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Coseismic ionospheric disturbance of the December 2004, Great Sumatra Earthquake

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Observations of the ionospheric disturbances after large earthquakes have become easy owing to the worldwide deployment of Global Positioning System (GPS) receivers, which can measure the ionospheric Total Electron Content (TEC). A recent study [1] of such disturbance after the 2003 Tokachi-Oki, Japan, Earthquake with a dense GPS array showed that it propagated by ~ 1 km/sec mainly toward the south. It is possibly an atmospheric sound wave propagating from the epicenter, at first upward, then horizontally through the ionosphere. Other studies suggested secondary excitation of such disturbances by the coupling between atmosphere and the Rayleigh surface wave [2] and tsunami [3]. Here we look for such signals in GPS stations near the epicenter and in the dense GPS array in Japan.

Keywords: GPS; ionospheric disturbance; TEC; 2004 Sumatra earthquake.

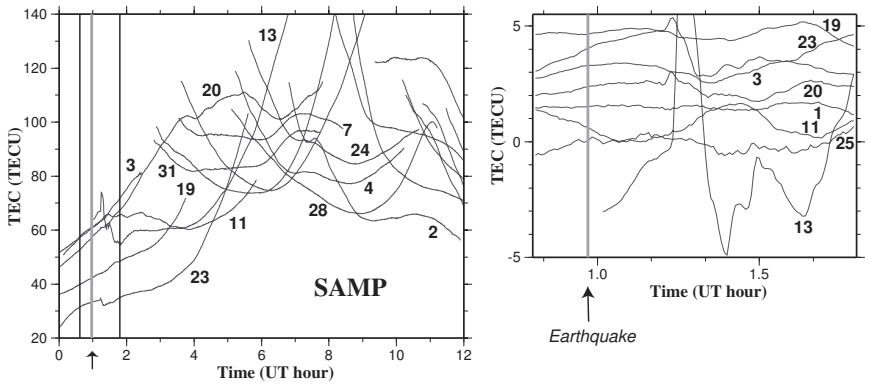

Figure 1.Ionospheric TEC time series measured with GPS at the SAMP station (Medan, Sumatra). A part of the raw time series to the left is enlarged to the right. Disturbances exceeding 1 TECU (= 10^{16} electron/m^2) are found for satellites 13, 23 and 20 at about ten minutes after the earthquake.

References

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