

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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Thank you for your comments and the links to the current studies, which infer rainfall from soil moisture data. Also the concept of a combined rainfall retrieval from soil moisture and runoff observations sounds interesting.

Ad (1): We developed and tested 2 different methods and models to infer rainfall from runoff, both times on the basis of the conceptual model COSERO. For the first model M1 we formulated a linear reservoir cascade and a soil module as a linear equation. This enables a simple analytical inversion, so that the rainfall term is on the left side of the equation and runoff is part of the right side. This model however has some limitations. The second model, which includes interception and routing, is presented

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in this manuscript. Both models and the inversion approaches were tested thoroughly with the mentioned "virtual experiments". We decided to highlight the fact that we did the virtual experiments but not to show the results, since this manuscript is already quite comprehensive. It would however also be in our interest to present the virtual experiments in a separate manuscript, if the ongoing discussion continues to show the need.

Ad (2): Although our model is quite simple, we argue, that it will be able to handle more complex catchment characteristics and interactions than the Kirchner (2009) model will be able to! It would definitely be an interesting exercise to compare different inverse models and evaluate their performance for different catchments (in size and complexity). However, we believe that such an exercise would certainly fill at least one paper on its own, so we would like to keep this as a separate study and publication for the near future. In this context also the parameter sensitivity, which is mentioned in the conclusions as a field for further investigations, can be addressed. The sentence "A more elegant method to calculate rainfall from runoff by analytically inverting the model equations is principally possible, but has some disadvantages (Herrnegger, 2013)." refers to the model M1 mentioned above. We simply believe that it is more elegant to analytically invert equations instead of using some iterative approach.

Ad (3): We agree, that some figures can be summarized in form of tables.

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