Hydrol. Earth Syst. Sci. Discuss.,
doi:10.5194/hess-2016-660-SC1, 2017

Hydrology and Earth System Sciences
Discussions

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

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Received and published: 27 January 2017

The manuscript describes a data-driven approach for the zero- and one-month ahead prediction of the discharge from water reservoirs. The discharge is predicted by an Adaptive-Network-based Fuzzy Inference System (ANFIS), which requires information on reservoir storage, inflow (with different lags) and seasonality to issue a forecast. The ultimate goal is to use reservoir-specific data-driven models to simulate the storage and release dynamics of water reservoirs in global hydrological models. The results obtained on 11 reservoirs appear to be encouraging.

We read the paper with interest, and have some comments that might be useful to the authors.

1. The approach requires the availability of (sufficiently-long) time series of inflow, storage and release for all reservoirs considered in a regional or global hydrological model. This represents a challenge for the immediate use of ANFIS, since actual releases are generally not available. The use of remotely sensed data–as discussed at line 23-28 (page 23)–is an interesting idea, but has yet to be developed fully for application in this context. For this reason, we believe that optimisation-based algorithms are the most ready-to-use technology available for regional and global studies (Turner and Galelli, 2016).

2. The good performance presented in the manuscript are obtained by feeding ANFIS with measured storage and inflow data. As discussed at line 4-9 (page 23), ANFIS should be used within a simulation model, where the storage dynamics are simulated with a mass balance. Hence, there is a risk that the errors in the prediction of the release are integrated over time–as the simulation progresses–leading to an inaccurate simulation of release and storage dynamics.

3. The model building process (training + validation + test) might be biased by the presence of drier years in the validation set (see Figure 6). The problem could be solved by adopting another validation scheme, such as cross-validation, which allows to account for all available information during the calibration process.

4. The authors may find some useful information in the study by Hejazi et al. (2008), who studied how different hydrologic information affect release decisions in 79 reservoirs in California.

References

HEJAZI, Mohamad I.; CAI, Ximing; RUDDELL, Benjamin L. The role of hydrologic information in reservoir operation–learning from historical releases. Advances in water resources, 2008, 31.12: 1636-1650.

TURNER, Sean WD; GALELLI, Stefano. Water supply sensitivity to climate change:

An R package for implementing reservoir storage analysis in global and regional impact studies. Environmental Modelling & Software, 2016, 76: 13-19.

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