

MI結合のドライバーとしてはたらく電離層

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Ionosphere as a driver of substorm MI-coupling

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Dynamic properties of the terrestrial ionosphere and the magnetosphere are coupled electrically and magnetically through the field-aligned current closure. The driver of the Alfvén waves in the magnetosphere, often represented by the perpendicular gradients of plasma pressure at right angles to the field gradient in the equatorial plane, is a source of field-aligned currents (FAC) in the MI coupling.

Meanwhile, the ionosphere may act as the driver of the FAC. Knowing that the expansion of the flux tube cross-section leads to the reduction of the magnetic field intensity in the ionosphere, we can assume that the inductive fields (fast mode) are set up in the auroral zone ionosphere at substorm onset. The Hall conductance of the ionosphere generates the static fields (Alfvén mode) in the auroral zone ionosphere by the mode coupling. The upward and downward FAC from the static field regions may form a current closure themselves through the Hall currents. The auroral zone ionosphere in northern and southern hemispheres individually serves as the source of the FAC at substorm dipolarization.