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Group 1.1 Solar Wind Physics

IPS observations at a UHF frequency (327 MHz) have been continued at three stations. Data books entitled "Solar Wind Speed from IPS Measurements, Feb.-Dec. 1986" and "Solar Wind Speed from IPS Measurements, Mar.-Dec. 1987" have been published.

Study of the solar wind acceleration at distances between 0.1 and 0.3 AU has been continued on the basis of IPS observations. It was observed that a high-speed stream increases its speed from a few hundreds km/s at 0.1 AU to a speed faster than 600 km/s beyond 0.3 AU, whereas a low-speed stream does not show large speed increase.

A harmonic analysis of the solar wind speed structure on a source surface was conducted. The structure of a low-speed belt can be approximated with a combination of the first and the second harmonic components of sine functions. A relative amplitude of the second harmonic component with respect to the first one shows yearly variation with a 6-year period; it becomes maximum in the ascending and the descending phases of the solar activity.

Latitudinal structure of the solar wind speed distribution in 1985 was analyzed. Because solar wind speeds estimated from the IPS measurements are biased and a sharp structure in the solar wind is blurred due to the integration effect along a line of sight, a model fitting method was used to retrieve the unbiased structures in the solar wind from the IPS observations. Since the year of 1985 was very close to the minimum of the solar activity, equal speed lines were almost parallel to the longitudinal direction and the speed gradient in the latitudinal direction was fairly large at the boundary between low-speed and high-speed streams. Larger turbulence level of electron density than that expected from the constant flux assumption is required in the high-speed stream to make the model best fit the observations.

The structures of the interplanetary magnetic field and the current have been studied by means of a two-dimensional MHD simulation. It has been confirmed that the solar wind plasma in the closed field region corotates with the sun. The helical magnetic field driven by the solar rotational motion is found to be more evident in the open field region than in the closed field region. It has been also found that the toroidal component of the interplanetary current makes neutral sheet structure near the equator, while the poloidal component, which flows into the sun in the open field region and flows out of the sun in the closed region, makes helical magnetic field in

the open field region.

A joint work on pulsar observations has been continued. Observations at a frequency of 15 GHz were made at Nobeyama Radio Observatory in June using the 45 m diameter telescope and a 20° K cooled HEMT receiver. Observations of $PSR0329+54$, $PSR0355+54$, $PSR0823+26$, $PSR1133+16$ and $PSR2021+51$ proved successful.

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- Takakiyo Kakinuma -

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