EVIDENCE FOR ENHANCED SOLAR WIND DRIVING OF THE MAGNETOSPHERE-IONOSPHERE SYSTEM DURING PERIODS OF ALFVÉNIC IMF

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The orientation and magnitude of the interplanetary magnetic field (IMF) and solar wind dynamic pressure are well known to affect the strength of convection. We have examined an extensive set of measurements of ionospheric convection in the dayside polar cap obtained from the Sondrestrom radar under various solar wind conditions, and we find evidence that ULF power in the IMF also has a substantial effect on the strength of dayside ionospheric convection. During the past winter, campaigns were also set up with the Sondrestrom and Poker Flat incoherent scatter radars to provide nightside radar observations of ionospheric flows within the auroral zone simultaneously with nightside plasma sheet flow observations from multiple THEMIS spacecraft. We find that ULF power in the IMF also has a substantial effect on the strength of convection on the nightside, both within the aurora ionosphere and within the plasma sheet. Convection flows during periods of large north-south IMF fluctuations are observed to be as strong as for steady and large southward IMF periods, and substantially enhanced convection is observed for northward IMF intervals when the IMF exhibits high ULF power. Observations during periods of Alfvénic magnetic fluctuations without high-speed solar wind indicate that the enhanced flows are at least in part directly due to the Alfvénic magnetic fluctuations and are not solely due to the high-speed solar wind. We furthermore find that the enhanced convection driven by the ULF power in the solar wind is highly structured in time, and is associated with many substorms, including during periods of northward IMF. Speculations concerning the cause for the enhanced coupling with the solar wind resulting from Alfvénic IMF fluctuations will be presented.

Convection, coupling

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