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Effects of model structure and catchment discretization on discharge simulation in a small forest catchment

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In the past a variety of different modeling approaches has been developed in catchment hydrology. Even though there is no argument on the relevant processes taking place, there is no unified theory on how best to represent them computationally. Thus a vast number of models has been developed, varying from lumped models to physically based models. Most of them have a more or less fixed model structure and follow the “one fits all” paradigm. However, a more flexible approach could improve model realism by designing catchment specific model structures based on data availability.

This study focuses on applying the flexible hydrological modelling framework RAVEN (Craig et al., 2013), to systematically test several conceptual model structures on the 19 km2 Große Ohe Catchment in the Bavarian Forest (Germany). By combining RAVEN with the DREAM algorithm (Vrugt et al., 2009), the relationship between catchment characteristics, model structure, parameter uncertainty and data availability are analyzed. The model structure is progressively developed based on the available data of the well observed forested catchment area. In a second step, the impact of the catchment discretization is analyzed by testing different spatial resolutions of topographic input data.