

Observations and Simulations of Electron Dynamics Near an Active Neutral Line

M. L. Goldstein, Kyoung-Joo Hwang, Maha Ashour-Abdalla, Mostafa El-Aloui, David Schriver, Robert Richard, Meng Zhou and Ray Walker

Recent observations in the Earth's magnetotail have shown rapid increases in the fluxes of energetic electrons with energies up to 100's of keV associated with dipolarization fronts that propagate into the inner magnetosphere. On August 15, 2001 the four Cluster spacecraft located slightly dawnward of midnight (yGSM \sim -5.4RE) at xGSM \sim -18RE observed a series of earthward propagating dipolarization fronts [Hwang et al., 2010]. At least 6 dipolarization fronts were observed in a 20m interval. Unlike previously reported cases the fluxes of electrons up to 95keV decreased during the passage of the first three fronts over the spacecraft. The energetic electron fluxes increased during the passage of the last three fronts. We have performed a global magnetohydrodynamic simulation of this event using solar wind observations from the ACE satellite to drive the simulation. In the simulation a very complex reconnection system in the near-Earth tail at XGSM \sim -20RE launched a series of earthward propagating dipolarization fronts that are similar to those observed on Cluster. The simulation results indicate that the Cluster spacecraft were just earthward of the reconnection site. In this paper we will present a study of the dynamics of electrons associated with these events by using the large-scale kinetic simulation approach in which we launch a large number of electrons into the electric and magnetic fields from this simulation.