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GPS Precise Point Positioning : an alternative to differential positioning ?

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GNSS geodetic positioning using the classical double-difference approach may have some limitations. For example, fixing ambiguities can be challenging for long baselines, while processing short baseline only give the relative displacement between the two stations. In this context and thanks to the continuous improvement of IGS GNSS orbit and clock products, the Precise Point Positioning (PPP) technique appears in the recent literature as a powerful alternative.
If all local Earth deformations are correctly taken into account, residuals of position time series may be used to assess the processing quality in terms of receiver performance and environment, constellation orbits and clocks error projection, and processing options pertinence. The main limitation of most of the current PPP processing strategies is that ambiguities can not be fixed to integer values. However, Mercier et al. (2006) demonstrated that GPS satellite hardware biases can be a priori identified in such a way that using a consistent set of GPS orbits, clocks and biases, phase ambiguities recover their integer nature. The CNES-CLS IGS Analysis Center is being providing such set of data since November 2009.
This study evaluate the performance of PPP including High-Rate solutions in front of the nowadays requirements of geodesy. We processed data from several IGS sites in order to compute coordinate series on a daily basis but also at higher frequencies (down to 30 second interval). The impact of fixing ambiguities on PPP solutions has been investigated. We demonstrate that most of the artefacts affecting “floating” PPP solutions disappeared when ambiguities are fixed. In addition relative kinematic integer PPP series show the same level of repeatability than the classical Double-Difference solutions.