

Assessment of Ionospheric TEC anomaly before large earthquake: Elimination of geomagnetic storm effects

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The detection of electromagnetic perturbations prior to large earthquakes has been proposed as a useful way to monitor the crustal activities. One of the most promising candidates is the measurement of Total Electron Content (TEC). There have been many reports on TEC anomaly associated with large earthquakes from different parts of the world. To verify the relation between TEC anomalies and seismicity around Japan, statistical studies by superposed epoch analysis have been carried out. The results have indicated that before a M>6 earthquake there are clearly higher probabilities of positive TEC anomalies in Japan. These results indicate the correlation between TEC anomalies and sizeable earthquakes. Furthermore, by making use of long-term TEC data over Japan during 2000-2013 and applying Molchan's error diagram, we can evaluate the optimal parameter for earthquake forecasting. The results show that the TEC data contain potentially useful information on earthquake forecasts.

Further research on earthquake forecasting and promoting its utilization will greatly contribute to disaster risk reduction. By using an interdisciplinary or integrated approach, which connects science with technologies related to the ongoing earthquake forecast researches such as ULF geomagnetic and GNSS methods, earthquake forecasting will be demonstratively realized.

Keywords: Ionospheric TEC anomaly, statistical studies, Molchan's error diagram