STATISTICAL STUDY OF THE TRANSPOLAR POTENTIAL UNDER STEADY AND VARIABLE SOLAR WIND DYNAMIC PRESSURE

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The significant effect of solar wind dynamic pressure fronts on ionospheric convection has been amply demonstrated in recent years. Super Dual Auroral Radar Network (SuperDARN) observations show that solar wind pressure fronts induce significantly enhanced ionospheric convection in the dayside ionosphere. The variations in solar wind pressure and those of the dayside convection after the pressure enhancement exhibit a remarkable correlation. In addition, Defense Meteorological Satellite Program (DMSP) measurements have shown that solar wind dynamic pressure enhancements significantly increase the transpolar potential and the solar wind/magnetosphere coupling efficiency. We now attempt to answer the following question: Is the response of the potential a transient feature of a magnetosphere adjusting to the new compressed state which slowly dissipates with time, or is it characteristic of an elevated background dynamic pressure? Case studies of long-duration solar wind pressure steps indicate that the potential first rises in response to the increase in pressure, but gradually subsides a few hours later despite the solar wind pressure remaining high. We study the behavior of the transpolar potential under steady solar wind dynamic pressure conditions and immediately after sudden enhancements in solar wind pressure, using DMSP flow observations over the polar cap. Initial results show that the potential does not vary significantly with pressure under steady conditions, while after a sudden jump in pressure it has a stronger response, not expected by the steady-pressure dependence. We investigate to what extent this is a general result, and discuss it in terms of magnetospheric dynamics after solar wind pressure fronts.

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