



TEC Anomalies prior to earthquakes: comparative analysis of regional and global TEC variations

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Ionospheric anomalies, such as variations in the maximum electron concentration of the ionospheric F2 layer and/or TEC appeared a few days before earthquakes in the vicinity of an earthquake's epicenter, are considered to be precursory signals. However, it is known that the main factors that influence the ionosphere are space weather effects. Therefore, it is important to distinguish local anomalies in the regular daily TEC changes, probably, initiated by earthquakes preparation processes, from those caused by the global influence of geomagnetic or solar activity changes. To track the dynamics of global ionosphere, we calculated global TEC following the idea by Afraimovich et al. (*Adv. Space Res.*, <http://dx.doi.org/10.1016/j.asr.2007.11.007>, 2007). To estimate local TEC changes, we calculate TEC value over the territory of an earthquake's epicenter. In addition, we calculated TEC over a seismically-quiet region (for example, Moscow area, 52-55 N; 35-40 E) and we found that TEC variations above such "check" region are similar to the ones above the area of epicenter, but with time shift corresponding to the local time difference.

Comparison of local and global TEC values showed that, mostly, local TEC changes represent global variations of the ionosphere. For instance, it turned out that TEC anomalies recorded before the Chi-Chi earthquake (21.09.1999, M7.3), the Tokachi-oki earthquake (25.09.2003, M8.3), San Simeon (22.12.2003, M6.6) and Parkfield (29.09.2004, M6.0) could be caused not as much by the enhanced seismic activity before earthquakes as by changes of the global ionization due to dynamics of the UV

solar radiation or due to even quite moderate geomagnetic activity.