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Study of Correlationships between Main Ionospheric Parameters by Stochastic Modeling

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We employ multivariate statistic methods applied to long period daily observational data for find out time shifts between fundamental ionospheric parameters. The F2 layer critical frequency (foF2), Kp index, and solar radiation flux at 10.7cm (F10.7 index), and relative sunspot number R as indicators of phase of solar cycle as studied time series was used. As a paralel observed series was utilized E10.7 (Solar EUV index based on F10.7) and TEC series. The foF2 data series measured from mid-latitude ionosonde stations was used.
For investigation of relationships between time and geographic variations of parameters studied we employ the method of the conditional independence graphical models (CIG) which describing and transparently representing structure of dependence relationships in the time series. This method appears useful for studying the correlationships between fundamental ionospheric parameters and can be applied even in the case when classical parametric methods are not convenient, e.g. for non-continuous time series etc. We consider the structure of pairwise dependence of its individual components, looking for the maximum likelihood estimate of the variance matrix under conditions given by the graphical model. The CIG method allowed implementation of additional time series variables into previous model. Simultaneously we used clasical stochastic model. The data best fit relationship model is computed.