Trialling New Surface Water Flooding Forecasts in Yorkshire, UK

Steven Boeing (1), Ben Rabb (1), Cathryn Birch (1), Andrea Taylor (1), Alan Blyth (1,2), Kay Shelton (3), Neil Hunter (3), Rob Lamb (4,5), Mark Trigg (6), Adrian Hines (1,7)

(1) School of Earth and Environment, University of Leeds, Leeds, United Kingdom (s.boeing@leeds.ac.uk), (2) NCAS, University of Leeds, Leeds, United Kingdom, (3) JBA consulting, Skipton, United Kingdom, (4) JBA trust, Skipton, United Kingdom, (5) Lancaster Environment Centre, Lancaster, United Kingdom, (6) School of Civil Engineering, University of Leeds, Leeds, United Kingdom, (7) Met Office, Exeter, United Kingdom

The UK Environment Agency estimates that over 3 million properties in England are at risk of surface water flooding, which is even more than the 2.7 million at risk from rivers and the sea. Rapid urban development reliant on an ageing drainage system, increasingly intense rainfall as a result of climate change, and a fragmented, informal management strategy means that the problem is worsening. Moreover, surface water flooding events are notoriously difficult to accurately predict, as they are usually caused by localised convective rainstorms. Currently, warnings issued by the UK Flood Forecasting Centre (FFC) are given on a county-wide scale.

In July 2018, the Department for Environment, Agriculture and Rural Affairs (DEFRA) released an action plan covering many of the systemic issues such as the need to: improve risk mapping, ensure infrastructure is resilient, clarify roles and responsibilities, and improve forecast and warning systems. Yorkshire's Integrated Catchment Solutions Programme (iCASP) is a 5-year Natural Environment Research Council (NERC) - funded programme with the mandate to ensure the UK's existing environmental research and expertise can be rapidly deployed to solve the problems that DEFRA and others have articulated. iCASP has brought together leading weather and water scientists based in Yorkshire together with the Met Office, FFC, JBA Consulting, Yorkshire Water, Environment Agency and Leeds and York City Councils to road-test the feasibility of a high-resolution warning system to complement regional warnings.

The iCASP project is working to understand how (or even if) the latest advances in probabilistic rainfall forecasting (such as the Met Office Global and Regional Ensemble Prediction System, MOGREPS) and high-resolution hydrodynamic modelling (capable of predicting depths and speed of water flow over the land, such as JBA's JFlow® flood model) can be combined into probabilistic, hyper-local forecasts with short lead times for making decisions. As part of this work, we are also exploring different ways of processing and presenting the probabilistic forecasts.

The process rather than the outcome is key. Academic experts are working closely with operational staff to raise capacity in understanding the benefits and limitations of probabilistic forecasting. Rather than promising a quick fix, the project is feeding into the FFC's five-year science strategy so the whole UK can benefit.

The culmination of the project will be an incident response workshop planned for April 2019, where Yorkshire's regional local authorities and other local resilience fora members replay a previous surface water flooding incident to see if the new forecast information would have been useful and how it might have changed their response.