

Interactive comment on “Technical note: Stochastic simulation of streamflow time series using phase randomization” by Manuela I. Brunner et al.

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My congratulations to the authors on this excellent paper. Very glad to see a clever adopted to frequency domain alternatives in formulating a stochastic streamflow generator. My comments below are aimed to enhance the presentation and I am in support of publication once these have been addressed. Comments are:

line 2/9 - The authors are missing the works by Keylock (10.1029/2012WR011923). This work performed resampling to an existing time series using phase randomisation in the frequency domain. If I remember correctly, it had some nice inclusion of ICA to tackle the multivariate issue, and wavelets to get around nonstationarity in the data

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that cannot be handled using a fourier transformation alone. I think they need to read those papers (I am familiar with the above one but there may be more since) and acknowledge them here, and also try and show how their work distinguishes itself from the above paper.

line 3/21: I think the work by Mehrotra (10.1029/2005JD006637) should be acknowledged here as it represents essentially something analogous to a ARMAX type of a model even though it is cast as a stochastic downscaling approach. A mention should be made on the ability to preserve low frequency variability, which I believe the proposed approach will be able to address as well.

Line 3/35: Even though it relates to the problem of correcting systematic biases, given the use of phase transformation (not randomisation), the approaches of Nguyen should perhaps be acknowledged for completeness. The rationale behind these approaches and the one here has a lot in common. (10.1007/s00382-018-4191-6, 10.1016/j.jhydrol.2016.04.018).

line 5/21: The authors may want to look through the details of (10.1007/s00382-018-4191-6, 10.1016/j.jhydrol.2016.04.018) as they performed another level of pre-processing - they fit a Thomas Feiring type model to the monthly data and after that structure was removed, the Fourier transformation was performed. This was done after trying with the steps referred to above, as it was found to exhibit clear advantages.

line 6/21: Setting negatives to zero is not a clean option. Please refer to the Keylock paper above again on how they restricted their approach to resampling to avoid having to set negatives to zero. line 11/10: Underestimation of cross-correlations is I think addressed well in (10.1007/s00382-018-4191-6). The trick that is used is to not randomly generate phases for all variables, but for a "key" variable (say biggest streamflow mean location). And then maintain the phase difference between alternate sites. The phase difference in space helps capture the cross-dependence attributes.

Lastly, I feel not addressing the issue of non-stationarity in a stochastic generation

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paper under our present climate should be discouraged. The issue of nonstationarity can be addressed in the sense of a discussion by thinking of adding an exogenous predictor variable set in the formulation, which can impart the changes needed. Some discussion to that effect would be good to include in the paper before it is published.

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