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Section 6. Solar Emission and Related Terrestrial Phenomena

IPS observations at a UHF frequency (327 MHz) have been continued at three stations. A data book entitled "Solar Wind Speed from IPS Measurements, March-December 1984" has been published. Since 1985, the number of observed IPS sources has been increased to twenty five. Potentially, our UHF system is expected to be able to observe more than forty IPS sources during a year. In order to make full use of this ability, observations must be made with an optimum observation schedule such that weak IPS sources are observed around the time when they come close to the sun. This requires frequent changes of the observation schedule. Detection of interplanetary transient phenomena with the best space and time coverage also demands immediate change of the observation program. For the purpose of making speedy schedule changes, we have completed installation of a remote control system between the host station (Toyokawa) and two remote stations (Fuji and Sugadaira). We can also monitor the status of remote sites using this system.

Kojima and Kakinuma (1985) have developed a method of mapping solar wind speed in the heliographic longitude and latitude so that fine structure in the solar wind can be investigated. Using this mapping method, they studied the evolution of solar wind structure for the years from 1973 through 1985. The low speed regions are distributed along the neutral sheet through the whole period of the solar activity cycle. When solar activity is low, they are distributed on the wavy neutral sheet along the solar equator. In the active phase, they tend to be distributed vertically across the equator. As the polar high speed region extended equatorward, the latitudinal gradient of speed increased and the breadth of the low speed region decreased. Near the phase of minimum solar activity, two localized minimum-speed regions appear on the neutral sheet and their locations are longitudinally separated almost by 180 degrees.

Kojima participated in the 19th ESLAB symposium, "The Sun and the Heliosphere in Three Dimensions", held at Les Diablerets in Switzer-

land in June 1985 and presented a paper entitled "Solar Wind Observations Near the Sun". In further analysis of VLA observations made during his stay at UCSD, peculiar cross-correlation functions were discovered and he demonstrated that they could be accounted for with randomly oriented irregularities.

Cooperative work among the first Japanese deep space missions, "Sakigake" and "Suisei", and IPS observations has commenced. We made comparison of data obtained from last September to November and found that discrepancies of speed data between "Sakigake" and "Suisei" can be sufficiently explained by taking into consideration the two dimensional solar wind structure in heliographic longitude and latitude coordinates which was estimated from IPS observations.

We are planning to make observations of solar wind very close to the sun (within 10 solar radii) by measuring the dynamic spectrum of IPS using the wide-band acousto optical spectrometer at Nobeyama Radio Observatory. A new data acquisition system for this observation has been completed with support of the Grant in Aid for Science Research of the Ministry of Education, Culture, and Science (60540157).

Three-dimensional propagation properties of interplanetary disturbances occurring from 1978 to 1981, including STIP Interval IX and XII, were studied on the basis of interplanetary scintillation and spacecraft observations. A comparison between in-situ solar wind observations and IPS observations for significant solar-interplanetary events in February and March 1980 showed remarkable consistency in estimated shock speeds. A nearly isotropic distribution of the propagation speed at 1 AU heliocentric distance (500 - 600 km/s) near the solar equatorial plane was found for the interplanetary disturbance associated with the solar flare of 2232UT, on May 8, 1981. Interplanetary disturbances associated with a series of intense solar flares of 1208UT on May 10, 0352UT on May 13, and 0824UT on May 16, 1981, which took place within the same active region (SESC 3106), had a similar tendency that the highest propagation speed (>1000 km/s at 1 AU) was observed in the region to the east of the longitude of the flare site. Broad-front interplanetary disturbances were observed in association with several high-speed coronal mass ejections. This supports an idea that interplanetary consequences of some white-light coronal mass ejections with loop-like appearances are bubble-like disturbances.

Watanabe et al. examined the solar wind data obtained with spacecraft and IPS observations in early February 1980 in order to determine large-scale propagation properties of a proposed interplanetary disturbance relevant to very rapid 10 degrees turning of the

plasma tail axis of comet Bradfield (1979L) on February 6, 1980. The result shows that a solar-flare associated interplanetary disturbance was responsible for the tail event.

February 26, 1986
- Takakiyo Kakinuma -

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