

Empirical Relation Between Solar Wind Velocity and Magnetic Properties of Its Source Region

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Various speeds of solar wind originate from open magnetic field region what is called coronal hole. During solar minimum, we have found extremely high correlation between solar wind velocity and coronal magnetic field strength (Hirano et al. , 2003). To examine this relation in high solar activity period and to clarify the control parameters of solar wind velocity, we analyzed the relation between solar wind velocity and properties of its source region such as photospheric/coronal magnetic fields in years from 1995 to 2001. In this study solar wind velocity distributions are obtained by applying computer-assisted tomography to interplanetary scintillation observation data at 327 MHz, Solar-Terrestrial Environment Laboratory, Japan. Photospheric source regions of solar wind are determined by using potential field coronal magnetic field calculated from synoptic magnetogram data observed at Kitt Peak National Solar Observatory. The relation between solar wind velocity (V), magnetic flux expansion rate (f) and photospheric magnetic field (B) are examined by cross-correlation analysis. As results, we found positive correlation between V and B/f through whole solar activity.