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Porosity signatures of large lunar impact basins

Wahl, Daniel*, Wiczorek, Mark, Oberst, Jürgen
*Technische Universität Berlin, Straße des 17. Juni
135, 10623 Berlin, daniel.wahl@tu-berlin.de

The upper highland crust of the Moon is known to exhibit a wide range of porosities between 3 and 23% [1]. We used most recent GRAIL gravity data as well as LOLA topography to create bulk density and porosity maps in high spatial resolution (grid size of 0.75°). Benefitting from the high level of detail we studied the distinct porosity signatures of 40 impact basins in the lunar highlands.

Analyzing azimuthally averaged porosity profiles from the basins, we find regions of high porosity around the impact sites, while the basin centers exhibit low porosities. Larger basins have a more pronounced signature than smaller basins, most likely due to more extensive fracturing of rock, caused by a stronger shock wave and a thicker ejecta blanket. Moreover, even though the data statistics are limited, we tentatively identify higher porosity for young basins.

[1] Wiczorek et al. (2013), Science 339, 671-675

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