38th COSPAR Scientific Assembly 2010

Space Studies of the Earth-Moon System, Planets, and Small Bodies of the Solar System (B)
Mars Exploration (B02)

EXPLORING THE MARS' SURFACE COMPOSITION WITH THE PFS INSTRUMENT, AND THE BED SPECTRAL LIBRARY

Alessandro Maturilli, alessandro.maturilli@dlr.de
DLR, Berlin, Berlin, Germany
Jorn Helbert, joern.helbert@dlr.de
DLR, Berlin, Berlin, Germany
Mario D'Amore, mario.damore@dlr.de
DLR, Berlin, Berlin, Germany

The Planetary Fourier Experiment (PFS) on board the ESA Mars Express mission is routinely observing the red planet since the beginning of 2004, and collected more than one million Martian spectra. The spectrometer measures the radiation emerging from the planet simultaneously in the Long Wavelength Channel (LWC) between 5 and 45 μm, and in the Short Wavelength Channel (SWC), in the 1 to 5 μ spectral intervals. The Berlin Emissivity Database (BED) is a spectral library containing true emissivity measurements of planetary analogues, covering the whole 3 to 50 μm spectral range in four grain size separates: 0-25, 25-63, 63-125, 125-250 μm, to efficaciously represent the variety of grain sizes composition of a typical planetary surface. By means of a principal component (factor) analysis and a target transformation technique, we separated the atmospheric from the pure superficial contribution to the calibrated PFS LWC spectra. The surface emissivity spectrum was modelled with a linear deconvolution algorithm, using the BED entries as endmembers. Among the investigated Martian regions, are Syrtis Major and Mawrth Vallis, where the phyllosilicates detection from other remote sensing instruments (Omega on Mars Express and CRISM on the NASA Mars Reconnaissance Orbiter) were confirmed and better characterized in terms of singular mineral abundances. The study carried on shows that having multiple grain sizes endmembers in the used spectral library, significantly increases the accuracy of the results.