The structure and dynamics of electromagnetic energy flow in the plasma sheet during major geomagnetic storms

J. R. Wygant
School of Physics and Astronomy, University of Minnesota

Cluster and Polar spacecraft measurements have been used to investigate intervals of strong Poynting flux in the tail during strong geomagnetic storms. Almost every interval of plasma sheet expansion encountered during major geomagnetic storms is associated with a 5-20 minute interval of Poynting flux directed Earthward with magnitudes of .01 to .5 ergs/cm^{2}s (or >30 ergs/cm^{2}s if mapped to 100km altitude). These observations indicate there is a layer of Poynting flux directed towards the Earth, which coincides with the outer boundary of the plasma sheet and extends from the immediate vicinity of the reconnection line all the way to the auroral acceleration region. This layer has now been encountered by Cluster near the reconnection line at ~18 Re; at 9.2 Re in the high beta plasma sheet near Polar apogee; and, at 4-7 Re in the low beta plasma immediately above the auroral acceleration region during Polar passes through the PSBL We will compare the properties of the waves during these intervals of strong Poynting flux to the measurements of electron and ion flows, kinetic energy flux, and distribution functions in order to understand the processes involved in energy transport and particle acceleration in the tail.