Analysis of GPS observation network applying ITRF 2005 coordinates system

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Updated international terrestrial reference frame, ITRF 2005, is released in October 2005 (Altamimi, IGS Mail 5432, 2006). IGS (International GNSS Service) began to apply the updated coordinates for the analysis of the IGS global network since November 5, 2006. Because more than five years observation data are newly available since the release of the former reference frame, ITRF 2000, in ITRF 2005 some IGS sites added in the table, velocities as well as coordinates on the reference epoch are added in some IGS sites, and in general error ellipsoid becomes around one-order smaller compared with the ITRF 2000 reference frame, and regional reference frame is more accurately established for instance in the eastern Asia.

In NIED, referencing with about 20 IGS sites in the eastern Asia, the central Pacific, and the north America, the time variations of about 60 GPS site network in the western Kanagawa Prefecture, the Izu Peninsula, and the Tokai area were monitored using GEONET and NIED GPS tracking data applying the ITRF 2000 coordinates system. In this paper, we evaluate the coordinate solutions of the network applying the ITRF 2005 coordinates system compared with the solutions by the ITRF 2000 system for the data in 2005.

Almtamimi gives the multiple coordinates to the periods divided by the co-seismic variations, antenna changes and another reasons to change the site coordinates. On the other hand, IGS gives unique coordinates for each IGS site (Ferland, IGS Mail 5447, 2006). Thus the ITRF 2005 reference frame given by Altamimi do not completely coincide with the reference frame used in IGS analysis (IGS_05.snx). For the analysis of the past data, the discrepancy must become larger. In this paper we use the coordinates given by Altamimi. We use GAMIT/GLOBK GPS analyzing software. Because it is very difficult to give the coordinates which differ every epoch in GAMIT, the coordinates of the last epoch are used in the GAMIT analysis. In the evaluation of the GLOBK analysis, for the fiducial IGS site coordinates we use complete ITRF 2005 coordinates set given by Altamimi, which may include gaps of the coordinates in some epochs for each IGS site.