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Sensitivity of ionosonde detection of atmospheric disturbances induced by seismic Rayleigh waves at different latitudes 2. Aeronomy

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Abstract

© 2017 The Author(s).Ionospheric disturbance was observed in ionograms at Kazan, Russia 55.85°N, 48.81°E), associated with the M8.8 Chile earthquake in 2010 (35.91°S, 72.73°W). The disturbance was caused by infrasound waves that were launched by seismic Rayleigh waves propagating over 15,000 km along Earth's surface from the epicenter. This distance was extremely large compared with the detection limit of similar ionospheric disturbances that were previously studied at lower latitudes over Japan. The observations suggest that the sensitivity of ionograms to coseismic atmospheric disturbances in the infrasound range differs at different locations on the globe. A notable difference in the geophysical condition between the Russian and Japanese ionosonde sites is the magnetic inclination (dip angle), which affects the ionosphere-atmosphere dynamical coupling and radio propagation of vertical incidence ionosonde sounding. Numerical simulations of atmospheric-ionospheric perturbation were conducted, and ionograms were synthesized from the disturbed electron density profiles for different magnetic dip angles. The results showed that ionosonde sounding at Kazan was sensitive to the atmospheric disturbances induced by seismic Rayleigh waves compared with that at Japanese sites by a factor of ~ 3. Graphical Abstract: [Figure not available: see fulltext.]

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Keywords

Earthquakes, Infrasound, Ionosonde, Lithosphere-atmosphere-ionosphere coupling, Rayleigh waves

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