IMAGING SPECTROSCOPY IN LAB: A TOOL SUPPORTING THE INTERPRETATION OF REMOTELY SENSED DATA BY DAWN MISSION.

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Introduction: We discuss here the main experimental results obtained with VIS reflectance spectroscopy techniques applied to a slice extracted from the LEW88005 meteorite. This activity was done to support the scientific interpretation of the hyperspectral data produced by VIR-MS, the imaging spectrometer aboard the Dawn mission to asteroids 1 Ceres and 4 Vesta [5]. Using suitable laboratory equipments, we can study terrestrial rocks and meteorites, considered analogs of the Vesta surface, in order to extract information from reflectance spectra that will be acquired during the mission.

LEW88005 is a meteorite from the Antarctic Meteorites Collection managed by the US Antarctic Meteorite Program that is a cooperation among the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and the Smithsonian Institution. According to [1], LEW88005 is a polymict eucrite; ten percent of the original fusion crust remains on LEW88005. Many large semi-rounded clasts, as large as 2 x 2 cm, are present. These clasts include mono- and poly-mineralic clasts, aphantic clasts and eucritic type clasts. Several areas are stained with oxidation.

Measurements: We acquired an hyperspectral image in the visual spectral range (0.25–0.95 μm). The spatial resolution of the image is 0.25mm while the measured portion is roughly (2 x 2.5) cm wide [2].

Fig. 1 shows the image as a three bands combination: 886 nm, 690 nm and 515 nm, while fig. 2 shows four spectra extracted from the same data set. In fig. 1 it is possible to recognize several spatial structures. In particular there is a dark vein and brighter spots with higher visual reflectance. The spectra in fig. 2 show several differences, the red spectrum refers to the dark region in the image and is composed mainly by glasses. In the black and violet spectra can be recognized the 1 μm band typical of pyroxenes. The orange spectrum is and intermediate case.

Conclusions: The data acquired in this study demonstrate the capability of our set-up to discriminate compositional features on a meteoritic sample. The spectra in fig. 2 clearly identify zones in the sample with different composition. We applied to this data-set analysis method, such as MGM ([3], [4]), to get parameters describing the spectral differences across the sample. The results of this on going analysis will provide the spatial distribution of the mineralogical composition along the analyzed surface.

References: [1] Grossman (1994) *Meteoritics*, 29, 100-143. [2] Ammannito et al. (2008) LPS XXXIX Abstract #1391. [3] Sunshine J. M. (1990) *JGR, 95*, 6955-6966. [4] Sunshine J. M.. and Pieters C. M. (1993) *JGR, 98*,9075-9087. [5] Russell, C. T. et al., (2007) *Earth, Moon, and Planets*, 101, pp. 65-91.

Fig. 1. Three bands image of the sample.

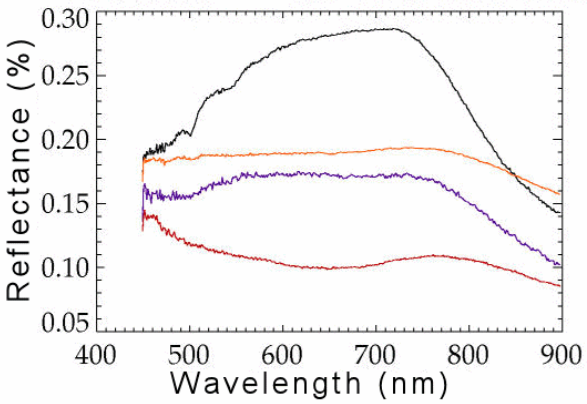

Fig.2 spectra of the sample for different positions on the measured surface. Different colors refer to different pixel in the image.