

Interactive comment on “Why does a conceptual hydrological model fail to predict discharge changes in response to climate change?” by Doris Duethmann et al.

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This manuscript tries to untangle one of the most challenging problems in hydrology, and it has implications to more than hydrology models: why even a calibrated hydrology model is not reliable for future simulations?

While the authors lay down quite great effort to test and examine some hypothesis, its vision and credibility may be shorten by some major limitations. It is great to see authors went through input driving data (precipitation, temperature, etc.) to all the way up to discharge. The whole analytical process was very convincing.

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Regardless of the model details, I only have a couple of concerns and comments. First, various spatially distributed hydrology models were used across scales. The authors need to justify why HBV is representative here. There are models considering vegetation dynamics for example.

Second, as authors pointed out many sources may contribute to model low performance, I suggest there should be at least more evaluations of various hydrological processes. For example, the spatial maps of snow cover, SWE, canopy interception, runoff, snowmelt, soil moisture, etc. A cost function only focus on discharge will likely miss a lot of information. We all know a combination of different parameters can produce the similar results but only one of them is the correct set. The only way to reduce this uncertainty is to examine every single step.

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