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Worst case scenarios of floods based on spatio-temporal distributions of extreme precipitation.

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An estimation of flood return levels that are widely above the scope of today's methods are often required for planning of highly sensitive buildings and infrastructure (e.g. nuclear power plants, dams). Extreme floods with return periods up to 10'000 years have to be estimated in some cases, indeed. Proper methodological procedures, however, are still missing, e.g. estimating extreme flood peaks in a pure probabilistic way based on short time series (< 100 years) is unrewarding. Our study discusses the possibility to replace such inappropriate estimations by a worst-case-approach which is based on a Monte-Carlo-simulation of worst cases of extreme precipitation distribution in space and time. Then, a procedure was chosen to select these cases out of the Monte Carlo sample which are physically feasible. These cases form the input for a simple Unit-Hydrograph-based model which allows to generate a wide range of different hydrographs and peak flows, and therefore to confine a range of possible peak flows. Furthermore, worst-case precipitation distributions for the forcing of deterministic hydrological models can be determined.