

# **Common Observations for Near Source Ground Motions and Coseismic Ionospheric Disturbances following the 2011 Off the Pacific Coast of Tohoku Earthquake**

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## **Abstract**

The time history and spatial dependence of the seismic wave propagation in ground and Ionosphere following the 2011 Off the Pacific Coast of Tohoku Earthquake reconstructed from dense seismic networks and Global Positioning System (GPS) array observations are presented. Using the total electron content data recorded by a dense GPS receiver network, the near source ionosphere perturbations induced by this giant earthquake were analyzed and the high resolution images of seismic wave propagation in the Ionosphere were presented. The similar spatial images of ground motions were reconstructed from dense seismic array observations. Observations of this event provide, in the first time, an opportunity to compare the near source ground motions with the near-field coseismic ionosphere perturbations excited by this ground motions. Analyzed results were employed to discuss the source rupture and seismic wave propagation. Both seismic and ionosphere observations indicated that major release seismic energy propagated radially outward with the hypocenter in the beginning, but the circular shape was distorted gradually when the source rupture was extended. However, coherent wave fronts from both analyses presented different pattern in their later propagation.