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San Francisco | 14–18 December 2015

P53E-2187: Geomorphological Evidence for Pervasive Ground Ice on Ceres from Dawn Observations of Craters and Flows.

ABSTRACT


**Friday, 18 December 2015****13:40 - 18:00***Moscone South - Poster Hall*


Five decades of observations of Ceres' albedo, surface composition, shape and density suggest that Ceres is comprised of both silicates and tens of percent of ice. Historical suggestions of surficial hydrated silicates and evidence for water emission, coupled with its bulk density of ~2100 kg/m³ and Dawn observations of young craters containing high albedo spots support this conclusion. We report geomorphological evidence from survey data demonstrating that evaporative and fluid-flow processes within silicate-ice mixtures are prevalent on Ceres, and indicate that its surface materials contain significant water ice. Here we highlight three classes of features that possess strong evidence for ground ice. First, ubiquitous scalloped and "breached" craters are characterized by mass wasting and by the recession of crater walls in asymmetric patterns; these appear analogous to scalloped terrain on Mars and protalus lobes formed by mass wasting in terrestrial glaciated regions. The degradation of crater walls appears to be responsible for the nearly complete removal of some craters, particularly at low latitudes. Second, several high latitude, high elevation craters feature lobed flows that emanate from cirque-shaped head walls and bear strikingly similar morphology to terrestrial rock glaciers. These similarities include lobate toes and indications of furrows and ridges consistent with ice-cored or ice-cemented material. Other lobed flows persist at the base of crater walls and mass wasting features. Many flow features evidently terminate at ramparts. Third, there are frequent irregular domes, peaks and mounds within crater floors that depart from traditional crater central peaks or peak complexes. In some cases the irregular domes show evidence for high albedo or activity, and thus given other evidence for ice, these could be due to local melt and extrusion via hydrologic gradients, forming domes similar to pingos. The global distribution of these classes of features, combined with latitudinal variation in their abundance and/or


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spatially varied and/or activated by energetic events. Dawn high altitude mapping orbit (HAMO) data will provide better views.



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