A transfer function model of gravity wave propagation in the dissipative atmosphere

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In order to study the relationship between the excitation source of troposphere and the response of ionosphere, we have built a three-dimensional transfer function model based on the internal gravity wave dispersion relation in the dissipative atmosphere without background winds. Then the transfer function model was used to simulate and analyze the response of ionosphere to a severe weather event. The simulated horizontal wave number and the disturbance period have been compared with those observed values which were obtained from the observation of a short baseline array of GPS receivers. The compared results reveal that the simulated wave parameters of the ionospheric disturbances are consistent with those derived from the observation. For the internal gravity wave, the atmosphere behaves like a filter which only offers the easy passage to some gravity waves whose periods are between 15 min and 30 min, and the horizontal wave lengths are between 200 km and 400 km. However, the other components of the internal gravity wave cannot propagate from troposphere to 300 km altitude in the ionosphere.