

Study of magnetic storm effects on the variation of TEC over low, mid and high latitude station

*Roshni Atulkar¹ and P. K. Purohit¹

*National Institute of Technical Teachers' Training and Research, Bhopal – 462002, MP, India.

The ionosphere is very important because of its influence on the passage of radio waves. Total electron content (TEC) is a key ionospheric parameter that describes the major impact of the ionosphere on the propagation of radio waves which are crucial for terrestrial and space communication. The present investigation is dedicated to study the latitudinal variation of ionosphere. The study is carried out by taking three stations one each in low, mid and high latitude regions namely IISC, Bangalore, India (13.020 N, 77.570E), GUAO, Urumqi, China (43.820N, 87.600E) and NYAL, NY-Alesund, Norway (78.920N, 11.860E) respectively. To study the changes in the ionosphere at three selected stations we have considered the GPS observations. The GPS derived TEC values have been collected from the SOPAC (Scripps Orbits and Permanent Array Center) data archive of the IGS (International GPS service). We studied the behaviour of ionospheric Total Electron Content (TEC) during the geomagnetic storms. We have selected 5 intense geomagnetic storms ($Dst \leq -100nT$) that were observed during the year 2012. From our analysis we observed that the effect of geomagnetic storms on VTEC is highest at low latitude, moderate at mid latitude and low at high latitude.

Table 1. Catalogue of all the five selected intense geomagnetic storm events along with Peak Dst.

Event Date	Peak Dst(Min.)
9 March 2012	-143nT
24 April 2012	-104nT
15 July 2012	-133nT
1 October 2012	-133nT
14 November 2012	-109nT

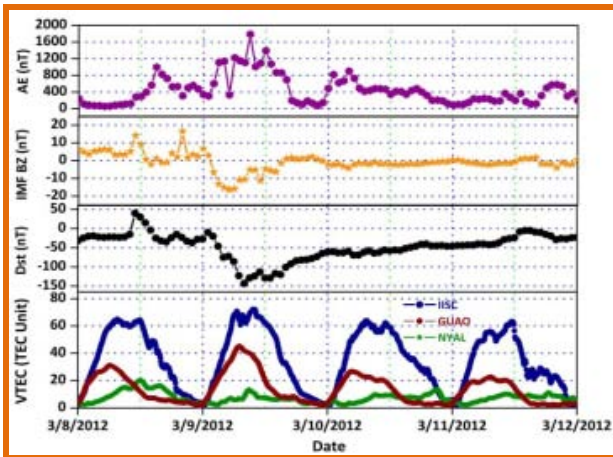


Figure 1:

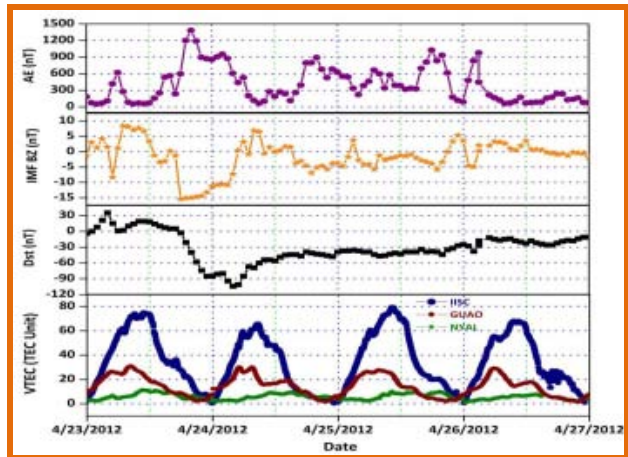


Figure 2

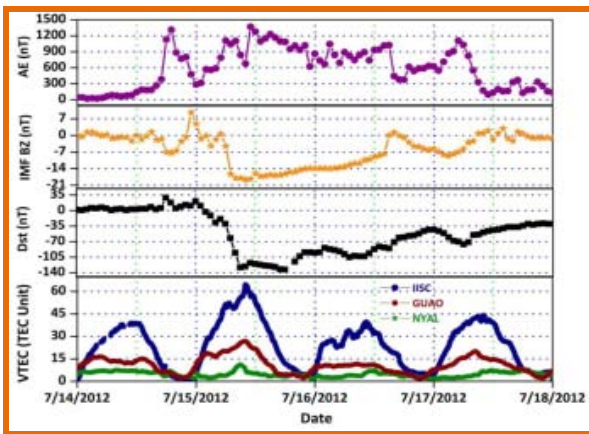


Figure 3

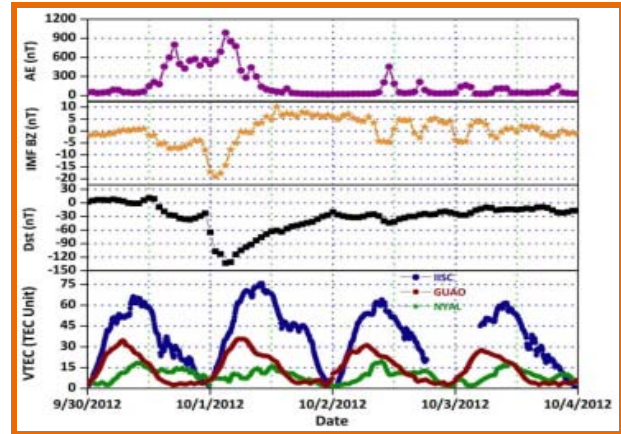


Figure 4

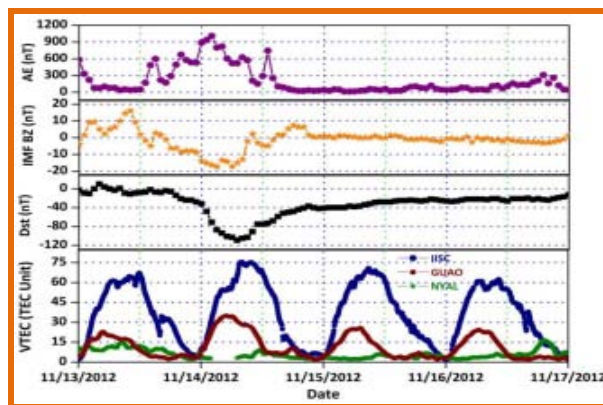


Figure 5

Figure 1, 2, 3, 4, and 5. Plot of temporal evolution of ionospheric VTEC along with Dst, IMF Bz and AE during the geomagnetic storm of 9 March, 24 April, 15 July, 1 October, and 14 November 2012.

References

- [1] Akasofu S-I. (1981) Relationships between the AE and Dst indices during geomagnetic storms. *J. Geophys. Res.* 86:4820–4822. [2] Mendillo M, et al. 1970, Ionospheric storms at midlatitudes. *Radio Sci.*; 5:895–898. and,

doi: 10.1029/RS005i006p00895.[3] Titheridge J E et al.1988. A comparison of Northern and Southern Hemisphere TEC storm behaviour. *J. Atmos. Terr. Phys.*;50:763–780.