AOGS 2006

Neutral Wind Effects to the Stormtime Low-Latitude Ionosphere

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During magnetic storms the ionospheric total electron content (TEC) at low-latitude often shows great variations. To study the importance of various ionospheric drivers in producing the variations, we perform numerical simulations for stormtime low-latitude ionosphere using the Sheffield University Plasmasphere Ionosphere Model (SUPIM) with values for the neutral wind, temperature and composition provided by the National Center for Atmospheric Research (NCAR) Thermosphere Ionosphere General Circulation Model (TIEGCM). Various numerical experiments were run to identify the relative importance of the stormtime ionospheric drivers. The simulation results show that the enhanced upward E×B drift due to the stormtime eastward penetration electric field can expand the low-latitude equatorial ionization anomaly (EIA) to higher latitudes and produce the observed TEC enhancement. However, the TEC enhancement due to the effect of penetration electric field alone, is less than that due to the combined effect of the storm-generated equatorward neutral wind and the penetration electric field. Our simulations suggest that the storm-generated equatorward neutral wind plays an important role in producing the TEC enhancement at low and mid-latitudes, in addition to the eastward penetration electric field.