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Investigation of the TEC Changes in the vicinity of the Earthquake Preparation Zone

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Recently, investigation of the anomalies in the ionosphere before the earthquake has taken too much attention. The Total Electron Content (TEC) data has been used to monitor the changes in the ionosphere. Hence, researchers use the TEC changes before the strong earthquakes to monitor the anomalies in the ionosphere. In this study, the GPS-TEC variations, obtained from the GNSS stations in the vicinity of the earthquake preparation zone, was investigated. Nidra earthquake (M6.5), which was occurred on the north-west of Greece on November 17th, 2015 (38.755°N, 20.552°E), was selected for this study. First, the equation proposed by Dobrovolsky et al. (1979) was used to calculate the radius of the earthquake preparation zone. International GNSS Service (IGS) stations in the region were classified with respect to the radius of the earthquake preparation zone. The observation data of each station was obtained from the Crustal Dynamics Data and Information System (CDDIS) archive to estimate GPS-TEC variations between 16 October 2015 and 16 December 2015. Global Ionosphere Maps (GIM) products, obtained from the IGS, was used to check the robustness of the GPS-TEC variations. Possible anomalies were analyzed for each GNSS station by using the 15-day moving median method. In order to analyze these pre-earthquake ionospheric anomalies, we investigated three indices (Kp, F10.7 and Dst) related to the space weather conditions between 16 October 2015 and 16 December 2015. Solar and geomagnetic indices were obtained from The Oceanic and Atmospheric Administration (NOAA), The Canadian Space Weather Forecast Centre (CSWFC), and the Data Analysis Center for Geomagnetism and Space Magnetism Graduate School of Science, Kyoto University (WDC). This study aims at investigating the possible effects of the earthquake on the TEC variations.