R005-53
Zoom meeting C ：11/3　AM1　(9:00-10:30)
10:00-10:15

地磁気静穏時に発生した pseudo breakup における熱圏応答のイベント解析

#大山　伸一郎[1)2)3)],新堀　淳樹[1)],小川　泰信[3)],Kellinsalmi　Mirjam[4)],Raita　Tero[5)],Rietveld　Michael[6)],Aikio　Anita[2)],Heikki　Vanhamaki[2)],塩川　和夫[1)],Virtanen　Ilkka[2)],Cai　Lei[7)],Workayehu　Abiyot[2)],Pedersen　Marcus[2)],Kauristie　Kirsti[4)],津田　卓雄[8)],Kozelov　Boris[9)],Demekhov　Andrei[9)],Yahnin　Alexander[9)],土屋　史紀[10)],熊本　篤志[10)],笠原　禎也[11)],松岡　彩子[12)],小路　真史[1)],寺本　万里子[13)]
[1)]名大 ISEE,[2)]オウル大学,[3)]国立極地研究所,[4)]フィンランド気象研究所,[5)]オウル大学ソダンキラ地球物理観測所,[6)]欧州非干渉散乱レーダー協会,[7)]スウェーデン王立工科大学,[8)]電気通信大学,[9)]ロシア極地地球物理学研究所,[10)]東北大学,[11)]金沢大学,[12)]京都大学,[13)]九州工業大学

An event study of the thermospheric response at a pseudo breakup during geomagnetically quiet conditions

#Shin-ichiro Oyama[1),2),3)], Atsuki Shinbori[1)], Yasunobu Ogawa[3)], Mirjam Kellinsalmi[4)], Tero Raita[5)], Michael Rietveld[6)], Aikio Anita[2)], Heikki Vanhamaki[2)], Kazuo Shiokawa[1)], Ilkka Virtanen[2)], Lei Cai[7)], Abiyot Workayehu[2)], Marcus Pedersen[2)], Kirsti Kauristie[4)], Takuo Tsuda[8)], Boris Kozelov[9)], Andrei Demekhov[9)], Alexander Yahnin[9)], Fuminori Tsuchiya[10)], Atsushi Kumamoto[10)], Yoshiya Kasahara[11)], Ayako Matsuoka[12)], Masafumi Shoji[1)], Mariko Teramoto[13)]
[1)]ISEE, Nagoya Univ.,[2)]Space Physics and Astronomy Research Unit, University of Oulu,[3)]National Institute of Polar Research,[4)]Finnish Meteorological Institute,[5)]Sodankyla Geophysical Observatory, University of Oulu,[6)]EISCAT,[7)]KTH Royal Institute of Technology,[8)]The University of Electro-Communications,[9)]Polar Geophysical Institute,[10)]Tohoku University,[11)]Kanazawa University,[12)]Kyoto University,[13)]Kyushu Institute of Technology

A geomagnetically quiet-time (Kp=0+) pseudo breakup event on 20 February 2018 was investigated to examine the Magnetosphere-Ionosphere-Thermosphere coupling at auroral to subauroral latitudes in the Scandinavian sector using multiple ground-based instruments and spacecraft. Coinciding with appearance of the pseudo breakup at 71-73 MLat at approximately 21 MLT, a red arc emerged at the ionospheric trough minimum located at 68 MLat (L?7.1). The ionospheric trough was scanned meridionally by the Swarm A and C spacecraft, and the measurements clearly showed an electron temperature peak (~15,000 K) at the trough minimum. We concluded that causality to produce the red arc was the heat flux transferred from the plasmapause similar to generation of the stable auroral red (SAR) arc. Different from the SAR arc, the red arc was found at the onset time. The red arc may represent a moment of SAR arc birth, which is generally masked by bright dynamic aurorae. The new feature is named the ephemeral auroral red (EAR) arc. Ion velocity measured by the Swarm A showed westward flow of about 1700 m/s in the trough but at the equator side slope and the flow speed at the trough minimum was almost 0 m/s. This suggests that the polarization electric field may not have been spatially uniform throughout the trough. A Dynasonde deployed at Tromsoe (67 MLat, which is located near the equatorward trough edge) measured westward turning of the F-region ion velocity at the pseudo breakup. The collocated Fabry-Perot interferometer (FPI, 630.0 nm) also detected westward wind acceleration following the ion velocity change with almost no delay but with some relative speed. For an approximately 20-min interval after the pseudo breakup, **Un**?**Vi** was negative, which suggests that the mechanical energy of the neutral particles was transferred to the plasma in the ionosphere, contributing to the Joule heating rate at a moment of sudden magnetospheric electric field change at the pseudo breakup. Here **Un** and **Vi** are the neutral wind and ion velocity, respectively. However, after this interval, **Un**?**Vi** turned to be positive. The Dynasonde-FPI comparison suggests that the thermospheric wind was prompt to respond to the substorm-induced ion velocity change even in the low plasma density trough, and that inertia of the neutral particle plays a partial role to generate the thermal energy.