GEOLOGIC MAPPING OF THE Ac-H-14 YALODE QUADRANGLE OF CERES FROM NASA'S DAWN MISSION. D.A. Crown[1], R.A. Yingst[1], S.C. Mest[1], T. Platz[1,2], H.G. Sizemore[1], D.C. Berman[1], D.A. Williams[3], T. Roatsch[4], F. Preusker[4], A. Nathues[2], M. Hoffman[2], M. Schäfer[2], C.A. Raymond[5], C.T. Russell[6], and the Dawn Science Team, [1]Planetary Science Institute, 1700 E. Ft. Lowell Rd., Suite 106, Tucson, Arizona 85719 (crown@psi.edu); [2]Max Planck Institute for Solar System Research, Göttingen, Germany; [3]School of Earth and Space Exploration, Arizona State University, Tempe, Arizona; [4]German Aerospace Center, DLR, Berlin, Germany; [5]NASA JPL, California Institute of Technology, Pasadena, CA; [6]UCLA, Los Angeles, California.

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. 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 surface geology and geologic evolution of the Ac-H-14 Yalode Quadrangle (21-66°S, 270-360°E).

Mapping Data: At the time of this writing LAMO images (35 m/pixel) are just becoming available. The current geologic map was produced using ArcGIS software based on HAMO images (140 m/pixel) and Survey (400 m/pixel) digital terrain models (for topographic information). Dawn Framing Camera (FC) color images were also used to provide context for map unit identification. The map to be presented as a poster will be updated from analyses of LAMO images.

Mapping Results: The Yalode Quadrangle is dominated by the 260-km diameter impact basin Yalode (42.3°S, 293.6°E) and includes rugged and smooth terrains to the east. Named features include the impact craters Besua (42.4°S, 300.2°E, 17 km diameter), Lono (36.7°S, 304.3°E, 20 km diameter), and Mondamin (63.0°S, 353.6°E, 126 km diameter). Preliminary geologic mapping defined two regional units (*cratered terrain* and *smooth material*), which dominate the quadrangle, as well as a series of impact crater material units (Figure 1) [3,4]. Mapped geologic features include crater rims, graben, ridges, troughs, scarp, lineaments, and impact crater chains. Geologic contacts are typically not distinct in Survey and HAMO images. Cratered terrain in the Yalode Quadrangle is rugged in places due to the presence of both impact craters and irregular high-standing zones not clearly associated with individual impact structures.

Impact craters in Yalode Quadrangle display a range of preservation states. Degraded features, including Yalode basin and numerous smaller craters, exhibit subdued rims, lack discrete ejecta deposits, and have infilled interiors. More pristine features (including Mondamin in the SE corner of the quadrangle and Besua, Lono and other craters on the Yalode basin floor) have well-defined, quasi-circular forms with prominent rims and in some cases discernible ejecta. Some of these craters have bowl-shaped interiors, and others contain hills or mounds on their floors that are interpreted as central peaks.

Yalode basin has a variably preserved rim, which is continuous and sharply defined to the north/northwest and is irregular or degraded elsewhere. Image and topographic data suggest that Yalode may have developed an interior ring structure. The western rim of Yalode is disrupted by Urvara basin, and structural features (mapped as impact crater chains and lineaments) extend from Urvara across Yalode's floor. Hummocky deposits interior to a prominent scarp are observed along Yalode's northern rim. These observations and the more pristine morphology of Urvara suggest the Urvara impact event post-dated formation of Yalode and may have caused collapse and burial of Yalode's rim and also triggered resurfacing of Yalode's floor. The basin floor includes hummocky and smooth areas (some bounded by scarps), crater chains, and a densely lineated zone.

Although distinct flow features have not been identified to-date, the widespread occurrence of smooth materials both associated with impact structures and within the cratered terrain point to the likelihood of cryovolcanic landforms/deposits. High-resolution images are being used to search for cryovolcanic features on the Yalode basin floor and in association with basin structures. To the east of Yalode basin, a high-standing region in cratered terrain is observed to be surrounded by smooth materials. Geologic mapping suggests that the cratered terrain may have been uplifted and fractured in this location. Smooth materials will be examined here to determine if they are locally sourced (and potentially volcanic in origin) or part of a regional surficial unit.

Survey orbit color composites show significant color variations within the Yalode Quadrangle. Preliminary analyses have identified distinct zones on the Yalode basin floor and associated with individual ejecta blankets that suggest compositional differences.

Summary: Preliminary geologic mapping of the Yalode Quadrangle of Ceres using Dawn Mission data shows that: 1) Yalode Quadrangle exhibits abundant impact craters with wide ranges in crater size and morphology (degraded to well-preserved) and diverse interior deposits/structures; 2) Yalode's rim includes prominent scarps indicating basin enlargement by collapse and mass-wasting; 3) well-defined craters occur through the region, including on the Yalode floor, and suggest significant crustal strength even where disrupted by large impacts; and 4) basin morphologies and cross-cutting relationships suggest Urvara basin post-dates Yalode basin.

References: [1] Williams D.A. et al. (2014) *Icarus, 244,* 1-12. [2] Yingst R.A. et al. (2014) *PSS, 103,* 2-23. [3] Yingst R.A. et al. (2015) *GSA Abstracts with Program*, Abstract 308-14. [4] Crown D.A. et al. (2015) *Fall Meeting AGU*, Abstract P53E-2181.

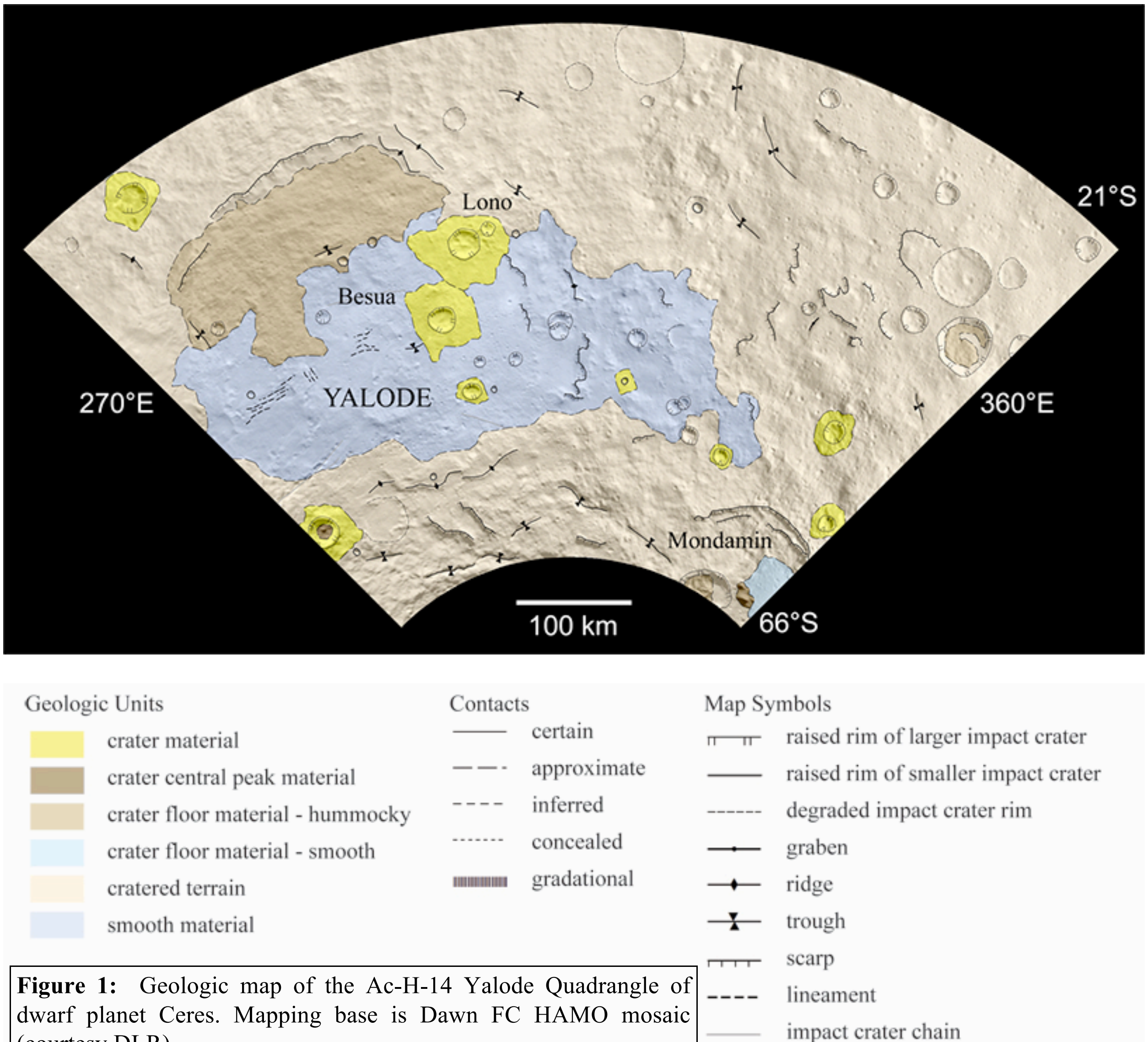

Figure 1: Geologic map of the Ac-H-14 Yalode Quadrangle of dwarf planet Ceres. Mapping base is Dawn FC HAMO mosaic (courtesy DLR).