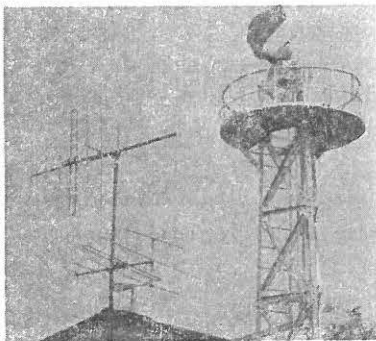


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Section 2. Source of Atmospheric and Atmospheric Electricity.

As in past years, thunderstorm observation was carried out at Imaichi Observatory for forty days this summer with the cooperation of the members in Section 5. To proceed effectively in the investigation of the mechanism of storm activity development, the radar system, that had been set on a small trailer until last year, was modified and installed in an observation room for easier monitoring and recording of its scope. The antenna was raised on a new tower, 7 meters high, to improve its scanning area. This section was interested in two topics this summer. The polarization of radiative waves in the VHF range would be connected with the mechanism of voluminous discharge in thunderclouds, which might be a clue to solve the formation of precipitations in clouds in relation to the electrical activity. This was observed by the use of vertically and horizontally polarized Yagi-antennas and recorded with a high time resolving power. On the other hand, magnetic field variation associated with lightning discharges is a direct indication of discharge current, so it will be more useful than the electrostatic field change in analyzing the relation between long propagated atmospheric and their origins. The magnetic field variation was measured in two frequency ranges, 10 to 1000 Hz by a permalloy-cored coil, and 1 to 50 KHz by a loop antenna, at the same time as the electric field variation. These data are now being processed.

The investigation on fair-weather atmospheric electricity has been continued at every opportunity. The data obtained during three cruises of Hakuho-Maru, the research vessel of the Ocean Research Institute, University of Tokyo, from 1968 to 1970 were analyzed. The global nature of the atmospheric electric field was studied by comparing the data with those measured at Syowa Station in Antarctica and on two vessels in the Mid-Atlantic Ocean. The electrical state in the transitional atmosphere from land to ocean was also studied by the measurements of aerosol density, small ion concentration and electric conductivity. The extension of land pollution over the ocean sometimes reached several hundred kilometers.



Radar tower and VHF antenna
at Imaichi Observatory.

The measurement of small ion density in the stratosphere was carried out at Haranomachi

Balloon Center of University of Tokyo. As the density showed considerable fluctuation according to time and circumstance, the cause of it, for example, the effect of aerosol or ozone content, is being discussed. In addition to this, the measurement of electric field within aurora by the use of a small rocket has been planned, and will be carried out at Syowa Station by the twelfth party of the Japanese Antarctic Research Expedition next year.

At Sakushima Observatory a synthetic observation facility for atmospheric electricity is being constructed. It will involve the measurement of surface atmospheric electricity elements and meteorological parameters, and moreover the electrical parameters in the lower ionosphere by receiving electric wave from radio-stations. It will serve to study atmospheric electrical methods to be applied to weather forecasting or to the transportation of air pollution, as well as to see the essential electrical state of the atmosphere.

December 1, 1970
— Masumi TAKAGI —

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