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Assessment of ionospheric models in GNSS single frequency positioning at low latitude regions

Xurxo Otero Villamide, Bruno Nava, and Sandro M. Radicella
The International Centre for Theoretical Physics, Trieste, Italy (xotero_v@ictp.it)

The derivation and improvement of accurate TEC models is necessary to enhance accuracy for single frequency GNSS applications, as far as real-time precise positioning solutions at a reduced cost for the receiver are concerned.

In the present work the CODE vertical total electron content (TEC) maps, the standard NeQuick2 and NeQuick for Galileo models have been assessed in terms of their capabilities to evaluate the TEC values and therefore to provide the relevant ionospheric range delay corrections for single frequency GNSS measurements.

Different positioning algorithms have been applied to demonstrate the effectiveness of the cited ionospheric models. They are the standard positioning service, with L1 pseudorange measurements and the precise point positioning (PPP), based on both L1 pseudorange and carrier phase measurements with accurate orbit and clock information.

Particular attention has been devoted to the position solutions in low latitude regions where, due to the presence of the Equatorial Anomaly, strong electron density and TEC gradients exist and the ionospheric models are less effective in providing the range delay corrections needed to achieve high accuracy levels.