Geophysical Research Abstracts
Vol. 18, EGU2016-10661, 2016
EGU General Assembly 2016

Recent Progress in Understanding the Structure of the Lunar Crust

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High-resolution gravity from GRAIL and high-resolution topography from LRO/LOLA are providing new insight into the lunar crust. Bouguer gravity and its gradient are providing the unique opportunity to explore the shallow internal structure of the lunar crust in greater detail than for any other solid planetary body beyond Earth. Gravity and topography combined produce Bouguer gravity that reveals the distribution of mass in the subsurface. At high degrees, the spherical harmonic expansion is sensitive to shallower structure, with the depth taken to correspond to the spatial block size or half wavelength of the spherical harmonic degree. Using models of density contrasts within the crust and their expression at the lunar surface, we compare model results to observations acknowledging the inherent non-uniqueness of gravity. We have initially focused on highlands crust, where >98% of free air gravity is associated with topography, so high degree and order mass anomalies that remain after the Bouguer correction constitute <2% of the full gravitational signal. We deconstructed the Bouguer gravity field into degree-ranges and plot the implied subsurface distribution of density anomalies for several regions of the lunar highlands including several basins.