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The ionospheric disturbances during low Solar activity years and influence of them on HF radio waves propagation

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Vertical and oblique-incidence sounding data obtained from ionosouders, located in the north-eastern region of Russia have been used to study ionospheric disturbances during moderate geomagnetic storms (Dst $>$-120 nT) for 2005-2007 and during geoactive period of December 2006. It is shown that disturbances with a periods $\sim$1-4 hours occur during main phase of the moderate storms. These disturbances produce the changes in the height of F2 layer maximum $\sim$40 - 100 km and in the critical frequency $\sim$1,5-2,0 MHz. These changes affect on the variations of maximal observed frequency (MOF) on investigated paths. Similar wave disturbances may be caused by a generation AGW in auroral zone and their propagation to equatorial latitudes. December 2006. is characterized by a high flare activity. Some optic and X-ray flares including four X-class flares were recorded in December from 5^{th} to 7^{th} and from 13^{th} to 16^{th}. After the flares major negative ionospheric disturbances and sporadic Es layers with high frequencies were observed.

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