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Neutrospheric delay using NWP model over the Brazilian territory: assessment of the recent improvements

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In the Meteorological sciences the atmospheric layers are classified according to the temperature and pressure. The first layer is from 8 to 12 km and it is called Troposphere. However, if the electronic composition is taken into consideration the electronically neutral layer extends to up to 50 km and is named Neutrosphere. The neutrospheric refraction generated in the radio frequency signal propagation, due to thermodynamic characteristics of the atmosphere, can be divided in two components: one generated by the dry gases influence, the hydrostatic component, and another by water vapor influence, the wet component. When these components are taken into account, they can generate significant errors in the GNSS (Global Navigation Satellite System) positioning. Brazil territory has regions with very different climatic characteristics, in which the neutrosphere theoretical models (empirical models) are not totally representative, mainly because they were built based on average values of pressure and temperature. Numerical Weather Prediction (NWP) models are one of the great alternatives to minimize such nuisance parameter. Center for Weather Prediction and Climate Studies from Brazilian Institute for Spatial Researches (CPTEC/INPE) in Brazil provides a regional NWP model, currently used to produce Zenithal Neutrospheric Delay (ZND) predictions. In the last years two versions were available. The first one with spatial resolution of 20 km and temporal resolution of 6 hours was made available until February 2012. It was replaced by a second model with spatial resolution of 15 km and temporal resolution of 3 hours. From a robust assessment of the neutrospheric delay over the Brazilian territory it was possible to perform an analysis of the ZND regional behavior. In this contribution will be presented a seasonal overview of the ZND over different regions of Brazil, which an evaluation of the ZND estimates considering the new temporal and spatial resolutions will also presented. In this evaluation it will be used as reference the ZND estimates from the GOA-II (GNSS-Inferred Positioning SYstem and Orbit Analysis Simulation Software) software.