



Accuracy Assessment for PPP by Comparing Various Online PPP Service Solutions with Bernese 5.2 Network Solution

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GNSS precise point positioning (PPP) technique is frequently used for geodetic applications such as monitoring of reference stations and estimation of tropospheric parameters. This technique uses the undifferenced GNSS observations along with the IGS products to reach high level positioning accuracy. The accuracy level depends on the GNSS data quality as well as the length of the observation duration and the quality of the external data products. It is possible to reach the desired positioning accuracy in the reference frame of satellite coordinates by using a single receiver GNSS data applying PPP technique.

PPP technique is provided to users by scientific GNSS processing software packages (like GIPSY of NASA-JPL and Bernese Processing Software of AIUB) as well as several online PPP services. The related services are Auto-GIPSY provided by JPL California Institute of Technology, CSRS-PPP provided by Natural Resources Canada, GAPS provided by the University of New Brunswick and Magic-PPP provided by GMV.

In this study, we assess the accuracy of PPP by comparing the solutions from the online PPP services with Bernese 5.2 network solutions. Seven days (DoY 256-262 in 2015) of GNSS observations with 24 hours session duration on the CORS-TR network in Turkey collected on a set of 14 stations were processed in static mode using the above-mentioned PPP services. The average of daily coordinates from Bernese 5.2 static network solution related to 12 IGS stations were taken as the true coordinates.

Our results indicate that the distributions of the north, east and up daily position differences are characterized by means and RMS of 1.9 ± 0.5 , 2.1 ± 0.7 , 4.7 ± 2.1 mm for CSRS, 1.6 ± 0.6 , 1.4 ± 0.8 , 5.5 ± 3.9 mm for Auto-GIPSY, 3.0 ± 0.8 , 3.0 ± 1.2 , 6.0 ± 3.2 mm for Magic GNSS, 2.1 ± 1.3 , 2.8 ± 1.7 , 5.0 ± 2.3 mm for GAPS, with respect to Bernese 5.2 network solution.

Keywords: PPP, Online GNSS Service, Bernese, Accuracy