Responses to review of revised manuscript by Referee #2

Dear Editor,

Please find below our point-by-point replies to the referee comments on the revised version of our manuscript. The Referee comments are in blue. The page and line numbers refer to the revised version of the manuscript.

Comment 1: As fresh read of the revised paper, I think the paper reads well for most of aspects: paper structure, descriptions, focus, figures. Reviewing the responses, the authors addressed my comments adequately. I appreciate the revisions made based on my comments, but I still feel that the statement for adaptive clustering could be improved (though I do see the effort to revise that section). I think one minor revision would improve the paper.

Reply 1: We are sorry, but we do not understand where the referee misses a stronger statement for adaptive clustering. We think we made its key goals clear in the abstract (page 1 line 10) and in the first sentence of the summary and conclusion (page 18 line 6).

Comment 2: 1. There are different properties between the state variables and flux variables in models. How to distinguish and handle them in the system of adaptive clustering?

Reply 2: The mapping from representatives to recipients within a cluster is done in the same manner for state and flux variables: Each normalized state (or flux) from the representative is transferred to the recipient, and then de-normalized by the particular [min,max] range of the recipient for the particular state (or flux). We explain this in section 2.1, but mainly only mentioned state variables. For clarification, we have added the term 'flux' here (step 'e' on page 4 lines 9-10). In section 2.3, where we explain the implementation of adaptive clustering in the SHM Attert model, we already mentioned both state and flux variables (page 7 lines 18-23).

Comment 3: 2. The similarity of spatial patterns and their clustering control is elaborated; however, the statement on the similarity of temporal patterns is not clear. Moreover, how to solve the transition between two time series with different states and fluxes of all sub catchments while the model run?

Reply 3: We assume the referee refers to page 13, line 16, and page 18, line 22 here. What we mean by temporal patterns of similarity is that the degree of similarity among the sub catchments varies with time (i.e. the number of clusters needed varies over time). Also, which sub catchments are put into one cluster also varies with time: Sometimes, when rainfall dominates, the sub catchments close to the same rain gauge fall into one group. At other times, sub catchments sharing the same geology will be put into one group. To clarify this point, we replaced at the above-mentioned places "the temporal and spatial patterns of similarity" by "the spatial patterns of similarity and their variation with time".

Comment 4: 3. In Figure 3 (a), the colors cannot be distinguished.

Reply 4: We changed the color of q_{out}. Now all lines should be distinguishable.

Comment 5: 4. The conclusions and summary are suggested to condensed, and the key points are focused.

Reply 5: We expanded this section according to the recommendations of referee#1, so we prefer to keep it as is.

Yours sincerely,

Uwe Ehret, on behalf of all co-authors