

Electric field and neutral wind control of positive ionospheric storms at low and mid latitudes

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It has been suggested recently that the eastward prompt penetration electric field (PPEF) developed during the daytime main phase of intense geomagnetic storms is the root cause of the dramatic increases in the peak electron density (N_{max}) and total electron content (TEC) (or positive ionospheric storms) observed at low and mid latitudes. The eastward horizontal PPEF combined with the northward horizontal magnetic field over the equator generates a super plasma fountain, which leads to the positive ionospheric storms [Kelley et al., 2004]. However, modeling studies and observations later showed that the (1) PPEF alone is unlikely to produce positive ionospheric storms and (2) PPEF in the presence of an equatorward neutral wind can produce positive ionospheric storms. A physical mechanism of how the neutral wind helps producing the positive ionospheric storms has also been reported. In the present paper we show that an equatorward neutral wind alone can produce stronger positive ionospheric storms than together with PPEF. Observations and model results are presented.