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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Benchmarking hydrological models for low-flow simulation and forecasting on French catchments" *by* P. Nicolle et al.

Anonymous Referee #3

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The manuscript compares the performances of 5 different hydrological models used to forecast low flows of 21 French watersheds based on a large variety of criteria. The text is well written and structured, clear, referring to the recent literature on low flow forecasting and will certainly be of interest for the readers of HESS. The work could nevertheless benefit from a more in-depth analysis of the obtained low-flow forecasts and their limits. The whole approach remains a little too empirical and descriptive at this stage with no clear conclusion or open perspectives for future improvements. Important questions, some mentioned in the manuscript, could be discussed in more detail: beginitemize

Most of the tested models have not been specifically developed for the purpose of simulating low-flows. Have their calibration procedures been adapted to better simulate the low-flow periods? Some information on the calibration procedures of the model, the possible influence on their parameter values, recession dynamics, would be useful here as well as some suggestions.

Beyond the quantitative criteria, the analysis of the simulated discharge series could be a little more developed. Are for instance the forecasts in fig. 11 realistic? Is it really likely that the discharge increases within a few days to exceed the Q80 during a marked low-flow period in mid-August for a significant number of rainfall scenarios as suggested by some tested models? I have some doubts. Most of the tested models seem too sensitive to rainfall during low flows for the Meuse river.

It appears that the discharge lies significantly under the average inter-annual discharge already in May for the 3 selected severe low-flow periods and the 2 selected watersheds in figures 10 to 12. This leads to a question: what is the relative importance of the initial conditions and of the summer rainfall scenarios in the determination of the discharge evolution during low-flows? Is this relative weight the same in the observed and simulated series? In other words, are the models representing the correct low-flow dynamics? This is a tricky question that cannot be answered based on aggregated criteria only. By the way, the selected NVQ benchmark could have been improved: distribution of available streamflows in the other years for the considered day, but selecting only the years where the baseflow at the date of the forecast lie in similar ranges as in the considered year. This would probably be less in favor of the tested models. Could the authors test this?

The differences between simulation and forecasting performances deserve some more explanation.

Beyond the relative performances of the models, could the authors comment on the

absolute values obtained for the various tested criteria? Are the performances of the models really sufficient for decision making (what decisions) on the tested rivers?

The figures and tables could also be improved. I am not convinced that the rankings are the most useful peace of information. I would prefer to see the average values of the criterions in tables 6 and 7. Comments on the ranks in the text are sufficient. Many figures and legends are too small. Figures 4 and 8 are for instance attractive, but difficult to read and interpret. They have moreover little added value if compared to tables 6 and 7 (with values of criteria) and figures 14 to 16. Fig 10 is impossible to read because the contrast between the different curves is not sufficiently marked. Colours but also line types should be varied.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 10, 13979, 2013.