

Basaltic Martian analogues from the Baikal Rift Zone and Mongolian terranes

J. Gurgurewicz (1), J. Kostylew (2)

(1) Space Research Centre, Polish Academy of Sciences, Warsaw, Poland, (2) Institute of Geological Sciences, University of Wrocław, Poland (jgur@cbk.waw.pl)

In order to compare the results of studies of the western part of the Valles Marineris canyon on Mars there have been done field works on terrestrial surface areas similar with regard to geological setting and environmental conditions. One of the possible terrestrial analogues of the Valles Marineris canyon is the Baikal Rift Zone [1]. Field investigations have been done on the south end of the Baikal Lake, in the Khamar-Daban massif, where the outcrops of volcanic rocks occur. The second part of the field works has been done in the Mongolian terranes: Mandalovoo, Gobi Altay and Bayanhongor, because of environmental conditions being similar to those on Mars. The Mandalovoo terrane comprises a nearly continuous Paleozoic island-arc sequence [2]. In the Gobi Altay terrane an older sequence is capped by younger Devonian-Triassic volcanic-sedimentary deposits [2]. The Bayanhongor terrane forms a northwest-trending, discontinuous, narrow belt that consists of a large ophiolite allochthon [3]. The collected samples of basalts derive from various geologic environments.

The CORONA satellite-images have been used for the imaging of the Khamar-Daban massif and the Mandalovoo terrane. These images have the same spatial resolution and range as the Mars Orbiter Camera images of the Mars Global Surveyor mission. In the Mandalovoo terrane these images allowed to find an area with large amounts of tectonic structures, mainly faults (part of the Ongi massif), similar to the studied area on Mars.

Microscopic observations in thin sections show diversification of composition and structures of basalts. These rocks have mostly a porphyric structure, rarely aphyric.

The main components are plagioclases, pyroxenes and olivines phenocrysts, in different proportions. The groundmass usually consist of plagioclases, pyroxenes and opaques. The most diversified are basalts from the Mandalovoo terrane.

Infrared spectroscopy has been used to analyse the composition of the rock material and compare these results with those of Martian missions. The range of the recorded spectra is from 400 to 2000 cm^{-1} . Characteristic absorption bands in the spectra confirm the presence of minerals observed in thin sections and moreover, indicate the presence of leucite, analcime and saponite. The analyzed spectra have been compared with those of the Planetary Fourier Spectrometer of the Mars Express mission. The long wavelength channel of this spectrometer has a similar spectral range, from 230 to 2000 cm^{-1} . This comparison indicates the similar absorption bands of clinopyroxenes in both spectra.

References: [1] Komatsu G. (2003) *Lunar Planet. Sci. XXXIV*, abstract 1314. [2] Soja C. M. and White B. (2006) *Geol. Soc. Amer.*, 38, 90. [3] Parfenov L. M. et al. (2002) *Northeast Asia geodynamics map*.