



Evidence for frozen-in breakdown in the central plasma sheet during substorms observed by THEMIS

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In this work, we have investigated a number of substorm events during major conjunctions of the THEMIS spacecraft for the tail seasons of the mission. We present simultaneous plasma, magnetic field and wave activity observations from various instruments onboard the THEMIS spacecraft during the events. We focus particularly on events when at least one of the THEMIS spacecraft is found to be adjacent to the neutral sheet where convective plasma flows are observed. In order to shed light on the mechanism triggering near-Earth dipolarization we have examined whether these substorm events show evidence of Earthward high speed plasma flows accompanied with intense wave activity prior to dipolarization signatures. We present clear cases where earthward convective flows are well correlated with abrupt thinning, expansion of the plasma sheet and intense wave activity. During these events we expect that some kind of plasma instability occurs in the central plasma sheet intimately related to the observed wave activity. For this reason we investigate whether a breakdown of the frozen-in condition is observed in order to get a clearer view of the relationship between earthward convective flows, particle non-adiabaticity, wave activity, cross-tail current disruption and magnetic field dipolarization.