

Current Status of the FACTORS mission for the Space-Earth Coupling System Exploration

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The FACTORS mission opportunity has been investigated as the first Japanese multi-point space plasma exploration mission in a polar orbit of 400 km(perigee) to 4000 km(apogee) for integrated in-situ and remote-sensing observations in the space-Earth coupling system. We have been discussing the cutting-edge science goals, the state-of-the-art measurement methodologies with capabilities of high-time/spatial resolutions and direct evaluations on the energy transports between the plasma waves, and possibilities of international collaborations with the Swedish InnoSat program of the micro satellite series. We, here, present observation strategies and the current status of FACTORS.

The FACTORS mission consists of two identical compact satellites for realizing the formation flight configuration for the simultaneous multi-point observations by the adjacent satellites with their controllable separation distances of 1-50 km. In this mission, we focus on the demonstrative and quantitative investigations on the plasma acceleration/transport mechanisms and the electromagnetic coupling processes emerging in the terrestrial polar magnetosphere and ionosphere. In order to address these scientific targets, we apply some innovative measurement and operational approaches represented by identical six 5-m electric field antennas for three axial components, high time-resolution pitch-angle and gyro-phase captures of transversely accelerated ions, two-types of high-time/spatial resolving monochromatic auroral imaging cameras, and simultaneous multi-point observations with a satellite separation distance of 1 km at closest. While each FACTORS satellite carries a chemical propulsion system for large satellite orbit controls, the precise formation flight configuration could be kept by changing the satellite attitude which significantly affects the aerodynamics particularly near the perigee. These instrumentation and operation plans and developments are discussed in this presentation.

Keywords: multi-point simultaneous satellite observation, integrated satellite observation, formation flight observation, space-Earth coupling system