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Search for the source regions of precipitating electrons which generate pulsating aurora based on REIMEI observations.

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Pulsating aurora is a phenomenon which shows periodic emission variation in diffuse aurora. The emission is characterized by not sinusoidal change but pulsation, and its typical period ranges from a few seconds to a few tens of seconds. Energy range of precipitating electrons which generate pulsating aurora was estimated from a rocket observation by *Sandahl et al*., [1980]. Because pulsating aurora appears in diffuse aurora, electrons are thought to undergo cyclotron resonance with whistler mode waves in the equatorial region of the magnetosphere and to precipitate into Earth's upper atmosphere by pitch angule scattering. This concept is widely accepted, but there is a few demonstration by observation in past. *Sato et al*., [2004] recently suggested that the source region of pulsating aurora is located earthward, far from the equatorial plane, raising a question about the source region of pulsating aurora.

The purpose of this study is to search for the source regions of pulsating aurora using simultaneous image and particle observation data from REIMEI satellite in statistical basis. A great advantage of REIMEI is simultaneous observation of aurora image and particle flux by attitude control that makes it possible to point the field of view of Multi-spectral Aurora Camera (MAC) to a footprint of magnetic field line threading the satellite. We used mainly MAC and Electron/Ion energy Spectrum Analyzer (E/ISA) in this study. MAC takes a picture with three wavelengths; 427.8 ($N_2{}^+$ 1st Negative Band), 557.7 (O Green line) and 670.0 (N_2 1st Positive Band) nm. The field of view is 7.6 degrees and the time and spatial resolution are 120 ms and 1 km, respectively. E/ISA is top-hat type electrostatic analyzer with energy range from 10 eV to 12 keV and time resolution of 40 ms. In observation of pulsating aurora, energy dispersion of electron flux associated aith pulsating aurora is seen. From the difference of energy and time, we carried out Time of Flight analysis and calculated a distance of the source region from REIMEI. The distance was traced along a magnetic field line using Tsyganenko-89 model and the source regions were identified.

We analyzed 15 paths from November 2005 to November 2007 and 38 source regions were identified. The results revealed that the source regions are not necessarily located close to the equatorial plane but distribute continuously in an extent of 30 degrees from the equatorial plane. In order to examine the results, we carried out numerical calculation for linear cyclotron resonance between whistler mode wave (ELF-VLF) and electrons. As a result, the energy satisfying the resonance condition in a source region located earthward such as acceleration region (altitude 10,000-20,000 km) ranges from 430 keV to 60 MeV and cyclotron resonance will not occur because of lack of high energy electrons that satisfy the resonance condition. On the other hand, in the equatorial region the energy is less than several keV. This suggests the resonance occurs easily in the equatorial region and supports the model that pulsating aurora is produced near the equatorial region by interactions between whistler mode waves and electrons.