Using Convex in support of the CCRA2 flood study

Brief overview of method and thoughts (work in progress)

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AND PARTNERS

Paul Sayers
Presentation to the Convex Meeting

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Horritt Consulting

British Geological Survey
NATURAL ENVIRONMENT RESEARCH COUNCIL

Flood Hazard Research Centre
Prof. Edmund Penning-Rowsell

University of Newcastle
Prof. Chris Kilsby

CCRA 2017 Floods Study: Overview

By start of summer 2015….

- **Provide an assessment of the UK future flood risk under climate and demographic change and potential opportunities for adaptation:**
  - Fluvial
  - Coastal
  - Surface water
  - Groundwater
- **Commissioned by the Climate Change Committee** (Dave Thompson/Kathryn Humphreys/Daniel Johns)
- **Key partners:** Environment Agency, SEPA, NIRA, NRW and NERC

Future changes of interest: Population

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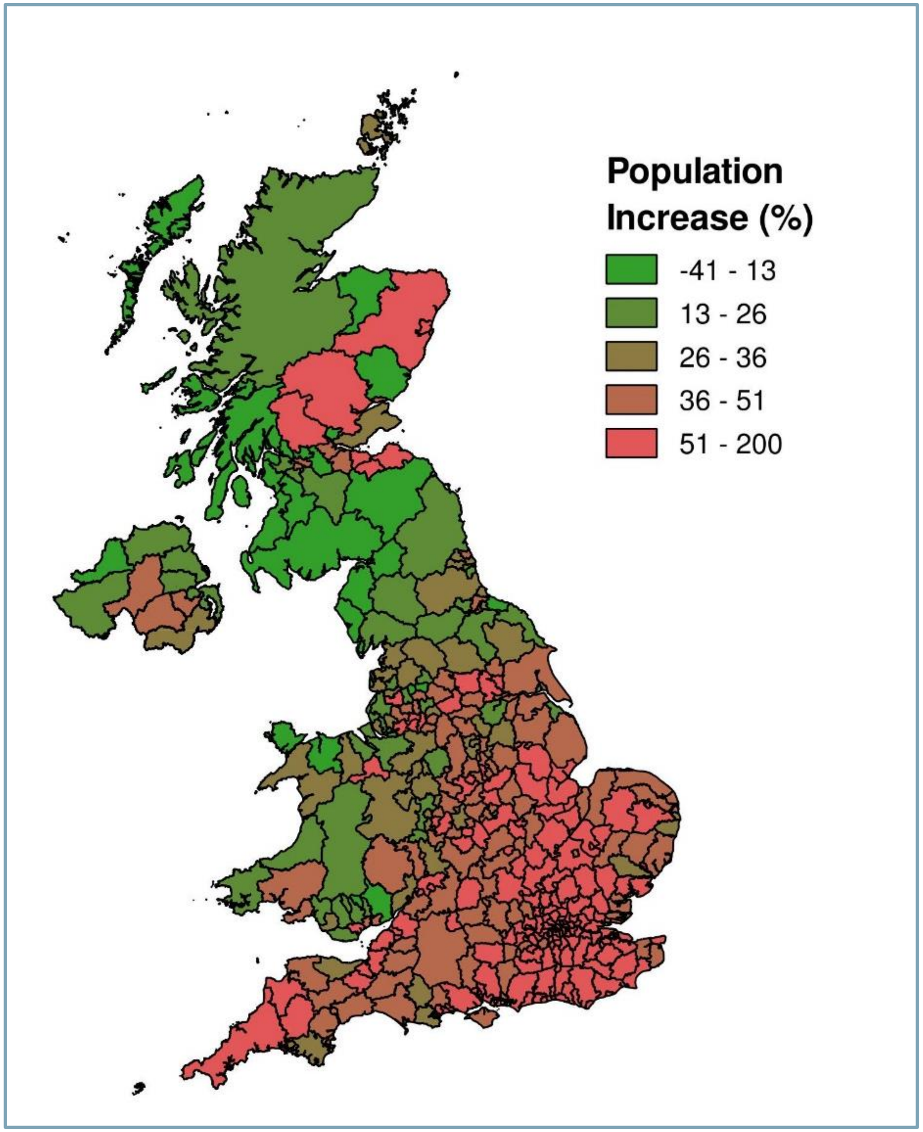
Population and occupancy:

- To be finalised .....
- **Lower** (~20% increase by 2080s)
- **Higher** (~50% increase in population by 2080s)



Based on analysis completed by HRW for CCC.

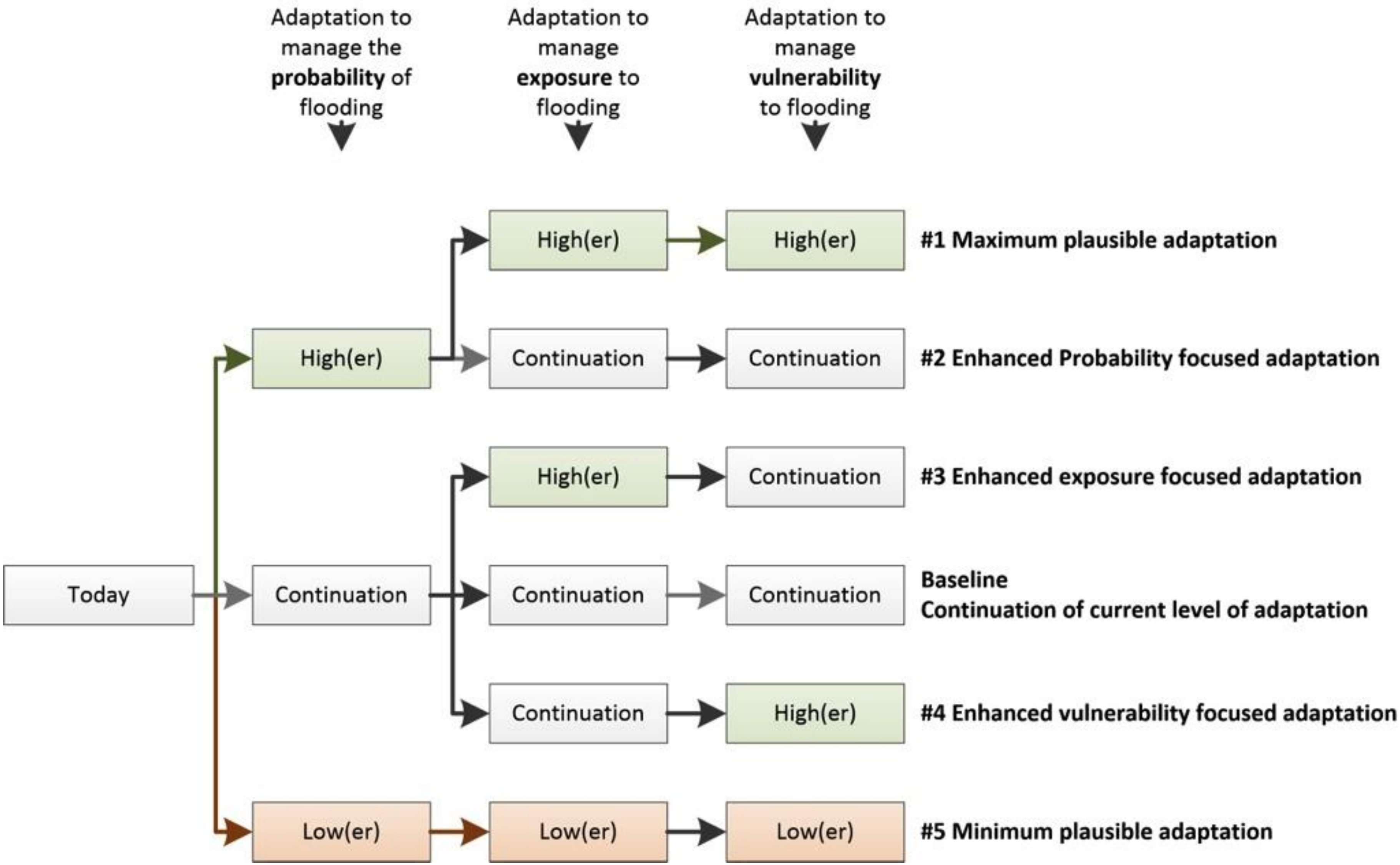
Future changes of interest: Climate

Climate changes:

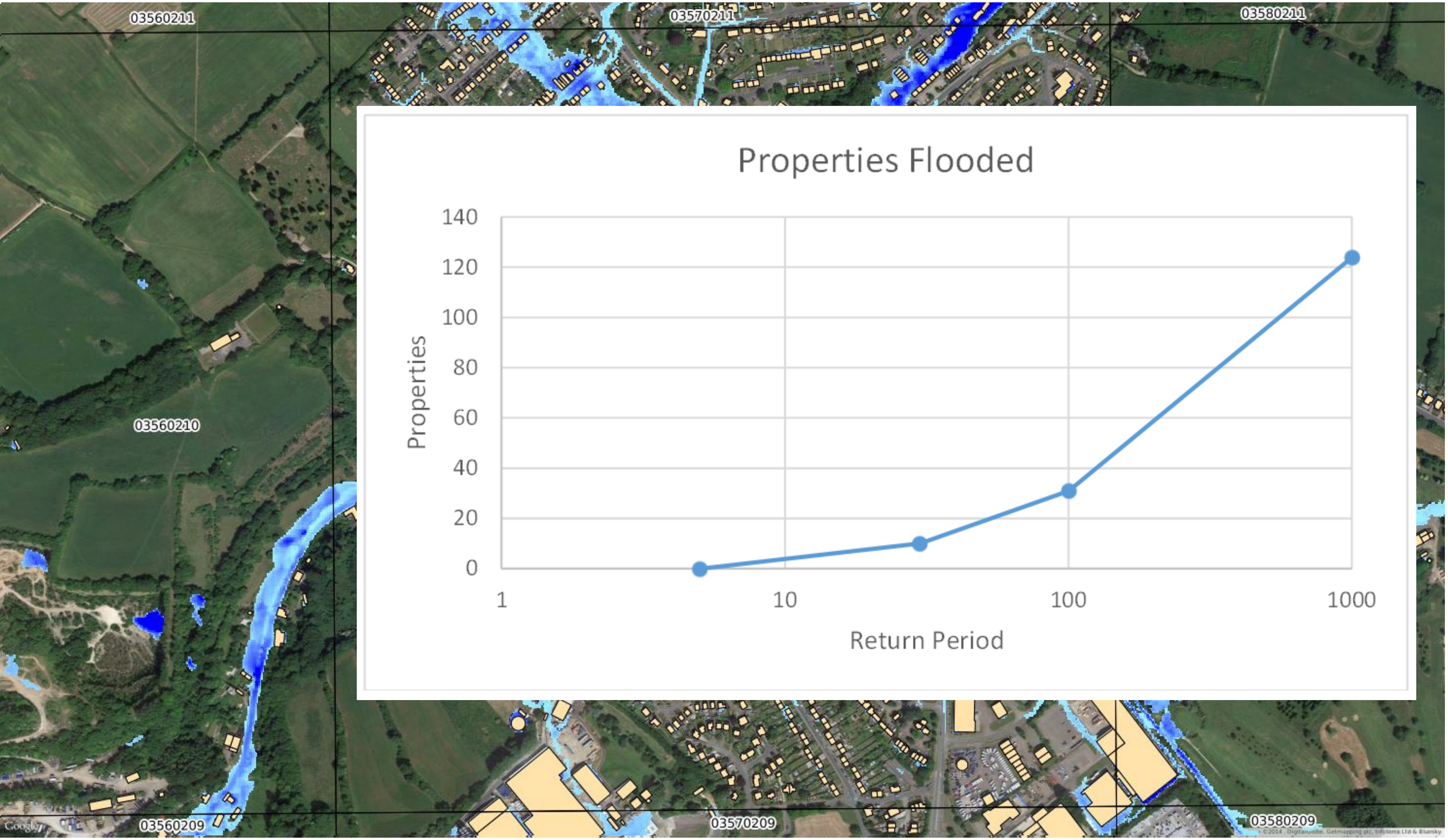
- Reflecting **2** and **4**^{o}C change in Global Mean Temperature by the 2080s from the 1990s baseline.
- Working with WP D (CEH/Met Office) **H++** change

Core scenarios		Change in Global Mean Temperature		H++
		2 degrees	4 degrees	
Socio-economic change	Low	L2	L4	
	High	H2	H4	H++

Future changes of interest: Adaptations



Approach: A new ‘all source’ Future Flood Emulation (FFE) model



FFE risk estimates are sensitivity to:

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- **Changes in climate related 'loads':**
  - E.g % increase in river flows, rainfall and rSLR
- **Changes in the performance of flood infrastructure:**
  - E.g. Representative Standard and Condition Grade, urban drainage capability
- **Changes in exposure**
  - E.g Number and location of properties
- **Changes vulnerability**
  - E.g the damage incurred if a property / receptor is flooded

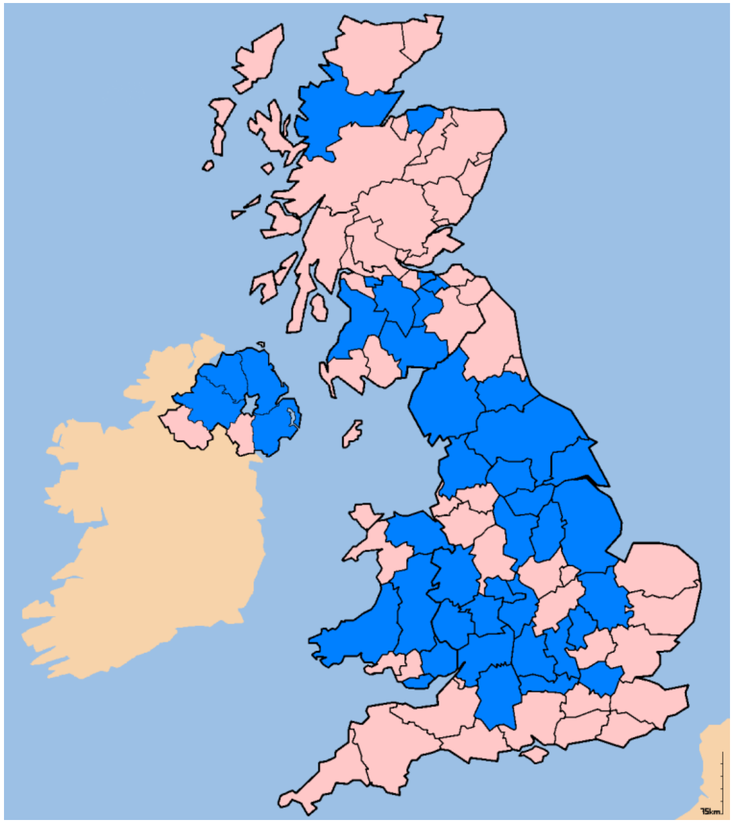
So, how are we using Convex outputs?

To support the assessment of surface water risks:

- New ‘convex’ observations of rainfall relevant for surface water (Prof. Kilsby)
- Analysed rainfall records for 1, 3 and 6 hour for 2007 flood event
- Estimate RP rainfalls for 1, 3, 6 hours to provide a map of return periods

This analysis is now enabling us to:

- **Validate the FFE risk estimates:** Estimate the damages from the 2007 event (and compare to actual damages)
- **Explore future spatially coherent rainfall events:** Estimate the damages assuming the 2007 event happens again in 2080s with uplifted rainfall.



But how are we proposing to uplift rainfall?

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Simply…building only basic evidence (e.g. EA, 2011) – can Convex help here?

Climate change factor	Global Temperature Increase	2020s	2050s	2080s
Lower	2°C	+0%	+5%	+10%
Medium	4°C	+5%	+10%	+25%
H++	6°C	+10%	+20%	+40%

What would make Convex outputs more useful?

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- **National coverage of the new observational data relevant to surface water (gridded?)**
- **Extended attribution and consolidation of the data e.g:**
  - Annual and monthly maxima would be a useful for each gauge (for durations relevant to surface water flooding)
  - Easier access to the associated/**updated** DDF models (appropriate to durations relevant to surface water)
  - Spatially varying statements of confidence/uncertainty
- **Spatial climate impacts**
  - Spatially resolved % changes in rainfall at durations relevant to surface water (building on the EA, 2011 formats?)
  - Event set of spatially coherent extreme events with associated probability – now and future?

More questions and thoughts?…..please contact

- **Paul Sayers**
  - Paul.sayers@sayersandpartners.co.uk
  - Skype: floodsman
  - Telephone: 01865 600039