EGU2020-3625
https://doi.org/10.5194/egusphere-egu2020-3625
EGU General Assembly 2020

Contribution of Galileo observations to improve the quality of daily and sub-daily earth rotation parameter estimates

Dzana Halilovic and Robert Weber
TU Vienna, Department of Geodesy and Geoinformation, Vienna, Austria (dzana.halilovic@geo.tuwien.ac.at)

The European GNSS Galileo became almost fully operational with 22 usable satellites in orbit and two testing satellites on the extended orbit. Since the introduction of the first Galileo satellite in December 2005, it became an important complement in GNSS applications to the already established GPS and GLONASS. The combination of Galileo with GPS observations allows to achieve an increased accuracy of precise parameter estimation.

GNSS-based applications are one of the most important methods to derive estimates of the pole coordinates x, y and the LOD (Length-of-Day). In previous work, the potential to improve GNSS observations for the estimation of hourly earth rotation parameters (ERP), based on a Multi-GNSS approach, has been investigated. The analysis covered a 6 month's (August 2017 – December 2017) time period and considered a globally distributed network of approximately 160 GNSS stations. For around 75 stable stations, an NNR (No-Net-Rotation) constraint to their ITRF2014 coordinates was applied and precise GPS+Galileo ephemerides provided by ESA were used (based on an improved SRP apriori box-wing model for the Galileo satellites). On top solar radiation pressure coefficients were estimated using the empirical CODE orbit model (ECOM). Two solutions were applied, a GPS-only and a combined GPS+Galileo solution.

Meanwhile a reprocessing of the same time series was performed, based on an upgraded stable GNSS station network. Again, a GPS-only and a combined GPS+Galileo solution was carried out. The processing of the new time series has been extended for the whole year of 2017 and the first half of 2018, to provide more reliable results.

In this presentation, comparisons of 1- and 3-day arc ERP solutions with the IERS reference model IERS2010XY will be examined and discussed. Additionally, the different solution types (GPS-only and GPS+Galileo) from the first and reprocessed run were compared. From both GNSS solutions, amplitude corrections for tidal waves were estimated and analyzed w.r.t. the IERS2010XY reference model.