ELEMENTAL COMPOSITION AND HYDRATION OF MARTIAN REGOLITH BASED ON GAMMA AND NEUTRON SPECTROSCOPY DATA. M. L. Litvak, N. E. Demidov and I.G. Mitrofanov, Institute for Space Research, Moscow 117997, Profsojuznaya st. 84/32, Russia, mlitvak.iki@gmail.com

Introduction: Spectrometric measurement of regolith by Viking 1,2, Pathfinder, MER-A,B showed the presence of material with similar concentration of basic elements in all landing sites [1,2]. The homogeneous upper Martian soil is the result of primary basalts dominant occurrence and eolian mixing. From the other hand it is known (observed by different instruments during orbital measurements) that there are some locations with anomalous non volcanic rocks like phyllosilicates, chlorides or sulfates [3,4].

In our study we concentrated on the Mars Odyssey gamma ray (GRS instrument) and neutron spectroscopy (HEND instrument) data to distinguish both regions with basic elemental composition consistent with standard regolith model and regions with anomalous elemental composition. The last ones may show presence of different hydrated minerals.

Data and Method: We used GRS instrument Si, Fe, Al, Ca, Cl, S concentration maps [5] and H concentration map according to HEND instrument [6] to check if the concentration in each pixel of the global martian map is consistent with standard regolith model. This test was based on the assumption that standard regolith regions may be described by two-component model with concentration of Si, Fe, Al, Ca, Cl and S equal to mean concentration found be MER A,B and variable amount of water. Calculations based on Pearson criteria for different levels of confidence were performed to chose the best-fit elemental composition for each pixel.

Conclusions: Calculations showed that standard regolith occupy vast territory of old southern highlands [fig. 1]. It was also found that regions with anomalous concentrations of basic elements are located in northern lowlands with fewer smaller locations in highlands and in the Hellas area. The resulted map of hydrotation for standard regolith regions [fig. 2] represents the most developed map of water on Mars created both on the basis of hydrogen measurements and normalization on the concentrations of other basic regolith elements.

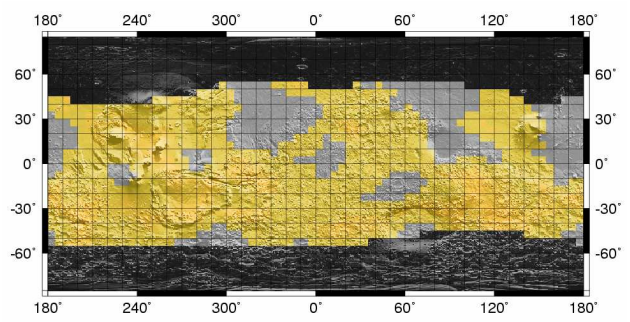

Fig. 1 Map showing location of regions formed with standard regolith (brown) and nonstandard regolith (grey)

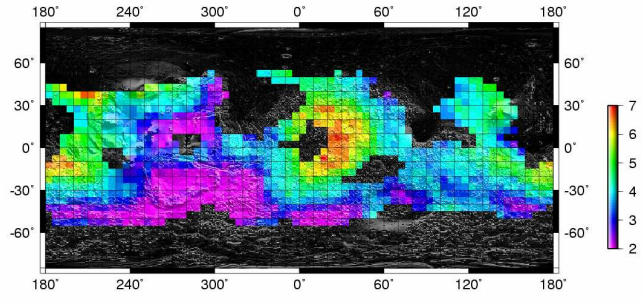

Fig. 2 Map of H_2O concentration in weight % for regions made by standard regolith.

References:

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