GEOLOGIC MAPPING OF THE Ac-H-3 DANTU QUADRANGLE OF CERES FROM NASA's DAWN MISSION. T. Kneissl[1], N. Schmedemann[1], A. Neesemann[1], D.A. Williams[2], D.A. Crown[3], S.C. Mest[3], D.L. Buczkowski[4], J.E.C. Scully[5], A. Frigeri[6], O. Ruesch[7], H. Hiesinger[8], S.H.G. Walter[1], R. Jaumann[9], T. Roatsch[9], F. Preusker[9], E. Kersten[9], A. Naß[9], A. Nathues[10], T. Platz[3,10], M. Hoffmann[10], M. Schaefer[10], M.C. De Sanctis[6], C.A. Raymond[5] and C.T. Russell[11], [1]Freie Universität Berlin, Malteserstr. 74-100, 12249 Berlin, Germany (Thomas.Kneissl@fu-berlin.de). [2]School of Earth and Space Exploration, Arizona State University, Tempe, AZ 85287, USA. [3]Planetary Science Institute, Tucson, AZ 85719, USA. [4]Johns Hopkins University Applied Physics Laboratory, Laurel, MD 20723, USA. [5]Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA 91109, USA. [6]National Institute of Astrophysics, Rome, 00136, Italy. [7]NASA Goddard Space Flight Center, ORAU Oak Ridge Associated Universities, Greenbelt, MD 20771, USA. [8]Institut für Planetologie, Westfälische Wilhelms-Universität, Münster, Germany. [9]German Aerospace Center (DLR), Berlin, Germany. [10]Max-Planck Institut für Sonnensystemforschung, Göttingen, Germany. [11]Department of Earth and Space Sciences, University of California, Los Angeles, CA, USA.

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, topographical, mineralogical, elemental, and gravity data [1]. The Dawn Science Team is conducting a geologic mapping campaign for Ceres similar to that done for Vesta [2,3], 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-3 Dantu Quadrangle.

Mapping Data: The current geologic map of Ac-H-3 Dantu is based on a Framing Camera (FC) clear-filter image mosaic from HAMO data (~140 m/px) as well as a digital terrain model (DTM) derived from imagery of the Survey phase. The DTM was produced using stereo-photogrammetric methods (for details see [4]). Albedo variations were identified and mapped using a mosaic of photometrically corrected HAMO images provided by DLR Berlin. FC color images provided further context for map unit identification. LAMO images (35m/pixel), which have just become available at the time of writing, will be used to update the map to be presented as a poster.

Results: The Dantu Quadrangle is located between 21-66°N and 90-180°E in a large-scale depression north of the prominent impact basin Kerwan. The northern and southeastern parts of the quadrangle are characterized by cratered terrain while the south and southwestern parts are dominated by the partially smooth ejecta blankets of craters Dantu (d=~126 km) and Gaue (d=~80 km). The largest crater in the quadrangle, Vinotonus (d=~140 km), which is located at the western quadrangle boundary, is highly degraded and does not show a well preserved ejecta blanket.

Pit/crater chains: East-west oriented pit/crater chains and/or grooves seem to be connected to the pit/crater chains found in Ac-H-2 and Ac-H-4, the neighboring quadrangles to the west and east, respectively. [5] and [6] describe these pit/crater chains as regional linear structures (RLS) and interpreted them to be formed over sub-surface fractures, i.e., to be related to tectonic processes.

Dantu: Dantu crater is a complex impact crater showing slump terraces and a partially smooth crater floor with concentric and radial fractures. Furthermore, Dantu shows a central pit structure with pitted terrain on its floor as well as several bright spots in the interior of and exterior to the crater. High-resolution measurements of crater size-frequency distributions (CSFDs) at various locations on Dantu's ejecta blanket and in the interior of the crater indicate a formation/modification age of ~200 - 700 Ma. Most of the ejecta appear to be relatively bright and correspond to parts of the #2 high albedo region observed with the Hubble Space Telescope [7]. However, the southwestern portion of the ejecta blanket, which is mainly located in the Ac-H-7 Kerwan Quadrangle, is characterized by relatively dark ejecta material. Interestingly, Dantu is located in a longitude range where the Herschel space telescope might have observed the release of water vapor [8]. Detailed LAMO-based geologic mapping will help to identify potential water sources.

Conclusion: The observed pit/crater chains seem to belong to the RLS, which are interpreted to have an tectonic origin [5,6].

Dantu's ejecta blanket shows albedo variations and differences in color ratios indicating materials of different compositions in the subsurface.

CSFDs superposed on Dantu crater indicate a formation/modification age between ~200 and ~700 Ma.

Future Work: Detailed analyses of LAMO imagery as well as VIR spectral data will help to constrain the compositional variations and the overall geologic history of the Dantu crater region. Further CSFD measurements will help to determine the formation ages of other impact structures in the quadrangle.

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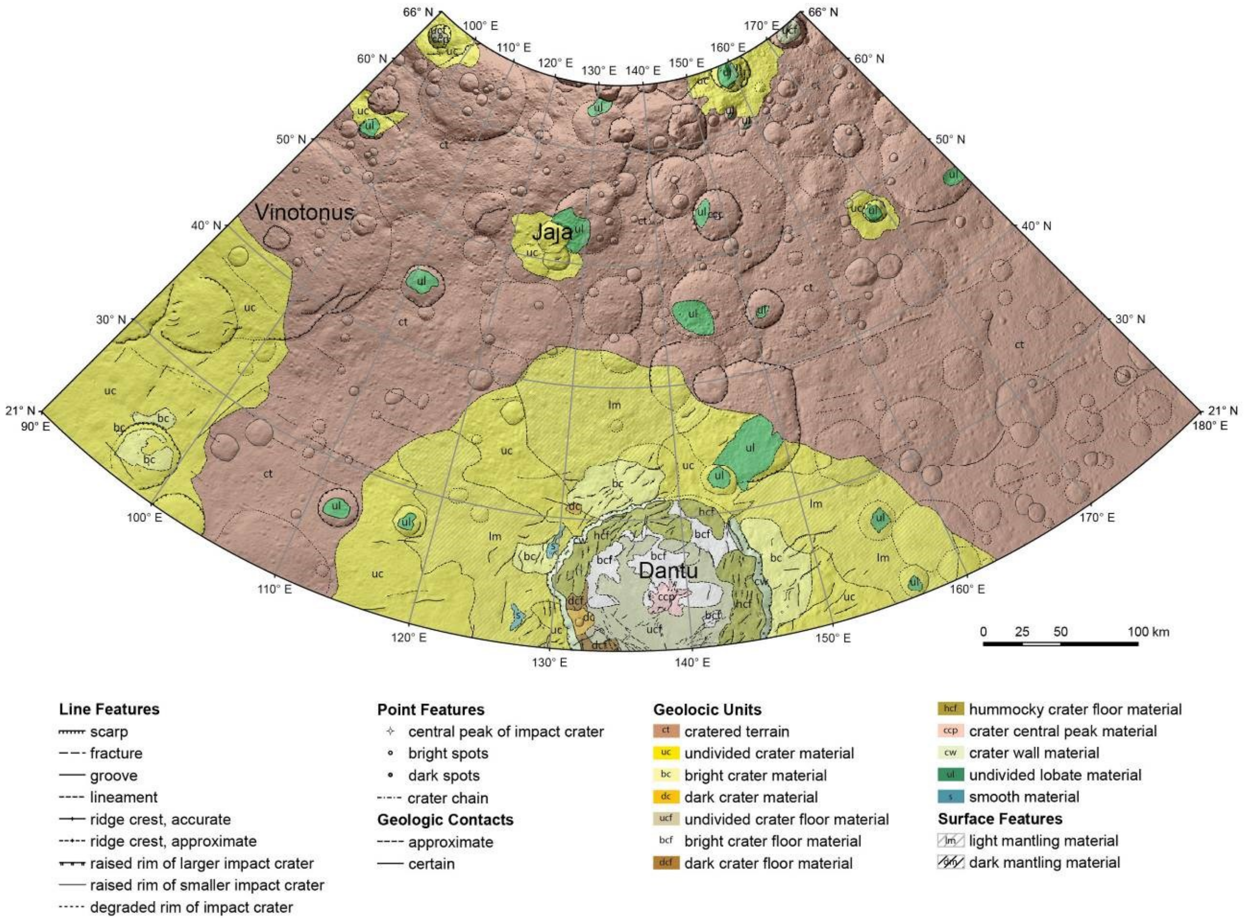

Figure 1: Geologic map of the Ac-H-3 Dantu Quadrangle of dwarf planet Ceres. Mapping base is Dawn FC HAMO mosaic (courtesy DLR).