

Electric current evolution associated with the magnetic dipolarization observed by Arase (ERG) in the inner magnetosphere

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At the substorm the cross-tail current in the plasma sheet is disrupted and diverges to the field-aligned current. The current disruption is closely related to the change of the magnetic field configuration, i.e., magnetic dipolarization. Meanwhile the field-aligned current flows into the ionosphere and very possibly associated with the auroral illumination. The dynamic change of the magnetic field configuration associated with the dipolarization propagates toward the low altitudes by the magneto-hydrodynamic (MHD) waves, which are confined in flux tubes as we have showed in previous presentations. The same MHD waves should work to establish the field-aligned current flowing between the magnetic equator region and ionosphere.

The electric current configuration associated with the substorm has been studied mainly by the data from geosynchronous orbit satellites. We are studying the current evolution associated with substorm events at smaller L values observed by Arase (ERG) and its dismissal. The development of the field-aligned current is expected to affect not only the ionospheric plasma but also the energetic plasma in the inner magnetosphere. It could be most effective in the transient period of the magnetic dipolarization by the inductive effect. The plasma measurement data from Arase are examined to recognize the carrier of the field-aligned current.

In the presentation, we will show several events of the substorm and associated dipolarization events observed by Arase. We discuss the process to establish the field-aligned current closure, as well as its contribution to the energetic plasma in the inner magnetosphere.