

## The detection of seismo-ionospheric phenomena: approaches and problems

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During several decades the effects related with seismic activity were extensively studied. The nonregular ionospheric variations, associated with pre- and co-seismic activity, were investigated by various radiophysical and in-situ measurements over different seismo-active regions. Nowadays one of the most effective tools for diagnostic of seismo-ionospheric phenomenon in a global scale is the method based on analysis of TEC variations obtained from global navigation systems signals (GPS/GLONASS). The influence on the ionosphere from ground is frequently weaker in compare with effects of solar or geomagnetic origin. By this reason it is very actual the problem of detection of seismo-ionospheric anomalies on the background of strong regular and quasi-regular variation of space weather parameters.

For analysis of seismo-ionospheric effects the traditional approach consists in statistical processing of long-term datasets, calculation of non-disturbed averaged diurnal variation of TEC, estimation of differences and anomaly recognizing. Many scientists studied seismo-ionospheric phenomena have reported about different precursors appearance for the same earthquakes.

Results of analysis of possible ionospheric anomalies associated with earthquakes of 2007-2011 was indicated that estimation of differences, obtained by traditional techniques can led to anomalies during seismo-quiete periods, but strongly correlated with variations of solar ionizing radiation. Also similar effects can be caused by superimposing effects of waves in the ionosphere (planetary 2-3 day period waves, terminator waves, Poincare waves, etc).

In this work we analyze the influence of different factors (separate and superimposed) on the reliability of detection seismo-ionospheric anomalies. It was considered the specific temporal intervals used for background calculation and revealed most optimal variants. It is proposed several approaches in order to take into account the space weather factors and ionospheric waves during process of seismo-ionospheric phenomenon recognizing.

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