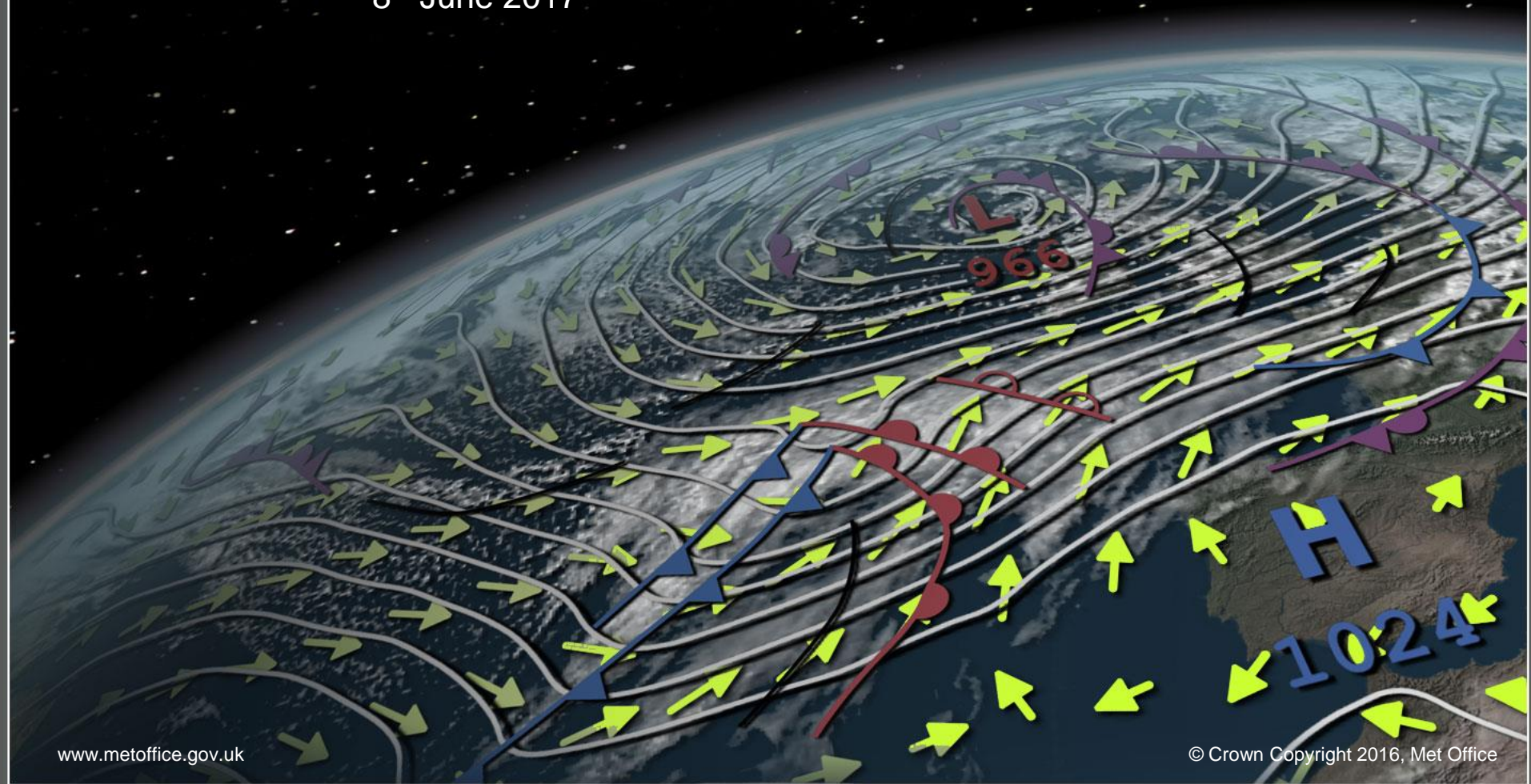




Climate science post CoP21

Stephen Belcher, Met Office Chief Scientist

8th June 2017



2015: A Landmark Year



Understanding and quantifying climate risk is at the core of all of these actions



SUSTAINABLE DEVELOPMENT GOALS



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Future drivers of climate science post COP21

How is the climate system changing: What is the current energy balance of the climate system

Mitigation strategies and the case for early action: What are the carbon budgets and emission pathways compatible with different levels of warming?

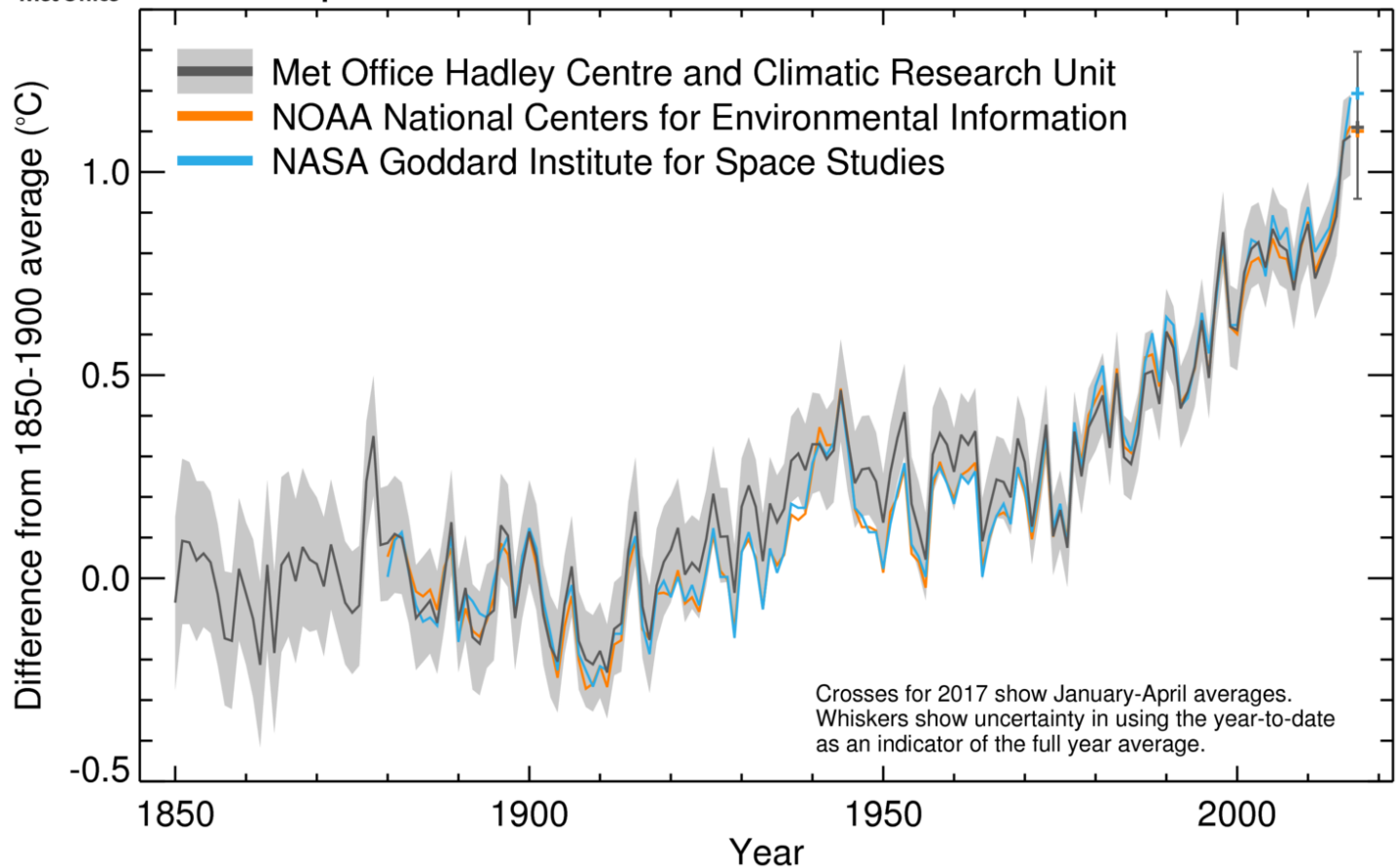
Weather and climate hazards: what are the present and future extreme weather and climate hazards?

Impacts and opportunities of mitigation and adaptation: What are the risks of impacts of the mitigation and adaptation actions?

Another record year for global temperatures?



Global average temperature anomaly
1850 - April 2017



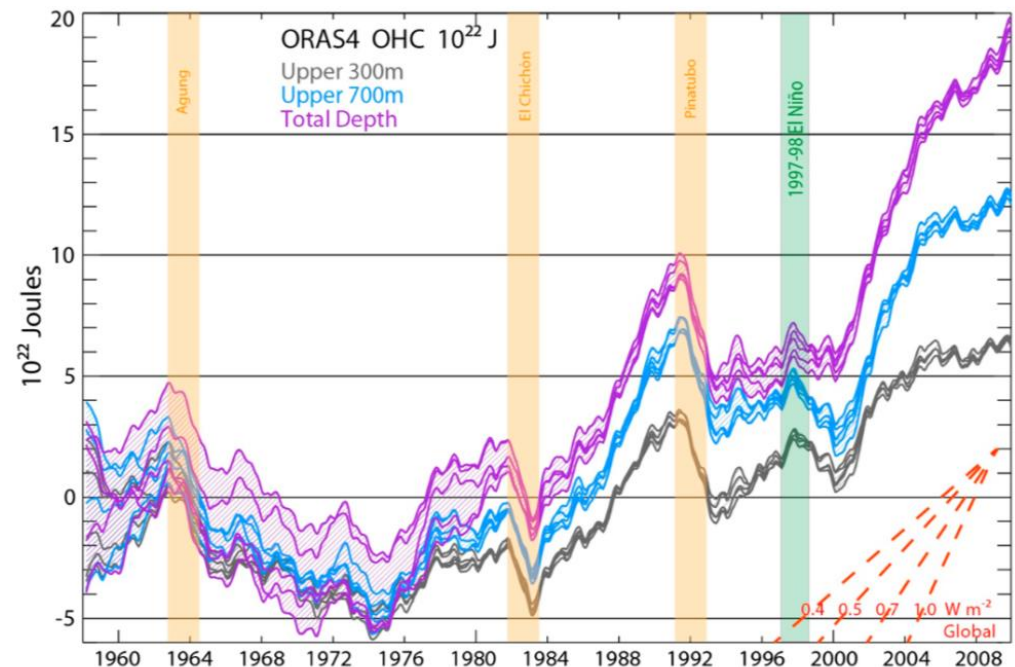
Global ocean heat content

Balmaseda, Trenberth and Kallen, 2013

‘Slowdown’ in upper ocean warming post 2004 not evident in deeper ocean

Change in vertical distribution of OHC is strongly linked to atmospheric circulation

BALMASEDA ET AL.: SIGNALS IN OCEAN HEAT CONTENT



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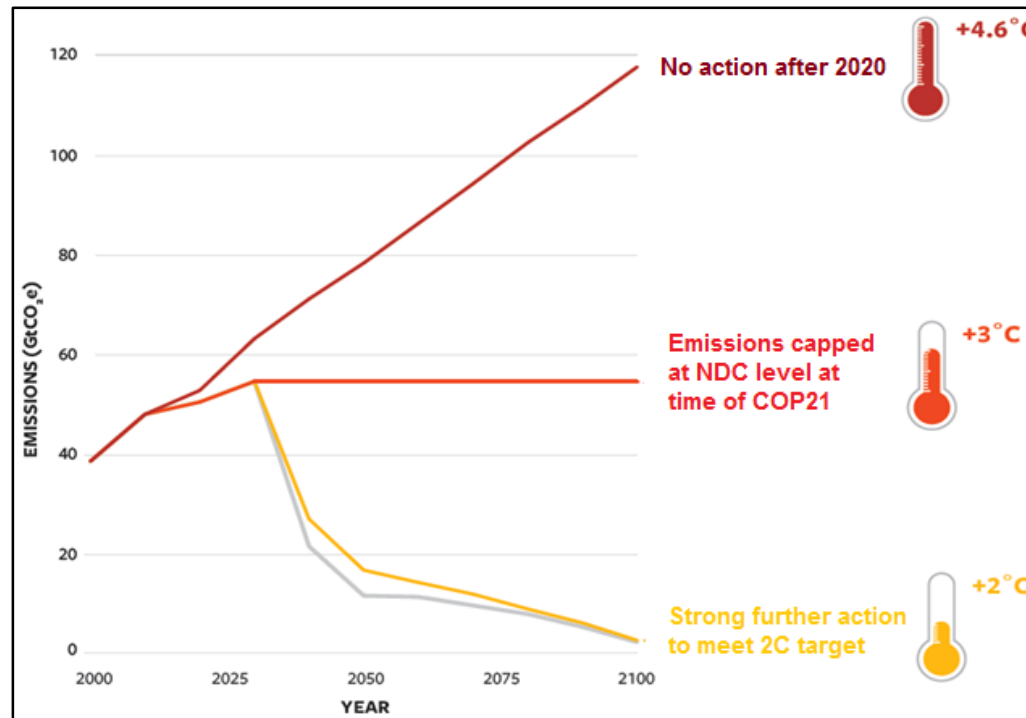
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Can we achieve a 1.5°C target?



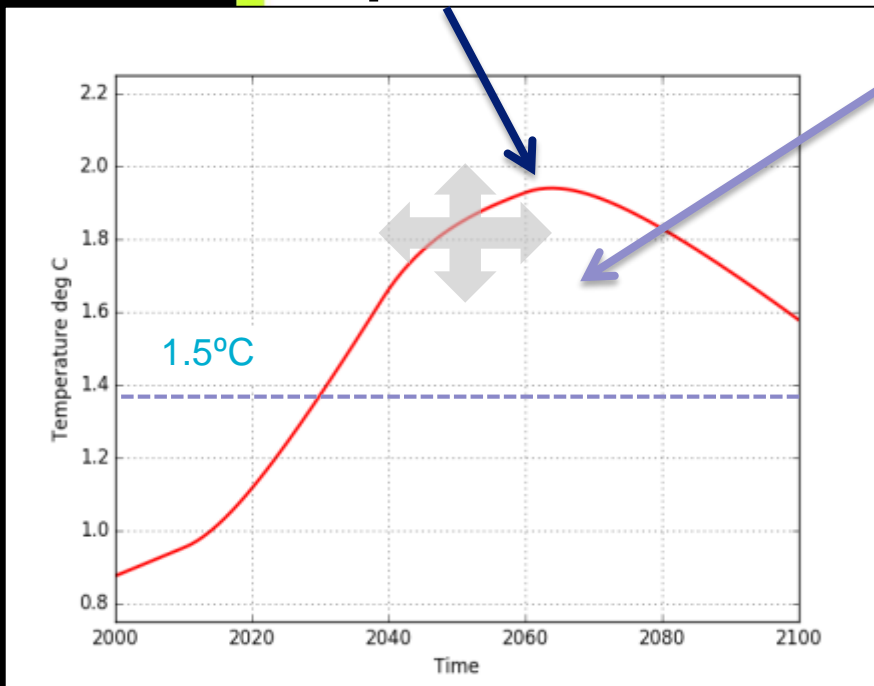
AVOID2
Can we avoid dangerous climate change?

- Need for further emissions reductions in order to avoid dangerous climate change.
- Recent research has shown it is possible to reduce emissions more rapidly after 2030 which limits warming to below 2°C (shown by grey line)

Uncertainties: Carbon budgets and overshoots

1. When will global temperature rise peak?

2. What will be the impacts during any overshoot?



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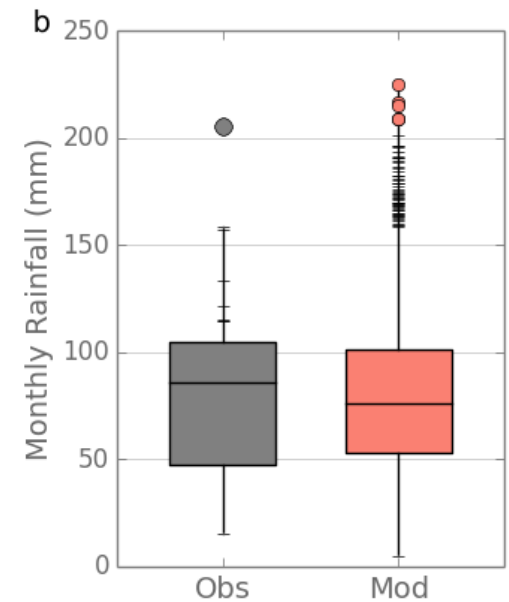
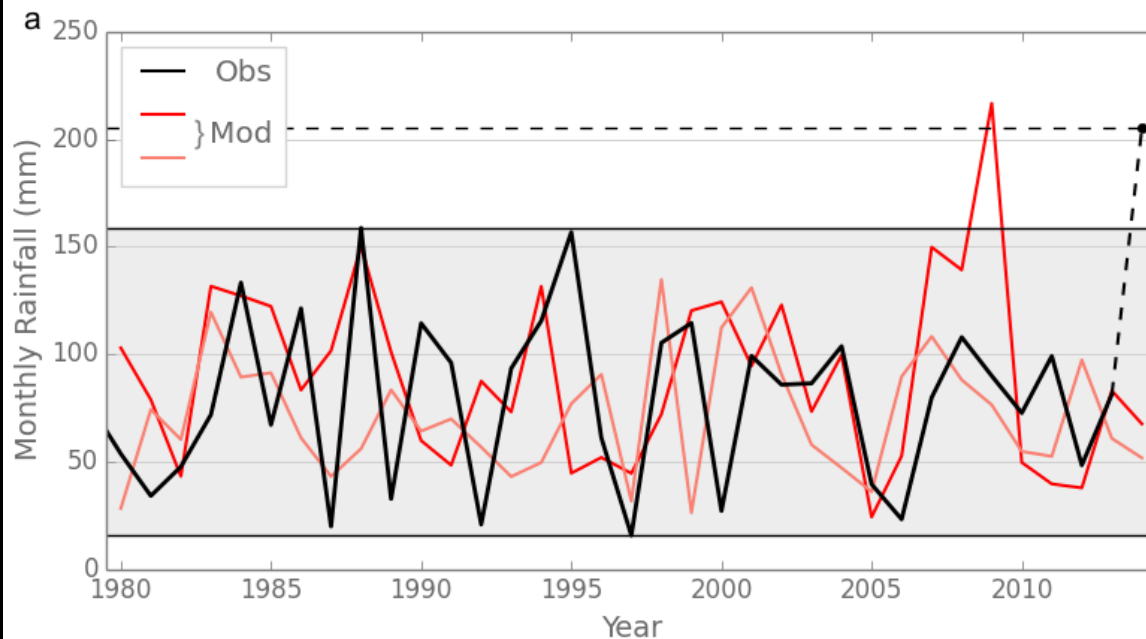
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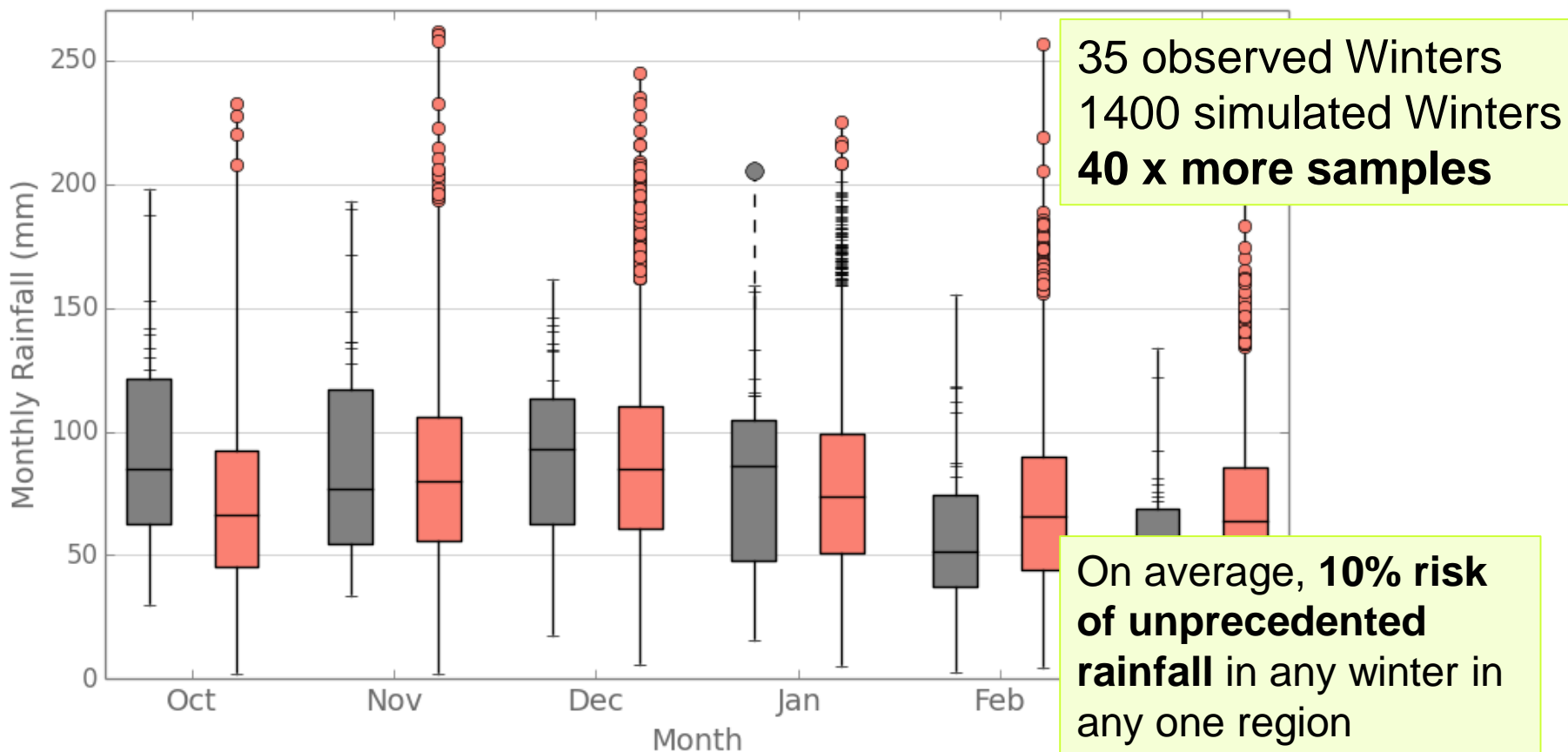
Recent high UK rainfall

January 2014, S.E. England

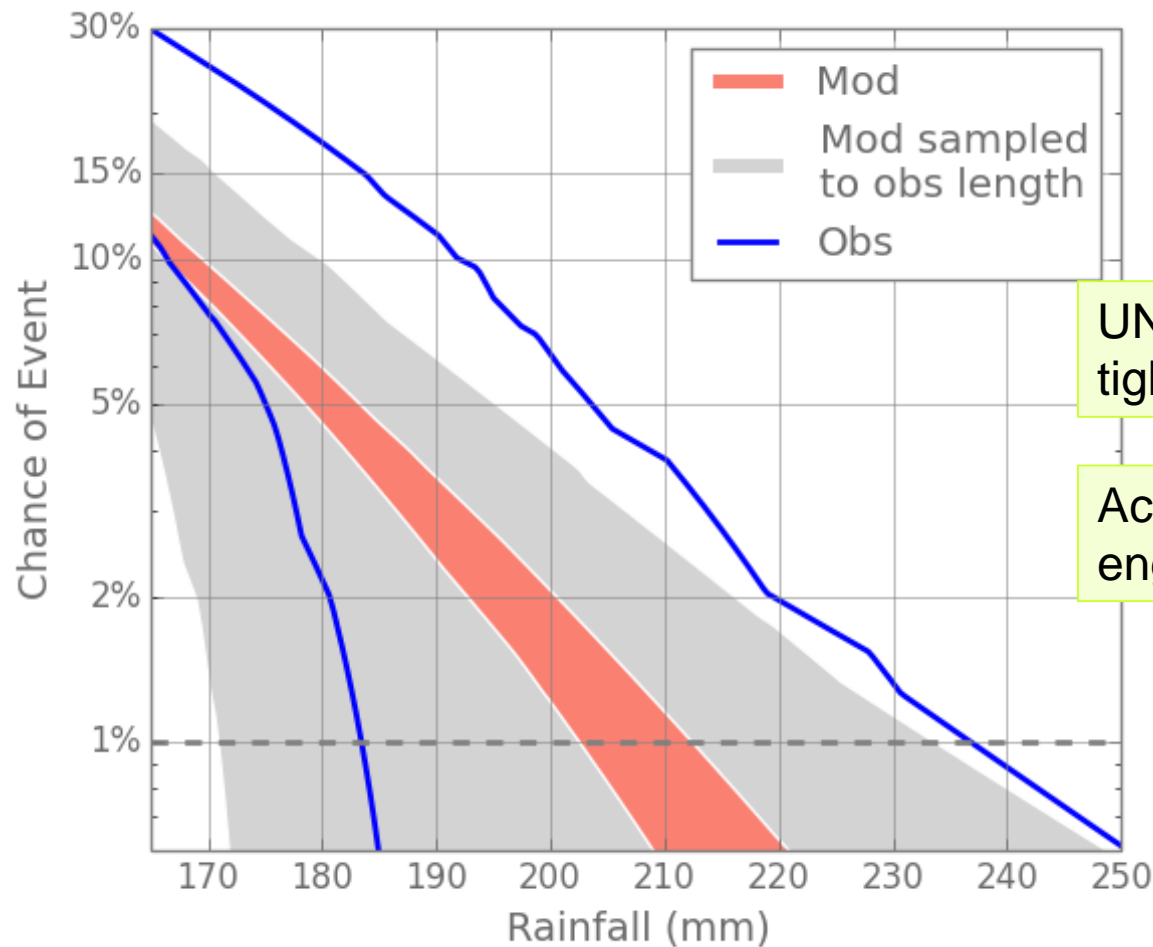


Unseen events current climate

South east England monthly rainfall totals



Risk of an unprecedented month of rainfall occurring during a given winter

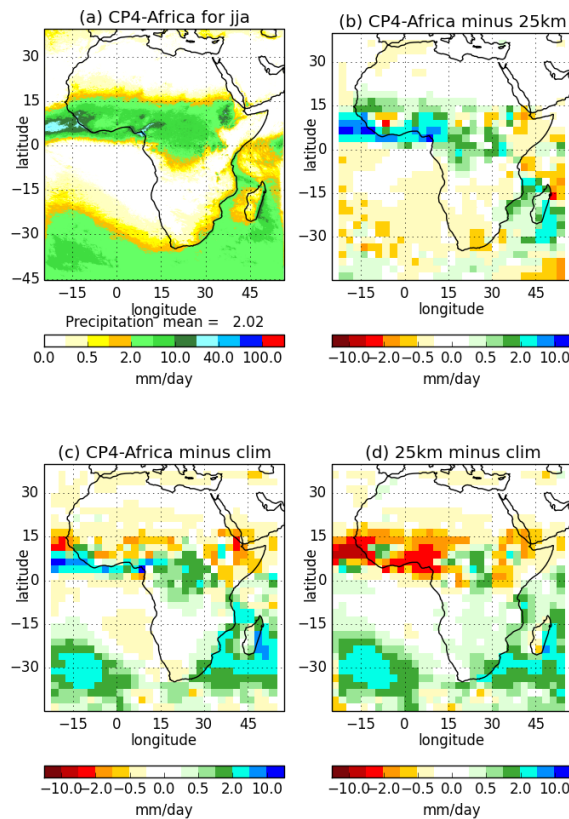


UNSEEN provides tighter confidence

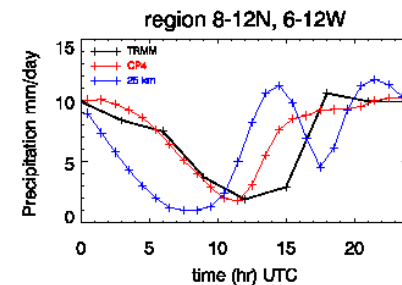
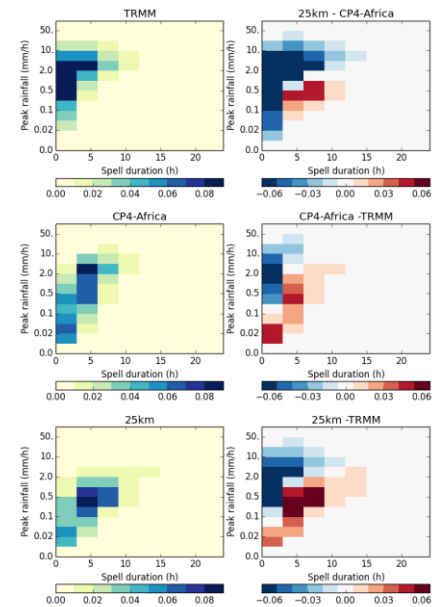
Actual rain amounts for engineering practice

CP4-Africa: Progress and results

JJA Precipitation



Spatio-temporal characteristics of rainfall



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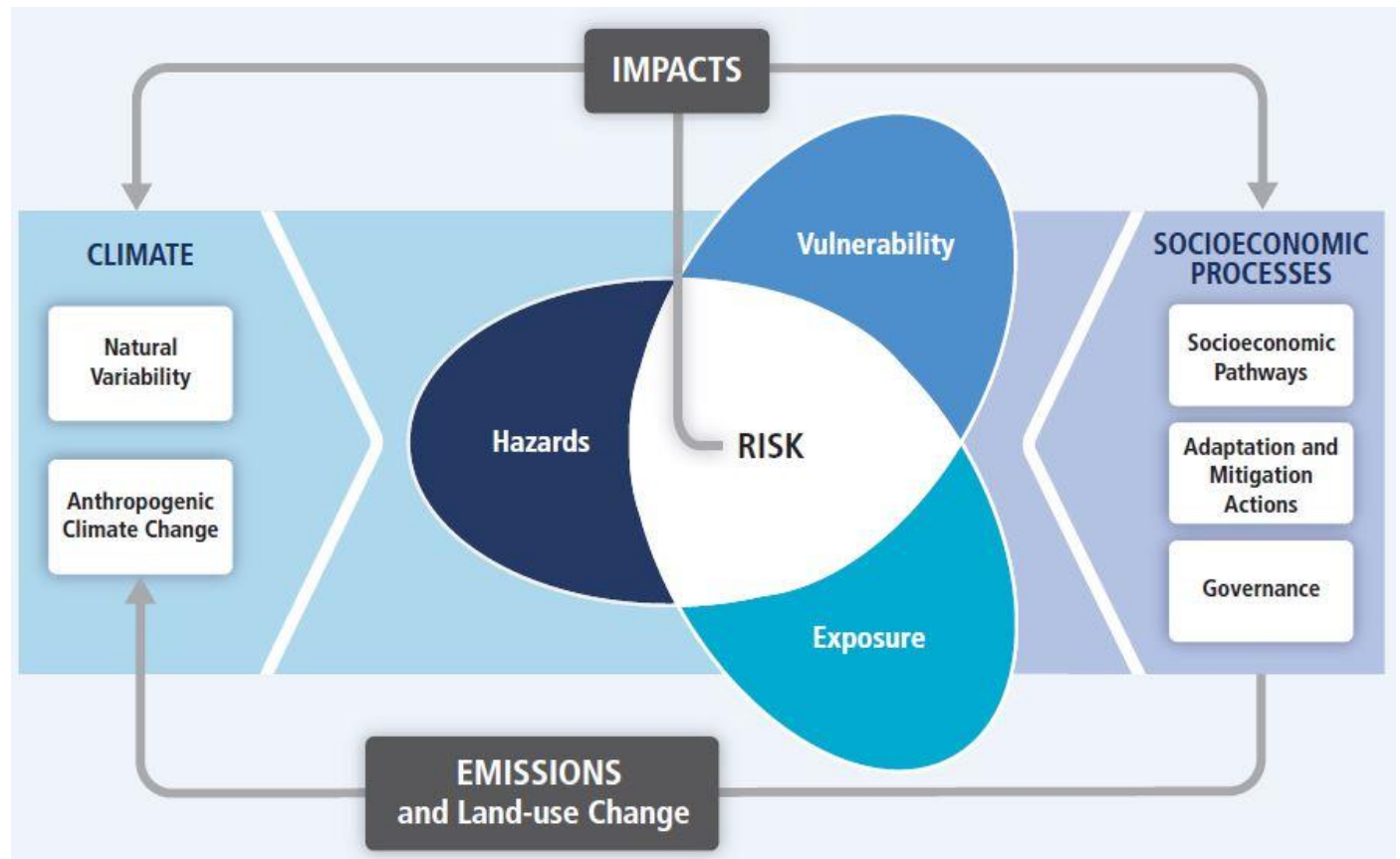
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Risk assessment framework



Informing on climate risk: Building resilience

Maize production is concentrated in the USA and China



What is the risk of multi breadbasket failures?

Estimating the probability of severe maize production shocks in the present day climate due to water stress

Some retirement problems...

- A theory for the climate sensitivity
- A theory of the North Atlantic storm track

