

Transient polar ionospheric convection response to negative dynamic pressure pulse

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The response of the high latitude ionospheric convection to a sudden decrease in solar wind dynamic pressure provides a unique opportunity to investigate how the solar wind couples to the dayside magnetosphere and ionosphere. Here, the event shows three IMF components do not have prominent changes, but the solar wind plasma went down to near zero magnitude, which leads to very weak solar wind driving during northward IMF. However, ionospheric convection observed by SuperDARN radars showed enhanced plasma flow speed in the central polar cap region just after the negative pressure pulse arrival to the magnetosphere. Simultaneous convection map generated by SuperDARN measurement presents enlarged convection cell with obvious equatorward moving Heppner-Maynard boundary. It is noted that cross polar cap potential enhanced instantly and this enhanced feature continued almost 10 min. The distribution of total electron content (TEC) exhibited typical auroral oval signature especially on dayside ionosphere, TEC density in auroral oval showed a noticeable decrease after the arrival of the negative pressure pulse. Both ionospheric convection and TEC distribution reveal that negative pressure pulse impacts the magnetosphere-ionosphere coupling system directly and dramatically. Moreover, the TIEGCM model also showed an enhanced polar potential pattern.

Keywords: Dynamic pressure, Ionospheric convection, Auroral oval