Propagation characteristics of whistler mode chorus waves deduced from the first-year observations by the Arase satellite

Satoshi Kurita[1]; Yoshizumi Miyoshi[1]; Yoshiya Kasahara[2]; Shoya Matsuda[3]; Ayako Matsuoka[4]; Iku Shinohara[5]
[1] ISEE, Nagoya Univ.; [2] Kanazawa Univ.; [3] ISAS/JAXA; [4] ISAS/JAXA; [5] ISAS/JAXA

Whistler-mode chorus is electromagnetic waves in nature observed in the frequency range from 0.1 to 0.8 times of electron gyrofrequency, fce, and they frequently appear in the dawn and noon side magnetosphere. Chorus waves often have a gap of wave power at 0.5 fce, and the waves below and above 0.5 fce are called lower-band (LBC) and upper-band chorus (UBC), respectively. These waves have been considered as the primary driver of the electron dynamics in the inner magnetosphere since they can resonate with electrons in the wide energy range and cause the acceleration and loss of the electrons. Characteristics of the waves such as the wave normal angle, wave power, and their latitudinal distributions are of interest since these parameters strongly control the time scale for acceleration and loss of electrons. The characteristics of LBC was investigated by using the 11 year Cluster measurements [Santolik et al., 2014], while those of UBC has not been well clarified yet. In this study, we investigate characteristics of both LBC and UBC observed by the Arase satellite using the data processed by Onboard Frequency Analyzer (OFA), which is one of the receivers of the Plasma Wave Experiment (PWE). OFA computes power spectral density of wave electric and magnetic fields in the frequency range from 64 Hz to 20 kHz, and spectral matrices of the electric and magnetic fields are also provided. Applying the singular value decomposition technique [Santolik et al., 2003] to the magnetic spectral matrix computed by OFA, we derive occurrence frequency distributions of wave normal angle and wave magnetic field power as a function of magnetic latitudes. The parameters of LBC and UBC are separately analyzed, and we also classify the magnetic local time of the wave observations into dayside and night side. In the presentation, we will show the latitudinal distributions of wave normal angle of LBC and UBC and discuss the different propagation characteristics between LBC and UBC. We also represent latitudinal wave magnetic field power distributions to discuss the propagation effect on the wave power, that is, convective growth and damping of LBC and UBC. We will also discuss the day/night difference of the parameters between LBC and UBC.