

Interactive comment on “Effects of spatial variability of precipitation for process-orientated hydrological modelling: results from two nested catchments” by D. Tetzlaff and U. Uhlenbrook

Anonymous Referee #1

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General comments.

The paper carries out an interesting study to assess the hydrological implications of using different rainfall data sources. The hydrologic effects of different rainfall data are evaluated by comparison of the hydrographs simulated by a spatially-distributed model using the radar data and the ground station data. The study identifies the spatial variability of the precipitation as the main cause of the hydrograph differences. The paper also assesses the relative importance of capturing the spatial distribution of the rainfall at different spatial scales by comparing the results for two nested catchments of different area. I think that the paper is appropriate for publication in HESS subject to some minor revisions which could clarify some aspects of the approach adopted and give a better support to the conclusions driven by the authors.

Specific comments.

- 1) One important aspect of the paper is the use of different rainfall data sources; I think the title should explicitly report that particular approach. Moreover the effects are considered only in terms of hydrograph prediction. Therefore I would suggest a title like: Effects of the rainfall data source on simulated discharge in two nested catchments.
- 2) p.120 line 8. "Ë input rainfall data from up to 11 ground stations Ë" while at p.125 line 21 "Ë but for the subsequent runoff simulations, in addition to the radar data, up to 7 ground stations were usedË". I think it is better to say in the introduction the right number of rain gauges used for the model simulations instead of those used for radar calibration. In the figure 1 I can count 5 rain gauges, are the two stream gauging stations measuring precipitation as well?
- 3) The data used are not purely from radar and gauge stations but at one side a combination of radar and ground data and at the other side only ground data.
- 4) p.123 lines 1-4. The first aim of the paper is "to develop a methodology for an optimum adjustment of the operational available radar data". Can you be more specific on that? What it is here the meaning of "optimum"? Did you compare this method with others?
- 5) p. 123 lines 5-7. The third aim is "to examine the influence Ë on simulated runoff and different runoff components". Can you provide some analysis of different runoff components?
- 6) p.129 line 15. "Firstly, equal time intervals of 5 min between the radar and ground data were constructed for comparability of both data sets". Which was the original time resolution of the ground data? How did you disaggregate/aggregate the data?
- 7) p. 129 line 23. A r^2 of 0.47 is quite low. Can you expand more on this?
- 8) Do you think that the model efficiency plays a negligible role? Do you think that the model is not affected by the data used for the calibration? (In Uhlenbrook et al. 2004b

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it is said the rain gauge data have been used).

9) p. 128 lines 20-23. The Nash and Sutcliffe coefficient is used to evaluate the goodness of the model efficiency while in the rest of the paper the same coefficient is used to evaluate the goodness of the rainfall data. Do you think this approach is coherent? According to tab. 6, the Nash-Sutcliffe coefficients range between -0.99 to 0.95 for rainfall data, and between -0.88 and 0.82 for radar data. Can one use these coefficients for model evaluation instead?

10) pp. 134-135. The paper clearly shows the influence of using different rainfall data input, but I think nothing can be said about the role of the spatial distribution of rainfall since the results radar/ground station are in contrast. Moreover the total amount of the precipitation is different in all the event for the different data sources (according to table 5). Can just these deviations explain the runoff differences? In other words I think it is not possible to assess the relative effects on the discharge of the total precipitation amount versus the temporal and spatial distribution of the precipitation. Any comments?

11) p.135 lines 18-20. Why should the non-linearity of the hydrologic response balance or smooth the differences in precipitation? Can you explain that?

12) p. 136 lines 3-6. "Consequently, the importance of the input data for flood prediction can be very large, and this should be considered as much as the nowadays frequently discussed parameter uncertainty when using such process-orientated models." How? Should we go for installing new radars or for intensifying ground station networks? Is it just a matter of unavoidable uncertainty of the prediction? Can you be more specific on this?

Technical comments.

1) Table 5. Can you add a column with the deviations?

2) Figure 1. Are the stream gauging stations also measuring precipitation? Can you

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update the legend?

3) Figure 4. Can you add the layer with the ground stations location?

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