Hydrol. Earth Syst. Sci. Discuss., 2, S19–S23, 2005
www.copernicus.org/EGU/hess/hessd/2/S19/
European Geosciences Union

Hydrology and Earth System Sciences Discussions

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 #2

Received and published: 18 February 2005

General Comments

This paper carries out an interesting study to investigate the utility of rainfall radar data to define spatial variability in precipitation in two nested catchments, and to compare the resulting rainfall fields with ground data. The importance of the spatial variability is evaluated by comparison of predicted hydrographs generated by a spatially-distributed rainfall-runoff model using the radar data and the ground data. The study provides a much needed addition to the body of research considering methods of defining spatial variability in precipitation and the potential value of radar data, which themselves involve many uncertainties. The paper also highlights the significance of the spatial variability in terms of hydrological prediction at different spatial scales.

I believe the paper is appropriate for publication in HESS subject to a number of minor revisions that would make the paper easier to read, and clarify the approaches. In particular, the paper would benefit from a general revision of grammar, largely through revision of sentence structures.

Specific Comments

1. The title does not entirely reflect the content of the paper. In particular some indication of the comparison between using radar and ground data would be useful. E.g. Spatial variability in precipitation: a comparison of radar data with ground data and its implications for catchment modeling.

2. Include some key words.

3. p120 line 18 ...a new method was developed... The novelty of the approach is not clear from the presentation of the method on pp125-126. How does it differ from previous approaches?

4. p120 line 24. There is no demonstration in this paper that the benefits of using rainfall radar data are model dependent as only one model has been tested.

5. p121 line 7-9. The mean diameter of a rain cell must vary hugely for different climates and rainfall types and hence typical values will only be regionally applicable.

6. p121 line 16-18. Do you mean simulated total runoff or peak runoff? Presumably total runoff follows total rainfall.

7. p 123 line 1-9. The three-fold aims of the paper make its structure rather difficult to follow. I suggest some restructuring to the section headings to separate out the methods and results that apply to each of the three objectives. I would also suggest separating out the scientific methods from the description of the study area and rainfall data. The methods section could include (1) Precipitation data handling ñ (1.1) ground data and (1.2) radar data. (2) Hydrological modeling. This would involve splitting up section 2.2 (p124-125) and bringing in part of the results section 3.1 (p129 line 14 -

HESSD

2, S19–S23, 2005

p130 line 14) to the methods. The results section should only present the data resulting from application of each method.

8. p124 line 25. The significance of radar reflectivity should be explained here rather than on p126 lines 17-22.

9. p125 line 23 and p126 line 6. This text repeats itself. What was the rationale behind the 80:20 weighting? Was this trial and error, or is there some physical reason for it? Why not 50:50?

10. p126 line 15. There is no discussion of snow processes. Presumably this is why summer events were chosen, but a statement to this effect would be useful. What is the value of radar data during snow events?

11. p128 line 26. There is little explanation of how the radar data were calibrated. As suggested previously, the presentation of the method in section 3.1 (p129) should come earlier in the paper.

12. p129 line 4-9. Using this method, general (non-event specific) biases in the radar or ground data will not be identified. Any comments?

13. p129 line 23. r2 of 0.47 is rather low. What are the implications of this?

14. p130 lines 1-14. Description of method is not very clearly presented or explained.

15. p131 line 2 How do you know that the IDW- elevation data result in overestimation rather than the radar data causing underestimation.

16. p 134 The discussion is a bit limited. Where do we go from here? What are the implications of the findings. Are there any recommendations for using different data types in modeling, and how much effort should be made to calculate spatial variability? Do we need more ground stations or radar stations?

17. p 134 lines 7-9 How would the radar data be calibrated for periods of less intense rainfall that do not directly create storm hydrographs, but which are important in terms

HESSD

2, S19–S23, 2005

of soil moisture and antecedent conditions?

18. p136 line 5. The point about data uncertainty as compared with parameter uncertainty is important. Can you expand more on this?

19. p 136 line 6. Are there any other applications for which this study is of particular relevance?

20. p 136 Conclusions are rather vague. Can they be separated from the more general discussion and even perhaps bullet-pointed?

Technical corrections

1. There are many instances of sentence inversion which would read better with the subject at the start of the sentence e.g. p122 line 16 There exist a number of studies... could be changed to: A number of studies exist...

2. p120 line 16, p132 line 1 etc. replace insufficient with inadequate or unacceptable.

3. p 121 line 2 change termed to identified.

4. p121 lines 16-19 restructure sentences.

5. p122 line 2 and lines 25-27 restructure sentences.

6. Other similar examples of sentence restructuring required throughout paper.

7. p124 line 2 change exposition to exposure

8. p128 line 15 change ...which had some fillings of... to ...using estimated values for the hydrological storages prior to this period.

9. p130 line 15 change: The exemplary shown percentage deviations... to Example percentage deviations...

10. Figure 1. Lines representing contours, streams and catchment boundaries are had to distinguish. Can the figure be improved?

HESSD

2, S19–S23, 2005

11. Figure 2. Terminology on figure (slow, medium, fast) is inconsistent with caption and text describing three runoff generation mechanisms.

12. Figure 4. More labels required to define maps of radar and ground data input and events.

Interactive comment on Hydrology and Earth System Sciences Discussions, 2, 119, 2005.