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Age-dependent morphological and compositional variations on Ceres

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Extended smooth plains cover the interior of a number of craters on Ceres. Smooth plains appear on different topographic levels associated with pits and flow-like features that overrun crater rims. The material forming these plains also ponds in depressions and smaller craters and cover the pre-existing surface creating distinct geological boundaries. Ikapati crater shows smooth plains on different topographic levels associated with pits and flow-like features that overrun crater rims. The material forming these plains, ponds in depressions and smaller craters and cover the pre-existing surface creating a distinct geological boundary. The interior of Occator also exhibits extended plains of ponded material, multiple flows originating from the center overwhelming the mass wasting deposits from the rim, dome-like features, vents cracks and fissures. Furthermore, crater densities on Occator's floor are lower than those on the ejecta blanket indicating a post-impact formation age of the flows. 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 a depression of the crater center, possibly after discharging a subsurface reservoir.
The plains and flows as well as some areas surrounding the craters appear spectrally blue. Both plains and flow material are characterized in camera and spectrometer visible spectra by a slightly negative slope with a gradual drop off up to 10% in reflectance from 0.5μm to 1μm. Although the spectral variations in the visible are subtle, they are clearly expressed in the color ratio composite. The crater densities of 20 locations across the surface of Ceres with different spectral behavior were analyzed in order to investigate the age dependence of spectral surface features. The results indicate that bluish material is mainly associated with the youngest impact craters on Ceres (< 0.5 Ga) while the investigated craters located in the reddish/brownish regions are typically much older (> 1 Ga) suggesting that the bluish material changes its spectral characteristics with time either due to weathering, radiation, particle size decrease or compositional alteration like dehydration.