SUBSURFACE WATER DISTRIBUTION IN MARTIAN EQUATORIAL REGIONS FROM HEND/ODYSSEY DATA. A.S. Kozyrev¹, I.G. Mitrofanov¹, M.L. Litvak¹, A.B. Sanin¹, V. Tretyakov¹, W.V. Boynton², D.K. Hamara², C. Shinohara², R. S. Saunders³, D. Drake⁴, ¹Space Research Institute, RAS, Moscow, 117997, Russia, kozyrev@mx.iki.rssi.ru, ²University of Arizona, Tucson, AZ 85721, USA, ³NASA Goddard Space Flight Center, Greenbelt, MD 20771, USA, ⁴Lansce 3, Los Alamos Nat'l Lab. Los Alamos, NM and Tech-Source Inc, Santa Fe, NM 87594, USA.

Introduction: The analysis of water abundance in Martian subsurface is presented for equatorial regions of Mars. In our study we used observational data of neutron albedo gathered by HEND instrument onboard 2001 Mars Odyssey ([1,2]). The previous results based on neutron spectroscopy of Martian surface shows presence of significant amount of water at equatorial latitudes of Mars near Arabia Terra and Elysium Fossa [1]. The preliminary calculations shows that average content of at these regions may be as high as 10% by weight [3]. This value is close to natural limit, which may be explained by presence of chemically bound water. From other side one may say that water is not homogenously distributed trough the surface and there are some wet spots where content of water may be significantly higher then ~10%.

Data Analysis. The main goal of this study was to search for most wet spots inside Arabia Terra and Elysium Fossa. We also try to investigate temporal stability of data accumulated at these wet spots. The whole set of data accumulated at equatorial regions was distributed into several groups corresponding to different season intervals. For each season interval we create map of statistical deviations from mean value of neutron flux to locate geographical spots with significantly low neutron fluxes. It was found that most stable behavior with time is demonstrated by small region around 30°E, 10°N. Practically for all season intervals we observe here minimal values of neutron flux, which correspond to presence of maximal quantity of water. To estimate content of water in this wet spot we used model depended deconvolution of neutron data gathered at this region for whole time period (Ls=330-190 degree, see fig 1). Calculations shows that content of water may be close to 16%. The similar analysis applied to Elysium Fossa revealed that maximal presence of water in this region might be as high as 12%.

References:

Fig 1. The distribution of statistical deviations from mean value of neutron flux is presented for large region near Arabia Terra.