EFFECTS OF PROMT PENETRATION ELECTRIC FIELD AND NEUTRAL WIND DYNAMO ON THE IONOSPHERE AND THERMOSPHERE: A COMPARATIVE STUDY OF OBSERVATIONS AND SIMULATIONS

GANG LU

High Altitude Observatory, National Center for Atmospheric Research, Boulder, Colorado, USA

During geomagnetic storms the magnetospheric electric fields driven by the solar wind and interplanetary magnetic field (IMF) can directly penetrate from high latitudes to lower latitudes. Strong eastward penetration electric field has been found to be the primary cause of dayside positive storm phase. In addition, enhanced Joule heating dissipation in the high-latitude polar region produces large pressure gradients that drive neutral winds equatorward toward mid and low latitudes, even into the opposite hemisphere. The globally altered thermospheric neutral winds can thus affect the dynamical structures of the mid- and low-latitude ionosphere. To illustrate the relative importance of prompt penetration electric field and neutral wind dynamo we use the NCAR Thermosphere-Ionosphere Electrodynamic General Circulation Model (TIEGCM) to study two well-observed storm events of 9-10 November 2005 and 10 September 2005, which were driven by these two types of electrodynamical and dynamical forcing, respectively. Comparison of simulation results with radar and satellite observations will also be shown as a way of model validation.

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Gang Lu, National Center for Atmospheric Research, Boulder, Colorado, USA; tel: +1 303-497-1554; fax: +1 303-497-1589; email: ganglu@ucar.edu