

Point by point reply to Anonymous Referee #1, Report #2

1) Lines 348-350: my understanding is that the use of surrogates (e.g., bootstrapping) is only applied when we lack an analytical test of the null hypothesis. So, for the case of cross correlation, we don't need bootstrapping because there is an analytical null hypothesis. Please check.

We see two cases where the use of surrogate (or bootstrapping) techniques for significance testing are justified: (1) when we lack an analytical test (as mentioned); (2) when the underlying hypotheses the analytical test (e.g., normality and i.i.d) are not met (see Ebisuzaki, 1997). In the manuscript, we propose to use surrogate data testing to test the significance of correlation coefficients for the second reason, as hydrological variables are often skewed in their statistical distributions and serially correlated. Furthermore, if some analytical tests exist for the zero correlation, they may be misleading when applied to test for zero cross-correlation given the number of trials (lags involved in the computation of the correlogram). For all these cases, our point is that the surrogate data test is more generically applicable, at the cost of computational power, and less prone to false positives due to chance because it is permissive for violations of the usual normality and iid assumptions.

In addition, note that surrogate data tests are also used for the CCM method to test the significance of the Pearson's correlation coefficient measuring the predictive skills (e.g., van Nes et al. 2015).

We have modified the manuscript to include Ebisuzaki (1997), whose abstract reflects our point.

References:

Ebisuzaki, W. (1997). A Method to Estimate the Statistical Significance of a Correlation When the Data Are Serially Correlated, *Journal of Climate*, 10(9), 2147-2153. [https://doi.org/10.1175/1520-0442\(1997\)010<2147:AMTETS>2.0.CO;2](https://doi.org/10.1175/1520-0442(1997)010<2147:AMTETS>2.0.CO;2)

van Nes, E., Scheffer, M., Brovkin, V. et al (2015). Causal feedbacks in climate change. *Nature Clim Change* 5, 445–448. <https://doi.org/10.1038/nclimate2568>

2) Lines 7, 62, 232, 299 and elsewhere: replace "study case" with "case study".

Modified as suggested

3) Line 270: replace "Result" with "Results"

Modified as suggested