

Interactive comment on “Regionalization with Hierarchical Hydrologic Similarity and Ex-situ Data for the Estimation of Mean Annual Groundwater Recharge at Ungauged Watersheds” by Ching-Fu Chang and Yoram Rubin

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We thank the Anonymous Reviewer 1 for the constructive comments, which are valuable to improve the quality of this manuscript. Please find our responses in below.

1. We will add the discussion on the lack of temporal coverage as one of the limitation of the case study.
2. We will add the discussion on the lack of coverage over a desirable range of values as one of the limitation of the case study.

3. Agreeing with the reviewer, we acknowledge that some of the findings are specific to the case study, but the generality of the nested tree-based modeling approach is not. In a nutshell, the approach's Bayesian feature sets it apart from other approaches, as the limitation in data accentuates the need to account for uncertainty. The nested structure allows modelers to account for model parameter uncertainty in each individual BART model, and account for conceptual model uncertainty by proposal multiple plausible BART models and comparing them under the nested structure. The nested tree-based modeling approach can help us obtain an informed empirical probability mass function of the plausible BART models (which was exemplified in the case study). This part of the contributions is general, and independent of the case study. The other part of the contributions (including the shift in dominant controlling factor, the pivotal role of soil available water content, etc.) is indeed specific to the case study, and we will try our best to discuss the two parts separately, to reduce confusion. The explanation above will be included in the revised discussion section, and we thank the review for this precious comment.

4. This will be addressed in the same discussion mentioned in the response to comment 3 above.

Comments about the figures:

1. Wording will be changed as suggested.
2. A revised version of the Figure will be provided.
3. The suggested addition will be made.
4. Font size of node numbers will be increased.

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Discussion paper

