

Proceedings of the Research Institute of Atmospheric,
Nagoya University, vol. 27(1980)

ACTIVITY REPORT

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

As regards the real time location of thunderstorms by a single station, a method to minimize errors in determining distance to the lightning in the daytime was studied. Using atmospheric data during a half year, the solar zenith angle was introduced to more accurately obtain the distance. In this case, precise position of thunderstorms, corresponding to observed groups of atmospheric from the associated lightning, were located by the clouds photographed by the meteorological satellite.

To investigate the time variation of the conductivity parameter of the D layer of the ionosphere, the wave impedance of propagation was studied by the use of the slow tail. Observations of slow tail waveforms by both electric and magnetic fields were carried out at Shibetsu in Hokkaido and at Kagoshima in Kyushu for a couple of weeks each. Phase frequency spectra for both fields were obtained by a computer so that the ionospheric parameter concerning the conductivity and reflection height could be deduced, independent of the nature of the lightning.

The Kita-Kyushu (Northern Kyushu) Decca chain was employed and the deviation (error) of hyperbolic line of position (LOP) caused by the wave propagation was studied. Namely, the error of the LOP near the transmitting station, and the distortion of the LOP because of the non-uniform conductivity of the propagation path (for instance, land to sea propagation across a coast line) were discussed experimentally. In addition, the Deccometer reading affected by the secondary radiation of the metal work of a ship, that is the error of the LOP, was also studied. It was suggested that this effect would be caused by the reradiation of a imaginary vertical loop which is in the centre (from stem to stern) line of a ship.

A national working group on the natural noise from lightning was initiated corresponding to the same group as the URSI Commission E whose chairman is Dr. Lundquist. It was decided that meetings of the

working group are to be held four times a year, and a theme of interest would be the comparison between a few methods of location of atmospheric phenomena originated in Asia.

From November, 1978 to June, 1979, T.Ogino stayed at the Fermi National Accelerator Laboratory, USA and studied the electron cooling problem on the proton-antiproton colliding beam project. Hot antiprotons must be quickly cooled by the cold electron beam in order to increase the number density and the life time of the antiproton. A cooling time of 30 - 60 ms, which is enough to practical use, was obtained for several experimentally estimated parameters when the electron space charge and the solenoidal magnetic field were taken into account.

In order to investigate the behavior of the D region, we have continued with the phase-height measurements for waves of 22.3 kHz (NWC), 18.6 kHz (NPG), 11.3 and 10.2 kHz of four OMEGA station at Aldra, Haiku, Reunion and N.Dakota, and also continued with the field intensity measurements of atmospheric waves for 9 kHz, 21 kHz and 27 kHz at Sakushima Observatory. As the sun's activity reached nearly maximum in 1979, the lowerings of the D layer height by more than 10 km were frequently observed associated with solar X-ray bursts. We developed a SPA monitor system, which utilized real time analog data through a micro-computer and printed out the starting time and the time of maximum of each SPA automatically. But, as there is still much more to be desired, we intend to improve on that system.

As one of the IMS projects in Antarctica, rocket experiments by the S-310 Japanese sounding rockets were carried out with great success by the 19th Japanese Antarctic Research Expedition party at Syowa Station. Our rocket named S-310JA-6 was launched along the geomagnetic field line at 00^h56^m00^sLT on August 28, 1978. That rocket hit active aurora arcs and obtained satisfactory results. That is, we were successful in observing the LHR Hiss with a sharp cut-off frequency and the static waves excited by the LHR Hiss. These data will give us valuable results we can use to investigate the wave-particle interaction in the polar ionosphere. We are now engaged in the data interpretation.

Furthermore, we have joined a group for the experimental observation of stimulated plasma waves in the magnetosphere by the Japanese scientific satellite "JIKIKEN". As the "JIKIKEN" surveys the deep magnetosphere, many interesting and valuable results can be obtained.

Some valuable results obtained by our experiment named SPA were

the plasma parameters and the electron number density profile of the magnetosphere, the position of the magneto-pause, etc..

December 12, 1979

- Kazuo SAO -

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Publications

- Yamashita, M.: Propagation of tweek atmospherics. J.A.T.P. vol.40.2. pp151 - 156 (1978)
- Sao, K. and H.Jindo: A simple method of location of thunderstorms in Asia. Trans.IECE (in press, in Japanese)
- Kamada, T., H.Oya, A.Morioka and T.Ono: Results of artifitialVLF plasma waves by K-9M-61 rocket. Reports of Space Observation Symposium. July, 1978. (in Japanese)
- Kamada, T., S.Tokuda and T.Hironaga: SPA observed during July 1978 events at Toyokawa. STE Research in Japan vol.3. pp150 - 153 (1979)
- Kamada, T., M.Nishino, Y.Tanaka, T.Hirasawa and H.Oya: Observation of Auroral Hiss by the S-310JA-6 Sounding Rocket. Proc. of RIA. vol.27 (1980)
- Kamada, T., S.Tokuda and T.Hironaga: Sudden Phase Anomalies observed on 20-21 August and on 14-20 September 1979 interval at Toyokawa. Proc. of RIA. vol.27 (1980)
- Tokuda, S. and T.Kamada: On an improved MSK converter. Proc.of RIA. vol.25 (1978)
- Tokuda, S. and T.Kamada: On a SPA monitor system. Proc. of RIA. vol.27 (1980)

