Geophysical Research Abstracts, Vol. 9, 04484, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-04484

First results of the ASPERA-4 experiment onboard Venus Express

S. Barabash (1), J.-A. Sauvaud (2), THE ASPERA TEAM

(1) Swedish Institute of Space Physics, Kiruna, Sweden (stas@irf.se), (2) CESR/CNRS, Toulouse, France (sauvaud@cesr.fr)

ASPERA-4 (Analyzer of Space Plasmas and Energetic Atoms) is a package of an electron spectrometer, ion mass analyzer, and two energetic neutral atom imagers. In this talk we report the first ASPERA-4 observations during the period April - December 2006. The structure of the Venus - solar wind interaction region as characterized by the ASPERA-4 experiment includes the following regions and boundaries bow shock, magnetosheath, induced magnetosphere boundary and induced magnetosphere, photoelectron boundary. The similar structure is identified at Mars. However, at Venus the flux of the planetary ions is more stable and better reproducible over the observational period. Similar to Mars the photoelectron peaks observed when the spacecraft entries the ionosphere. Photoelectrons result from the photodissociation of CO_2 and have the typical energy around 22 - 28 eV. Observations of the photoelectrons shows that the satellite is magnetically connected with the Venus ionosphere. Photoelectrons are used to introduce a new boundary not detected at Venus before, a photoelectron boundary similar to Mars. ASPERA-4 established for the first time composition of the escaping planetary ions. The main escaping ion is O^+ in contrast to Mars where the escaping plasma consists of approximately equal amounts of O^+, O_2^+ and 20-50% submixure of CO_2^+. This results from higher gravity at Venus which bounds heavier components such as CO_2^+ closer to the surface. The induced magnetosphere is also filled by low energy protons from 10 eV (the instrument lower limit) to the solar wind energy. The observed escaping He^+ has never been detected at Venus before. However, to constrain the escape rate of this gas is critical for establishing helium balance at Venus that, in turn, is needed to estimate the radiogenic production rate. The detected fluxes of He^+ exceed the ones at Mars on more than an order.