

LUNAR WREATHS - UNUSUAL, APPARENTLY YOUNG, MARE LANDFORMS. P. J. Stooke¹, ¹Dept. of Geography and Centre for Planetary Science and Exploration, University of Western Ontario, London, Ontario N6A5C2 (pjstooke@uwo.ca) (<http://publish.uwo.ca/~pjstooke/>).

Introduction: Lunar wreaths (Figure 1) are a newly-observed landform in the lunar maria, so far seen only in Mare Imbrium and Mare Insularum. A systematic search has not yet been undertaken so the actual distribution is not known. A wreath is a circular or elliptical patch of mare surface, 1 to 2 km across, with a wrinkled texture, significantly reduced small crater density compared with the surroundings, and in most cases a slightly raised rim and depressed interior. Some depressed interiors have higher albedo (or photometric properties serving to brighten the interior) than the surroundings. They are inferred to be produced by physical disturbance of the existing mare surface.



Terrestrial wreath



Lunar wreath

Figure 1: Wreaths on Earth and the Moon

Descriptions: Four examples are described here. Wreath 1 (Figure 2a) is centered at 48.87° N, 22.79° W in northern Mare Imbrium. It is circular, 2000 m in diameter, with a concentric trough only about 2 m deep inside its rim and a raised region west of center about 8 m above the average level of the surrounding mare, a very low relief feature. The wrinkled texture is observed throughout. Two depressions, each about 300 m across, occur in the central region, one on top of the highest part of the feature. A few small craters (maximum 50 m diameter) occur on the wreath, but the density of small craters appears very much lower than in the surrounding mare.

Wreath 2 (Figure 2b) is centered at 48.14° N, 23.29° W in northern Mare Imbrium. It is elliptical, 3000 by 2000 m across, elongated SW-NE. Depressions about 10 m below the surrounding mare occur at at each end of the elongated floor and the central floor is at the level of the surroundings. The wrinkled texture is found throughout the walls and floor, and the lower areas near each end appear brighter than the rest of the feature, with many blocks exposed near the northern end of the floor. The crater density is extremely low compared with the surroundings.

Wreath 3 (Figure 2c) is centered at 3.52° S, 19.57° W in southern Mare Insularum. It is circular, 1000 m in diameter with a smooth floor 10 m below the mare level, wrinkled walls and blocks around the edge of the floor. The crater density is again very low.

Wreath 4 (Figures 1, 2d) is centered at 3.63° S, 19.62° W in southern Mare Insularum. It is 700 m by 900 m across, elongated N-S, with wrinkled walls and rim and a smoother floor. It is poorly sampled by GLD100 but appears to be 3-4 m deep, and has few superposed craters.

Discussion: These features differ from nearby degraded impact craters, which typically have the same interior crater density as their surroundings. The wrinkled texture somewhat resembles that seen on slopes everywhere on the Moon despite the very low slopes of most parts of these features. The rims often appear raised by a few meters but they are not resolved in GLD100 and NAC stereo mapping has not yet been done. Possible formation mechanisms are impact and volcanism, though impact seems unlikely for this morphology. Outgassing of residual volcanic volatiles or radiogenic argon might be a possible explanation. An unusual irregular mare patch at 26.79° N, 42.97° W near Rimae Prinz may possibly be a transition landform.

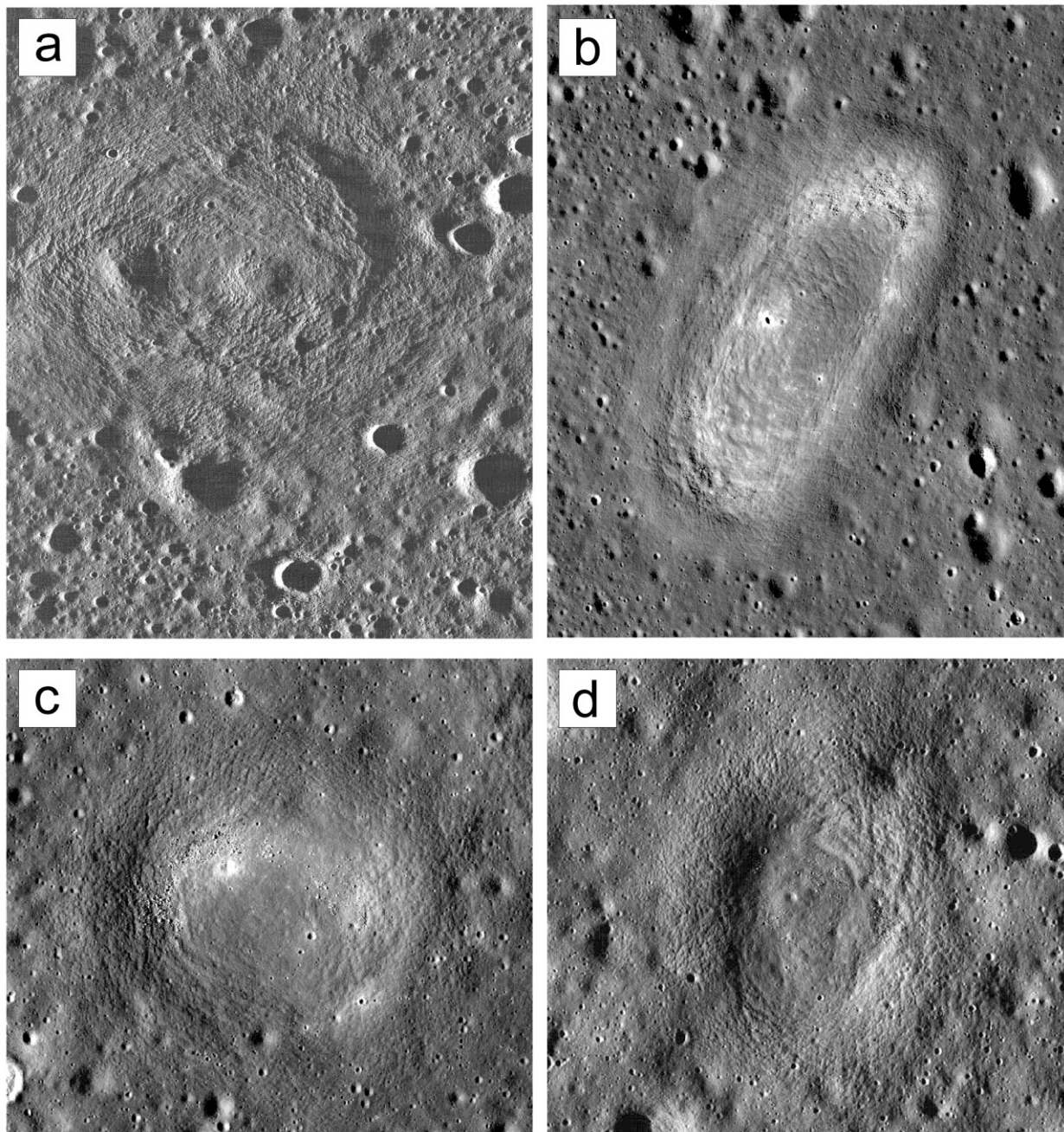


Figure 2. Examples of lunar wreaths.

a: Wreath 1, 48.87° N, 22.79° W, 2000 m diameter.

b: Wreath 2, 48.14° N, 23.29° W, 3000 by 2000 m.

c: Wreath 3, 3.52° S, 19.57° W, 1000 m diameter.

d: Wreath 4, 3.63° S, 19.62° W, 700 m by 900 m.