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Comparison of global ionospheric maps, high-orbital and low-orbital radio tomography.

Viacheslav E. Kunitsyn, Elena S. Andreeva, Ivan A. Nesterov, Svetlana A. Kalashnikova, and Artem M. Padokhin
M.V. Lomonosov Moscow State University, Faculty of Physics, Russia

Observations on the GPS receivers networks which are being actively developed at present provide the input data for constructing global ionospheric maps (GIM) of the distributions of total electron content (TEC) in the ionosphere. The methods applied in the GIM construction at several data processing centers are different although all based on the common idea of finding the appropriate model parameters to fit the selected model of the vertical distribution of electron density to the observed GPS data. At the same time, the existing global IGS network together with several regional GPS networks open the possibility for solving the problem of 4D (spatiotemporal) ionospheric radio tomography (RT) based on the data of high-orbiting navigational satellite systems (the high orbital radio tomography, HORT). The approaches used in HORT are similar to those applied and found highly efficient in 2D low-orbital radio tomography (LORT).

The purpose of the present work is to compare TEC estimations based on GIMs, calculated by different centers, with HORT and LORT reconstructions observed at different geomagnetic activity. The results of such comparison along RT systems in Russia and Alaska during the periods of geomagnetic storms of 2003-2004 are reported and discussed. The reconstructions for quiet periods are basically similar, although higher GIM and HORT TEC compared to LORT TEC, which might be due to the plasmaspheric contribution, are still noteworthy. However, during the geomagnetic storms, GIM TEC significantly differs from either LORT and HORT TEC.

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