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Section 4. Whistlers and Related Phenomena

Routine observations of whistlers and VLF/ELF emissions have been continued by means of magnetic tape recordings in two minutes every hour at our observatories, Moshiri(L=1.6) and Kagoshima(L=1.2). VLF/ELF emissions have been also observed, using valley antennas, and hiss type emissions are identified by means of hiss recorders.

Routine observations for locating the distant atmospherics sources by the triangulation network(Moshiri, Sakushima, Kagoshima) have been continued for one period of 1520-25 since July 4, 1985.

Research activities of our section are being changed. Studies on whistlers are being decreased except for studying unresolved problems of low-latitude whistlers. Direction findings of atmospherics will be, on the smallest scale, continued for more one year. Our present interest is the generation and propagation of magnetospheric plasma waves.

For the wave-particle interaction study in the inner zone radiation belt, conjugate measurements of the whistler-mode waves of Decca signals transmitted from Hokkaido(L=1.6), Japan have been again made at the conjugate points at and around Birdsville, Australia in July to September, 1986. In order to study the propagation of the LF whistler-mode waves and the wave-particle interaction in the equatorial topside ionosphere (L=1.2), conjugate measurements of the whistler-mode Decca waves transmitted from Kyushu(L=1.2) will be carried out at the conjugate point around Darwin, Australia for the period of July to September in this year, along with simultaneous measurements of geomagnetic pulsations between the conjugate points.

In order to explore the feasibility of an active experiment by the transmission of LF signals around Moshiri, we are carrying out a simulation experiment on the investigation of transmission characteristics of a travelling wave type antenna at LF.

Whistler-mode signals were measured at the conjugate point(L=1.93) in South Australia of the VLF transmitter in Eastern USSR, in 1984 and 86. The intensity of the whistler-mode signals increased usually at sunset and occasionally at sunrise, and it was moderate during nighttime.

By means of the calculation of the wave attenuation in the lower ionosphere, the result may be interpreted in terms of different mechanisms of propagation in the magnetosphere and transmission out of the ionosphere : spacially coherent propagation in a field-aligned duct and transmission out of the duct onto the ground at sunset and sunrise ; and spacially incoherent propagation and transmission at night. A high correlation was found between the occurrence probability of the 14.881 kHz whistler-mode signals and the occurrence number of whistlers, which may suggest that the occurrence of whistlers is controlled predominantly by propagation conditions.

The generation and propagation of auroral LHR noise have been discussed, based on the observation data aboard the rocket S-310JA-6 at Syowa, Antarctica. Electromagnetic noise with banded structure observed on the rocket showed a sharply defined lower cutoff at $\sim$ 4 kHz and an indefinite upper cutoff around 8 kHz corresponding to the lower hybrid resonance frequency of the ambient plasma of the rocket location. Directions of the wave and Poynting vectors and estimated wave refractive indices indicate that the banded noises propagate with large wave normal angles to the geomagnetic field, down to the rocket. It may be suggested that such noises excited in the auroral ionosphere by energetic electron streams($\leq$ 5 kev) in a Landau instability process propagating down to the rocket.

Then, the generation and propagation of auroral VLF hiss emissions of impulsive and narrow-banded types observed at Syowa are being comprehensively discussed ,based on the direction finding data.

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