

Observation plan of pulsating aurora with a monochromatic camera on a rocket experiment

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To understand the small-scale variation of pulsating aurora and its cross-scale coupling to large-scale feature, we plan a S520 sounding rocket experiment to carry out the high-time resolution wave-particle measurements as well as optical imaging. This rocket experiment is characterized by the simultaneous measurement among plasma particle in the wide energy range up to more than 200 keV, VLF and high-frequency plasma waves, magnetic field, electron temperatures and monochromatic auroral image at the N2 1st positive band. Ground-based instruments, such as EISCAT radar, optical imager, and SuperDARN radar, will join this experiment. The rocket will be launched into pulsating auroras from Andoya, Norway during a new moon period in winter of 2017 to achieve the conjugate measurement with the ERG satellite. The launch window is 01-06 MLT, and the apex altitude of rocket will be more than 300 km in altitude. The total mass, electric power and data rate are estimated to be 48 kg, 110 W, and 3.1 Mbps, respectively.

We are developing a monochromatic camera for this project. The auroral imaging data at the N2 1st positive band (670 nm) is useful since the time response of N2 emission to the precipitating electrons is prompt, and its emission intensity is proposal to the total energy flux of electrons that cause the pulsating aurora. The optical and electrical designing is still in progress. At the present design, the field-of-view (FOV) is 45 degrees covering the ontological to downward directions, time resolution is several frame-per-second, and spatial resolution is 1 to a few km. Using successive image data in the vicinity of pulsating auroral emission layer, we expect to estimate the thickness of emission layer. In addition, we will achieve simultaneous image-particle measurement using the data when the FOV of camera is pointed to the magnetic footprint threading the rocket during the apex period. In this presentation, we give the current status of optical and electrical design of monochromatic camera, its detailed specifications and operation plan.

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