

# ***Interactive comment on* “Statistical Hypothesis Testing in Wavelet Analysis: Theoretical Developments and Applications to India Rainfall” by Justin A. Schulte et al.**

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Summary The author appreciates the detailed comments and suggestions, which have been adopted in the revised manuscript. Changes to the manuscript include the rewriting of sentences to make them less terse, a more detailed discussion about the data sets used in this study, and the inclusion of a supplementary file. More specific changes are outlined below. Reviewer comments are in bold and the author’s responses are in plain text. Reviewer 2 General comments: The paper highlights (and provides the solution to) an important aspect of the application of wavelet analysis which is relevant to the broad field of geophysics and beyond, where an

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understanding of non-linear and complex processes is required. Correlation among wavelet coefficients is a very well-known issue which has been discussed in the context of forecasting applications using wavelet-based models in many previous studies. However, it is rather rare to see the accommodation of this aspect in wavelet power spectrum and coherence based studies which the author has successfully demonstrated in this paper. The author provides a novel method of estimating significant periodicities while tacking the issue of false-positive results employed in differentiating the significant periodicities in the wavelet power spectrum compared to the background noise of the spectrum. The R package for this application would be very useful to the community and I would strongly recommend the community to use, test and validate the proposed approach. The paper is very well written and provides sufficient details and arguments in support of the study. I would recommend accepting this paper pending some very minor corrections which I have listed below: Technical corrections: Many sentences are too terse. Especially in the abstract. For eg: "The output of a recently developed cumulative area-wise....." "Statistical hypothesis tests in wavelet analysis are reviewed and developed.: As there may be multiple kinds of analysis pertaining to the application of wavelets, I would suggest specifying what kind of hypothesis test is discussed in that kind of wavelet analysis in this study. Many sentences have been lengthened, especially those in the abstract. For example, in the abstract, it is now mentioned that the arc-wise test uses normalized arc length to assess statistical significance. The beginning section of the abstract was also rewritten to provide the reader with some details about the nature of the statistical tests discussed in the study. P2 Line 2-3: "To make such comparisons, one must implement statistical tests." Please specify which tests. The statistical tests are now specified on Page 2, Lines 10 and 11 of the revised manuscript. P2 Line 11-12: "the first of which is that the test will frequently generate many false positive results because of the simultaneous testing of multiple hypotheses." Please provide relevant references for this point. References have been added on page 2 Lines 15 in the revised manuscript P3 Line 3: "a first survey of the theoretical"- I suggest replacing

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"survey" with "review". "Survey" has been changed to "review" on Page 3, Line 11 of the revised manuscript. P3 Line 28: what is the significance or the Normalization of the reproducing kernel. are the mathematically different from that shown in Eq 2? Please clarify. Normalization means that the reproducing kernel is divided by its maximum value so that the maximum of the normalized reproducing kernel is equal to unity and located at the point at which the reproducing kernel is centered. Besides division by the maximum value, the mathematical is the same as Eq. 2. P5 Line 19: Adjective "concrete" is not required. The adjective "concrete" has been deleted.

Please also note the supplement to this comment:

<https://www.nonlin-processes-geophys-discuss.net/npg-2018-55/npg-2018-55-AC1-supplement.pdf>

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Interactive comment on Nonlin. Processes Geophys. Discuss., <https://doi.org/10.5194/npg-2018-55>, 2018.

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