GEOLOGICAL MAPPING OF THE Ac-10 RONGO QUADRANGLE OF CERES. T. Platz[1], A. Nathues[1], H.G. Sizemore[2], D.A. Crown[2], M. Hoffmann[1], M. Schäfer[1], N. Schmedemann[3], T. Kneissl[3], A. Neesemann[3], S.C. Mest[2], D.L. Buczkowski[4], O. Ruesch[5], A. Naß[6], D.A. Williams[7], and F. Preusker[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]Freie Universität Berlin, Berlin, Germany, [4]JHU-APL, Laurel, USA, 5GSFD, Greenbelt, USA, [6]DLR, Berlin, Germany, [7]Arizona State University, Tempe, USA.

Introduction: Dwarf planet Ceres, the largest object in the main asteroid belt, is being investigated by the orbiting Dawn spacecraft. Between June 2015 and August 2016 the spacecraft moved through three orbital phases: Survey, High-Altitude Mapping Orbit (HAMO), and Low-Altitude Mapping Orbit (LAMO). Framing Camera (FC) [1] image resolution increased from ≈410 m/px to ≈140 m/px to ≈35 m/px. Ceres's surface geology is being mapped globally at LAMO scale through a series of 15 quadrangle maps [2], as was done previously at Vesta [3,4]. This abstract presents the LAMO-based geological map of the Ac-10 Rongo Quadrangle (22°N–22°S, 288-360°E).

Base maps: Mapping bases are the panchromatic LAMO mosaic and the HAMO-based stereo-photogrammtically derived Digital Terrain Model (DTM) with a horizontal resolution of ≈137 m/px and a vertical accuracy of 10 m [5]. Auxiliary data comprise the HAMO FC RGB (R=0.97 µm, G=0.75 µm, B=0.44 µm) and colour ratio mosaics, the photometrically corrected HAMO mosaic as well as an unregistered HAMO anaglyph mosaic.

Results: The Rongo quadrangle (Fig. 2) is located in the western hemisphere equatorial region. The total topographic relief across the quadrangle is 11.1 km. Its main feature is the unique isolated mountain Ahuna Mons rising up to 5 km above the surrounding terrain; planar outline is 19.4 km × 13.8 km. Ahuna Mons' flanks are smooth and are composed of bright material—primarily salts and carbonates [6,7]. The contact to the surrounding cratered terrain is sharp and only gradational where flank-induced flow deposition occurred. The summit region exhibits linear to arcuate ridges with no preferred orientation. Ahuna Mons is a cryovolcanic edifice and is likely formed by the eruption of brines-bearing material [6]. A further ancient tholus located within Begbalel Crater is also interpreted as cryovolcanic edifice in this study.

The landscape is characterised by an abundance of impact craters spanning a range in diameter from <100 m to 205 km and states of preservation—from fresh to highly degraded. Rongo Crater is 65 km in diameter and experienced several crater wall collapse events as evidenced by the pronounced scalloped rim. A number of gently rising and partially coalesced landforms are observed across the quadrangle. The SW portion of the quadrangle is characterised by rough-textured material interpreted to represent ejecta from Yalode Crater (260 km in diameter). Yalode ejecta material is often dissected and is clearly distinct in texture from the cratered terrain—the dominant surface unit on Ceres. The eastern region of the quadrangle is partially covered by Haulani-sourced ejecta material. Individual ejecta rays (Fig. 1) can be traced for up to 450 km. Some fresh to slightly degraded impact craters excavated bright material. In one instance, fluidised ejecta flows formed similar to those observed at Haulani Crater [8].

Detailed analysis of crater size–frequency distributions revealed model ages for Yalode crater of about 540 Ma and c.1.8 Ga as formation age for the cratered terrain. The cratered terrain is the most widespread unit on Ceres exhibiting large variations in crater densities across the globe [9] with resulting model ages ranging between 1.4-3.4 Ga [10-13].

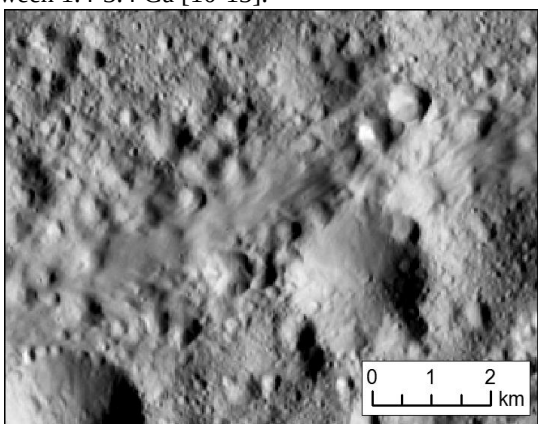

Fig. 1: Haulani-sourced crater ray at a distance of 230 km from source. Haulani Crater is 34 km in diameter.

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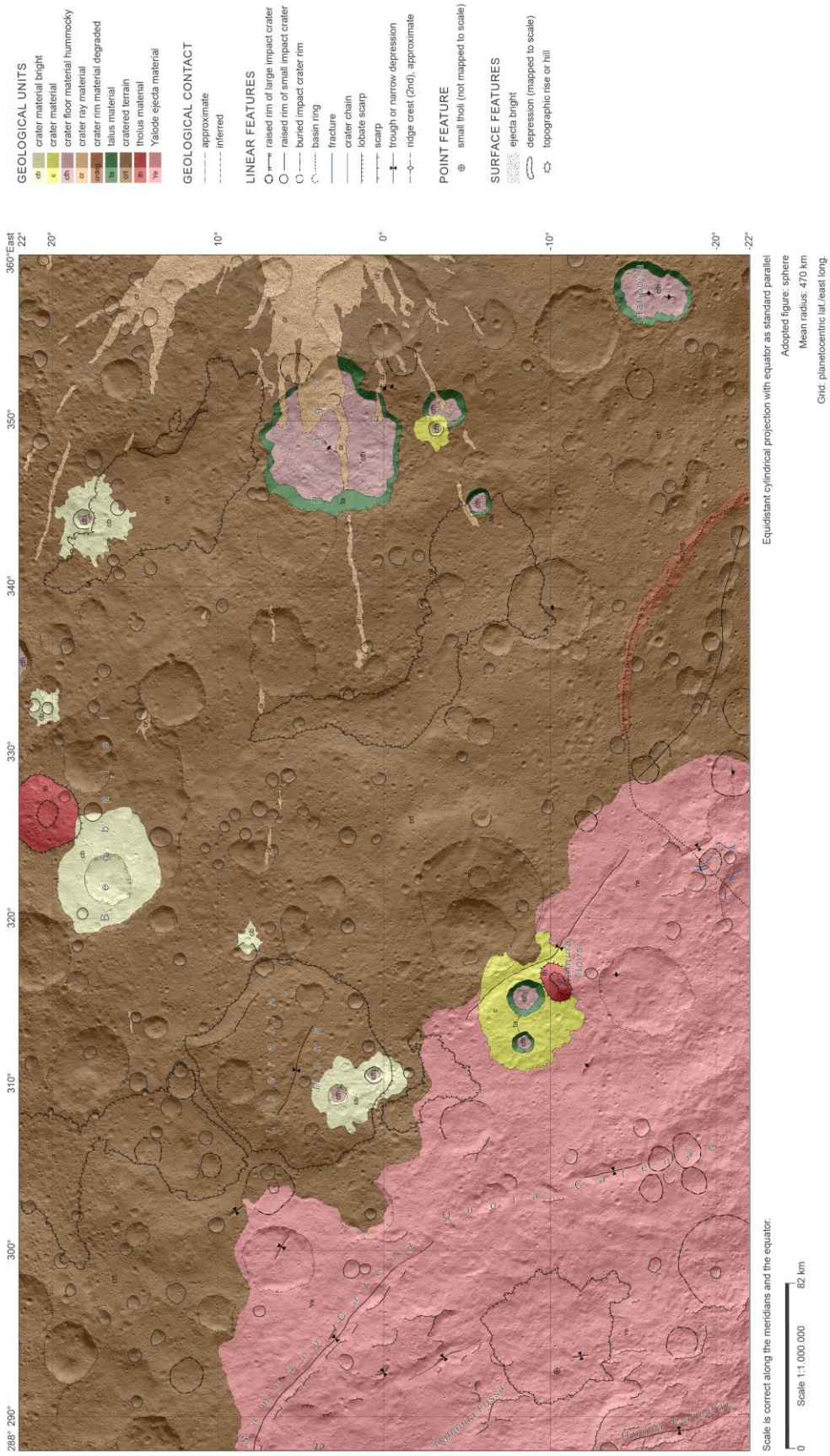

Fig. 2: Geological map of the Ac-10 Rongo Quadrangle of Ceres.