Ocean loading effects in a high time resolution GPS analysis. Implications and artefacts with GINS software.

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The today's geodynamical and navigation applications of GNSS are being processed by a large variety of softwares where each one of them implements its own analysis strategy. The estimated unknown parameters of a LSQ (recursive or iterative) procedure can depend on theses strategies (reference frame definition, tropospheric parameterisation, ambiguity resolution, receiver's antenna effect, stochastic parameterisation etc.) which can induce artefacts in the estimated positions and velocities of geodetic points.

The aim of this study is to analyse the geodynamical results coming from the methodology used by GINS GPS software. We are currently examining a DD network solution together with the Precise Point Positioning (PPP) strategy implemented in our software. To compare the strategies analysis, we use a set of 10 days from the 6 months GPS data acquired in the north-western France, Brittany in 2004 in order to study ocean loading. The ocean tides of this region can reach up to 10 m and produce loading effects up to 12 cm peak-to-peak on the vertical component and some cm-level displacements on the horizontal components of geodetic stations. In this specific case we need high time resolution GPS solutions to study short-periodic signals (diurnal, semi-diurnal, tier-diurnal, quart-diurnal, fifth-diurnal, sixth-diurnal, seventh-diurnal, and eighth-diurnal period signals) instead of classical 24h or hebdo-average solutions. Moreover, the equivalence in some cases between the loading effect and the processing artefacts sets up a sensitivity condition for the processing strategy (ambiguity resolution problem, constraints, tropospheric delay, ad-hoc models etc.). For example in GRGS we are currently producing our own GPS orbits and a comparison of the solutions with the ones from IGS orbits is examined. So it is essential to quantify the software's strategies impact on the GPS positioning.

The different solutions are compared to the predicted positioning time series based on FES2004 (LEGOS) model in a local geodetic system NEU, which is considered as our reference in this study.