Title: Interior Evolution of Ceres Revealed by Dawn

Authors: Raymond, Carol A. ; Park, Ryan S. ; Konopliv, Alex S. ; Bland, Michael T. ; Marchi, Simone ; Castillo-Rogez, Julie C. ; McCord, Thomas B. ; Jaumann, Ralf ; Russell, Christopher T. ; Prettyman, Thomas H.

Affiliation: AA(Jet Propulsion Laboratory, California Institute of Technology), AB(Jet Propulsion Laboratory, California Institute of Technology), AC(Jet Propulsion Laboratory, California Institute of Technology), AD(USGS Astrogeology Science Center), AE(SwRI), AF(Jet Propulsion Laboratory, California Institute of Technology), AG(Bear Fight Institute), AH(DLR), AI(IGPP/UCLA), AJ(Planetary Science Institute)

Publication: American Astronomical Society, DPS meeting #47, id.#103.01

Publication Date: 11/2015

Origin: AAS

Bibliographic Code: 2015DPS....4710301R

Abstract

Dawn's exploration of Ceres has revealed its geophysical characteristics, informing the processes that have shaped it. Dawn has determined the average diameter of Ceres to be 940 km, smaller than the previously estimated 975 km [1]. This implies a density of 2160 kg/m^3, indicating that Ceres is less differentiated than predicted [2]. The low-degree gravity field is consistent with the body being in hydrostatic equilibrium and the magnitude of J_2 implies

some central condensation. Ceres' entire surface is cratered, implying the lack of a thick (10's of km) water ice layer at the surface. Variability in Ceres' crater morphology indicates that the near-surface layer has variable strength and rheology, likely due to heterogeneity in the near-surface mixture of rock, ice and salt. The lack of a number of expected large impact basins on Ceres can be interpreted to be the result of viscous relaxation, resurfacing or a combination of both. These data provide insights into Ceres' thermal evolution and mechanical properties, which appear to be unique to this warm, icy body.[1] Thomas, P. C., et al., Differentiation of the asteroid Ceres as revealed by its shape, Nature, 437, 224–226, 2005; [2] McCord et al., Ceres: Its Origin, Evolution and Structure and Dawn's Potential Contribution, Space Sci Rev DOI 10.1007/s11214-010-9729-9, 2011.
