

Comparative tectonic features on Ceres and other planetary bodies

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ABSTRACT

Dawn Framing Camera images of Ceres' surface indicate that tectonic processes have played an important role in the surface formation history and alterations. We study structures expected to be the result of tectonic deformation and crustal stresses, which may enable us to reconstruct the formation process of the surface and the topographic signature. Tectonic features on Ceres such as troughs, ridges, scarps, fractures, depressions and domes are analogous to those on other planetary bodies like Enceladus, Ganymede, Europa and Mercury. Comparing these surface features will provide additional information about possible scenarios of crustal formation on Ceres.

First investigations show that craters, like Urvara (46°S and 249°E), display sets of trenches radiating from the craters interior. They were likely formed by extensional tectonics linked to the impact. Similar features were also found on Mercury's surface. It is expected that other tectonic deformations on Ceres also influence the appearance of craters and crater walls. Comparatively small scale fissures on Ceres' surface, frequently arranged subparallel, seem to appear in terrain that looks smooth in the images. Fractures, cracks and scarps on Ceres can be found on Enceladus, Europa and Mercury in similar patterns. The "tiger stripes" on Enceladus are possible large scale analogues. Ridges on Europa, Enceladus and Ganymede are lineaments that dominate their entire surface. Those on Ceres' however, are more irregularly shaped and less distinct. On Ceres surface troughs seem to be relatively rare. However, they show similarities to troughs on Enceladus and Mercury, and could also be related to those on Europa and Ganymede. Domes are distributed over Ceres' entire surface and have a relatively regular shape. Analogous exist on Europa (relatively irregular or with halos) and Ganymede in the crater interiors.