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Hydrology and Earth System Sciences Discussions

Interactive comment on "Comparison of hydrological model structures based on recession and low flow simulations" *by* M. Staudinger et al.

Anonymous Referee #2

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This study uses the FUSE approach to design various model structures with the goal of improved recession or low flow predictions. With that, 79 structures where developed to investigate the role of model structure on influencing low flow predictions. This influence is considered under winter and summer conditions as these behave differently for the test catchment located in Norway. The manuscript is well written and the research is well conceived and performed. I have a few general comments the authors should consider. Following those is a list of minor and editorial comments.

General Comments

In a study specifically about the subjective choices made when developing or putting together hydrologic models, it is a bit interesting that the snow melt modeling was pre-

scribed and no other variations considered. I would expect decisions regarding this 'module' would be rather important in a snowmelt dominated catchment in Norway. In particular, I would expect this to be of variable importance depending on winter or summer seasons. Why has this not been better taken up in a FUSE (or FUSE-like) manner? I understand (and appreciate) the need to implement a modeling routine since FUSE does not cover snowmelt, but what does it imply to the modeling community to push forward with just one selected snowmelt algorithm and assign some parameters from nearby studies?

There needs to be a definition of what summer is and what winter is. Further, assuming there is a calendar split between the seasons, was the delay of water flowing through the catchment considered at all? Water that is stored in the catchment at the end of winter (or summer) could take a considerable amount of time to leave the system. How was this handled in 'splitting up' the seasons? For example, did you remove the spring and autumn periods of the records from the comparison to consider the transition period? In addition, thinking about processes, was any consideration given to 'warm winters' that might behave like summers? Isolating these from cold winters could help highlight the changes represented using the FUSE approach. Of course, it is quite possible that all winters in Norway are cold winters.

Along the same line, how were periods of recession defined in both observed and modeled data? Were periods of rain identified and filtered out? Is recession any two day period where the second day has lower flow than the first? How you define recession and/or filter data from a hydrograph could have an implicit influence on the sensitivity of recession parameters to modeling components. This would have large implications for this study, yet the authors have not presented any methodological details here. Further, the concepts of recession and low flow are tossed around a bit loosely throughout the manuscript. The authors could do a better job to clarify things. In fact, how do the authors define low flow? I could not find this information in the manuscript. In general, the methodology around how things were done could be tightened up considerably.

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Interactive Comment

Lastly, it could be nice in the introduction to give some minor review of FUSE. Specifically, what other applications have been made? Has similar approaches to the one used in this study been applied elsewhere? This could be helpful to give context and provide a bit of background to the utility of FUSE (i.e., not the details of how it works but information on how it has been used).

Minor and Editorial Comments

P6834L6: Remove comma before 'and'

P6834L21: I fail to see how the first half of this sentence is connected to the second half. Rewrite this sentence.

P6837Methods: It would be nice to see units for all the parameters in this section (as is done later around P6843L10).

P6841L4-6: The sentence structure here is confusing. Break this into two sentences.

P6841L20: Should this be '3' instead of 'three'? Also, some statement of the influence of setting this value to '3' must be given here. Were other values tested or considered? What is the potential impact in this headwater system?

P6844L14: How were seasons defined for 'splitting'?

Fig4: Why not have the L's and P's included in the labels on the y-axis instead of just the subscripts? This figure should be consistent with Table 1.

Fig5: Consider what is actually being added by your use of color in the figure and the figure caption. I printed this manuscript in black and white.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 6833, 2011.