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Improving integration (of science and practice) in an end-to-end flood forecasting framework for intense rainfall

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The literature says a lot about what we should be doing to ensure impactful science; working on interdisciplinary projects, engaging with stakeholders early and often, communicating in novel ways… It has a lot less to say about how to implement this in practice. How do you actually go about integrating multiple organisations, research topics and data sets to produce meaningful improvements in flood forecasts and warnings? Using our experiences over the past five years as part of the joint NERC and Met Office funded Flooding from Intense Rainfall programme (FFIR), we will explore this challenge by showcasing our scientific developments in end-to-end forecasting and sharing the lessons we have learnt about interdisciplinary research.

Flooding from intense rainfall is a short-lived, localised natural hazard that is hard to predict accurately. The FFIR programme investigates the feasibility of improving the integration of end-to-end forecasting to help increase the lead time and reliability for warnings for these events for the UK. We consider each stage in the forecast chain from observations through to meteorological/hydrological models and then flood warnings and impacts.

The scientific achievements of the FFIR programme can be summarised under four themes; improved knowledge of catchment vulnerability to flash flooding, improved rainfall (radar) and river observations during events, improved forecasting of convection, and real time flood inundation modelling. The research has resulted in better estimates of heavy rainfall in convective storms, improved probabilistic forecasting and street-level modelling of surface water and flash floods. These achievements will be demonstrated using case studies from the flash flooding in Coverack (south-west UK) in July 2017.

Through consideration of the links between these themes, the programme has shown the benefits, and challenges, of interdisciplinary working. Using evidence from interviews conducted with researchers, consultants and operational experts as part of a policy and practice review of the programme, this presentation will suggest that there are three key components required to generate impactful improvements to operational forecasting systems. Firstly integrated project design that embeds a culture of joint working from the outset. Secondly people with the skills to see the 'big picture' who can appreciate how their research links to other components in the end-to-end chain and can communicate well with people outside of their field. And thirdly, consideration of the practicalities associated with facilitating the sharing of data, models and workload across organisations.

Through combined research across multiple disciplines the FFIR programme bridges the gap between hydrology and meteorology and demonstrates new science within an integrated end-to-end framework which will improve forecasts and flood warnings for intense rainfall.