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Section 5. Atmospheric Radio Noise and Thunderstorms

Synchronous observations of the statistical parameter, $V_{0.1}$, at two different stations have been planned for the four frequencies of 2.5 kHz, 3.5 kHz, 5 kHz and 8 kHz. The plan was carried out for the first time in 1983, that is, one observation was performed at Sakushima Observatory and the other on board the Hakuho-maru, which was cruising in northwest Pacific Ocean during the period from January to March in 1983. For the latter, observations of APDs and CRDs were performed over their full ranges of amplitudes. Then, values of $V_{0.1}$ will be acquired as a function of the geographical place, and now analysis of data is being made.

Another attempt to measure the source statistics of atmospheric radio noise was performed in summer of 1983, that is, observations of APDs and CRDs were carried out at the same four measurement frequencies, 2.5 kHz, 3.5 kHz, 5 kHz and 8 kHz in Ohtsu in August of 1983. A number of APDs and CRDs were synchronously measured near thunderstorms, which will give significant information on not only characteristics of two distributions, but also the values of $V_{0.1}$ versus the frequency relation near sources. Further the latter relation is expected to give an important clew in estimating the distance to sources, because the relationship between the ratio, $V_{0.1}$ at 8 kHz/ $V_{0.1}$ at 5 kHz, in dB and the distance to a single thunderstorm or an assumed distributed-source has been derived for distant thunderstorms in a single wave guide propagation system.

Previously, a basic model of moving-vehicles on a straight road has been presented. An expansion of the model is being undertaken by taking into account the beam patterns of receiving- and transmitting antennas, propagation on the road and the source statistics of impulses emitted.

This year, we observed thunderstorms at five locations. The observations are divided into three objectives: 1) summer thunderstorms at Ohtsu; 2) winter thunderstorms at Mikuni, Kahokugata and Smoela in Norway; 3) tropical oceanic thunderstorms at Ponape in Micronesia.

Triggered lightnings from a tall chimney at Mikuni and those with rockets at Kahokugata were observed as well as natural ones. Velocities of leaders, return strokes and M-components were measured at the three sites in Japan with the optical device which was developed by us. The mechanism of the M-component strokes was discussed based upon results of velocity measurements. Return stroke currents were measured with a broad band antenna system (up to 1 MHz) for lightning magnetic fields. Spectral analysis was made for the electric fields due to nearby lightning return strokes. It is found by the analysis that the spectrum at VLF range changes with distance to the lightning in winter but not in summer. The observations at Ponape were carried out to find some characteristics on tropical oceanic thunderstorms. We observed the thunderstorms at Smoela in winter to compare with Japanese winter thunderstorms. The data on the above two projects are now under analysis. The two projects were cooperative research with Prof. Kitagawa of the Saitama University. The observation at Smoela was supported by Dr. Huse, the Norwegian Research Institute of Electricity Supply.

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-Taketoshi Nakai-

-Tosio Takeuti-

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