Geophysical Research Abstracts, Vol. 9, 01962, 2007
SRef-ID: 1607-7962/gra/EGU2007-A-01962

The Cross-Scale mission

W. Baumjohann (1), S. Schwartz (2) and the Cross-Scale Team
(1) IWF/ÖAW, Graz, Austria, (2) IC, London, UK (baumjohann@oeaw.ac.at)

Collisionless space plasmas exhibit complex behavior on many scales. Fortunately, one can identify a small number of processes and phenomena, essentially shocks, reconnection and turbulence that play a predominant role in its dynamics. These processes act to transfer energy between locations, scales and modes, a transfer characterized by variability and three-dimensional structure on at least three scales: electron kinetic, ion kinetic and fluid scale. The nonlinear interaction between physical processes at these scales is the key to understanding these phenomena. Current and upcoming multi-spacecraft missions such as Cluster, THEMIS, and MMS only study three-dimensional variations on one scale at any given time, but one needs to measure the three scales simultaneously to understand the energy transfer processes and the coupling and interaction between the different scales. A mission called Cross-Scale would comprise three nested groups, each consisting of up to four spacecraft. Each group would have a different spacecraft separation, at approximately the electron and ion gyro radii, and at the larger magnetohydrodynamic or fluid scale. One would therefore be able to measure simultaneously variations on all three important physical scales, for the first time. With the spacecraft traversing key regions of near-Earth space, namely solar wind, bow shock, magnetosheath, magnetopause and magnetotail, all three aforementioned processes can be studied.