Evaluation of site position solution of the Tsukuba 2000 Campaign considering the deviation of water vapor

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We evaluate the time variations of the solutions of site position in GPS meteorology 2000 Campaign carried out during October and November 2000 in Tsukuba. The date in analysis is 36days during 286 day of year (doy) and 319 doy. In the analysis GPS sites are divided to 10 groups according to the kind of receiver and antenna, and IGS sites are included to each group as fiducial. GAMIT program is applied to the analysis, and estimate the site position every day. GLOBK program connect all groups in a day with IGS global solutions estimated by Scripps Institution of Oceanography. Thus we obtain one day solutions and final site coordinates are estimated using all one day solutions. Scherneck's ocean tide model is adopted in the ocean tide correction. To obtain one day solutions global 14 IGS sites including Tsukuba (TSKB) and Usuda (USUD) sites in Japan are used as fiducial and tightly constrained the horizontal coordinates. In the obtained final solution, the internal errors of the Tsukuba 2000 Campaign sites are generally less than 1 mm in horizontal components and less than 1.5 mm in vertical.

In the time variations of the loose-constrained vertical components of the Tsukuba 2000 Campaign sites, all sites varies together with the maximum amplitude of 30 mm, indicating the rigid network motion of the Tsukuba 2000 campaign sites. One-sigma repeatability is 4 – 5 mm in the most of sites. To evaluate the relation between the deviation of the vertical component and the zenith tropospheric delay, some part indicates positive correlation, but no correlation is seen in general.

To remove the rigid variation of the network, we calculate the difference between one site (TSKB) in the network and the other sites. Thus the time variations of the vertical component of the difference are less than 20 mm, with the one-sigma repeatability 2 – 4 mm in the most of sites.

On the other hand, the daily variations of the zenith delay do not seem to be scattered among the network sites, although the daily variations of the vertical component of the baseline vectors among the network sites scatter largely. The comparison between the time variations of the vertical component of the baseline vector and the daily-averaged zenith delay in each site indicates small correlation (correlation coefficient 0.0533). The scatters of the baseline vector do not cause the water vapor variations with the scale presented by the zenith delay.

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