

Aurora seen by the REIMEI satellite

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The REIMEI (INDEX) satellite was launched successfully on 24 August 2005 by the Dnepr rocket from Baikonur Cosmodrome, Kazakhstan into a sun-synchronous polar orbit at an altitude of 610-670 km in 00:50-12:50 local time meridian. Though the REIMEI satellite is a micro-satellite launched as a piggy-back, on-orbit experiments of advanced satellite technologies and highly-specified science mission were planned. Those have been performed satisfactory for about six months after its launch, and at present the condition of REIMEI satellite is still good although the nominal life time is one month.

The purpose of science mission by the REIMEI satellite is to clarify auroral fine structures. High-time and high-spatial resolution observations of fine-scale aurora have been carried out by an auroral camera, auroral particle sensors, and a plasma current monitor onboard the REIMEI satellite. Auroral images at three different emissions of N2+ first negative band (427.8 nm), OI (557.7 nm) and N2 first positive band (670 nm) are simultaneously obtained by the auroral camera with typical spatial and time resolutions of 2 km and 120 ms, respectively. On the other hand, the energy-spectrum of auroral electrons and ions are measured by the particle sensors with a time resolution of 20 msec which corresponds to about 150 m considering the orbiting speed of satellite. Utilizing the three-axis attitude control system of the REIMEI satellite, unique measurements of auroral emissions and particles have been made so far. The casual relationship between auroral precipitating particles and emissions is obtained by pointing the field-of-view (FOV) of auroral camera toward the footprint of magnetic field line at satellite position. On the other hand, the height distribution and three-dimensional structure of auroral emissions are obtained by pointing the FOV of auroral camera toward the earth's limb.

In this talk, we will report the recent results of fine-auroral structures and their dynamical variations obtained from REIMEI satellite observations. Particularly, simultaneous image-particle observations of active discrete aurora, black aurora and the 'thin pulsating aurora' whose widths are about 5km in magnetic latitude and several tens km in magnetic longitude, respectively, will be presented.