



Estimation of floods with long return period using continuous simulation within the framework of the limits of acceptability approach

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The estimation of flood frequency by continuous simulation provides an alternative method to direct statistical estimation for catchments where there are limited historical records of flood peaks. We are presenting the extended GLUE multiple limits of acceptability calibration strategy in which models are treated as hypotheses about system response, to be rejected if the predictions fall outside of the limits of acceptability.

Flood frequency predictions on the Skalka catchment in the Czech Republic (672 km², range of altitudes from 460 to 1041 m a.s.l.), are compared against summary information of rainfall characteristics, the flow duration curve, and the frequency characteristics of flood discharges and snow water equivalent.

Limits of acceptability have been defined, prior to running the Monte Carlo model realisations. Since we have identified only 39 behavioural models we have relaxed the limits of acceptability using a procedure of scoring deviations relative to the limits, to identify the minimum extension across all criteria (together 114 criteria) to obtain a sample of 4192 parameter sets that were accepted as potentially useful in prediction.

Long term simulations of 10000 years for retained models were used to obtain uncertain estimates of the 1000 year peak required for the assessment of dam safety at the catchment outlet.

We also demonstrate the effect of different input realisations on acceptability. Taking just one of the behavioural parameter sets and generating 10,000 input sequences of the same length as the observed flood series results in a range of critical values for acceptability across a range of evaluation criteria.