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Midlatitude ionospheric F2-layer response to eruptive solar events-caused geomagnetic disturbances over Hungary during the maximum of the solar cycle 24: a case study

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Abstract

In our study we analyze and compare the response and behavior of the ionospheric F2 and of the sporadic E-layer during three strong (i.e., $Dst < -100\text{nT}$) individual geomagnetic storms from years 2012, 2013 and 2015, winter time period. The data was provided by the state-of-the-art digital ionosonde of the Széchenyi István Geophysical Observatory located at midlatitude, Nagycenk, Hungary (IAGA code: NCK, geomagnetic latitude: $46,17^\circ$ geomagnetic longitude: $98,85^\circ$). The local time of the sudden commencement (SC) was used to characterize the type of the ionospheric storm (after Mendillo and Narvaez, 2010). This way two regular positive phase (RPP) ionospheric storms and one no-positive phase (NPP) storm have been analyzed. In all three cases a significant increase in electron density of the foF2 layer can be observed at dawn/early morning (around 6:00 UT, 07:00 LT). Also we can observe the fade-out of the ionospheric layers at night during the geomagnetically disturbed time periods. Our results suggest that the fade-out effect is not connected to the occurrence of the sporadic E-layers.

Keywords: ionospheric storm, geomagnetic disturbance, space weather, midlatitude F2-layer, sporadic E-layer

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