An evaluation of positioning error estimated by the mesoscale non-hydrostatic model

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We are now evaluating atmospheric parameters (equivalent zenith wet delay and linear horizontal delay gradients) derived from VLBI, GPS, and WVR by comparing with the ray-traced slant path delay through the two days data sets of the non-hydrostatic numerical weather prediction model with 5 km horizontal resolution. Our ultimate purpose is to establish the new method for reducing the atmospheric effect. Thus, it is significant important to grasp the variability of the positioning error due to the atmospheric disturbance such as the intense mesoscale phenomena. We calculate the slant delay using ray-tracing technique through the two days data sets of the non-hydrostatic numerical weather prediction model (NHM). The NMH which we used provides temperature, humidity and geopotential height at the geosurface and at 38 surfaces of constant pressure (which vary between 1000 and 10 hPa), for each node in a 5 km by 5 km grid that covers all of central Japan and surrounding ocean. We perform ray tracing experiments for the entire grid points at 16 separate epochs corresponding to the successive operational runs of the NHM between 1200 UT 10/19/2000 and 1200 UT 10/20/2000. At each station-epoch we traced about 100 rays to the station with roughly uniform density (count per unit solid angle) on the upper hemisphere, so as to approximate a sampling geometry similar to both GPS and VLBI. The delays for these 100 rays for each station, and for each epoch, constitute the (input) data. We will present comparative results for several assumed baselines in the NHM field.