Flood Foresight: Forecast and near-real time flood impact assessment

Effective flood management begins with Foresight

John Bevington, Beatriz Revilla-Romero, Kay Shelton, Robert Berry, Barry Hankin, Elizabeth Wood, Andrew Gubbins & Marc Pinnell

Overview

National scale flood maps are available in many countries, describing the risk of flooding from rivers, sea and intense rainfall.

Global scale maps are also available, typically developed for the private re/insurance market so that large scale risk can be evaluated. These report the extent or depth of inundation for a given return period event. The events they describe are therefore hypothetical, making them useful for planning and evaluating long-term flood risk, but not for understanding how a forecast event might unfold.

Flood Foresight is a suite of tools aimed at the insurance, government and utilities sectors providing geographical information before, during and after flood events.

Rainfall Screening

- Forecast daily rainfall data
- Maximum rainfall return period exceeded – by grid or catchment
- T+0 – T+7 day forecasts

Flood Forecasting

- Forecast daily flood extents and depths for UK and Ireland
- Input data: flows from rainfall-runoff model
- T+0 – T+10 day forecasts
- Trans-national extents; globally scalable

Flood Monitoring

- Near real-time sub-daily flood extents and depths (and other countries with open real-time flow data). 3-hourly in GB.
- Input data: telemetered river gauges

Methodology

The Rainfall Screening module compares forecast (NCEP GFS) and analysis (NCEP GDAS) rainfall with historical rainfall (NCEP CFSR) to determine rainfall rarity on a 0.5° grid or for river catchments.

The flood-risk modules are supported by global flood mapping across 168 countries at 30m horizontal resolution. The flood maps are based on river flow event sets linked to river catchment rainfall event sets.

The Flood Forecasting and Monitoring modules link predicted (deterministic SMHI E-HYPE) or observed (gauge telemetry) streamflow to lookup tables for volume on floodplain and distributed event rarity, defined for 1km impact zones (IZs) linked to each (pseudo-) gauge. The forecast and real-time flood footprints are generated by stitching together the most appropriate depth grid from each of the IZs.

Benefits

- Move from reactive to proactive flood management
- Integrate into a range of platforms, web apps, and workflows
- Rapidly prioritise and mobilise flood mitigation and response measures
- Combine with asset data to forecast impact and loss across whole portfolio
- Communicate evolving flood risk to partners and clients earlier
- Consistent, (trans-) national data. Globally scalable.