Geophysical Research Abstracts
Vol. 12, EGU2010-8619, 2010
EGU General Assembly 2010

Mechanisms of ion energization and escape processes on Mars and Venus

Eduard Dubinin (1) and the ISSI-Mars-Venus-Titan Team

(1) Max-Planck Institut für Sonnensystemforschung, Katlenburg-Lindau, Germany (dubinin@mps.mpg.de), (2) Swedish Institute of Space Physics, Kiruna, Sweden, (3) MSSL, University College London, UK, (4) KFKI Research Institute for Particle and Nuclear Physics, Budapest, Hungary, (5) University of Iowa, Iowa City, Iowa, USA, (6) Centre d'Etude Spatiale des Rayonnements, Toulouse, France, (7) Finnish Meteorological Institute, Helsinki, Finland, (8) CETP-IPSL/LATMOS, Velizy, France, (9) Swedish Institute of Space Physics, Uppsala, Sweden, (10) IKI RAN, Moscow, Russia

Mars and Venus do not have a global magnetic field and as a result solar wind interacts directly with their ionospheres and upper atmospheres. Ionospheric ions and neutral atoms ionized by solar UV, charge exchange and electron impact are extracted and scavenged by solar wind providing a significant losses of planetary volatiles. There are different channels and routes through which the ionized planetary matter escapes the planets. Processes of ion energization driven by direct solar wind forcing and their escape are intimately related. Forces responsible for ion energization in different channels are different and, correspondingly, the effectiveness of escape is also different. Classification of the energization processes and escape channels on Mars and Venus and also their variability with solar wind parameters is the main topic of our review. We will distinguish a classical pick and 'mass-loaded' pickup processes, energization in boundary layer and plasma sheet, polar winds on unmagnetized planets with magnetized ionospheres and enhanced escape flows from localized auroral regions in the domains filled by strong crustal magnetic fields.