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