Nonlinear Processes
in Geophysics
Discussions

NPGD

**Interactive
comment**

Interactive comment on "Application of Levy Processes in Modelling (Geodetic) Time Series With Mixed Spectra" *by* Jean-Philippe Montillet et al.

Anonymous Referee #2

Received and published: 18 March 2020

This manuscript discusses the use of different scaling processes to model geodetic time series. The logical structure of the manuscript is so confuse that I can only recommend to reject the manuscript. Here are comments and suggestions.

- First of all the authors seem to have published similar works recently (He et al., 2017, 2018; Montillet and Yu, 2015): the authors should indicate clearly what is new in this manuscript with respect to these previous works - the authors do not introduced adequately the topic: what is GNSS data, why does it have non-stationary and stochastic components? - in section 2.2 the authors indicate that GNSS time series have a scaling power spectrum with slope beta. But no data is shown to justify this. All the structure

of the manuscript is very confusing, with many different models proposed from time to time, with no justification from the data. It really seems a mess. - a more orderly and correct structure would be the following: first explain what is GNSS data and why it is non stationary and stochastic. Then show some plots of such data, with power spectrum and pdf. Then this justifies the use of given modelling with given hypotheses and parameters. Then, explain how to estimate the parameters.

Other comments: - the citations to previous works is too erratic, with bad placed spaces before commas. The authors should be much more cautious on this. - when discussing Levy stable processes, a reference to a web page (Nolan) is not the correct citation. There are many works that can be cited, such as Samorodnitsky and Taqqu, Stable non-Gaussian random processes, 1994. - the authors mention FARIMA models, but these models are discrete. When discussing stochastic processes possessing scaling properties, no need to go to the discrete models. For an overview of the different stochastic models possessing such property, see e.g. Pipiras and Taqqu, Long-range dependence and self-similarity, 2017. - in the field of probability theory (and not finance, no need to go to these field, all was done in the field of mathematics) a Levy process is a continuous time stochastic processes having independent and stationary increments; it includes infinitely divisible families, and belongs to the general family of self-similar processes. - equation 3 is not correct, the good relation is beta=1+2H. For a Brownian motion, beta=2 and H=0.5.

The manuscript needs a complete rewriting from scratch with a much more simple and logical structure.

Interactive comment on Nonlin. Processes Geophys. Discuss., https://doi.org/10.5194/npg-2019-48, 2019.