



Statistical evidence of seismo-ionospheric precursors of the GPS total electron content in China

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Evidence of the seismo-ionospheric precursor (SIP) is reported by statistically investigating the relationship between the total electron content (TEC) in global ionosphere map (GIM) and 56 $M \geq 6.0$ earthquakes during 1998-2013 in China. A median-based method together with the z test is employed to examine the TEC variations 30 days before and after the earthquake. It is found that the TEC significantly decreases 0600-1000 LT 1-6 days before the earthquake, and anomalously increases in 3 time periods of 1300-1700 LT 12-15 days; 0000-0500 LT 15-17 days; and 0500-0900 LT 22-28 days before the earthquake. The receiver operating characteristic (ROC) curve is then used to evaluate the efficiency of TEC for predicting $M \geq 6.0$ earthquakes in China during a specified time period. Statistical results suggest that the SIP is the significant TEC reduction in the morning period of 0600-1000 LT. The SIP is further confirmed since the area under the ROC curve is positively associated with the earthquake magnitude.