The Relations Between Field-aligned Currents in Plasma Sheet Boundary Layers and Geomagnetic Activity–clusterii Observation

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Field-aligned currents (FACs) density increases with the polar cap potential drop, and Kp index are also correlated with the polar cap potential drop. Some people studied the relationship between the FACs intensity and the Kp index with low altitude satellite data or radar data. In our paper, we have studied the relations between FACs and Kp index in the plasma sheet boundary layer (PSBL) with four ClusterII satellites observations. The trajectory and magnetic field data of ClusterII enable us to conduct a more comprehensive and systematic survey than former work base on one or two satellites data, because we can compute FACs density directly. This paper analyzes 172 FACs cases when the Cluster satellites crossed the PSBL in the magnetotail from July to October 2001. According to the data, the relationship between the variations of FACs and Kp index turned out to be: 1) The FACs occurrence rate will be higher if the geomagnetic activity Kp index is higher. 2) The density of FACs and Kp index have a close correlation. FACs density increase monotonically with Kp index but it is nonlinear. 3) By comparing Kp index with AE index (Because AE and Kp index are both correlated with the polar cap potential drop.), we confirmed that the density of FACs has more close correlation with Kp index.

Keywords: plasma sheet boundary layer; field-aligned currents; geomagnetic activity.

References

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