Geophysical Research Abstracts,
Vol. 11, EGU2009-12681, 2009
EGU General Assembly 2009

Precise Point Positioning Ambiguity Resolution: Are we there yet?

FN Teferle (1), J Geng (1), X Meng (1), AH Dodson (1), M Ge (2), C Shi (3), and J Liu (3)

(1) Institute of Engineering Surveying and Space Geodesy, University of Nottingham, Nottingham, United Kingdom (norman.teferle@nottingham.ac.uk, +44 (0)115 9513881), (2) GFZ German Research Centre for Geosciences, Potsdam, Germany, (3) GNSS Centre, Wuhan University, Wuhan, P. R. China

Precise point positioning (PPP) has become a powerful tool for the analysis of Global Positioning System (GPS) measurements in many geoscientific applications. By using the un-differenced ionosphere-free linear combination of the carrier phase observations together with precise satellite and Earth rotation products, sub-centimeter accuracies can be achieved when observing over 24 hours. One limiting factor for PPP, especially in obtaining similar accuracies over shorter observation time spans, was the inability in resolving the carrier phase integer ambiguities, when using data from a single station only, due to the presence of receiver- and satellite-dependent uncalibrated hardware delays (UHD). These offsets originate in the frequency oscillators and it is usually assumed that they are absorbed by the ambiguities in PPP data processing. However, recent studies show that if these UHD can be determined accurately in advance within a reference network, then PPP ambiguity resolution at a single station becomes possible. Similarly to Ge et al. (2007), we determine wide-lane and narrow-lane UHD by averaging the fractional parts of all involved single-difference (between satellites) wide-lane and narrow-lane ambiguity estimates. We then apply these UHD products as ambiguity corrections to recover the integer property of the single-difference wide-lane and narrow-lane ambiguities during PPP. A refinement to the approach by Ge et al. (2007) benefits from the increased stability of the narrow-lane UHD computed from a regional rather than a global reference network. This allows the use of only one set of narrow-lane UHD estimates between a pair of satellites within each continuous tracking period of that pair by the regional network, as opposed to re-computing them at regular (for example 15 minute) intervals. Although this refinement may come with the restriction to a regional scale, the number of UHD parameters to be estimated is significantly reduced, making our approach also applicable to real-time applications if the required satellite orbit and clock, UHD, and Earth rotation products are disseminated in real-time.

In this presentation we will show results obtained from our new strategy. In particular, we present statistics of daily and sub-daily PPP solutions with ambiguities resolved, investigate the extent to which our approach is useful in respect of the regionally-estimated UHD and apply the technique to investigate ocean loading deformations associated with a storm surge in the North Sea.