

IMF dependence on solar wind plasma

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It is usually believed that IMF is determined independently of solar wind plasma. However, the B_z component of IMF becomes smaller depending upon decrease of the solar wind dynamic pressure as shown in Figure A. This property has been found from the scatter plot of Dst index versus the square root of solar wind dynamic pressure ($Pd^{0.5}$, Figure B). There are two boundaries in Figure B. The upper boundary which linearly increases with increasing $Pd^{0.5}$ shows the minimum level of the ring current. For a fixed value of Pd , Dst (ring current) decreases with decreasing negative B_z . The lower boundary which linearly decreases with increasing $Pd^{0.5}$ is produced by decreasing negative IMF- B_z seen in Figure A. The scatter plot of Dst index versus the square root of the solar wind density ($N^{0.5}$) shows the similar pattern as Figure B. When Pd or N becomes smaller, IMF- B_z approaches to zero value while the B_x - and B_y -component converges to a finite value of 3-4 nT. This means that IMF shows a typical spiral pattern for rare solar wind.

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