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Hydrology and Earth System Sciences
Discussions

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

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Thank you for all the comments and questions regarding to our submission to HESS: Hydrological functioning of West-African inland valleys explored with a critical zone model". Many thanks to the four reviewers who raised relevant questions that we hope to address in this final response. We will mainly gather previous replies written in the debate phase and add our suggestions for changes in the manuscript.

RV #4 1. With the information provided, it is basically impossible to reproduce any results. There are some tables with parameters but it would be so much easier if the complete code and data were made available, preferably as a Docker container. Where are the the topographic data? Where are the measurement values? Which

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version of ParFlow was used (why not link to the code?)? See, for example, the article “Most computational hydrology is not reproducible, so is it really science?” (https://doi.org/10.1002/2016WR019285). This is a serious issue within hydrology and I would urge the authors to spend some time carefully curating their code and data. This would greatly improve usability and uptake of their approach.

=>Thank you for pointing that out. We will indeed attach the main ParFlow configuration script, as supplementary material (if this is relevant for the Editor) and link to the ParFlow code (there is a tagged version on PF Github that we will point to: https://github.com/basileh/parflow/releases/tag/v3.3.1-IGE). Input data will be made available upon request, together with a Docker image (too large to provide with the paper anyway) that allows to run the model in the same configuration as for the paper.

2. It is stated that a complete study would be needed to describe the effects of H2. I agree but perhaps tell the reader a bit more about the geology. Is the geology metamorphic or granitic? The work by Bertrand may be useful here with a nice overview presented in Sitapha Diatta’s work on impermeable layers in inland valleys (http://docnum.univ-lorraine.fr/public/SCD_T_1996_0043_DIATTA.pdf). Being familiar with their work, I can still not determine if the Nalohou is similar or completely different. So please add some morphological/geological information.

=>The Geology is metamorphic, thank you for pointing out this omission. Many thanks also for the reference given, which we did not know, but significantly strengthen the current study. This inland valley study describes the same hydrological behavior between the perched water table and the permanent water table : a disconnexion in the valley thalweg and some lateral connexion upstream, as described in Figure 13 in Hector, B., Séguis, L., Hinderer, J., Cohard, J.-M., Wubda, M., Descloitres, M., Benarrosh, N. and Boy, J.-P.: Water storage changes as a marker for base flow generation processes in a tropical humid basement catchment (Benin): Insights from hybrid gravimetry, Water Resour. Res., doi:10.1002/2014WR015773, 2015. We will discuss our settings and results with respect to their study.

Modifications in the manuscript:

P4. L3: In this section, we briefly describe our conceptual representation of the main soil and vegetation characteristics found in the hard-rock basement areas of the Sudanian climatic region (yearly precipitation amount between 700 and 1400 mm), dominated by metamorphic settings.

P4. L11: this specific behavior is representative of inland valley functioning in similar geological/climatic context (see e.g. Brabant, 1991 in Cameroun or Diatta, 1996 in Ivory Coast)

References added: Diatta, S.: Les sols gris de bas versant sur granito-gneiss en région centrale de la Côte d'IvoireâĂŕ: organisation toposéquentielle et spatiale, fonctionnement hydrologiqueâĂŕ: conséquences pour la riziculture, Nancy 1. [online] Available from: http://www.theses.fr/1996NAN10043 (Accessed 26 July 2018), 1996.

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