Hydrol. Earth Syst. Sci. Discuss., 8, C5540–C5542, 2012
www.hydrol-earth-syst-sci-discuss.net/8/C5540/2012/

Hydrology and Earth System Sciences Discussions

Interactive comment on "SCS-CN parameter determination using rainfall-runoff data in heterogeneous watersheds. The two-CN system approach" *by* K. X. Soulis and J. D. Valiantzas

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Received and published: 3 January 2012

Soulis and J. D. Valiantzas presented a modified version of the Soil Conservation Service Curve Number (SCS-CN) that is intended to better capture basin heterogeneity. The reasonable performance of the SCS-CN method alone is noteworthy, because it demonstrates the dominance of precipitation in the runoff generation processes. The proposed two-CN value method is intriguing since it seems to improve the calculation's performance significantly.

Perhaps, a better way to arrive to the two-CN solution would have been to systemati-

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cally increase the CNs to two, three and four or more and show the gain at each step. One could expect some sort of break point reflecting the differentiation between "standard" vs. "complacent" behavior, where adding more parameters don't improve the performance. The synthetic experiment with three-CN vs. two-CN is a good start, but it would be more informative if it went further. The demonstrated better performance of the two-CN solution compared against the simple CN solution itself is not really surprising. Benchmarking against four or five CN implementation and showing that the gain is significant when going from one to two but diminishes going beyond, would have been more meaningful.

I don't necessary find the two case studies sufficient to demonstrate the robustness of the proposed method. Normally, I would try to do tens if not hundreds of basins before claiming victory. I also wonder, how this method can be applied to basins without discharge gauges. Perhaps a systematic reduction of distributed CN values (based on recommended values) could lead to a finite number of "composite" CN values (two, maybe more) that are still representative for a basin, but simplifies the computation.

I recommend the paper for publication, because I see a potential in extending this work further that could lead to a reasonably simple and still solid method to estimate discharge. I also see a value in assessing, how the number of parameters in a simple rain-fall runoff model can be reduced without loosing fidelity of the model performance.

Few Notes

Page 8964, line 9: I don't necessary see what is novel about the acknowledging that typically varies in watersheds. What is interesting and perhaps novel in this paper is the demonstration that introducing a second set of CN values improves the method's performance significantly. Page 8969, line 7: CN is utterly non-dimensionless. The original implementation must have been expressed in inches (hence the odd 25400 and 254 coefficients). Actually, it would be better if the authors used the 25.4 [mm/inch] (1000/CN -10) formula, which is closer to the original and clearly indicates the english

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metric origin. Page 8970, line 5: The meaning of “composite CN” is unclear in this context although, it is explained later, it would be better, if the explanation came earlier.

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., 8, 8963, 2011.