

Interactive comment on “A history of TOPMODEL” by Keith J. Beven et al.

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This is a very nice overview of the history of Topmodel and I think that it will serve as an extremely useful reference for anyone who may feel a bit lost in the numerous variations of model structures that have emerged over the year (which at least was the case with this reviewer).

I don't have much to add to the other reviews apart from a few specific comments (see below); however I would like to second Dave Milledge's comments on the lack of discussion on landscape connectivity in determining the contribution of surface runoff to river flow, as explored in publications such as Lane et al., (2004) and Lane et al., (2009). At least, looking back on my own applications of Topmodel, I identify our inability to account properly for varying surface contributing area as a result of dynamic surface hydrological connectivity as a major bottleneck for our model performance (in addition

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to errors in the input data). Even though this process could clearly be observed in the field, there was no way to incorporate this in the model (apart from some simple and unsatisfactory conceptual approaches) because of the lack of topographic information of sufficient quality. However, recent advances in drone-based remote sensing, including the generation of cm-resolution digital elevation models, may open interesting new opportunities in this regard and I would be very interested in hearing the authors' views on this.

(On the other end of topographic-data-availability-spectrum, I seem to recall some successful implementations of Topmodel that bypassed the topographic index derivation altogether in favour of the use of a gamma distribution with calibrated parameters.)

Specific comments

l55: there is an error in the formula (S on the right hand side should not be there)

l60: it may be useful to define S_0 here explicitly - also further in the document, not all symbols are always clearly defined

l237: ofa -> of

l249: attractive. -> attractive

l285: "but t more"

l452: "runoff." -> "runoff"

l730: Lane et al. (2009) is referenced here in relation to SCIMAP although the publication is not really about SCIMAP.

References:

Lane, S. N., Brookes, C. J., Kirkby, M. J., & Holden, J. (2004). A network-index-based version of TOPMODEL for use with high-resolution digital topographic data. *Hydrological Processes*, 18, 191–201.

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Lane, S. N., Reaney, S. M., & Heathwaite, A. L. (2009). Representation of landscape hydrological connectivity using a topographically driven surface flow index. *Water Resources Research*, 45, W08423.

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