Elimination of the day-boundary jump of BDS Inter System Bias and its applications

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Abstract: Inter System Bias (ISB) is a necessary parameter in the Multi-GNSS combined positioning and combined satellite precise orbit determination (POD). The numerical example on BDS ISB estimation demonstrated that the serial of ISB is not relatively stable, and there are day-boundary discontinuities between days. The day-boundary jumps appear mainly since the observation, BDS orbit and satellite clock products are generally provided by one day, however, the initial conditions and error influences (e.g. tropospheric delay, multipath) between days are usually different, which is partly absorbed by ISB in the Multi-GNSS positioning. Here we propose and apply two methods to eliminate these discontinuities. The first one is to regard the day-boundary jumps as outliers to cancel out, then the nine-order Lagrange interpolation is used to recover the ISB values. The other one is to conduct continuous solutions with applying a priori ISB constraint. With these two methods a smoother serial ISB can be obtained. Thus these processed ISB, which used as a given value or a priori constraint, can be applied to predict the ISB of the following days in the positioning. It is conducive to reducing the convergence time and improving the accuracy of solutions.
Keywords: Inter System Bias; BDS; day-boundary; Lagrange interpolation; a priori constraint