

Interactive comment on “How effective and efficient are multiobjective evolutionary algorithms at hydrologic model calibration?” by Y. Tang et al.

Anonymous Referee #2

Received and published: 10 January 2006

This is a valuable paper making a significant contribution to the issue of multi-objective optimisation algorithms in hydrological modelling. Often optimization algorithms are tested and compared only for simplified problems (e.g., models with very few parameters). Doing this on real-world cases obviously is more useful. The paper is generally well written and I recommend accepting it after revisions according the comments already posted and the ones I have below.

The one issue which is somewhat disappointing is that the authors use only streamflow data at the outlet. Of course, by looking on different aspects of the hydrograph this can be seen as multi-objective problem, but, at least to me, the more interesting aspect of multi-objective calibration is the problem when a model has to be fitted to different kinds

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of data, such as runoff and soil moisture. Given that such data seems to be available for the Shale Hills watershed I wonder why these data were not used?

Another issue which seems not be addressed is the issue that there might be different solutions (i.e. parameter sets) for the same point on the pareto front. This should be discussed.

The authors could consider providing a little more information about e-NSGAI and SPEA2 as the typical HESS reader might not be familiar with those. A schematic figure might be helpful. Also, some more explanation on the test function suite would be helpful. Could the metrics described on p.2485 be clarified using a schematic figure? Figure 1, on the other hand, could be omitted.

P2473, l.1: "publishable precision or error tolerances for their objectives to avoid wasting computational resources on unjustifiably precise results", usually it is not possible to a-priori know what goodness-of-fit can be achieved for a certain catchment (data quality, ...)!

P2476, l.13: "Euclidean norms for measuring distance from neighbour solutions", what is meant, the distance in the parameter space or the distance in the objective-function-space?

P2478, l.5: the effect of the transformation depends on the size/unit of the runoff. If y-values are larger 1 the transformation actually will increase the importance of high flows. Please provide information on y-values (units and average runoff)

P2479: the model used for the Shale Hill watershed should be better described, it is not well-known. What are the 4 parameters for each spatial zone? How are these zones delineated? ...

Table 4: there are too many digits. The information provided in fig 5b and fig 9 does not require a figure

For single-objective calibration the SCE-UA algorithm is often seen as the best algo-

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rithm. Given the results presented in this paper I wonder whether this still holds. I would like the authors to comment on this. Can the SCE-UA still be claimed to be best or is a similar study for single-objective calibration needed?

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 2465, 2005.

HESSD

2, S1245–S1247, 2005

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