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ACTIVITY REPORT

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

Atmospherics as a pulse is complementary to the c.w. signal radiated from a transmitter for the research on the VLF and ELF radio wave propagation. Though it is extremely difficult to study the bearing error of the atmospheric received by means of the atmospheric itself, there is a way to pursue it by the use of the radio wave for the marine navigation aid. For instance, for the purpose of examining the effect of the refractive index of the atmosphere or that of the terrain on the velocity of the surface wave on the Earth, we have been studying with particular interest the irregular data measured by the DECCA receiver. As to the mode wave propagation, efforts have been made for the development of measuring method of the wave impedance at frequencies of 250 Hz (ELF atmospheric) and 10.2 kHz (OMEGA C signal). It is imperative to know the daily variation of the conductivity of the lower ionosphere for both the study of the location of atmospheric and that of LOP of the OMEGA navigation.

We have continued with the phase-height measurements for VLF radio waves of 22.3, 18.6, 17.4 and 11.3 kHz. From these data, the correlation between sudden phase anomalies (SPA) and solar X-ray bursts has been examined statistically, and the expected correlation curve was obtained for the deduction of solar X-ray burst intensities at 1-8 Å wavelength from the phase-height variation. We now can place our hope on the ground-based detection of solar X-ray flares by SPA measurements.

The active experiment for the artificial excitation of plasma waves in the ionospheric plasma was carried out by the Japanese sounding rocket K-9M-56 on September 18, 1976 at Kagoshima Space Center. Artificially-stimulated plasma waves were observed, which are considered to be generated by a non-linear interaction between acoustic mode waves and electron beams.

As one of the IMS project in Antarctica, rocket experiments for the wave-phenomena in the antarctic ionosphere planned by our Wave-project group will be carried out by the 18th Japanese Antarctic Research Expe-

dition party that departed from Japan, November 1976.

Theoretical works to investigate non-linear wave-wave and wave-particle interactions in the magnetospheric plasma were made for the provision of EXOS-B Japanese satellite experiment which is planned for launch in 1978.

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