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Evaluation of IGS reproduction precise ephemeris applying the analysis of Japanese domestic GPS network data (Part 2)

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International GNSS Service (IGS) revised the conditions to calculate GPS precise ephemerids after 1400 GPS week (November 5, 2006) and 1410 GPS week (January 14, 2007). IGS recalculates precise ephemerides for the weeks before 1410 GPS week applying the same conditions with those after 1410 week (IGS reproduction ephemeris).

Shimada (2010) evaluates IGS reproduction orbit analyzing about 90 GEONET and 5 NIED GPS network sites in Tokai-Izu area for the period during 1997 and 1998 with about 15 IGS network sites in and around Eastern Asia applying the IGS reproduction orbit and the IGS final orbits and comparing the site coordinates repeatability of the Tokai-Izu sites obtained using those two orbits. In the analysis site coordinates, zenith delay parameters, tropospheric gradients, and ambiguities of Tokai-Izu and IGS sites, orbit parameters, and the EOP parameters are estimated. By the comparison there is very little difference between the repeatabilities applying those two orbits. The little difference may be caused by the orbit relaxation approach in the analysis adopting the ITRF2005 site coordinates and velocities (Altamimi et al., 2007) for the IGS fiducial sites, and the approach makes very little difference between those two improved orbits.

Therefore in this study we fix those two orbits and analyze the same datasets with the same conditions but fixing orbits, and compare the site repeatabilities of the Tokai-Izu sites applying the IGS reproduction and final precise ephemerides. In the result the averages and standard deviations of the sites repeatabilities of Tokai-Izu sites applying the IGS reproduction orbit are 2.0 ± 0.9 mm, 2.6 ± 0.8 mm, and 6.4 ± 1.3 mm for N-S, E-W, and U-D components respectively. On the other hand, those applying the IGS final orbit are 2.1 ± 0.9 mm, 3.0 ± 0.8 mm, and 7.1 ± 1.2 mm respectively. Judging with the standard deviation the difference is not significant, but especially for E-W and U-D components the repeatabilities of the reproduction orbit seem to improve compared with those of the final orbit.

Keywords: IGS reproduction precise ephemeris, site coordinates repeatability