

“The Lunar Interior Revealed from the Gravity Recovery and Interior Laboratory (GRAIL) Mission”

Maria T. Zuber

*Department of Earth, Atmospheric and Planetary Sciences,
Massachusetts Institute of Technology, Cambridge, MA 02139, USA*

The GRAIL Discovery mission to measure the gravity field of the Moon has provided new insights into the structure and evolution of the Moon as a result of the quality of the measurements and the very low altitude from which the measurements were obtained. The average horizontal and radial resolution of the global free air gravity field so far derived from the data is better than 5 km, a fraction of the thickness of the lunar crust, thus enabling detailed study of vertical crustal structure, including density and porosity. The long-wavelength component of the gravitational field has been improved by 3 to 6 orders of magnitude and has provided a greatly improved estimation of the gravity tide, as well as refined constraints on core parameters. Observations have elucidated details of lunar origin and the Moon's early thermal state, have solved the longstanding question of the origin of mascons, have informed understanding of the Moon's asymmetry in volcanism and crustal formation, have provided insight into the depth to which the effects of impacts penetrate into and beneath the crust, and have refined the population of large impact basins. We synthesize selected results from the mission so far and discuss the expectations of ongoing analyses.