EROSION OF THE MARTIAN ATMOSPHERE ON PLASMA MEASUREMENTS

A.V. Zakharov, Space Research Institute, Moscow, 117810, USSR

The report reviews the results on the ionospheric ion outflow in the Martian magnetosphere by the plasma experiments on the PHOBOS-2 spacecraft. The measurements show a large escape rates of $O^+$ ions ($\sim 2 \times 10^{25}$ ion s$^{-1}$) from the Martian ionosphere. The loss of this ions results from both ion pick-up due to mass-loading of the solar wind in the Martian boundary layer and an acceleration of the ionospheric ions up to several keV, quite similar to that observed above the Earth's auroral oval.

In the case if Mars lacked a significant magnetic field in the past, the measured escape rate implies that the planet has been exposed to a continuous atmospheric erosion what can be an important source of the loss of the Martian atmosphere over geologic time. Ionospheric outflow can be very significant from the point of view of an atmospheric erosion even if early Mars had a significant magnetic field. However, the erosion of the Martian atmosphere due to dissociative recombination of $O_2^+$ ions, apparently is higher than one from the solar wind interaction.