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Towards matching the ‘observational scale’ with the ‘model scale’ in a mountainous catchment: on the relevance of saturated areas for large scale responses

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In the field of catchment modelling, there has been an ongoing discussion about how to incorporate (often very detailed) conceptual understanding into procedural models in a parsimonious way. Therefore, how much model complexity is necessary in order to be consistent with observations and be able to make robust predictions? Our philosophy is that the level of model complexity should depend on the modelling problem to be solved, especially with regard to the availability of model input data and the spatial and temporal scales of comparison between model simulations and observations.

This study brings together areas with dominant runoff generation processes (hydrotopes) of the meso-scale mountainous Brugga catchment, Germany (the ‘observational scale’) and the rainfall-runoff model Dynamic Topmodel (the ‘model scale’). A deterministic top-down approach to identifying the dominant modes of catchment behaviour within an uncertainty framework is applied. Importantly, we ask which hydrotopes can be conceptualised in ways that reveal true dominant processes and which can be disregarded when compared to available observations?

As a first step within this context, we will discuss whether the performance of a uniform parameterisation of the catchment can be improved with the introduction of a saturated area hydrotope. We will assess the relevance of saturated area processes for large scale responses in the Brugga catchment by exploring the information content of discharge data observed at the catchment outlet, especially the distribution of storm runoff coefficients in precipitation events.