



**Precursory ionospheric disturbances for mid-latitude large earthquakes:  
EIA enhancements and TEC anomalies**

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Recent researches have provided more persuasive links of the seismic activities to ionospheric disturbances preceding earthquakes. In this study, to investigate whether the connection between seismic activity and ionospheric change is valid, satellite observations of electron density around several mid-latitude large earthquakes were analyzed, and were compared with GPS Total Electron Content (TEC) data. In addition, statistical analyses of large earthquakes ( $M \geq 6.0$ ) that occurred during the satellite observation period were performed. The results showed that mid-latitude earthquakes contribute to equatorial ionization anomaly (EIA) enhancements and TEC anomalies as well, and that ionospheric disturbances precede seismic events. According to statistical analyses, the normalized equatorial plasma density increases were sensitive to both the magnitude and focal depth of an earthquake, as reported in previous studies. TEC anomalies were also frequently observed in larger earthquakes compared to smaller earthquakes.