MARTIAN MULTI-ELEMENTAL MAPS FROM THE MARS ODYSSEY GAMMA-RAY SPECTROMETER. R.C. Reedy[1], W.V. Boynton[2], D. Hamara[2], K. Kerry[2], D. Janes[2], J.M. Keller[2], K.J. Kim[1], T.H. Prettyman[3], G.J. Taylor[4], J. Brückner[5], H. Wänke[5], L.G. Evans[6], R. Starr[7], S.W. Squyres[8], S. Karunatillake[8], C. d'Uston[9], O. Gasnault[9], and Mars Odyssey GRS Team. [1]Univ. of New Mexico, Albuquerque, NM 87131 (rreedy @unm.edu). [2]Univ. of Arizona, Tucson. [3]Los Alamos National Laboratory, Los Alamos, NM. [4]Univ. of Hawaii, Honolulu, HI. [5]Max-Planck-Institut für Chemie, Mainz, Germany. [6]Computer Sciences Corp., Lanham, MD. [7]Catholic Univ. of America, Washington, DC. [8]Cornell Univ., Ithaca, NY. [9]Centre d'Etude Spatiale des Rayonnements, Toulouse, France

Introduction: The Mars Odyssey spacecraft has been in its 400 km-high polar mapping orbit around Mars since the beginning of 2002. The Mars Odyssey gamma-ray spectrometer (GRS) collected gamma-ray spectra in cruise and in early mapping until it was deployed on a 6 meter boom in June 2002. Since then, it has been collecting its prime martian spectra. Gamma-ray spectra in early 2002 helped to quantify the distribution of hydrogen, believed mainly to be in the chemical form of water, in the top meter of Mars near the martian poles [1]. Initial gamma-ray results for K, Th, Si, and Fe were presented at the 34th Lunar and Planetary Science Conference [2-5]. Additional results for these five elements are reported here.

Data Reduction: Spectra are accumulated every 19.75 seconds, corrected to a common gain, and added together to get adequate counting statistics. Depending on the signal strength, spectra are summed for different size bins (5º, 10º, or 15º), and the areas under the gamma-ray peaks are determined. Spectra collected during and just after solar particle events or when there is a CO_2 layer on the surface were not used. These peak areas were then compared to expected counts based on calculations to get concentrations [2].

Results: The hydrogen content is in water equivalent by weight and is normalized to 94% water near the north pole. H concentrations assume that the H is uniformly distributed with depth to several meters and that the composition of the soil with respect to major neutron absorbing elements is the same as that of Mars Pathfinder soil [6]. In the regions never covered by CO_2, between 45 degrees north and south, H varies between 1% and 7%. The H content increases polewards of 45º and reaches ~43% near the south pole.

Results for K, Th, Si, and Fe are currently limited to regions recently free of surface CO_2 that have many spectra, between 65º N and 45º S. For large regions (many degrees square), the concentration of K varies from about 0.2 to 0.5% and of Th between 0.7 and 1.6 ppm, higher than in most Shergottites [4]. The K/Th ratio varies between about 1800 and 4000, which could reflect both primary production and secondary alteration processes [4]. Preliminary results for Si and Fe were normalized to their concentrations at the Mars Pathfinder landing site [6]. Iron varies between ~11-17% Fe by weight, and Si varies between ~19-23% Si by weight.

Our preliminary concentrations do not show any strong correlations with other remote-sensing results for Mars, such as thermal inertia, albedo, and rock abundances [5]. The region between 40º and 60º N that was identified as "type 2" in TES spectra [7] (either andesitic [7] or weathered basalt [8]) is enriched in K and Th.

References: [1] Boynton W.V. et al. (2002) *Science 297,* 81-85. [2] Boynton W.V. et al. (2003) *LPS 34,* #2108. [3] Reedy R.C. et al. (2003) *LPS 34,* #1592. [4] Taylor G.J. et al. (2003) *LPS 34,* #2004. [5] Keller J.M. et al. (2003) *LPS 34,* #2021. [6] Wänke H. et al. (2001) *Space Sci. Rev. 96,* 317-330. [7] Bandfield et al. (2000) *Science 287,* 1626-1630. [8] Wyatt M.B. and McSween H.Y. (2002) *Nature 417,* 263-266.