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Mitigation of Site Specific Errors

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For well over a decade GPS time series have been used as an effective way of densifying a reference frame. During this period numerous advances have been made in the analysis and modelling techniques applied to GPS observations. This has seen GPS time series improve by almost an order of magnitude in accuracy, and has allowed even more challenging applications of GPS time series analysis to be investigated such as glacial isostacy, elastic deformation of the earth's crust due to atmospheric loading and atmospheric tomography.

Despite numerous improvements in the GPS analysis technique to handle different error sources there still remains significant long term site-specific biases. The biases are often caused by local multi-path effects and/or near-field antenna phenomena and have an adverse impact on the signal being analysed. Typically the largest effect is seen in the height component or the scale of the reference frame determined by the GPS network. Correction of these site-specific systematic errors can not only remove biases, but will also reduce the phase residual noise level, thus providing a better resolution to distinguish the signal of interest.

We will present a technique to detect, and mitigate long term systematic errors by using one-way phase residuals obtained from a post-processed GPS network. We will then assess the impact of applying these derived individual site models into a re-processed solution for the purposes of reference frame determination at the Regional and Global level. We will also assess the performance of these derived site-specific models for real-time solutions.