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# Investigation of the characteristics of the dipolarization region with THEMIS data (II)

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Taking an advantage of THEMIS/All-Sky Imager (ASI) observations with high time resolution (typically 3 sec), we performed the superposed epoch analysis on the evolution of the Earth's magnetotail with THEMIS probe data. In this study, we focus on the progress of the dipolarization and low frequency electromagnetic turbulence closely associated with the current disruption. Practically, the standard deviations of the magnetic field data with the time window of 1 min were obtained.

By investigating the location and timing of the enhancements of standard deviations for three components of the magnetic field, we found that the first variation occurs at X ˜ -10 Re. Interestingly, the enhancement starts near the lobe-side boundary of the near-Earth plasma sheet, and it rapidly propagates earthward. It was also found that the earthward flows start simultaneously with the enhancement of the magnetic field variations about 20 sec before the substorm onset that was determined by auroral breakup with ASI data. The tailward flows whose velocities are less that those of the earthward flows start at the same time. The region of flow enhancement expands in an earthward direction synchronized with the enhancement of magnetic field variations.

Prior to these variations, convective earthward flows reach the very thin plasma sheet at X ˜ -12 Re, and further proceeds earthward. The convective flows originally accompany large magnetic field variations, but they seem to trigger the occurrence of considerable enhancement of the magnetic field fluctuations associated with the current disruption. Those statistical features support the outside-in model for substorm triggering.

Keywords: magnetosphere, aurora, substorm, current disruption, THEMIS