R006-38
A 会場 ：9/27　AM2 （10:45-12:30）
11:45〜12:00

あらせ衛星観測によるコーラス波動強度・伝搬角の経験モデルの構築

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Construction of wave power and wave normal angle models of chorus waves based on the Arase PWE/OFA observation

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Whistler mode chorus waves play crucial roles in the dynamics of the Earth's inner magnetosphere through wave-particle interactions. In particular, it has been considered that stochastic acceleration by chorus waves is responsible for the creation of relativistic electrons in the Earth's outer radiation belt during geomagnetic disturbances. The stochastic acceleration has been described by the quasi-linear diffusion regime, and modeling works successfully reproduce observed flux increase in radiation belt electrons during geomagnetic disturbances. The quasi-linear diffusion model of chorus waves requires information on wave power and wave normal angle of chorus waves, which greatly changes the timescale for the acceleration of relativistic electrons. The model describes the wave power distribution as a function of frequency using a Gaussian function. The wave normal angle distribution for a fixed wave frequency is also represented by a Gaussian function. The magnetic latitude dependence of these distributions needs to be incorporated into the model to include stochastic acceleration of electrons during the propagation of chorus waves from the magnetic equator to higher latitudes. It is also worthwhile to construct the wave power and wave normal angle models of chorus waves as input parameters of test-particle simulations which can describe nonlinear aspects of wave-particle interactions between electrons and the waves.

The purpose of this study is the development of the empirical chorus wave model based on the Arase satellite observation, which describes the wave power distribution as a function of frequency, wave normal angle distribution for a fixed wave frequency, and the MLAT dependence of these distributions. We have statistically investigated spectral matrices obtained by the Onboard Frequency Analyzer (OFA), which is a part of the Plasma Wave Experiment onboard the Arase satellite. The wave power and wave normal angle of chorus waves are derived from the OFA-MATRIX datasets, and these parameters are modeled so that the parameters can be used as inputs of the quasi-linear diffusion model. We report on the wave power distribution of chorus waves as a function of normalized frequency (f/fce) and wave normal angle distribution of chorus waves at a fixed normalized frequency. The MLAT dependence of these distributions is also shown in the presentation. The input parameters of the quasi-linear diffusion model will be derived from the obtained distributions, and diffusion rates will be shown using the parameters derived from the Arase observation.