

PEM027-P15

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Coordinated observations of PBIs and reconnection signatures in the magnetotail: THEMIS case studies

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Poleward boundary intensifications (PBIs) are nightside auroral disturbances at the poleward boundary of the auroral oval and have been suggested to be the manifestation of nightside reconnection. However, there have been no simultaneous observations of PBIs and nightside reconnection, so that the association between PBIs and the formation of the near-Earth neutral line (NENL: $X \sim -20$ to -30 Re) and distant neutral line (DNL: $X \sim -100$ Re) is still unclear.

We have performed coordinated observation of PBIs and nightside reconnection, using the THEMIS all-sky imagers (ASIs) and outer spacecraft (THEMIS B and C). In the present study, we present two case studies on 23 February 2009 and 10 March 2010. We focused on enhancements of PBIs in the ionosphere along with fast tailward flows in the magnetotail that were suggested to be originated from the NENL.

On 23 February 2009, THEMIS B and C were located at $X \sim -17$ and -23 Re, respectively. In this event, pseudobreakup occurred ~ 7 min after the PBI enhancements. Both spacecraft observed fast tailward flows associated with enhancements of the PBI. It suggests that the enhancements of the PBI were closely associated with the formation of the NENL. We found multiple bipolar signatures in the north-south component of a magnetic field during fast tailward flows. The signatures had a few min periods and were associated with periodic enhancements of the PBI. We suggested that the bipolar signatures of B_z represented successive plasmoid releases from a single NENL.

On 10 March 2010, THEMIS C was located at $X \sim -50$ Re in the magnetotail, when enhancements of PBIs were detected in the field of view of ASIs. In this event, a substorm was identified at $\sim 06:17$ UT. 20-60 min prior to the onset, enhancements of PBIs were associated with fast earthward flows at $X \sim -50$ RE, which were suggested to be originated from the DNL. On the other hand, enhancements of PBIs several min before the onset were associated with plasmoid ejection from the NENL. These results suggested that both NENL and DNL could be the manifestation of PBIs.

Keywords: substorm, reconnection, aurora, poleward boundary intensification, fast flow