



Earth rotation and GNSS orbits from one-day and three-day arcs

Simon Lutz (1), Stefan Schaer (2), Rolf Dach (1), Gerhard Beutler (1), Peter Steigenberger (3), Michael Meindl (4), and Adrian Jäggi (1)

(1) Astronomical Institute, University of Bern, Bern, Switzerland (simon.lutz@aiub.unibe.ch), (2) Federal Office of Topography swisstopo, Wabern, Switzerland, (3) Institut für Astronomische und Physikalische Geodäsie, Technische Universität München, München, Germany, (4) Institute of Geodesy and Photogrammetry, ETH Zurich, Zürich, Switzerland

The Center for Orbit Determination in Europe (CODE) is one of the analysis centers of the International GNSS Service (IGS). It is estimating satellite orbits and consistent sets of Earth rotation parameters (ERPs) for the final, rapid, and ultra-rapid product lines of the IGS. The solutions are derived from a combined multi-system (GPS and GLONASS) analysis of the GNSS tracking data.

Since September 2012 two series of final solutions are operationally generated and submitted to the IGS: the first is based on the observations from exactly one day (requirement of the IGS) and the second stacks the one-day normal equations of three consecutive days to get orbital arcs and piecewise linear Earth rotation parameters which are continuous at the boundaries of the middle day.

The same two solution types were produced for the second reprocessing campaign of the IGS (covering the interval from 1994 to the end of 2013; GLONASS starts in 2002). The estimation of the polar motion rates reveals serious deficiencies in the case of the one-day solutions (probably due to interferences with the sub-daily ERPs). Suspicious signatures in the time series of the estimated parameters not visible in the three-day solutions are systematically disturbing the results of the one-day solutions. Artifacts with periods typical for the GLONASS constellation are clearly visible in the one-day solutions, but to a much lesser extent in the three-day solutions. This becomes even more evident in an alternative series generated as consistent (even regarding the station selection) GPS- and GLONASS-only products over four years (2007-2011).