



GNSS scale determination using chamber calibrated ground and space antenna pattern

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Global Navigation Satellite Systems (GNSS) does traditionally not contribute to the scale of the terrestrial reference frame (TRF) since the satellite antenna offsets are not sufficiently known to the scientific community and need to be estimated. In 2016, the European GNSS Agency (GSA) disclosed the satellite antenna calibrations for the Galileo In Orbit Validation (IOV) satellites. In November 2017, also the antenna corrections for the Full Operational Capability (FOC) satellites have been disclosed. With the second disclosure the antenna phase center offsets (PCO) and phase center variations (PCV) for most of the Galileo constellation (the calibrations for the last 8 satellites are not yet released) are now publically available. In addition to Galileo, the Cabinet Office, Government of Japan (CAO) has also released the satellite antenna calibrations for QZSS.

For the receiver antennas the situation is different. Most of the receiver antennas in the IGS network have type-mean calibrations based on dual frequency robot calibration. Since these calibrations include only GPS and GLONASS, no patterns for the second Galileo frequencies are available at the moment (the assumption that E1 is similar to L1 seems reasonable). Chamber calibrations from the University of Bonn include all frequencies covering a wide range of antennas used within the IGS/MGEX. After an IGS call for antenna chamber calibrations, many institutions provided their calibrations to this study.

We will present a study which aims to assess the potential of chamber calibrations within a Multi-GNSS (MGEX) solution (namely Galileo) for the determination of a GNSS scale. A scale contribution from GNSS would allow future International TRF (ITRF) solutions to not only depend on VLBI and SLR for the scale determination but also to use terrestrial GNSS as a third technique.