Modeling and Observation of Loading Contribution to Time-Variable GPS Sites Positions

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We investigate loading consequences on the time-variable GPS station positions of hundred stations around the world during the 2001-2006 time span. We model the three dimensional site displacements using a Love number formalism to describe the elastic deformation of a spherical Earth's model submitted to atmospheric, oceanic and hydrological loadings. Our AOH model is computed 6-hourly at all GPS sites and includes atmospheric (ECMWF), oceanic (MOG2D) and hydrological (GLDAS) loadings. We compute site position time series using the GPS analysis software GAMIT/GLOBK with or without integrating a combination of loading models and study their impact on recovered 3D site positions. We compare the variability of modeled and observed site positions (without integrating loading in the GAMIT Software) and we discuss the variability reduction in the GPS site positions provided by the loading when integrating it in the GAMIT Software as an a priori of the processing. We conclude that the seasonal variability of site vertical displacement is quite well explained by our model at several locations, mainly located at mid-latitudes in the northern hemisphere, while it is much less understood near coastal areas.