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# Effects of azimuthal multipath heterogeneity and hardware changes on GPS coordinate time series

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Within GPS observations, carrier phase multipath is currently one source of unmodeled signals that bias GPS time series significantly. We investigate the effect of artificially generated multipath on time series of offshore sites from 2002-2008. The focus is on GPS receivers located on offshore platforms at $\sim$61 degrees N which also undergo hardware changes. Further, high-, mid- and low-latitude IGS sites are included for comparison. We examine the effect of modelled multipath in different sectors of the sky, considering a multipath reflector at 0.1m, 0.2m, and 1.5m below an antenna. The differences between a horizontally uniform multipath source are analyzed. For the offshore sites, multipath induced in the NE sector produces a smaller bias than multipath in the SW sector although each sector exhibits a slightly different influence on the coordinate time series. The multipath propagation changes as the satellite geometry changes, but this is abrupt at receiver/antenna hardware changes with each multipath scenario giving different offset magnitude.