



Ionospheric signatures during a magnetotail flux rope event

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On 13 Aug 2002, during a substorm, Cluster observed four successive fast flows in the central magnetotail. The first event at $\sim 23:00$ UT and the second one at $\sim 23:07$ UT took place during the expansion phase of the substorm, the third one at $\sim 23:15$ UT and the fourth one at $\sim 23:22$ UT during the recovery phase. Preceding the first and the third event by about one minute, a flux rope-like signature was observed. In the conjugate ionospheric region in Northern Scandinavia, the ionospheric equivalent currents were observed by the MIRACLE network. The ionospheric electron densities and electric fields were measured by the EISCAT radar along a meridional scanning profile, and the auroral evolution was observed by the Wideband Imaging Camera (WIC) on-board the IMAGE satellite. Continuing the study of Amm et al. (2006), we examine the substorm evolution and possible ionospheric signatures associated with the flux ropes and the fast flows. Amm et al. examined the first event in detail and found that the ionospheric footprints of Cluster coincided with a region of reduced auroral emission, reduced conductances and downward field-aligned current. They speculated that this region of downward current, together with a trailing region of upward current further southwestward, might correspond to the ends of the flux rope. Following the detection of each fast flow at Cluster, we observe an intensification of an ionospheric, north-south directed flow channel. Unlike in the first event, however, we do not see any clear ionospheric features associated with the flux rope-like signature

of the third event. To determine the differences between these two events, particle data from Cluster is used.