



Time-variable distortion of the Earth's shape due to errors in GPS satellite antenna phase-center offsets

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Systematic errors in models of the GPS satellite antenna phase-center offsets can have a significant effect in estimates of site position, specially on its vertical component. The spatial pattern of this vertical error has a pronounced geographical dependence, thus inducing a distortion of the Earth's shape. This global distortion cannot be corrected by a coordinate transformation (i.e., rotation, translation, and scale factor) and can affect the accuracy of the ITRF. Furthermore, phase-center offset errors can vary with time as satellites age and the GPS constellation is upgraded, thus inducing a time-varying global distortion that can affect the stability of the ITRF. Realistic simulations using the latest set of GPS satellite phase-center offset estimates imply seasonal vertical errors with amplitude of the distortion at the mm level and global vertical velocity errors at the mm/yr distortion level. We will present these simulations and show that these errors would be greatly reduced if GPS satellite antenna phase-center offsets were calibrated to 0.1-meter level.