



Low-altitude electron acceleration due to multiple flow-bursts in the magnetotail

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We present near-conjugate observations of Cluster and THEMIS on Feb. 25, 2008 around 10 UT when multiple flow bursts with ion velocities up to 800 km/s are observed in the magnetotail by THEMIS at the time of a large-scale dipolarization. THEMIS observed three pulses of flows with vortex signatures indicating flow shear at the dusk side of a localized flow burst. The flow burst amplitudes decay successively as typically observed during the oscillatory flow braking. At lower altitudes, Cluster 1 shows bursts of low-energy, counter-streaming electrons with a broad energy distribution, and a narrow pitch-angle distribution, coinciding in time with the multiple flow-bursts in the tail. This type of electron distribution has been associated with acceleration and modulation by Alfvén waves. We propose that episodes of the enhanced low-energy electrons are due to kinetic Alfvén waves launched from the flow. Such relationships between the waves and fast flows has been established in recent studies based on observations of magnetotail and ground signatures. The unique conjugate observations with Cluster and THEMIS presented here not only support these findings but also provide the first direct observation of the effects of multiple fast flows on the near-Earth magnetospheric plasma in the high-altitude auroral region.