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Nonlinear Processes in Geophysics
Discussions

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

Anonymous Referee #1

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General summary The authors have attempted to develop new statistical significance test for wavelet analysis. This is an important contribution as there are many studies involving wavelet analysis and it is important to differentiate between spurious and significant patterns. In addition, a package is developed in R which could be used for testing the proposed statistical method.

I am opinion such a study is of great significance, given the growing application of Wavelet analysis. The theoretical background of conventional point-wise significance testing and the more recent cumulative area-wise method is sound. It provides the reader with an insight into the advantages and drawback of the point-wise method

and the need of cumulative arc-wise testing method. The paper is suggested to be accepted for publication. Below are few comments that would make the proposed analysis more robust and enhance the overall quality of the manuscript:

Major suggestion The authors have attempted to compare the results with the previously published results concerning Indian rainfall. I feel that in order to prove the efficacy of the new method, the author has to apply to many other case studies. Further, it is to be noted that the results (Figure 3) obtained using the arc wise and point wise are comparatively similar and moreover, the latter method is more sensitive to the singularity, the author should provide more evidence for his claim.

Data and reproducibility The authors do not give the complete information on the source and the resolution of the Indian rainfall data. The link of the website (http://www.tropmet.res.in) does not direct to the data page. Authors should provide a complete link of the source of the data, and mention the same in the text to make the work reproducible.

Statement (P13/L11) "To understand the temporal behaviour and spatial variability of India rainfall, monthly rainfall data for 5 homogenous regions (Parthasarathy et al. 1995a) extracted from Indian Institute of Tropical Meteorology website (http://www.tropmet.res.in) were analyzed" does not provide detailed insights about the selection of the data. For example, statement doesn't make it clear whether all stations lying inside the five homogeneous regions were selected, if not then what? Average of all stations lying inside homogeneous regions? Kindly modify the statement appropriately.

I again have a serious concern if mean timeseries of all existing stations within the homogeneous regions has been used. This would result the smoothing of high peaks and might reduce the variability of the rainfall data significantly. Could author comment on the same?

Text and referencing

Although the authors mention that an R package is written, however, the documentation provided in the link (http://justinschulte.com/wavelets/wavenew.html) mentions about the codes in MATLAB only. It would be useful if the authors can provide a direct link of the developed package in R.

Page 1/line 33: wavelet has been applied to broad range of topics... I recently witnessed the drastic use of wavelet in network analysis (for e.g. climate network analysis). Citing and mentioning will link this article to recent study and ultimately I feel it would increase the readability and application of the article.

It would be worth citing few studies based on the same Indian precipitation dataset and wavelet.

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