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How can we benefit from basin similarity in hydrological studies?

Considering *basin similarity* may significantly improve the informative value of hydrological studies. *Basin similarity* is particularly helpful in the process of dissemination and application of the results of such studies, but it also supports the prediction of hydrological parameters in ungauged basins (PUB). This keynote will review our experience gained with *basin similarity* in Switzerland over the last decades.

At first, a "classical use" of *basin similarity* is discussed: Based on a comprehensive study, basins with similar flow regimes were identified. Then, this classification was employed to estimate mean monthly flows in ungauged catchments. For this step, so-called representative basins had to be identified. Measures of similarity were introduced to attribute a basin without runoff data to a representative catchment. In an additional study, the representative basins were adopted – as a surrogate for all basins with a similar flow regime – to study the effects of climate change.

Secondly, the benefit of basin similarity in regionalisation is elaborated: For the prediction of various hydrological parameters in ungauged basins (PUB) a methodological framework was established within which *basins similarity* plays a key role. The latter facilitate the application of a deterministic hydrological model in ungauged basins. *Basin similarity* was used to estimate the free model parameters which could not be calibrated directly due to missing runoff data. As a result, hydrographs in an hourly resolution from 1984 onwards for almost all meso-scale basins of Switzerland are available now. This quite unique data set has opened interesting possibilities for further studies: In the context of the Swiss project CCHydro (Climate change and Hydrology in Switzerland) basins with a similar reaction to climate change were identified. This study clearly demonstrated that alpine basins will be more affected than lowland basins. In a next step, the grouping of Swiss basins with a similar reaction to climate change was combined with the results of a study which compiled a typology of hydropower stations where *basin similarity* was a key parameter, again. Eventually, all this information was applied to upscale and estimate the effects of climate change on hydropower production in Switzerland. According to these results, the production of electricity will increase slightly in the near future, i.e. until 2050, due to the additional runoff from melting glaciers and the expected higher amounts of winter precipitation.