P42A-05: The Geology of Ceres: an Overview

ABSTRACT

Thursday, 17 December 2015
11:20 - 11:35
Moscone West - 2007

Ceres exhibits geological features indicating significant resurfacing due to impact cratering, tectonic stress, relaxation, mass displacement, upwelling, doming and possible cryo-volcanic and/or cryo-glacial processes. Ceres' surface is characterized by a smooth and rugged topography ranging from about -7.5km to 7.5km relative to a best-fit ellipsoidal shape with 482x482x446km. Ceres' topography has a much greater range in elevation relative to its ellipsoidal dimensions (3.2%) than the Moon and Mars (1% and 0.9%) or Earth (0.3%) but is lower compared to Vesta (15%). Its topography is comparable to the icy satellite Iapetus (3.6%) but significantly higher than that of other icy satellites (<1.8%). The topography of Ceres indicates a rigid crust manifesting a range of processes at large and small scales in the course of its geological evolution. Impact craters of all sizes, central peaks and rings, and a variety of ejecta blankets, as well as lineaments, apparent depression infills and distinctive bright spots characterize Ceres' surface. Impact craters range from pristine to highly degraded, comparable to that of various icy satellites, the Moon and Vesta, indicating an intensive cratering history over the age of the solar system as indicated by surface units with different crater densities. Some craters show upwelling dome-like structures on the floor. Bright spots with higher albedo than the surrounding terrain occur at different locations correlated with impact structures and tectonic crustal stress. These spots indicate material differences and possible time-variable effects related to cryo-processes either volcanic and/or glacial. Trough-like features and polygonal impact crater rims indicate crustal stress that compensates by tectonic processes. According to the relatively high topography to radius ratio, steep slopes, mass wasting, and flow processes are expected and observed. We thank the Dawn Science and Operations Team for their support.

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Session: Vesta and Ceres as Seen by Dawn and Earth-Based Instruments I

Section/Focus Group: Planetary Sciences

Day: Thursday, 17 December 2015