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Reconciling statistical and deterministic flood estimation methods – a case study in Tyrol

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The determination of design values for dimensioning flood control measures in small mountainous catchments is performed by a variety of deterministic and statistical approaches yielding results differing by a magnitude up to 3. In a currently performed study, design values determined by methods such as flood frequency statistics, the design storm method and empirical formulas are compared and evaluated attempting to explain the reasons for those discrepancies. Statistical approaches have the advantage that the frequency of exceedance of observed flood peaks is used, while deterministic approaches such as the design storm methods allow for a detailed description of processes especially in small catchments. In order to understand better the reasons for the differences of both approaches a continuous rainfall runoff model is used which allows interpreting flood frequencies as combined probabilities of rainfall and soil moisture conditions. This shall be the basis for reconciling the diverse results and proposing a harmonised approach in the determination of design values for flood control measures.

In a first case study in the area of Tyrol a few selected small alpine catchments (30 - 100km2) are examined, where design values have already been defined by flood frequency statistics and the design storm method. Continuous modelling is performed using a spatially distributed model with a soil moisture accounting scheme at pixel scale (based on the HBV Model) and a within catchment routing and a river routing component. This model has already been successfully implemented for the Kamp catchment in Lower Austria. The performance of the model for extreme events in small catchments, the uncertainties of the results and the applicability of the model in reconciling design values will be discussed an analysed in detail.