**Results of a survey carried out on Theophilus region under strongly oblique illumination.** G. Tarsoudis[1] and R. Lena[2]- Geologic Lunar Research (GLR) Group. [1]Filamon 12, 68100 Alexandroupolis, Greece; gtarsoudis@gmail.com; [2] Via Cartesio 144, sc. D, 00137 Rome, Italy; r.lena@sanita.it

**Introduction:** Theophilus is a prominent lunar impact crater that lies between Sinus Asperitatis in the north and Mare Nectaris to the southeast. It partially intrudes into the comparably sized crater Cyrillus to the southwest. Fig. 1 shows the examined region from Theophilus (in shadow at bottom) to Torricelli (the keyhole-shaped crater to the north). We have organized a survey in the region of Theophilus, with images taken under strongly oblique illumination, for a topographic study. In this contribution we provide an analysis of the soil elevation of the examined region by using LOLA DEM and GLD100 dataset [1].

**Ground-based observations:** Under very low solar illumination angle a straight rille crosses a circular rise. However the domical object (outlined in red in Fig. 1b) is undetectable in the image due to the distractions of Theophilus' ejecta.

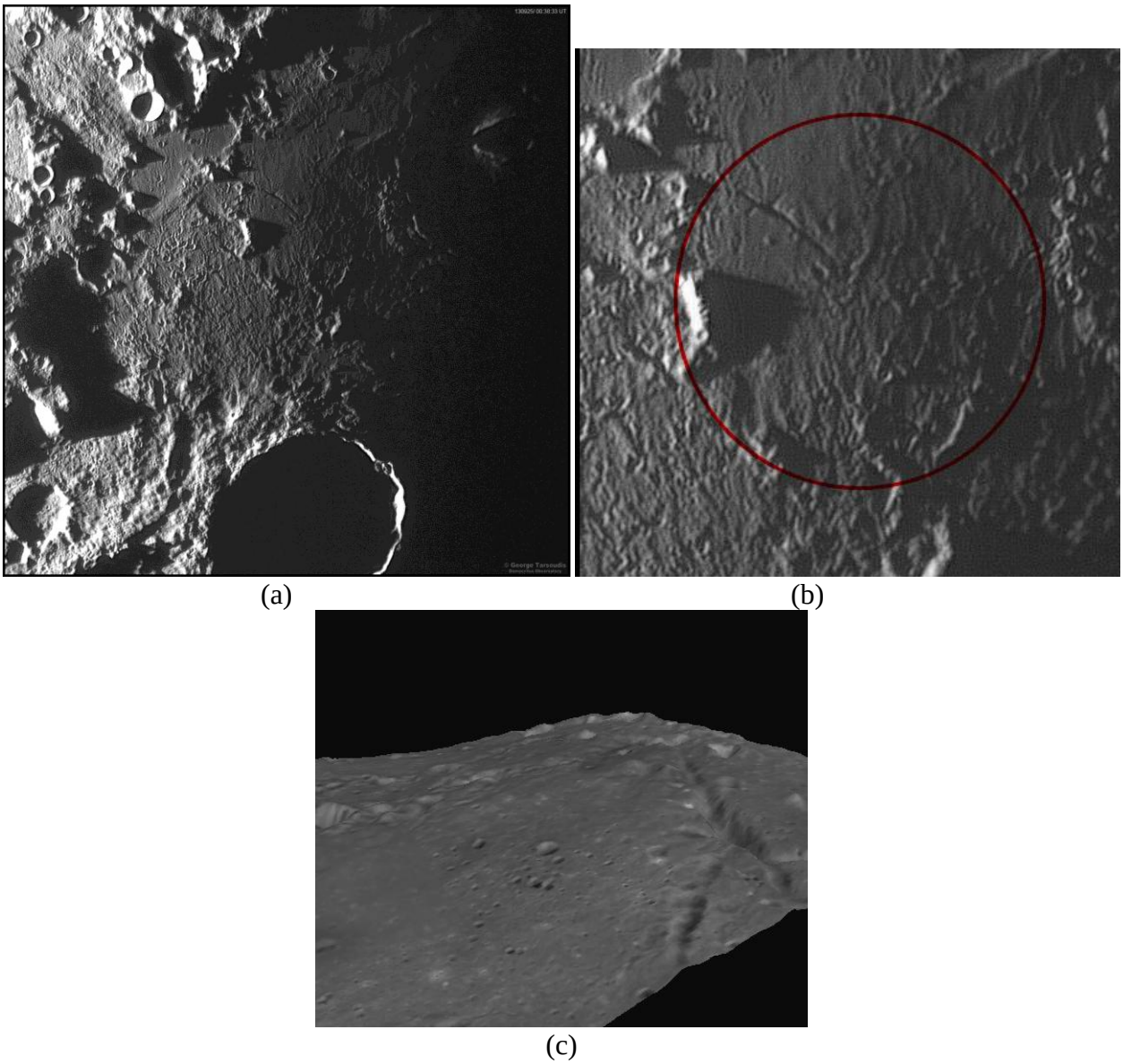


**Fig. 1.** Top (a): Telescopic image acquired on September 25, 2013 at 00:38 UT with a 360 mm aperture reflector (Tarsoudis); (b) The region of interest described in the text. Enlargment of the previous CCD image; Bottom (c) WAC derived elevation model (GLD100). View from northwestern direction. The vertical axis is 10 times exaggerated.

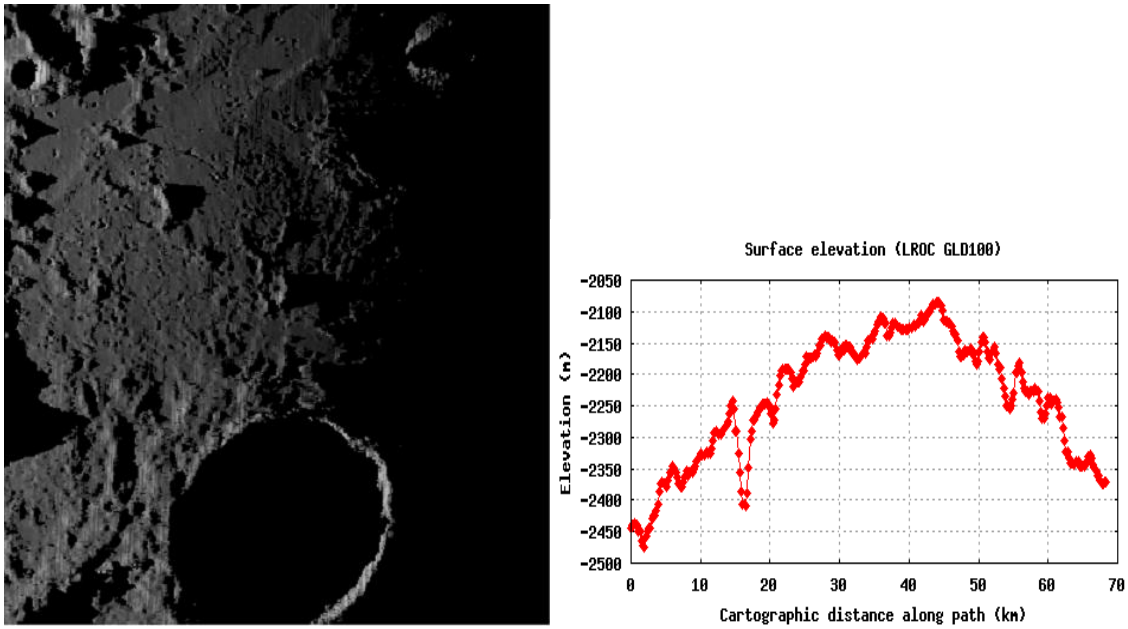


**Fig. 2.** (Left) Image simulated based on the LOLA DEM using LTVT, assuming the same illuminationconditions as in the telescopic image; (Rigth) Cross-sectional profile of the described raised domical soil (outlined in red in the CCD image shown in Fig. 1b) in east-west direction derived with the ACT-REACT Quick Map tool.

**GLD 100 data set:** Using the ACT-REACT tool, GLD 100 dataset [1], it is possible determine distances, profiles and elevations of several lunar features.

We found that the soil northern to Theophilus has an elevation determined at 370 m (Figs. 1c and 2) and is about 65 km wide. An autorotate view of the corresponding 3D reconstruction is presented at: http://target.lroc.asu.edu/qm3d/o2w_3d_606095668_151_25_177_114_0/

In the LOLA DEM, the elevation difference between the centre and the surrounding surface corresponds to about 370-380 m.

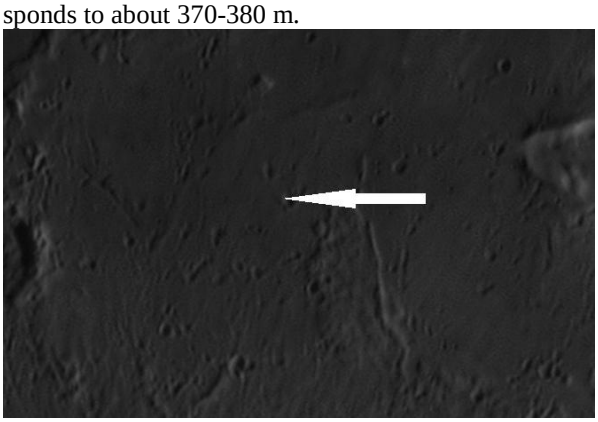

**Fig. 3.** Telescopic image acquired nder high solar illumination on November 9, 2013 at 16:12 UT with a 360 mm aperture reflector (Tarsoudis).

The curvilinear rille crossing the surface of this domical object would indicate structural control by subsurface geology and these features are commonly interpreted as fractural features [2] that may occur as a result of the flexural uplift. In this scenario the upbowing of the soil may be "in principle" considered as a dome, with a corresponding average flank slope of 0.65°, bisected by a rille, similar to large candidate intrusive domes introduced in [3-4].

**Conclusion:** If an igneous intrusion occurred in this region, related to a magmatic body rising near the surface, an elevated terrain should be visible. The western straight rille is likely of tensional origin.

Based on the LOLA DEM and GLD100 data, we estimate its effective elevation to 370 m, and could imply on origin due to a subsurface intrusion of a large magmatic body.

**References:** [1] Scolten et al. (2012) *J. Geophys. Res.* 117 (E00H17),doi:10.1029/2011JE003926; [2] Nichols et al. (1974) *Lun. Planet Sci. V*, 550-552 ; [3] Wöhler & Lena (2009) *Icarus 204*, 381-398; [4] Lena et al. (2013) *Lunar Domes: Properties and Fomation Processes.* Springer Praxis Books.