

Plasma Characteristics within Three Type Structures of dayside Magnetopause Current Layer under Northward and Southward IMF

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It is widely known that hot and cold plasmas (ion and electron) originated from both magnetosphere and magnetosheath are mixing within more inner region of dayside magnetopause current layer (MPCL) (e.g. LLBL). However, process that these plasmas are penetrated into the LLBL before mixing within LLBL is not clear. Moreover, the aspect that the plasmas within the dayside MPCL are transported towards the magnetosphere also does not evidence. Then, using 61 plasma energy - time spectrograms (E-t diagram) when GEOTAIL was crossing the dayside MPCL during 1.5 years from August 1995 to February 1997, we categorized them into three plasma structures by penetration patterns of cold plasma originated from the magnetosheath into LLBL. Before categorizing data, we defined the criteria of the typical plasma energy (temperature) ranges of both ion (T_i) and electron (T_e) in the magnetosheath and magnetosphere. Moreover, when population more than 30 Counts/Samples of both ion and electron from the magnetosheath was observed in LLBL on E-t diagram, we identified that the magnetosheath cold plasmas were penetrating into LLBL (magnetosphere). Under these criteria, collected 61 samples are categorized into three plasma structures (Type-I, -II and -III).

In addition, using the magnetic field and plasma moment data during same term when E-t diagrams were collected, we examined how the plasma (ion) was transported within three type dayside MPCL and whether aspects of plasma transport really vary due to the IMF B_z orientation.

As this results, regardless of the IMF orientation, within the dawn side MPCL, the low energy plasma from magnetosheath was almost transported from dawnward to tailward. On the other side, plasma from the magnetosheath was almost transported from duskward to tailward within dusk side MPCL. This result indicates that the magnetic reconnection under southward and northward IMF at the dayside MPCL plays an important role for the transport of plasma within the dayside MPCL. Moreover, it was found that these three types of dayside MPCL plasma structure are formed by the difference of scale of both temporal and space of the magnetic reconnection.