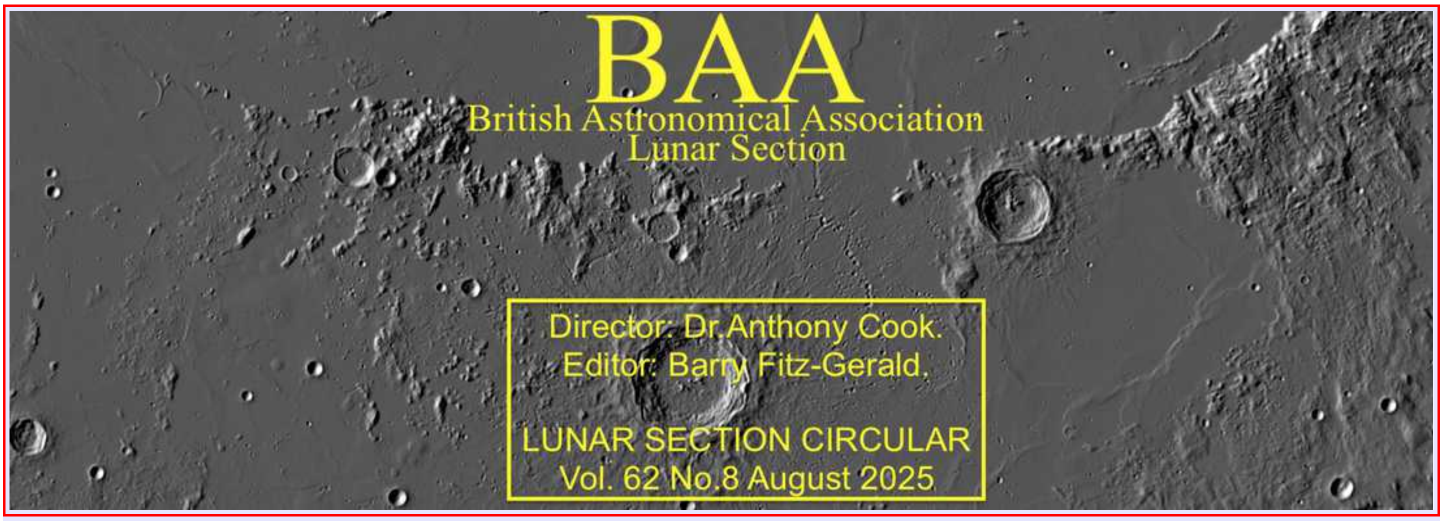
BAA
British Astronomical Association
Lunar Section
Director: Dr.Anthony Cook.
Editor: Barry Fitz-Gerald.
LUNAR SECTION CIRCULAR
Vol. 62 No.8 August 2025


14.8 day Moon
2024 June 21
0712 - 0713UT
Skywatcher Esprit 80ED with
2.5X Barlow & QHY5III462C
Maurice Collins
Palmerston North, NZ

**LUNAR SECTION CIRCULAR**
**Vol. 62 No.8 August 2025.**

**Contents**



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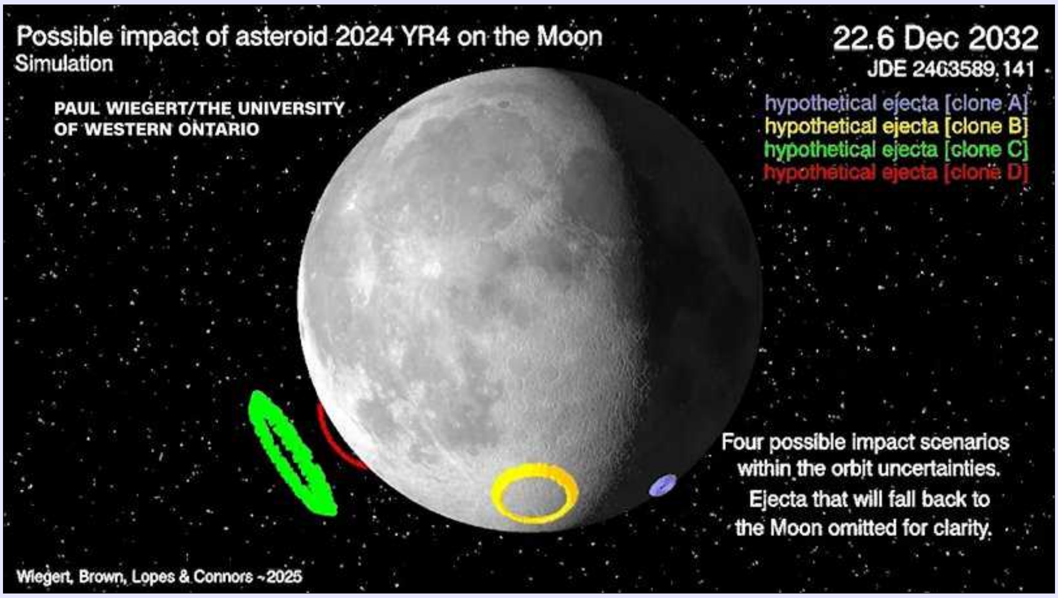
*Cover image by Maurice Collins

## FROM THE DIRECTOR

July was really not a great month for lunar observing, at least from where I live in Mid Wales. Alas I have no news of new lunar missions planned to launch, or land in August either, so this month's editorial is really just a couple of news items:

Firstly, please take a look inside this circular and see James Dawson's summary of the survey findings, they make interesting reading and I thank all those members who took part. We will try to enact upon some of the findings, for example including a contents page, and maybe a summary/highlight of things to see on the Moon each month. Please bear with us though as all work publishing the circular is voluntary, some of us have full time jobs, and often we are up against the monthly deadline to publish – but we do the best we can.




A still from a video frame of possible impact scenarios for asteroid 2024 $YR_4$ were it to strike the Moon. From the Department of Physics at Western Ontario University web site:
https://physics.uwo.ca/~pwiegert/2024YR4/index.html
Impact sites could be anywhere in between these four examples and the red one is actually on the far side.

Although further astrometric studies by telescopes on Earth and in Space have now shown that the asteroid 2024 $YR_4$ will definitely not collide with the Earth on 22nd Dec 2032 (thank goodness) it seems that it now has a 1 in 23 chance of colliding with the Moon, meaning it probably won't, as the chance of not colliding is 95.7%! This has not however prevented some astronomers contemplating what might happen if this approximately 60m diameter small asteroid did strike the Moon, travelling at 13 km/s. If it did really happen then the impact would be seen on the gibbous Moon at around 15:17 to 15:21 UT and could form a crater of approximately 1 km in diameter (big enough to be seen in amateur telescopes) and the extensive bright rays would make it an easy target. What would really stand out however would be the impact flash itself as this could be seen easily with the naked eye – though astronomers are being guarded about the magnitude. On March 17th 2013 astronomers at the NASA Marshall Space Flight Center recorded an impact flash at magnitude +4 which was produced by a 5 Ton TNT equivalent explosion. Estimates suggest that 2024 $YR_4$ could yield a 6.5 Mega Ton TNT equivalent explosion, and as 5 magnitudes corresponds to a factor of 100 in terms of energy it could potentially be up to magnitude -11 in brightness. This is highly speculative though as we don't know how the ejecta might shield the source of the flash and the location and angle at which it strikes on the lunar surface could also make a difference to the apparent magnitude.

So how would one observe this? The flash could last many seconds, perhaps even minutes, gradually decaying away. The problem would be the huge dynamic range of brightness to handle, so having a variety of cameras and scopes to deal with the different stages of illumination would seem sensible. Maybe one camera or scope could have a diffraction grating over the lens to record a time lapse of the spectra so that we could learn about the composition and temperature of the impact fireball. With this amount of radiated light involved it is possible that the area around the impact site could be illuminated and there might be even temporary shadows radiating away from the crater. As an ejecta cloud would be produced, expect to see an expanding fuzzy blob, or even a cone if the impact is off the limb, – gradually tapering away in density the further it is from the impact site. It could expand at several km (are sec) per second across the lunar surface. After the initial dazzling flash, astronomers could perhaps also see a dull red glow from the impact melt on the floor of the crater and the surroundings, similar to that from volcanic lava.

The real danger, as with all impacts on the Moon, is not being struck by the object – this is statistically improbable, but by being hit by the extensive high velocity shrapnel. There is no atmosphere on the Moon to slow it down, so it can travel vast distances before hitting the ground. So, surface landers, rovers or astronauts could be in danger, depending upon how far away they are from the impact site – an inverse square law dependency perhaps? Huge, amounts of debris could also escape the Moon's gravity and enter the Earth Moon system. This could pose a risk to lunar orbiters flying through the debris and even satellites in Earth orbit, depending upon how the gravitationally bound escaped debris moves around the Earth Moon space. Extra meteor showers and sporadics could be expected in our atmosphere.

Just one last thought – we were worried about asteroid 2024 $YR_4$ striking the Earth, but later improved astrometric data showed this would not happen. However, as astronomers, most of us would really love to witness a spectacular impact on the Moon, but of course this has a downside for space satellites, especially lunar orbiters. We should be very careful what we wish for!

For a more detailed account of the hypothetical impact, based upon academic, albeit as yet unrefereed research, see this preprint paper submitted to the American Astronomical Society Journal and available at: https://arxiv.org/abs/2506.11217

Tony

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## Lunar Occultations for August 2025 by Tim Haymes.

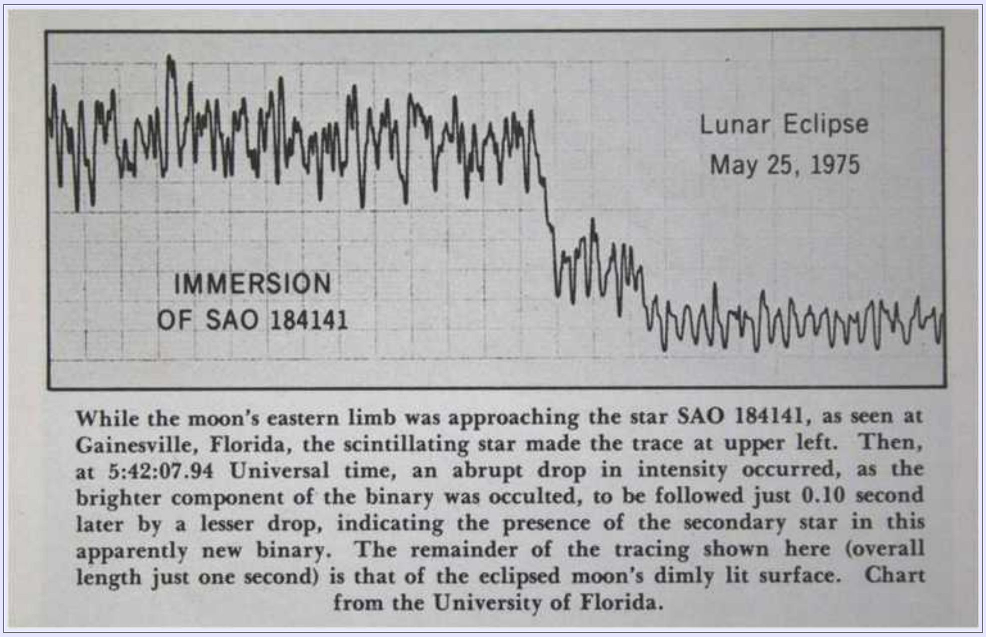
**Time capsule: 50 years ago: in Vol 10 No.9**

[With thanks to *Stuart Morris* for the LSC archives.]

* G.W. Amery (Occultation subsection) encouraged the observation of reappearances this month.
* Mr M. Abdul-Ahad (Iraq) sent in his first occultation observation. He says dust is a big problem.
* Planetary Occultations: Mars will occult SAO 77081 on December 3$^{rd}$.
  Details will be in the 1975 Handbook.
* Miss CM Botley notes the "magnificent coverage" in an S&T report (1975 August) of the May 25$^{th}$ Total Lunar Eclipse. Also in that report is a "trace" from new binary star SAO 184141
* Allan Brown: Report on PROCLUS.

**Comment:**
(From S&T, August 1975) The star SAO 184141 was observed photoelectrically by John P. Oliver at University of Florida in Gainesville, with the Rosemary Hill Observatory's 30-inch telescope. (29 24 00N 82 35 10W). The data rate looks like 250 samples/sec or frames/sec in modern CMOS terms.

I used SkyMap Pro at the stated time and location. The star (in Scorpius) is in the WDS Catalogue as MCA43 (H A McAlister) first measured in 1980. The S&T report appears to pre-date this. The occultation occurred in the Umbral shadow. The Moon was setting at Greenwich.

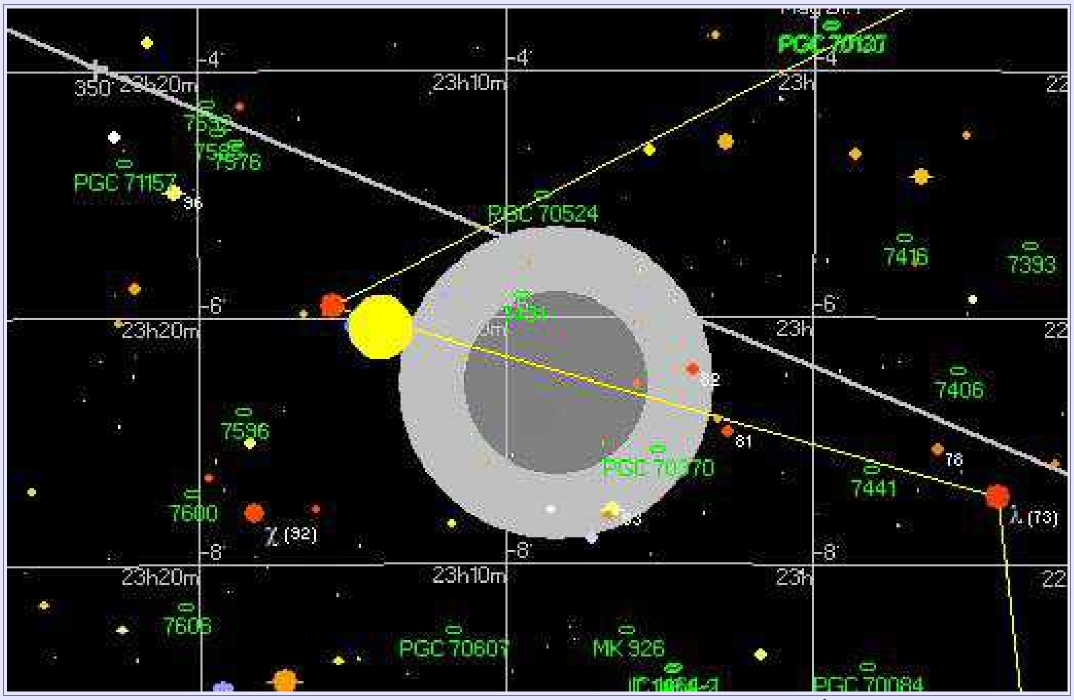



While the moon's eastern limb was approaching the star SAO 184141, as seen at Gainesville, Florida, the scintillating star made the trace at upper left. Then, at 5:42:07.94 Universal time, an abrupt drop in intensity occurred, as the brighter component of the binary was occulted, to be followed just 0.10 second later by a lesser drop, indicating the presence of the secondary star in this apparently new binary. The remainder of the tracing shown here (overall length just one second) is that of the eclipsed moon's dimly lit surface. Chart from the University of Florida.

**Planetary Occultations in August.**
To encourage occultation measurements by small bodies, I have updated the web page that list some minor planet predictions: http://www.stargazer.me.uk/call4obs/NextEvents/Current.htm.

Asteroid (200) Dynamene occults a 7$^{th}$ magnitude star, TYC 1859-1083-1 in Auriga (an M class giant) on Aug 15$^{th}$ 2025 between 0324 and 0325UT, when the Sun is at Alt -12 (dark enough). The asteroid, at mag 13 will cause the star to disappear totally for up to 4 seconds. A visual experience, or a suitably positioned observer could time the event. All the information needed is on the Occult Map.

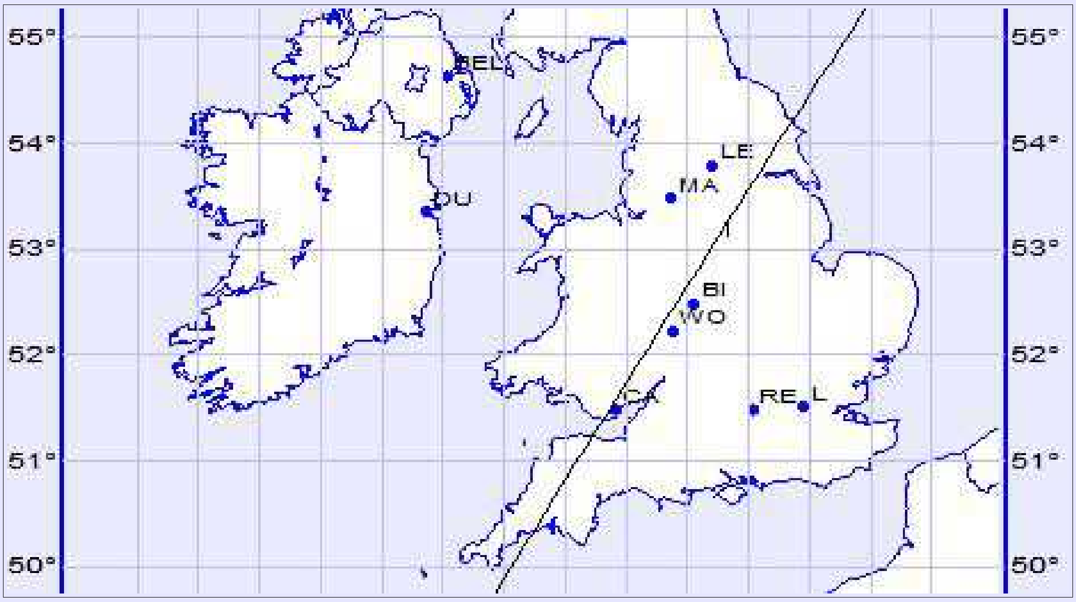
**Lunar Occultations.**
I am grateful to James Dawson for reminding us of the **Lunar Eclipse on September 07**. The occultation of phi Aquarii occurs just after the end of the penumbral phase, at the bright limb. Since lunar phase is still 100%, it would be interesting to see if the star is observable and time-able. The star is spectral type M2.



Here are the general circumstances from SkyMapPro on Sept 7th at about 2100 UT

**Prediction in August.**
There are no prediction in the BAAH for August. The reason being the magnitude limit, which is 6.0.

**Grazes in August**
SAO 75777 on Aug 16 at 0136UT, (BAAH number 7) passes near Doncaster, Wolverhampton, Cardiff, Okehampton and Looe. Details from Tim Haymes.



**Occultation predictions from 2025 Aug 01 to Sep 07 (Times at other locations will +/- a few minutes)**
**Oxford: E. Longitude -001 18 47, Latitude 51 55 40**

Stars brighter than r8.0 at illumination less than 98%
(Except phi Aquarii on Sep 7th, ill = 100-)

| day yy | mmm | d | Time h | m | s | Ph | Star No | Sp D* | Mag v | Mag r | % ill | Elon | Sun Alt | Moon Alt | Moon Az | CA o | Notes |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 25 | Aug | 5 | 21 | 55 | 2.0 | D | 186391 | cA2 | 7.8 | 7.7 | 87+ | 138 | | 9 | 188 | 62N | |
| 25 | Aug | 10 | 22 | 25 | 54.8 | R | 3332 | K0 | 7.0 | 6.5 | 97- | 159 | | 17 | 132 | 78S | 65 Aqr |
| 25 | Aug | 10 | 23 | 58 | 25.2 | R | 146296 | WA5 | 7.4 | 7.3 | 97- | 159 | | 25 | 154 | 85N | |
| 25 | Aug | 11 | 0 | 21 | 15.3 | R | 146302 | K0 | 8.3 | 7.7 | 97- | 159 | | 27 | 160 | 55S | |
| 25 | Aug | 12 | 0 | 36 | 57.1 | R | 146804 | KF8 | 8.2 | 7.9 | 91- | 145 | | 31 | 149 | 69S | |
| 25 | Aug | 12 | 2 | 36 | 10.2 | R | 146825 | cK5 | 8.7 | 7.9 | 91- | 145 | | 36 | 184 | 54N | |
| 25 | Aug | 12 | 22 | 46 | 57 | m | 109180 | SK0 | 7.9 | 7.4 | 84- | 133 | | 19 | 108 | 9N | |
| 25 | Aug | 12 | 23 | 6 | 15.8 | R | 109184 | K0 | 8.3 | 7.8 | 84- | 133 | | 21 | 113 | 61S | |
| 25 | Aug | 13 | 0 | 18 | 44.9 | R | 53 | wB8 | 6.9 | 7.0v | 84- | 132 | | 31 | 129 | 89S | |
| 25 | Aug | 13 | 2 | 40 | 50 | m | 64 | F5 | 6.5 | 6.3 | 83- | 131 | | 43 | 170 | 13N | |
| 25 | Aug | 13 | 3 | 57 | 49.6 | R | 109254 | F0 | 8.0 | 7.8v | 83- | 131 | -7 | 42 | 196 | 84S | |
| 25 | Aug | 13 | 22 | 29 | 8.7 | R | 109756 | F5 | 8.0 | 7.7 | 75- | 120 | | 14 | 91 | 36S | |
| 25 | Aug | 14 | 0 | 6 | 22.8 | R | 92347 | pF5 | 8.0 | 7.7 | 74- | 119 | | 29 | 111 | 41N | |
| 25 | Aug | 14 | 3 | 34 | 52.5 | R | 203 | K0 | 6.8 | 6.2 | 73- | 118 | -10 | 49 | 171 | 86N | |
| 25 | Aug | 14 | 22 | 32 | 5.2 | R | 313 | cK0 | 7.1 | 6.2s | 64- | 107 | | 11 | 78 | 37S | |
| 25 | Aug | 15 | 1 | 1 | 6.1 | R | 92833 | G0 | 8.2 | 7.9 | 63- | 105 | | 34 | 107 | 81N | |
| 25 | Aug | 15 | 22 | 23 | 53.4 | R | 75706 | M0 | 8.4 | 7.4 | 53- | 93 | | 7 | 64 | 68N | |
| 25 | Aug | 15 | 22 | 36 | 5 | m | 75715 | cK0 | 7.3 | 6.7 | 53- | 93 | | 8 | 66 | 6N | |
| 25 | Aug | 16 | 1 | 19 | 30.1 | R | 75764 | SF0 | 7.6 | | 52- | 92 | | 33 | 96 | 81S | |
| 25 | Aug | 16 | 1 | 37 | 45.7 | R | 461 | cK0 | 7.2 | 6.7 | 51- | 92 | | 35 | 99 | 83N | |
| 25 | Aug | 16 | 1 | 40 | 4 | Gr | 75777 | B9 | 7.6 | 7.5 | 51- | 92 | | 36 | ** GRAZE: nearby | | |
| 25 | Aug | 16 | 1 | 45 | 0.2 | R | 75777 | B9 | 7.6 | 7.5 | 51- | 92 | | 37 | 100 | 24N | |
| 25 | Aug | 17 | 23 | 0 | 13.5 | R | 76965 | cG | 7.6 | 7.2 | 30- | 67 | | 1 | 46 | 22S | |
| 25 | Aug | 18 | 0 | 12 | 7.4 | R | 773 | wF8 | 7.0 | 6.7 | 30- | 66 | | 10 | 58 | 49N | |
| 25 | Aug | 18 | 1 | 9 | 33.1 | R | 77030 | K0 | 8.6 | 7.9 | 29- | 65 | | 18 | 68 | 65N | |
| 25 | Aug | 19 | 0 | 44 | 50.7 | R | 78128 | K2 | 8.3 | 7.7 | 20- | 53 | | 7 | 53 | 74S | |
| 25 | Aug | 19 | 1 | 5 | 33.7 | R | 952 | K2 | 8.0 | 7.2 | 19- | 52 | | 9 | 56 | 51N | |
| 25 | Aug | 19 | 1 | 33 | 2 | m | 78191 | A0 | 7.7 | 7.7 | 19- | 52 | | 13 | 61 | 9N | |
| 25 | Aug | 19 | 3 | 37 | 1.9 | R | 78291 | K0 | 7.7 | 7.0 | 19- | 51 | -11 | 30 | 82 | 43N | |
| 25 | Aug | 20 | 2 | 31 | 36.6 | R | 79316 | G2 | 7.5 | 7.1v | 11- | 39 | | 11 | 62 | 68N | |
| 25 | Aug | 20 | 2 | 34 | 34.4 | R | 79319 | K2 | 7.9 | 7.3 | 11- | 39 | | 12 | 63 | 44S | |
| 25 | Aug | 29 | 19 | 38 | 51.7 | D | 183171 | kF3 | 7.2 | 7.0s | 36+ | 74 | -7 | 5 | 220 | 76S | |
| 25 | Sep | 1 | 20 | 42 | 46.7 | D | 185731 | K5 | 7.9 | 7.0 | 65+ | 107 | | 6 | 201 | 66N | |
| 25 | Sep | 3 | 22 | 17 | 29.0 | D | 2878 | K2 | 8.5 | 7.7 | 83+ | 131 | | 10 | 198 | 55N | |
| 25 | Sep | 4 | 19 | 57 | 58.0 | D | 3000 | M4 | 8.2 | 7.3v | 90+ | 142 | -11 | 12 | 155 | 54N | AK Cap |
| 25 | Sep | 4 | 20 | 39 | 7.2 | D | 189467 | K0 | 8.4 | 7.9 | 90+ | 143 | | 13 | 164 | 28S | |
| 25 | Sep | 4 | 23 | 14 | 37.3 | D | 189542 | K0 | 8.5 | 7.8 | 90+ | 144 | | 13 | 200 | 86S | |
| 25 | Sep | 6 | 1 | 52 | 17.6 | D | 164534 | K3 | 7.3 | 6.6 | 96+ | 157 | | 10 | 226 | 75N | |
| 25 | Sep | 6 | 20 | 41 | 17.0 | D | 165021 | M4 | 8.4 | 7.7v | 99+ | 168 | | 17 | 138 | 60N | |
| 25 | Sep | 6 | 23 | 14 | 7.4 | D | 165070 | K0 | 8.2 | 7.6 | 99+ | 169 | | 26 | 176 | 81S | |
| 25 | Sep | 7 | 2 | 57 | 34.8 | D | 3310 | pA8 | 6.4 | 6.2 | 99+ | 171 | | 14 | 232 | 66N | |
| 25 | Sep | 7 | 3 | 11 | 2.3 | D | 165153 | SK5 | 8.2 | 7.4s | 99+ | 171 | | 12 | 235 | 85S | |
| 25 | Sep | 7 | 21 | 8 | 12.0 | DB | 3412 | M2 | 4.2 | 3.4s | 100- | 178 | | 20 | 130 | -64N | phi Aqr |
| 25 | Sep | 7 | 22 | 12 | 37.2 | RD | 3412 | M2 | 4.2 | 3.4s | 100- | 178 | | 27 | 146 | 40S | phi Aqr |

**44th European Symposium on Occultation Projects.**


**Website: https://esop44.iota-es.de/**

The meeting will have some presentations on Lunar Occultations (Grazes and Double Stars). To participate by Zoom, please contact the organiser(s). Wojciech Burzynski 44esop@gmail.com

**Addendum:**

ANNOUNCEMENT

Fullerscopes have moved from their modern shop and bright spacious workshops in Finchley Road, to the grotty gloom of the delapidated mediaeval curiosity shop and dungeon at 63 Farringdon Road, in darkest E.C.1. These appalling conditions coupled with the bread-line wages paid to their servile staff, have enabled Fullerscopes to remain highly competitive in a world gone made with soaring inflation and inferior rubbish.

AND WHAT'S MORE WE CAN STILL PROVIDE

★ A friendly and informal atmosphere.

This announcement appeared in the Handbook 1975. It makes amusing (perhaps desperate) reading. There are two spelling errors. I visited BC&F establishment several times in the 80s/90s to buy equipment. The last time in 2003 I think, it was worth the visit and an 'Aladdin's Cave'.

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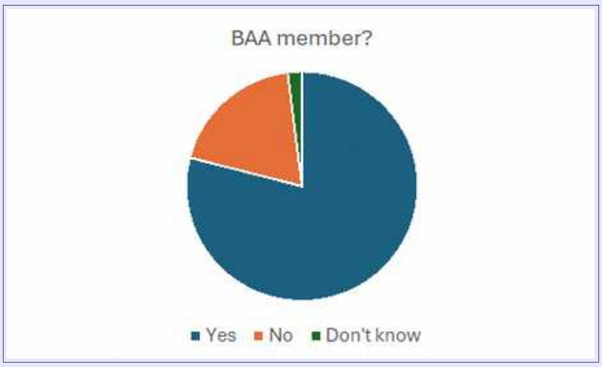
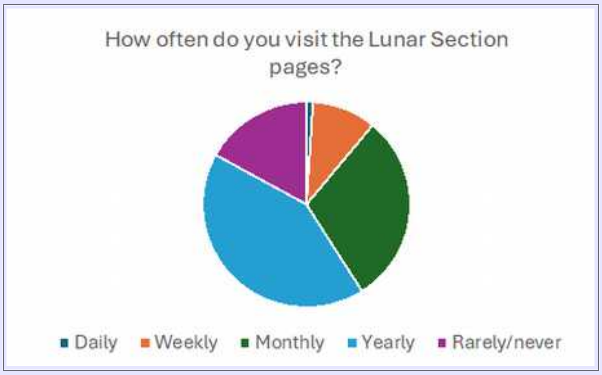
## BAA Lunar Section survey by James Dawson.

The survey was open from 8th May 2025 to 30th June 2025 and accessible to anyone with the hyperlink to *Microsoft Forms*, where the survey was hosted. There were 90 responses. Many of the responses were free text, and the comments from these have been grouped together into themes. Themes which 5% of people highlighted (3 or more people) are outlined in this summary, but all comments have been scrutinised, discussed and considered. The questions asked in the survey and a summary of the responses are included here. ***Thank you to everyone who took time to complete the survey.***

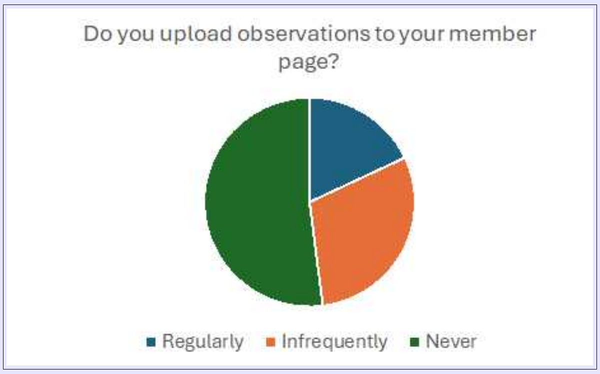
**Q. Are you a BAA member?** 79% responded yes; 19% no; 2% (2 people) didn't know.



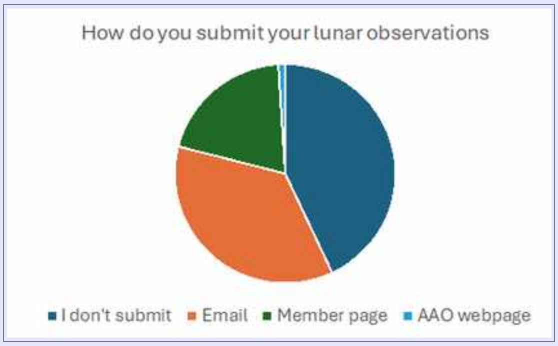

**Q. How often do you visit the Lunar Section pages on the BAA website?** 1% daily; 10% weekly, 30% monthly, 42% a few times a year, 17% rarely / never.



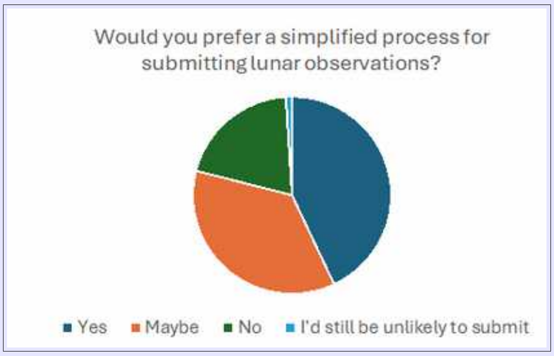

**Q. Do you upload observations (lunar or otherwise) to your BAA Members Page?** 18% regularly; 30% infrequently; 52% never.



**Q. How do you submit lunar observations to the BAA?** 43% I don't submit observations; 36% email; 20% my BAA member's page; 1% amateur astronomer's outreach web page.




**Q. Would you prefer a single simplified submission process?** 26% yes; 36% maybe; 13% no; 25% I'd still be unlikely to submit observations.




**Q. If you have not sent in lunar observations before, what makes you hesitate?**
**A.** There were 54 free text responses to this. About a third of respondents indicated they are not currently observing the Moon. A third did not have the confidence to submit their observations, felt their observations and images were of insufficient quality to submit, or not sure what observations should be submitted. Nine percent suggested they will start submitting following the survey. Eight percent indicated they did not record their observations, and a further eight percent said they were too busy.

**Q. Are there any specific features you would find useful on the Lunar Section pages on the website? For example, a targeted observing calendar, a catalogue of books useful to the lunar enthusiast, lunar feature of the month etc.**
**A.** There were 67 free text responses to this. Nearly half of respondents thought an observing calendar or feature of the month was a good idea. 18% wanted information on books. 12% wanted information about upcoming special events such as eclipses, Clair-obscur events, when to observe for meteor impact events etc. Six percent wanted links to other websites and resources. Five percent wanted more information on the basics of lunar astronomy.

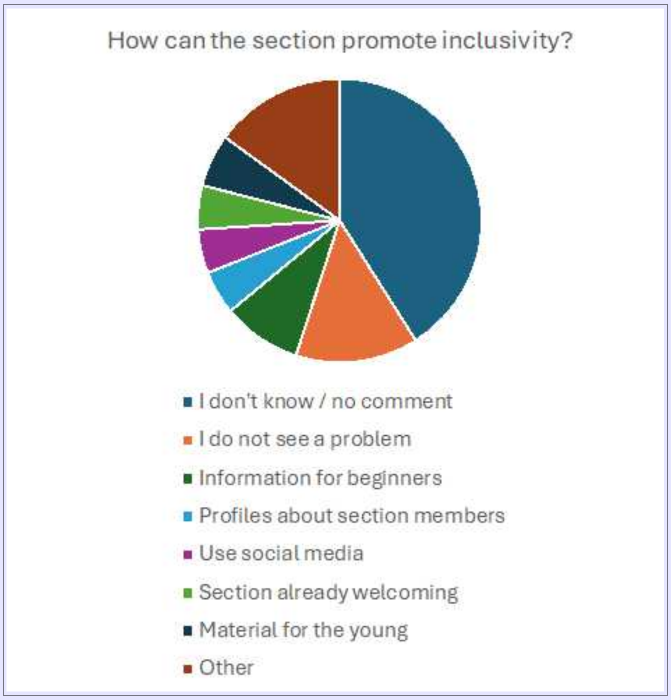
**Q. Are there any features on the Lunar Section pages on the website you think are not needed?**
**A.** There were 44 free text responses to this. 96% of respondents indicated they were happy with the status quo. One person thought the pages needed some housekeeping to update some aspects.

**Q. The LSC content is often along similar lines by the same authors - what would you prefer to see more or less of? We cannot promise to deliver everything as this would rely on members contributions which are unpredictable, but your views may point to a way to evolve the content to appeal to more.**
**A**. Over 80 people responded to this.

| | I'd like more (%) | I'm happy as it (%) | I'd like less (%) |
|---|---|---|---|
| Lunar News / Mission Updates | 32 | 64 | 4 |
| Geological research | 33 | 56 | 11 |
| Historical articles | 40 | 52 | 9 |
| Member's images / drawings | 36 | 63 | 1 |
| Book reviews | 36 | 58 | 6 |
| Equipment / imaging articles | 54 | 41 | 5 |

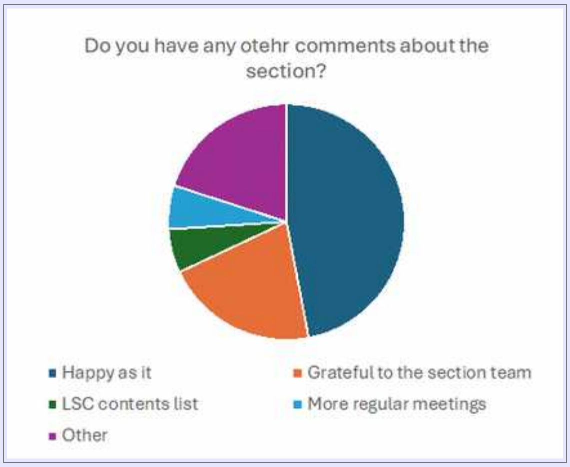
**Q. We want to encourage diversity within the Lunar Section. This is important as we move forward as a group. Is there anything you can suggest for us to include in future events and newsletters to promote inclusivity?**

**A**. There were 50 free text responses to this. 18 individuals said they did not know or made no comment; six individuals did not see diversity or inclusivity as a problem currently; four people thought material for beginners would help; two people thought features about members of the Section would help; two people thought using social media may be useful, and two people said to continue being welcoming.

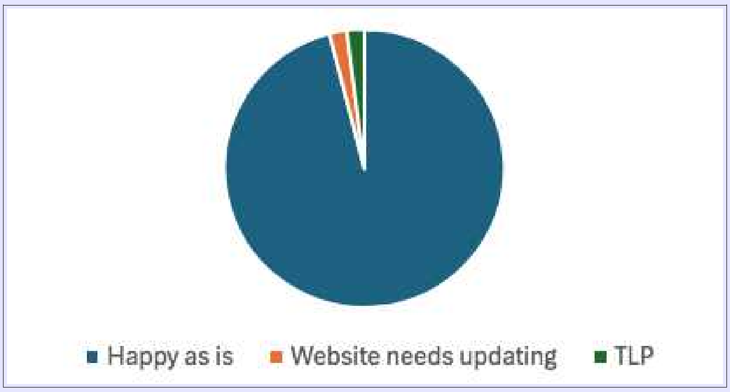



**Q. Is there anything else you would like to say about the Lunar Section Circular, the Lunar Section pages on the website or ways to make the Lunar Section a more welcoming and inviting place?**

**A.** There were 58 free text response to this. 47% of respondents were happy with the Section; 21% expressed their thanks to the team who keep the Section running; three people thought a contents list for the Lunar Section Circular would be useful; three people thought meetings would be good. Other comments included online tutorials, getting feedback on submitted observations, a Lunar Section discussion forum, and biographies of Section team and other members.




**Q**. Does anything need changing about the Lunar Section webpages?

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## Images and Drawings sent in and from the BAA Gallery.

### Sunrise over Copernicus.

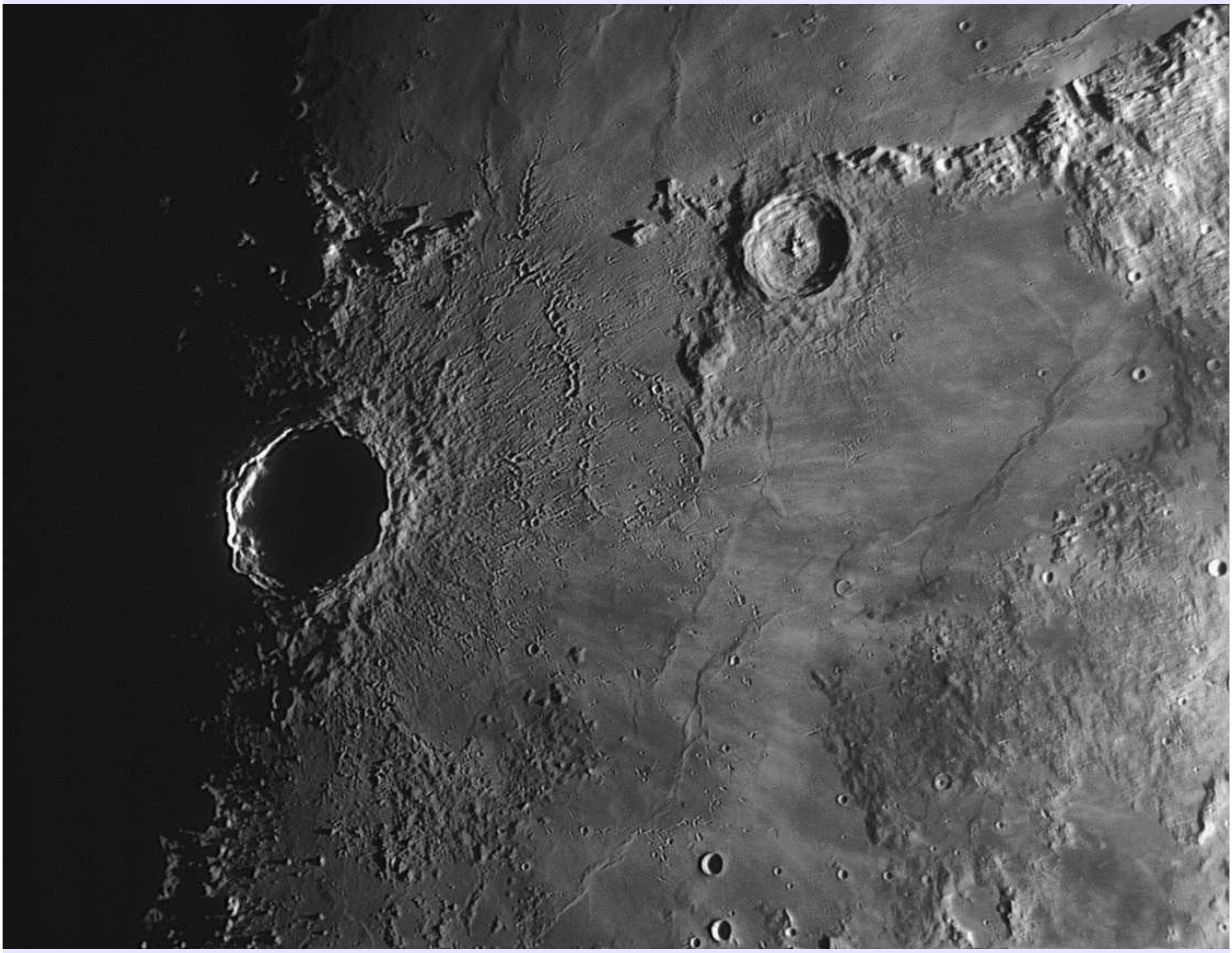


**Image from the BAA Gallery, and taken by Alun Halsey on 8th March 2025 at 21:19 using a Meade 12" SCT, Player one Neptune-M (IMX178), ZWO IR pass 850nm filter and Mesu-200 Mk1**

**Carrel.**

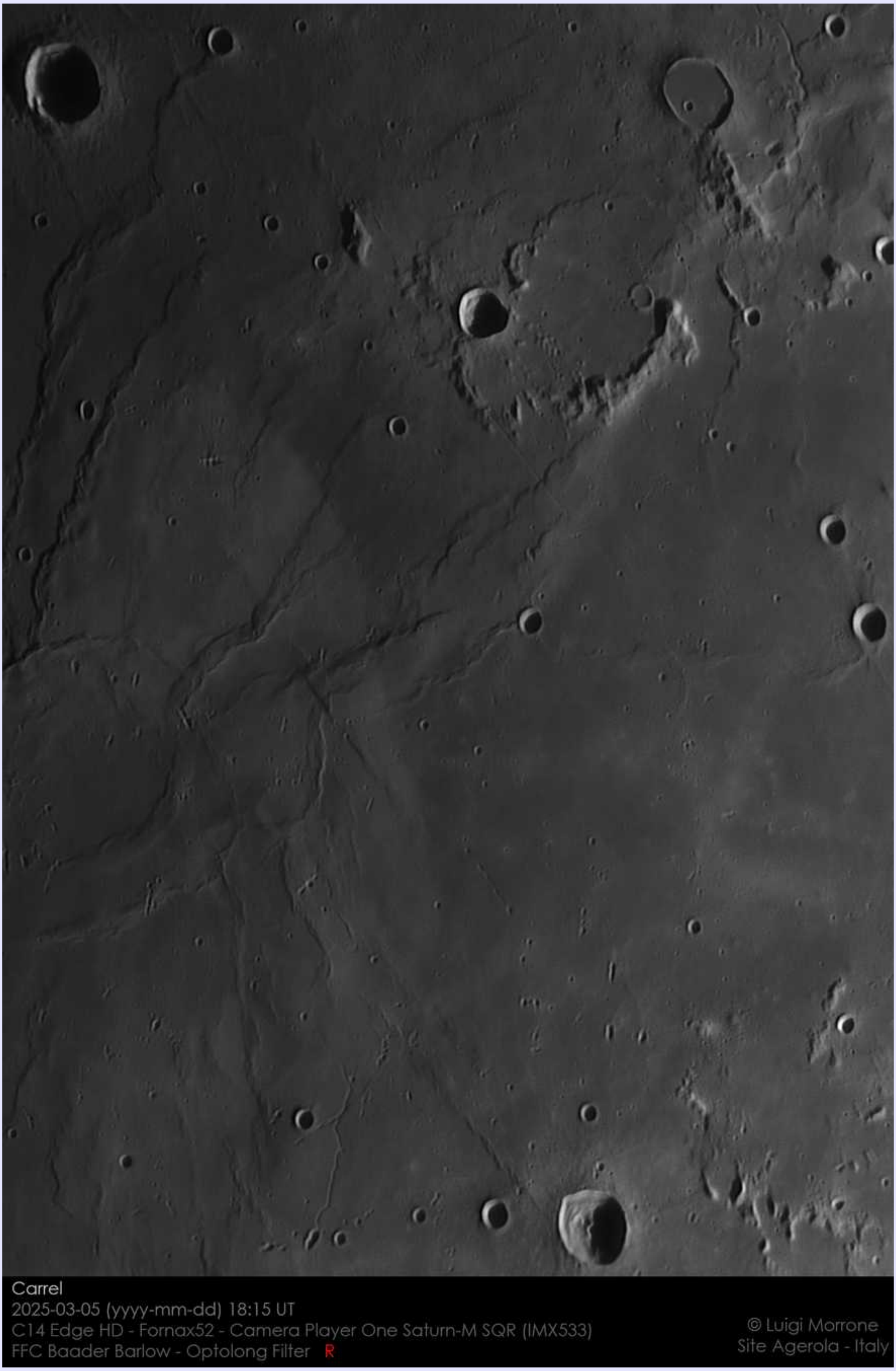



**Image by Luigi Morone with details as shown.**

**Schickard, Nasmyth, Phocylides, Wargentin.**

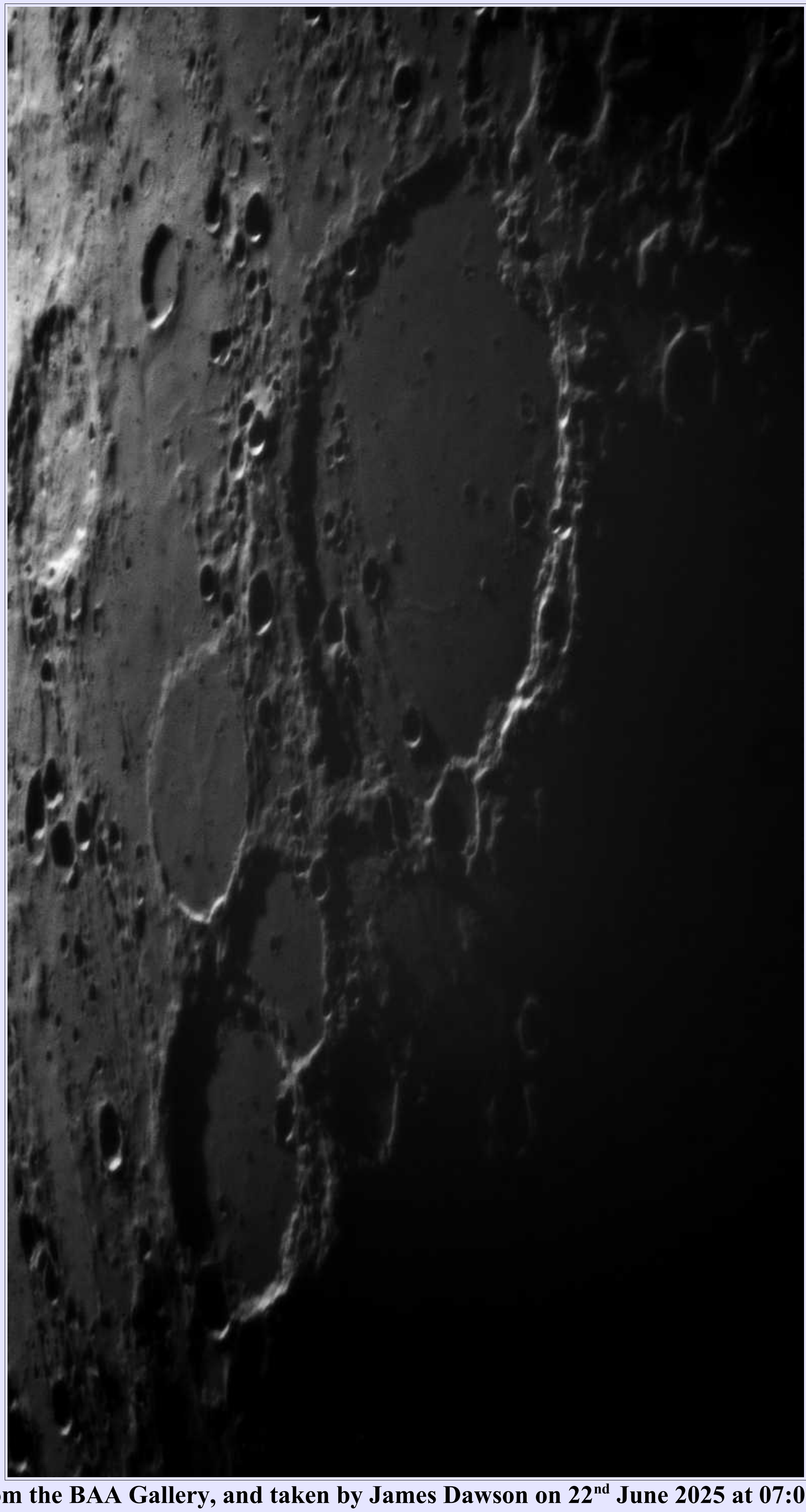
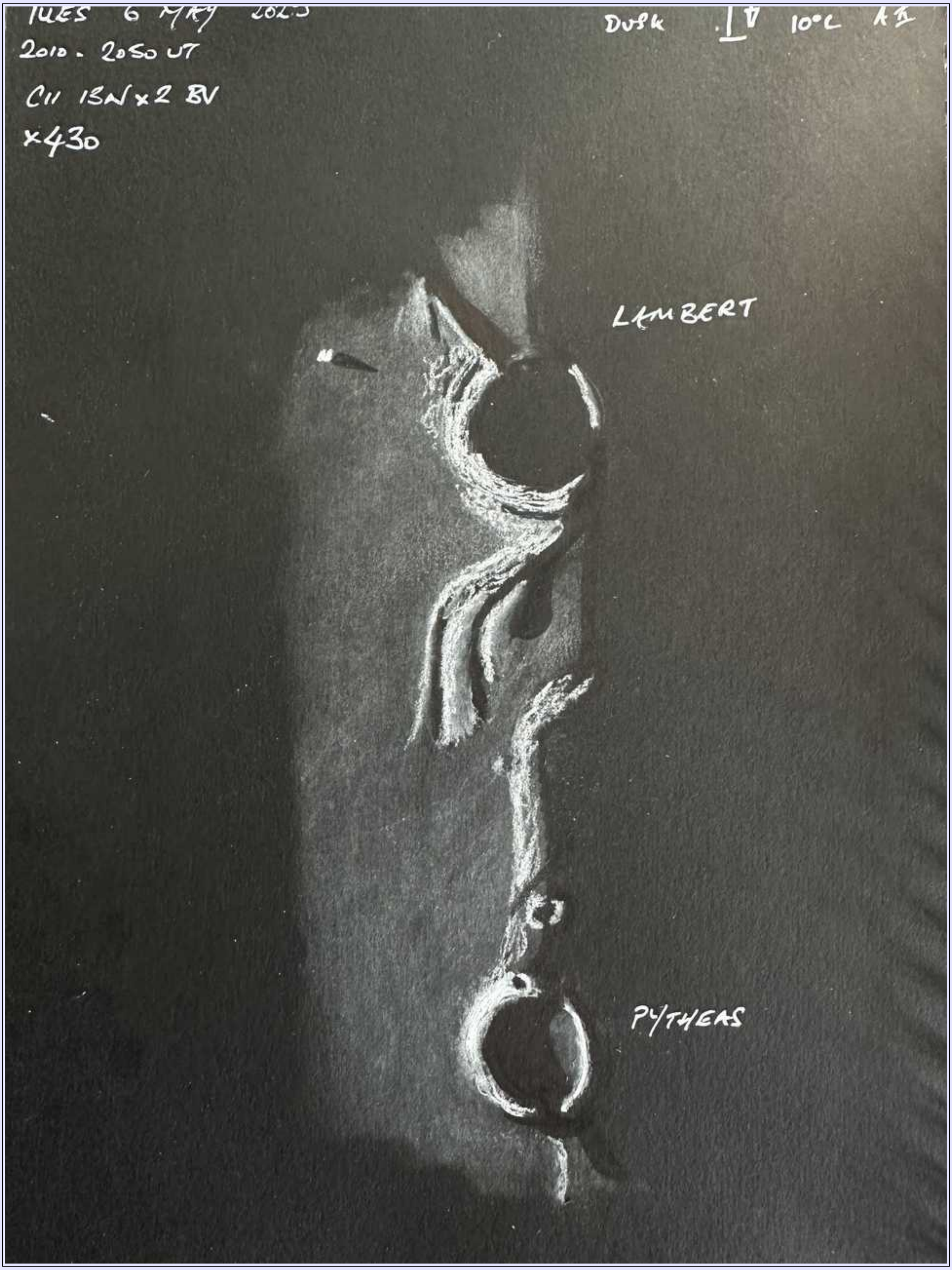


**Image from the BAA Gallery, and taken by James Dawson on 22nd June 2025 at 07:07hrs using a Celestron C14 and ASI ZWO 585MC, 2x Barlow and ProPlanet 807nm IR filter.**

**Mare Nectaris and surroundings.**

**Image from the BAA Gallery, and taken by Oliver Hext on 2nd June 2025 at 21:00hrs using a Skywatcher 127mm and ZWO ASI 678MC USB 3 Camera.**

**Lambert and Pytheas.**




**Drawing and notes by Mark Radice who spent an evening sketching..........**

*Lambert (30km) and Pytheas (20km) in Mare Imbrium, north of Copernicus, were tonight's first target. At high sun angles, the mare surrounding the two craters is a uniform sea of frozen lava, completely devoid of details. A flat uniform grey. With sunlight catching the ramparts, however, there are subtle and delicate wrinkle ridges running between the two craters, a feature I have not studied before.*

**Rima Ariadaeus.**

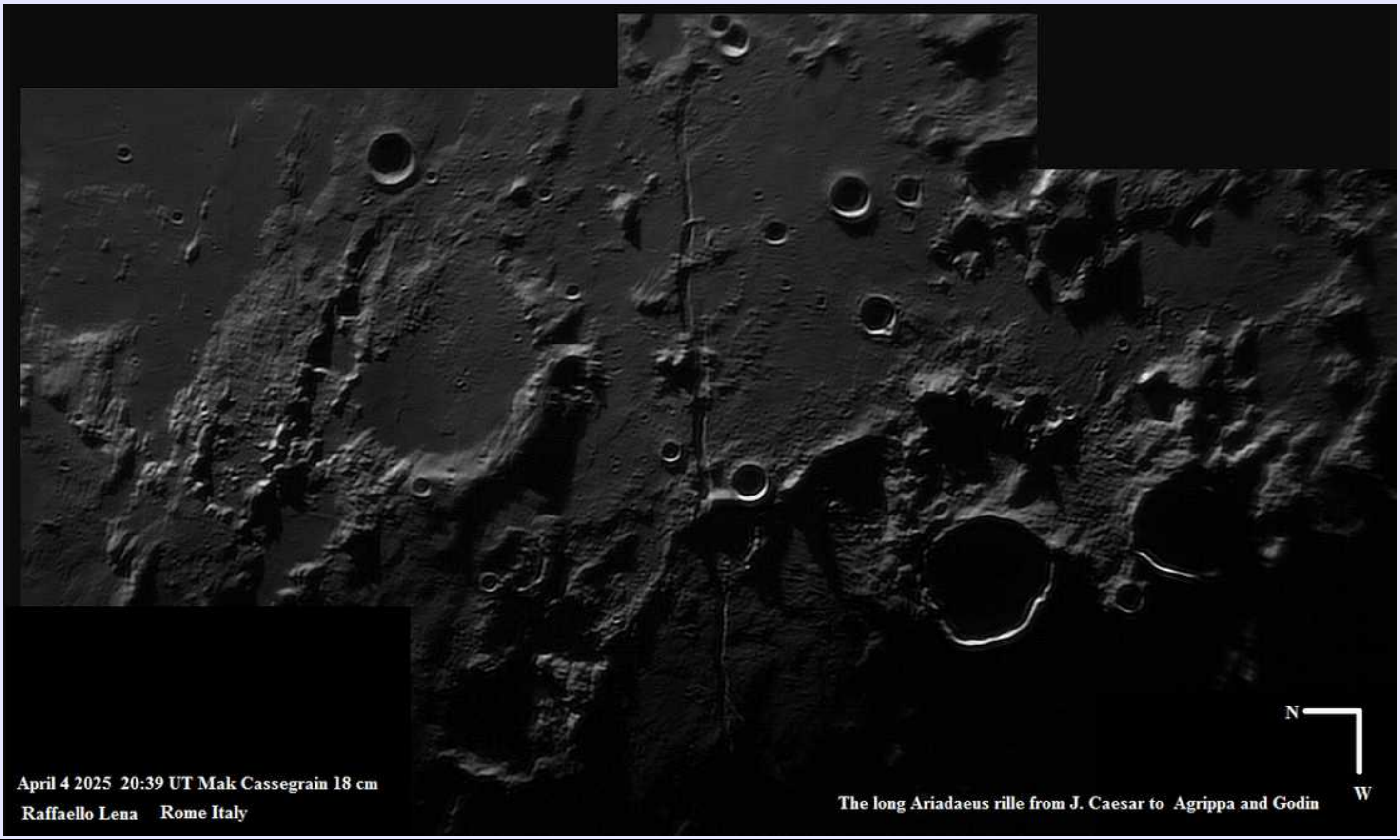



***Image and text by Raf Lena.***

*Rima Ariadaeus is believed to be fault that formed as a result of tectonic activity. It is a graben. The long rille is imaged from Rome Italy on April 4 2025 Mak Cassegrain 18 cm. It is imaged near the terminator with maximum contrast and hence a dramatic view.*

**Sinus Amoris.**

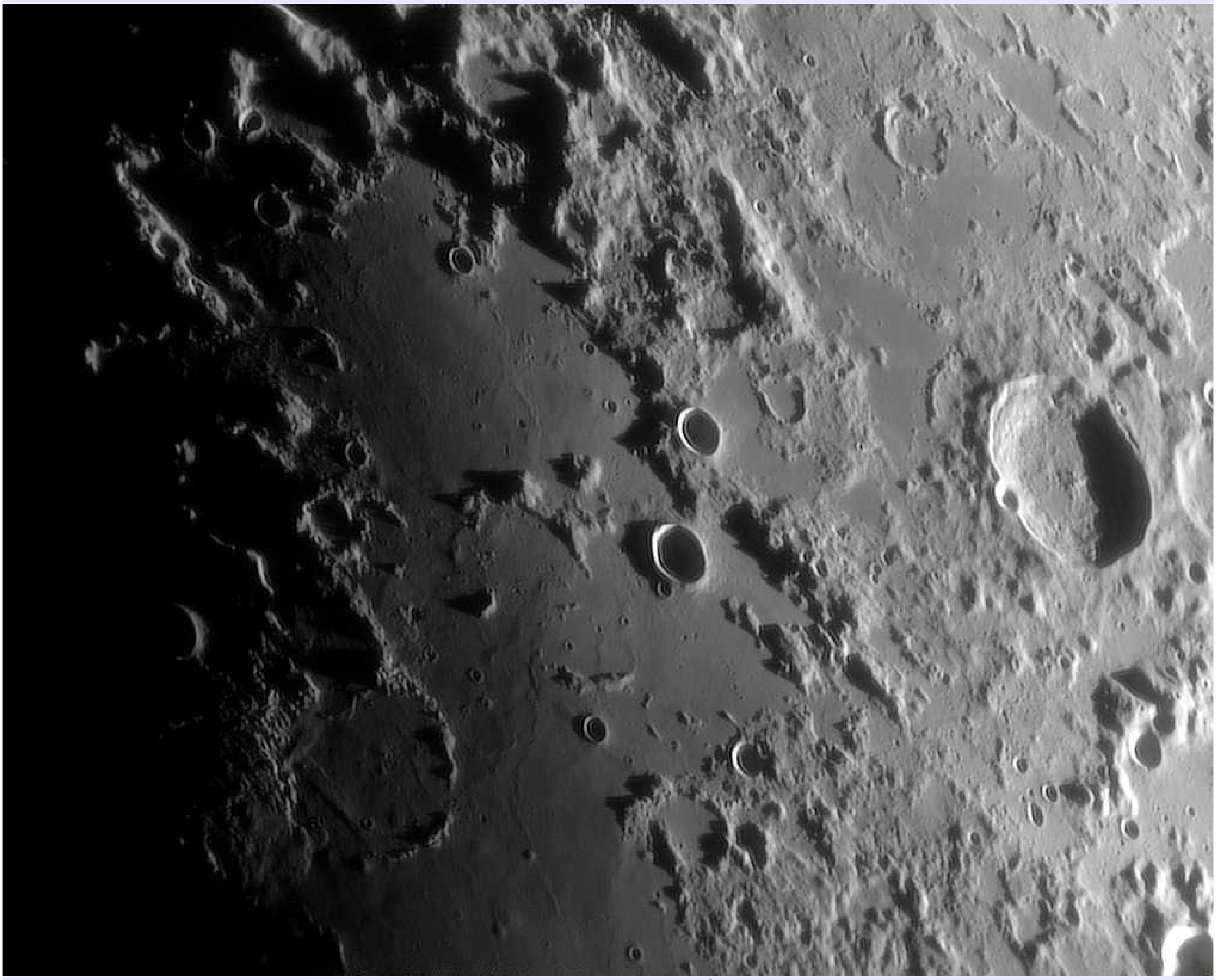


**Image by Bill Leatherbarrow taken on 2nd April 2025 at 19:20hrs.**

Sinus Amoris is a good place to go hunting lunar domes, as there are plenty of volcanic features here, particularly around Maraldi D, the degraded and flooded crater just clearing the terminator in the lower left of the frame. These show up mostly as low dimples on the lunar surface, some with conspicuous summit vents, but some without, and they seem mostly to be the result of the eruption of a basaltic magma on to the mare surface. A fine example can be seen to the east of Maraldi D, where there is a prominent pimple like feature perched on the edge of a wrinkle ridge that is orientated N-S.

A NAC image of this rather fine little dome is shown in Fig.1, and from the accompanying profile shown in the inset, you can see that it is a shade over 4kms in diameter, about 150m high and with a summit crater or vent some 20m deep. The wrinkle ridge that it sits adjacent to, appears to have slightly deformed its eastern flank, so whilst a relatively young geological feature, it pre-dates the contortion of the mare surface that produced the ridge.

But domes of this type are not the only volcanic features in Sinus Amoris, and if we look at the part of the sinus shown in Fig.2 we can see that Bill's image has picked up a few others. Features 1 and 2 (marked with white arrows) are not prominent telescopically, and only show up as subtle relief features. This because the structures here though being volcanic in origin are somewhat different in nature to the dome in Fig.1.

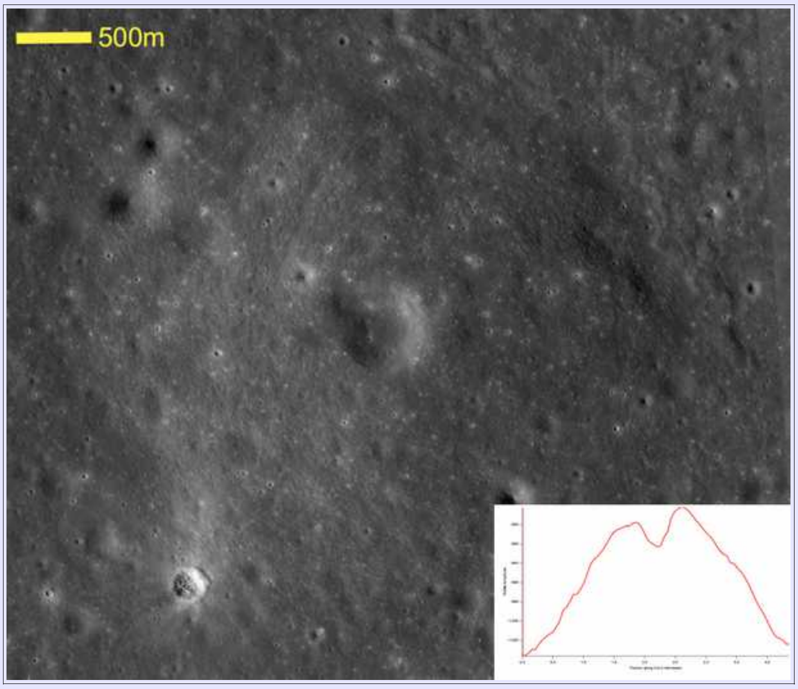



**Fig.1**

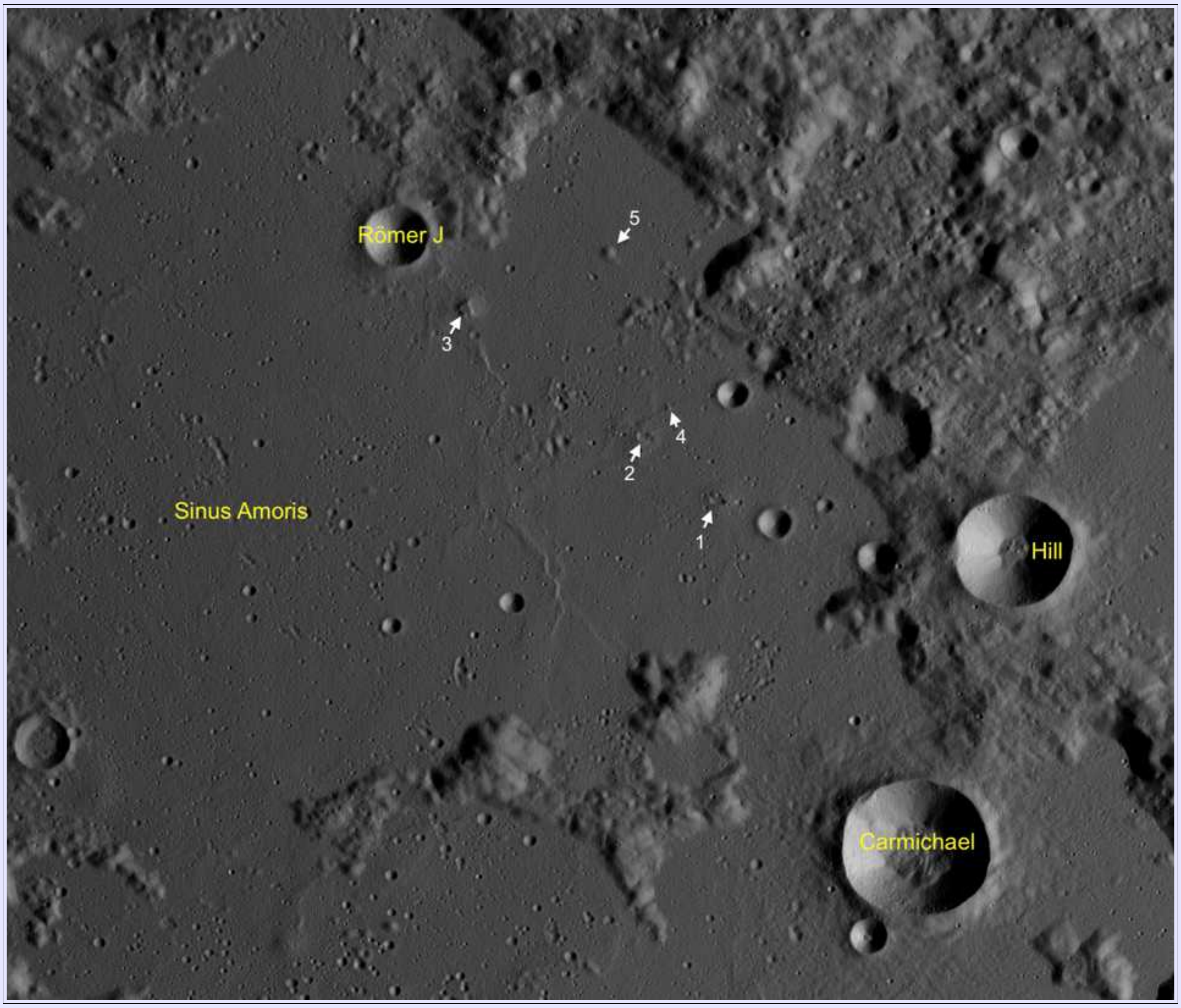



**Fig.2**

Features 1 and 2 are are more likely to be cinder cone type structures as opposed to a mini volcano formed by the extrusion of lava. They are each about 5kms in diameter, upwards of 100m high and with a central vent that seems to reach down deeper than the surrounding surface. This sort of thing would form as a result of the eruption of volatile rich magma that fragmented into billions of minute ashy fragments and fell back to the lunar surface to accumulate around the vent – something frequently seen in terrestrial basaltic volcanic settings. The vents on both are somewhat elongated along a SE-NW direction possibly suggesting tectonic control over the ascent of magma – possibly along a fracture system.

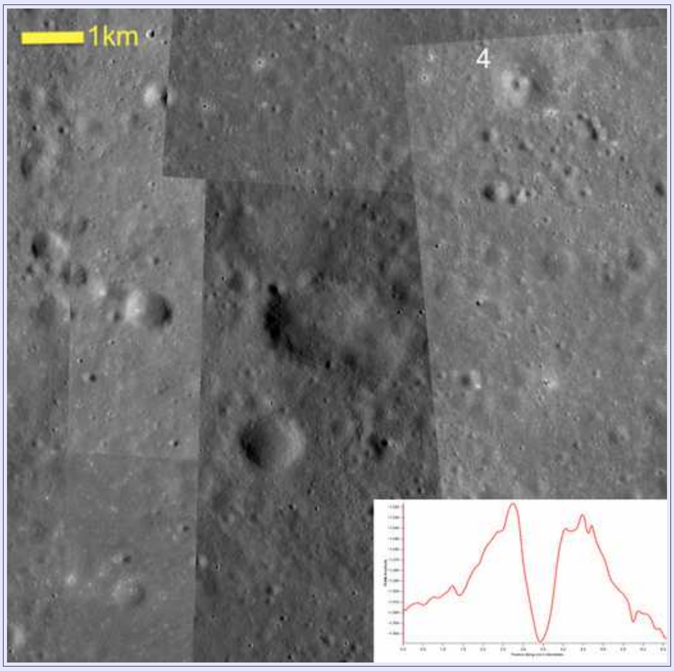



**Fig.3**

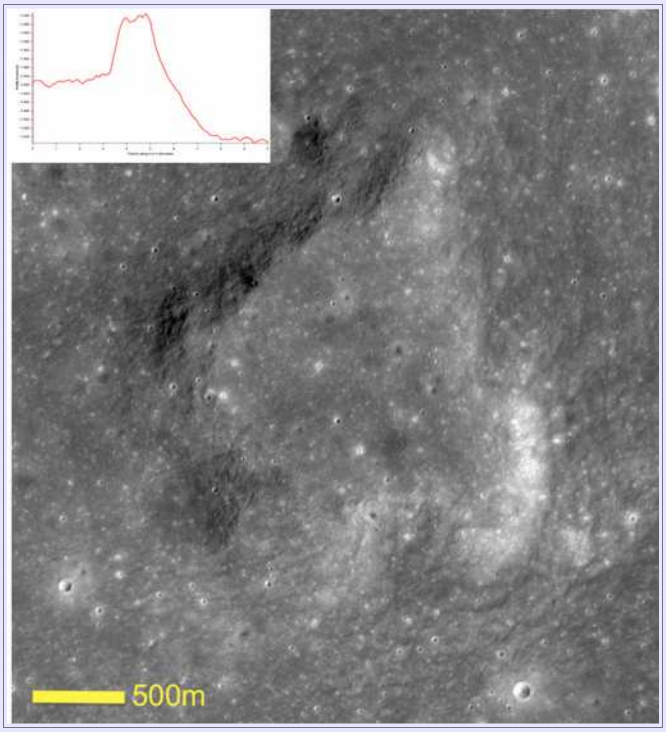



**Fig.4**

Fig.3 is a NAC view of feature 2, and as you can see the topographic profile shown in the inset is quite different to that seen in Fig.1. Because of the vertical exaggeration of the plot, the cross section looks quite volcano like, but in reality the structure is extremely subtle and low – so picking it up telescopically is dependent on very low angle illumination.

Feature 3 shown in Fig.4 by contrast is completely different again, consisting of a flat topped 'mesa' type of landform about 4kms in diameter but only about 150m high. There is no apparent vent, so there seems to have been little in the way of violent explosive or effusive volcanism. There are very many similar landforms on the Moon, and you only need to skip across to the Marius Hills to see many similar structures. The belief is that these represent the eruption of a more viscous but still basaltic type of magma, who's thick sticky flows built up the short stubby structure we see.

Note that features 1, 2 and 3 are on a bit of an alignment (as noted for 1 and 2) from SE-NW, suggesting some form of fault system acting as a conduit along which magma has erupted in various places.

Feature 4 is the smallest of the volcanic features here, being only 1.5kms in diameter and 100m high (Fig.5). It has a vent like pit – offset from the summit, with bouldery deposits within it. It lies very close (~ 4kms) to feature 2 to which is connected by a small ridge like structure. It is tempting to suggest that this is a parasitic cone of feature 2 to which it is joined by a subsurface dike.

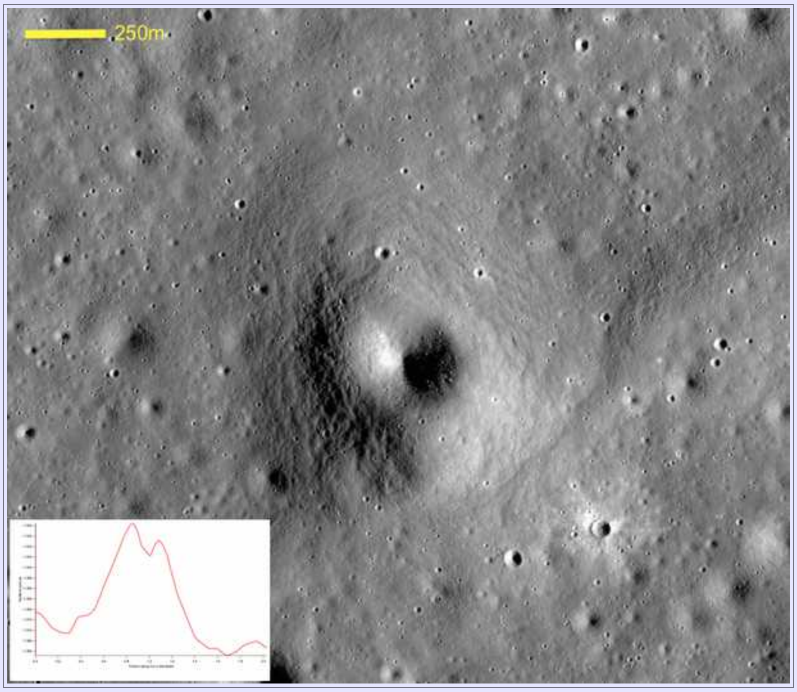



**Fig.5**

Feature 5 is a red herring, it is shown as a dome in some sources, but is in fact an isolated highland nubbin, sticking up above the mare surface – and many such hills are mistakenly identified as volcanic domes, but only spacecraft data and mineralogical information can reveal their true identity.

So, lots to see and interpret in just this small piece of the lunar surface, and a diligent search would probably reveal more!

**Timocharis.**


**Image by Alexander Vandenbohede with details as shown.**

**Theophilus and Sinus Asperitatis**

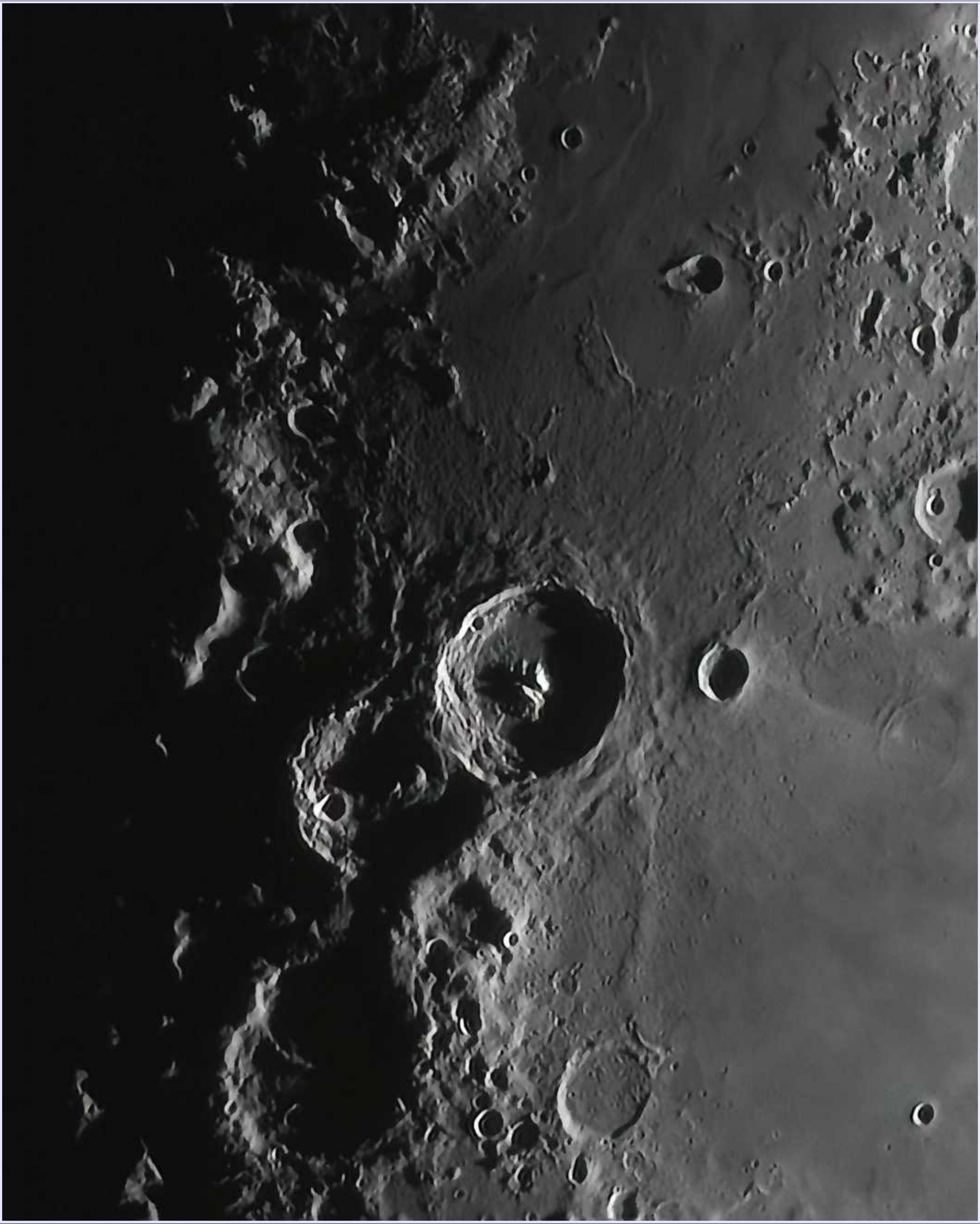


**Image by John Arnold and taken on 1st June 2025 at 22:17hrs using a Stellalyra 8" Classical Cassegrain, ASI178MM camera with 742 nm long-pass filter.**

**Rupes Altai.**

**Image from the BAA Gallery, and taken by David Basey on 2 June 2025 at 21:25hrs using a 358mm Newtonian Reflector, Altair 178M3 camera and W25 (R+IR) filter**

No doubt, the Rupes Altai are a spectacular landform, but I have to admit that every time I look at this part of the lunar surface, the feature that stands out to me is the keyhole shaped multiple crater Rothmann H and J. Rothman itself is at the bottom of the frame, just to the right of centre, whilst H and J are 50kms off to the NW.

The two letters H and J imply just 2 craters, but as you can see from Fig.1 this is at least a triple crater, with an unnamed crater in between.

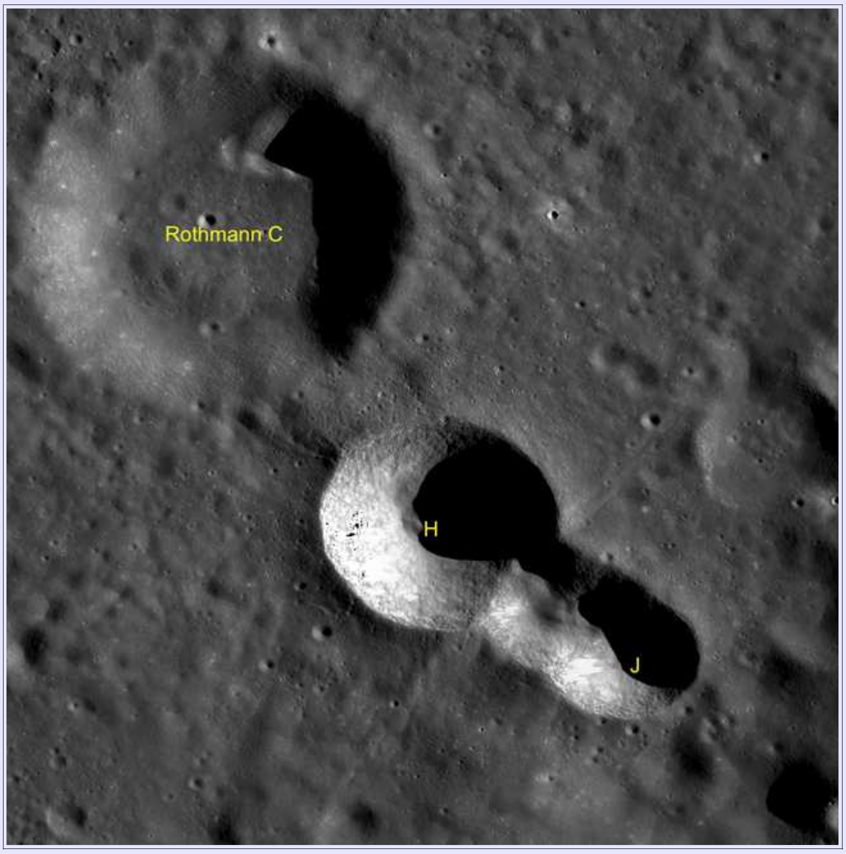



**Fig.1 LRO image of Rothmann H and J. Rothmann H is 10kms in diameter.**

That this is a multiple, *simultaneous* impact crater is demonstrated by the two 'wing' like features extending away from the intersection of H and the unnamed crater between it and J. These 'wings' are diagnostic of simultaneous impacts, forming as the individual ejecta blankets interact *as* the craters are forming. They usually take the form of elongate crater chains and ridges, giving the feature a bit of a 'twisted rope' appearance – and this is what we see on the wing that extends away to the SW. The opposite wing however, which stretches away to the NE, takes the form of a low ridge ~ 5m high, with no trace of the 'ropey' appearance of its neighbour. Bearing in mind that both features formed at the same time and from the same process (interaction of the ejecta blankets) it is odd that they end up looking so different. If you want to see a nice example of a 'ropey' crater chain, have a look to the west of the crater Cauchy – not a binary crater, but the crater chains that form the edge of its Zone of Avoidance (ZoA) are essentially the same. On the other hand if you want to see a wing similar to the ridge like one, have a look to the west of Newcombe, which *is* a binary crater, and you can see the same sort of morphology.

Whilst H and J look like they might have formed by the impact of a single body, a glance at Fig.2 which is a 3D rendition, shows that the unnamed crater in between is a bit messy, with the possibility that we are looking at 2 or maybe even 3 partially overlapping craters. This suggests that the original impacting body was formed of a large body which gave rise to H, a smaller body which gave rise to J and in between a cluster of smaller bodies which formed the unnamed crater – all travelling in trail formation.

Which direction were they travelling from though? If I had to take a guess, I would say from NW to SE, with the larger H impactor hitting the surface first, followed by the cluster of bodies which formed the middle crater and lastly the smaller body forming J. This is suggested by the observation that the middle unnamed crater partially overlies H, whilst it in turn is partially overlain by J – but bear in mind that the the time delay between each impact would have been only fractions of a second - if that - and all the craters would have been forming essentially at the same time.

**Fig.3 3D rendition of Rothmann H and J – note the appearance of the unnamed crater between H and J – possibly the result of several separate but simultaneous impacts.**

The more you look at these LRO images the more you see, and despite spending far too much time in the past looking at this 'trio', only recently have I noticed something peculiar about H, and that is the presence of a swathe of impact melt extending from its north-western rim up towards, and over the southern rim of the nearby Rothmann C (Fig.4). The northern rim of H is also draped in a lot of impact melt, but there is not so much around the remainder of the rim.

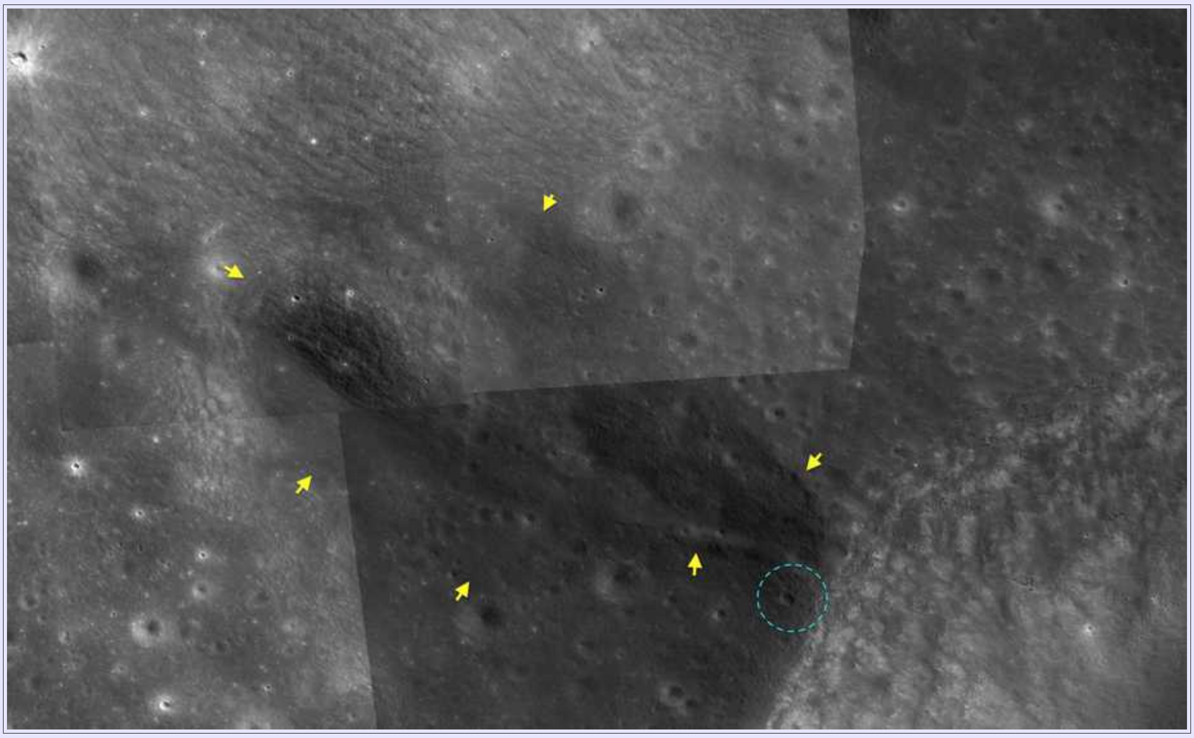


**Fig.4 NAC image of the north-western rim of Rothmann H (lower right corner) with a swathe of dark impact melt rich deposits (approximately defined by the yellow arrows) which extends from it towards the southern rim of Rothmann C (top left corner).**

In some craters, impact melt can be ejected from the crater via a low point in the rim as a result of the collapse of the crater wall, and the northern rim of H is a low point – the eastern and western rims being about 100m higher.  This appears to have happened in the case of the crater Arago but in here in Rothmann H, there is no sign of extensive crater wall collapse of the sort that could displace lots of melt up and over the rim. Also, this is, we have established the up-range rim – so we cannot be looking at melt that was propelled from the impact along the direction of travel as happens in some impacts. It is probable that this crater cluster is the result of a low angle impact as it *is* somewhat saddle shaped along its length, with the north-western rim of H being lower than the rest of the rim, and the south-eastern rim of J is some 200m lower than the rest – all features of low angle impacts.

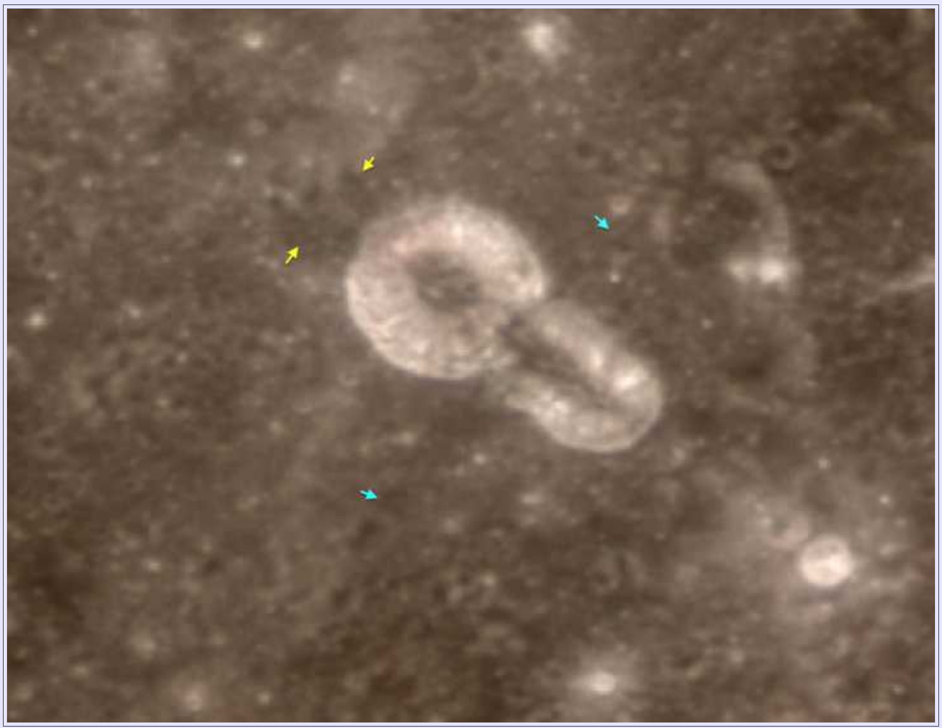


**Fig.5 WAC Colour Hapke-Norm overlay of Rothmann H to J from Quickmap. The yellow arrows show the dark impact melt outside the northern rim whilst the blue arrows show the 'wings' either side of the trio picked up in more dark impact melt rich deposits.**

Other areas where we see impact melt in these craters is associated with the wings mentioned above, and in Fig.5 we can see them picked out in darker material, similar to the melt outside the northern rim. This is quite similar to what we see in the case of Messier A, which is another multiple simultaneous impact crater.

Another feature that I had not noticed before is the population of shallow, subdued craters in the 20-25m size range, clustered around the northern rim, you can see this in Fig.6. These look like old craters but as they are perched on the crater glacis they cannot be older that Rothmann H. Many of them are also draped in impact melt, so they must be younger than these deposits. The most likely explanation is that these small craters are 'self secondaries' that formed as a result of excavated material being ejected on almost vertical trajectories, stalling and then falling back to land in and around the forming crater. These were then smeared with impact melt which arrived slightly later. Their concentration around the northern rim of H would be consistent with the crater group being formed by a low angle arrival from the NW, as in many cases the ejecta from such impacts can be concentrated in the immediate up-range part of the crater ejecta field.

So a possible reconstruction of the impact event might go something like this – a chain of debris from a disrupted asteroid approached the surface, consisting of a large body in the lead followed by 2, 3 or maybe even 4 smaller bodies travelling behind, with a slightly larger one at the rear. As they struck the surface at almost the same time, their ejecta cones interacted and produced the wing like structures as the debris both eroded the surface and was deposited as ridge like structures. Impact melt was also concentrated in these deposits. Due to the low approach angle, the ejecta from the first and largest impactor (which formed H) did not extend to the north very far, but formed almost a vertical sheet that threw material along almost vertical trajectories – andd when this material stalled and fell back to the surface, it produced a swarm of self-secondary craters on the still forming rim of the transient cavity. These craters were then draped with impact melt which rained down on the northern rim – and which was ejected from the crater during the final stage of the excavation process.

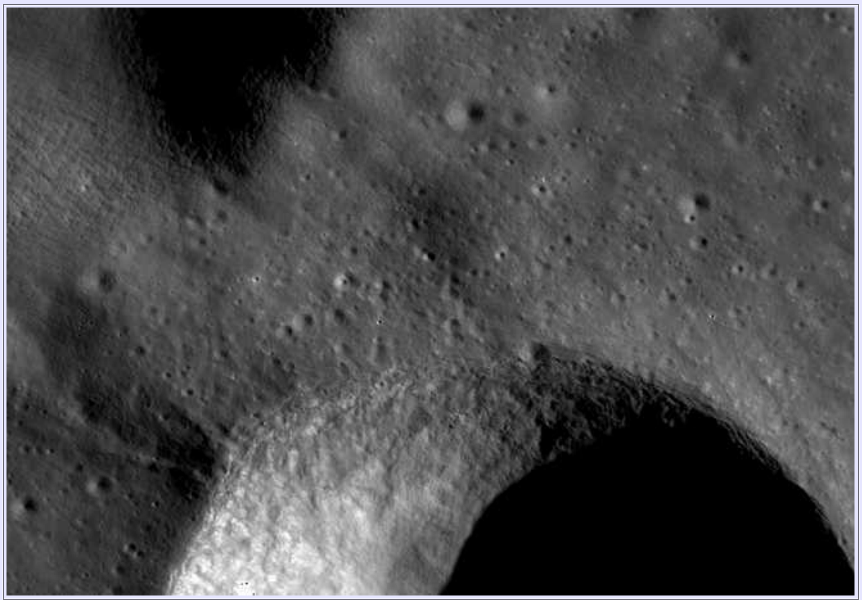


**Fig.6 SELENE image of the northern rim and glacis of Rothmann H showing numerous small subdued craters.**

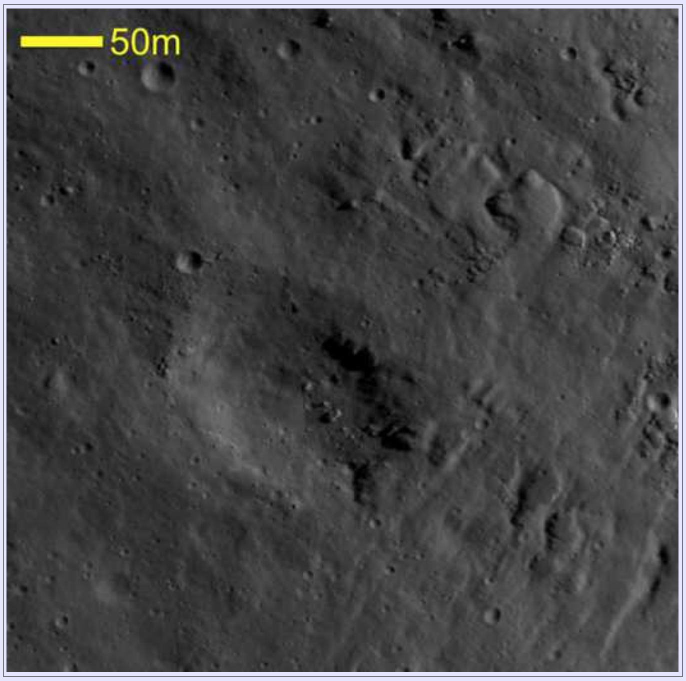



**Fig.7 Small crater on the northern rim of Rothmann H which has been partially infilled by impact melt that has flowed down off the rim. Its location is shown with the blue circle in Fig.4.**

An obvious final conclusion might be that whatever the impactor was made up of, the individual bodies were travelling in a trail formation along the trajectory of flight. This is similar to the probable trajectory alignment behaviour seen in other lunar multiple craters such as Birt and Birt A and Heis and Heis A, probably under the influence of the Earth-Moon gravitational system. This crater cluster stands out well due to its sharp rim(s) and is conspicuous telescopically set in as it is amongst fields of older more eroded craters.

**Archimedes.**

**Image by Maurice Collins and taken on 7th April 2025 at 0901UT using an 80mmED refractor, 3xbarlow and QHY5III462C**

**Mare Nubium.**

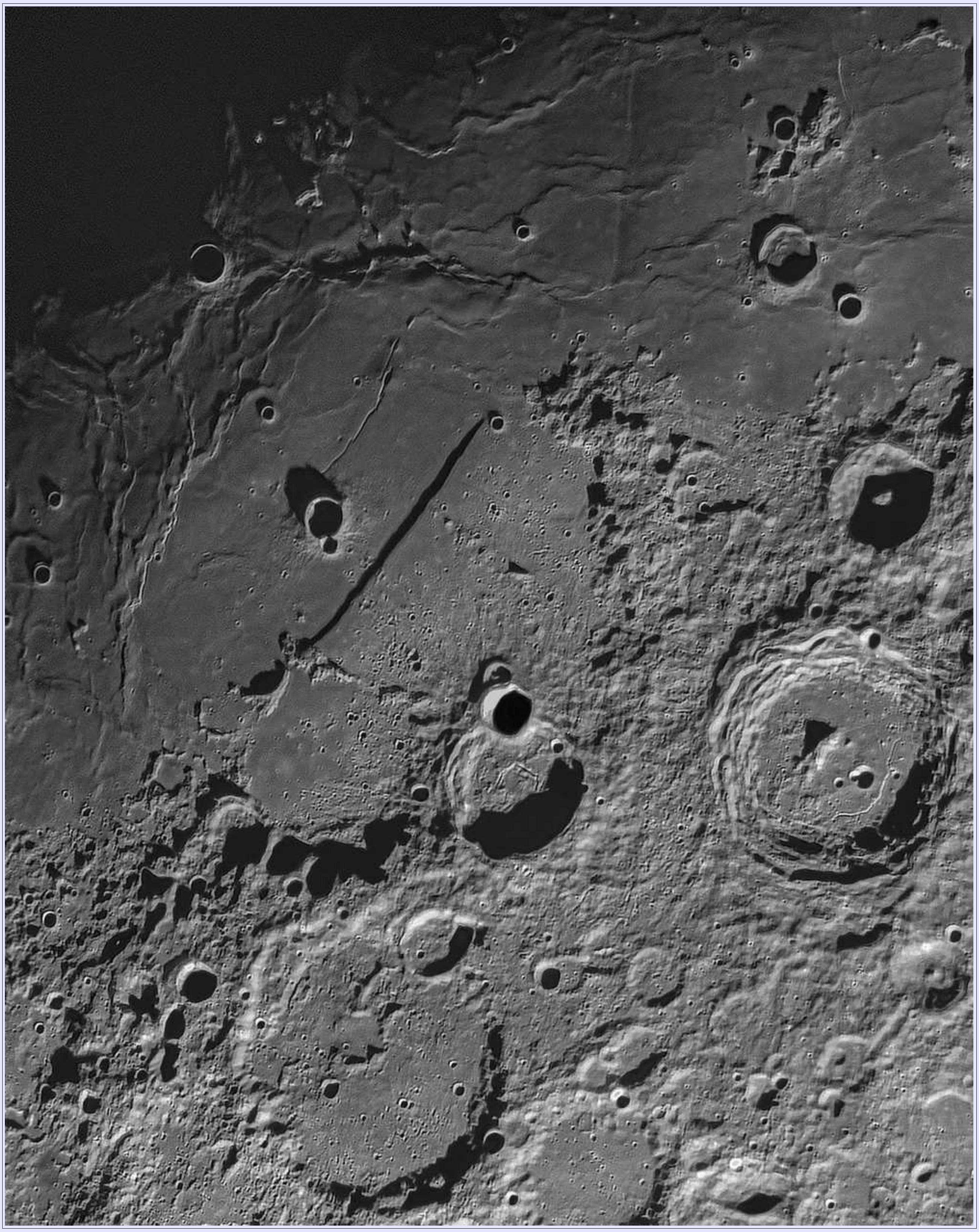


**Image by Leo Aerts taken on 6 April 2025 at 19:29 UT using a Celestron 14 SCT.**

**Maurolycus**

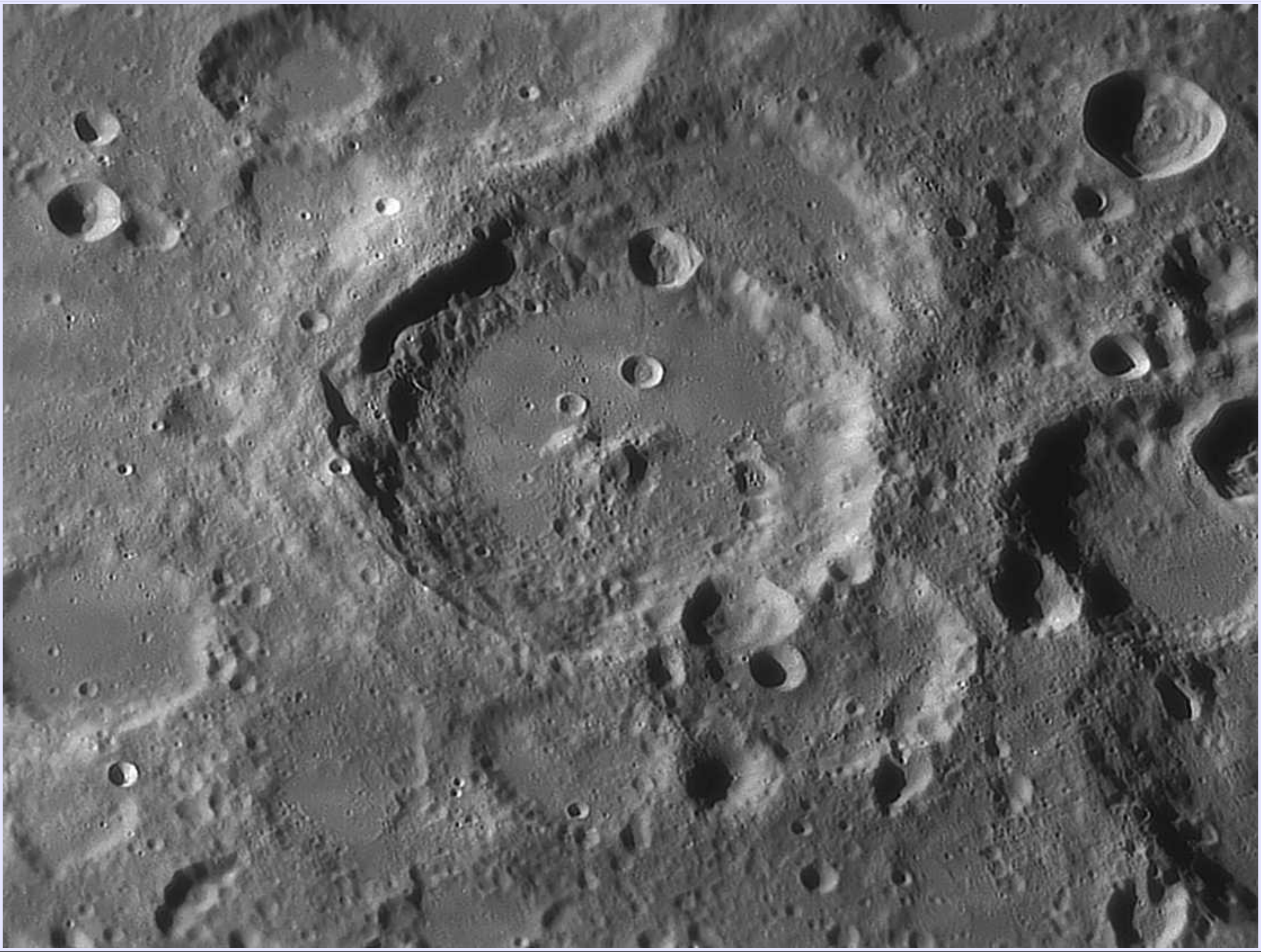


**Image by Mike Greenhill-Hooper and taken on February 17th 2024 18:49 using a 20" f/4 Obsession Dobsonian; 3x TeleVue barlow and ASI224MC with Astronomik Proplanet filter**

**Furnerius.**

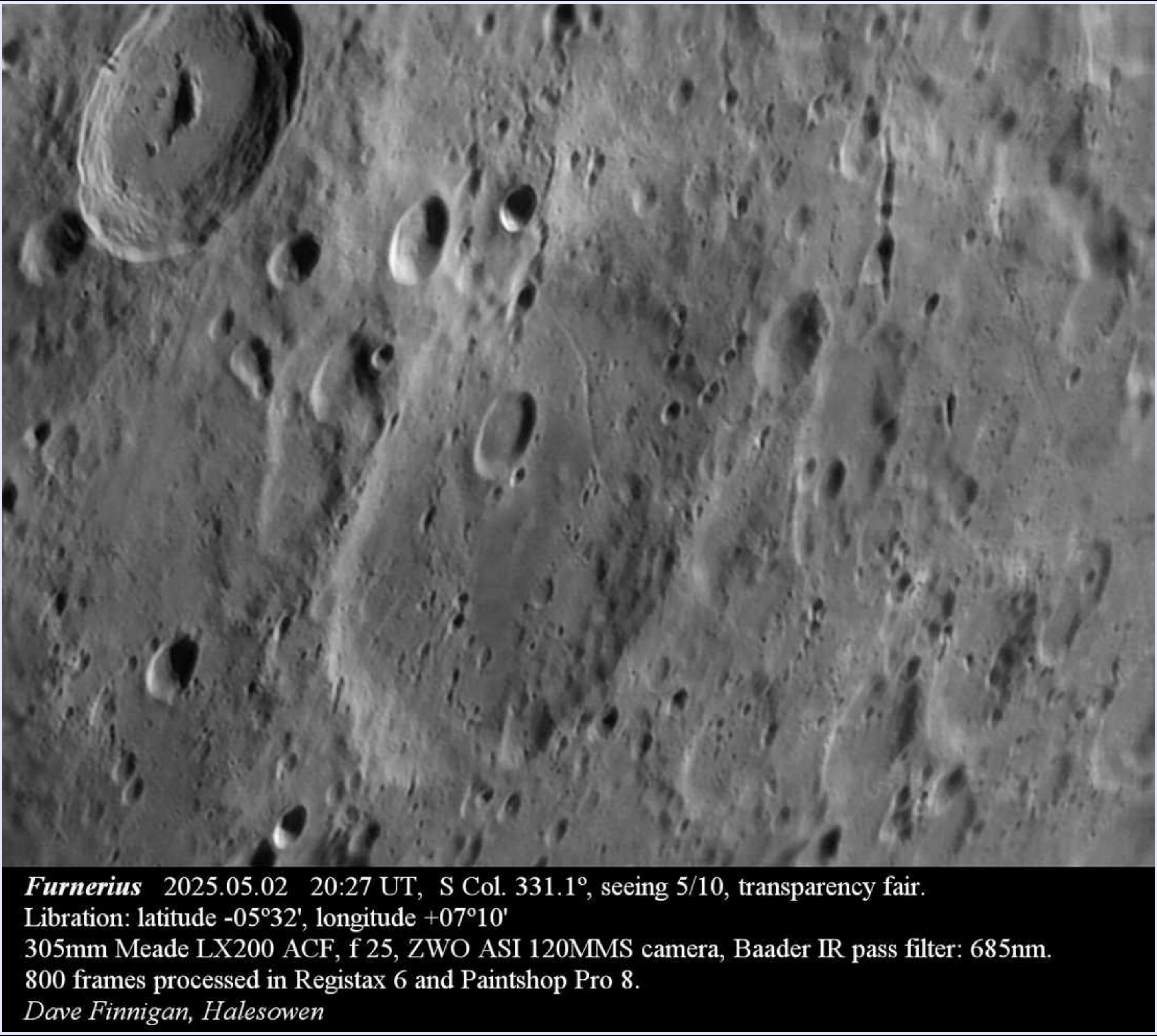



**Image by Dave Finnigan with details as shown.**

**Polarised Moon.**

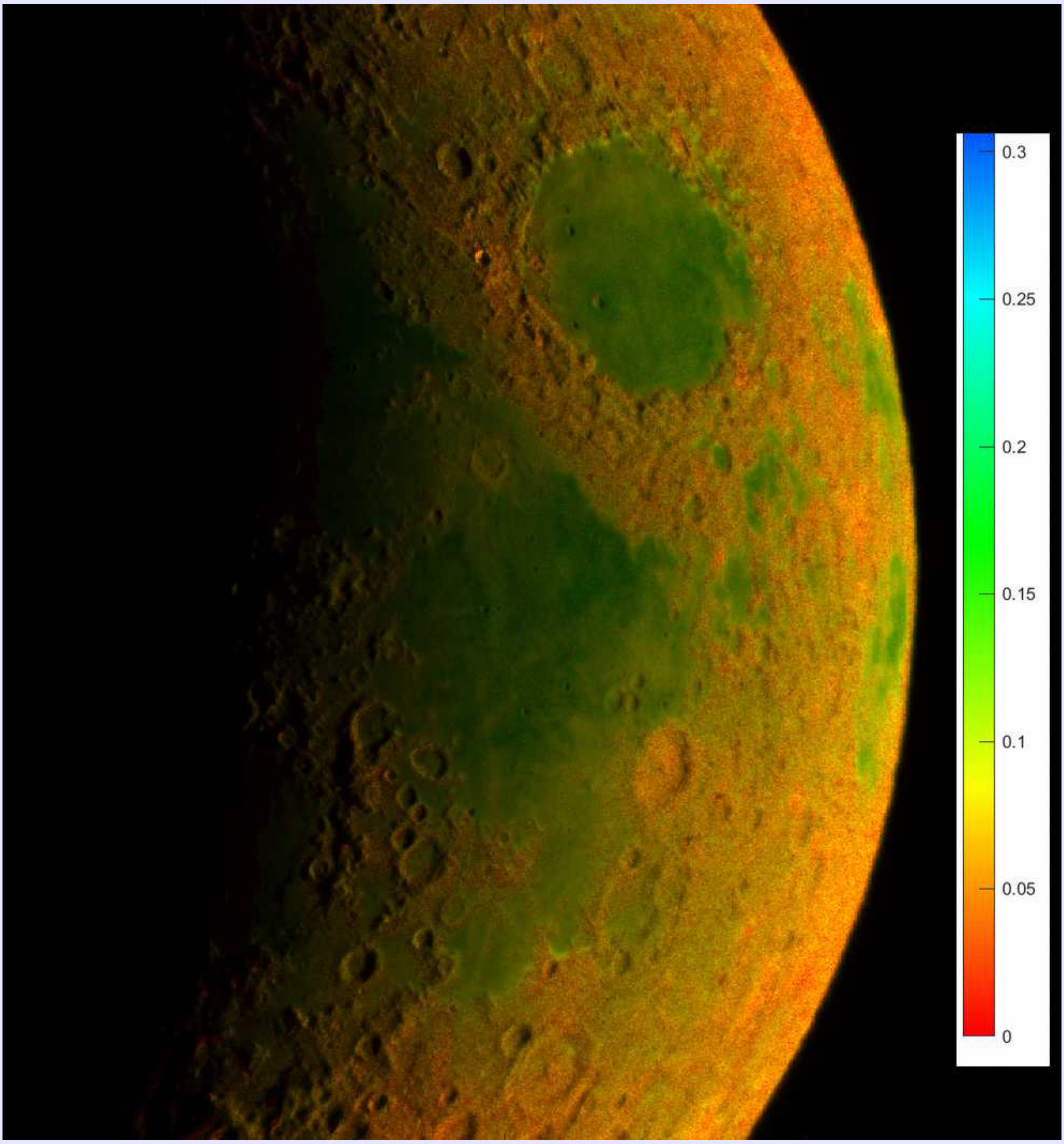



**Image and text below taken from the BAA Gallery and submitted by Nick James. Image taken on May 31st 2025 using a Lucid PHX050S1 and Celestron 0.15m, f/10.**

*I'm doing some experiments with a Lucid polarisation camera which I've bought for use to do some polarimetry on the solar corona at the next total eclipse. The camera uses a Sony IMX264MZR sensor. This has a grid of polarisers implemented over the pixel sensors, similar to the colour filters in a Bayer array but sensitive to 0, 90, 45 and 135 degree linear polarisations. This means that you can do simultaneous imaging in all linear polarisations and then synthesise parameters such as degree and angle of polarisation (DOLP and AOLP).*

*Light reflected from the lunar maria is fairly strongly linearly polarised and this can be used to determine information about the lunar regolith (see the work reported here). This image is a single frame from the camera processed to show DOLP in false colour. It shows that light from the highlands is nearly unpolarised but that light from the maria is polarised with a DOLP of around 20%.*

**Schickard to Bailly.**

**Image by Chris Hooker taken at 21:06hrs on 24th February 2024 using a 254 mm F/6.3 Newtonian, 2x Barlow, Baader 610 nm & IR-cut filters and ZWO ASI174MM camera.**

## Bullialdus with image and text by Rick Hill.


*After you have worn yourself out on Eratosthenes and Copernicus and see all the features around Plato, 8-9 days after new moon, you may notice a beautifully terraced crater in the south just west of Arzachel and Rupes Recta. This is Bullialdus (63km diameter) with a floor 3.5km below the rim and a multi-peaked "central peak" rising over a kilometer above that crater floor. This formation is only 1.1-3.2 billion years old making it of Eratosthean age, before Copernican but after Imbrian ages. Its isolation on the surrounding plain of southern Mare Nubium makes it stand out. There is a good hatch work of ejecta outside the crater walls extending out about a crater radius.*

*South of this crater is Bullialdus A (26km) a shallow crater undoubtedly filled with ejecta from the Bullialdus impact, and a bit farther south is slightly smaller Bullialdus B (21km) and then west (left) of that is a rather polygonal but similarly sized crater, Konig (23km). Apollo 16 got a splendid view of these group and it's worth looking up on the web. There are a number of ghost and partial craters in this frame surrounding Bullialdus. The most obvious can be seen at the top and bottom of the image, Lubiniezky (40km) and Kies (46km) respectively. Due west of Bullialdus you can see two more ruined. nearly ghost, craters,*

*The closest one is Agatharchides P (65km) with the little cirque cut out in the lower left which is Agatharchides N (21km) and a little further west is Agatharchides itself (51km). South of these craters is another ghost crater crossed by rimae, or stretch marks from Mare Humorum farther to the west. When that mare cooled there was a subsidence as the rock contracted leaving the parallel arc graben like rimae you see here. The crater in question is Hippalus (57km) listed by the Virtual Moon Atlas as an "Exceptional formation" but as shown here, not at all unique in Mare Nubium.*

*On the opposite side of Bullialdus, to the right or east is an unusual ghost crater, Gould (32km) that is mostly just the west wall of the crater. South of this is a heart-shaped crater, Wolf. It is listed as 25km diameter but it is anything but circular. This formation, which includes the irregular walls and flooding, probably consists of at least 3 separate impacts. The thing I find fascinating about this feature is how it changes with changing illumination during the lunar day, but that's another article in itself! Don't hesitate to explore this area when it is available. Your efforts will be well rewarded.*

*This image was made from two AVIs stacked with AVIStack2 and further processed with GIMP and IrfanView.*

**Whewell, Tempel and D'Arrest.**

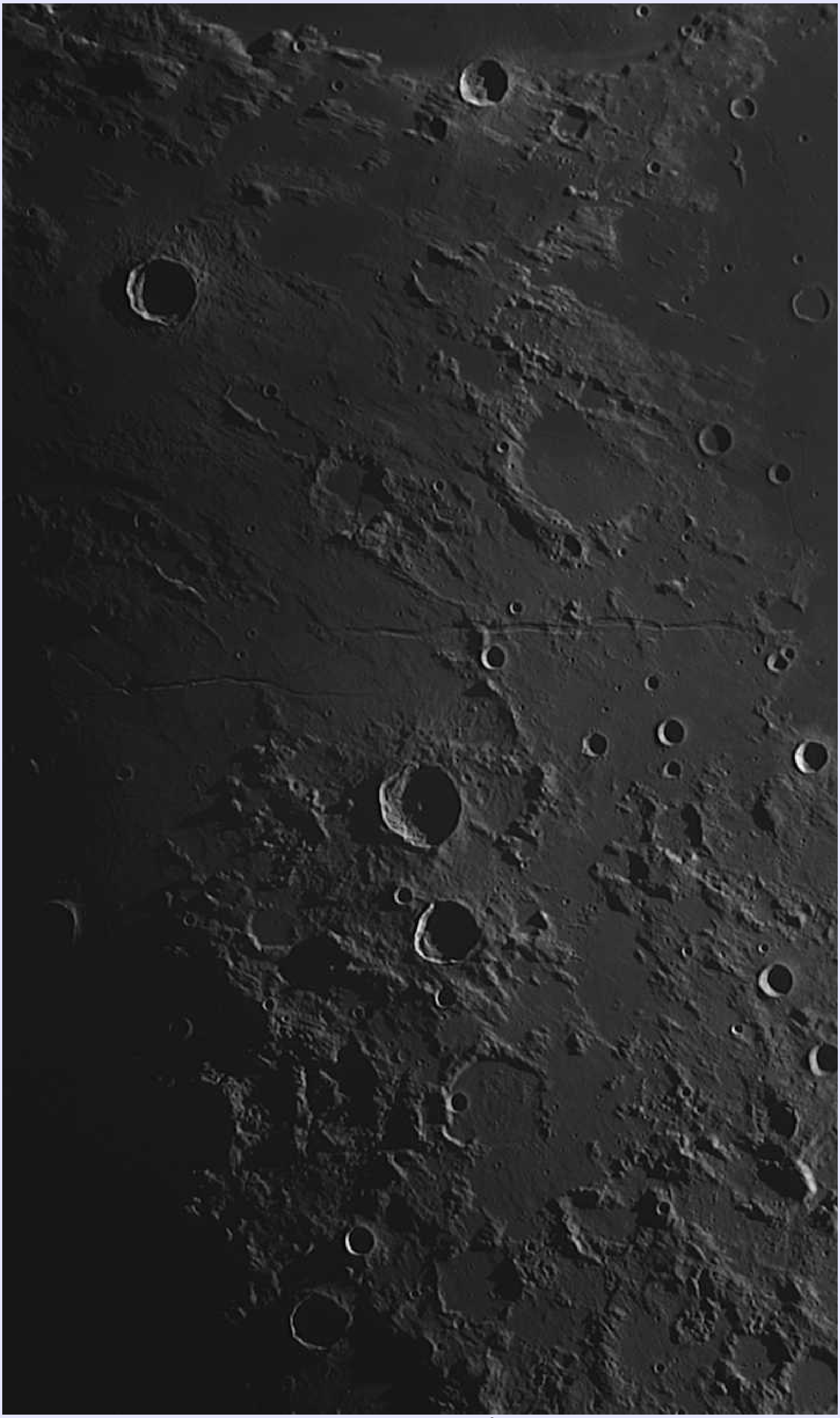


**Image by Bob Stuart and taken on 4th May 2025 at 19:00hrs**

**Copernicus.**

**Mosaic image by Chris Longthorn taken on 6th May 2025 at 20:45 taken with a 200mm StellaLyra Classical RC Cassegrain with a ZWO ASI224MC colour camera.**

**Lunar Impact Flash Observing Programme.**
**By Tony Cook.**


**Figure 1.** Earthshine, Saturn and Neptune as imaged by James Weightman on 2025 Jun 19 UT 05:13 from Cirencester UK, using an Olympus ON-5 with 150mm zoom, 1 sec exposure at f/4 and ISO 2000.

## Update on Video Observation of Earthshine in June:

| Date | UT Start | UT End | Duration(hours) | Filter | Observer | Location |
|---|---|---|---|---|---|---|
| 2025-06-01 | 22:26:32 | 23:54:38 | 1.468 | H | AC_Cook | Newtown_UK |
| 2025-06-02 | 18:05:03 | 19:39:58 | 1.582 | H | AC_Cook | Newtown_UK |
| 2025-06-02 | 20:14:52 | 20:49:32 | 0.578 | H | AC_Cook | Newtown_UK |
| 2025-06-30 | 15:04:01 | 15:22:48 | 0.313 | H | AC_Cook | Newtown_UK |
| 2025-06-30 | 15:48:38 | 15:51:08 | 0.042 | H | AC_Cook | Newtown_UK |
| 2025-06-30 | 16:15:24 | 17:13:18 | 0.965 | H | AC_Cook | Newtown_UK |
| 2025-06-30 | 17:28:00 | 17:46:21 | 0.306 | H | AC_Cook | Newtown_UK |
| 2025-06-30 | 19:10:58 | 19:52:44 | 0.696 | H | AC_Cook | Newtown_UK |

Total Contact time with earthshine in June 2025 = 5.9 hours with no overlap of observations – so it's not possible to confirm any flashes, should any eventually be detected in the video. Video has still to be analysed for impact flashes.

**Video Observation of Earthshine in July:**

| Date | UT Start | UT End | Duration(hours) | Filter | Observer | Location |
|---|---|---|---|---|---|---|
| 2025-07-02 | 16:50:30 | 18:35:40 | 1.753 | H | AC_Cook | Newtown_UK |
| 2025-07-02 | 19:08:08 | 19:47:11 | 0.651 | H | AC_Cook | Newtown_UK |
| 2025-07-02 | 19:57:52 | 20:21:08 | 0.388 | H | AC_Cook | Newtown_UK |
| 2025-07-02 | 20:29:39 | 21:54:17 | 1.411 | H | AC_Cook | Newtown_UK |
| 2025-07-02 | 21:34:16 | 21:35:27 | 0.020 | Red | AC_Cook | Newtown_UK |
| 2025-07-02 | 21:36:26 | 21:40:18 | 0.064 | Red | AC_Cook | Newtown_UK |
| 2025-07-02 | 21:41:19 | 21:42:28 | 0.019 | Red | AC_Cook | Newtown_UK |
| 2025-07-02 | 21:43:13 | 21:46:51 | 0.061 | Red | AC_Cook | Newtown_UK |
| 2025-07-02 | 21:52:48 | 22:42:26 | 0.827 | Red | AC_Cook | Newtown_UK |
| 2025-07-03 | 17:00:32 | 17:56:52 | 0.939 | H | AC_Cook | Newtown_UK |
| 2025-07-03 | 20:33:09 | 21:33:11 | 1.001 | H | AC_Cook | Newtown_UK |
| 2025-07-03 | 20:42:24 | 21:33:11 | 0.846 | H | AC_Cook | Newtown_UK |

Total Contact time with earthshine in July 2025 = 8.0 hours or 7.8 hours if you exclude simultaneous observations. The total number of hours of simultaneous observations (useful to confirm any flashes) was under 0.2 hours. Video has still to be analysed for impact flashes.

There are no favourable showers to go out and look for impact flashes on the Moon this month. Even the strong Perseid shower falls on fallow ground on the Moon, i.e. the dayside and far side (See Fig 2). You are not likely to detect anything on the dayside, as the Moon will be too bright. Should you even attempt to observe, then shifting to the near IR, or longer wavelengths, would maximize your chances terms of impact flash detections. Also having an image scale of around 1” per pixel, any flash would be swamped by lunar background at poorer image scales. So far I have never detected an impact flash on the day side – these are incredibly rare due to the need to be bright enough to stand out above the background glare.

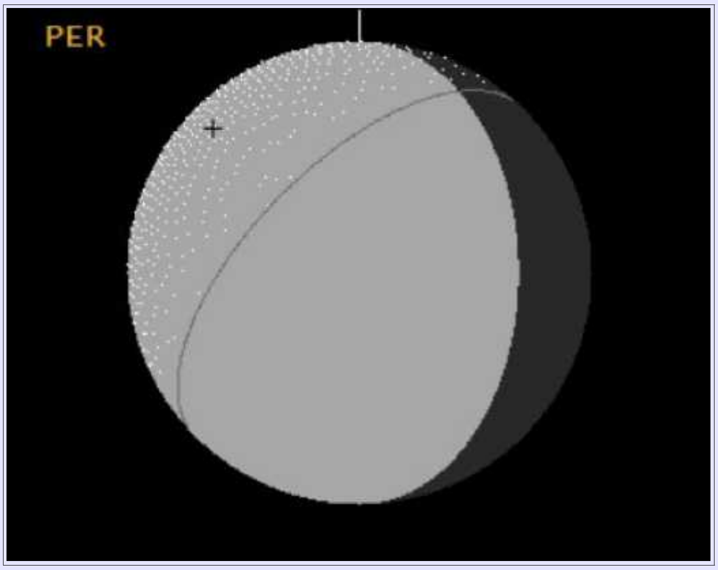



**Figure 2.** Impact distribution of the Perseids on the Moon, at maximum peak on 2025 Aug 12, according to Lunar Scan software.

The good news is that the earthshine lunar impact flash observing opportunities are very favourable in the early morning sky in August up to about 1 hour before sunrise, so long as the Moon is past last quarter.

If you have never attempted to look for impact flashes before, then you may be surprised how easy it is to observe – you just need a camera capable of detecting a few features in earthshine (Fig 1 illustrates an earthshine view and the capability of detecting stars – Neptune is about magnitude 7.8 – but cameras on a telescope are better and must have video) and be capable of running at least 10 frames per second (fps), ideally 25 or 30 fps and detecting stars at this frame rate down to magnitude 9, 10 or fainter in real time. Monochrome cameras are usually more sensitive than colour cameras.

Whilst hunting for impact flashes you can also take in some occultations and send them to Tim Haymes. But you will also get pleasant surprises from seeing objects cross in front of the Moon such as satellites, birds, planes (Fig 3), helicopters, and the even the International Space Station.

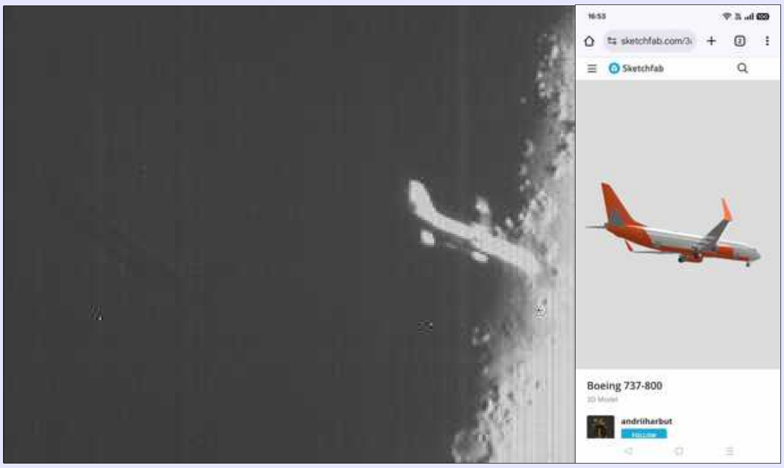



**Figure 3. (Left)** Possibly Ryan Air flight RYR12NJ FR658 Brussels to Dublin recorded in the short-wave IR H Band at 1.5-1.7 microns through Tony Cook's 8" Newtonian. Record on 2025 Jul 03 UT at 19:31:04UT from Newtown, Wales. The identity of the aircraft was deduced by finding the only aircraft in that part of the sky, at the time, from FlightRadar24. **(Right)** For comparison, via Maurice Collins, a day time screen shot of the plane in a similar profile.

To learn how to observe impact flashes I have put together an instructional web site – this will be added to over time: https://users.aber.ac.uk/atc/lumio.htm . It's a  lot simpler than you might think!

Two other useful lunar impact web sites are: https://www.pvamu.edu/pvso/cosmic-corner/lunar-meteor-watch/ and https://www.asg.ed.tum.de/en/lpe/research/lunar-impact-flashes/ .

You can find out when to look for impact flashes by checking on this web site: https://users.aber.ac.uk/atc/lunar_schedule.htm , however visual observers are recommended to stick to meteor shower times to improve their chances of detection.

Don't forget to join the impact flash mailing list on: lunar-impacts@groups.io

If you would like further details on how to observe impact flashes, please drop me an email. To learn more about the LUMIO mission, watch : https://www.youtube.com/@associationoflunarandplanetary/streams and select ALPO 2024 Conference Day 2 and wind on to about 4h8m into the video.

Tony (Email: atc @ aber.ac.uk)

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**<u>Murchison and 'Berg's' by Barry Fitz-Gerald.</u>**

John Moore* in his 'Craters of the Near Side of the Moon' makes an interesting observation in his description of the rather battered 58km diameter Nectarian age crater Murchison. Along with its overlying neighbour Pallas (49km diam) Murchison lies on an Imbrium scoured plateau to the south of Mare Vaporum. Moore notes the gap in the SE rim of Murchison and wonders if lavas flooding in from from Sinus Medi, breached the crater wall here, carrying portions of the rim into the crater rather like 'bergs' to become stranded in the form of the isolated blocks that we can now see on the crater floor.

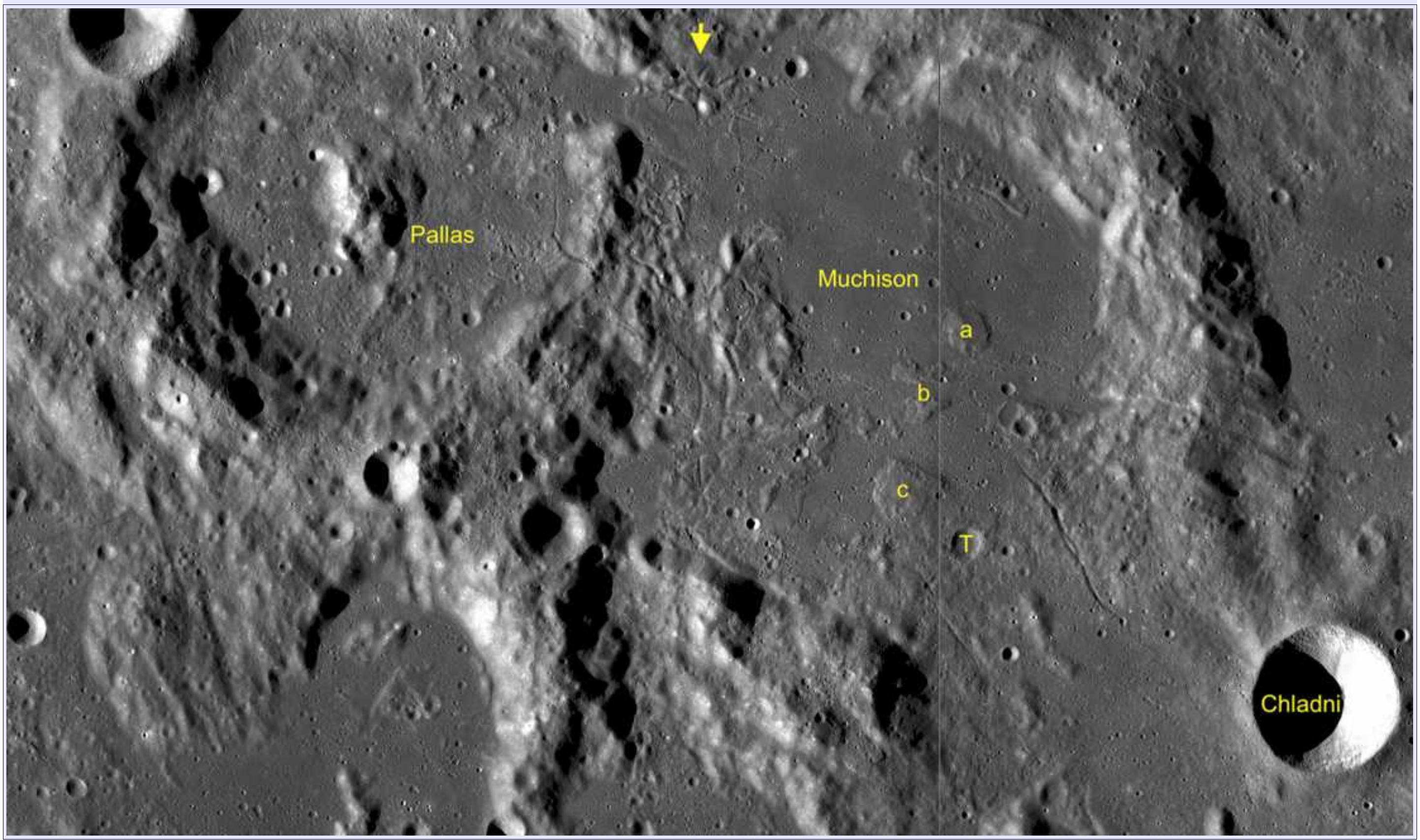


**Fig.1 SELENE evening image of Pallas and Murchison showing the lava filled floor of Murchison with 3 low blocks of terrain a,b and c and an unusual bit of cracked topography near the junction of the 2 craters (yellow arrow). The crater marked T is Murchison T.**

Fig.1 which is another of the rather lovely SELENE images provided by JAXA (the Japanese Space Agency) shows these blocks on the south-eastern crater floor, and you can see how the impression of being displaced rim segments suggested itself, as they lie opposite a substantial breach in the crater rim, which leads down in to Sinus Medi.

These isolated blocks have been observed in the past and suggested as being possible lunar domes, Fig.2 shows a 1963 drawing by B.T Doherty from 'The Moon', his accompanying notes indicate that he held this view**. There are however no indications in the modern data to suggest that these are volcanic in origin, though it must be said that they are quite oddly shaped structures, having something of a rounded and subdued appearance to them when viewed in the NAC imagery from Quickmap.

Fig.3 is a NAC image of the one labeled 'c' in Fig.1, from which it can be seen that it is about 7kms across and rises some 250-300m above the surroundings. The structure has something of a 'terraced' look to it, and you can almost distinguish lower and an upper 'platforms', particularly around its western side. It is also has a quite rounded off, subdued topography without any sharp edges, bouldery cliffs or rocky exposures.

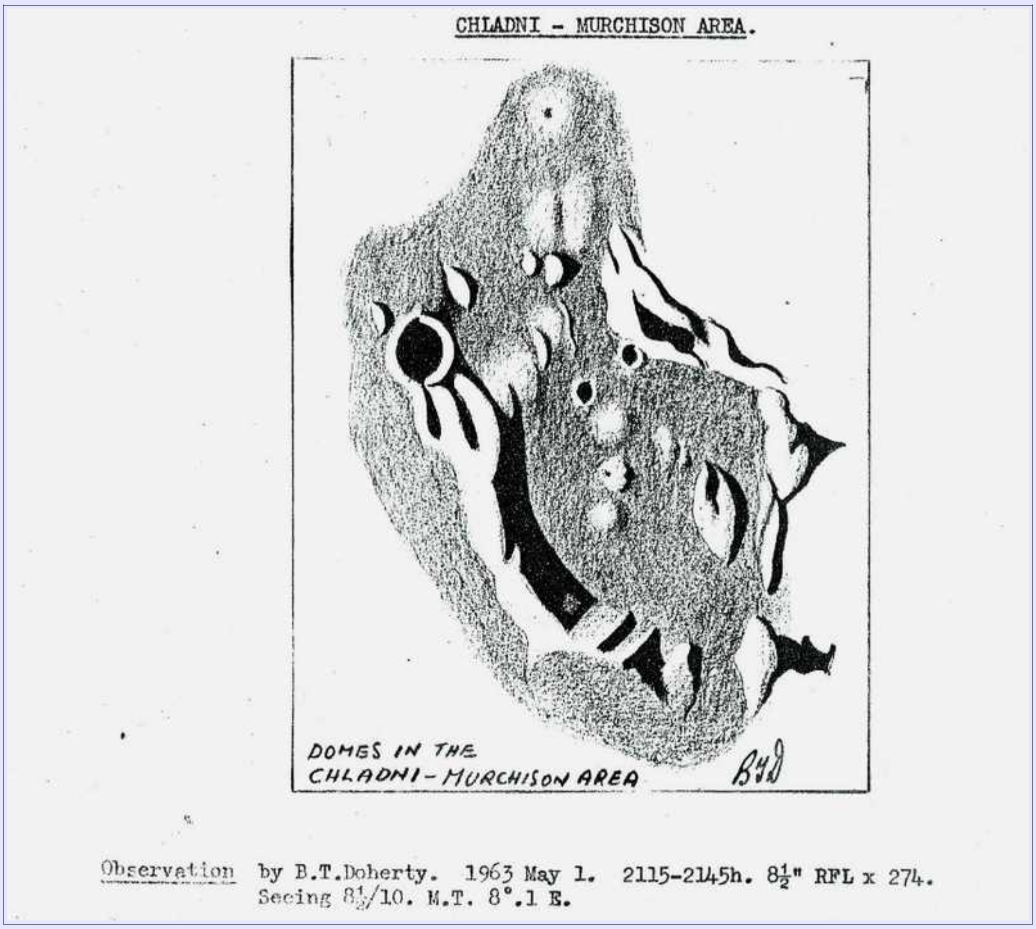


**Fig.2 Drawing of Murchison by B.T.Doherty from The Moon Vol.12, No.1 October 1963 showing the features a,b and c from Fig.1. Note the drawing is North Up.**

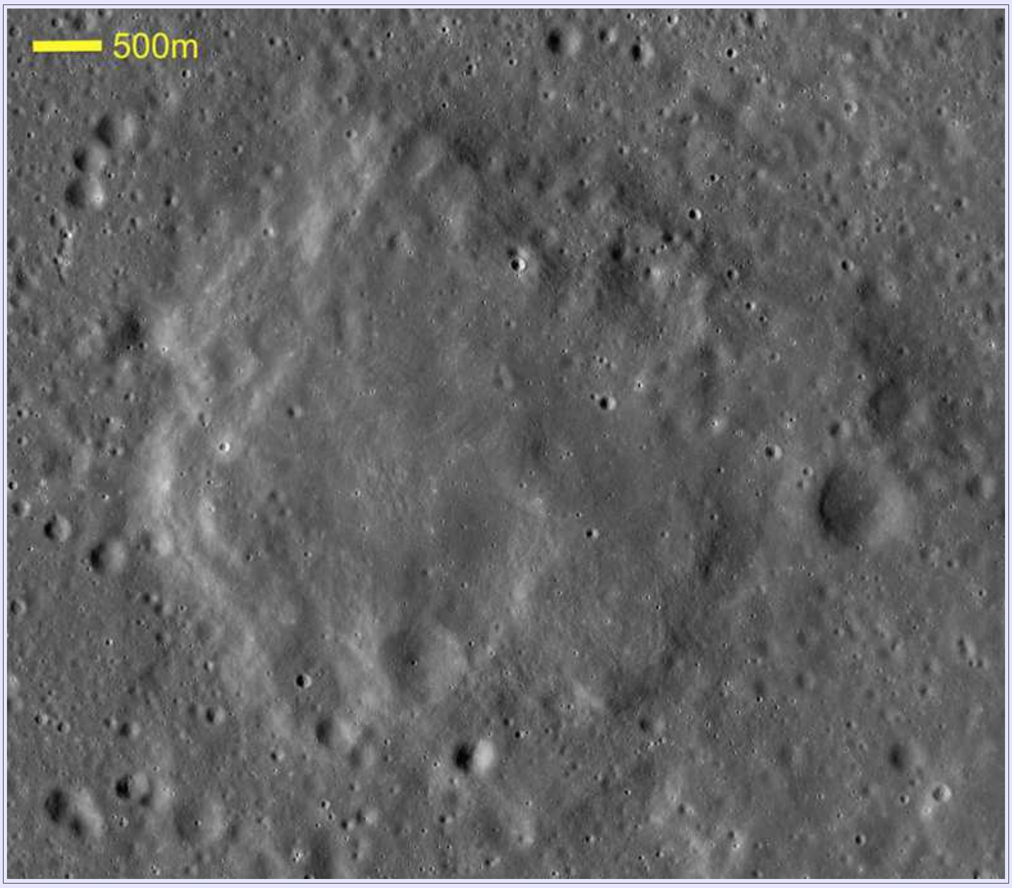


**Fig.3 NAC image of feature 'c' in Fig.1.**

This terraced type of structure suggests (to me, at least) that what we may be looking at here is a remnant of Murchison's crater floor that has been thermally eroded after being drowned within a standing lake of molten lava. Similar morphology can be found at the locations of other former 'lava lakes' such as the NE quadrant of Gassendi, where the crater floor was essentially eroded away as it was drowned by a lava lake, which then melted underlying rocks, leaving isolated blocks of surviving floor which are rounded about the edges, and with terraces which mark former lava lake levels - in effect fossil high tide marks.

If that is what we are looking at, then maybe we should find some other evidence of a former lava lake within Murchison itself – which is where we come to the peculiar structure marked with a yellow arrow in Fig.1 and shown in detail in Fig.4.

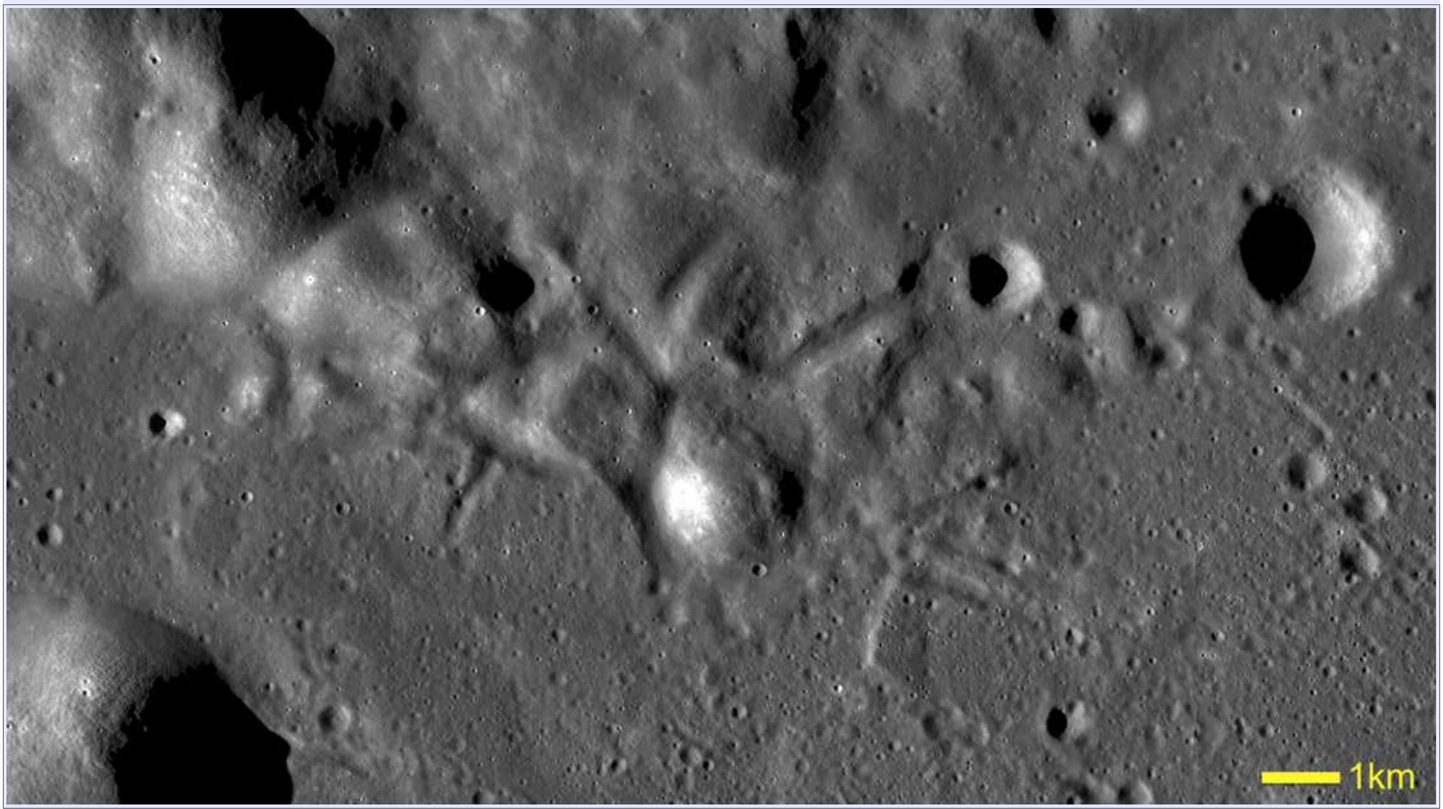


**Fig.4 LRO NAC image of the feature marked with the yellow arrow in Fig.1. The bright rounded hill is a nubbin of highland material which is surrounded by what appear to be grounded slabs of the lavas which at one time formed the crust of a lava lake occupying the floor of Murchison.**

I mentioned John Moore's use of the term 'berg' when speculating about the nature of the isolated hills discussed above, and whilst I am not sure they deserve the title, the plate like slabs of rock surrounding the bright hill in Fig. 4 certainly look like a cluster of grounded ice-bergs on an arctic shore. The rounded bright hill at the centre of this jumble of slabs is of a highland composition, so in all likelihood a piece of the collapsed rim of Murchison. It is not part of the original crater floor, as Murchison is only about 1800m deep, and a crater of this size should be closer to 3,500m deep – so the original floor is probably deeply buried. The angular slabs are of the same spectral type as the mare like units on Murchison's floor, and so probably consist of solidified basalts lavas that flooded the crater at some point.

The sequence of events that gave rise to this arrangement is shown in the cartoon in Fig.5, starting with panel 1(top) where the underlying terrain of the crater floor, including its hills and ridges, is submerged by vast amounts of basalt lava that erupted into the crater to produce a lava lake. This lava would have thermally eroded the submerged terrain (not depicted in these diagrams) – to produce the landforms we see as features a-c in Fig.1 At the same time the lava cooled forming a solidified upper crust (thick red line). The cooling lavas would have contracted – lowering the lake level. Additionally, still liquid magmas may also have flowed away via some low point in the crater wall, or even drained away via some subterranean plumbing system. The result, as shown in panel 2 (bottom) is that the solidified crust would have subsided in level and then grounded on any high points in the submerged terrain, cracking into individual plates that tilted as the surrounding lavas and crust, which were clear of the submerged high ground, continued to drop.

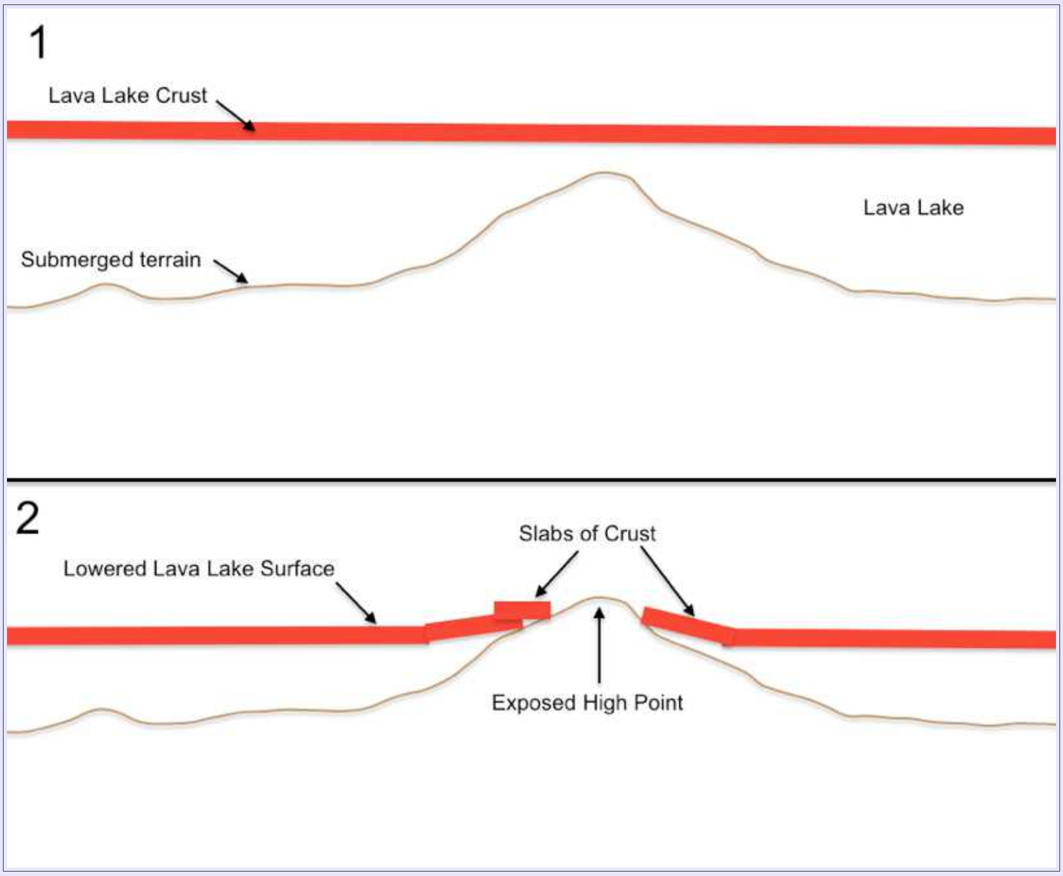


**Fig.5 Panel 1 shows the lava lake having submerged the underlying crater floor, including the hill, whilst the thick red line represents a solidified lava crust. Panel 2 shows the result of the lava draining away – the crust over the hill becomes initially grounded, and then cracks into slabs as the lake continues to drain all around.**

The edges of these tilted slabs are between 40 and 60m high, and it is possible that this represents the thickness of the lava lake crust at the time the lake drained or emptied.

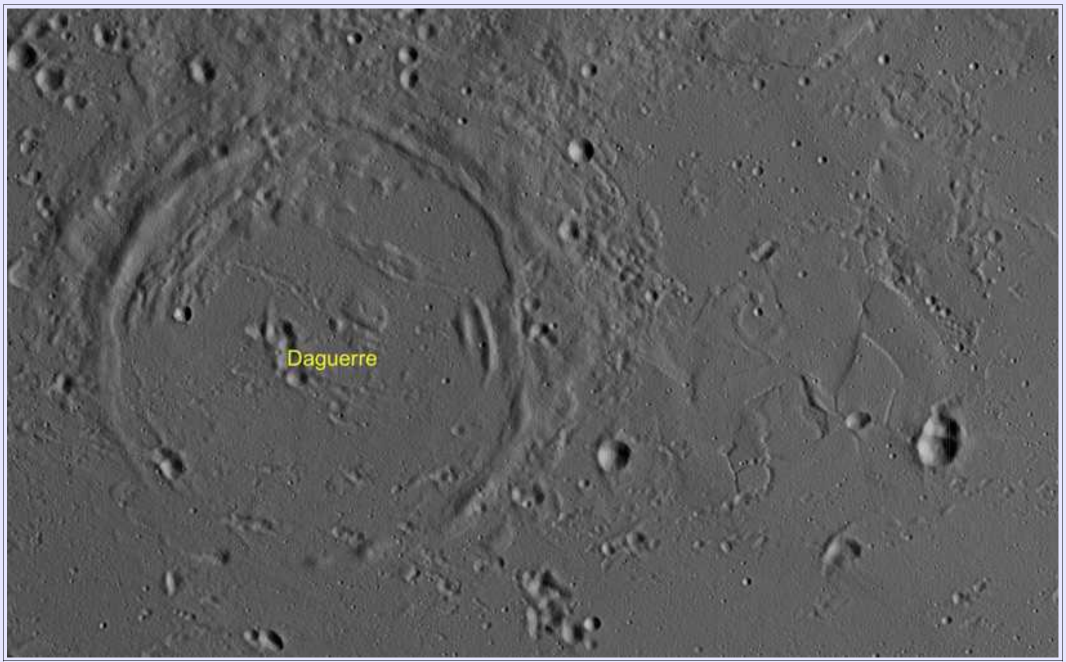


**Fig.6 Terrain Hillshade rendition of northern Mare Nectaris to show the 'grounded berg' like terrain to the east of Daguerre which is probably slabs of basalt lava crust left 'high and dry' as the level of the mare dropped.**

This process must have occurred many times during lunar history, and there are probably many examples of these 'lava bergs' over the Moon's surface. A nice example can be seen just to the east of the crater Daguerre and on the edge of Mare Nectaris, where the mare surface appears to be broken up in to a number of slabs which lie in a confused jumbled mass, partially over-riding one another and very reminiscent of a sheet of ice, broken on a shoreline. This is probably due to the level of basalt lava in the mare dropping and stranding some of the solidified surface crust on a section of submerged 'high ground' beneath – not an unexpected result in these peripheral parts of the mare.

So, if there was a lava lake within Murchison, might the lava have drained out over the eroded SE rim and down in to Sinus Medi? A glance at Fig.7 might suggest that something like this might have happened, as there is a broad, mare covered ramp extending down from the gap in the rim, and past the southern rim of Chladni. But there is no real sign of a channel along which large volumes of lava might have flowed down from Murchison and towards the lower ground in Sinus Medi – so maybe not.

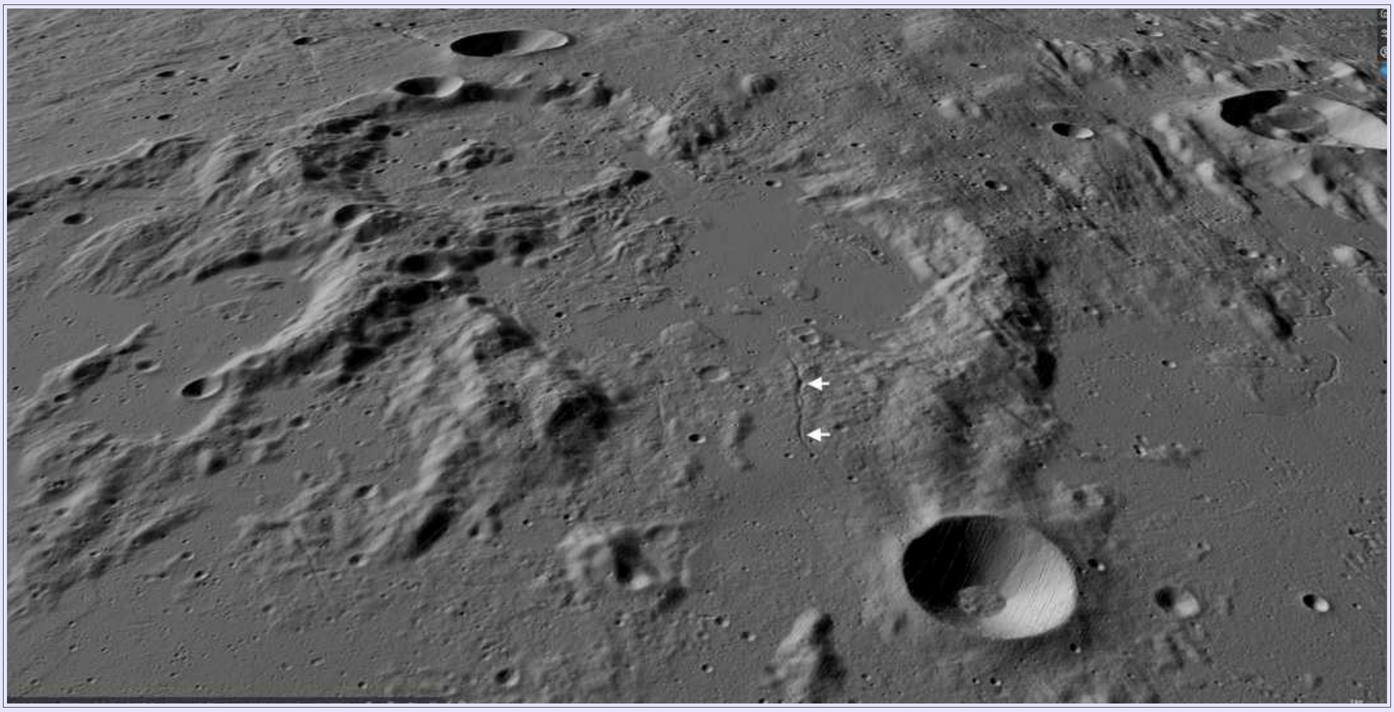

**Fig.7 A 3D Terrain Hillshade rendition of Muchison, with Pallas in the distance and Chladni in the foreground. Note the mare like 'ramp' leading down from the breach in the SE rim of Murchison. Also note the small rima hugging the northern side of this breach (just to the right of Murchison T) and marked by the white arrows. The upper white arrow shows a pit like part of this rima that may be a vent.**

There is however one possible channel like feature worth mentioning, and this can be seen as a thin thread like cleft – or rima in Fig.7, running down the northern edge of the gap in Murchison's rim. Part of this rima forms a pit like structure about 140m deep and 1.6kms long – which has rocky outcrops along its walls and indications of olivine and FeO within it (Fig.8). The part of the rima that heads off towards Sinus Medi looks like a 'V' shaped valley – possibly representing a fault or fracture, but the part heading towards the floor of Murchison is broader and deeper, and it is tempting to speculate that the pit is a vent that has developed along a fracture in the crust, and that the channel leading down on to Murchison's floor is a channel along which lava has flowed from the vent and into the crater. Whether or not this could be the source of the lava that flooded Murchison is questionable, but it could have contributed some if the lavas that filled the lava lake within it.

It looks like the lava lake did not occupy Pallas, as there is only a small tongue of mare like material extending from Murchison's floor westwards into its neighbour. This is probably because Pallas's floor is higher than Murchison's – sufficiently so to halt the westwards incursion of the lavas forming the lake next door. The Lunar Orbiter III image shown in Fig.9 gives a nice oblique view of Murchison showing all the features discussed - but I would be particularly interested if anyone has any images they have taken of Murchison that might shed any light on the presence any vent like structures or pyroclastic deposits, some images on the internet hint as some darker patches near the proposed vent in Fig.8, but are not of sufficient resolution to be too helpful.

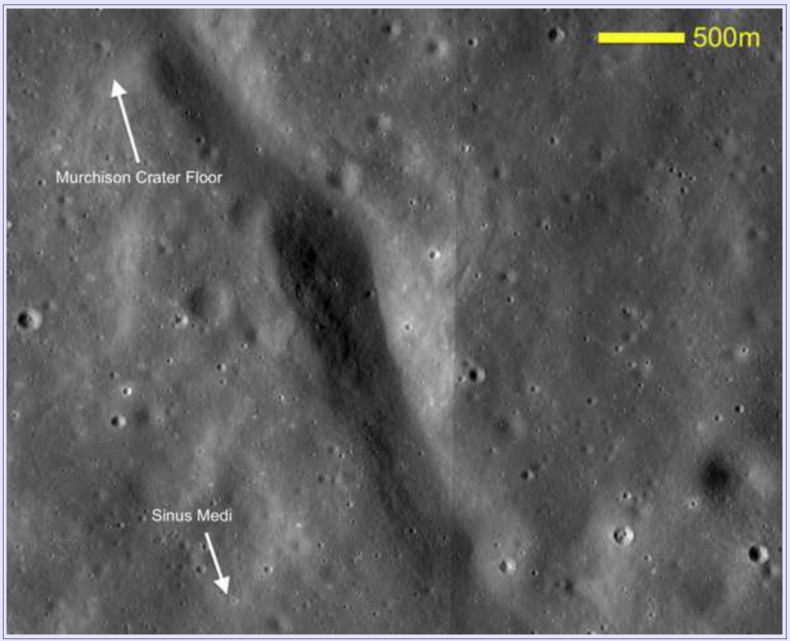


**Fig.8 NAC image of the suspected vent shown by the upper white arrow in Fig.7.**

**Fig.9 Lunar Orbiter III image of Murchison viewed obliquely from the south, and looking over the southern rim.**

* John Moore (2014) Craters of the Near Side of the Moon. CreateSpace Independent Publishing Platform

** The Moon Vol.12, No.1 October 1963

**LUNAR GEOLOGICAL CHANGE DETECTION PROGRAMME**
**By Tony Cook.**

**TLP Reports: No TLP reports were received for July.**

**Routine reports received for Jun included**: Peter Anderson (Australia – BAA) imaged several features. John Arnold (North Leeds, UK – BAA) imaged several features. David Bassey (South Norfolk, UK - BAA) imaged: Aristoteles, Rupes Altai and Theophilus. Steve Brown (North Yorkshire, UK – BAA) imaged the Moon. Jane Clark (Newport, UK – BAA) imaged: several features. Maurice Collins (New Zealand - ALPO/BAA/RASNZ) imaged: Archimedes, Aristarchus, Atlas, Copernicus, Hevelius, Mare Nectaris, Plato, Posidonius, Pythagoras, Schickard, Schiller, and several features. Tony Cook (Newtown, UK – ALPO/BAA) imaged: the Moon in the Short-Wave infrared. James Dawson (Nottingham, UK – BAA) imaged: Damoiseau, Pythagoras, Rima Sirsalis, Schickard and Schluter. Gary Eason (Colchester, UK – BAA) imaged: Theophilus. Rico Enzmann (Germany) imaged: the south pole area and Vallis Alpes. Valerio Fontani (Italy – UAI) imaged: Eratosthenes and Ptolemaeus. Nicholas Freeman (Canada – BAA) imaged several features. Massimo Giuntoli (Italy – BAA) observed the crescent Moon. Oliver Hext (Portsmouth, UK – BAA) imaged: Mare Tranquillitatis and several features. Andrew Paterson (France – BAA) imaged: the crescent Moon. Alan Snook (Kent, UK – BAA) imaged the Moon. Franco Taccogna (Italy – UAI) imaged: Barrow, Bullialdus, Cyrillus, Mare Crisium, Mare Tranquillitatis, Ptolemaeus, and Torricelli. Aldo Tonon (Italy – UAI) imaged: Mare Crisium, Fabio Verza (Italy – UAI) imaged: Picard. James Weightman (Cirencester, UK – BAA) imaged: earthshine. Honor Wheeler (Weybourne, UK – BAA) imaged: the Moon. Luigi Zanatta (Italy – UAI) imaged: Mare Crisium and Ptolemaeus.

**Analysis of Reports Received (June):**

**Barrow:** On 2025 Jun 02 Franco Taccogna imaged this crater about 23min before the following Lunar Schedule request started:

*BAA Request: On 1972 May 18 M.Burton (UK) saw a E-W light streak across the floor of this crater and also that the east side of the crater was very brilliant. This is probably a normal appearance for this stage in illumination, but we would like to check this out. Minimum sized telescope to use is a 5". Please send any high-resolution images, detailed sketches, or visual descriptions to: a t c @ a b e r . a c. u k .*

This corresponded to the following TLP description:

*Barrow 1972 May 19 UT 20:17 M.Burton (UK, 13.5-inch Cassegrain reflector, x180, seeing IV-III, Transparency: Fair) noted that the E. side of the crater wall was brilliant. There was also a luminous streak across the floor from E-W. No colour was detected using a Moon Blink device. ALPO/BAA weight=0.*

Nerveless, Fig 1 is quite intuitive. We have studied this before in the 2020 Dec newsletter, and concluded that it wasn’t a TLP, but kept it on the Lunar Schedule website, just to double check. I think we can now safely remove it from Lunar Schedule.

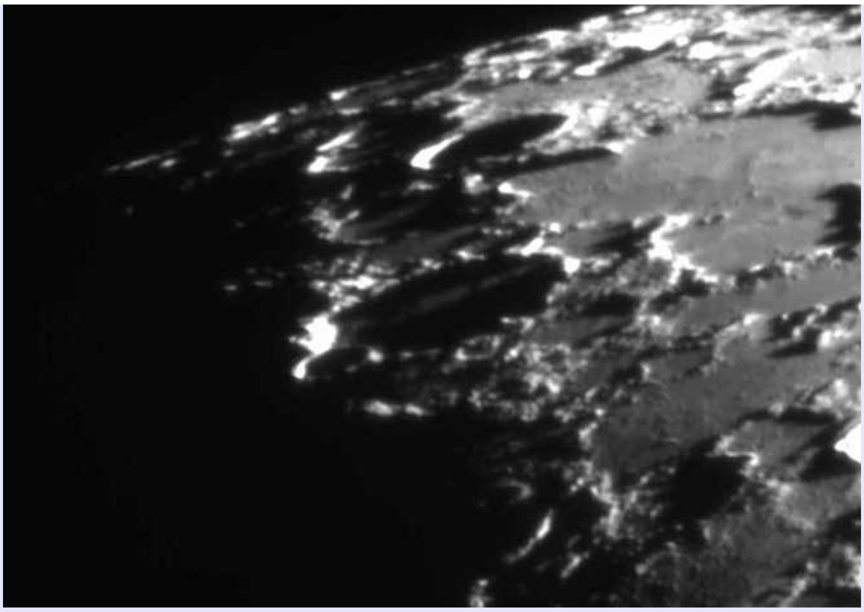

**Figure 1.** Barrow crater in the centre of the image, taken by Franco Taccogna on 2025 Jun 02 UT 20:02 and orientated with north towards the top.

**Rabbi Levi:** On 2025 Jun 02 Oliver Hext (BAA) image the Moon and caught a view of Rabbi Levi (Centre of Figure 1) under similar illumination to the following report:

*Rabbi Levi 1969 May 23 UT 05:28-05:35 Observed by Perez, Gay, Skinner, Floodine (Edinburgh, TX, USA, 17" reflector) "3 small craters in it, middle one had a blink (Trident MB --red) very bright & the NW crater of the 3 had a dimmer blink. A few bright flashes were seen vis. by 3 obs. without the image tube, lasting 15s. Clouded out at 0525h, (alt. of Moon was very low--atm?, ? Apollo 10 watch)." NASA catalog weight=3 . NASA catalog ID #1140. ALPO/BAA weight=3.*

**Figure 2.** Rabbi Levi located at the centre of this image, taken on 2025 Jun 02 UT 21:01 and orientated with north towards the top. Note that the image has been sharpened and had its colour saturation enhanced. Some evidence of atmospheric spectral dispersion is present due to colour fringes on crater rims and peaks.

Fig 2 clearly shows the 3 (actually 5) craterlets on the floor of Rabii Levi. There is nothing here resembling the 1969 TL:P report. Moon Blink devices are largely free from suffering atmospheric spectral dispersion effects, so under normal situations, there should not be colour here. The report is correct though that the middle crater is the brightest. We shall leave the weight at 3 for now.

**Mare Crisium:** On 2025 Jun 02 Jane Clark (BAA) imaged the Moon, albeit in monochrome light, under similar illumination to the following report:

*On 2009 Apr 01 at UT 20:00-20:30 C. Brook (Plymouth, UK, 5" refractor, x40 and x100, using red and blue gelatine Edmund Optics filters observed that a few bright areas in the centre of mare Crisium were brighter in red at the start of the observing session than in blue, although not at a higher magnification. The observation ended when seeing worsened. The ALPO/BAA weight=2.*

Figure 3 provides a nice context view of the general appearance of what Mare Crisium would have looked like to Clive Brook back in 2009.

**Figure 3.** Mare Crisium as imaged by Jane Clark (BAA) on 2025 Jun 02 UT 21:12 and orientated with north towards the top.

As Fig 3 is a monochrome image, we should treat Jane's image as a useful context image of the general appearance of the Moon as Clive Brook would have seen in 2009.

**Apollo 11:** 2025 Jun 02 - although not TLP related, we have on the Lunar Schedule web site, requests for images of Apollo landing sites showing us what the Moon would have looked like (exactly the same illumination), for example when Apollo 11 touched down on 1969 Jul 20. You can see this in Fig 4 from images by BAA members Gary Eason and Oliver Hext.

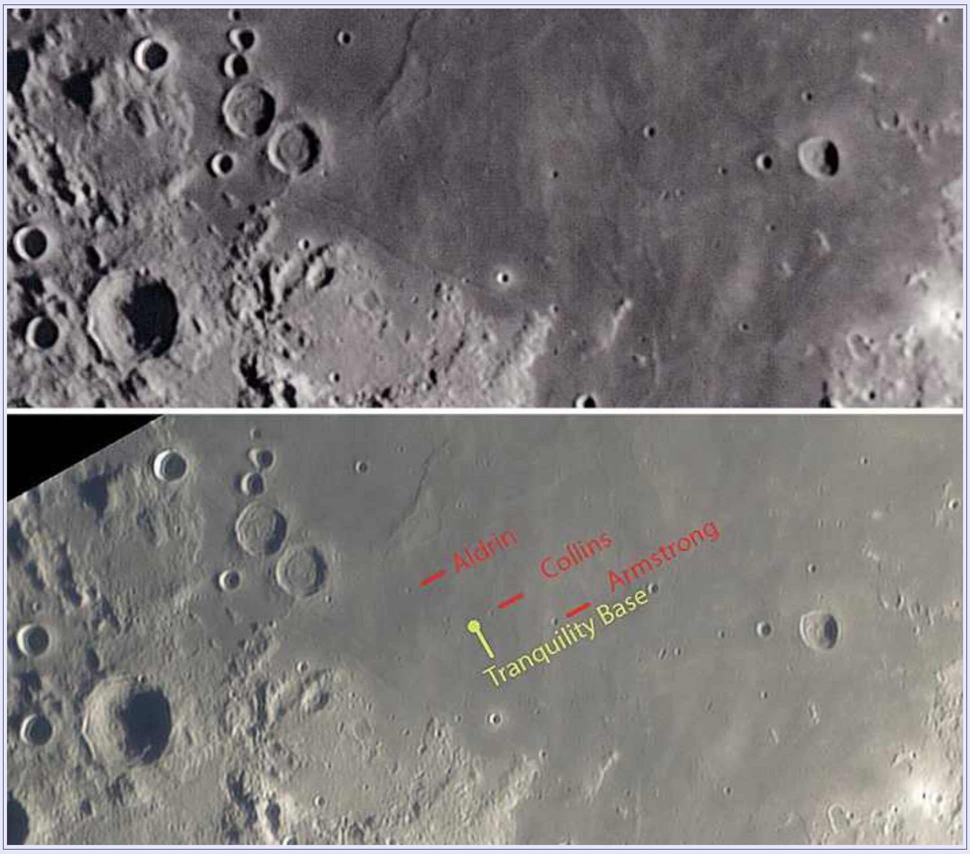


**Figure 4.** The Apollo 11 landing area on 2025 Jun 02, as it would have appeared under similar illumination to when Neil Armstrong set foot upon the Moon on 1969 Jul 20. North is towards the top. **(Top)** A monochrome image taken by Gary Eason at 21:06 UT. **(Bottom)** A colour image by Oliver Hext taken at 21:31UT that Oliver has labelled.

**Eratosthenes:** On 2025 Jun 04 Valerio Fontani imaged this crater under similar illumination to the following two reports:

*Eratosthenes 1961 Oct 18 UT 01:05-01:25 Observed by Bartlett (Baltimore, MD, USA, 5" reflector x180, S=P, T=G) "Fluorescent violet on inner W(IAU) wall (reported as bright spot in MB). NASA catalog weight=4. NASA catalog ID #751. ALPO/BAA weight=*

*Eratosthenes 1970 Apr 15 UT 01:25-01:42 Observed by daSilva (Brazil, 10" reflector x200 & 20" refractor x224, Seeing=good, Transparency=Good). "Vis. blink? on lower c.p. Ilum. walls were yellowish-white C.p. diamond brightness with a pt. flashing. Turbulent atms. impeded confirm. Other features were normal (Apollo 13 watch. S-IVB impact at 0109h, took 70 s to reach A12 ALSEP." NASA catalog weight=3. NASA catalog ID #1252. ALPO/BAA weight=3.*

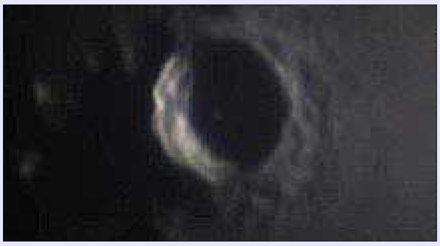

**Figure 5.** Eratosthenes as imaged by Valerio Fontani (UAI) on 2025 Jun 04 UT 20:24 and orientated with north towards the top. The image has been sharpened and had its colour saturation increased.

Fig 5 shows no sign of any colour in the places described so we shall leave the respective ALPO/BAA TLP weights as they are.

**Eratosthenes:** On 2025 Jun 05 Rik Hill (ALPO/BAA) imaged the Copernicus area and on the top right of his image he captured Eratosthenes under similar illumination the following report:

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

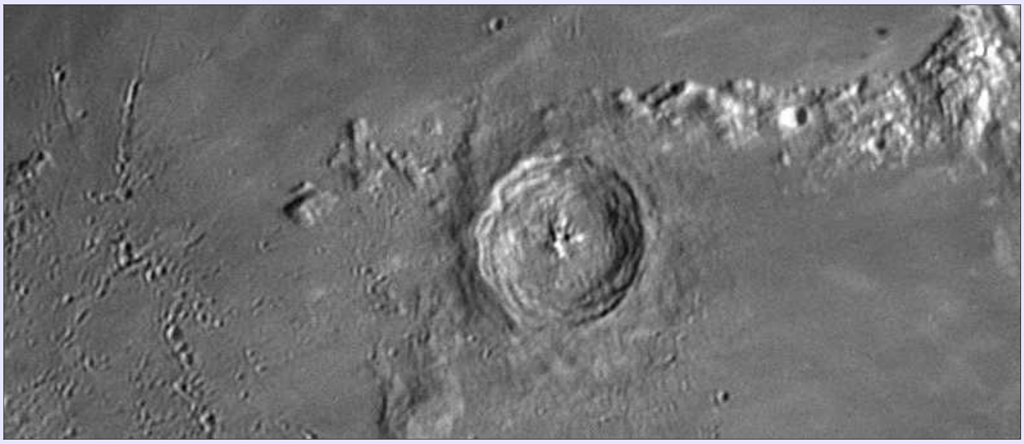

**Figure 6.** Eratosthenes as imaged by Rik Hill (ALPO/BAA) on 2025 Jun 05 UT 03:43 and orientated with north towards the top.

The central peaks in Fig 6 are clearly and plainly visible, so it is a mystery why Peter Cattermole did not see them through a 3-inch refractor back in 1954. So, we shall leave the weight at 2 for now.

**Aristarchus:** On 2025 Jun 08 Walter Elias (AEA) imaged this crater under similar illumination to the following two reports:

*Aristarchus 1972 May 25 UT 19:32-19:38 Observed by Leitzinger (8.75E, 48.75N, Germany, 60mm f/15 telescope T=2, S=2) "Bright point at SE wall well visible, colour changed to* *orange shortly before it disappeared" published in Hilbrecht & Kuveler (1984) Moon and Planets, Vol 30, p53-61. ALPO/BAA weight=1.*

*On 1979 Dec 02 at UT 00:36 D. Darling (Sun Praire, WI, USA, 12.5" reflector, x349, seeing? 9-10/10 at 32 deg altitude) observed a bright flash between Aristarchus and Prinz crater on the illuminated part of the surface. The Cameron 1978 catalog ID=76 and weight=3. The ALPO/BAA weight=2.*

**Figure 7.** Aristarchus as imaged by Walter Elias (AEA) on 2025 Jun 08 UT 21:01, orientated with north towards the top.

Although Walter's image is of low resolution and suffering from atmospheric spectral dispersion, it is perhaps the kind of image quality that Leitzinger might have seen with a 2-inch aperture refractor back in 1972. So, we shall leave the ALPO/BAA weight at 1. Likewise, we are unable to comment on the flash seen in the 1989 report, from a single image, so we shall leave that weight at 2 for now.

**Grimaldi:** On 2025 Jun 09 Maurice Collins imaged this area under similar illumination to the following report:

*Grimaldi 1839 Jun 24 UT 22:00? Observed by Gruithuisen (Munich, Germany) "Smokey, grey mist". NASA catalog weight=4. NASA catalog ID #117. ALPO/BAA weight=3.*

**Figure 8.** Grimaldi on 2025 Jun 09 UT 07:31 as imaged by Maurice Collins (ALPO/BAA/RASNZ) and orientated with north towards the top. The image has been sharpened and had its colour saturation increased.

Fig 8 may or may not show a smoky grey mist – I will leave that to the reader's imagination and perhaps lower the ALPO/BAA weight to 2.

**Aristarchus:** On 2025 Jun 10 whilst videoing an occultation of the first magnitude star Antares, captured Aristarchus under similar illumination to the following reports:

*On 1977 Dec 24 at UT 19:30-23:20 P.Foley (Kent, UK, 12" reflector). CED Brightness changes were noted in the central peak and the west wall. The following features remained relatively steady in comparison: Proclus, Mon Pico north peak, Mons Piton and Censorinus. Cameron 2006 catalog ID=19 and weight=4. ALPO/BAA weight=3.*

**Figure 9.** Aristarchus as imaged by Peter Anderson (BAA) on 2025 Jun 10 UT 09:16 with north towards the right. The image has been sharpened and had its colour saturation increased to bring out colours on the Moon. The bright orange blob, just off the SW limb is the star Antares.

Although an amazing image in Fig 9, it is just useful as a context image because the 1977 report involved changes and a single image cannot tell us about these. We shall leave the ALPO/BAA weight at 3 for now.

**Picard:** On 2025 Jun 28 UAI observers: Francesco Modello, Franco Taccogna, Aldo Tonon, Fabio Verza and Luigi Zanatta all contributed observations for the following repeat illumination event:

*East of Picard (56E, 15N) 1877 May 15 UT 20:30 Observed by an unknown observer (in England?) "Bright spot. (white patch) there unlikely to be bright at sunrise normally)." NASA catalog weight=3. NASA catalog ID #189. ALPO/BAA weight=2.*

and also, for the following Lunar Schedule web site request:

*BAA Request: On 2013 Feb 17 UAI observer: Giuseppe Macalli observed visually an orange cloud form just to the west of Picard crater, and then disappear. The effect lasted about 1 minute. Obviously, we are not likely to see whatever this was (?) again under similar illumination, but just for the record it would be useful to have a high-resolution monochrome or colour image of this area, at the requested observing time. N.B. an image in the 2018 Jun LSC suggests that the date given of 2013 Feb 17 may have been Feb 18? Please send any high-resolution images to: a t c @ a b e r . a c. u k .*

**Figure 10.** Picard as imaged by UAI observers on 2025 Jun 28 with north mostly towards the top. **(Far Left)** By Aldo Tonon at 19:10 UT. **(Left)** By Francesco Modello at 19:18 UT. (Centre) By Fabio Verza at 19:19 UT. **(Right)** By Franco Taccogna at 19:22 UT. **(Far Right)** By Luigi Zanatta at 19:33 UT.

Figure 10 shows that there is no obvious white spot east of Picard so the 1877 TLP report is a mystery, so we shall leave its weight at 2. For the 2013 report, again there is no sign of an orange cloud west of Picard, so we shall leave the 2013 TLP report at a weight of 2.

**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. If in the unlikely event you do ever see a TLP, firstly read the TLP 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 TLP 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

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## Useful Lunar Links.

**Clair Obscur Effects.**
BAA stalwart Mary McIntyre has a list of upcoming Clair Obscur Effects for 2025 on her website https://marymcintyreastronomy.co.uk/ these can be accessed at:

https://marysastronomyblogs.blogspot.com/2025/

**APLO The Lunar Observer back issues.**

Back issues of this publication contain articles and images which are well worth a browse – they are available free without any Log-In required.

https://www.alpo-astronomy.org/Lunar/Publications/TloList

**Search the LPI Abstract Collection.**

The Lunar and Planetary Science Conferences are a valuable resource to see what some of the latest research findings are – this link lets you search using keywords. The results can be displayed by relevance/date publication and so on.

https://www.lpi.usra.edu/publications/absearch/

**The SAO Astrophysics Data System**

This searchable database hosted by Smithsonian Astrophysical Observatory is another useful resource for hunting down up to date research on lunar topics. Many of the search results will be accessible for free – depending on the publication, but some will only be available in abstract form. Still – a useful place to start your research.

https://ui.adsabs.harvard.edu/

**Lunar and Planetary Institute Digital Library.**

Some of the virtually impossible to get hold of classics of lunar science are available here as pdf's – if you have not read Don Wilhelm's 'To a Rocky Moon' or 'Lunar Sourcebook -a users guide to the Moon' - now you have no excuse not to!

https://www.lpi.usra.edu/publications/books/

**GLR Group Lunar Dome Atlas.**

This atlas is a valuable tool for tracking down what may or may not be a known lunar dome. It is one of the labours of Raf Lena and well worth bookmarking.

http://www.fabiolottero.it/lac/map.htm