

PEM024-10

会場:ファンクションルーム A

時間: 5月26日16:15-16:30

THEMIS衛星データに基づくプラズマシート電子のライフタイムの算出

Estimation of lifetimes of the plasma sheet electrons from the THEMIS observations

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A dominant loss process of electrons in the inner magnetosphere is thought to be the pitch angle scattering by plasma waves. Electrons scattered into the loss cone precipitate into the atmosphere and contribute to aurora emissions. It is generally accepted that the dominant source of diffuse aurora is electrons scattered from the central plasma sheet. However, there is still much controversy on dominant scattering mechanism of plasma sheet electrons because electrons resonate with both electrostatic electron cyclotron harmonic (ECH) waves and/or whistler mode waves. The purpose of this study is to investigate which wave is mainly responsible for the loss of the plasma sheet electrons. In this study, we estimate lifetimes of the plasma sheet electrons from the THEMIS observations, and compare them with the theoretical loss timescales due to the pitch angle scattering by whistler mode chorus. We have derived global distributions of the average phase space density in the first adiabatic invariants of 50 and 100 eV/nT, using the electron data obtained from the electrostatic analyzer (ESA) on board the THEMIS satellites for 2 years. The electron lifetimes are estimated from the decrease of the PSD along the drift paths, which are calculated from the Volland-Stern electric field and dipole magnetic field models. The loss timescales are theoretically evaluated from the pitch angle diffusion coefficients due to the typical whistler mode chorus waves. The results of the comparison suggest that the precipitation loss of the plasma sheet electrons is mainly caused by the chorus waves. We will extend the estimation of the lifetimes to lower and higher first adiabatic invariants to investigate the energy dependence of the electron loss process. We will also compare the electron lifetimes from the THEMIS observations with the theoretical loss timescales considering more realistic situations, such as a use of the wave data obtained from the THEMIS satellites.

キーワード:プラズマシート,ディフューズオーロラ,テミス,コーラス,波動粒子相互作用

Keywords: plasma sheet, diffuse aurora, THEMIS, chorus, wave-particle interaction