



Computation of Estonian CORS data using Bernese 5.2 and Gipsy 6.4 softwares

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GNSS permanent station network in Estonia (ESTREF) was established already in 2007. In 2014-15 extensive reconstruction of ESTREF was carried out, including the establishment of 18 new stations, change of the hardware in CORS stations as well as establishing GNSS-RTK service for the whole Estonia. For GNSS-RTK service one needs precise coordinates in well-defined reference frame, i.e. ETRS89.

For long time stability of stations and time-series analysis the re-processing of Estonian CORS data is ongoing. We re-process data from 2007 until 2015 with program Bernese GNSS 5.2 (Dach, 2015). For the set of ESTREF stations established in 2007, we perform as well computations with GIPSY 6.4 software (Ries et al., 2015).

In the computations daily GPS-only solution was used. For precise orbits, final products from CODE (CODE analysis centre at the Astronomical Institute of the University of Bern) and JPL (Jet Propulsion Laboratory) for Bernese and GIPSY solutions were used, respectively. The cut-off angle was set to 10 degrees in order to avoid near-field multipath influence. In GIPSY, precise point positioning method with fixing ambiguities was used. Bernese calculations were performed based on double difference processing. Antenna phase centers were modelled based on igs08.atx and epnc_08.atx files. Vienna mapping function was used for mapping tropospheric delays. For the GIPSY solution, the higher order ionospheric term was modelled based on IRI-2012b model. For the Bernese solution higher order ionospheric term was neglected. FES2004 ocean tide loading model was used for the both computation strategies.

As a result, two solutions using different scientific GNSS computation programs were obtained. The results from Bernese and GIPSY solutions were compared, using station repeatability values, RMS and coordinate differences.

KEYWORDS: GNSS reference station network, Bernese GNSS 5.2, Gipsy 6.4, Estonia.

References:

Dach, R., S. Lutz, P. Walser, P. Fridez (Eds); 2015: Bernese GNSS Software Version 5.2. User manual, Astronomical Institute, University of Bern, Bern Open Publishing. DOI: 10.7892/boris.72297; ISBN: 978-3-906813-05-9.
Paul Ries, Willy Bertiger, Shailen, Shailen Desai, & Kevin Miller. (2015). GIPSY 6.4 Release Notes. Jet Propulsion Laboratory, California Institute of Technology. Retrieved from <https://gipsy-oasis.jpl.nasa.gov/docs/index.php>