

多重サブストーム時の磁気圏尾部リコネクション：テミス衛星による観測例 Tailward leap of magnetic reconnection: A THEMIS case study

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A multiple-onset substorm is studied using observations of aurora and the magnetotail. Four successive auroral brightenings were identified in all-sky images roughly every 10 minutes starting at 0219 UT on 27 March 2009. The first brightening was "initial brightening" while other brightenings were auroral breakups. Corresponding reconnection signatures are studied using THEMIS satellites observations between 8 and 24 Re down the tail. At the time of the initial brightening, no fast plasma flows were observed by THEMIS satellites. It is thus unclear whether reconnection is involved in the initial brightening from a classical point of view. An auroral breakup occurred 6 min later and was accompanied by a tailward fast flow observed THEMIS-1 satellite at 24 Re down the magnetotail. This breakup is thus associated with reconnection in the tail as previously reported.

Another auroral breakup occurred 12 min further later at a latitude higher than the previous breakup. At the same time a change of the flow direction from tailward flow to earthward flow was observed by the THEMIS-1 satellite. This flow reversal is often interpreted as the tailward retreat of a single magnetic reconnection site. However, another THEMIS satellite located 5 Re earthward from THEMIS-1 observed the earthward flow 1 min later. Thus, the observed sequence rather corresponds to a tailward leap of the reconnection site. We suggest that the poleward leap of auroral breakup is associated with the tailward leap of reconnection site as a consequence of the magnetic flux pileup in the dipolarization region.

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