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Receiver Clock Modelling for GPS-only Gravity Field Recovery from GRACE

E. Orliac (1), A. Jaeggi (1), R. Dach (1), U. Weinbach (2), and S. Schoen (2)

(1) Astronomical Institute, University of Bern, Bern, Switzerland (etienne.orliac@aiub.unibe.ch), (2) Institut für Erdmessung / QUEST, Leibniz Universität Hannover, Hannover, Germany (weinbach@ife.uni-hannover.de)

Previous results from the authors [1, 2] show that for stations connected to highly stable clocks (H-Maser), kinematic Precise Point Positioning (PPP) solutions for the height component can be highly improved. A reduction of up to 70% of the standard deviation of the kinematic position could be observed if the receiver clock is modelled with a second order polynomial instead of estimating independent epoch-wise clock corrections. Although those initial results are very promising, the applicability of such an approach is rather limited since very stable clocks are hardly portable.
The only "truly" kinematic objects carrying a GPS receiver connected to a stable clock are the two GRACE satellites. In this paper we investigate the impact of the deterministic modelling of the receiver clocks in the determination of kinematic positions for the two GRACE satellites. Solutions from both contributing institutions, namely the Astronomical Institute of University of Bern and the Institut für Erdmessung of Leibniz Universität Hannover are considered. Comparisons with standard kinematic and reduced-dynamic orbit solutions will be provided and technical aspects discussed. Finally, based on one month of data, gravity fields from all kinematic solutions are derived and compared.

[1] Orliac, E., R. Dach, D. Voithenleitner, U. Hugentobler, K. Wang, M. Rothacher, and D. Svehla (2011). Clock Modeling for GNSS Applications, AGU Fall Meeting 2011, San Francisco, USA, December 5-9, 2011.
[2] Weinbach, U., and S. Schön (2011). GNSS receiver clock modeling when using high-precision oscillators and its impact on PPP, J. Adv. Space Res., 47(2):229-238 DOI: 10.1016/j.asr.2010.06.031.