



Flood estimation in ungauged Swiss catchments using process-based continuous modelling

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Reliable estimations for floods of various return periods are an indispensable prerequisite for successful flood protection. To elaborate such estimations for ungauged catchments is equally difficult as well as important. So far, empirical methods have mainly been used for this purpose. In order to make further progress in flood estimation, the approach of continuous precipitation-runoff-modelling is further developed and elaborated for practical application in Switzerland. For this, the conceptual process-oriented hydrological modelling system PREVAH (Precipitation-Runoff-Evapotranspiration Hydrotape Model) is used to simulate continuous discharge hydrographs in hourly resolution. While PREVAH was calibrated successfully for 140 meso-scale catchments, parameter values for ungauged catchments are derived with help of a newly developed regionalisation module which combines the regionalisation approaches of Nearest Neighbours, Kriging and Regression. The simulations are subsequently analysed by means of extreme value statistics. With this approach, it is possible to derive the relevant flood estimations for an arbitrary catchment, while both peak flow series as well as complete discharge hydrographs are available.

Results show that the approach of continuous simulation is indeed able to produce plausible flood estimations in ungauged Swiss northern-alpine catchments. The quality of these flood estimations compares with present empirical procedures, while the range of deviations is noticeably smaller. Since previous approaches and the one presented here differ strongly in their methodological set-up, significant gain in information is achieved for estimation of rare peak flows in ungauged catchments.