

Ionospheric Variations Associated with the Great East Japan Earthquake Disaster

ICHIKAWA, Takashi^{1*}, HATTORI, Katsumi¹, HIROOKA, Shinji¹, LIU, Jann-Yenq², OTSUKA, Yuichi³, OYAMA, Kaori¹

¹Graduate School of Science, Chiba University, ²Institute of Space Science, National Central University, Taiwan, ³Solar-Terrestrial Environment Laboratory, Nagoya University

Recently, there are many reports on earthquake-related electromagnetic phenomena. Anomalous TEC (Total Electron Content) changes preceding large earthquakes are one of the most promising phenomena among of them. In this study, we investigate TEC anomalous variations in time and space for the 2011 off the Pacific coast of Tohoku Earthquake and after the accident at Fukushima Daiichi Nuclear Power Station.

In this study, TECs are computed with using the GEONET and GIM (Global Ionosphere Maps). In order to remove a daily variation of TEC, 15 days backward running average (TECmean(t)) and its standard deviation sigma(t) at a specific time are taken for the normalization. The normalized TEC* (t) is defined as follows: $TEC * (t) = (TEC(t) - TECmean(t))/sigma(t)$.

For the Pacific coast of Tohoku Earthquake, GPS-TEC* anomalies exceeding +2 sigma appear 4 and 5 days before the earthquake. Their total durations are 13 and 14 hours, respectively. GIM-TEC* anomalies exceeding +2 sigma appear 4 days before the earthquake. The duration is more than 20 hours. In space, the region of GIM-TEC* anomalies 4 days before the earthquake appears over northern Japan and remains more than 24 hours.

These results are consistent with the previous statistical analysis around Japan. The details will be given in the presentation.