

Responses of the ionosphere to the great Sumantra earthquake and volcanic eruption of Pinatubo

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A sudden ionospheric disturbance was detected by the Doppler shift sounding equipment at Beijing, about 25 minutes later after the outbreak of the Sumantra earthquake on December 26, 2004. Actually, this ionospheric disturbance appears less than 10 minutes after the earthquake was first recorded at Beijing seismological station by the arrival of the seismic Rayleigh wave. The analysis shows that a little more than 10 minutes are the time necessary for seismic Rayleigh wave to propagate from the epicenter to the site of Beijing and then, about 10 minutes for acoustic waves to propagate from the surface of Beijing area to the altitude of the ionosphere. This observation might provide a different mechanism to explain the global ionospheric response to the great Sumantra earthquake. Also, a report was made as another example to show the ionospheric response of Doppler shift observation at Beijing area during the Mount Pinatubo eruption of 1991. These two examples show clear evidences of the lithosphere-atmosphere-ionosphere coupling. The ionospheric disturbances are caused by the waves in the lower atmosphere. The former case is in the frequency domain of infrasonic waves of the earth surface oscillation due to the Rayleigh waves caused by the earthquake, while the latter is in the acoustic-gravity wave category directly excited in the atmosphere by the mass and energy eruptions of the Mount Pinatubo.