MINERALOGY OF THE SINTANA-TOHARU REGION ON CERES. M.C. De Sanctis[1], E. Ammannito[2], F.G. Carrozzo[1], F. Zambon[1], M. Ciarniello[1], J-P. Combe[3], A. Frigeri[1], A. Longobardo[1], A. Raponi[1], F. Tosi[1], S. Fonte[1], M. Giardino[1], E. Palomba[1], C. A. Raymond[4], C. T. Russell[2] and the Dawn Science Team. 1) Istituto Nazionale di Astrofisica, IAPS, Rome, Italy. 2) University of California Los Angeles, EPSS, Los Angeles, CA. USA, 3) Bear Fight Institute, Winthrop, WA, USA, 4) Jet Propulsion Laboratory, California Institute of Technology, Pasadena, CA, USA.

Introduction: We present here the first results of the mineralogical mapping of the Sinatana and Toharu quadrangles on Ceres. These two quadrangles define a region in the southern hemisphere between latitudes 20°S and 65°S and longitudes 0°E and 180°E.

The mineralogical mapping is mainly based on the acquisitions made by the spectrometer VIR [1] on board the Dawn spacecraft [2].

The average reflectance spectrum of Ceres is consistent with the presence on Ceres' surface of a mixture of ammoniated-phyllosilicates, Mg-phyllosilicates, carbonates, and dark materials [3]. A strong 2.72 µm absorption dominates the overall spectrum. The shape of the band indicates the presence of OH-stretching vibrations in phyllosilicates [4] while the weaker 3.06 µm absorption has been attributed to the presence of ammonium in phyllosilicates [5]. Here we discuss the distribution of these to absortptions within Sinatana and Toharu quadrangles on Ceres.

The position and intensity of the 2.72 µm and 3.06 µm absorptions have been computed as described in [6]. Figures 1 and 2 show the distribution of a few relevant parameters of this region: the intensity of the 2.7µm band (fig. 1) and the intensity of the 3.2µm band (fig. 2).

Discussion and conclusion: The presence and the position of the 2.7-µm absorption are globally constant in this southern region, but its intensity shows significant variations . We do not see any clear correlation between the intensity of the bands and the albedo and reflectrance slope. The spatial distribution of the 2.7-µm band depth (Fig. 1) shows a general increase of band depth from the northern border going to the most southern latitudes. Both the quadrangles, Sintana and Toharu, behave in a similar manner, but this increase at southern latitudes is not seen in the other two adjacent quadrangragles, Urvara and Yalode (Ammannito et al., LPSC2017, Ammannito et al., 2016).

The distinct absorption feature at about 3.1 µm has been attributed to ammoniated phyllosilicates. Also in this case, the analysis of this feature shows that its band center position does not vary across the surface [6]. As with the 2.7-µm absorption, the absence of variability in the central wavelength of the 3.1-µm absorption suggests that the ammoniated phyllosilicate phase is compositionally homogeneous over most of Ceres' surface. However, the portion of Ceres' surface here discussed shows spatial variability in the 3.1-µm band intensity (Fig. 2) that broadly follows that of the 2.7-µm band depth distribution. Also in this case we see a general increase of the intensity of the ammoniated phyllosilicates band going from the mid-equatorial regions to the south. Band depth primarily reflects the abundance of the absorbing species.

Although the Ceres phyllosilicates are compositionally homogeneous, the variations in the depth of absorptions in the 2.7 and 3.1 µm indicate a variability in the abundance of the associated minerals. The large-scale regional variations shown in Figures 1 and 2, suggest latitudinal heterogeneity in phyllosilicate abundance over a scale of several hundreds of kilometers. Superimposed to this general trend, we see many localized areas that show variation in band depth with respect to the nearby regions. Most of them are associated with craters of different size, shapes and ages.

Notably is the behavior of Tupo crater, showing a deficency in the absorption of the phyllosilicate but not in the absorption of ammoniated-clays.

The nature of the enrichments and depletions in OH and NH_4 present in this southern region (20°S and 65°S and longitudes 0°E and 180°E.) and the differences with the other southern regions (20°S and 65°S and longitudes 180°E and 360°E) are still under investigation. The main hypothesis is the presence of vertical and lateral heterogeneities within the most external layer of the Ceres' crust.

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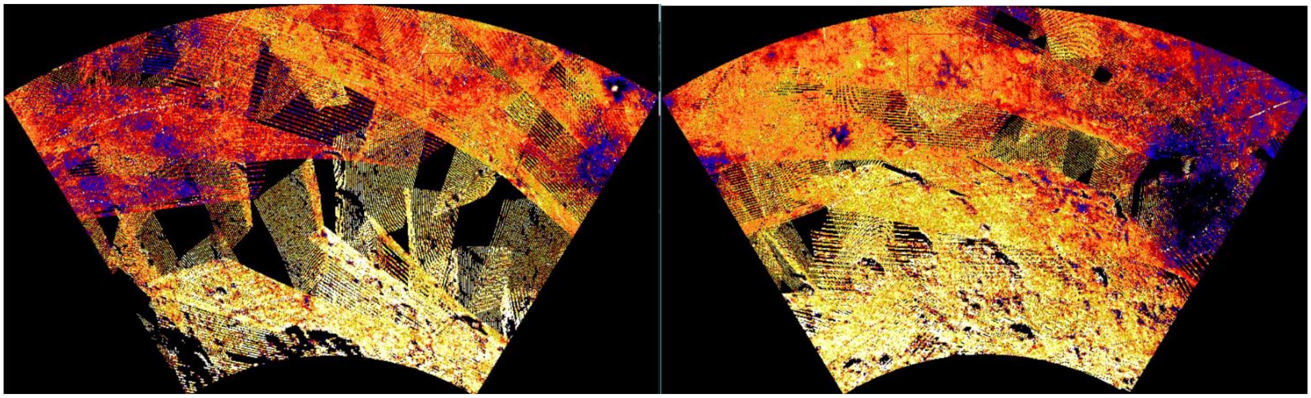

Fig. 1 Intensity of the 2.72 µm band of Sintana (left) and Toharu (right) quadrangles. Light yellow color represent high abundance of phyllosilicates while deep-blue/black represent low abundance of phyllosilicates.

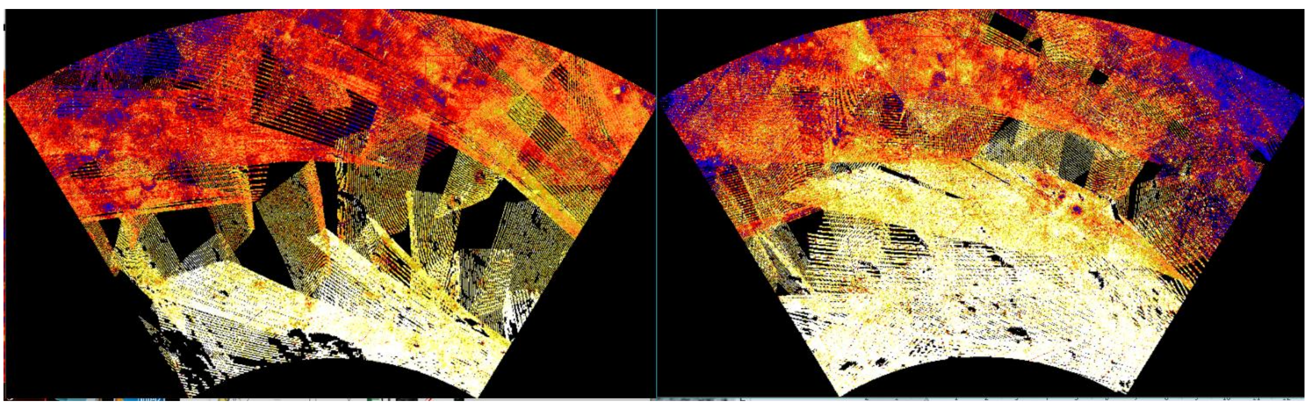

Fig. 2 Intensity of the 3.06 µm band of Sintana (left) and Toharu (right) quadrangles. Light yellow color represent high abundance of NH4-phyllosilicates while deep-blue/black represent low abundance of NH4-phyllosilicates.