

GPS analysis software effects on geodynamical application: Case study on ocean loading in Brittany, NW France

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The GAMIT 10.2 GPS analysis software is usually used for geodynamical applications and sometimes with different processing strategies. Estimated parameters can depend on the chosen strategy, in particular with respect to the reference frame realization and to the tropospheric parameterization which can induce artifact mainly on the vertical component. The aim of this paper is to test various GPS analysis softwares on a single case study and to analyze the possible effects of the methodology used on the geodynamical results. In addition to GAMIT, we use BERNESE, GINS, and the Precise Point Positioning (PPP) strategy of GIPSY/OASIS II. To compare the strategy analysis, we use GPS data acquired during a 6-month campaign performed in northwestern France, Brittany, in 2004, in order to study ocean loading. In this region, ocean tides can reach up to 10 m and induce crustal displacements up to 12 cm peak-to-peak on the vertical component and cm-level displacements on the horizontal components. Since the geodynamical signal is larger than the processing artifacts, this data set is well suited for multi-software analysis. Moreover, in this specific case we need short sub-daily solutions to study short-period signals (at least diurnal and semi-diurnal periods) instead of classical 24h-average solutions. This condition makes the solution very sensitive to the processing strategy and it is therefore essential to quantify the software impact on the GPS positioning. The different solutions are compared to the predicted positioning time series based on FES2004 model, which is considered as our reference in this study.