



Response of ionospheric E and F layers to disturbances associated with major and minor storms of March 2012

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Abstract

The present study investigates the response of E and F layers of the equatorial ionosphere in the Indian sector to six geomagnetic storms (one major and five minor) with Dst index -50nT to -150 nT occurred in March 2012. Variability in the F layer parameters foF₂, hmF₂ and h'F obtained using a digital ionosonde at Trivandrum (TVM, 8.7°N, 77.8°E, Geom. Lat. 0.4°S) has been examined to identify the impact of positive and negative storms on the dip equatorial ionosphere. Further, geomagnetic data from eight stations covering mid-low and equatorial latitudes of both hemispheres have been utilized to identify the effects of Disturbance dynamo (Ddyn) on the ionospheric E-layer. From the study it has been noted that storms on March 8 (Dst~-145 nT) and March 28 (Dst~-68 nT) resulted in Ddyn induced Equatorial counter electrojet over Trivandrum. From the latitudinal profile of geomagnetic data formation of an anti-Sq pattern observed for the major storm of 8th March, for both the hemispheres, and is attributed to Ddyn effects, whereas this pattern was not observed for minor storms. The foF₂ variations from Trivandrum during the period of study have revealed the occurrences of negative ionospheric storms associated with Ddyn events. Additionally, the variations in Total Electron Content (TEC) from the crest and trough of Equatorial Ionization Anomaly have been examined for all the storms and found that TEC along the crest show a significant decline and TEC along the trough show an enhancement due to Ddyn effects associated with major storm on 8th March. This study discusses these aspects in detail.

Keywords: Geomagnetic storm, Disturbance dynamo, Equatorial Ionosphere