

**CHARACTERISTICS OF MINI-MAGNETOSPHERES FORMED BY PALEO-MAGNETIC FIELDS OF MARS.** N. F. Ness<sup>1</sup>, A. M. Krymskii<sup>2</sup>, D. H. Crider<sup>3</sup>, T. K. Breus<sup>4</sup>, M. H. Acuna<sup>5</sup>, D. Hinson<sup>6</sup> and K. K. Barashyan<sup>2</sup>, <sup>1</sup>Bartol Research Institute, 104 Center Mall, #217, University of Delaware, Newark, DE 19716 USA, [nfness@udel.edu](mailto:nfness@udel.edu), <sup>2</sup>Rostov State University, Rostov-on-Don, Russia, <sup>3</sup>The Catholic University of America, Washington, DC, <sup>4</sup>Space Research Institute (IKI), Moscow, Russia, <sup>5</sup>NASA-Goddard Space Flight Center, Greenbelt, MD, USA, <sup>6</sup>Center for Radar Astronomy, Stanford University, Stanford, CA, USA.

**Introduction:** The intensely and non-uniformly magnetized crustal sources generate an effective large-scale magnetic field. In the Southern hemisphere the strongest crustal fields lead to the formation of large-scale mini-magnetospheres. In the Northern hemisphere, the crustal fields are rather weak and there are only isolated mini-magnetospheres. Re-connection with the interplanetary magnetic field (IMF) occurs in many localized regions. This may occur not only in cusp-like structures above nearly vertical field anomalies but also in halos extending several hundreds of kilometers from these sources. Re-connection will permit solar wind (SW) and more energetic particles to precipitate into and heat the neutral atmosphere. Electron density profiles of the ionosphere of Mars derived from radio occultation data obtained by the Radio Science Mars Global Surveyor (MGS) experiment are concentrated in the near polar regions. The effective scale-height of the neutral atmosphere density in the vicinity of the ionization peak has been derived for each of the profiles studied. The effective scale-heights have been compared with the crustal magnetic fields measured by the MGS Magnetometer/Electron Reflectometer (MAG/ER) experiment. A significant difference between the large-scale mini-magnetospheres and regions outside of them has been found. The neutral atmosphere is cooler inside the large-scale mini-magnetospheres. It appears that outside of the cusps the strong crustal magnetic fields prevent additional heating of the neutral atmosphere by direct interaction of the SW. The scale-height of the neutral atmosphere density derived from the experiment with the MGS Accelerometer has been compared with MAG/ER data. The scale-height was found to be usually larger than mean value near the boundaries of potential mini-magnetospheres and around “cusps”. It may indicate that the paleo-magnetic/IMF field re-connection is characteristic of the mini-magnetospheres at Mars.