Section 3 Radio Astronomy

The international cooperative study on the solar-terrestrial physics has been strengthened since the beginning of 1969, the first year of the 'International Years of Active Sun' or IASY. At Toyokawa Observatory, the study has been centered on the fine structure of the active regions on the sun with the high-resolution interferometers on 3 and 8 centimeters.

At the start of the 'Proton Flare Poject' of the IUCSTP Working Group 2 on 1 May 1969, though it was unsuccessful due to the unexpectedly low solar activity, we have decided to issue the daily message on the radio activity of the active regions on the sun through the IUWDS network. The code is 'URALS' which includes the total flux on 8 centimeters, the E-W posision of active regions, the flux value from each active region on 3 centimeters, the flux ratio 3-cm/8-cm, and a few remarks. This information is regarded as one of the most useful materials for the forecasting of proton flare, and it has been successfully used also for the domestic balloon projects.

Unfortunately the sun is not so active as it was in the last solar cycle, and we have not yet succeeded to take a dynamic spectrum of the major burst at frequencies of 2-4 GHz, nor have we succeeded to observe a great burst by the quick-scanning interferometer on 8 centimeters through which we are expecting to observe the variations of the magnetic field during the burst. However, the greatest burst ever observed at Toyokawa occurred on 30 March 1969 at 10 degrees behind the west limb. Though it was not favorable for the study of polarization, we observed a remarkable expansion of the burst source for the first time. We are now making reductions of this event.

We observed two microwave impulsive bursts with double structure by the quick-scanning interferometer on 24 December 1968 and 18 January 1969. The delay of starting time by about 10 seconds between each of the pair was found in both cases. This result seems to be difficult to be explained by the bouncing model proposed by Takakura and others.

As to the instrument, the 3-cm radioheliograph has been in operation since July 1969, which is explained in detail in this volume. The experiments on the absolute calibration of solar radio flux density are still being continued, because the discrepancy between Ottawa and Toyokawa by about 6 % has not yet been solved. The present situation was reported at the General Assembly of URSI, Ottawa 1969.

T. Yamashita has studied the radio emisson from the sun, moon and terrestrial atmosphere in the millimeter wave range using the data taken with the University of Texas 16-ft. radio telescope. He found a characterstic variation in the sky emission

temperature ; the temperature increases slowly in the early morning, reaches its peak at around one hour before the ground sunrise, and decreases rapidly thereafter. From this result he made a speculation on the diurnal and seasonal variations of the sky temperature in the microwave range as well as on their possible mechanisms.

A theoretical work has been done by Énomé, who derived the time-dependent equation of radiative transfer in dispersive anisotropic media from the equation of continuity in the coordinate and wave vector phase space and supported the result given by Bekefi who derived it from a geometrical point of view.

Our present task is the modernization of data processing since the amount of data has been increased enormously for these several years. On the other hand, the design of the 8-cm radinheliograph is being made to be operated simultaneously with the existing 3-cm radioheliograph. (Dec. 1, 1969)

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