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Impact of empirical parameters on precise orbit determination and prediction of GNSS satellites

Thomas Papanikolaou, Tzu-Pang Tseng, and Michael Moore
Geoscience Australia, Canberra, Australia (thomas.papanikolaou@ga.gov.au)

Precise orbit determination and prediction are major objectives underlying in all real-time GNSS applications. The accuracy of the GNSS predicted orbits is critical in the case of high precision approaches such as the Precise Point Positioning (PPP) method. The current study focuses on GNSS orbit propagation based on full force model and the use of empirical parameters estimated over previous orbit arcs. In particular, we apply a precise orbit determination approach considering empirical forces that include bias and cycle per revolution terms. The orbit propagation is performed based on single-step numerical integration methods and the use of the previously estimated parameters. We investigate the strength of these empirical parameters in terms of orbit accuracy and arc length. The study aims at quantifying the impact of the empirical parameters on the GNSS orbit propagation over following arcs.