Distributed rainfall-runoff modelling of Swiss mountainous basins: effects of scale on modelling parameters

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A distributed physically-based rainfall-runoff model (TOPKAPI) is used to analyze runoff on a number of small and large mountainous research basins in Switzerland. Model parameters are estimated based on physical catchment properties, using historical streamflow and climatic data. The ability of TOPKAPI to represent hydrological processes at varying scales is evaluated by analysing a range of basin sizes (4 km^2 to 55 km^2), using a range of grid sizes (25mx25m to 200mx200m). The sensitivity of model parameterization to climate and landscape controls is evaluated in two steps. First, the relationships between model parameters and climatological variables such as rainfall and snow cover are investigated. Second, the relationships between model parameters and basin characteristics such as soil and landuse types, altitude, glacial coverage, and river network morphology are investigated. Preliminary results showing the effects of scale are presented by evaluating parameter sets for each basin at varying grid sizes. It is anticipated that the results from this analysis of hydrological processes will lead to the development of regionalization techniques for the application of distributed models to ungauged catchments.