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Title: First Geological Mapping Investigation of the Kerwan Hemisphere of Ceres (0-180°E), from NASA's Dawn Mission

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Abstract

The Dawn Science team divided the surface of Ceres into quadrangles, in order to facilitate systematic geological mapping, which is a tool used to methodically observe and interpret the surfaces of planetary bodies. Here we present a geological map of the Kerwan hemisphere of Ceres (0-180°E), which we assemble from a combination of quadrangle-scale geological maps. Ceres' Kerwan hemisphere is dominated by smooth plains, which surround the 284-km-diameter Kerwan crater. The smooth material has a lower abundance of craters than other parts of the Kerwan hemisphere, and may suggest that regional resurfacing has occurred. The current topography data also indicates that broad, positive topography features are present within Kerwan crater. In addition, there are ejecta deposits surrounding Haulani and Dantu craters, which are distinctive in photometrically corrected mosaics and color composite mosaics. These ejecta deposits may contribute to the #1 and #2 bright albedo regions observed by Li et al. (2006) with the Hubble Space Telescope. In the northern region, there are homogeneously distributed impact craters, most of which are circular, shallow, flat-floored and contain central mounds. Polygonal craters are also observed, which may provide inferences about the target materials in which they formed. In the southern region there are numerous craters containing central mounds and smooth material in their interiors. For example, the 129-km-diameter Zadeni crater contains a broad central mound. Moreover, lobate deposits are found in numerous craters in the Kerwan hemisphere, which are likely formed by mass wasting. Ongoing work will include the development of a detailed geological history and the use of crater morphologies to infer the composition and physical properties of the sub-surface. Currently, our geological mapping is based on Approach (~1.3 km/pixel) and Survey (~400 m/pixel) mosaics of clear and color filter data from the Dawn spacecraft's Framing Camera. In addition, shape models derived from Framing Camera data are used as a mapping aid. Dawn will begin the High Altitude Mapping Orbit (HAMO) in mid-August, and our geological mapping will then incorporate the higher resolution HAMO mosaics (~140 m/pixel).

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