

Ulysses" Solar Wind Ion Temperatures: Radial, Latitudinal, and Dynamical Dependencies

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Observations of the Ulysses SWOOPS plasma experiment are used to determine the dependencies of solar wind ion temperatures upon radial distance, speed, and other parameters, and to estimate solar wind heating. Since the velocity space resolution of the experiment is best in the energy (as opposed to angular) channels, the radial component of the temperature tensor is used. From the magnetic field direction, the relative contributions of the parallel and perpendicular temperature components to the observed one dimensional temperature is known, and determining the dependency upon magnetic field direction in principle allows the radial variation of these components to be estimated. To reduce the scatter of the data, it is necessary to account for temperature variations that are not due to changes in magnetic field direction. For this reason, a multivariate analysis is used that determines dependency upon solar wind speed, compression perpendicular and parallel to the magnetic field (i.e., $1/B$ and ρ/B , where B is the magnitude of the magnetic field and ρ is the plasma density), magnetic field direction and radial distance. Comparisons with three dimensional temperature estimates determined from the ion spectra by a least squares fitting program will be provided (only small samples of data have been reduced with this program).