

EuropaNet TNA Report

PROJECT LEADER

Name: JOANNA GURGUREWICZ
Address: Space Research Centre PAS ul. Bartycka 18A 00-716 Warszawa Poland
E-mail: jgur@cbk.waw.pl

COLLABORATORS

Name:	Affiliation:
Natalia Zalewska	Space Research Centre PAS
Date of TNA visit:	January 30 - February 5
Host laboratory:	Planetary Emissivity Laboratory (PEL) at Deutsches Zentrum für Luft- und Raumfahrt (DLR) in Berlin

Project Title – Emissivity measurements of Mercurian basaltic analogues

- Report on the outcomes of the TNA visit (approx 1 page)

The instruments at PEL allow to measure emissivity of planetary analogue materials at temperatures of more than 400°C (typical for Mercury's low-latitude dayside) and under vacuum. During this TNA visit, emissivity measurements of 11 samples of basalts - possible Mercurian analogues - have been performed using a Fourier transform infrared spectrometer Bruker VERTEX 80v, in the 3-16 µm wavelength range. For these measurements, the samples of basalts have been reduced, to produce the powders in four particle size ranges: <25 µm, 25-63 µm, 63-125 µm and 125-250 µm. For the moment we have focused only on the measurements of the powders in the smallest particle size (<25 µm), which is the most relevant for Mercury. Each sample powder has been measured at 1A, 4A and 5A (33 measurements in total). For all measured samples the temperatures at 1A have been around 150°C, at 4A - around 350/400°C and at 5A - around 450/500°C. Each measured emissivity was calibrated. For the interpretation of absorption bands in the 6-16 µm wavelength range (we do not take into account the range below 6 µm because of the calibration problems) of the calibrated emissivity spectra we are using the Berlin Emissivity Database. We are going to compare spectra of the powders of minerals in particle size range <25 µm with the obtained data.

Measured basalts from Mongolia are representative of three different terrestrial geological environments, both young and older geological units (terranes). The Mandalovoo terrane (6 samples) comprises a nearly continuous Paleozoic island arc sequence. In the Gobi Altay

terrane (3 samples) an older sequence is capped by younger Devonian-Triassic volcanic-sedimentary deposits. The Bayanhongor terrane (2 samples) forms a discontinuous, narrow belt that consists of a large ophiolite allochthon. We are going to analyse differences and similarities between measured spectra of basalts from these three different geological environments. Another aspect is the comparison of the spectra of each sample, measured at 1A, 4A and 5A (in different temperatures). Preliminary observations show, in general, flattening and smoothing of the spectra in higher temperatures, and, as a consequence, fading of the smaller absorption bands.

Powders of six samples of the Mandalovoo basalts have been earlier measured at lower temperatures, using the same instrument. We also plan to compare measurements of the same material at extremely different temperatures - also for technical reasons.

Obtained data will be also very useful for future comparison with the MERTIS data (Bepi Colombo mission), which will operate in the 7-14 μm wavelength range.

- Publications arising/planned (include conference abstracts etc)

- abstract for 43rd Lunar and Planetary Science Conference

- Host approval The host is required to approve the report agreeing it is an accurate account of the research performed.