Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., author comment AC4
https://doi.org/10.5194/hess-2022-2-AC4, 2022

Reply to RC3

Günter Blöschl

Author comment on "Flood generation: process patterns from the raindrop to the ocean" by Günter Blöschl, Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-2-AC4, 2022

Many thanks for the thoughtful assessment of this paper.

A discussion of a formalization of the scale and scaling ideas in the form of frameworks and analysis approaches is of course important, perhaps building on Blöschl and Sivapalan (1995) and the present paper but, given its focus, a formalization would go beyond what this paper tries to achieve. It would, however, be worthwhile thinking about a follow up discussion or paper focusing more specifically on upscaling that builds on patterns.

Yes, a focus on timescales was missing in Blöschl and Sivapalan (1995), and it is missing in this paper too. As pointed out in my response to reviewer RC1, scale issues in time have been the subject of Sivapalan and Blöschl (2015). Traditionally, hydrologists were more concerned with scale issues in space because of the lack of spatial information, while time series of hydrologic fluxes have been available for a long time. More recently, the situation has changed a bit, both because of the availability of spatial satellite data and the increased importance of hydrological change, so scale issues in time are definitely becoming very relevant, in particular when the interactions with human activities are involved.

A joint consideration of space scales and timescales is important and there has been some work on it (see, e.g., Skøien et al., 2003; Blöschl et al., 2015) but I fully agree that, given the important science questions and the data availability, there is now an opportunity for deepening our understanding of space scales and timescales considered together.

References

Blöschl, G. and M. Sivapalan (1995) Scale issues in hydrological modelling - a review. *Hydrological Processes,* 9, pp. 251-290.

Blöschl, G., H. Thybo and H. Savenije (2015) A Voyage Through Scales - The Earth System in Space and Time. Edition Lammerhuber, Vienna, 123 pp.

Sivapalan, M. and G. Blöschl (2015) Time scale interactions and the coevolution of humans and water. *Water Resour. Res.*, 51, 6988–7022, doi:10.1002/2015WR017896.

Skøien, J. O., G. Blöschl and A. W. Western (2003) Characteristic space scales and timescales in hydrology. *Water Resources Research*, 39, (10), article number 1304.