

## Longitudinal association between magnetotail reconnection and auroral breakup based on Geotail and Polar observations

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The dawn-dusk locations of reconnection in the near-earth magnetotail at the time of auroral breakup are studied to clarify whether breakup is always accompanied by reconnection. The near-earth reconnection is identified by tailward plasma flows faster than 200 km/s with southward magnetic field in the plasma sheet. We first identified 66 isolated auroral breakups in the Polar ultraviolet imager observations of the night-side polar ionosphere. We then calculated the occurrence rates of tailward flows during breakups using Geotail in-situ observations of the plasma sheet between 25 and 31 Re down the tail and within 15 Re of the tail axis.

It was found that tailward flows tended to be observed on the dusk side for dusk-side breakups, and near midnight for midnight breakups, indicating that tailward flow occurs in the dawn-dusk (Y) location associated with breakup magnetic local time (MLT). The correlation coefficient between breakup MLTs and the Y locations of relatively fast (faster than 400 km/s) tailward flows was 0.8, with a regression line of  $Y_{\text{gsm}} = -5.7 \times \text{MLT} - 3.6 \text{ Re}$ . Most tailward flows were observed within 5 Re of the modeled Y locations, where tailward flows occurred in 88 % of the 26 cases of breakups between 22 and 0 MLT. It is thus inferred that in most cases breakup is accompanied by tailward flow near the breakup MLT with its dawn-dusk dimension  $\sim 10 \text{ Re}$ .

There were only two events without tailward flows in the region where flows have been expected. These two events were an earthward flow event and a traveling compression region event, which are not inconsistent with the initiation of the near-earth reconnection. Auroral breakup is thus likely to always be accompanied by near-earth reconnection near breakup-MLT. It is also inferred that reconnection and breakup occur simultaneously within a few min, assuming a time delay between reconnection onset and the arrival of tailward flows at satellite locations.