

Mass transport from magnetotail to geosynchronous orbit by fast flows

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Understanding transport processes of plasma in the magnetotail is a fundamental and important problem of magnetospheric physics. From simultaneous multipoint observations by THEMIS, Geotail, and LANL satellites on 12 November 2007, it is suggested that dense ions in the midnight plasma sheet are pushed into inner magnetosphere by fast plasma flows. These dense ions may have moved from dawnside after the southward turning of the interplanetary magnetic field (IMF) followed by prolonged northward IMF.

In order to investigate effects of mass transport by fast flows on the inner magnetosphere, statistical studies have been conducted using the data obtained from Geotail and LANL satellites. We selected intervals when Geotail observed the plasma sheet and a LANL satellite observed geosynchronous orbit (GEO) simultaneously after the IMF southward turning followed by extended northward IMF. We investigated the characteristics of enhancement of the ion density at GEO, classifying events in terms of the presence/absence of the fast flows. It is found that the events associated with fast flows account for about 30% of the events showing the ion density enhancement at GEO. This indicates that fast flows play an important role in transport of plasmas. Additionally, a larger decrease in ion temperature associated with the ion density enhancement at GEO is seen in the fast flow events. We will discuss how plasmas are heated during transportation.