



Field-Aligned Currents in the Cusp: Research Opportunities with Swarm Mission

Yulia Bogdanova (1), Malcolm Dunlop (2,1), Chao Shen (3), Hermann Luhr (4), Patricia Ritter (4), Berndt Klecker (5), Andrew Fazakerley (6), and Jinbin Cao (2)

(1) RAL Space, Rutherford Appleton Laboratory, STFC, Harwell Oxford, Didcot, OX11 0QX, United Kingdom (yulia.bogdanova@stfc.ac.uk), (2) Space Science Institute, School of Astronautics, Beihang University, 100191, Beijing, China, (3) NSSC, CAS, PO Box 8701, Beijing 100190, China, (4) Helmholtz Centre Potsdam, GFZ German Research Centre for Geosciences, Behlerstrasse 3a, 14467 Potsdam, Germany, (5) Max-Planck-Institut für extraterrestrische Physik, Giessenbachstrasse 1, 85748 Garching, Germany, (6) Mullard Space Science Laboratory, University College London, Holmbury St. Mary, Dorking, Surrey, RH5 6NT, UK

Field-aligned currents (FACs) play a fundamental role in the solar wind energy and plasma transfer to the magnetosphere and ionosphere, and the spatial and temporal variations of various FAC systems are under active investigation. Here we present observations of the field-aligned currents in the mid-altitude cusp by 4 Cluster spacecraft and discuss their filamentary structure and variability for different IMF conditions and at different multi-spacecraft separation scales. In addition, we show and analyse an event with the cusp field-aligned currents observed by CHAMP as an example of future FAC observations from the Swarm mission. We then discuss the opportunities for studying cusp field-aligned currents using the data coming from Swarm mission, which will provide multi-point measurements of the magnetic field and plasma at low polar orbit. We will consider how such observations can enhance our knowledge of filamentary structure and time variability of cusp field-aligned currents and what type of conjunctions between Cluster and Swarm would facilitate research into the cusp and Region 1 current systems.