

Section 7. Magnetspheric Radio Emissions

The routine observation of ELF - VLF emissions has been carried out as before at Moshiri, by the minimum level reading method for hiss, at four specific frequencies of 8, 5, 2.5 and 0.8 KHz and by the method of wide band (0.5 - 8 KHz) recording on magnetic tapes for the discrete emissions as well as for hiss.

As for the study of the generation and propagation mechanisms of medium-latitude VLF emissions, we lay our emphasis on the direction finding at the two stations in Europe (Chambon la Foret in France, Brorfelde in Denmark). Due to the improvement of the equipment and due to the increase of solar activity we could detect a lot of VLF emission events last winter, which are now yielding interesting results. In order to relate the ionospheric exit points of emissions with the plasmopause position, we estimate, in Brorfelde, the location of plasmopause based on the measurement of nose frequency (up to 20 KHz) and direction finding of whistlers.

The Coordinated satellite and ground measurement for VLF waves including VLF emissions and whistlers is being made with the group of Univ. of Poitiers. Being synchronous with the passes of ISIS satellites over Europe, We made simultaneously the goniometer measurements for VLF waves at Brorfelde, Chambon la Foret and Poitiers.

A new direction finding for auroral VLF emissions has been in operation and will be continued at Syowa Station in Antarctica to study the generation and propagation mechanisms of auroral VLF emissions. Some useful data are being obtained. An experiment to know the wave normal direction of VLF emissions in the ionosphere was successfully carried out by means of the S - 310 - JA6 rocket at Syowa Station last summer and will be analysed shortly.

The Exos - B satellite has been successfully launched at Kagoshima Space Centre and we are involved in studying the characteristics of natural plasma waves in the magnetosphere.

The equatorial VLF emissions have been investigated based on the Ariel 3 and 4 satellite data with the group of Univ. of Sheffield. It is found that the origin of equatorial emissions is probable to be thunder storms, but some of intense ones may be amplified by some mechanism.

Unusual VLF noise event was observed at Sakushima during the observation period of 06h 50m to 06h 52m on Sep. 29, 1978, associated with a moderate severe magnetic storm. Discrete traces showing harmonic relation continued in more or less noisy background, which changed in frequency, intensity and number of trace. Required energy of resonant electron is estimated in a range of several tens to hundred Mev when we apply the electron cyclotron resonance condition.

In order to understand basic conditions concerning excitation of triggered emissions by whistlers. Unperturbed phase change of perpendicular velocity of resonant electron relative to magnetic field of interacting whistler wave have been investigated. It is seen that frequency and dispersion of whistler and interaction location have essential effects on the length of interaction.

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Publications

- Hayakawa M. and Y. Tanaka : ELF emissions observed at Moshiri, Nature (Physical Sci.), 270, 703 (1977).
- Hayakawa M., K. Bullough and T. R. Kaiser : Properties of storm-time magnetospheric VLF emissions as deduced from the Ariel 3 satellite and ground observations, Planet. Space Sci., 25, 353 (1977).
- Hayakawa M., A. R. L. Tatnall and K. Bullough: Equatorial VLF emissions as observed by Ariel satellites, in preparation.
- Ohtsu J. and M. Kashiwagi: An unusual VLF noise event observed at Sakushima on Sep. 29, 1978, this issue.
- Tanaka Y., M. Hayakawa and M. Nishino: An observing plan of wave normal direction of auroral VLF emissions on board a rocket at Syowa Station, Proc. 2nd Symp. Rocket Experiments in Antarctica, Natl. Inst. Polar Res., Oct., p76(1978).
- Tanaka y., M. Hayakawa, A. Iwai, T. Okada, M. Satoh and J. Ohtsu: Preliminary report on the simultaneous observation of VLF emissions at Brorfelde(Denmark), Chambon la Foret(France) and Moshiri, Proc. Res. Inst. Atmos. Nagoya Univ., 25, 7(1978).