



## **Elevation gradients in streamflow and the future of Alpine water resources**

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Mountain catchments are known to provide high shares of streamflow to downstream areas. This so-called water tower effect results from topography-driven gradients in hydrological processes, the most obvious being, at many places, the increase of precipitation with elevation and the decrease of air temperature. Other gradients that come into play are vegetation cover and related evapotranspiration, subsurface storage volumes, gradients of groundwater recharge from snow versus rainfall or accumulation and ablation of snow and ice. The actual role of these drivers in generating streamflow patterns across elevation gradients has rarely been investigated in detail. Based on hydro-climatic data from Switzerland covering catchments of the order of one km<sup>2</sup> to a few hundred km<sup>2</sup> with mean elevation between 500 m asl. to 3000 m asl., we analyze observed seasonal relationships between streamflow and catchment elevation and discuss the observed patterns in terms of the underlying hydrological processes and climatic differences. Important conclusions can be drawn from this analysis for the future evolution of available water resources from these Alpine catchments in the context of ongoing climate warming.