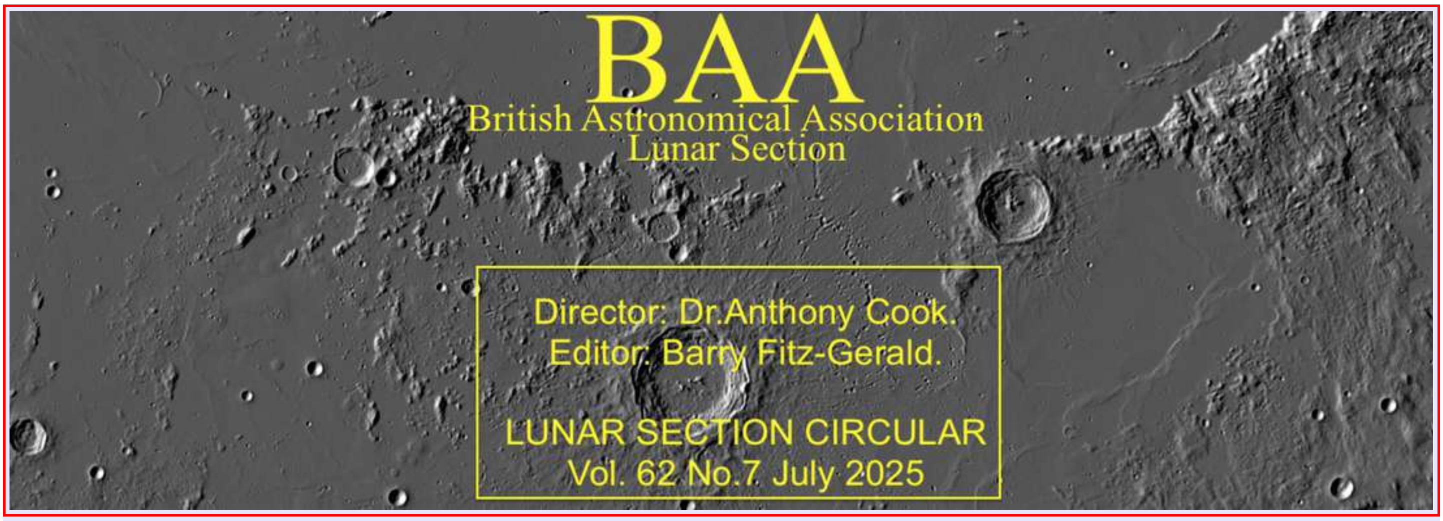

FROM THE DIRECTOR

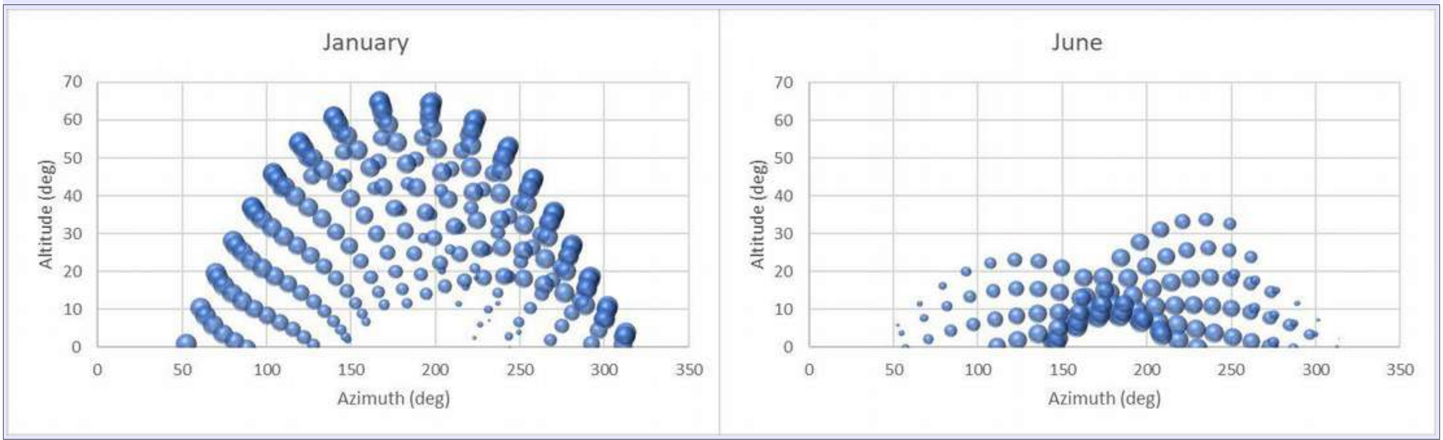

Figure 1. Hourly plots of the Moon's altitude and azimuth in the sky as seen from Birmingham UK, at night, for 2025. The larger the point size, the closer the lunar phase is to Full Moon. The smaller the point size, the closer the phase is to a crescent phase. Medium sizes points are close to first and last quarter i.e. 50% illuminated. The plots were generated with data from NASA's JPL Horizon web Site, and then visualized in Excel.

This month, I thought for new members, I would write a bit about the Moon's visibility throughout the year. Most planetary objects gradually move along the ecliptic, i.e. the plane of the Solar System in which most planets orbit. Their motion across the sky background and successive nights is gentle. The Moon though zips around in comparison, and the visibility of different phases and its altitude above the horizon is very seasonal as you can see from the January and June plots above.

The winter months are generally good with the Moon high up in the sky for Full Moon phases; for first quarter phases the spring is good and for last quarter, autumn months. For earthshine visibility, generally I find November to May gives exhibits it well, at least in the evenings. However, can still see earthshine well in June and July, but only during the early crescent stages, because in the days after this the Moon drops rapidly in declination, getting lower on the horizon.

To illustrate some of this I generated a couple of plots above. The first is from January, as seen from the UK and shows how there is great visibility of the Moon with the long nights. See how the Full Moon can reach altitudes of 65° above the horizon. Now compare that with June and we can see two things, the daylight hours severely limit observing opportunities i.e. a lot less data points, and secondly note that the maximum altitude is now 35° above the horizon, and most of the Full and gibbous phases are now very low, as one would expect as the Moon is close to opposite the Sun in the Sky. So, in the summer months the Sun is high in the sky and Full and gibbous phases have to be the opposite, where the ecliptic is low in the sky. I would have shown you all twelve months of plots but these would fill up at least a couple of pages.

Some lunar section members get around the phase visibility issue, at certain times of the year, either by getting up at anti-social hours, for example in the early hours of the morning before sunrise. However, a more logical approach, used by others, is to image the Moon in daylight (not shown in the plots), using a near-IR or red, filter to make the sky dark.

One other thing to take into account, though mostly we don't notice, is that the Moon does not follow exactly the ecliptic, the path of the Sun. Sometimes it deviates by as much as 5° above and below the ecliptic. This follows a long-term Saros cycle of just over 18years where the Moon will be exactly at the same point in the sky. So, you may find that some years the Moon can have 5 deg higher or lower variability in declinations in the sky to what you would normally expect.

The final thing to take into consideration is that the above applies to observers in the UK. If you were to head to southerly latitudes, the reverse would apply to visibility of phases, though the Saros effect remains unaffected.

Anyway, I hope this brief summary has been helpful, and if you have any questions about the visibility of lunar phases at different times of the year, feel free to email.

Other news – I will invite James Dawson, our media coordinator, to summarize the survey findings in next month's Circular, as the survey finally closed 30th June. As you probably gathered, the iSpace lander from Japan, didn't land successfully in Mare Frigoris. Landing autonomous vehicles on the Moon is very tricky, the main danger window seems to be changing from a very fast near orbital velocity to close to zero then descending, and knowing when you are near the ground and it's safe to switch off the engines. This all happens in the matter of minutes, and a lot can go wrong in this time slot especially if sensors give wrong and conflicting readings. Hopefully they will have better luck next time.

Tony.

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Lunar Occultations July 2025 by Tim Haymes

Time capsule: 50 year ago: in Vol 10 No.7

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

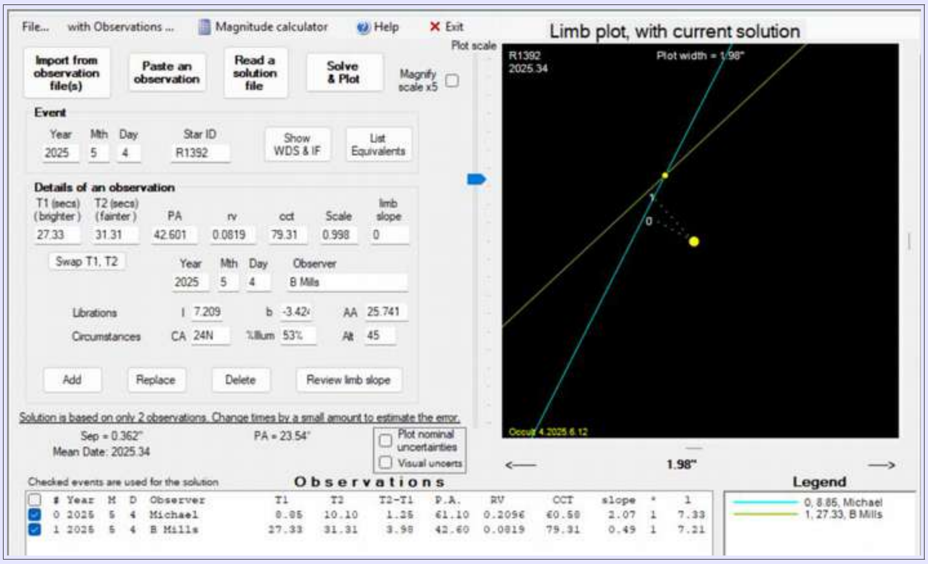
- *The Director (PM) thanks John Mason, Miss R. Atwell and Reg Spry for continued help with the LSC production, and complains about (yet more) postal costs increases.
- *Miss C.M Botley on a connection between Solar Activity and TLP
- *Miss C.M Botley: W.S. Cameron on a TLP article in Strolling Astronomer, Sept 1974
- *G.W Amery: Notes on observing occultations, their purpose and how we can improve.

An interesting "double" occultation of ZC1392 on 2025 May 04 – continued from the June LSC

Two video files (AVI) from Brian Mills (Kent) (BM) sent to the writer, have been analysed with Tangra to obtain the times of Disappearance and Reappearance of both components (DD). The magnitudes of the pair given by WDS – otherwise known as Aitkin 2477 – is 7.8 and 8.4 with SEParation 0.43 arcsec in PA 13.7 (The WDS and star information can be viewed from Occult Lunar Predictions by right-click on the line) What separation (SEP) and position angle (PA) would our occultation observations reveal?

Alex Pratt (Leeds) has reported an analysis of the same star observed by Michael OConnell (MOC) near Dublin. In our preliminary report (see below) the observed times for the DD from these two observers (companion and main star) were plotted with "Solve for double-star PA and separation" tool in Occult.

We are performing a more detailed analyses with LiMovie to improve the timings. That refinement is not included in all the data used in this preliminary display:



Explanation of the technique: Occult4 displays the companion orientation from these DD observations relative to the main star. An observation by BM of Reappearance at the Dark limb during grazing incidence, was excluded from the analysis because of uncertainties in the limb contact angle. This angle is an important factor and does not work well at small cusp angles (we find).

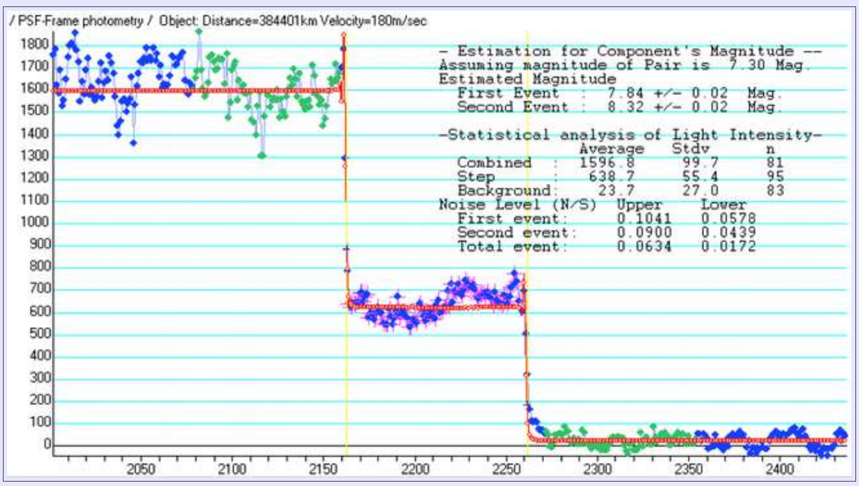
The maths behind the analysis is hidden, but the concept can be understood: The main star is identified in the double-star report files. The position of the companion is at the intersection of two lines. These being a tangent to the lunar limb at the time of occultation, and the distance (dotted line) is derived from the step duration.

This example has worked well. Normally we would need two observations over a wide range of PA. Here we have PA 42.6 and 61.07. A third observation would improve the analysis if it were available. The best we can do is obtain good step times optimised by use of LiMovie which fits a diffraction pattern (see below).

	Separation	PA	
Observed [2]:	0.36”	23.5	
WDS/Occult	0.43”		13.7

My thanks to Alex Pratt and Michael OConnell for helpful discussion, and Brian Mills.

LiMovie example of a step light curve with diffraction included. The contact times may be improved.
AVI video supplied by Brian Mills for ZC1392, analysed by Tim Haymes.



Occultations this month:
There is a daylight Pleiades passage on July 23 from 1030 to 1200 UT. They are not included here.
Please refer to the BAA Handbook.

Occultation predictions for 2025 July (Times at other locations will +/- a few minutes)

Oxford: E. Longitude -001 18 47, Latitude 51 55 40

day yy	mmm	d	Time h	m	s	Ph	Star No	Sp D*	Mag v	Mag r	% ill	Elon	Sun Alt	Moon Alt	Az	CA o	Notes
25	Jul	2	22	59	35.4	D	1822	K5	6.8	6.0	51+	91		4	253	85N	28 Vir
25	Jul	14	1	24	47.7	R	164931	K0	7.6	7.1	89-	141		22	157	60S	
25	Jul	17	2	4	42.0	R	109393	A3	7.7	7.6	61-	102		30	124	61S	
25	Jul	18	1	23	44.5	R	92496	cK5	7.6	6.8	49-	89		23	100	66S	
25	Jul	18	2	47	55.1	R	230	SA3	7.3	7.2	49-	89	-10	36	118	51N	100 Psc
25	Jul	18	2	48	36.7	R	92522	WF5	8.6	8.3	49-	89	-10	36	118	51N	
25	Jul	20	3	3	36.9	R	501	pK0	6.2		26-	62	-8	30	91	62S	66 Ari
25	Jul	21	0	18	38.3	R	647	WB9	5.4	5.4	18-	50		2	49	72S	chi Tau
25	Jul	21	1	10	23.2	R	655	PF5	7.9	7.6	17-	49		8	58	65S	
25	Jul	22	1	46	36.8	R	77224	cF8	7.4	7.1	9-	36		6	52	35N	
25	Jul	22	2	43	17	Gr	77267	cK2	8.3	7.6	9-	35	-11	14	**	GRAZE:	nearby

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Observing Lunar Occultations of Antares by Peter Anderson (Brisbane Australia).

I have been timing lunar occultations visually for half a century at an average rate of some 200 per year. It is not uncommon to record short fading occultations near the lunar poles due to near grazing approaches but these are usually not longer than a fifth of a second. Standard occultations appear instantaneous to the naked eye and the only variations are for the few bright giant bloated red stars like the interesting case of Antares, a close double star.

The magnitude 5.4 companion is of B type and so is blue-white in colour. It is only some 2.5 arc seconds distant from the orange-red M type primary, and almost directly west. In average observing it is generally lost in the glare or the optical diffraction rings of the first magnitude primary, though it is reported as having been regularly visible in a 15cm telescope under very good conditions. Sometimes it is even reported as being green or greenish due to the colour contrast effect. The pair provides some interesting lunar occultation phenomena specifically for re-appearances on the dark limb after full Moon. The secondary, preceding Antares and lost in its glare, is not visible at the time of occultation but as it emerges mere seconds before Antares upon re-appearance, is quite memorable especially as it is then instantly snuffed out as brilliant Antares flares into view.

One remarkable observation I remember one late evening was a re-emergence of Antares from behind the dark limb of the waning Moon. As the time of the event arrived a blue-white star suddenly appeared at the expected spot - to be drowned out a few seconds later by the orange eruption of brilliant Antares emerging from behind the lunar limb. Because of the angular size of its disc (some 40 milli arc seconds), and the circumstances of the event, re-appearances of Antares generally do not appear instantaneous, but flare into view like a struck match.

On 10th June 2025 Antares was occulted by the waxing 99% illuminated Moon. Following re-appearance behind the bright limb, the excessive brightness of the Moon had drained much of the glare surrounding first magnitude Antares and the companion was plainly visible as a small dot just west of the orange star. This was quite an unusual observation.

Occultation of Antares by the Moon on 10th June 2025.

The above image shows the visual appearance at 09hrs 16minUT immediately before the occultation. Being nearly full, the Moon was exceedingly bright and separate exposures were necessary to show both the Moon and Antares to reasonable effect. I used a 150mm F8 Skywatcher ED refractor for his images. This occultation of Antares, the brightest star in the constellation of Scorpius, was visible from south-east Queensland, Australia and was widely observed. In Brisbane it occurred around 09hrs 16min UT (7.16pm) with reappearance from behind the bright limb of the 99% illuminated Moon around 10hrs 30min UT (8.30pm). Visually I used X156 on a Celestron C14, and after reappearance I soon noticed that the 5.4 magnitude companion star, 2.5 arc seconds to the west of Antares, was readily visible because the brightness of the Moon had substantially reduced the glare of Antares that usually makes observation of this companion quite difficult.

Unfortunately there are no Antares occultation events reasonably observable from the United Kingdom until 2042. An earlier occultation event does occur on 4 July 2028 at 0hrs 55minUT but from London the 92% illuminated waxing Moon is nearly setting at the time of the occultation being a mere 1 degree in altitude. (Courtesy ‘Occult’ software and ‘Stellarium’.)

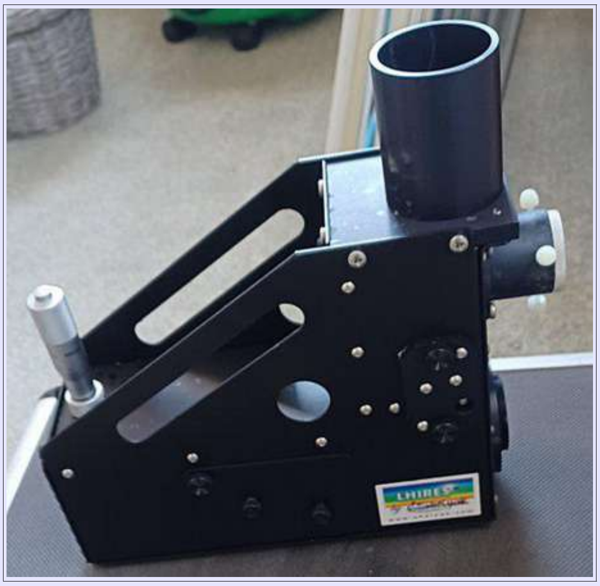
Ed. Comments: Out of interest I asked Peter if he had images of the telescopes he used for his observations, and he kindly sent a number, two of which are reproduced below.The Skywatcher 150mm ED refractor was used for the Antares occultation image and the C14 principally to visually time lunar occultations. Peter followed the event visually with the C14 at the same time.

Celestron C14 (above) and Skywatcher 150mm ED refractor (below)

For Sale.

Littrow High Resolution Telescope Spectrometer (LHIRES III) by Shelyak Instruments

We don't normally carry advertisments for 2nd hand equipment, but this one has a strong lunar connection. The above was owned by one of our Lunar Section Members, Brendan Shaw, who sadly passed away back in 2022. Mary, his partner was wondering if any one in the Lunar Section, might like to buy Brendan's spectrometer. Although it's not possible for Mary to test this, Brendan always looked after his astronomical equipment exceedingly well, so it probably is in good working order. If you would be interested in this, perhaps to do high resolution lunar spectroscopy, or stellar spectroscopy, or you know of someone who would be interested from another BAA section, then please email me with a price offer before Tuesday 15th July and I will email any offers to Mary to decide which to accept. Any offers made will remain confidential and not be disclosed to others apart from Mary. Please note that as a guide, the full price of one of these spectrometers, brand new, can be found on: https://www.shelyak.com/categorie-produit/spectroscopes-en/?lang=en



So, if you are interested in the offer, please email me an offer on: atc @ aber.ac.uk and I will pass it on. If you need further information then I can also send you all the full resolution images available. Note that probably it is sensible for this to be for UK members only as shipping international is very expensive especially with complicated customs tariff systems.

Lunar Impact Flash Observing Programme

Video Observation of Earthshine in April: (Update)

Just an update to May's total – there were some typos present which have been corrected below. Note that also I have copied some non-BAA observational reports off the Lunar-Impacts-group: lunar-impacts@groups.io

Video Observation of Earthshine in May:

2025-05-01	19:00:58	19:30:58	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-01	19:32:18	20:02:18	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-01	20:02:39	20:32:39	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-01	20:33:19	21:03:19	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-01	21:03:40	21:33:40	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-02	18:29:00	19:53:23	1.41	H-Band	AC_Cook	Newtown_UK
2025-05-02	20:35:57	21:46:58	1.18	H-Band	AC_Cook	Newtown_UK
2025-05-02	22:47:47	23:27:01	0.65	H-Band	AC_Cook	Newtown_UK
2025-05-03	17:50:11	19:40:30	1.84	H-Band	AC_Cook	Newtown_UK
2025-05-03	19:43:25	20:48:48	1.09	H-Band	AC_Cook	Newtown_UK
2025-05-03	23:16:28	00:03:20	0.78	H-Band	AC_Cook	Newtown_UK
2025-05-04	17:37:44	19:20:23	1.71	H-Band	AC_Cook	Newtown_UK
2025-05-04	22:26:39	00:15:43	1.82	H-Band	AC_Cook	Newtown_UK
2025-05-06	19:18:40	19:48:40	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-06	19:49:42	20:13:16	0.39	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-06	20:48:23	21:18:23	0.50	Opitical	JI_Bastl	Bayerwald -Sternwarte_Germany
2025-05-22	07:22:53	07:29:40	0.11	H-Band	AC_Cook	Newtown_UK
2025-05-22	07:27:26	07:42:48	0.26	H-Band	AC_Cook	Newtown_UK
2025-05-22	07:45:51	08:36:04	0.84	H-Band	AC_Cook	Newtown_UK
2025-05-30	17:28:37	17:41:51	0.22	H-Band	AC_Cook	Newtown_UK

Total Contact time with earthshine in May 2025 = 16.7 hours or 12.8 hours from the UK if we exclude the non-BAA observations from Germany. No observing sessions overlapped. This month.

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	1.47	H-Band	AC_Cook	Newtown_UK
2025-06-02	18:05:03	19:39:58	1.58	H-Band	AC_Cook	Newtown_UK
2025-06-02	20:14:52	20:49:32	0.58	H-Band	AC_Cook	Newtown_UK

Total Contact time with earthshine in June 2025 = 3.6 hours, which is appreciably down, but perhaps not surprising as the Sun is at its highest in the sky and the ecliptic, which the Moon follows and starts to fall in declination, so the Moon will get lower quicker in the evening sky on successive nights from the northern hemisphere.

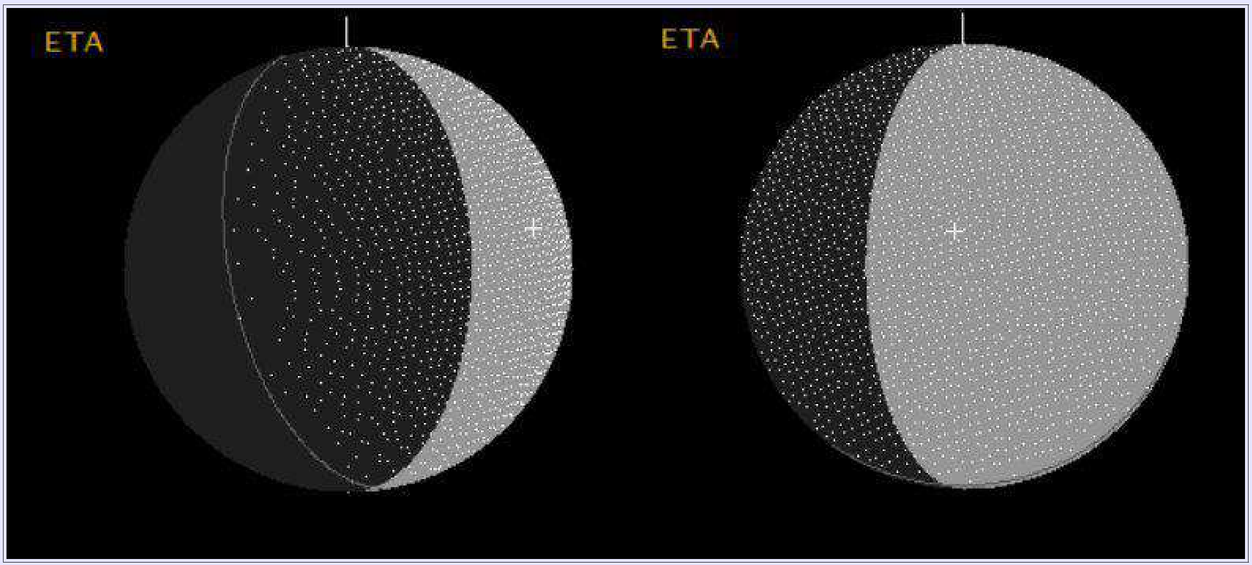


Figure 1. Impact distribution of the Eta Aquarids on the Moon according to Lunar Scan for : (Left) 2025 May 01 (Right) 2025 May 06.

In terms of LIF detections, I have just started with observations from Jan in my backlog of videos to reduce. However, the Bayerwald-Sternwarte observatory astronomers, mention on lunar-impacts@groups.io that they have a confirmed impact flash on 2025 May 01 at UT 20:43:45 and a suspected unconfirmed impact flash on 2025 May 06 UT 19:37:55. That is not bad for just 4h of observing! Please therefore check any videos you have of earthshine to see if you can see these flashes as these maybe Eta Aquarid meteoroid impacts? This shower is linked to Halley's comet and has a velocity of about 66 km/s, which is quite high for most showers, and has a ZHR rate here on Earth of about 40-60 per hour over the entire observers sky, and the shower peaked on May 6th.

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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Copernicus/Fra Mauro area.

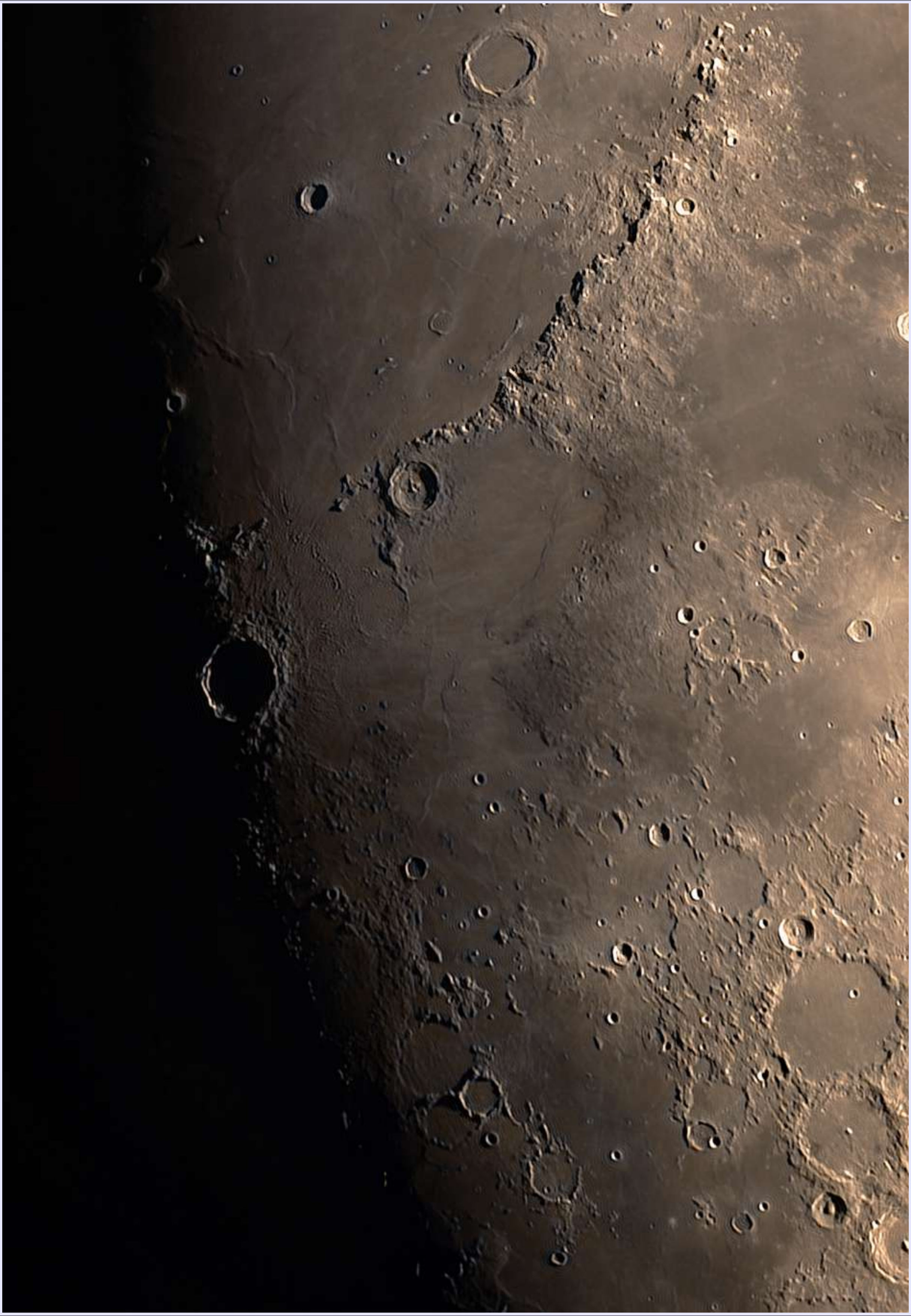


Image by Chris Longthorn on the 6th May 2025 at 20:45hrs using a 200mm StellaLyra Classical RC Cassegrain with a ZWO ASI224MC colour camera.

The Moon in Twilight.

Image by Randy Trank (Rockford Amateur Astronomers USA) with details as shown in caption.

Moon over Newtown

Photo by Bob Bowen and taken at 23.35pm BST 31/05/2025.: Canon 7D Mk2 DSLR, Skywatcher ST80 scope, Slik tripod. Cropped & sharpened on MacBook Pro's Preview program. ISO 200, 1/160 sec, f5, 400mm.

Deslandres.

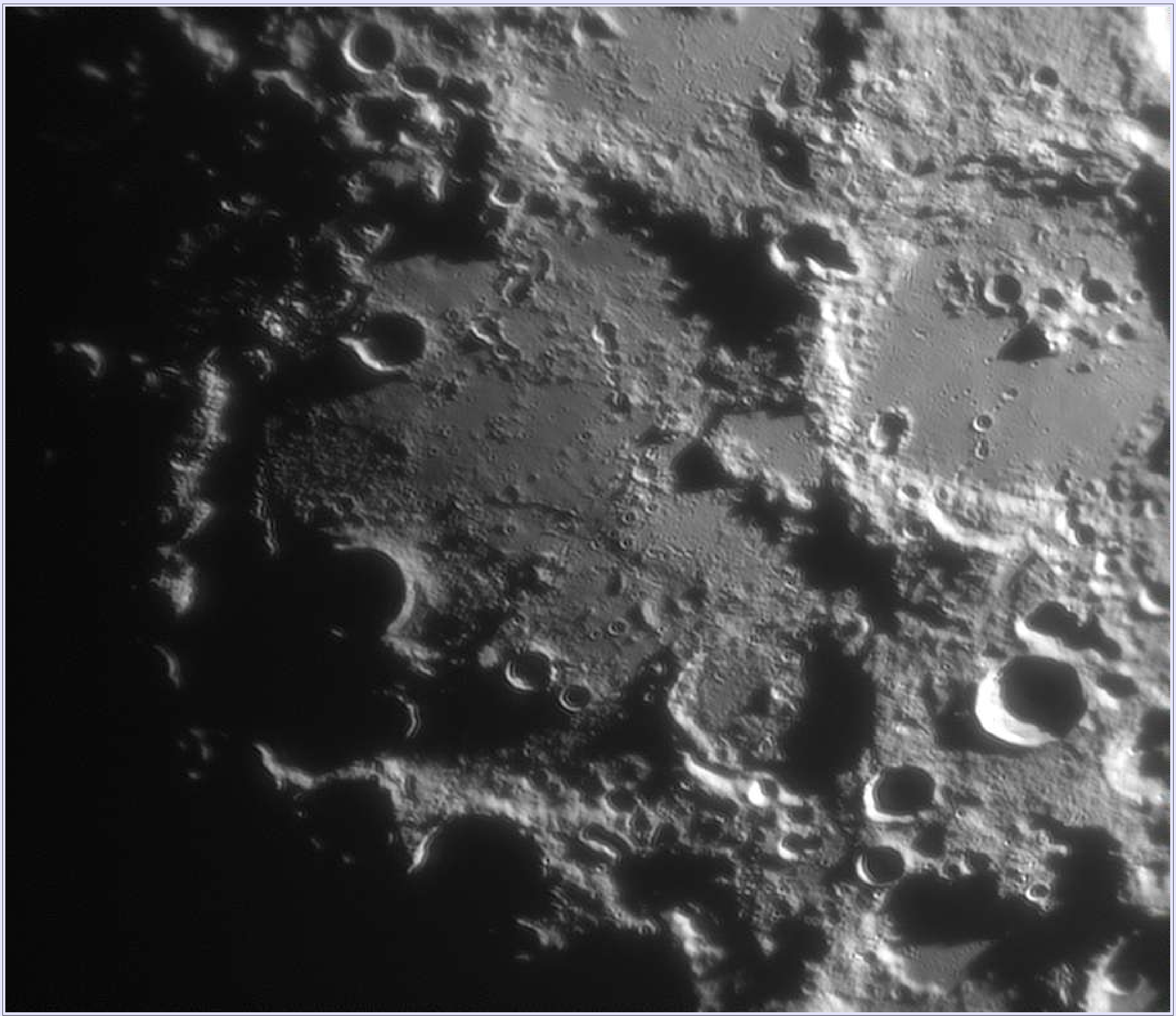


Image by Bill Leatherbarrow taken on 5th May 2025 at 21:18hrs.

Bill Noted: *I think this low sun angle over Deslandres is quite revealing - are there hints of a buried inner ring, or am I imagining what should be there given the size of the crater? Also, it seems to me that it is difficult to trace back the secondary crater chains and striations to any obvious source, at least not with any certainty.*

Deslandres is a pre-Nectarian proto-basin, with a diameter somewhere in the region of 200kms – and the '*somewhere in the region of '* is because it is so highly degraded that locating the rim is a bit like a game of pin the tail on a donkey, and the diameters cited in various papers vary quite a bit. Bill mentions two features in the image, the first being the apparent presence of a buried inner ring – a feature which proto-basins like Deslandres will likely exhibit. This certainly appears to be the case in his image, but the LRO imagery is far less revealing with nothing as obvious visible. However this 'inner ring' which is shown with a yellow circle in the right hand panel of Fig.1 appears to correspond to a positive Bouguer gravity anomaly shown in the left hand panel, which suggests that there is some subtle topographic feature visible here that may be related to the underlying plug of mantle material that has ascended to occupy the deep central portion of Deslandres. The interior of Deslandres is extremely uneven, which is no surprise considering the battering it has taken over the eons, but there is a hint in the topographic data that the very central portion of the basin floor, over the gravity anomaly, is slightly depressed relative to the surroundings, but not by much (~200m).

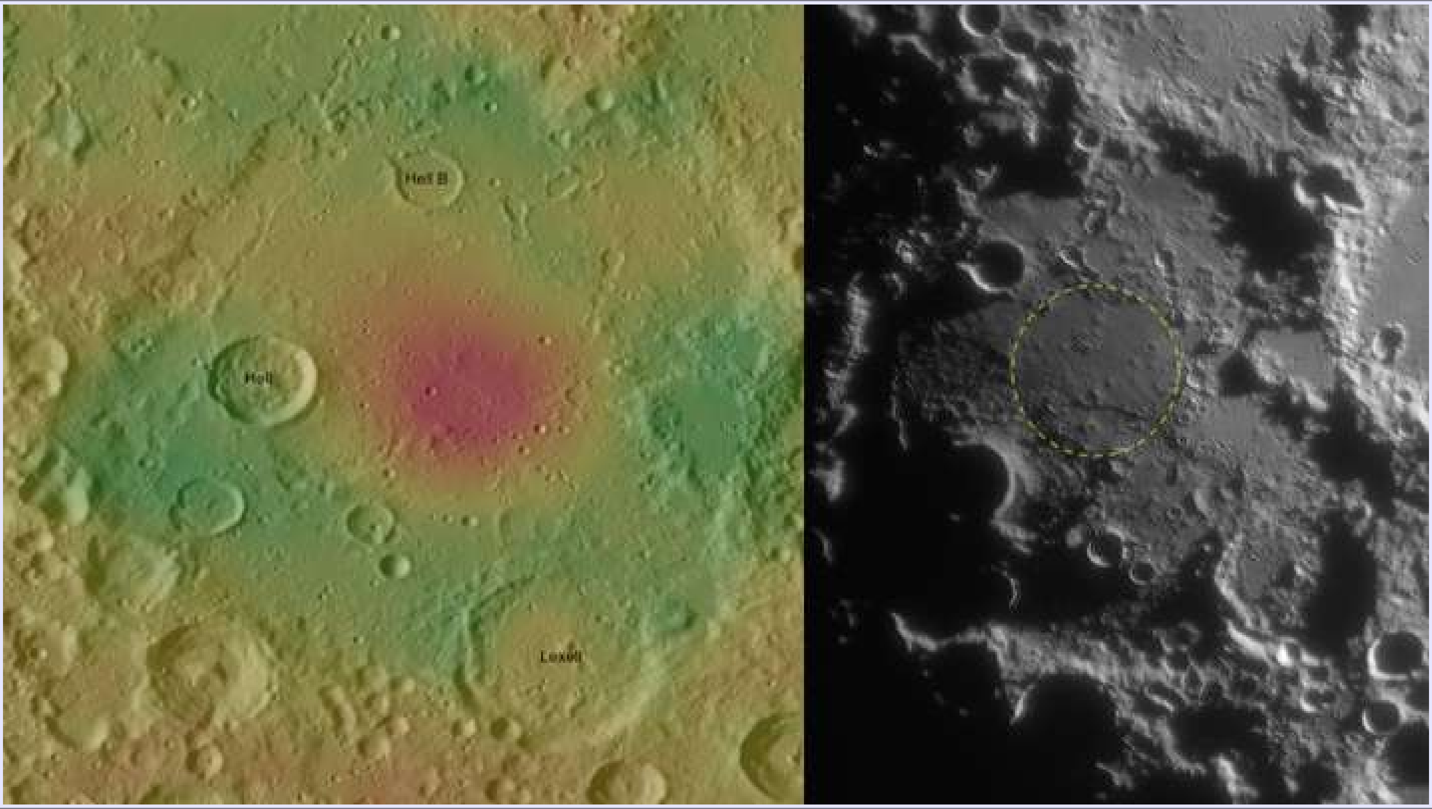


Fig.1 Left Bouguer gravity overlay showing the positive gravity anomaly within Deslandres (in red) which corresponds to the location of the 'inner ring' Bill suggested might be visible in his image (yellow circle) shown on the right.

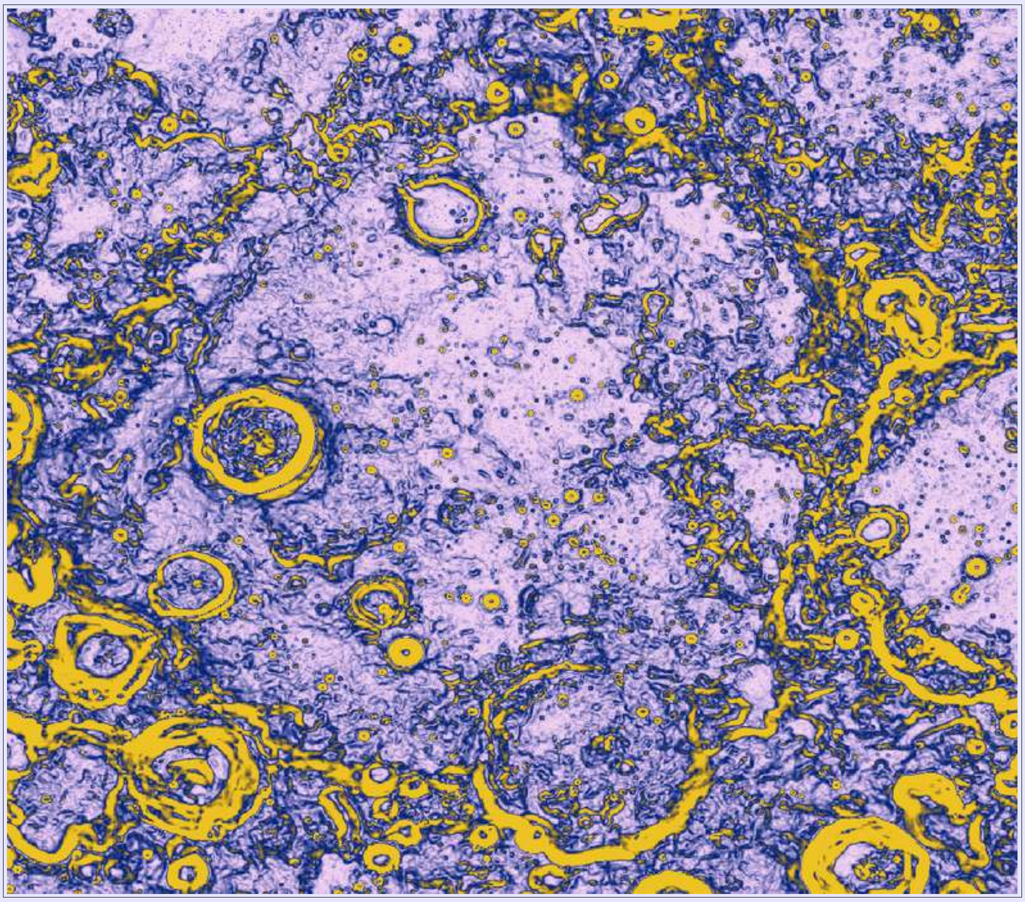


Fig.2 Terrain Slope overlay from Quickmap showing the central area noted above exhibiting less topographic variation than the rest of the floor of Deslandres.

Fig.2 shows a Terrain Slope overlay, and as you can see the suspected 'inner ring' encloses a surface which has a reduced topographic variation than the remainder of Deslandres's floor – in other words not as rough or uneven. You get this impression from Bill's image as well, but there not much in the way of mineralogical differences to indicate that this circular area is made up of anything different to the rest of the crater floor. This might be explicable if we consider the likely depth of highland derived impact deposits that have accumulated within the proto-basin over time – a process that would smother any underlying mare like deposits or lava flows that might have erupted into Deslandres in the remote past. At the moment Deslandres is between 600 and 800m deep – suggesting that there may well be over 3000m of deposits within it, as Antoniadi, a *relatively* unmodified and much younger proto-basin of similar size is well over 4000m deep.

Bill also mentions the secondary crater chains within Deslandres, with the most prominent one being visible to the east of Hell B, orientated roughly N-S. The morphology of this catena suggests a parent impact to the north to north-east, which is roughly aligned with two other catena visible here, one to the west of Hell, and another to the north-west of Hell B, which cuts the northern rim of Deslandres. None of these appear to be related to the Imbrium Basin, and it is possible that the basin forming impact that resulted in Mare Serenitatis could be a more likely candidate.

Now, without wishing to disorientate you, take a look at Fig.3 which is a crop from Leo Aerts's image on page 17, shows Deslandres, but under a much higher illumination angle. The suspected 'inner ring' is still visible, so its presence is fairly certain I would say.

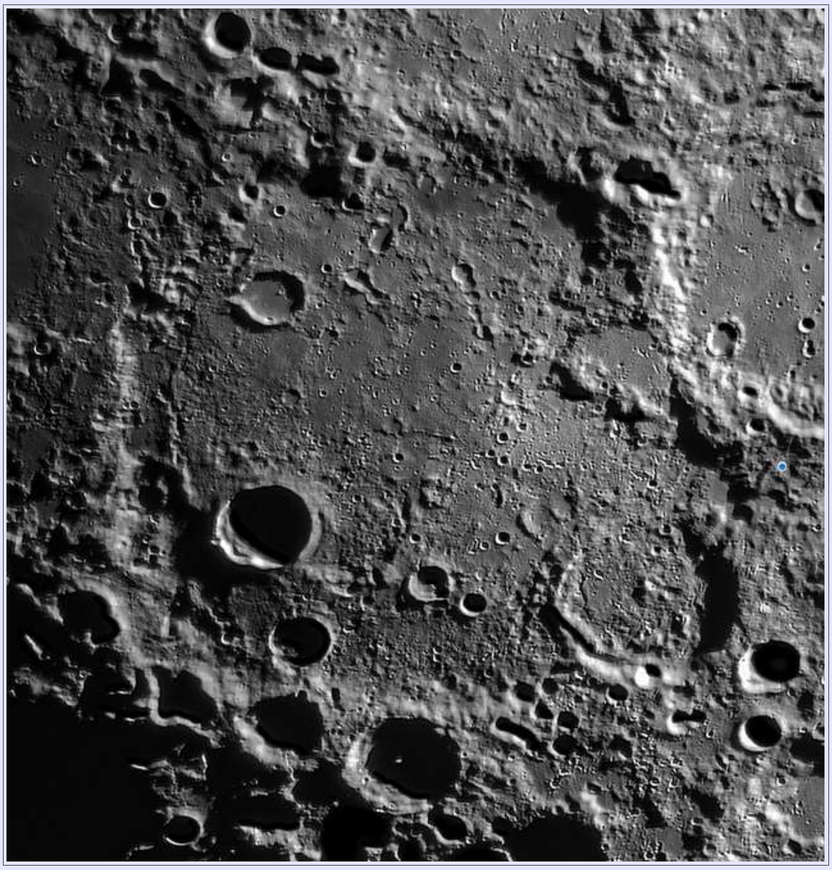


Fig.3 Crop from Leo Aerts's image shown on p.17.

The catena mentioned above are also nicely shown, with the one to the west of Hell showing up particularly well. What also shows up in this image is the difference in appearance between the northern part of Deslandres's floor and the southern part – so north of Lexell, but mostly south of Hell.. You can see a hint of this in the Terrain Slope data shown in Fig.2 (above). I am not sure exactly what this southern segment of Deslandres's floor represents, but again Leo's image might supply a possible answer in the form of the subtle striations visible on its surface. These appear to be related to a wider general NE-SW trending 'grain' which is composed of fine lineations over the surface. The USGS maps identify the floor of Deslandres as being either Imbrium plains or Imbrium terra with a sprinkling of Nectarian terra, but I wonder if much more of this southern floor unit is in fact Nectaris Basin ejecta, so belonging to the Janssen Formation.These deposits might also be the hummocky material on the eastern floor of Lexell.

As noted above if there is a difference in rocky makeup of the northern and southern floor of Deslandres, the mineral data in Quickmap gives little in the way of clues as to what is going on. This is complicated by the fact that Tycho has smothered the area in ejecta with an elevated highland composition, but there is a slight suggestion that the southern floor deposits may have a lower FeO content than the northern floor.

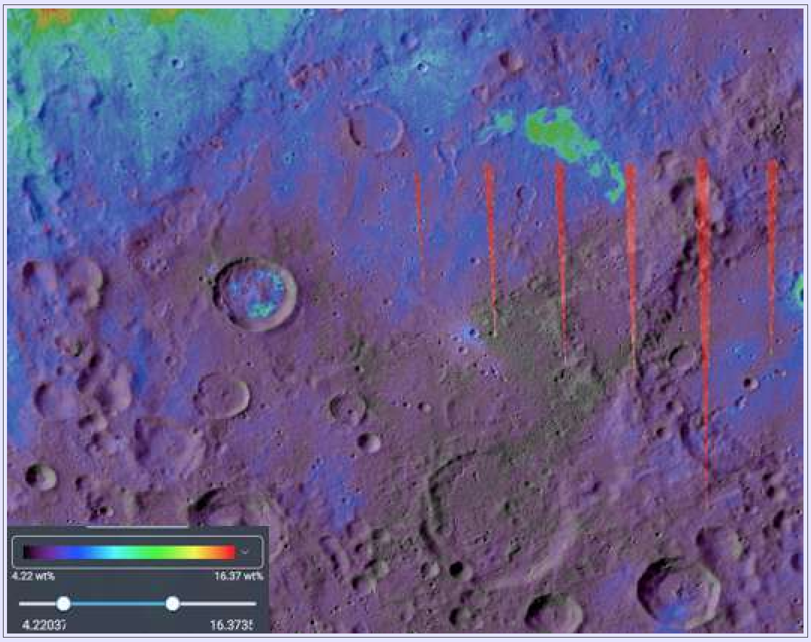


Fig.4 Abundance of FeO (wt %) mosaic overlay from Quickmap.

You can see this in Fig.4, where the blues and greens over the northern floor indicate deposits with a higher FeO content – possibly derived from underlying lavas, with the greens representing much younger mare like patches up against the north-eastern rim. The purple and blacks over the southern floor indicate a lower abundance of FeO, but this may be a veneer of material with a more abundant highland composition draped over the same type of floor we see to the north. This might be consistent with it being Janssen Formation derived from the Nectaris basin.

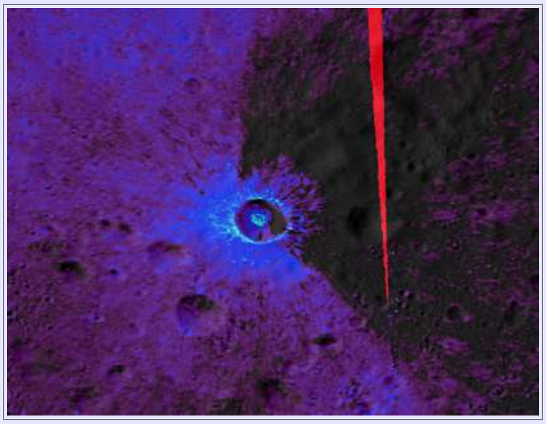


Fig.5. Hell Q.

This is suggested by the fact that Hell Q has impacted this southern floor, but the western half of its ejecta blanket consist of material with an elevated FeO content. All in all Deslandres is a complex feature and deserves a bit of an in depth study to determine what its geological history involves.

Deslandres Walter and Stofler

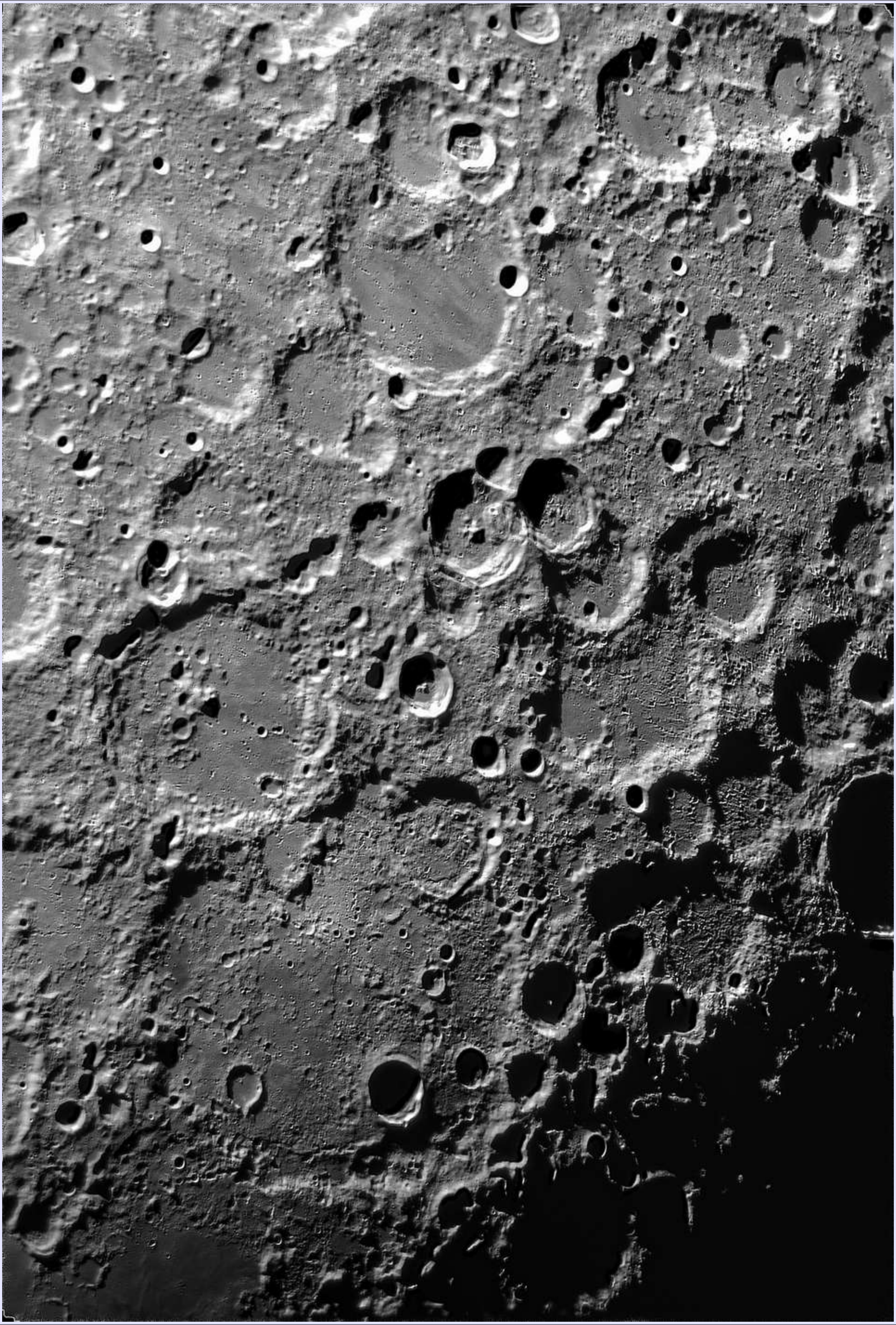
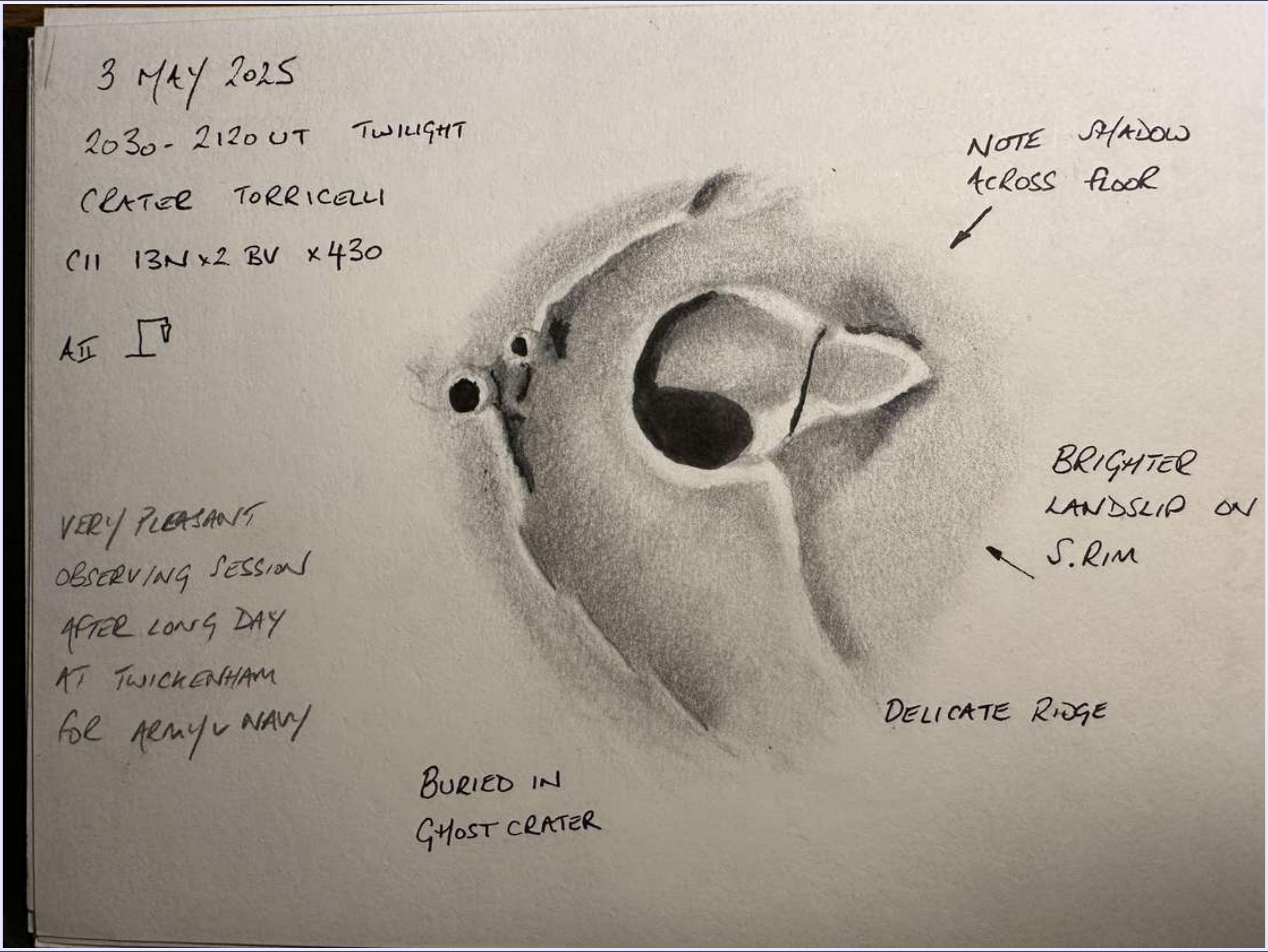


Image by Leo Aerts taken on 6 April 2025 at 19:19 UT using a Celestron 14 SCT.

Torricelli.



Drawing and notes by Mark Radice.

Having just got back from watching the Army v Navy at Twickenham with 50,000 drunken service-personnel I was keen to catch the calm of the Moon before it set behind the nearby trees! Scanning the terminator, the unusual double-crater Torricelli in Sinus Asperitatis caught my eye. As you can see, the two craters are conjoined with only a gentle rubble-wall between them. What makes this area interesting is that Torricelli is within a ghost crater whose delicate ramparts were lit by the rising sun. Furthermore, there are gentle ridges running north and south from the crater-join. Interestingly, I could see a black shadow line crossing the rubble wall although there is nothing obvious on the high-resolution Quickmap imagery.

Langrenus.

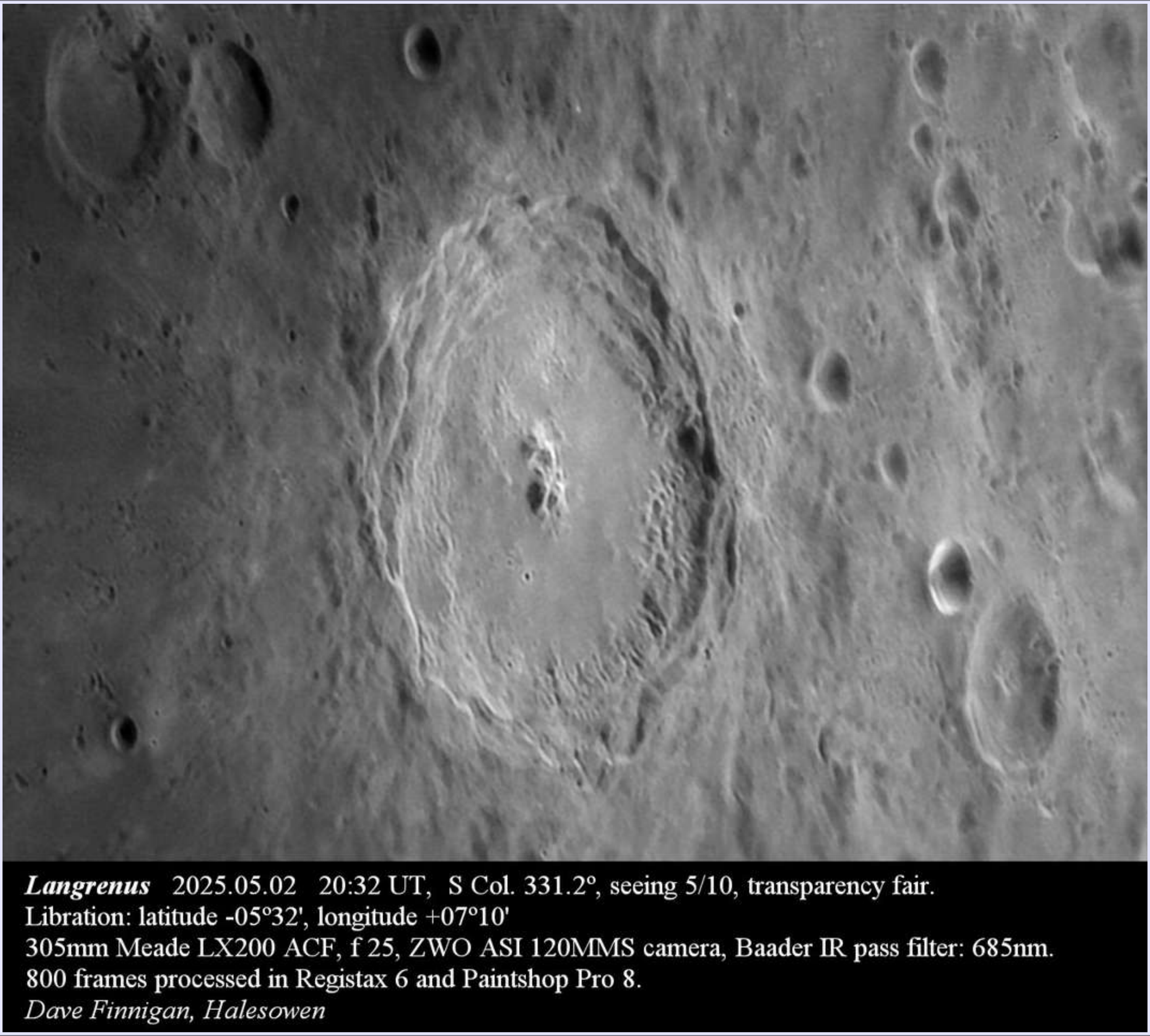


Image by Dave Finnigan with details as shown.

Palus Epidemiarum.

Image by Alexander Vandenbohede with details as shown.

9 day old Moon.

Image by Maurice Collins with details as shown.

Two views of Copernicus.

On the left is a drawing of Copernicus by Mark Radice on the 6th May who added the following notes: *The dramatic crater Copernicus (93km). The crater rim was catching the morning rays but the floor itself was completely in shadow. Note the central mountains are not visible implying that they are lower that the crater walls (a fact verified in Luna Cognita which states the walls are 3.8km high and the central peak only 1.2km high). What a beautiful sight! There are so many details in the terracing and surrounding impact melt it was a struggle to catch the details. Hopefully the sketch gives the right impression of the complex grandeur of Copernicus.*

On the right is an image by Chris Longthorn on the 6th May 2025 at 20:45hrs using a 200mm StellaLyra Classical RC Cassegrain with a ZWO ASI224MC colour camera.

Almost simultaneous observations nicely recorded using the old and the new.

Rimae Sirsalis.

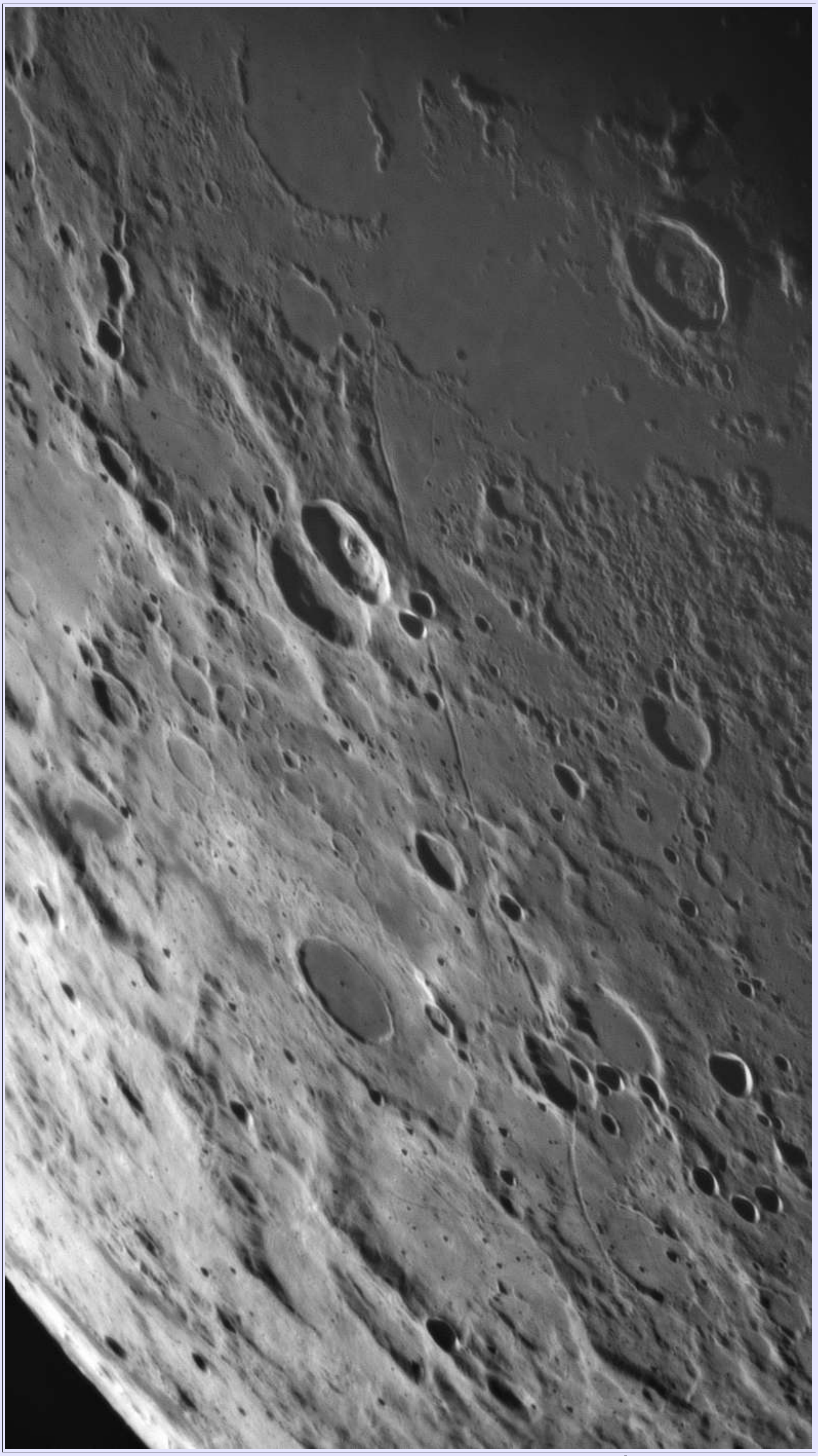


Image from the BAA Gallery, and taken by James Dawson on 22nd June at 206:20hrs using a Celestron C14 and ASI ZWO 585MC, 2x Barlow and ProPlanet 807nm IR filter (*and in awful seeing!*).

Lunar Craters Theophilus, Cyrillus and Catherina.

Image from the BAA Gallery, and taken by Gary Eason on 2nd June 2025 at 21:06hrs using a Celestron 9.25 EdgeHD, Player One Poseidon-C Pro, Sky-Watcher Wave 150i and ZWO UV/IR-cut filter

Apollo 11's landing site on the Moon

Image from the BAA Gallery, and taken by Oliver Hext on 2nd June 2025 at 21:30hrs using a Skywatcher 127mm and ZWO ASI 678MC USB 3 Camera.

Sunrise Posidonius.

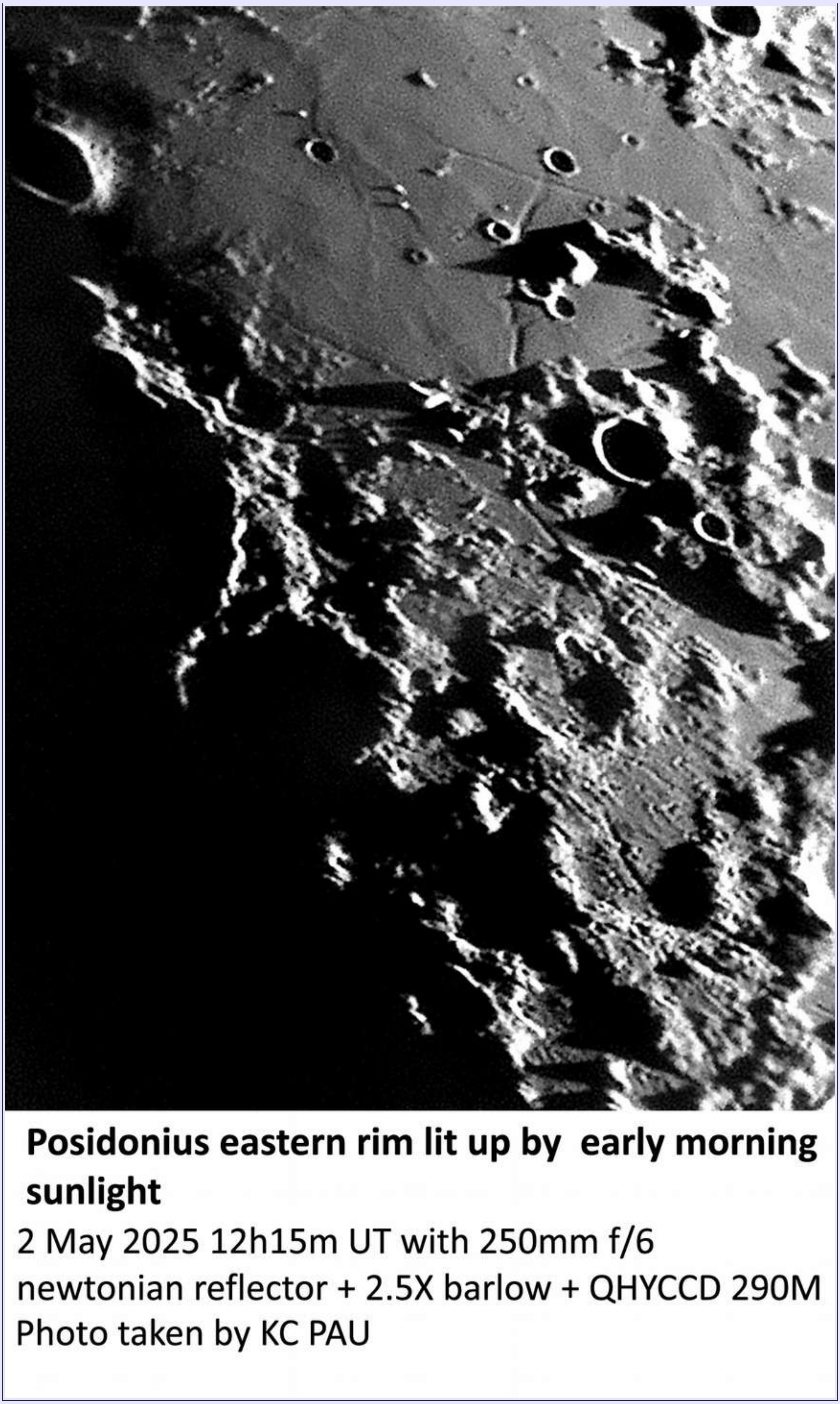


Image by K.C.Pau with details as shown.

Rupes Recta.

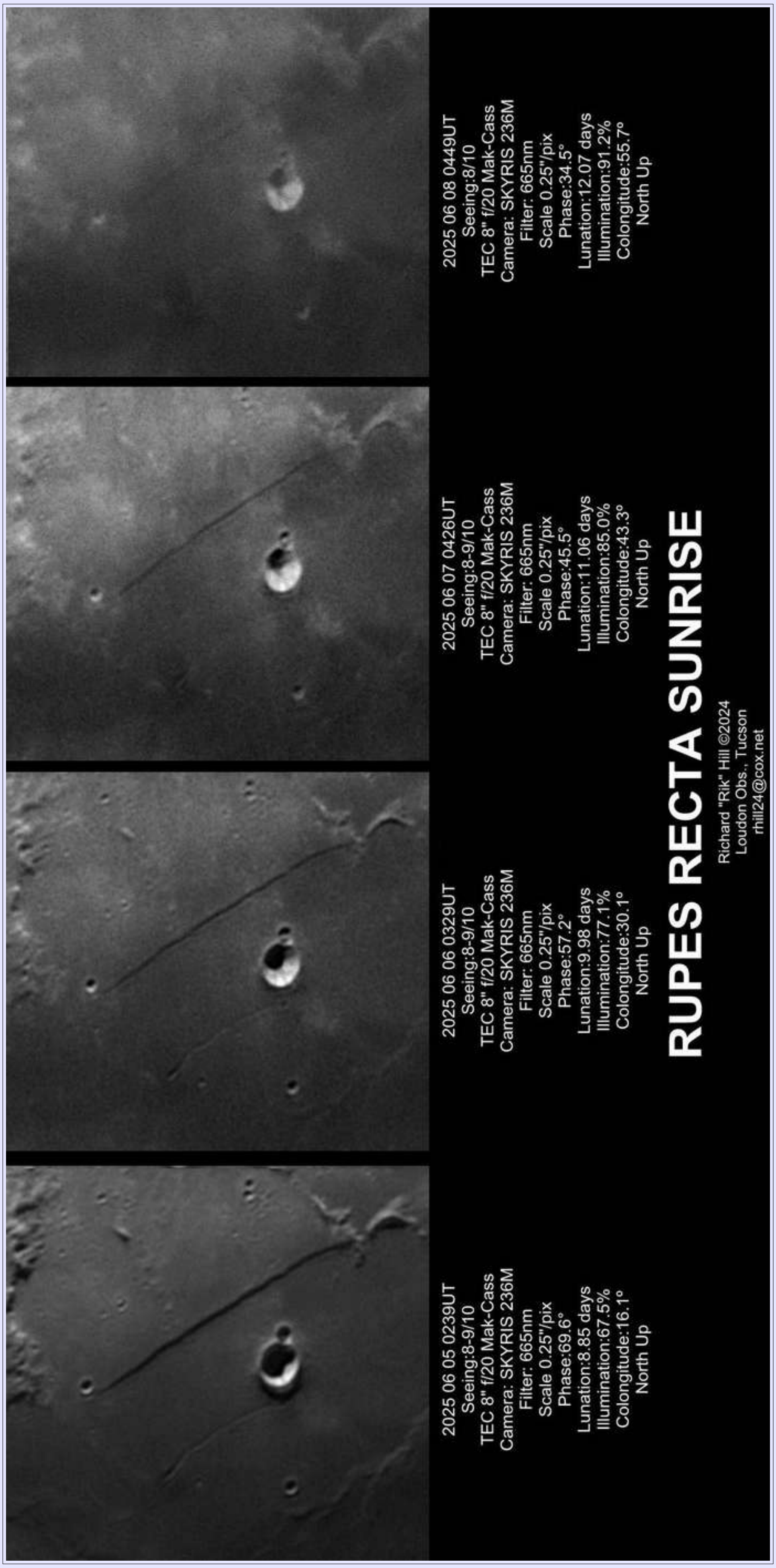
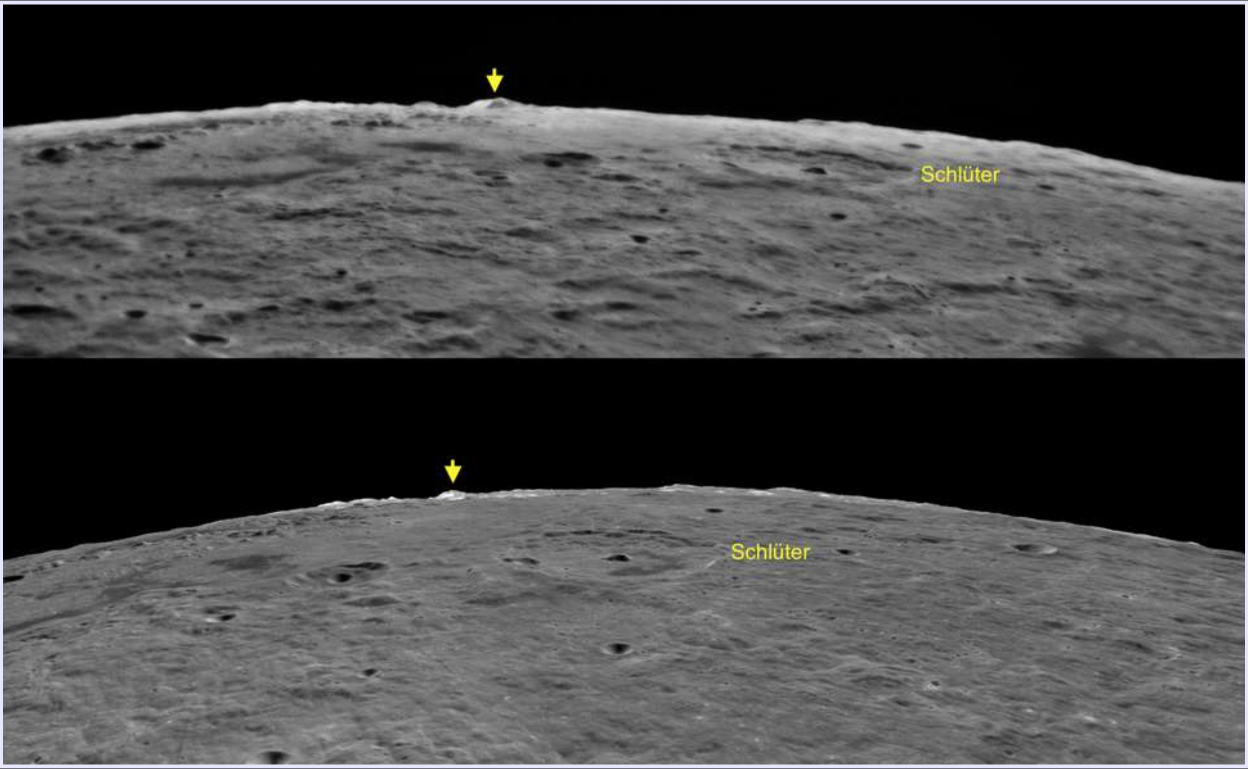
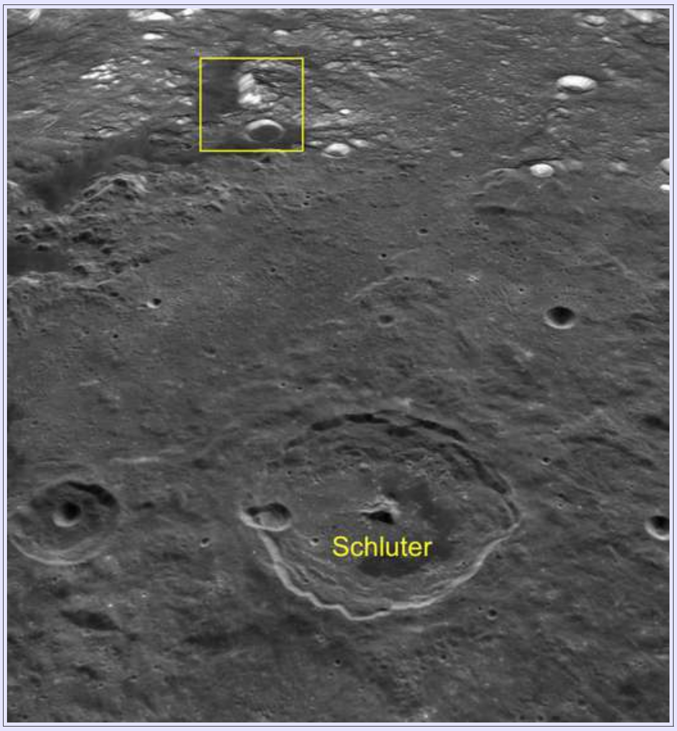


Image by Rik Hill who added: *Here's a montage of 4 nights of sunrise on this feature. It gives a lot of clues to the slope of the cliff that forms this feature.*

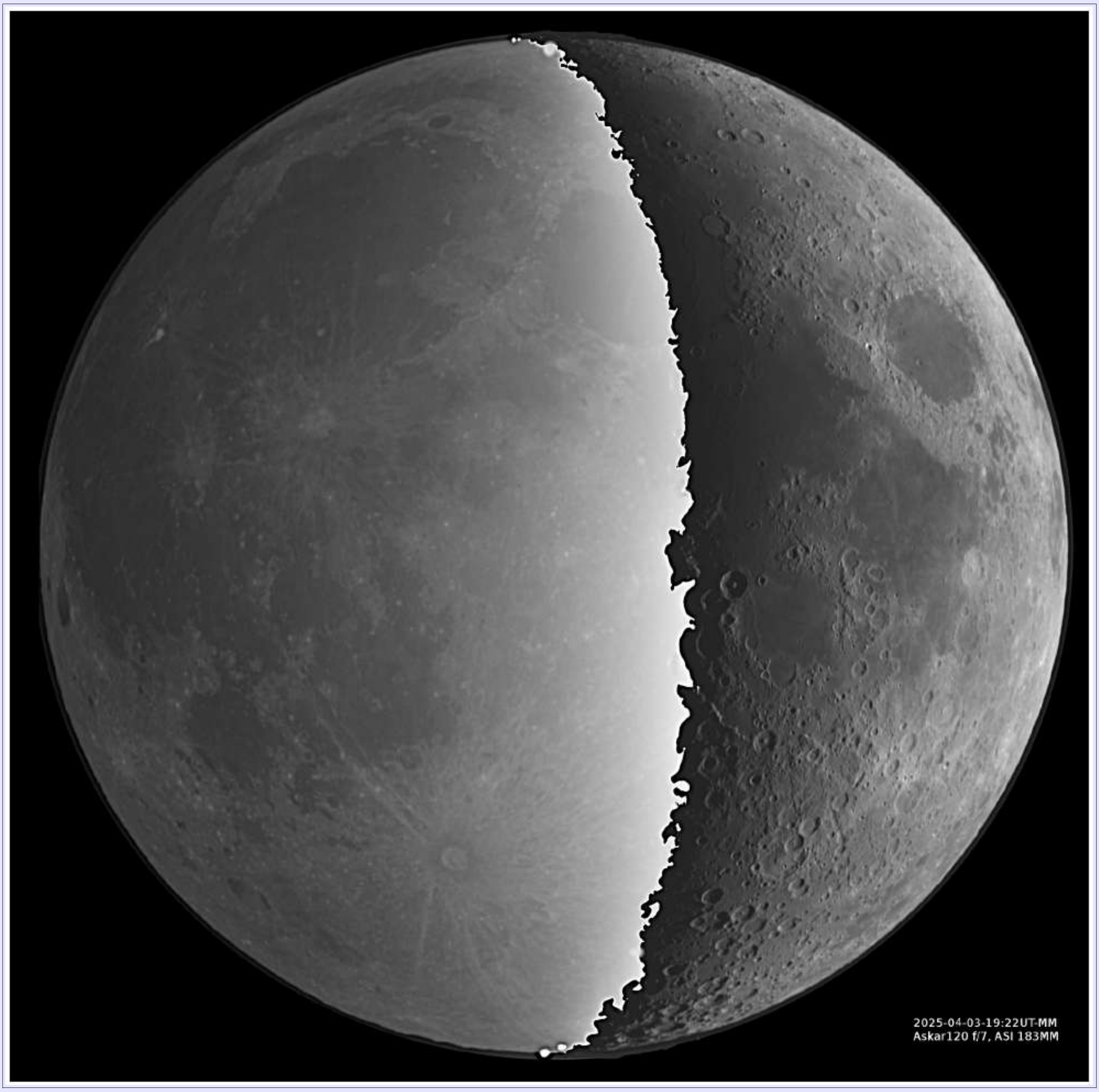
Montes d’Alembert or stacking artefact?



The upper image is one taken by James Dawson and posted in the BAA gallery – James was unsure whether the distant mountains are real lunar features or simply an artefact of stacking. You can see the crater Schluter in the middle distance, and this makes it fairly straightforwards to use the Quickmap Lunar Globe widget to produce a 3D rendition from roughly the same perspective and identify the peaks as sections of the Montes d’Alembert. But if you want a thoroughly comprehensive exploration of these these peaks you can refer to the article 'Identifying the peaks of Montes d’Alembert' written by regular contributor Alexander Vandenbohede (J. Br. Astron. Assoc.132, 2, 2022). Using his images and 3D simulations we can say that the peak identified with the yellow arrow in the above images is the one marked A2 in his Fig's 4 and 5. The below image shows that the aspect captured by James is the end of a rectangular block that forms part of the Outer Rook Mountains of the Orientale Basin, and as Alexander points out, their visibility is very dependent on favourable libration.



The Moon and Earthshine.



This image was prepared by Michael Machleb who was observing from his balcony in Berlin with his new Askar 120 (f7) refractor. It has processed to show the illuminated part of the Moon as well as that only illuminated by Earthshine. A full article on obtaining the image and how it was obtained should appear in a forthcoming ALPO TLO newsletter, copies of which can be accessed via the ALPO website https://alpo-astronomy.org/Lunar

Lunar domes (PART XCII): Volcanic material and eruption style
By Raffaello Lena

In this note I will examine the volcanic material linked to the style of volcanism, e.g. extrusive and explosive activity.

Volcanic material and short glossary

Ash: fine volcanic material with dimensions less than 2 mm.
Caldera: almost circular depression generally due to the collapse of a sector above the magma chamber which empties following a large eruption.
Dike: dikes can be described as fractures into which magma intrudes or from which they might erupt. The fracture can be caused by the intrusion of pressurized magma, or vice versa, the rise of magma can be caused by and exploit existing or tectonically forming fractures.
Dome: swelling of the volcanic building due to an accumulation of lava.
Eruption: spillage, often violent, of molten, solid or gaseous volcanic material.
Laccolith: sheet-like intrusion that has been injected within or between layers of sedimentary rock. The pressure of the magma is high enough that the overlying strata are forced upward and folded, giving the laccolith a dome like form with a generally planar base.
Lahar (mud flow): movement of pyroclastic material impregnated with water deposited on the flanks of the volcano.
Lapilli: volcanic material with dimensions between 5 and 50 mm.
Lava fountain: emission of jets of fluid lava at a considerable height from the outlet due to the pressure of the gases dissolved in it.
Lava: magma erupted on the surface.
Magma chamber: area of accumulation of magma below the earth's surface.
Magma: molten material at high temperature (generally between 900 and 1200 degrees Celsius) found inside the earth.
Plinian: strong explosive eruption similar to that of Vesuvius in 79 AD described by Pliny the Younger in two letters to Tacitus.
Pumice: light, glassy and very porous effusive rock due to the high presence of voids due to the expansion of gas inside the magma and subsequent rapid cooling.
Pyroclastic flow: high speed lateral movement of pyroclastic material due to the decrease in pressure of the volcanic column.
Pyroclasts (tephra): solid volcanic material such as ash, sand, lapilli, blocks, volcanic bombs emitted during an explosive eruption.
Sill: a tabular sheet intrusion that has intruded between older layers of sedimentary rock, beds of volcanic lava or tuff, or along the direction of foliation in metamorphic rock. A sill is a concordant intrusive sheet, meaning that a sill does not cut across preexisting rock beds.
Slag: fragments of still fluid magma that deposit around a mouth during an eruption.
Stratovolcano: volcano formed by the alternation of lavas and pyroclasts.
Surge (base): steam mixed with ash that flows quickly along the flanks of the volcano from the base of the explosive column, setting fire to and destroying everything in its path.
Tuff: type of rock made of volcanic ash ejected from a vent during a volcanic eruption. Following ejection and deposition, the ash is lithified into a solid rock. Rock that contains greater than 75% ash is considered tuff.
Volcanic blocks: solid material of various sizes thrown during an eruption.
Volcanic bomb: large volcanic material (greater than 64 mm) produced by a volcanic explosion.
Volcanic conduit: chimney through which the magma flowing into the crater rises.
Volcanic crater: depression generally located on the top or flanks of the volcano building in which the volcanic conduit culminates.
Volcanic explosion: more or less violent emission of pyroclasts due to the release of gas from magma.

Basic magmas tend to flow behaving like fluids rather dense and giving rise to large sub-horizontal lava covers (basaltic shelves). Acid (less fluid) magmas damage instead, it leads to type phenomena explosive, with emission of dust, ashes, lapilli and bombs. These phenomena are much more dangerous of the precedents because the ashes can result in gravitational phenomena (castings pyroclastic and basal surge), which cause rapid descent along slopes of large chaotic masses (gas, liquid and solid) to high temperature.

Terrestrial volcanism

Lava bomb and reticulite from explosive eruptions

A lava bomb is a "drop" of lava that solidifies during flight, being able to travel even kilometers away and often acquiring particular shapes aerodynamic, by virtue of its partial plasticity (Figs. 1-2)

Figure 1: Olivine lava bomb (private collection of Phillips) from Mortlake Australia.

Pumice is a glassy volcanic rock that is so full of bubbles that most examples will float on water. Reticulite is an extreme form of pumice in which the bubbles have coalesced, leaving only a tenuous reticular network of glassy lava behind in the interstitial spaces between the bubbles (Fig. 3). While pumice is more characteristic of the ejecta from the silica-rich magmas of stratovolcanoes such as Mount St. Helens, Lipari, Vesuvius, it may also be formed from the more silica-poor basaltic magmas of shield volcanoes such as those of Iceland and the Hawaiian Islands. Reticulite is formed only by very high fountains of basaltic lava that contain dissolved gasses such as water vapor and carbon dioxide. The specimen of reticulate, shown in Fig. 3, was probably formed by lava fountaining at Kilauea Volcano's Pu'u O'o vent sometime during the early to mid-1980s. Reticulite is so light that it's frequently transported many miles downwind of an eruption site. The Pu'u O'o vent lies roughly 7 miles (11 km) to the north of the Pu'u Loa site.

Figure 2: Olivine lava bomb (private collection of Phillips) from Mortlake Australia.

Fumarolic activity
Vulcano island (Italy) is a volcano characterized by vulcanian activity. Vulcanian eruptions may throw large meter-size blocks several hundred metres, occasionally up to several kilometres. Since the end of the last magmatic eruption of Vulcano (1890), activity has consisted of fumarolic emissions of fluctuating intensity (La fossa crater). Several minerals may be identified in the fumarolic activity.

Figure 3: Reticulite (private collection of Phillips).

A document of the eruption in Leilani Estates is also visible in internet (see video clip below)

Eruption of Leilani Estates (see historical document below) https://www.youtube.com/watch?v=YwXgk2HtAwA

Stratovolcanoes
These volcanoes are characterized by effusive and explosive activity and are built up by the accumulation of material erupted through the conduit and increases in size as lava and pyroclastic particles are added to its slopes.

A volcanic eruption in Russia's far eastern Kamchatka P is shown in the video below
https://www.youtube.com/watch?v=mEhNb1I2xAk%20eninsula
Mount Etna (Italy) is one of the world's most active volcanoes and is in an almost constant state of activity (https://www.youtube.com/watch?v=WngG4gXbcHw).
Vesuvius, Vulcano and Phlegraean Fields caldera (Campi Flegrei) in Italy have a very low eruptive frequency

and are found in plugged vents. Some also exhibit secondary volcanism - such as degassing in the form of fumaroles. Volcanic activity in Italy is also concentrated in the submerged areas of the Tyrrhenian Sea and the Channel of Sicily. Some underwater volcanoes are still active, while others, now extinct, represent real submarine mountains. The best known are Marsili, Vavilov, Magnaghi, the submarine volcanoes Palinuro, Glauco, Eolo, Sisifo, Enarete. Information on the distribution of Italian volcanoes is reported in the following video:
https://www.youtube.com/watch?v=-YVw7YfFkqk

Tuff from explosive eruptions
Tuff is relatively soft and porous rock that made of ash and other sediments from volcanic vents that has solidified into the rock (Fig. 4).

Figure 4: Tuff from Ventotene island in Italy (private collection of Lena).

Spinels
The group of minerals produced by explosive eruptions may include the minerals essentially present in zeolitized lava projectiles and metamorphosed carbonates, and also spinels described below. The spinels are any of a class of minerals of general formula AB_2X_4 which crystallize in the cubic (isometric) crystal system; other combinations incorporating divalent, trivalent, or tetravalent cations, including magnesium, zinc, iron, manganese, aluminum, chromium, titanium, and silicon, are also possible. The spinel is referred to $MgAl_2O_4$. The anion is normally oxygen. A and B can also be the same metal with different valences, as is the case with magnetite, Fe^3O_4 (as Fe^2+ Fe3+2O_{2-4}), which is the most abundant member of the spinel group.

Thus these species are sub-divided into three series: Spinel series (B = Al), Magnetite series (B = Fe), and the Chromite series (B = Cr). Some samples of the private collection of the author are shown in Figs. 5a-b (Magnetite) and 6 (Chromite).

One unexpected result was the discovery of a new feldspathic rock with spectral features dominated by (Mg, Al)-spinel exposed at localized areas on the lunar surface. The spinels identified on the Moon are Fe, Cr or Ti rich opaque minerals. Small amounts of transparent (Mg, Al)-rich spinels (pink spinel) have been identified in few lunar samples, but they have always been found to occur in association with olivine or other mafic minerals.

Figure 5a: Magnetite (private collection of Lena), with magnetic properties.

Figure 5b: Magnetite (private collection of Lena), with magnetic properties.

Lunar Pyroclastic deposits and spinels

The distribution of lunar pyroclastic deposits (LPDs) bears on the problem of the nature of lunar volcanism. LPDs are low-albedo units observed as dark smooth areas in the highlands; on the floors of craters as well as near mare deposits and they are often associated with fractures, irregular depressions and other likely volcanic vents. These pyroclastic deposits often appear to drape over or mantle the underlying surface, which may be at mare, smooth plains, or hummocky highland deposits. A recent work by Weitz et al. examined the M^3 mineralogical parameter mosaic across the *Sinus Aestuum* province, confirming spectrally the presence of possible pyroclastic glasses, including spinels. The spinel deposits are strongly correlated to the distribution of pyroclastic deposits, indicating the two materials were most likely emplaced together (Fig. 7).

Figure 6: Chromite (private collection of Lena).

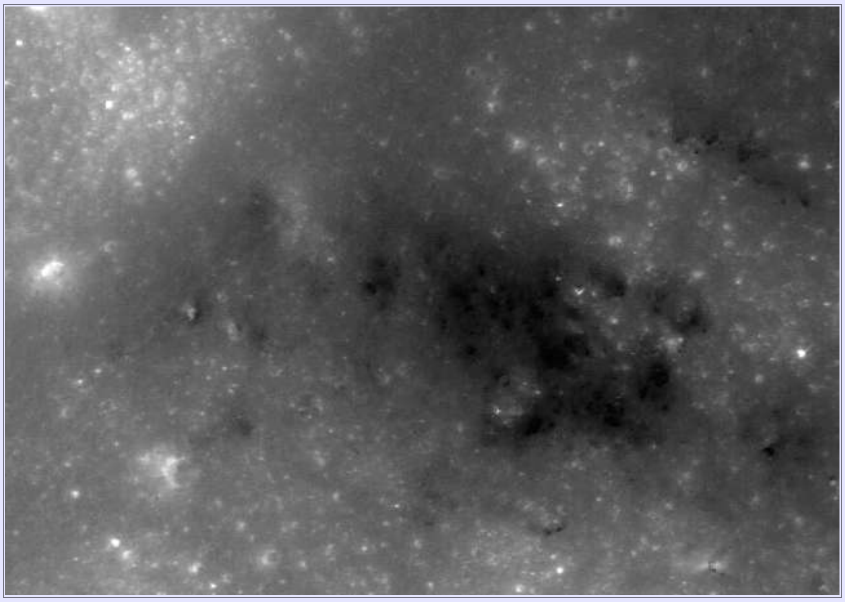


Figure 7: NAC imagery of Sinus Aestuum province with lunar pyroclastic deposits (dark patches).

These spinel-rich deposits are found among the *Sinus Aestuum* pyroclastic/dark mantle deposits (DMD) and are notably absent from the adjacent Rima Bode DMD, as reported by Sunshine et al (2010), see also their work. The spinel deposits are defined spectrally in the near infrared by their strong 2,000 nm absorptions and extremely weak or absent 1,000 nm absorptions, as is characteristic of spinel group minerals. The spectral signatures of spinel/chromite are reported in Fig. 8.

Another aspect on which future studies might concentrate is spectral studies to identify the dome-forming minerals based on the recent data acquired by the Chandrayann-1 Moon Mineralogy Mapper (M^3) dataset, accessing to ACT react quick map, as described below, including spectra of some lunar regions. The spinels may have formed in the same magma chamber that produced the pyroclastic beads, or the spinels may reside in a pluton at depth that was assimilated into the magma as it made its way to the surface. Although the spinels and pyroclastics may have once existed as a homogeneous deposit on the highlands, mixing by craters and regolith development over billions of years has created a heterogeneous distribution of both spinels and pyroclastics within the highlands of *Sinus Aestuum*, and buried the deposit beneath younger lava flows on the mare [Sunshine et al., 2010; Sunshine et al., 2014].

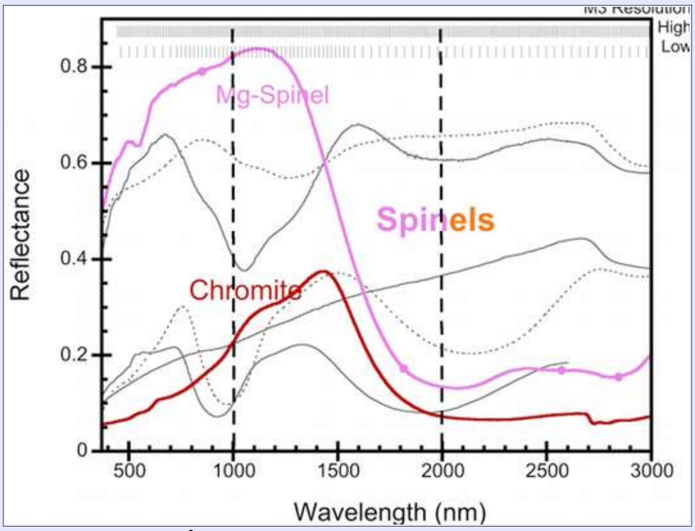


Figure 8: M³ spectral analysis of spinel and chromite.

All the strongest visible wavelength features in M³ data correspond to the freshest-looking craters, although there are examples of young fresh craters in the highlands that do not display a spinel signature, consistent with a heterogeneous distribution of spinels within the highland soils.According to previous works [Sunshine et al., 2010; Sunshine et al., 2014], I have identified the presence of spinel-rich deposits in *Sinus Aestuum* region as demonstrated by the spectral signature, for some sampled area, characterized by a strong 2,000 nm spectral absorption (Fig. 9).

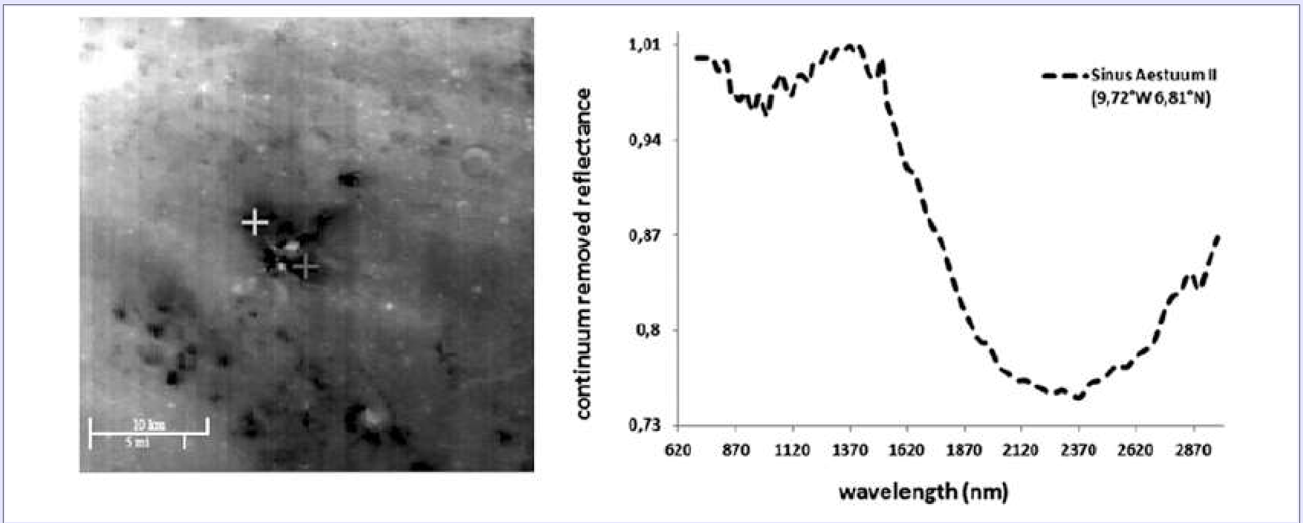


Figure 9: M³ spectral analysis. Spectra of the Sinus Aestuum showing the presence of spinel rich deposit. (Left) The sampled area located at latitude 6.81° N longitude 9.72° W and 6.94° N and longitude 9.86° W, respectively. (Right) Spectra with continuum removal of LPDs characterized by spinel-rich deposits reported in the Sinus Aestuum region. OP2C1 orbital period.

The presence of spinel-rich deposits is also detectable near Schröter and in several locations shown in Fig. 8. I have identified these deposits as demonstrated by the spectral signature, characterized by a strong 2,000 nm spectral absorption (Fig. 7).

Especially, the materials that lack a 1,300 nm feature could be interpreted as Fe-rich spinel rather than chromite, although the existence of the small amount of chromites cannot rule out. There is also a clear difference in the occurrence trends of the spinels at *Sinus Aestuum* and the Mg-spinels. Detection areas of the spinels at *Sinus Aestuum are* on DMD, while most of the Mg-spinels are associated with impact basins such as Moscoviense, Nectaris, Humboldtianum, Smythii, and Ingenii, as reported by Yamamoto et al (2013).

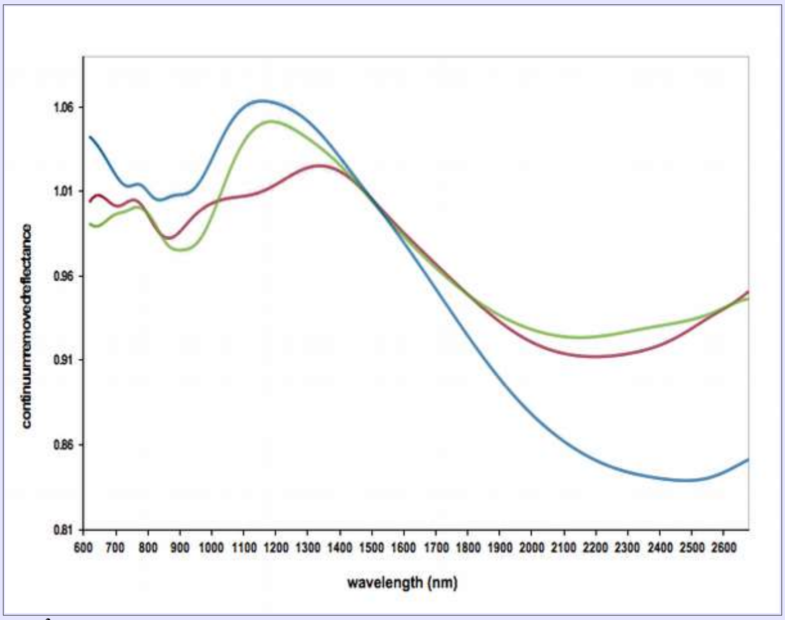


Figure 8: M^3 spectral analysis. Spectra of the Sinus Aestuum region (see text for detail).

In conclusion, the identification of the presence of spinels on the Moon represents a particularly interesting field of investigation, using the information obtained from the data acquired by the Chandrayann-1 Moon Mineralogy Mapper (M3).

References

[1] Sunshine, J. M., Besse, S.N., Petro, E., Pieters, C. M., Head, J. W., Taylor, L. A., Klima, R. L., Isaacson, P. J., Boardman, J. W., Clark, R. C. and the M3 Team. 2010. Hidden in Plain Sight: Spinel-Rich Deposits on the Nearside of the Moon as Revealed by Moon Mineralogy Mapper (M^3). 41th Lunar and Planetary Science Conference, abstract #1508.
[2] Sunshine, J. M.,. Petro, N. E., Besse, S., Gaddis, L. R., 2014. Widespread Exposures of Small Scale Spinel-Rich Pyroclastic Deposits in Sinus Aestuum. 45th Lunar and Planetary Science Conference, abstract# 2297.
[3] Bhattacharya, S., Chauhan, P., Ajai, A., 2012. Mg-spinel-rich lithology at crater Endymion in the lunar nearside, 39th COSPAR, E1.5-7-12, 173.

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Thornton's Anti-Aircraft Shell by Barry Fitz-Gerald.

Some time ago* Tony Cook mentioned the possible impact flash witnessed by Harry Thornton on October 18th 1945 and described by him in an article entitled *"Things do happen on the Moon"* published in the JBAA Vol. 57, No.3,1947. Thornton was observing Plato when he noted a "*minute but brilliant flash of light"* (which he compared to an exploding anti-aircraft shell) inside the western rim – which is, in modern post IAU parlance, the eastern rim.

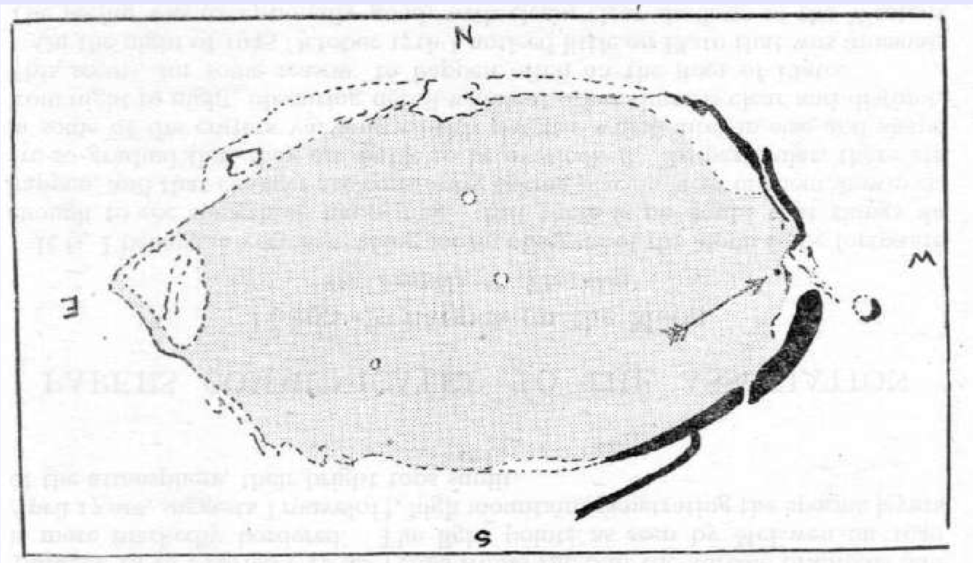

Fig.1. Drawing by Thornton of the location of the flash seen on October 18th 1945 – note the image is inverted from the original. West, as shown in the upside-down labelling is therefore east!

His drawing of the location is shown in Fig.1 – it is shown here inverted so that it tallies with the images shown below. If this was an impact flash, at 80 years of age, the resulting crater should be extremely fresh and could even show up as a 'cold spot' as do many small fresh (and sometimes not so small) craters when viewed in the DIVINER Night Time Soil Temperature plots. The drawing is pretty accurate by the look of it, but comparing it to Fig.2 there may be some uncertainty in the exact location. Fig.1 implies a position to the *north-west* of Plato G, the 8km diameter crater on the eastern glacis of Plato – near a promontory with hook like appearance to it, projecting from the eastern rim.

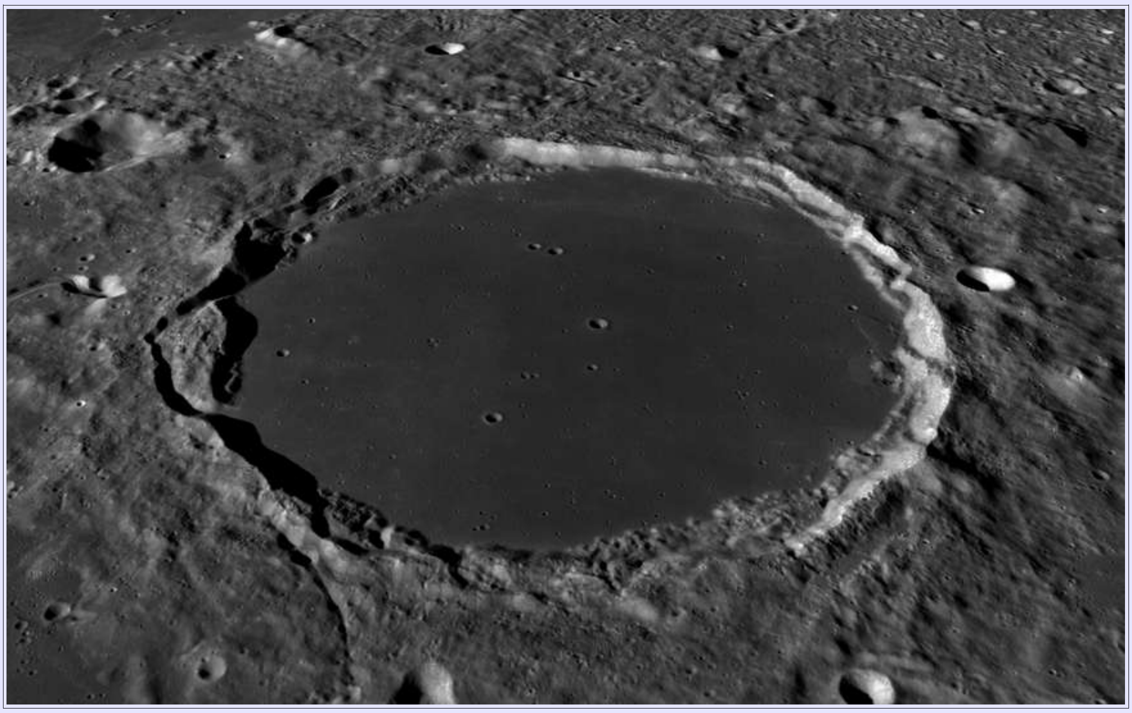

Fig.2 WAC image of Plato showing Plato G just outside the eastern rim and the hook like promontory to its west.

In Fig.2 we can see this hook like promontory to the *west* of Plato G – or is the promontory drawn by Thornton another one some 14kms to the north? In Fig.3 I have attempted to reconcile the drawing with the imagery, so line 'a' (sorry about the different colour) in each image is the inner edge of a collapse terrace which slants up from the mare filled crater floor to the northern rim. Line 'b' is a linear feature – possibly a fault - that skirts the southern rim of Plato G tangentially and intersects the hook promontory already noted. Line 'c' is the outline of this promontory and a rounded section of crater wall, and line 'e' appears to be the shadow cast by a ridge that emerges from the mess of the south-eastern rim of Plato.

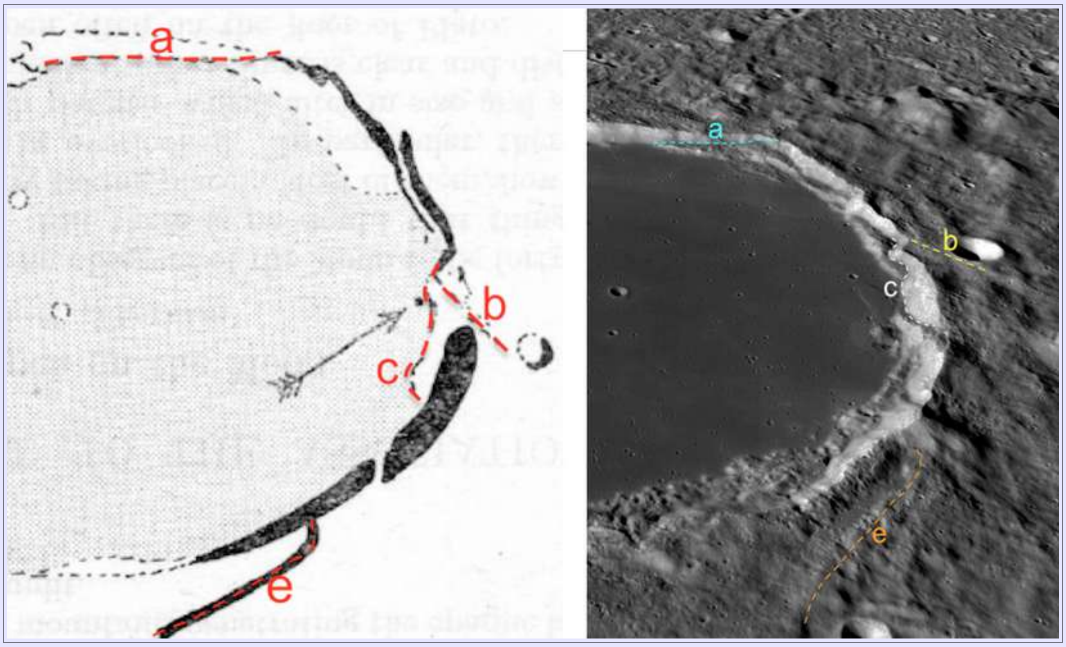

Fig.3 A combination of Fig's 1 and 2 with what appear to be corresponding features marked a,b,c,d and e.

These correspondences seem therefore to point to the location of the flash recorded in Thornton's drawing as being just to the south-west of the hook like promontory. So far, so good, but is there anything resembling a fresh crater in this particular area. Well, as far as cold spots are concerned the answer is 'no' but in terms of brightness as an indication of youth there is a small 60m diameter crater located on the edge of the lower collapse terrace as can be seen in Fig.4.

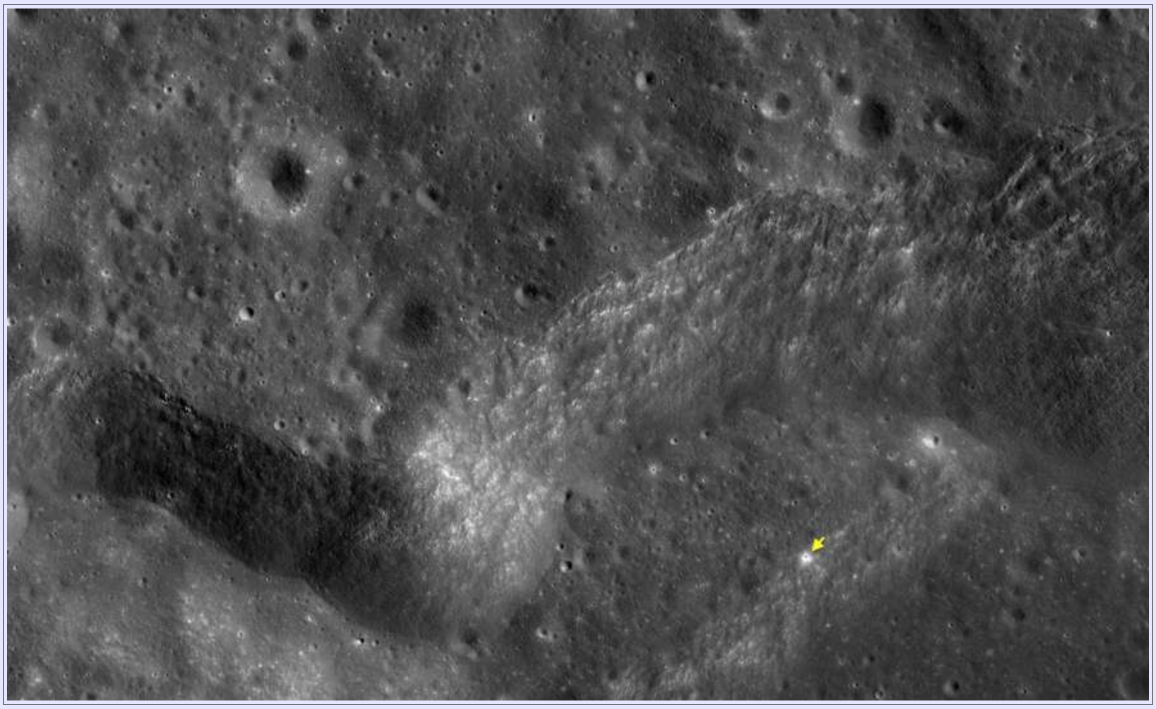

Fig.4 LRO WAC image of the promontory with the hook – which is actually a bulbous wall slump, with the small suspect 1945 crater shown with the yellow arrow. The view if from the west looking east.

Whilst this crater is quite unimpressive and has a limited bright halo, it appears to be the only crater in the vicinity that has this elevated brightness, even when we venture further away from the crater walls and on to the crater floor – see Fig.5.

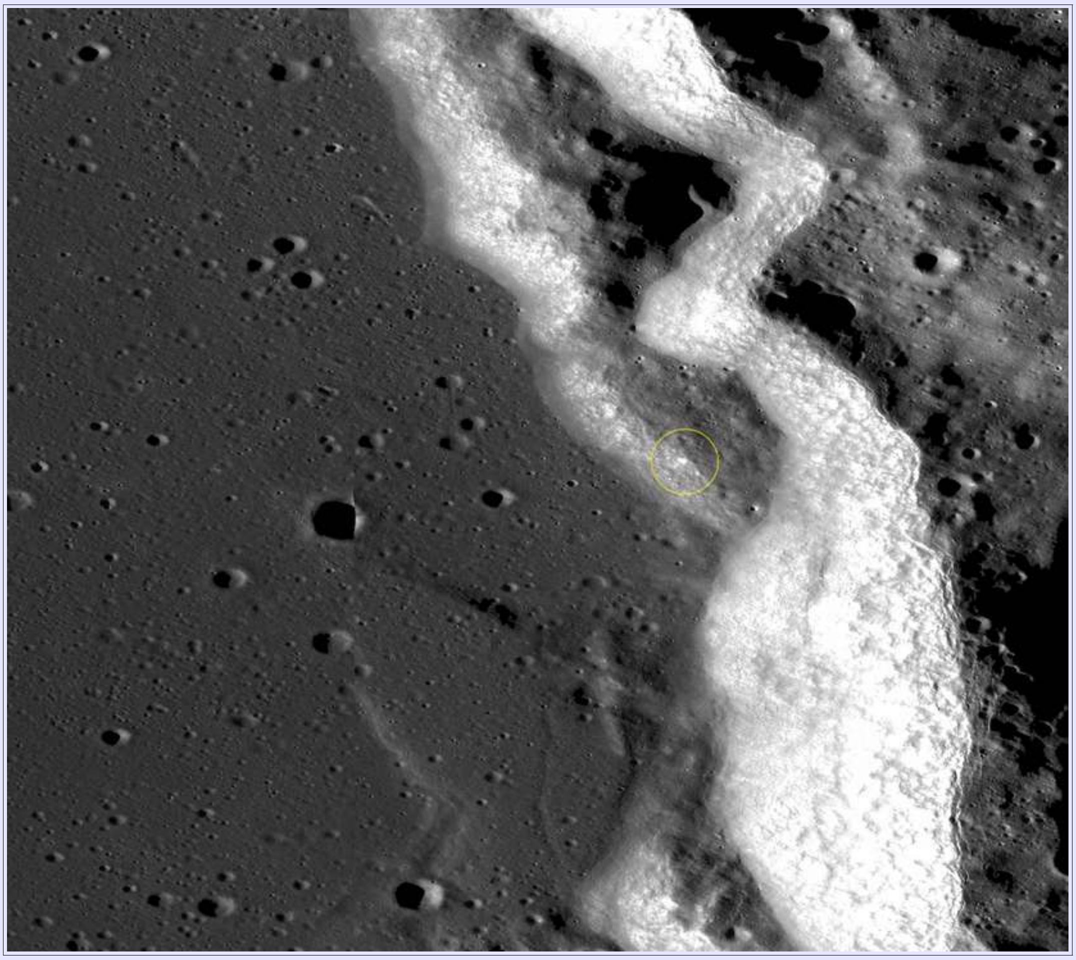

Fig.5 A SELENE image giving a wider panorama of the suspected 1945 flash location – note the absence of any other *obvious* candidates.

But, if this is the 1945 impact site why is it so relatively obscure, and why is there no associated cold spot? Fig.6 shows a small crater – it is a shade over 100m in diameter, so bigger than our 1945 candidate, but the cold spot associated with it is over 2kms in diameter! Craters smaller than this – you can find examples in the 20 -30m diameter range – produce conspicuous cold spots, so it might be logical to ask why one only 80 years old lacks such a feature?

The exact mechanism behind the production of cold spots is still being debated, but appears to involve the modification of the surface regolith to produce a lower density layer, with a lower thermal inertia than the surroundings – the net effect of which is that the modified surfaces radiate their heat more rapidly during the lunar night than adjacent areas – hence the cold spot. This surface modification is thought to extend to a depth of some 10's of cms, so is not of any great depth and seems to be quite ephemeral, with the cold spot effect disappearing within a relatively short span of time – in lunar terms. This short span of time is however considerably longer than the 80 years since Thornton's observation, and so if there had been a cold spot produced, it should still be plainly visible.

A possible answer lies in the position of this crater, which is on the west facing scarp with a slope angle of about 18°. This may not seem much, but a glance at Fig. 7 shows that the surface either side and downslope from the crater appears to have been disrupted with evidence of the surface regolith slumping down-hill, and the odd lobe of dry avalanche materiel being visible.

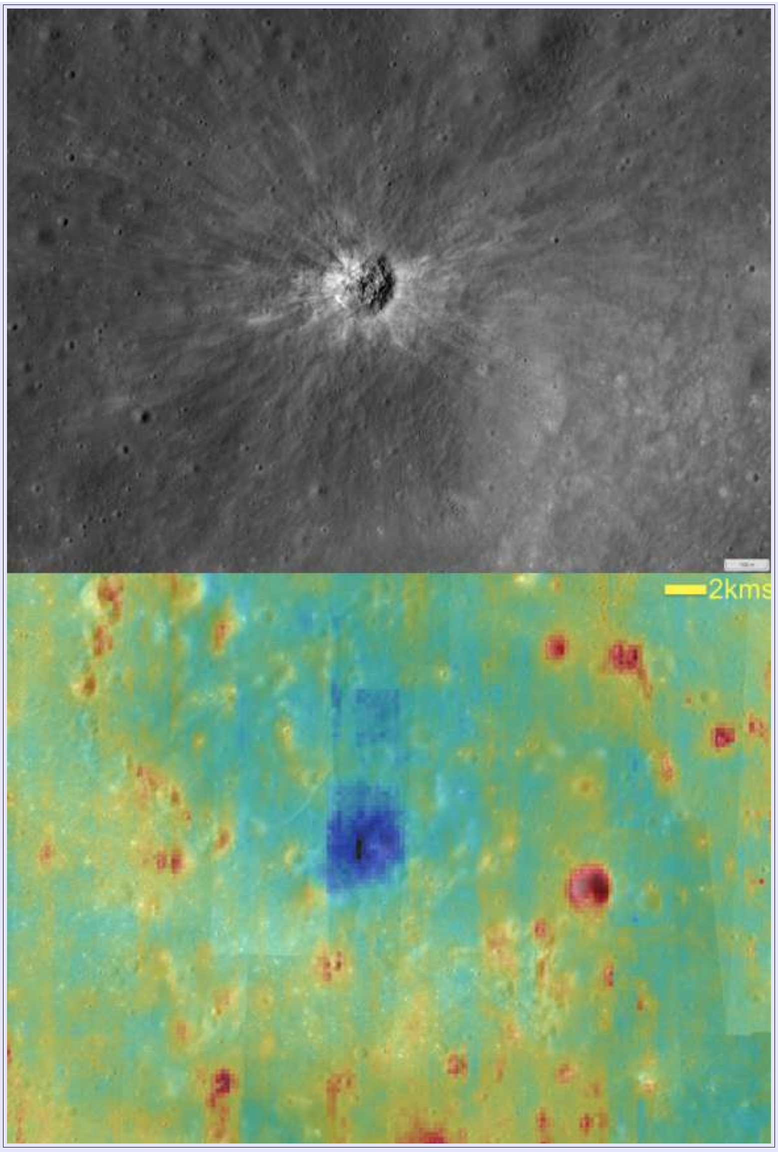

Fig.6 A small ~ 100m diameter crater (top) surrounded by a prominent cold spot which shows up as blue in the DIVINER overlay (bottom) and which is over 2kms across.

There is also plenty of indications of mass wastage (avalanches in old money) along this west facing scarp, with fields of boulders, partially in-filled craters and scars where regolith has slumped downwards nearby – suggesting that the slope is at best fairly unstable. In this case it is possible that any small impact would cause a seismic effect sufficient to de-stabilise the surface, leading to material cascading downslope and effectively inhibiting the subtle surface modifications implicated in cold spot formation.

There are many cold spot craters on sloping surfaces such as the ones shown in Fig.8 – both craters have formed on slopes and are surrounded by a cold spot that extends considerably beyond the bright proximal ejecta visible in the image. However in neither case has the adjacent regolith surface undergone mass wastage or any other form of apparent displacement, and the bright proximal ejecta we see lies directly on the pre-existing regolith surface. This might suggest that in these cases, the lack of surface disruption caused by the impact allowed the process that gives rise to the cold spot to occur, but where the nearby surface *is* disturbed (such as in the 1945 candidate) the physical changes that result in the cold spot are inhibited or erased. Of course, there is always the very real possibility that this crater is not the result of the 1945 event or that the source of the flash was something other than an impact – and I would be more than happy for you to pick some holes in the above argument!

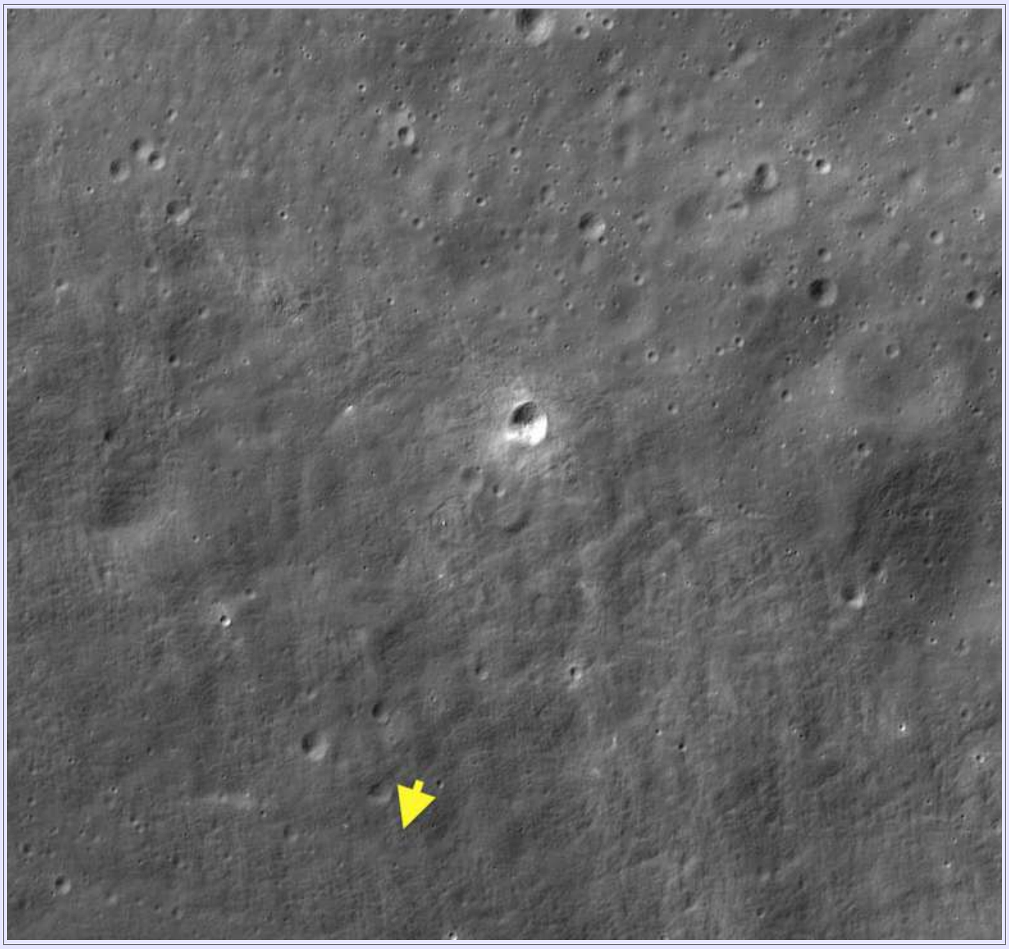

Fig.7 LRO NAC image of the suspected 1945 crater showing its location on an 18° west facing slope – yellow arrow shows the downhill direction. Note the face of this slope has a lot of disturbed regolith including debris lobes (just below the candidate crater) partially infilled craters and bouldery areas (not so obvious at this image scale).

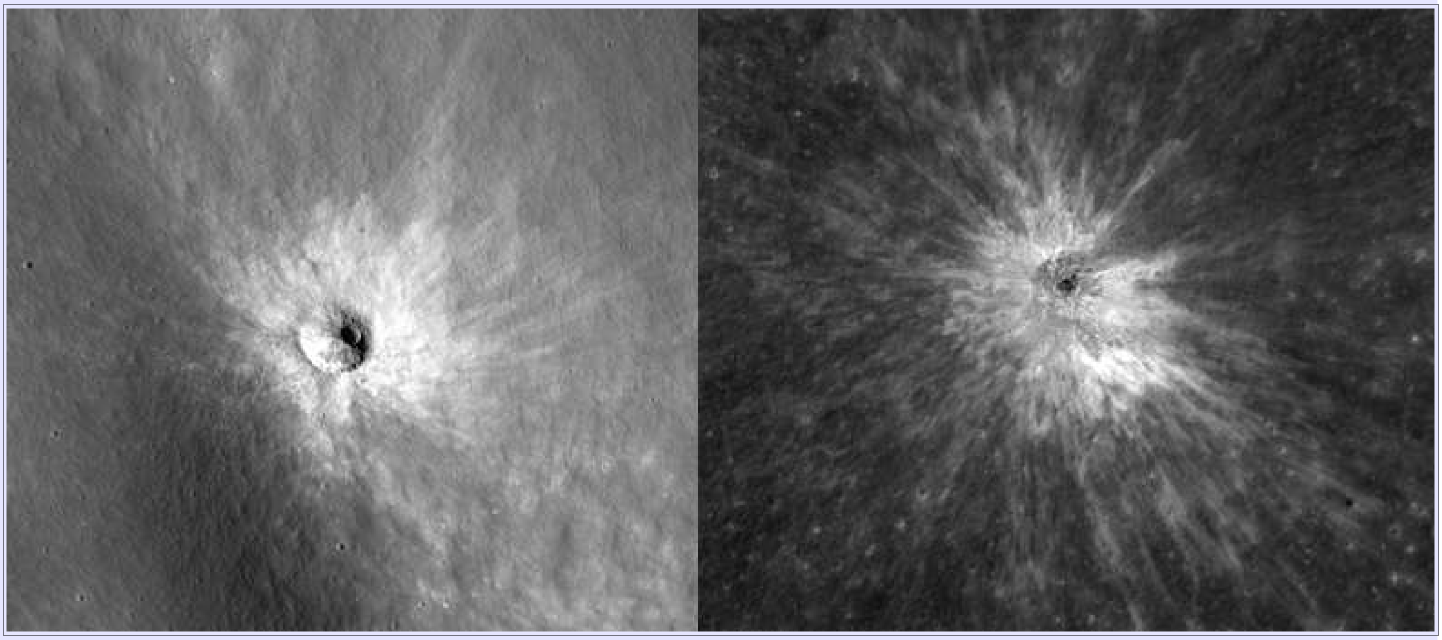

Fig.8 Left – a 200m diameter cold spot crater on the western wall of Alphonsus and Right another 200m crater to the south of Argelander W. Both are on sloping surfaces but show no indication that the regolith surface has been displaced by the impact, with the bright proximal ejecta lying undisturbed on the surface.

*(LSC Vol.61, No. 10, Oct.2024)

LUNAR GEOLOGICAL CHANGE DETECTION PROGRAMME

TLP Reports: No TLP reports were received for June.

Routine reports received for May included: Paul Abel (Leicester, UK - BAA) observed: Rupes Recta. Maurice Collins (ALPO/BAA/RASNZ) imaged: Aristarchus, Bailly, Copernicus, Grimaldi, Hipparchus, Langrenus, Montes Apenninus, Petavius, Pythagoras, Reiner Gamma, Schickard, Triesnecker, and several features. Bob Bowen (Newtown, UK – NAS) imaged: the Moon. Jane Clark (Newport, UK – BAA/CAS/NAS) imaged: several features. Anthony Cook (Newtown, UK – ALPO/BAA) imaged: earthshine in SWIR. James Dawson (Nottingham, UK – BAA) imaged: Parry. Walter Elias (Argentina – AEA) imaged: Aristarchus. Dave Finnigan (Halesowen, UK - BAA) imaged: Fracastorius, Oken and Rheita. Bill Leatherbarrow (Sheffield, UK – BAA) imaged: Alphonsus, Archimedes, Deslandres, Maginus, Ptolemaeus, Thebit. Dave Finnigan (Halesowen, UK – BAA) imaged: Fracastorius, Furnerius, Humboldt, Janssen, Langrenus, Oken, Petavius, Rheita, and Vendelinus. Nigel Longshaw (Oldham, UK – BAA) observed: Posidonius. Chris Longthorn (Rugby, UK - BAA) imaged: Copernicus, Eratosthenes, Fra Mauro and Montes Apenninus. Bob Stuart & granddaughter Sophie (Rhayder, UK – BAA/NAS) imaged: Aristoteles, Asclepi, Atlas, Azophi, Breislak, Catherina, Censorinus, Cyrillus, D'Arrest, Dove, Fabricius, Fracastorius, Grove, Hagecius, Ideler, Isidorus, Jacobi, Janssen, Lacus Dororis, Le Monnier, Linne, Maurolycus, Montes Haemus, Nicolai, Piccolomini, Plinius, Pontanus, Posidonius, Riccius, Ritchey, Rothmann, Rupes Altai, Silberschlag, Taylor, Theon Senior, Theophilus, Whewell, Williams, and several features. Aldo Tonon (Italy – UAI) imaged: Posidonius. Alexander Vandenbohede (Belgium, BAA) imaged: Alphonsus, Deslandres, Janssen, Plato, and Stofler. Randy Trank (Rockord, IL, USA - BAA) imaged the Moon.

Analysis of Reports Received (May):

Posidonius: On 2025 May 02 UT 20:40-21:30 Nigel Longshaw (BAA) sketched this crater under similar illumination and topocentric libration.

Posidonius 1821 Apr 07 UT 18:00? Observed by Gruithuisen (Munich, Germany) "Small bright crater in it was shadowless. Schroter also saw it shadowless several X" NASA catalog weight=4 (good). NASA catalog ID #87. ALPO/BAA weight=3.

Nigel comments that the shadow inside Posidonius A was well seen (Fig 1) and it certainly should be present at this stage in illumination. So, what was seen by Gruithuisen in 1821 is a mystery. This is compounded by the fact that another TLP, seen by Belgian astronomer, Andre on 1963 Oct 22 at 21:00UT? was also missing a shadow in Posidonius A. This was a mere 0.25° difference in selenographic colongitude to the Gruithuisen observation. Now, the only way one can explain making a shadow disappear is either incredibly bad atmospheric seeing conditions, mistaken identification by the observer(s) of what they were looking at, or some process on the Moon such as light emission from the shadowed interior floor, something very bright on the rim illuminating the floor (but wouldn't they have noticed a bright spot?), or considerable light scattering of sunlight from a dense dust cloud above the floor – sufficiently high that it is outside the shadow. For two observers to see the same dramatic effect at similar colongitudes, but 142 years apart is strange. We have covered this TLP before in the 2014 June newsletter.

In terms of features inside the crater that might seem unusual, the only aspect that I have noticed is a light shaded 550m diameter rocky region on the shallow 19° slope southern rim, about 600m inside the rim (See Fig 2). This has a high TiO_2 abundance and a low FeO abundance, it has a cold regolith temperature and has a slight reddish colour. It is almost as if the lighter covering material has been removed/blown away? But it might also just be an impact crater on a slope modified by landslides? However, there are other examples of similar looking, but much smaller rock outcrop areas elsewhere on the inner slopes of this crater, so maybe it's just exposed terracing under the veneer of impact ejecta/melt over the inside of the crater? Anyway, please keep a look out for a lack of Posidonius A's shadow in the repeat illumination predictions in future. We shall leave the ALPO/BAA weight at 3 for now.

Figure 1. A rectified sketch of Posidonius crater made by Nigel Longshaw (BAA) on 2025 May 02 UT 20:40-21:30 with north at the top. Sketched using a Celestron C90 (x110 & x140) under Antoniadi II-III seeing conditions, and transparency very good.

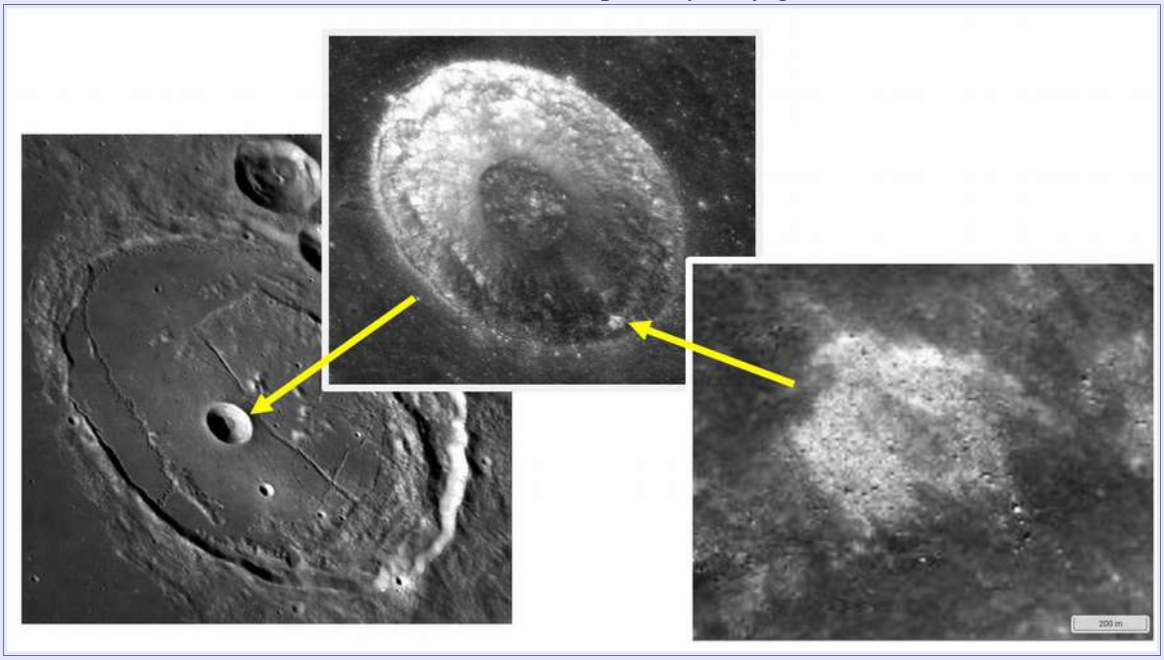

Figure 2. A zoom view into Posidonius A using the NASA Quickmap tool.

Pitiscus: On 2025 May 04 UT 19:59 Bub Stuart and his granddaughter Sophie, imaged the region around Ideler. The image contained the crater Pitiscus at the same illumination of images allegedly of a plume from this crater:

Pitiscus 1981 Sep 05 UT ??:?? but assumed to be AM? which would make it 00:00-03:00UT. Observed by Slayton (Fort Lauderdale, Florida, USA, 8" reflector, ASA 64EK7 f/170, Kodak Kodachrome) photographed a bright glow in the crater that appeared to move. Observer also reported seeing it visually noting that it looked grey with a tinge of red. For further information see p266 of Sky & Telescope (1991, March). Note that Cameron gives the date and UT at 1981 Sep 06 UT 01:00-01:30, or one day later. I will use this date and time from now on. The Cameron 2006 catalog ID=152 and weight=5. The ALPO/BAA weight=3.

Figure 3. Pitiscus with north towards the top. Dates and UTs given in the images.

The Pitiscus glow (Fig 3 – top), photographed by Gary Slayton has been a puzzle ever since 1981. Those of us who have used Barlow lenses for lunar imaging, know the problems with internal reflections, and it does have some resemblance to this optical effect. However, according to the report, Gary Slayton saw it visually too – but we don't know if this was through a SLR camera viewer, or through an eyepiece? We have attempted repeat illumination studies before. Brendan Shaw's view from 2005 is closer in terms of illumination similarity to the 1981 report, but Bob Stuart and Sophie's image has more detail albeit with less shadow. We shall leave the Slayton TLP at a weight of 3 for now, but consider changing the 1981 UT range to match the shadow appearance to the TLP closer.

Alphonsus: On 2025 May 05 UT 20:10 Alexander Vandennohede (BAA) imaged this crater under similar illumination to the following report:

Figure 4. Alphonsus on 2025 May 05 UT 20:10 as imaged by Alexander Vandennohede (BAA) with north towards the top.

On 1990 May 03 at UT 02:03 D. Darling (Sun Praire, WI, USA, seeing steady) observed a point of light inside Alphonsus just *to the north of the central peak, along the "centre ridge". It was seen again, half way between the central peak and the north west rim - along the ridge. All other features were normal. The Cameron 2006 catalog ID=403 and the weight=3. The ALPO/BAA weight=3.*

Clearly from Fig 4 there is no sign of a point of light half way between the central peak and the rim, along the central ridge. We do have a craterlet slightly off to the right, but nothing that would fit David's description. I think we shall leave the ALPO BAA weight at 3 for now as the effect has not repeated despite the same illumination etc. We have examined this before in the 2015 March newsletter.

Alphonsus: On 2025 May 05 UT 21:29 Bill Leatherbarrow (BAA) imaged this crater under identical illumination to the following report from Cambridge, England:

Alphonsus 1968 May 05 UT 20:00 Observed by Farrant (Cambridge, England, 8" reflector, x220, Seeing: Good). "Did not see grey patch SE (ast. ?) of c.p. Noted W. (ast. ?) dark patch was invis. while S. one was seen easily, emerging from shadow. On 7th all seen easily, emerging from shadow. On 7th all 3 clearly vis. with the darkest one the invis. one on 5th." NASA catalog weight=3. NASA catalog ID #1071.ALPO/BAA weight=2.

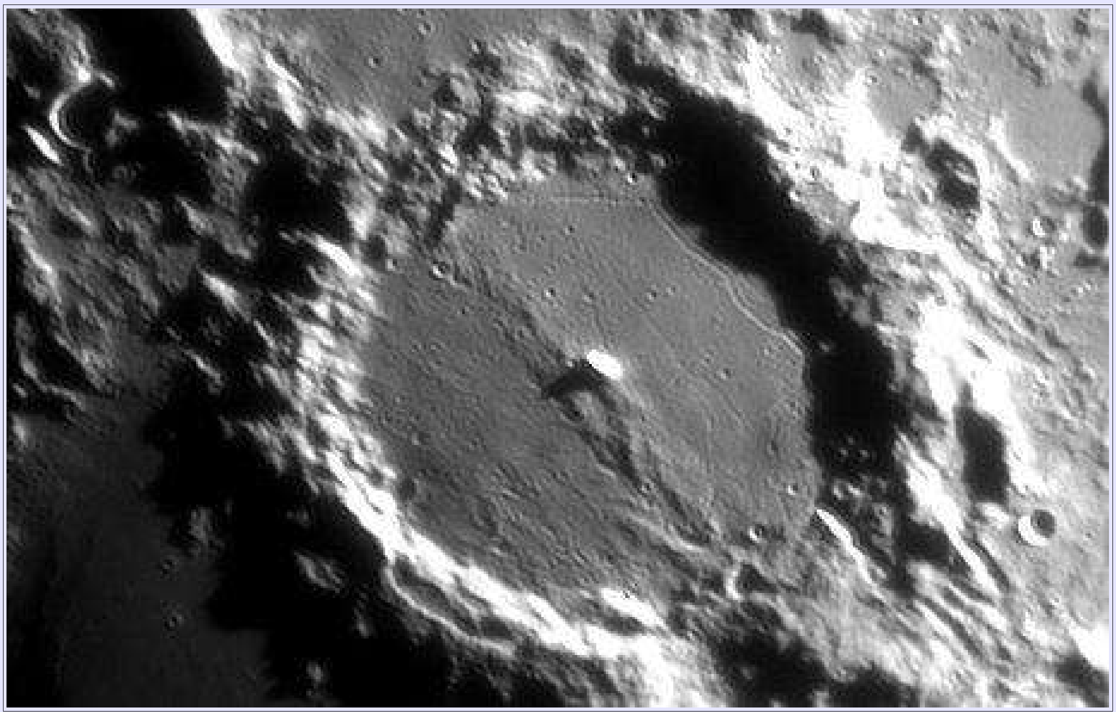

Figure 5. Alphonsus as imaged by Bill Leatherbarrow (BAA) on 2025 May 5 UT 21:29 and orientated with north towards the top. The image had been contrast stretched to bring out detail on the crater floor.

I checked the original report by Malcomb Farrant, published in the June 1968 BAA Lunar Section Circular. As far as I can make out, he was using IAU coordinates, so Winnie Cameron was wrong to assume Astronomical coordinates. So, when he says a grey patch SE of the central peak – I can see a dark patch way to the SE on the floor by the SE floor (Fig 5), but it's quite dark, so maybe some grey areas closer to the central peak are what he was referring to? I quite agree, the dark patch under the west wall is not visible, this this is perfectly normal at this stage in illumination. The "southerly patch by the E wall" I presume he means the SE dark spot – again this is normal, and indeed it is on the edge of the shadow. We have studied this crater before under similar illumination to this report in the 2020Aug newsletter. The only slight oddity of the Farrant report is the grey spot SE of the central peak – but this maybe hinted at in Fig 5. I will therefore lower the weight of this TLP report from 2 to 1.

Clavius: On 2025 May 06 UT Jane Clark (South Wales – UK – BAA/NAS) imaged the whole Moon and in part of the image one can see Clavius crater under similar illumination to the following report:

Clavius 1915 Apr 23 UT 20:00 Observed by Miss Cook (England?) "Narrow straight beam of light from crater A to B" NASA catalog weight=1. NASA catalog ID #352. ALPO/BAA weight=1.

Figure 6. Clavius from a small section of a whole Moon image obtained by Jane Clark (BAA/NAS) on 2025 May 06 UT 22:34 and orientated with north towards the top.

Assuming craters A and B were the same today as they were in 1915, Fig 6 shows no obvious sign of a beam of light (gap in the shadows) between craters A and B, though there is a light streak through the floor of crater A. We shall leave the ALPO/BAA weight at 1 for now.

Posidonius: On 2025 May 07 UT 19:55, 20:02 & 20:03, Aldo Tonon (UAI) imaged this crater under similar illumination to the following report:

On 1997 Dec 09 at UT 18:42-19:02 P. Salimbeni(Cugliate Fabiasco, Italy, 20cm reflector) observed colour on the northern edge of the crater - 23A filter used. This is a UAI reported observation and has come from this organization's web site. The ALPO/BAA weight=3.

The Kodak 23, or rather 23A. filter is red and blocks all colours at wavelengths shorter than 550nm. So whatever Piergiovanni Salimbeni saw, must have been appreciably red or not red, in order for them to claim that colour was detected. For example, if there was a blue colour on the Moon's surface this would appear dark in a red filter, and if something is red on the lunar surface it will appear brighter in the red filter and perhaps a bit less bright without a filter. Note that there is no appreciable natural colour on the north of the crater in the centre of Fig 7. Simulations with atmospheric spectral dispersion also do not create much colours in the north of the crater except more noticeably on the bright edge of Posidonius B. So, I am not sure if that was what Piergiovanni was referring to, or not? We shall lower the ALPO/BAA weight to 2 because there is not enough information in the original report. We have seen two similar repeat illumination reports in the 2020 Dec and 2024 Aug LGC newsletters.

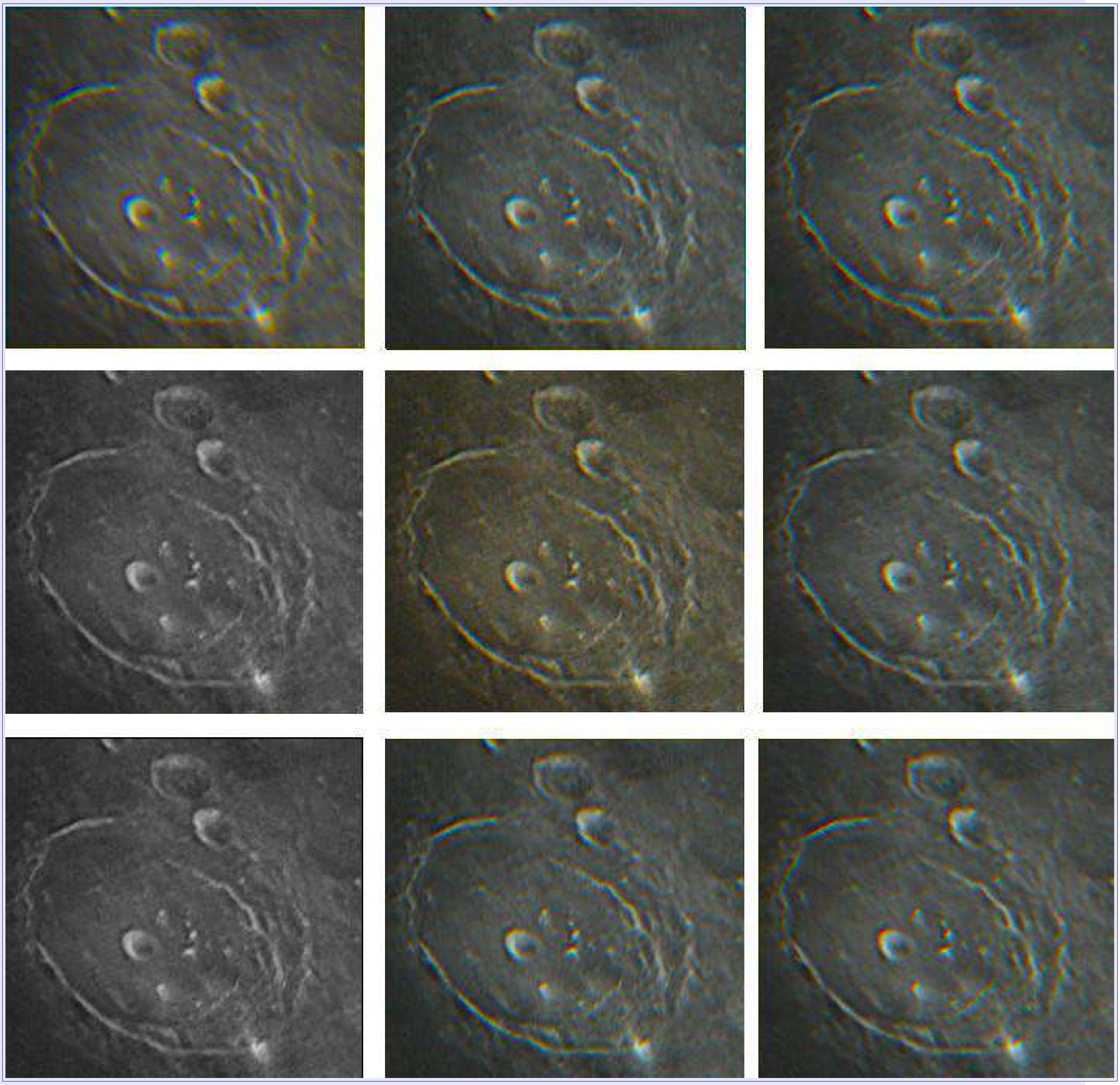

Figure 7. (Centre) Posidonius on 2025 May 07 UT 20:02 as imaged by Aldo Tonon (UAI) with north towards the top and colour saturation enhanced. **Surrounding images** are monochrome versions of this image but offset in the RGB channels, in different directions, to mimic atmospheric spectral dispersion effects.

Copernicus: On 2025 May 06 UT 20:46 and 21:00 Chris Longthorn (BAA) imaged this crater under similar illumination to the following report:

Copernicus 1939 Mar 29 UT 19:00-19:15 Observed by Wilkins (Kent, England, 6" reflector) "C.P. diffuse light spot, faint glow seen as tho in a luminous mist (3h before SR) Some indication of E.terraces, then vanished." NASA catalog weight=4. NASA catalog ID #447. ALPO/BAA weight=3.

As you can see from Fig 8, there is no evidence of a faint illumination of the central peak or inner east terraces taken by Chris Longthorn, during the repeat illumination observing window, though some processing artifacts are present. Just out of curiosity, I came across an image taken later that evening, outside the observing window (Fig 8 – Top Right) and upon contrast stretching, we can perhaps see the inner eastern rim, being illuminated by scattered light off the sunlit western rim, (Fig 8 – Bottom Right), however there is no sign of the central peak area. We shall keep the Wilkins TLP at an ALPO/BAA weight of 3. We have covered this report previously in the 2014 Feb and 2024 Jul newsletters.

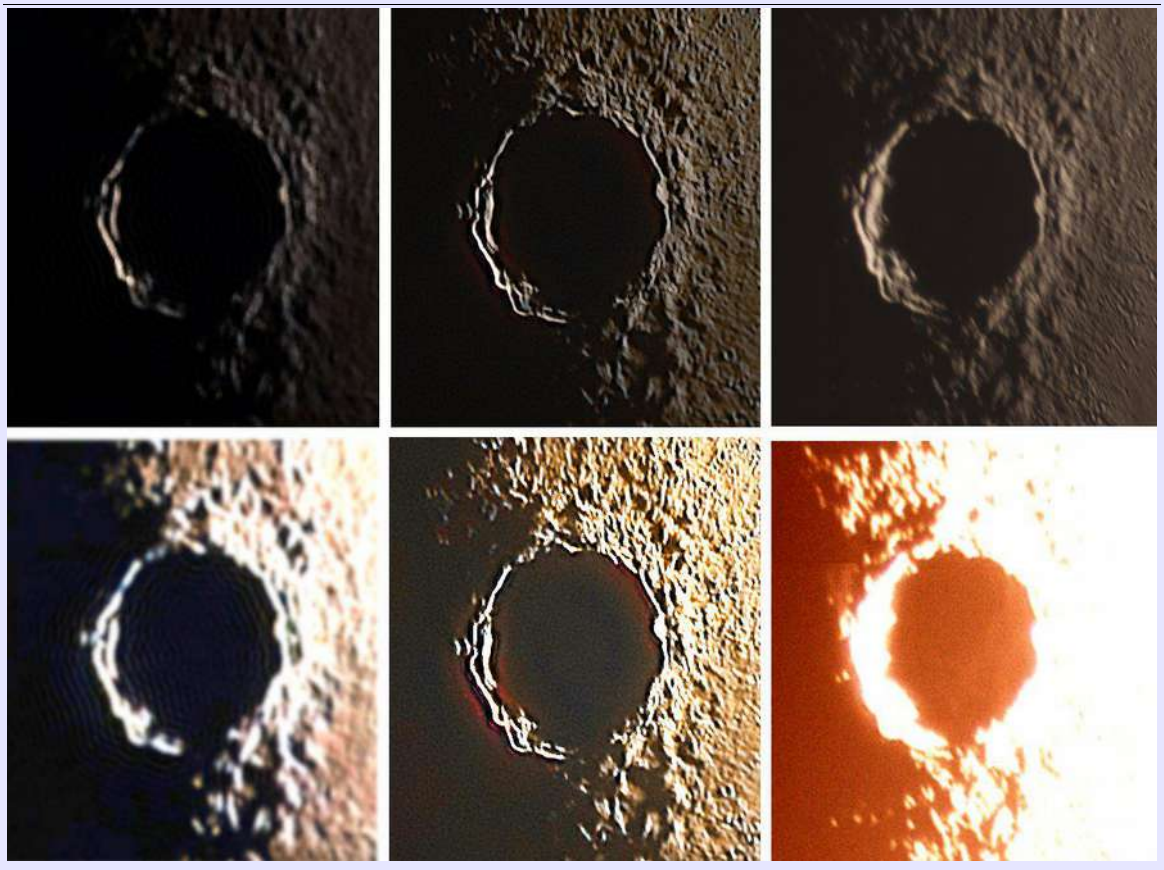

Figure 8. Copernicus as imaged on 2025 May 06 and orientated with north towards the top. **(Top Left)** original image, by Chris Longthorn (BAA) taken at 20:46 UT. **(Top Centre)** Original image, by Chris Longthorn (BAA) taken at 21:00UT. **(Top Right)** Original image taken by James Dawson (BAA) at 22:09-22:10UT. **(Bottom Left)** A contrast stretched version of the 20:46 image. **(Bottom Centre)** A contrast stretched version of the 21:00 image. **(Bottom Right)** A highly contrast stretched version of the 22:09-21:10 image.

Aristarchus: On 2025 May 11 UT 22:36 Walter Elias (AEA) imaged this crater under similar illumination to the following report:

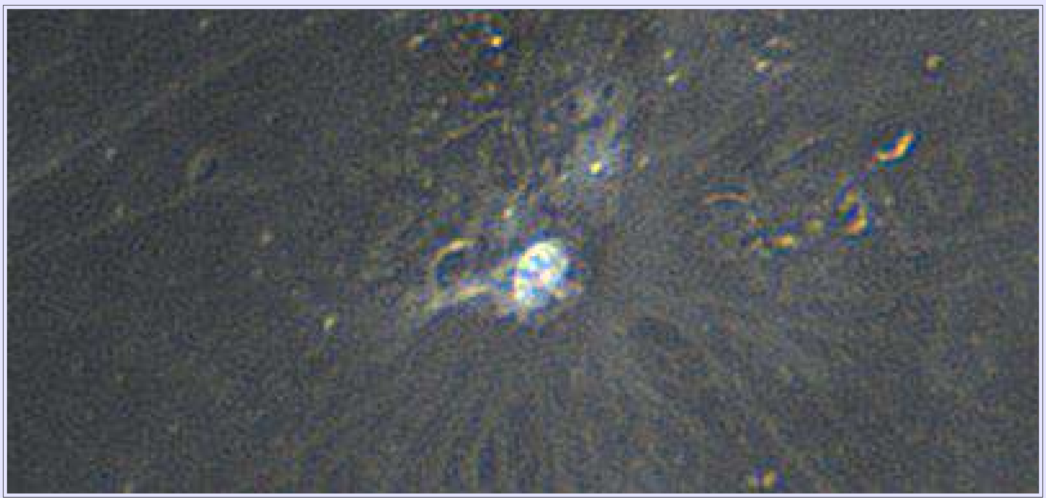

Figure 9. Aristarchus taken by Walter Elias (AEA) on 2025 May 11 UT 22:36 and orientated with north towards the top.

Aristarchus 1966 Aug 01 UT 00:50-01:20 Observers: Moore, Moseley, Corvan (N.Ireland, 10" refractor) - "Eng. moon blink detected colour (red?) on SW wall. Tel. link got other vis. confirm, & also another moon blink. "NASA catalog ID=#960, weight=5. ALPO/BAA weight=4.

Fig 9 shows no sign of colour on the SW wall although the crater is slightly saturated in the image. We shall leave the weight at 4 because there was apparently independent confirmation of the colour seen back in 1966, according to Cameron.

Aristarchus: On 2025 May 14 UT 08:11 Maurice Collin imaged the crater under similar illumination to the following report:

On 1975 Dec 19 at UT22:45 P.W. Foley (Kent, UK) suspected an anomaly in Aristarchus. Cameron 1978 catalog weight=1424 and weight=1. ALPO/BAA weight=1.

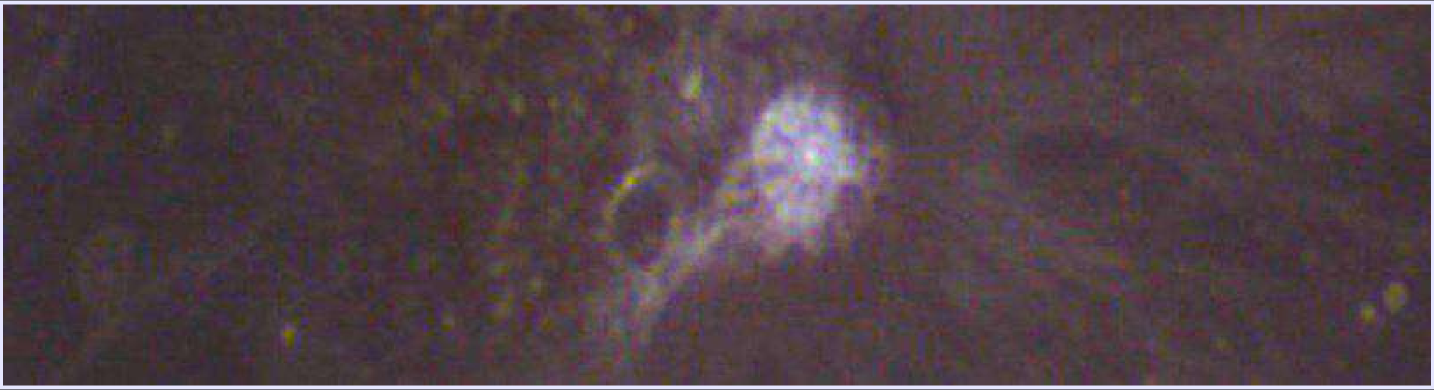

Figure 10. Colour image of Aristarchus, taken my Maurice Collins on 2025 May 14 UT 08:11, with north at the top and colour saturation enhanced.

I am not sure what Peter Foley was referring to as an “anomaly”, but Fig 10 shows what the crater would normally look like at this stage of illumination. Also, I cannot find anything in the archives, only the reference in the Cameron 1978 catalog and a mention of “anomaly” in the BAA Lunar Section circular – but no follow up description? Interestingly, I cannot find anything in Cameron’s card index that we had digitized either, but it’s not the only observation missing from 1975. We shall keep this at an ALPO/BAA weight of 1 for now. We have covered this TLP before in the 2018 Oct newsletter.

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 .

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