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Evaluation of numerical simulation of positioning errors using numerical weather prediction models

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The tropospheric delay is one of the major error sources in the positioning using the space geodetic techniques such as GNSS. Although the positioning errors due to tropospheric delay are largely reduced by estimation of tropospheric gradients parameters, which have been adopted in the new analysis strategy of GEONET, there still remain positioning errors that are likely to be caused by tropospheric noise.
We investigate a possibility of using numerical weather prediction models for correction of positioning errors. We use two data for the investigation. One is the Japan Meteorological Agency (JMA) meso scale numerical weather prediction model (MSM) with 10km horizontal resolution and 3-hour temporal resolution. The other is the high-resolution numerical weather model with 2 km horizontal resolution and 1-hour temporal resolution. This model assimilates JMA meso-scale analysis data and SST data. In the previous report (JPGU,2009), we reported that the positioning errors simulated by the JMA MSM are very small compared with the observed remaining positioning errors due to tropospheric delay. But positioning errors simulated by the high-resolution model clearly correlated with the observed ones.
After that horizontal resolution of objective analysis for JMA MSM changed 5km from 10km and GPS precipitable water vapor, which is obtained from GEONET, has been assimilated into JMA MSM since October, 2009. So we evaluate the impact of resolution change and assimilation GPS PWV on tropospheric delay and positioning errors simulated by JMA MSM. In addition, we evaluate positioning errors simulated by the high-resolution model by some statistical methods.