

## ***Interactive comment on “Parameterization and uncertainty in coupled ecohydrological models” by S. Arnold et al.***

### **Anonymous Referee #1**

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General comments: 1. Does the paper address relevant scientific questions within the scope of HESS? - Yes. 2. Does the paper present novel concepts, ideas, tools, or data? - At least partially. 3. Are substantial conclusions reached? - Yes. 4. Are the scientific methods and assumptions valid and clearly outlined? - Yes. 5. Are the results sufficient to support the interpretations and conclusions? - Some points should be clarified, some aspects should be discussed/explained further (see "Specific comments"). 6. Is the description of experiments and calculations sufficiently complete and precise to allow their reproduction by fellow scientists (traceability of results)? - Yes. 7. Do the authors give proper credit to related work and clearly indicate their own new/original contribution? - Yes. 8. Does the title clearly reflect the contents of the paper? - Maybe the title should be "Complexity of Coupled Ecohydrological Models

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and uncertainty in simulation results" or in that way. The parameterization plays only a minor role in the article while the model complexity/structure of the models is of major concern. 9. Does the abstract provide a concise and complete summary? - Yes. 10. Is the overall presentation well structured and clear? - Yes. 11. Is the language fluent and precise? - Yes. 12. Are mathematical formulae, symbols, abbreviations, and units correctly defined and used? - Yes. 13. Should any parts of the paper (text, formulae, figures, tables) be clarified, reduced, combined, or eliminated? - No. 14. Are the number and quality of references appropriate? - Yes. 15. Is the amount and quality of supplementary material appropriate? - Yes.

Specific comments: Abstract: - In line 2 (page 4156) "simulation" instead of "prediction" should be used.

1. Introduction: - In line 21 (page 4158) "modelling" should be replaced by "model calibration".

2.1.2 Hydrosystem: - Looking at Fig. 1, with colours/structures in the northern part completely different to those in the southern part, it is hardly to imagine that the alluvial aquifer is embedded into impermeable granite (although the cross section given in Dahan et al. (2008) - Fig. 2 - shows such a geologic setting). Can the authors give further evidence that there is no rift/fault below the alluvial aquifer? Furthermore, Fig. 2 displays rather a cross section than the water balance (Otherwise the arrows should be labelled and further information given). What is the "intermediate zone" in Fig. 2 supposed to be (not mentioned in the text or the formulae)?

2.2 Hydrological model: - In line 7 (page 4163) the number of "2400 m<sup>3</sup>/d ha" is given as cited from Dahan et al. (2008). I could not find this number there - is it calculated from data therein? - Formula (8) and line 7 (page 4164) "...ground water volume available to plant roots": the water available to plant roots will be depending considerably on the plants age and hence the root depths. This fact is not mentioned in the article, but will play a role regarding the transpiration, the depth to ground water, green and

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reserve biomass (2.4 Ecological model) and others. - Line 1 (page 4165): "Qin" with partially dry or flooded river bed it is hardly to imagine that the gw-inflow from upstream is constant over the season - can you give any evidence?

3. Results: - Although the results show that for model "B" only 0.009% of the parameter sets are acceptable, the number of the parameter sets for models "A" and "C" also is very small. Therefore I think it is somewhat premature to exclude "B" from further analysis.

4. Discussion: - Line 26 (page 4176) and line 8 (page 4177): "only two of the three models" and "only models A and C"; the number of parameter sets allowing for coexistence is larger for models "A" and "C", but the mentioned lines indicate that model "B" does not allow for coexistence at all. (Also in the Conclusion section, line 4, page 4181) - Line 28 (page 4177): "...integrating more knowledge in a model does not automatically lead to more realistic modelling results"; here it should be mentioned, that "On the other hand, (simple) models can give satisfactory results, but for wrong reasons" (effects may be neglected which can play an important role under different management or climatic conditions)

General: In the Introduction the authors write that "modles are required... investigating the effects of management actions". Therefore it would be interesting to simulate such management actions with all appropriate models (parameter sets) and to compare the results. It would be very insightful if the simulated effects are the same for all appropriate models (parameter sets). What if the fewer parameter sets acceptable for model "B" give more robust results than those for models "A" and "C"?

Technical corrections: - page 4160, line 17: "15 500 km<sup>2</sup>", blank as separator; line 18: "2000 m", no blank as separator - page 4164, line 1: "where...(t)=0.015)" should be placed at page 4163, line 20, directly below formula (7a) - page 4178, line 15: "... and C. (Fig. 6)."; Delete dot after "C" - page 4180, lines 26/27: "is a challenging because"; Delete "a" or insert "task" after "challenging"

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