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Noise Characterisation of coordinate time series at space geodesy collocation sites

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The accuracy achieved today, in the global terrestrial reference frames estimation (namely ITRF), is mainly limited by technique-related systematic errors, which are often poorly qualified or quantified. Therefore it is essential to analyze the individual techniques' solutions with respect to systematic differences, models, parameters, datum definition, etc. So, the present paper deals with one aspect of this analysis: noise analysis.
The analysis methodology of noise, affecting the position residuals time series, consists of two steps: station stability and space geodesy technique noise. The first is performed with Allan variance estimation and which includes noise type and noise level. The second is handled by the Three-Corner Hat (TCH) approach. In geosciences, a white noise signature in the position residuals would point to random errors (Gaussian errors) affecting the measurements, while a flicker noise signature would point to perturbations that may have different origins, like local tectonics, instrument defects, analysis consistency, etc.
The data concern the time series of geographical positions of collocated sites with GPS, SLR, DORIS and VLBI techniques. The results show a domination of white noise in most coordinate residuals for SLR and DORIS with a balanced mix of white noise and flicker noise in the case of SLR height components which is due to the strong correlation between these components and the range bias of the laser instrument. The GPS results show a balanced mix of white noise and flicker noise with more frequency of the flicker one which is caused mainly by the antenna defects.