

R006-02

Zoom meeting B : 11/1 AM1 (9:00-10:30)

9:30~9:45

Region 1 沿磁力線電流の生成領域

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Generation regions of Region 1 field-aligned currents

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We investigated the generation regions of the Region 1 field-aligned currents (FACs) by using the global magnetohydrodynamics (MHD) simulation. Unlike conventional means, we considered Alfvén and convective transit time by tracing a packet backward in time from the ionosphere to the solar wind. Two potential regions are identified for the generation of the Region 1 FACs. One is located near the (low-latitude) magnetopause (G1), and the other is in the (high-latitude) bow shock (G2). In these regions, plasma performs negative work against the magnetic tension force and the divergence of FACs is non-zero. Interestingly, these regions are far from the original magnetic field line because of relatively slow Alfvén speed in the outer magnetosphere and beyond. G2 can be on the magnetic field lines detached from the Earth. As the packet proceeds in the magnetosheath, the field line extending from the packet experienced reconnection with Earth's field line. Immediately after the reconnection, the packet enters the region (G1) where plasma performs negative work against the magnetic tension force. That is, plasma originating in the solar wind pulls lobe magnetic field lines. Large part of the FACs are canceled just inside G1, where the plasma performs positive work against the tension force. That is, the magnetic field lines pull lobe plasma. The remnant of the FACs propagates to the ionosphere. Since the contribution from G2 is negligible, it is concluded that the flank magnetopause (G1) is the major region for the generation of the Region 1 FACs. We discuss the relation between the generation of FACs, configuration of the magnetic field, and energy conversion.