

Interactive comment on “Hydrological functioning of West-African inland valleys explored with a critical zone model” by Basile Hector et al.

Anonymous Referee #3

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Hector et al. present an interesting study of an elementary catchment (what is elementary?) replicated from the Sudanian Savanna (please use this term instead of Sudanian area) which is based on a plethora of field data and experience from a previous study. The focus are inland valleys and their hydrologic response and sensitivity to hydrogeologic heterogeneity and land cover change. The model is validated against the field data, which lends confidence in the results. This is a well-performed case study, which demonstrates that, in case of bulk mass fluxes, heterogeneity may play a minor role in the overall valley hydrologic response. Key are the boundary conditions and the interactions with the land surface.

I have only two points that the authors should address and some minor comments below. First, the authors state that this is a synthetic study of an elementary catchment,

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however, which is based on their best knowledge and a plethora of data of the real system. In addition, the model is validated quite comprehensively. This is not consistent. In my opinion, the authors present a well-informed case study and not a synthetic study, which needs to be made clear in the text. Second, if they seek generalization of their results beyond their test site (and I feel that is what they suggest with the term elementary catchment) they need to find a way to make the results transferable and show this by applying their findings to inland valley across the region. In addition, the manuscript will benefit strongly from a careful check of language and grammar.

Minor comments Define the length of the time series earlier in the text. Provide information the climatology of the region at the beginning. The forcing is homogeneous over the model domain? Is it evaluation or validation data; please check section title. If you validate with data, why is this a synthetic modeling study? I would prefer Sudanian Savanna instead of Sudanian area. Remove “...” from enumerations. I prefer all variable symbols (Q, ET, etc.) in italic. In the EOF analyses, I assume that additional modes do not show any useful information, which I find disappointing, because I would have expected perhaps also some variance over longer time scales in storages in the 7 year time series. The annual signal is clear, which is not surprising.

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