Hydrology and Earth System Sciences Discussions

Interactive comment on "Hydrologic system complexity and nonlinear dynamic concepts for a catchment classification framework" *by* B. Sivakumar and V. P. Singh

Anonymous Referee #3

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This paper by Sivakumar and Singh discusses a very interesting and actual topic: Classification of catchments based on data patterns and level of complexity. The hypothesis behind is that process complexity is preserved and reflected in the runoff signal.

For me, this paper is mainly a review of previous papers of the author. In addition, the proposed classification framework remains on a very general level. Therefore, the title is misleading and the paper offers not exactly what its title promises. From my point of view, the paper in its present from does not add much substance to prevous material/ideas already published by the author.

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Nevertheless, the paper itself is well written and it provides a good introduction to the topic. By adding a "true" classification example, this paper may be suitable for publication in HESS.

Specific Comments

The review part of your paper can be shortened. p. 4437 line 2ff: "... Therefore, the present study is, in a way, an inverse approach to study the classification framework." Inverse to what? Please explain.

Section 5

Your example compares two catchments of completely different size and the information, concluded from the data is that the signal from the larger catchment is less complex because it has a clearer attractor and a lower correlation dimension. From my point of view, this might also be an effect of catchment size.

From your example, it becomes not clear how classification of catchments will work: How would you quantify complexity, what is your scale: How you define "low", "medium", "high" On p. 4445, lin3 8ff you write: "these observation and numerous others on nonlinear dynamic analysis of hydrologic time series....": Why you are not presenting at least an example classification based on a larger number of time series? Which allows showing that you get distinct groups of catchments.

Section 6

p. 4445, lines 15-24: Fig. 3 contains exactly the same information!

p. 4446, line 25: "It is premature, at this stage, to provide definitive guidelines....", this means, that, at this stage, you are not introducing a complete classification framework at all...?!

Recommendations

I recommend rearranging the paper as follows:

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-Shorten sections 1-4: focus on methods applied in your example classification

-Introduce your classification framework:

-Add a complete classification example:

1. Detection of data patterns and determination of level of complexity/dimensionality

2. Determination of classification framework based on these results and classification of sample catchments into groups based on data patterns system complexity

3. Discussion of results in a hydrological context (e. g. catchment properties)

The number of sample catchments should allow the formations of more than two clearly distinguishable groups of catchments based on a least one attribute based on data patterns and one attribute based on system complexity.

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