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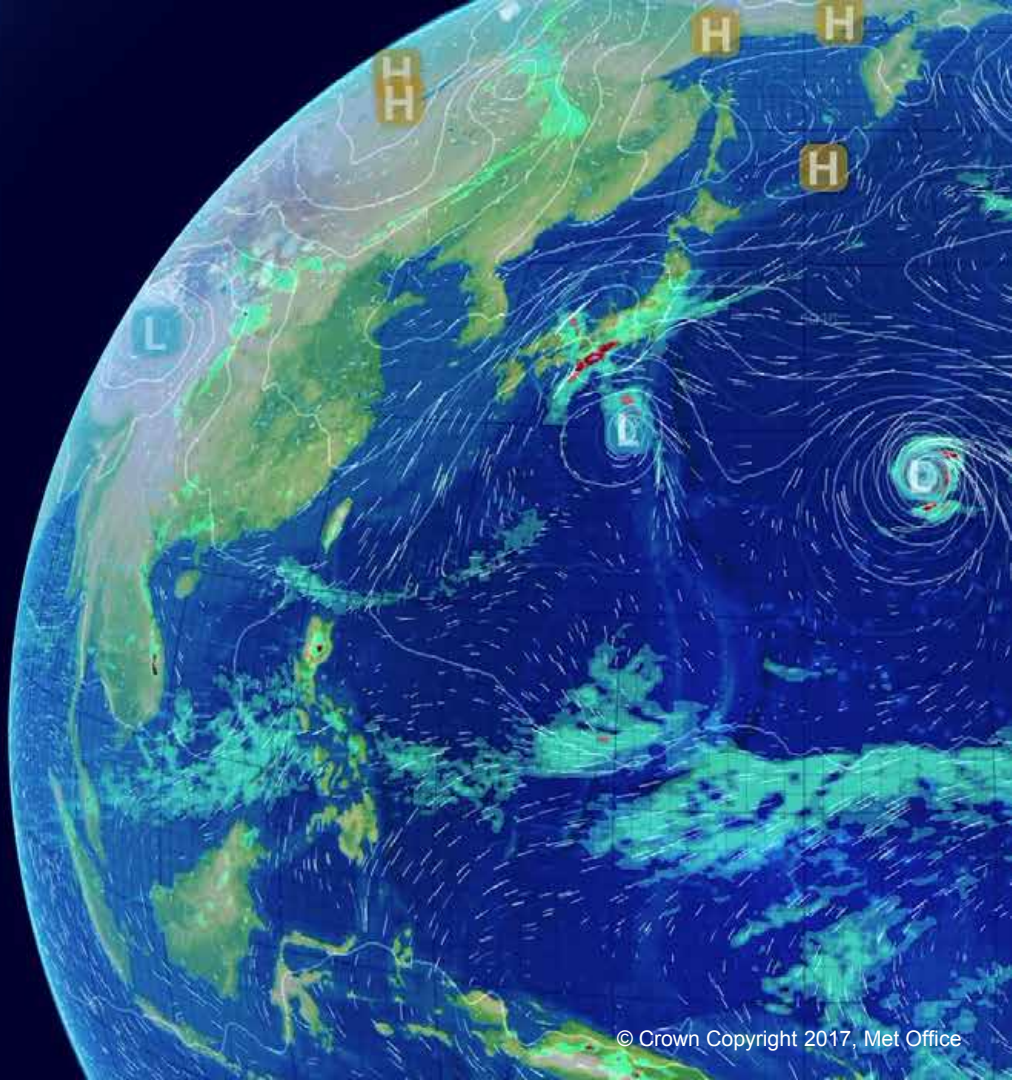
The Impact of Climate Change

Prof. Peter Stott,

Met Office Hadley Centre for Climate Science and Services

Professor of Detection and Attribution, University of Exeter



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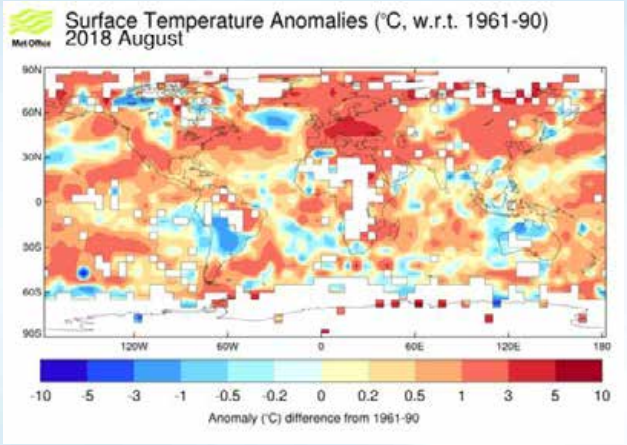
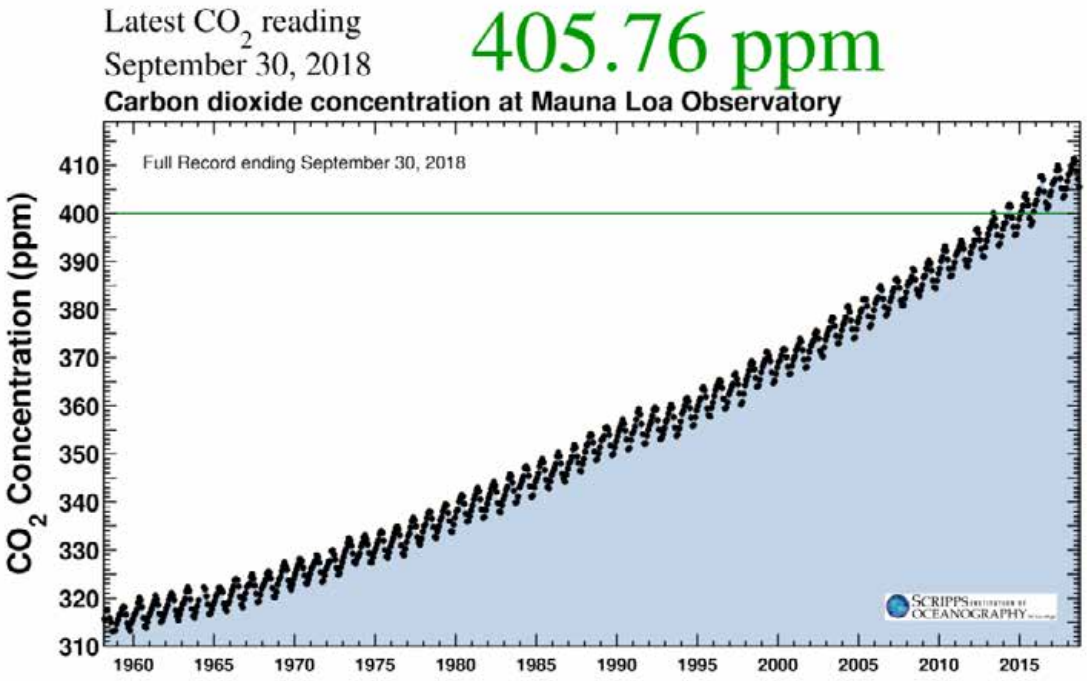
What is the link between recent extreme weather events and human-induced climate change or natural climate variability?



Summer, 2018

Do we need to adapt to a greater or lesser frequency of such events in future?

How can we avoid the worst effects of climate change?



Source: https://scripps.ucsd.edu/programs/keelingcurve/

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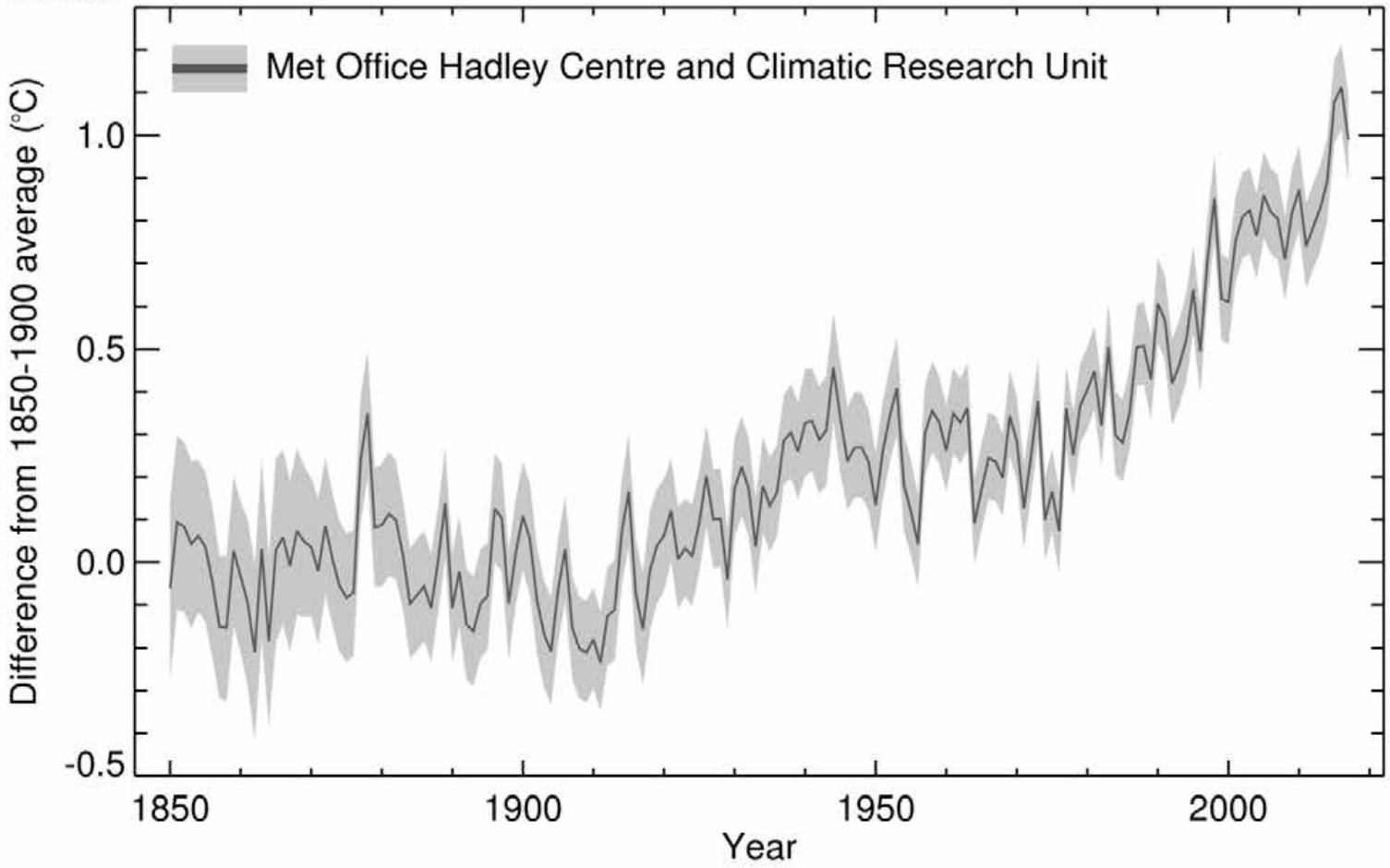
Global average temperature anomaly 1850 - 2017



Observed decadal mean warming

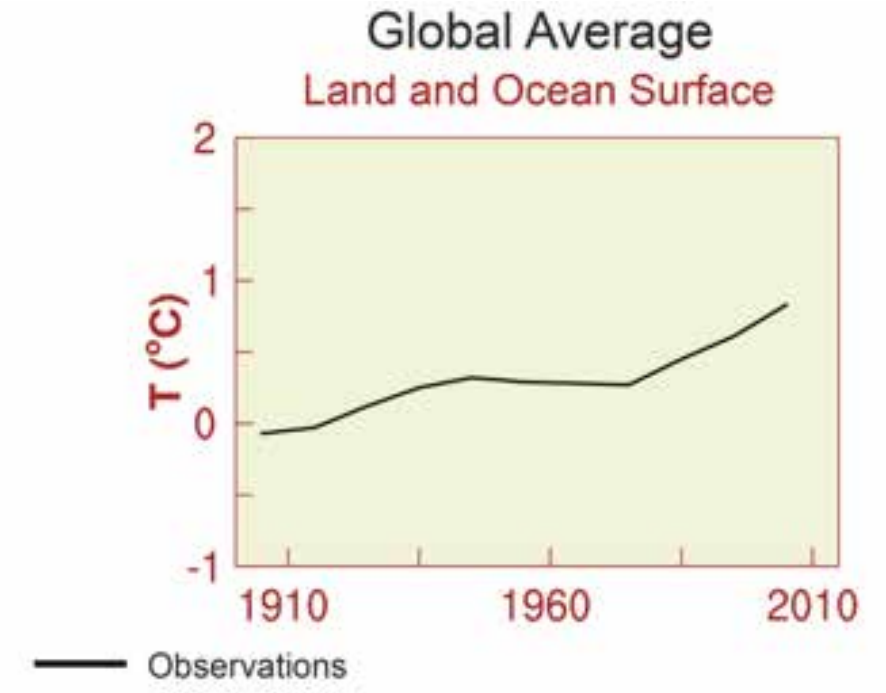


Fig SPM.5

IPCC AR5 Working Group I
Climate Change 2013: The Physical Science Basis

Observed warming inconsistent with that expected from natural factors

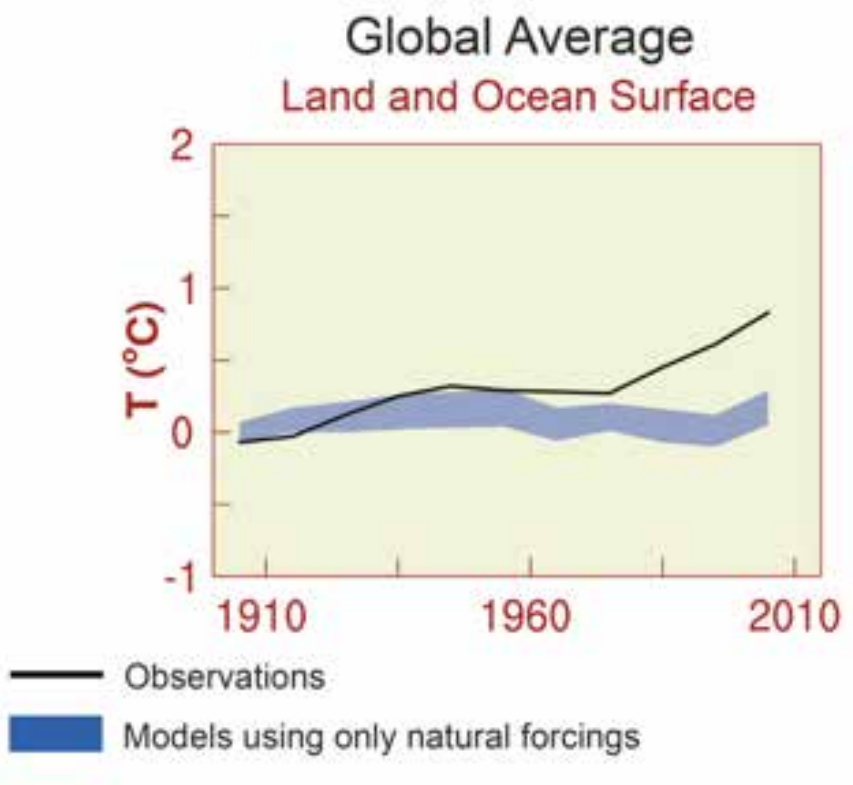


Fig SPM.5

IPCC AR5 Working Group I
Climate Change 2013: The Physical Scienc

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ERNMENTAL PANEL ON climate change

Observed warming consistent with simulations that include anthropogenic factors

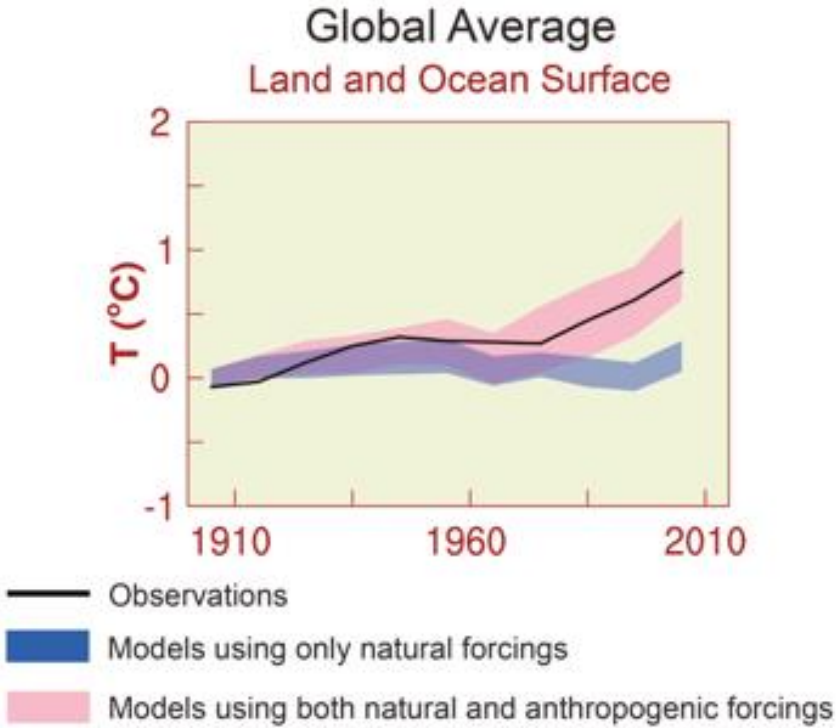


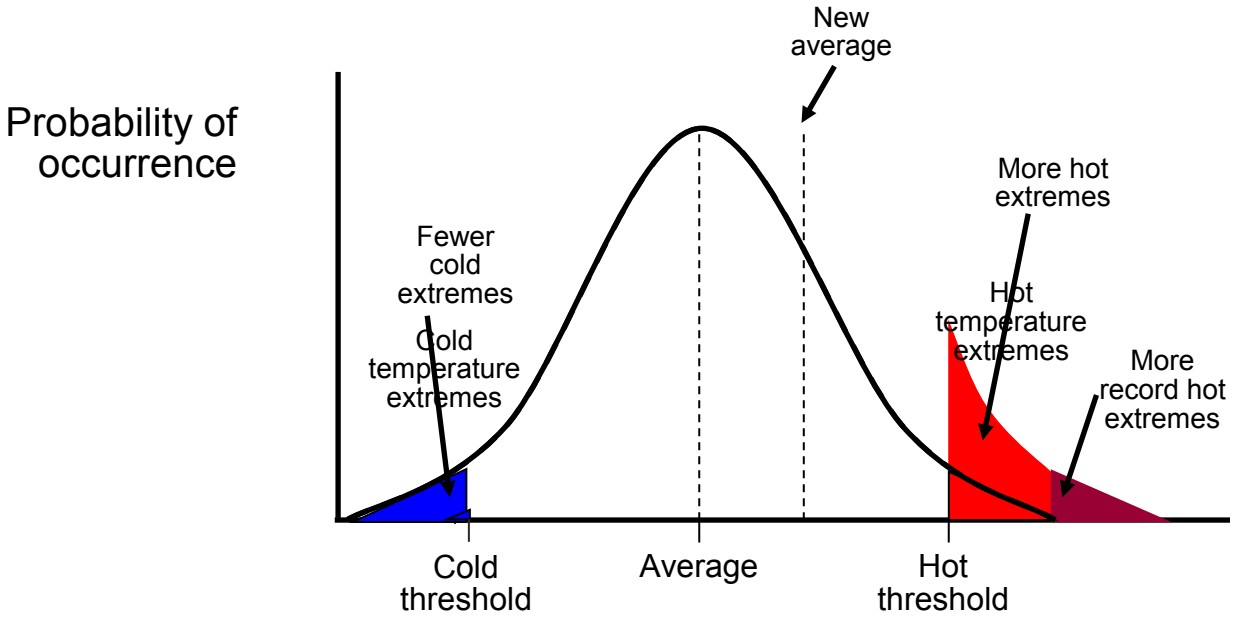
Fig SPM.5

IPCC AR5 Working Group I
Climate Change 2013: The Physical Science Basis

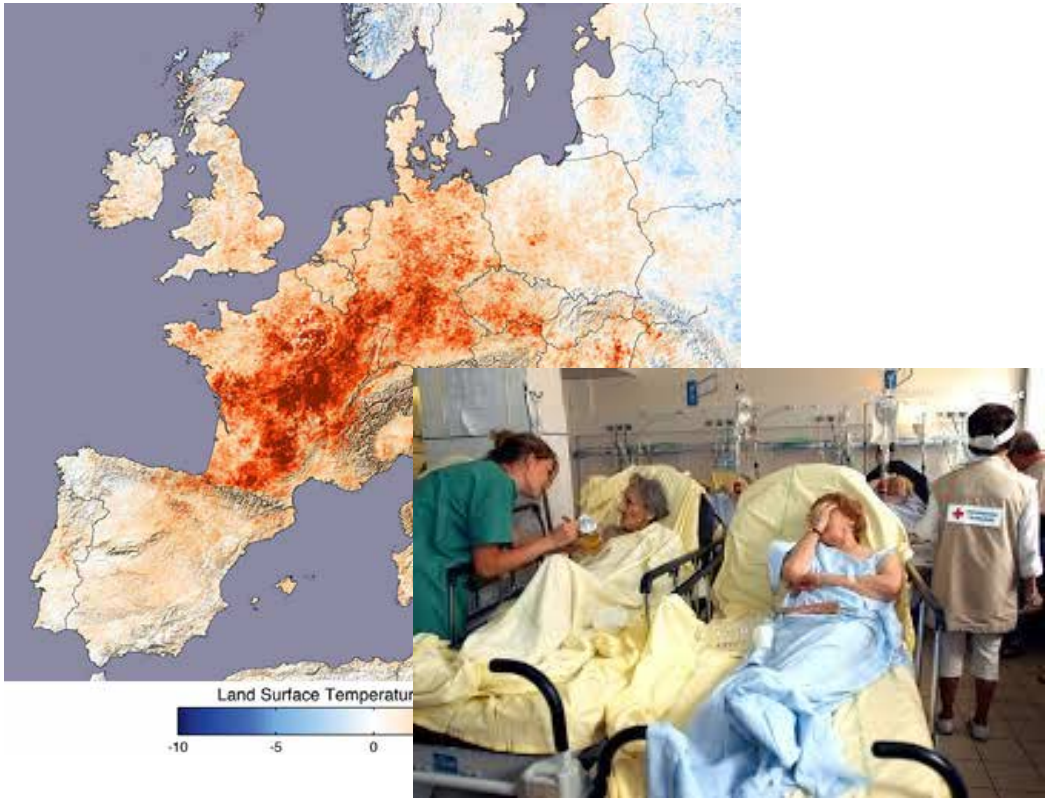
“Human influence on the climate system is clear” IPCC Fifth Assessment Report

Change in Extremes in a warming climate

- Temperatures with climate change



2003 European heatwave



“ Human influence has very likely at least doubled the risk of European summer temperatures as hot as 2003”

Stott et al, Nature, 2004

“Events that would occur twice a century in the early 2000s are now expected to occur twice a decade”

Christidis et al, Nature Climate Change, 2015

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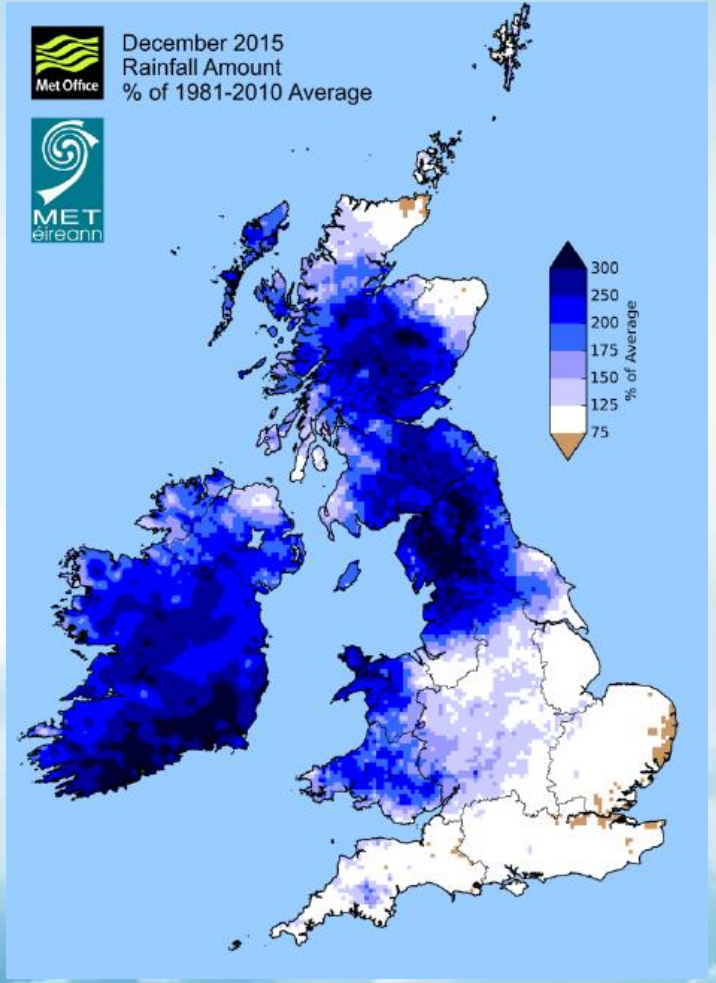
Storm Desmond



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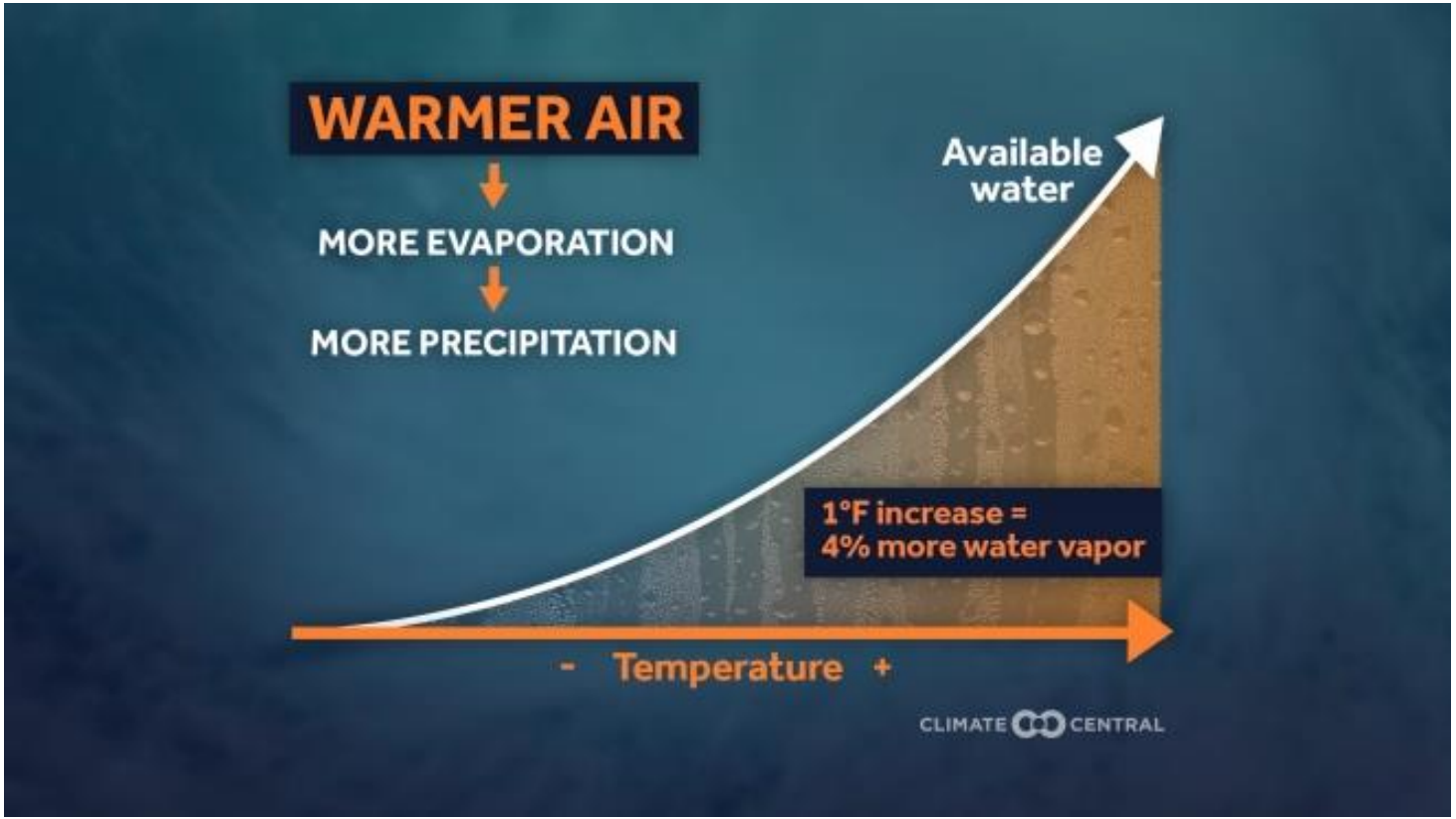

Storm Desmond – human fingerprint is evident

Environmental Research Letters

LETTER

Super Storm Desmond: a process-based assessment

T Matthews[1,5], C Murphy[2], G McCarthy[3], C Broderick[2] and R L Wilby[4]

[1] School of Natural Sciences and Psychology, Liverpool John Moores University, Liverpool L3 3AF, United Kingdom
[2] Irish Climate Analysis and Research Units, Department of Geography , Maynooth University, Kildare, Ireland
[3] National Oceanography Centre, Southampton, SO14 3ZH, United Kingdom
[4] Department of Geography, Loughborough University, Loughborough, LE11 3TU, United Kingdom
[5] Author to whom any correspondence should be addressed.

E-mail: climatom86@gmail.com

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Supplementary material for this article is available online

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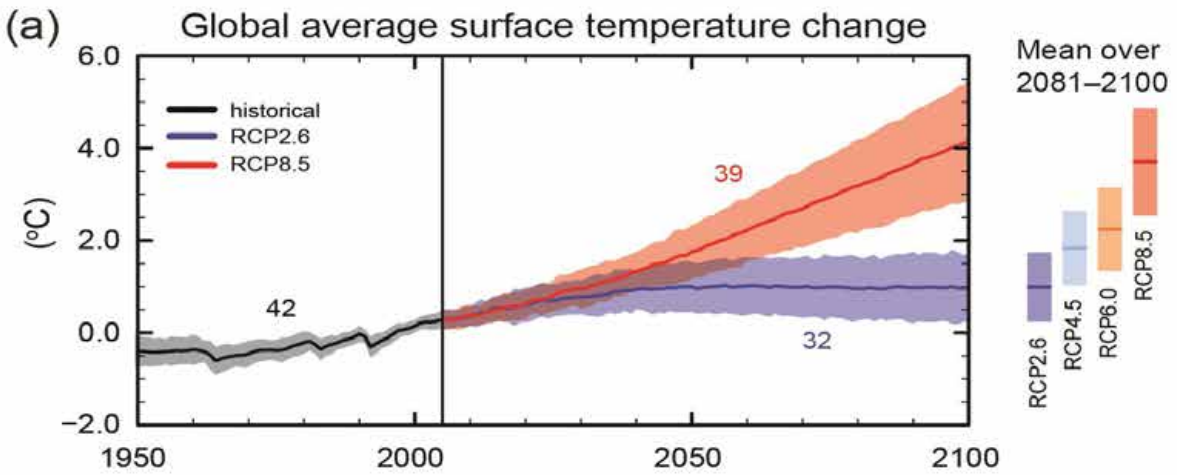
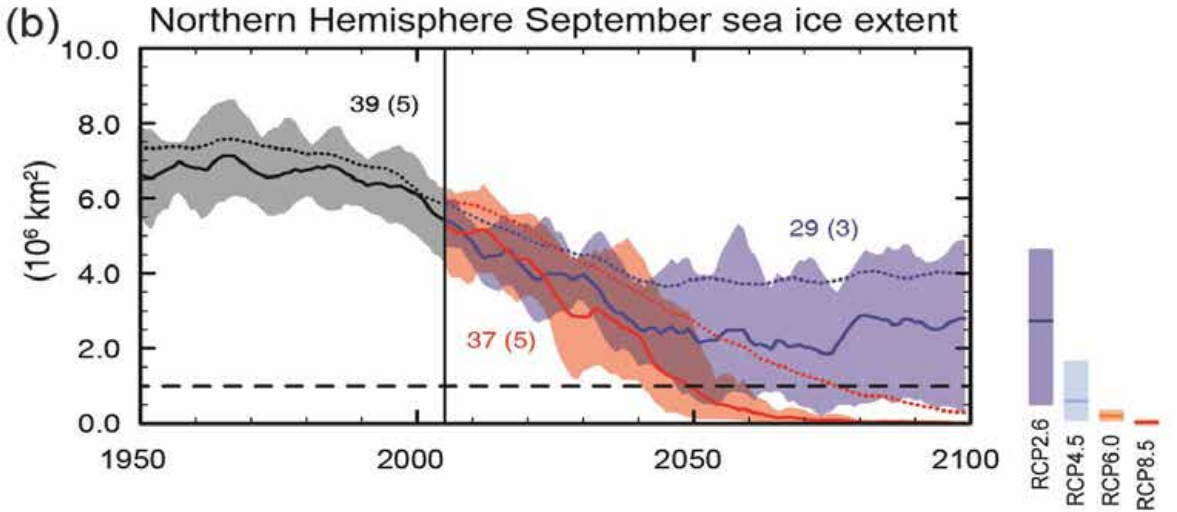
Abstract

'Super' Storm Desmond broke meteorological and hydrological records during a record warm year in the British–Irish Isles (BI). The severity of the storm may be a harbinger of expected changes to regional hydroclimate as global temperatures continue to rise. Here, we adopt a process-based approach to investigate the potency of Desmond, and explore the extent to which climate change may have been a contributory factor. Through an Eulerian assessment of water vapour flux we determine that Desmond was accompanied by an atmospheric river (AR) of severity unprecedented since at least 1979, on account of both high atmospheric humidity and high wind speeds. Lagrangian air-parcel tracking and moisture attribution techniques show that long-term warming of North Atlantic sea surface temperatures has significantly increased the chance of such high humidity in ARs in the vicinity of the BI. We conclude that, given exactly the same dynamical conditions associated with Desmond, the likelihood of such an intense AR has already increased by 25% due to long-term climate change. However, our analysis represents a first-order assessment, and further research is needed into the controls influencing AR dynamics.





"Continued emissions of greenhouse gases will cause further warming and changes in all components of the climate system. Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions." IPCC AR5

How frequent may extreme Irish weather events become in future?

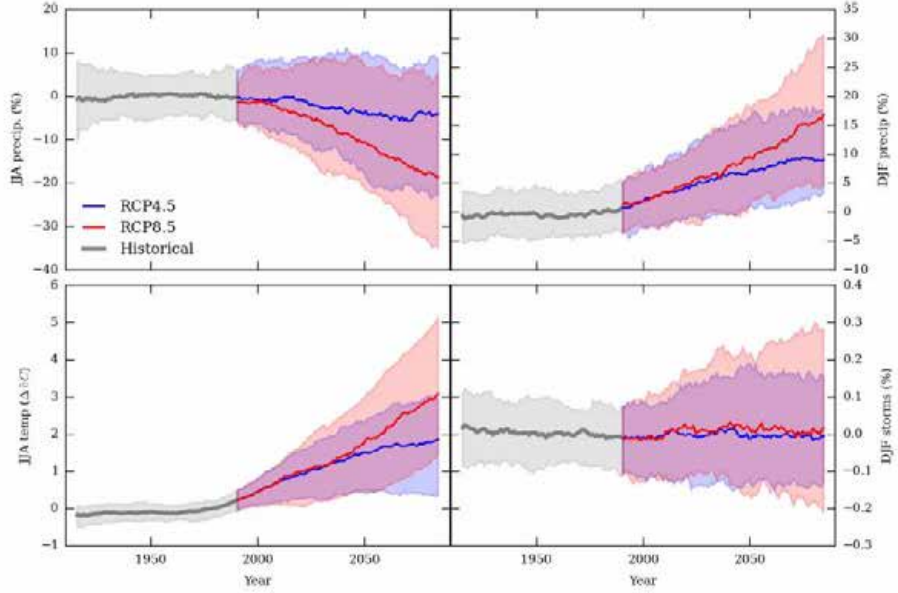
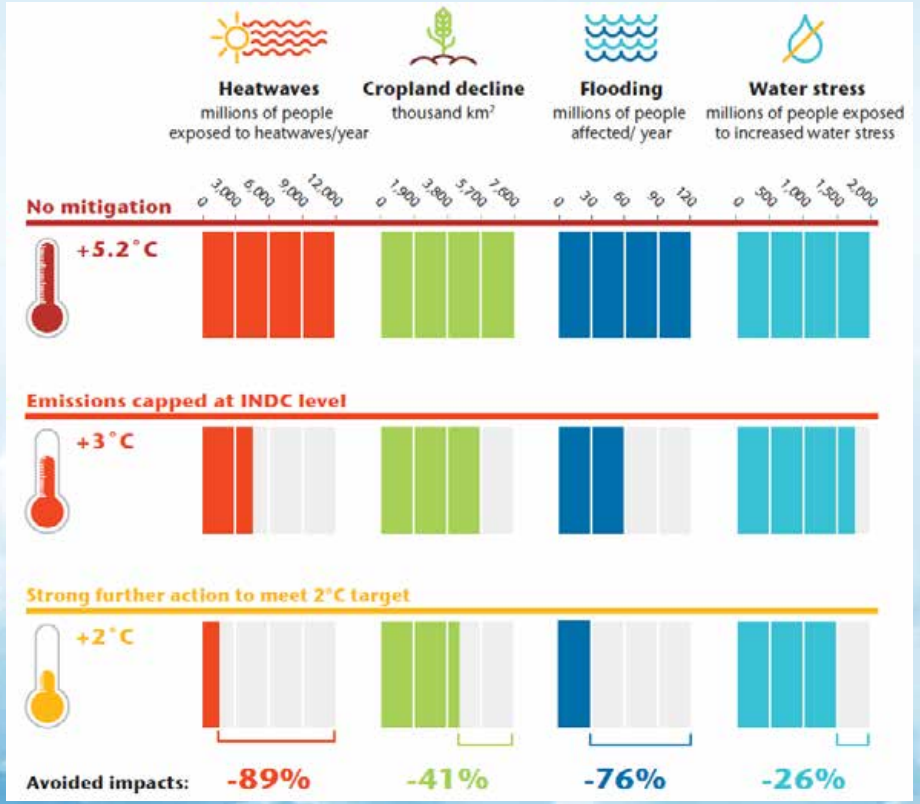


Fig. 10. Centred 30-year running means of the respective variables, expressed as anomalies from 1901–2005. See Fig. 8 caption for further details.

- In a business as usual world..
- 1 in 8 years as dry as 1995
- 1 in 8 years as wet as 1994
- 1 in 7 years ***as cool as*** 1995
- BUT these graphs also allow us to consider vulnerability to future change

Avoiding the impacts of dangerous climate change

With sustained effort up to and beyond 2030, the pledges made in the Paris Agreement will limit the severity of key impacts on people and society



Summary

- The climate is warming.
- With increasing warming comes an increasing risk of heatwaves, heavy rainfall and other impacts of climate change.
- Taking action to limit climate change will significantly reduce the severity of key impacts on people and society.