Observations of Flux Transfer Events: Transient and patchy reconnection at the magnetopause

Hideaki Kawano[1]; Christopher T. Russell[2]

[1] Earth and Planetary Sci., Kyushu Univ.; [2] IGPP/UCLA

Flux transfer events (FTEs) are transient phenomena observed near the magnetopause, characterized by bipolar perturbations in the magnetic field component perpendicular to the magnetopause (Bn). FTEs are generally thought to be the results of transient reconnection at the magnetopause.

In this paper we address the direction of motion of FTEs, which is difficult with one satellite, by statistically analyzing FTEs simultaneously observed by ISEE-1 and ISEE-2 satellites, which made observations for continuous ten years (1978-1987). Two-point observation does not completely resolve the direction of motion; we cover it by large-scale statistics (634 events) of the ten-years data of ISEE.

For each FTE we have determined the time lag from ISEE-1 to ISEE-2 as that which maximizes the cross-correlation function between Bn's at ISEE-1 and ISEE-2.

This time lag has a significant correlation with the longitudinal distance between the two satellites, consistent with east-west motions away from the subsolar point. The time lag shows a weaker correlation with the latitudinal distance. The significant east-west motion suggests that FTEs in nature are likely to have a structure whose longitudinal scale is shorter than its latitudinal scale. In other words, flux rope structure, caused by patchy reconnection, is more consistent with the observations than a long-X-line type structure.