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Planetary Interiors and Geodesy

Veronique Dehant
Royal Observatory of Belgium, Brussels, Belgium (veronique.dehant@oma.be, Tel 0032 2 3730266)

Lander and orbiter, even rover at the surface of planets or moons of the solar system help in determining their interior properties. First of all orbiters feel the gravity of the planet and its change. In particular, the tidal mass redistribution induces changes in the acceleration of the spacecraft orbiting around a planet. The Love number k2 has been determined for Venus, Mars and the Earth, as well as for Titan and will be deduced for instance for Mercury (MESSENGER and BepiColombo missions) and for the Galilean satellite from new missions such as JUICE (Jupiter Icy satellite Explorer). The properties of the interior can also be determined from the observation of the rotation of the celestial body. Radar observation from the Earth ground stations of Mercury has allowed Margo et al. (2012, JGR) to determine the moments of inertia of Mercury with an unprecedented accuracy. Rovers such as the MERs (Mars Exploration Rovers) allow as well to obtain the precession and nutation of Mars from which the moments of inertia of the planet and its core can be deduced. Future missions such as InSIGHT (Interior exploration using Seismic Investigations, Geodesy, and Heat Transport) will further help in the determination of Mars interior and evolution.