Geophysical Research Abstracts
Vol. 13, EGU2011-4397, 2011
EGU General Assembly 2011

Magnetized Mars: Spatial distribution of oxygen ions

Esa Kallio (1) and Stas Barabash (2)

(1) Finnish Meteorological Institute, Space Research Unit, Helsinki, Finland (esa.kallio@fmi.fi, +358 9 1929 4603.), (2) Swedish Institute of Space Physics, Kiruna, Sweden

We have studied the spatial distribution of oxygen ions near Mars by assuming that it has a weak intrinsic magnetic field. The study is performed by a global self-consisted numerical hybrid model HYB-Mars by analyzing four magnetization cases when the strength of the dipole magnetic field at the magnetic equator was 0 nT, 10 nT, 30 nT and 60 nT. In all cases the upstream solar wind conditions was assumed to be present day nominal values. Two different regions were found: (1) a closed magnetic field line region where the density of oxygen ions were high and the ion velocity small and (2) an open magnetic region near the magnetic poles were both the density and the velocity of planetary oxygen ions were high. The former region has similarities with the Earth's plasmasphere and the latter the Earth's magnetic cusps. The size of the closed magnetic field region increases with increasing dipolar field. The oxygen ion originating from the ionosphere was found to escape easily along the magnetic field from the magnetic cusps but become trapped within the closed magnetic field line region. The adopted model does not include a self-consistent ionosphere but it is interesting to note that the total loss rate had a local maximum at the small dipolar field (10 nT) case.