

Retrieval of TEC data using GPS receiver and study of its behavior during different ionospheric conditions at a low latitude station Agra

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The routine measurements of GPS based total electron content (TEC) are in progress since 24 June, 2006 at low latitude station Agra (Geographic Lat. 27.2⁰N, Long.78⁰E), India. Since then, the relations of GPS-TEC with varying ionospheric conditions have been studied. These include the study of morphological behavior of GPS-TEC and its behavior during various solar and geophysical phenomena. Seismo-ionospheric perturbations have also been observed. The results show that the mean TEC varies from a minimum at 0500 hrs LT (LT=UT+5.5 hrs) to a peak value at about 1400 hrs LT and then decreases. The lowest values of TEC are observed in winter whereas highest values are observed in equinox and summer during the low solar activity period. The GPS-TEC is found to be perturbed two days after the occurrence of some magnetic storms. A comparative study of GPS-TEC with IRI-2007 model also reveals almost similar temporal and seasonal variations. The variations of GPS-TEC are also observed during the total solar eclipse of 22 July, 2009 and it is found that the TEC decreased by about 30% from normal days during the total solar eclipse.

We compare our results of the GPS-TEC data recorded at Agra station with GIM-TEC and a good correlation is found between the two. We also study the precursory and post seismic effects on TEC data for the large magnitude earthquakes ($M \geq 5.5$). In order to separate the seismic effects on the TEC data from magnetic storm effect we choose the geomagnetically quiet period data only. Different statistical procedures have been applied to find out the anomalous days and it is found that the perturbation occur in the form of enhancements and depletions. In most of the events the precursory period lies between 5 and 10 days.