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# *Interactive comment on* "A Comparison of the Discrete Cosine and Wavelet Transforms for Hydrologic Model Input Data Reduction" *by* Ashley Wright et al.

**Anonymous Referee #1**

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Thank you for the chance to review this manuscript. The manuscript is generally well written. However, there are a number of issues that need to be resolved before this manuscript can be accepted for publication.

1. Innovation and contribution of the paper needs to be better defined. The authors compared two methods commonly used in signal processing (i.e. DCT and DWT) for reconstructing rainfall information. But why is this study important? And why these two methods were selected? Are these two methods better than currently used methods? What about other methods used in signal processing, such as short-time Fourier transform (STFT)?

2. Description of experiment design is not very clear. [1] Can you please use a flow



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chart to illustrate the steps taken during the experiment? If space is of concern, this reviewer recommends to remove current Figure 1, which is not described in detail and does not have much value. [2] What is the role of stream flow in this study? In the last paragraph on page 7, PE (peak error) is defined as "the peak streamflow error over the 10 year period". Can the authors explain how this error is calculated? How is this error linked to reconstructed rainfall and the performance of the two methods? Are rainfall-runoff models used? If so, these rainfall-runoff models need to be described in the experiment design section. All these information can be included in the flow chart mentioned above, it will help the readers to understand the experiment process. [3] The two methods were not validated – please refer to comment 3.3.

3. Results analysis [1] It is obvious that DWT performs better than DCT from the results obtained. But why is this the case? Is this because the nature of cosine functions oscillating at different frequencies makes DCT unsuitable for rainfall signals that is not cosine in nature? If this is the case, it comes back to my comment 1 above, why is DCT selected for this study at the first place? [2] Figure 4 is a scatter plot of RSR generated using the two methods. It is obvious that they are linearly correlated and the RSR from DWT is always lower than that from DCT. However, what evidence included in this figure show that "DWT is able to reconstruct the input rainfall signal" (line 23 page 8)? [3] The authors claimed that in this study the two methods were "validated" "using several simulation performance summary metrics". Line 24, page 3. This reviewer disagrees. In this study, the performance of the two methods was evaluated using a number of different metrics; however, no independent validation was conducted.

Minor comments: 1) There a few typos throughout the manuscript. For example, Line 7, page 2: "prediction uncertainty" should be "prediction of uncertainty"; Line 22, page 8 "is always able reconstruct" should be "is always able to construct". 2) Line 12 page 1: The sentence does not really make sense here. "Unfortunately, errors in rainfall time series data may lead to hydrological model parameter estimates that produce adequate streamflow simulations during calibration". 3) Figure 1 has only symbols,





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which is rather confusing. Please add descriptions in both the figure and caption so the figure stands alone and makes sense.

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