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Section 7. Magnetospheric Radio Emissions

The routine observations of VLF/ELF emissions (mainly hiss-type) have been continued at Moshiri by means of minimum reading circuits at four frequencies of 0.8, 2.5, 5.0 and 8.0kHz. The dynamic spectra for discrete- as well as hiss-emissions can be obtained from the synoptic wide-band (0.5-8.0kHz) observation on magnetic tapes.

New apparatus for VLF/ELF emissions with improved sensitivity has been constructed at Moshiri and Kagoshima. The increased sensitivity is achieved based on the cross-correlation of the two waveforms of the emission received by the existing antenna and by a newly-built large loop antenna at each observatory. The intercomparison of the data from Moshiri and Kagoshima will enable us to study the following subjects; (1) improved understanding of the medium-latitude VLF/ELF emissions taking place around the plasmopause during magnetic disturbances, (2) the emissions in the electron slot, and the formation of the slot, and (3) the emissions associated with the particles in the inner radiation belt.

The spaced direction finding measurements for medium-latitude emissions carried out in Europe have yielded interesting results. The use of the direction findings has enabled us to classify the emissions into several categories such as (1) the plasmopause-associated VLF emissions, as mentioned above, (2) VLF emissions in the electron slot, (3) periodic emissions and (4) VLF emissions triggered by the hiss band. Further detailed analyses and theoretical interpretations are in progress.

A study of the auroral VLF emissions has been continued by means of the data obtained with the new direction finding system, and the correlation between the VLF and auroral emissions is being studied to investigate the mechanism of generation and propagation of auroral VLF emissions.

Hayakawa stayed in CRPE/CNRS at Orleans (France) and came back last December. He participated in the VLF/ELF wave experiment on the low-altitude satellite, ARCAD 3, on which we will determine, systematically,

wave normal directions of ELF emissions at several frequencies. The direction finding system to be used can find multiple propagation directions. The principal aim is to understand the acceleration mechanism of auroral electrons and wave-particle interactions. In conjunction with the satellite passes over Japan, we make the simultaneous ground-based VLF observations at our stations in Japan. This will provide useful information on the generation and propagation of VLF emissions and on the ionospheric penetration characteristics of VLF waves.

The effect of inhomogeneity of the plasma parameters in electron cyclotron interaction with whistler-mode wave with constant frequency is theoretically studied by means of the kinetic energy consideration. It is found that the joint effect of wave acceleration and magnetic field inhomogeneity is most contributive in reducing the electron kinetic energy, when the inhomogeneity increases during the interaction. The reduced part of the change in the kinetic energy goes increasingly into the wave energy.

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-Jinsuke OHTSU-

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