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Auroral Particle Measurement with REIMEI Satellite

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REIMEI (formerly INDEX) satellite was launched in August, 2005, revolving a sun-synchronous (00:50-12:50LT) polar orbit with an altitude of ∼630km. The purpose of REIMEI mission is to investigate fine-scale structures of auroral arc emissions. Five scientific instruments are onboard REIMEI, which are auroral particle analyzers (ESA/ISA), a multi-spectral auroral camera (MAC), current probes (CRM), and magnetic field sensors (GAS). MAC was ready to make observations three weeks after launch, and then, ESA/ISA was available for routine operation after the end of October. All the scientific instruments are working well so far. REIMEI is three-axes stabilized satellite, since it carries auroral cemaras. However, still we need auroral particle measurement with wide pitch-angle coverage. Our solution is to use special attitude control of satellite, which can keep geomagnetic field directions within field-of-view of ESA/ISA. Then, observations with full pitch-angle coverage can be made almost all the cases, since ESA/ISA are top-hat type analyzers. Note that time resolution of ESA/ISA is determined only with internal energy scan, 20ms. Taking 7500m/s for satellite velocity, 20ms corresponds to ∼150m in distance. Coordinate observations with ground-based instruments are effective, since REIMEI is a low-altitude satellite. EISCAT raders can deduce vertical profiles of plasma parameters from lower ionosphere up to altitude of ∼1000km, including regions where REIMEI is flying. Therefore, direct comparisons between detailed energy spectra of auroral particles and estimated vertical profiles can be made. Results of auroral particle measurements with coordinated ground-based observations will be presented.