GEOLOGIC MAPPING OF THE Ac-H-2 CONIRAYA QUADRANGLE OF CERES FROM NASA's DAWN MISSION. J.H. Pasckert[1], H. Hiesinger[1], D.A. Williams[2], D.A. Crown[3], S.C. Mest[3], D.L. Buczkowski[4], J.E.C. Scully[5], N. Schmedemann[6], R. Jaumann[7], T. Roatsch[7], F. Preusker[7], A. Naß[7], A. Nathues[8], M. Hoffmann[8], M. Schäfer[8], M.C. De Sanctis[9], C.A. Raymond[5], C.T. Russell[10]. [1]Institut für Planetologie, Westfälische Wilhelms-Universität, Wilhelm-Klemm-Str. 10, 48149 Münster, Germany (jhpasckert@uni-muenster.de); [2]School of Earth & Space Exploration, Arizona State University, Tempe, Arizona; [3]Planetary Science Institute, Tucson, Arizona; [4]JHU-APL, Laurel, Maryland, USA; [5]NASA JPL, California Institute of Technology, Pasadena, California, USA; [6]Inst. of Geosciences, FU Berlin, Berlin, Germany; [7]DLR, Berlin, Germany; [8]Max Planck Inst. for Solar System Research, Göttingen, Germany; [9]National Institute of Astrophysics, Rome, Italy; [10]UCLA, Los Angeles, California, USA.

Introduction: Dawn is the first mission to visit dwarf planet Ceres (~950 km) located at ~2.8 AU in the main asteroid belt [1]. Since 01/25/2015 Dawn has delivered images of Ceres with a higher spatial resolution than the Hubble space telescope. Dawn entered into orbit around Ceres on 03/05/2015, and since then is orbiting Ceres at progressively lower altitudes. We report on our preliminary geologic mapping results for the Coniraya Quadrangle based on Framing Camera (FC) mosaics from the Dawn Approach (1.3 km/px), Survey (415 m/px) and High Altitude Mapping (HAMO: 120 m/px) orbits [2]. In addition, DTMs based on Survey and HAMO data were used to get topographic information of the mapping area. As Low Altitude Mapping Orbit (LAMO: ~35 m/px) images are becoming available and full coverage of the mapping area will be reached until LPSC, the map presented as a poster will be updated with analyses of LAMO images.

Geologic Setting: This quadrangle is located between 21-66 °N and 0-90 °E and is dominated by mostly highly degraded impact craters of diameters between 50 and 200 km and clusters of small to midsize impact craters. The seven most prominent impact craters have been named Coniraya, Gaue, Omonga, Ikapati, Achita, Ernutet, and Liber. Coniraya is the largest relatively intact impact crater with a diameter of 136 km, centered at 65.8°E/40.5°N. With a diameter of 84 km, Gaue crater appears to be the freshest large impact crater in this quadrangle. It is located at the eastern border of the Coniraya Quadrangle and has a small central peak at 85.7°E/30°N. Another even fresher prominent impact crater is Ikapati (50 km in diameter; 45.5°E/34°N).

Geologic Units: We mapped this quadrangle at a scale of 1:500,000 with a resolution of 120 m/px (Figure). In total, 10 different geologic units were identified and mapped. Most of them are related to impact craters.

Cratered terrain: Highly cratered areas between prominent large impact craters have been mapped as cratered terrain and impact craters in this unit are either small or highly degraded like Coniraya crater.

Undivided crater material: As many impact craters in this quadrangle are highly degraded, we mapped them as undivided crater material. Impact craters where mapped as undivided crater materials when no subdivisions like ejecta blankets, crater walls or central peaks could be made. Impact craters that were even more degraded and crater rims that have been almost completely eroded (e.g., Coniraya crater) were not mapped as undivided crater materials, and were mapped as cratered terrain. These degraded crater rims were indicated by line features.

Crater ejecta, wall, floor, and central peak: At the current spatial resolution we were able to subdivide relatively fresh impact craters like Gaue and Ikapati into ejecta, crater wall, mass wasting deposits, crater floor, and central peak materials. Most of the other impact craters do not show ejecta blankets so that only the crater interiors could be mapped in more detail.

Crater ejecta are characterized by their smooth appearance, and their lower density of overlaying impact craters. The borders between the ejecta materials and the surrounding cratered terrain are mostly sharp and relatively close to the parent crater rims.

Crater walls are characterized by steep slopes and outcrops of more solid materials. At some craters (e.g., Gaue and Ikapati) terraces and mass wasting deposits can be traced down to the crater floor, starting at the crater wall.

Smooth deposits: In addition, we identified smooth materials on the floors and around Gaue and Ikapati craters. These smooth materials are similar in impact crater density to the surrounding ejecta blankets and seem to be relatively young.

Bright spots: We identified several bright spots, mainly in and around Gaue, Ikapati, and Achita craters. These bright spots seem to be associated with outcrops of bright materials from the subsurface exposed by the crater formation. They appear mainly at the crater walls, but also at proximal parts of the ejecta blankets. At Ikapati crater, the bright spots can also be found at the central peak and parts of the smooth crater floor. The bright spots at the crater floor and the smooth deposits might be associated with small impact craters excavating brighter material. But this has to be confirmed by LAMO data. Generally, all bright spots identified in this quadrangle are darker and much smaller than the large bright spots described by [3].

Tholus deposits: At the western edge of this quadrangle, we identified a dome-like structure (10°E/ 41.3°N) inside a large degraded impact crater. The dome-like structure is nearly circular and has a diameter of ~65 km. DTMs of the dome show an elevation of over 3 km relative to the crater floor, and that the dome is as high as the degraded crater rim. On top of the dome, we identified a possible central depression, but this has to be confirmed with LAMO data. We mapped this dome-like structure as tholus material.

Undivided lobate material: We identified one lobate flow-like deposit at an unnamed crater (50.5°E/27°N) west of Ernutet. The deposit shows a lobate front and sides. It emanates from an irregularly shaped depression at the contact between two crater rims and flows downhill into the crater.

Absolute Model Ages (AMA): We performed crater size-frequency distribution (CSFD) measurements of Gaue and Ikapati crater using the Lunar-derived production and chronology functions. The ejecta blanket of Ikapati crater shows a background AMA of ~3.1 Ga and a resurfacing age of 360 (±100) Ma. CSFD measurements of the smooth deposits in and around Ikapati crater show similar AMAs of 300 to 390 Ma. One of these smooth deposits at the border to the cratered terrain also shows a background age of ~3.5 Ga. The background ages of 3.1 and 3.5 Ga might be correlated to a large impact (e.g., Kerwan (~3 Ga) or Coniraya) that overprinted this part of the quadrangle. The AMAs ranging from 300 to 390 Ma can be interpreted to be the retention age of Ikapati crater.

CSFD measurements of the ejecta blanket of Gaue show (~3.3 Ga) a similar background age to Ikapati, but an older resurfacing age of 980 (±100) Ma. The crater floor of Gaue shows a similar AMA of 910 (±90) Ma. Consequently, these AMAs (910-980 Ma) can be interpreted to be the retention age of Gaue. The background age of ~3.3 Ga might be correlated to the same resurfacing event as the background ages at Ikapati crater.

Discussion: The formation process of the smooth materials mapped in craters Gaue and Ikapati is still unclear. However, we do see lineations and rilles that might be an indication for downward movement of the smooth material at local slopes. Whether such mass wasting occurred under dry or wet conditions cannot be distinguished at the moment. However, such ponds filled with smooth materials that show possible connections by channel-like features at crater rims have been also observed on the Moon (e.g., Tycho crater) and have been interpreted as impact melt ponds [4]. The derived AMAs for the smooth deposits in and around Ikapati crater seem to confirm the link between the formation of the smooth deposits and the crater formation itself, as the AMA of the ejecta blanket at least of Ikapati crater is similar to those of the smooth deposits. On new LAMO images some of these ponds show small pits at the surface, which might indicate the release of volatiles. Consequently, the smooth materials did not completely melt during the impact event, as volatiles were still in situ during deposition at the ponds.

References: [1] C. T. Russell and C. A. Raymond, The Dawn Mission to Minor Planets 4 Vesta and 1 Ceres, *Springer* (2012). [2] H. Sierks et al. (2011), The Dawn Framing Camera, *Space Sci. Rev.* [3] Nathues et al. (2014), *Nature*, 528, 237-24. [4] Shoemaker et al., (1968) Television observations from Surveyor VII, *NASA Jet Prop. Lab. Tech. Rept.,* 32-1265, p9-76.