

Ground observation and AMIE-TIEGCM modeling of a large-scale traveling ionospheric disturbance

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We show comparison of ground observation and modeling of a prominent large-scale traveling ionospheric disturbance (LSTID) observed in Japan during the major magnetic storm of March 31, 2001 (Shiokawa et al., JGR, 2003). The LSTID was detected as an enhancement of the 630-nm airglow intensity, an enhancement of GPS-TEC, a decrease of F-layer virtual height, and an increase of foF2. They moved equatorward with a velocity of 400-500 m/s. These results suggest that an enhancement of poleward neutral wind (propagating equatorward as a traveling atmospheric wave) caused the observed ionospheric features of the LSTID. The ion drift measurement by the MU radar and Doppler wind measurement by a Fabry-Perot interferometer (630-nm and 558-nm airglow) at Shigaraki actually showed poleward wind enhancement during the LSTID event. To model this LSTID event, we used the assimilative mapping of ionospheric electrodynamics (AMIE) technique as inputs to the thermosphere-ionosphere-electrodynamics general circulation model (TIEGCM). The model shows fine structures of the poleward wind enhancement both propagated from the auroral zone and generated directly at midlatitudes.