Is the UK ready for climate change?

Implications for the coast

Daniel Johns

Head of Adaptation

Committee on Climate Change

Coastal Futures 2014

22nd January

The Adaptation Sub-Committee

Statutory roles:

- **To provide expert advice** on climate threats and opportunities
- **To report on progress** towards adaptation
- **To advise Parliament** on whether enough is being done

Lord John Krebs (chair)

Sir Graham Wynne

Prof Sam Fankhauser

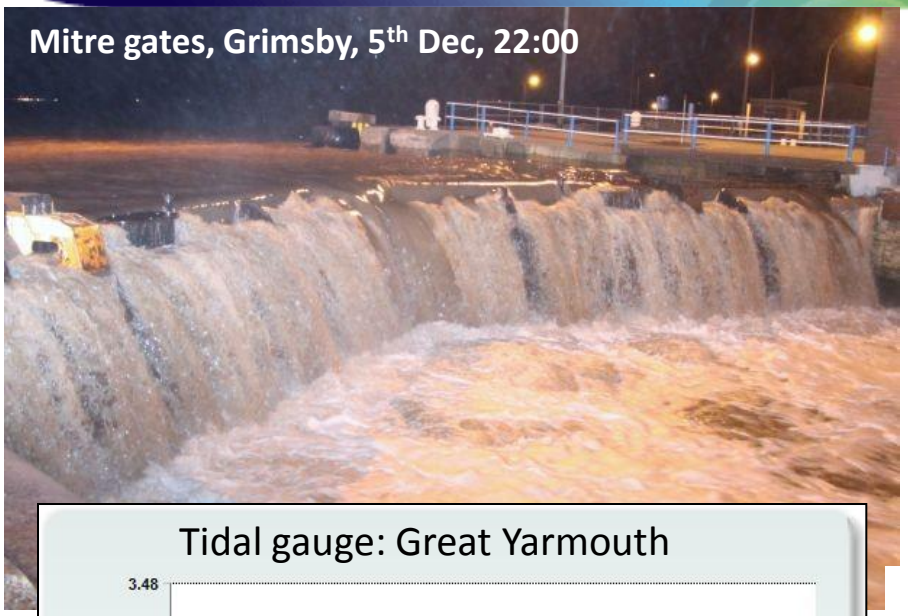
Prof Martin Parry

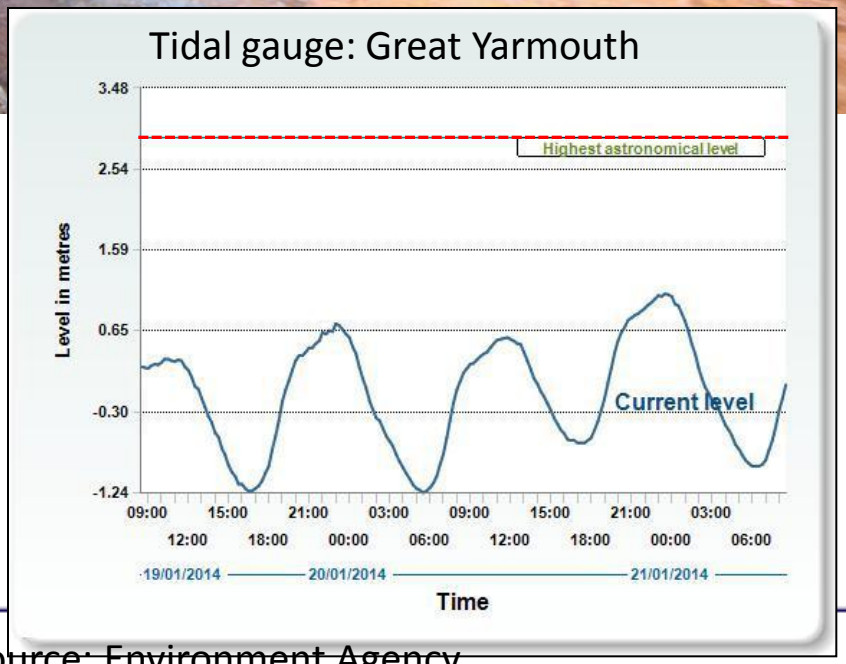
Prof Jim Hall

Prof Dame Anne Johnson

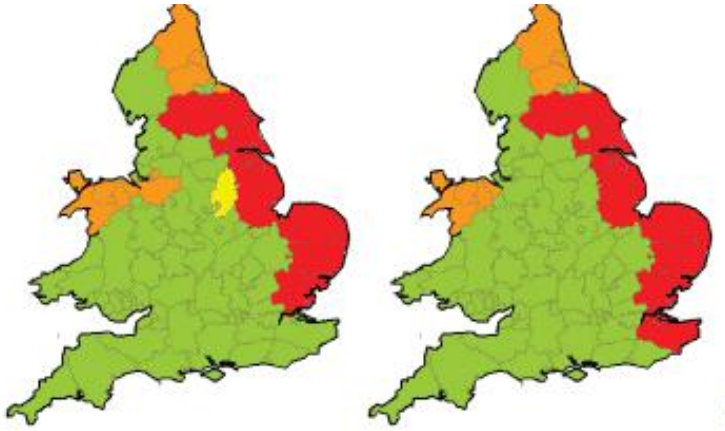

LONDON
UNITED
WE ARE IN DROUGHT
NONE OF US CAN MAKE IT RAIN - BUT WE CAN ALL USE LESS WATER
WISELY

The December tidal surge was in many places higher than in 1953





Flood Guidance Statement as at 21:30hrs, Dec 5th



21:30 - 23:59hrs

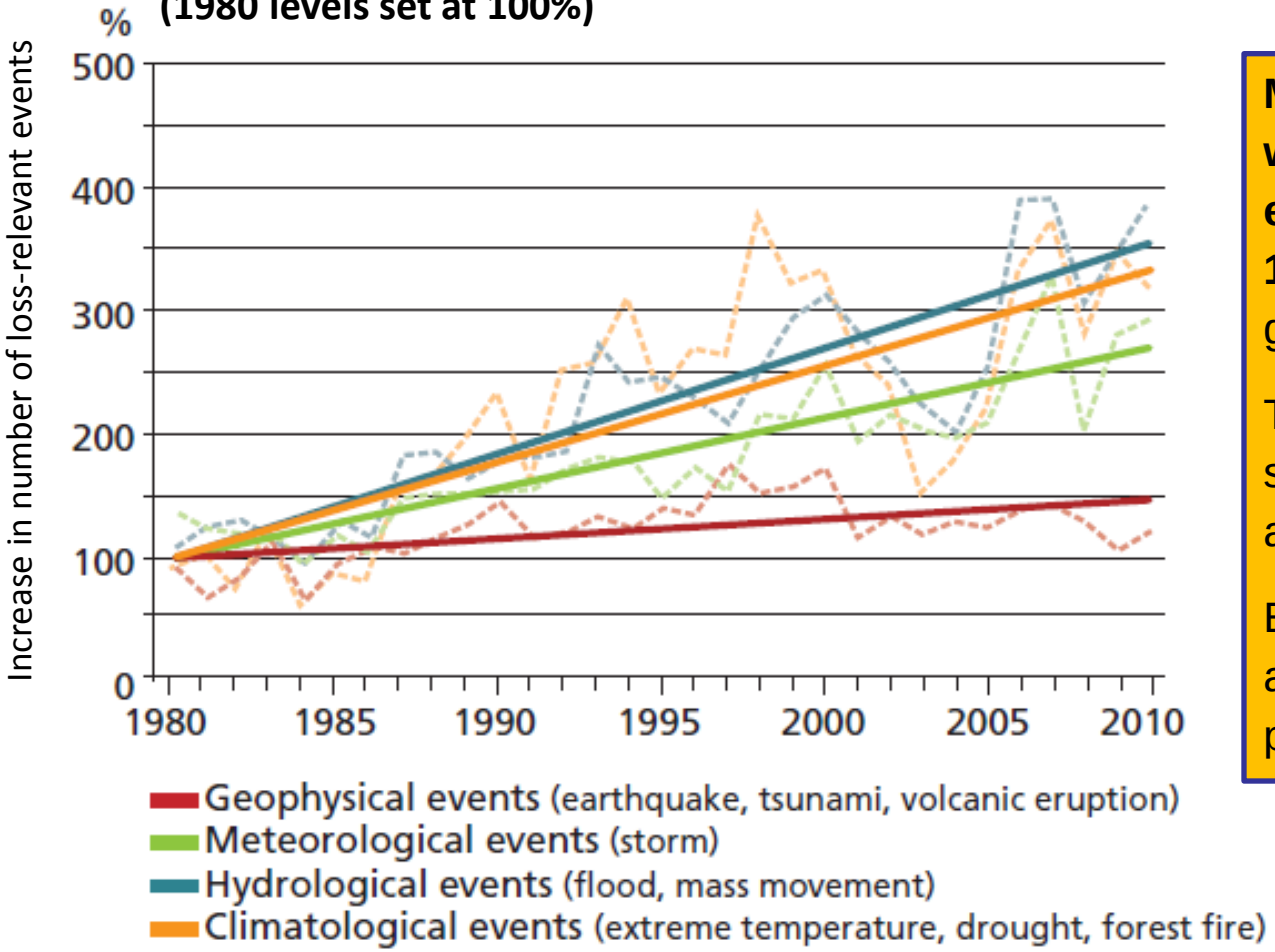
Thursday
05 December 2013

Friday
06 December 2013

Source: Environment Agency

Clear trends in weather-related extreme events over recent decades

Worldwide trends in different types of natural catastrophe (1980 levels set at 100%)



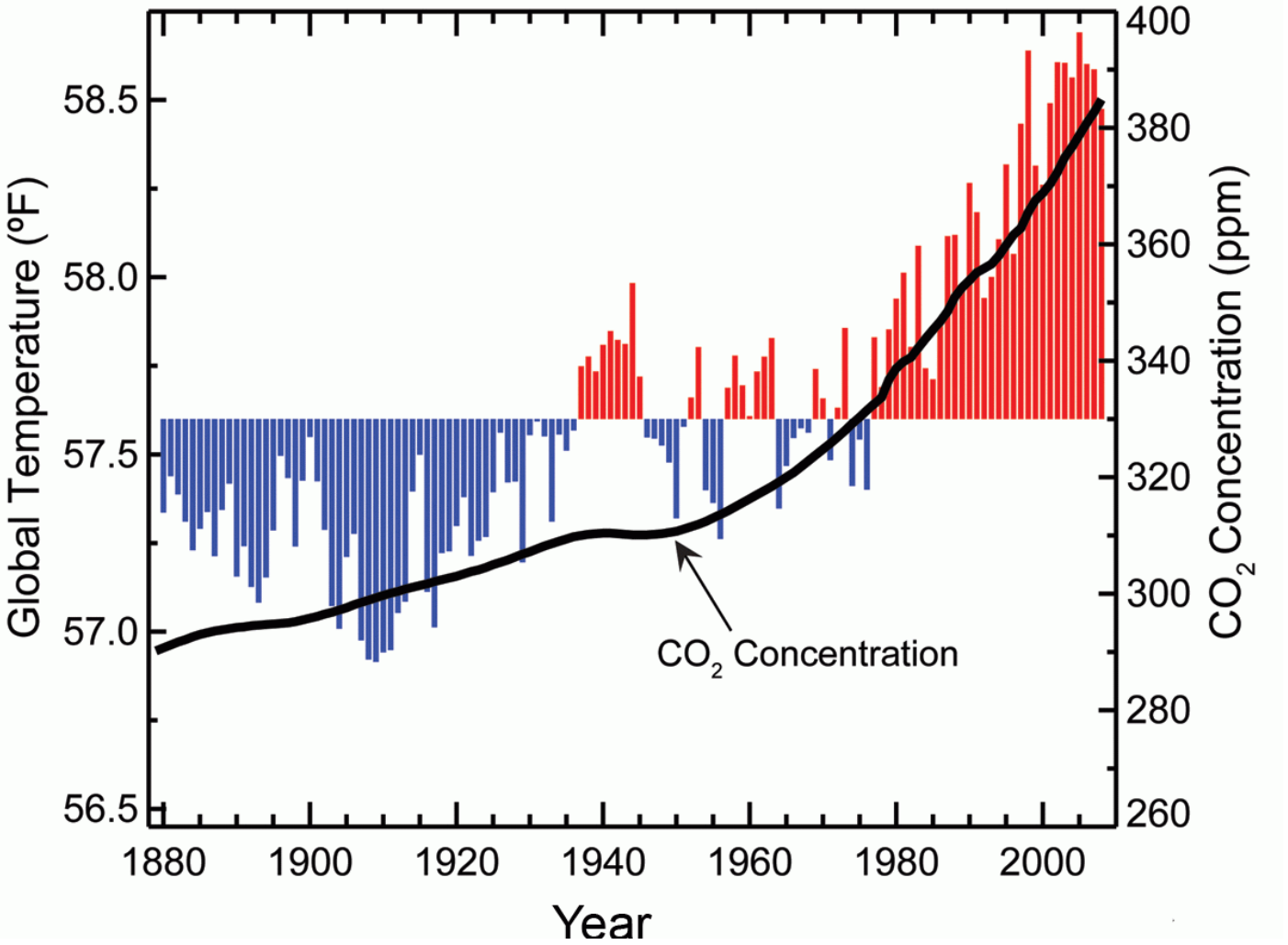
Marked increases in weather-related extreme events since 1980, faster rise than geophysical events.

Trends particularly strong in Asia, Australia and North America.

Europe has seen less of an increase than other parts of the globe.

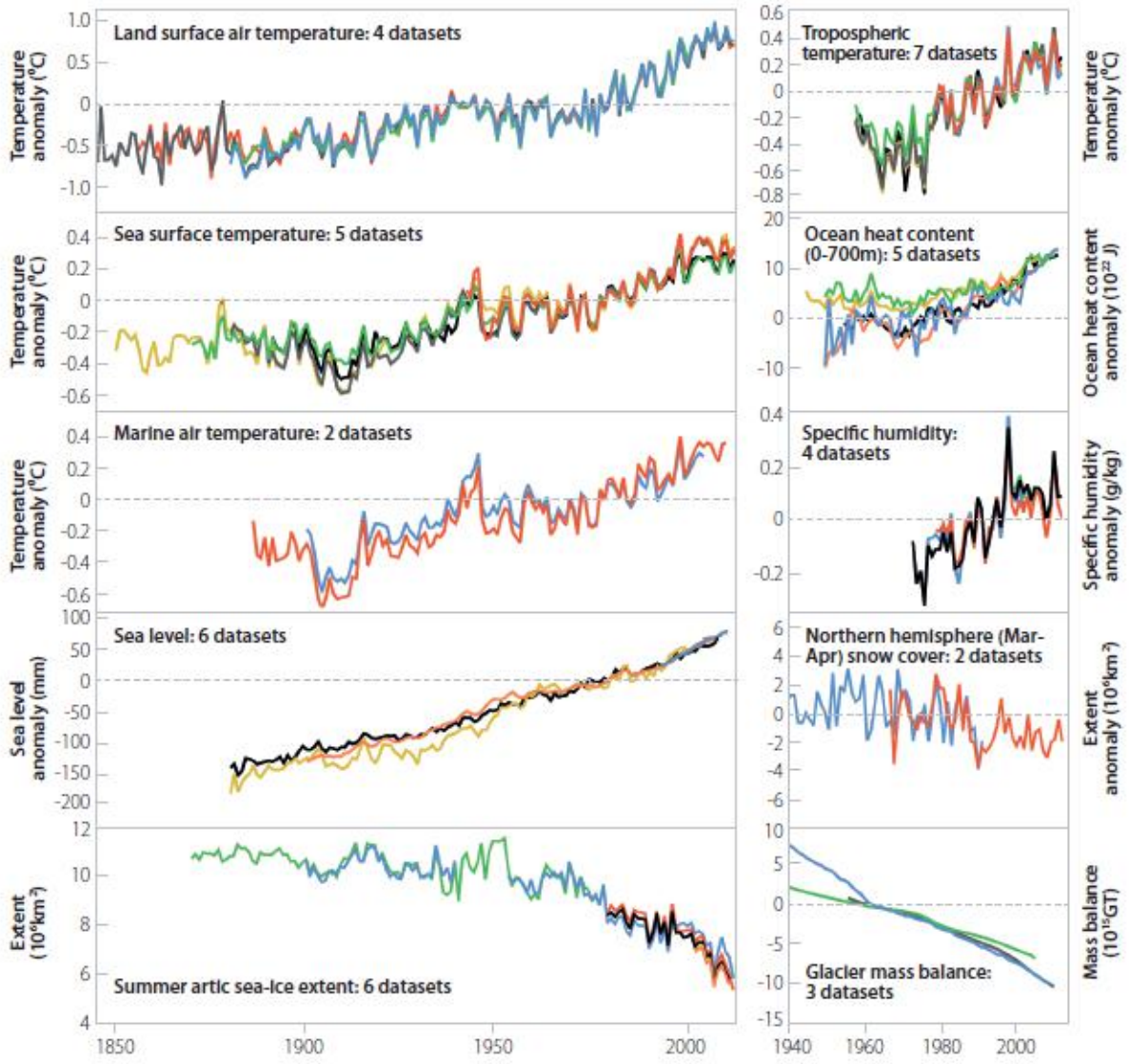
Source: European Academies Science Advisory Council (2013), using MunichRE NatCatSERVICE

Increasing CO2 in the atmosphere causes warming, the only remaining question is how much



Source: Global Climate Change Impacts in the United States, NOAA/NCDC

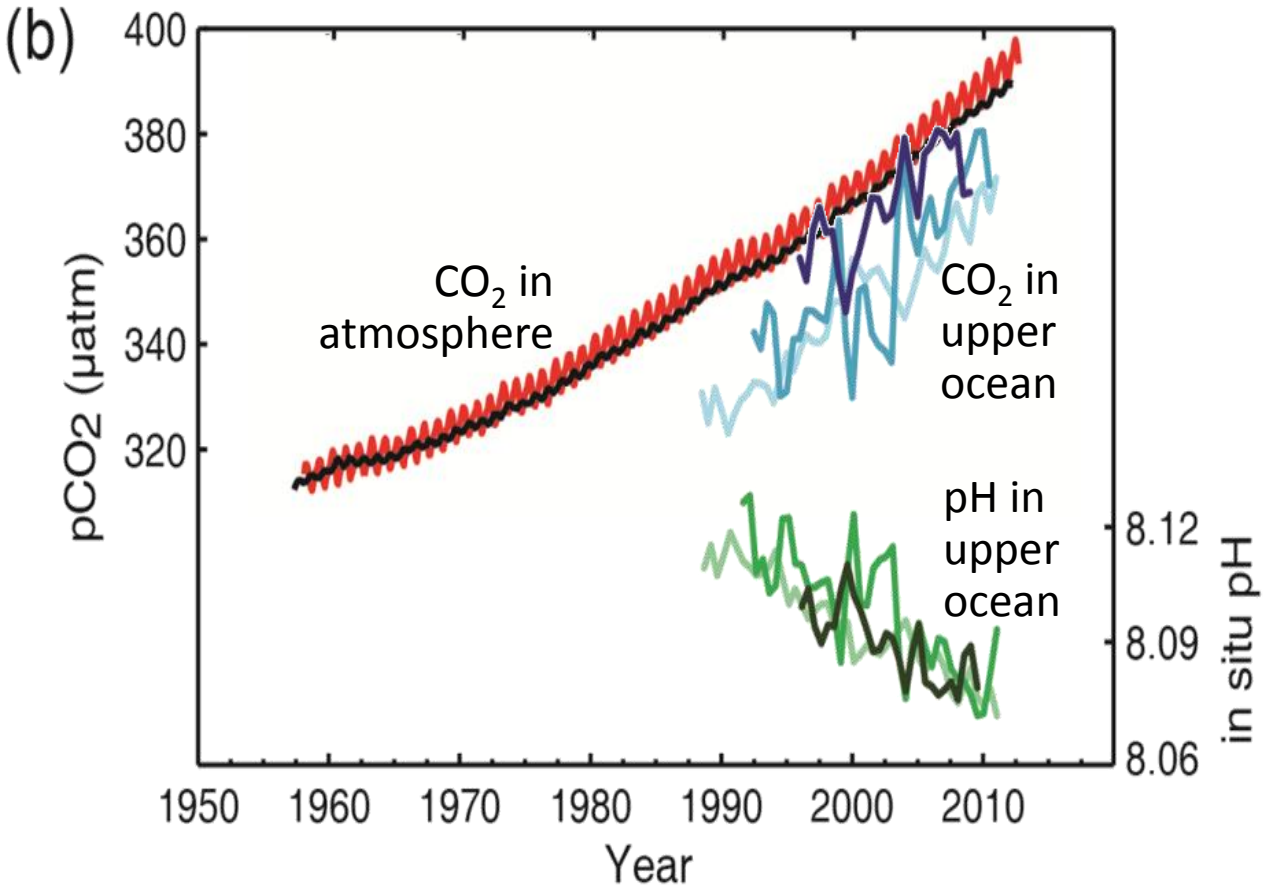
A range of indicators highlight the changes taking place



Each recent decade warmer than the last in terms of sea, surface and air temperature. **Sea level rising** by 3cm per recent decade, **glacier mass declining**, extent of summer **Arctic summer sea ice reducing,** reduced by half in last 60 years.

Source: CCC, adapted from IPCC 5th Assessment Report

Oceans are absorbing CO2 and becoming more acidic

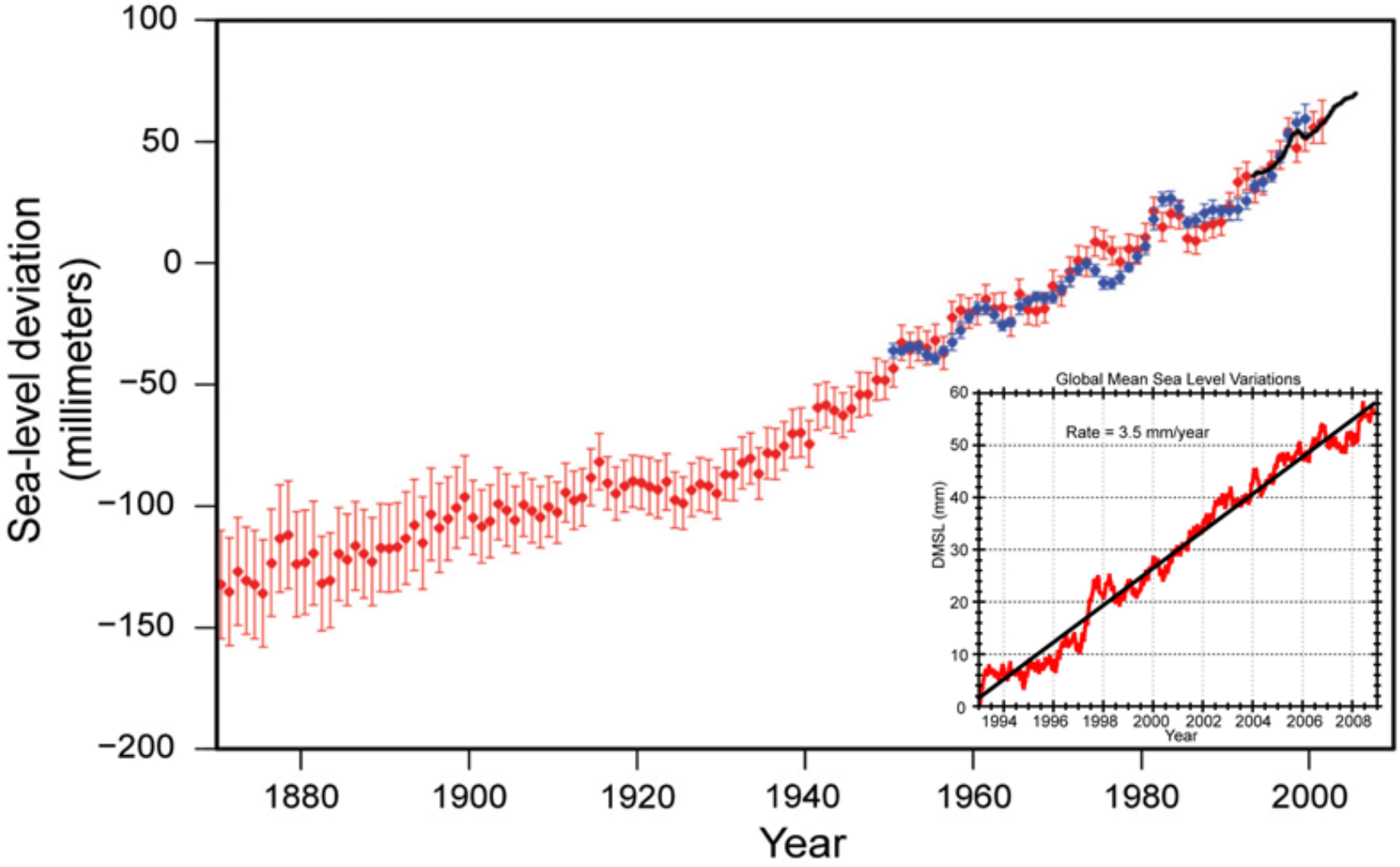


30-40% of CO2 emissions are absorbed by the oceans, rivers and lakes, decreasing pH levels

Measured decreases in near-surface ocean pH in the central Pacific (light green) and two Atlantic sites (green, dark green) compared to dissolved CO_2 at those sites (light blue, blue, dark blue) and atmospheric CO_2 at Mauna Loa, Hawaii (red) and the South Pole (black)

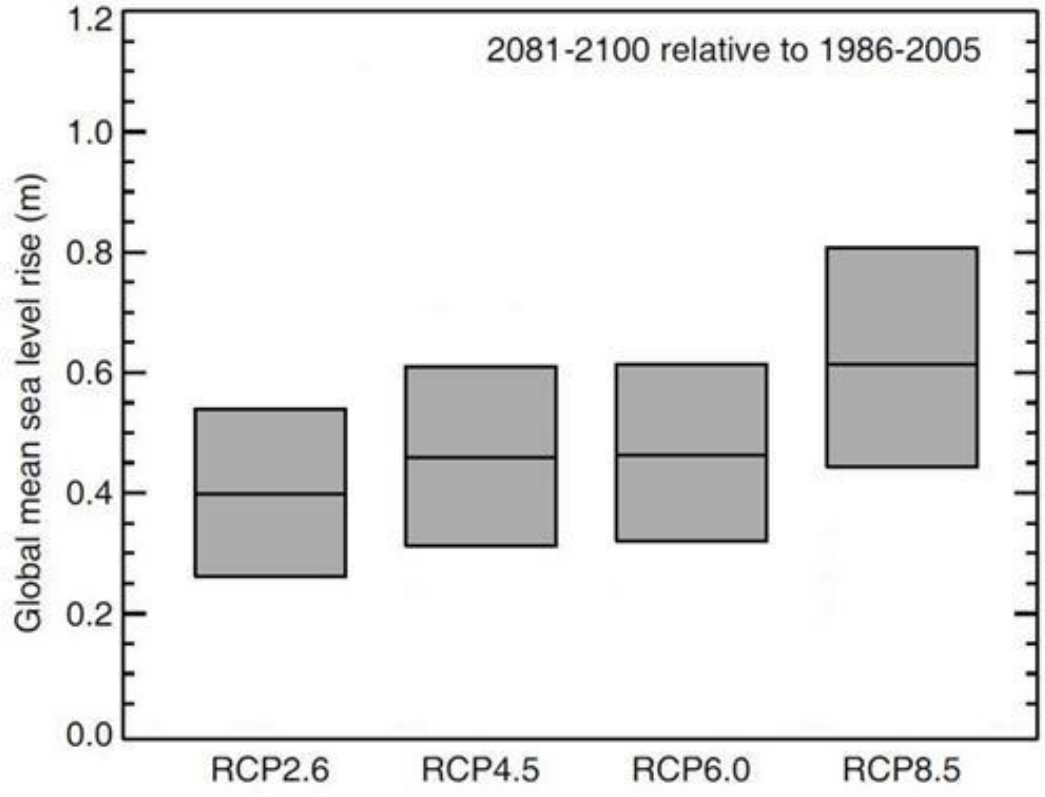
Source: IPCC (2013) 12th Session of WG I, Summary for Policymakers

Sea level has been rising faster in recent decades, at 3cm per decade



Source: NOAA/NCDC

Global mean sea level expected to rise between 40cm and 62cm this century, but could be 82cm+



Sea levels rose 16cm in last century, could be a further 80cm this century.

Global emissions trajectory is currently higher than RCP8.5 scenario.

IPCC 4th Assmt range: 18-59cm

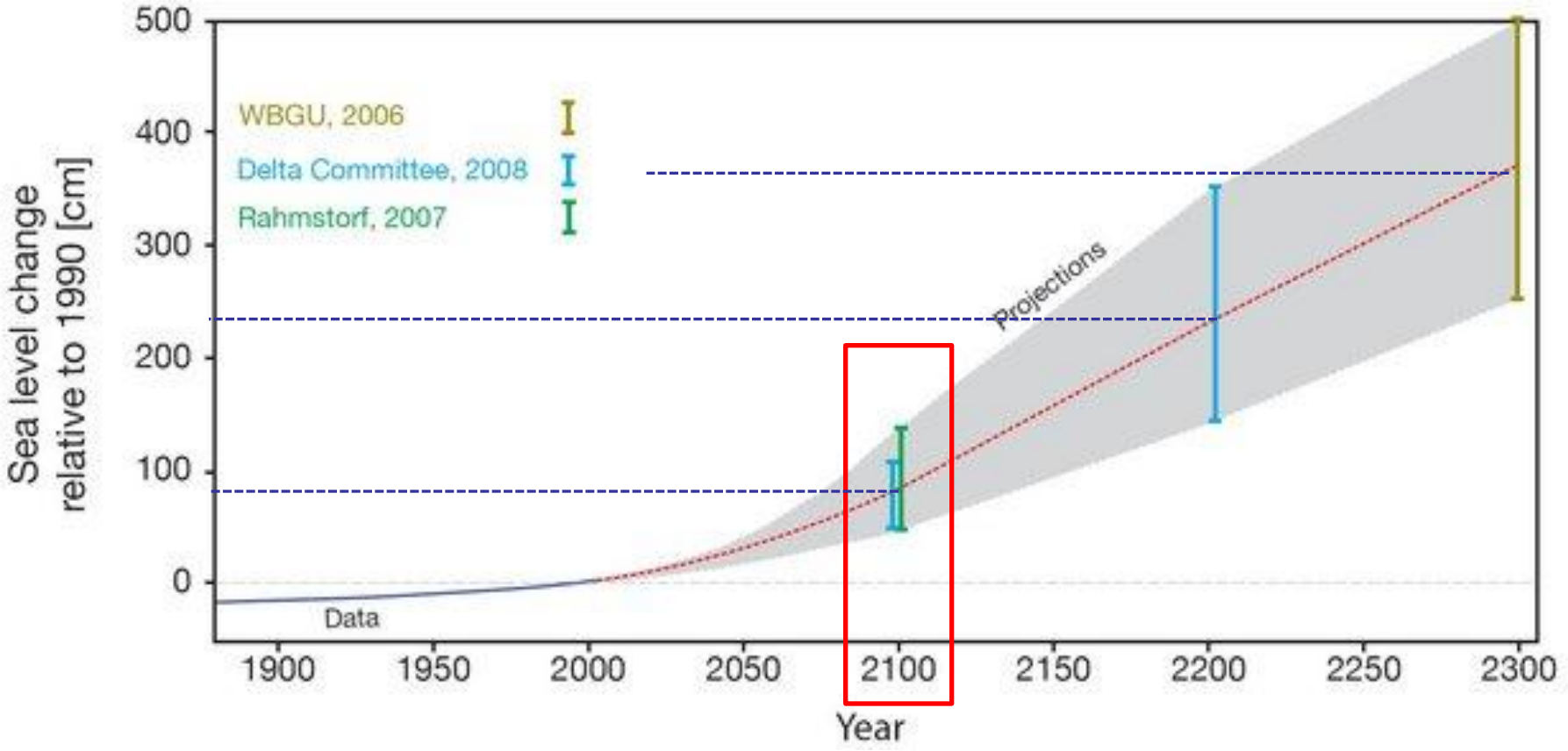
IPCC 5th Assmt range: 26-82cm

Any increase in size of tidal surges would add to this

UKCP09 High++ Scenario for vulnerability testing suggested a 0.93-1.9 metre mean sea level rise plus 0.2-0.95 metres under tidal surge conditions

Source: IPCC, 5th Assessment Report

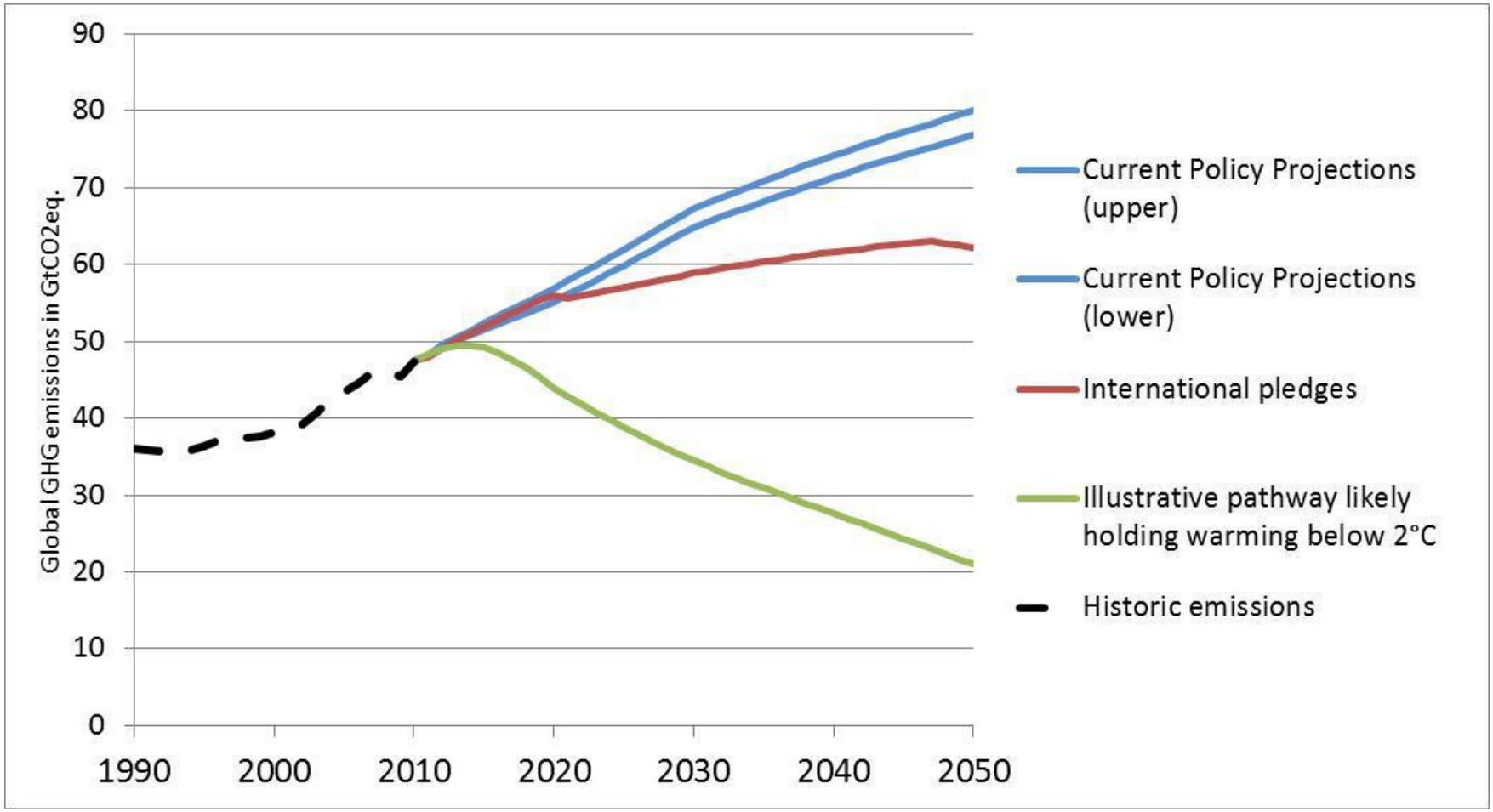
Global mean sea levels will keep on rising



The rise by 2100 will only be a small beginning of a much larger, multi-century response of oceans and ice sheets to elevated global temperatures

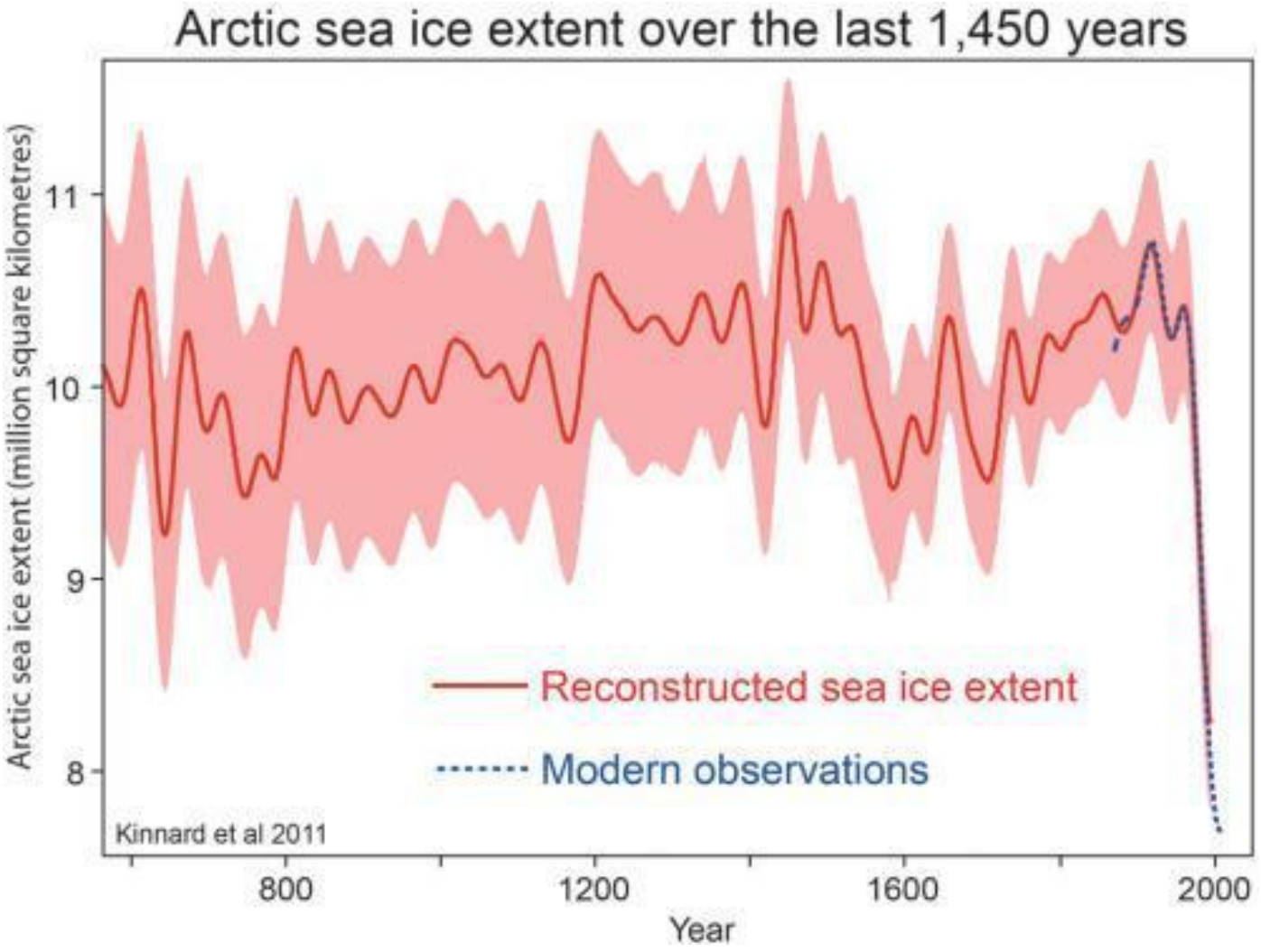
Source: Modeling sea level rise. Nature Education Knowledge, 2012

Emissions need to peak in the next 10 years and then fall rapidly to avoid dangerous climate change



Source: Climate Action Tracker

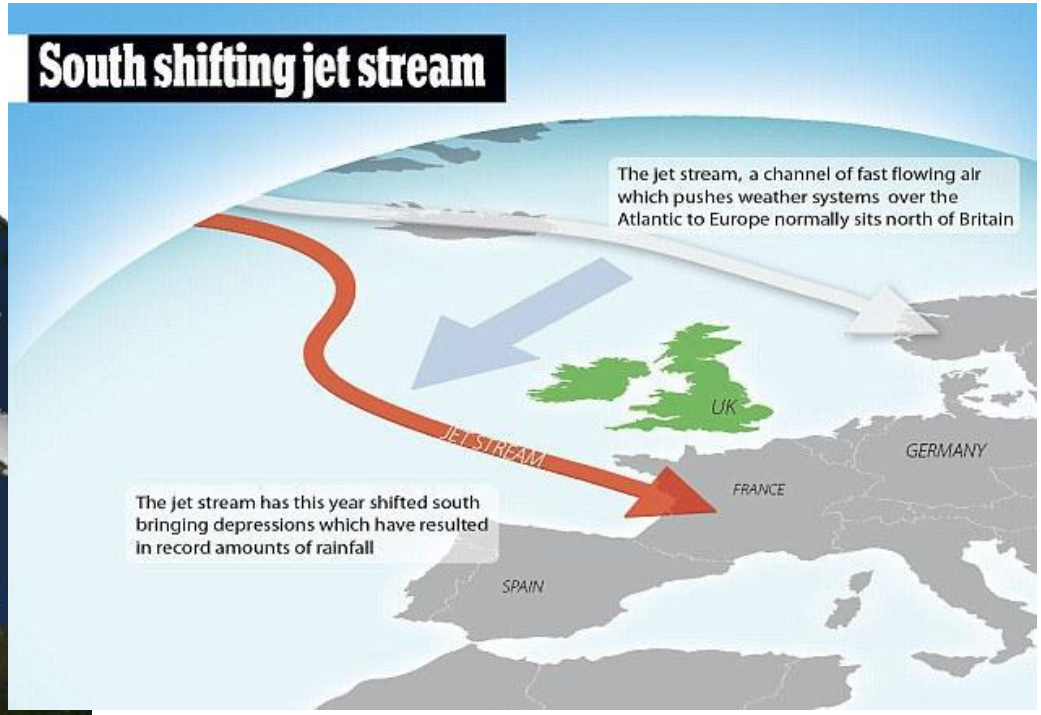
Average summer arctic sea ice extent has fallen (IPCC data suggests halved in last 60 years)



Source: Kinnard et. al, Nature 479, 509–512 (2011)

Attribution: evidence emerging that impacts of climate change are already being felt

- Global warming since pre-industrial era made Easter floods of 2000 two to three times more likely (Allen et al, 2011)
- Evidence that loss of Arctic sea ice makes southwards shifts in jet stream more likely (Screen, 2013)



Flooding is already more likely than you might think

- Chance of a 1 in 200 flood happening somewhere in England next year

  = about 50:50

- Chance of a flood on the scale of 2007 happening next year

  = 5 – 15% chance

- Chance of a catastrophic flood causing in excess of £12 billion UK losses and risking insurance company default

  = ~10% chance over the next 20 years

All become more likely with global warming, as a result of CO2 already in the atmosphere

Source: Defra, Environment Agency

Flooding is the Government's flagship policy on adaptation, so how are they doing?

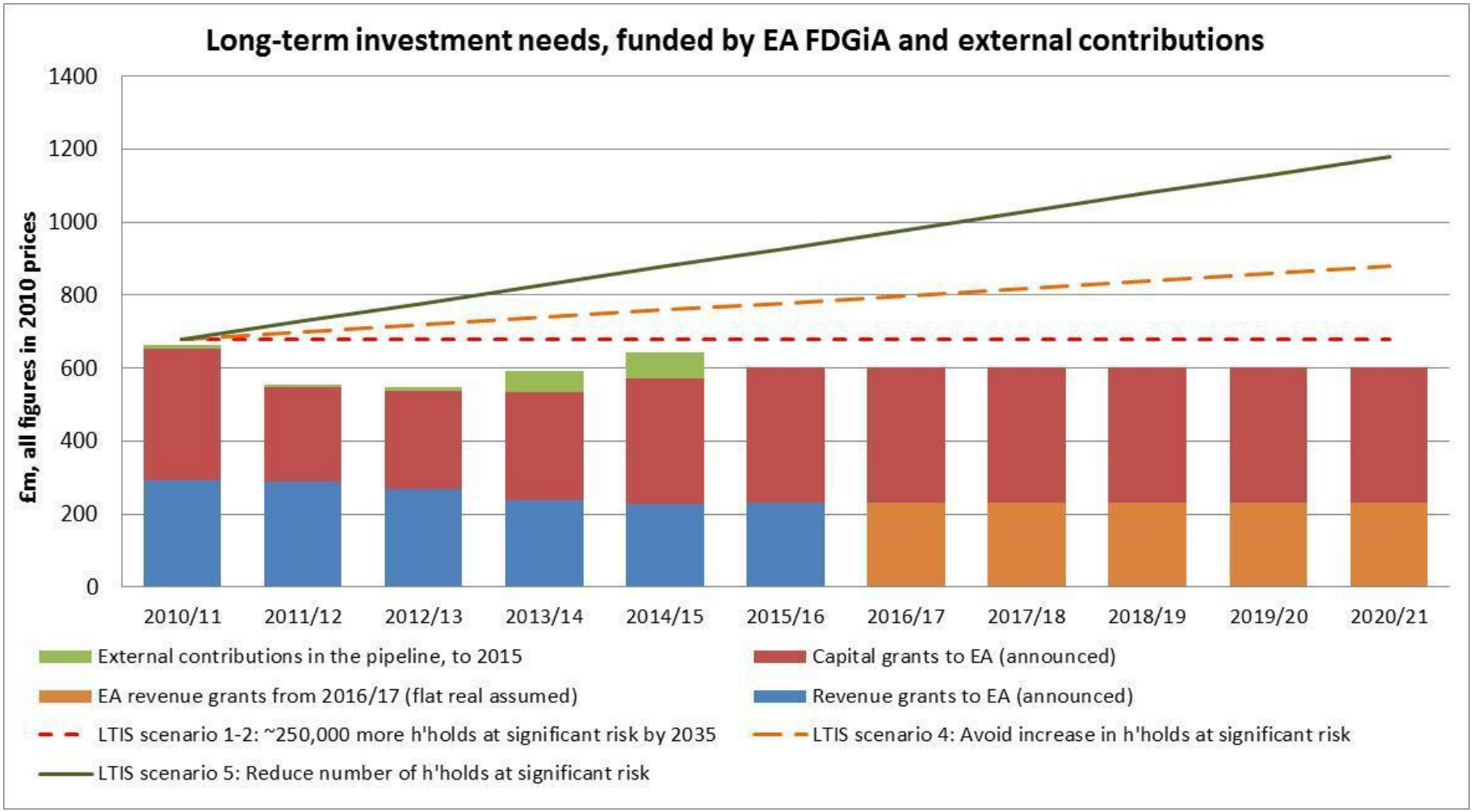
Flooding indicators

Name	Long-term trend (10 years)
Development in the floodplain.	↑
Development in areas at significant flood risk (unprotected or poorly protected).	↑
Planning applications approved by local authorities despite Environment Agency flood objection.	?
Paved-over surfaces in urban areas.	↑
Investment in flood defences.	→
Uptake of measures to reduce flood risk (property-level flood protection, sustainable drainage systems, Environment Agency flood warning).	↑

Note on arrows: The direction of the arrow depicts the trend in that indicator (increasing, decreasing or no significant trend). The colour of the arrow identifies the level of risk (red = increasing risk; green = decreasing risk; yellow = risk is neither increasing nor decreasing).

Source: ASC

Spending this period is half a £billion behind the long-term need if we are to avoid increasing flood risk



Source: ASC, 2014

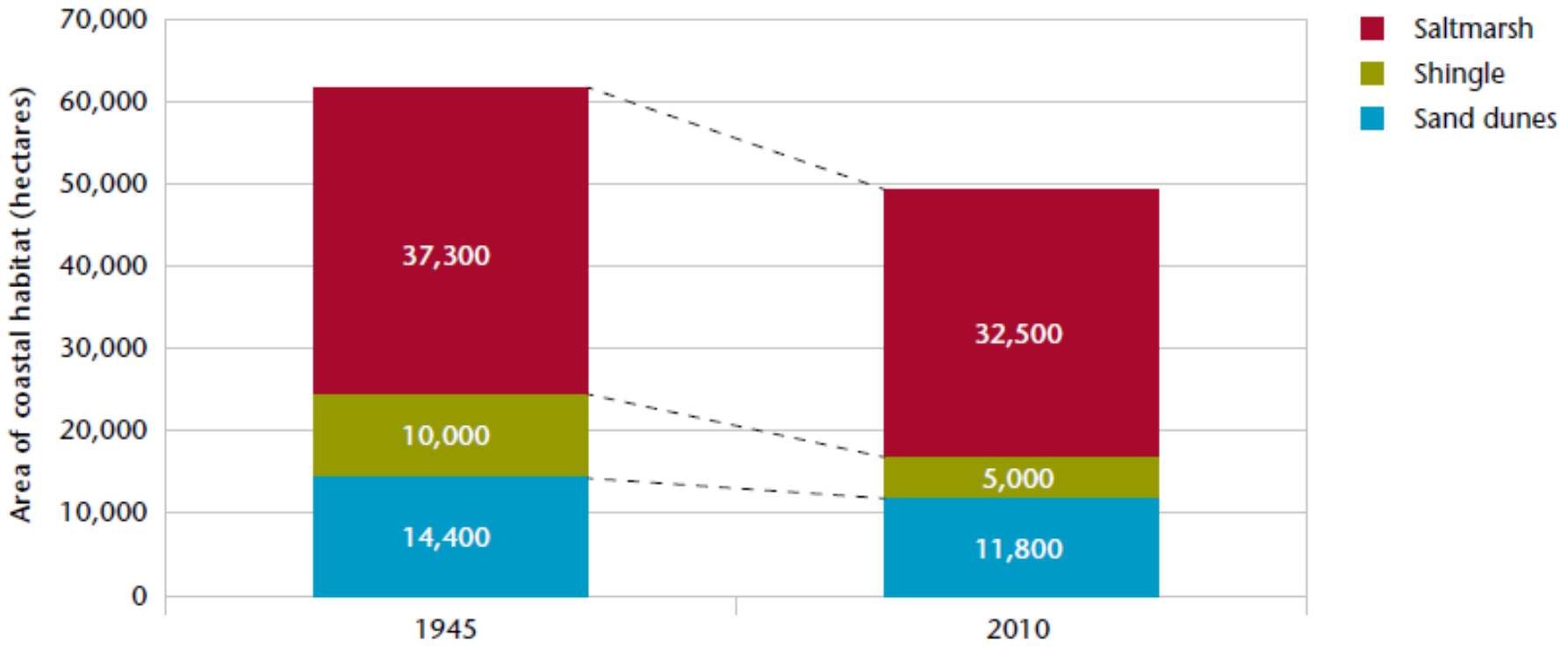
On the coast, there is an uphill battle against sea level rise and development

Coastal indicators

Name	Direction of trend	Implication of trend
Extent of coastal habitats	↓	
Condition of protected coastal habitats	↓	
Length of coastline realigned (km)	↑	
Amount of habitat creation, following managed realignment	↑	

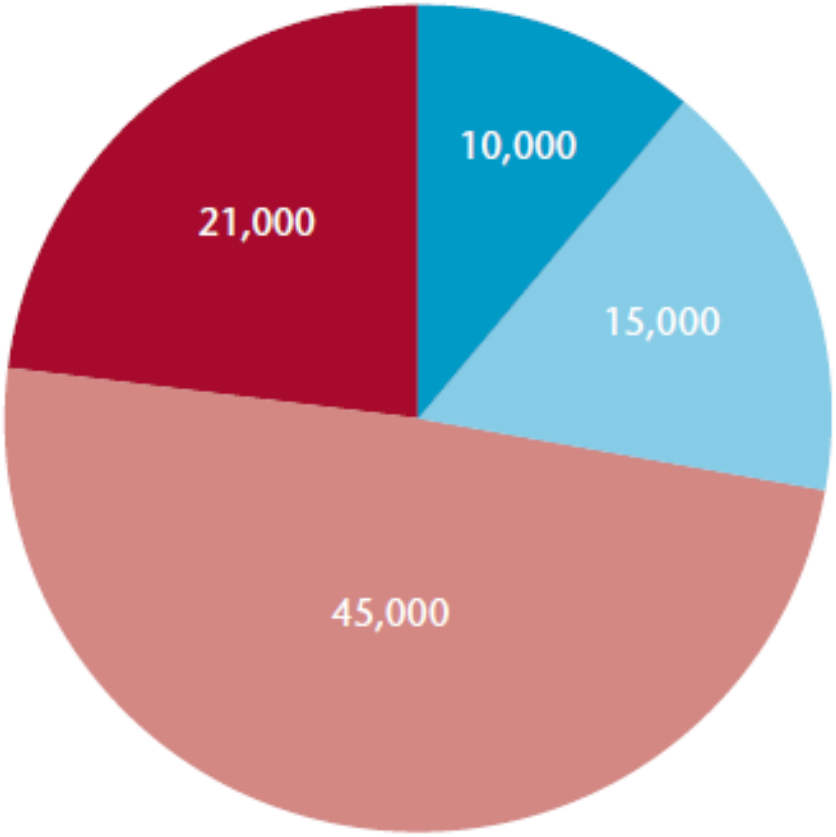
Source: ASC, 2013

20% of coastal habitat lost since WWII



Source: UK National Ecosystem Assessment, 2011

Around three quarters of coastal habitats at risk of coastal squeeze with sea-level rise



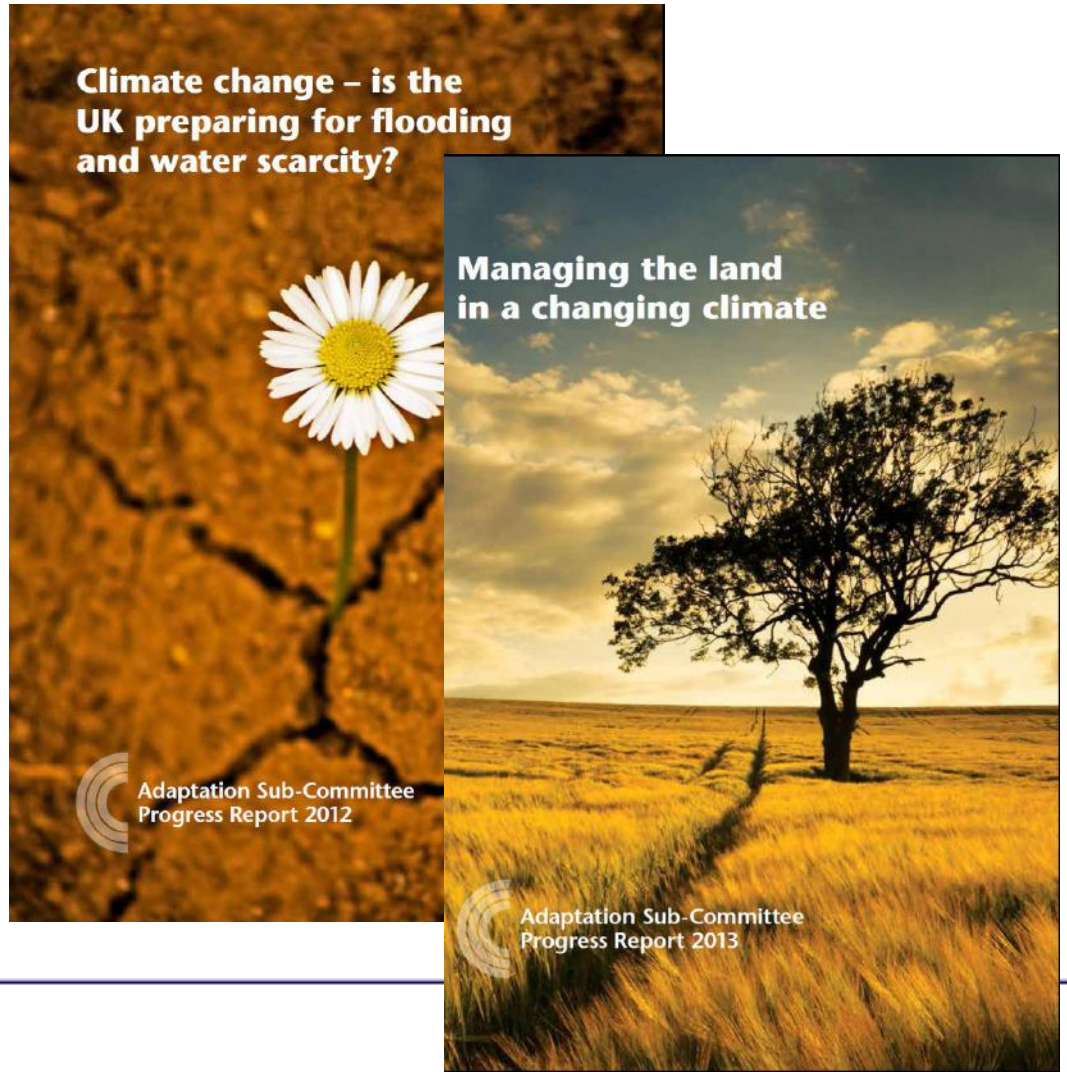
Intertidal habitats area (hectares)

- Saltmarsh in front of defences, potentially at risk of coastal squeeze
- Saltmarsh not in front of artificial defences
- Mudflats in front of defences, potentially at risk of coastal squeeze
- Mudflats not in front of artificial defences

Source: Environmental Change Institute for ASC, 2013

Next steps

- ASC reports available at: http://www.theccc.org.uk/publications/
- IPCC Working Group II summary report March 2014
- Next ASC report July 2014:
  - Business
  - Infrastructure
  - Public health
  - Emergency response
- First ASC statutory report on progress: July 2015
- Ad-hoc briefings on topical issues



daniel.johns@theccc.gsi.gov.uk

Adaptation Sub-Committee
http://www.theccc.org.uk

Twitter: @theCCCuk, @DanielJ88