2010-2011 年冬期における EMCCD カメラを用いた パルセーティングオーロラの高速撮像観測計画

西山尚典[1]、坂野井健[1]、三好由純[2]、片岡龍峰[3]、八重樫あゆみ[1]、浅村和史[4]、岡野章一[1]
[1]東北大・理・惑星プラズマ大気
[2]名大 STE 研
[3]東工大
[4]宇宙科学研究所

Observation plan of pulsating auroras by high-speed imaging technique using an EMCCD camera in 2010/2011 winter campaign

Takanori Nishiyama[1], Takeshi Sakanoi[1], Yoshizumi Miyoshi[2], Ryuho Kataoka[3], Ayumi Yaegashi[1], Kazushi Asamura[4], Shoichi Okano[1]
[1]*Planetary Plasma and Atmospheric Research Center, Tohoku University*
[2]*Solar-Terrestrial Environment Laboratory, Nagoya University*
[3]*Interactive Research Center of Science, Tokyo Institute of Technology*
[4]*ISAS/JAXA*

Pulsating aurora is a phenomenon which shows periodic changes of emission intensity in the diffuse aurora. The emission is characterized by not sinusoidal change but pulsation, and its typical period is from a few seconds to a few tens of seconds [e.g., *Oguti et al*., 1981; *Yamamoto, 1988*]. Precipitating electrons which generate pulsating aurora were observed with 3 Hz modulations by rockets and low-altitude satellites and the energy ranges from a few keV to a few tens keV [*Sandahl et al*., 1980; *Sato et al*., 2004]. Since 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 the Earth's upper atmosphere by pitch angle scattering. Moreover, some simultaneous optical and VLF whistler mode wave observations have been carried out to demonstrate this idea [*Hansen and Scourfield*, 1990; *Tagirov et al*., 1998]. These studies suggested that appearance of auroral pulsations were related to VLF emission activity, however, one-to-one correspondence of order of a few hundred ms between auroral fine-scale structures with high temporal fluctuations and each element of VLF emission were not shown yet. The purpose of this study is to investigate the characteristic of temporal variations in pulsating auroras using a high-speed camera equipped with an Electron Multiplying CCD (EMCCD). We are planning a new observation that addresses especially pulsating auroras. The plan is to carry out simultaneous observations with three cameras (two EMCCD cameras and another camera for guiding), a photometer, a VLF receive system (100 kHz sampling) and an ELF magnetometer (1 kHz sampling). EMCCD camera takes an image at mainly 670.0 nm (N2 1st Positive Band) wavelength at intervals of 10 ms. The field of view is 48.9 × 48.9 degrees and the spatial resolutions equals to 1.6 km at altitude of 110 km (8 × 8 binning). The photometer consists of a Schmidt-Cassegrain telescope (F10.0, f2000mm), an interference filter at 670.0 nm, a photo counting head and a photo counting unit. Its field of view is 0.22 × 0.22 degrees and corresponding to 840 × 840 m at altitude of 110km. It is possible to observe pulsating auroras with a few kR by 1 kHz sampling.
The observation is going to be operated at Poker Flat Research Range (MLAT 66.77° MLON 262.97°) in Alaska between November, 2010 and March, 2011, and initial results of our observations will be reported in this presentation, if possible.

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