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Mars Analogues Emissivity Spectra from the Berlin Emissivity Database (BED)

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Several well-recognized Martian soil analogues have been classified and studied in the last years. The JSC Mars-1, collected and distributed under control of the NASA Johnson Space Center, originates from Pu'u Nene cinder cone in Hawaii, USA, between Mauna Kea and Mauna Loa. The material is a palagonitic tephra (glassy volcanic ash altered at low temperatures), chosen mainly for its spectral similarity to bright regions on Mars. The Salten Skov, coming from a subsurface deposit in the Midjutland region of Denmark, is a Fe-oxide precipitate having a dark red color, composed mainly of goethite, hematite and maghemite, with mineralogical and magnetic characteristics that closely resemble those of the martian soil. Other natural materials commonly referred as Martian soil analogues are montmorillonite and palagonite.

Here we present and discuss the emissivity spectra of these analogue minerals from the Berlin Emissivity Database spectral library. The Berlin Emissivity Database (BED) currently contains also emissivity spectra of plagioclase and potassium feldspars, low Ca and high Ca pyroxenes, olivine, elemental sulfur and a lunar highland soil sample measured in the wavelength range from 7 to 22 μm as a function of particle size. For each sample we measured the spectra of four particle size separates ranging from $<$25 to 250 μm.

The emissivity device is built at DLR (Berlin) and is coupled to a Fourier transform infrared spectrometer (Bruker IFS 88), purged with dry air and equipped with a cooled MTC detector. All spectra were acquired with a spectral resolution of 4 cm^{-1}.

We are currently working to upgrade our emissivity facility: a new spectrometer (Bruker VERTEX 80v) and new detectors will allow us to measure the emissivity of samples in the wavelength range from 1 to 50 μm, even in a vacuum environment.