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Topography and Geomorphology of the Interior of Occator Crater on Ceres

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With a diameter of 92km, Occator is one of the most prominent craters on Ceres. Its depth ranges from 4.8km along the crater rim to -1.1km at the crater floor with respect to a reference ellipsoid. Occator shows a set of specific features such as post impact formation crater filling including multiple flow features, a central pit with a dome in its center, extensional tectonics expressed as linear radial and concentric graben, and spectral variations indicating a complex formation process. We processed 550 LAMO stereo images from Cycle01-Cycle11 with a resolution of ∼35m/pixel to generate a high-resolution digital terrain model (DTM) of the Occator impact structure. Occator crater has mass wasting deposits originating from the crater rims and walls, which extend into the crater for 10 to 20km. However, in the southeast and northeast these mass wasting deposits are completely covered by crater floor plains material that extends from the crater center to the rim, ponding against the crater walls. The flows also superimpose the mass wasting deposits from the rims [1]. Furthermore, crater densities on Occator's interior deposits are slightly lower than on its ejecta blanket, indicating post-impact formation or target parameter variation between consolidated melt and unconsolidated ejecta deposits [2,3,4]. The terrain northwest of the central area is very rough, shows mass wasting deposits and is about 2km thick w.r.t the rim of the central pit. The plains to the southeast are smooth, pond against the crater wall, and are less than 500m thick w.r.t. the rim of the central pit The central pit is about 3.5km wide and 600m deep while the dome rises 250m within the pit [5]. In the northeast, multiple flows approaching the crater rim very closely. These flow plains are also less than 500m thick w.r.t. the rim of the central pit. Some of the flows seem to have been superposed on the lower parts of the crater wall and then flowed back into depressions of the plains. The flows to the northeast appear to originate from the central region and move slightly uphill. This indicates either a feeding zone that pushes the flows forward by supplying low-viscosity material or an extended subsidence of the crater center, possibly after discharging a subsurface reservoir [1,2], or lateral oscillations of an impact melt sheet during emplacement. The plains material covers an area of about 4750km2 with an average depth of about 250m resulting in a body of plains material of about 1200km3. The plains material is slightly younger than the impact event and the bright deposits are even younger than the plains material. Post impact processes might be due to impact melt, hydrothermal alteration, or cryovolcanic crater filling
[1] K. Krohn et al, GRL43, 11994, (2016). [2] R. Jaumann et al., LPSC47, 1455 (2016). [3] N. Schmedemann et al, GRL43, 11987. (2016) [4] A. Neesemann, et al., Icarus, in prep. [5] P. Schenk, et al., LPSC47 (2016).