DORIS satellite phase center determination and consequences on the derived scale of the terrestrial reference frame

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We analyzed several years of DORIS data to estimate daily determination of satellite antenna phase center corrections. For each DORIS satellite, we considered long-term time series of such individual estimations, looking for possible biases, discontinuities, trends or annual signals. All SPOT satellites show very similar patterns, showing a significant constant bias of about 20 mm as well as a clear annual signal of 10 mm amplitude. For TOPEX and Jason, comparisons with similar studies based only on GPS measurements will be presented and discussed. A constant annual error in the DORIS phase center correction would directly map in the scale of the Terrestrial Reference Frame (TRF), through systematic errors in the ground beacon vertical coordinates. Currently, all recent DORIS IGN/JPL solutions show a clear offset of -3 ppb with ITRF (equivalent to 19 mm in station height). Similarly, annual errors in the satellite phase center offset could also potentially map into annual signal in the TRF scale, as currently seen in the IDS solutions with a current amplitude of 0.6 ppb (equivalent to 4 mm in all station heights). In a second step, we have used these corrections to compute satellite orbits, station coordinates and daily polar motion using DORIS data in single and multiple satellite solutions. We compared these results internally (toward previous DORIS results) or externally (toward a GPS reference), to look for any improvement in accuracy. In particular, we investigated if the estimated radial phase center offset and the estimated annual signal are sufficient to explain or not the current bias or annual signal with regards to the ITRF2005 scale.