Opinion Papers

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INVITED COMMENTARY

HYDROLOGICAL PROCESSES
Hydrol. Process. **20**, 3141–3146 (2006)
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On undermining the science?

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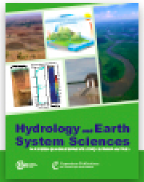
At the 2006 European Geophysical Union meeting in Vienna, I was challenged (and not for the first time) about overemphasising the issue of model uncertainty and model rejection, with the consequent danger of undermining the confidence of stakeholders and users of model predictions, in the science on which they are based. It is therefore interesting to consider whether this is a reasonable charge.

We can break the issue down into three parts, which will be considered in turn with a view to starting a debate, in *HPToday*, about the issues raised:

1. **Are the uncertainties in model predictions being overestimated by the application of the GLUE methodology or alternative techniques of uncertainty estimation?**
2. **Will showing the results of such analyses to users and stakeholders undermine their confidence in the science if the uncertainty bounds are large?**
3. **And if current uncertainty bounds really are large, how could the uncertainties best be constrained in future to improve predictability (and acceptability) of model results?**

Opinion papers

- Savenije, H.H.G., HESS Opinions "Topography driven conceptual modelling (FLEX-Topo)", *Hydrol. Earth Syst. Sci.*, 14, 2681–2692, 2010. doi:10.5194/hess-14-2681-2010
- Savenije, H.H.G., 2009. The Art of Hydrology. *Hydrology and Earth System Sciences*, 13, 157–161, 2009.
- Savenije, Hubert H.G., 2004. The importance of interception and why we should delete the term evapotranspiration from our vocabulary. *Hydrological Processes*, 18(8):1507-1511.
- Savenije, H.H.G., 2001. Equifinality, a blessing in disguise?, HP Today Invited commentary, *Hydrological Processes*, 15, pp. 2835-2838.



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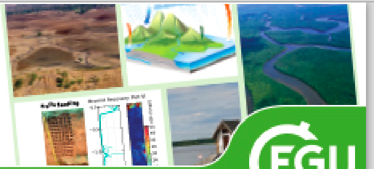

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Opinion article

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HESS Opinions "Catchments as meta-organisms – a new blueprint for hydrological modelling"

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Abstract. Catchment-scale hydrological models frequently miss essential characteristics of what determines the functioning of catchments. The most important active agent in catchments is the ecosystem. It manipulates and partitions moisture in a way that supports the essential functions of survival and productivity: infiltration of water, retention of moisture, mobilization and retention of nutrients, and drainage. Ecosystems do this in the most efficient way, establishing a continuous, ever-evolving feedback loop with the landscape and climatic drivers. In brief, hydrological systems are alive and have a strong capacity to adjust themselves to prevailing and changing environmental conditions. Although most models take Newtonian theory at heart, as best they can, what they generally miss is Darwinian theory on how an ecosystem evolves and adjusts its environment to maintain crucial hydrological functions. In addition, catchments, such as many other natural systems, do not only evolve over time, but develop features of spatial organization, including surface or sub-surface drainage patterns, as a by-product of this evolution. Models that fail to account for patterns and the associated feedbacks miss a critical element of how systems at the interface of atmosphere, biosphere and pedosphere function.

In contrast to what is widely believed, relatively simple, semi-distributed conceptual models have the potential to accommodate organizational features and their temporal evolution in an efficient way, a reason for that being that because their parameters (and their evolution over time) are effective at the modelling scale, and thus integrate natural heterogeneity within the system, they may be directly inferred from observations at the same scale, reducing the need for calibration and related problems. In particular, the emergence of new and more detailed observation systems from space will lead towards a more robust understanding of spatial organization and its evolution. This will further permit the development of relatively simple time-dynamic functional relationships that can meaningfully represent spatial patterns and their evolution over time, even in poorly gauged environments.

How to write an opinion paper

- It should be personal
- Make sure you have a new vision/insight/perspective
- It should be controversial
- It is not something you can do when you have limited experience