

ACTIVITY REPORT

Section 1 Propagation of Atmospherics and ELF Radio Noise

Co-operative research on ELF atmospherics between U.S. and Japan was formally over last spring, and the third international symposium on ELF was held in Kyoto during March 15-21, 1969. Five papers were presented at this symposium. During these three years' co-operative observations, the necessity for maintaining higher accuracy of measurements came to be pointed out with the progress of the observations. Efforts are being made to this effect to improve the method of measurement and the calibration accuracy of the apparatus so that simultaneous observations with higher accuracy can be made over the Pacific area. Works on this study will be maintained henceforward for the purpose of keeping alive the useful scientific co-operations founded in the course of performing the program.

In order to investigate the antipodal wave of slow tail suggested by Wait, it is necessary to confirm the reception of atmospherics radiated from the very distant origin. In the observation made in November 1968 the identity was established of the source of the atmospherics received at both Boulder and Tottori stations by the identical waveforms, direction finding measurements, the time of arrival, and the time separation at both stations. The source of the identified waveforms was located, with a reasonable evidence, somewhere in South America, from which feasibility of reception of atmospherics originating in other active areas of thunderstorm in the world was established. The feasibility has encouraged us to plan out future observations of slow tails so that the information of sferics fixes by U.K. network can be incorporated in the research for the purpose of extending the coverage of the work.

SEA effects accompanied by solar flares in the ELF range were analyzed together with SDA at a frequency of 5 KHz using the data obtained in the long term continuous observations of the integrated field intensity. The frequency spectrum of the SEA rate in the ELF range was found to be related to the time of occurrence, which seems to be explained by the use of a two-layered ionospheric model.

Tweek atmospherics have been studied by many workers, however, one difficult point is still remaining to be solved, that is, to establish a theory which accounts for the unchanging amplitude of successively reflected pulses for several tens milliseconds. Employing a simple model of the lower ionosphere and the tensor reflection coefficient

ient with the assumption of the QL approximation, it is indicated that the ionosphere reflects waves as though it is almost a perfect conductor when an appropriate ionospheric condition is assumed.

As regards the genesis of slow tail atmospheric, it was concluded, from the existence of multiple strokes in slow tails and the study of the frequency spectrum of discharge current deduced from the frequency analysis of slow tail waveforms at receiving point, that slow tails are generated in a discharge process related to the individual return stroke of a lightning.

Fund were granted by the Ministry of Education this year for holding seminars as a part of the activities of Commission VIII of the URSI national committee, which enable us to hold at least three seminars on radio noise of terrestrial origin by the end of this academic year.

Observations of VLF radio noise in the ionosphere were carried out by the use of sounding rockets L-3H-4 and K-9M-26 launched at Kagoshima Space Center in January and August 1969 respectively. The performance of L-3H-4 was not successful, but K-9M-26 rocket attained to its maximum altitude of 341 km. Thus, very useful data of the radio noise in the frequency range from 100 Hz to 15 KHz were obtained through the direct sounding in the ionosphere. An investigation of the propagation characteristics of radio waves in the ionospheric plasma is being planned with K-9M-29 sounding rocket to be launched in February 1970.

Theoretical works have been made as to propagation and excitation mechanisms of ion acoustic and electromagnetic waves in the ionospheric plasma.

The experiment of the mutual interference among apparatus for a flight simulation of the Radio Exploration Satellite (REXS) has been made by the use of the space chamber of the University of Tokyo.

Observation of atmospheric associated with the low atmospheric pressure in the polar region is being carried out at Showa Base in Antarctica, and will be continued until January 1970. A new direction finder for the location of near-by sources has been constructed and is expected to be into operation at Showa Base after April 1970.

Routine observations of the intensity of VLF atmospheric are being kept on at Sakushima and Kagoshima Observatories.

— Kazuo SAO —

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