



Coseismic ionospheric and geomagnetic disturbances caused by great earthquakes

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Despite primary energy disturbances from the Sun, oscillations of the Earth surface due to a large earthquake will couple with the atmosphere and therefore the ionosphere, then the so-called coseismic ionospheric disturbances (CIDs) can be detected in the ionosphere. Using a combination of techniques, total electron content, HF Doppler, and ground magnetometer, a new time-sequence of such effects propagation were developed on observational basis and ideas on explanation provided. In the cases of 2008 Wenchuan and 2011 Tohoku earthquakes, infrasonic waves accompanying the propagation of seismic Rayleigh waves were observed in the ionosphere by all the three kinds of techniques. This is the very first report to present CIDs recorded by different techniques at co-located sites and profiled with regard to changes of both ionospheric plasma and current (geomagnetic field) simultaneously. Comparison between the oceanic (2011 Tohoku) and inland (2008 Wenchuan) earthquakes revealed that the main directional lobe of latter case is more distinct which is perpendicular to the direction of the fault rupture. We argue that the different fault slip (inland or submarine) may affect the way of couplings of lithosphere with atmosphere.

References

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