

Study of Ionospheric perturbation at the epicenter and at the conjugate point by integrated wavelet transform, for M6.6 China earthquake

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ABSTRACT

This paper attempts to identify ionospheric anomaly prior to the M6.6 earthquake which occurred in the Sichuan province of China (30.30°N, 102.88°E) on 20April 2013, having depth 14 km. Pre-seismic ionospheric Total Electron Content (TEC) anomalies were pursued using GPS receivers. Integrated Wavelet Analysis Method (IWAM) is adapted as the diagnostic tool for detecting ionospheric perturbations, before the impinging of the earthquake, at the epicenter and its conjugate point. IWAM is a combination of Continuous Wavelet Transform (CWT) and Cross Wavelet Transform (XWT). Perturbations of the impending earthquake, in the ionosphere are detected by CWT whereas a dynamical relationship is obtained by XWT between the ionospheric variability and the geophysical index variable (ap) in the same span of observations, before the triggering of the earthquake. A correlation has been detected between the epicenter and its conjugate point by XWT. The spatial signatures prominently, persistently, and simultaneously appear around the epicenter and its conjugate areas, of the China earthquake. GIM maps have been retrieved at the epicenter to study TEC, on enhanced and reduced anomaly days.

Key words: Ionospheric disturbances, TEC, Earthquake, Integrated Wavelet Analysis Method