Geophysical Research Abstracts
Vol. 14, EGU2012-9977, 2012
EGU General Assembly 2012

Global directional distribution of the hydrogen energetic neutral atom emission from Mars as measured by Mars Express ASPERA-3

X.-D. Wang (1), S. Barabash (1), Y. Futaana (1), A. Grigoriev (2), and P. Wurz (3)

(1) Swedish Institute of Space Physics, IRF, Kiruna, Sweden (wang@irf.se, 098079000), (2) Space Research Institute, Moscow, Russia, (3) University of Bern, Bern, Switzerland

We used the data obtained by the Neutral Particle Detector(NPD) of Analyzer of Space Plasma and Energetic Atoms(ASPERA-3) on Mars Express(MEX) to derive the global directional distribution of hydrogen energetic neutral atoms (ENAs) around Mars. The NPD instrument package consists of two identical neutral particle energy spectrometers with direction resolving capability. Either instrument has an energy range of 100 eV$\sim$10 keV, and a factual angular resolution(full-width-half-maximum) of $5^\circ \times 40^\circ$ covering the total filed of view $9^\circ \times 180^\circ$ in six pixels in the fan-geometry. The data used in this study cover 5 months, from March 14, 2004 to August 17, 2004. The directional flux distribution of hydrogen ENAs was first converted to the MSE (Mars centered solar electric field) frame constructed by the direction of the Sun, the magnetic field component perpendicular to the Sun-Mars line and the convection electric field. MGS proxies for the interplanetary filed were used. The directional flux distributions along each orbit were then projected on a sphere centered at Mars with a radius of 100 Mars radii in order to isolate the direction distribution of ENA from the position variation of the spacecraft. From the projection, we obtained a sky map of ENA flux pointing away from Mars. The sky map shows large ENA flux in the direction of positive convection electric field and moderate flux in a cone facing the Sun. These two populations correspond to so-called ENA jets originated in the magnetosheath, which turned out to be strongly asymmetric regarding to the electric field direction, and ENAs backscattered from the upper atmosphere. We also investegated the correlations of ENA signatures to the solar wind pressure, F10.7 irradiance and the local time of the Martian magnetic anomalies.