Hydrol. Earth Syst. Sci. Discuss., 6, C2556–C2559, 2009
www.hydrol-earth-syst-sci-discuss.net/6/C2556/2009/

Hydrology and Earth System Sciences Discussions

Interactive comment on "Selection of an appropriately simple storm runoff model" *by* A. I. J. M. van Dijk

Anonymous Referee #2

Received and published: 9 November 2009

General comment:

This manuscript deals with the balance between model simplicity, parameter equifinality and model performance. The question of how complex a hydrological model should be is an important research question that has been receiving much attention. The author takes the USDA Soil Conservation Service curve number method and explores several simplification options by using an extensive dataset from 260 catchments. While the database is impressive and should yield some useful insight, as the author states himself, even the optimal, most complex model structure studied shows only moderate performance, and implications or recommendations based on this study remain unclear. The study demonstrates the difficulties associated with relating empir-

ically obtained relationships and parameters to processes and physically meaningful parameters. I would recommend to include different/and or more complex model structures that describe the data more satisfactorily and from there stepwise simplify and discuss the tradeoffs between model simplicity and model performance.

Specific comments:

- section 1.1: Please add references to the discussion of runoff processes. It does not contain a single reference.

- Section 1.2: There have also been studies documenting and discussing threshold behavior at different scales. Adding some of them to the discussion of threshold behavior would be helpful.

- I recommend a list with parameters and their abbreviations – there are many parameters similar in notation to keep track of and their use does not always seem to be consistent (e.g. fs vs. fsoil on page 5756, equ. 4, line 14, line 20)

- Section 2.1, line 5: were selected

- Section 2.1, line 6: ..or other processes upstream on streamflow

- The author provides information on the total of 362 catchments but only 260 catchments were selected for the study. I would recommend to rather provide the mean statistics, characteristics etc for the selected 260 sites.

- The dataset of 260 catchments seems to encompass quite a range in climatic conditions. More information on climates, topography, geology and anticipated dominant runoff mechanisms would be very helpful. It should also be stressed more that all catchments were apparently taken from very humid regions – certainly a constraint for applying results to other regions.

- I think it would be worth mentioning explicitly that the models considered in this study are about predicting total storm runoff and not about predicting time series/storm hy-

HESSD

6, C2556–C2559, 2009

drographs.

- Section 3.2: this subset of 20 stations – how was this subset selected?

- P. 5763, line 20: ..because of the larger..

- I found the listing of results in section 3.2. and then section 3.3 confusing. 3.3 repeats in part results that are mentioned in the bullets. P. 5764, line 13: shouldn't that be 5667 mm? p. 5764, line 6: wrong 80% range?! Also, I think some of the results could be presented better in plots – e.g. the distributions of parameters.

- P. 5765, lines 12-13: considering the annual rainfalls, none of the catchments seem to be "dry". Please explain how you define dry and wet. Again, it would be useful to have more information on climatic conditions, rainfall distribution etc.. Also, isn't that counterintuitive that saturated area changes faster in a dry catchment than in a wet catchment?

- How were antecedent moisture conditions taken into account?

- Please mention at least briefly the methods for travel time estimation.

- This study is averaging results over a wide range of catchment sizes and climates and, I assume, topographies/geologies. Wouldn't it be helpful to analyze results for subgroups – e.g. small vs. large catchments, steep vs. shallow, depending on rainfall distribution over the year?

- P. 5767, lines 20/21: what are Australian conditions? Please explain.

- Section 4.4, last sentence: Generally specifying initial losses as 12 mm is a big simplification, across scales, climates, topographies and geologies. Please provide a rationale why this "would seem realistic".

- Section 4.7, lines 12/13: Doesn't that strongly depend on climate (e.g. convective events with high intensities vs. frontal events with typically moderate/lower intensities although storm totals can be very similar)?

HESSD

6, C2556–C2559, 2009

Interactive Comment

- Many conclusions remain speculative, e.g. conclusion 4, without actual field data/observations backing those assumed mechanisms.

- I am not clear on what the implications of this study are and how results can be used further. Here is where I think that the inclusion of a more complex model could improve he usefulness of the study.

- Fig. 2: why are some catchments shaded in grey and others in black?

- Fig. 3: is the last column supposed to be truncated? What are dots and the gray-shaded areas? (probably refer to some percentile, median etc.)

- I think a figure plotting measured vs. modeled storm runoff at least for one of the models (the optimal model structure) would be very informative.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 6, 5753, 2009.