

## ***Interactive comment on “From runoff to rainfall: inverse rainfall–runoff modelling in a high temporal resolution” by M. Herrnegger et al.***

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Dear colleagues!

May I add a short remark to your discussion. Most of hydrological models are formulated as a state space model in which the output  $O(t+1) = F(S(t), I(t))$  depends only on the previous state  $S(t)$  and the input at time  $t$ . You only need to know the recent state and not any previous state.

This approach is found in several hydrological models, eg. HBV, in most of the models which approximate a partial differential equation by a discrete scheme in the time domain, e.g. groundwater models etc.

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Thus, when you are able to fit a model to observed data you can also invert it, without considering lags and "independently from the scale".

But there are constraints which rather refer to the fact that you have a lumped input which does not reflect the internal heterogeneity over the basin, and thus numerical instabilities etc. may occur. Another constraint is in snowfall events. These inputs are accumulated without any direct on the hydrograph. Much later, due to increasing  $T$ , the runoff will react. Wishing you all a nice weekend

Peter

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