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Analyzing the hydrograph to get insights about catchment characteristics

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The hydrological response of a catchment is subject to a strong heterogeneity in space and, thus, the hydrographs, measured in different locations in the same region, may present different characteristics. This behavior depends on a large number of factors, spanning from the climate to the physical properties of the catchment. Understanding which are the dominant processes that contribute the most to shaping the hydrograph is crucial for building models that reflect the real processes happening in the catchment.

In this study, ten sub-catchments of the Thur River, an alpine and peri-alpine basin in the north-east of Switzerland, are studied; this region presents a large spatial variability in terms of climatic conditions, morphology, geology, soil, and land use, leading to a wide span of hydrological responses. To better capture the peculiarities of each hydrograph, signatures are designed and extracted, and, then, correlated with the physical characteristics of the catchment to motivate its hydrological behavior. This analysis represents the first step in building a semi-distributed hydrological model that takes advantage of these results to subdivide the catchment in Hydrological Response Units (HRUs) that are supposed to present the same hydrological response and, thus, to have the same model structure and parameters.