

Relationships between parallel fast flows and nightside auroral activities

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Abstract

In this study, we investigate relationships between nightside auroral activities and parallel fast flows in the plasma sheet. We first identify fast flow events from Geotail data using a criterion of $|V_{//X}| > 300$ km/s, where $V_{//X}$ is the X component of ion velocity parallel to the ambient magnetic fields. Then we quantitatively estimate auroral power rate of change over a region of $60\text{--}80^\circ$ MLAT and 2000–0400 MLT for each of the Polar Ultraviolet Imager auroral images. It is found that almost all the auroral power rate of change do not increase significantly, which indicates all the parallel fast flows do not have a significant association with nightside auroral activities. It is also found that the auroral power rate of change is independent of the radial distance in the noon-midnight meridian. We interpret the result as the energy of electron particles scattered into the loss cone inside the electron acceleration region, which were not sufficient to create a significant auroral power of change.