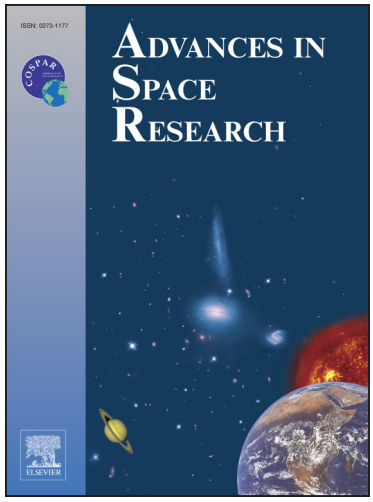

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Hemispheric, seasonal and latitudinal dependence of storm-time Ionosphere during low solar activity period

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Abstract

Analysis of the seasonal, hemispheric and latitudinal variation of the ionospheric F2 peak during periods of disturbed geomagnetic conditions in 2011, a year of low solar activity, had been studied using hourly data obtained from low- and mid-latitude ionosonde stations. Our results showed an enhancement in F2-layer maximum electron density (NmF2) at daytime over low latitudes. For the mid-latitude stations, NmF2 depletion pre-dominates the daytime and overturned at nighttime. In general, the variation in terms of magnitude is higher in the low-latitude than at mid-latitude. The nighttime decrease in NmF2 is accompanied by a corresponding F2 peak height (hmF2) increase and overturned at daytime. The hmF2 response during the equinoctial months is lower than the solstices. NmF2 shows distinct seasonal, hemispheric and latitudinal dependence in its response. Appearance of a significant ionospheric effect in southern hemisphere is higher than in the northern hemisphere, and is more pronounced in the equinoxes at low latitudes. At mid-latitudes, the ionospheric effect is insignificant at both hemispheres. A negative ionospheric response dominates the whole seasons at the mid-latitude except for March equinox. The reverse is the case for the hmF2 observation. The amplitudes of both the NmF2 and hmF2 increase with increasing latitude and maximize in the southern hemisphere in terms of longitude.

Keywords: *NmF2; hmF2; hemisphere; seasons; positive and negative ionospheric response, standard deviation.*

1. Introduction

The effect of geomagnetic disturbances on ionospheric **F-layer** plasma density has been the major concern of space weather researchers. **This plasma** density is strongly disturbed during **episodes of geomagnetic** activity due to various processes. Some of these include penetration of electric field from the magnetosphere, changes in the thermospheric composition and wind circulation, and traveling wave disturbances (Danilov, 2001; Liu et al., 2011; Adebesin et al., 2013a). Latitudinal differences during magnetic disturbances have been reported **in literatures**. The occurrence of positive and negative ionospheric effects shows a strong dependence on local time (Prölss, 1995; Rishbeth, 1998; Mendillo, 2006). The effects during geomagnetic disturbances in the high and mid latitudes had also been extensively reported (Bagiya et al., 2011; Adebesin, 2012; Danilov, 2013).

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