



Electron beams observed before and right at the dipolarization front

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Strong field-aligned pitch angle distribution of electron beams are observed before the dipolarization front (DF) when the THEMIS satellites are traveling in the plasma sheet. The observed electrons with fluxes peak at around 300eV-800eV when the plasma showing an increase of bulk velocity about $>100\text{km/s}$. These beams bi-directional, with flux in one direction greater than that of the other, and the electrons are cold, with temperature changing slightly with time and position. Right at the front, cold electrons beams, providing field-aligned current, are observed at 15 RE in the plasma sheet by four Cluster satellites are nearly identical to those commonly observed at aurora altitudes, suggesting the electron beams are aurora electrons accelerated upward by electric fields parallel to the geomagnetic field. The beams and the current carried by them are strong enough to satisfy the Bohm criteria to initiate current driven instabilities. It is strongly suggested that electrons from the ionosphere may play an important role during the dissipation of energy in the earth tail.