Hydrology and Earth System Sciences Discussions

Interactive comment on "Reply to J. Vrugt's comment on "How effective and efficient are multiobjective evolutionary algorithms at hydrologic model calibration?"" *by* P. Reed et al.

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The comment and reply raise two questions:

1) What is the MOSCEM-UA algorithm? Or better, is the initial sampling a part of MOSCEM-UA? It is probably not fair to ask Tang et al. to test different ways to improve the various algorithms, but if the initial sampling is part of MOSCEM-UA than of course Tang et al. should have used it. Tang et al. (2006) refer to Vrugt et al. (2003) where the initial sampling was found to be useful, so one could say that Tang et al. should have used this sampling as it is a part of MOSCEM-UA (although one might argue that the initial sampling was more like an option). On the other hand, as I understand the initial

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sampling was not part of the implementation of the algorithm as provided by Jasper Vrugt to Tang et al., which would say the initial sampling is not part of MOSCEM_UA. Quite confusing, isn't it. But may be less a scientific issue than a communication problem that easily could be solved over a beer.

2) Is MOSCEM-UA with the initial sampling really that much better? HESS-D would be a great platform to put numbers into the discussion, if Jasper Vrugt could provide Tang et al. with a MOSCEM-UA version with initial sampling and they would be willing to re-run part of the analysis or if Tang et al. could provide the necessary input data and model code to Jasper Vrugt. It would be interesting to see these results!

Obviously there are not only many different optimization algorithms but each of those has many options for settings (or parameters). In other words, we do not only have an optimization problem in the hydrological model but also in the optimization algorithm. While this discussion certainly is interesting, quite honestly, I must admit that I feel that we have other problems in hydrological modelling. Most models which we can run 5-10 000 times are simple models which we in principle can run as many times as we want to in short times (millions rather than thousand of runs can be done rather quickly). The situation is different for more complex models but for those even 5 - 10 000 runs are often not feasible. Even more important, we have all kind of uncertainties and, thus, equifinality issues. In other words, we probably should not aim to find single solutions along the pareto-front by optimization but accept the existence of different solutions. Questions like data uncertainties and which types of data to use in multiobjective model evaluations seem more important to me than the discussion on the optimal optimization algorithms (even here I'd expect some equifinalty).

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 4, 183, 2007.