



Electron density estimation in the Earth's magnetotail by cross-calibrating different plasma experiments of the Cluster mission

A. Masson (1), P. Décréau (2), A. Fazakerley (3), M. André (4), H. Laakso (1), A. Rochel (2), P. Escoubet (1), M.G.G.T. Taylor (1), A. Asnes (1)

(1) RSSD of ESA, ESTEC, The Netherlands, (2) LPCE, CNRS and Université d'Orléans, Orléans, France, (3) MSSL, University College, London, UK, (4) IRF, Uppsala, Sweden.

The four spacecraft of the ESA/NASA Cluster mission were launched in summer 2000 and put into a polar orbit with a perigee at 4 Earth radii (R_E) and a line of apsides around the ecliptic plane. To date there have been 6 magnetotail seasons of around 4 months duration in which the spacecraft apogee has precessed across the magnetotail at a geocentric distance of about 20 R_E . The plasma density in the vicinity of the tail is a difficult parameter to derive as plasma are tenuous. The Cluster satellites carry five instruments (CIS, EFW, PEACE, WBD, WHISPER) that provide information about the local electron and ion density. This study focuses on the derivation of high time resolution (4 s) electron density time series using active soundings of the WHISPER relaxation sounder (104 s time resolution in normal mode), the spacecraft potential measured by the EFW electric field instrument and the electron density estimation derived from the PEACE electron experiment. A new procedure to calibrate the spacecraft potential based on active soundings and numerical simulations in the 1-100 eV will be presented. First results of a statistical approach to calibrate the EFW spacecraft potential depending on the electron temperature estimated by PEACE will also be detailed.