



Geological Mapping of the Ac-H-14 Yalode Quadrangle of Ceres from NASA's Dawn Mission

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The Dawn Science Team is conducting a geologic mapping campaign for Ceres that includes 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). The current geologic map was produced using ArcGIS software based on HAMO images (140 m/pixel) for surface morphology and stratigraphic relationships, Survey (400 m/pixel) digital terrain models for topographic information, and Dawn Framing Camera (FC) color images as context for map unit identification. The map will be updated through analysis of LAMO images (35 m/pixel) that are just becoming available.

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. 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. 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.

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, Besua, Lono and 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 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.

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.

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