

Interactive comment on “Calibration of hydrological model parameters for ungauged catchments” by A. Bárdossy

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General comments

The paper proposes a new method for the regionalisation of rainfall - runoff parameters. The main objective of the study is to overcome the problem of non-uniqueness of hydrological parameter sets that can be assumed to be one of the important reasons why parameter regionalisation fails to give reliable prediction results for validation catchments.

The paper represents an important contribution to this area of research. The proposed transfer of entire parameter sets from one catchment to another constitutes a promising solution to account for the problem of parameter non-uniqueness.

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As mentioned in the paper, the application of the method is restricted to catchments that are relatively similar. In its current form, the paper does however not show how similar the used catchments are and accordingly, the applicability of the method is difficult to appreciate. In general, the paper does provide very few results referring to the proposed method.

Specific comments

- Section 1: In general, the contribution should be better referenced (in the introduction section, only very few statements are referenced). The paper is not clearly situated in the context of hydrological model regionalisation.
- Section 2: Referring to the simple illustrative example, it is mentioned that a linear interpolation between points A and B of the hyperbolic curve would give a considerably wrong estimation for C. It is not clear why someone would do that; in a traditional regionalisation approach, the problem is that only one point from this curve would be retained (presumably without being aware of the other possible solutions. For a second catchment, another point from another, similar curve would be chosen. The question then is whether it makes sense to interpolate between these two points.
- Section 3, Page 1113, line 25: why does the inclusion of the mean discharge avoid parameter sets that lead to non-stationary conditions?
- Section 3: The case study reposes strongly on (Hundecha and Bardossy, 2004). For better understanding of the paper, some details should be added, referring namely to the selected model parameters and the used catchments. Why have the 5 parameters been chosen for the parameter vector transfer (only in the conclusion section is mentioned that “parameter vectors corresponding to a selected group of hydrological processes can be transferred”)? Which catchments have been selected and why and how similar are their characteristics?

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- Section 3: The readability of the paper could be enhanced by separating the case study (HBV applied to the Rhine catchments) from the regional calibration methodology.
- Section 4: The results section outlines again the calculation steps (which is very useful for the reader!) but gives only very few details about the obtained results. Is the unique presented regionalisation result the most striking result or is the same result obtained for many catchment pairs? Does the improvement of the Nash-Sutcliffe efficiency if the quality of the mean and the standard deviation is considered depend on the catchments characteristics or is it of the same order of magnitude for most catchments? Are there any catchments for which no parameter vectors could be transferred from any other catchment (according to the conclusion section it seems to be the case)? How “close” (from a geographic, physic or hydro-climatic point of view) are catchment 1 and 11? How different are the retained parameters sets (the corresponding simulations)? The reader has only an idea about the NS efficiency for the transfer to one catchment but cannot judge how different the underlying simulations are.
- Abstract: The abstract should mention the main result / conclusion.
- Figure 7: I suggest indicating the NS value corresponding to the simulation

Technical corrections

There are several typing errors (especially missing spaces) and wrong or wrongly doubled prepositions (e.g. on p. 1115, line 16 “for by”, p. 1114, line 22 “of for”).

- p. 1115, line 6, there is a problem in the sentence “the reason for the difference (..)”
- p. 1115, line 17: “ The non-linearity (..) possibly leading to unreasonable results.” This sentence is difficult to understand, what does it mean?

- References: error in the title of the reference Samaniego and Bardossy.

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