

Interactive comment on “Deduction of Reservoir Operating Rules for Application in Global Hydrological Models” by Hubertus M. Coerver et al.

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Dear referee,

Thank you very much for your comments and suggestions, I will take them into consideration in a final version of the paper.

Regarding your question about the "training/validation/test" procedure, it should be understood as follows. The data used is split into three "sets". During the training of the rules, the training and validation sets are used (I understand this is confusing and will try to clarify it in the final paper), while the data in the test set is not used during training

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of the rules. The data in the training set is actually put through the ANN, both backward and forward, in order to update the rules. Simultaneously, the performance of the rules is tested using the validation set. The results from these tests are used to determine when the training is finished. Then finally, the trained ANN is tested with the test set, to acquire a result independent from the training and validation set.

As also mentioned in the first referee's comment, the non-stationarity of the data time series is indeed an issue within the current methodology. In the ANFIS algorithm, there is a parameter present that can correct for changing conditions, by giving a greater weight to more recent training samples. This way, the rules slowly "forget" about samples that are too back in time. In the current study, this mechanism is not applied however and all samples have the same weight.

As long as the actual operating rules (for example as described by a rule curve) did not change, the fuzzy rules within the ANN should still be applicable. If the upstream hydrological conditions change, through climate or landuse change for example, the ANN will more often activate the rules describing these more "extreme" circumstances than before, but that does not necessarily mean the consequences of these rules are wrong. Of course this does not hold if through hydrological changes, circumstances arise that were simply not present in the training set. In that case it is theoretically impossible for the ANN to know what the response will be. So indeed, when applying this method in a GHM, the rules would have to be updated every so often.

Regards, Bert Coerver

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