GEOLOGIC MAPPING OF THE Ac-H-5 FEJOKOO QUADRANGLE OF CERES FROM NASA's DAWN MISSION. K. H. G. Hughson[1], C. T. Russell[1], D. A. Williams[2], D. L. Buczkowski[3], S. C. Mest[4], J. E. C. Scully[5], T. Kneissl[6], O. Ruesch[7], A. Frigeri[8], J-P. Combe[9], R. Jaumann[10], T. Roatsch[10], F. Preusker[10], T. Platz[11], A. Nathues[11], M. Hoffmann[11], M. Schaefer[11], R. Park[5], S. Marchi[12], C. A. Raymond[5]. [1]Department of Earth, Planetary, and Space Sciences, University of California Los Angeles, 595 Charles E Young Dr. E, Los Angeles, CA 90095, USA (p151c@ucla.edu), [2]ASU, Tempe, AZ, USA, [3]JHU-APL, Laurel, MD, USA, [4]PSI, Tucson, AZ, USA, [5]JPL, Pasadena, CA, USA, [6]FUB, Berlin, Germany, [7]NASA/GSFC, Greenbelt, MD, USA, [8]National Institute of Astrophysics, Rome, Italy, [9]Bear Fight Institute, Winthrop, WA, USA, [10]DLR, Berlin, Germany, [11]MPI for Solar System Research, Göttingen, Germany, [12]SWRI, Boulder, CO, USA.

Introduction: NASA's Dawn spacecraft arrived at Ceres on March 6, 2015, and has been studying the dwarf planet through a series of successively lower orbits, obtaining morphological & topographical image, mineralogical, elemental abundance, and gravity data. Ceres is the largest object in the asteroid belt with a mean diameter of ~950 km. The Dawn Science Team is conducting a geologic mapping campaign for Ceres similar to that done for the asteroid 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 present the LAMO-based geologic map of the Ac-H-5 Fejokoo quadrangle (21-66 °N and 270-360 °E) and discuss its geologic evolution.

Mapping Data: At the time of this writing LAMO images (35 m/pixel) are just becoming available. Thus, our geologic maps are based on HAMO images (~140 m/pixel) and Survey (~400 m/pixel) digital terrain models (for topographic information) [3, 4]. 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 (~35 m/pixel).

Key Geologic Features:

Fejokoo Crater. The approximately 80 km diameter Fejokoo crater is located in the south central region of its eponymous quadrangle, and is the largest well defined polygonal crater on Ceres. The east and west inward facing slopes of Fejokoo contain large terraced deposits of collapsed material, while the crater floor is dominated by smooth material and a quasi-linear east-west trending central peak complex.

Victa Crater. Located NW of Fejokoo, Victa crater hosts the darkest material found in the Fejokoo quadrangle. This low albedo material is found both within the crater, where it forms a hummocky and furrowed floor deposit morphologically similar to the floors of similarly sized craters on icy Saturnian satellites [5], and to its south where it forms a depressed lobate deposit.

Abellio Crater. Similar to Victa, Abellio crater shares many morphological similarities to similarly sized craters on icy worlds. These include steep crater walls and a relatively flat floor with an arcuate hummocky texture [5]. Abellio is also surrounded by one of the best preserved ejecta aprons in the Fejokoo quadrangle, which appears overall to be ancient and depleted in such features relative to the average Cerean surface.

Cozobi Crater. Located in the NW region of the Fejokoo quadrangle, Cozobi crater contains an unusually smooth and bulbous floor deposit. Thin, sheeted, multi-lobed flow-like features are observed to be emanating radially away from sections of Cozobi's north and south rim. These structures have a strong morphological resemblance to fluidized ejecta flows as seen on Mars, which may indicate a localized enrichment of ground ice in the vicinity of Cozobi [6].

Oxo Crater. Straddling the prime meridian at roughly 42 °N lies Oxo crater. With its bright crater wall material and bright ejecta rays Oxo is among the brightest features observed on Ceres (second only to the bright spots in Occator crater). A total lack of superimposed craters and geologic structures (at HAMO resolution) around Oxo indicate that it is one of the youngest features on the surface of Ceres. Due to its aforementioned youth and compositional variability inferred by FC color images the material at and around Oxo may represent one of the best samplings of fresh subsurface Cerean material visible to the Dawn spacecraft.

Tholus material. Numerous large, conical, and radially symmetric hills are distributed in the central region of this quadrangle. These tholi all rise above the background cratered terrain by several kilometers. Though they lack the sharp margin and distinctive morphology of Ahuna Mons these structures may represent additional intrusive features on the surface of Ceres [7]. The tholi exhibit a lower crater density than the background cratered terrain and have an affinity for appearing near to large and moderately sized craters indicating a possible causal relationship.

Discussion and Geologic History: Based on the current geologic map shown below the following geologic history was constructed for the Fejokoo quadrangle:

1. The background cratered terrain was emplaced and represents the oldest geologic unit in the quadrangle.

2. The growth of tholi and emplacement of undegraded craters Takel, Cozobi, Abellio, Victa, Fejokoo, Dada, and Roskva happened subsequent to the development of the cratered terrain.
3. Most recently, Oxo crater and its undisturbed ejecta was emplaced.

Before LPSC, we will refine and expand upon the aforementioned geologic history, and continued research into:

1. The possibility of the Fejokoo tholi being intrusive structures.
2. The different types of mass wasting in this quadrangle and their relationship to ground ice.
3. The morphological and compositional nature of Oxo crater (which are further discussed in [8] and [9] respectively).

References:

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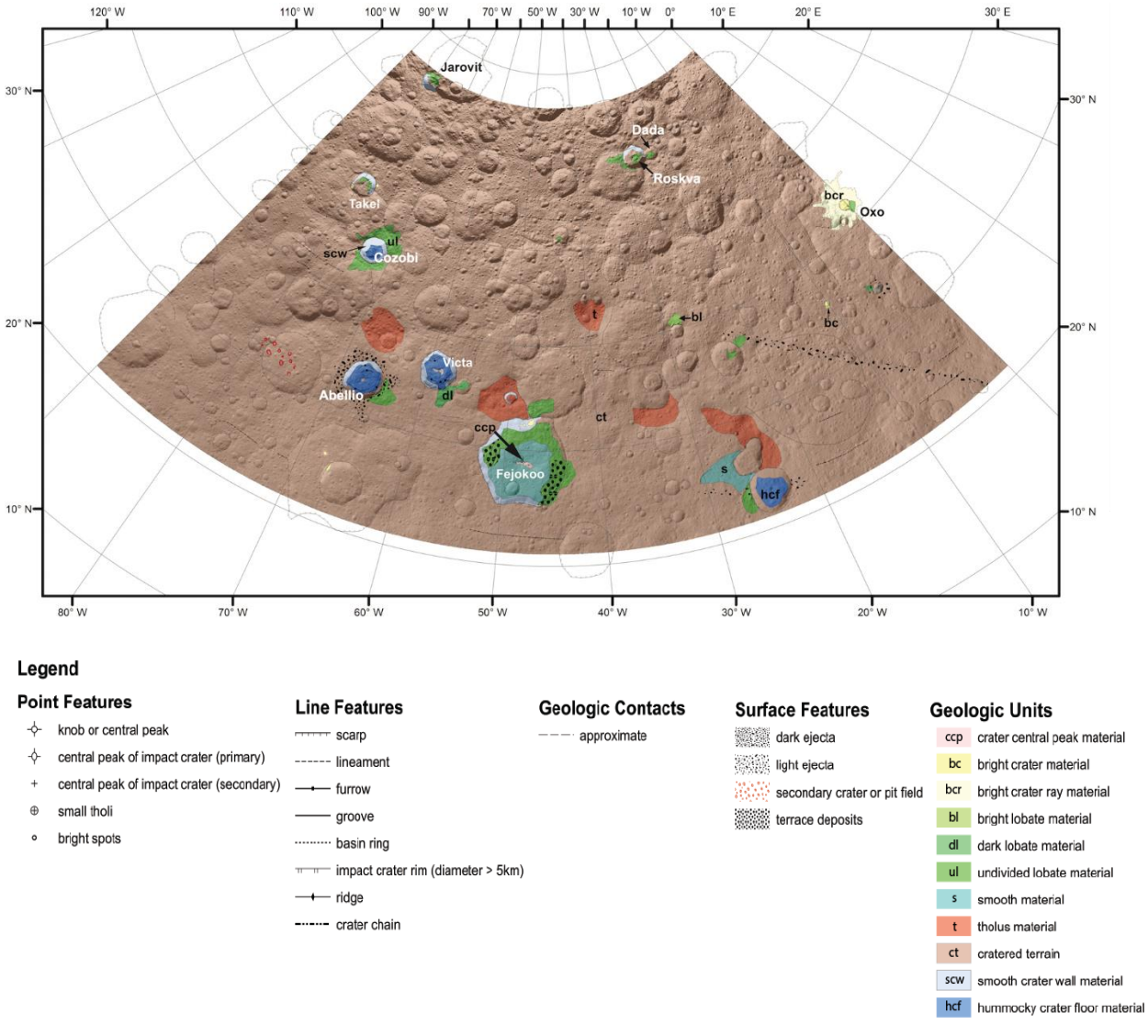

Figure 1: Geologic map of the Ac-H-5 Fejokoo Quadrangle of dwarf planet Ceres. Mapping base is Dawn FC HAMO mosaic (courtesy DLR).