



Travelling large-scale ionospheric irregularities associated with earthquake precursors

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Global TEC maps were used to detect the ionospheric irregularities associated with earthquake precursors. Earlier such seismo-ionospheric irregularities was detected by using ionosonde measurements. Analyses of GPS derived TEC data confirmed a hypothesis about occurrence in vicinity of strong earthquakes ($M > 5$) epicenters large-scale positive ionospheric inhomogeneities. They occur at 10 - 15 hours before the earthquakes times, after that they move approximately on the major circle arc, the velocity is about 1000 km/h, the displacement distance reaches 10000-15000 kms and more. The verification of this hypothesis was performed for two cases – an isolated event of August 17, 1999 and the second one of May 6, 1999, when 9 spatial and time spaced shocks took place. For these nine earthquakes ($M > 5$) the corresponding group of ionosphere irregularities was identified. So, macroscale inhomogeneities existence and its displacement before large earthquakes are confirmed on the complex data including the ground, onboard ionosonde data and TEC measurements.

The analysis has shown an opportunity of using global GPS derived TEC maps for the studying of similar travelling large-scale ionospheric irregularities. The obtained results have confirmed the possibility of using information such as velocity, size and propagation direction of these irregularities as the basis of the short-term earthquakes forecast.

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