

Origin of the interplanetary magnetic field B_y -controlled field-aligned current systems on the dayside

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It is well accepted that the field-aligned current systems (FACs) on the dayside are controlled by the dawn-dusk (B_y) component of the interplanetary magnetic field (IMF). We here describe the FAC systems for southward IMF. During IMF B_y -dominated periods, there appears a pair of FAC sheets in the midday sector. When IMF B_y is positive, in the Northern Hemisphere, the equatorward current flows into the ionosphere while the poleward current flows away from the ionosphere. The flow directions are opposite in the Southern Hemisphere. When IMF B_y is negative, the above-mentioned flow directions reverse. Although the morphology is well established, as for the understanding of the magnetospheric sources of those currents, there has been almost no progress in the past two decades. This is because what we can know from observations is very limited. To overcome the difficulty, we performed numerical magnetohydrodynamic simulations using the REPPU (Reproduce Plasma Universe) code recently developed by T. Tanaka. In the talk, we discuss the dynamo processes revealed by the numerical modeling.

Keywords: field-aligned current, magnetospheric dynamo, magnetohydrodynamics