G52A-07 - Spatial Behavior of Time-Correlated Noise in the Position Time Series of 10,000 GPS Stations.

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Abstract

Obtaining reliable estimates about geophysical processes from GPS products requires considering time-correlated noise in position time series. For about two decades, the time dependence of noise has been actively investigated. The most common noise model consists of the combination of power-law processes with various spectral indexes, including white noise. However, the origin of such power-law time correlations in position time series remains unclear.

Analyzing the spatial dependence of noise provides a way to investigate the causes of power-law processes but requires a dense GPS network. Here, we analyze the data products of 10 000 GPS stations processed by the Nevada Geodetic Laboratory (NGL). We first iteratively detected outliers and offsets using a modified multivariate Detection Identification and Adaptation (DIA) method. Then, we used the Non-Negative Least Squares Variance Component Estimation method (NNLS-VCE) to assess the white noise and correlated noise amplitudes for each component of each station, i.e., a total of 30 000 time series. Our analysis evidences a multi-scale spatial variability of noise for the three North, East, and Up components. In particular, short spatial variations (a few hundred kilometers) of power-law amplitudes across the USA and Europe might point to either the presence of non-modeled regional geophysical signals or the influence of regional networks in the observations.

Authors

Kevin Gobron
University of La Rochelle

Olivier de Viron
U. La Rochelle

Michel J Van Camp
Royal Observatory of Belgium

Alain Demoulin
Université de Liège

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CONTACT US

2000 Florida Ave. NW,
Washington, DC 20009
Phone: +1 202 462 6900
Toll Free: 800 966 2481 (North America only)