MINERALOGY OF NOCTIS LABYRINTHUS ON THE BASIS OF OMEGA/MEX AND PFS/MEX DATA.
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Introduction: The Noctis Labyrinthus region is situated in the western end of the Valles Marineris canyon on Mars and consists of a high plateau cut by a network of structurally controlled troughs, which extend for 976 km along the Martian equator. This dense network of grabens, a few kilometers deep in some places, leads to forming by numerous fault dislocations in the western part of Valles Marineris [1].

The OMEGA imaging spectrometer and the Planetary Fourier Spectrometer (PFS) data of the Mars Express mission have been used to analyse the presence and diversification of the mineral composition of the Noctis Labyrinthus region.

Data sets and methods: The Spectral Hourglass Wizard algorithm has been used to analyse the OMEGA/MEx data set. This algorithm is based on the factor analysis, which is a multivariate technique for reducing matrices of data to their lowest dimensionality. The set of measured spectra is selected. The eigenvectors of the covariance matrix of the measured spectra are calculated. The spectral endmembers are identified with the first n eigenvectors where n is the number of linearly independent components in the set of measured spectra. The selected set of endmembers (Fig. 1) is then fit to the library spectra.

The next step of the analysis is the image classification with using the Spectral Angle Mapper algorithm. The classification process assigns each image pixel to one cluster. Each of such cluster should correspond to one of the mineral contents on the analysed image. At the last step cluster should group pixels showing areas covered by a specific type of material (Fig. 2).

Results and discussion: From analysis both OMEGA and PFS data can be concluded that the dominant minerals of the Noctis Labyrinthus area are pyroxenes and plagioclases, which are present both on the canyon floors and plateau. Presence of clinopyroxenes is observed both in the central and western part of Noctis Labyrinthus. Plagioclases are located in the central part. Large quantity of hematite covers the plates, mainly in the western part of the study area. In the central part small quantities of
hydrated minerals are observed on the slopes and floors of canyons.

![Graph A](image1)

**Fig. 3** PFS/MEx data, orbit 486: (A) radiance spectrum; brown curve is the Planck function; (B) emissivity spectrum.

Presence of hydrated minerals (probably phyllosilicates) in the oldest part of rock basement and large quantity of hematite on the plateau corresponds to the stratigraphy of Mars based of the global mineral composition of the surface [2]. In some spectra from both OMEGA and PFS spectrometers absorption bands show reduced intensity compared to the library spectra. It could reflect smaller grain size of the materials present on the Martian surface. In the case of hydrated minerals the difference in the intensity of the bands might be caused by the -OH group content. Test comparison of the OMEGA spectra of the investigated area and the spectra of rocks from JHU Spectral Library indicates basaltic andesite.

In the case of the Noctis Labyrinthus region the quality of the data set collected by OMEGA and PFS is handicapped by a considerable distance of the spacecraft from pericentre during measurements and an increased thickness of the atmospheric column arising from the few-kilometers deep grabens making the significant part of the explored area.

From this work can be concluded that the use of two different data sets - OMEGA and PFS allows to obtain the convergent results. Presence of hydrated minerals in Noctis Labyrinthus was also discovered using the CRISM/MRO data [3]. A comparison of results from OMEGA and PFS spectrometers with CRISM data is planned.

**References:**