

## Ionospheric TEC anomaly prior to the 2008 Wenchuan earthquake

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We investigate the ionospheric total electron content (TEC) anomalies prior to the 2008 Wenchuan earthquake (May 12, 2008, M7.9). In this paper, we use the International GNSS Service (IGS) data for TEC computation and the Global Ionosphere Maps (GIM) for GIM-TEC computation. In order to minimize possible confounding effects of consecutive earthquakes and properly identify the abnormal signals, we computed the mean TEC ( $TEC_{mean}$ ) and GIM-TEC ( $GIM-TEC_{mean}$ ) values for the previous 15 days, and the associated standard deviation ( $\sigma$ ) as a reference at specific times. Then, we derived the normalized TEC ( $TEC^*$ ) and GIM-TEC ( $GIM-TEC^*$ ) values by the following equations.  $TEC^*(t) = (TEC(t) - TEC_{mean}(t)) / \sigma(t)$ , where the  $TEC^*$  is derived every 30 sec. and averaged every 60 min.  $GIM-TEC^*(t) = (GIM-TEC(t) - GIM-TEC_{mean}(t)) / \sigma(t)$ , with using linearly interpolations. The correlation of TEC and GIM-TEC variation found to be very good. In this paper, to ensure that an observed TEC anomalous depression is earthquake related, we require that the reduction of the geomagnetic index Dst does not exceed -70 nT, otherwise it is considered to be geomagnetic storm related.

The result shows that the reduction anomaly of  $TEC^*$  observed at Shanghai day 3 before the EQ (May 9, 2008). It can also be found the significant decrease anomaly of the  $GIM-TEC^*$  at the epicenter on the same day. The spatial analysis using the global  $GIM-TEC^*$  map suggests that the extent of this anomaly reached to the 15 degrees in latitude and 30 degrees in longitude and appeared for 12 hours around China. Moreover, the ionospheric electron density observed with the DEMETER satellite decreased 3 and 2 days before the EQ. Therefore, these results indicate that the ionospheric anomalies around the epicenter are possibly affected by the EQ.