

Review of “Multi-objective calibration by combination of stochastic and gradient-like parameter generation rules: the caRamel algorithm”, by C. Monteil, F. Zaoui, N. Le Moine, and F. Hendrickx

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General comments and critique

This version is the revision of the technical note that has been submitted to HESSD, under the title “The caRamel R package for Automatic Calibration by Evolutionary Multi Objective Algorithm”. The content and philosophy of the revised article is very different, since the authors have made a large effort to provide a research paper rather than a short technical note. I am also very pleased for the detailed response letter, and the fact that many of my recommendations have been addressed.

I found this work much more comprehensive. The new algorithm is quite well presented, although I would expect a more careful review of the current advances in the field of multiobjective optimization and its applications in hydrological modelling, in order to justify the importance of this new methodology. In this context, I encourage the authors to address this important issue, which stands for any new research.

Another suggestion involves the presentation of results. I found them quite poor. To my opinion, the benchmark problem can be further developed, e.g. by running the three methods with much lower budget (instead of allowing 50 000 evaluations) and also changing the population size. You may take some ideas from the work by Tsoulakas et al. (2016), as well as many other similar works in the optimization literature. This will better reveal the pros and cons of the CaRamel method, and ensure a clearer comparison with respect to MEAS and NSGA-II.

Finally, I do think that a short section conclusive is missing, with guidance for optimal setting of algorithmic inputs.

There are also few additional comment and editorial correction, which are listed below.

In this respect, my overall recommendation is for a moderate revision.

Specific comments

Page 2, lines 32-33: “Most of multi-objective algorithms rely mainly on stochastic generation rules, with few deterministic aspects”. This argument requires some development, since it denotes the motivation of your research. If possible, also add references.

Page 6, line 123: Please explain the meaning of “secondary optimum”.

Page 6, section 3.1.3: Please, explain the criteria for selecting the so-called “a priori variance” of each parameter.

Minor editorial comments

Page 1, line 24: Please, change to read “have been” instead of “have become”.

Page 2, line 25: Please, change to read “... problems that are too complex...”

Page 2, line 26: “The advantage of these evolutionary algorithms lies not only....” This sentence is unclear.

Page 2, line 31: Please, change to read “to meet the need for an automatic calibration”.

Page 6, line 126: “... to make the variance of parameters independent from each other”. This statement is unclear. Variance and independence are two different notions.

Page 6, line 139: It may be preferable using M^T for transpose matrix. Most readers are familiar with this symbol.

Page 9, line 195: Please, open parenthesis.

References

Tsoukalas, I., P. Kossieris, A. Efstratiadis, and C. Makropoulos, Surrogate-enhanced evolutionary annealing simplex algorithm for effective and efficient optimization of water resources problems on a budget, *Environmental Modelling and Software*, 77, 122–142, doi:10.1016/j.envsoft.2015.12.008, 2016.