

Spatio-temporal characteristics of the precipitating electron energy of pulsating aurora and comparison with the numerical simulation

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Pulsating aurora (PsA) is characterized by quasi-periodic intensity modulations with a period of 2-20 s which is known as the main modulation. Electrostatic Cyclotron Harmonic waves and whistler-mode waves are known to cause the pitch angle scattering of energetic electrons in the magnetosphere. In particular, whistler-mode chorus waves play a crucial role in the pitch angle scattering of the electrons. The lower-band chorus causes precipitation of electrons whose energy is greater than several keV [Miyoshi et al., 2015]. The energy of precipitating electrons causing PsA has been estimated from ground-based optical observations. Ono [1993] observed the emission intensities of PsAs at wavelengths of 427.8 and 844.6 nm using a multi-channel photometer at Syowa Station in Antarctica, and estimated the energy of the precipitating electrons by combining the ratio of the two emission intensities and the model calculation. However, Ono [1993] conducted observations using the instrument with a narrow field-of-view, and the energy estimation using all-sky imagers has not yet been performed. In Tromsø, Norway, several highly-sensitive EMCCD cameras have been operated, which have simultaneously observed all-sky images of the emission intensity at the two wavelengths (427.8 and 844.6 nm) with a sampling frequency of 10 Hz. In this study, we investigate the spatio-temporal variations of precipitating electron energy using these EMCCD cameras. We estimated the precipitating electron energy of PsA by comparing the intensity ratio of the two emission lines using the all-sky images and the emission intensity calculation results obtained by the GLOW model. We will compare the emission intensity ratio obtained from a code coupling simulation of GEMSIS-RBW that calculates wave-particle interactions and resultant precipitations and the GLOW model to estimate the optical emissions at different wavelength. In this presentation, we show the spatio-temporal characteristics of the precipitating electron energy of PsA and discuss energy spectrum of precipitating electrons by comparing with the code-coupling simulation.

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