GEOLOGIC MAPPING OF THE Ac-H-10 RONGO AND Ac-H-15 ZADENI QUADRANGLES OF CERES FROM NASA'S DAWN MISSION. T. Platz[1,2], A. Nathues[1], H. G. Sizemore[2], O. Ruesch[3], M. Hoffmann[1], M. Schaefer[1], D. A. Crown[2], S. C. Mest[2], R. A. Yingst[2], D. A. Williams[4], D. L. Buczkowski[5], K. Hughson[6], T. Kneissl[7], N. Schmedemann[7], N. Schorghofer[8], A. Naß[9], F. Preusker[9], C. T. Russell[6], [1]Max Planck Institute for Solar System Research, Justus-von-Liebig-Weg 3, 37077 Göttingen, Germany (platz@mps.mpg.de), [2]Planetary Science Institute, Tucson, USA, [3]NASA/GSFC, Greenbelt, USA, [4]Arizona State University, Tempe, USA, [5]JHU-APL, Laurel, USA, [6]UCLA, Los Angeles, USA, [7]Freie Universität Berlin, Berlin, Germany, [8]University of Hawaii, Honolulu, USA, [9]DLR, Berlin, Germany.

Introduction: On March 6, 2015, NASA's Dawn spacecraft arrived at dwarf planet Ceres, the largest object in the main asteroid belt with a mean diameter of ~950 km. Dawn is studying (1) Ceres more than one year through successively lower orbits at increasing resolution. Three main orbital phases include Survey Orbit, High Altitude Mapping Orbit (HAMO), and Low Altitude Mapping Orbit (LAMO) where Framing Camera (FC) [1] resolution increased from ~400 m/px, to ~140 m/px, to its best at approx. 35 m/px, respectively. As done for Vesta [2,3], Ceres' surface geology is being mapped globally based on HAMO data and through a series of 15 LAMO-based quadrangle maps. This abstract presents HAMO-based geological maps of Ac-H-10 Rongo (22°N–22°S, 288-360°E) and Ac-H-15 Zadeni (65-90°S, 0-360°E) quadrangles (Fig. 1).

Mapping data: The final maps will have as their mapping base a 35 m/px panchromatic image mosaic; these LAMO images are just becoming available at the time of writing. Auxiliary databases comprise HAMO FC colour mosaics and a HAMO digital terrain model derived from stereo-photogrammetry [4].

Results: The Rongo Quadrangle is located at the equatorial region and comprises the unique isolated mountain Ahuna Mons (10.5°S/316.0°E; formerly known as the pyramid). It rises up to 4.5 km above the surrounding terrain and has an elliptical, 14×20 km, planar outline. The smooth flanks are composed of bright material; its summit exhibits arcuate ridges. This exceptional mountain has been formed by cryovolcanism through the eruption of salty brines onto the surface [5].

The quadrangle is also characterised by abundant impact craters spanning a range in diameters and states of preservation—from fresh to highly degraded. Rongo crater (3.5°N/348.1°E) is 65 km in diameter and highly modified through successive wall collapse events as evidenced by pronounced rim scallops and a hummocky textured flat floor. A number of tholi is also observed, which may represent surface expressions of sub-surface diapir intrusions. Finally, the SW portion of the quadrangle is covered by rough material currently thought to represent Yalode-sourced ejecta [6]. Lineament development on this ejecta material and elsewhere in the quadrangle could be related to the Yalode impact event or, at least partially, be associated with regional lineament structures observed farther west across Erntedank Planum [7,8].

The Zadeni Quadrangle is dominated by the 122-km-diameter crater Zadeni located at 70.2°S/37.4°E). It is moderately degraded though portions of the rim appear rather sharp. General crater morphologies range from highly degraded to pristine. Portions of the quadrangle are covered by ejecta material sourced from Urvara [9] and Yalode [6]. The region around the South Pole is poorly illuminated with the South Pole itself likely located within a larger impact structure. Most of the shadowed areas may be semi-permanently or permanently shadowed regions though HAMO and LAMO imagery were taken past the southern winter solstice.

Future work: HAMO-based geological mapping already revealed a diverse set of landforms, plains, and crater morphologies. On LAMO images contacts of surface units and crater ejecta material will become clear allowing the identification of discrete geological events in Ceres' past. Detailed crater-based dating of individual units will help understand the geological record and evolution preserved within Rongo and Zadeni quadrangles and beyond. Of particular interest and investigation are cryovolcanic landforms within the Rongo Quadrangle and (semi-)permanent shadowed regions within the Zadeni Quadrangle, in which surface water ice may be trapped [10,11].

Acknowledgement: Support of the Dawn Instrument, Operations, and Science Teams is gratefully acknowledged. This work is supported by grants from NASA through the Dawn project, and from the German and Italian Space Agencies.

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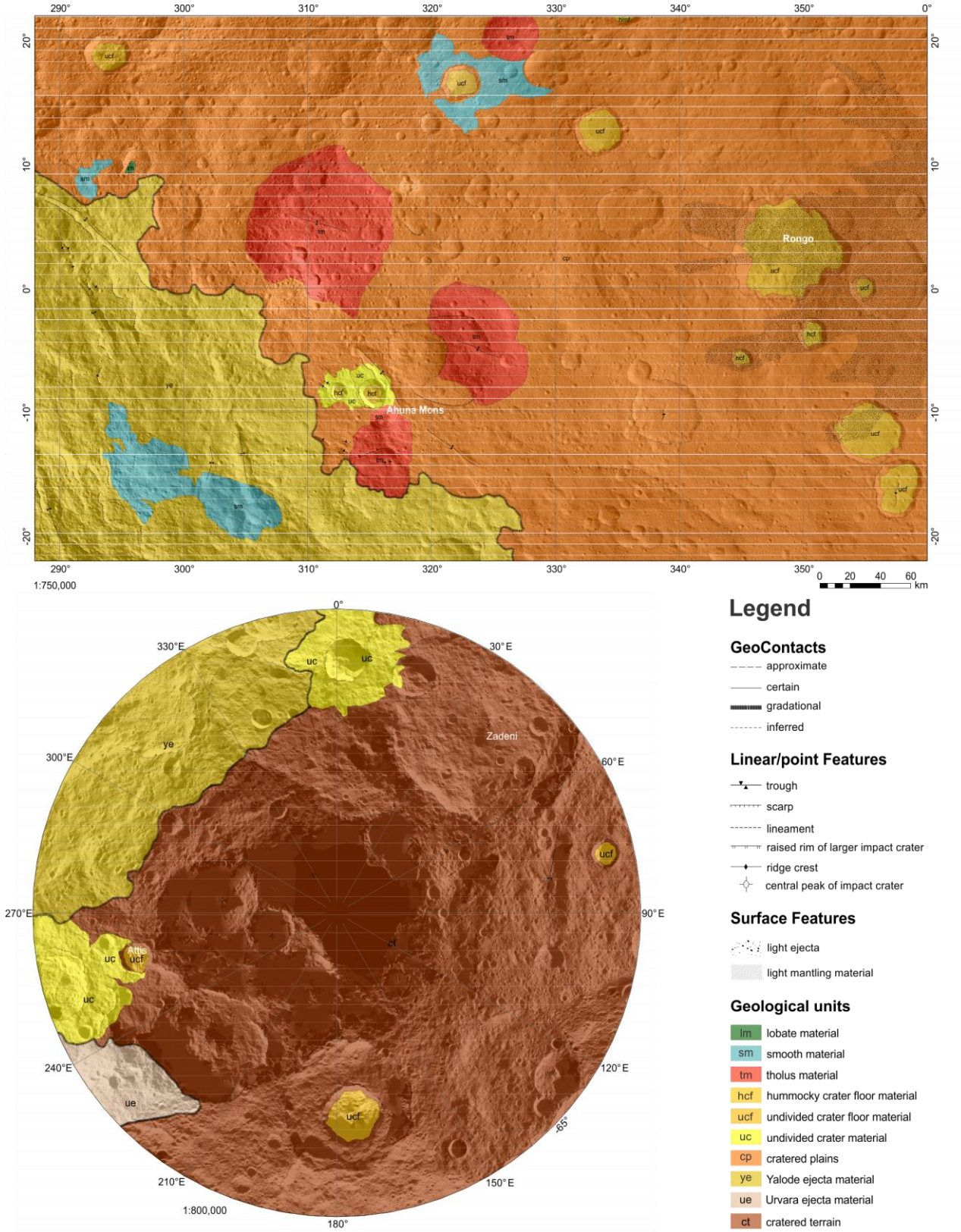

Figure 1. Geological maps of the Ac-H-10 Rongo (top) and Ac-H-15 Zadeni (bottum) quadrangles of dwarf planet Ceres. The base map is a Dawn Framing Camera HAMO mosaic (~140 m/pixel). The legend applies to both maps.