

Evaluation of IGS reproduction precise ephemeris applying the analysis of Japanese domestic GPS network data (Part 3)

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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 (2011) evaluates IGS reproduction orbit analyzing about 90 GEONET and 5 NIED GPS network sites in Tokai-Izu area for the period during 1996 and 1999 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 are estimated. In the result the sites repeatabilities of Tokai-Izu sites applying the IGS reproduction orbit are improved especially for E-W and U-D components compared with those applying the IGS final orbit, although the improvement is not significant compared with the standard deviation of those repeatabilities.

In this study, we examine the systematic biases of the station coordinates between the reprocessed and the IGS final orbits, and we find that the coordinates applying the original final orbit deviate in north, east, and upward compared with those applying the reprocessed orbit although the difference is not significant compared with the uncertainties of site coordinate solutions. Then we examine the systematic discontinuity of the station coordinates between the periods of the different reference frames applied in the IGS final orbit, and find that the jump between ITRF94 and ITRF97 is far larger than that between ITRF96 and ITRF97, although the most jumps are not significant compared with the one sigma uncertainties.

Keywords: IGS reproduction precise ephemeris, systematic biases of site coordinates, systematic discontinuity of site coordinates