit in from the limb is the degraded crater le Gentil. Named after the French astronomer Guilliaume H. le Gentil who lived from 1725 to 1792 (and is famous for his Venus transit misfortunes), this 113 km diameter is eroded. This is likely because Bailly impacted on its northeast rim and Drygalski to its southwest added ejecta. Le Gentile is of pre-Nectarian age and is peppered with craterlets which may be secondaries from the Mare Orientale impact. It sits on the main 2500 km diameter ring/rim of the South Pole-Aitken Basin. In fact, the mountains on the limb of the Moon in this image may be part of the peak ring of the South Pole-Aitkin Basin.

References

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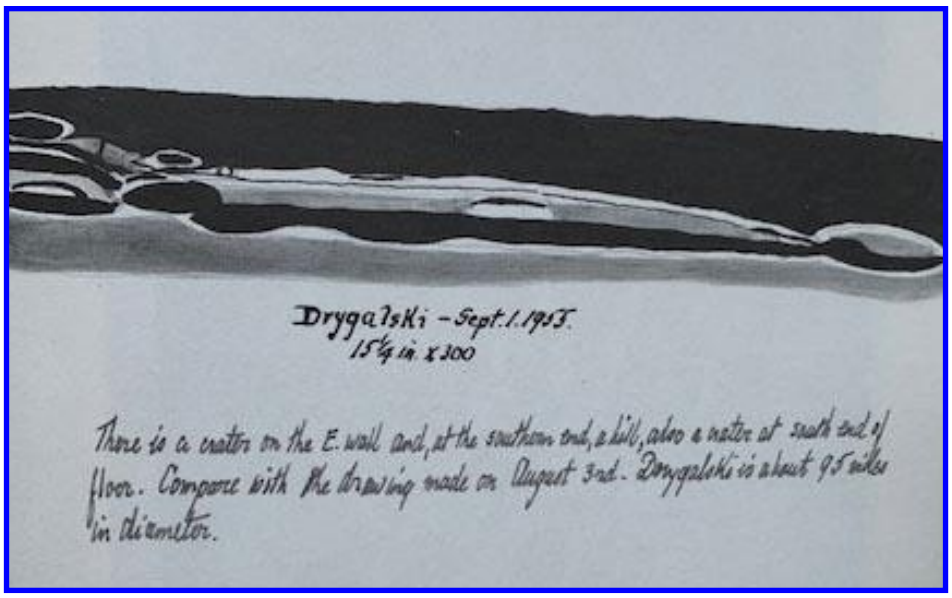
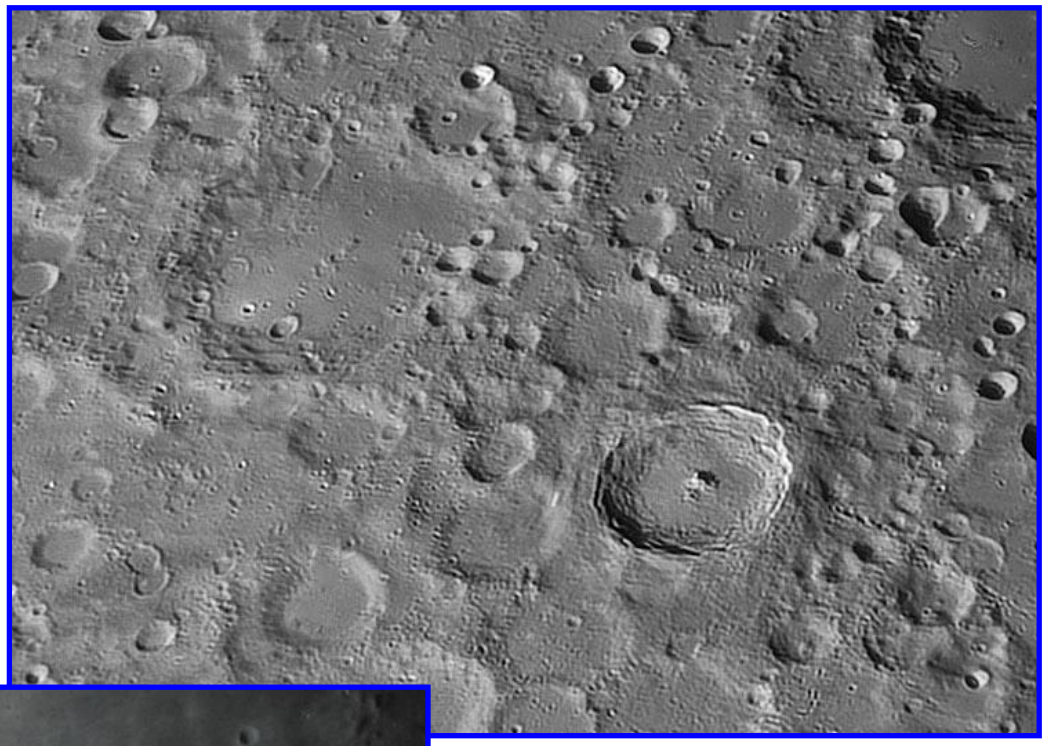


Figure 2

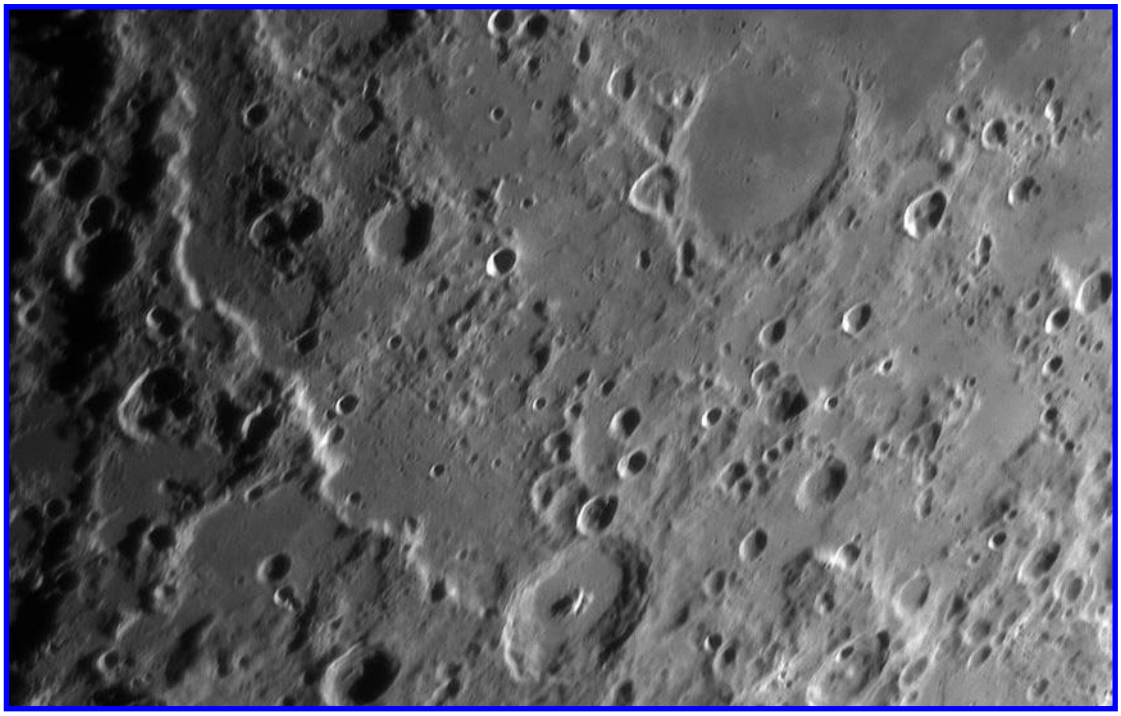
Recent Topographic Studies



Tycho, *Michael Sweetman, Tucson, Arizona, USA. Sky Crest Observatory. 05 March 2020 0708 UT. 8 inch f/12 Guan Sheng Classical Cassegrain , Skyris 132M camera, Astronomik Pro IR 742nm filter. Seeing 4-6/10, transparency 3/6. South top, west right.*

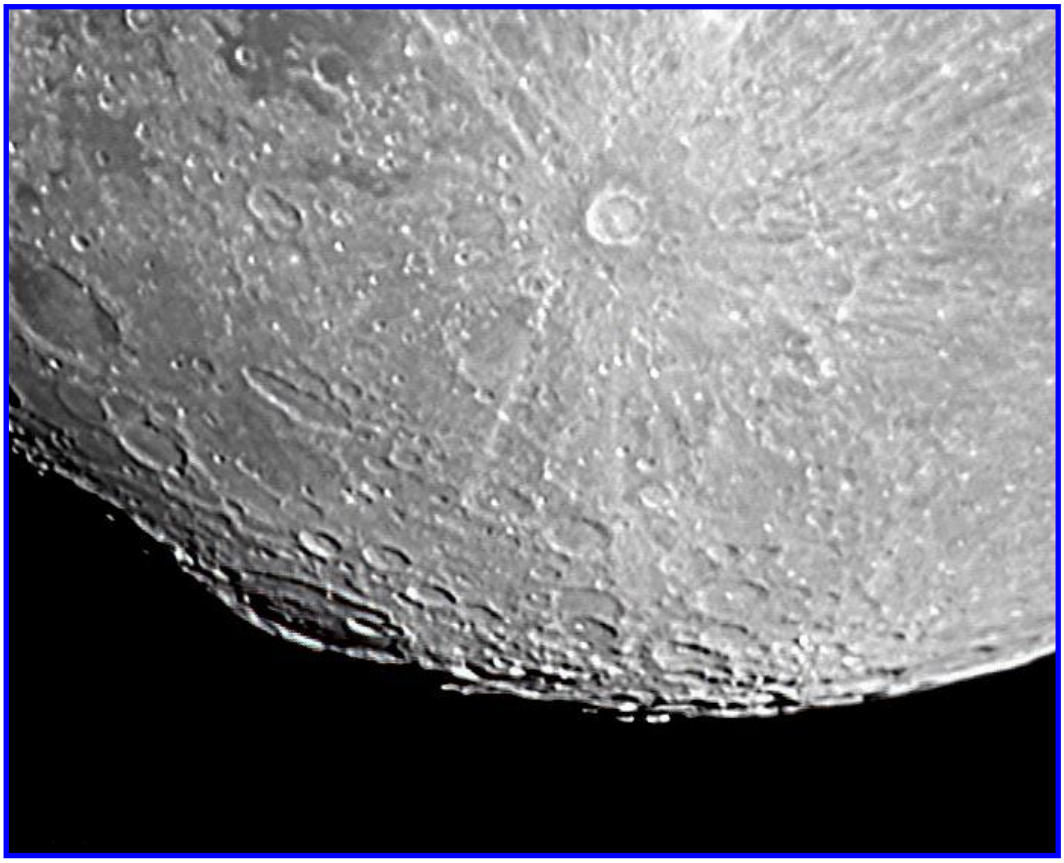
Aristarchus, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 16 March 2020 0855 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Recent Topographic Studies



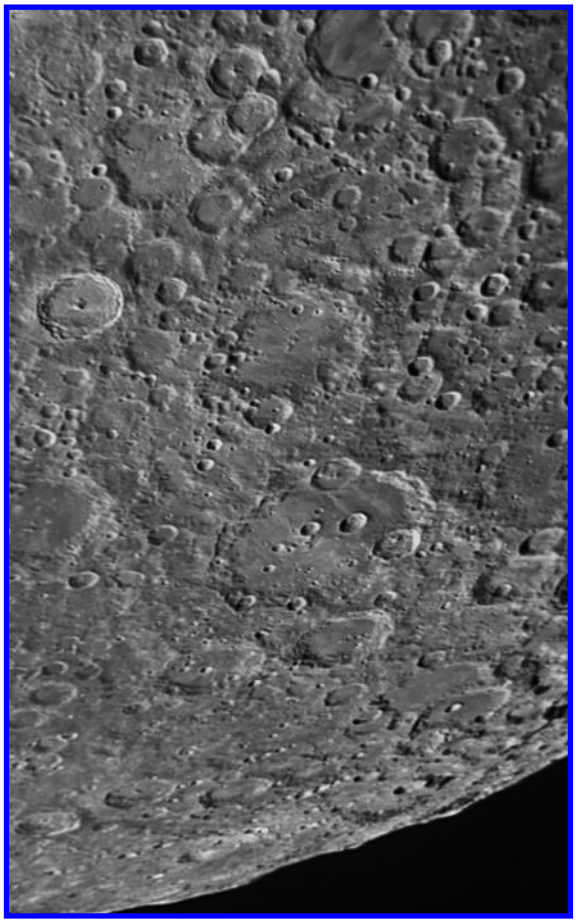
Rupes Altai, *Howard Eskildsen, Ocala, Florida, USA. 29 February 2020 2346 UT, colongitude 345.1°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, W-25 red filter, Skyris 236M camera. Seeing 7/10, transparency 5/6.*

Three rings from the Nectaris impact basin are visible. The Altai Mountains (Rupes Altai) arc from Piccolomini at the bottom of the image to the upper left of the image showing the outer ring of the basin. The inner ring is just visible on the upper right where the flat mare surface is interrupted by Fracastorius which itself is flooded with mare basalt. Between Fracastorius and the Altai Mountains, a low, broad ridge arcs across the upper left image. That is the middle ring of this three-ring basin.



Tycho, *Leonardo Alberto Colombo, Cosquín, Argentina. 08 March 2020 0216 UT. 67 mm refractor. Samsung SCB 2000 camera.*

Recent Topographic Studies



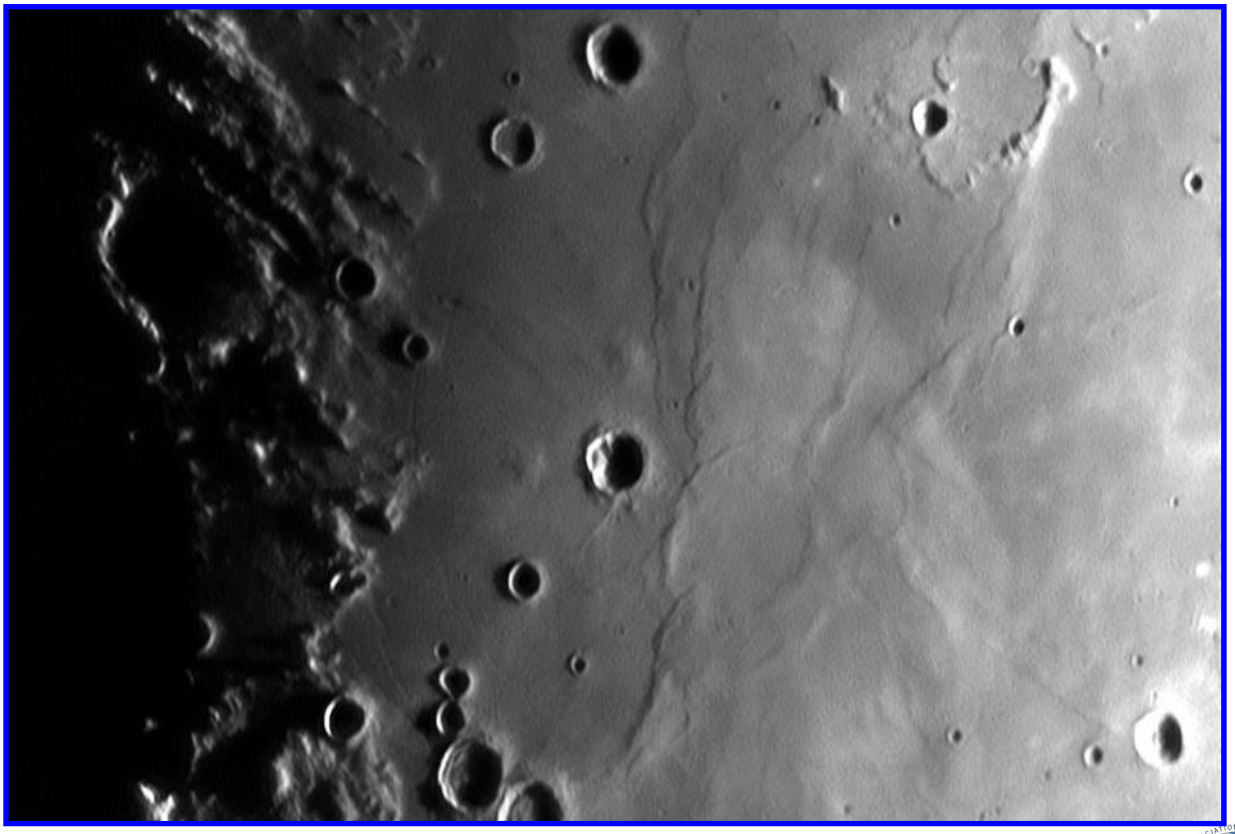
Right, Clavius, *Sergio Babino, Montevideo, Uruguay. 14 March 2020 0134 UT. 250 mm catadioptric telescope. ASI ZWO 174 mm camera.*

Below, Lamont, *Howard Eskildsen, Ocala, Florida, USA. 29 February 2020 2334 UT, colongitude 345.0º. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, W-25 red filter, Skyris 236M camera. Seeing 7/10, transparency 5/6.*

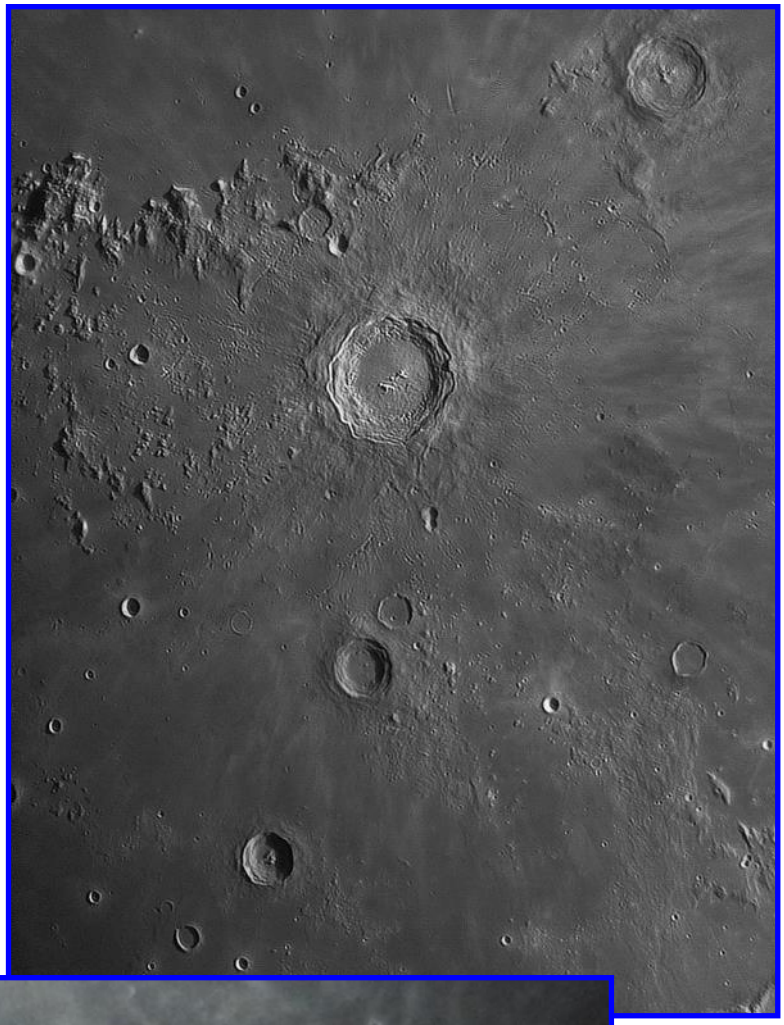
This area shows various effects of lunar volcanism. Crater Arago sits in Mare Tranquillitatis near the middle of the image. To its lower right a swarm of "wrinkle ridges" (dorsa) show where compression forces acted on the broad lava mare sheet that settled after it had solidified. Some suggest that the central oval ridges outline a buried crater, but it is possible that this is a random effect of the compression forces focused towards the center of settling.

Along the margin of the mare, settling caused tension or distraction where the settling basalts pulled away from the margins. Arcuate cracks (rilles) on the left side of Mare Tranquillitatis, near the margin of the mountains to the left, resulted from those forces.

Finally, notice the mounds to the north and to the east of Arago? These are last-gasps of volcanism in the area and were of higher viscosity lava and so formed low domes like shield volcanoes on Earth. They are known as the Arago Domes.



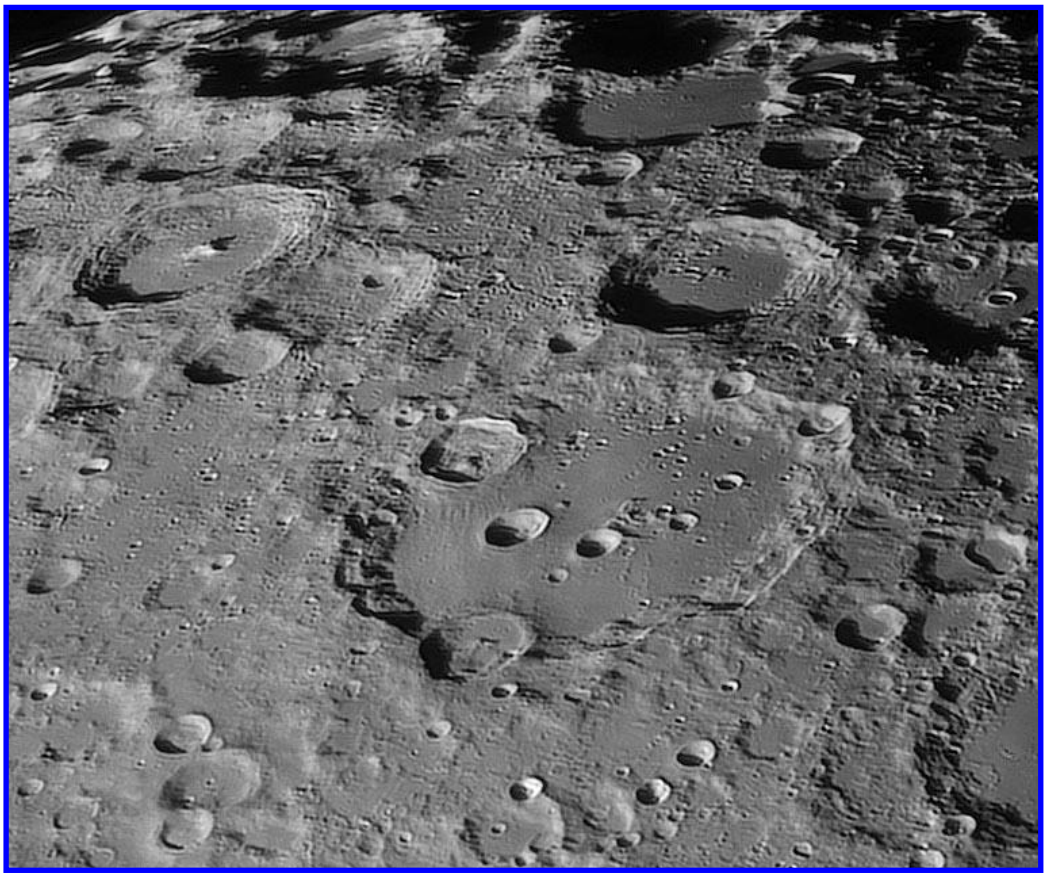
Recent Topographic Studies



Copernicus, *Michael Sweetman, Tucson, Arizona, USA. Sky Crest Observatory. 05 March 2020 0711 UT. 8 inch f/12 Guan Sheng Classical Cassegrain , Skyris 132M camera, Astronomik Pro IR 742nm filter. Seeing 4-6/10, transparency 3/6.*

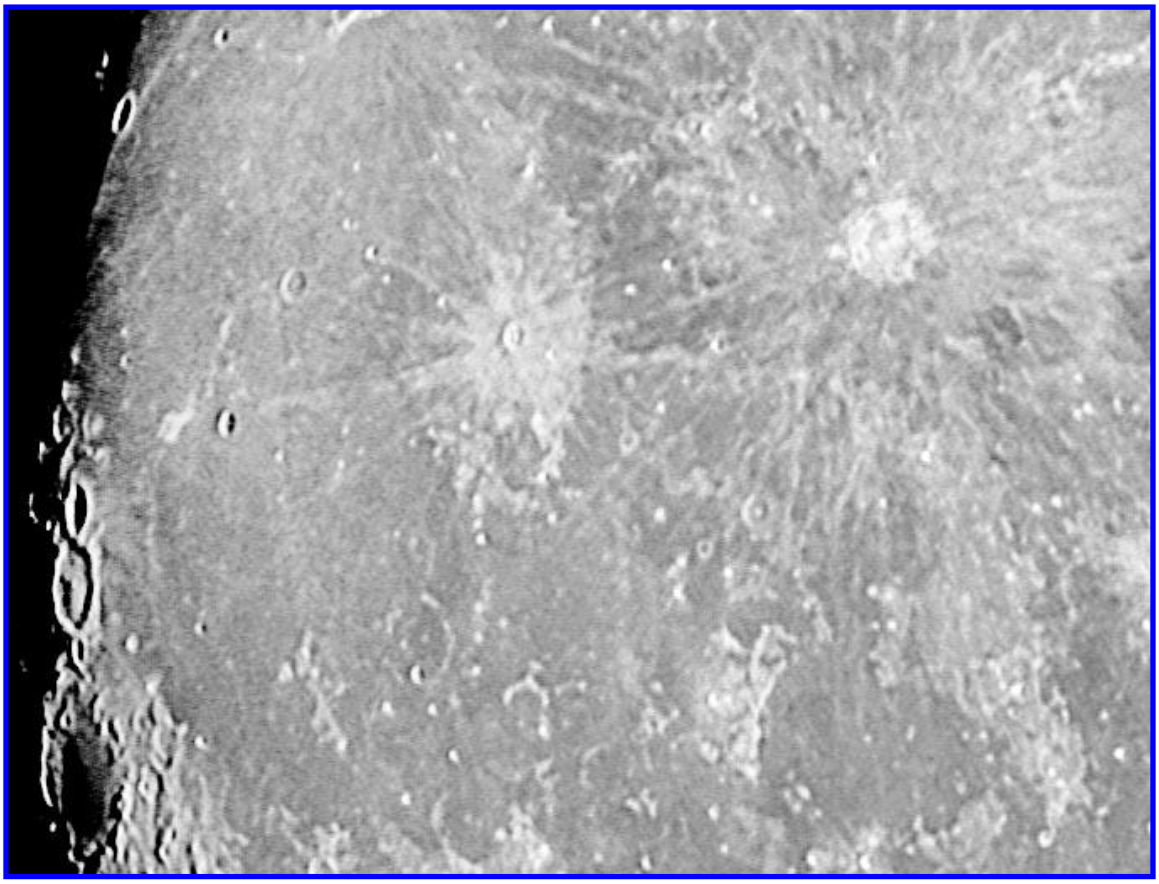
Below, Copernicus, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 16 March 2020 0855 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Recent Topographic Studies

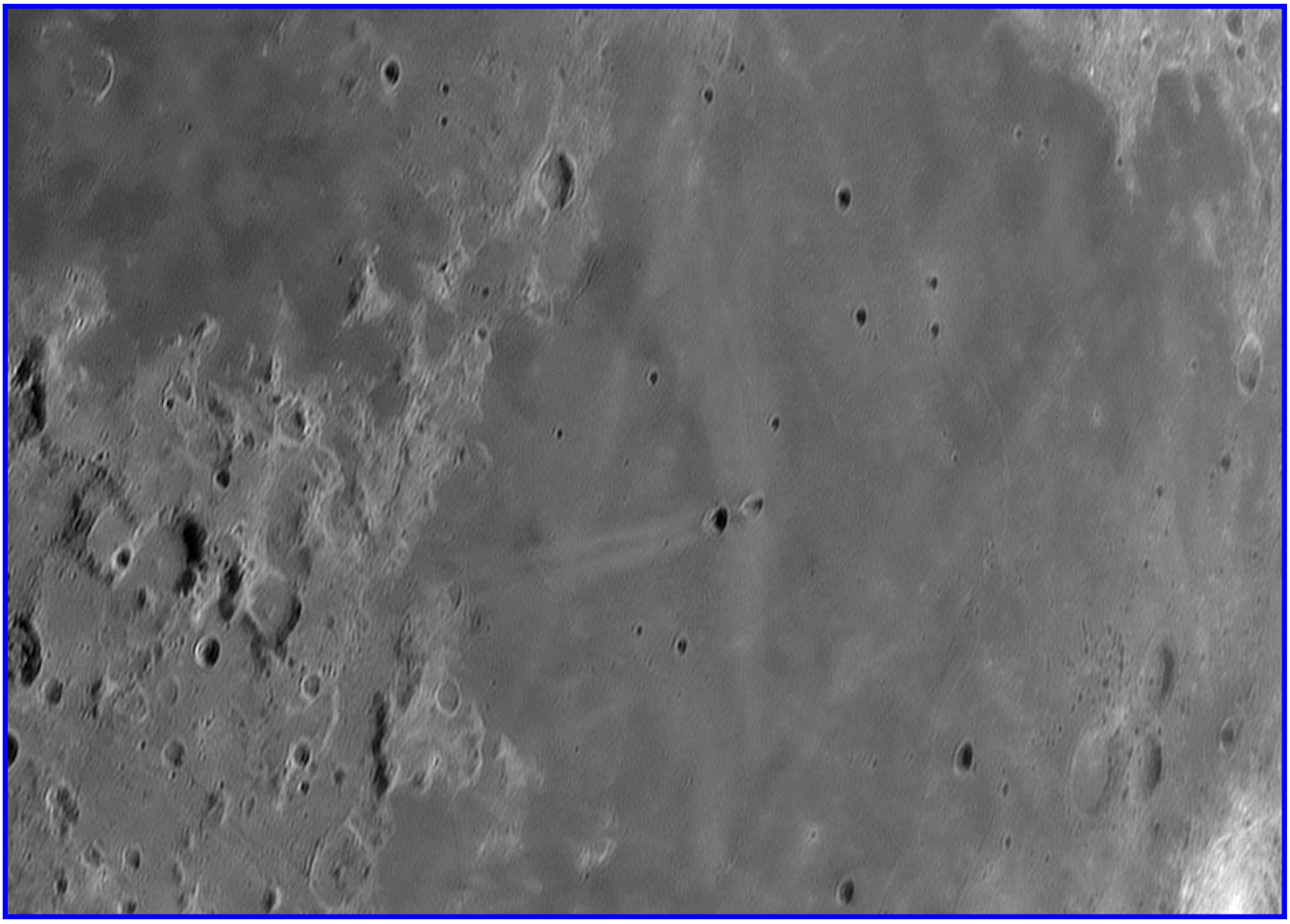


Clavius, *Michael Sweetman, Tucson, Arizona, USA. Sky Crest Observatory. 05 March 2020 0708 UT. 8 inch f/12 Guan Sheng Classical Cassegrain , Skyris 132M camera, Astronomik Pro IR 742nm filter. Seeing 4-6/10, transparency 3/6. South top, west right.*

Below, Copernicus, *Leonardo Alberto Colombo, Cosquín, Argentina. 08 March 2020 0220 UT. 67 mm refractor. Samsung SCB 2000 camera.*



Recent Topographic Studies



Messier, *Howard Eskildsen, Ocala, Florida, USA. 29 February 2020 2349 UT, colongitude 345.1°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, W-25 red filter, Skyris 236M camera. Seeing 7/10, transparency 5/6.*

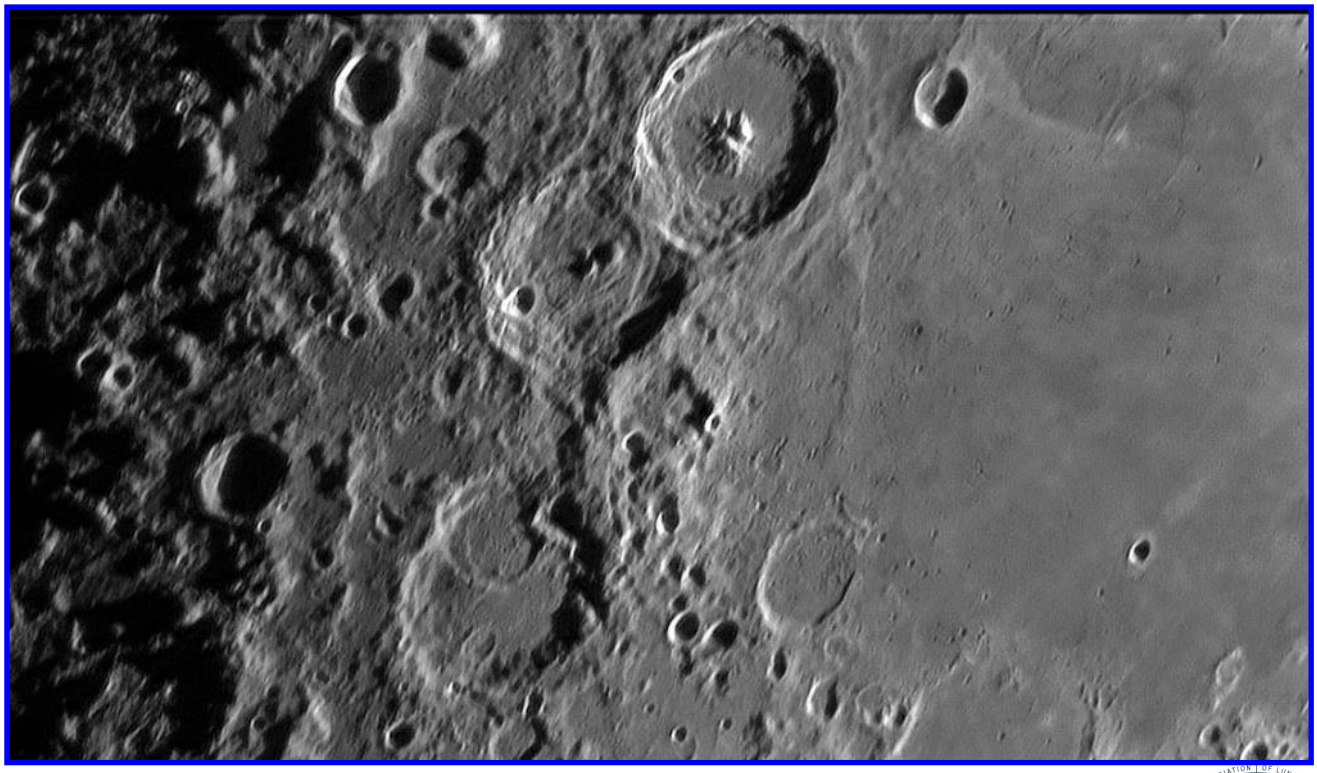
Messier and Messier A on Mare Fecunditatis form a curious pair near the center of the image. Though small, they are notable for their strange ray pattern. Messier (crater to right) has "wings" of ejecta spreading north and south from it and the east margin of Messier A. Two long streamers extend downrange from Messier A like a pair of tails. The two craters are the result of a single, very low angle impact from the east, perhaps three degrees or less. This low angle caused the impactor to either break apart, or skip over the surface, first creating Messier and then exploding to form Messier A. In the process it created the butterfly wings extending north and south and the downrange rays. Discovery of the dynamics of this feature required the development of hypervelocity mini-cannons firing projectiles at speeds of 1-2 miles per second at varying angles. Until hyper-cannon experiments solved the mystery, some very fanciful explanations had been proposed.

Recent Topographic Studies

Mare Crisium, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 10 March 2020 0017 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Below, Nectaris, *Howard Eskildsen, Ocala, Florida, USA. 29 February 2020 2346 UT, colongitude 345.1°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, W-25 red filter, Skyris 236M camera. Seeing 7/10, transparency 5/6.*

I refer to this image as "elements of ruin" The left side of the image shows what the right side of the image may have looked like before a huge meteor slammed into the area, erased the craters there, and created the Nectaris basin that later filled with lava. Three large craters cross the central image. Theophilus at the top of the image appears in good shape and landed long after the basin was created. It crashed into the northeast (upper right side) rim of Cyrillus and spread ejecta across its surface. South of Cyrillus near the lower margin of the image, the badly battered Catharina probably survived the Nectaris impact as well as several other small impacts and is very badly weathered or ruined.

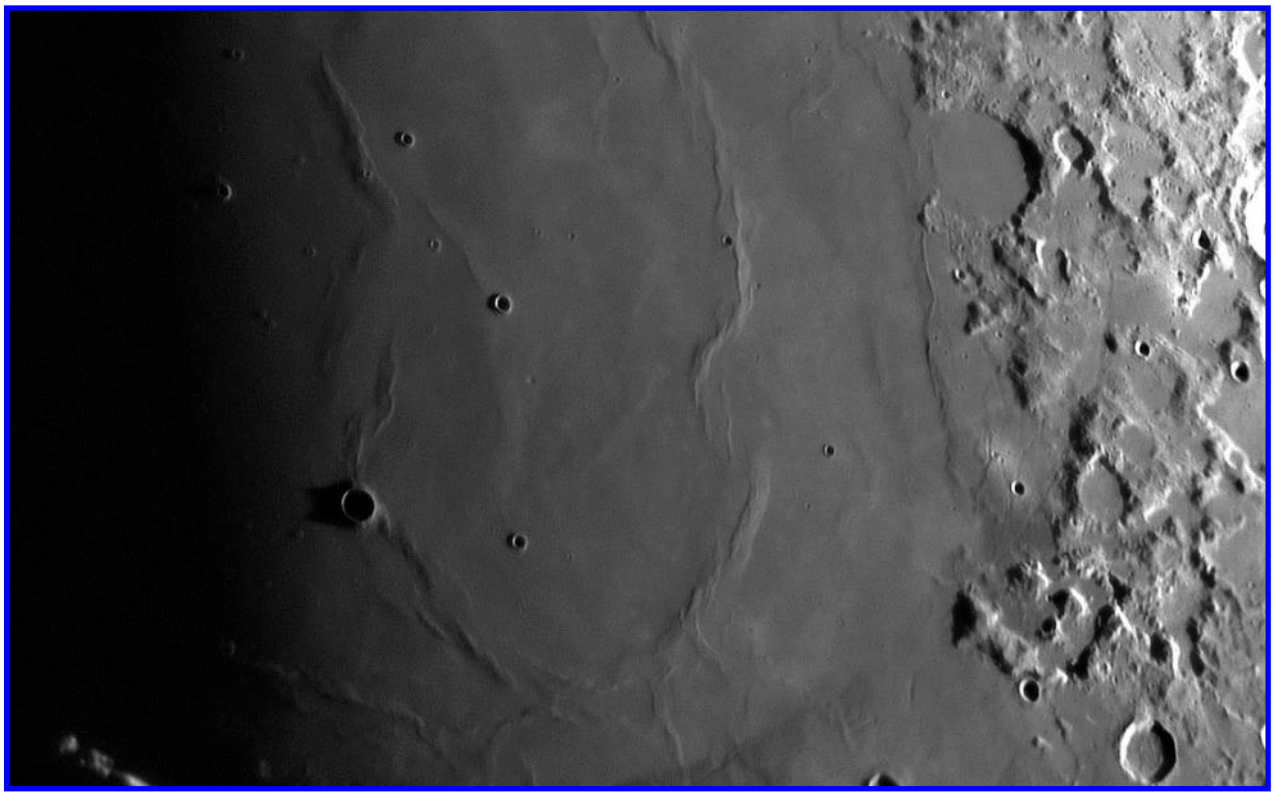


Recent Topographic Studies

Right, Plato, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 16 March 2020 0855 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Below, Serpentine Ridge *Howard Eskildsen, Ocala, Florida, USA. 29 February 2020 2338 UT, colongitude 345.0°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, W-25 red filter, Skyris 236M camera. Seeing 7/10, transparency 5/6.*

The unofficially-named "Serpentine Ridge" is visible coursing across this image of Mare Serenitatis, and is another example of wrinkle ridges formed by settling over time of the solidified lava sheets. The whole Serpentine Ridge consists of segments officially known as Dorsa Smirnov on the upper central image, Dorsa Lister forming the "U" shape at the lower image and extending to the upper left. Incidentally, on the lower right of the image lies the rugged Taurus-Littrow Valley astronauts last left foot prints on the Moon during the Apollo 17 mission.



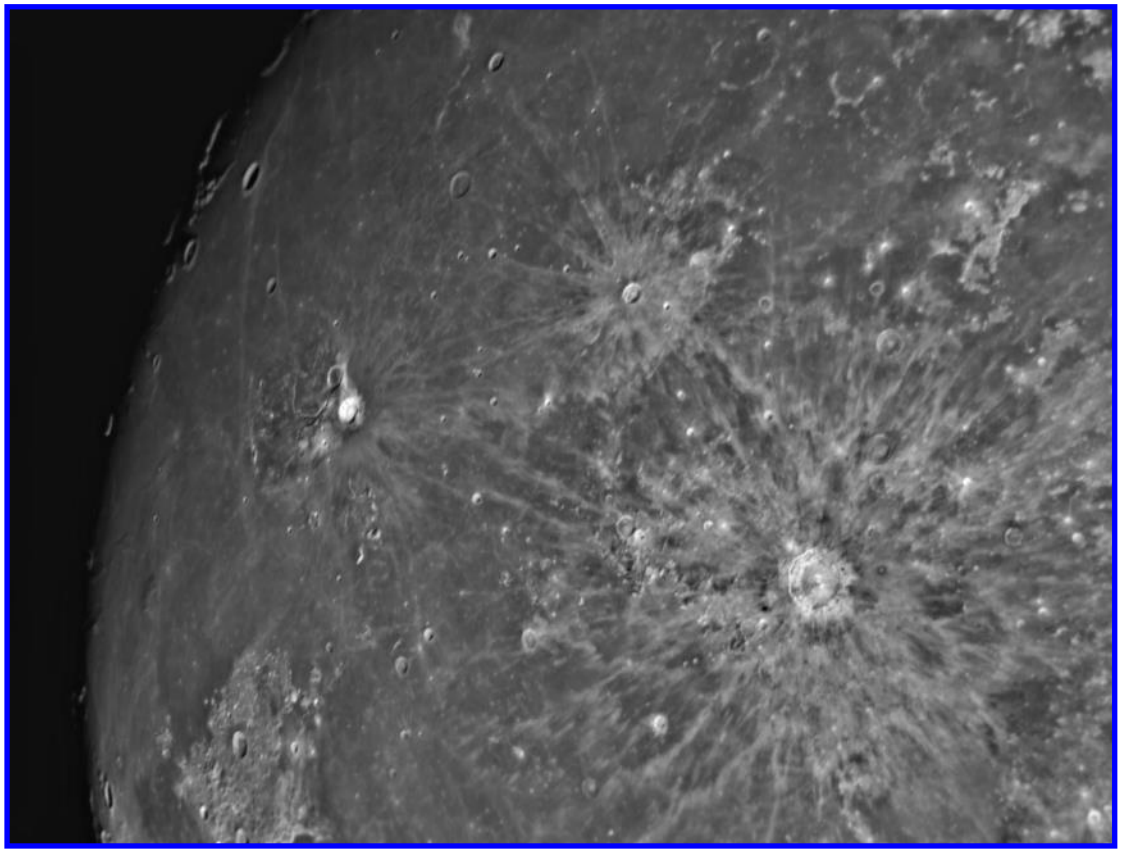
Recent Topographic Studies

Right, Theophilus, *Sergio Babino, Montevideo, Uruguay. 14 March 2020 0149 UT. 250 mm catadioptric telescope. ASI ZWO 174 mm camera.*

Petavius, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 10 March 2020 0018 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Recent Topographic Studies

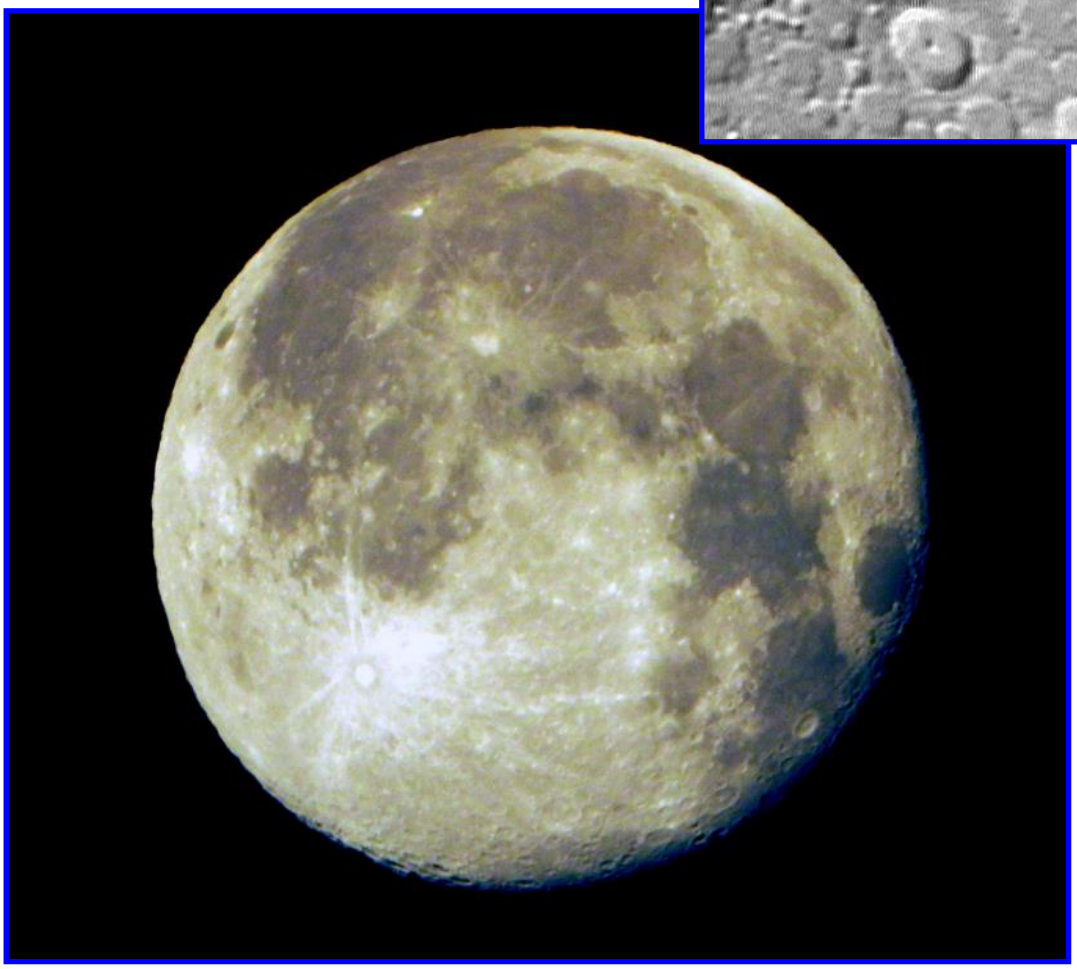
Moretus, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 16 March 2020 0855 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*



Copernicus-Kepler, *Sergio Babino, Montevideo, Uruguay. 08 March 2020 0129 UT. 250 mm catadioptric telescope. ASI ZWO 174 mm camera.*

Recent Topographic Studies

Bullialdus, *Leonardo Alberto Colombo, Cosquín, Argentina. 05 March 2020 0225 UT. 67 mm refractor. Samsung SCB 2000 camera.*



Waning Gibbous Moon, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 10 March 2020 0018 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Recent Topographic Studies

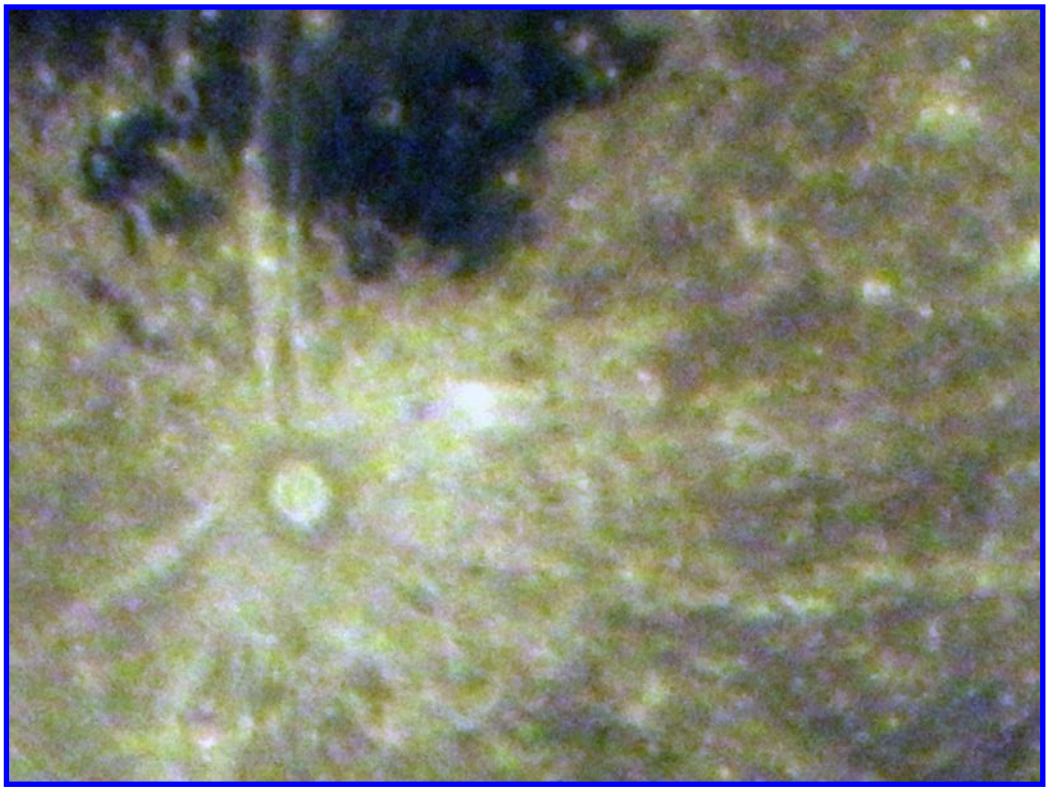
Plato, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 17 March 2020 1007 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Gassendi, *Sergio Babino, Montevideo, Uruguay. 08 March 2020 0134 UT. 250 mm catadioptric telescope. ASI ZWO 174 mm camera.*

Recent Topographic Studies

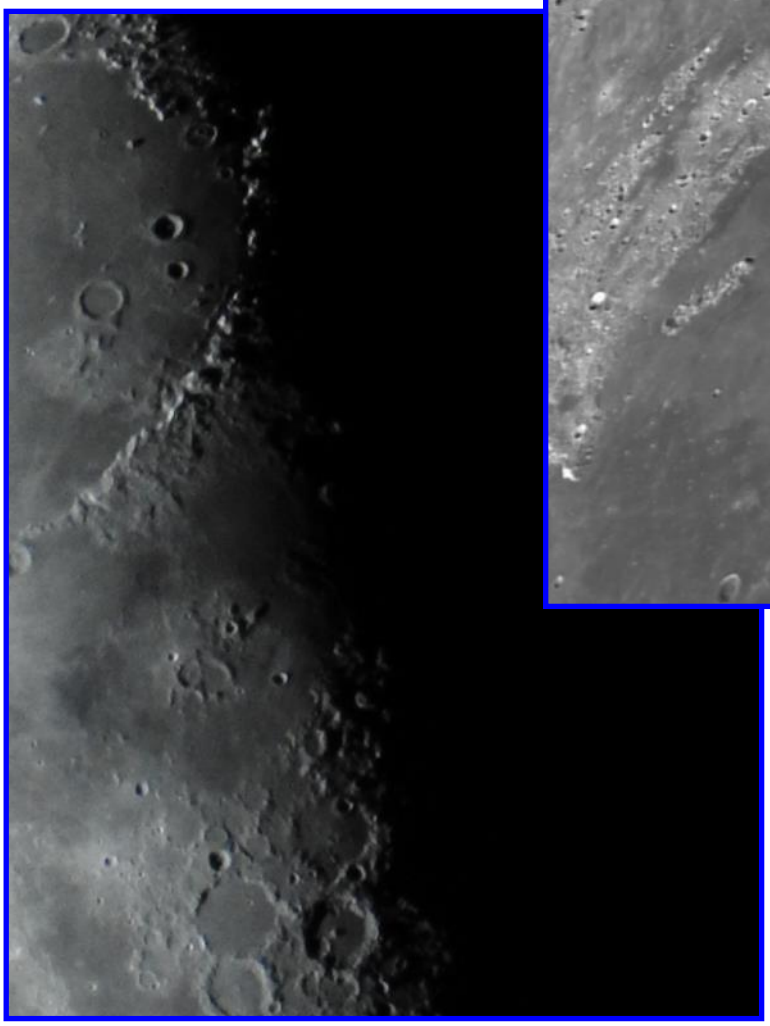
Purbach, *Leonardo Alberto Colombo, Cosquín, Argentina. 02 March 2020 0014 UT. 67 mm refractor. Samsung SCB 2000 camera.*

Tycho, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 10 March 2020 0019 UT. 67 mm refractor, 1428 mm fl. Nikon P900 camera.*



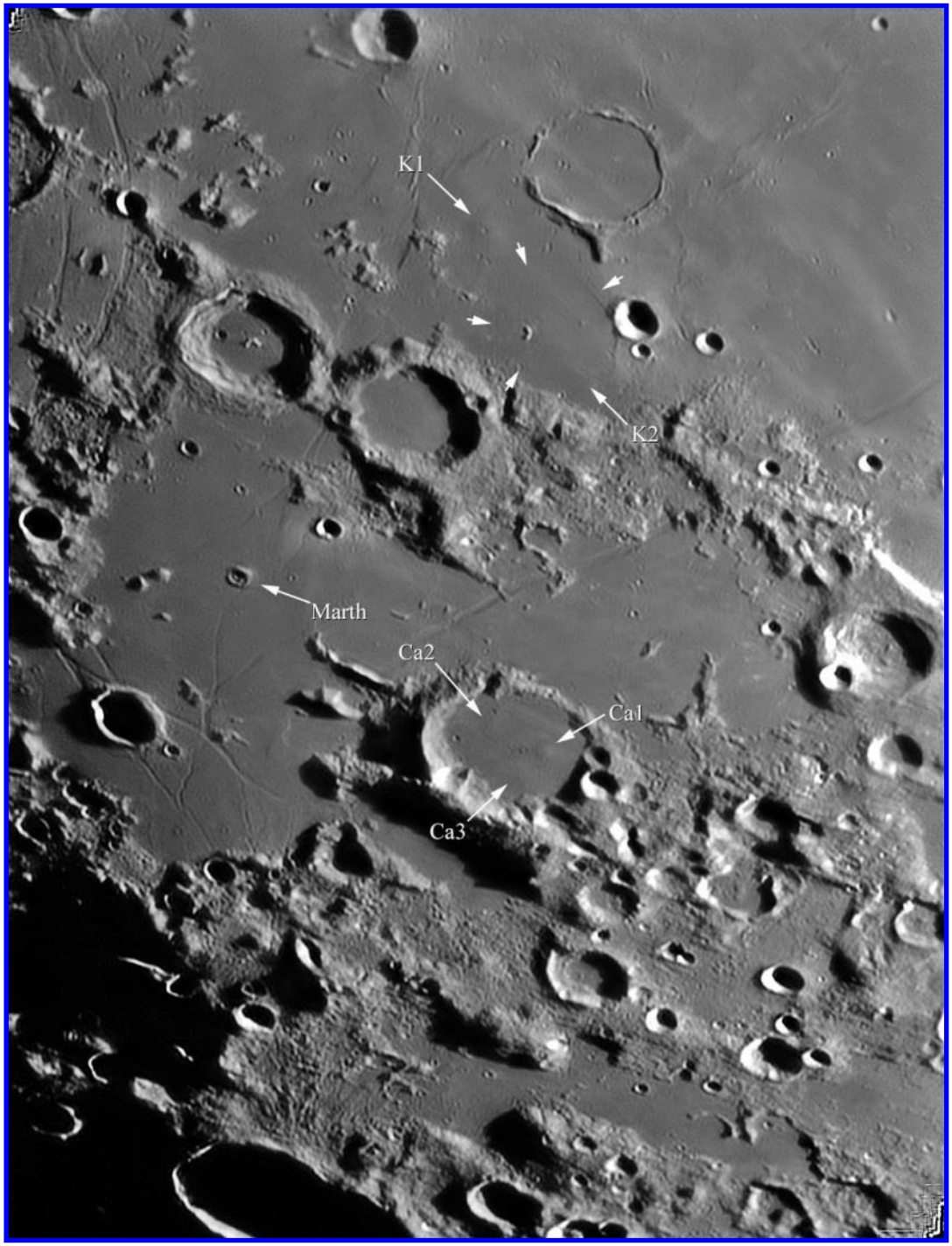
Recent Topographic Studies

Plato, *Sergio Babino, Montevideo, Uruguay. 08 December 2019 0032 UT. 250 mm catadioptric telescope. ASI ZWO 174 mm camera.*



Montes Apenninus, *Abel David Emiliano Gonzalez Cian, AEA - Oro Verde, Entre Rios, Argentina. 16 March 2020 0855 UT. 67 mm refractor, 1285 mm fl. Nikon P900 camera.*

Recent Topographic Studies

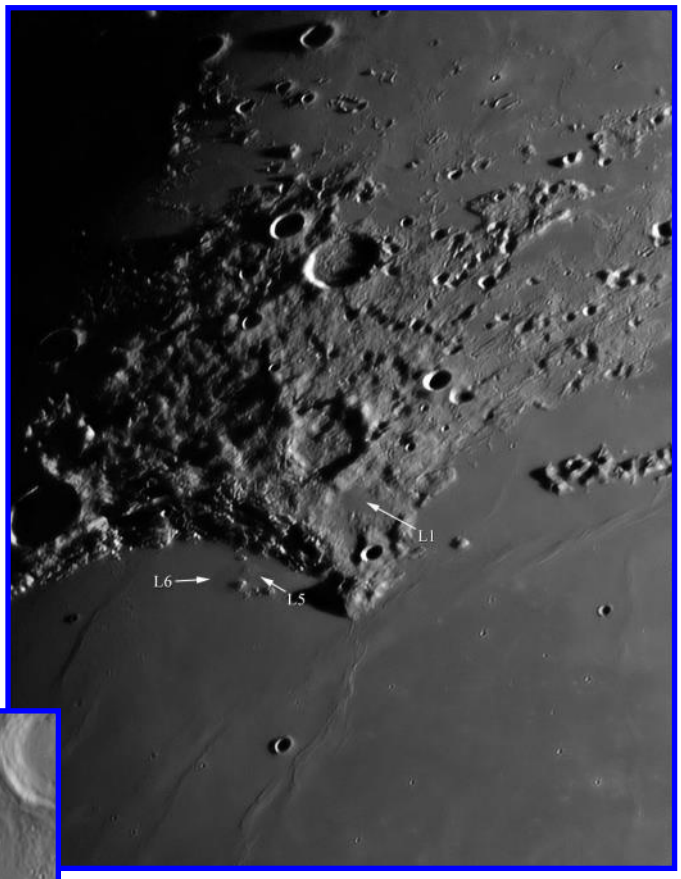


Domes: Kies to Epidemiarum, *Howard Eskildsen, Ocala, Florida, USA. 05 January 2020 2321 UT, colongitude 35.9°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, 2x Barlow, W-25 red filter, DMK 41AU02.AS camera. Seeing 7/10, transparency 5/6.*

The crater Kies had one well known dome labeled K1 on this image as well as a lesser-known dome, K2, which is outlined by short arrows, south and east of K1. In Palus Epidemiarum, Capuanus has three domes with locations marked on the image. Also the strange concentric crater, Marth, is located on a dome as well. The eastern margin of the dome is visible between the tip of the arrow and the eastern crater wall. Information source for Kies and Capuanus domes can be found at from the Lunar Domes Atlas GLR group at http://kiesdomes.blogspot.com/ and at http://capuanusdomes.blogspot.com/

Recent Topographic Studies

Promontorium Laplace, *Howard Eskildsen, Ocala, Florida, USA. 05 January 2020 2322 UT, colongitude 35.9°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, 2x Barlow, W-25 red filter, DMK 41AU02.AS camera. Seeing 7/10, transparency 5/6.*



Lansberg D Domes, *Howard Eskildsen, Ocala, Florida, USA. 05 January 2020 2326 UT, colongitude 35.9°. C9.25 Schmidt-Cassegrain telescope, f/10, fl 2395 mm, 2x Barlow, W-25 red filter, DMK 41AU02.AS camera. Seeing 7/10, transparency 5/6.*

Lunar Geologic Change Detection Program

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

2020 April

Reports have been received from the following observers for Feb: Jay Albert (Lake Worth, FL, USA - ALPO) observed: Aristarchus, Censorinus, Gassendi, Mare Imbrium, and Plato. Alberto Anunziato (Argentina - SLA) observed earthshine and sketched Eudoxus. Aylen Borgatello (Argentina - AEA) imaged Birt, Carlini and Mons Pico. Pasquale D'Ambrosio (Italy - UAI) imaged the Full Moon. Rob Davies (Mid Wales – BAA/NAS) imaged: Mersenius and several features. Walter Elias (Argentina – AEA) imaged: Aristarchus, Gassendi, Proclus, Stevinus, and Tycho. Clyde Forster (South Africa – BAA) imaged Moretus. Victoria Gomez (Argentina – AEA) imaged Mare Imbrium, Plato and Tycho. Leonardo Mazzei (Italy – UAI) imaged Sinus Iridum. Gabriel Re (Argentina – AEA) imaged: Copernicus, Grimaldi and Promontorium Laplace. Phil Sheperdson (Woodthorpe, UK – BAA) observed/imaged Ptolemaeus. Trevor Smith (Codnor, UK - BAA) observed: Aristarchus, Bullialdus, Darney, Eratosthenes, Herodotus, Mons Piton, Plato, Proclus, and Sinus Iridum. Bob Stuart (Rhayader, UK – BAA/NAS) imaged: Anaximander, Aristarchus, Babbage, Capuanus, Clavius, Copernicus, Gassendi, Goldschmidt, Hainzel, Herschel, Kepler, Mairan, Mare Imbrium, Moretus, Philolaus, Schiller, Tycho, W. Bond and several features. Franco Taccogna (Italy – UAI) imaged: Mare Frigoris and the Full Moon. Aldo Tonon (Italy – UAI) imaged: Eratosthenes, Mersenius, Sinus Iridum and the Full Moon.

News: This has been a surreal last few weeks, across the globe, with lock down for large parts of the World's population. I have been checking up on many of our observers by email and fortunately, at the time of writing everybody has been free of Covid-19 but frustrated that they cannot go out much. Fortunately, some have telescopes that they can use from their gardens. However, please do be careful out there, and make sure you wrap up warm and watch out for trip hazards in the dark – we all really want to do our best and avoid keeping out of hospitals right now.

LTP reports: In the November 2019 edition of The Lunar Observer, p. 32 I stated that the date of Alberto Anunziato's (SLA) sketch of Deluc H was 2019 Oct 06 - this should have read 2019 Jun 10. A mistake on my part in interpreting American versus European date notations.

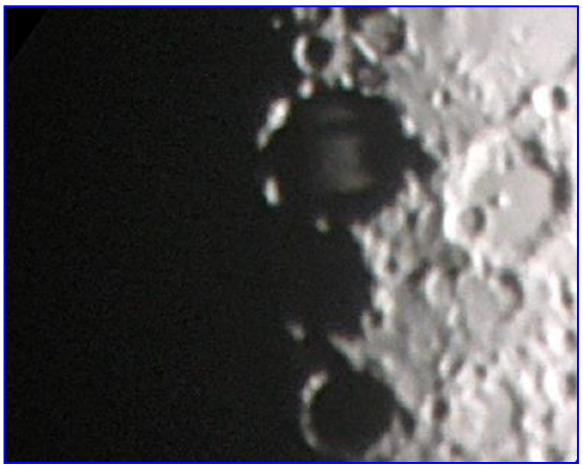


Figure 1. *Ptolemaeus, as imaged by Phil Sheperdson on 2020 Feb 01, taken some time between 19:40-19:50 UT. Image orientated with north towards the top.*

Although not a LTP, Phil Sheperdson (BAA) contacted myself, and the director of the BAA Lunar Section, to query the appearance of "veiled light" on the floor of Ptolemaeus that he saw visually and imaged (Fig 1) on 2020 Feb 01 UT 19:40-19:50. This is the sort of thing we expect observant astronomers to report in the LTP program. Fortunately, on this occasion, both myself and Bill Leatherbarrow, instantly recognized this as the effect of a fine grid of shadow spires from the rim, falling across the flat floor during sunrise. Similar effects can sometimes be seen on the flat floors of Plato and Archimedes. Nevertheless, it's an interesting and spectacular appearance to look out for, so I have added it to the Lunar Schedule web site, with another idea to test out, namely how does the appearance change when viewed through a polaroid filter? Given that the sunlight reaching the floor is coming through a narrow strip of valleys in the rim, maybe we can check to see if the illuminated floor gets brighter or darker when the polarizing filter is rotated. This may not work, but it might be interesting to try.

Another thing that was not a LTP, but nevertheless transient, and we will unfortunately be seeing a lot more of in the next few months and years, are Elon Musk's flotilla of Starlink satellites (or the remains of the bankrupt Oneweb company satellites?). On 2020 Mar 27 UT 19:51:58-19:53:16 UT, in just a span of 78 sec, some 4 satellites flew past the earth lit Moon from where I was observing here in the UK. Fig 2 shows a composite shot of them exiting the SW limb of the Moon. They were not all together like in Fig 2, but were spaced apart and definitely all travelling in the same direction and the same speed. I am estimating that the magnitude was around 5-6? This probably won't hinder our lunar observations, apart from showing up as false detections in impact flash software, but will definitely play havoc with Deep Sky astronomers. Although this technology has a benevolent use of satellites, providing cheap coverage and communication in some of the poorest parts of the world, it also has the potential to massively increase space junk - should anything go wrong and renegade/defunct start colliding!

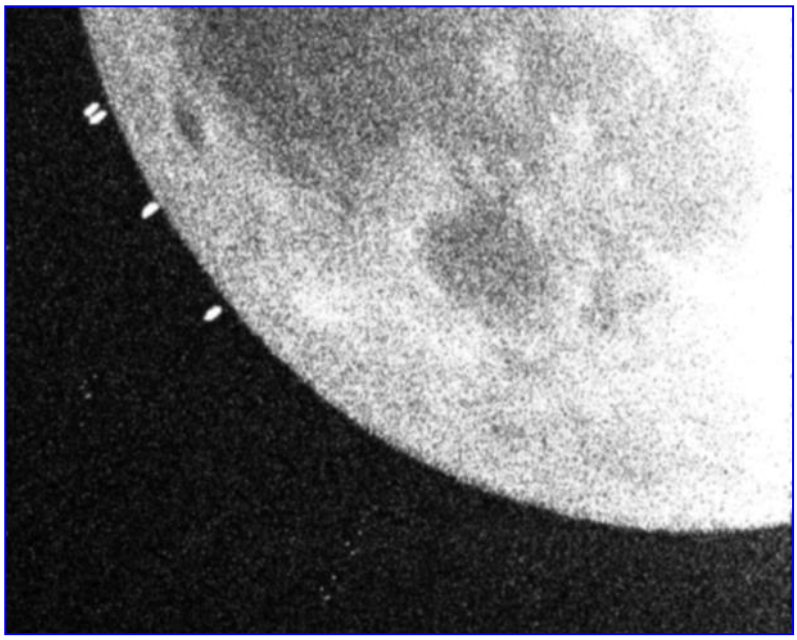


Figure 2. *A Composite view of Earthshine with four suspected Starlink satellites exiting the SW limb. Taken by Tony Cook from Newtown, UK on 2020 Mar 27, These four frames are each 1/50th sec exposure and were from frames combined from video captured between 19:51:58 and 19:53:16UT.*

Routine Reports: Below are a selection of reports received for February that can help us to re-assess unusual past lunar observations – if not eliminate some, then at least establish the normal appearance of the surface features in question.

Eratosthenes: On 2020 Feb 03 UT 19:10-19:35 Trevor Smith (BAA) sketched and observed visually this crater whilst the Sun was at a similar illumination (±0.5°) to the following Walter Haas report:

On 1936 Oct 25 at 01:35 UT W. Haas (Alliance, OH, USA, 12" reflector) saw small bright spots on the floor of Eratosthenes, (Pickering's atlas 9A, col. 30deg, shows no spots - according to Cameron). Cameron 1978 catalog LTP=417 and weight=4. ALPO/BAA weight=1.

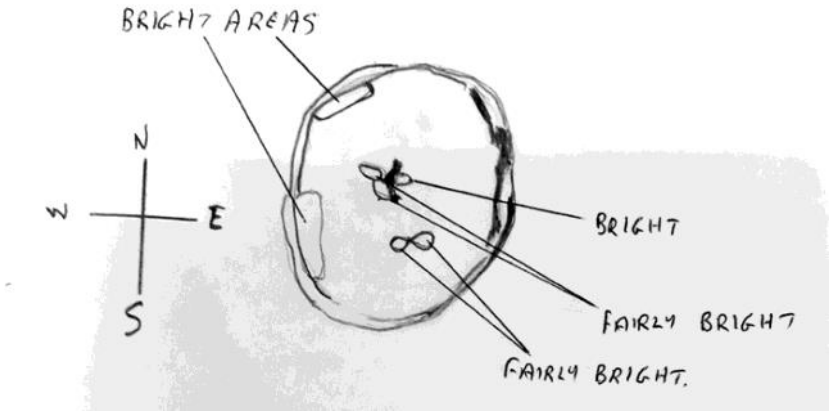


Figure 3. *An Eratosthenes sketch by Trevor Smith (BAA) made on 2020 Feb 03 UT 19:10.*

Trevor comments that there were no signs of any bright spots on the crater floor. The central peak was bright and sunlit. Some lighter areas were labelled as seen in Fig 3 and these were especially well seen in yellow Wratten 12 and 15 filters. I should point out that Trevor was using a 16" reflector, so if any spots were to be seen they should have been, except for the fact his seeing was a poor Antoniadi IV. We shall leave the ALPO/BAA weight at 1 for now.

Sinus Iridum: On 2020 Feb 04 UT 20:10-20:45 Trevor Smith observed, and at 20:32 Leonardo Mazzei (UAI) imaged, this area under a Lunar Schedule request for similar colongitudes for the following report:

BAA Request: Is there a dark shaded area on the floor of size approximately ~1/4 diameter of Sinus Iridum and on western interior by the rim? Telescopes as small as 2" aperture can be used for this study at a magnification of approximately 110x. Any visual descriptions, sketches or images should be emailed to: a t c @ a b e r . a c. u k .

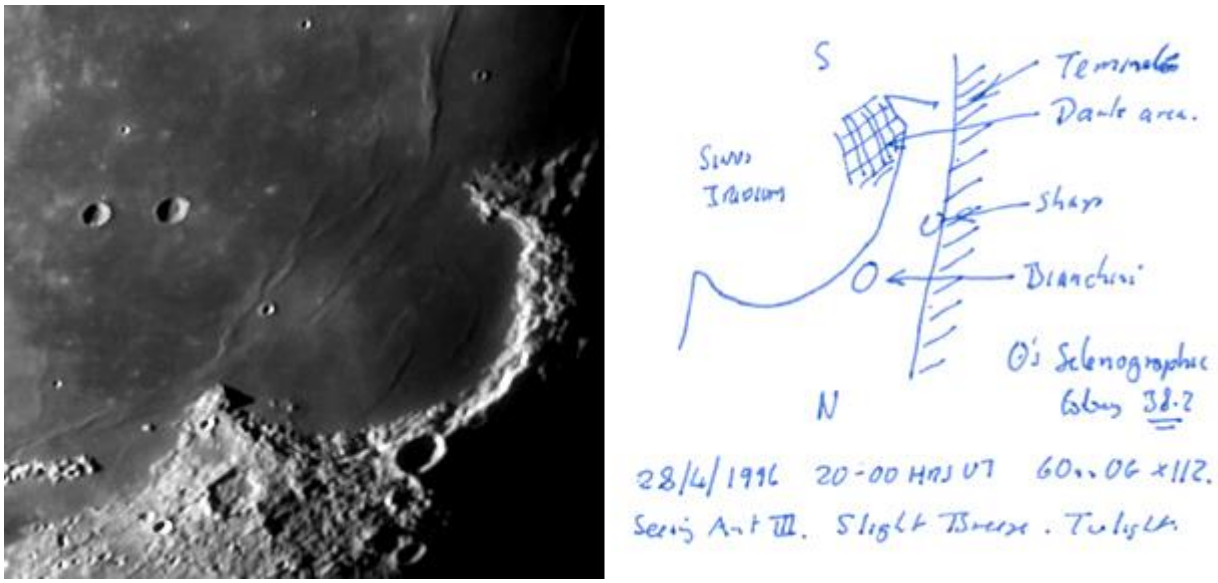


Figure 4. *Sinus Iridum orientated with north towards the bottom.* ***(Left)*** *Image taken by Leonardo Mazzei (UAI) on 2020 Feb 04 UT 20:32.* ***(Right)*** *A sketch made by Clive Brook (BAA) on 1996 Apr 29 UT 20:00.*

Astute readers will know that we covered this last month (see p 72). Again, nothing relating to shading in the SW quadrant of the floor of Sinus Iridum can be seen in Fig 4 (Left). However, the whole western half of the floor is darker than the eastern half and this was confirmed by Trevor Smith visually. Given that the scope that Clive Brook used, was just a 2" refractor, the weight of 1 seems reasonable until we can figure out for sure what he saw. Possibly we need to aim at later colongitudes to match the visibility of Sharp.

Gassendi: On 2020 Feb 05 UT 00:40-01:35 Jay Albert, ALPO) observed this crater under similar illumination and topocentric libration (both within ±1.0°) to the first report below, and under similar illumination (±0.5°) to the second report below:

Gassendi 1977 May 28/29 UT 20:45-21:15 Observed by D. Sims (Dawlish, Devon, UK) saw a hazy area on the south east floor that was normal in red and white light but darker in blue. This was partly confirmed by J-H Robinson (Devon, England, 10" reflector) 21:24-23:12 who saw the south east floor of Gassendi to have a loss of detail - but no color seen, although at 21:57-21:58 it was slightly brighter in red than in blue briefly. P. Doherty (22:45-23:15) did not see anything unusual. D. Jewitt (22:22-22:55) did not reveal anything unusual, apart from spurious color. The Cameron 1978 catalog ID=3 and ID=1463. The ALPO/BAA weight=3.

On 1990 Sep 30 at D. Darling (Sun Praire, WI, USA, 12.5" reflector, x150) observed a red spot on the west wall (bright in red filter and faint in the blue filter. No filter reactions were found elsewhere. Gassendi had much detail visible. A sketch was made. BAA observers in the UK were alerted but they could not observe due to cloud. Cameron 2006 extension catalog ID=411 and weight=5. ALPO/BAA weight=3.

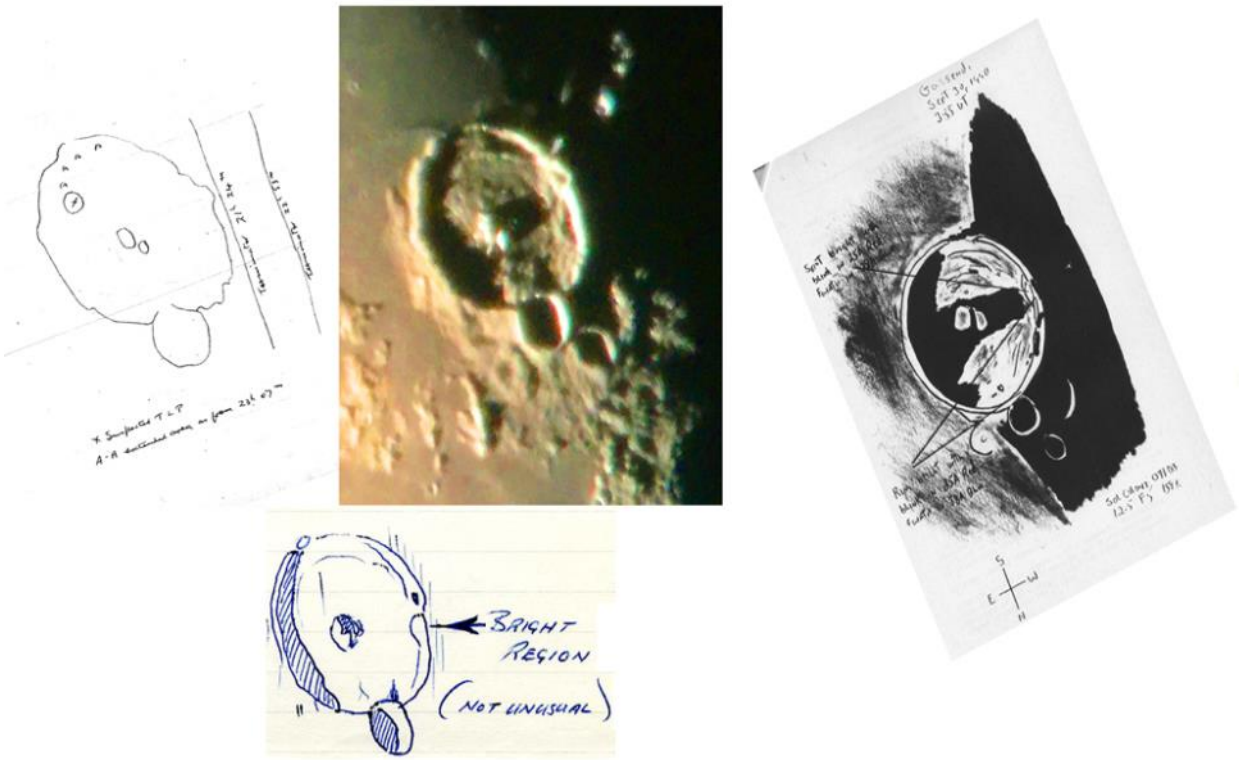


Figure 5. *Gassendi orientated with north towards the bottom right to preserve the label orientation in the three sketches.* ***(Top Left)*** *A sketch by J. Hedley Robinson (BAA) made on 1977 May 28 UT between 21:24 and 22:53.* ***(Top Centre)*** *An image by Jay Albert made using an iPhone, on 2020 Feb 05 UT 01:29 with color saturation increased to 80%.* ***(Bottom)*** *a sketch by Paul Dougherty, made using Patrick Moore's 15" reflector at Selsey, UK on 1977 May 28 UT 23:00.* ***(Right)*** *A sketch made by David Darling on 1990 Sep 30 UT 03:55.*

Jay observed visually and commented that the interior of the crater was beautiful with lots of detail. No red spot, or indeed any other color, was seen on the west wall or elsewhere. Much of the SE floor was in shadow and the rims were sharp. The interior of the crater was apparently sharper in a red Wratten 25 filter as opposed to the blue/green Wratten 44A filter – where the entire crater was slightly darker than in red or white light. However, everything elsewhere on the Moon was similarly slightly darker in the blue filter anyway. Visible detail on the SE floor (much of which was in shadow) was sharp, not hazy and some of the rills were seen, even on the E floor, near the central peaks. Even with Jay's image having its color saturation increased to 80% see Fig 5 (Top Centre), although some color is visible, this is entirely due to atmospheric spectra dispersion or chromatic aberration as it lies on light/dark boundaries and is visible in other places too. Therefore, in view of the fact that we cannot replicate what Sims, Hedley-Robinson (Fig 5 Left), and Darling (Fig 5 Right) saw, we shall leave the weights as they are. We have discussed both reports before in the 2014 Aug (p11-13), 2017 Sep (p22-25), and 2017 Oct (p24-25) newsletters.

Mersenius C: On 2020 Feb 05 Rob Davies and Bob Stuart (BAA/NAS) and Aldo Tonon (UAI) imaged this crater under similar illumination (±0.5°) to the following report:

2005 Nov 13 G. Ward (a lunar observer for 15 years) observed an area just south west of Mersenius C to be blurred and in a greenish cloud. The green color was more like that of dead grass than one gets from a neon bulb. The effect was seen from 04:50-04:57UT, but could have been going on before it was first noted at 04:50-UT. Seeing was 6-7/10 4" Refractor (2 element). Refractor had been used hundreds of hours before (over a 10-year period) with no similar color was seen. The observer checked other areas but did not see any similar effects. They also rotated and changed eyepieces, but this made no difference to the LTP. The LTP site seen was picked up on an image taken earlier at 04:47UT by W. Bailey, from Sewell, NJ, USA. Unfortunately, the area concerned, a mountain on the image, was saturated and so we cannot tell if a color was present there and the seeing was poor. ALPO/BAA weight=3.

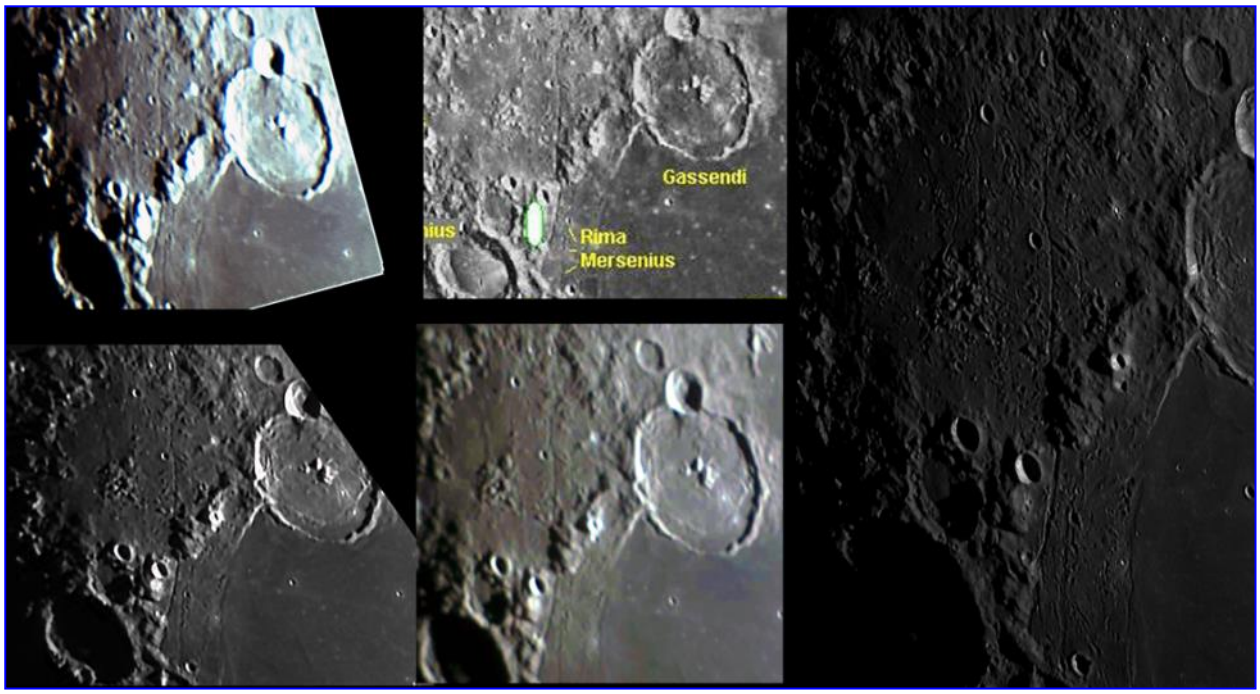


Figure 6. *NW orientated with north towards the top.* ***(Top Left)*** *A color image by Wayne Bailly (ALPO) taken on 2005 Nov 13 UT 04:47.* ***(Top Centre)*** *A sketch by Glen Ward (ALPO) indicating where they had seen a lime green glow in this area on 2005 Nov 13 UT 04:40-04:57.* ***(Bottom Left)*** *a monochrome image by Rob Davies (BAA/NAS) taken on 2020 Feb 5 UT 18:57.* ***(Bottom Centre)*** *A color image by Aldo Tonon taken on 2020 Feb 5 at 19:24UT. The image has been color normalized and then had its color saturation increased to 80%.* ***(Right)*** *Image by Bob Stuart (BAA/NAS) taken at 19:45 UT with a green filter. Note that this has been rotated – hence why part of Mersenius is missing.*

The results of these repeat illumination observations have been especially useful. Although Wayne Bailly's image (Fig 6 – Top Left) was taken around the time of Glen Ward's visual sighting of color (Fig 6 – Top Centre), Wayne's image was over exposed on bright area and had a greenish cast, making it difficult to assess Glen's report. Fortunately, Rob's new image (Fig 6 – Bottom Left) is detailed and allows us to fix the position of the 2005 LTP more precisely. Aldo's color image (Fig 6 – Bottom Centre) confirms that there is no natural color here that could cause the effect that Glen saw. An even more detailed image by Bob Stuart (Fig 6 – Right), albeit slightly under exposed compared to the other images, can be used to help compare with LROC WAC images of the area (not shown here).

So, is this all we can say? Take a closer look at Wayne's image (Fig 6 – Top Left) at where the green glow should have been if it had not been saturated on that sunlit area. Notice that the elliptical bright area matches the elliptical shape that Glen saw. Now compare the brightness of this area with Rob, Aldo's images on the bottom of Fig 6. This region is not as bright in the lower half of where Glen saw the green glow. This difference might suggest that Wayne may have captured at least the brightness of the LTP? However, to be sure it is important to try to simulate the over exposure in Wayne's image in Rob's, Aldo's and Bob's images. This has been done in Fig 7. You can now see that apart from image resolution issues, the shape of the area in question actually agrees well with all four images. So unfortunately, we cannot confirm any brightening, or blurring, that Glen reported. We shall therefore leave the weight at 3, but at least now we know that there is no normal natural color in this region and that any color did not lie outside of the bright sunward facing slope area.

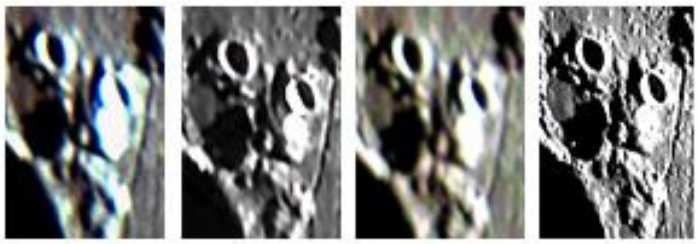


Figure 7. *An enlargement of the region SW of Mersenius C where Glen Ward saw a colored LTP in 2005 Nov 13.* ***(Far Left)*** *A color image by Wayne Bailly (ALPO) taken on 2005 Nov 13 UT 04:47 – the blue green cast is an artefact of the processing and is visible elsewhere in Fig 6 (Top Left).* ***(Left)*** *a monochrome image by Rob Davies (BAA/NAS) taken on 2020 Feb 5 UT 18:57.* ***(Right)*** *A color image by Aldo Tonon taken on 2020 Feb 5 at 19:24UT.* ***(Far Right)*** *Image by Bob Stuart (BAA/NAS) taken at 19:45 UT.*

Vallis Schroteri: On 2020 Feb 07 UT 00:44 Walter Elias (AEA) imaged the crater under similar illumination (±0.5°) to the following report:

1991 Aug 23 UT 02:19-02:49 Flashing spot at end of SV fluctuated. Herzog, Darling & Weier confirmed spot but not fluctuation. Spot brighter in red than blue, but Cobra Head was bright in blue. No other region was abnormal. ALPO/BAA weight=3.

Figure 8*. Vallis Schroteri, Aristarchus and Herodotus as imaged by Walter Elias (AEA) on 2020 Feb 07 UT 00:44 and orientated with north towards the top.*

Walter's image (Fig 8) shows up Vallis Schroteri very nicely, however it is unclear where the spot at the end of the valley could be? The Cobra's Head craterlet does not look especially bright. There is a mountain peak to the north of the valley (Mons Herodotus) which is bright, but could not be regarded as being at the end of the valley. For now, I will leave the ALPO/BAA weight at 3.

Mare Crisium: On 2020 Feb 08 UT 19:52 Franco Taccogna (UAI) imaged the whole Moon, but this included Mare Crisium under similar illumination (to within ±0.5°) for the following report:

On 2000 Jun 16 UT 20:37 C. Brook (Plymouth, UK, 60mm refractor, x117 & x40, seeing good, transparency excellent) observed a bright spot on the north rim of Mare Crisium (57E, 25N). It was comparable to the illuminated rim of Proclus in brightness. No color seen. The spot was not visible the next night. The ALPO/BAA weight=1.

Figure 9. *Mare Crisium from a whole Moon image captured by Franco Taccogna (UAI) on 2020 Feb 08 UT 19:52. Image orientated with north towards the top.*

As you can see from Fig 9, there is no bright spot on the northern rim of Mare Crisium, that was comparable to the bright rim of Proclus. There is sometimes a bright spot on the NW rim shortly after sunrise in this area, but it is definitely not bright here. So either the Clive Brook perhaps got the date wrong (his letter was dated the 16th, so am assuming the observation was made on the 16th too – though if it was written the day after then the date would have been the 15th) or more likely this could be a librational effect, requiring a slope angle to be favorable to yield a bright spot. We hall leave the weight at 1 for now.

Full Moon: On 2020 Feb 08 UT 20:19-20:23 Pasquale D'Ambrosio (UAI) took an image of the Moon through a Digital camera telephoto, approximately 8 hours before Full Moon. This was part of the Lunar Schedule observing program:

Figure 10. *The Full Moon as imaged by Pasquale D'Ambrosio (UAI) and orientated with north towards the top.*

The Digital No. (DN) brightness of selected features, measured on Fig 10, were as follows: Bright spot near Hell=168, Proclus=163, Censorinus=153, Tycho=145, Aristarchus=136, Copernicus=118, Kepler=95, Plato=59. Compare this the relative brightness mentioned in previous newsletters (e.g. Jan 2020 p47/48) and you can see that the order changes and Aristarchus certainly isn't always the brightest feature on the Moon. This is probably related to libration angle making some slopes brighter depending upon the viewing angle. This has very important implications for the brightness of Aristarchus in Earthshine too. When we have enough data points, we will investigate the relationship with libration, though I suspect that image resolution will have an effect too.

Promontorium Laplace: On 2020 Feb 12 UT 01:21 Gabriel Re (AEA) imaged Sinus Iridum under the same Sun angle, to within ±0.5° to the following report.

Peter Foley observed a tiny yellow-brown region close to the tip of the cape, north east of the precipitous west edge, in the face of the north facing slope. The area concerned was diffuse and varied in density despite the surroundings not varying. Foley noticed no color elsewhere on the Moon, though Amery thought that he saw some in Aristarchus, but Foley thinks this was spurious. Cameron 2006 catalog extension ID=27 and weight=5. ALPO/BAA weight=3.

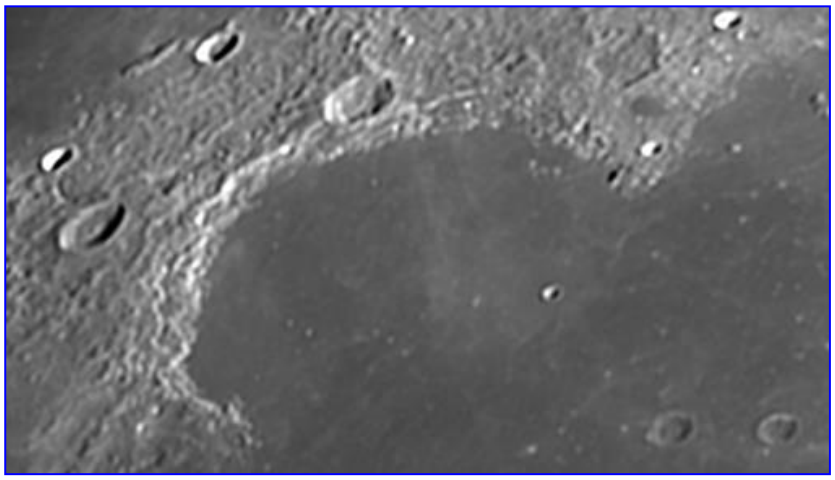


Figure 11. *Sinus Iridum as imaged by Gabriel Re (AEA) on 2020 Feb 12 UT 01:21 and orientated with north towards the top.*

Although Gabriel's image (Fig 11) was monochrome, it provides not only a useful context image, but can also be used to check out Peter Foley's comment that the area N/NE of Promontorium Laplace was diffuse. Gabriel's image shows the area nice and sharp, so therefore Peter Foley's description of the area was abnormal, though it is always possible that the diffuseness was caused by atmospheric seeing. We shall leave the ALPO/BAA weight at 3 for now.

Plato: On 2020 Feb 12 UT 03:13 Victoria Gomez (AEA) imaged this area under similar illumination, within ±0.5°, to the following WWII era report:

On 1944 Mar 12 at UT 23:00 H.P. Wilkins (Kent, UK, 8.5" reflector) observed that Plato appeared incomplete – the central crater had its north wall obscured. Cameron comments that maybe this was due to the low altitude of the Moon? The Cameron 1978 catalog ID=491 and the weight=4. The ALPO/BAA weight=2.

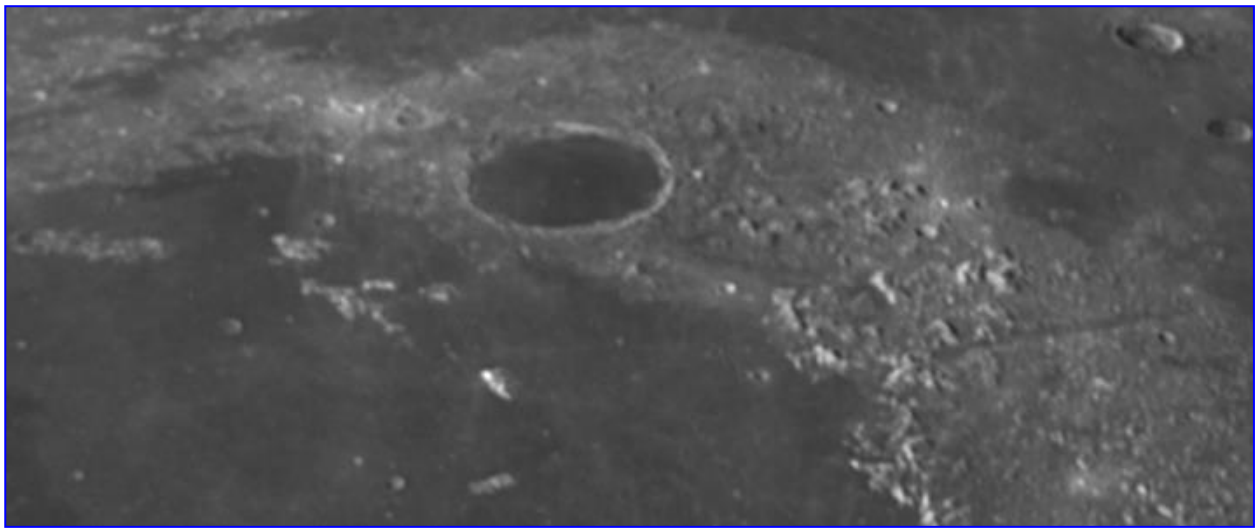


Figure 12. *Plato as imaged by Victoria Gomez (AEA) on 2020 Feb 12 UT 03:13 and orientated with north towards the top.*

Victoria's image (taken with an identical sized telescope), in Fig 12, confirms that the central craterlet was quite clearly visible, although doesn't quite have enough resolution to say whether or not the north wall of that craterlet was obscured or not. But at least we have a context image now. Incidentally the altitude of the Moon, as seen from Wilkins' telescope back in 1944 was 41°, so this was not low altitude for the UK.

Birt: On 2020 Feb 12 UT 03:21 Aylen Borgatello (AEA) imaged this region, to within (±0.5° similar illumination to the following report:

Birt 1972 Sep 25 UT 23:20-23:45 Observed by Doherty (Stoke-on-Trent, England, 10" reflector x280, S=VG) "All bright areas were similar in intensity (albedo) but 2 larger ones at times seemed brighter. N & S. The E. IAU? wall of the small craterlet showed most prominently & at times suspected a faint pt. of light just W. of its center. This was very suspect however." NASA catalog weight=1. NASA catalog ID #1345. ALPO/BAA weight=1.

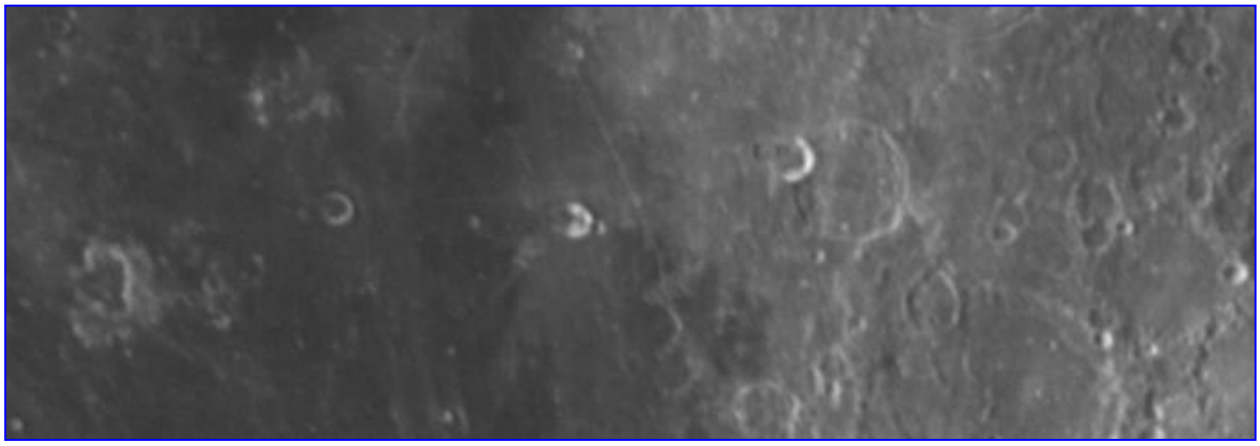


Figure 13. *The crater Birt (located at the center of the image) as captured by Aylen Borgatello (AEA) on 2020 Feb 12 UT 03:21, and orientated with north towards the top.*

Aylen's image (Fig 13) shows two bright spots on the NE rim of Birt. The west most has a digital number (DN) brightness value of 190 and the east most DN=197. By contrast the SE rim of Birt is only DN=179 and the E rim of Birt A is just DN=151. However, this is just a snapshot at an instant in time, and there is no way to know how the atmospheric seeing affected image resolution and brightness of the sunward facing slopes of the rims back in 1972. For now, we shall leave the ALPO/BAA weight at 1, but at least we have a nice image showing what the crater normally looks like at this stage in illumination.

Eudoxus: On 2020 Feb 29 UT 21:13-21:33 Alberto Anunziato (SLA) sketched this crater under similar illumination (±0.5°) to a LTP report:

On 1988 Nov 15 at 10:07-10:40 UT P. Jean (Outremont, Quebec, Canada, 4" refractor?) saw to the SE of Eudoxus (18E, ~43N) a luminescent area just over on the night side of the terminator - it was cone shapes and coppery in color. Cameron comments that maybe it was a very low sun angle effect and she has seen something similar, but on the bright side of the terminator. Jean then goes onto comment that at 10:25UT a very dark line was seen south of the cone i.e. east of the terminator. A sketch was provided and P.Foley commented that the cone did not correspond to any terrain. Cameron 2006 Catalog Extension ID=339 and weight=3. ALPO/BAA weight=2.

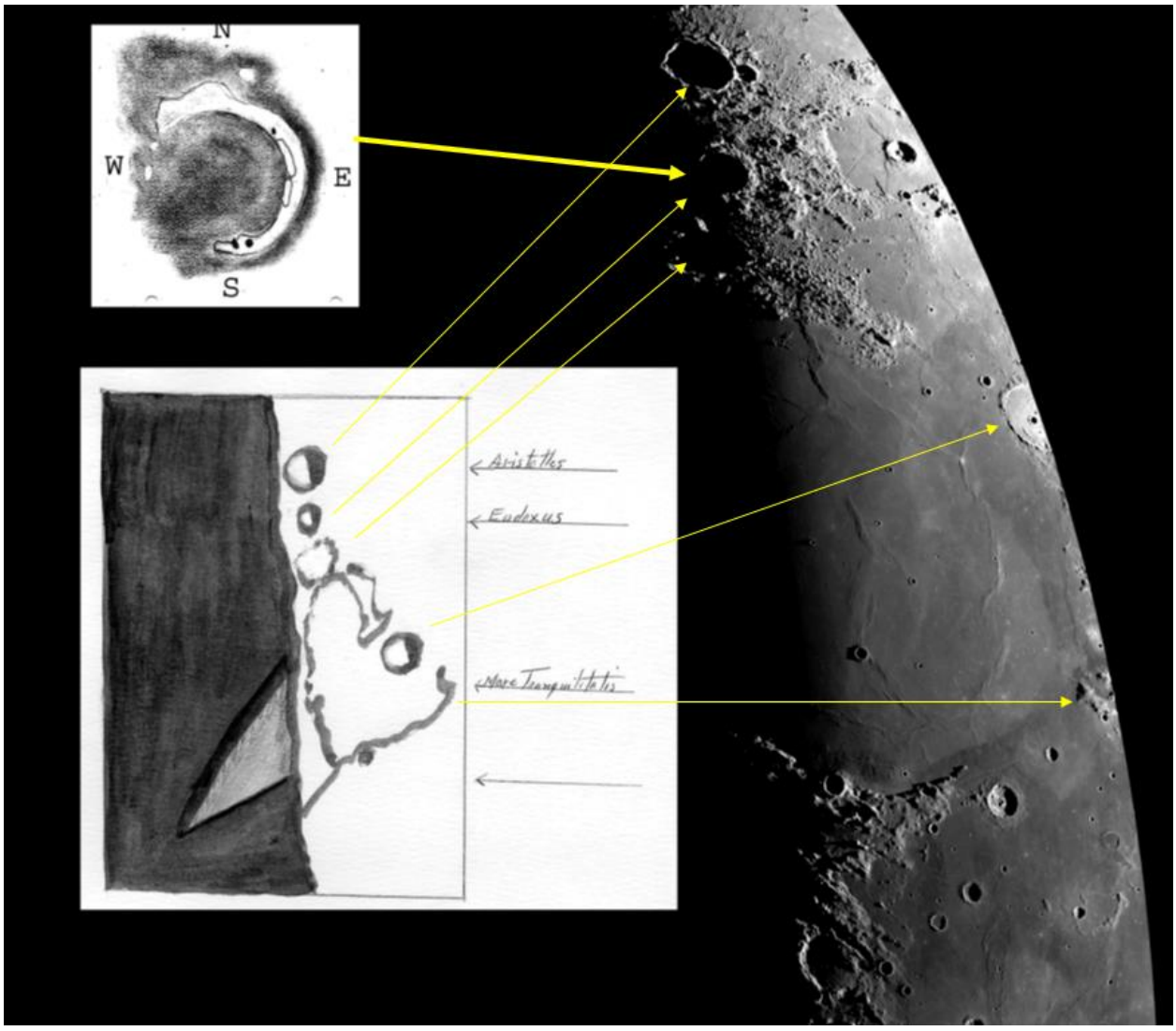


Figure 14. (Background Image) *a synthetic view of the Moon generated with ALVIS for 1988 Nov 15 UT 10:25 for lunar longitudes 20°W-30°E. Orientated with north towards the top. Various craters have been arrowed for identification purposes.* ***(Top Left)*** *A sketch of Eudoxus made by Alberto Anunziato (SLA) on 2020 Feb 29 UT 21:13-21:33.* ***(Bottom Left)*** *a sketch by Pirrette Jean made on 1988 Nov 15 UT 10:07-10:40.*

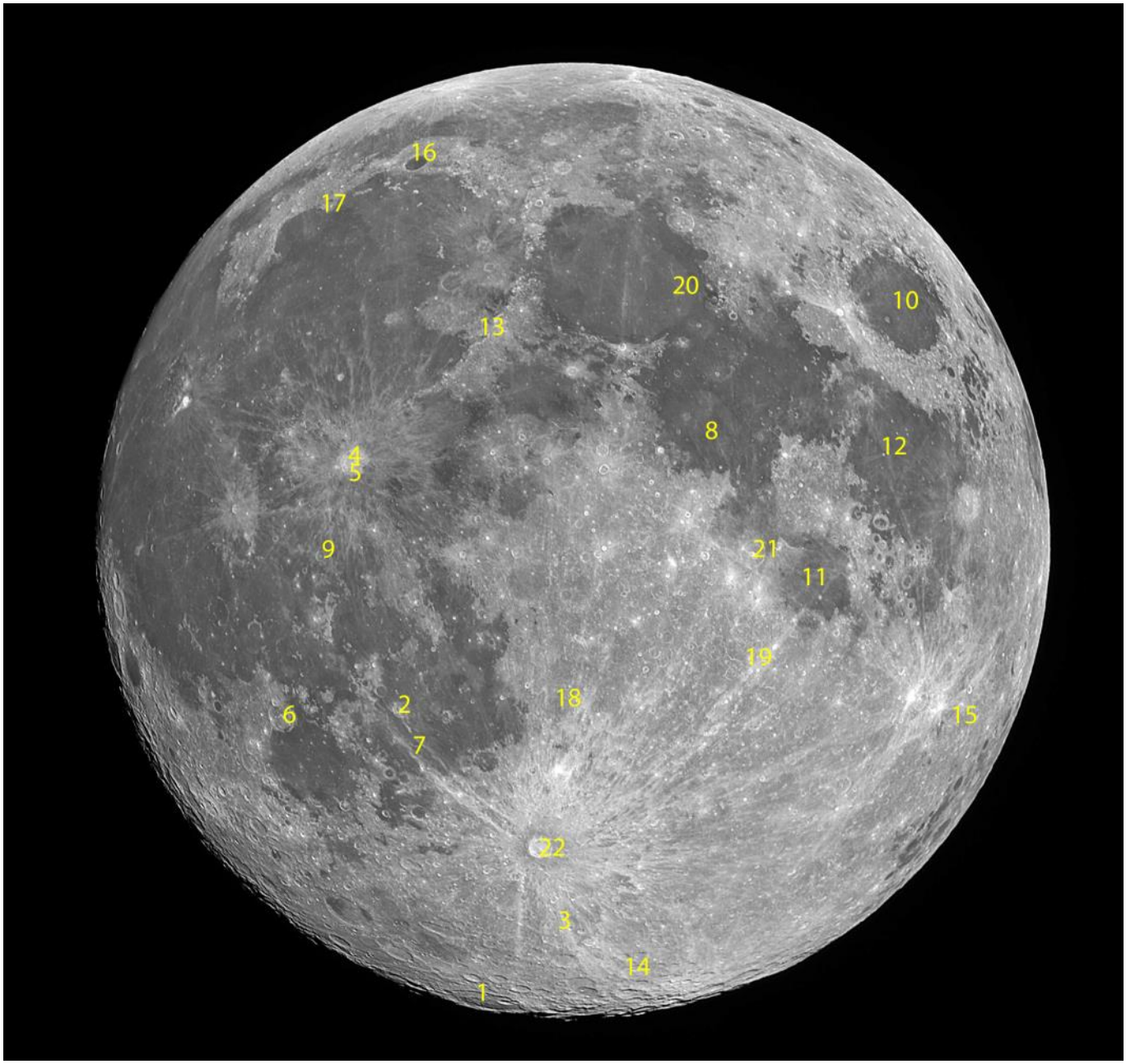
Alberto's sketch (Fig 14 – Top Left) shows a nice crescent shaped Eudoxus crater emerging into sunlight on the lunar terminator. This matches with the visibility in the sketch by Jean (Fig 14 – Left). However, because the effect described by Jean covers such a large geographical area, I decided to generate a virtual view of part of the Moon, as seen from Quebec for the date and UT in question, so as to test out the reliability of the rest of her sketch. The virtual view can be seen in the background for Fig 14 and although this illustrates that there are some cartographic inaccuracies in Jean's sketch, most of the land marks are visible as indicated by arrows. What is slightly disturbing is that she places the terminator further to the west, which might infer that her UT was wrong. Although the area of Jean's cone shaped protrusion, beyond the terminator, is hidden in the background image in Fig 14, I can vouch for the fact that there is not normally anything to be seen here.

Due to the terminator issue, and also the fact that a small instrument was used, I will lower the weight from 2 to 1 for now. It should be said that the database shows that Jean was a bit over sensitive to seeing LTP, perhaps not quite as prolific as Bartlett, but she does show up quite high on the statistics of LTP observers. At least, using the virtual view of the Moon we can say that the extent of the LTP was approximately 10W-5E and 15N-30N.

General Information: For repeat illumination (and a few repeat libration) observations for the coming month - these can be found on the following web site: http://users.aber.ac.uk/atc/lunar_schedule.htm . By re-observing and submitting your observations, only this way can we fully resolve past observational puzzles. To keep yourself busy on cloudy nights, why not try "Spot the Difference" between spacecraft imagery taken on different dates? This can be found on: http://users.aber.ac.uk/atc/tlp/spot_the_difference.htm . If in the unlikely event you do ever 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 https://twitter.com/lunarnaut .

Dr Anthony Cook, Department of Physics, Aberystwyth University, Penglais, Aberystwyth, Ceredigion, SY23 3BZ, WALES, UNITED KINGDOM. Email: atc @ aber.ac.uk

Key to Images In This Issue



1. Bailly
2. Bullialdus
3. Clavius
4. Copernicus
5. Fauth
6. Gassendi
7. Kies
8. Lamont
9. Lansberg
10. Mare Crisium
11. Mare Nectaris
12. Messier
13. Montes Apenninus
14. Moretus
15. Petavius
16. Plato
17. Promontorium Laplace
18. Purbach
19. Rupes Altai
20. Serpentine Ridge
21. Theophilus
22. Tycho