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TIGA Tide Gauge Data Reprocessing at GFZ

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To analyse the tide gauge measurements for the purpose of global long-term sea level change research a well-defined absolute reference frame is required by oceanographic community. To create such frame the data from a global GNSS network located at or near tide gauges are processed. For analyzing the GNSS data on a preferably continuous basis the International GNSS Service (IGS) Tide Gauge Benchmark Monitoring Working Group (TIGA-WG) is responsible.

As one of the TIGA Analysis Centers the German Research Centre for Geosciences (GFZ) is contributing to the IGS TIGA Reprocessing Campaign. The solutions of the TIGA Reprocessing Campaign will also contribute to 2nd IGS Data Reprocessing Campaign with GFZ IGS reprocessing solution. After the first IGS reprocessing finished in 2010 some improvements were implemented into the latest GFZ software version EPOS.P8: reference frame IGb08 based on ITRF2008, antenna calibration igs08.atx, geopotential model (EGM2008), higher-order ionospheric effects, new a priori meteorological model (GPT2), VMF mapping function, and other minor improvements. GPS data of the globally distributed tracking network of 794 stations for the time span from 1994 until end of 2012 are used for the TIGA reprocessing. To handle such large network a new processing strategy is developed and described in detail. In the TIGA reprocessing the GPS@TIGA data are processed in precise point positioning (PPP) mode to clean data using the IGS reprocessing orbit and clock products. To validate the quality of the PPP coordinate results the rates of 80 GPS@TIGA station vertical movement are estimated from the PPP results using Maximum Likelihood Estimation (MLE) method. The rates are compared with the solution of University of LaRochelle Consortium (ULR) (named ULR5). 56 of the 80 stations have a difference of the vertical velocities below 1 mm/yr. The error bars of PPP rates are significant larger than those of ULR5, which indicates large time correlated noise in the PPP solutions.