

DEVOTED TO THE STUDY OF EARTH'S MOON

VOL. 30 No. 2

SUMMER/FALL 2011

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The Journal of the American Lunar Society





Selenology

Vol. 30 No. 2 Summer/Fall 2011

The official journal of the American Lunar Society, an organization devoted to the observation and discovery of Earth's moon.

Contents

Eskildsen's Moon4

We apologize for the tardiness in publication of this issue. Last June our computer crashed, taking the templates and software for publication with it. New templates for layout had to be built. New software had to be learned. Transfer skills going from a PC to a Mac had to be developed. With the publication of this issue, things should be on track again. The winter issue is expected to appear in late December / early January.



Cover:

Waning Gibbous 2011/06/17, 08:44 UT,
(4-image composite), Seeing 7/10, Transparency
2/6, 6" f/8 Refractor, Explore Scientific Lens,
0.72X Focal Reducer, Losmandy GM8 Mount,
JMI Electric Focuser, DMK 41AU02.AS, Howard
Eskildsen, Ocala, Florida, USA

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Eskildsen's Moon

For quite a while now, Howard Eskildsen has been sending me the most remarkable e-mails. Time and again they have driven me back to my telescope to view what I had thought I'd seen before. His work has let me look at the moon with fresh eyes. It deserves to be shared and Howard has graciously given his blessing to reprinting excerpts in our journal. - Steve Boint, editor

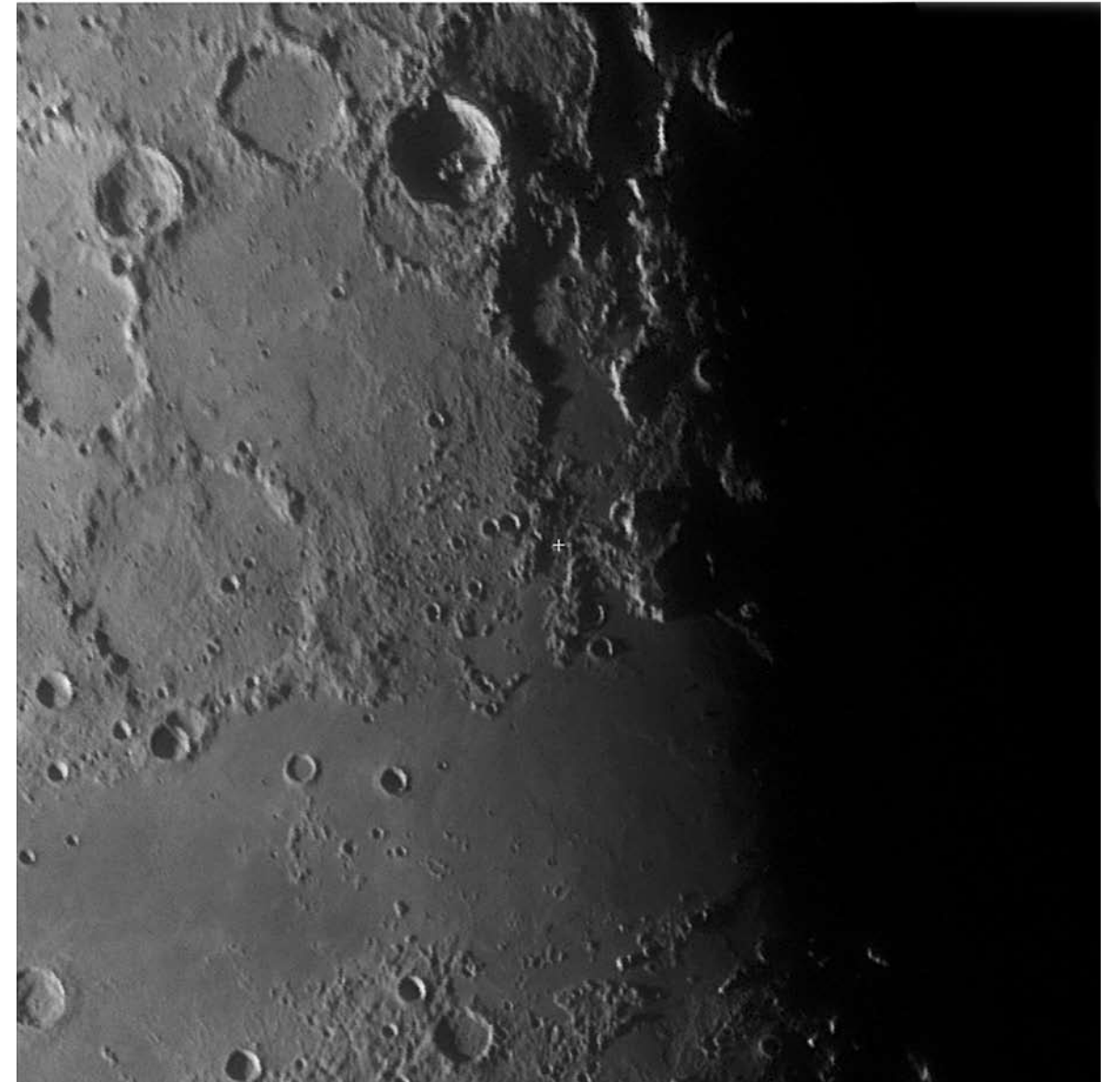
LTVT Image: Sub-solar Pt = 47.147 W/0.809 N Sub-Earth Pt = 11.109 W/55.850 N Center = 20.024 W/63.192 N Zoom = 5.000
Vertical axis : central meridian



Texture file: NW Comp 110123 1048 copy.jpg

I was looking at the area of the strange rays over Frigoris and prepared aerial views of the region using LTVT for two photographs that I took with the 6" refractor (Explore Scientific lens). One shows Anaxagoras rays and the Frigoris rays while the other shows a rugged valley between Philolaus and Anaxagoras that extends southward to Mare Frigoris just west of Fontenelle. (The latter image was set to the same date and time as the ray photo for better comparison.) Some of the Frigoris rays almost appear to branch off of the more pronounced Anaxagoras rays as they approach the rims of the valley or nearby rugged terrain. I wonder: Is it possible for topographic formations to deflect low angle ray ejecta from Anaxagoras to produce the fan of rays the extend across the western part of Frigoris? It is also interesting to note that one bright ray approaches the western edge of the valley about halfway between Philolaus and Fontenelle then noticeably turns to follow the western ridge of the valley, while another bright ray just a little farther north traverses the ridge apparently unaffected. Curious.

LTVT Image: Sub-solar Pt = 47.147 W/0.809 N Sub-Earth Pt = 24.868 W/64.060 N Center = 24.868 W/64.060 N Zoom = 5.000
Vertical axis : central meridian



Texture file: NW Limb 101031 0836.jpg

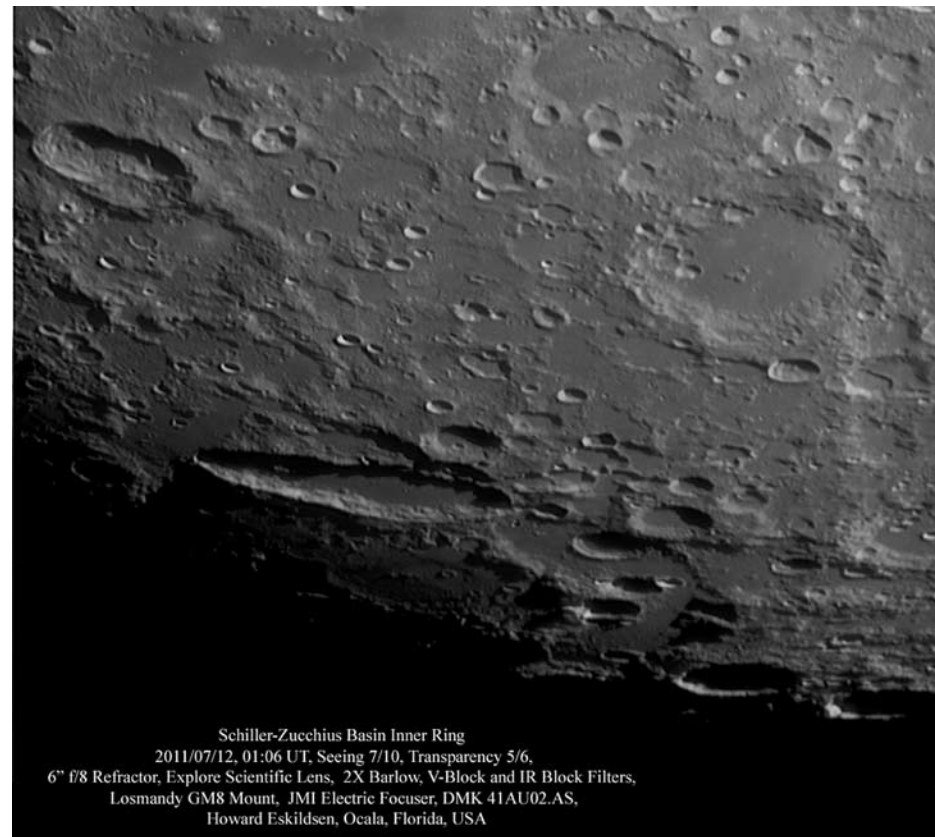


The favorable librations in April revealed a good share of the rays from Thales (crater left of center about 1/3 of the way down from the top) plus the "Hayn Ray." Imbrium sculpture and many other fascinating areas are also visible. The ray's zone of avoidance to the upper left of the crater shows the direction of approach of the impacting object. You will not often see this area so favorably tilted towards Earth!

Thales Rays

(4-image composite)
2011/04/14, 00:51-00:55 UT
Seeing 9/10, Transparency 5/6,
6" f/8 Refractor, Explore Scientific Lens,
JMI Electric Focuser, Losmandy GM8 Mount,
DMK 41AU02.AS, 3X Barlow, IR-block and V-block Filters
Howard Eskildsen, Ocala, Florida, USA

At the bottom center of the photo, part of the battered multi-ringed Schiller-Zucchius basin is clearly visible. The tortured, elongated crater Schiller obliterates part of the basin's outer northern rim, but the rim continues to the right and curves downward to be lost in the darkness at the northern margin of Zucchius. Part of the smaller inner ring matches the curvature of the outer ring just to the right of center, while a depression between the widest portion of Schiller and the dark terminator hints at a third, innermost ring of this multi-ringed basin. The basin is often referred to as a double-ringed basin, but it has been suggested in the past that there are actually three rings. This photo supports the latter view.

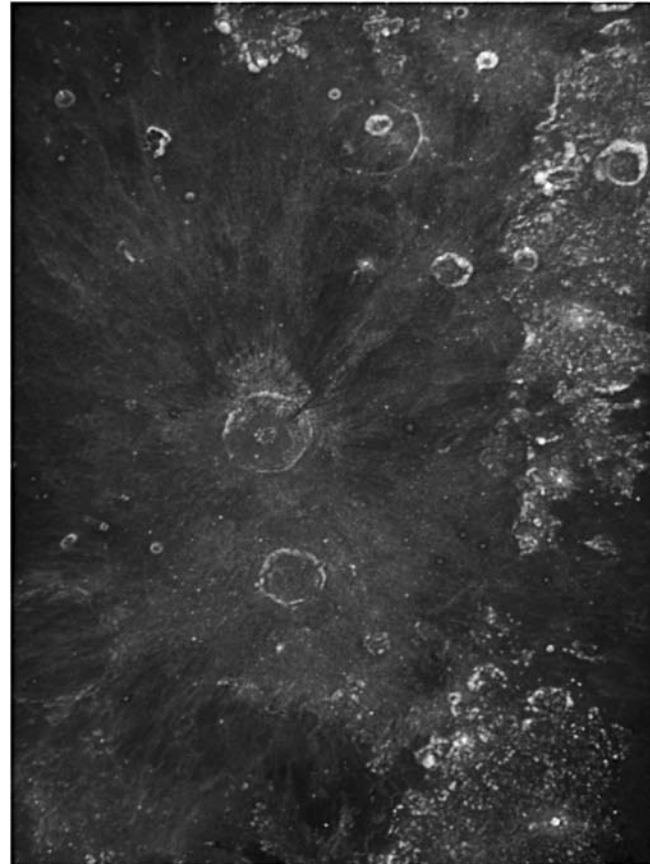


Schiller-Zucchius Basin Inner Ring
2011/07/12, 01:06 UT, Seeing 7/10, Transparency 5/6,
6" f/8 Refractor, Explore Scientific Lens, 2X Barlow, V-Block and IR Block Filters,
Losmandy GM8 Mount, JMI Electric Focuser, DMK 41AU02.AS,
Howard Eskildsen, Ocala, Florida, USA

I re-processed this region from recent images in order to accent the rays, especially the prominent NE Tycho ray which crossed diagonally across the center of the image. But check out the rays from Aristillus across Asperitatis and the Nectaris basin. Note all the dark halos. And what is with Rosse, the small, bright crater in southern Nectaris with the comet-like tail of a ray streaming to the northeast? Is this just a coincidence, or is Rosse not as old as billed, but rather a Tycho secondary? Probably not, but this area really needs a lot more study.



NE Tycho Rays 2011/07/12, 01:32 UT, Composite, Seeing 7/10, Transparency 5/6,
6" f/8 Refractor, Explore Scientific Lens, 2X Barlow, V-Block and IR Block Filters,
Losmandy GM8 Mount, JMI Electric Focuser, DMK 41AU02.AS,
Howard Eskildsen, Ocala, Florida, USA



Aristillus: Crater and central peak diameters

Diameter: 54 km at 01.22°E, 33.87°N
 Central peak base diameter: 15 km at 01.18°E, 33.81°N

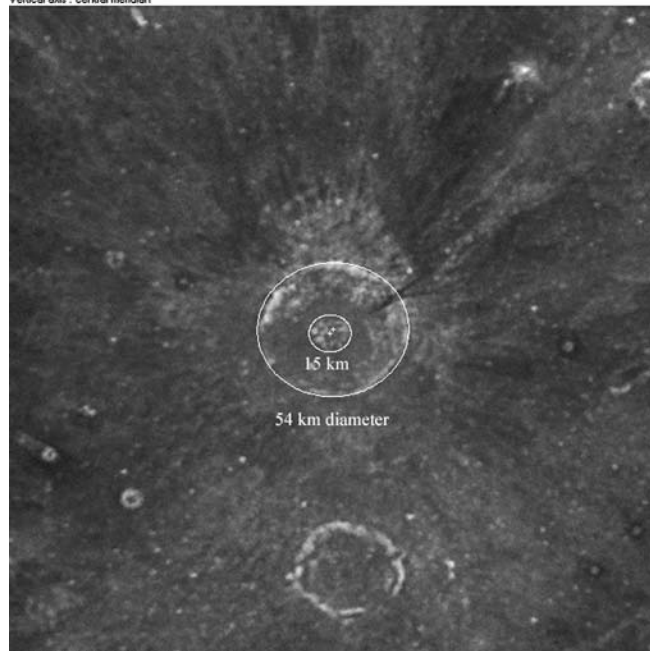
Calibration craters: Archimedes C, Cassini C
 Cross checked with: Aristillus A & Piton B
 (All 1994 ULCN database craters)

Aristillus A	Longitude	Latitude
Measured coordinates:	04.55°E	33.63°N
ULCN coordinates:	04.488°E	33.623° N

Piton B	Longitude	Latitude
Measured coordinates:	00.16°W	39.33°N
ULCN coordinates:	00.153°W	39.36° N

2011/04/18, 03:18 UT, Seeing 7/10, Transparency 5/6,
 6" f/8 Refractor, Explore Scientific Lens, 3X Barlow,
 DMK 41AU02.AS, IR-block and V-block Filters
 Howard Eskildsen, Ocala, Florida, USA

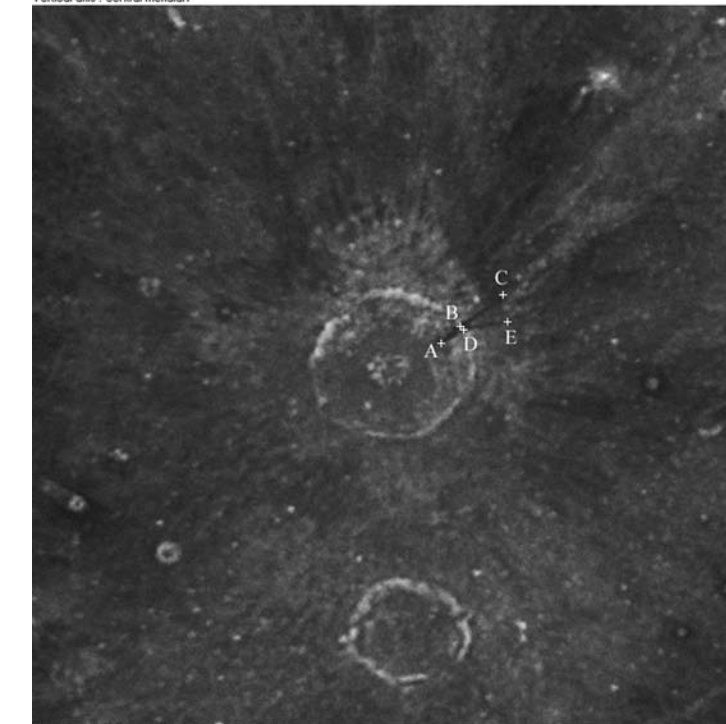
LTVT Image: Sub-solar Pt = 1.557 E/1.298 N Sub-Earth Pt = 2.640 E/5.994 N Center = 1.241 E/33.848 N Zoom = 15.000
 Vertical axis : central meridian



Texture file: Aristillus 11-04-18 03-18-08p copy.jpg
 This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 4/18/2011 at 03:18:00 UT

Aristillus 2011/04/18, 03:18 UT, Seeing 7/10,
 Transparency 5/6, 6" f/8 Refractor, Explore
 Scientific Lens, 3X Barlow, Losmandy GM8
 Mount, JMI Electric Focuser, DMK 41AU02.AS,
 IR-block and V-block Filters.

LTVT Image: Sub-solar Pt = 1.557 E/1.298 N Sub-Earth Pt = 2.640 E/5.994 N Center = 1.241 E/33.848 N Zoom = 15.000
 Vertical axis : central meridian



Texture file: Aristillus 11-04-18 03-18-08p copy.jpg
 This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 4/18/2011 at 03:18:00 UT

Aristillus: Dark Band Measurements

Segment	Distance	Azimuth
A-B	8.7 km	45°
B-C	17.9 km	50°
A-D	8.7 km	56°
D-E	14.4 km	78°

Pont	Longitude	Latitude
A	1.85°E	34.13°N
B	2.09°E	34.33°N
C	2.64°E	34.71°N
D	2.14°E	34.29°N
E	2.70°E	34.38°N

Calibration craters: Archimedes C, Cassini C
 Cross checked with: Aristillus A & Piton B
 (All 1994 ULCN database craters)

Aristillus A	Longitude	Latitude
Measured coordinates:	04.55°E	33.63°N
ULCN coordinates:	04.488°E	33.623°N
Error:	00.06°E	00.01°N

Piton B	Longitude	Latitude
Measured coordinates:	00.16°W	39.33°N
ULCN coordinates:	00.153°W	39.36°N
Error:	00.01°W	00.03°S

2011/04/18, 03:18 UT, Seeing 7/10, Transparency 5/6,
 6" f/8 Refractor, Explore Scientific Lens, 3X Barlow,
 DMK 41AU02.AS, IR-block and V-block Filters
 Howard Eskildsen, Ocala, Florida, USA

Anaxagoras

Image: north up



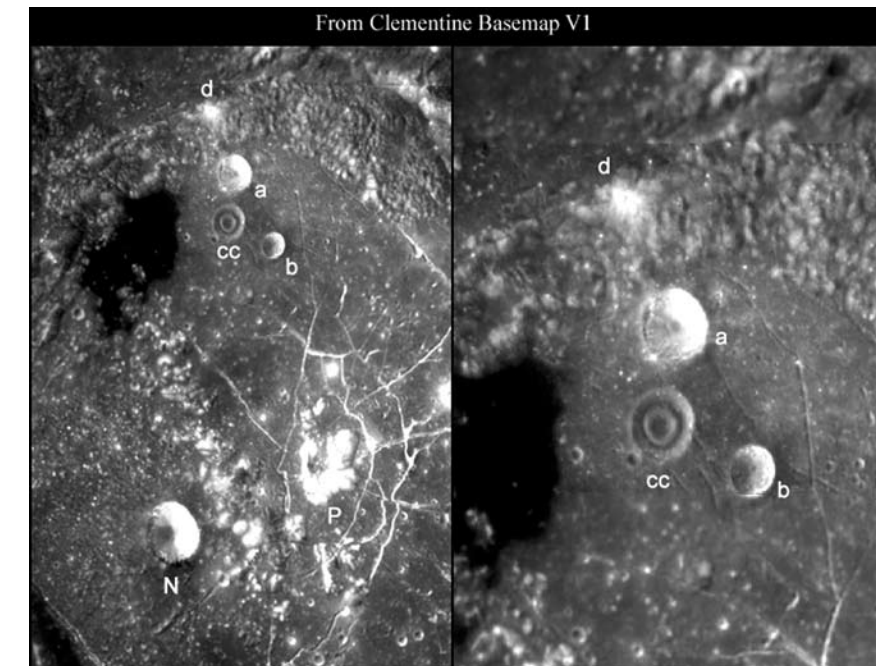
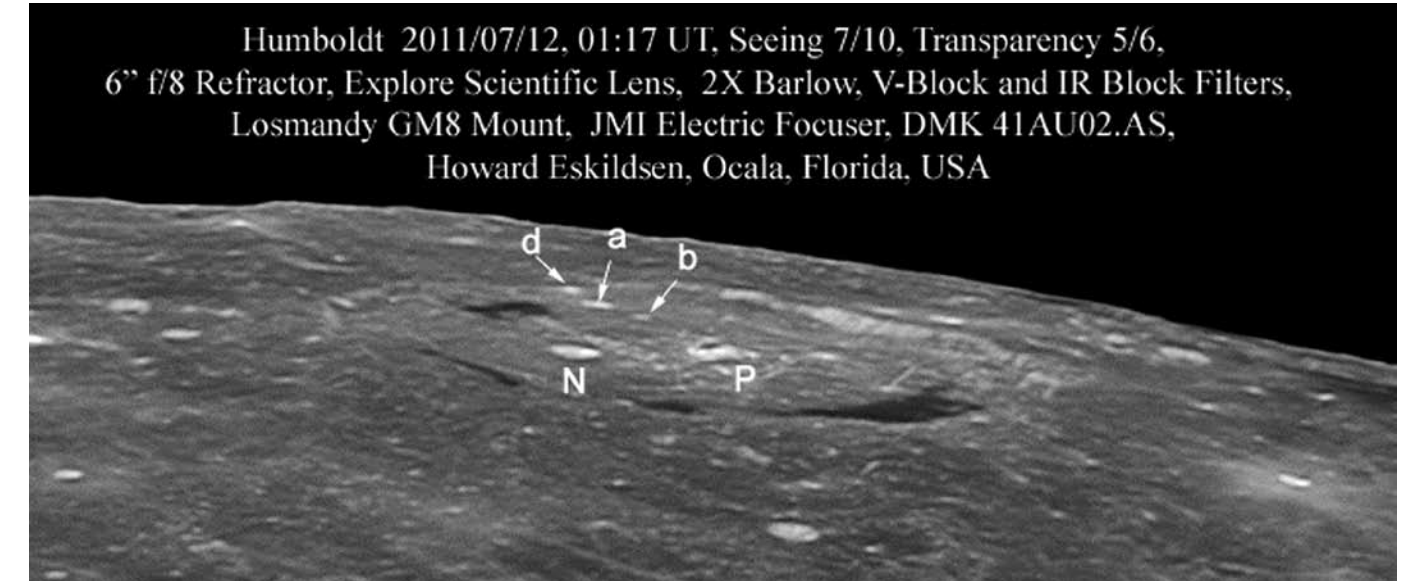
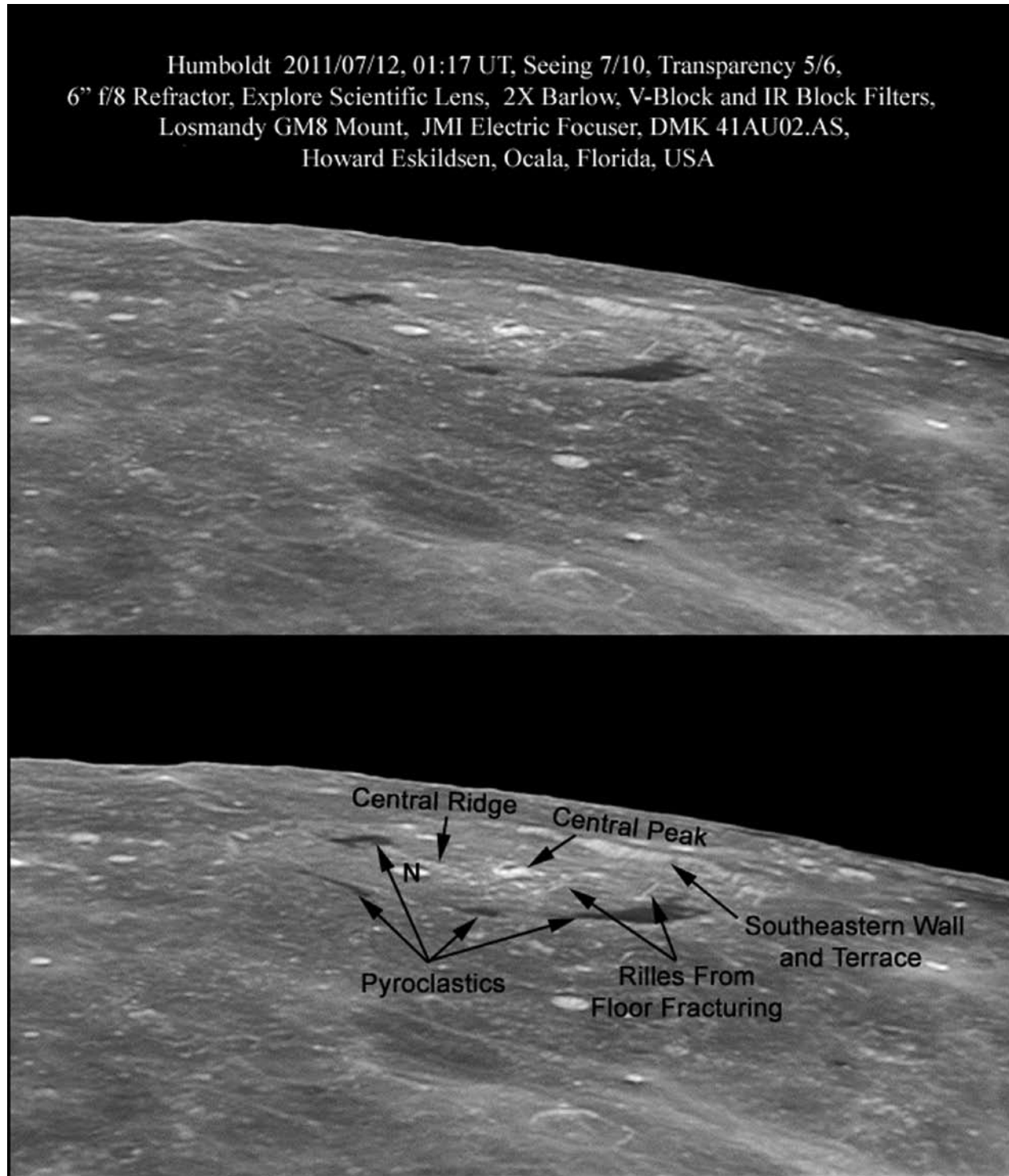
A rough interior is evident with varying albedo features. The central peak area appears jumbled and disorganized, and a ridge crosses the central crater just beyond the shadow of the eastern rim. On the southwestern rim, near the central ridge margin, a prominence approximately 5 km across rises to 580m ± 100m height (LTVT measurement). Bright bands that are visible under high illumination do not appear in this image.

A terrace is visible on the northwestern crater wall that angles downward over a distance of about 30 km towards the southwestern base of the crater wall.

The crater diameter measures 53m ±2 km, and the crater depth 2700m ± 200 m (per LTVT) on this image. Limb foreshortening, however, may compromise the reliability of the data.

Howard Eskildsen, 6" f/8 Refractor, Explore Scientific Lens
 DMK AU02.AS, 3X Barlow, IR Block and V-block Filters
 Seeing: 9/10, Transparency: 5/6
 Date 2011/04/14, Time (UT): 00:43

A recent imaging session got me thinking about Humboldt again. My humble image and the Clementine V1 basemap image yield insights that support the hypothesis that igneous intrusion is the cause of concentric craters. The images reveal that Humboldt's concentric crater is by far the oldest crater of the close-knit trio on the crater floor since weathering has darkened it to the point that it no longer contrasts with the crater floor. The other craters are bright and fresh. By the time the two other craters appeared, the intrusives had cooled and solidified and could not alter the latter craters into concentric craters. Not absolute proof, but certainly consistent with the hypothesis.



Features on Humboldt

- “N” - Humboldt N, 14 km diameter.
- “P” - Central Peak
- “a” - Crater 8 km diameter
- “b” - Crater 5 km diameter
- “cc” - Concentric crater 8 km diameter
- “d” - rays from tiny crater, diameter undetermined

All features except the concentric crater are visible on the top earth-based telescope image. The concentric crater is not visible since it is much older and of same albedo of the crater floor.

Recent studies suggest igneous intrusion as the most likely cause of the formation of concentric craters, (see <http://www.lpi.usra.edu/meetings/lpsc2011/pdf/1698.pdf>) Were craters a & b of same age as the concentric crater, might igneous intrusion have made concentric craters of them as well?

I photographed the Capuanus area again this July. For some reason it has held my attention since I first started imaging the moon. Its strange projections to the northwest seemed like feathers in a cap and were hard for me to understand. Later during the same lunation when the lunar colongitude was around 200 degrees, I had briefly gazed at the moon through my little 5" Mak-Cass and noticed that Capuanus' feathers and many other surrounding features pointed back towards Mare Humorum. Obviously they were sculpture remnants from the formation of Mare Humorum. The July image hinted of this, but not to the degree that I had seen visually.



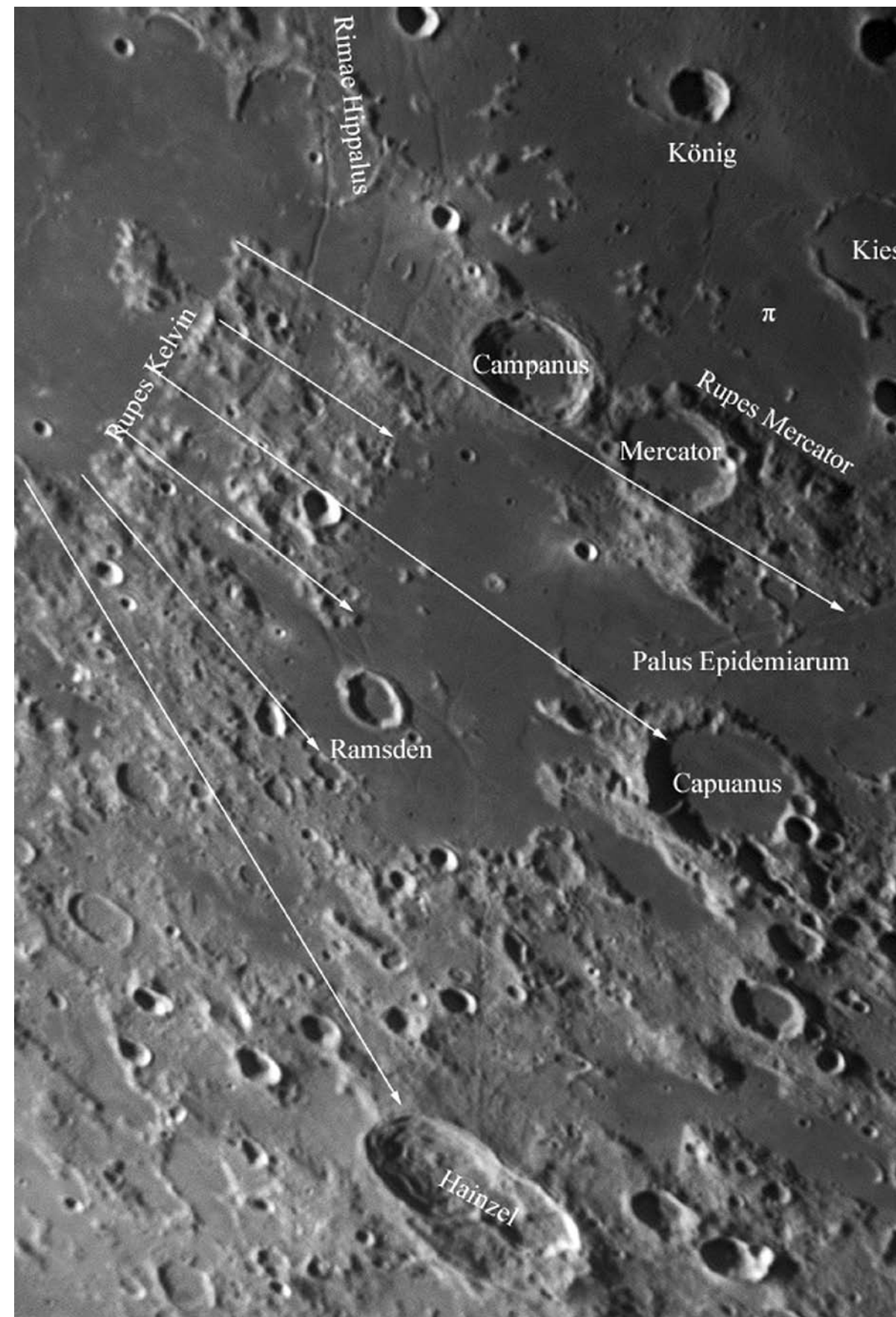
Palus Epidemiarum 2010/10/31, 08:18 UT, Seeing 7/10, Transparency 5/6, 6" f/8 Refractor, Explore Scientific Lens, 2X Barlow, Losmandy GM8 Mount, JMI Electric Focuser, DMK 41AU02.AS, No Filter, Howard Eskildsen, Ocala, Florida, USA

After searching my files I located another image from October, 2010, that nearly matched what I saw through the small scope, with the sculpture showing quite plainly. I added arrows showing some of the sculpture lines to both images for comparison. Some of the more southern areas without arrows seem to point more towards Vitello or southern Humorum than the areas marked with arrows. It makes me wonder if this might represent migration of the center of pressure due to oblique impact or modification by later, more distant impacts such as Orientale.

It is interesting how Palus Epidemiarum sits at the margin of sloping hills in a manner similar to Mare Vaporum at the foot of the Apennines on the northern moon. It is also separated from Lacus Excellentiae by a highland ridge that is similar to the separation between Mare Vaporum and Mare Aestuum, while another ridge separates Epidemiarum from Mare Humorum that is analogous to Montes Haemus. The whole area on the images reminds me of a micro

Montes Apenninus. Obviously-similar mechanisms were at work on a smaller scale.

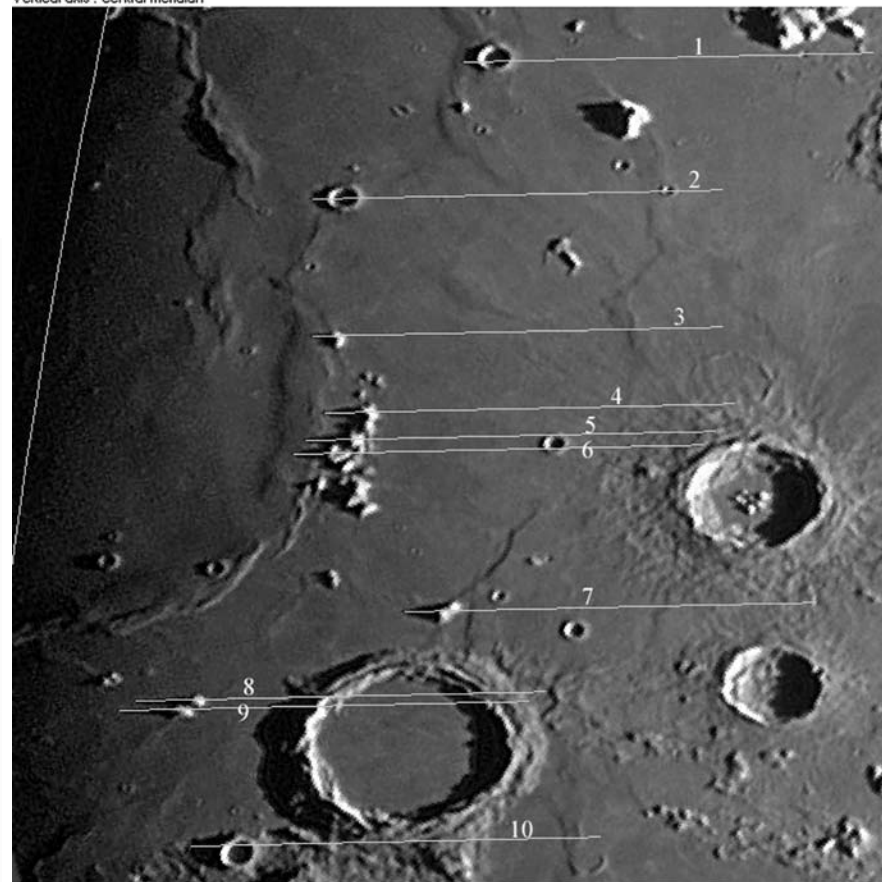
Had I not taken 5 minutes early one morning to gaze at the moon through a little scope, I might never have noticed and would still be scratching my head over Capuanus' feathers.





Clavius to Epidemiarum 2011/07/12, 01:08 UT, Seeing 7/10, Transparency 5/6, 6" f/8 Refractor, Explore Scientific Lens, 2X Barlow, V-Block and IR Block Filters, Losmandy G8 Mount, JMI Electric Focuser, DMK 41AU02.AS, Howard Eskildsen, Ocala, Florida, USA

LTVT Image: Sub-solar Pt = 79.274 E/0.072 S Sub-Earth Pt = 0.775 E/6.670 S Center = 3.552 W/34.755 N Zoom = 10.000 Vertical axis : central meridian



Texture file: Aristillus 080215 0016p2.jpg This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 2/15/2008 at 12:16:00 AM UT

Photo Data: 2008/02/15, 00:16 UT, Seeing 6/10, Clarity 5/6 D&G 8" f/12 refractor, courtesy of Louise Olivarez, Orion Starshoot II Solar System Imager. Ocala, Florida, USA Calibration points (from 1994 ULCN Dot File): Egede B, Marco Polo B

Measurements using LTVT inverse shadow length method. Turquoise "+" sign at shadow margin, coordinates show point of measurement along the reference line.

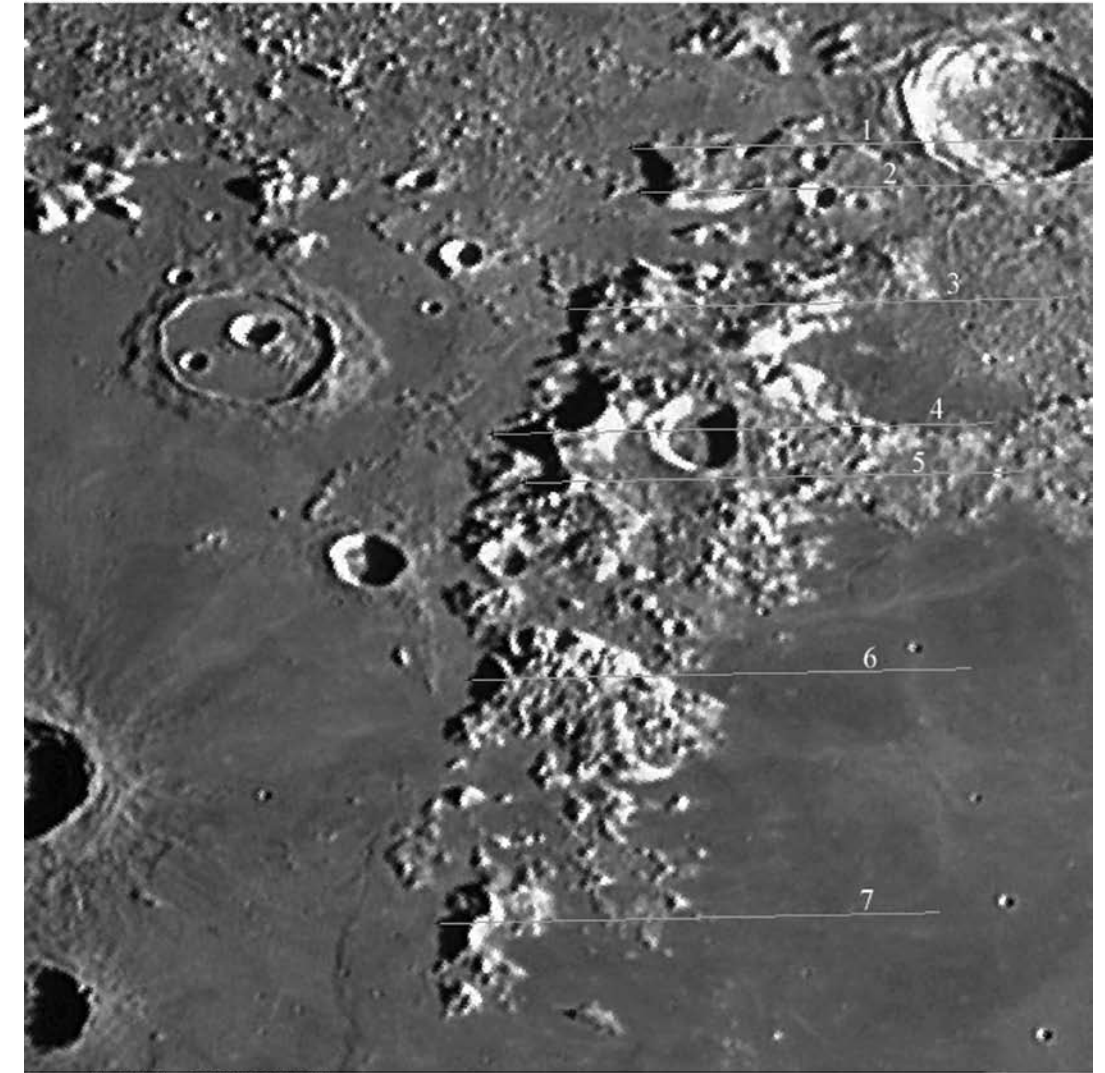
Montes Apenninus

Measurements	Long.	Lat.	
1. 4000 (3968)m @	04.16 E,	26.71 N	(APE 04162671)
2. 4200 (4224)m @	04.56 E,	26.06 N	(APE 04562606)
3. 2900 (2919)m @	03.68 E,	25.82 N	(APE 03682582)
4. 4300 (4299)m @	03.02 E,	24.55 N	(APE 03022455)
5. 4300 (4269)m @	01.56 E,	23.61 N	(APE 01562361)
6. 3600 (3620)m @	00.66 E,	22.25 N	(APE 00662225)
7. 4700 (4707)m @	00.07 W,	21.54 N	(APE 00072154)
8. 4400 (4388)m @	02.71 W,	20.26 N	(APE 02712026)
9. 4800 (4833)m @	03.06 W,	19.58 N	(APE 03061958)
10. 2600 (2611)m @	04.52 W,	18.65 N	(APE 04521865)
11. 4200 (4198)m @	04.46 W,	18.15 N	(APE 04461815)

Results rounded, raw data in parentheses. Parenthetic text and numerals at end of lines are database codes. (First three letters of nearby named feature followed by lunar coordinates of point of measurement.)

Error estimated at 100 m based on repeated measurements taken after data recorded.

LTVT Image: Sub-solar Pt = 79.274 E/0.072 S Sub-Earth Pt = 0.775 E/6.670 S Center = 8.733 E/37.404 N Zoom = 10.000 Vertical axis : central meridian



Texture file: Aristillus 080215 0016p2.jpg This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 2/15/2008 at 12:16:00 AM UT

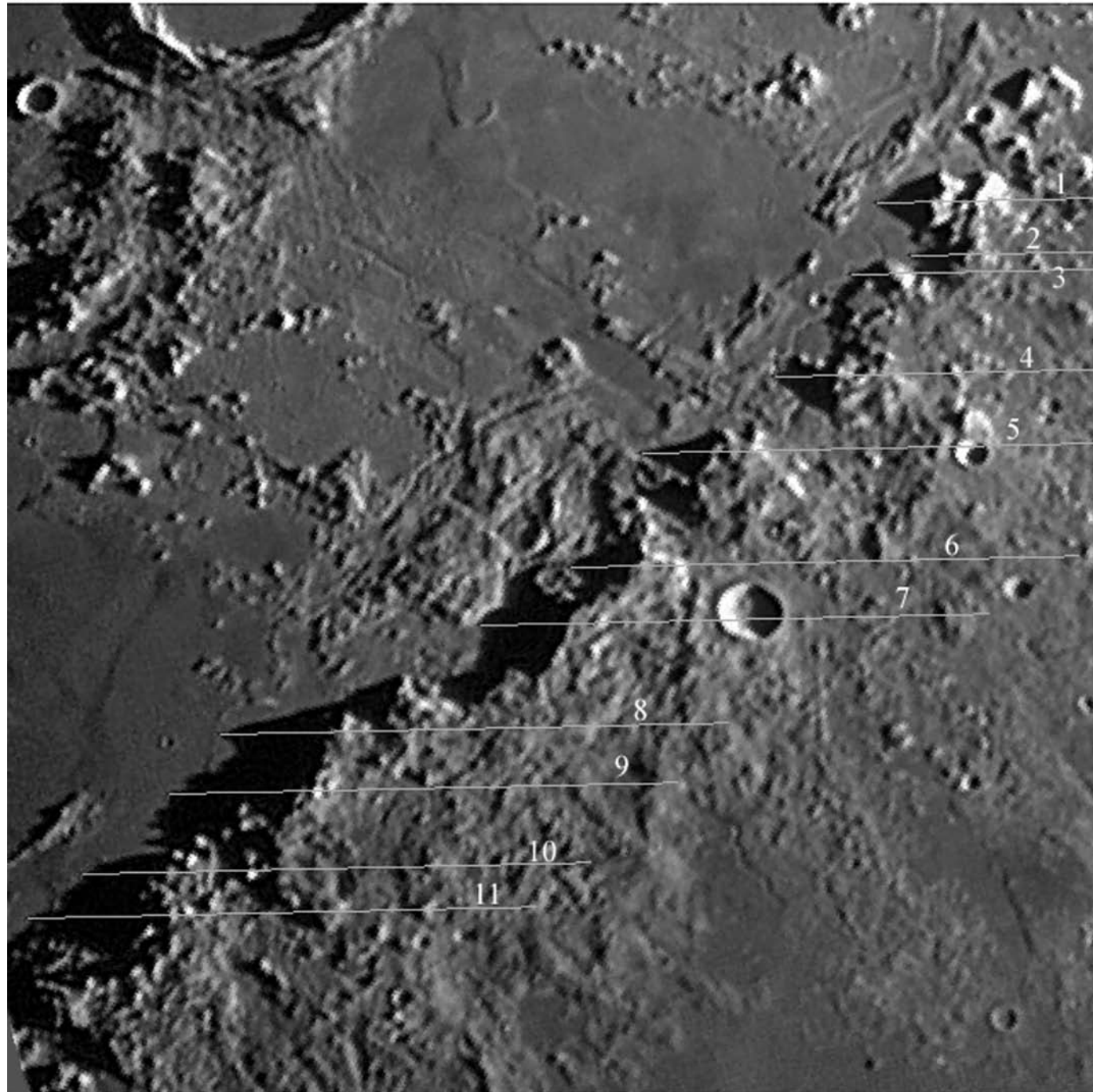
Photo Data: 2008/02/15, 00:16 UT, Seeing 6/10, Clarity 5/6 D&G 8" f/12 refractor, courtesy of Louise Olivarez, Orion Starshoot II Solar System Imager. Ocala, Florida, USA Calibration points (from 1994 ULCN Dot File): Egede B, Marco Polo B

Measurements

1. 2000 (2047)m @ 10.92 E, 43.58 N (Cau 10924358)
2. 3000 (2969)m @ 11.07 E, 42.87 N (Cau 11074287)
3. 2000 (2008)m @ 09.59 E, 40.95 N (Cau 09594095)
4. 5200 (5198)m @ 08.83 E, 39.01 N (Cau 08833901)
5. 4000 (4026)m @ 08.98 E, 38.27 N (Cau 08983827)
6. 3000 (2967)m @ 07.80 E, 35.32 N (Cau 07803532)
7. 2700 (2692)m @ 07.08 E, 31.89 N (Cau 07083189)

Results rounded, raw data in parentheses.

LTVT Image: Sub-solar Pt = 79.274 E/0.072 S Sub-Earth Pt = 0.775 E/6.670 S Center = 0.240 W/22.427 N Zoom = 10,000
 Vertical axis : central meridian



Texture file: Aristillus 080215 0016p2.jpg
 This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 2/15/2008 at 12:16:00 AM UT

Left

Photo Data: 2008/02/15, 00:16 UT, Seeing 6/10, Clarity 5/6
 D&G 8" f/12 refractor, courtesy of Louise Olivarez,
 Orion Starshoot II Solar System Imager. Ocala, Florida, USA
 Calibration points (from 1994 ULCN Dot File):
 Egede B, Marco Polo B

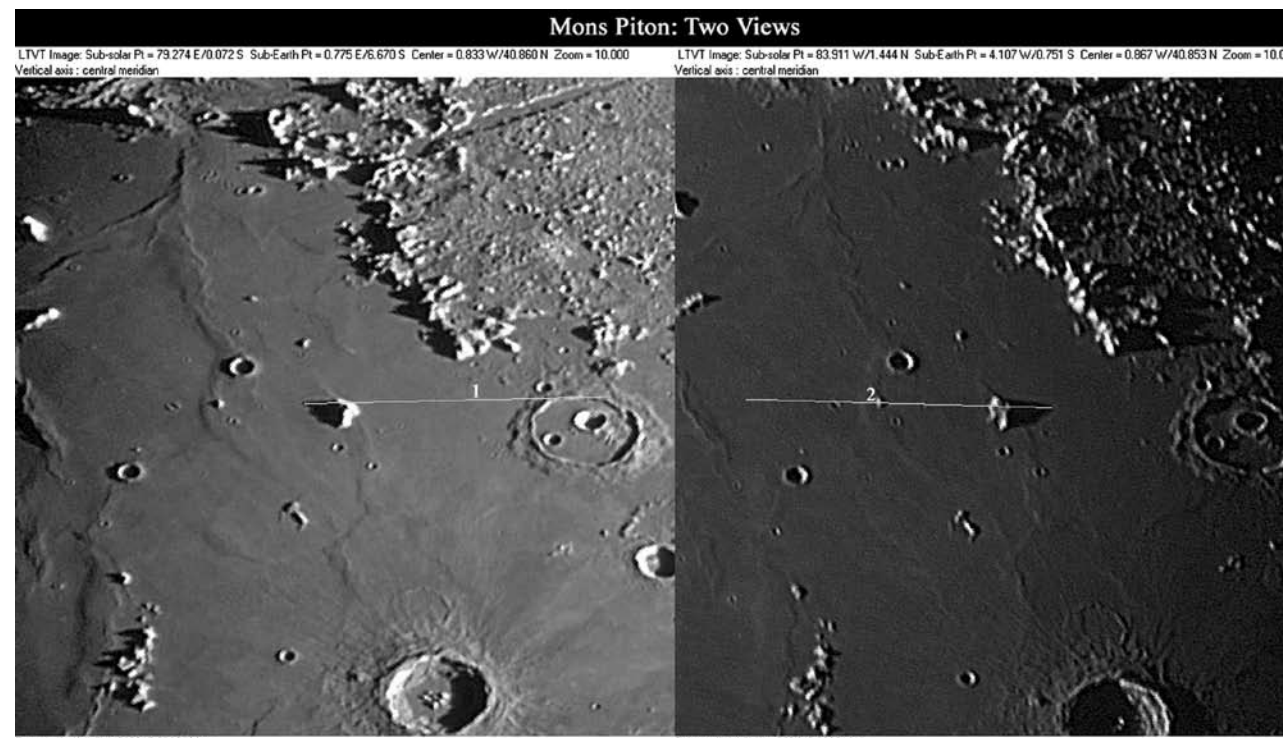
Measurements using LTVT inverse shadow length method.
 Turquoise "+" sign at shadow margin, coordinates show
 point of measurement along the reference line.

Montes Apenninus

Measurements	Long.	Lat.	
1. 4000 (3968)m @	04.16 E,	26.71 N	(APE 04162671)
2. 4200 (4224)m @	04.56 E,	26.06 N	(APE 04562606)
3. 2900 (2919)m @	03.68 E,	25.82 N	(APE 03682582)
4. 4300 (4299)m @	03.02 E,	24.55 N	(APE 03022455)
5. 4300 (4269)m @	01.56 E,	23.61 N	(APE 01562361)
6. 3600 (3620)m @	00.66 E,	22.25 N	(APE 00662225)
7. 4700 (4707)m @	00.07 W,	21.54 N	(APE 00072154)
8. 4400 (4388)m @	02.71 W,	20.26 N	(APE 02712026)
9. 4800 (4833)m @	03.06 W,	19.58 N	(APE 03061958)
10. 2600 (2611)m @	04.52 W,	18.65 N	(APE 04521865)
11. 4200 (4198)m @	04.46 W,	18.15 N	(APE 04461815)

Results rounded, raw data in parentheses. Parenthetic text and numerals at end of lines are database codes. (First three letters of nearby named feature followed by lunar coordinates of point of measurement.)

Error estimated at 100 m based on repeated measurements taken after data recorded.



Texture file: Aristillus 080215 0016p2.jpg
 This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 2/15/2008 at 12:16:00 AM UT
 Photo Data: 2008/02/15, 00:16 UT, Seeing 6/10, Clarity 5/6
 D&G 8" f/12 refractor, courtesy of Louise Olivarez,
 Orion Starshoot II Solar System Imager. Ocala, Florida, USA
 Calibration points (from 1994 ULCN Dot File): Egede B, Marco Polo B

Measurements
 1. 2300 (2291)m @ 00.99 W, 40.98 N (Mons Piton Morning Illumination)
 2. 2400 (2371)m @ 00.76 W, 40.87 N (Mons Piton Afternoon Illumination)
 Results rounded, raw data in parentheses.

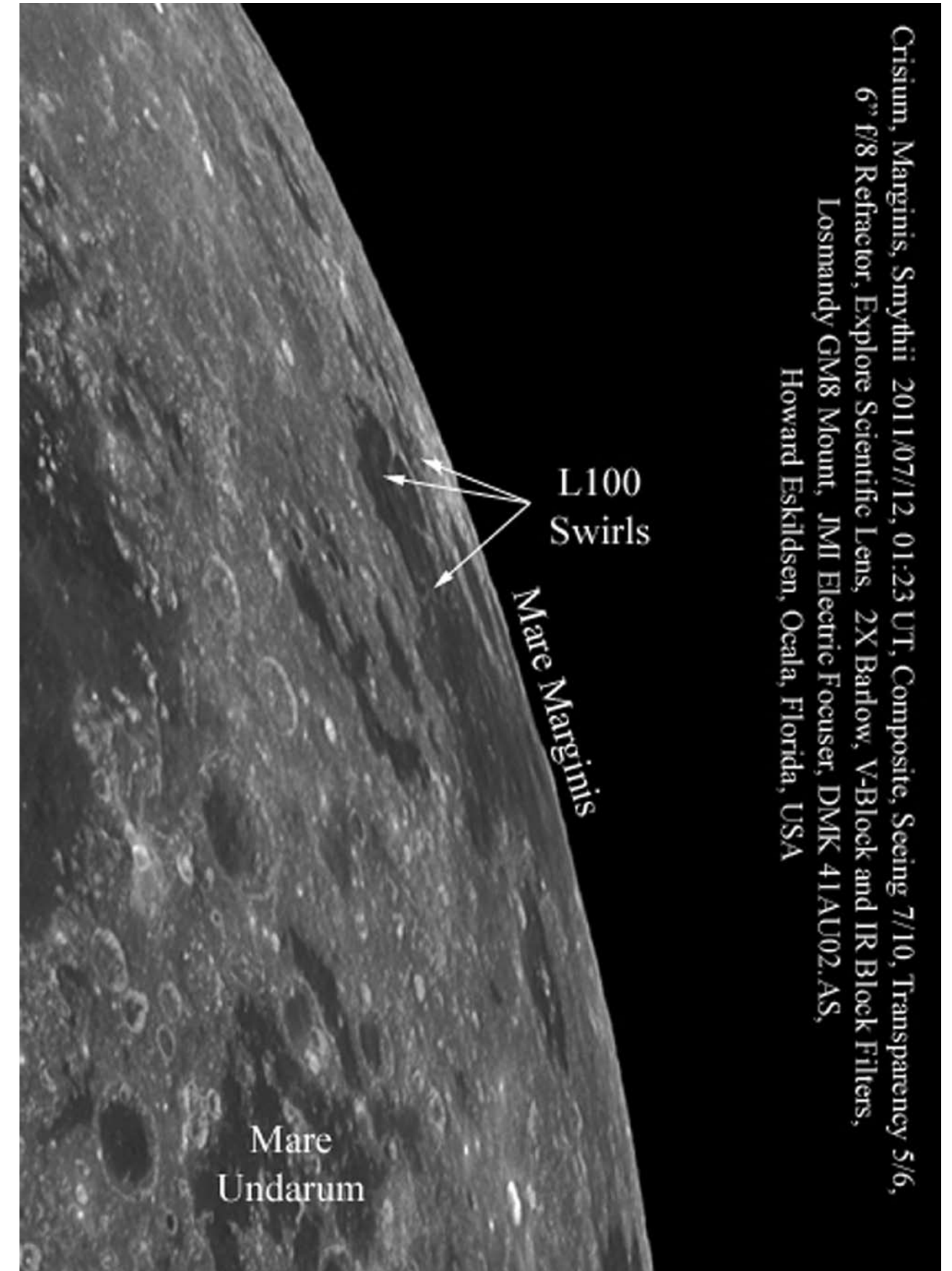
Texture file: Aristillus 050516 0522p.jpg
 This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 5/16/2009 at 09:22:00 UT
 Photo Data: 2009/05/16, 09:22 UT, Seeing 8/10, Clarity 5/6
 Meade 6" f/8 refractor, 2X Barlow, W-15 Yellow Filter
 Orion Starshoot II Solar System Imager. Ocala, Florida, USA
 Calibration points (from 1994 ULCN Dot File): Maupertius A, Feuilee
 Note: The turquoise "+" north of the red line "2" marks the coordinates of the elevation reading in image "1".

Comparisons:
 Viscardy 1985: 2.25 km; Cherrington 1969: 2.49 km

I wonder if the Imbrium flows extend further than usually visible under rising sun illumination. On the marked image, dark arrows show the flows that I am familiar with. The white arrows point to regions that seem to be extensions of earlier flows. Real? Illusion? Something else?



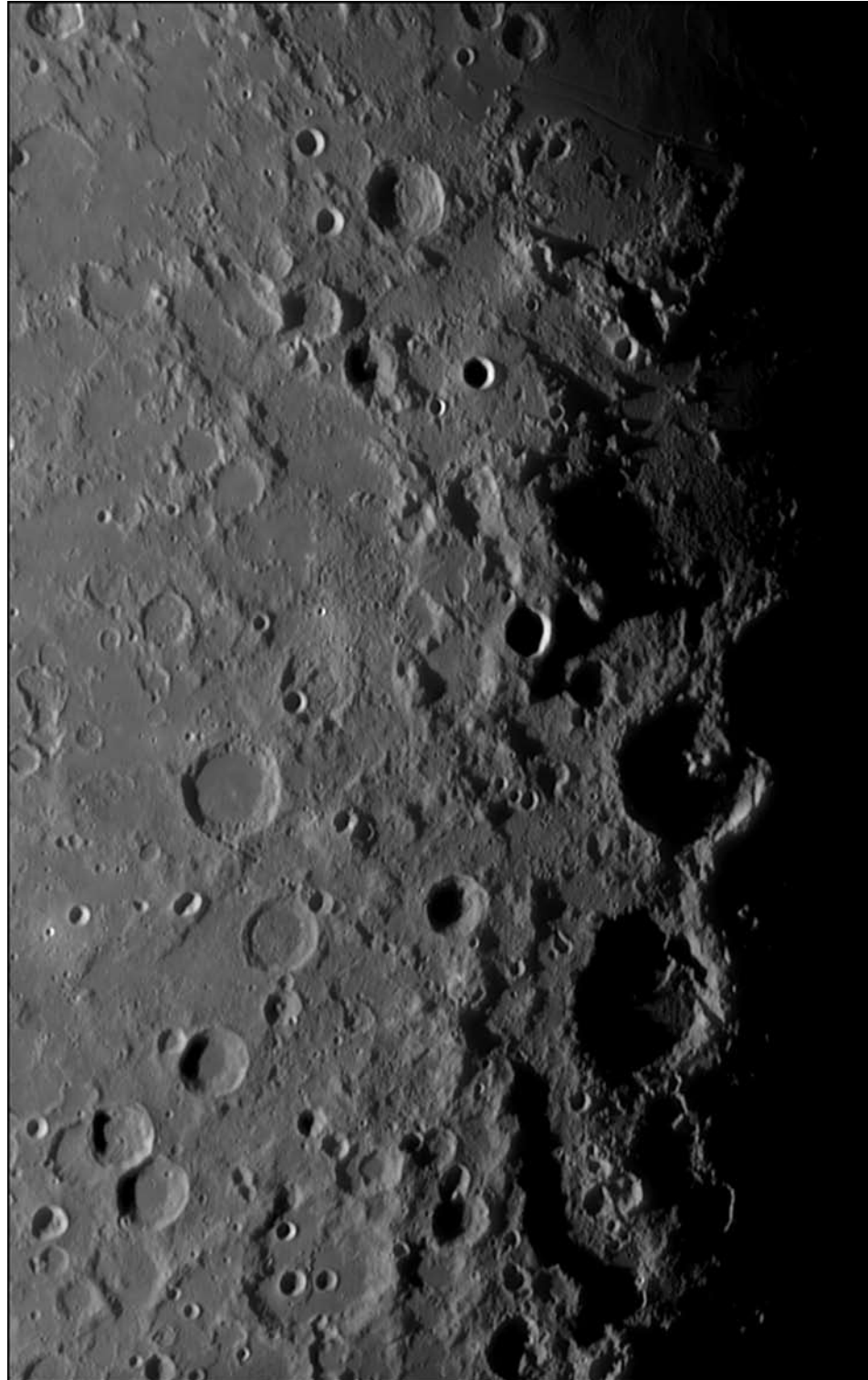
Right Here is the last composite image from the July 12 session. Note the swirls on Mare Marginis (labeled image). This is L100 on Chuck Wood's Lunar 100 list of objects to view on the moon and is a rare sight. These swirls are of unknown origin, but have a relatively strong magnetic field that may alter space weathering to make the swirls bright or may trap fresh, bright levitated granules or ejecta ... no one really knows. Interestingly, it is antipodal (directly opposite) to the Orientale Basin on the SE moon. Most of the known swirls are antipodal to major impact basins, except for the most famous swirl, Reiner Gamma. Strange features.



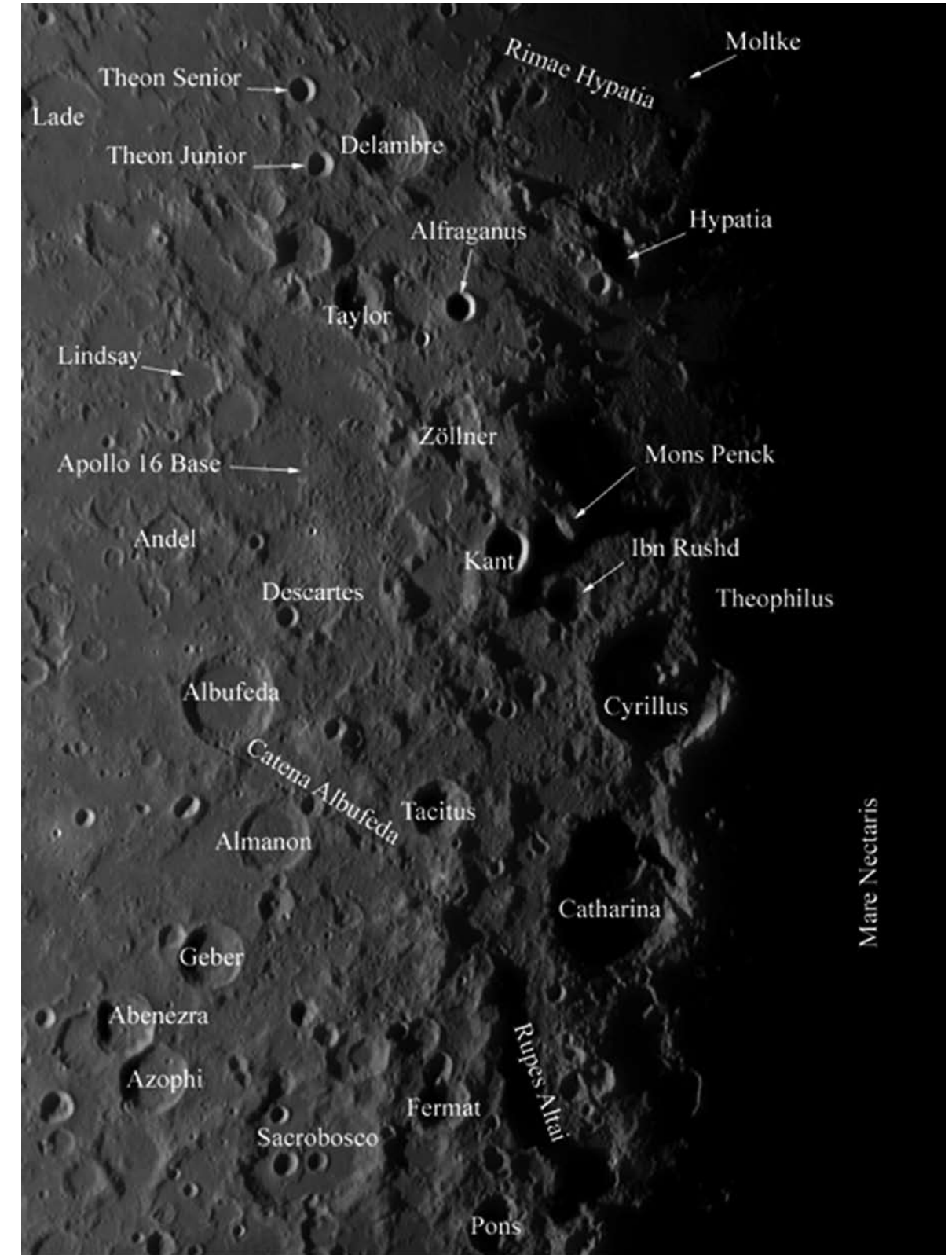
A sunset view of this area distinctly reveals the Altai scarp and gives the appearance that the basin rim continues through Mons Penck and past the eastern side of the odd crater Hypatia. I have other images with a circle connecting these areas that was drawn with LTVT. It fits nicely, but suggests a diameter about 90 km greater than the 860 km generally listed. I have to make more measurements at different illuminations before further challenging the true basin rim diameter.

The diminutive crater Moltke shows its rim distinctly, more often it is visible as a fuzzy white spot. Rimae Hypatia caresses its margins.

The Apollo landing site is easy to locate between the distinct light markings of north and south ray craters. The flat Cayley formation blankets the lowlands to the west and northwest of the landing site. The Cayley looks distinctly different than the rough area north of Descartes and just east of the Apollo 17 base, it is a very interesting juxtaposition.

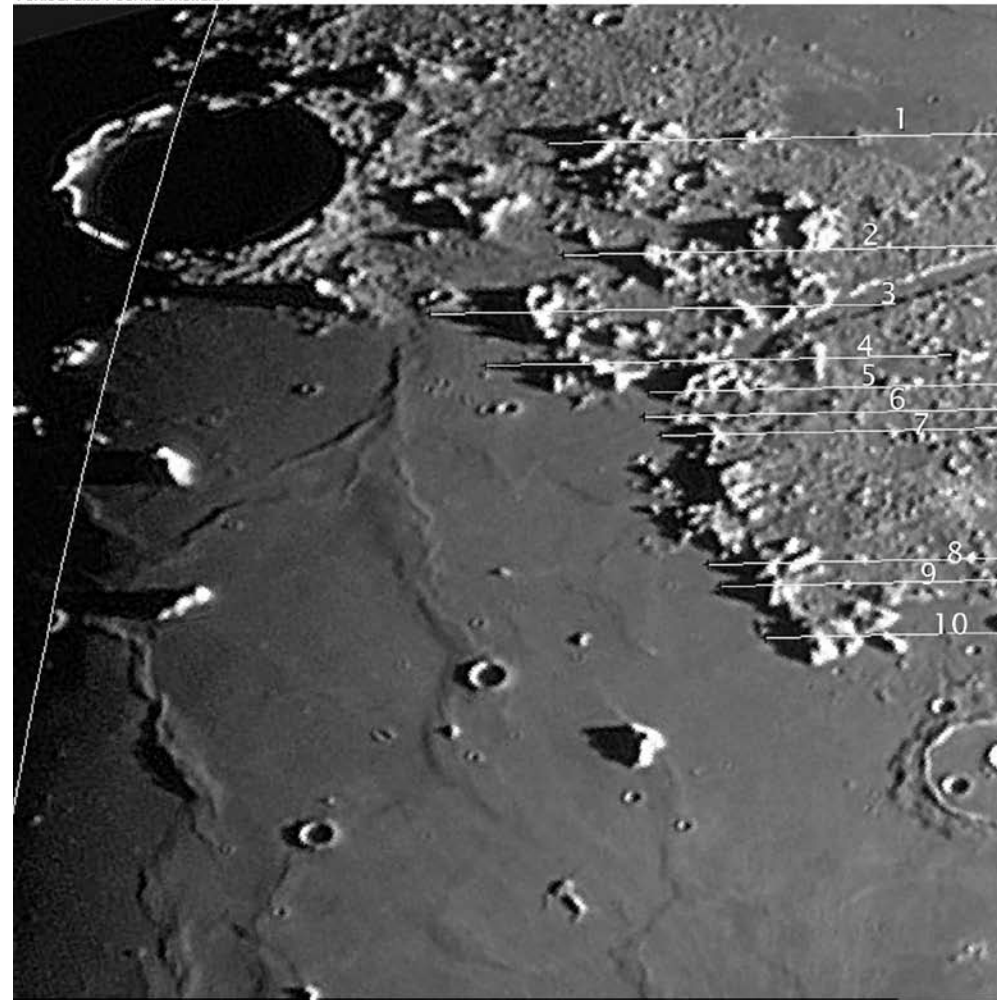


Finally, Theon Senior and Theon Junior add to the curiosity of the region. Senior was named for astronomer Theon of Alexandria who lived around 380 B.C while Junior was named after a Greek mathematician and astronomer living around 100 B.C. Who says cartographers lack a sense of humor?



Western Nectaris Basin and Region, 2011/08/19, 09:45 UT, Composite, Seeing 7/10, Transparency 4/6, 6" f/8 Refractor, Explore Scientific Lens, 2X Barlow, V-Block and IR Block Filters, Losmandy GM8 Mount, JMI Electric Focuser, DMK 41AU02.AS, Howard Eskildsen, Ocala, Florida, USA

LTVT Image: Sub-solar Pt = 79.274 E/0.072 S Sub-Earth Pt = 0.775 E/6.670 S Center = 3.097 W/45.012 N Zoom = 10.000
Vertical axis : central meridian



Texture file: Aristillus 080215 0016p2.jpg
This view is predicted for an observer on Earth at 82.130 W/29.180 N and 20 m elev on 2/15/2008 at 12:16:00 AM UT

Photo Data: 2008/02/15, 00:16 UT, Seeing 6/10, Clarity 5/6
D&G 8" f/12 refractor, courtesy of Louise Olivarez,
Orion Starshoot II Solar System Imager. Ocala, Florida, USA
Calibration points (from 1994 ULCN Dot File):
Egede B, Marco Polo B

Measurements

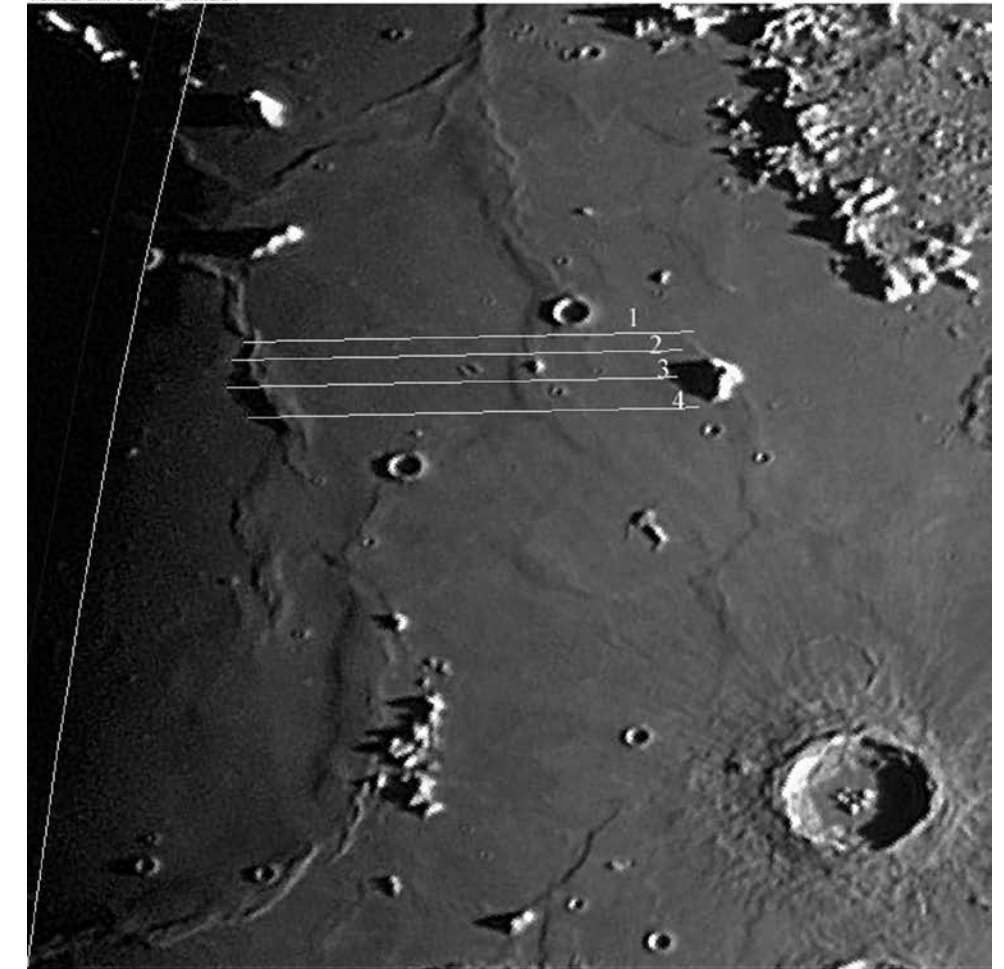
1. 1800 (1779)m @ 01.93 W, 52.28 N (Alp 01935228)
2. 2800 (2788)m @ 01.13 W, 49.90 N (Alp 01134990)
3. 2800 (2787)m @ 03.03 W, 48.70 N (Alp 03034870)
4. Data discarded, uncertain which peak cast shadow.
5. 1400 (1441)m @ 00.34 W, 47.11 N (Alp 00344711)
6. 1200 (1243)m @ 00.49 W, 46.63 N (Alp 00494663)
7. 2300 (2278)m @ 00.17 E, 46.30 N (Alp 00174630)
8. 3000 (3039)m @ 01.09 E, 43.90 N (Alp 01094390)
9. 2600 (2617)m @ 01.13 E, 43.51 N (Alp 01134351)
10. 2500 (2467)m @ 01.73 E, 42.59 N (Alp 01734259)

Results rounded, raw data in parentheses.

Error estimated at <100 meters.

Here is another set of measurements. This is my first attempt at measuring such features. The precision in repeated attempts was $\pm <10\%$ for the two lower elevations and $\pm <5\%$ for the two higher measurements. Precision of measurement, however, does not guarantee absolute accuracy of the results.

LTVT Image: Sub-solar Pt = 79.274 E/0.072 S Sub-Earth Pt = 0.775 E/6.670 S Center = 3.999 W/38.873 N Zoom = 10.000
Vertical axis : central meridian



Texture file: Aristillus 080215 0016p2.jpg
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Measurements using LTVT inverse shadow length method.
Turquoise "+" sign at shadow margin, coordinates show point of measurement along the reference line.

Measurements

1. 150 (149)m @ 08.26 W, 41.46 N (WRI 08264146)
2. 190 (190)m @ 08.34 W, 41.14 N (WRI 08344114)
3. 410 (408)m @ 08.05 W, 40.66 N (WRI 08054066)
4. 420 (417)m @ 07.72 W, 40.13 N (WRI 07724013)

Results rounded, raw data in parentheses. Parenthetic text and numerals at end of line are improvised feature codes. "WRI" signifies "wrinkle rigde Imbrium" and following eight digits show coordinates of point of measurement.

