

Lunar Domes: Searching lunar domes in T.Mayer and Brayley region

By Raffaello Lena

Guy Heinen, from Linger- Luxembourg, has reported a possible dome, with a vent on the summit, located to the south of the crater Brayley D (Fig. 1). I term provisionally this volcanic construct as M24, to be consistent with previous classification regarding Milichius - T. Mayer region. A map of this region is shown in Fig. 2.



Figure 1. WAC imagery showing the location and appearance of M24 and its vent.

Notably, the detailed study of lunar domes is possible based on images of the lunar surface acquired under oblique illumination conditions for their measurements and for maximum detail. Thus we wait further telescopic CCD images of this feature in order to characterize it with more consolidated measures. It is located at 19.17° N and 32.55° W. Preliminary data would indicate a diameter of about 18km. The height is determined to about 90m. The geologic map USGS I-465 displays the examined feature as a dome (<https://www.lpi.usra.edu/resources/mapcatalog/usgs/I465/150dpi.jpg>). Many lunar domes have a summit crater pit likely representing the vent of the volcano which was enlarged by magma withdrawal and/or later erosion [1-3]. The dome examined here does not display a circular summit pit but its summit is crossed by an elongated fissure of 4.5km length (see Fig. 1). Volcanoes can have such elongated vents especially when they were formed along a fissure or by a dike intrusion. Hence, this depression represents the original vent, the place at which lava poured out over the lunar surface, successively building up a shield-like volcano around it [1-2].

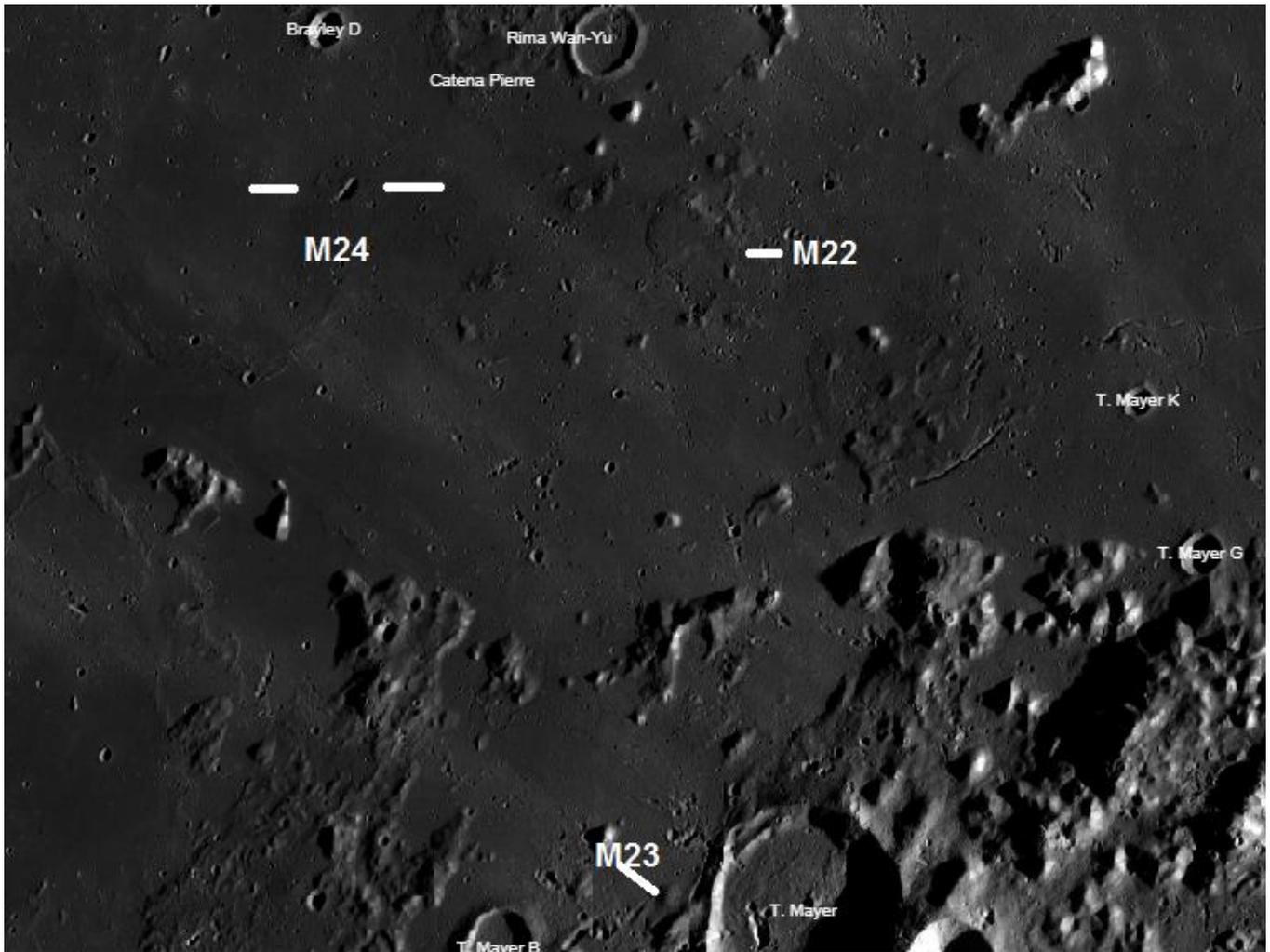


Figure 2. WAC imagery including T. Mayer crater, Brayley D and the domes termed M22-23.

Central vents are the most common types of volcanic vents. Central vents are the conduit pipes through which magma is forced upward to the surface and then ejected as lava or pyroclastic fragments. A central vent connects the magma chamber to the open vent on top of a volcano, and is maintained open by the continuous release of volcanic material. Note that the vent of M24 is breached in the SW direction and material of lower albedo is present near the rim and nearby soil, which could be pyroclastic material.

A full spectral analysis in order to identify eventual glass signature or an olivine component is in progress.

A WAC image of the vent under examination is shown in Fig. 3. The dark material and the breached vent are well detectable in Fig. 4.

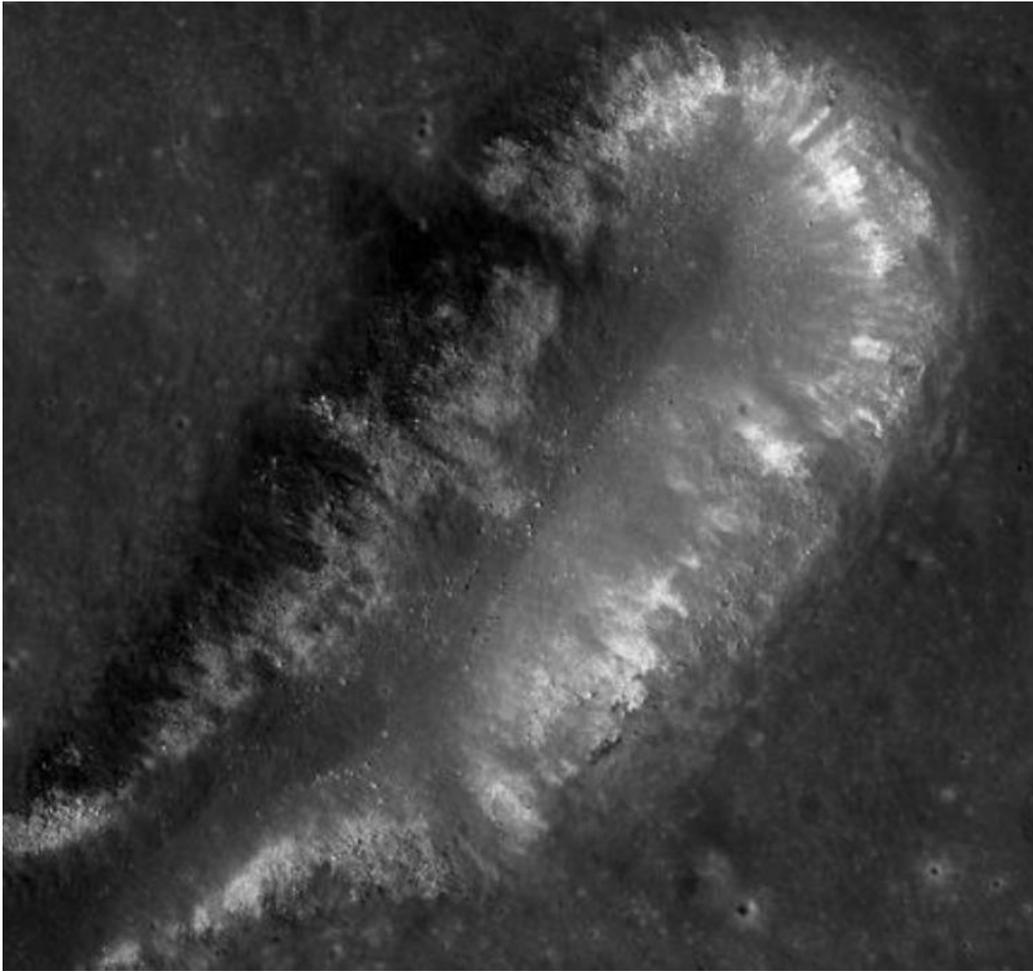


Figure 3. WAC imagery of the vent.

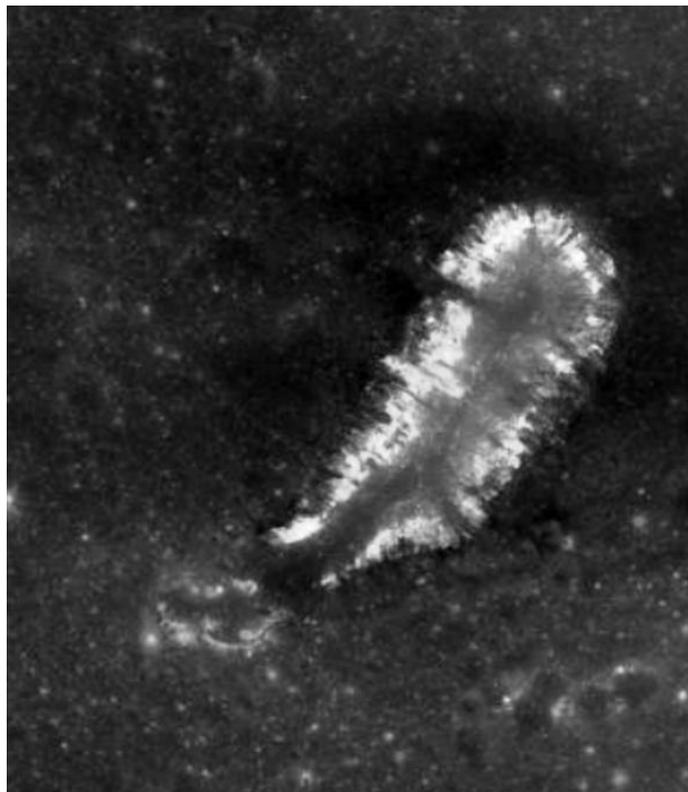


Figure 4. Another WAC imagery of the breached vent indicating the volcanic origin.

A synthetic image of a dome can be generated based on an available DEM as seen from a given direction for lighting from some other specified direction. The LTVT software [4] was used to generate synthetic view of selected parts of the LOLA DEM (Fig. 5). The LOLA DEM data and the rendered image, under oblique solar illumination angle (of about 1°), display the domical shape of M24 and its elevation.

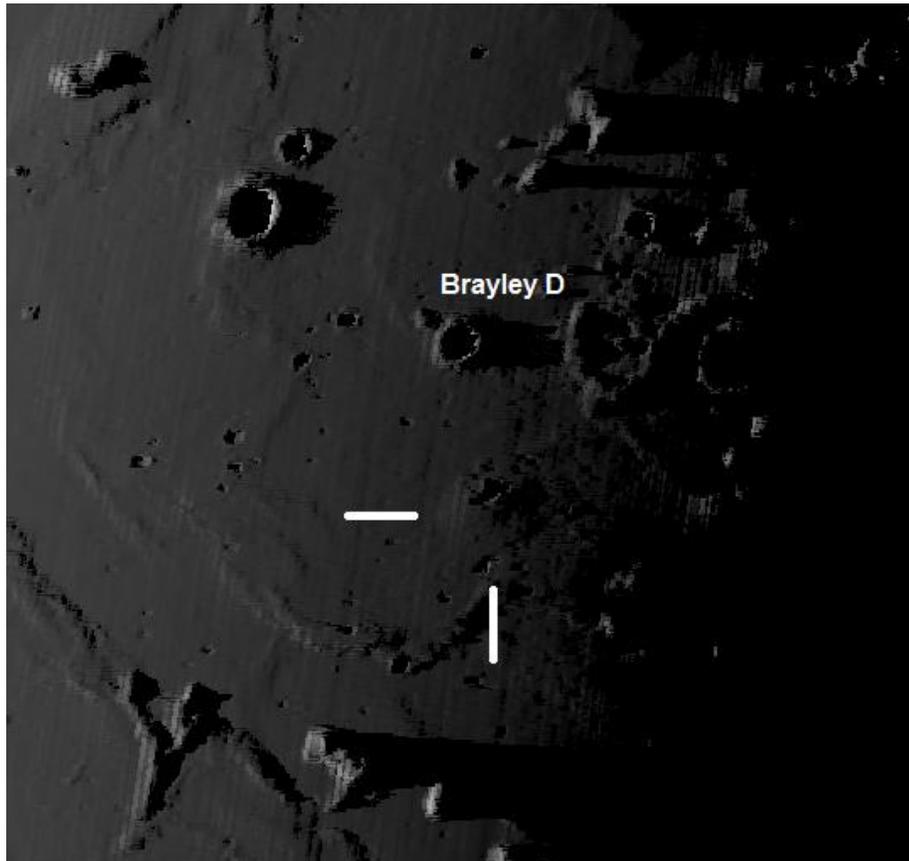


Figure 5. Rendered image based on the LOLA DEM using LTVT. M24 is marked with white lines.

In the revised catalogue of lunar domes by Kapral and Garfinkle [5] a dome- described as “unverified”- is reported at same coordinates but without any data of height, slope and volume.

I encourage more high-resolution imagery of this area so we can have more data to identify the shape of this dome which is not characterized in the morphometric and spectral properties yet. Please check also your past imagery and send them to us for the ongoing study (lunar-domes@alpo-astronomy.org).

References

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- [5] Kapral, C., Garfinkle, R., 2005: GLR Lunar Dome Catalog <http://digilander.libero.it/glrgroup/kapralcatalog.pdf>