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Use of RTIGS data streams for validating the performance of the IGS Ultra-Rapid products

Gottfried Thaler and Robert Weber

Technical University of Vienna, Institute for Geodesy and Geophysics, Advanced Geodesy, Vienna, Austria (gthaler@mars.hg.tuwien.ac.at)

The IGS (International GNSS Service) Real-Time Working Group (RTIGS) disseminates for several years raw observation data of a globally distributed steady growing station network in real-time via the internet. This observation data can be used for validating the performance of the IGS predicted orbits and clocks (Ultra-Rapid (IGU)). Therefore, based on pre-processed ITRF- station coordinates, clock corrections w.r.t GPS-Time for GPS-satellites and site-receivers as well as satellite orbits are calculated in quasi real-time and compared to the IGU solutions.

The Institute for "Geodesy and Geophysics" of the Technical University of Vienna develops based on the software RTIGS Multicast Receive (RTIGSMR) provided by National Resources Canada (NRCan) the software RTIGU-Control. Using Code-smoothed observations RTIGU-Control calculates in a first step by means of a linear KALMAN-Filter and based on the orbit information of the IGUs real-time clock corrections and clock drifts w.r.t GPS-Time for the GPS-satellites and stations. The second extended KALMAN-Filter (kinematic approach) uses again the Code-smoothed observations corrected for the clock corrections of step 1 to calculate the positions and velocities of the satellites. The calculation interval is set to 30 seconds. The results and comparisons to IGU-products are displayed online but also stored as clock-RINEX- and SP3-files on the ftp-server of the institute, e.g. for validation of the performance of the IGU predicted products.

A comparison to the more precise but delayed issued IGS Rapid products (IGR) allows also to validate the performance of RTIGU-Control. To carry out these comparisons the MatLab routine RTIGU-Analyse was established. This routine is for example able to import and process standard clock-RINEX-files of several sources and delivers a variety of comparisons both in graphical or numerical form. Results will become part of this presentation. Another way to analyse the quality and consistency of the RTIGU-Control products is to use them for positioning in post-processing mode. Preliminary results are already available and will also be presented.

Further investigations will deal with upgrading RTIGU-Control to become independent of the IGU products. This means to initialize the KALMAN-Filter process using the orbits (and also clocks) from IGU but to use for all further calculation steps the own established orbits. This procedure results in totally independent satellite orbit and clock corrections which could be used for example instead of the broadcast ephemerides in a large number of real-time PPP applications.