



Ionospheric variations during sudden stratospheric warming in the high- and mid-latitude regions

Anna Yasyukevich, Sergey Voeykov, and Anna Mylnikova

The Institute of Solar-Terrestrial Physics of Siberian Branch of Russian Academy of Sciences, Irkutsk, Russian Federation
(annpol@iszf.irk.ru)

The ionospheric dynamic in the high- and middle-latitude regions during the periods of sudden stratospheric warmings (SSW) was studied by using the international network of phase dual-frequency GPS/GLONASS receivers and the vertical sounding data. Twelve SSW events that occurred in the Northern Hemisphere 2006 through 2013 were considered. In order to identify the possible response of the ionosphere to SSW events, we carried out the analysis of the total electron (TEC) and the F2-layer maximum electron density (NmF2) deviations from the background level. We have also studied changes of the level of total electron content (TEC) wave-like variations characterized by a special index WTEC. The index reflects the intensity of medium- and large-scale traveling ionospheric disturbances. The dynamics of the high- and middle-latitude ionosphere at the points near the SSW areas was found to differ from the regular. For a large number of events, it is shown that, despite quiet geomagnetic conditions, a noticeable decrease in the NmF2 and TEC values (by 5-10% relative to the background level) is observed during the SSW evolution and maximum stages. On the contrary, for 10-20 days after the SSW maxima, NmF2 and TEC significantly exceed the monthly averaged values. Moreover, these electron density changes are observed for both strong and weak stratospheric warmings, and are recorded mainly during daytime. The observed SSW effects in the polar and mid-latitude ionosphere are assumed to be probably associated with the changes in the neutral composition at the thermospheric heights that affect the F2-layer electron density. The study is supported by the Russian Foundation for Basic Research under Grant No. 16-35-60018, as well as by the RF President Grant of Public Support for RF Leading Scientific Schools (NSh-6894.2016.5).