



Magnetic disturbances near Mars and the magnetic effect of atmospheric escape - MGS observations

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Theoretical modeling of solar wind - Mars interactions predict that the process of solar wind pick-up of planetary ions results in a strong hemispherical asymmetry of both plasma and magnetic field parameters near Mars. The asymmetry is controlled by the direction of the solar wind convective electric field and, hence, changes direction with the IMF. More than 5 years of magnetic field observations are now available from the Mars Global Surveyor (MGS) mapping phase mission. We use this extensive database to examine statistically the north-south asymmetry of the magnetic field related to the interplanetary magnetic sector structure. We find a clear north-south asymmetry of the magnetic field intensity near Mars in accordance with the theoretical predictions of the effect of the ion pick up process. In the northern hemisphere the magnetic field intensity in the pile-up region is stronger when IMF B_y is positive than when it is negative. In the southern hemisphere, in regions where the crustal magnetic field is weak, the opposite relation is found. The effect is observed both at the day-side and the night-side of the planet. We investigate the effect of both solar wind dynamic pressure and clock-angle on the asymmetry as well as solar cycle variations.