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Hydrology and Earth System Sciences
Discussions

Interactive comment on "Using altimetry observations combined with GRACE to select parameter sets of a hydrological model in data scarce regions" *by* Petra Hulsman et al.

Anonymous Referee #3

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This study explores the feasibility of using water level derived from satellite observations combined with GRACE observations and other information about river cross-section shape for the calibration of a distributed hydrological model in ungauged basins. The results are interesting and potentially valuable to improve our understanding about how to more effectively use radar altimetry observations from space to trace streamflow. The paper can be published in HESS after addressing the following comments:

1.Using GRACE observation to constrain parameter space is definitely worthy to be evaluated. However, the uncertainty of GRACE observations in the model calibration process need to be considered. The parameter sets reproduce GRACE observation

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well may not be reasonably reflect hydrological process of the basin. It is in doubt whether it is reasonable to discard 75% of the parameter set only based on their poor ability to reproduce GRACE observations. It is recommended to calibrate the model based on radar altimetry firstly and then based on GRACE observation. The differences between the two cases may give some new insights about amount of information contained in the two types of satellite observations for hydrological model calibration.

2.Table 4 shows that the parameter set has the highest model efficiency in calibration based on satellite observation is not necessarily to perform best in simulating streamflow. To judge which strategy is more effective in model calibration, it is suggested to show the correlations between model efficiency in simulating the satellite observations and streamflow corresponding to each parameter set.

3.The discussions about the influences of number of virtual stations on model simulation should be extended to exam its influences on streamflow estimation.

4.The spatial resolution of GRACE observations and hydrological simulation are different. How did you treat this difference in model calibration?

5.In the results and discussion section, it is expected to get more understanding about the implications for the future studies in this research field from the findings of the current study, rather than limitation and comparison with previous studies, for which the relevance to the simulation results is not very high and therefore the content need to be reduced. Also the length of abstract need to be reduced.

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