Coordinated observations of pulsating aurora with multi-point high-speed optical measurements, EISCAT and ARASE/ERG satellite

Keisuke HOSOKAWA[(1)], Shin-Ichiro OYAMA[(3)], Yasunobu OGAWA[(2)], Yoshizumi MIYOSHI[(3)], Rei Kurita[(3)], Hiroshi MIYAOKA[(2)], Yoshimasa TANAKA[(2)], Satonori NOAZAWA[(3)], Mariko TERAMOTO[(3)], Kazuo SHIOKAWA[(3)], Takeshi SAKANOI[(4)] and Ryoichi FUJII[(4)]

(1) University of Electro-Communications, Chofugaoka 1-5-1, Chofu, Tokyo, 182-8585, JAPAN

(2) National Institute of Polar Research, Midoricho 10-3, Tachikawa, Tokyo, 190-0014, JAPAN

(3) Institute for Space-Earth Environmental Research (ISEE), Nagoya University
Furo-cho, Chikusa-ku, Nagoya, Aichi, 464-8601, JAPAN
(4) Tohoku University, Katahira 2-1-1, Aoba-ku, Sendai, Miyagi, 980-8577, JAPAN

(5) Research Organization of Information and Systems (ROIS), Toranomon 4-3-15, Minato-ku, Tokyo, 105-0001, JAPAN

Pulsating aurora (PsA) is one of the major types of aurora often seen in the lower latitude part of the auroral region in the morning side. The period of the main optical pulsation ranges from a few to a few tens of seconds, and PsA is almost always observed during the recovery phase of substorm. Recent coordinated satellite-ground observations of PsA indicated that the temporal variation of the main optical pulsation is closely associated with the intensity modulation of whistler mode chorus waves in the morning side magnetosphere because the intensities of the chorus waves and optical pulsation show similar temporal variation [e.g., Nishimura et al., 2010]. However, it is still under debate what process causes the precipitation of PsA electrons and what factor controls the period of optical pulsation.

To further associate the chorus intensity variation in the magnetosphere and optical pulsation in the ionosphere, we need to conduct simultaneous ground/satellite observations of PsA. For this purpose, we have installed 3 identical all-sky cameras (ASI) in the northern Scandinavia to observe PsA in a wide area. The cameras were installed into Tromsø in Norway, Sodankylä and Kevo in Finland. By employing highly-sensitive EMCCD cameras (Hamamatsu C9100-23B), we succeeded in capturing PsA with a temporal resolution of 100 Hz. The temporal resolution of the camera is sufficient for resolving the temporal variation of both the main pulsation (a few to a few tens of second) and internal modulation (~3 Hz). In March/April 2017, we plan to conduct campaign observations of PsA with these optical instruments and ARASE/ERG satellite. In the presentation, we introduce several examples of wide area observations of PsA by combining the three ASIs, and then report the results of possible simultaneous observations of PsA with the ASIs and ARASE/ERG satellite.