2012 Workshop: Swarm EFI Validation

Long title
Swarm Electric Field Instrument Validation Using Incoherent Scatter Radars
Conveners
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Description

The European Space Agency's three Swarm satellites are currently being prepared for launch in summer 2012. The Swarm satellites will fly in polar orbits at initial altitudes between 450 and 530 km. Each satellite will carry a precision vector (similar to CHAMP) and scalar magnetometer, and also an Electric Field Instrument (EFI) consisting of a Thermal Ion Imager (TII) capable of measuring thermal ion drift and temperature, and a pair of Langmuir probes to measure electron density, temperature, and spacecraft potential.

ESA is overseeing a campaign to validate the Level 1B data products. In the case of the EFI, L1B data products include vector electric field (from vxB), vector ion drift, ion and electron temperatures, and plasma density, all at a rate of 2 per second. The validation plan relies on the world-wide ISR network. At least one hundred good conjunctions are desired in the commissioning phase, in the first three months of the mission; additional conjunctions will be exploited whenever possible throughout the four-year science mission.

This workshop is a forum to discuss the resources and ISR operating modes needed to optimize the value of Swarm-ISR overflights. We hope to have at least one representative from the ESA project team provide an update and overview of the Swarm mission, and plan to have one or two presentations on the design, testing and operation of the EFI instrument.

Justification

Validated Swarm data products will make a significant contribution to the integrated data set on which CEDAR science is based. Swarm will extend point (or regional) ISR measurements around the globe with a latitudinal spatial resolution of 4 km. Swarm's magnetic measurements are designed for the study of fields originating

both internally and externally to the earth, and will be able to support system-level studies of the integrated earth-thermosphere-ionosphere-magnetosphere system. The combined electric and magnetic field measurements will produce measures of ITM energy transfer (though Poynting flux) with a resolution of 1 microWatt per square meter. In short, Swarm will be able to contribute to nearly all aspects of the CEDAR strategic initiative.

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