Geophysical Research Abstracts
Vol. 19, EGU2017-19533, 2017
EGU General Assembly 2017

Atmospheric oscillations comparison on long term tropospheric delay time series derived from ray-tracing and GPS

Thalia Nikolaidou and Marcelo Santos

The caused time delay induced by the atmosphere on the GNSS signals (NAD), depends primarily on the amount of atmosphere the signal traverses till it reaches to the Earth's surface and can exceed t 20 m for low elevation angles (around 3 degrees). For a particular ray i.e. satellite/quasar-antenna link, the delay depends on the atmospheric parameters of total pressure, temperature, and the partial pressure of water vapor. Because of that, numerical weather models (NWM) have already proven beneficial for atmospheric modelling and geodesy.
By direct raytracing, inside NWM, the VMF1 and the University of New Brunswick VMF1 (UNB-VMF1) (Urquhart et al. 2011), access the 3D variation of the meteorological parameters that determine the delay thus being the state-the-art mapping functions used today. The raytracing procedure is capable of providing NADs delays for any point on the Earth's surface.
In this study we study the impact of regional numerical weather models, with high spatial and temporal resolution, namely 25km and 6h. These models outweigh the currently used NWM by having about 2.6 times better spatial resolution. Raytracing through such NWM, using the independent raytracing algorithm develop at UNB (Nievinski, 2009), we acquire superior quality NADs with regional application.
We ray-trace for the International GNSS service (IGS) network stations for a time span of 11 years. Benchmarking against the IGS troposphere product is performed to access the accuracy of our results.
A periodicity analysis is conducted to examine the signature of atmospheric oscillations on the NAD time series. In order to recognize the NAD periodicities, we compared our product against the GPS-derived IGS troposphere product. Systematic effects within each single technique are identified and long-term NAD stability is accessed.