Graben on the lunar nearside: Do dikes lie beneath?

Amanda L. NAHM1

1German Aerospace Center (DLR), Rutherfordst. 2, 12489 Berlin, Germany

E-mail: amanda.nahm@dlr.de

On the Moon, tectonic structures are concentrated on the nearside, spatially associated with the maria (e.g., Watters and Johnson, 2010), or basalt-filled impact structures. Lunar graben (or rilles) are long, narrow troughs up to several hundreds of kilometers long and up to 5 km in width. The occurrence of graben on material that formed after basin formation and mare emplacement indicate that graben formed relatively recently (Lucchitta and Watkins, 1978). Current model ages suggest that graben formation ceased around 3.6 Ga (Boyce, 1976; Lucchitta and Watkins, 1978; Watters and Johnson, 2010) and contractional structures formed ~1 Ga (Watters et al., 2010; Watters and Johnson, 2010). Crosscutting relationships, however, indicate that some wrinkle ridges pre-date the graben (Quaide, 1965; Nahm et al., 2016) and recent work on Rupes Recta, a large normal fault in Mare Nubium, indicates that it is younger than 3.2 Ga (Nahm and Schultz, 2013). These contradictory observations indicate that a detailed, systematic study of the distribution and timing of graben formation is needed. Here, I present the results from the first part of this systematic study: the mapping campaign.

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