Determination of Dispersion Curves of Lightning Whistler Using the VLF Waveform Data Obtained by Akebono

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The VLF wideband data (WBA) obtained by the Akebono satellite have been recorded into DAT and stored for 18 years. The total amount of the data is over 10Tbytes and these data are useful for studying the long-term variation of the electron density profile in the Earth's Magnetosphere. In the present paper, we introduce a calibration system of the WBA data and the automatic detection algorithm of lightning whistlers.

We constructed a database for the house keeping (HK) data related to the WBA and developed an application system for the calibration of the data referring the database. As a next step, we developed an algorithm of automatic detection of lightning whistlers from the WBA data. We propose an appropriate threshold level to detect lightning whistlers using an adaptive filter. We demonstrate that our new method is effective in detecting whistlers accurately with a small computation time so as to be applied to the onboard real-time data processing for the future satellites.

Finally we applied this method to the VLF data obtained along about 200 orbits of Akebono. We statistically analyzed the occurrence frequencies as functions of latitude, local time and so on.

The proposed method is useful enough for the automatic detection of whistlers in a systematic way, and propagation characteristics of lightning whistlers can be investigated using a large amount of VLF data in the near future.