2015). The first spatial resolved map of Ceres obtained on the basis of Dawn optical imagery revealed an overall dark surface with widespread albedo variations (Nathues et al., 2015). Ahuna Mons is an isolated elliptical mountain (21x13 km) located at 10.48°S, 316.2°E, and it has peculiar morphological characteristics. It is surrounded by a smooth-textured unit, less cratered than nearby terrains, and it can divided in two units: a summit with sub-radial arcuate structures (ridges and troughs) and a steep flanks formed by talus material (Ruesch et al., 2016). Ahuna Mons was formed by a volcanic process involving ascent of cryomagma and extrusion onto the surface followed by dome development (ibid). Spectroscopic analysis carried out in the Ahuna Mons region on the basis of VIR data indicates that this geological unit stands out as being distinct from the surrounding regions with respect to a series of diagnostic spectral indicators. Although the overall composition is not dissimilar from what is found elsewhere on Ceres, at the local scale Ahuna Mons emerges to have a lower abundance of hydrous mineral phases and a greater abundance of Na-carbonates than the surrounding areas observed at the same spatial resolution. The presence of a large amount of Na-carbonates is also consistent with the composition of the Occator bright spot (De Sanctis et al., 2016). This evidence is ultimately consistent with a cryovolcanic origin of Ahuna Mons, which would locally raise a portion of terrain by exposing fresh subsurface material richer in carbonates.

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511.06 – Mineralogy of crater Haulani on dwarf planet Ceres

On dwarf planet Ceres, several high-albedo units are visible at the local scale. Haulani crater, located in the equatorial quadrangle having the same name, is one of the notable bright units highlighted by the Dawn spacecraft since its first approach to Ceres in early 2015. Due to the images obtained by the Dawn Framing Camera, it was possible to reveal that Haulani's bright material displays a very small or even negative ("blue") spectral slope in the range from the visible to the near infrared light, which is a peculiar occurrence compared to the average surface of Ceres.
Hyperspectral images returned by the Visible and InfraRed mapping spectrometer (VIR) onboard Dawn enabled a detailed mineralogical analysis of the Haulani crater area. Already at the spatial resolution of the Survey phase (~1.1 km/px), and even more so during HAMO (~0.38 km/px) and LAMO (~0.10 km/px) mission phases, Haulani crater shows considerable spectral variability. The spectral features centered at 2.7 and 3.06 µm, respectively indicative of the presence of hydrous minerals and ammoniated phyllosilicates, show a decrease of band depth in the floor and in the bright ejecta corresponding to the blue spectral slope. Spectral signatures at 3.4 and ~4 µm, indicative of carbonates, also show a moderate variability. Finally, Haulani shows the highest thermal contrast over the entire surface of Ceres, which may be linked to the albedo and texture of the material excavated by the impact, combined with its compactness in specific areas such as pitted terrain.
The application of a spectral unmixing model on VIR data acquired in Survey and HAMO suggests that the observed spectral variations might be due to substantial differences in grain size, rather than to significant variations in composition. However, a comprehensive analysis shall include LAMO data acquired at higher pixel resolution.

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512 – Galilean Satellites I: Chemistry and Particle Interactions

512.01 – Jovian magnetospheric weathering of Europa's nonice surface material

Jovian plasma and energetic charged particles bombard the Galilean satellites. These satellites vary from volcanically active (Io) to a nearly primordial surface (Callisto). These satellites are imbedded in a harsh and complex particle radiation environment that weathers their surfaces, and thus are virtual laboratories for understanding how particle bombardment alters the surfaces of airless bodies. Europa orbits deeply in the Jovian radiation belts and may have an active surface, where space weathering and geologic processes can interact in complex ways with a range of timescales. At Europa's surface temperature of 80K to 130K, the hydrated nonice material and to a lesser extent, water ice, will be thermally stable over geologic times and will exhibit the effects of weathering. The ice on the surface of Europa is amorphous and contains trace products such as H_2O_2 [1] due to weathering. The nonice material, which likely has an endogenic component [2] may also be partially amorphous and chemically altered as a result of being weathered by electrons, Iogenic sulfur, or other agents [3]. This hydrated salt or frozen brine likely compositionally 'matures' over time as the more weakly bound constituents are preferentially removed compared with Ca and Mg [4]. Electron bombardment induces chemical reactions through deposition of energy (e.g., ionizations) possibly explaining some of the nonice material's redness [5,6]. Concurrently, micrometeoroid gardening mixes the upper surface burying weathered and altered material while exposing both fresh material and previous altered material, potentially with astrobiological implications. Our investigation of the spectral alteration of nonice analog materials irradiated by 10s keV electrons demonstrates the prevalence of this alteration and we discuss relevance to potential measurements by the Europa MISE instrument.

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