

Quasi Two Day Wave Response in the Ionosphere Using TIME-GCM Nudged with NOGAPS-ALPHA

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The quasi two day wave (QTDW) is a planetary wave that can be enhanced rapidly to extremely large amplitudes in the mesosphere and lower thermosphere (MLT) region during the northern winter post-solstice period. The dissipation of the planetary wave can change the background dynamics and the composition of MLT. This feature can also drive robust variability of the ionosphere system, for example, the total electron content (TEC).

In this study, we present five January case studies of QTDW events (2005, 2006, 2008, 2009, 2010) by using the Thermosphere-Ionosphere-Mesosphere Electrodynamics-General Circulation Model (TIME-GCM) nudged with the Navy Operational Global Atmospheric Prediction System-Advanced Level Physics High Altitude (NOGAPS-ALPHA) Weather Forecast Model. With NOGAPS-ALPHA introducing a more realistic lower atmospheric forcing in TIME-GCM, we can investigate ionosphere system coupling with the MLT region when dramatic features associated with the QTDW occur in middle atmosphere. This work opens a new method to evaluate the physical mechanism of ionospheric coupling from below during QTDW events.

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