

A small-satellite mission `INDEX': Scientific instruments for exploring auroral fine-scale structures

Masafumi Hirahara[1]; Takeshi Sakanoi[2]; Kazushi Asamura[3]; Yasumasa Kasaba[4]; Atsushi Yamazaki[5]; Masaki Okada[6]; Masaki Ejiri[7]; Shoichi Okano[8]; Toshifumi Mukai[9]

[1] Dept. Phys., Rikkyo Univ.; [2] PPARC, Grad. School of Sci., Tohoku Univ.; [3] ISAS; [4] JAXA/ISAS; [5] Univ. of Electro-Communications; [6] National Institute of Polar Research; [7] NIPR; [8] PPARC, Tohoku Univ.; [9] ISAS/JAXA

The INDEX is the first Japanese micro-satellite mission for the exploration of fine auroral structures in the Earth's polar region, which is a piggyback payload launched by an H2A. The auroral phenomena are characterized by photon emissions over a wide wavelength range, associated with distinctive energy and pitch-angle distributions of electrons and ions, as reported from previous polar-orbiting satellite results. Three scientific instruments will be carried by the INDEX satellite into a sun-synchronous orbit in the meridian of 1030-2230 LT at an 800-km altitude. One is the multi-spectral auroral camera (MAC) with three channels of CCD and interference filter for obtaining monochromatic images of visible auroras. The second is the low-energy auroral particle instrument consisting of two top-hat type sensors: electron and ion energy spectrum analyzers (ESA/ISA). The other is the electric current monitor (CRM), based on the detection principle of the Langmuir probe. The most important scientific purpose of the INDEX mission is the observations performed by the high time and spatial resolutions of auroral emissions, particles, and plasma environment with fine scale of structures. The past ground-based observations of discrete auroral arcs have indicated that the visible arcs are composed of extremely thin curtains. On the other hand, no satellite observations have shown such fine auroral structures because of orbital properties and instrumental limitations. In this paper, we would like to introduce our novel scientific mission using a micro-satellite built by in-house techniques and also discuss several observational modes for more fruitful scientific results.