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Special index of ionosphere variability as a short-term earthquake precursor

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Analysis of GPS TEC data of the GPS receivers networks within the area of earthquake preparation around the time of several important earthquakes has revealed the special kind of ionospheric variability which is observed several days before the seismic shock. It indicates the increase of spread of GPS TEC within the area reaching up to 40 TEC units. This type of the variability does not appear during the geomagnetic disturbances for the same set of GPS receivers what permits to distinguish the variations in ionosphere associated with solar and geomagnetic activity, and with the seismic activity. The observed variability is supported by the new type of GPS data analysis, permitting to determine the source of ionospheric disturbance and direction of propagation. It was discovered that during the period of increased activity indicated by the new index, the source of the disturbance is close to the earthquake epicenter, and the propagation direction is upward contrary to downward direction during the geomagnetic disturbances. The data for Hector Mine earthquake M7.1 (California, USA, 1999), Colima earthquake M7.6 (Mexico, 2003), San Simeon earthquake M6.5 (California, USA, 2003) and Parkfield earthquake M6.0 (California, USA, 2004) are presented.