



Generation of hourly global maps of the ionospheric peak electron density and peak height from GPS_TEC maps

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The instantaneous maps of the F2 layer peak density and height are in high demand in satellite communication and space based GNSS systems, but such maps are available online only on regional scale from few data centers. At the same time Global Ionospheric Maps, GIM-TEC, are available online since 1998.

Since October 2010, UPC (one of the IGS centers that produce GIM) started to provide GIM on an hourly basis using a Kriging interpolation. The hourly UPC GIM-TEC serve as an input to IRI-Plas to obtain a more realistic scale parameters foF2 and hmF2. The model updated parameters will, in turn, be utilized in the conversion of GIM-TEC 2-D maps to the 3-D global ionosphere maps.

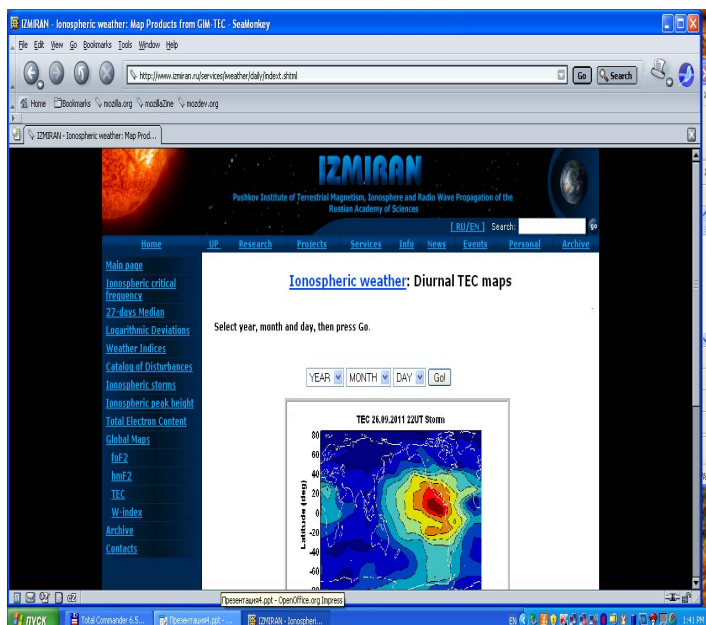


Fig. 1. Source UPC-TEC map

To fill gaps in ionosonde observations, the GIM-TEC assimilation technique is applied for 3-D reconstruction of electron density profile with automatic generation of the F2 layer peak electron density (critical frequency foF2 map) and the F2 layer peak height map using the International Reference Ionosphere model extended to the plasmasphere (IRI-Plas) [1]. The IRI-Plas is an important tool in estimation of ionospheric parameters. Generation of instantaneous foF2 map and hmF2 map from GIM-TEC maps extends the IRI-Plas predicting capabilities from monthly averages to near real time forecasts of the ionosphere parameters [2,3].

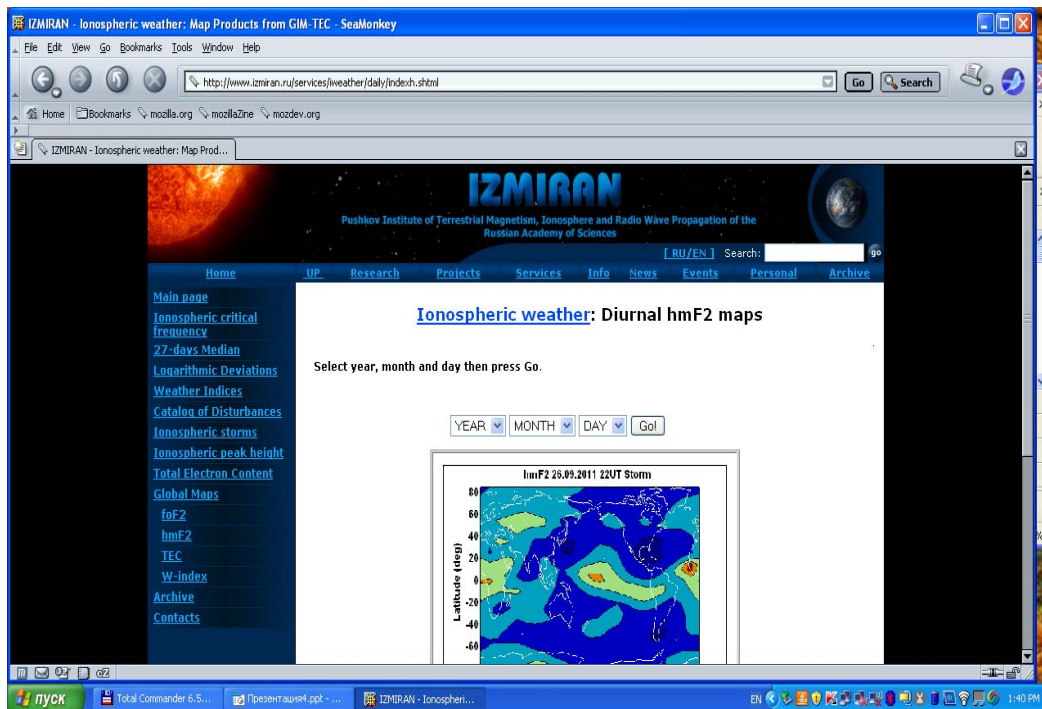


Fig. 2. The hmF2 global map produced from UPC-TEC map at IZMIRAN web site [3]

To maintain net-volume, TEC map in IONEX format is transformed to foF2 and hmF2 maps in IONEX format in geographic frame from -87.5 to 87.5 deg. in step of 2.5 deg. in latitude, -180 to 180 deg. in step of 5 deg. in longitude. The proposed cost-effective technique is implemented at (<http://www.izmiran.ru/services/iweather/>) providing online the numerical global maps of the ionosphere peak electron density and peak height as a new product of GIM-TEC.

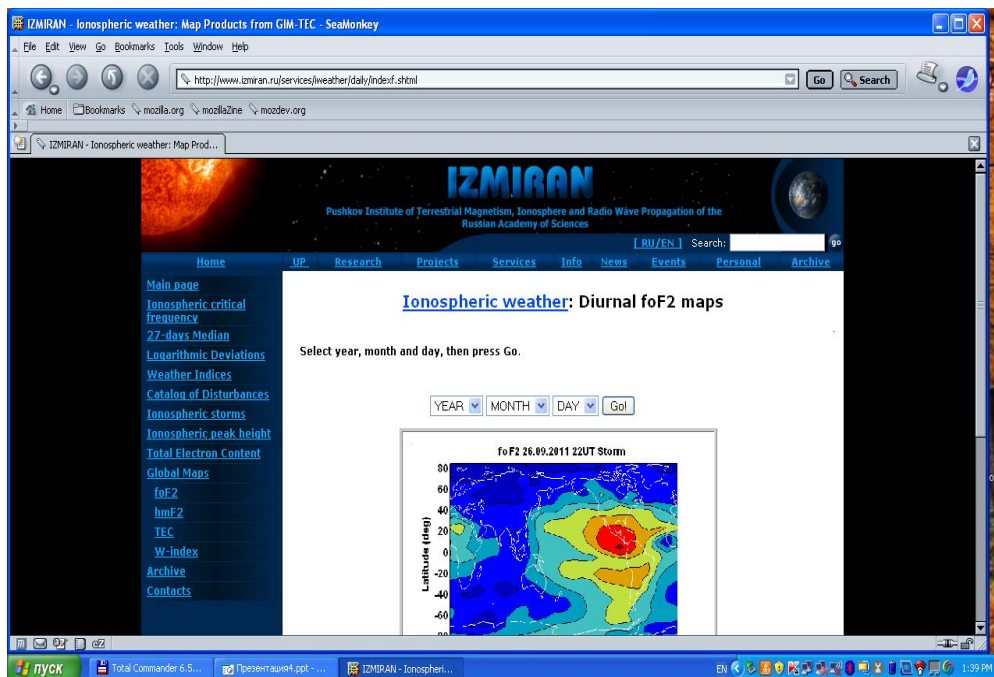


Fig. 3. The foF2 global map produced from UPC-TEC map at IZMIRAN web site.

Acknowledgements. This study is supported by the joint grant from TUBITAK EEEAG 110E296 and RFBR 11-02-91370-CT_a. The vertical total electron content TEC data are extracted from the GPS derived GIM-TEC maps produced by UPC online at <ftp://cddis.gsfc.nasa.gov/pub/gps/products/ionex/>.

References

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