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Variations of the Total Electron Content of the Ionosphere over Kazakhstan Region

Depending on Solar Activity

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This paper represents the results of the research of the ionosphere over Kazakhstan region (Almaty [76˚55′E; 43˚15′N]). It was found that variations of both, the integral electron content of I (t) and the electron density of the maximum of layer F2, "track" changes in the solar activity. Moreover, there was denoted an increase in daily values of the total electron content of ionosphere by 5-6 times (changes in nightly values approximately in 8 times) during the years of maximum solar activity in comparison with the years of minimum solar activity. Furthermore, the ratio of critical frequencies of F2 layer in conditions of maximum solar activity to *fo*F2 in minimum solar activity changes over the range (1,7÷2,0) for midday and (1,3÷1,8) for midnight.

One particular case that sticks out is that total electronic content is not dependent on solar activity within the range of F10,7 <80 units, while over the range of 80<F10.7 <(150÷200) the positive correlation is observed, which can be defined as linear function of the form $y = \mathbf{b}_1 x + \mathbf{b}_0$. Starting from the values of F10.7>(150÷200) units dependence of total electronic content on F10.7 weakens again (after increase of values of F10.7 growth of TEC values practically stops).

We also studied the diurnal variations of the absolute values of the total electron content for Almaty during the periods of high Solar activity (2012), using the IONEX maps (ftp://cddis.gsfc.nasa.gov/pub/gps/products/ionex). During quiet geomagnetic periods at night, regardless of the season, the local electron density changes within the range of $\sim$(8-12)$\times 10^{16}$ el/m^2, while the highest variations in the spring surpass the lowest in winter to 50%. During the daytime, the maximum amplitude of variations occurs on the vernal equinox, when the local electron density rises to $\sim$(39-40)$\times 10^{16}$ el/m^2 at 10 UT, what is $\sim$2.5 times higher than the variations of amplitude in the winter and in $\sim$1.8 and $\sim$2.0 times higher than the variations of amplitude in the spring and summer. Day to day TEC variability under quiet geomagnetic conditions does not exceed 10-12%.