GEOLOGIC MAPPING OF THE Ac-H-1 QUADRANGLE OF CERES FROM NASA's DAWN MISSION.

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Introduction: NASA's Dawn spacecraft arrived at Ceres on March 5, 2015, and has been studying the dwarf planet through a series of successively lower orbits, obtaining morphological and topographical information as well as, mineralogical, elemental, and gravity data. The Dawn Science Team is conducting a geologic mapping campaign for Ceres similar to that done for Vesta [1,2], including production of a Survey- and High Altitude Mapping Orbit (HAMO)-based global map, and a series of 15 Low Altitude Mapping Orbit (LAMO)-based quadrangle maps. In this abstract, we discuss the geologic evolution of the Ac-H-1 Asari Quadrangle.

Mapping Data: At the time of writing, LAMO images (35 m/pixel) are just becoming available. Thus, our geologic maps are based on HAMO images (140 m/pixel) and HAMO and Survey (400 m/pixel) digital terrain models (for topographic information) [3]. Dawn Framing Camera (FC) color images are also used to provide context for map unit identification. The maps to be presented as posters will be updated from analyses of LAMO images.

Results: Ac-H-1 quadrangle covers the North Pole area: 65°N-90°N. Key characteristics of the study area are: (1) a high density of impact craters and (2) only moderate topographic variations across the quadrangle. We measured a crater density of 9.8E-04 km^{-2} for crater diameters >10 km, the highest on Ceres measured so far. Topographic lows, reaching -4 km, correspond to the floors of impact craters with diameters up to 64 km. A few isolated topographic highs (plateaus), reaching ~5 km in altitude relative to the ellipsoid are present. Their irregular shape is often sculpted by impacts. A peculiar topographic rise is represented by Ysolo Mons: a ~5 km high and ~20 km wide mountain. No downslope striations are preserved on the Mons flanks, indicating an older surface relative to Ahuna Mons, a similar but morphologically fresh appearing mountain at the equator (quadrangle Ac-H-10, [4]).

Several impact craters show central peaks and/or mass wasting deposits on their floor. Crater rims often display terraces. These morphologies show varying degrees of degradation. Uncommon crater morphologies are a smooth crater floor (crater located at 79°N–170°E) possibly impact melt [5] and a large mass wasting landform inside Ghanan crater floor. The latter feature, similar to a long runout landslide, is ~20 km wide, ~25 km long and displays lineations on its surface. It originates from a crater that impacted on the rim of Ghanan crater.

Discussion and Conclusions: The high density of impact craters and the varying degree of crater degradation indicate that the cratered terrain of the Asari quadrangle is one of the oldest surfaces on Ceres. The terrain was probably not subject to resurfacing events that formed smooth plains in the equatorial region (e.g., Ac-H-7 Kerwan quadrangle). Quadrangle Ac-H-1 also lacks tectonic features such as troughs. Ysolo Mons shares some similarities (e.g., height/diameter ratio) to the Ahuna Mons (Ac-H-10 Rongo quadrangle). The regional context of Ysolo Mons is, however, different, as the surrounding terrain is more cratered (and thus older) than area adjacent to Ahuna Mons. The question remains whether Ysolo Mons and other topographic rises share a common formation mechanism. The formation of Ahuna Mons is under investigation and seems to be related to viscous material extrusion [6].

References:

[1] Williams D.A. et al. (2014) *Icarus, 244,* 1-12. [2] Yingst R.A. et al. (2014) *PSS, 103,* 2-23. [3] Preusker et al., this LPSC [4] Platz et al., this LPSC. [5] Schenk et al., this LPSC. [6] Ruesch et al., this LPSC.

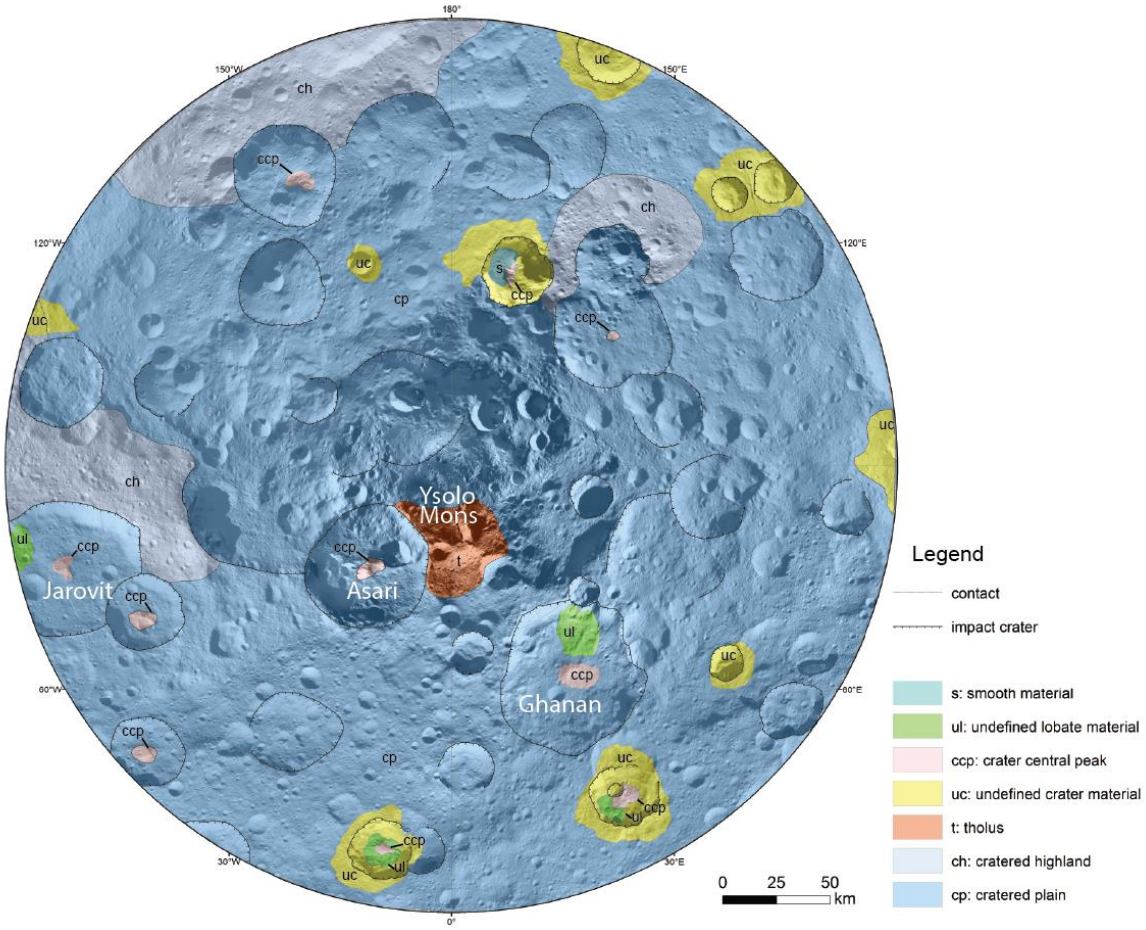

Figure 1: Geologic map of the Ac-H-1 Asari Quadrangle of dwarf planet Ceres. Mapping base is Dawn FC HAMO mosaic.