

## Gravity Waves in the Mesosphere/Thermosphere/Ionosphere simulated by a Whole Atmosphere Model

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Behaviors of gravity waves in the thermosphere/ionosphere are examined by using a whole atmosphere model. The dominant period of the simulated gravity waves becomes shorter at higher altitudes due to dissipation processes in the thermosphere, such as molecular viscosity and ion drag force, indicating that gravity waves with a larger horizontal phase velocity (larger vertical wavelength) can penetrate into the thermosphere. We also investigate the longitudinal and seasonal variations of gravity wave activity in low latitudes and upward propagation of gravity waves from the lower atmosphere to the thermosphere/ionosphere. Our results clearly indicate that the longitudinal variation of the gravity wave activity in the mesosphere and thermosphere is closely related to the cumulus convective activity in the tropics. WE are developing a higher horizontal resolution version (about 1 degree longitude by 1 degree latitude) of the atmosphere-ionosphere coupled model (GAIA). Using the high resolution version of the GAIA, we are planning to investigate effects of thermospheric gravity waves on the ionospheric variability.

Keywords: vertical coupling process, gravity wave, numerical simulation