Comparative analysis of TEC maps and HF propagation conditions

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Conditions of high frequency wave propagation in the ionosphere can be determined using parameter MUF=M3000F2*foF2, that is mainly by parameter foF2. Idea to use TEC for the determination of HF propagation conditions was seemed to be very attractive because there is a close connection between parameter total electron content (TEC) and foF2 (coefficient of correlation is often close to 0.8-0.98). This idea is implemented by a number of assimilative models of the ionosphere. Differential TEC values are sufficient in many scientific and applied cases but absolute TEC values are required to determine propagation conditions. In this paper are used values of TEC provided by: 1) model IRI (IRI2001 and IRI2007 with two new options of Bilitza and NeQuick), 2) database TEC RAL, 3) various official maps (JPL, CODE, UPC, ESA), 4) computer code of TEC determination from RINEX files for individual stations, 5) computer code of tomographic approach. Experimental data apply to year 2003 and European region (as examples). Comparison was done by means of absolute deviation and RSME of foF2 values calculated from TEC from observational values foF2 for various stations. The main results are as follows. 1. In the major cases new options of the IRI model significantly decrease deviations of foF2(model) from foF2(obs). In other cases both of options increase differences depending on latitude. 2. Values from database TEC RAL are artificially lowered and sometimes incorrect. 3. In the major cases values of TEC from CODE map provide the best results. Values of JPL maps are always overestimated. 4. The best results are provided by calculation utilizing average monthly biases.