PFISR OBSERVATIONS OF THE MAGNETOSPHERE-IONOSPHERE COUPLING ELECTRODYNAMICS OF THE EARTHWARD PENETRATING PLASMA SHEET FOLLOWING CONVECTION ENHANCEMENTS

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The plasma sheet moves earthward (equatorward in the ionosphere) after enhancements in convection, and the electrodynamics of this response is strongly influenced by Region 2 (R2) magnetosphere-ionosphere coupling. We have used Poker Flat Advanced Modular Incoherent Scatter Radar (PFISR) observations associated with relatively abrupt southward turnings of the IMF to provide an initial evaluation of aspects of this response. On the evening side, the observations show that strong subauroral polarization streams (SAPS) flow regions move equatorward as the plasma sheet electron precipitation (the diffuse aurora) penetrate equatorward following IMF southward turnings. The radar observations and concurrent DMSP particle precipitation measurements show that the enhanced westward flows of the SAPS lay within the low conductivity region between the equatorward boundaries of the plasma sheet electron and ion precipitation as the boundaries penetrated equatorward, a region where azimuthal pressure gradient of the plasma sheet ions drive downward R2 currents that are seen by DMSP. One the morning side, similar equatorward moving flow enhancements are seen, but the flows are eastward and are within the electron plasma sheet, extending poleward from its equatorward boundary. Rice Convection Model results are consistent with our observations, and indicate that the equatorward moving flow enhancements on the evening and morning sides are an important R2 electrodynamical response that includes shielding and the development of the R2 field-aligned currents.

Plasma sheet, convection, SAPS

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