Geophysical Research Abstracts
Vol. 19, EGU2017-3380, 2017
EGU General Assembly 2017

Gravity field and shape of Ceres from Dawn

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The Dawn gravity science investigation utilizes the DSN radio tracking of the spacecraft and on-board framing camera images to determine the gravity field and global shape of Ceres. The gravity science data collected during Approach, Survey, High-Altitude Mapping Orbit, and Low-Altitude Mapping Orbit phases were processed. The final gravity science solution yielded a degree and order 18 gravity field, called CERES18C, which is globally accurate to degree and order 14. Also, the final Ceres shape using the stereo-photoclinometry method is available with the height uncertainty better than 30 meters. The degree-2 gravity harmonics show that the rotation of Ceres is very nearly about a principal axis. Combining the gravity field and topography gives the bulk density of 2162.6±2.0 kg/m3. The estimated spin pole vector yields RA=(291.42744±0.00022)° and Dec=(66.76065±0.00022)° with the prime meridian and rotation rate of (170.374±0.012)° and (952.1532638±0.0000019)°/day, respectively. The low Bouguer gravity at high topographic areas, and vice versa, indicates that the topography of Ceres is compensated, which can be explained by a low-viscosity layer at depth. Further studies on Ceres interior show that low gravity-topography admittances are consistent with Airy isostasy and finite-element modeling require a decrease of viscosity with depth.