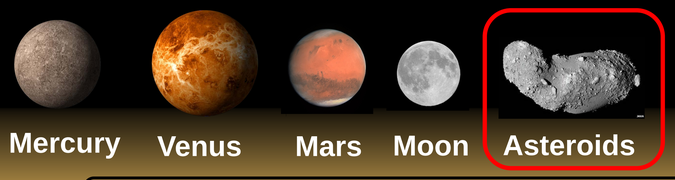
AGU FALL MEETING San Francisco | 15–19 December 2014 P51D-3972

Emissivity and Reflectance Spectra of Asteroid Analogs: their Dependence on Emerging Angle

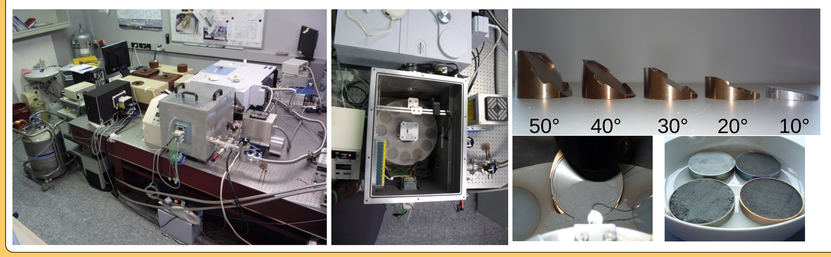


A. Maturilli, J. Helbert, S. Ferrari, M. D'Amore

Institute of Planetary Research, German Aerospace Center (DLR), Berlin, Germany

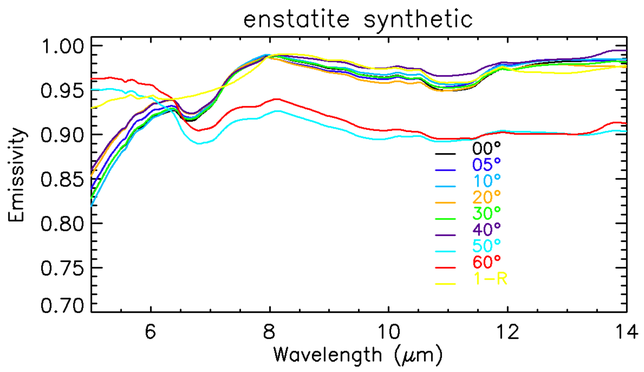
Contact: alessandro.maturilli@dlr.de / joern.helbert@dlr.de

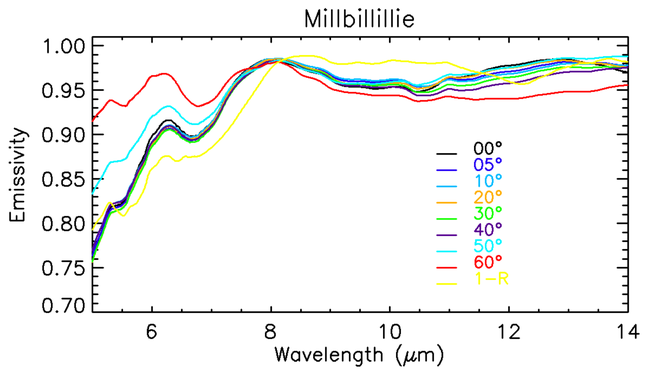
Experimental set-up and samples at the Planetary Emissivity Laboratory (PEL)



At the Planetary Emissivity Laboratory (PEL) of DLR in Berlin we set-up an experiment to measure the emissivity of two asteroid analogs, fine powdered (<25 µm) meteorite Millbillillie and a synthetic enstatite at surface temperature of 373K, with emerging angle (e) from 0° to 60°, with 10° step intervals. Special wedges have been created to incline the samples at the right emission angles: to prevent powder to slipper from the sample cups (always happening for e>30°), the samples have been packed using ethanol. For comparisons, we measured reflectance spectra of the same samples, keeping the incidence angle to the allowed minimum (i=13°) and varying the emerging angle as we did for emissivity measurements. All the data show very small spectral variations up to e=30°, while starting from e=40° the changes in band depth and shape become significant, and increase for each 10° step of increasing emerging angle..

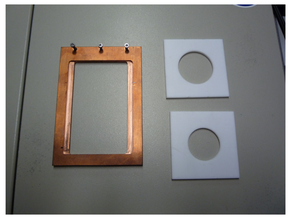
Emissivity measurements in vacuum





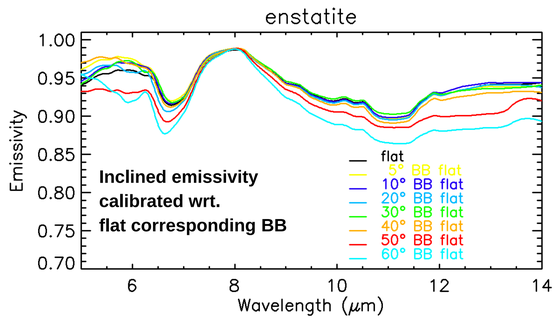
Field of View (FOV) of the spectrometer in vacuum (49 mm) fits exactly a flat cup diameter (50 mm).

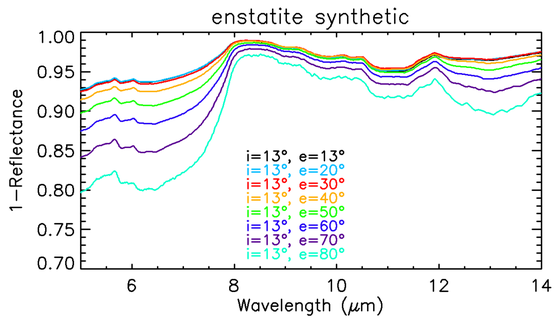
Exposed sample surface decrease with increasing angle e, also the influence of cup rim and external wedges structure (all of them hotter than sample) in measured radiance is increasing and disturbes the measurement. Cool masking the sample may solve the problem.

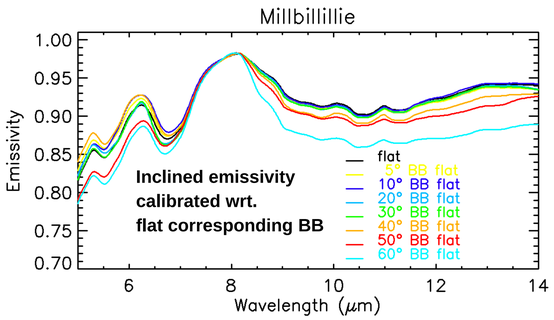


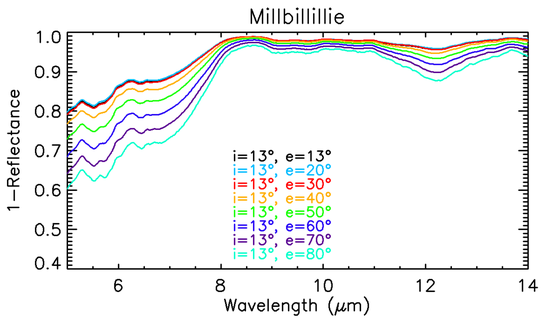
Emissivity (in purged air) and 1-reflectance (in vacuum) spectra of asteroid analogues

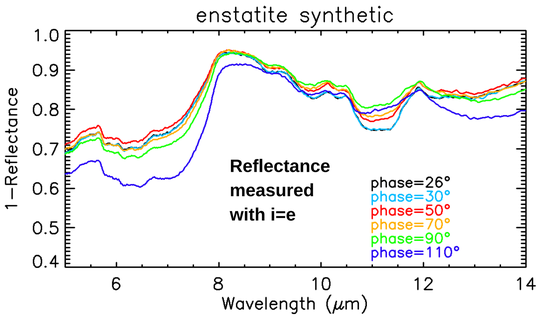
Field of View (FOV) of the purged spectrometer (24 mm) << flat cup diameter ➔ FOV fits exposed surface of inclined cup

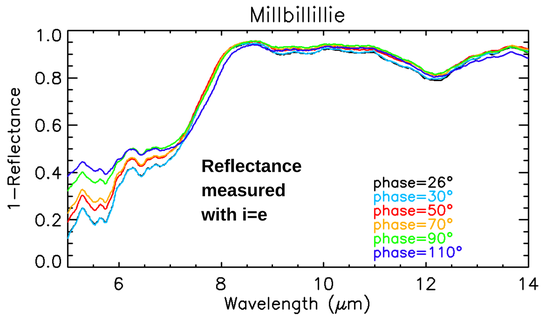




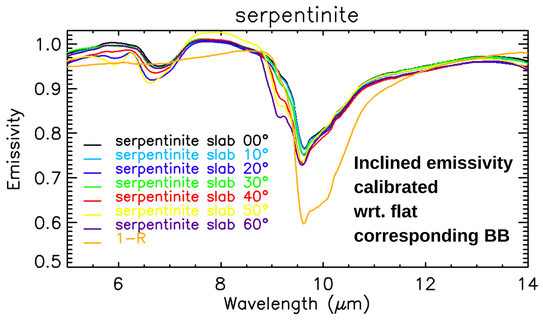








Hayabusa 2 calibration target for MARA on MASCOT and TIR imager



Emissivity in vacuum influenced by decreasing size of exposed sample surface with increasing emission angle (e). Emissivity under purged air shows significant spectral changes occurring for e>30°. Reflectance spectra with fixed incidence (i) and increasing e show the same trend, so like reflectance with increasing i=e angles. Serpentinite slab sample (calibration target for Hayabusa 2) spectra show same behaviour, tough less pronounced. Experiments to be continued on other analogues and for larger grain size fractions.