



Processing of multi-GNSS constellations based on raw observations

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With the modernization of GPS and GLONASS and the advent of Galileo, BeiDou, and regional satellite systems, there is now a multitude of signals available for ground station networks to observe. As a result, the complexity of deriving GNSS products like satellite orbits, clocks, station positions, and signal biases increases significantly when dealing with all these signals at once. The raw observation approach was developed to cope with this increased complexity in multi-GNSS processing. It is based on undifferenced and uncombined observations and therefore allows full exploitation of the information contained in each individual observable and preserves the original measurement accuracy. While the approach was developed with the aim of multi-GNSS processing, it was initially tested and evaluated using only the GPS constellation to limit the complexity of the software implementation. It is now being expanded to full multi-GNSS processing, the details of which will be the main topic of this submission. One focus lies on how inter-frequency and inter-system signal biases are handled during processing. The time-variability of those and related parameters and possible modeling strategies will be investigated, e.g. by modeling clocks and biases as stochastic processes. The resulting multi-GNSS products are compared with those of the IGS MGEX analysis centers to evaluate the performance of the raw observation approach.