A Statistical Study of Ionospheric Earthquake Precursors Monitored by Using Equatorial Ionization Anomaly of GPS TEC in Taiwan during 2001-2007

J. Y. Liu[1], C. H. Chen[2], Y. I. Chen[3], W. H. Yang[3], K. I. Oyama[1], and K. W. Kuo[4]

[1]*Institute of Space Science, National Central University, Chung-Li, Taiwan*
[2]*Department of Geophysics, Graduate School of Science, Kyoto University, Kyoto, Japan*
[3]*Institute of Statistics, National Central University, Chung-Li, Taiwan*
[4]*Central Weather Bureau, Taipei, Taiwan*

In this paper, we examine pre-earthquake ionospheric anomalies by the total electron content (TEC) derived from a ground-based receiver of the Global Positioning System (GPS). A network of 8 GPS receivers is used to construct daily latitude-time-TEC (LTT) plots to monitor the crest of equatorial ionization anomaly (EIA) in the Taiwan area. Three parameters of the strength, location, and formation time of the EIA crest are extracted. A 15-day running medians of the three parameters and the associated upper and lower quartiles are utilized as the references for identifying abnormal signals for all of the 150 M≧5.0 earthquakes in the Taiwan area during 2001-2007. Results show that the EIA crest significantly moves equatorward (poleward) and appears in an earlier (later) time of the afternoon period few days before (after) the earthquakes along the Taiwan longitude. The two parameters of the EIA crest location and occurrence time can be employed to detect ionospheric earthquake precursors.