The Interior of the Moon from the Gravity Recovery and Interior Laboratory (GRAIL) Mission

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ABSTRACT: The Gravity Recovery and Interior Laboratory (GRAIL) is a twin-spacecraft lunar gravity mission that has two primary objectives: to determine the structure of the lunar interior, from crust to core; and to advance understanding of the thermal evolution of the Moon. GRAIL mapped the Moon from March through December 2012 at average altitudes from 55 km down to 11 km. The current global gravity field resolves spatial blocks of 5 km and observations at coarser resolutions have been improved in quality by as much as a factor of $10^6$ over previous lunar gravity models. The internal structure of the Moon represents a significant uncertainty in models of the dynamics of the Earth-Moon system, and improved measurements of the Moon’s gravitational moments and tidal parameters have reduced substantially the range of plausible models of the lunar interior. GRAIL has provided a precise assessment of the lunar impact record, enabling major enhancement in understanding the bombardment history of the Moon, and by extension, Earth.