Analysis of ionospheric parameters using graphical models

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The main topic of this work is to study the influence of geomagnetic disturbances and solar activity on thermal plasma parameters. We employ multivariate statistic methods applied to long period daily observational data obtained using ionosondes.

For the investigation of relationships between time variations of ionosphere parameter F2 layer critical frequency (foF2) and solar radiation flux at 10.7cm wavelength (F10.7 index) we use graphical models [1, 2, 3] which describe and transparently represent the structure of dependence relationships in the time series. We compare this method with a common correlation analysis results and we use it for time delay searching.

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. Deviance is used as a test statistics and the particular graphical model is selected by Iterative Proportional Fitting. The data best fit model is computed. First results of such an approach are presented.

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