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Discussions

[GMDD]

Interactive

comment

Interactive comment on "Modular Assessment of Rainfall-Runoff Models Toolbox (MARRMoT) v1.0: an open- source, extendable framework providing implementations of 46 conceptual hydrologic models as continuous space-state formulations" *by* Wouter J. M. Knoben et al.

Anonymous Referee #2

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This is an interesting and well-written paper. It is a timely contribution to making available open, flexible and easy-to-use platforms for hydrological modelling. One strength and originality of the platform is the use of space-state model formulations and a well-adapted solver. The Supporting material also gathers a wealth of information, very useful for young (and less young) modellers wishing to better understand models' behaviour.

I have only a few minor comments detailed below. I advise publication after minor revision and I congratulate the authors for this impressive amount of work.

Detailed comments

1. P1, L4: Should not it be "state-space"? This aspect, which appears in the tittle, is not really discussed in the text. Maybe the authors could explain a bit more the implications of considering state-space formulations.

2. P2, L5-8: A number of earlier papers had discussed the issue of modelling steps and may be cited if deemed useful (Refsgaard and Henriksen, 2004; Refsgaard et al., 2005; Scholten et al., 2007).

3. P4, L9: Move "(ODEs)" to line 15.

4. P7, L7-10: Is it possible with the tool to apply a model on a set of catchments? This would be useful in the perspective of model testing on large sample.

5. P7, L30: I was surprised that PDM, which is widely applied in the UK and elsewhere, is not part of the platform.

6. P9, L1-11: Actually, these findings are not really new and corroborates past studies in the literature which could be cited.

7. P9, L26: The sentence was not fully clear for me.

8. P12, L22: I am unsure that this would be straightforward. Adaptive time-stepping means that model parameters are not time dependent, which is not always the case (?).

9. P23: The use of "unnamed" for many models is not informative. Could the authors give more explicit names, for example by using the first letters of the first author's name of the cited publications?

10. P23: Many models are not using a snow module, but could actually be used with

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such a module. To which extent snowmelt modules existing in other models could be used with these models?

11. Supplementary material, S2: A few models (e.g. S1, S3, S6) were not initially developed for short time steps (daily or shorter, as mentioned in P5,L5 of the article) and may be not directly applicable at these time steps. Typically, I am unsure a bucket model alone would perform well on most catchments at the daily time step. Should not this be clarified somewhere? Maybe the information on the original model time step development could be added in Table 1.

12. Supplementary material, S2: When reading this document, I found it would be useful to have a summary table for each model showing all model parameters together (symbol, meaning, unit). Some model descriptions are quite long and this table would ease the overview on model parameters. The authors may consider adding these tables, except if it is too much work.

13. Supplementary material, S2: Some models (e.g. #25 or 40 and maybe others) compute net rainfall as the difference between raw rainfall and potential evapotranspiration. This is actually equivalent to having an interception store with null capacity. Therefore I think these models should appear as having an interception store in Fig. 2. This process may also appear in S3 as an interception process.

14. Supplementary material, S2.1: This bucket model is also often used to represent interception (with evaporation at the potential rate), not only soil moisture. But this is generally only a part of a model.

15. Supplementary material, S2.5: line 8: "This"

16. Supplementary material, S2.5: The original IHACRES model includes a pure time delay, which is very useful for model applications on large catchments. Why was it removed here? I guess it would be useful also in other models which are not able to introduce a delay between rainfall and streamflow.

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17. Supplementary material, S4: The pure time delay mentioned in the previous comment could be introduced as another option of unit hydrograph. Actually, it can be easily coded as a UH, which would have only two non-zero ordinates. If td is the time delay (it can be a real value, not necessarily an integer value), the two non-zero ordinates would be respectively td-int(td) and 1-td+int(td).

18. Supplementary material, S4,7: Why a question mark before "Moore and Bell"?

19. P150: Not sure I fully understand the note on the filling parameter.

Cited references

Refsgaard, J. C. and H. J. Henriksen. 2004. Modelling guidelines - terminology and guiding principles. Advances in Water Resources 27: 71-82.

Refsgaard, J. C., H. J. Henriksen, B. Harrar, H. Scholten, and A. Kassahun. 2005. Quality assurance in model based water management - review of existing practice and outline of new approaches. Environmental Modelling & Software, 20: 1201–1215.

Scholten, H., A. Kassahun, J.C. Refsgaard, T. Kargas, C. Gavardinas and A.J.M. Beulens, 2007. A methodology to support multidisciplinary model-based water management. Environmental Modelling & Software 22, 743-759.