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Setting up a stochastic weather generator for estimating future river flood hazards.

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Abstract:

Flood hazard assessment is often conducted by coupling stochastic weather generators with hydrological models. Such a modelling framework may introduce additional uncertainties compared to statistical analyses of discharge data, where antecedent conditions are inherently accounted for, since discharge data integrate the temporal variations of rainfall and soil moisture in the catchment. However, the main advantage of a coupled modelling framework consisting of a weather generator and hydrological model is related to the possibility of altering the weather generator and thus system's input, for example in climate impact assessment. This research presents ways of setting up the semi-parametric multi-site weather generator by Breinl et al. (2014) by empirical-quantile mapping for climate impact modelling, using the latest EURO-CORDEX climate projections (Jacob et al. 2013). The parameterized weather generator is coupled with the rainfall-runoff model HBV-light (Seibert 1997, Seibert 2000) to simulate current and projected river flood hazards. The study is carried out in two Alpine catchments, namely the Ubaye catchment in France (Ubaye River) and the Salzach catchment in Austria (Salzach River). The comparatively small Ubaye catchment is dominated by rain-on-snow floods during spring-time, while the larger Salzach catchment is dominated by summer flooding. The results suggest that there are not only changes in the frequency of river floods, but also changes in their seasonality.

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