Japan Geoscience Union Meeting 2015
(May 24th - 28th at Makuhari, Chiba, Japan)

PEM07-26 会場:302 時間:5 月 25 日 16:15-16:45

脈動オーロラ時に見られる広いエネルギー帯の電子散乱と中層大気への影響について
Wide energy electron precipitation associated with the pulsating aurora and its impact on the middle atmosphere

三好 由純[1*] ; 大山 伸一郎[1] ; 齊藤 慎司[1] ; 栗田 怜[1] ; 藤原 均[2] ; 片岡 龍峰[3] ; 海老原 祐輔[4] ; Kletzing Craig[5] ; Reeves Geoff[6] ; Santolik Ondrej[7] ; Clilverd Mark[8] ; Rodger Craig[9] ; Turunen Esa[10] ; 土屋 史紀[11]
MIYOSHI, Yoshizumi[1*] ; OYAMA, Shin-ichiro[1] ; SAITO, Shinji[1] ; KURITA, Satoshi[1] ; FUJIWARA, Hitoshi[2] ; KATAOKA, Ryuho[3] ; EBIHARA, Yusuke[4] ; KLETZING, Craig[5] ; REEVES, Geoff[6] ; SANTOLIK, Ondrej[7] ; CLILVERD, Mark[8] ; RODGER, Craig[9] ; TURUNEN, Esa[10] ; TSUCHIYA, Fuminori[11]

[1] 名古屋大学太陽地球環境研究所, [2] 成蹊大学, [3] 国立極地研究所, [4] 京都大学生存圏研究所, [5] アイオワ大学, [6] ロスアラモス国立研究所, [7]Charles University in Prague, Czech Rep., [8]British Antarctic Survey, UK, [9]University of Otago, NZ, [10]Sodankyla Geophysical Observatory, University of Oulu, Finland, [11] 東北大学大学院理学研究科惑星プラズマ・大気研究センター
[1]Solar-Terrestrial Environment Laboratory, Nagoya University, [2]Seikei University, [3]National Institute of Polar Research, [4]RISH, Kyoto University, [5]University of Iowa, USA, [6]Los Alamos National Laboratory, USA, [7]Charles University in Prague, Czech Rep., [8]British Antarctic Survey, UK, [9]University of Otago, NZ, [10]Sodankyla Geophysical Observatory, University of Oulu, Finland, [11]PPARC, Tohoku University

The pulsating aurora is caused by intermittent precipitations of tens keV electrons. It is also expected that not only tens keV electrons but also sub-relativistic/relativistic electrons precipitate simultaneously into the ionosphere owing to whistler-mode wave-particle interactions. We analyzed the pulsating aurora event in November 2012 using several ground-based observation data; EISCAT, riometer, and sub-ionospheric radio waves, and the Van Allen Probes satellite data. The electron density profile obtained from

the EISCAT Tromsoe VHF radar identifies the electron density enhancement at >68 km altitudes. The electron energy spectrum derived from an inversion method indicates the wide energy electron precipitations from 10 keV - 200 keV. The riometer and network of sub-ionospheric radio wave observations also showed the energetic electron precipitations during this period. During this period, the footprint of the Van Allen Probe-A satellite was very close to Tromso and the satellite observed rising tone emissions of the lower-band chorus (LBC) waves near the equatorial plane. Using the satellite observed LBC and trapped electrons as an initial condition, we conducted a computer simulation of the wave-particle interactions. The simulation showed simultaneous precipitation of electrons at both tens of keV and a few hundred keV, which is consistent with the energy spectrum estimated by the inversion method using the EISCAT observations. This result revealed that electrons with a wide energy range simultaneously precipitate into the ionosphere in association with the pulsating aurora. We also discuss the possible impacts on the middle atmosphere due to precipitations of wide energy electrons during the pulsating aurora.

キーワード: 電子降り込み, ジオスペース, 中層大気
Keywords: energetic electron precipiation, Geospace, middle atmosphere