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The Topography of the Planets and Implications for their Interiors

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The normal definition of topography is the departure of a body from an equi-potential surface and it therefore represents the difference between the physical shape and the gravitational shape. In planetary science the shape is usually derived from altimeters and the gravity from spacecraft tracking data. The combination of these two data types enable inferences to be made about the interior and outer layers of the body, and to some degree its past history. Planetary missions over the past decade have provided both the shape and topography of Mars, to a lesser degree for the Moon, and for the asteroid 433 Eros. For all 3 bodies the data have enabled the construction of models of the crustal thickness or heterogeneity to be made and to make inferences about their thermal evolution. In the coming decade we anticipate that the measurements to be made at Mercury by the MESSENGER mission, already in cruise to the planet, and the BepiColombo mission to Mercury and due for launch around 2012, will permit similar studies, and interpretations, and comparisons between these planetary bodies.