Geophysical Research Abstracts
Vol. 18, EGU2016-8395-1, 2016
EGU General Assembly 2016

Gravity science investigation of Ceres from Dawn

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The Dawn gravity science investigation utilizes the DSN radiometric tracking of the spacecraft and on-board framing camera images to determine the global shape and gravity field of Ceres. The gravity science data collected during Approach, Survey, and High-Altitude Mapping Orbit phases were processed. Currently, the latest gravity field called CERES08A is available, which is globally accurate to degree and order 5. Combining the gravity and shape data gives the bulk density of 2162.5±8 kg/m3. The low Bouguer gravity at high topography area, or vice versa, indicates that the surface of Ceres is likely compensated and that its interior presents a low-viscosity layer at depth. The degree 2 gravity harmonics show that the rotation of Ceres is very nearly about a principal axis. This consistent with hydrostatic equilibrium at 1% level, and infers a mean moment of inertia of Ceres is 0.36, implying some degree of central condensation. Based on a simple two-layer model of Ceres and assuming carbonaceous chondrites and hydrostatic equilibrium, the core size is expected to be ∼280 km with corresponding average thickness of the outer shell of ∼190 km.