Attributing the 2014 floods to human influence

Nathalie Schaller, Alison Kay, Rob Lamb, Myles Allen + many others

OFA/ECI symposium, 22.03.15

Met Office

CEH Centre for Ecology & Hydrology NATURAL ENVIRONMENT RESEARCH COUNCIL

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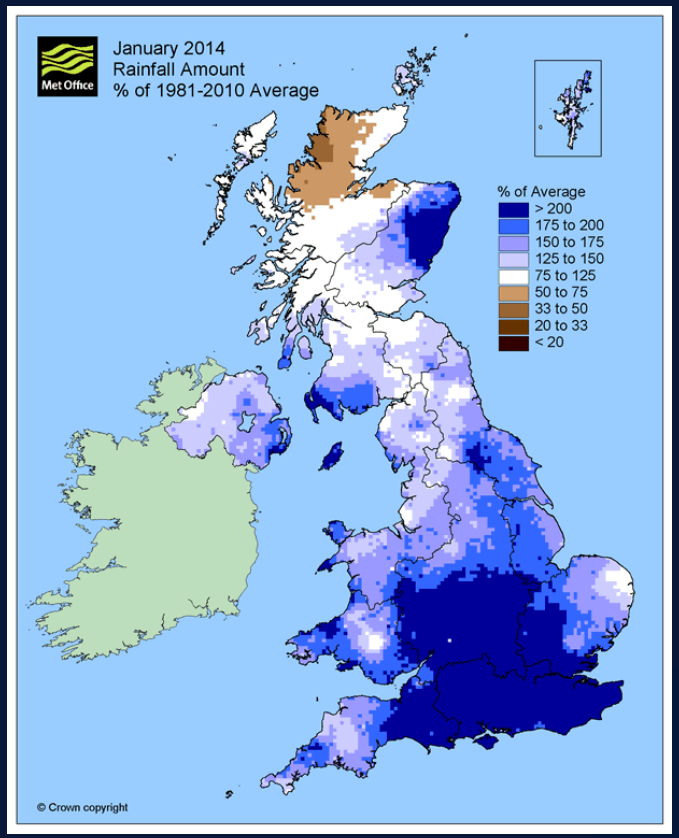
Introduction

"Were the floods caused by climate change?"

The Oxford Mail

www.metoffice.co.uk



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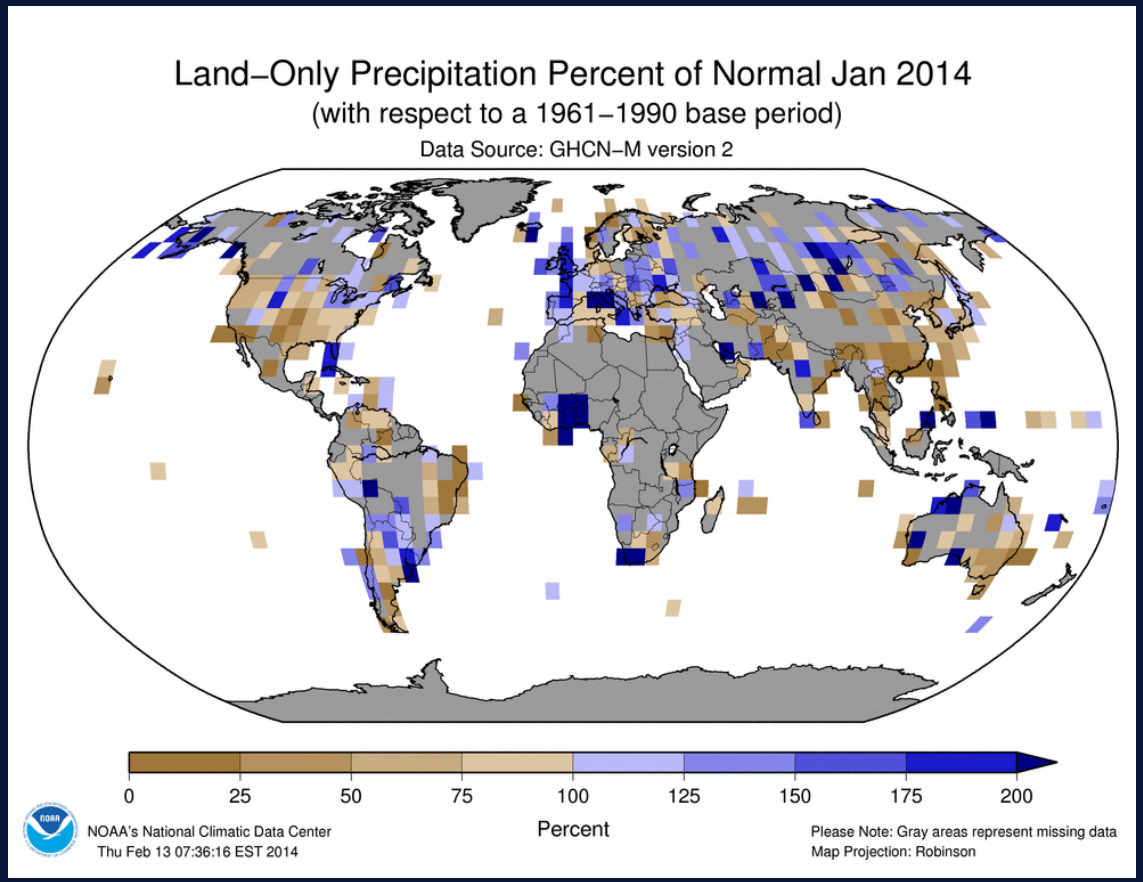
Event attribution

a) Answer is not trivial: there has always and will always be extreme events (natural variability)



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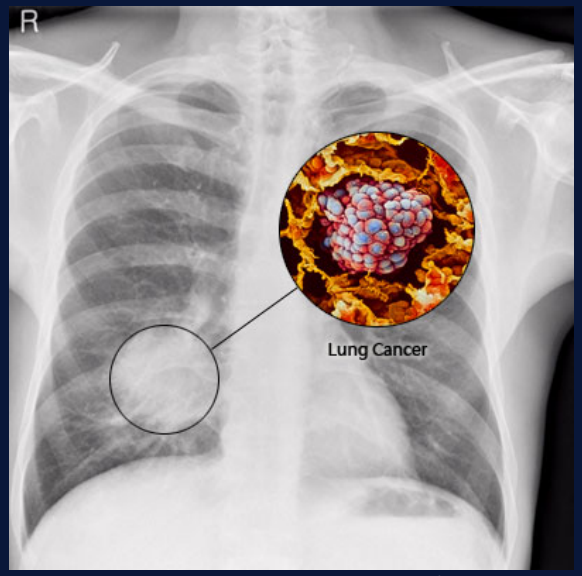
Event attribution

b) Question is ill-posed as it expects “yes” or “no” but the only answer possible is in terms of change in risk

Analogy: smoking and lung cancer



www.medicinenet.com

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Event attribution

a) Design model experiments

b) Did human activities affect the risk of the flood occurring?

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Climate change

Home computers to help scientists assess climate role in UK's wet winter

Spare computer time lent to researchers at Oxford University will allow intensive climate modelling of 2013-14 conditions

Damian Carrington

Tuesday 4 March 2014 06.00 GMT

Shares 739 Comments 55

Flooded town of Northmoor Green (Moorland) in Somerset, where almost all residents have now been evacuated on 10 February 2014. Photograph: David Levene for The Guardian

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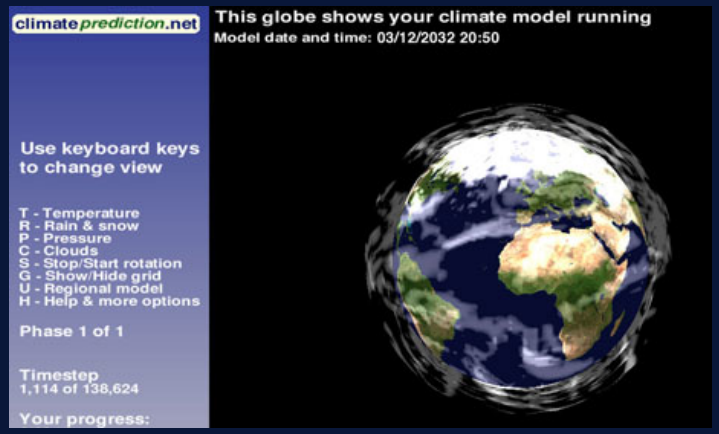
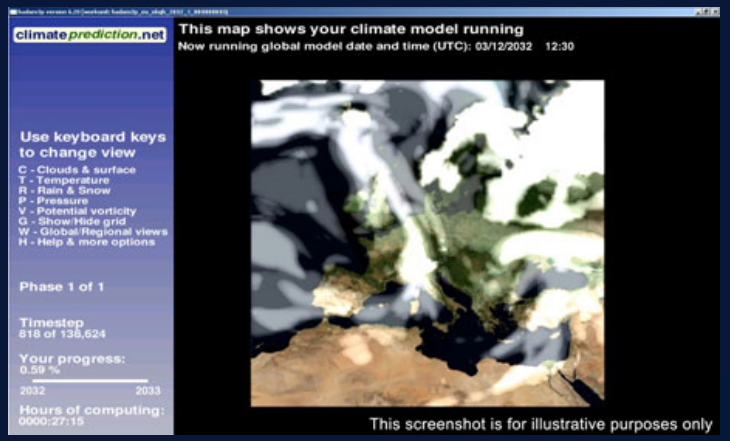
Methods

- Citizen science project weather@home
- Allows us to perform thousands of simulations
- Extreme events are rare by definition





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Methods

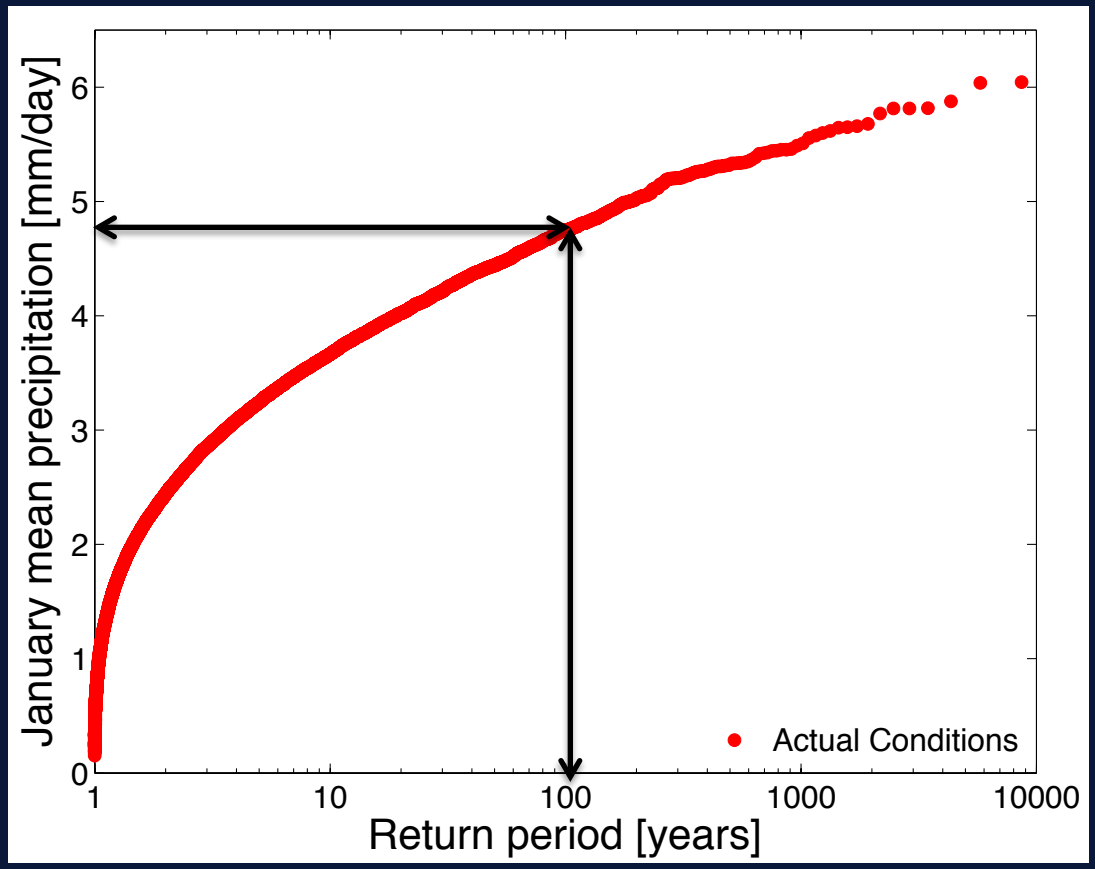
- Compare two ensembles of simulations

1) Simulations under “actual” conditions

2) Simulations under “world that might have been” conditions

Results

- Focus on the upper tail of the distribution: extremes



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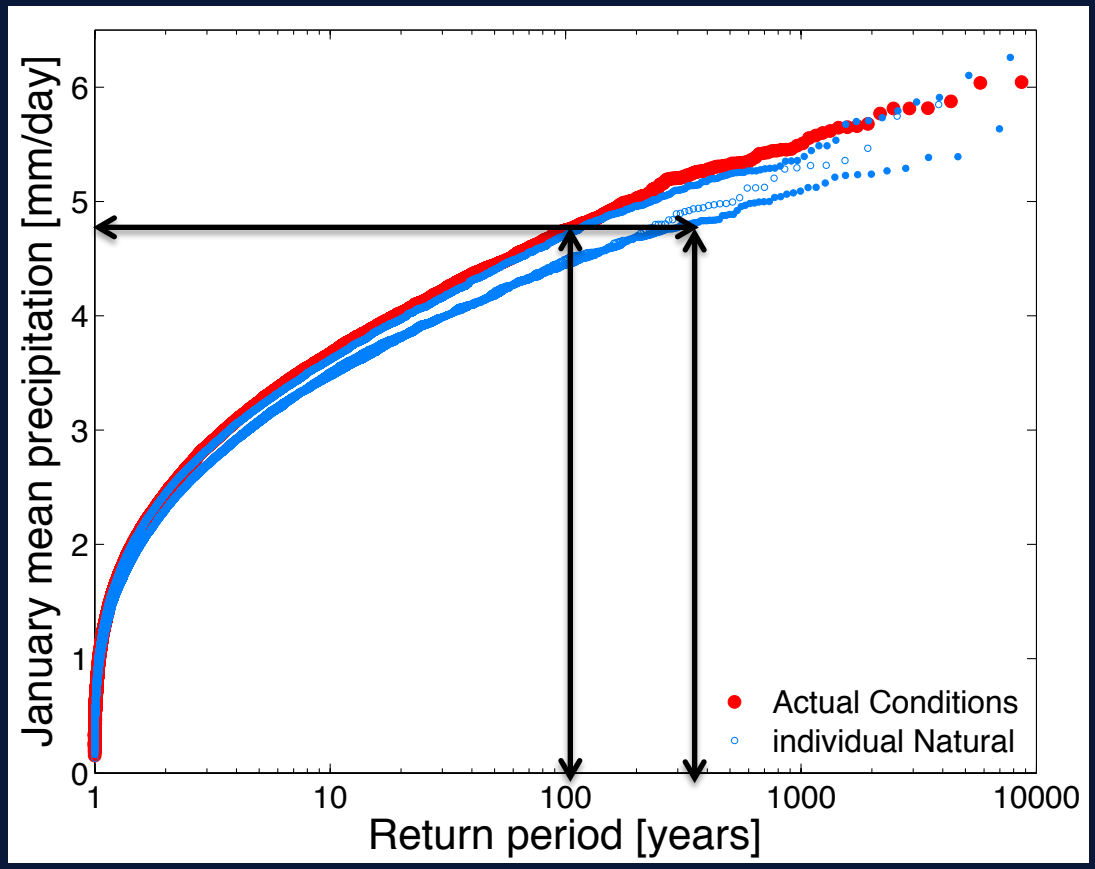
Results

- Range due to effect of anthropogenic forcing



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Results

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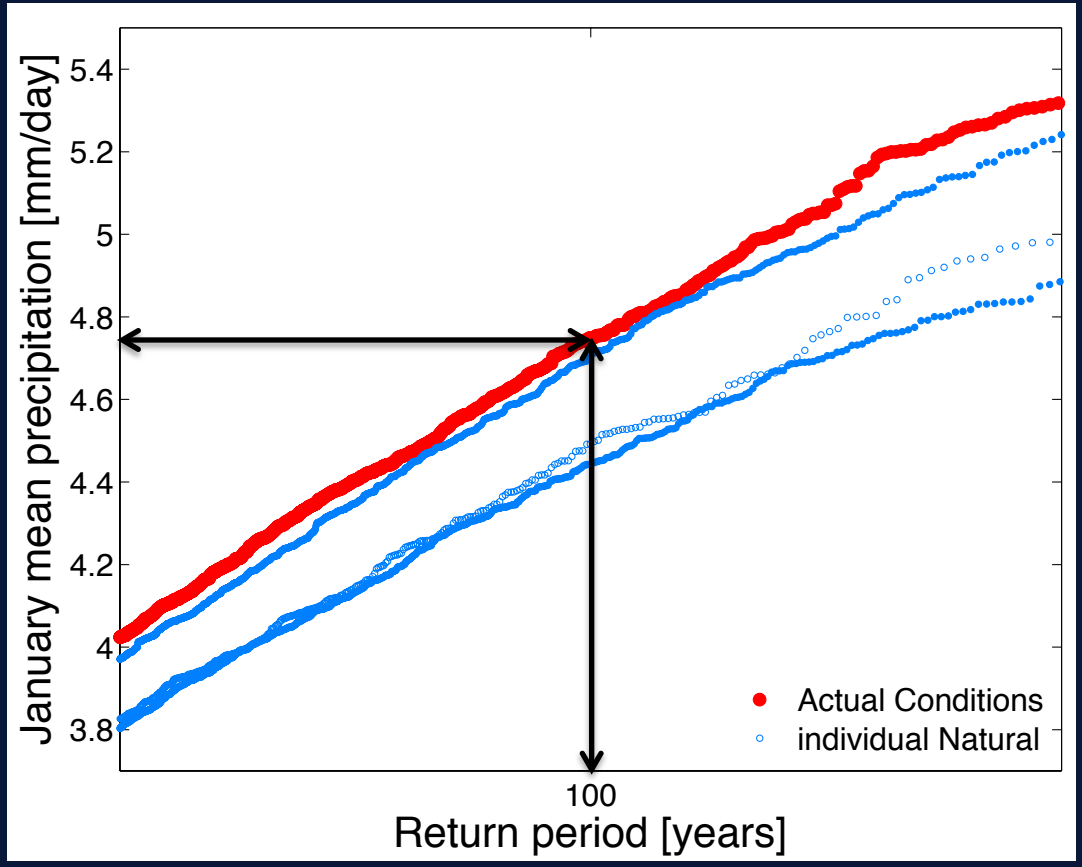

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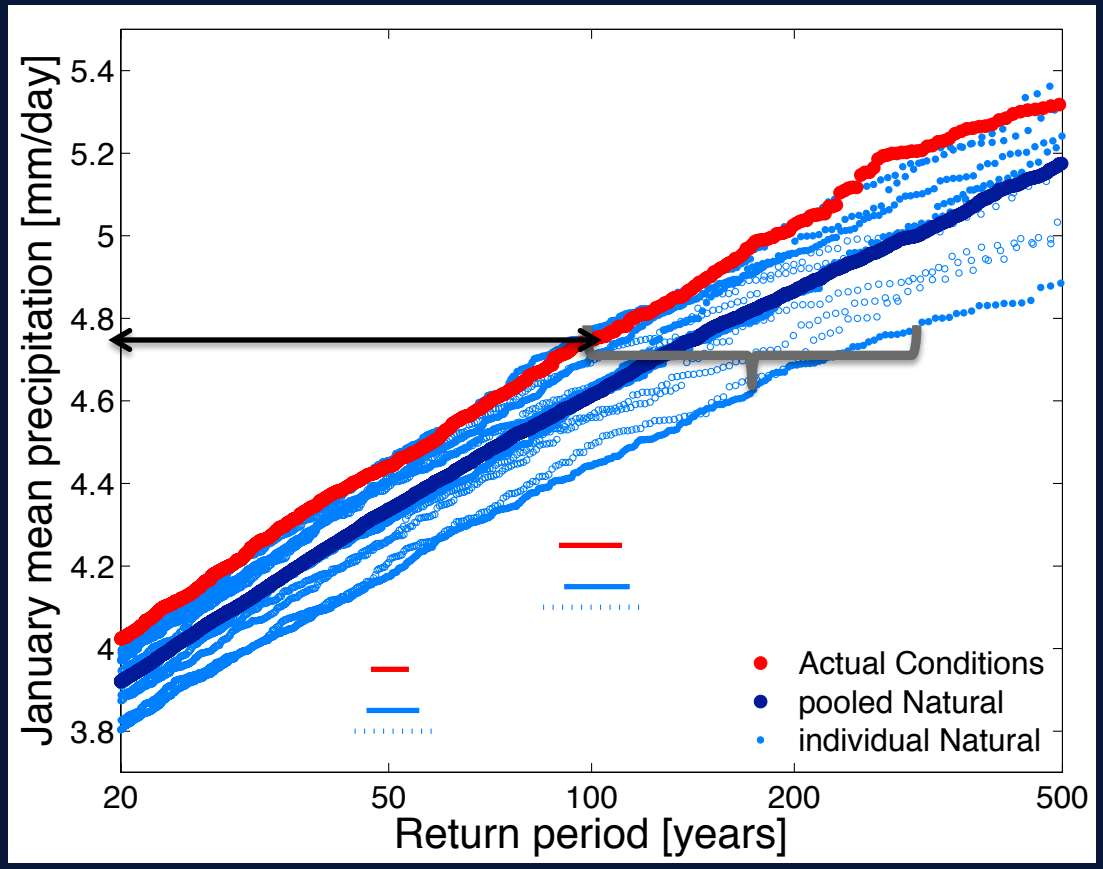
Results

- Increase in risk of heavy precipitation: 40% [0%:160%]



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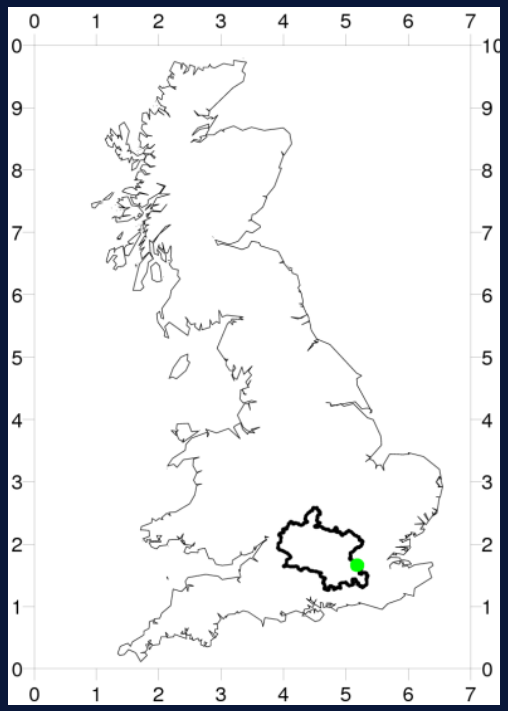
Results

- CLASSIC hydrological model
- Transform precipitation, temperature and evaporation output from climate model into peak river flows at Kingston



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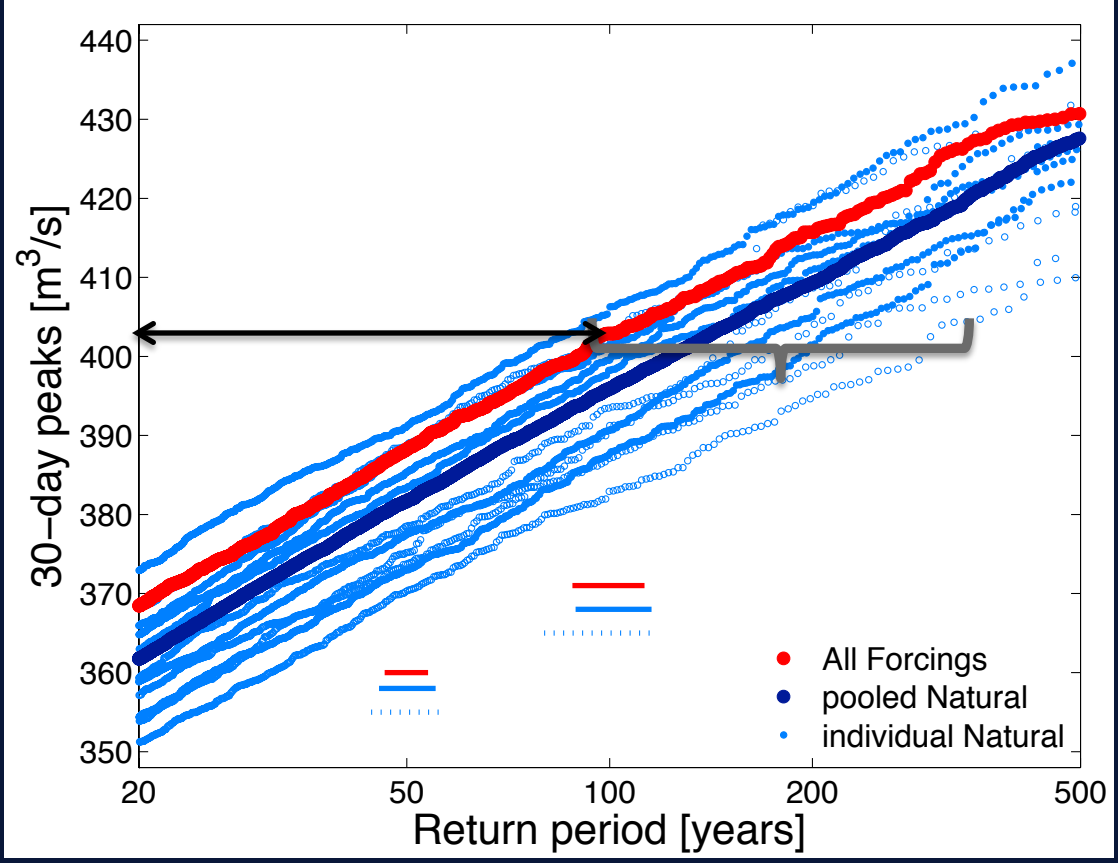
Results

- Increase in risk of peak river flows: 40% [-12%:195%]



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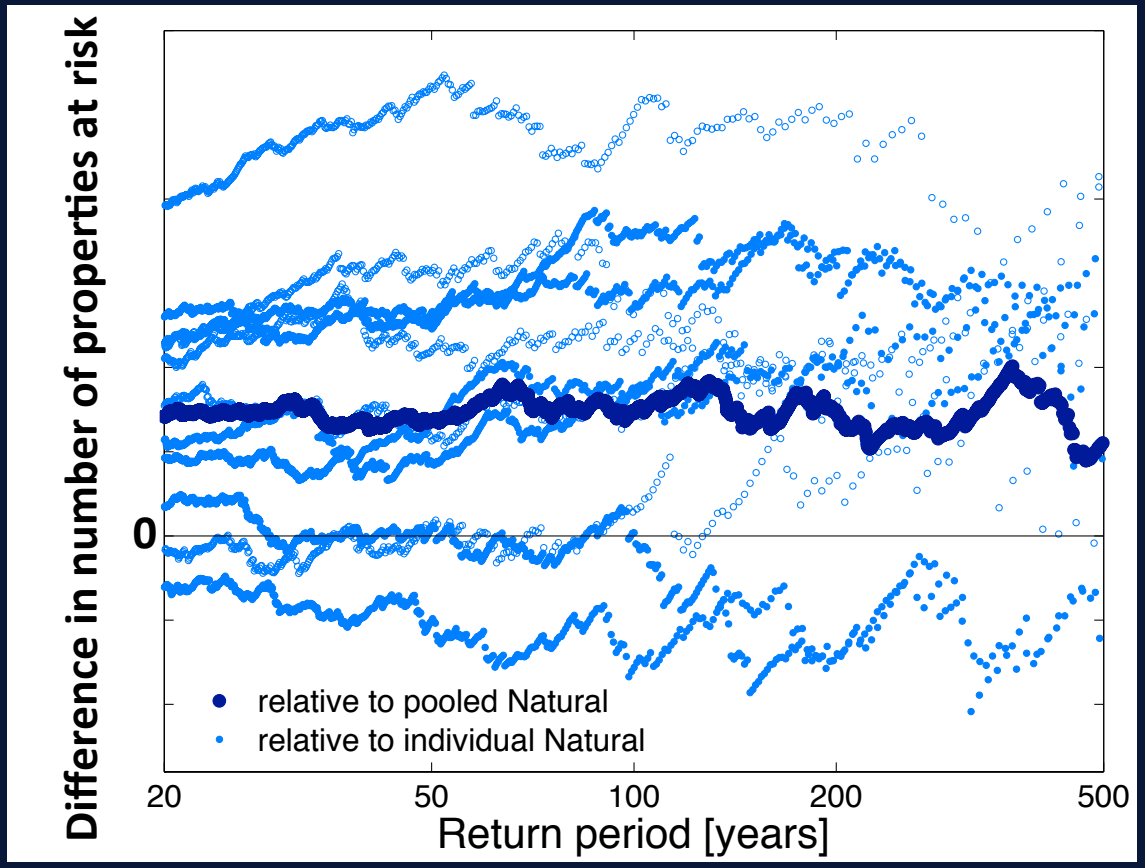
Results

- Increase in number of properties at risk



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Conclusions

- Attributing an extreme event to human influence is not trivial
- Need for very large number of simulations
- With our modeling setup, we find a 40% increase in risk of extreme precipitation and peak river flows due to human influence
- This leads to additional properties at risk in the Thames catchment
- But large range due to different estimates of the effect of past CO_2 emissions

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weather@home is a climateprediction.net project supported by

- The UK Natural Environment Research Council Changing Water Cycle programme
- The European Commission FP7 EUCLEIA project
- The Swiss National Science Foundation
- The European Research Council TITAN project
- *The Guardian*
- Building on earlier support from the UK Research Councils & Microsoft Research
- Made possible by the BOINC distributed computing platform and the endless patience and dedication of our global network of volunteer computers.