



The difficult use of discharge transformations in efficiency criteria calculation

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The calibration of hydrological models through the use of automatic algorithms aims at finding parameter sets that minimise the errors between simulations and observations. It is a wide-spread technique that has been subject of much research in the past. Indeed, the choice of the objective function (i.e. the criterion to optimise) and of the optimisation algorithm can significantly impact the parameter sets identified as optimal. Besides, the actual goal of the model application (floods or low-flow estimation, for instance) influences a lot the way calibration is undertaken.

This communication will discuss prior transformations that can sometimes be applied to the variable (usually discharge) that is compared to observations in the objective function or in evaluation criteria. Such transformations, for example square root or logarithmic transformations, aim at enhancing the weight of errors made on specific ranges of the hydrograph (typically, a logarithmic transformation tends to increase the fit of discharge on the lowest values, compared to no transformation).

We will show on a large dataset of catchments that the impact of these transformations on the obtained time series can sometimes be unexpected. For example, the use of the logarithmic transformation when using the Kling Gupta Efficiency can lead to an erroneous interpretation of the performance of the model (Santos et al., 2018). These findings will be illustrated with synthetic graphs and examples.

Reference

Santos, L., Thirel, G., and Perrin, C.: Technical note: Pitfalls in using log-transformed flows within the KGE criterion, *Hydrol. Earth Syst. Sci.*, 22, 4583-4591, <https://doi.org/10.5194/hess-22-4583-2018>, 2018.