



Flood and Coastal Erosion Risk Management Research Programme

Recommendations for future research and practice on non-stationarity in UK flooding

Project Summary FRS18087/REA/S2

Introduction

We recommend a programme of future work on 'non-stationarity' in UK flooding. This is based on the findings of a rapid evidence assessment and a review of international best practice.

Background

Traditional methods used to estimate the probability (likelihood) and magnitude (size) of floods assume 'stationarity' of extreme events. This means that flooding in the past is assumed to represent the behaviour of future flooding.

Due to recent high magnitude flood events on our rivers and coasts many hydrologists are now considering 'non-stationarity' as this recognises statistically significant changes over time.

Method

We have reviewed how other countries deal with non-stationarity in flood and coastal risk management, identified current UK initiatives and propose recommendations for future work on non-stationarity in fluvial (river), coastal and pluvial (extreme rainfall) flooding.

International practice

Apart from sea level rise, non-stationary methods of flood frequency estimation are not required by flood management authorities or generally used by practitioners in the USA, Canada, Australia, the Netherlands or Germany. Only in Switzerland does the Federal Office for the Environment fit a range of non-stationary models to peak flow data from river catchments and provide brief guidance on model selection.

UK initiatives

Investigating non-stationary in flood and coastal risk is an active area of research in the UK. A number of leading UK universities, including Bath, Oxford, Newcastle and Lancaster have ongoing programmes of work on non-stationary and are seeking further funding opportunities.

Recommendations for future research

This project has made 15 recommendations for future research and practice that cover inland and coastal flooding and data improvements. These include:

- considering non-stationarity in the magnitude and frequency of all river floods (not just the largest flood each year), their tendency to cluster, their duration, and hydrograph shapes and volumes
- developing a practical method of estimating non-stationary flood frequency that can be applied on ungauged river catchments
- analysis of the changes to future tidal curves due to the impact of sea level rise on astronomical tides
- re-assessing tide gauge records for accelerating sea level rise
- improving quantification of the natural variability of storm surges

This summary relates to information from project FRS18087, reported in detail in the following output(s):

Report: FRS18087/REA/R2

Title: Recommendations for future research and practice on non-stationarity in UK flooding.

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Website: <https://www.gov.uk/government/organisations/flood-and-coastal-erosion-risk-management-research-and-development-programme>

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