CONVEX EXTREME RAINFALL WORKSHOP

UNIVERSITY OF READING

17th & 18th April 2012

CONVEX:
An Introduction

The CONVEX team:

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University of Exeter

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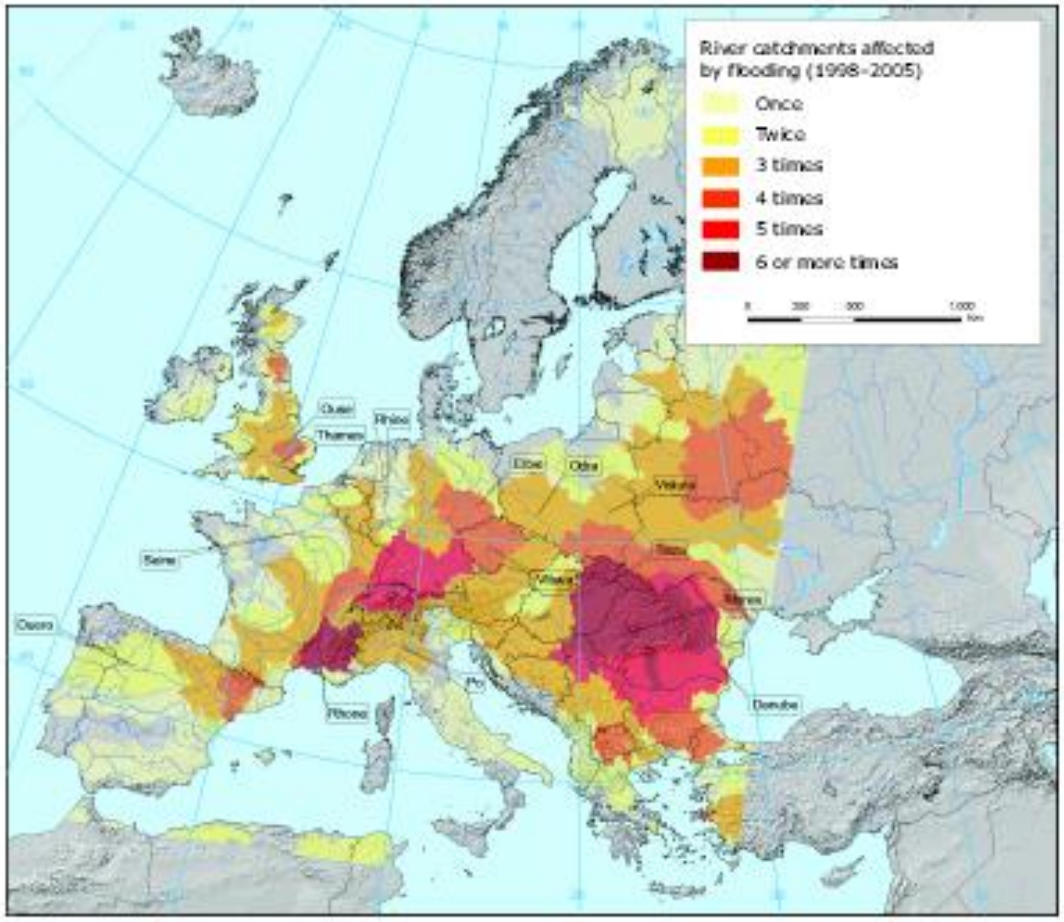
David Stephenson
Pat Sessford

CONVEX is supported by:

CONVEX: Context

Widely held perception that flood risk has increased across Europe during the last decade.

Figure 1.3 Recurrence of flood events in Europe between 1998 and 2005



Source: EEA, based on data from Dartmouth Flood Observatory.

Change in extreme rainfall

Models suggest that changes are likely to be detectable in the (near?) future (by 2050) and could be detectable by the 2020s

- Changes more likely to detectable in winter than other seasons;
- Testing UK Planning Policy Statement 25 (PPS25): precautionary allowances for climate change for use in flood risk assessment could be exceeded by current projections.

Fowler and Wilby 2010
Fowler et al. 2010

What is CONVEX?

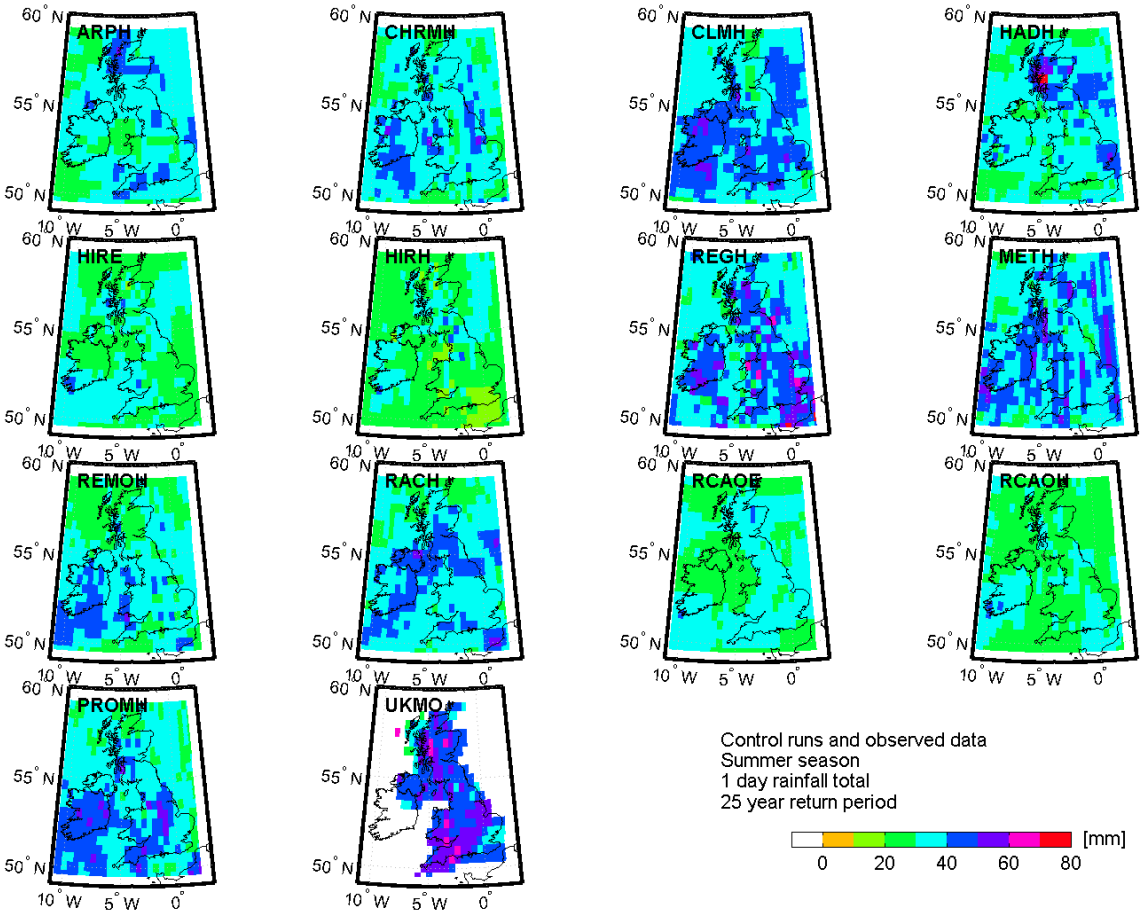
Using Observational Evidence and Process Understanding to Improve Predictions of Extreme Rainfall Change

What is CONVEX?

CONVective EXtremes

Convective rainfall is generally more intense, more localised and of shorter duration – “showers”

Why CONVEX?



Summer, 1 day 25 year return level

Fowler and Ekström 2009

CONVEX: Aims

Focussing on the **southern UK** in particular, CONVEX will :

- use observed evidence;
- and understanding of processes from new computer modelling capabilities.

With the aims of improving understanding of:

- how rainfall is produced in different locations;
- climate/weather model construction.

CONVEX: Aims

With a view to:

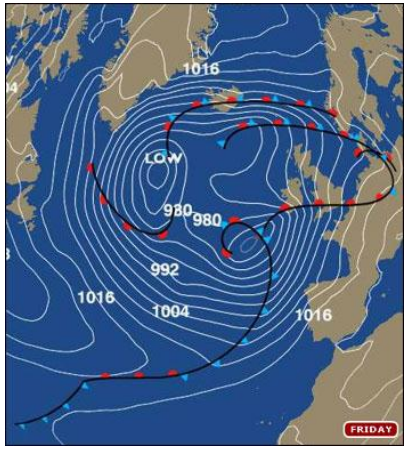
- providing a better understanding of flood-generating rainfall events;
- improve model predictions of extreme rainfall change;
- inform future adaptation strategies for flood risk management.

CONVEX: Objectives

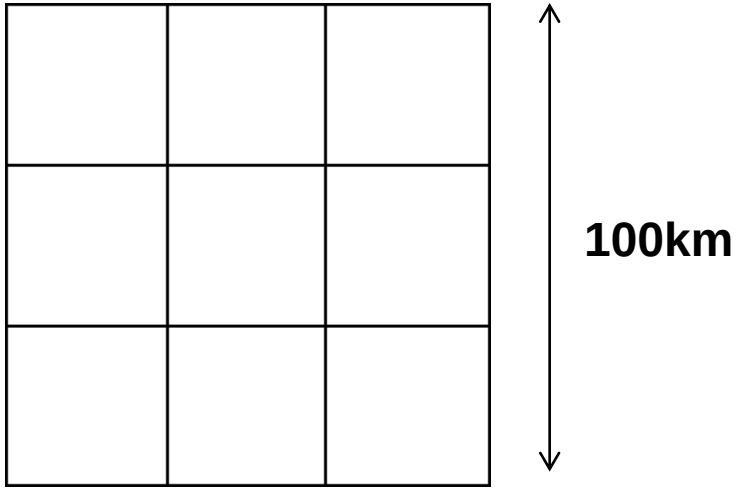
1. Explore observed rainfall

3. Assess the deficiencies of climate and weather models

2. Better understand the causes of extreme rainfall



4. Assess the influence of model detail



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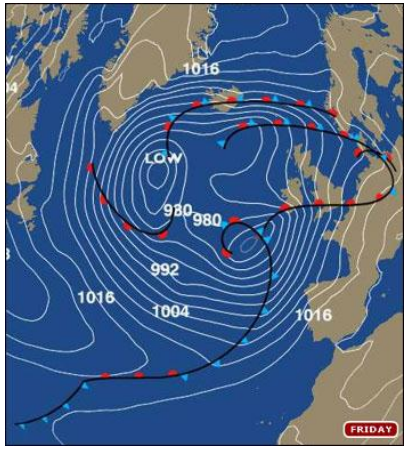

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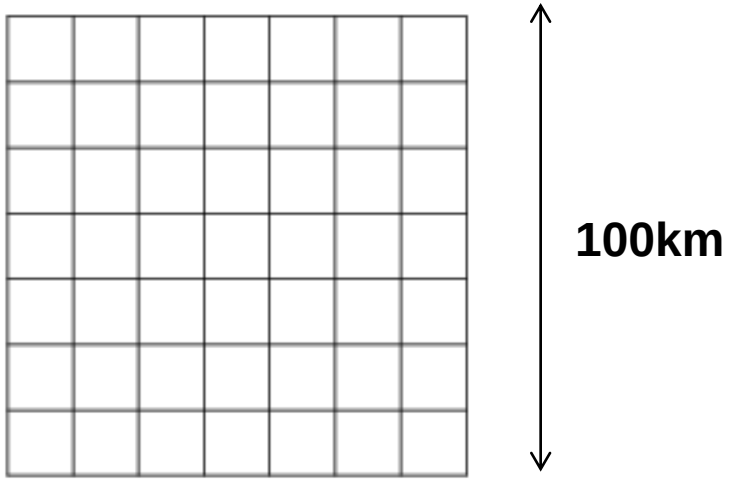

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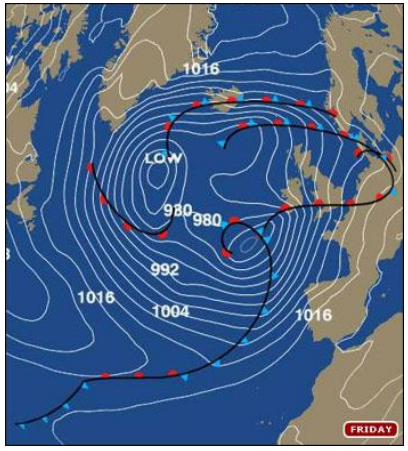

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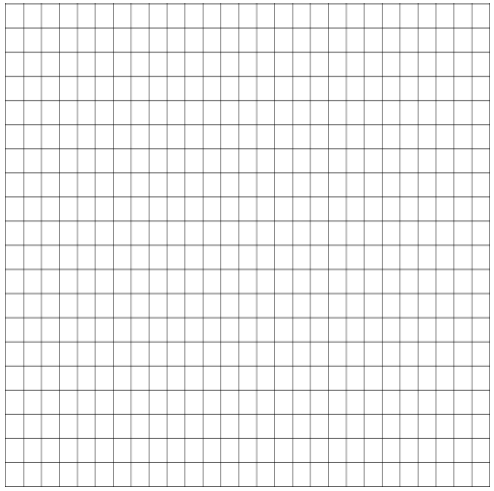
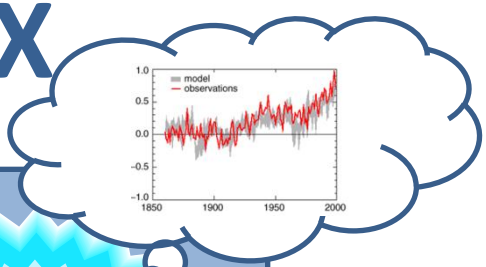


100km

CONVEX: Objectives

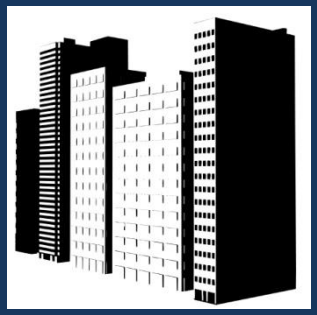
5. Provide new estimates of change to extreme rainfall.

The role of CONVEX



Climate modellers and weather forecasters.

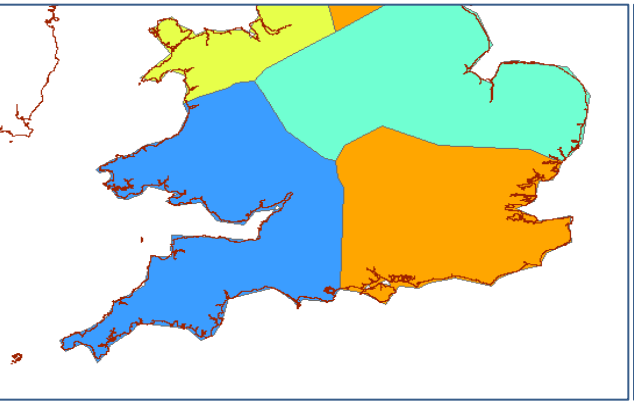
Governance & climate change impacts community



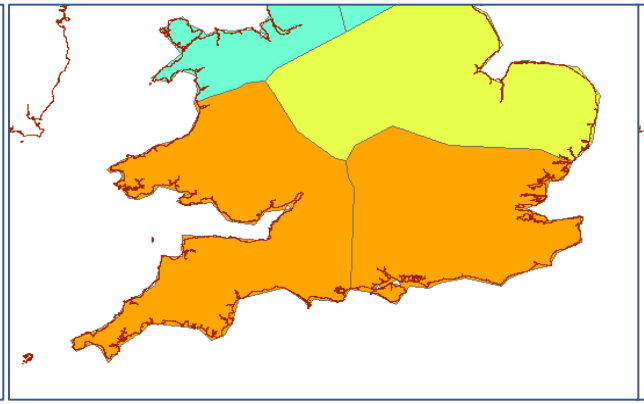
Other groups.

Historical Changes

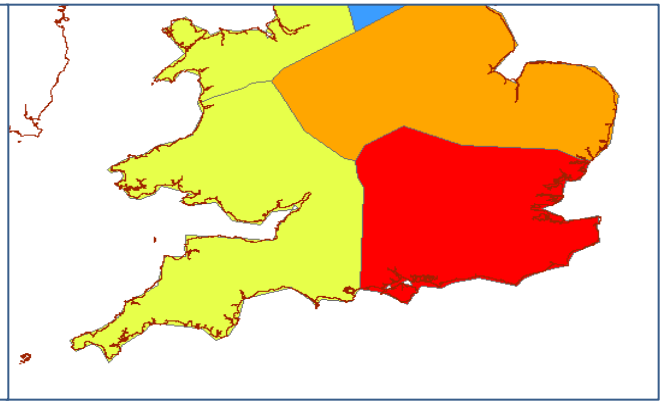
Summer 50 year 1 day rainfall



1960s



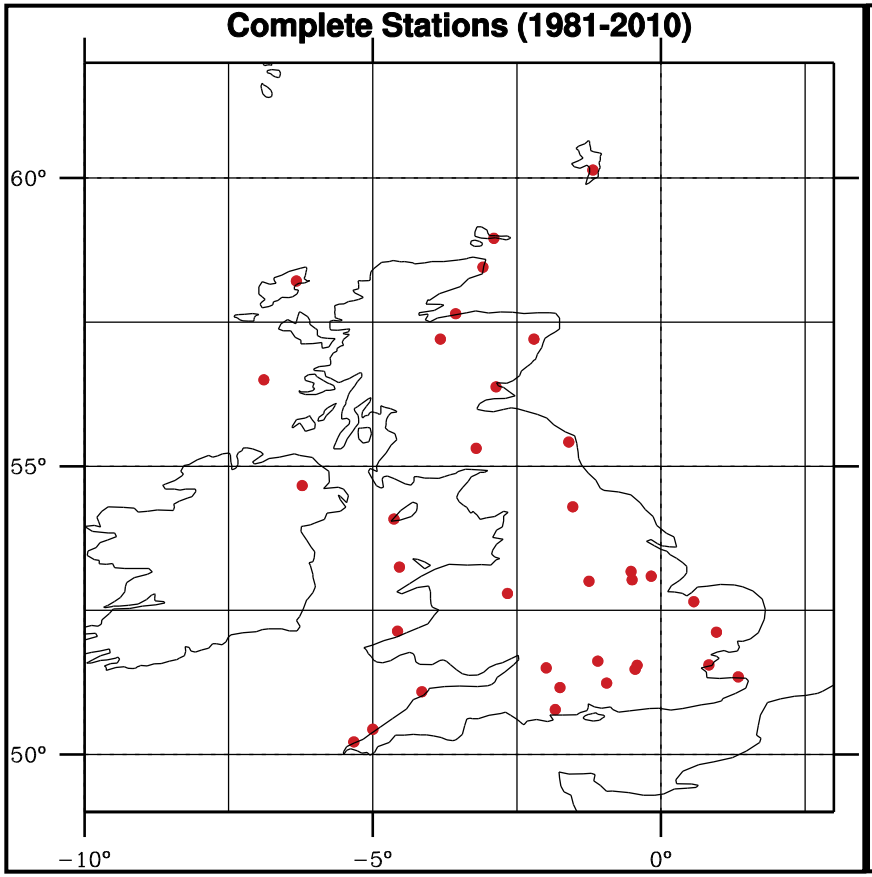
1980s



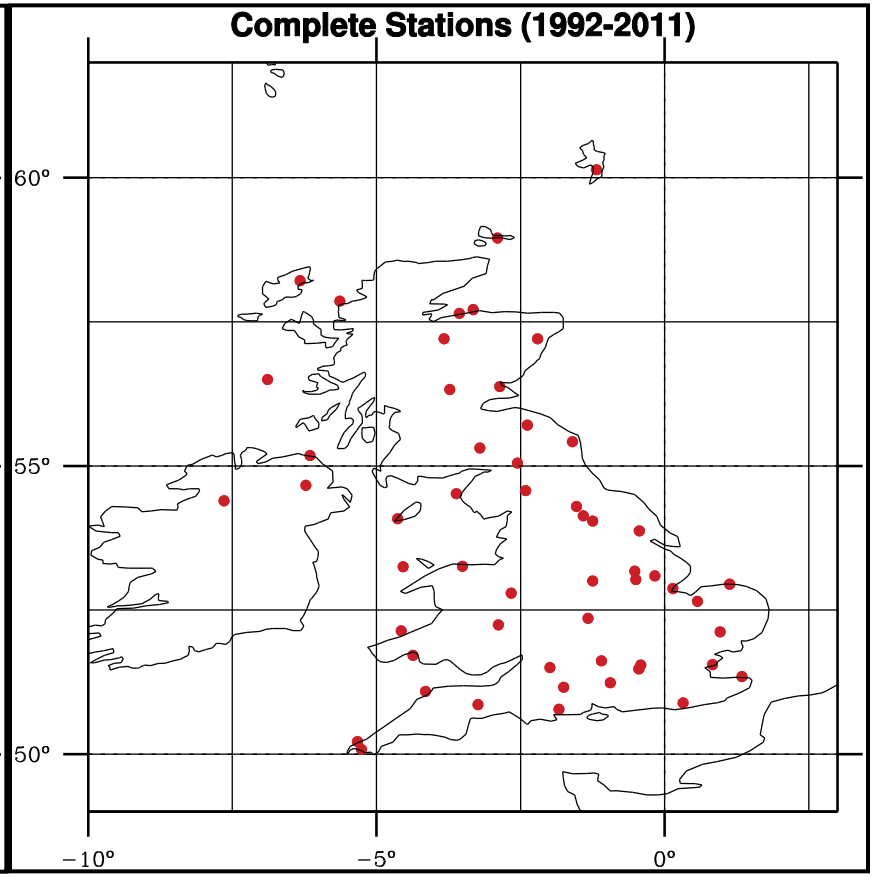
2000s

Jones et al. 2012

Analysis of historical rainfall datasets



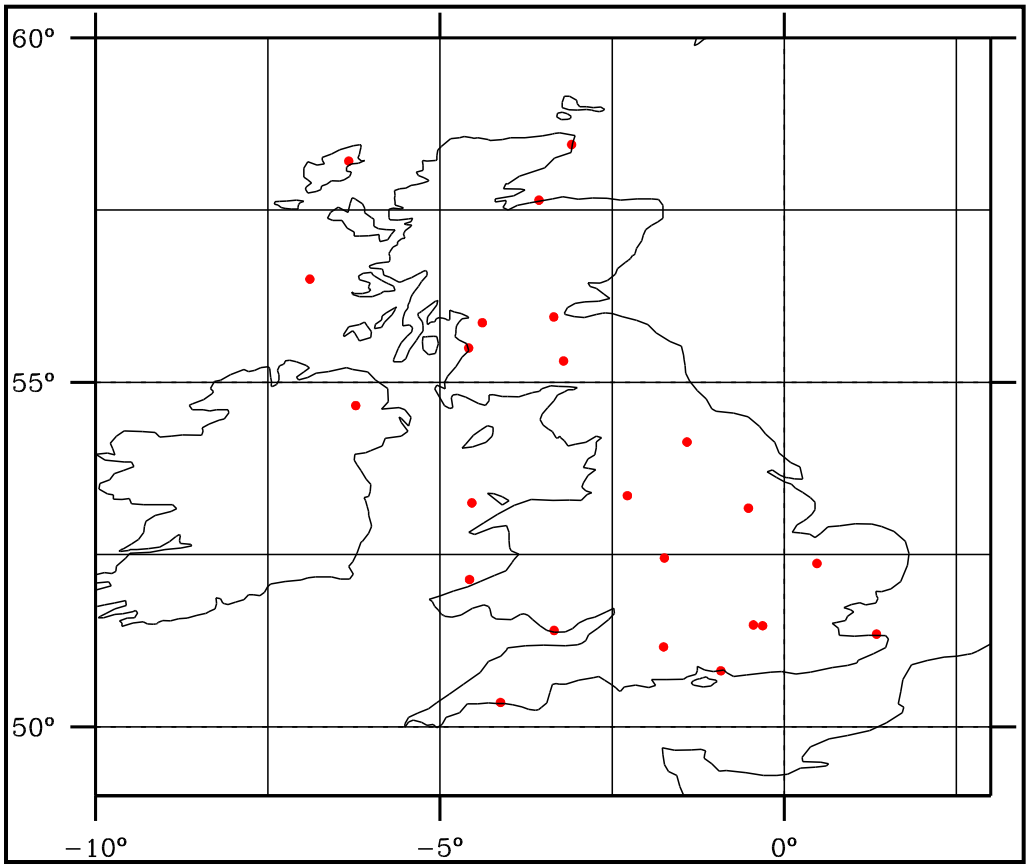
35 stations (30 years)



54 stations (20 years)

Hourly observations in the MIDAS dataset

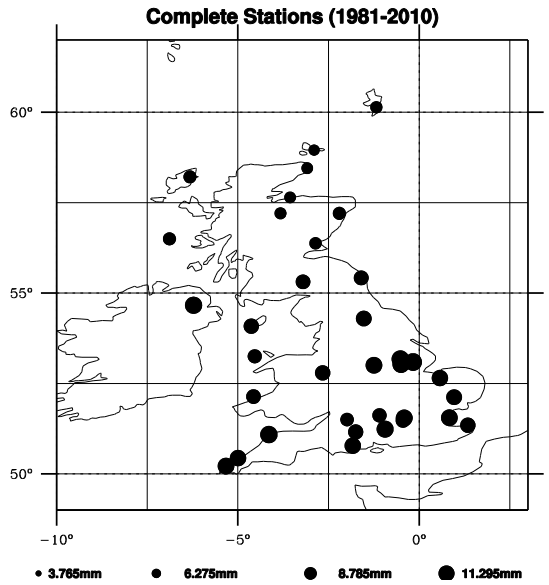
Analysis of historical rainfall datasets

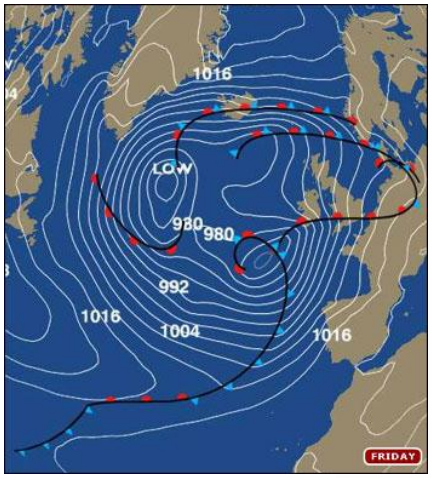


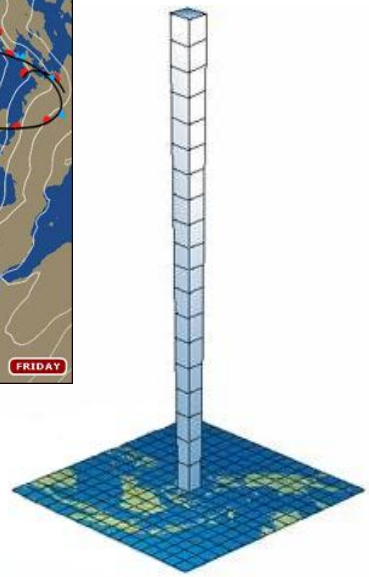
1960s - 22 stations

Hourly observations in the MIDAS dataset

Analysis of historical rainfall datasets



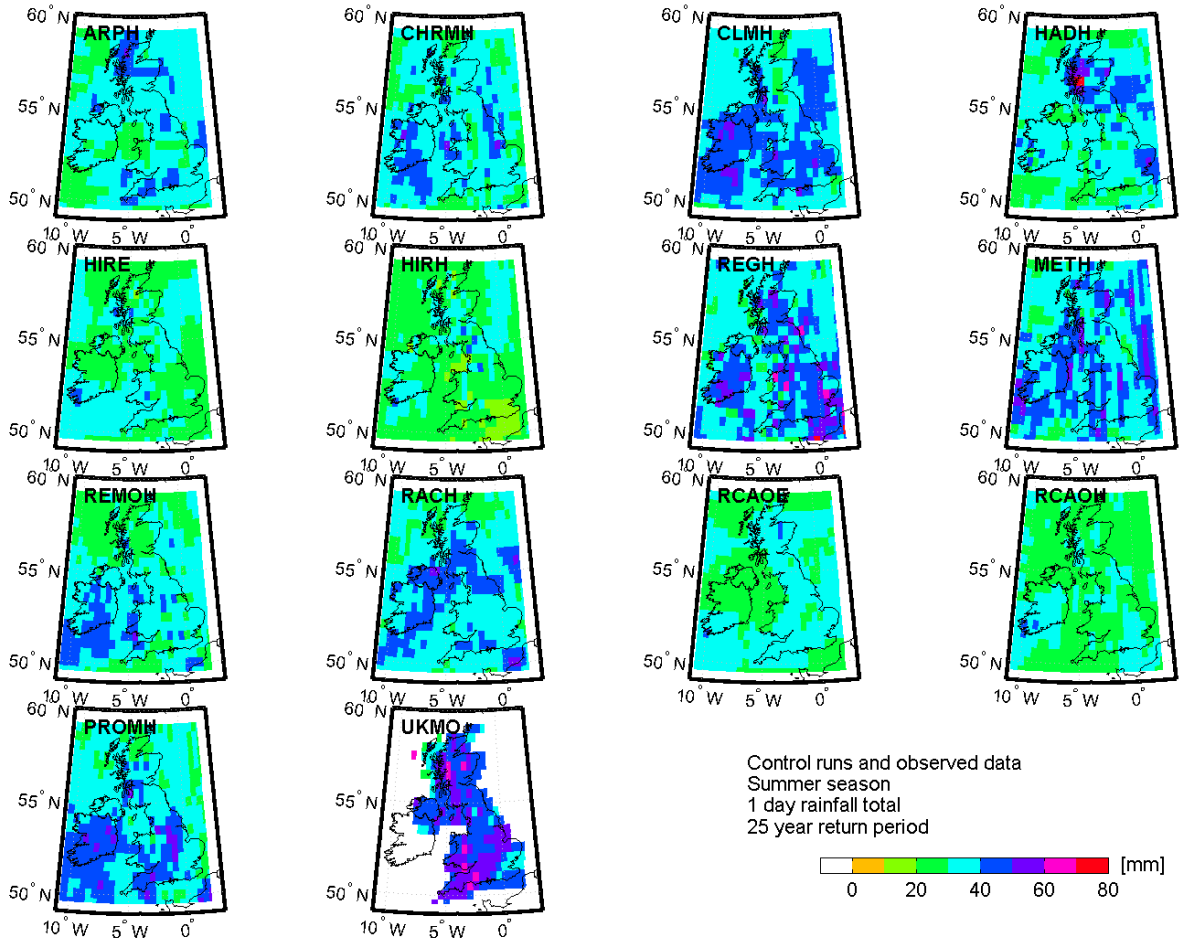




Using other historical data variables

Use radar data to examine other characteristics and “case studies”

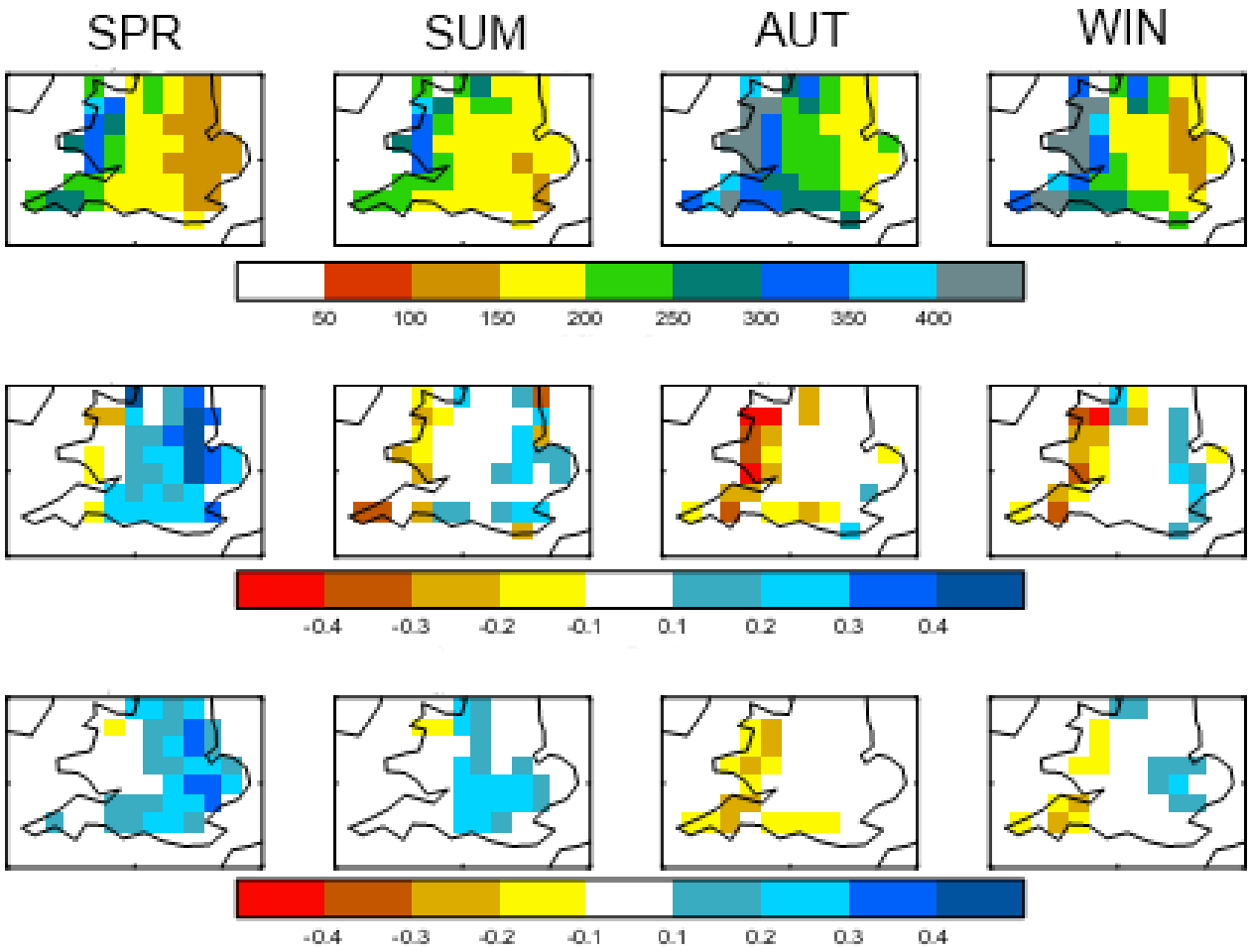
We know that models do not provide “truth”



Summer, 1 day 25 year return level

Fowler and Ekström 2009 IJC

Comparing effect of model detail: average rainfall

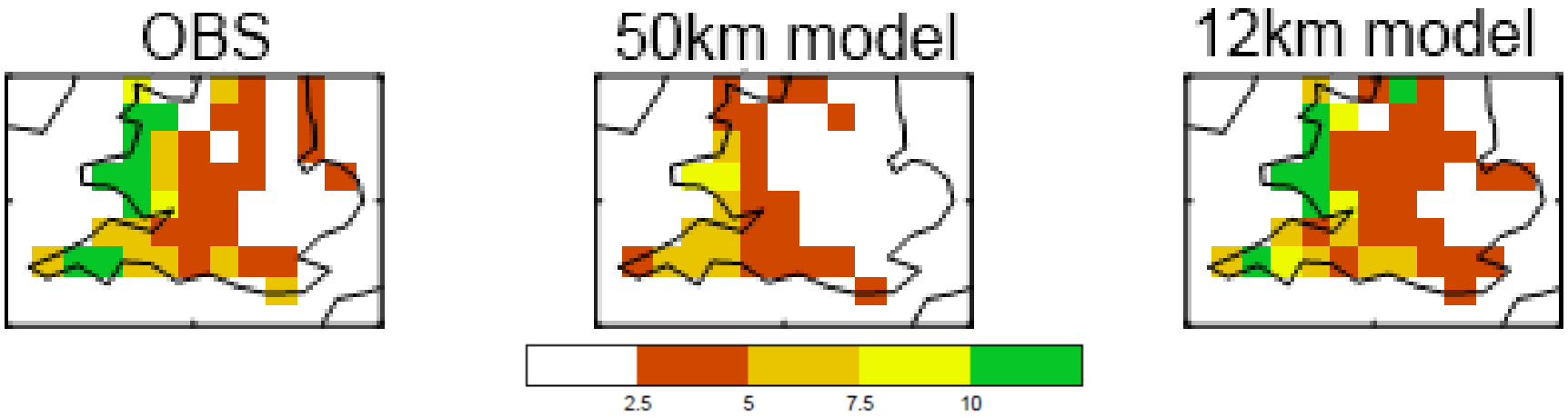


OBS

50km model

12km model

Comparing model resolution: extremes



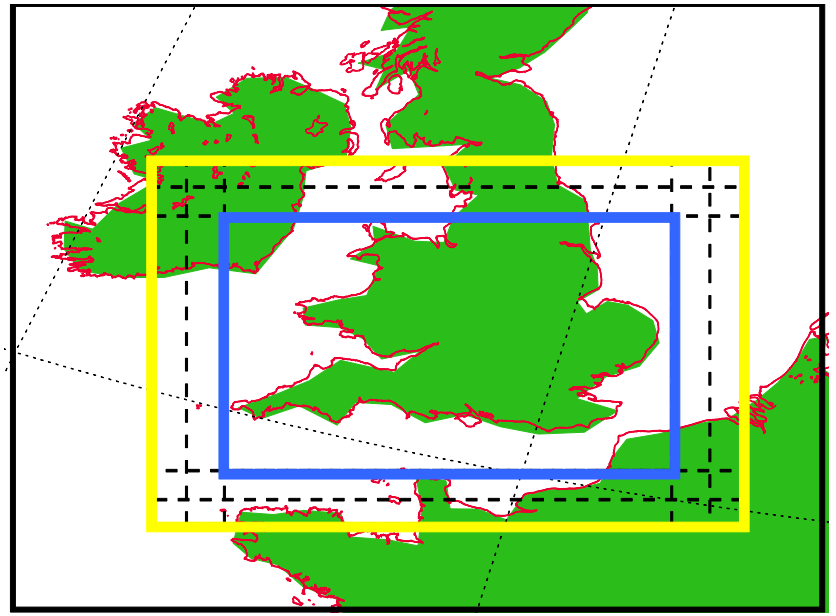
Average annual days with more than 20mm rainfall

Higher frequencies of extremes are produced at 12km

But this is not a “silver bullet”

Very high resolution climate modelling

- Same formulation as 1.5km weather forecast model
- Spans southern England and Wales at 1.5km resolution
- Explicitly represents important processes that cannot normally be taken into account



Progress to date

- 1.5km model has been run for 20 years (1989-2008).
(Paper published online in Journal of Climate.)

- 10 year “control” or baseline run just started, to be followed by a future (climate change) run of the model.

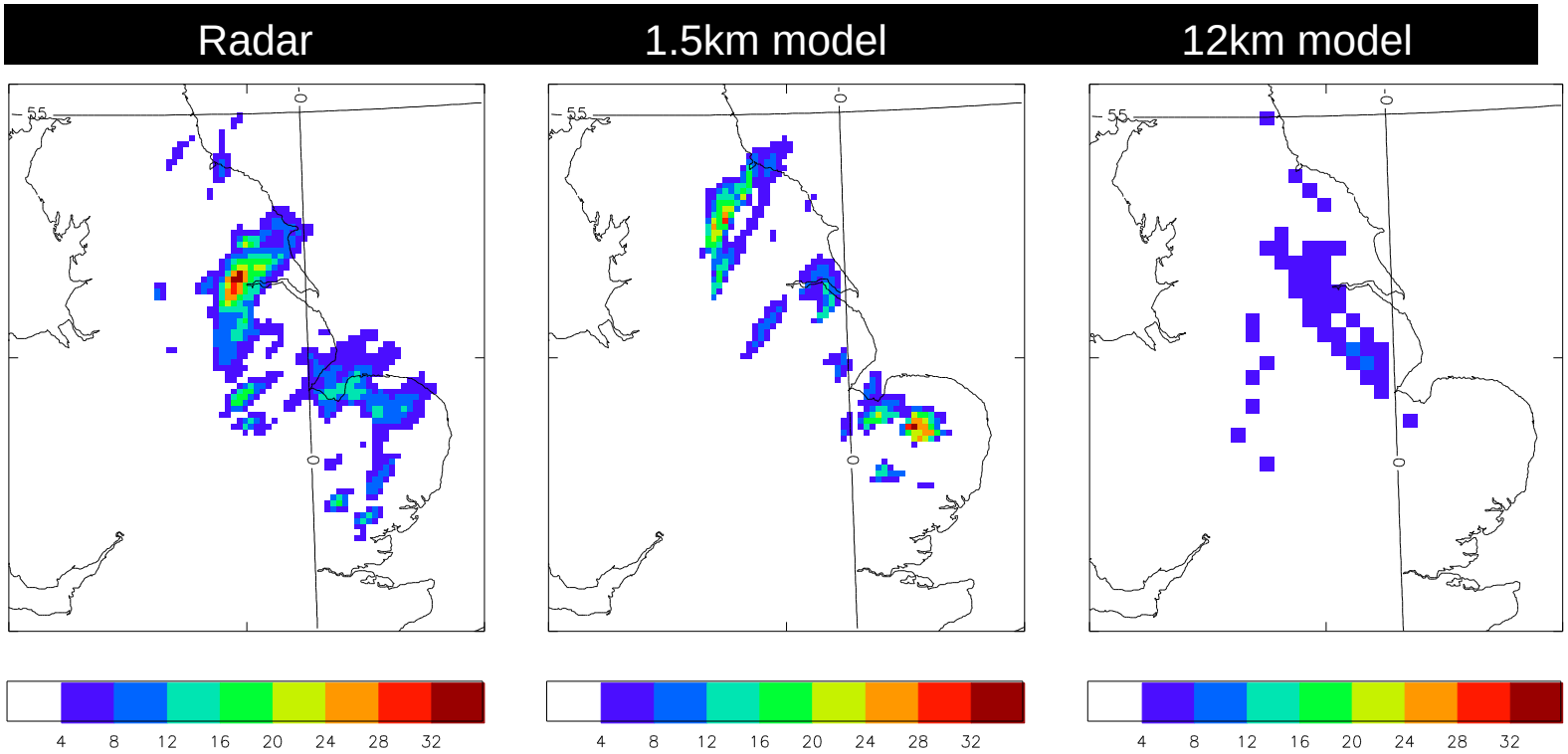
- Planned completion summer 2013.

What sort of results are we getting?

- 1.5km model more realistically represents whether it rains or not.

- In 1.5km model heavy rain is too intense, but its spatial pattern is much more realistic (previously too persistent and widespread).

Improved representation of convective showers



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- 1.5km model more realistically represents whether it rains or not.

- In 1.5km model heavy rain is too intense, but its spatial pattern is much more realistic (previously too persistent and widespread).

- Some confidence that the 1.5km model is better representing what is happening in atmosphere.

Summary

- CONVEX is using very highly detailed models in conjunction with the examination of historical weather data to:
  - improve our understanding of extreme rainfall;
  - assess future changes in extremes.
- Considerable progress in development and analysis of 1.5km model.
- Initial examination demonstrates improvement in characterising flood generating events.
- Important that outputs/analysis are relevant to the user community.

Finding out more

- The CONVEX project website:

http://research.ncl.ac.uk/convex/

- Follow us on twitter: #CONVEX_PROJECT
- Newsletters – twice annually
- A further workshop towards the end of the project