

Interactive comment on “Identification of runoff generation processes using hydrometric and tracer methods in a meso-scale catchment in Rwanda” by O. Munyaneza et al.

Anonymous Referee #2

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Review “Identification of runoff generation processes using hydrometric and tracer methods in a meso-scale catchment in Rwanda” by O. Munyaneza, O., Wenninger, J., Uhlenbrook, S.

Munyaneza et al. present in their manuscript an interesting data set about runoff separation in a Rwandan nested meso scale catchment which is under the influence of semiarid and tropical conditions. They present hydrograph separation for two events with deuterium, oxygen18 chloride and SIO₂ and for 13 events hydro meteorological data of the rain season and statistic data for hydro chemical data. The focus is clearly on the separation. They conclude that the catchments are dominated by subsurface

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water during the rain season. But they do not present information on soils and geology. In a revised manuscript information of the dominating geology, soils (texture, type) and soil depth should be included. That is important to have an idea of infiltration and subsurface processes.

The link between the two separated events and the remaining 11 events should be improved to underline their hypothesis.

The presentation of the isotopic fingerprint of the rainfall needs improvement. In the observation period of two years they identify a different signature of wet and dry period. There is only 40 mm rain in the dry period. In the presented intensely agricultural used area rainfall will be directly evaporated during that period and is negligible. Clarify the importance to know that signature.

In the introduction they start with a focus on increasing population density and importance of the resource water for the study area. They should pick up that point in the conclusion. There is an open question how they have estimated their runoff coefficients. That should be clarified in a revised manuscript.

The authors are writing from small runoff coefficients between 16 and 40 %. I disagree that these values are small. They are moderate to large.

The paper needs improvement in organisation and structure. The reader should be more introduced what is done for which question. The conclusions need improvement.

Specific comments: Page, Line

673, 19: the citations are not correct, the cited works are in the semiarid Tanzania and that work presents analysis of the rainfall season. Appropriate citations should be selected.

674, 19-20: the authors underline that they are working in an area which is under semiarid and tropical conditions but the presented data is only for events in the tropical rain season "Itumba". That should be clarified.

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675, 9-11: Rewrite the sentence.

675, 12-14: Is that important for the paper? Only the superior catchment and Kansu are observed.

681, 3-6: The argumentation is not clear why surface runoff is dominated by subsurface components. It is not possible to link low flow runoff events in Table 1 and 2 with mean values in 3. It would be helpful and interesting to merge Table 3 into 1 and 2 and not only presenting mean and standard deviation. What are the pre event conditions? Has that an influence on the event?

682, 11-15: Split the sentence. The authors should be careful by transfer plot scale observation to meso scale catchment size.

685, 5: It is hard to judge without knowing the volumes. During the dry period (June to August) approximately 40 mm is estimated by van den Berg and Bolt (2010). That volume is negligible by taken ET into account.

686, 4-6: van den Berg and Bolt have done four double ring infiltrometer tests at one small are in the head water of the Kansu catchment. The authors cannot explain the infiltration in the meso scale catchment Mingina with four point scale results.

686, 8-11: Split and Rewrite the sentence: "In the same study, they also found that Migina catchment is dominated by agricultural land use (92.5 %) while the range of runoff coefficients found in this current study (16.7–44.5%) agrees with the range for agricultural dominated catchments found by Larsen et al. (2007)." The message is not clear in the context to the next sentence.

688, 22: Table 1 and 2 do not show any origin of the hydrological compartments.

688, 24-25: That is not surprising if rainfall is only 40 mm in dry season.

Table 3 and 4: It is not clear what is the investigation period. Add to the caption that the samples are taken during rain season or the complete two year?

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