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# Mapping from Rainfall Frequency to Flood Frequency: an alternative method for climate impact assessment.

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Assessing the potential impacts of climatic change on flood frequency is a key research topic within the United Kingdom. Current methods tend to focus on continuous simulation, where a catchment model is calibrated for the observed flow time-series record and then the input climatic data is perturbed to represent a physically realistic future climate scenario. This project aims to develop an alternative approach, tentatively named 'frequency curve mapping'. This involves mapping from rainfall frequency to flood frequency using supporting information such as estimates of antecedent conditions and physical catchment descriptors. The project is part of a larger study known as "a next generation national Flood Risk Assessment under Climate ChAnge Scenarios" (FRACAS), funded under the National Environmental Research Councils (NERC) Flood Risk from Extreme Events (FREE) programme.

Early work used event based analysis to look at how consistent estimates of a storm and antecedent conditions might be used to estimate peak flow in a wide range of catchments. This has been carried out for a set of around 500 catchments within the UK, representing a wide variety of hydrological regimes. Results indicate that certain types of catchments are suited to estimating peak flow in this way. Groundwater dominated catchments display the poorest performance in flow estimation due to the relative importance of groundwater levels in influencing antecedent conditions in these types of catchments. In these cases, the antecedent conditions are considered complex and cannot be captured using a simple antecedent precipitation index or soil moisture estimate. Surface water catchments tend to be more amenable to the use of simple antecedent estimates. In order to assess performance in flow estimation, events were classified seasonally and by magnitude. Catchments have also been classified using numerous physical descriptors.

This early work informed the selection of a catchment set which can now be used to develop a direct link between a rainfall frequency and flood frequency curve. This is currently being carried out on a small subset of the original catchments. Using only the biggest rainfall events in a catchments rainfall record, the basic assumption is made that for these events, the antecedent influences are negligible. In these catchments, the comparison of growth factors for the largest rainfall and associated flow events can be made without any modification of the storm. Where antecedent influences are suspected, the storm total must be modified. This work is currently on-going.

Future work will likely involve extending to a larger catchment set, and also to the use of future rainfall scenarios to consider the climate change impacts.