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Section 4. Whistlers and VLF emissions

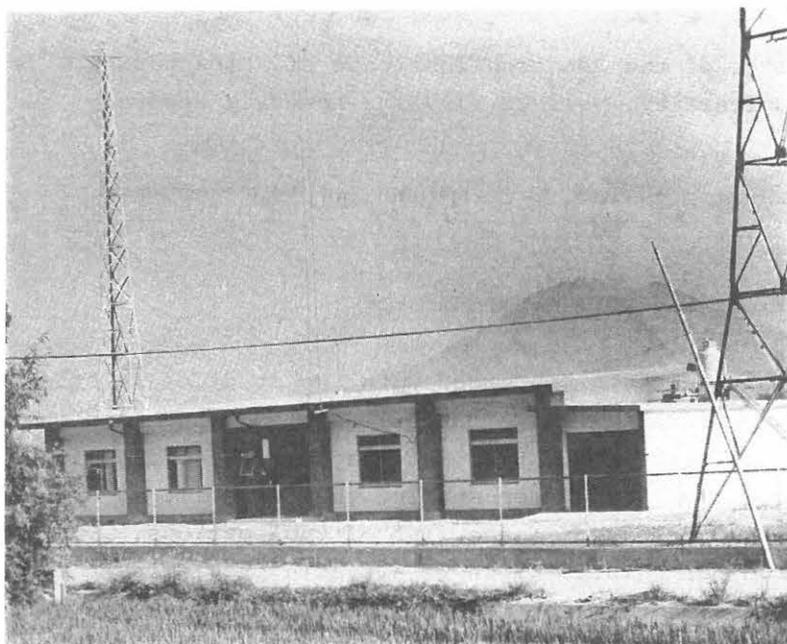
a) Whistlers and VLF emissions

Two main subjects concerned with the study of whistlers, i.e., the whistler penetration characteristics through the ionosphere, and the propagation features in the magnetosphere, deducing of the magnetospheric properties; have been studied theoretically as well as experimentally, as is presented in the list of publications. In spite of many years study of whistlers, there are some problems yet to be solved, which are to confirm the formation theory of whistler duct and to establish the experimental technique of the direction finding of whistlers and to develop the automatic recorder for the occurrence rate, dispersion and diffuseness of whistlers. The current attention is, therefore, paid to these unsolved problems.

As to VLF emissions, the study is made of the morphological differences between low-latitude and auroral VLF hiss (Hayakawa et al. 1974). The in-situ characteristics of VLF hiss during geomagnetic disturbances are studied by using the data observed by Ariel 3 satellite (Hayakawa et al. 1974). The result of the study on the above-mentioned morphological difference and of the observation by the satellite, suggests that the low-latitude non-auroral VLF hiss will be generated by drifting ring-current electrons outside and inside of the plasmapause in the morning and the evening sectors of the magnetosphere, respectively.

Kagoshima Observatory having been compelled to remove as described in the previous report, was built at a new site in Tarumizu City, this summer. In order to reduce the interfering man-made noises, the antenna for observing whistlers and VLF emissions is installed at the valley in Mt. Takakuma being 7.6 km east of the new observatory and the receiving signal being telemetered by UHF radio link. As using the large valley antenna at the site free from interfering noises, the occurrence rate of whistlers observed since this summer shows remarkable increase, compared with the occurrence rate before removal.

b) Location of atmospheric



Kagoshima Observatory

Receiving frequency of VLF direction finding system has been shifted down to tune at 7.3 kHz in order to avoid the interfering disturbances from VLF transmitting waves (10.2, 11.3, 13.6 kHz) of Tsushima Omega Station operating since this summer. Moreover, in order to reduce the interference error, the tuning circuits of the direction finders were shortened over by the FET switches which were designed to open for several milli-seconds only when the atmospherics exceeding the threshold level was received. By adopting this new system, the accuracies of the fixing of atmospherics were improved, especially for the nighttime observation, and polarization errors being also reduced by adjusting the operating time of FET switches.

In order to investigate precisely the site error of each station, a new direction finding system using the arriving time difference method is now under construction. This method is free from site and polarization errors, having the advantages that not only arrival direction but also incidental angle are obtained simultaneously.

Aiming at finding the distance of the nearby thunderstorm, the comparison of the peak values of electric fields of atmospherics within

300 km was carried out at several frequencies, last summer. The observing frequencies were 8, 50, 180, 455 kHz and 2 MHz, and the receiving bandwidth of each receiver was 10 kHz except 8 kHz receiver. This summer, the same observation was continued, adding 30 MHz receiver.

December 16, 1974

- Akira Iwai -

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