EXPLORATION OF MARTIAN RESIDUAL POLAR CAPS BASED ON HEND/MARS ODYSSEY DATA.

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Introduction: We have used data of the High Energy Neutron Detector (HEND) onboard NASA "2001 Mars Odyssey" to observe Martian residual polar caps.

It's well known what seasonal polar caps are consists mainly from CO_2 ice which sublimates during spring revealing residual caps. Till recent time major science information about presence of water ice/CO_2 frost within residual caps was based on Viking observations and theoretical models of martian climatere. From Viking data analysis it was found what the North residual cap consists from water ice (water mass fraction is close to 100%) and dust. The south residual cap is covered by thick layer of CO_2 frost all year round and it is not clear how thick this CO_2 deposit and which fraction of water ice is present underneath. Recent data (Mars Odyssey, Mars Express) shows what south residual cap may be enriched by water ice mixed with dust and CO_2 frost [1,2].

Data analysis: In this study we have used advantages of NASA "2001 Mars Odyssey" near polar orbit to get detailed information about average composition of Martian residual polar caps based on neutron spectroscopy data from High Energy Neutron Detector installed onboard Mars Odyssey spacecraft. The goal of our study is to compare water ice distribuation within North and South residual polar caps. Two years mapping allowed to select and study time intervals corresponding to different Martian seasons. Our previous studies of neutron flux in polar regions shows significant seasonal variations of neutron flux following seasonal redistribution of atmospheric CO_2 between martian poles (see Fig. 1) [3-5]. Now we concentrate our efforts on studying regions covered by residual caps to find relative fractions of CO_2 and H_2O ices in its upper 1 – 2 meters layer during different Martian seasons including estimation of CO_2 snow depth at Sourth residual cap.

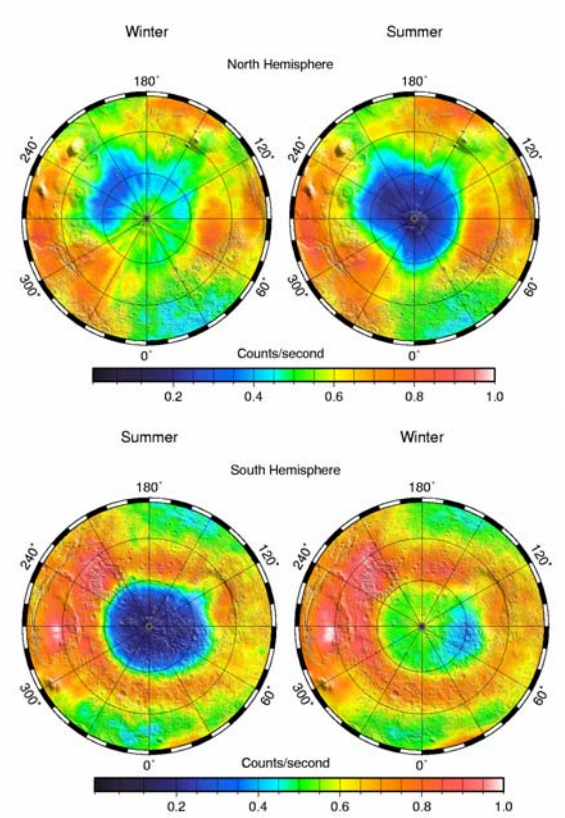

Figure 1. Seasonal variations of neutron flux originated from seasonal changes of CO_2 deposition at polar regions of planet.

References:

[1] Bibring J.P. et al. (2004) *Nature*, 428, 627-630. [2] Titus T.N. et al. (2003) *Science* 299, 1048-1051. [3] Mitrofanov I.G., Zuber M.T., Litvak M.L. et al. (2003) *Science*, *300*, 2081–2084. [4] Litvak M.L. et al. (2003) *Solar System Research*, 37, 378-386. [5] Litvak M.L. et al. (2004) *Solar System Research*, 38, 167-177.