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An investigation of monument stability of GPS stations in Iberia

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With the ever increasing number of continuous GPS stations, it is important to know the stability of the monument. For this reason, Williams et al. (2004) used a large set of global GPS stations and correlated the type of monument with the noise properties. As was to be expected, GPS stations on oil platforms performed worse, followed by concrete pillars. Unfortunately, the correlation between the type of monument and GPS noise levels is not always clear. For example, Beavan (2005) found good stability of concrete pillar monuments. This was corroborated recently by Baldi et al. (2009) who have found little difference in noise properties between 146 commercial and scientific GPS stations in the North of Italy. Here, the distinction between commercial and scientific stations implied a different degree of sophistication of the monument.
On the other hand, King and Williams (2009) noted that the before mentioned studies are based on global or regional data sets, and are hence subject to global and regional-scale signals and errors, they cannot be used to unambiguously determine the stability of individual site monuments. By studying pairs of GPS stations that were very close to each other, King and Williams could cancel most of the common noise signal, enabling a clearer investigation of the monument stability.
In this research we will compare the levels of noise in the GPS time-series from stations in Iberia with the type of monument. We estimate the spatial correlations that exist between the GPS observations in our time-series analysis in an attempt to account for this common regional-scale noise signal. This approach has not been explored much in the literature because including a full temporal & spatial variance-covariance matrix into the time-series analysis procedure is a numerical intensive task. However, under some special but fairly realistic assumptions of the shape of the noise spectrum, Amiri-Simkooei (2009) performed it for pairs of GPS stations. Using the fast time-series analysis technique of Bos et al. (2008) and using a cluster computer, we will extend this to a larger number of stations.