Color and albedo on the Ceres surface from Dawn Framing Camera images

*Stefan Ewoud Schroeder[1], Stefano Mottola[1], Uri Carsenty[1], Mauro Ciarniello[2], Ralf Jaumann[1], Jian-Yang Li[3], Andrea Longobardo[2], Eric Palmer[3], Carle M Pieters[4], Frank Preusker[1], Carol A Raymond[5], Christopher T Russell[6]

1. DLR, Germany, 2. INAF, Italy, 3. PSI, USA, 4. Brown Univ., USA, 5. JPL, USA, 6. UCLA, USA

We present a global spectrophotometric characterization of the surface of dwarf planet Ceres using Dawn Framing Camera images. We employed a global photometric model to assemble photometrically corrected images acquired on approach to Ceres into global maps of albedo and color. An accumulating body of evidence suggests water ice is abundant below the Ceres surface. Water ice is not stable on the surface, yet has been directly detected in Oxo crater (Combe et al. 2016). Water may even exist in liquid form in the interior. Carbonates identified in the very bright and young Cerealia Facula in Occator crater suggest (past) hydrothermal activity (De Sanctis et al. 2016). We search for spectrophotometric evidence for water ice and hydrothermal activity in the visible wavelength range. Even though colors on Ceres are generally subdued, this small world is surprisingly colorful. The dominant color variation over the surface is represented by "blue" and "red" material, which have a negative and positive spectral visible slope, respectively. Blue terrain is widespread and often distributed in and around fresh craters. A clear correlation between blue color and youth exists (Schmedemann et al. 2016). One of the bluest, and possibly youngest, craters is Haulani, which may show evidence for cryovolcanic flows (Krohn et al. 2016). The blue color may be associated with dehydrated phyllosilicates (Schröder et al. 2017), although alternative explanations have been proposed (Stephan et al. 2017). On the other hand, red terrain is found in only a few locations, usually in small patches. The prime examples are found inside Occator crater and around Ernutet crater (Nathues et al. 2016, Schröder et al. 2017). The reddest terrain in Occator is found in the youngest parts of Cerealia Facula, and may be associated with hydrothermal activity. The origin of the red terrain near Ernutet has not yet been established. Our color and albedo maps allow us to identify sites of interest that we study in more detail using color images acquired at higher resolution.

Keywords: Ceres, surface, spectrophotometry