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Impact of different individual GNSS receiver antenna calibration models on geodetic positioning

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Since April 2011, the igs08.atx antenna calibration model is used in the routine IGS (International GNSS Service) data analysis. The model includes mean robot calibrations to correct for the offset and phase center variations of the GNSS receiver antennas. These so-called "type" calibrations are means of the individual calibrations available for a specific antenna/radome combination.

The GNSS data analysis performed within the EUREF Permanent Network (EPN) aims at being as consistent as possible with the IGS analysis. This also applies to the receiver antenna calibrations. However, when available, individual antenna calibrations are used within the EPN analysis instead of the "type" calibration. When these individual calibrations are unavailable, then the EPN analysis falls back to (type) calibrations identical as the ones used within the IGS (igs08.atx).

The aim of this study is to evaluate the significance of the offset caused by using different receiver antenna calibration models on the station position. Using the PPP (Precise Point Positioning) technique, we first investigate the differences in positioning obtained when switching between individual antenna calibrations and type calibrations. We analyze the observations of the 43 EPN stations equipped with receiver antenna individually calibrated over the period covering from 2003 to 2010 and we show that these differences can reach up to 4 mm in horizontal and 10 mm in vertical.

Secondly, we study the accuracy of the individual calibrations models and we evaluate the effect of different sets of individual calibrations on the positioning. For that purpose, we use the data from 6 GNSS stations equipped with an antenna which has been individually calibrated at two calibration facilities recognized by the IGS: GEO++ and Bonn institute.