Hydrol. Earth Syst. Sci. Discuss., 6, C2676–C2679, 2009
www.hydrol-earth-syst-sci-discuss.net/6/C2676/2009/

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 #3

Received and published: 19 November 2009

The paper at hand deals with simple storm runoff models that are tested against storm flow time series to gain information on model performance. The number of free parameters to achieve a optimal model performance is analyzed based on the FPEC criterion. This test is applied on a large dataset of 260 catchments in Australia. This paper shows the reduction of prediction quality when reducing model complexity. In addition, it is tried to bring together runoff processes and simple models.

General Comments:

In the conclusions' section the success of the study is minimized. There and in section 4.7 the weak performance of even the best model is mentioned. This means that the applied models are not able to reproduce the observations. The reasons for this

Full Screen / Esc
Printer-friendly Version
Interactive Discussion
Discussion Paper

failure might be that the model does not include (not enough or) not the adequate parameters or the model structure does not imply the relevant processes. Therefore, the author should include more complex model structures that are able to reproduce the observations better. As far as the model evaluation is not improved in this sense, there is no benefit for the community of hydrologists. Due to this reasons I recommend to reject this paper.

Specific comments:

In the objectives (p. 5758) it is suggested that there has not been a comprehensive analysis of alternative model formulation. However, such model comparisons are a wide spread research activity in hydrology and they should be summarized. A literature review in this regard is missing. An overview of similar studies should be given in order to compare the approach and to bring the results in a larger context.

The dataset of 260 Australian catchments is impressive and gives a good basis for the presented work. However, beside the range of size and annual rainfall rate, no useful information is given about the structure of the catchments (vegetation, soils, geology, groundwater zones, lakes, altitude, riparian zones, etc.) nor about the instrumentation of the basins (precipitation gauge network). There should be a table summarizing such information. It would make sense to choose only catchments with good data quality for this study. Likewise, the author should consider to include not every storm event but to choose "good" events due to sharp criteria. Especially, rainfall data plays (besides discharge data) a crucial role in this assessment. Therefore, the quality of the estimated daily areal precipitation is very important. In the end (p. 5771) the information is given, that the network is generally rather low. Because, even in very small catchments, the spatial variability of rainfall in space is high, it must be suggested that it has a severe influence on the results obtained in this study.

At least in the conclusions a proposal of ideas or approaches how the results could be improved should be presented (e.g. at p. 5769/70 good intentions to improve the

HESSD

6, C2676–C2679, 2009

assessment are mentioned). The crucial role of rainfall data quality is mentioned above. Good data could be used to show the variability of the results by using better (higher resolved) data (e.g. higher resolved data of spatial rainfall distribution in catchments where such information is available).

In the paper some of the achieved results tried to be explained with the runoff generation theory and the involved runoff processes. These explanations are accompanied from speculations, suggestions and assumptions that are not comprehensible with the information given in this paper. On p. 5577 for example, for 72% of the catchments the calculated saturated area f_{sat} was less than 1%. No information is given whether this might be plausible. On p. 5769 daily rainfall intensities are brought together with Hortonian Overland flow (line 14-16). This argument is not suitable to explain higher peak flow rate. In line 12 perched water tables are mentioned. No information is given on the preconditions of this process. Also on page 5766 (line 4-6) very vague and doubtful explanations are given for the behaviour of the hydrograph recession curves. To strengthen these arguments additional information should be provided, or otherwise such statements should be left out.

The SCS-model is a rather simple and relatively weak hydrological model. Here it is used, although the adequateness of this model has been questioned in many parts of the world. The comparison should be done with a more adequate model.

To show some examples of good and worse results of modelled and measured hydrographs would be interesting. Some catchments react strange to precipitation (e.g. annual runoff of 2 mm). Such data should not be used.

Technical corrections

The article includes a lot of parameters. A table with all abbreviations and explanation should be inserted, which would make the article easier to read.

p. 5759, line 10: 3177 mm, is that value correct?

HESSD

6, C2676–C2679, 2009

p. 5766, line 8-14: this statement should be clarified.

p. 5768 line 2, 12mm instead of 12 m

p. 5759, line 9 and p. 5766 line 1, the values of median do not correspond

Fig. 1: The graphic is rather small. I recommend to enlarge the figure. You give a hint that there are no seasonal patterns of rainfall intensity. By monthly data intensity patterns can hardly be shown.

Fig. 2: The catchments are difficult to identify. Please enlarge the area where most of the catchments are located.

Fig. 5: the value of r^2 does not correspond to the place mentioned in the text.

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