

NIGHTTIME INCREASE IN TOTAL ELECTRON CONTENT OBSERVED BY GPS AT LOW LATITUDE STATION BHOPAL

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Abstract:

Global level studies of the structure, composition, and dynamics, electro-dynamics of the ionosphere including its variability has been a subject of interest from several years. The GPS ionospheric sounding is a powerful tool for remote sensing of the ionosphere. Total Electron Content (TEC) is a parameter, which is used to monitor the temporal and spatial behavior of the ionosphere. The GPS signals have provided a unique opportunity to study the short scale length variations in TEC (Total Electron Content) along the signal path in the presence of ionospheric irregularities and scintillations caused by these irregularities. GPS based ionospheric measurement can measure TEC variations smaller than 10-2 TEC unit. In the equatorial region, the Total Electron Content (TEC) is often quite large with large spatial gradients due to its anomaly. An important aspect of the ionospheric ionization (represented by TEC) at equatorial-anomaly latitudes is the frequent occurrence of anomalous nighttime enhancements, which are thought to be caused by the pre reversal strengthening of equatorial fountain. Seasonal, solar activity, latitudinal and inter hemispherical variations of night time enhancements has been studied by several group of workers. GPS data used in the TEC variability study is recorded at the low latitude station Bhopal (23.20° N, 77.54° E, Dip 18.5°) which lies at the crest of equatorial anomaly. Data set has been collected using a dual frequency GPS receiver GSV 4004A. The procured GPS receiver, GSV 4004A is a dual frequency GPS receiver. This receiver computes TEC from both carrier and code measurements at L-Band frequencies and scintillation parameters (amplitude and phase). This paper discusses the night time TEC enhancement observed at low latitude station Bhopal. Data for different seasons has been analyzed and frequent nighttime TEC has been observed. Nighttime TEC enhancement has been mostly observed in the pre-midnight hours. In some cases the nighttime TEC values have been found be greater than daytime TEC values. Pre-mid night enhancement is frequent at latitude near the dip equator ($\pm 17^{\circ}$ latitude), a region known as equatorial anomaly. The purpose of this paper is to describe the local ionospheric conditions for a low latitude station, Bhopal, using a dual frequency GPS receiver during a period of low solar activity.