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地震レーリー波による電離層電子密度擾乱のシミュレーション
Simulation Results for the Ionospheric Density Disturbances Triggered by Earthquake Rayleigh Waves

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During the great earthquake event of M9.0 Tohoku earthquake on 11 March 2011 in Japan, previous studies detected the horizontal wave structure of ionospheric total electron content (TEC) disturbances by a dense ground-based GPS receiver network. These results suggested that the ionospheric TEC disturbances could be caused by the earthquake-triggered seismic surface, acoustic-gravity, and tsunami waves, which are distinguished by the different propagation velocities, durations, and periods. In order to further investigate the vertical coupling effect for the ionospheric plasma density disturbances, this study employed a three-dimensional, non-linear, compressible numerical model. This model simulated the disturbances of neutral mass densities from the surface to lower, upper atmosphere and the ionosphere, by specifying the surface displacement triggered by the earthquake, such as the rayleigh waves, at the model lower boundary. The results show that the TEC disturbances have two types of the propagation waves, first horizontal waves and slow co-centric waves. These might be caused by the neutral wind dynamo effect and the ion-neutral collision along the magnetic field.

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