

IMF dependence on solar wind parameters

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We studied IMF dependence upon solar wind parameters using OMNI hourly values.

Figure below is a plot of the total force (B), horizontal component (B_{xy}) in the ecliptic plane and vertical component (B_z) of IMF versus the solar wind density (N_{sw}). The IMF is averaged over 0.2/cc bin of N_{sw} . Data number in each bin is also plotted. The data period here is 1979-1981 (maximum SSN phase).

The figure shows (1) that B , B_{xy} and B_z slowly decrease with decreasing N_{sw} and (2) that when N_{sw} approaches further to zero. B and B_{xy} begin to increase and converges to the same finite value (about 10 nT here) while B_z converges to zero. The property (2) suggests that IMF converges to a typical spiral pattern when solar wind density converges to zero.

Two other data periods, 1999-2001 (SSN maximum) and 2007-2009 (SSN minimum) are examined. IMF observed by MAVEN orbiting Mars is also studied for the period, 2014-2018. The results of the analysis are roughly consistent with the description above. We also checked IMF dependence on solar wind velocity

Keywords: IMF, solar wind density, solar wind melocity

