VIS-NIR reflectance spectroscopy of eucrites: the MILLBILLILLIE case.

A. Coradini (1), E. Ammannito (1), F.Capaccioni (2), M.T. Capria (2), M.C. De Sanctis (2), G. Filacchione (2), G. Piccioni (2), A. Boccaccini (1).

(1) Istituto Nazionale di Astrofisica – IFSI, Rome, Italy, (2) Istituto Nazionale di Astrofisica – IASF, Rome, Italy

In this work we report the main experimental results obtained with VIS-NIR reflectance spectroscopy techniques applied to a sample extracted from Millbillillie eucrite meteorite. This activity was done to support the scientific interpretation of the hyperspectral data produced by VIR-MS imaging spectrometer aboard Dawn mission to minor planets 1 Ceres and 4 Vesta. In particular we want to investigate the possibility that 4 Vesta could be the source of eucrite, howardite and diogenite meteorites (HEDs meteorites). For this reason we have developed in our laboratory an experimental setup to reproduce several possible illumination geometries of the sample in order to simulate the observation of the target by VIR-MS. This system is based on a spectrogoniometer consisting in 2 arms rotating around a common axis perpendicular to the horizontal plane on which the sample is located. Each of the two arms carries an optical fiber joined to a microcollimator to focus the beams: the first fiber, interfaced with a radiometric source, is used to illuminate the sample while the second fiber collects the reflected light and transmits it to the spectrometer (FieldSpec Pro, covering the 350-2500 nm spectral range). The two arms can rotate thanks to computer-controlled step motors that allow to move the light source at different angles looking always the same region of the sample. Data of inclusions and matrices of the Millbillillie sample have been acquired with the spectrogoniometer at different illumination angles.

During the on-ground calibration campaign of VIR-MS, data of the same Millbillillie sample have been collected. VIR-MS hyperspectral cubes cover an area of about 65x65 mm on the sample with a spatial resolution of about 0.25 mm/pixel and spectral resolution of 2nm in the visible range and 9 nm in the infrared range. The two experimental setups give analogous reflectance spectra, with well defined absorption features at 370, 930 and 2000 nm.