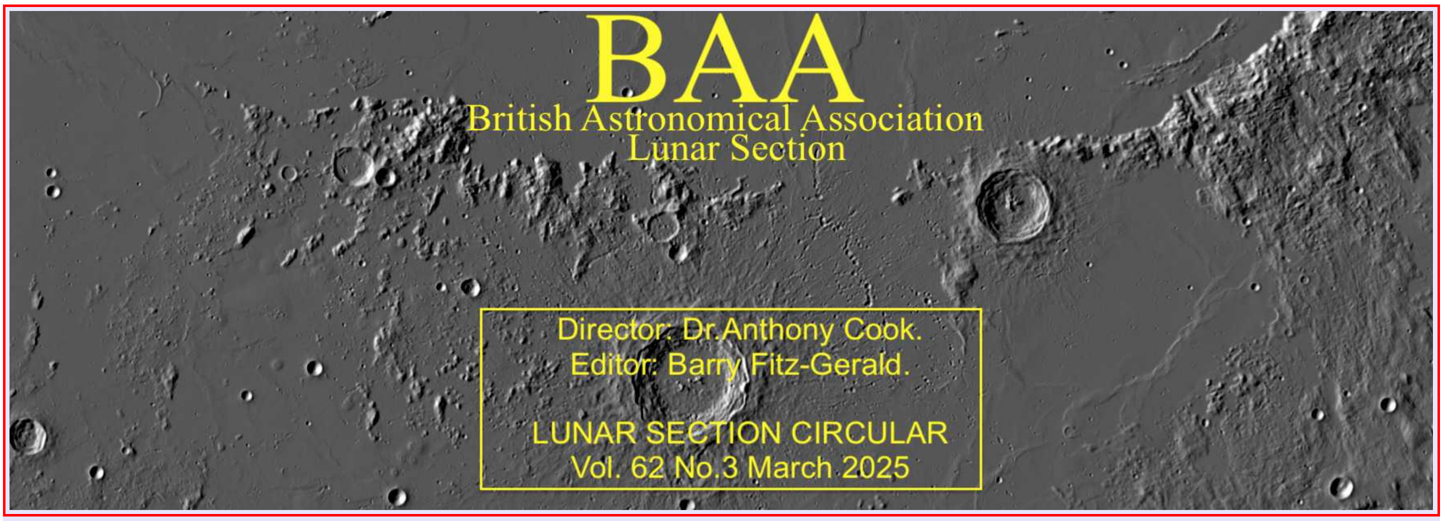


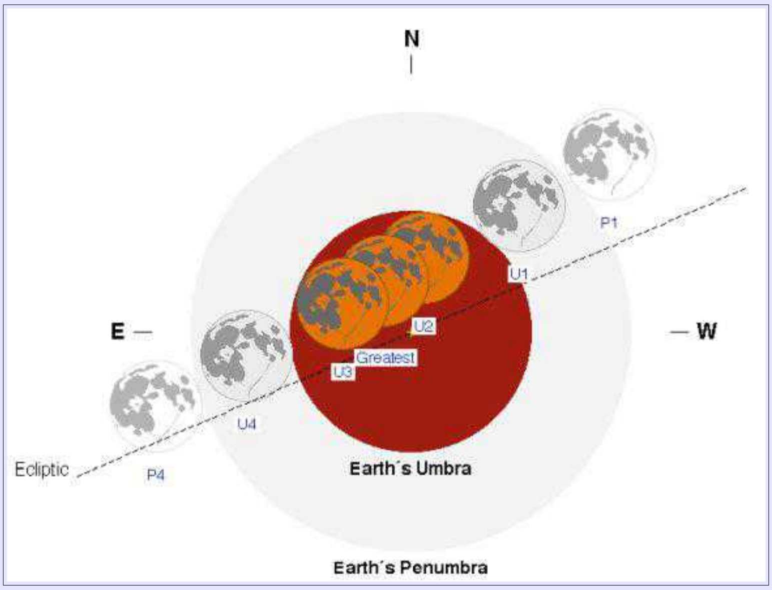
BAA
British Astronomical Association
Lunar Section

Director: Dr.Anthony Cook.
Editor: Barry Fitz-Gerald.

LUNAR SECTION CIRCULAR
Vol. 62 No.3 March 2025

FROM THE DIRECTOR

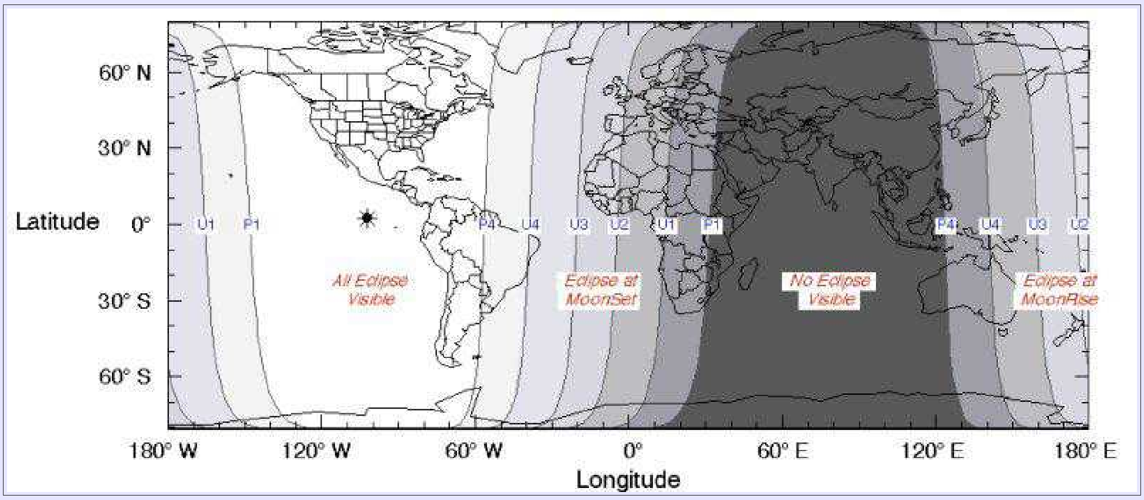
Announcement: In this circular we welcome Barry Fitz-Gerald as our official Assistant Director. Also, James Dawson, who has offered to keep the Lunar Section website in order and up-to-date.



Schematic of the timings of the Total Lunar Eclipse on the morning of 2025 Mar 14 (from: https://eclipse.gsfc.nasa.gov/eclipse.html)

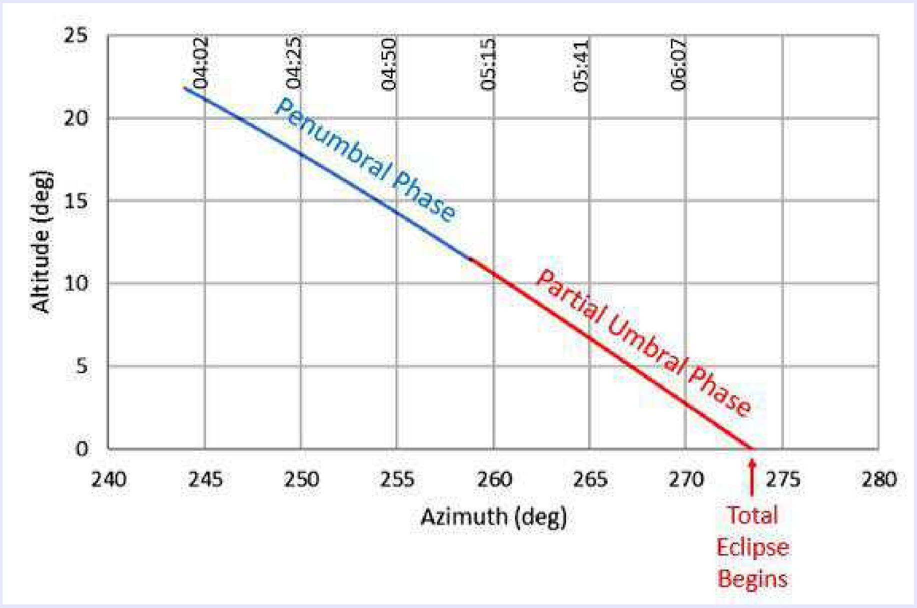
The March Eclipse: Total Lunar Eclipse visibility from the UK has been rare in the last few years, not helped much by the weather. Fortunately, we may have an opportunity to see one on 2025 March 14th, albeit it is very early in the morning and rather low down. The Americas will have a better chance to see the whole eclipse as you can see from the map below.

Lunar Eclipse stages are given letters and numbers: The Penumbral contact (P1) starts at 03:57UT and you might notice a very faint, slightly yellow, tint the Moon. Then the dark umbral shadow encroaches (U1) the Moon at 05:09UT and will be plainly visible spreading across the Moon from the SW to NE of the disk. The total eclipse begins (U2) at 06:26UT but only those in the west, south west, and north west will see it from the UK, as the Moon will be setting. The middle of the eclipse is at 06:59UT. Then the Moon begins to leave the umbra (U3) at 07:31UT, with the last remaining umbral shadow (U4) at 08:48UT. Then finally the Moon exits the faint penumbral shadow (P4) at 10:01UT.



World Wide visibility of the Total Lunar Eclipse of 2025 Mar 14 (from: https://eclipse.gsfc.nasa.gov/eclipse.html)

Planning for different scenarios for lunar eclipses pays off, especially for early morning ones as many astronomers are both tired and not thinking straight at these times. Perhaps the most important thing to be aware of and not get caught out by is the altitude and azimuth of the Moon as there is no point in getting up at 4-5AM to open up the observatory, if you are going to find the Moon behind a neighbour's house or tree. I use JPL’s Horizon web page (https://ssd.jpl.nasa.gov/horizons/app.html#/) to pull off the altitude and azimuth of the Moon and use this to produce a plot in Excel. Once you have this you can go out into the garden (armed with a compass), to scout around to ascertain the best viewing points. Portable telescopes, or a camera with a telephoto on a tripod, are a good backup plan. Below is a plot of the altitude and azimuth of the Moon as seen from Birmingham. This plot is only a guide as it will vary depending upon where you are in the UK - but generally the further east you are the less you will see of the umbral stage.



An altitude/azimuth plot of the Moon as seen from Birmingham UK with UTs for the 5 deg azimuth lines at the top of the graph. An azimuth of 270˚ is due West.

For those who just wish to judge the darkness of the shadow, visually, there is the famous Danjon scale, which goes: “4” a very bright orangey or perhaps copper-red shadow, “3” a brick red colour, “2” a dark rusty colour or deep red, “1” a dark brown or dark grey shadow, and “0” shadow dark enough to be almost invisible. But in all honesty UK observers may have some difficulty in doing this due to the fact that near totality there will be interference from twilight and the Moon’s low altitude may make it red anyway, like the setting Sun. Those in the Americas should be able to make more reliable estimates of the darkness of the eclipse.

Other observers concentrate on doing time lapse video of the shadow – though this can be challenging due to the extreme dynamic range of brightness from Full Moon to umbral shadow. 12- or 16-bit cameras can help here, otherwise cycle through 2 or 3 different exposures to capture detail inside and outside the shadow. Occultation observers may try to video occultations – but this could be difficult with increasing twilight from the UK. If it's clear then I will probably video the shadow for lunar impact flashes. Also as I have a thermal IR camera, I may give this a go to see if I can detect heat from rocky regions around ray craters such as Tycho.

It is good to have a plan B ready, for example what if it is intermittent cloud with rain mixed in. Possibly keep a portable telescope, or a camera with telephoto lens and tripod, ready, to take outside, or to use from a top floor open window, when it isn't raining. Also consider what to do if it is misty – experiment with longer exposures perhaps? For UK observers it's definitely worth going to bed early and pick a good time for your alarm clock so that you can get up and sort the observing equipment out in plenty of time for the eclipse. If it is totally cloudy then one could set an alarm clock, go back to sleep and wake up every 30 minutes to see if there are any gaps emerging between clouds. It goes without saying that after the eclipse, if you can't go back to sleep, then be prepared to be a bit jet lagged for the rest of the day! Anyway, I wish you all luck. Please send in any observations that you make, and remember an even more favourable evening eclipse will occur on 7th September 2025.

Tony

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Lunar Occultations March 2025 by Tim Haymes

Time capsule: 50 year ago: in Vol 10 No.3 (Mar 1975)
[With thanks to *Stuart Morris* for the LSC archives.]

*Graze teams from Reading AS and Maidenhead AS aim for ZC 755 on March 19.
*N James (Weston-super-Mare) plans to observe this graze.
*T Haymes: A Review of Graze Timing Methods.

Notes from the writer:
The ZC 755 graze was not observed and I have no notes in my journals. The Occult database has no recorded either on this date. I expect it was clouded-out.

Graze of 20 Tau on Apr 01, 2140UT. Northern Limit. Mean limb (red line)

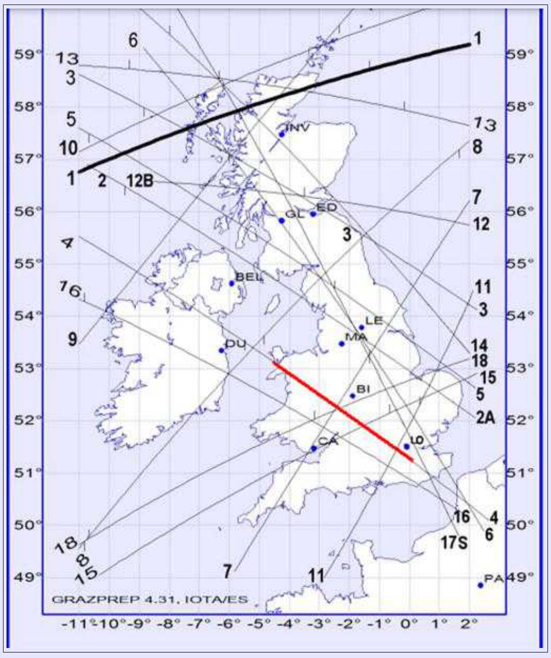

Image credit: the BAA Handbook 2025

The review of timing methods: I do recall writing this now, but it's not included with the scanned Circular in the LSC archive.   Basically these were alternatives to the use of a public telephone box (dial TIM). Two years later a build a 60 KHz MSF long-wave receiver.

The Pleiades are occulted on evening of April 1st
Included in this March edition of the LSC are predictions for the cluster and one graze.

Limb profile for the Graze of 20 Tau

An observer situated between the two green lines will see the most graze phenomena i.e between 2 and 4 km inside the mean limb drawn by the kmz file on Google Earth. (The kmz is in the zip archive).
There are location at 5 km and 10km south of the mean limb line where graze contacts may be seen at 1.7 and 2.5 min after mid graze time (See the mid graze times included in the zip archive.)

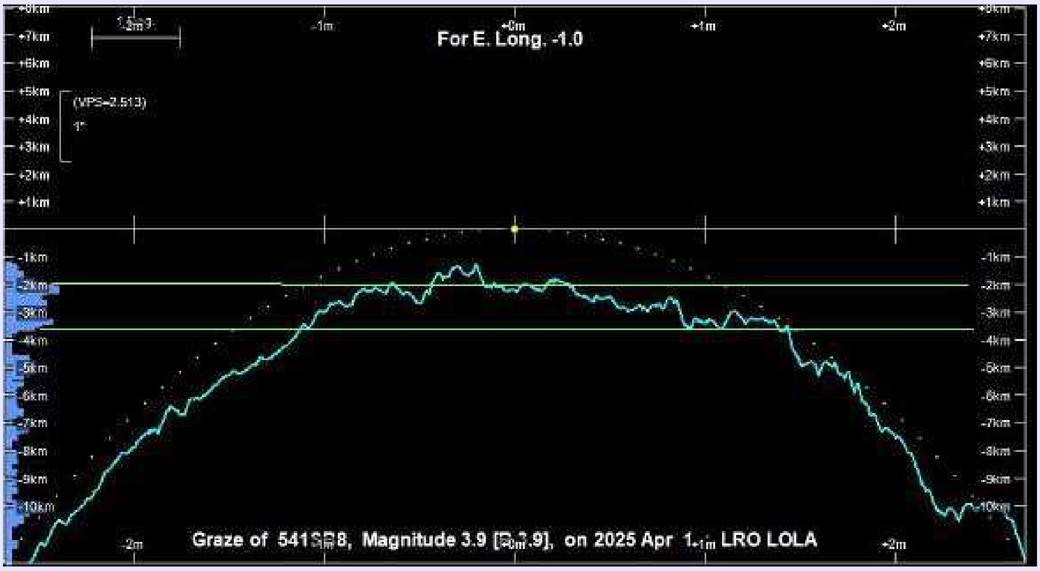

Image credit: Occult4 software

Observing a graze.

These can be spectacular events. Enjoy the view in a telescope with friends or make a video recording.
A live display on a big screen would have outreach potential.

Download the file for observation planning here: http://www.stargazer.me.uk/grazes/20-Tau-graze.zip

20 Tau is a close double star.

There is a companion Aa-Ab with magnitude 4.4 and 5.4 which could be resolved during the graze. This could appear as a fade or step event. These are most interesting aspects of an observation and will be unique to an observer's position. Observers separated by say 30m would make an interesting report.

Occultation predictions for 2025 March (Times at other locations will +/- a few minutes)
Oxford: E. Longitude -001 18 47, Latitude 51 55 40

Filter: Moon above 8 deg alt. Mag. brighter than r8.5, Sun Alt below -5

```
day       Time     Ph   Star  Sp  Mag  Mag    % Elon Sun  Moon   CA
yy mmm  d  h  m   s       No  D*    v    r   ill      Alt Alt Az   o   Notes
25 Mar  1 18 59 28.9 D      32 M5  7.0  6.1    4+  23      8 262  31S
25 Mar  2 20  2 32.4 D  109718PG0  7.2  6.9   10+  38     12 270  29N
25 Mar  3 20 44 11.6 D     313cK0  7.1  6.2   19+  52     19 272  57S
25 Mar  3 21  7 56.8 D   92802     8.9  8.3   19+  52     16 277  32N
25 Mar  4 19 40 57.7 D   75706 M0  8.4  7.4   29+  65     41 252  88S
25 Mar  4 20 33  3.2 D   75715cK0  7.3  6.7   29+  65     33 263  45N
25 Mar  4 22 55 52.6 D   75764SF0  7.6        30+  67     12 290  64N
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```
25 Mar  4 23 24 43.4 D     461cK0  7.2  6.7   30+  67       8 295  25N
25 Mar  5 19 53 12.1 D   76413 A2  8.7  8.5   40+  78      50 244  75N
25 Mar  5 20 19 25.3 D   76422 M0  8.6  7.7   40+  79      47 251  71N
25 Mar  5 20 40 50.1 D   76433 G0  8.9  8.5   40+  79      43 256  69N
25 Mar  6 19 28 29.4 D     756 F0  6.6  6.5   51+  91      62 218  84N
25 Mar  6 22 11 24.2 D     773wF8  7.0  6.7   52+  92      40 264  56S
25 Mar  7 20 59 45.0 D   78047 F5  8.5  8.3   63+ 105      59 231  58N
25 Mar  8  0  1 12.9 D     952 K2  8.0  7.2   64+ 106      33 274  47S
25 Mar  8  0 45  7.8 D   78191 A0  7.7  7.7   64+ 106      27 282  82N
25 Mar  8  1  6 50.1 D   78206 K0  8.0  7.4   64+ 107      24 286  63N
25 Mar  8 21 39  5.6 D    1088 A4  5.8  5.7   73+ 117      60 222  55S 47 Gem
25 Mar  9  0 23 59.5 D    1105cG7  6.5        74+ 119      38 266  78N
25 Mar  9  0 50 44.6 D   79243 K1  7.3  6.7   74+ 119      33 271  30S
25 Mar  9  1  6  0.8 D   79253cK1  7.6  7.1   74+ 119      31 274  35S
25 Mar  9  2 31 10.7 D   79316 G2  7.5  7.1   75+ 120      19 289  55S
25 Mar  9 18 52 23.0 D   79910 M0  8.0  7.2   81+ 129  -9 53 126  64S
25 Mar  9 19 40 36.8 D   79916 G5  8.4  8.1   81+ 129      59 143  18S
25 Mar 10 22 37 12.6 D   80605kF5  7.8  7.6   89+ 142      57 199  76S
25 Mar 12  0 57 59.5 D    1459 G5  7.4  6.9   95+ 155      44 228  89N
25 Mar 14  5 35 55.8 D  118918kA0  8.0  8.0   68E 179  -8  7 264  95U
25 Mar 14  5 46 35.2 D    1676 K5  6.5  5.7   50E 179  -6  6 267  99U
25 Mar 15  3 37 17.4 R    1753 K0  6.7  6.2   99- 170      24 228  71N
25 Mar 16  0 19 37.7 R    1843KF5  7.0  6.8   97- 160      29 162  62N
25 Mar 17  1  4 15.0 R    1949pA0  5.9        93- 149      24 165  41N
25 Mar 17  1 19 11.7 R  158014kA3  7.7  7.5   93- 149      24 169  76N
25 Mar 18  1 28 14.9 R  158495SA3  7.3  7.1   87- 138      18 161  58S
25 Mar 20  2 28 14.4 R    2287SB1  2.9  3.0   72- 116       9 156  58N pi Sco
25 Mar 31 20 37 12.5 D   93072cK5  8.2  7.7    8+  33      11 287  81N
```

Preview of Pleiades Occultation on Apr 01

```
day       Time     Ph   Star  Sp  Mag  Mag    % Elon Sun  Moon   CA
yy mmm  d  h  m   s       No  D*    v    r   ill      Alt Alt Az   o   Notes
25 Apr  1 20 49 52.6 D     537SB6  3.7  3.8s  16+  47      22 282  85N
   R537 = Electra = 17 Tauri
25 Apr  1 21  1  4.8 D   76145pA3  8.1  8.0   16+  47      20 284  74S
25 Apr  1 21  3 43.8 D     536pB7  5.5  5.5   16+  47      20 285  39N
   R536 = Celaeno = 16 Tauri
25 Apr  1 21  5 31.2 d   76136kA0  8.5  8.3   16+  47      20 285  52N
25 Apr  1 21 10 59.4 D   76158pA0  7.9  7.8s  16+  47      19 286  72S
25 Apr  1 21 22 47.1 D   76167SK2  7.6  7.0S  16+  48      17 288  78N
25 Apr  1 21 23 13.8 D   76169pA3  8.1  7.9   16+  48      17 288  80N
25 Apr  1 21 24 21.6 D     545SB6  4.1  4.2v  16+  48      17 288  48S
   R545 = Merope = 23 Tauri
25 Apr  1 21 26  3.1 D   76152pB9  7.2  7.1S  16+  48      17 289  32N
25 Apr  1 21 31  1.0 D     546pA0  7.3  7.3   16+  48      16 289  67N
25 Apr  1 21 40 16.4 d   76185 A2  8.4  8.3v  16+  48      14 291  53S
25 Apr  1 21 41 41   M     541SB8  3.9  3.9s  16+  48      14 291   8N
   R541 = Maia = 20 Tauri
25 Apr  1 21 43 15.6 d   76188pG0  8.7  8.4   16+  48      14 291  80S
25 Apr  1 21 44 25.7 D   76191PA7  8.2  8.1v  16+  48      14 291  82S
25 Apr  1 21 44 49.8 D     549SA0  6.3  6.3   16+  48      14 291  77S
   R549 = 24 Tauri
25 Apr  1 21 47 44.7 D     552SB7  2.9  2.9s  16+  48      14 292  74S
   R552 = Alcyone = eta Tauri
25 Apr  1 21 53 57.5 D     553pA0  6.8  6.8e  16+  48      13 293  67N
25 Apr  1 21 54 27.8 D     551SB9  7.3  7.3   16+  48      12 293  27S
25 Apr  1 22 10 23.9 D   76210pA3  8.2  8.1   17+  48      11 296  66N
25 Apr  1 22 12  1.5 d   76218cF8  9.0  8.7   17+  48      10 296  82S
25 Apr  1 22 17 44.3 D     557pA1  7.0  6.9   17+  48      10 297  61N
25 Apr  1 22 24 57.8 D     561SB7  5.1  5.1V  17+  48       9 299  68S
   R561 = Pleione = 28 BU Tauri
25 Apr  1 22 26 29.5 D     560SB8  3.6  3.7s  17+  48       8 299  50S
   R560 = Atlas = 27 Tauri
25 Apr  1 22 31  3.3 D   76237 A0  8.0  7.9S  17+  48       8 300  90S
25 Apr  1 22 36 34.7 D   76234pA0  7.5  7.5   17+  48       7 301  54N
25 Apr  1 22 36 40.3 D     562pB9  6.6  6.6   17+  48       7 301  59N
25 Apr  1 22 45 16.4 D   76249SA0  7.5  7.5s  17+  48       6 302  72N
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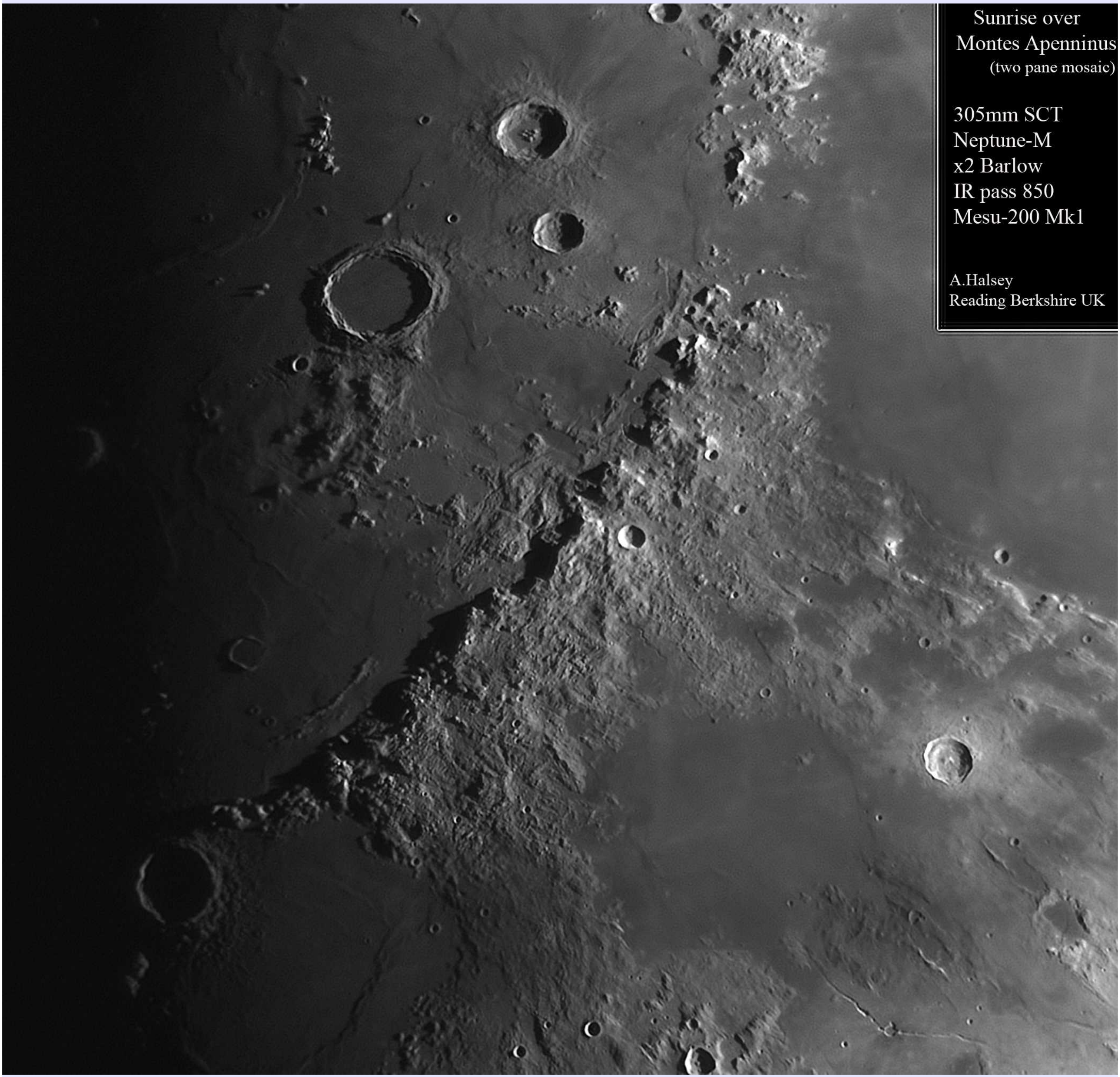
Montes Apenninus.



A two pane mosaic image from the BAA Gallery, and taken by Alun Halsey on 7th January 2025 at 22:06hrs using a Meade 12" SCT (LX200 GPS de-forked), Player One Neptune-M (IMX178), x2 Barlow, IR Pass 850 and Mesu-200 Mk1.

Clavius.

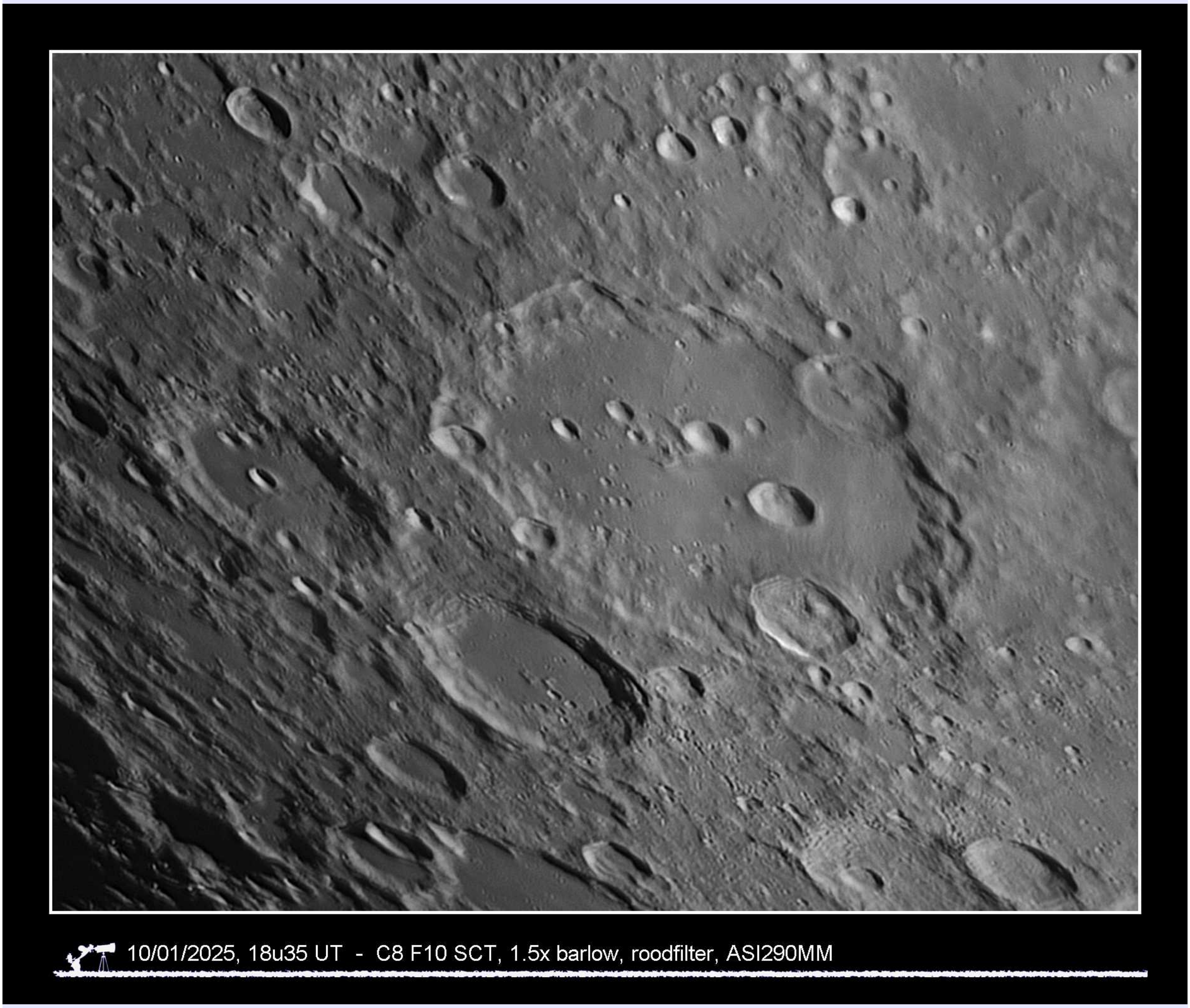


Image by Alexander Vandenbohede with details as shown.

Hyginus Rille

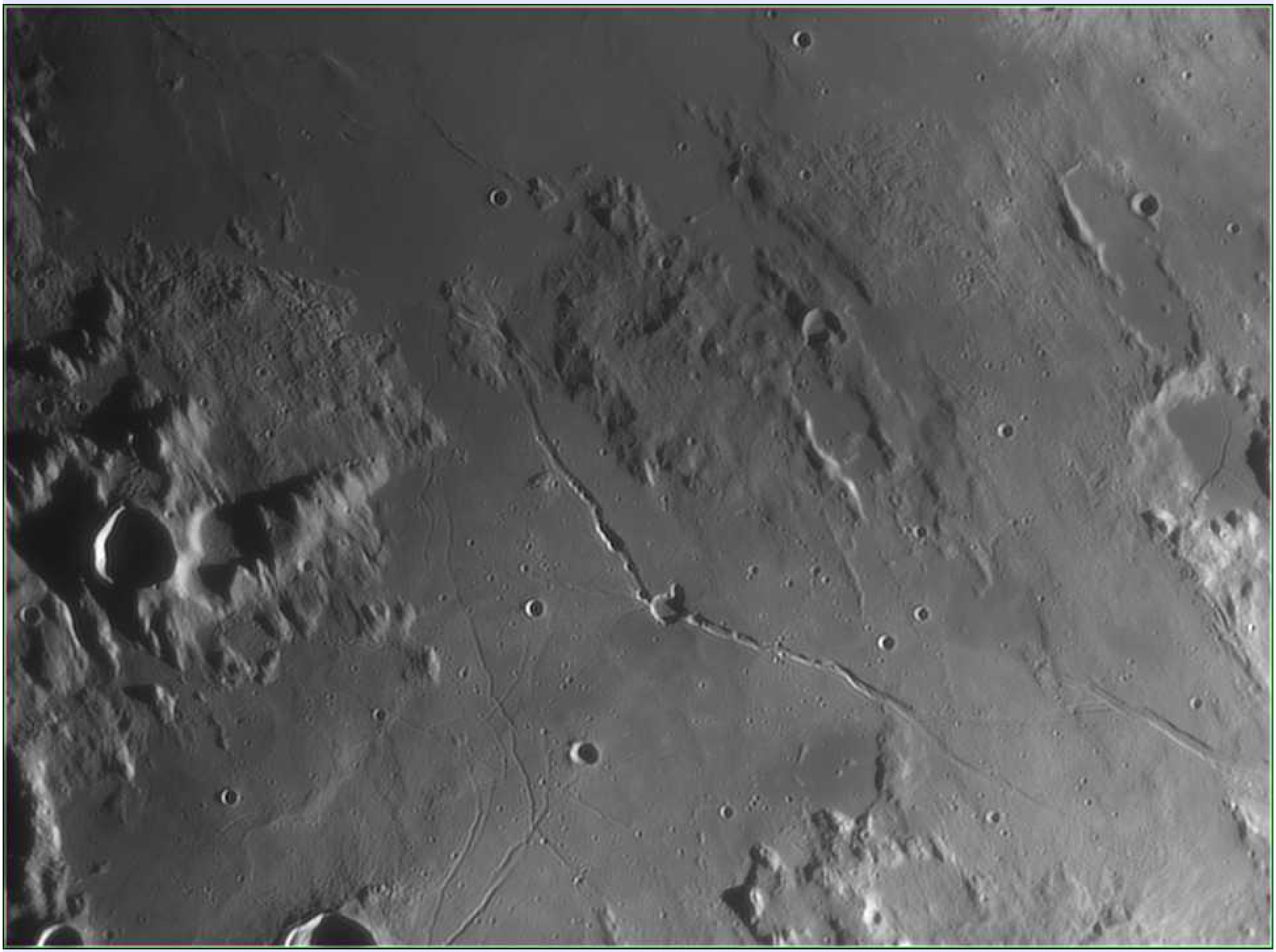
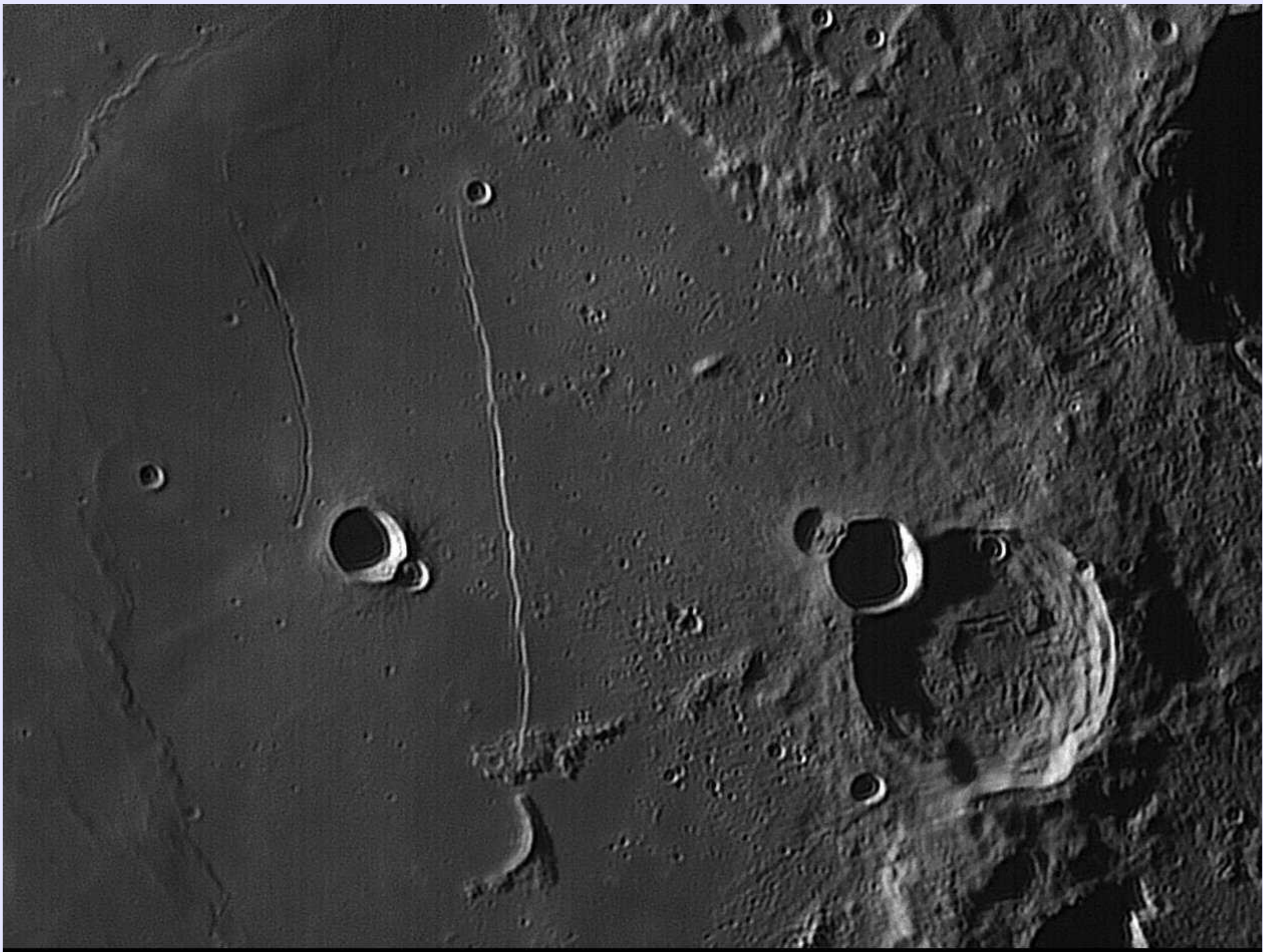


Image by Bill Leatherbarrow taken on 5th February 2025 at 1857hrs.

Purbach, Regiomontanus, Walter and Deslandres.

Image by Chris Longthorn taken with a 200mm RC Cassegrain at 18:08hrs on 7th January 2025.

Rupes Recta.



Rupes Recta, Thebit, Birt, Rima Birt 2024.07.28 04:20 UT, S Col. 176.5°, seeing 6/10, transparency fair. Libration: latitude -02º24', longitude +04º06'
305mm Meade LX200 ACF, f 25, ZWO ASI 120MMS camera, Baader IR pass filter: 685nm.
800 frames processed in Registax 6 and Paintshop Pro 8.
Dave Finnigan, Halesowen

Image by Dave Finnigan with details as shown.

Aristillus.

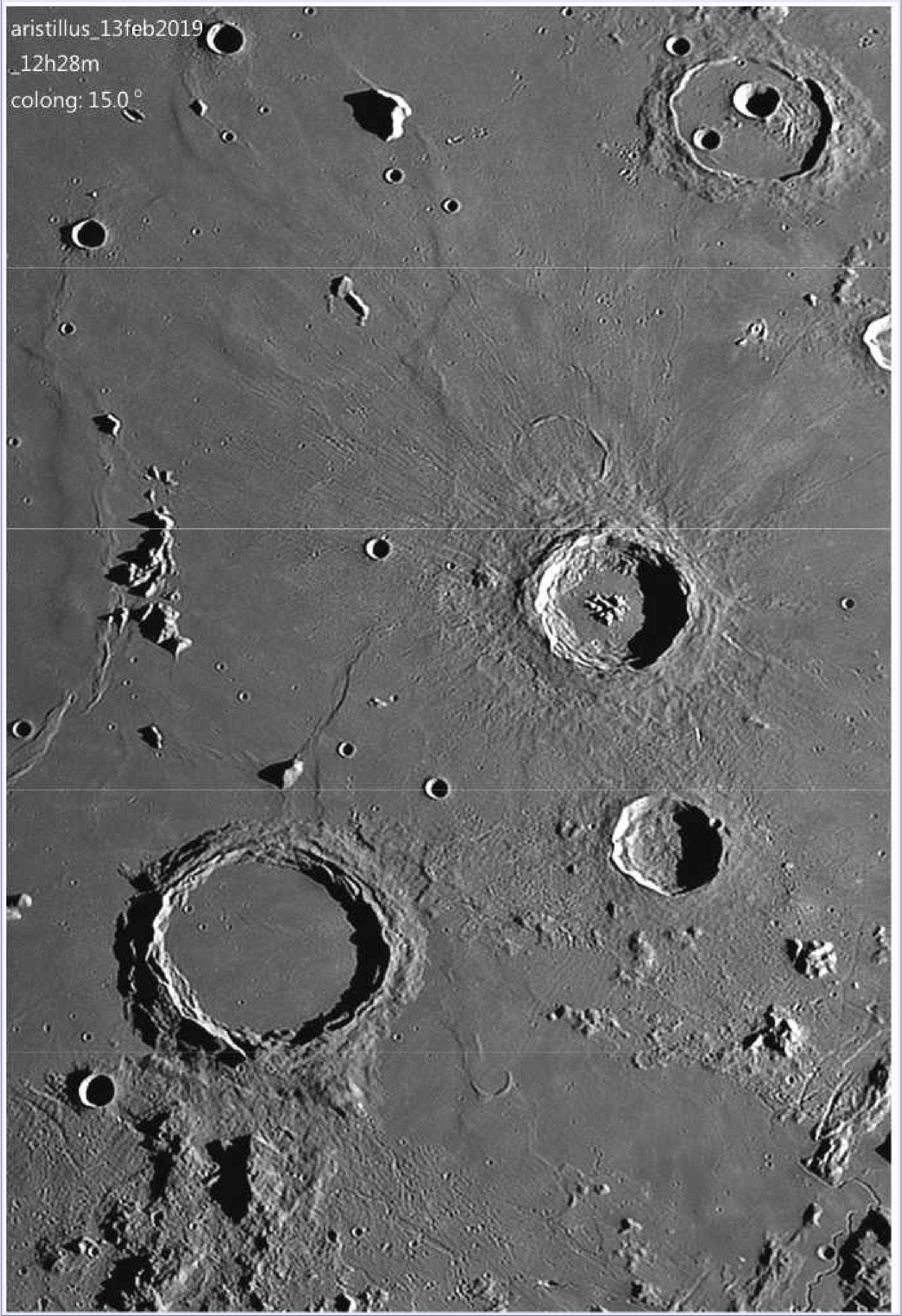
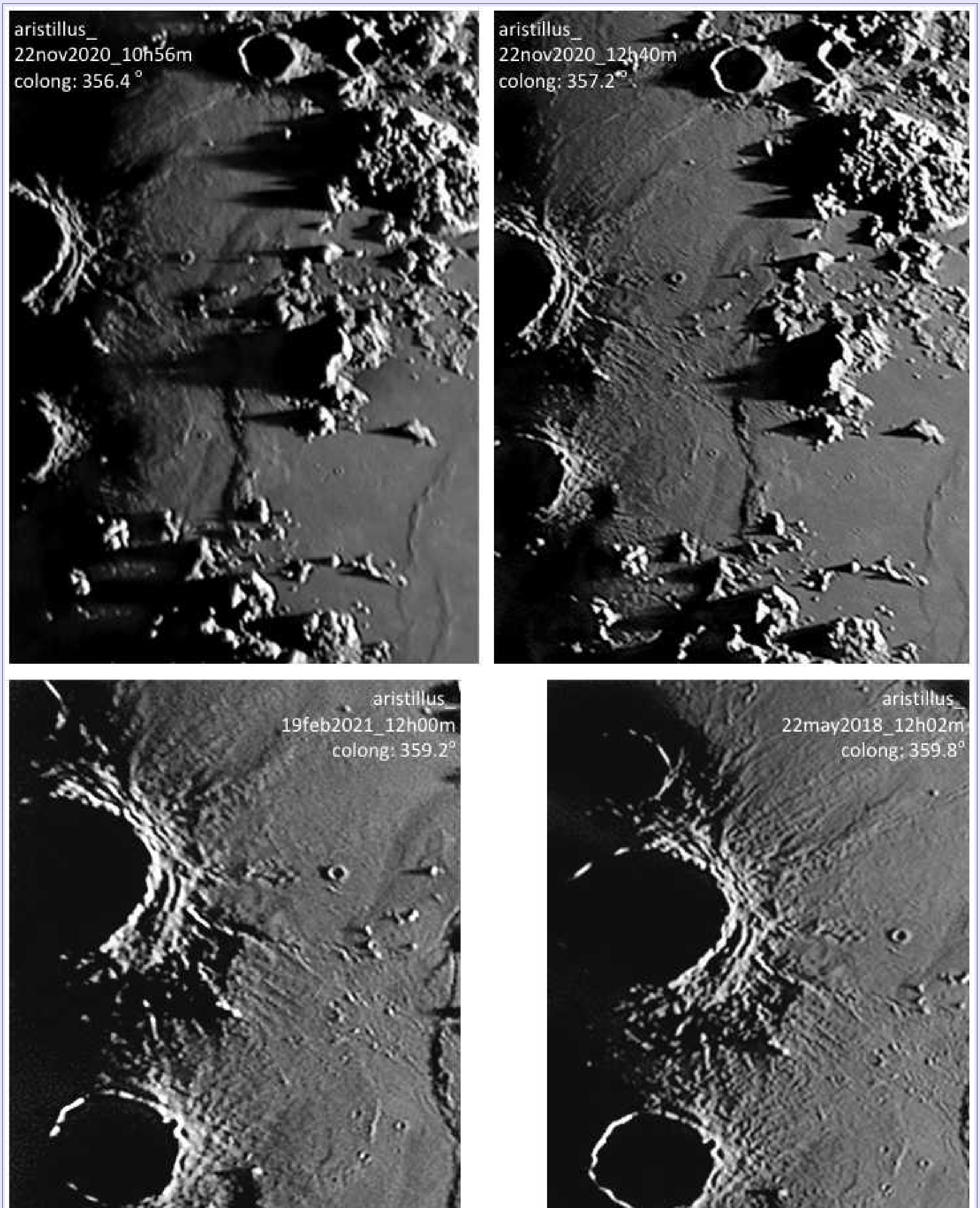


Image by K.C.Pau with details as shown.

Ed. Comments: I have mentioned before that K.C is in the process of writing a book on the Moon and he has *sent some images that are to feature in it shown above and on the next page. It will be in Chinese, but the pictures speak for themselves.*



Copernicus.

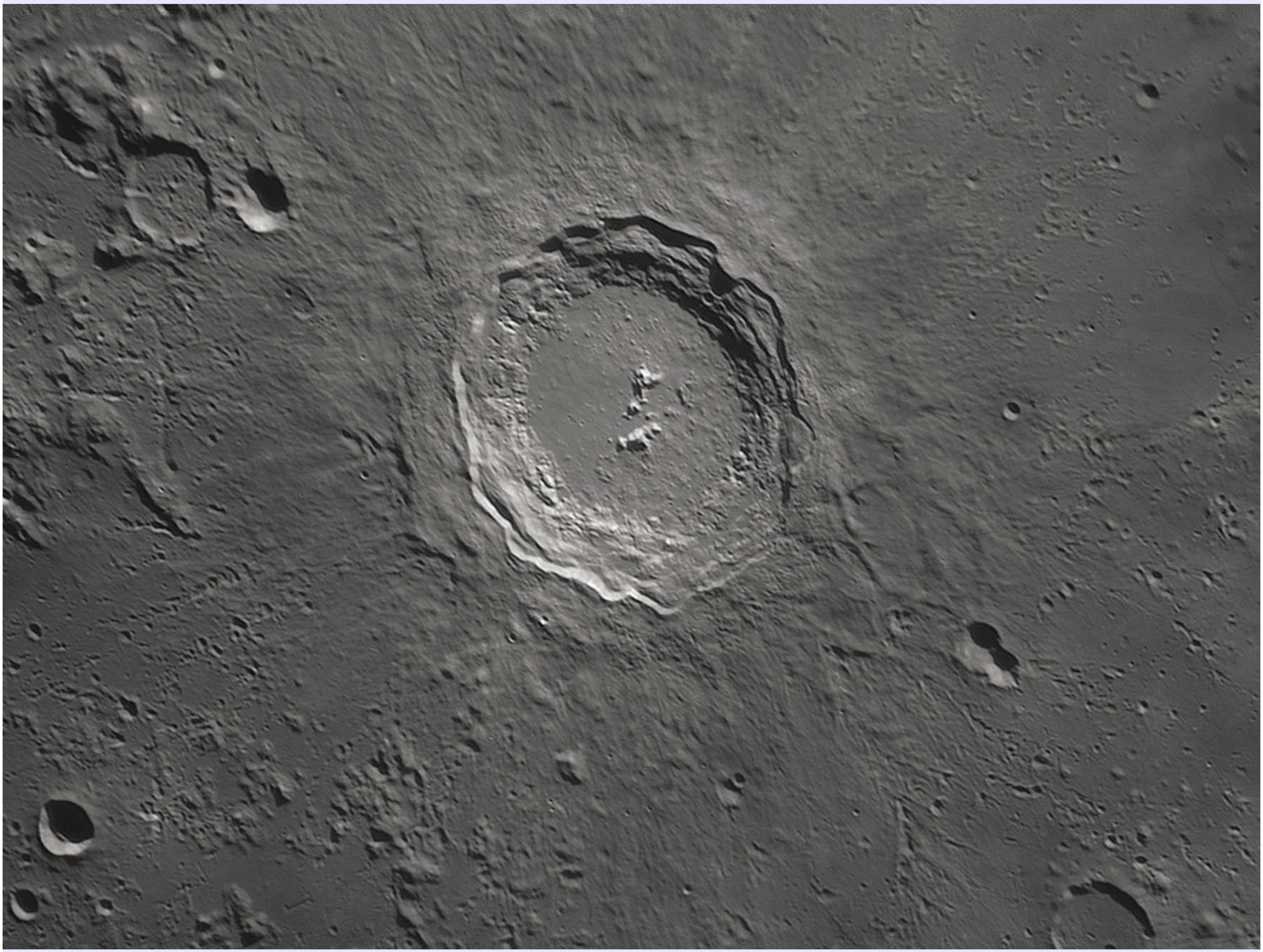
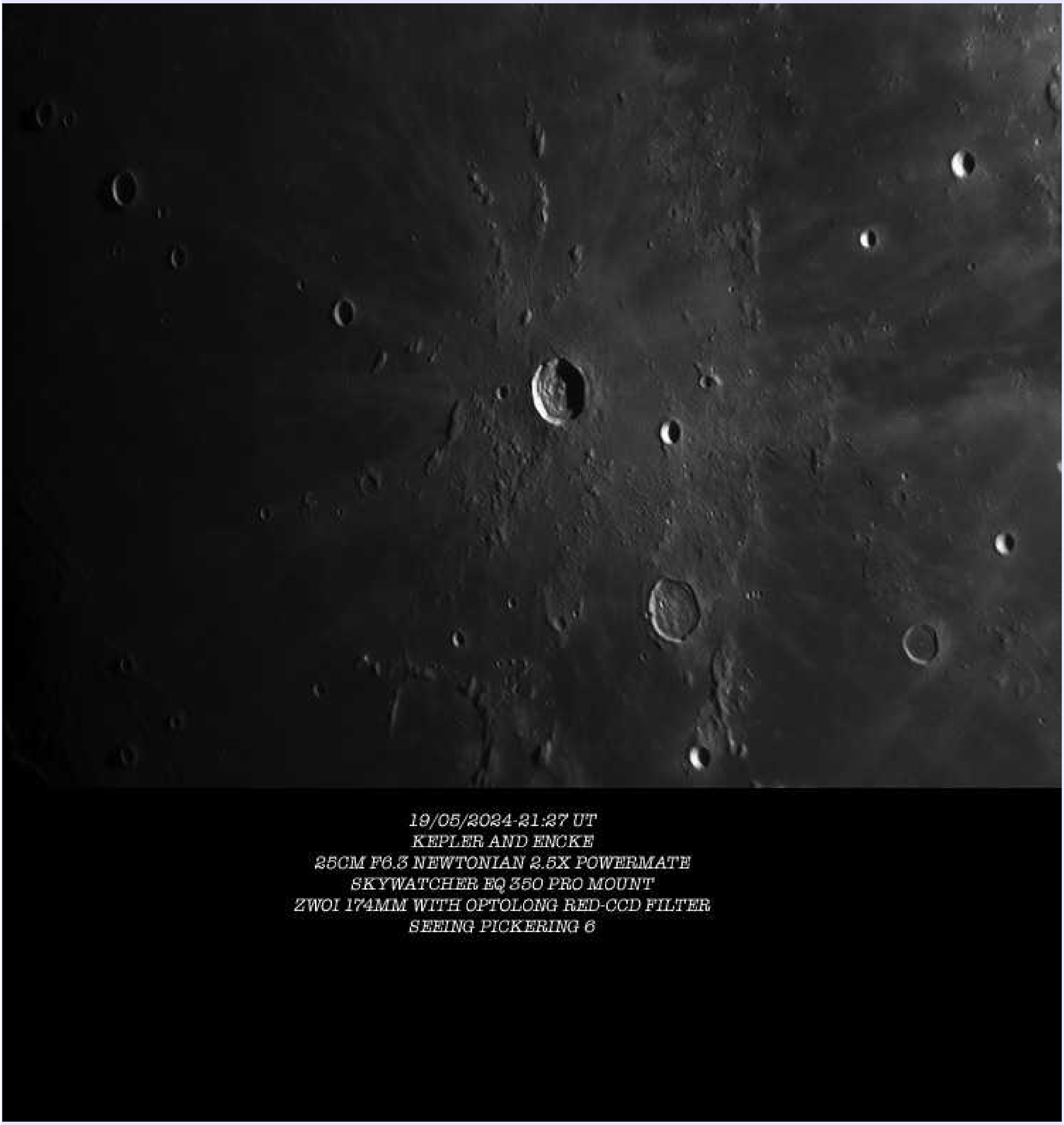


Image from the BAA Gallery, and taken by Martin Lewis on 14th May at 19:31 using a 444mm Dobsonian, ASI174MM and Baader 685nm IR filter.

Kepler and Encke.



19/05/2024-21:27 UT
KEPLER AND ENCKE
25CM F6.3 NEWTONIAN 2.5X POWERMATE
SKYWATCHER EQ 350 PRO MOUNT
ZWOI 174MM WITH OPTOLONG RED-CCD FILTER
SEEING PICKERING 6

Image by Bob Stuart with details as shown.

Montes Caucasus with craters Eudoxus and Aristoteles.

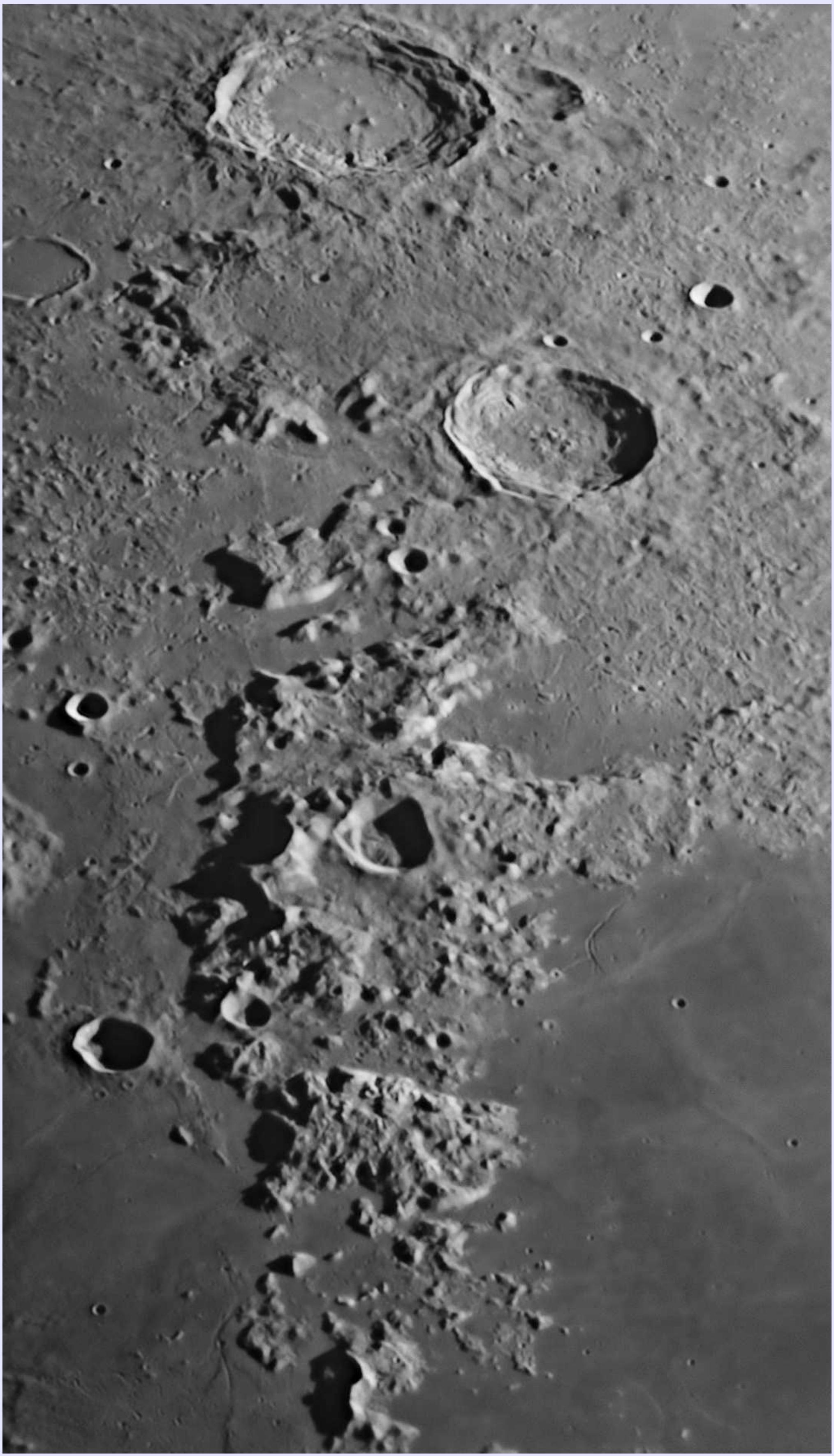


Image from the BAA Gallery, and taken by Craig Towell on 30th April 2020 19:27 using a 220mm Newtonian Altair 290mono APM 2.7x barlow Baader red filter

Gassendi and Letrone.

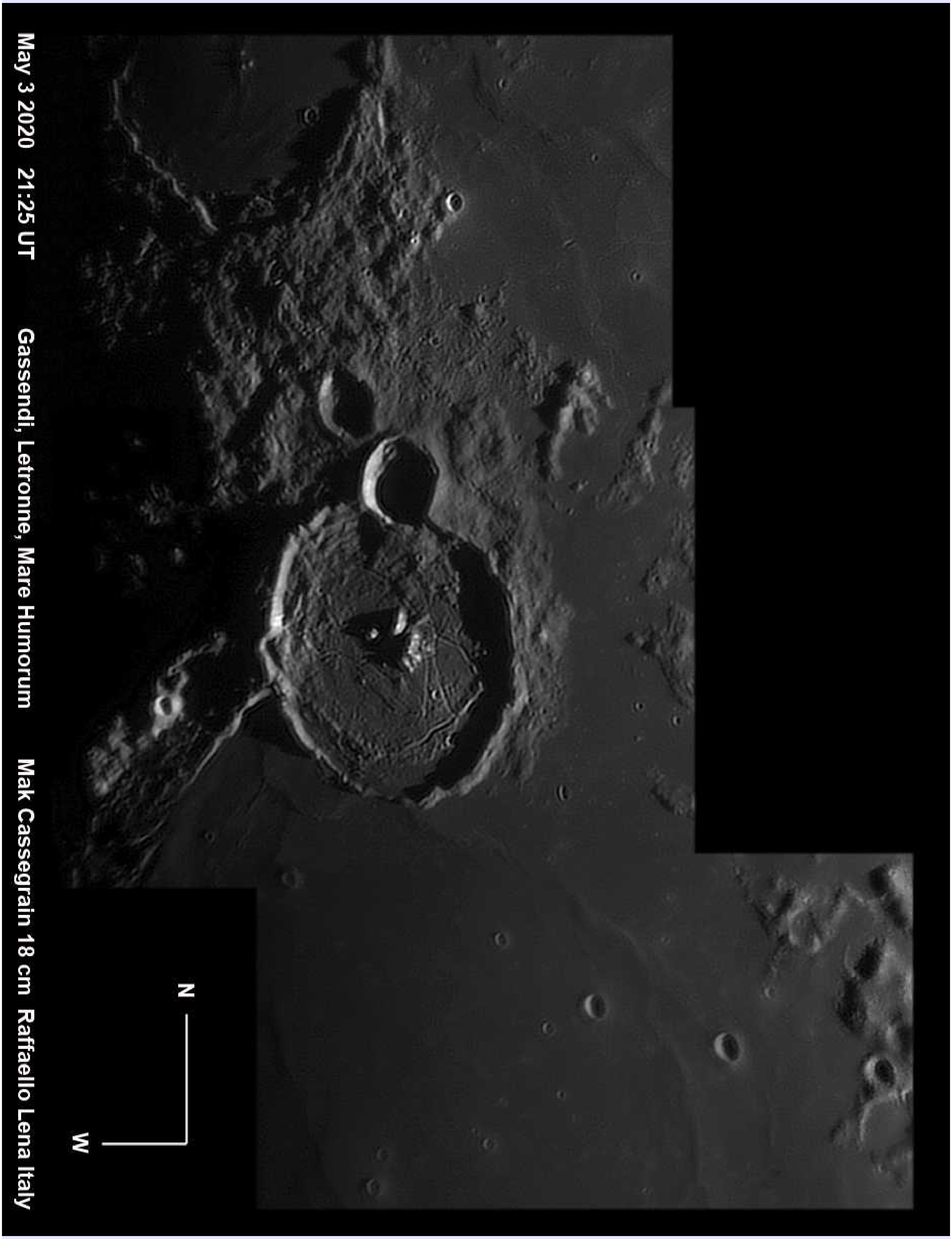
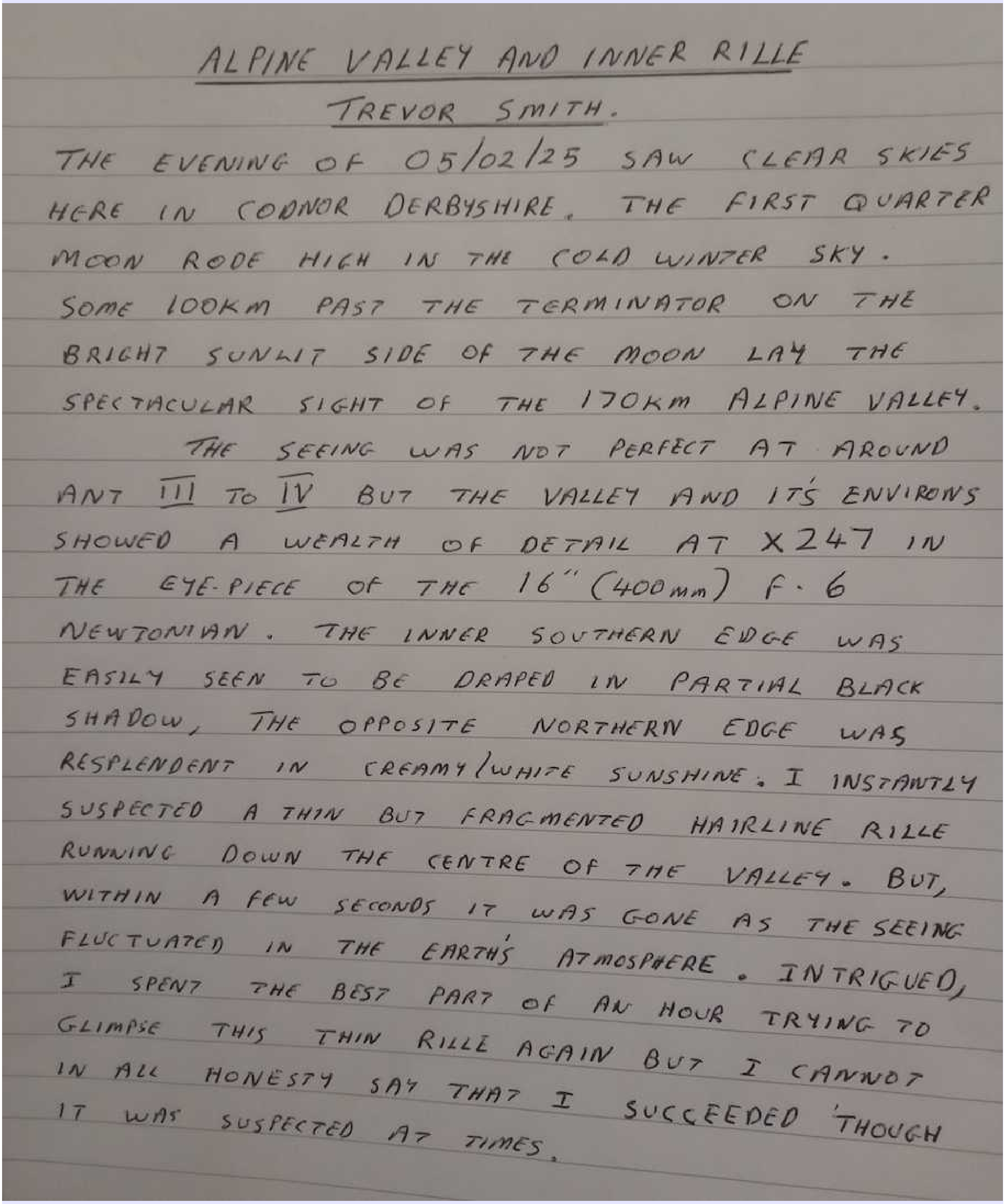


Image from the BAA Gallery, and taken by Raf Lena with the details as shown.

Observing notes on the Alpine Valley Rille by Trevor Smith.

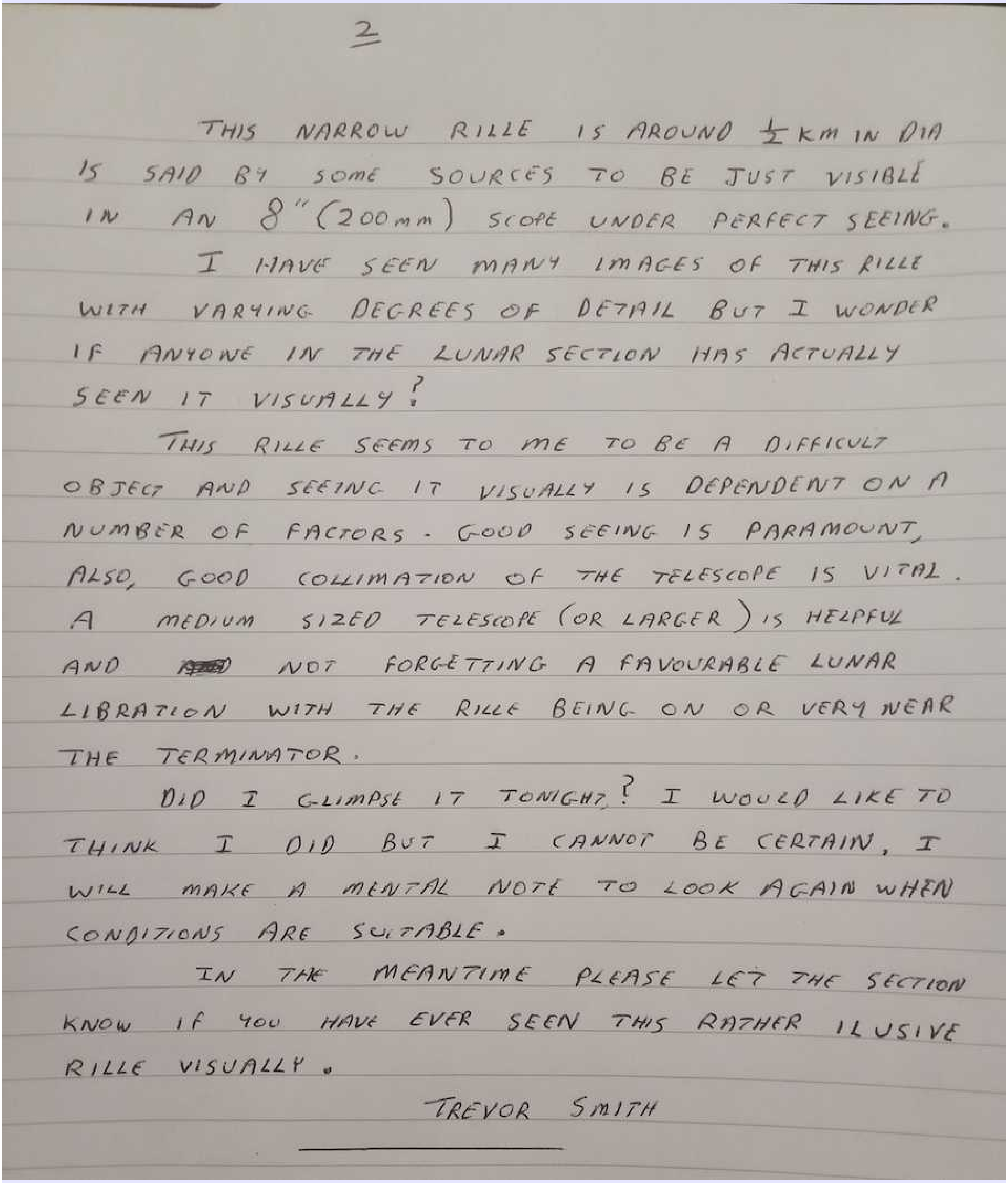


ALPINE VALLEY AND INNER RILLE

TREVOR SMITH.

THE EVENING OF 05/02/25 SAW CLEAR SKIES HERE IN CODNOR DERBYSHIRE. THE FIRST QUARTER MOON RODE HIGH IN THE COLD WINTER SKY. SOME 100KM PAST THE TERMINATOR ON THE BRIGHT SUNLIT SIDE OF THE MOON LAY THE SPECTACULAR SIGHT OF THE 170KM ALPINE VALLEY.

THE SEEING WAS NOT PERFECT AT AROUND ANT III TO IV BUT THE VALLEY AND IT'S ENVIRONS SHOWED A WEALTH OF DETAIL AT X247 IN THE EYE-PIECE OF THE 16" (400mm) F·6 NEWTONIAN. THE INNER SOUTHERN EDGE WAS EASILY SEEN TO BE DRAPED IN PARTIAL BLACK SHADOW, THE OPPOSITE NORTHERN EDGE WAS RESPLENDENT IN CREAMY/WHITE SUNSHINE. I INSTANTLY SUSPECTED A THIN BUT FRAGMENTED HAIRLINE RILLE RUNNING DOWN THE CENTRE OF THE VALLEY. BUT, WITHIN A FEW SECONDS IT WAS GONE AS THE SEEING FLUCTUATED IN THE EARTH'S ATMOSPHERE. INTRIGUED, I SPENT THE BEST PART OF AN HOUR TRYING TO GLIMPSE THIS THIN RILLE AGAIN BUT I CANNOT IN ALL HONESTY SAY THAT I SUCCEEDED 'THOUGH IT WAS SUSPECTED AT TIMES.



2

THIS NARROW RILLE IS AROUND ½ KM IN DIA IS SAID BY SOME SOURCES TO BE JUST VISIBLE IN AN 8" (200mm) SCOPE UNDER PERFECT SEEING.

I HAVE SEEN MANY IMAGES OF THIS RILLE WITH VARYING DEGREES OF DETAIL BUT I WONDER IF ANYONE IN THE LUNAR SECTION HAS ACTUALLY SEEN IT VISUALLY?

THIS RILLE SEEMS TO ME TO BE A DIFFICULT OBJECT AND SEEING IT VISUALLY IS DEPENDENT ON A NUMBER OF FACTORS. GOOD SEEING IS PARAMOUNT, ALSO, GOOD COLLIMATION OF THE TELESCOPE IS VITAL. A MEDIUM SIZED TELESCOPE (OR LARGER) IS HELPFUL AND NOT FORGETTING A FAVOURABLE LUNAR LIBRATION WITH THE RILLE BEING ON OR VERY NEAR THE TERMINATOR.

DID I GLIMPSE IT TONIGHT? I WOULD LIKE TO THINK I DID BUT I CANNOT BE CERTAIN, I WILL MAKE A MENTAL NOTE TO LOOK AGAIN WHEN CONDITIONS ARE SUITABLE.

IN THE MEANTIME PLEASE LET THE SECTION KNOW IF YOU HAVE EVER SEEN THIS RATHER ILUSIVE RILLE VISUALLY.

TREVOR SMITH

Alphonsus.

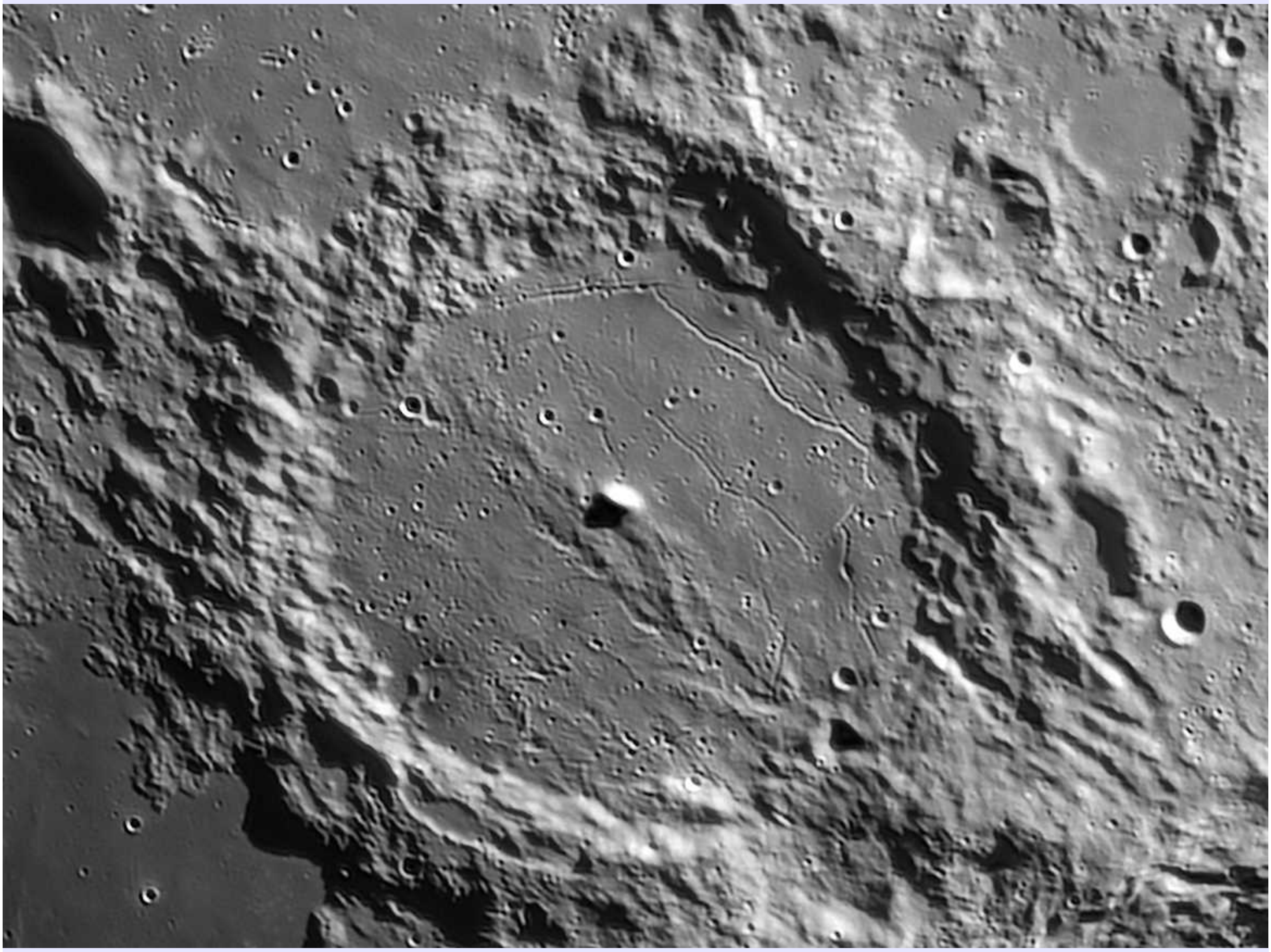


Image by Leo Aerts and taken at 18:53hrs on March 18th 2024.

6 Day old Moon.

Image by Maurice Collins with details as shown.

Albategnius and Ptolemaeus.

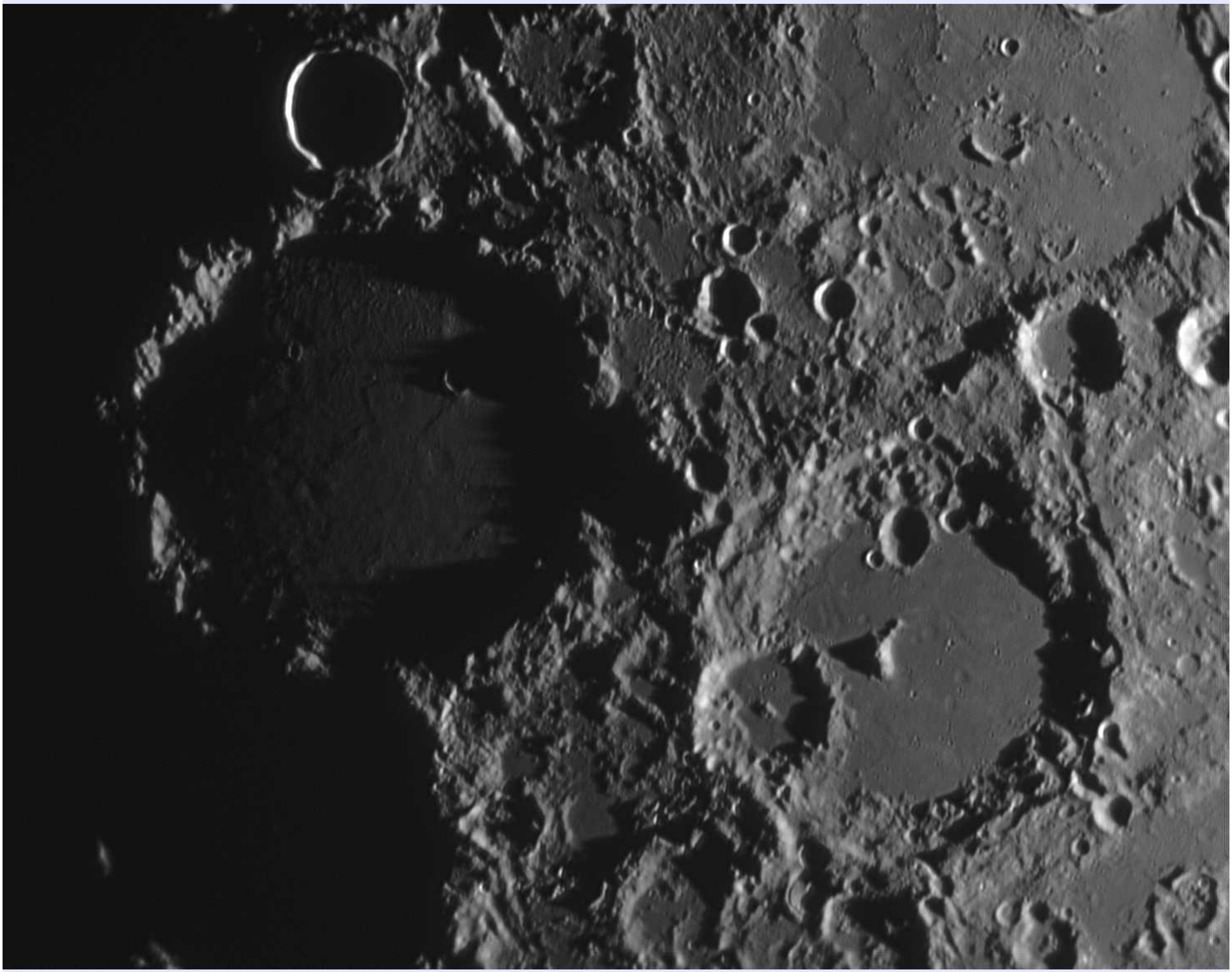


Image from the BAA Gallery, and taken by James Dawson on 5th February 2025 at 18:22hrs using a Celestron C14 and ASI 585 MC (non cooled)

Moon & Mars Close Approach

Image from the BAA Gallery, and taken by David Strange on 9th February 2025 at 14:02hrs using a Takahashi 100DF.

Sunrise at Clavius

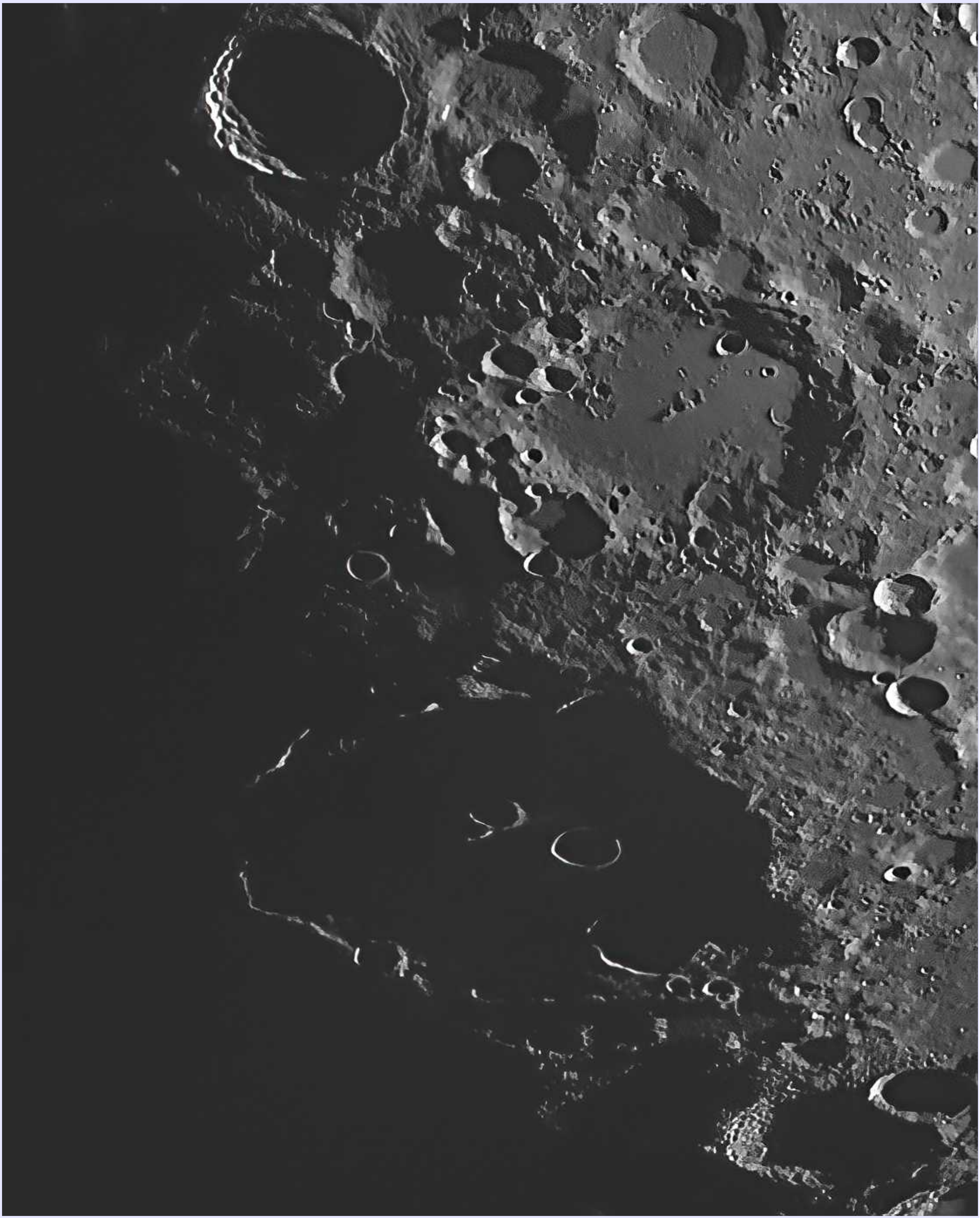


Image from the BAA Gallery, and taken by John Arnold on 6th February 2025 at 15:46hrs using a Stellalyra 8" Classical Cassegrain, ASI178MM camera with 742 nm long-pass filter.

Waxing Crescent.

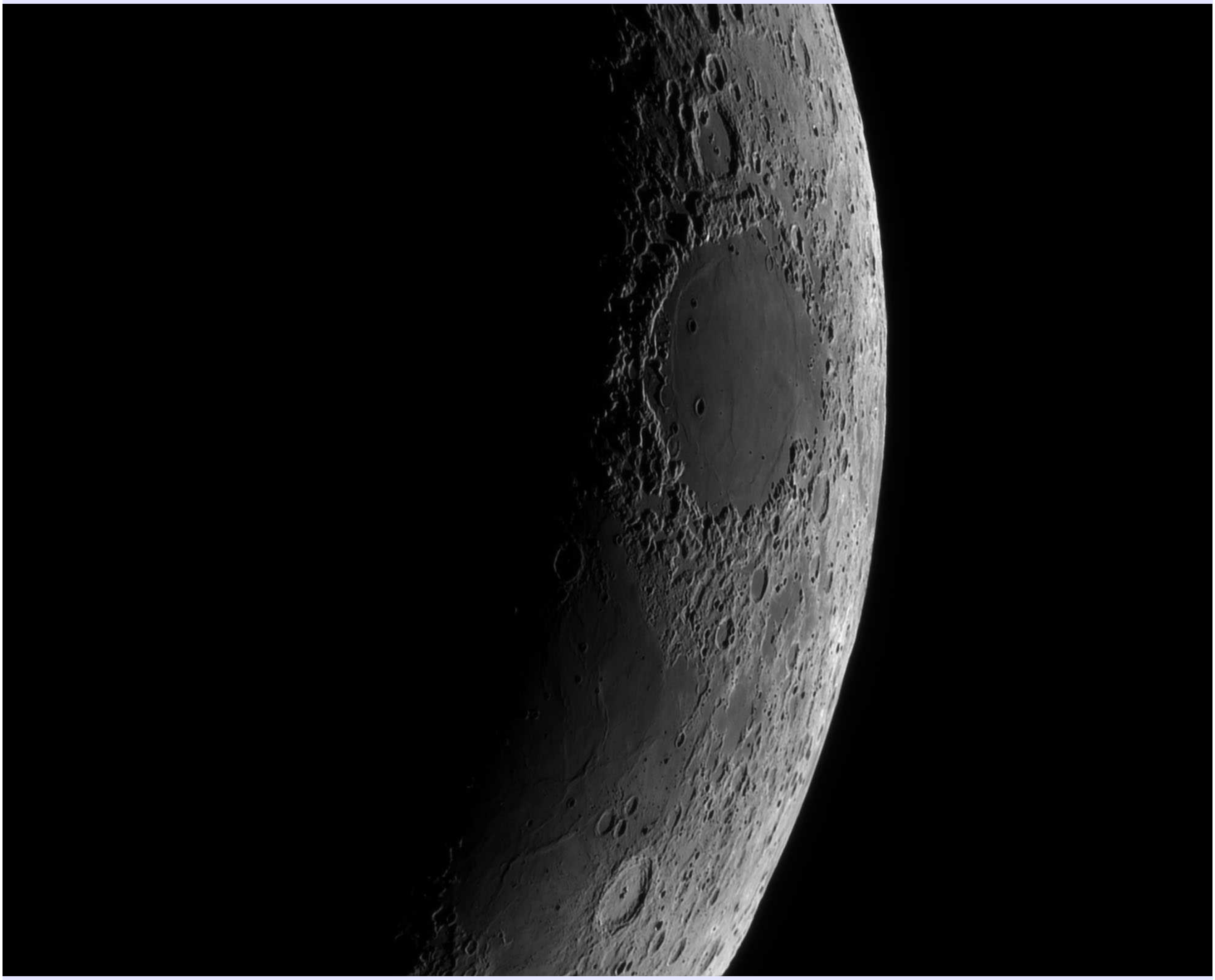


Image from the BAA Gallery, and taken by Neil Webster on 1st February 2025 at 19:25hrs using a 115mm Apo Refractor, EQ6 R, ZWO ASI290MM, Astronomik Filter (642 – 840nm).

Apennine Mountains & Eastern Mare Imbrium.

Image from the BAA Gallery, and taken by Steve Williams on 11th January 2022 at 20:53hrs using a 6-inch F8 Refractor and x2 Barlow.

Buried Basins and Craters: March 2025 by Skylar Rees

Last month, we received a report of a possible ghost crater by Alberto Anunziato (SLA) in Argentina. They propose a structure southeast of *Plato* and next to *Piazzi Smyth*, centred at LAT = 41.5°N, LON = 2.0°W on the nearside, and suggest many other potential ghost crater candidates may be nearby. There are none currently listed in this area on our catalogue, so please send in any additional observations from this region.

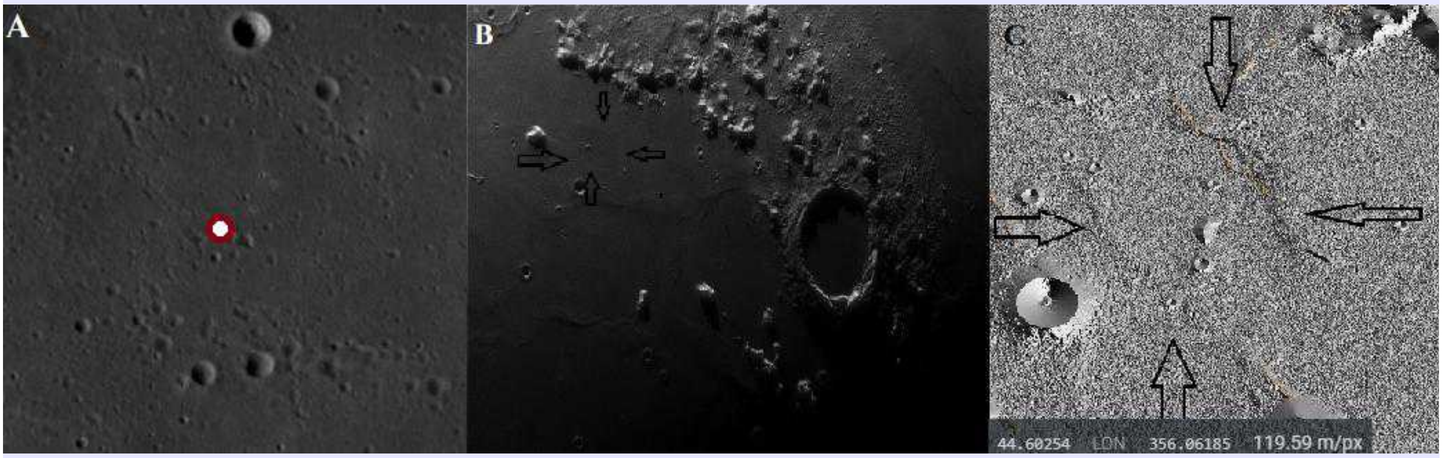


Fig.1*(a) QuickMap view of the suggested area with dot at the suggested centre. (b) Submitted photography of the suggested ghost crater. (c) Submitted QuickMap Azimuth filter view of the crater.*

The three views in Fig.1 above do highlight a faint enclosure, though Fig.1(c) demonstrates it is not circular. In Fig.1(b) and the faint orange line of Fig.1(c) the presence of wrinkle ridges is also highlighted, which infers the overlaying lava (possibly from *Mare Imbrium* due southeast) has bent and fractured upon cooling. It is possible that the ghost crater may have infilled and preferentially formed a ridge upon the northern edge, particularly as asymmetry in impact formations can lead to slumping on one side. However, the difference in elevation according to Quickmap, is very modest – only ~100m separating the 'rim' coincident with the wrinkle ridge and the 'southern rim' – therefore the raised part of Fig.1(c) being a surviving rim is difficult to justify. Possibly due to widespread mare resurfacing, the terrain elevation is remarkably uniform here at around 2700m absolute height everywhere. Unfortunately, this also means it is practically useless in this instance at defining topographically distinct features.

TerrainSlope (Fig.2 below) is typical of a highly degraded and resurfaced structure, with the average change in slope only ~2-3° throughout. Exceptions to this occur at the centre of both latitudinal (2b) and longitudinal (2c) cross-sections, an upturn to nearly 7°; this seems to be the approximate location of the central mound in Fig.1(c). As highlighted by the orange arcs in Fig.2(d), the faint oval outline of the proposed impact structure does appear with some uncertainty.

However, the southern arc does also show the highest variations in slope in the area (~8-9°), suggesting a difference from the flatter terrain above it. If these are indeed rims, the approximate diameter of this structure is ~16km. At that diameter it is possible that this was a complex crater prior to resurfacing, this central spike in slope and the mound in Fig.1(c) the central complex. However, the actual size of the possible ghost crater is visibly uncertain therefore so is the 'complex'.

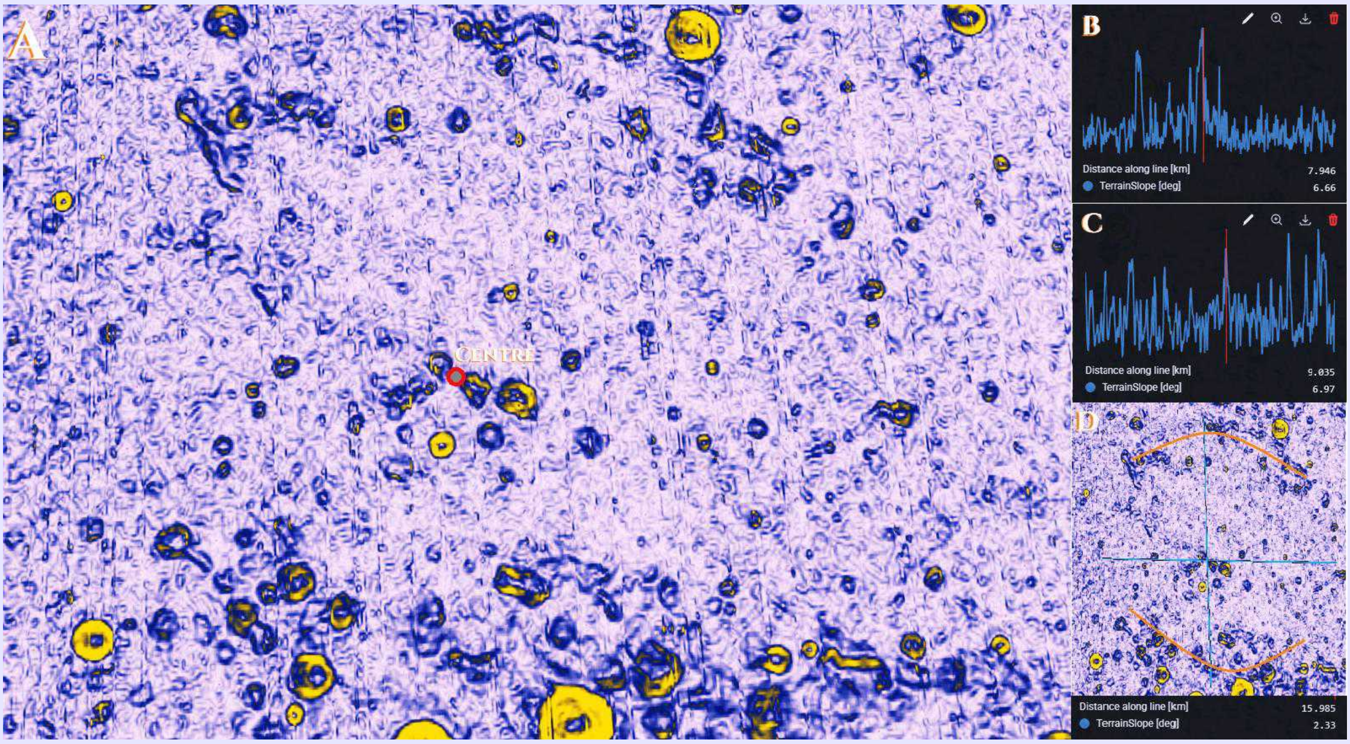


Fig.2(a) QuickMap's TerrainSlope filter. (b) Latitudinal variation of slope. (c) Longitudinal variation of slope. (d) Asymmetric plotting of axes; orange lines highlight an arcuate slope pattern, possibly a rim. Contrast boosted 40% in all images for clarity. Approximate size of the area based on the arcs is 16km.

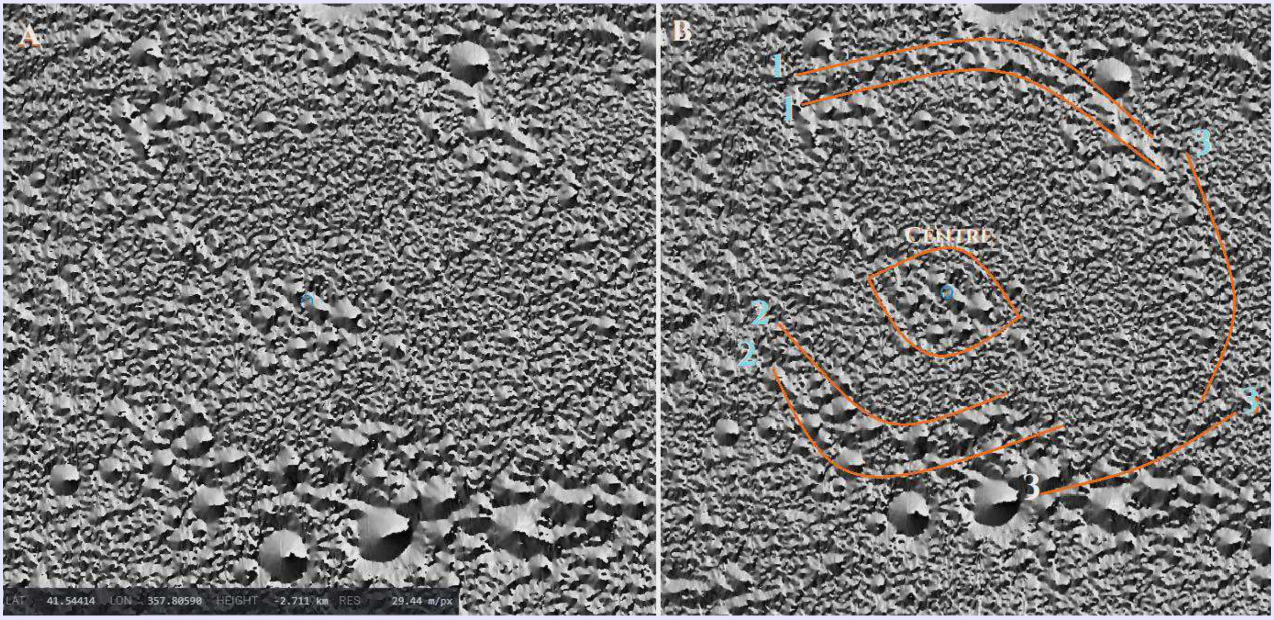
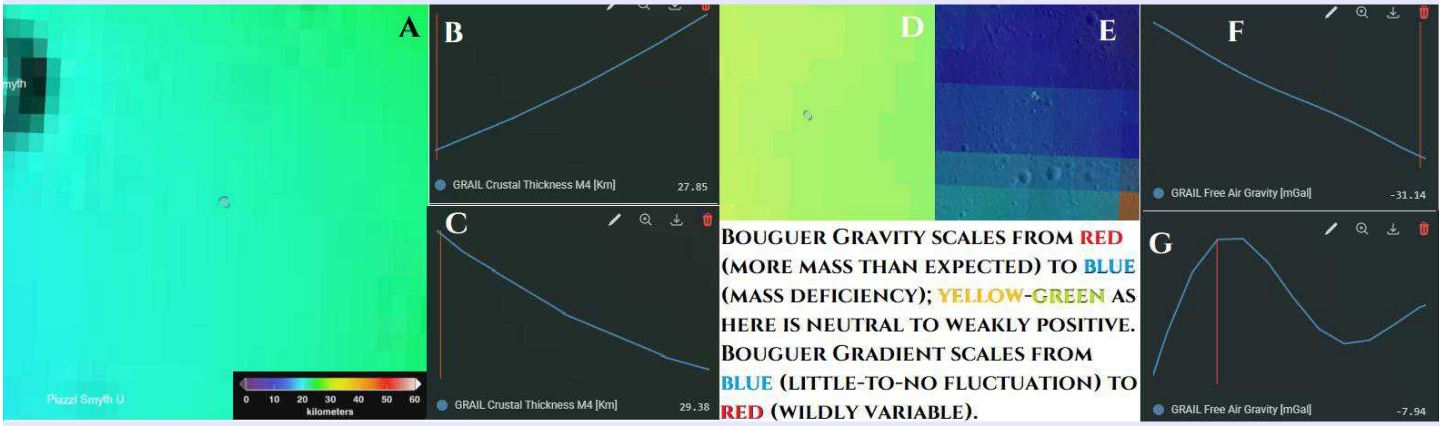


Fig.3(a) QuickMap's TerrainAzimuth filter. (b) Potential remnants, assessed in confidence intervals (1 = more confident, 3 = less clear). Brightness decreased by 10% and contrast increased by 20% for visibility.

The possible remnants are also observed, in varying confidences, by the TerrainAzimuth filter in Fig.3(b) above. However, rather than smooth and continuous topography – for example in the more confident arcs to the north (labelled 1) – most of the terrain is quite 'rough' and discontinuous. The southern 'arcs' (labelled 2) appear to retain their shape but are made up of several smaller circular structures, which would suggest degradation by subsequent impactors rather than a product of resurfacing or contraction. The edges (labelled 3) are even more tenuous and do not display this kind of "mackerel sky" texture like the southern arcs. The centre again shows an accumulation of smoother and more connected terrain than its immediate surroundings, suggesting a topographical distinction, but overall this region is more coarse and disconnected than expected from mare flooding or impact-gardening.



BOUGUER GRAVITY SCALES FROM RED (MORE MASS THAN EXPECTED) TO BLUE (MASS DEFICIENCY); YELLOW-GREEN AS HERE IS NEUTRAL TO WEAKLY POSITIVE. BOUGUER GRADIENT SCALES FROM BLUE (LITTLE-TO-NO FLUCTUATION) TO RED (WILDLY VARIABLE).

Fig.4 QuickMap's GRAIL gravity data. (a-c) Crustal Thickness, latitudinal and longitudinal plots through the same axes as in Fig.2(d). (d,f,g) Bouguer Gravity Anomaly and latitudinal and longitudinal plots through the same axes as in Fig.2(d). (e) Bouguer Gradient. No edits to contrast or brightness.

GRAIL gravity data in Fig.4 above is also inconclusive. The crustal thickness (Fig. 4a-c) increases from west to east, while decreasing at a similar rate from north to south; these range from around 15-28km in both cases. This would partially be explained by erosion from mare and basalt emplacement, but Bouguer Gravity (Fig.4d,f,g) - while somewhat decreasing laterally and fluctuating longitudinally – remains comfortably within the neutral gravity range (0-30mGal). Bouguer Gradient (Fig.4e) also suggests very weakly varying gravity. While this could be explained by significant infilling and solidification by the mare so to return the crater to pre-impact levels, this is not supported by the widespread ~2700m absolute depth everywhere in the area.
Barata et al (2012) classified ghost craters on Mars as "flat-floored, rimless, extremely shallow, without central peaks, and would probably represent what remains after erosion". Assuming that this definition holds for the Moon, it is unlikely to be a ghost crater. There are suggestions of a rim, it is not particularly shallow at 2700m absolute depth and appears to have some remaining central fixture. Its floor is flat in terms of slope, albeit coarse-grained and discontinuous in azimuthal terms. There are indications that a structure exists, but the evidence does not seem to support it as a palimpsest – in fact, if it predated the mare, greater thickness and height (e.g. from basaltic flow) would be expected from infilling. Because it cannot be definitively ruled out and a flat floor in both slope and gravity profiles exist, we will weight this as a 2.

[1] Barata, T. et al (2012). "Characterization of palimpsest craters on Mars". *Planetary and Space Science*. 72(1):62–69. DOI: 10.1016/j.pss.2012.09.015.

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Lunar domes (part LXXXIX): Cauchy and further identified domes C51-C54 by Raffaello Lena

In this note I will describe some further domes in Cauchy, volcanic region, identified in terrestrial telescopic image taken by Maximilian Teodorescu (Fig. 1). Previously I have studied and described the domes Vi8, C43-C50 and C55-C57 (Lena, 2024). The domes examined in this conclusive study are named C51-C54.

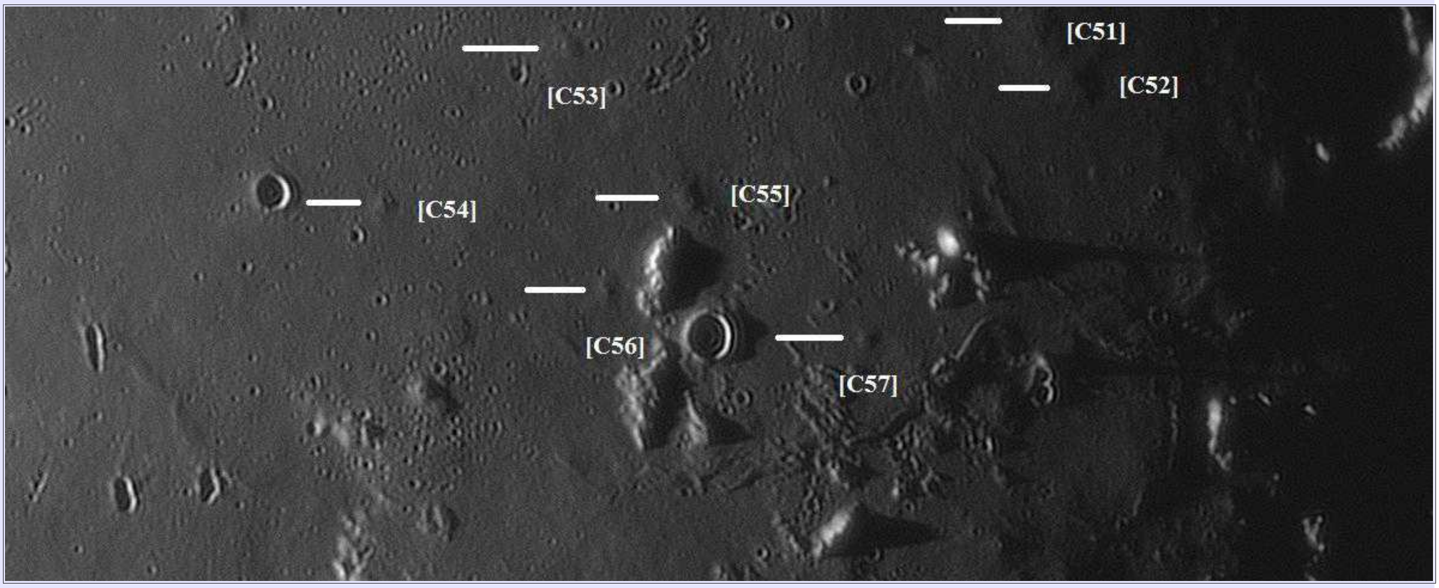

Figure 1: Telescopic image of the examined region. The image was taken by Teodorescu on October 22, 2024 at 02:57 UT, using a 355 mm Newtonian reflector. The domes examined in this study are C51-C54.

A 3D reconstruction based on telescopic terrestrial image has been obtained. A well-known image-based method for 3D surface reconstruction is shape from shading (SfS). This technique makes use of the fact that surface parts inclined towards the light source appear brighter than surface parts inclined away from it. The SfS approach aims to derive the orientation of the surface at each image location by using a model of the reflectance properties of the surface and knowledge about the illumination conditions, finally leading to an elevation value for each image pixel (Lena et al., 2013).

The height h of a dome is obtained by measuring the altitude difference in the reconstructed 3D profile between the dome summit and the surrounding surface, considering the curvature of the lunar surface. The average flank slope was determined according to: slope = arctan 2h/D, with D the diameter in km. The uncertainty results in a relative standard error of the dome height h of ±10 percent, which is independent of the height value itself. The dome diameter D can be measured at an accuracy of ± 5 percent.

The Clementine color ratio image is shown in Fig. 2. The blue color of the lava is indicating a moderate to high TiO_2content.

FeO content and the mineralogical composition was estimated utilizing the Multiband Imager (MI) data. MI is a high-resolution multispectral imaging instrument on board of Kaguya. It has five visible (VIS) bands (415 nm, 750 nm, 900 nm, 950 nm, and 1,000 nm) and four near-infrared bands (1,000 nm, 1,050 nm, 1,250 nm, and 1,550 nm).

Estimate of TiO_2 wt% and map creation (Fig. 3) is given from a linear correlation between the TiO_2 contents of returned lunar soil samples and the WAC 321/415 nm ratio at the sampling sites: the 321/415 nm ratio map was converted to the TiO_2 abundance map as reported by Sato et al. (2017).

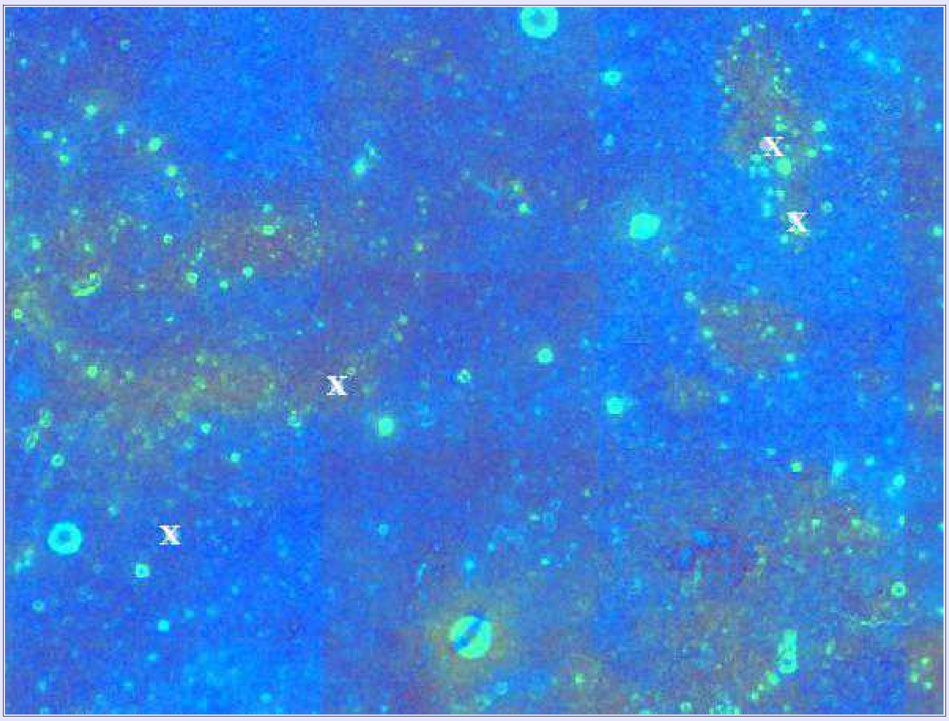

Figure 2: Clementine Channel Ratio Red = 750 nm/415 nm Green = 750 nm/950 nm Blue = 414 nm/750 nm. The lunar highlands, mostly old (~4.5 billion years) gabbroic anorthosite rocks, are depicted in shades of red. The lunar maria (~3.9 to ~1 billion years), mostly iron-rich basaltic materials of variable titanium contents, are portrayed in shades of yellow/orange (iron-rich, lower titanium) and blue (iron-rich, higher titanium). The domes C51-54 are labeled with the symbol X.

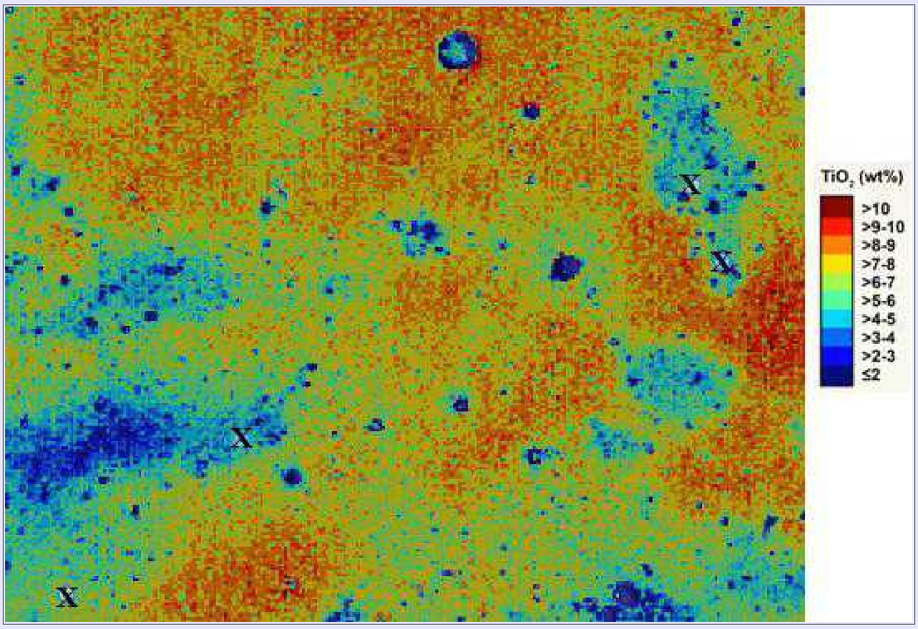

Figure 3: TiO$_2$ wt% abundance. The domes C51-54 are labeled with the symbol X.

Results and discussion

C51.

C51 lies at coordinates 33.77º E and 6.27° N, with a base diameter of 8.2 km ± 0.3 km (Fig. 1). The height amounts to 50 m ± 5 m yielding an average flank slope of 0.67° ± 0.1° (Fig. 4). The edifice volume, assuming a parabolic shape, is determined to 1.3 km^3. The rheologic model yields an effusion rate of 234 m^{3}s^{-1} and lava viscosity of 7.4 x 10^3 Pa s. It formed over a period of time of 0.18 year.

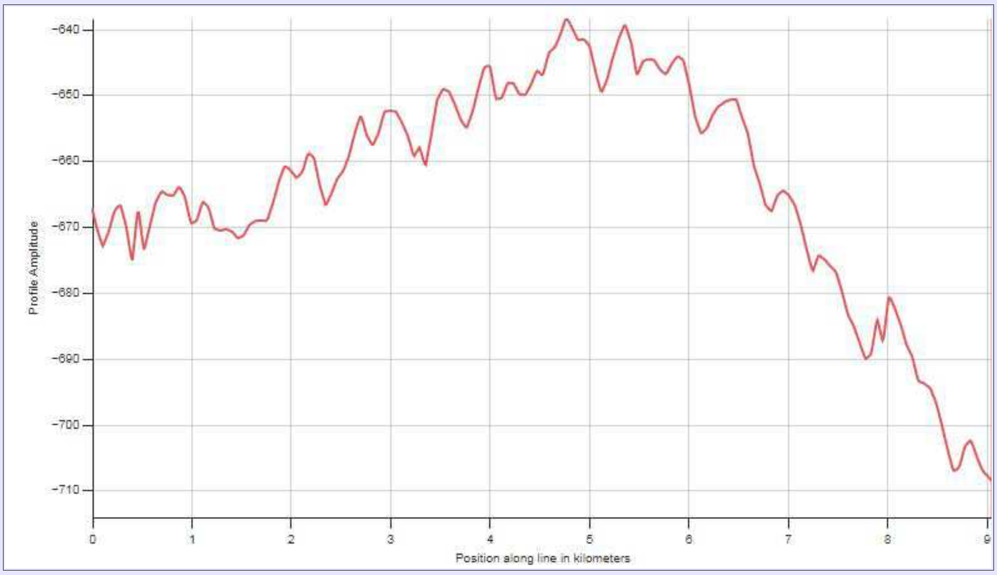

Figure 4: LRO WAC-derived surface elevation plot of an east to west cross-section of the examined dome named C51.

The 3D reconstruction is shown in Fig. 5.

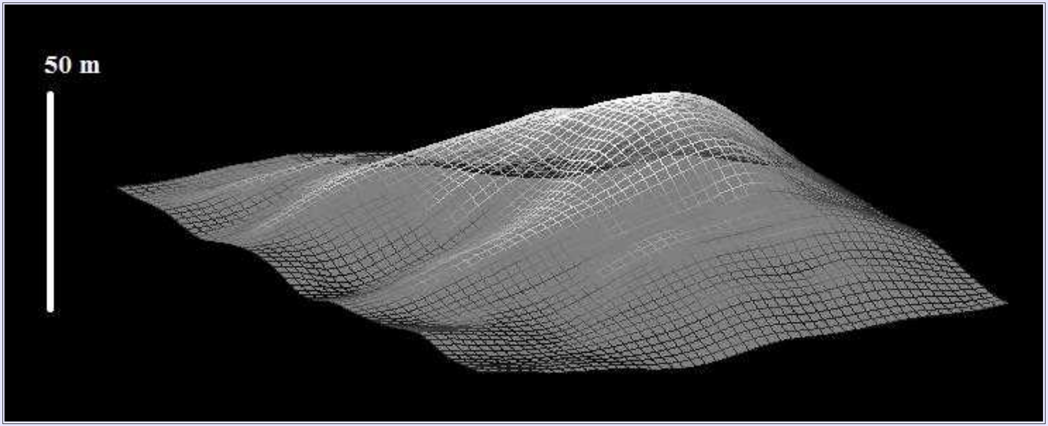

Figure 5: Digital elevation map of C51 described in the text obtained from telescopic terrestrial image. The vertical axis is 20 times exaggerated.

The Clementine UVVIS spectral data of the dome a value for the UVVIS colour ratio of $R_{415}/R_{750} = 0.6466$, indicating moderate to high TiO_2 content. According to the classification scheme for lunar domes, C51 belongs to class A.

C52

C52 lies at coordinates 33.96º E and 6.00° N, with a base diameter of 5.0 km ± 0.3 km (Fig. 1). The height amounts to 35 m ± 5 m yielding an average flank slope of 0.8° ± 0.1° (Fig. 6). The 3D reconstruction based on terrestrial telescopic image is shown in Figure 7.The edifice volume, assuming a parabolic shape, is determined to 0.34 km^3. The rheologic model yields an effusion rate of 125 m^{3}s^{-1}and lava viscosity of 4.4 x 10^3 Pa s. It formed over a period of time of 0.08 year.

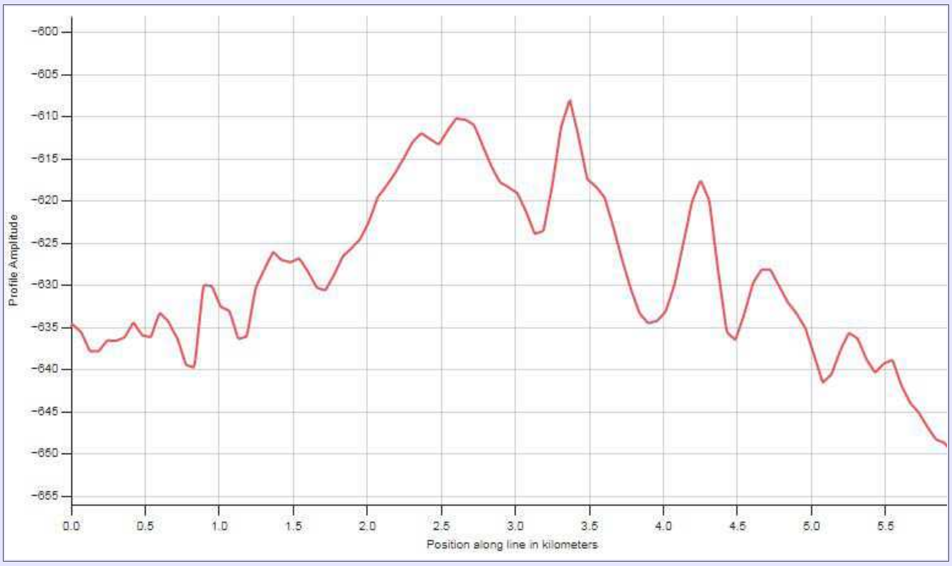

Figure 6: LRO WAC-derived surface elevation plot of an east to west cross-section of the examined dome named C52.

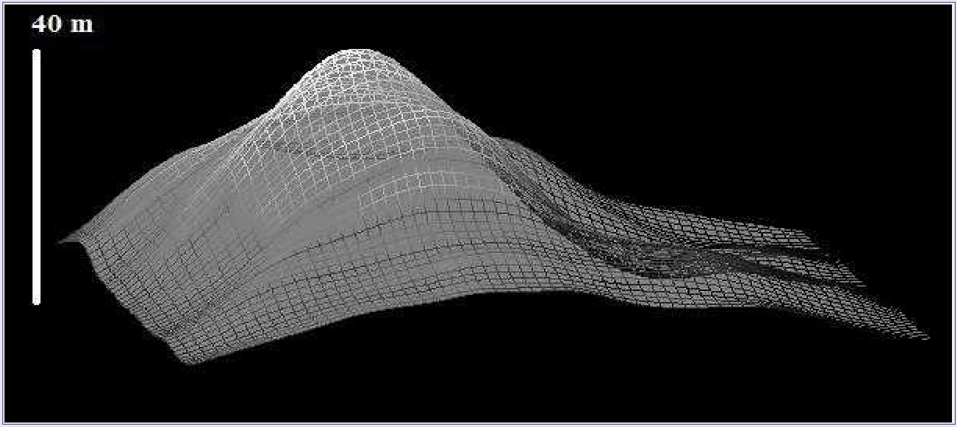

Figure 7: Digital elevation map of C52 described in the text obtained from telescopic terrestrial image. The vertical axis is 25 times exaggerated.

According to the classification scheme for lunar domes, also C52 belongs to class A.

C53

C53 lies at coordinates 31.63º E and 6.04° N, with a base diameter of 7.0 km ± 0.3 km (Fig. 1). The height amounts to 80 m ± 5 m yielding an average flank slope of 1.3° ± 0.1° (Fig. 8). The 3D reconstruction based on terrestrial telescopic image is shown in Figure 9. The edifice volume, assuming a parabolic shape, is determined to 1.6 km^3. The rheologic model yields an effusion rate of 110 m^{3}s^{-1}and lava viscosity of 1.0 x 10^5 Pa s. It formed over a period of time of 0.5 year.

The Clementine UVVIS spectral data of the dome a value for the UVVIS colour ratio of R_{415}/R_{750} = 0.6437, indicating moderate to high TiO_2 content. According to the classification scheme for lunar domes, C53 belongs to class A.

The dome displays a TiO_2 content of 7.2 wt% to 8.4 wt% and low plagioclase content (<50.0 wt %). The FeO content varies from 18.0 wt % to 19.0 wt % like the nearby mare units. The region where this dome lies has a gap in the MI dataset. Hence the abundance of clinopyroxene and orthopyroxene was not computed.

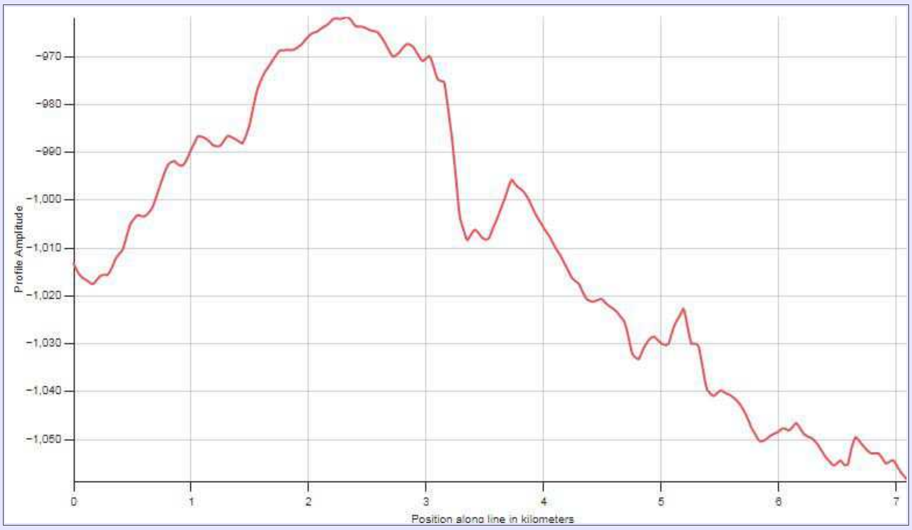

Figure 8: LRO WAC-derived surface elevation plot of an east to west cross-section of the examined dome named C53.

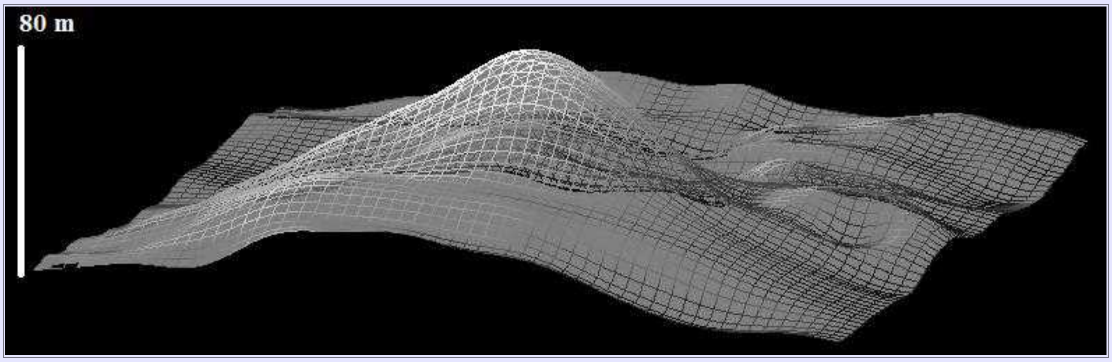

Figure 9: Digital elevation map of C53 described in the text obtained from telescopic terrestrial image. The vertical axis is 20 times exaggerated.

C54.

This dome lies at coordinates 30.86º E and 5.86° N, with a base diameter of 5.7 km ± 0.3 km (Fig. 1). The height amounts to 60 m ± 5 m yielding an average flank slope of 1.1° ± 0.1° (Fig. 10). The 3D reconstruction based on terrestrial telescopic image is shown in Figure 11. The edifice volume, assuming a parabolic shape, is determined to 0.8 km^3. The rheologic model yields an effusion rate of $104 m^3 s^{-1}$ and lava viscosity of 8.5×10^4 Pa s. It formed over a period of time of 0.26 year.

The dome displays a TiO_2 content of 7.6 wt% to 8.4 wt% and low plagioclase content (<50.0 wt %). The FeO content varies from 18.0 wt % to 19.0 wt % like the nearby mare units. The region where this dome lies has a gap in the MI dataset. Hence the abundance of clinopyroxene and orthopyroxene was not computed.

The Clementine UVVIS spectral data of the dome a value for the UVVIS colour ratio of $R_{415}/R_{750} = 0.6570$, indicating moderate to high TiO_2 content. According to the classification scheme for lunar domes, C54 belongs to class A.

Age

ACT-REACT Quick map tool was used to access to the mare age units. In the corresponding map of the examined region each polygon includes the unit name and crater size-frequency distributions model age (Hiesinger et al. 2011). The model indicates an age of 3.60 billion years for C51-C54.

Further domes identified in the examined volcanic region have been included in our lunar dome list. A full article will be organized and regarding the distribution of the domes in Cauchy region.

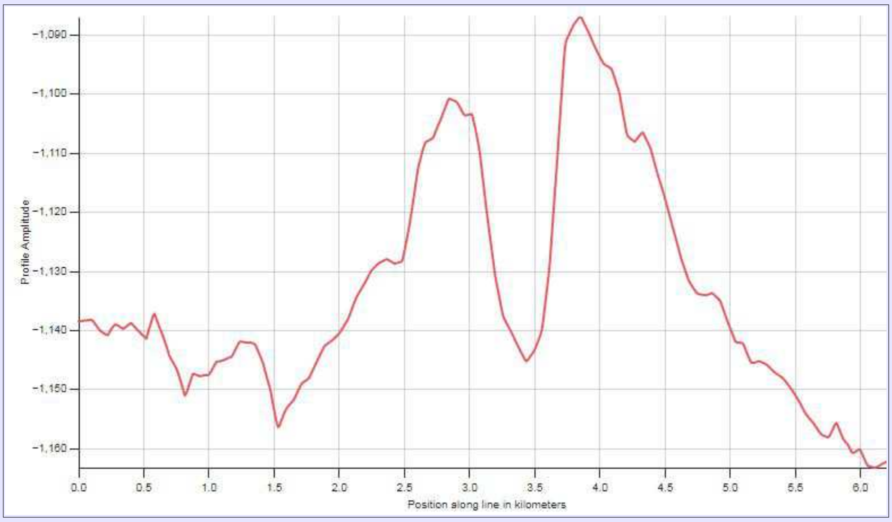

Figure 10: LRO WAC-derived surface elevation plot of an east to west cross-section of the examined dome named C54.

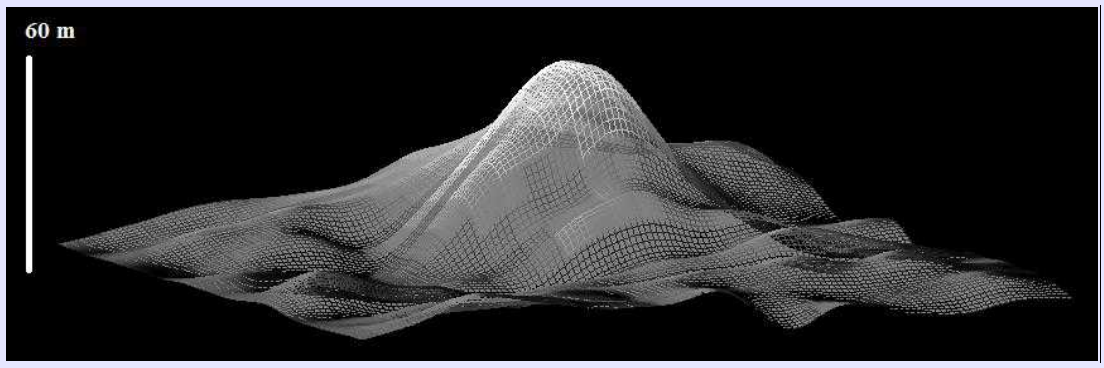

Figure 9: Digital elevation map of C54 described in the text obtained from telescopic terrestrial image. The vertical axis is 30 times exaggerated.

References

Hiesinger, H., Head III, J. W., Wolf, U., Jaumann, R., Neukum, G. (2011). Ages and stratigraphy of lunar mare basalts: A synthesis, Geological Society of America Special Papers 477, 1-51.doi:10.1130/2011.2477(01)

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Sato, H., Robinson, M.S., Lawrence, S.J., Denevi, B.W., Hapke, H., Jolliff, B.L., Hiesinger, H. (2017) Lunar Mare TiO2 Abundances Estimated from UV/Vis Reflectance, Icarus, doi:10.1016/j.icarus.2017.06.013.

Spudis, P. D., P. J. McGovern and W. S. Kiefer (2013), Large shield volcanoes on the Moon, J. Geophys. Res. Planets, 118, 1063–1081, doi:10.1002/jgre.20059.

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Lunar Impact Flash Observing Programme by Tony Cook.

Observations of earthshine for February 2025 were made on the following dates and times:

2025 Feb 02 UT 17:59-18:28 (duration 0.48 hours) visual light video – UAI observers in Italy
2025 Feb 03 UT 17:28-18:25 (duration 0.95 hours) visual light video – UAI observers in Italy
2025 Feb 04 UT 20:14:55-21:01:28 (duration 0.89 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 04 UT 20:48:03-20:48:35 (duration 0.01 hours) Polarizing Camera (G filter) video – Observer A.C. Cook
2025 Feb 05 UT 16:44-18:58 (duration 2.23 hours) visual light video – UAI observers in Italy
2025 Feb 05 UT 17:42-18:42 (duration 1.00 hours) visual light video – UAI observers in Italy
2025 Feb 05 UT 18:22:42-19:51:09 (duration 1.47 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 05 UT 21:41:59-22:46:34 (duration 1.08 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 17:44:07-17:46:44 (duration 0.04 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 17:49:17-17:52:10 (duration 0.05 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:28:52-18:29:03 (duration 0.003 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:29:07-18:29:13 (duration 0.002 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:29:26-18:30:23 (duration 0.02 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:31:28-18:33:37 (duration 0.04 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:34:32-18:35:14 (duration 0.01 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:35:29-18:36:01 (duration 0.01 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:36:30-18:36:53 (duration 0.01 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:37:15-18:38:00 (duration 0.01 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:40:56-18:41:11 (duration 0.004 hours) H band SWIR video – Observer A.C. Cook
2025 Feb 06 UT 18:42:14-18:42:28 (duration 0.004 hours) H band SWIR video – Observer A.C. Cook

Total Contact time with earthshine in Feb 2025 = 6.65 hours of which 1.01 hours was observed simultaneously through two or three telescopes – a good way to confirm impact flashes.

UAI observers did a full analysis and did not detect any flashes during their observing sessions. I still have to find time to sit down and analyse my own videos. Note that my 6th Feb observations, were affected by the weather, and these short duration snatches of the Moon were obtained through gaps in the clouds. With amateur sized scopes we would expect one impact per 10-20 hours of observing. Maybe we will get lucky in March?

Note that using an expensive Short wave IR camera, with an improvised H band filter allows one to look for impact flashes during the day and to some extent when the Moon is at higher phases than we would dare to observe the night side on in the visible part of the spectrum

The Italian UAI have, upon re-analysis of old video of earthshine, may have found a couple of impact flashes from 2024. If you were videoing the Moon at these times please check: a flash videoed on 2024 May 12 UT 20:14:05, observed by Luigi Zanatta, with the flash located in western Sinus Medii. The second was recorded on 2024 Dec 06 UT 17:13:53 also by Luigi Zanatta, with the flash located not far from Plato.

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 .

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.

We have a total lunar eclipse on the 14th of March – observers in the Americas are encouraged to monitor the surface for impact flashes and report these to ALPO's Brian Cudnik, or myself.

If you would like further details on how to observe impact flashes, please drop me an email (atc @ aber.ac.uk). 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.

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Theophilus by Barry Fitz-Gerald.

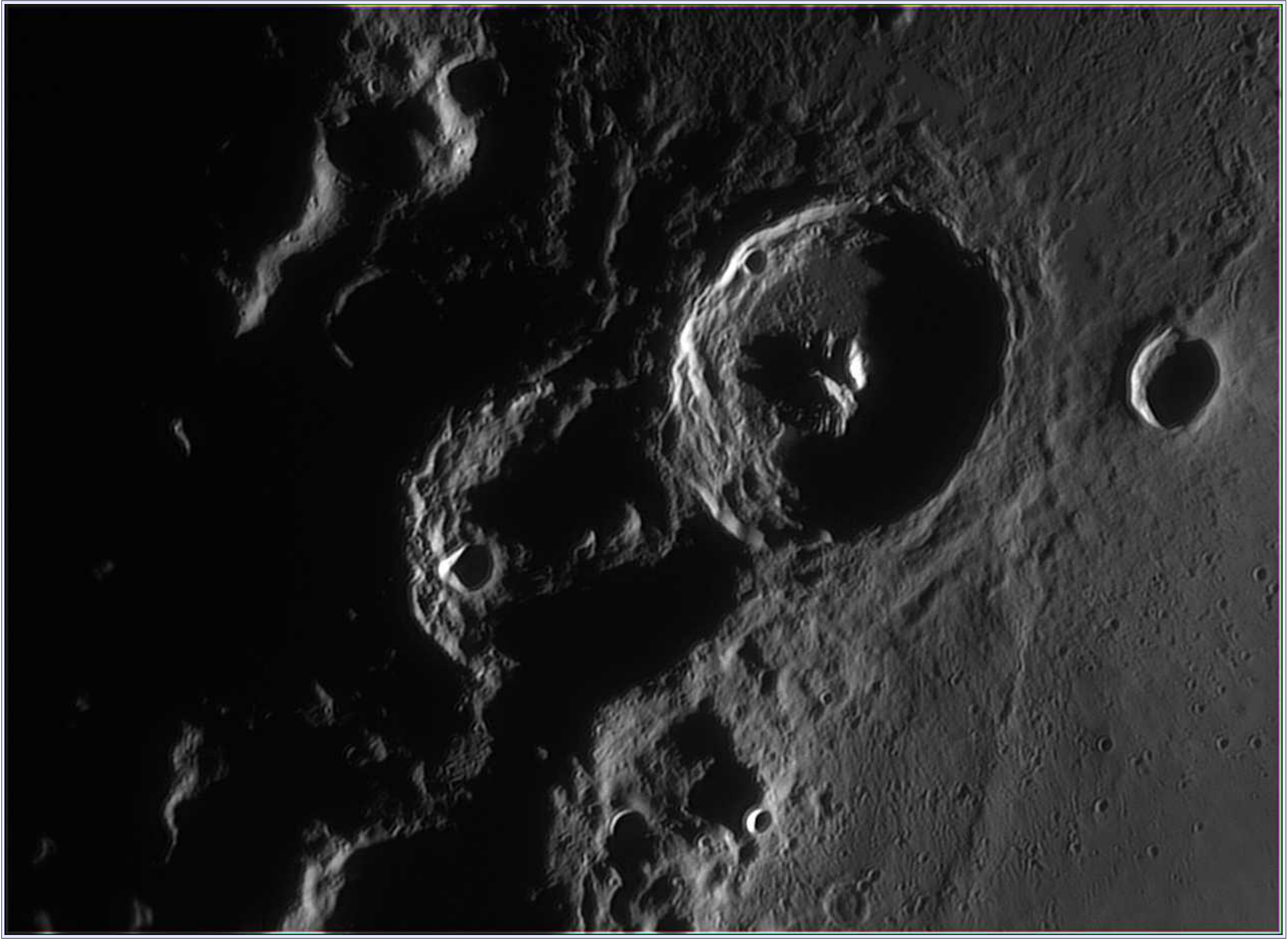

Fig.1. *Image by Bill Leatherbarrow and taken at 1740hrs on 3rd February 2025.*

This image (Fig.1) sent in by Bill Leatherbarrow shows something interesting about Theophilus – it is not strictly speaking circular in outline, in fact it has a rather elongate appearance, measuring some 107kms rim to rim along a NE-SW axis and 94kms along a NW-SE axis as shown in Fig.2. Now the reason for this might be fairly obvious, in that the south-western rim of Theophilus has obliterated the north-eastern rim of the much older Cyrillus, and this section of the Theophilus rim has collapsed down into the crater and towards the central peak – to produce an elongation of the crater outline in this direction.

Bill has covered this interaction between the two craters in '*Noisy Neighbour*', an article in his Moonwatch column in *Astronomy Now* from January 2021. He points out not only the obliteration of the north-eastern rim of Cyrillus, but the fact that the formation of Theophilus has covered much of the interior of the older crater in ejecta that has partially buried the central peak. This ejecta is sculpted with groves and ridges that are orientated

NE-SW with the most prominent trough like feature marked with a blue arrow in Fig.2.

Bill used these features, as well as the variation in Theophilus's rim (being lower to the NE and higher to the SW) height to suggest the crater may have formed from a low angle impact from the north-east, with material being pushed down-range towards the SW during the impact process.

For a crater to depart from circularity, the impact angle has the be fairly low, and you need to get down to well below 30° for the crater outline to depart from the circular. The distribution of ejecta however departs from the symmetrically circular at much higher angles, and so its distribution becomes preferentially orientated down-range and cross-range well before the crater itself becomes elongate. The thick mantling of ejecta covering Cyrillus certainly suggests something along the lines of a down-range enhancement in ejecta distribution, but would this scenario necessarily be needed to explain the collapse of the south-western rim of Theophilus? The collapse - and the crater outline – may simply be a result of fact that Cyrillus is perched on a higher bit of terrain than Theophilus, and what we see is the result of gravity and not impact angle.

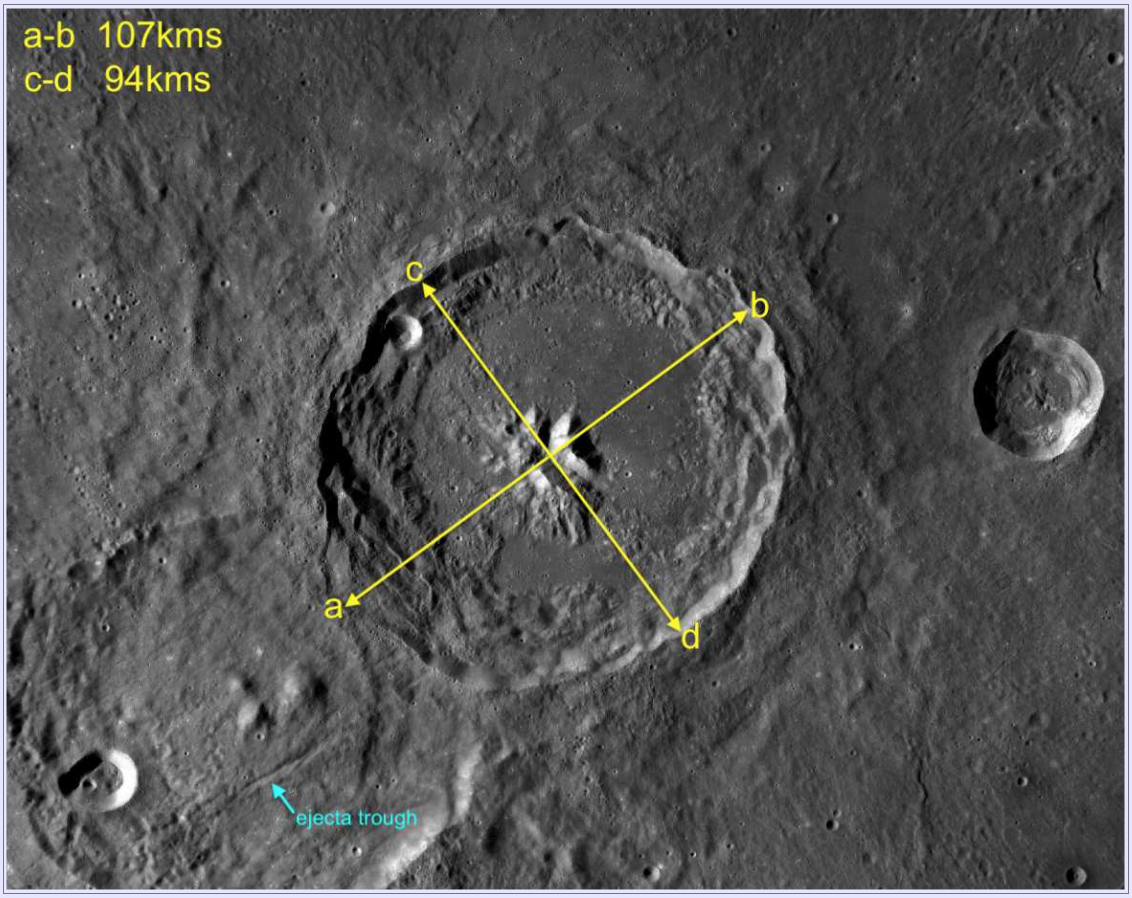

Fig.2. *Theophilus showing the slightly elongate crater outline. Note the linear trough in the ejecta just to the south of the central peak of Cyrillus.*

Well, by way of coincidence I suggested a little while ago, in the January 2023 LSC (Vol.60 No.1) that Theophilus originated from an impact from the north-east, but based on the presence of the unusual chevron shaped feature to the south of Torricelli (Fig.3), which is usually taken to be the almost completely submerged rim of an ancient mare filled crater. This interpretation is certainly the most obvious one, but this particular feature reminded me strongly of other chevron shaped ridges that are in fact part of the up-range ejecta pattern of certain low angle impact craters .

Fig.3. *A Terrain Hill Shade rendition Sinus Asperitatis, showing the distribution of Theophilus secondary craters which extends up to but only sparsely beyond the chevron ejecta feature (yellow arrows) to the south of Torricelli*.

Fig.4. *LROC WAC image of Horrocks showing the chevron ridge to the south which is a feature of the up-range ejecta pattern.*

One of the best examples of this type of structure can be seen to the south of the 29km diameter crater Horrocks

(Fig.4), where you can see a distinct chevron ridge separating the ejecta scared terrain to the north from the less heavily blanketed terrain to the south (Fig.5).

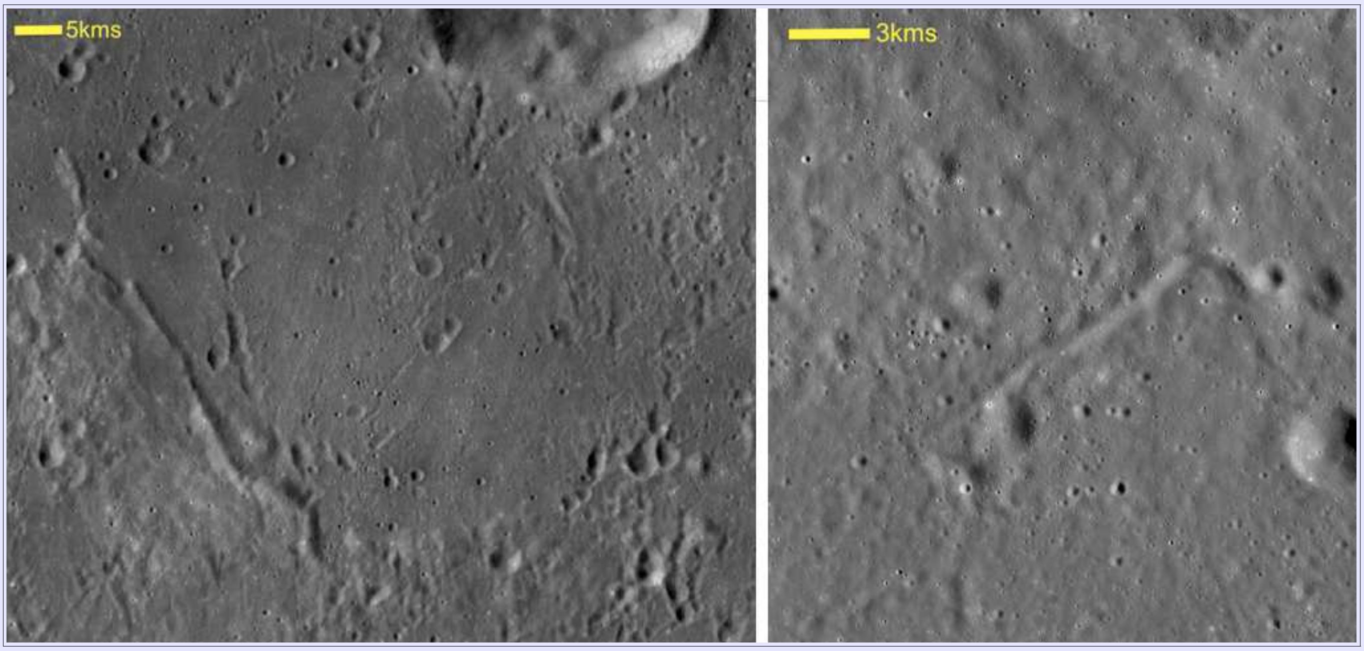

Fig.5. *A comparison between the chevron structure to the south of Torricelli (left) and that to the south of Horrocks (right).*

Though on quite different scales these chevron features are strikingly similar, even down to the observation that the terrain of the side towards the 'parent' crater is more deeply covered in ejecta than the terrain on the far side of the ridge (Fig.6). The difference in scale which is apparent in Fig. 5, is probably to do with Theophilus being over twice the size of Horrocks, but of course we may be looking at two different structures and the similarity we see may just be coincidence.

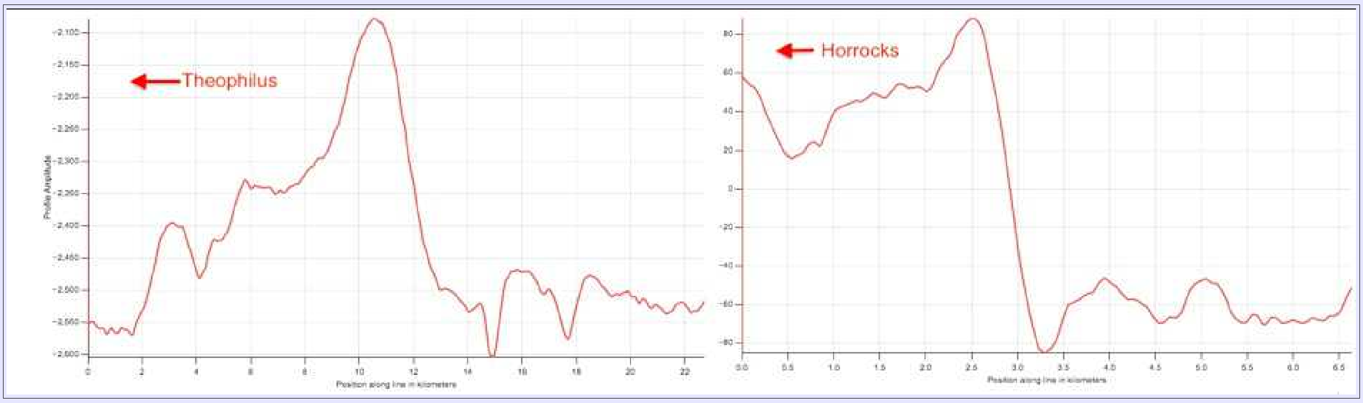

Fig.6. *Cross section over the chevron ridges associated with Theophilus and Horrocks, as can be seen the depth of ejecta is greater on the side towards the 'parent' crater.*

So, do we have two lines of evidence pointing to Theophilus being an oblique impact from the north-east?Well there is a fly in this ointment and it is illustrated by Fig.7. If the chevron shaped ridge is an up-range ejecta feature similar to the one in Horrocks, then the impactor trajectory might be expected to be something similar to the white arrow, bisecting the chevron and passing through the central peak which is aligned along a NNE-SSW axis, but if we are looking at the general outline of Theophilus we can see that the long axis of the crater, which might indicate impactor trajectory is aligned along a NE-SW axis – shown by the red arrow.

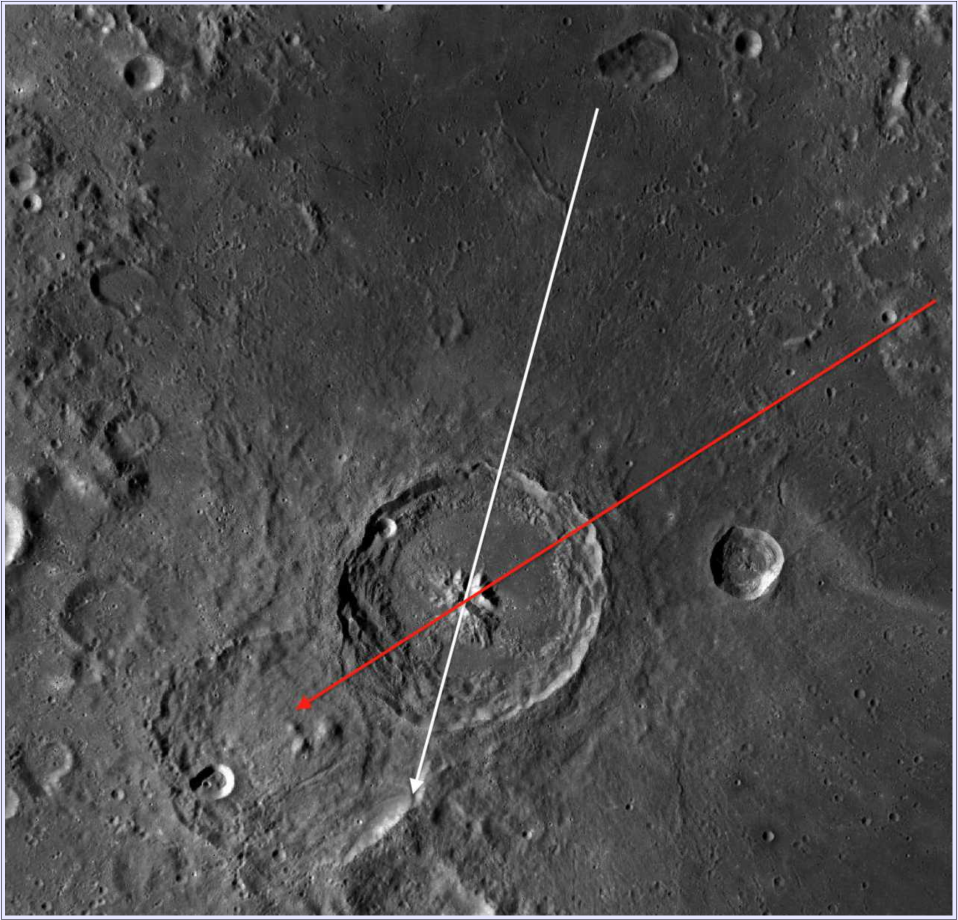

Fig. *7. The white arrow bisects the chevron ridge and passes through the central peak of Theophilus – this might indicate the impactor trajectory if this ridge is an ejecta feature. It diverges significantly however from what appears to be the long axis of Theophilus shown by the red arrow.*

Unfortunately the mineralogical data is not much help in showing up any asymmetry in the ejecta blanket of Theophilus so this does not help interpretation. What might support the white arrow trajectory hypothesis is that the rim of Theophilus is generally lower in this direction, which would be consistent with a low angle impact from this direction, and as Bill pointed out in his article, large volumes of impact melt appear to have been propelled up and over this part of the rim, possibly by the collapse of the wall separating Theophilus and Cyrillus. Additionally the collapse of this intervening wall between Theophilus and Cyrillus might have been the result of gravitational instability and not be a direct result of the impactor coming from the NE so might not be in the precise down-range direction, but off to one side.

I am open to be persuaded that the this chevron feature is not part of the ejecta from Theophilus but is a part of the rim of a submerged crater – the physical similarity is not sufficient on its own to state conclusively that it is the same as whet we see in Horrocks, but I would agree with Bill that Theophilus has all the hallmarks of a low angle impact from the north-east or thereabouts.

Your thoughts on this conundrum welcome!

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LUNAR GEOLOGICAL CHANGE DETECTION PROGRAMME
by Tony Cook.

News: On 2025 Mar 14 there will be a total lunar eclipse. It will be best seen from the Americas, and from Europe it only the umbral stage before totality will be visible, except for parts of totality close to moonset as seen from western extremities of Europe. The Penumbral contact (P1) starts at 03:57UT and you might notice a very faint, slightly yellow, tint the Moon. Then the dark umbral shadow encroaches (U1) the Moon at 05:09UT and will be plainly visible spreading across the Moon from the SW to NE of the disk. The total eclipse begins (U2) at 06:26UT. The middle of the eclipse is at 06:59UT. Then the Moon begins to leave the umbra (U3) at 07:31UT, with the last remaining umbral shadow (U4) at 08:48UT. Then finally the Moon exits the faint penumbral shadow (P4) at 10:01UT. Please monitor the umbral shadow with video for lunar impact flashes.

TLP Reports: Upon re-examination of an archive video from March and a new Video from Dec 2024 the Italian UAI Lunar Section reports two candidate impact flashes. Unfortunately these have yet to be confirmed so they need your help. If you were videoing the Moon at these times please check: a flash videoed on 2024 May 12 UT 20:14:05, observed by Luigi Zanatta, with the flash located in western Sinus Medii. The second was recorded on 2024 Dec 06 UT 17:13:53 also by Luigi Zanatta, with the flash located not far from Plato.

Additional Routine reports received for December included: Valerio Fontani (Italy – UAI) imaged Herodotus, Eugino Polito (UAI – Italy) imaged: Plato. Aldo Tonon (Italy – UAI) imaged: Herodotus.

Analysis of Reports Received (December): Note that time constraints imposed on the author don't allow us to do any analysis in full this time, so please just take a look at the images and the reports and make your own judgement as to whether what happened in the past and was regarded as a TLP is recurring under these repeat illumination windows or was something unique that was seen.

Herodotus: On 2024 Dec 12 Valerio Fontani and Aldo Tonon respectively imaged this crater under similar illumination to the following two reports:

On 2002 Feb 24 UT 06:05-06:20 W. Haas (Las Cruces, NM, USA) observed that the shadow was, almost, but not completely black. This might have been related to the observing conditions. ALPO/BAA weight=2.

On 2016 Jun 17 UT 05:00 A.Anunziato (AEA, Argentina Meade ETX 105, seeing 7/10, sketch made) observed a very tiny light spot where the shadow from topographic relief to the south of Vallis Schroteri nerges into the crater rim shadow on the floor of Herodotus. There should be no light spot here. ALPO/BAA weight=1.

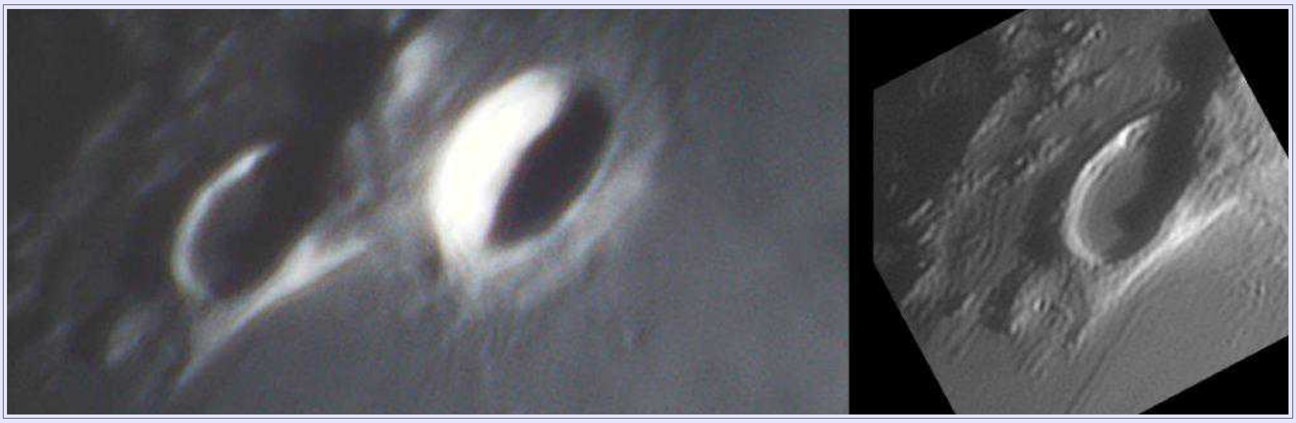

Figure 1. Herodotus from 2024 Dec 12 with north towards the top. **(Left)** An image by Valerio Fontani at 16:47 which matches the illumination of the 2002 TLP. **(Right)** An image by Aldo Tonon taken at 20:43 UT which matches the illumination of the 2016 TLP.

Plato: On 2024 Dec 14 UT 16:55 Eugino Polito imaged this crater for the following Lunar Schedule request:

BAA Request: Two observers have reported colour on the rim around this colongitude, once in 1938, and again in 2013. Please take a look and report what you see, and where on the rim. Please send any high resolution images, detailed sketches, or visual descriptions to: a t c @ a b e r . a c. u k .

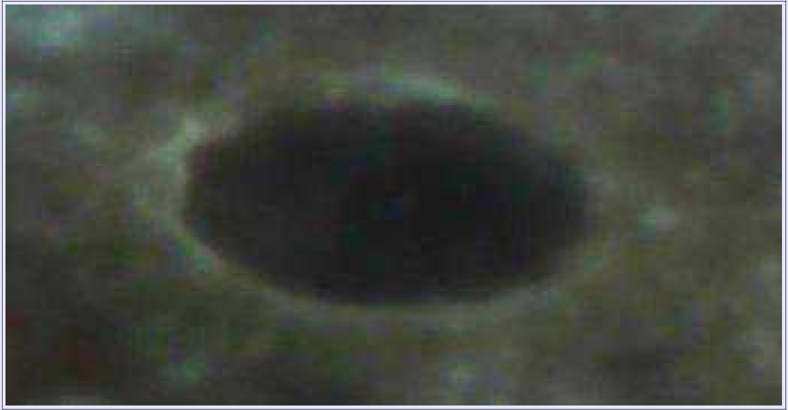

Figure 2. Plato on 2024 Dec 24 at 16:55UT with north towards the top and colour saturation increased.

Routine reports received for January included: Alberto Anunziato (SLA – Argentina) observed: Aristarchus, Gassendi, Peirescius and Proclus. Maurice Collins (ALPO/BAA/RASNZ) imaged the whole Moon. Tony Cook (Newtown, Wales – BAA): videoed the Moon in polarized light and in the H band in the SWIR. James Dawson (BAA – Nottingham) imaged: Clausius, Gassendi, Letronne, Plato and Schiller. Walter Elias (AEA – Argentina) imaged: Archimedes, Aristarchus, Censorinus, Gassendi, and Proclus. Chris Longthorn (BAA) imaged: Alphonsus, Cassini, Censorinus, Manilius, Vallis Alpes and several features. Trevor Smith (BAA - Codnor, UK) observed: Aristarchus, Copernicus, Mare Crisium, Mons Piton, Plato and Promontorium Laplace. Bob Stuart (BAA – Wales) imaged: Apollonius, Atlas, Bela, Boussingault, Casatus, Cleomedes, de la Rue, Furnerius, Galle, Langrenus, Manzinus, Mare Crisium, Mercurius, Mutus, Petavius, Rosenberger, Sheepshanks, Vendelinus, Watt, Yoshi, Zach and several features. Aldo Tonon (UAI - Italy) imaged: Cyrillus and Mons Vinograd. A. Vandenbohde (BAA) imaged: Clavius, Moretus, and Schiller.

Analysis of Reports Received (January): Note that time constraints imposed on the author don't allow us to do any analysis in full this time, so please just take a look at the images and the reports and make your own judgement as to whether what happened in the past and was regarded as a TLP is recurring under these repeat illumination windows or was something unique that was seen.

Lyell: On 2025 Jan 04 UT 08:09-08:13 Maurice Collins imaged the Moon under similar illumination to the following report:

Lyell 1972 Nov 10 UTC 23:43 Observed by Bartlett (Baltimore, MD, USA, 3" refractor x54, x100, x200S=3, T=5) "At apparent centre of floor & edge of morning shadow an elongated, N-S irreg. obj. dull whitish-gray, albedo=4 like a c.p. (photo in Kwasan atlas in 1963 taken at col. 339.3 deg has a faint suggestion of a bright spot in that place- (plate 20) LO IV66 h2 & 73 H2, sun elev. @ 20deg show an even, dark floor with a very small crater right in centre -- unresolvable at earth. Kwasan photo's spot could be an artifact" NASA catalog weight=3. NASA catalog ID #1349. ALPO/BAA weight=2.

Figure 3. Lyell on 2024 Dec 24 UT 08:09-08:13 the Lyell area, from a larger mosaic, as imaged by Maurice Collins (ALPO/BAA/RASNZ) and orientated with north towards the top. Lyell is located just left of the image centre here.

Birt: On 2025 Jan 07 UT 18:07 Chris Longthorn (BAA), imaged Alphonsus, but the image included part of Birt under similar illumination to the following report:

2004 Dec 20 UT 02:51-03:26 R. Gray (Winumma, USA) noted that the crater had exceptional brightness to nimbus surrounding it. ALPO/BAA weight=1.

Figure 5. The eastern edge of Birt, with part of the nimbus area (lower left edge of image), on 2024 Jan 07 UT 18:07 as imaged by Chris Longthorn and orientated with north towards the top.

Mons Piton: On 2025 Jan 09 UT 21:00-21:52 Trevor Smith (BAA) observed visually this mountain under similar illumination to the following report:

Piton 1969 Nov 19 UT 21:15-22:00 Observed by Baum (England, 4.5" refractor) "Traces of cloudiness on E. slope at 2115h. Increased at 2150h in extent & brightness. Spread onto plain. Summit & shadow in W. part sharp & clear. (Apollo 12 watch)."NASA catalog weight=2. NASA catalog ID #1221. ALPO/BAA weight=2.

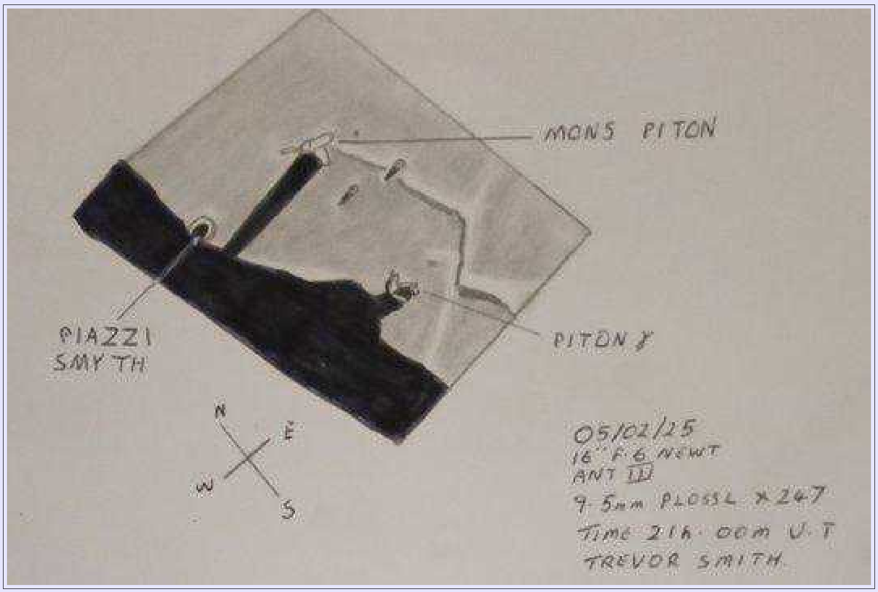

Figure 6 Mons Piton as sketched by Trevor Smith BAA – see image for details

Trevor commented "I looked and found Mons Piton in my estimate to be very slightly fainter than Proclus. Piton was bright but no brighter than is usual at this stage of illumination. Piton had a long narrow Black Shadow Spire to its western edge reaching all the way to the terminator. Its north, south and eastern edges were bright and not in shadow as stated in Marshall's report! To me everything looked normal! No false colour or obscuration was seen"

Plato: On 2025 Jan 10 UT 17:39 James Dawson (BAA) imaged Plato under similar illumination to the following report:

Plato 1980 May 25 UT 21:33-22:54 Observed by North (Seaford, UK, seeing III-IV, 460mm Newtonian) Definite strong reddish glow along NNW border, definitely much stronger than spurious colouration and always visible when telescope moved in RA and Dec to eliminate possible chromatic aberration effects in the eyepiece. Effect ended by 21:54 UT. BAA Lunar Section Report. ALPO/BAA weight=2

Figure 7 Plato as imaged by James Dawson (BAA) on 2025 Jan 10 UT 17:39 and orientated with north towards the top.

Proclus: On 2025 Jan 14 UT 04:24 Walter Elias (AEA) imaged this crater under similar illumination to the following report:

Proclus 1972 Nov 20 UT 20:20 Observed by Farrant (Cambridge, England, 8.5" reflector, x178) "Dark patch in crater. Disappeared by next nite. The normal ring seemed thickened. On Dec. 7. the crater appeared bright. Drawings. (prob. real LTP, nr. FM)" NASA catalog weight=3. NASA catalog ID #1350.

Figure 8 Proclus as imaged by Walter Elias (AEA) on 2025 Jan 14 UT 04:24 and orientated with north towards the top.

Cleomedes A: On 2025 Jan 15 UT 00:02 Bub Stuart (BAA) imaged Cleomedes under similar illumination to the following report:

On 1993 Sep 02 UT2250-23:30 C. Brook (Plymouth, UK, 70mm refractor, x100, seeing=III) noted that Cleomedes A was exceptionally bright and compared it with plate 4C in Henry Hatfield's Atlas. He had noticed it was bright earlier in the evening, but his attention was drawn to it at 22:50UT. By 23:07UT it was dimmer, with patches of cloud coming up and a slight deterioration in seeing. By 22:30 UT the crater was no longer exceptionally bright. The Cameron 2006 catalog ID=466 and weight=5. The ALPO/BAA weight=1.

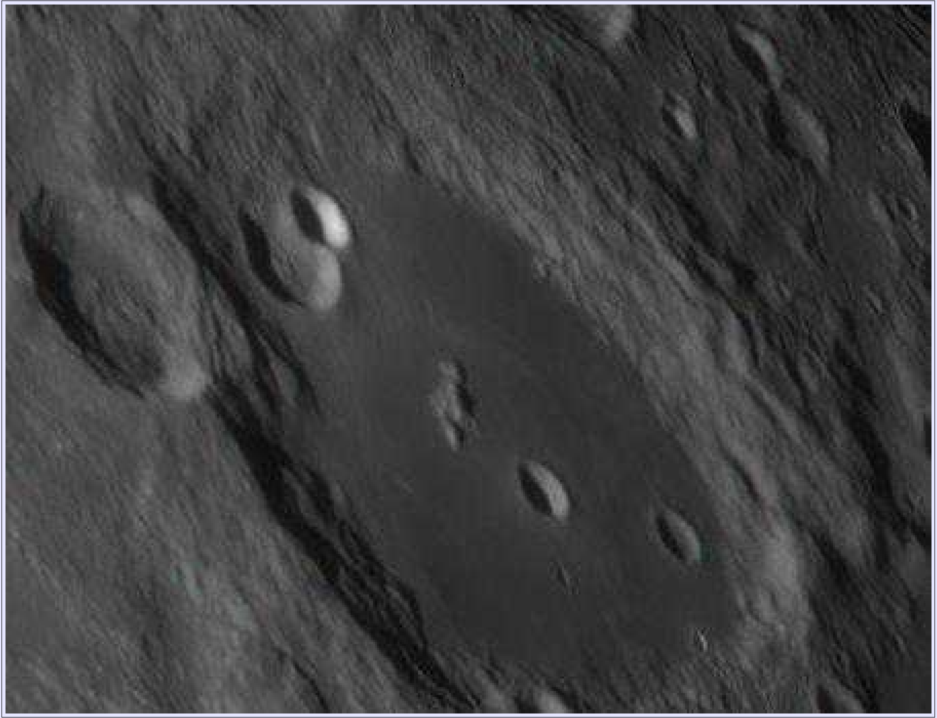

Figure 9 Cleomedes as imaged by Bob Stuart (BAA) on 2025 Jan 15 UT 00:02 and orientated with north towards the top. Cleomedes A is near the top of the floor of the crater.

Mons Vinogradov: On 2025 Jan 17 UT 23:33 Aldo Tonon (UAI) imaged this area under similar illumination to the following report:

On 2006 Jan 16 at 05:44UT T. Bakowski (Orchard Park, NY, USA) observed a round dark object in 1 of 21 frames from a camera. The exposure was 1/250th sec. Seeing conditions were bad. The dark spot is east of Mons Vinogradov, at or near crater J. ALPO/BAA weight=1.

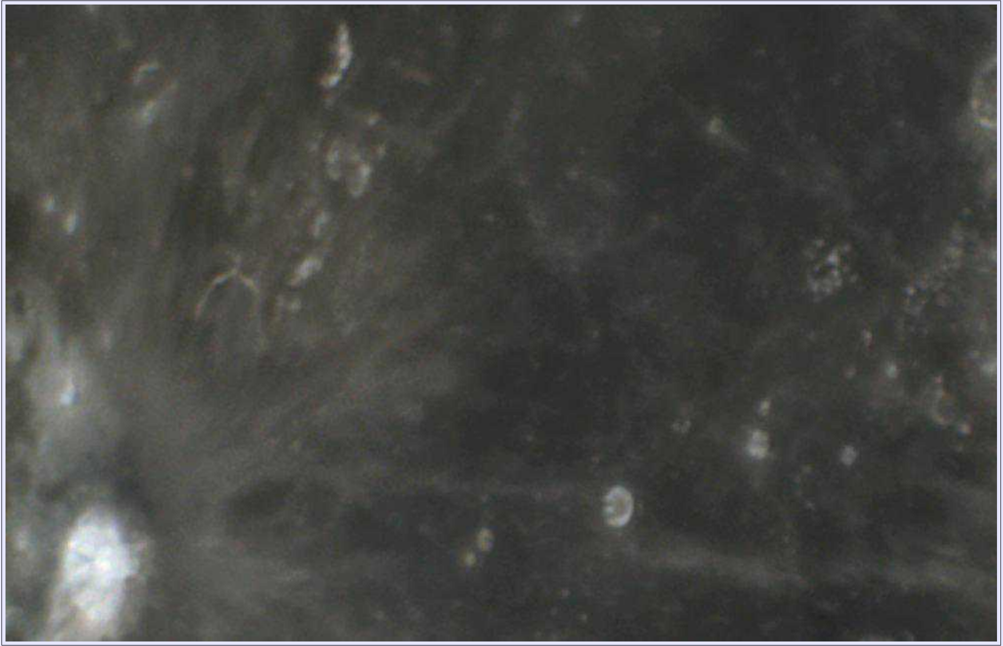

Figure 10 Mons Vinogradov as imaged on 2025 Jan 17 UT 23:33 and taken by Aldo Tonon (UAI).

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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