

Larger Scale traveling ionospheric disturbances observed by GPS TEC during the magnetic storm

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Propagation of traveling ionospheric disturbances during the magnetic storms of October 29-31, 2003 was analyzed in this paper using GPS TEC data from the International GNSS Service(IGS). Two-dimensional asymmetric polynomials were applied to remove background trends of perturbations and obtain the two-dimensional distribution of TID in north America. The results show that, a large-scale traveling ionospheric disturbance was observed on October 29, 2003 right after the sudden commencement of the magnetic storm. The TID propagates southwestward with wave azimuth of 220 degrees. The wave scales were 350 m/s for horizontal phase velocity, 1.6 hours for wave period and 2016 km for horizontal wavelength. The disturbance persisted for about 2 hours, with the maximal amplitude of 2.5 TECU. As compared with the early studies of gravity wave ducted modes, we found that the disturbance may be caused by the southward-propagating gravity wave G2 mode. Both the westward-blowing thermospheric winds and the relative position of wave source are responsible for the westward propagating component of the ionospheric disturbance.