

## ***Interactive comment on “Physically-based modelling of hydrological processes in a tropical headwater catchment in Benin (West Africa) – process representation and multi-criteria validation” by S. Giertz et al.***

**Anonymous Referee #2**

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General evaluation:

The paper “Physically-based modelling of hydrological processes in a tropical headwater catchment in Benin (West Africa) - process representation and multi-criteria validation” by S. Giertz, B. Diekkrüger and G. Steup reports new findings related to hydrological modelling in the tropics. The authors have added new developments to an existing model to simulate run-off and related hydrological processes in small catchments in Benin. The paper presents new and important results related to a part of the world where so far not much knowledge regarding hydrological processes and the applicability of run-off models has been obtained. The paper clearly is an important contribution

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to hydrological sciences and fits the scope of HESS. The model is outlined precisely and all parameters and data are described appropriately. Data and results are of high quality and merit publication.

Specific remarks:

1. In the abstract and/or the introduction the concept of the model should be outlined more clearly by stating its semi-distributed structure.
2. The discussion of errors (section 9) is rather general and does not try to give much quantitative measures. It should be considered, if the range of specific errors, when stated more precisely using numbers, could be used to evaluate the relative impact of these errors on the model's precision.
3. The paper states the relevance of land use within the catchments which as a general comment is not really new. However, the authors could underline this important fact with numbers that result from the model runs. Therefore, I would find it helpful and further enhancing the paper's quality if the authors would more deeply discuss the impact of farming activities on the hydrological cycle especially by relating such a agro-hydrological discussion to the separation of surface runoff, interflow and ground water flow as it can be deduced from the results. Although the paper is longish as it is, I suggest to add a separate section on that matter.
4. Technical correction: On page 1 line 17 it should be "were larger" instead of "was larger".

I recommend to accept the paper for publication within HESS after minor changes according to the points outlined above.

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