

Anomalous Ionospheric Density Changes Prior to 2008 Wenchuan Earthquake

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On May 12th 2008 at 06:28 UT a major earthquake $M_s=8.0$ struck Wenchuan County (31.0°N, 103.4°E) in southwest China. Ionospheric total electron content (TEC) derived from a network of 58 global positioning system (GPS) receivers over China and nearby countries were used to investigate the time and spatial variations of the ionospheric TEC signatures prior to the great earthquake. The observations revealed that there was an anomalous enhancement in TEC (100% increase than the 15-day median) at afternoon-evening sector on May 9th 2008 while geomagnetic condition was quiet ($K_p \leq 2$). The TEC variations on the west side and east side of the epicenter show large dissimilarity on May 9th 2008. By constructing the longitude/latitude TEC map, the distribution of the region predominated by increased TEC was shown to be localized at longitudes 90°-130°E. The ion density at the topside ionosphere observed by the DMSP satellite (840 km) was sharply enhanced at low and equatorial latitudes at nightside (12:00 UT/21:30 LT) on May 9th. The significant abnormal increment of the ionospheric ion density indicates that the EIA tends to be intensified 3 days prior to the earthquake which agrees well with the enhanced EIA map of TEC. Then we discuss the problem of certain data corrections of that permit local changes to be distinguished from global effect that produced by the solar radiation or geomagnetic storms.