

Interactive comment on “Accounting for dependencies in regionalized signatures for predictions in ungauged catchments” by S. Almeida et al.

Anonymous Referee #2

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Being a “physically-based” hydrologist interested in signatures as indicators of catchment functional behaviour, but not a specialist at all of regionalization and statistics, I read the paper with interest, expecting to learn more about this topic. The objective of the paper is to propose a methodology for selecting the relevant regionalized signatures for calibrating a rainfall runoff model on an ungauged catchment.

In general, I found the paper quite difficult to read and understand, especially Sec 3/Results and the corresponding Figures. The Bayesian methodology developed looks mathematically sounded (I am not a specialist).

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My main comments would be on the testing protocol:

- the regionalization model used in this study is not described in detail (2.3.1), and, from the information given, looks quite simplistic. Simple regression laws are fitted to physical attributes of the catchments (we don't even know which ones). Moreover, using blindly the data of 83 catchments to estimate regionalized signatures on the 84th looks like a very rough method. This regionalization model is not evaluated, although it certainly conditions the final results.
- the selection of signatures is quite limited and basic (only 5 really classical signatures on runoff). I'm not sure that much can be concluded on the relevant number of signatures / relevant signatures using such a small sample. I understand that the objective of the paper is to present the methodology, but the application example is also important to convince readers that the methodology is useful.
- I don't understand the interest of using synthetic data. It seems to me that rather than simplifying the problem, it does bring more complexity to it: the model is first calibrated on the observed time series for each catchment, thus model structure and observational errors are still there.
- Section 3 is really difficult to understand. The main focus seems to be on the comparison of synthetic / observed data, and the initial focus (selecting the relevant regionalized signatures) is lost. The Figures are incomprehensible.
- Finally the authors seem to obtain quite disappointing results, and cannot conclude much from the study. Potential additional developments are widely discussed in Sec 3.4. Before that, maybe it would be worth revisiting and/or discussing the testing protocol, that may be inadequate.

Finally on the form of the paper:

- The paper is really focussed on the mathematics (especially from Sec 3); it could be nice not forgetting readers who are not specialists

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- In section 2, information is mixed up along the paragraphs: for example the regionalization technique is described partly p 5393 (in 2.1), p 5395 (in 2.2.2), and 5397 (in 2.3.1). I could be worth restructuring this part a bit.

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