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A cascaded uncertainty framework for cloud-to-catchment flood inundation modelling

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This new study will provide simulations of the impacts of climate change on extreme floods from GCM to large catchment scales with the desire to track uncertainties as these are cascaded through the modelling framework.

The proposed scheme is initially tested with a cascade set-up starting by downscaling meteorological input through two separate techniques to a rainfall runoff model, LISFLOOD-RR, and finally to a flood inundation model, LISFLOOD-FP. Different models will be set-up alongside to provide a loosely coupled modelling framework. The model set-up is applied to the Upper Severn catchment in England.

Outstanding research questions include: (1) how sensitive is the cascade set-up to the simulated meteorological input from the GCMs with respect to extreme events; (2) how the climate signal is affected by the downscaling technique; (3) the sources and magnitude of uncertainties when simulating floods within the context of climate change; (4) the best way of dealing with multi-scale multi-source uncertainties whilst taking into account the limitations of our observed measurements; (5) How to develop strategies that improve the efficiency of sampling such a cascaded modelling structure to characterise the uncertainties