



On the Impact of GPS phase centre corrections on geodetic parameters: analytical formulation and empirical evaluation by PPP

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Several contributions and papers in geodesy intensively discuss the impact of the variability of GPS/GNSS absolute phase centre corrections (PCCs) directly on the positioning domain, neglecting any studies on the observation domain. Furthermore, it is very complex to evaluate in a general way the impact of several PCCs in geodetic positioning due to the different positioning concepts (e.g. PPP, relative positioning in networks) as well as implementation philosophy. Up to know, it is not clear how accurate different PCCs have to be for an individual geodetic grade antenna, in order to assume no significant and negative impact on the geodetic parameter estimation. Currently, individual calibrations have to be comparable of at least below 1mm.

The poster will cover this topic by studying the observation domain as well as the geodetic position domain. The used approach is based on a pragmatic method, investigated by Geiger (1988), using generic PCC pattern. The contribution is divided into an analytical approach and an empirical approach. The analytical step discusses in detail the mathematical model and the propagation of error functions, classified by several antenna models. The empirical step evaluates these findings by practical experiments carried out with pre-defined errors on PCCs within a geodetic positioning estimation (PPP) using different software packages.

We will show on the one side that some symmetrical error contributions of typical geodetic antenna designs can be described very well by this simple and pragmatic approach. The theoretical findings are compared to PPP solutions, revealing differences between the used software packages. On the other side, we show that asymmetrical error contributions are highly correlated with the satellite constellation and the geographical location.

References:

Geiger A. (1988): Modeling of Phase Centre Variation and its Influence on GPS-Positioning, In GPS-Techniques Applied to Geodesy and Surveying, Lecture Notes in Earth Sciences, Springer, Volume 19, pages 210-222