Magnetosphere–Ionosphere Coupling in the Auroral Region (M–ICAR)

Project Summary

The polar aurora is the most spectacular effect of the magnetosphere–ionosphere (M–I) coupling and of the solar–terrestrial interaction. Essentially, the M–I coupling is achieved by a superposition of DC and time-dependent field-aligned currents (FACs), with the time-dependent FACs carried typically by Alfvén waves. The FACs transfer energy and momentum in the auroral current circuit, from a collisionless generator region in the magnetosphere to the resistive polar ionosphere, where the energy is dissipated. A key element of the M–I coupling chain is the auroral acceleration region (AAR), a transient potential structure located at 1–2 Earth radii altitude, where electrons are energized to 1–10 keV. The central goal of M–ICAR is to investigate the DC and Alfvénic contributions to the M–I coupling during the substorm cycle, based on data from the multi-point Cluster and THEMIS missions, from low altitude satellites like FAST, DMSP, Reimei, and from ground based observatories. This goal is addressed by examining AAR events, by exploring the whole M–I system, and also by simulations. M–ICAR complements the POLARIS project, carried on at the International Space Science Institute, Bern, and contributes to the collaboration between the Institute for Space Sciences (ISS) Bucharest and Jacobs University Bremen. The project is executed by a team of six people from the Space Plasma and Magnetometry Group at ISS, two of whom are young scientists.

Keywords

auroral physics; field-aligned currents; Alfvén waves; substorms; auroral acceleration

Results

The results of the project, papers and presentations, are listed under the *Results* section of the web site. For specific information, beyond that presented on the site, the reader is invited to contact the project leader at the e-mail address provided under the *Team* section.