



Field-aligned current signatures during auroral activations of Feb. 16, 0220 UT substorm

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Two auroral activations with poleward/equatorward expansion were observed starting around 0216 UT and 0243 UT on 16 Feb 2008, when the five THEMIS spacecraft were distributed in the premidnight to midnight (22-24 MLT) region between 8 and 18 RE downtail. We compare and contrast the possible field-aligned current signatures associated with dipolarization accompanied by Earthward flows observed at the THD(P3) and THE(P4) spacecraft in the premidnight sector at downtail distances between 8 and 9 RE by referring also to the mid-tail spacecraft, THC(P2) and THB(P1), which provide information on the current sheet configuration. Both dipolarization events started from the tailward side, THD(P3), but had quite different profiles in the magnetic shear components relevant to the field aligned current, as well as in the magnetotail current sheet configuration and auroral signatures. The 0216 UT event occurred in a thinner near-Earth current sheet condition and THD(P3) and THE(P4) detected dipolarization accompanied by fast flows and enhanced shear in the magnetic field, while conjugate ground signatures suggest development of a slant North-south aligned aurora, east of a small surge. During the 0243 UT event, X-line signatures at a midtail thin current sheet were observed, followed by a large-scale plasma sheet expansion and the associated auroral activation took place more poleward. Dipolarization was again observed at THD(P3) and THE(P4) but accompanied by less significant shear component and delay in the fast flow signatures compared to the magnetic signatures. We discuss these two different dipolarization/field aligned current signatures in terms of different stages of the fast flows interacting with the ambient field in a different configuration of the tail current sheet.