# Numerical Simulation of Traveling Ionospheric Disturbances generated by upward propagating gravity waves

*Yasunobu Miyoshi[1], Hidekatsu Jin[2], Hitoshi Fujiwara[3], Hiroyuki Shinagawa[2]

1. Kyushu University, 2. NICT, 3. Seikei University

It has been recognized that gravity waves (GWs) play an important role on the momentum and energy budget in the thermosphere/ionosphere. In this study, using a whole atmosphere-ionosphere coupled model (GAIA) with a high horizontal resolution, behaviors of Traveling Ionospheric Disturbances (TIDs) generated by upward propagating GWs in the thermosphere are investigated. The horizontal resolution of GAIA is 1 degree longitude by 1 degree latitude, which is adequate to simulate large-scale GWs. The GAIA contains the region from the ground surface to the upper thermosphere, so that we can simulate excitation of gravity waves in the lower atmosphere, their upward propagation to the mesosphere and thermosphere, and their impacts on the thermosphere/ionosphere system. The GAIA can simulate TIDs because interaction processes between the ionosphere and neutral atmosphere are included. The equatorward (poleward) TIDs become dominant during the daytime (nighttime) due to the filtering effect of GWs by poleward (equatorward) thermospheric winds. The dominant horizontal wavelength and period of the simulated TIDs are 500–1500 km and 30–90 min, respectively. The dominant wavelength and period of TIDs are the same as those of GWs near 250–300 km height. We discuss seasonal and longitudinal variations of TIDs and their relation to GW activity in the thermosphere.

Keywords: ionosphere-atmosphere coupling process, TID, Gravity wave

 