

On the Functional Relation of Solar Wind Velocity with Solar Longitude

The Ulysses observations during its fast latitude scan as well as interplanetary scintillation measurements have shown that the solar wind has a bimodal structure; a slow component with velocity less than 450 km/s, confined to the equatorial region separated by a sharp velocity gradient from the fast component whose typical speed is greater than 500 km/s. The fast solar wind, emanating from open magnetic field regions, is rather uniform and steady while the slow solar wind, which is found to correspond to closed magnetic field regions, exhibit structures and therefore, is an important feature for detailed study. Several earlier studies have revealed the discrepancy in the latitudinal extent of the slow solar wind belt and the heliospheric current sheet, identified as the neutral line of the coronal magnetic field obtained from potential field source surface model; the latter being larger. As the slow solar wind corresponds to the closed magnetic field regions or the heliospheric current sheet, the discrepancy suggests a longitudinal gradient of solar wind velocity on the current sheet or higher values of solar wind within slow wind. The present work focusses on the possible dependence of velocity on the solar longitude and the existence of a preferred longitude for the high velocities within the slow speed belt. Also, an attempt is made to relate this longitude of high velocities to the location of coronal features like coronal holes.