Improved UT1 estimation from VLBI Intensive sessions through combination with GNSS data

Tobias Nilsson, Maria Karbon, and Harald Schuh

GFZ German Research Centre for Geosciences, Section 1.1, GPS/Galileo Earth Observation, Potsdam, Germany
(nilsson@gfz-potsdam.de, +49 331 288 1111)

The VLBI Intensives are 1-hour long Very Long Baseline Interferometry (VLBI) sessions performed every day in order to estimate Universal Time (UT1). The accuracy that can be achieved is however limited because of the short observation time and the fact that normally only two stations are participating in these sessions. Hence many parameters need to be fixed to some a priori values, and errors in these will result in errors also in UT1. In particular, since it is impossible to estimate both UT1 and polar motion with observations from only a single baseline, accurate a priori polar motion estimates are needed. In this work we investigate the possibility to improve the UT1 estimates from the Intensives by a combination with the Length of Day (LOD) and the polar motion estimated from Global Navigation Satellite Systems (GNSS) data. The combination is performed with a Kalman filter, optimized in such a way that the short term UT1 variations are mostly determined by GNSS LOD while the UT1 from the VLBI Intensives determine the long term variations. We evaluate the results by comparing with the UT1 obtained from the analysis of standard 24-hour VLBI sessions. Furthermore, we investigate the possible improvements in UT1 that can be achieved by also combining the estimated tropospheric zenith wet delays and gradients from the Intensives and from GNSS.