On the use of IGS TEC maps for ionospheric storm-time specification: scientific user requirements for modelling and service developments

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The Total Electron Content (TEC) grid, provided by the International GNSS Service (IGS), offers a global coverage with an estimated accuracy of 2–8 TECU, time resolution of 2 hours, and spatial resolution of 5° in longitude and 2.5° in latitude. IGS TEC has been extensively used for developing empirical and assimilative TEC models needed for trans-ionospheric time delay or range error corrections in various navigation and remote sensing applications, for TEC calibration and forecast. This presentation will address some existing possibilities and challenges of using IGS TEC maps, particularly for ionospheric specification during storm-time conditions. In our studies (Stankov et al., 2010, 2012; Stankov, 2014), it has been established that, during geomagnetic storms, the TEC relative deviations from the quiet-time, average behaviour depends on the storm time elapsed but also on season, local time, and latitude. Statistical analyses of storm events allowed us to develop a European model for the TEC storm-response applicable to ionospheric forecast. Here we report on our further use of IGS TEC data, in combination with ionosonde measurements, to investigate the (storm-time) behaviour of other ionospheric characteristics such as slab thickness and time/spatial gradients. Also reported are validations with local GNSS measurements. We discuss the obstacles encountered and some feasible improvements of the IGS TEC data provision.

References:

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