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ACTIVITY REPORT

Section 1. Propagation of Atmospherics and VLF, ELF Radio Noise

During the past year, two important events occurred in this section. One was the closure of the Tottori Observatory owing to changes of situation of the Sand Dune Laboratory, Tottori University. Our efforts to find another observation site were devoted to locations free from power line and nearer to the Institute. The Tohnoh Stock-Farm, which takes two hours by car from the Institute, has been selected for our future use. Measurements will be done there in the van using apparatus driven by batteries. The Tohnoh Stock-Farm consists of hills at a height of 700 m above sea level and is located 65 km north of the Institute. The other was that Dr. Yamashita was transferred to the Nagoya City College of Child Education located in the suburbs of Nagoya. Though she left our Institute, she has a continuing association with our group as well as interests in various research projects.

The attenuation coefficient and excitation factor of the Earth-Ionosphere waveguide are calculated for both quasi-transverse magnetic (QTM) and quasi-transverse electric (QTE) modes. Computations are presented for propagation under a homogeneous anisotropic ionosphere, assuming the QL approximation in the frequency range 1.5 to 10 kHz. It is found that in the presence of an anisotropic homogeneous ionosphere, the QTE modes are efficiently excited by a vertical dipole source, at frequencies near their cut-off frequency. This fact, together with the extremely low attenuation constant of the QTE modes just above their cut-off frequency shows that QTE modes play a dominant role in the formation of tweek atmospherics.

The U.S. Navy VLF station at North-West Cape, Australia changed from FSK to MSK, which made it impossible to track the signal-phase with our existing VLF tracking receiver. We developed an improved MSK converter which allows us to track the phase of MSK code waves by our VLF tracking receiver. We have continued with the phase-height measurements for 22.3 kHz, 18.6 kHz and 11.3 kHz at Toyokawa, Japan and for 17.4 kHz at Syowa, Antarctica. We have also continued with the field intensity measurements of atmospherics for 9 kHz, 21 kHz and 27 kHz at Sakushima Observatory.

The active experiment for the artificial excitation of plasma waves was carried out in the magnetospheric plasma by Japanese sounding rocket L-3H-9 on August 16, 1977 and similarly it is also planned in the ionospheric plasma by K-9M-61 rocket on January, 1978. Artificially-stimulated plasma waves were observed between 500 km to 1300 km altitude on the L-3H experiment. Furthermore, we are now joined the party for the provision of the flight-model test of EXOS-B Japanese scientific satellite which is planned for launch on September, 1978.

As one of the IMS projects in Antarctica, rocket experiments for the wave-phenomena in the polar ionosphere by the S-310 sounding rocket planned by our Wave-project group will be carried out between Feb. and Oct. of 1978 by the 19th Japanese Antarctic Research Expedition party that departed from Japan, November 1977.

December 1, 1977

- Kazuo SAO -

- Tetsuo KAMADA -

Publications

- Yamashita, M.: Propagation of tweek atmospherics. J.Atmos.Terr.Phys.
(in press)
- Kamada, T., M. Nakano and T. Takeuchi: Investigations of atmospherics's environment on earth by micro-wave technique. Reports of Scientific Satellite Symposium. June, 1977 in Japanese.
- Tokuda, S. and T. Kamada: On an improved MSK converter. in this issue.