Geophysical Research Abstracts, Vol. 9, 09107, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-09107

Auroral electrodynamics on arc and oval scales: Insights from a new technique

O. Marghitu (1,2), T. Karlsson (3) and B. Klecker (2)

(1) Institute for Space Sciences, Bucharest, Romania
(2) Max-Planck-Institut für extraterrestrische Physik, Garching, Germany
(3) Alfvén Laboratory, Royal Institute of Technology, Stockholm, Sweden
(Contact: marghitu@venus.nipne.ro)

Basic features of the auroral oval, on the large scale, and of the auroral arc, on medium to small scales, can be understood with a highly idealized model, where the oval or arc is assumed to be a stripe of uniformly enhanced conductance, associated with a specific system of currents. Field-aligned currents (FACs) in and out of the ionosphere are connected across the oval/arc through Pedersen current, while a divergence free electrojet flows in azimuthal direction as Hall current. Most of the time, however, the experimental data show a complicated interplay between the ionospheric conductance, electric field, and current, which points to the need for more realistic models. In order to take full advantage of the measured data we developed the ALADYN method, originally designed for the higher conductance regions close to and within the arc. Here we present the extension of this technique to downward current regions, both on large and smaller scales. The application of ALADYN to synthetic data enables the investigation of key oval features, like the relative location of the electric field (and plasma convection) reversal with respect to the FAC boundaries. By using ALADYN with arc related satellite data, we are able to examine the consistency of the results and evaluate the deviation of the real arc from the idealized model.