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Assessing uncertainties in climate impact modelling: flood inundation hazard in the Upper Severn catchment, UK

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This study is an attempt to assess flood inundation impacts and extent as well as its hazards and to quantify the prediction uncertainties associated with climate change scenarios. The study is performed within a cascaded modeling framework starting from downscaled meteorological input to a rainfall-runoff model, LISFLOOD-RR, and finally to a flood inundation model, LISFLOOD-FP.

Spatial rainfall forecasts are very much dependant on the grid scales of the simulated atmospheric dynamics, the initial conditions and sub-grid parameterisations. Rainfall runoff models are subject to uncertainties with respect to the observed data, the model structures, and their parameters. Hydraulic models, as the last component in the chain, not only produce their own sources of uncertainties but also incorporate and include the propagated uncertainties from all other sources. This is then reflected at the very end of the chain in a risk of flooding extent and impact.

The aims of this study are therefore two-fold: (1) how sensitive is the cascade set-up to the simulated meteorological input from the GCMs, particularly with respect to extreme events; (2) the sources and magnitude of uncertainties when simulating flood inundation within the context of climate change. Here we do not yet include model structural uncertainties for the majority of the cascade. The next stage of the project

will take different model structures into consideration by introducing other modeling approaches into the modeling cascade set-up.