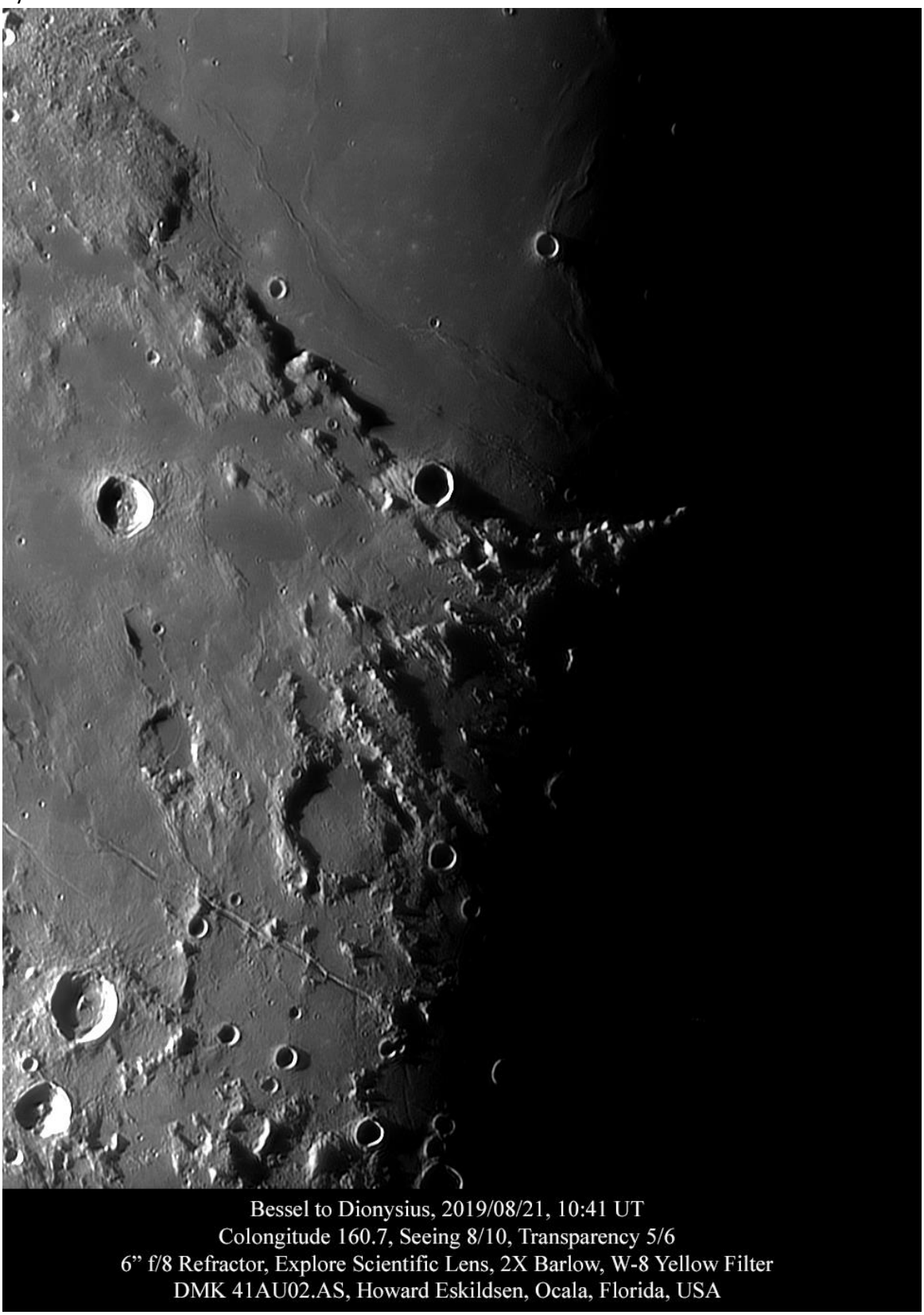
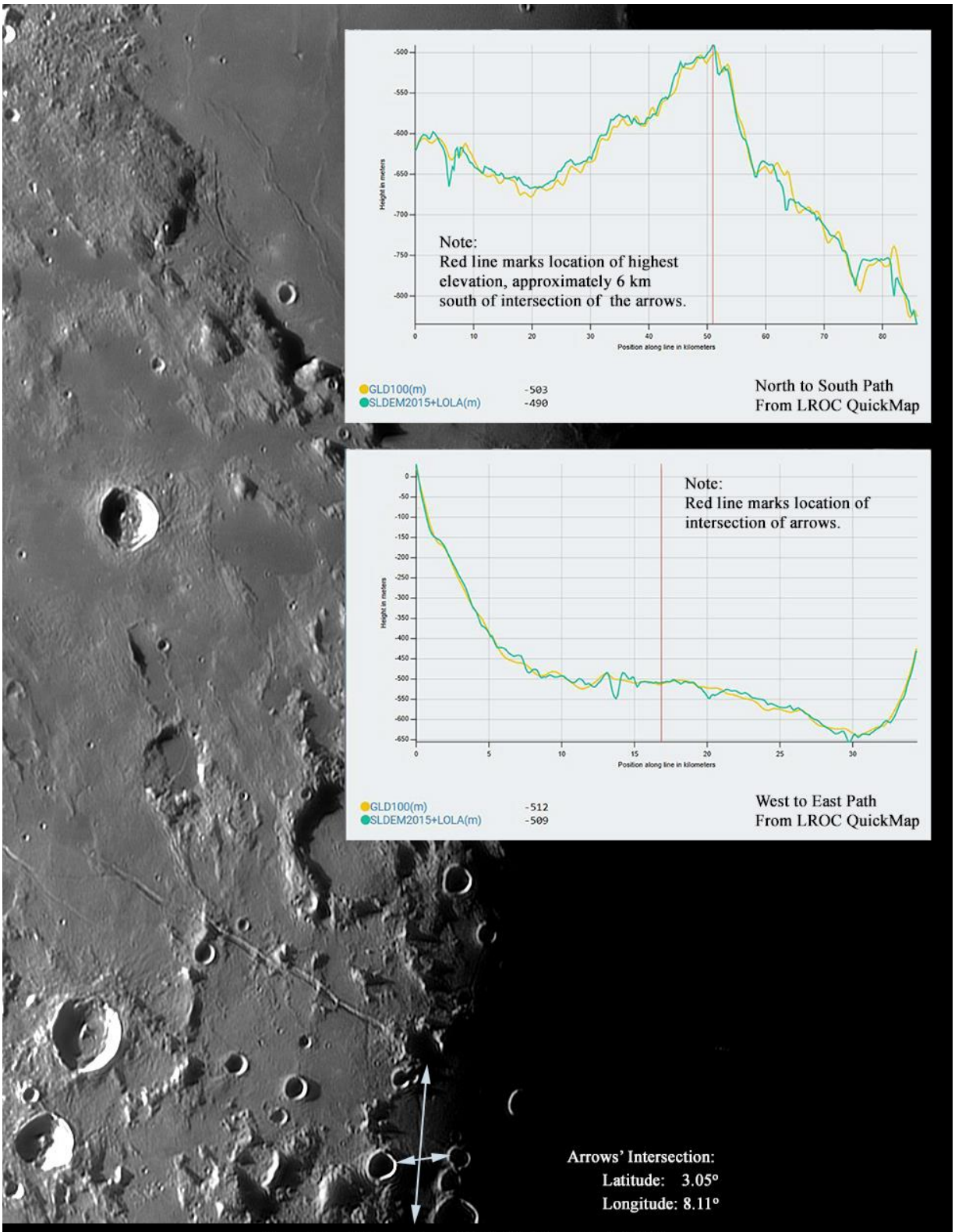
Rimae Ritter and Ritter 1 Dome

by Howard Eskildsen



Bessel to Dionysius, 2019/08/21, 10:41 UT
Colongitude 160.7, Seeing 8/10, Transparency 5/6
6” f/8 Refractor, Explore Scientific Lens, 2X Barlow, W-8 Yellow Filter
DMK 41AU02.AS, Howard Eskildsen, Ocala, Florida, USA



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LROC QuickMap Measurements Rimae Ritter Region
(elevation in meters, distance in kilometers)

QuickMap SLDEM2015+LOLA Path Measurements

North-South Path Elevations Relative to Lunar Mean			N-S Distances From Start of Path	
Elevation B1	(north base)	-660	D1	20
Elevation B2	(summit)	-490	D2	51
Elevation B3	(east base)	-1054	D3	112
Average Dome Base Elevation		-857	Dome Width (km)	92.00
Summit Height Above Base		367	Dome Height (m)	367
			H/W ratio	0.004
			Slope (radians)	0.008
			Slope (degrees)	0.457

QuickMap SLDEM2015+LOLA Path Measurements

West-East Elevations Relative to Lunar Mean			W-E Distances From Start of Path	
Elevation B1	(west base elevation)	-500	D1	8.00
Elevation B2	(summit)	-509	D2	17.00
Elevation B3	(east base elevation)	-640	D3	32.00
Average Dome Base Elevation		-570	Dome Width (km)	24.00
Summit Height		61	Dome Height (m)	61
			h/W ratio	0.003
			Slope (radians)	0.005
			Slope (degrees)	0.291

Summary:

Arithmatic Mean Height (m)	214.0
Geometric Mean Width (km)	47.0
h/W ratio	0.005
Slope per GM Radians	0.009
Slope per GM degrees	0.522

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This lunar region (fig. 1) was originally imaged to show the domes associated with Menelaus, which are visible in the upper central photo. However, I was surprised to see rilles between Dionysius and Ritter on the central lower margin of the image. Where there are such rilles, there is likely subterranean volcanic intrusion with associated uplift of the area. The Virtual Moon Atlas (VMA) denotes a dome, Ritter 1 there, however, it is not noted on the Geological Map of the Julius Caeser Quadrangle of the Moon. The quadrangle does identify a crater chain which is just visible on this image at the shadow margin just northeast of Dionysius. On review with the

LROC QuickMap, it could alternatively be considered a chain of collapse pits, but I believe that to be less likely.

Measurements of elevations and distances along the arrow paths on the image were made using the LROC Quickmap and were charted as seen on figure 2. The path chart at the top of the image runs from north to south and the lower path chart shows the west to east dimensions of the area. The intersection of the two paths lies at latitude 3.05° and longitude 18.11°. The VMA lists the dome coordinates as latitude: 3 ° 2 ' north and longitude: 18 ° 12 ' east. The highest elevation on the north-south path lies about 6 km south of the intersection of the paths. Unfortunately, the north-south curve is still trending downwards where the image terminates, so the southern end of the downslope is not shown on this image nor in the corresponding north-south path chart. Review of the LROC QuickMap revealed that southern end of the rise is 24 km farther and has an elevation of -1054 meters relative to mean lunar elevation. Those data points were used in further calculations of diameter and elevation.

From the path charts and the updated southern dimensions, calculations of diameter, elevation, and average slope of the uplift were done as seen in figure 3. The arithmetic mean uplift is 214 meters above the average base elevation and runs 24 km west-east by 92 km north-south, with a geometric mean width of 48 km and an average slope of 0.522^{o}.
The Virtual Moon Atlas describes Ritter 1 Dome as "extrusive volcanism," however, I could find no signs of volcanic flows in the region using the LROC QuickMap, and its low slope would be more consistent with an intrusive dome. If this really is a dome, it would fit in to the intrusive class, In1. Per *Lunar Domes* by Lena, et al. page 135, In1 domes have diameters over 25 km and slopes between 0.4^{o} and 0.6^{o}.

References:

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