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A simplified rainfall-runoff stochastic simulation method for an application of the SCHADEX method to ungauged catchments.

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SCHADEX is a probabilistic method for extreme flood estimation, developed and applied since 2006 at Electricité de France (EDF) for dam spillway design [Paquet et al., 2013]. SCHADEX is based on a semi-continuous rainfall-runoff simulation process. The method has been built around two models: a Multi-Exponential Weather Pattern (MEWP) distribution for rainfall probability estimation [Garavaglia et al., 2010] and the MORDOR hydrological model.

To use SCHADEX in ungauged context, rainfall distribution and hydrological model must be regionalized. The regionalization of the MEWP rainfall distribution can be managed with SPAZM, a daily rainfall interpolator [Gottardi et al., 2012] which provides reasonable estimates of point and areal rainfall up to hight quantiles. The main issue remains to regionalize MORDOR which is heavily parametrized.

A much more simple model has been considered: the SCS model. It is a well known model for event simulation [USDA SCS, 1985; Beven, 2003] and it relies on only one parameter. Then, the idea is to use the SCS model instead of MORDOR within a simplified stochastic simulation scheme to produce a distribution of flood volume from an exhaustive crossing between rainy events and catchment saturation hazards.

The presentation details this process and its capacity to generate a runoff distribution based on catchment areal rainfall distribution. The simulation method depends on a unique parameter S_{max}, the maximum initial loss of the catchment. Then an initial loss S (between zero and S_{max}) can be drawn to account for the variability of catchment state (between dry and saturated). The distribution of initial loss (or conversely, of catchment saturation, as modeled by MORDOR) seems closely linked to the catchment's regime, therefore easily to regionalize. The simulation takes into account a snow contribution for snow driven catchments, and an antecedent runoff. The presentation shows the results of this stochastic procedure applied on 80 French catchments and its capacity to represent the asymptotic behaviour of the runoff distribution.

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