

Field-Aligned Current Monitoring with CPMN

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It is important in magnetospheric physics and space weather to continuously monitor Field-Aligned Currents (FACs). We have examined the relationship between the FAC intensity obtained by DMSP satellites and the ground magnetic field observed by CPMN (Circum-polar Pacific Magnetometer Network) in order to monitor the FAC from the ground, and the result is promising, as follows.

We have used the summary database of DMSP constructed by Higuchi and Ohtani (2000) to automatically identify FACs in the DMSP data. The time resolution of CPMN is 1s and it is expected that we can more continuously observe FACs than satellite observations, which observe FACs per several 10 minutes (orbital periods of the satellites) if we can monitor FACs using the CPMN data. CPMN covers the 210 degrees magnetic meridian, and we have analyzed events for which DMSP passed over the 210 degrees magnetic meridian. Such events were mostly located in the evening MLT sector, due to the orbital parameters of DMSP.

The results of the analysis are as follows. When FAC has a two-sheet structure that consists of Region 1 (R1) and Region 2 (R2) in evening MLT sector, the H component of ground magnetic field have a positive peak in the latitude-series plot. This positive peak is thought to be created by an eastward Hall current associated with the R1-R2 FAC. The FAC intensity has a correlation with the height of this positive peak. In addition, the correlation between the R2 intensity and the height of the peak is larger than that for R1. It deserves to be stressed here that we can calculate the FAC intensity from the ground magnetic field by using this regression line. In this paper, we present, as an initial test, time-series plot of the R2 intensity calculated from the ground magnetic field using the above result. In the future, we will be able to continuously monitor FACs and in real-time through further development of this method.