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Statistical analysis of ionosphere variation due to solar flare in different seasons during the peak of solar cycle 24

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In the current study, we examined the ionospheric changes due to solar flares that occurred from 2013 to 2015. The X-ray and EUV flux data are obtained from GOES and SOHO. GPS TEC data for the current investigation has been acquired from the international GNSS services network station in Bangalore, India (geomagnetic latitude 4.58^{o}N). During the period of analysis, we examine 10 X class solar flares, 105 M class and 546 C class solar flares. We have analyzed seasonal variation of solar flare effect on the low latitude ionosphere using GPS TEC data.

The analysis shows that a large change in TEC was found in the equinox and a smaller change during the solstice. Mean TEC changes for a C class solar flare are 1.90 TECU, 1.40 TECU, 1.71 TECU, and 1.52 TECU, respectively, during the March equinox, June solstice, September equinox, and December solstice. The mean TEC change for solar flares of the M class is marginally higher than those of the C class (2.29 TECU, 1.51 TECU, 2.53 TECU, and 1.65 TECU). The June solstice, September equinox, and December solstice are 3.10TECU, 5.18TECU, and 0.54TECU, respectively, for X-class solar flares.

In our study, we found that the largest ΔTEC in September equinox (5.18TECU) and smallest ΔTEC change was in December solstice which is 0.54 TECU in X class solar flares. Le et al., (2013) reported the season's dependence on X-class solar flares and found bigger ΔTEC in September equinoxes which is 1.33TECU and smallest in june solstice 0.78 TECU from 1996 to 2006. They conculed that the season reliance of TEC response is thought to be mostly caused by the seasonal change in neutral density. Detail results are presented during the conference.

1. Le, H., Liu, L., Chen, Y., and Wan, W. (2013). Statistical analysis of ionospheric responses to solar flares in the solar cycle 23. Journal of Geophysical Research: Space Physics, 118(1), 576–582. https://doi.org/10.1029/2012JA017934