

Ionospheric magnetic fields at Venus and Mars

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Abstract

Mars Global Surveyor (MGS) and Venus Express (VEX) spacecraft have provided us a wealth of in-situ observations of characteristics of induced magnetospheres of Mars and Venus at low altitudes during the periods of solar minimum. At such conditions the interplanetary magnetic field (IMF) penetrates deeply inside the ionosphere while the solar wind is terminated at higher altitudes. We present the measurements made by MGS and VEX in the ionospheres of both planets which reveal similar features of the magnetization. The arising magnetic field pattern occurs strongly asymmetrical with respect to the direction of the cross-flow component of the IMF revealing either a sudden straightening of the field lines with a release of the magnetic field stresses or a sudden rotation of the magnetic field vector with a reversal of the sign of the cross-flow component. Such an asymmetrical response is observed at altitudes where the motion of ions and electrons is decoupled and collisional effects become important for generation of the electric currents. Asymmetry in the field topology significantly modifies a plasma transport to the night side.

