Relationship between ionospheric and magnetospheric plasma flows during northward IMF

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The primary source of energy driving ionospheric convection at high latitudes is the interaction of the solar wind with the Earth's magnetosphere. The flow of the solar wind past the magnetosphere induces a large-scale electrostatic potential drop across the magnetosphere, most of which projects into the ionosphere. This drives large-scale plasma convection and currents inside the magnetosphere and ionosphere, with their magnitudes and configurations dependent on the orientation of the interplanetary magnetic field (IMF). Utilizing data from DMSP and Cluster EFW we compare ionospheric plasma velocity and precipitating particle measurements in the ionosphere to electric field measurements in the magnetotail. We map ionospheric phenomena associated with northward IMF (transpolar arcs and reverse plasma convection) to plasma flows seen in the near magnetotail. We present new observational results of the ionospheric and magnetospheric signatures of high-latitude CRBs and the evolution of the ionosphere and magnetosphere during northward IMF and changing By.