

Proceedings of the Research Institute of Atmospheric,
Nagoya University, vol. 18 (1971)

Section 3. Radio Astronomy

During the second year of IASY, Toyokawa Observatory has contributed, as before, to the international cooperative program in various ways, mainly by continuous observations with high-resolution interferometers on 3 and 8 centimeters. Information on the brightness and spectral features of each active region, which are useful for the forecasting of solar flares, has been reported daily by telegram with the code 'URALS' through the IUWDS network. Radio bursts of more than 100 flux units have been reported immediately as ADALERT TOYOKAWA TENFLARE through the same network.

As the World Data Center, WDC-C2, for the special analysis of solar radio emission, the observatory has made contributions to STAC (Solar Terrestrial Activity Chart) issued from the Interdisciplinary Analysis Center for Solar Terrestrial Activity, Science Council of Japan. Besides, we are preparing a 'Solar Activity Chart', where the flux on 3 cm and the flux ratio (3 cm/8 cm) of active regions as well as radio bursts of more than 20 flux units are displayed synoptically.

In relation to the low activity of this solar cycle, Tanaka compared the radio activity between the 19th and 20th solar cycle. He found that, between these solar cycles, both the S-component and occurrence frequency of bursts decreased by a factor of 0.5, but no change has been found for an index of showing the relation between the peak flux and the number of bursts per unit flux.

As for the instrumental work, we constructed a radiometer at the Kagoshima Space Center, the University of Tokyo, for solar patrol at 5 GHz. Records are being sent to Toyokawa every ten days, which fill the gap of observations there between 8 and 3 centimeters. This radiometer is fully automatic, such that the declination axis and the polar axis of endless rotation are corrected twice a day with a pin-and-cylinder memory like a large music box. Calibration of gain and gain control for the burst are also made automatically. Data are available from 12 August 1970.

Considerable progress has been made in data processing. Owing to full application of theory and computer, refined pictures of radio-brightness distribution of the sun are being obtained every day as routine work. Details are described in this volume.

Results of quick-scan high-resolution observations of the greatest burst on March 30, 1969 were presented to the IAU Symposium No. 43 on 'Solar Magnetic Fields' held at Paris. In this paper, we have revealed for the first time the existence of a turbulent field and diffusion of energetic electrons in a flaring region.

A microwave burst on March 7, 1970 had no parent S-component before its onset. From the H α patrol at Mitaka, this event has been identified as a 'disparition brusque' where the associated flare was in the form of 'two bright ribbons'. A preliminary result is to be published in a special report of World Data Center A, Upper Atmosphere Geophysics.

Yamashita found by his observations on mm waves at the University of Texas in the U. S. A. that the temperature of dark filaments is about 6- to 7-thousand degrees Kelvin. This estimation is based on the fact that filaments are observed as absorption on 8.6 and 4.3 mm while they are observed as emission on a 3.2 mm wavelength.

Énomé has formulated equations which govern the distribution of charged particles in an arbitrary configuration of the magnetic field, with future application to solar microwave bursts. He has been studying a theory on solar microwave and hard X-ray bursts, in which he has stressed the significance of the condensed fine structures, which have long been recognized spectroscopically. These dense gases may play an important role as the target of energetic electrons in the emission of hard X-rays.

Mr. Masato Ishiguro, who had been working with us as a postgraduate student of Nagoya University, joined us formally as a staff member of Toyokawa Observatory in October, 1970. Mr. Masakazu Arisawa, who has also been a postgraduate student, is to get a post in the Electrical Communication Laboratory, Nippon Telegraph and Telephone Public Corporation.

December 1, 1970

— Haruo TANAKA —

Publications (1970)

- Arisawa, M.: Improved Radio Mapping of the Sun, Proc. Res. Inst. Atmospheric, Nagoya Univ., **18**, 89, (1971).
- Énomé, S.: High-Resolution Observations of a Microwave Burst on March 7th, 1970, World Data Center A-Upper Atmosphere Geophysics Report UAG on the period centered around March 6-10, 1970.
- Énomé, S.: Distribution of Charged Particles in a Dipole Magnetic Field, Proceedings of IASY Symposium 1970 (in Japanese), Inst. Space Aeronaut. Sci., The University of Tokyo (1970).
- Énomé, S.: Solar Microwave and Hard X-Ray Bursts, Proceedings of IASY Symposium 1970 (in Japanese), Inst. Space Aeronaut. Sci., The University of Tokyo (1970).
- Énomé, S. and Tanaka, H.: Magnetic Fields in the Lower Corona Associated with the Expanding Limb Burst on March 30th 1969 Inferred from the Microwave High-Resolution Observations, Proceedings of the IAU Symposium on "Solar Magnetic Fields" (1971).
- Ishiguro, M.: Image Correction in High-Resolution Radio Interferometer, Proc. Res. Inst.

- Atmospherics, Nagoya Univ., **18**, 73, (1971).
- Tanaka, H.: Comparison of Solar Radio Activity between 19th and 20th Solar Cycle, Proceedings of IASY Symposium 1970 (in Japanese), Inst. Space Aeronaut. Sci., The University of Tokyo (1970).
- Tanaka, H.: Forecasting of Solar Flares, Kagaku (in Japanese), **40**, 7, 349 (1970).
- Yamashita, T.: On the Determination of the Temperature of Quiescent Prominences by Means of Observations at mm Wavelengths, submitted to Publ. Astr. Soc. Japan (1971).

