Geophysical Research Abstracts, Vol. 9, 10394, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-10394

A local-to-global view of the plasma sheet: bringing together in situ measurements, remote sensing, and modelling

J.-M. Jahn (1), A, Korth (2), M. Liemohn (3), M. Samara (1), and H. A. Elliott (1)

(1) Southwest Research Institute, San Antonio, TX 78253, U.S.A. (jjahn@swri.edu/Fax: +1-210-520-9935), (2) Max-Planck-Institute for Solar System Research, Katlenburg-Lindau, Germany, (3) University of Michigan, Ann Arbor, MI 48109, U.S.A.

Occupying the near equatorial region of Earth's magnetotail, the plasma sheet partakes in the storage and release of magnetospheric energy, transporting plasma and magnetic flux into the inner magnetosphere. Over the years, individual spacecraft have been probing Earth's magnetotail, collecting valuable data on the plasma sheet. In parallel, increasingly sophisticated models covering plasma sheet physics are being developed. Nonetheless, when we compare these efforts to the inner magnetosphere, the plasma sheet remains relatively under-sampled. This leads to a lack of experimental knowledge across a range of scale sizes, and to less than optimal interplay between data analysis and modeling. This becomes perhaps most apparent when we consider the departure from average (quiet time) properties during substorms and especially geomagnetic storms. The transport of energy, mass and momentum intensifies significantly, and the storm-time supply chain of plasma into the plasma sheet is often altered in favor of the ionosphere as major particle source. Based on data from recent missions (esp. Cluster, IMAGE) we discuss the current state of affair in plasma sheet research under quiet and disturbed conditions. We will argue that we may not only need a "Cross-Scale"-type mission to regionally observe relevant plasma processes and their spatial evolution/extent. We should also perform global observations of the plasma sheet to make connection between local processes and their impact on the whole magnetospheric system on a per-event basis. This could be achieved with a constellation of many spacecraft covering the tail region. However, we will argue that remote sensing using energetic neutral atom observations could be an alternative avenue to overcome the lack of global plasma sheet observations.