

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

Francesc Gallart (Referee)

francesc.gallart@idaea.csic.es

Received and published: 31 August 2020

First of all, I want to congratulate the authors and appreciate their keenness in writing this nice article. It is sensibly short and easy to read and, although I already knew part of this history, I learned or consolidated many aspects of it published in media not always easy to get. The manuscript includes not only most of the TOPMODEL developments but also several criticisms it received during this already long history, in a frank and friendly style.

I have some suggestions to include or enlarge comments on issues that arise from my experiences. I also include a list of typos to be corrected.

- Scale dependence of the topographic index. This issue is mentioned in line 375, but the writing used is not sufficiently explicit, so readers that do not know this effect might miss the message.

C1

- Topographic index used with too large areas or mesh sizes. The topographic index is designed for hillslope hydrology, so when it is applied to an area large enough to include channels, it may take very high values that fall out of its intended physical sense (Quinn et al., 1995a). Likewise, when the index is calculated with a mesh size that is large enough to include channels, the physical sense is also lost. These issues seem to be indirectly mentioned after line 745, but I deem that they deserve a more explicit comment.

- Negative values of deficit. During wet periods, local saturation deficits may take negative values in saturated areas and even the mean catchment deficit may become negative (Saulnier and Datin, 2004). Although this behaviour is not an issue for the application of the model, it compromises its physical soundness and therefore should deserve some comment in the paper.

- Value of TOPMODEL for teaching. While I understand that this is not the purpose of the paper, I wonder if some comment on TOPMODEL value for teaching could be included. I agree that its relative simplicity means that it can be riskily used as passe-partout conceptual scheme for areas that do not meet the key assumptions, as it happened with the models based on the precipitation excess process. But if this risk is bounded, according to my experience, one of the strengths of TOPMODEL for teaching is its usefulness to exemplify the model parameter compensation and equifinality issues, as well as the consequent principle that a good flow efficiency of a model does not mean that it works for the right reasons. The paragraph starting at line 525 is a superb example of these questions, how field observations can be used for their amendment and the lessons that not just KB but every one of us can learn.

Minor comments:

- Line 149: the abbreviation BK79 is used before it is defined in line 182.

- Line 298: “Rigelbach” should be Ringelbach.

C2

- Line 649: “Staring” should be starting.
- Line 777: “Disretisation” should be discretisation.
- Line 816: “Frances” should be Francesc
- Line 817: “Kulusova, Jerome Latron, Pilar, Llorens” should be Kulasova, Jérôme Latron, Pilar Llorens.
- Line 1089: “Leibendgut” should be Leibundgut.
- Line1324: “Bloschl” should be Blöschl

Interactive comment on Hydrol. Earth Syst. Sci. Discuss., <https://doi.org/10.5194/hess-2020-409>, 2020.