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Section 6. Solar Emission and Related Terrestrial Phenomena

The distribution of the solar wind velocity in longitude and latitude for periods of several rotations during 1974-1979 has been studied by the IPS data of the high-latitude radio source 3C48. The effect of the weighting average of the transverse components of the solar wind velocity along the line of sight to a radio source has been taken into account. The observations during 1974-1978 show the existence of the north polar high-speed (800 km/sec) region. This region extended from the pole down to 45° ~ 50° latitude for the most of 1974-1977, while the region contracted up to 80° in 1978 and was hardly observed in early 1979.

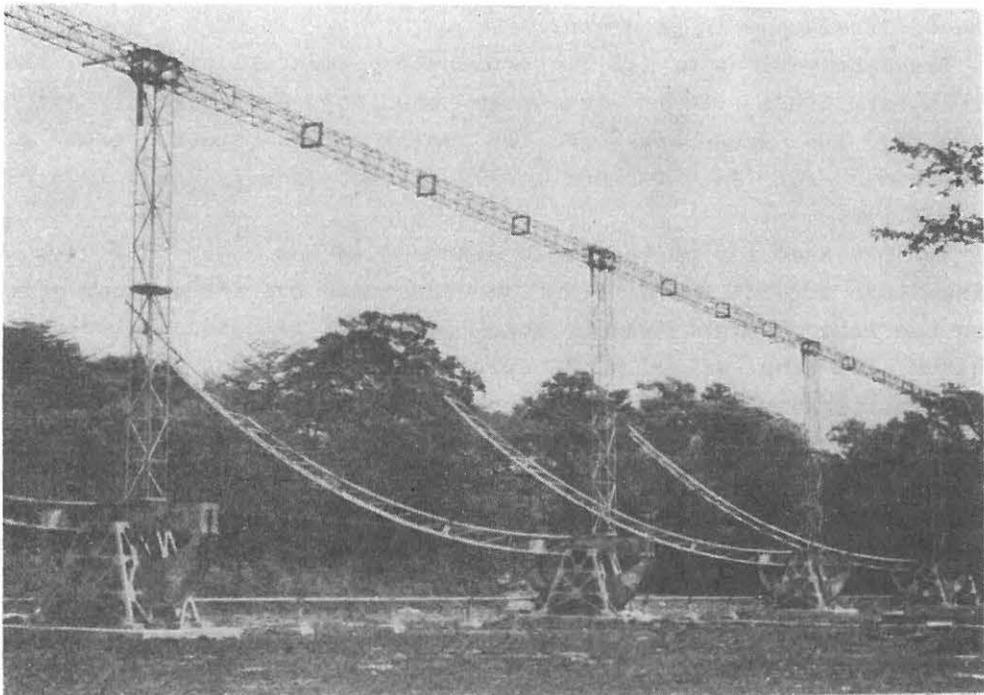


Figure 1. UHF cylindrical parabolic reflector at Fuji.



Figure 2. UHF cylindrical parabolic reflector at Sugadaira.

We have been making a new three-station system for the observations of IPS at a frequency of 327 MHz (UHF) at the same places where the VHF antennas are located. This new system has cylindrical parabolic antennas of 100m length in E-W direction and 20m width in N-S direction. These antennas have been completed and the adjustment of receivers is now in progress.

The observations of IPS (interplanetary scintillation) of radio sources at 69MHz (VHF) have been continued at Toyokawa, Fuji and Sugadaira. The data-books of the solar wind speed from IPS measurements for July-December, 1977 and for January-June, 1978 have been published.

The IPS spectrum of the radio source 3C48 has been analyzed by taking into account the diffraction effect and the integration effect along the line of sight which make apparent relation between the spectrum and the solar wind speed. The spectrum of the solar wind irregularities (10^{2-3} km) has been found to be expressed with a single power law spectrum regardless of the solar wind speed.

The theoretical study on the solar wind acceleration due to the ponderomotive force of Alfvén waves has been continued. Using the Lie transform technique, a quite general but compact expression for the ponderomotive scalar and vector potentials for a single particle in a covariant form is derived.

Watanabe has returned from U.S.A. in September after his stay at Space Environment Laboratory, NOAA/ERL for one year. He developed several methods to predict solar-terrestrial events induced by

flare-generated disturbances or corotating high-velocity streams.

Mr. K. Koike, Radio Research Laboratories, joins us for half a year. He is studying the amplitude probability distribution (APD) of IPS signal. He has found that the asymmetry of the APD increases with the scintillation index until the latter saturates.

Mr. A. D. Bobra, Physical Research Laboratory, Ahmedabad, India, stays at our division for about two months for the study of our VHF and UHF antenna systems.

February 22, 1980

- H. Washimi -

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