

GEONET-TEC OVER JAPAN DURING GEOMAGNETICALLY QUIET AND SEISMICALLY ACTIVE PERIOD

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Using data of Japanese dense array of GPS receivers (GEONET) we calculated vertical TEC with time resolution of 1 hour. We further performed analysis of TEC over Japan in May-August 2008, when 22 earthquakes with $M > 5.0$ (including three large events of $M = 6.8 \div 7.0$) occurred around the Tohoku area of Japan. This work aims, first of all, at searching for pre-seismic anomalies in TEC taking advantage of the high spatial resolution provided by the GEONET. In order to detect abnormal signals, we performed a quartile-based processing. In addition, we analyze TEC around the area of future epicenter and compare it with so-called “regional” TEC values, i.e. mean TEC estimated over Japan. Note, that the analyzed period of ~100 days is long enough to exclude planetary waves appearance in the ionosphere TEC which are known to have a period of ~2, 5, 10, 16 days (Shalimov, Cosmic Research, 2001, 39, 6, 559) and which can be taken by mistake as precursory signals. Knowing that the decisive role in the ionosphere state is played by space weather effects, we compared the estimated TEC values with time series of the interplanetary magnetic field component B_z , F10.7 solar flux and UV solar radiation, index of geomagnetic activity Dst and planetary index Kp. Besides, due to local TEC anomalies were reported to reflect global variations of TEC (Afraimovich and Astafyeva, 2008, Earth, Planets and Space, 60, 961), we bring out data of global TEC as well. Though the considered period falls on the minimum of solar activity, and the space weather influence was minimum at this time, the observed “positive” anomalies in the regional TEC corresponds to fluctuations of IMF B_z component and to the following increase in AE, Kp, and Dst indices. Other case of ~25% TEC increase of duration of four days (DOY: 140-143) is caused by increase of the solar UV radiation and certainly coincides with growth of the global TEC.

TEC, GEONET, seismo-ionosphere relation

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