Self-orgaized criticalty of magnetotail

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We have been studying statistics of a dynamical system which models multi-scale magnetic reconnections, from the viewpoint of the self-organized criticality.

Onto a neutral sheet, a perturbation current is added at a randomly chosen site, and if the current at any site exceeds a certain threshold, we diverge it into adjacent paths (micro-reconnection). In many cases, the system settles after a single reconnection, but sometimes the reconnection continues to occur (an avalanche).

By repeating the addition of the noise and successive relaxations, we study spatial and temporal statistics of avalanches, and percolation statistics of magnetic island.