

Statistical analysis of lightning whistlers observed by VLF/WBA onboard AKEBONO

Yuta Oike^{1*}, Yoshiya Kasahara¹, Yoshitaka Goto¹

¹Kanazawa Univ.

The AKEBONO spacecraft was launched on 1989 to observe particles and plasma waves in the auroral region and plasmasphere of the earth. The AKEBONO has been operated for nearly 24 years, which are 2 cycles of solar activity or 1 cycle of solar magnetic polarity reversal.

The WBA (Wide Band Analyzer) is one of subsystems of the VLF instruments onboard AKEBONO. It measures 1 component of electric or magnetic analogue waveform at frequency band of 50 Hz - 15 kHz. Lightning whistlers are frequently observed mainly in the plasmasphere by the WBA and their dispersions depend on electron density profile along their propagation paths. Therefore it is possible to estimate the electron density profile in the plasmasphere statistically using the trend of whistler dispersions along the trajectories.

In this study, we developed an automatic detection system of lightning whistlers from the spectrogram of the WBA receiver. We statistically analyzed the characteristics of lightning whistlers observed from 1989 to 1991 detected by the system. We found that lightning whistlers are hardly observed in the dayside, while they are mainly observed in the lower magnetic latitude range below 30 degree. It was also found that the dispersion of lightning whistler tends to be larger at higher altitude region.

We briefly introduce the detection system, and report the results of statistical study. Finally we discuss the propagation characteristics of lightning whistlers depending on the condition of electron density in the plasmasphere.

Keywords: AKEBONO, VLF, wideband receiver, lightning whistler, dispersion