Geophysical Research Abstracts
Vol. 17, EGU2015-1756-1, 2015
EGU General Assembly 2015

Impact of the numerical weather model's horizontal resolution on ray-traced delays and VLBI analysis

Armin Hofmeister, Daniel Landskron, and Johannes Böhm
Department of Geodesy and Geoinformation, Vienna University of Technology, Austria

Space geodetic applications such as Very Long Baseline Interferometry (VLBI) or Global Navigation Satellite Systems (GNSS) depend on accurate tropospheric slant delays in order to correct the influences of the troposphere on the observations. In this context ray-tracing is an alternative method for the determination of the tropospheric slant delays compared to the common way of determining them via zenith delays and mapping functions. In order to estimate ray-traced slant delays, information about the troposphere in terms of refractivity values along the ray paths of the observations are needed. These can be derived from a numerical weather model (NWM), which therefore serves as the main input for the ray-tracing method. When choosing the appropriate NWM as data base for the ray-tracing, there is also the possibility or requirement of defining the specific horizontal resolution of the NWM. Now, as the ray-tracing algorithms are dependent on the refractivities derived from the NWM, the selected horizontal resolution may have significant impact on the resulting ray-traced slant delays. For the purpose of assessing the effect of the NWM's horizontal resolution on the ray-traced delays, we use our new ray-tracing programme RADIATE in order to determine the delays. As meteorological data input we use a NWM from the European Centre for Medium-Range Weather Forecasts (ECMWF) with different horizontal resolutions, e.g. 0.125° x 0.125° and 1° x 1°. As observational data input we use the CONT11 campaign of the International VLBI Service for Geodesy and Astrometry (IVS) covering 15 days of continuous VLBI observations. We compare the estimated ray-traced delays derived from the same NWM with different horizontal resolutions in order to see the direct effect on them. Furthermore the ray-traced slant delays are used in VLBI analysis to assess the impact of the different horizontal resolutions of the NWM in terms of baseline length repeatability.