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Short-term forecasting of the maximum observed frequency on middle-latitude paths of oblique ionospheric sounding

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In present work results of researches of spatial and time correlation of maximum observed frequency (MOF) on two middle-latitude paths of oblique sounding are submitted: Inskip – Rostov and Cyprus – Rostov for 2-7 December 2006. The search of time correlations for the referred paths was realized in consideration of a delay of MOF values from 5 up to 120 minutes. The research of dynamics of spatial correlation was executed taking into account the time shift (1 hour) between MOF of Inskip – Rostov and Cyprus – Rostov because of distinction in a geographical position of points of reflection.

The significant variation of values of time correlation coefficient on both paths is found out, that specifies on ionosphere instability. The radius of MOF time correlation at a level $0.5\mathrm{R}_{0.5}$ makes $\sim$ 40-50 min at day time and $\sim$ 50-60 min at night time for Inskip – Rostov path, and for Cyprus – Rostov path$\mathrm{R}_{0.5}$ $\sim$ 30-40 min in day time and $\sim$ 50-60 min at night time for quiet geomagnetic conditions. The change of correlation sign takes place for day time that is the most notably during weak ($Dst > -50$ nT) geomagnetic disturbance. Probably, it is connected to passing of traveling ionospheric disturbances (TID) through the area of radiowave reflection. The comparison of dynamics of time correlation coefficient for each path allows us to estimate the speed of TID drift in conditions of weak geomagnetic disturbance and during quiet times.

The establishment of spatial connection between maximum observed frequencies for researched paths of oblique sounding was carried out by search of linear correlations

for each of days of a researched interval. It is revealed, that high correlation between maximal observable frequencies on researched paths is observed for all examined days, and the level of correlation does not change essentially. It can mean, that at a small general level of disturbance (Dst $\sim$ – 50 nT), as well as during quiet times, changes of spatial distribution of electronic concentration in meridional and latitudional directions on scales $\sim$ of 1600 km (distance between points of reflection for two paths) occur synchronously.

The presence of high spatial correlation (up to 94 %) between MOF on two paths has allowed to execute the restoration of data sets on the Cyprus – Rostov path with using Inskip – Rostov path original data by method of artificial neural networks. The efficiency of a network learning was up to 97 %.

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