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Ionospheric GPS TEC disturbances triggered by the 26 December 2004 Indian Ocean tsunami

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Tsunami ionospheric disturbances (TIDs) of the 26 December 2004 M9.3 Sumatra earthquake are detected by the total electron content (TEC) of ground based receivers of the global positioning system (GPS) in the Indian Ocean area. It is found that the tsunami waves triggered atmospheric disturbances near the sea surface, which then traveled upward with an average velocity of about 730 m/s (2700 km/hr) into the ionosphere and significantly disturbed the electron density within it. Results further show that the TIDs, which have maximum height of about 8.6-17.2 km, periods of 10-20 minutes, and horizontal wavelengths of 120-240 km, travel away from the epicenter with an average horizontal speed of about 700 km/hr (190 m/s) in the ionosphere.