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Hydrology and Earth System Sciences
Discussions

Interactive comment on "The evolution of process-based hydrologic models: Historical challenges and the collective quest for physical realism" *by* Martyn P. Clark et al.

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We thank the reviewer for his/her constructive comments.

The referee brings up an interesting point, in that the closure relations (i.e., flux parameterizations) can be parsimonious functions of storage. This approach has been described in some of our other papers, in particular, Clark et al. (2008), Gupta et al. (2012) and Hrachowitz and Clark (2017).

Such bucket-style models are extensively used in engineering hydrology. A key example is the Sacramento model used for streamflow forecasting in the USA.

We describe the bucket-style modeling approach on page 3, and we have modified the

text to refer to Hrachowitz and Clark [2017]. The revised text is

"In bucket-style rainfall-runoff models – at the simplest end of the complexity continuum – the large-scale transmission of water is often defined as a linear (or near-linear) function of water storage (e.g., see the synthesis in Clark et al. [2008] and the review by Hrachowitz and Clark [2017])."

References:

Clark, M. P., A. G. Slater, D. E. Rupp, R. A. Woods, J. A. Vrugt, H. V. Gupta, T. Wagener, and L. E. Hay, 2008: Framework for Understanding Structural Errors (FUSE): A modular framework to diagnose differences between hydrological models. Water Resources Research, 44, doi: 1029/2007WR006735.

Hrachowitz, M., and M. P. Clark, 2017: HESS Opinions: The perceived dichotomy between physically-based and conceptual modelling strategies in hydrology and how we can benefit from their convergence. Hydrology & Earth System Sciences, under review.

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