

Complex (selected) monitoring of the ionosphere with GPS and ionosondes

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The important question related to the ionosphere is its large scale characteristics. The global ionosonde's site was in the past the only tool to sound and monitor the global features of the bottom- side of the ionosphere. However the satellite systems at the Earth orbits bring new possibilities to radiograph the all layers of the ionosphere to give the global picture of vertically integrated slab of the ionosphere. The top-side sounding of the ionosphere it is possible as well.

The ground-based and satellite monitoring of ionospheric parameters is performed at discrete points spread over the Earth surface or along the satellite orbits. To construct the global model of the ionosphere on the base of these types of data any regularisation is needed. In course of this work the geo-statistics methodology was used to construct on the base of the monitoring data the maps of selected parameters of the ionosphere. However, close to the single monitoring station the evolution of structural function of the ionosphere in due course of time determines the strength of correlation in any domain of the characteristics.

Thus, it makes possible to compare the range of correlation of any parameters of the ionosphere like $N(h)$ or TEC in different geophysical conditions. We have performed this study to determine the variogram of characteristics as well as structural function for the set of GPS and ionosonde data base at mid- and high- latitudes during ionospheric storms in few steps:

- Calculate TEC and F_{max} maps based on observations and analyze dependence of the storm phase effect on the location of the geomagnetic pole.
- Compare the structural functions of TEC and F_{max} at selected single points.