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Hydrology and Earth System Sciences
Discussions

Interactive comment on "A process-based diagnosis of catchment coevolution in volcanic landscapes: synthesis of Newtonian and Darwinian approaches" *by* Takeo Yoshida and Peter A. Troch

Anonymous Referee #1

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This study looks at the relations between topography and streamflow characteristics. It does so by using the interesting approach to switch catchments parameterisations and input time series. As much as I like the approach there are a number of concerns with the current version of the study:

There is a fundamental assumption that the input time series do not influence the parameter values. While one might hope for this (the parameters should represent the physical characteristics after all), many studies have shown, that parameter values actually are related to variables such as mean annual precip. This issue needs to be

addressed as it could largely influence the conclusions from this study.

P3L86: it is unclear why 8 out of 14 catchments were selected; this may sound a bit like cherry-picking. Please explain why/how only 8 catchments were selected here.

P5L138: The consideration of parameter uncertainty is not convincing. The sequential calibration is highly sensitive to the order of the parameter in calibration, and this order is not clearly described/motivated. Of course, this approach apparently reduces parameter interactions/uncertainty, but it does so by only investigating part of the parameter space. Just because one is not looking everywhere, does not mean parameter uncertainty is really reduced! I would recommend to consider parameter uncertainty explicitly by allowing for different parameter sets using some type of Monte Carlo approach (resulting in ranges of simulated streamflow characteristics).

Much of the analysis is based on the assumption that the model realistically can reproduce the observed runoff. There are two issues with this. The performance of the model in terms of NSE is not fully demonstrated, it is only mentioned that the NSE values were smaller 0.5 in many catchments (P9L232). This sounds rather alarming to me! Furthermore, even higher NSE values would not ensure that the different streamflow characteristics (signatures) would be realistically reproduced.

It also remains unclear how the different goodness-of-fit measures were combined (weighted mean). As the results largely depend on the parameterization and model performance, all these above issues are crucial for this study and need to be better addressed/described.

I am a bit confused by the term coevolution. This sounds fancy, but does the manuscript really deal with coevolution? I don't think so. Even if there is a relationship between topography and flow characteristics this does show necessarily any coevolution. Please clarify this term in the context of the manuscript (or omit it). The second part of the title (Newtonian/Darwinian) remains a total mystery to me, please explain what is meant here.

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