



Reference total electron content: global 30-day average empirical VTEC maps for rapid assessment of weather-climate deviation

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Since 1998, the International GNSS Service (IGS) Ionosphere Working Group has been continuously releasing global maps of vertical total electron content (VTEC) in rapid, final, and predicted schedules. The IGS Ionosphere Combination and Validation Center (ICVC) at University of Warmia and Mazury is responsible for an ensemble analysis of the global VTEC maps synthesized independently by several ISG Associate Analysis Centres by applying the observation uncertainty weights determined by validating the VTEC data against the original slant TEC measurements. Comparison of the ICVC-released “weather” VTEC maps to their quiet-time “climate” counterpart is a powerful instrument in the space physicist toolbox: such deviation maps allow rapid evaluation of the anomalous near-space plasma dynamics as it responds to a wide variety of effects in the Sun-Earth system, ranging from the forces acting in the outer space to the processes on the surface and even underneath the Earth’s crust. However, development of such global reference quiet-time VTEC maps proved to be a difficult task, given the staggering complexity and dynamics of the constituent subsystems and the intersystem coupling mechanisms. Our approach to the task of building a reference for the deviation maps is to compute daily empirical 30-day running average VTEC. Such averaging is expected to smooth out effects from any ongoing events (that would otherwise distort the presentation of ionospheric/plasmaspheric climate) while still preserving the specifics of the annual cycle. The main objective of presented work is to introduce such global 30-day average empirical TEC maps into GAMBIT Explorer software used to build deviation maps for ionosonde-derived global maps of the bottomside ionospheric plasma.