



The goodness-of-fit myth in hydrological modelling

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In hydrological modeling it is common to judge simulation quality by the model, or Nash-Sutcliffe, efficiency. Some authors explicitly state that a model is good when the model efficiency values are above a certain value (such as 0.7). In other studies similar judgments are formulated more implicitly. While most modelers agree that a good performance in terms of runoff does not ensure that the model works for the right reasons, we also argue that efficiency values for a certain model in a certain catchment cannot be interpreted without lower and upper benchmarks. An efficiency of, for instance, 0.8 might indicate a good or poor simulation depending on what would be possible at best and what should be expected simply because of the temporal patterns in the input data. Here we propose the use of upper and lower benchmarks that represent what could and should be expected and suggest possibilities for concrete benchmarks based on simulations using simple hydrological models which implicitly take observation uncertainties in both input and output time series into account. We demonstrate the variability the upper and lower benchmarks for a large set of catchments in the UK and the US.