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Absolute antenna phase center corrections and their impact on GPS results

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In parallel with the switch to the new International Terrestrial Reference Frame ITRF2005 in April/May 2006 the International GNSS Service (IGS) intends to switch from a relative to an absolute modeling of the GPS antenna phase centers. Till today phase center variations (PCVs) relative to the reference antenna AOAD/M_T, whose PCVs are assumed to be zero, are in use for the receiver antennas, whereas the behavior of the satellite antennas is almost ignored (block-specific z-offsets only, no PCVs). In contrast to that, the new absolute model (igs_05.atx) comprises absolute robot calibrations carried out by the company Geo++ for the most important receiver antennas and PCVs and offsets consistent with them for the transmitting antennas on board the satellites. The block-specific PCVs that are only nadir-dependent so far as well as the satellite-specific vertical offsets w.r.t. the center of mass are the result of a homogeneous reprocessing of more than 10 years of IGS data performed by GFZ and TUM using two independent software packages. Besides the avoidance of systematic errors on long baselines the advantage of absolute receiver antenna PCVs compared to relative ones is the consideration of the azimuth-dependence as well as the availability down to 0° elevation. Furthermore, the effect of radomes on the phase center position will be considered for several antenna types.

The upcoming transition from relative (for receivers only) to absolute PCVs (for receivers and satellites) together with the consideration of several radome types will cause significant changes in the station coordinates and the terrestrial scale. We intend to demonstrate the influence of different PCV sets (relative, absolute with block- or satellite-specific z-offsets, absolute with or without azimuth-dependent satellite an-

tenna PCVs, absolute with or without radome calibrations) on global GPS solutions. In particular we will focus on the scale w.r.t. ITRF2000 as well as on selected time series of station coordinates and troposphere zenith delays by comparisons of homogeneously reprocessed multi-year time series. Besides, the dependence of the coordinate results on the selected elevation cut-off angle will be analyzed for the different PCV sets.

Absolute GPS phase center corrections also help to reduce tropospheric zenith delay biases between GPS and VLBI at co-located stations. We will demonstrate the quality of the absolute PCVs on the one hand and evaluate different troposphere mapping functions (Niell mapping function, Isobaric mapping function, ...) on the other hand.