Hydrology and
Earth System
Sciences
Discussions

Interactive comment on "On the effectiveness of recession analysis methods for capturing the characteristic storage-discharge relation: An intercomparison study" *by* Xing Chen et al.

Anonymous Referee #1

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General Remarks

The work presented in the manuscript addresses relevant problems and tries to fill important gaps of knowledge in hydrological research. The work seems to have been conducted with high rigor and is of solid quality. A systematic comparison of different storage-discharge analysis methods on a large set of catchments is an important contribution in judging the value of those methods for research and practice. The manuscript should be published after some revisions.

Streamflow reconstruction vs. "control experiment":

The reconstruction of observed streamflow is the only method presented in the pa-

per that actually evaluates the practical applicability of the storage-discharge analysis methods for real-world problems. The "control experiment" setup allows, as the authors correctly point out, to better compare the different approaches by reducing the interference of potentially violated assumptions. However, the "control experiment" only allows to make comparative statements such as: "if a catchment can be accurately represented by a single reservoir, and discharge only depends on the state in that reservoir, then method A is superior to method B in identifying the characteristic storage-discharge relationship". It cannot be used to make statements about the applicability of those methods in general. This should be stated more clearly throughout the manuscript.

Chapter 2.2.1

Page 5, Line 20: The inequality is true only on the rising limb of the hydrograph, but we should be on the falling limb. The same for Line 21.

Chapter 2.3

Page 7, Line 23,24: How well was the lag time identifiable? Was there an uncertainty in the lag time? How would this uncertainty propagate to the streamflow reconstruction? This should be investigated and mentioned in a few sentences.

Chapter 2.4

Equation 9: The authors state that the measure of wr^2 allows to account for both, the dispersion and systemic bias between two variables. They say that the slope of the regression line (b) between two variables allows to consider the systemic bias. But in my opinion, this is only partially true: the slope of a regression line alone is not sufficient to say anything about a systemic bias between the two variables. The intercept would also have to be considered for this. For example, it could be that the slope is 1, but one variable is consistently higher than the other because the intercept is not 0. Furthermore, none of the metrics in Chapter 3.2 (Page 13, Line 5) considers

a systemic bias. Therefore, it should be checked if the intercept of the regression lines significantly differs from 0 and if yes, this should be included in the analysis to make statements about the bias.

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