Hydrology and Earth System Sciences Discussions

Hydrol. Earth Syst. Sci. Discuss., community comment CC1
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Comment on hess-2022-56

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Community comment on "Improving hydrologic models for predictions and process understanding using neural ODEs" by Marvin Höge et al., Hydrol. Earth Syst. Sci. Discuss., https://doi.org/10.5194/hess-2022-56-CC1, 2022

This is an interesting article. There are minor issues that I think would increase the value of it (in no particular order):

- M(t) (the flow between the two buckets in M0, which I guess is a snow melting flow) is not formally defined in the model description.

- There is no explanation of why different errors where applied to different modules of the hybrid models. Ther eis a comment in the discussions regarding the known failures of models to capture discharge peaks, this performance is strongly linked to the type of error (or the noise distribution in a sotchastic modeling context) that was used to train the model. Did the chosen erros for traing improve this? why? what was the criteria to choose the different errors?

- I could not find a link to the software, and "be makde available in the near future" is too ambiguous. The software should be part of the publication work, citing:
“An article about computational result is advertising, not scholarship. The actual scholarship is the full software environment, code and data, that produced the result.” -- Buckheit and Donoho

- The data-driven relation learn by M50/100 are clearly tuned to the data. Assuming the proposed mechanism is causal and universal, wouldn't it then make more sense to train these modules in the totality of the data, not per catchment? On the one hand, it is well stablished that non-causal data-driven can easily ourperform causal models (e.g. a casual structure X -> Y -> Z with noise in X larger than in Z will cause data-driven models to choose Z to as the best predcitor of Y, alas non-causal). On the other hand, it is unlikely that NN models will use relations that go beyond the scope of the data, hence the optinal relations found per catchment might be reflecting circumstantial relations, but the mechanisms proposed are suposed to be principled mechanisms, not cimcustantial.