

A production mechanism of pulsating aurora and wave-particle interactions based on REIMEI observations.

Takanori Nishiyama[1]; Takeshi Sakanoi[1]; Shoichi Okano[1]; Kazushi Asamura[2]; Atsushi Yamazaki[2]; Yusuke Ebihara[3]; Masafumi Hirahara[4]

[1] Planet. Plasma Atmos. Res. Cent., Tohoku Univ.; [2] ISAS/JAXA; [3] Nagoya Univ., IAR; [4] Dept. Earth & Planet. Sci., Univ. Tokyo

<http://pparc.geophys.tohoku.ac.jp/index.html>

Pulsating aurora is a phenomenon which shows periodic emission variation in diffuse aurora. The emission is characterized by not a sinusoidal change but a 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 angle scattering. This concept is widely accepted, but there is a few observations conflicting this idea. *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 a source region and a production mechanism of pulsating aurora.

The purpose of this study is to search for the source regions and the production mechanism of pulsating aurora using simultaneous image and particle observation data from REIMEI satellite in statistical basis. We used mainly MAC and Electron/Ion energy Spectrum Analyzer (E/ISA) in this study. MAC takes aurora images with three wavelengths; 427.8 (N₂⁺ 1st Negative Band), 557.7 (O Green line) and 670.0 (N₂ 1st Positive Band) nm. The field of view is 7.6 degrees and the time and spatial resolutions are 120 ms and 1 km, respectively. E/ISA is a tophat type electrostatic analyzer with energy range from 10 eV to 12 keV and time resolution of 40 ms.

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 the outer zone of radiation belt, it is reported that whistler mode wave frequently appears in an extent of 20 degrees from the equatorial plane at recovery phase (*Meredith et al.*, [2001]) and it is consistent with our results. This suggests the resonance occurs in the region extending from the equator to latitude of 30 degrees. In addition, past theoretical studies reported that there is a modulation (3-5Hz) in precipitating electrons flux generated by interactions between whistler mode waves and electrons [*Demekhov et al.*, 1994; *Trakhtengerts et al.*, 1999]. Analysis is now going on to try to find such modulations in REIMEI observation data and results will be presented.