

Overall Messages from the IPCC Fifth Assessment Report (AR5) and implications for a climate deal in 2015

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Why the IPCC ?

Established by WMO and UNEP in 1988

to provide **policy-makers** with an **objective source of information** about

- causes of climate change,
- potential environmental and socio-economic impacts,
- possible response options (adaptation & mitigation).

WMO=World Meteorological Organization

UNEP= United Nations Environment Programme



Strengths of the IPCC

- ✓ **Mobilisation of thousands of multi-disciplinary experts worldwide**
- ✓ **Policy-relevant findings (but not policy-prescriptive)**
- ✓ **Widely used methodological reports**
- ✓ **Assessments relying on peer reviewed literature**
- ✓ **Review process involving experts and Governments**
- ✓ **Media attention and outreach activities**

AR5 is the best ever

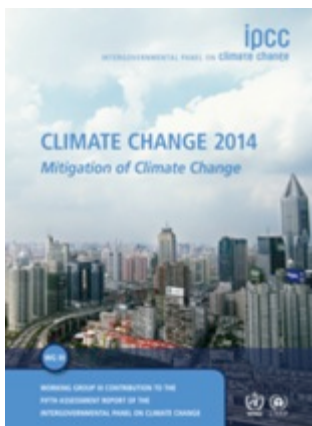
- **Better integration of Mitigation and Adaptation**
- **Improved risk-management approach**
- **Evolving away from the non-mitigation SRES scenarios** (SRES= Special Report on Emission Scenarios, 2000)
- **Special effort to provide regional information when available**
- **Sustainable development & equity aspects**
- **More comprehensive treatment of economic aspects, and of cross-cutting issues**
- **Emerging issues handled (acidification, ...)**
- **Better handling & communication of uncertainties**



What is happening in the climate system?



What are the risks?



What can be done?

Key Messages

- **Human influence on the climate system is clear**
- **Continued emission of greenhouse gases will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems**
- **While climate change is a threat to sustainable development, there are many opportunities to integrate mitigation, adaptation, and the pursuit of other societal objectives**
- **We have the means to limit climate change and build a more sustainable and resilient future**

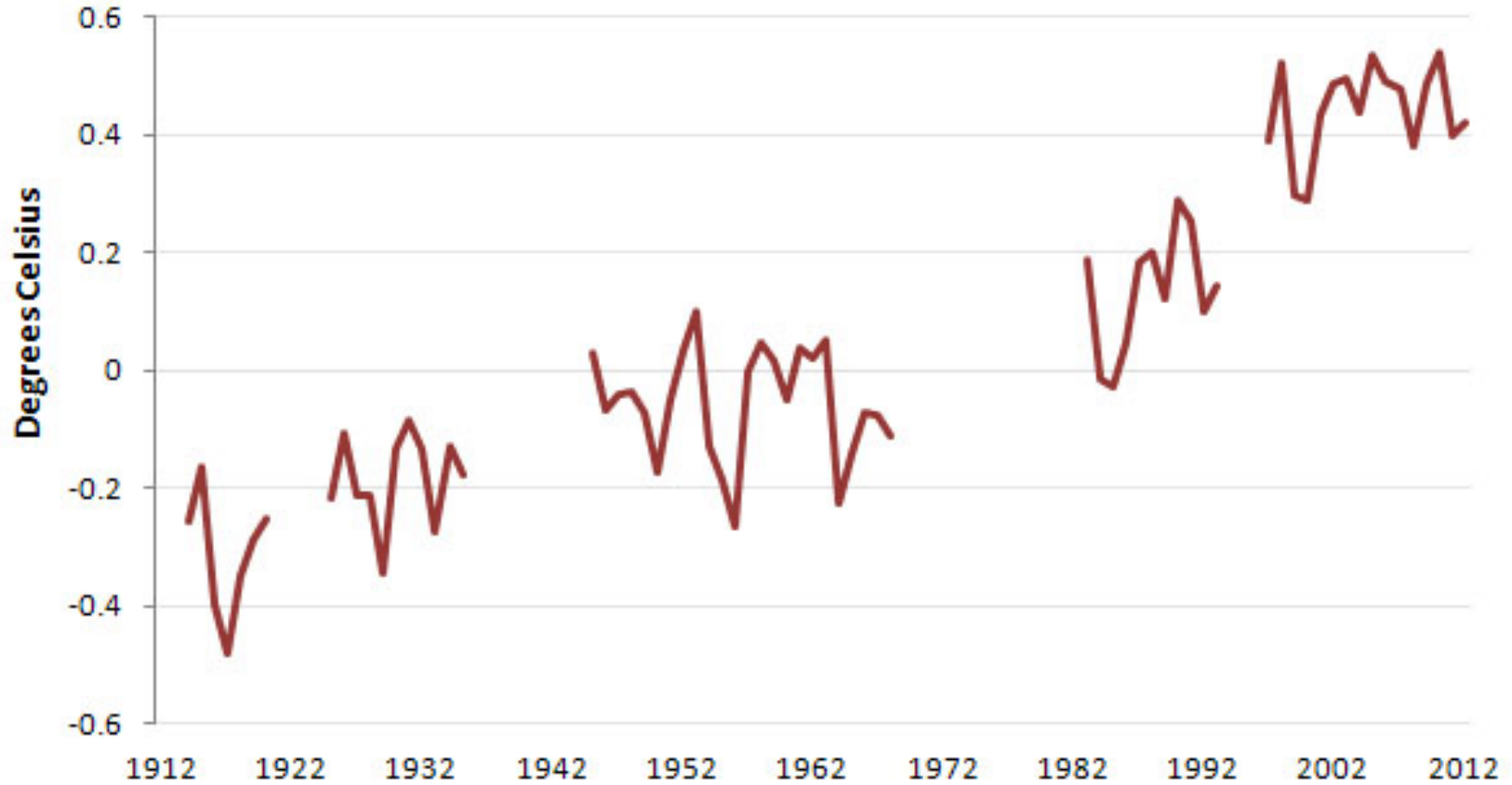
AR5 WGI SPM, AR5 WGII SPM, AR5 WGIII SPM

Temperature Change From 1961-1990 Average



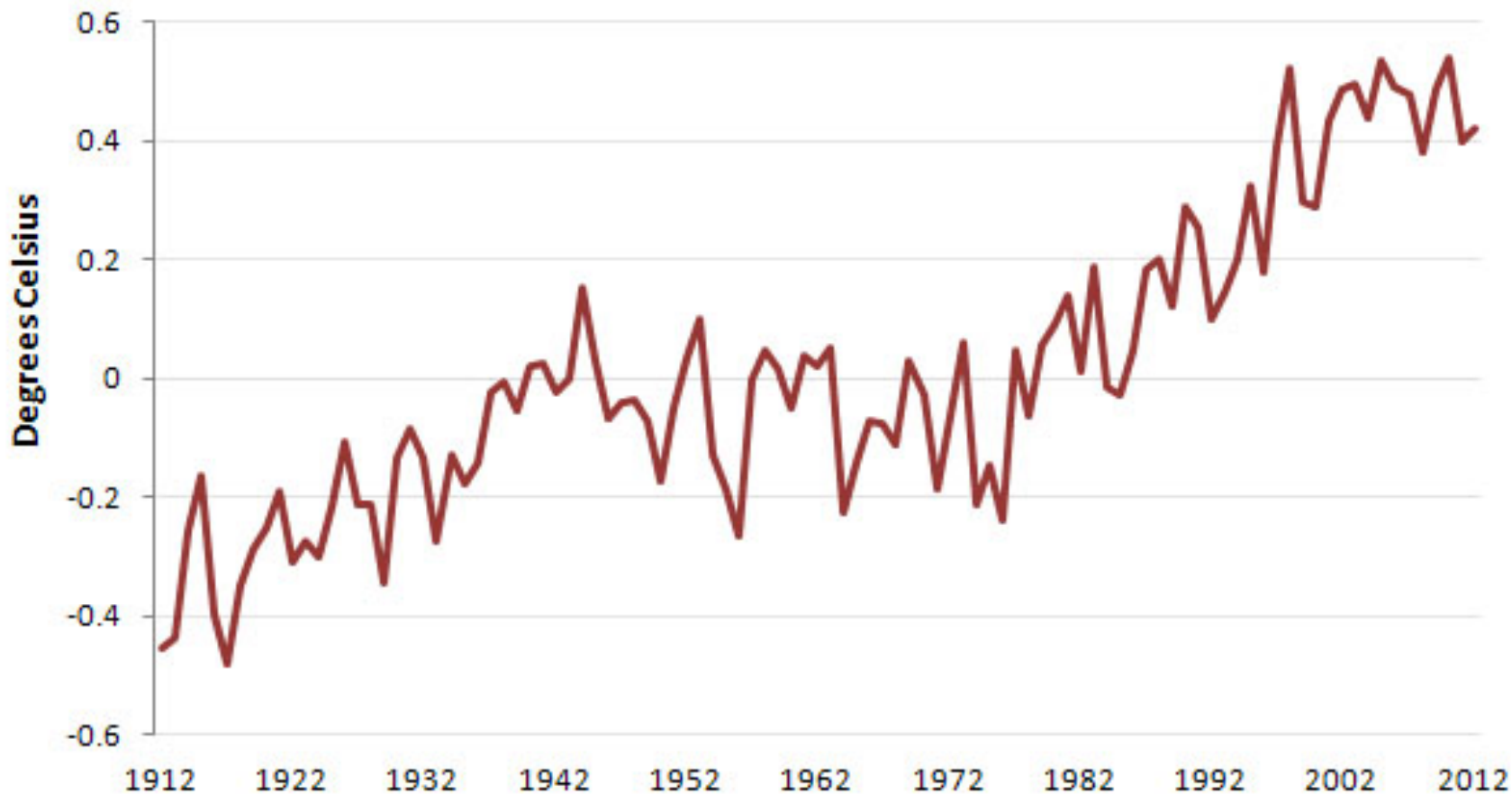
Lying With Statistics, Global Warming Edition

Temperature Plateaus — 1912-2012

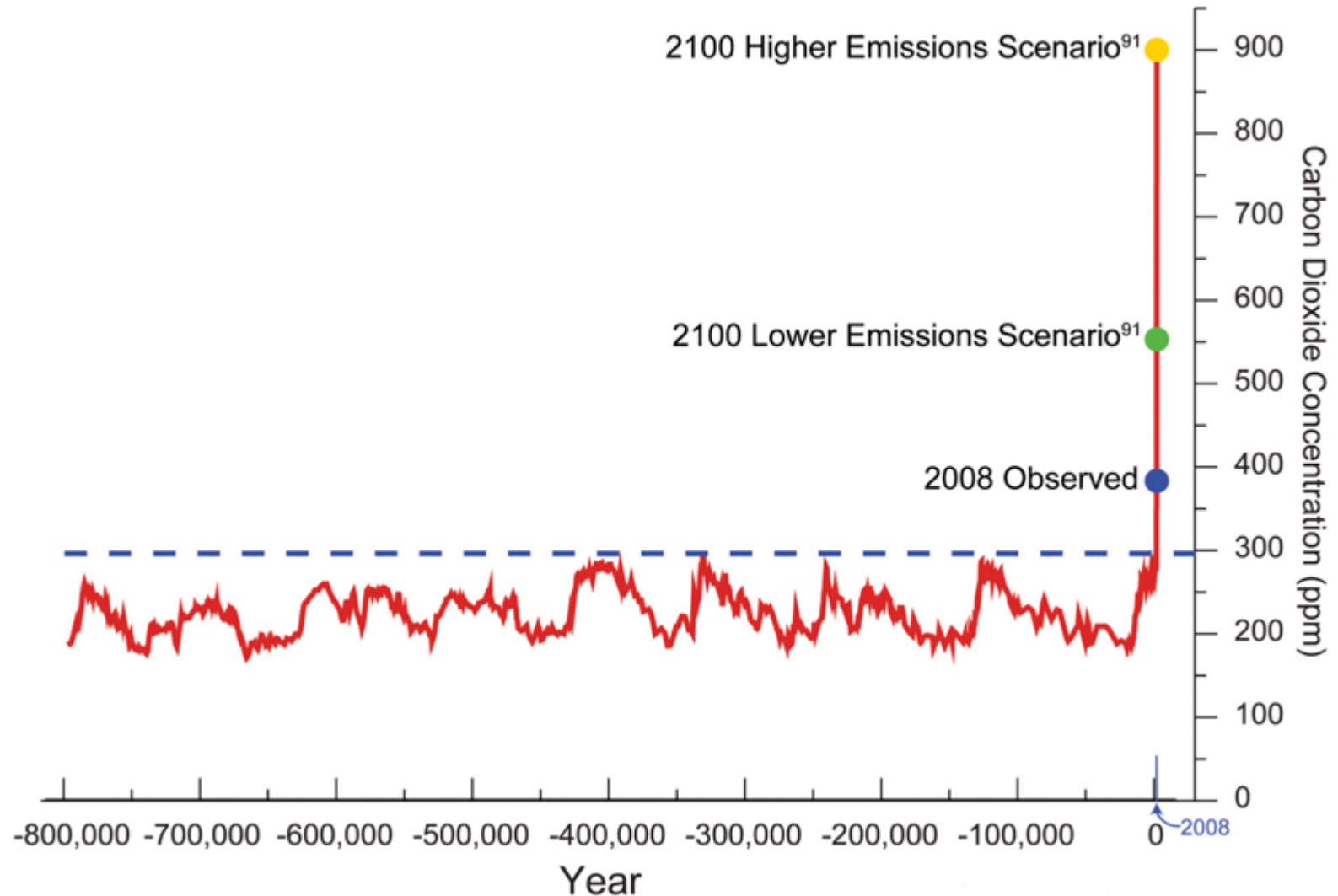


Lying With Statistics, Global Warming Edition

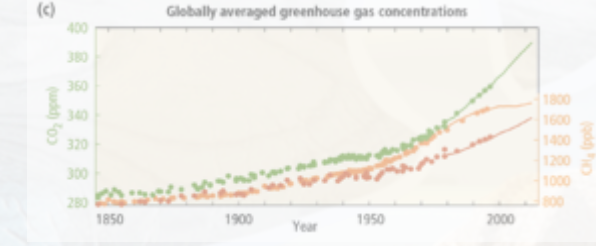
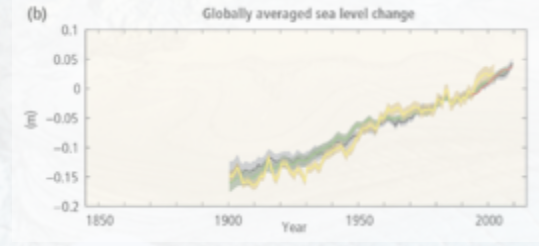
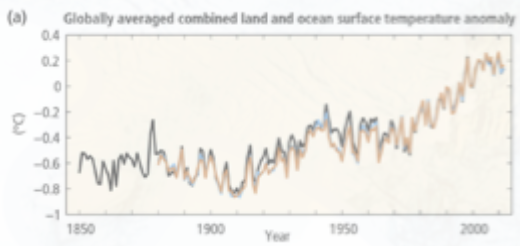
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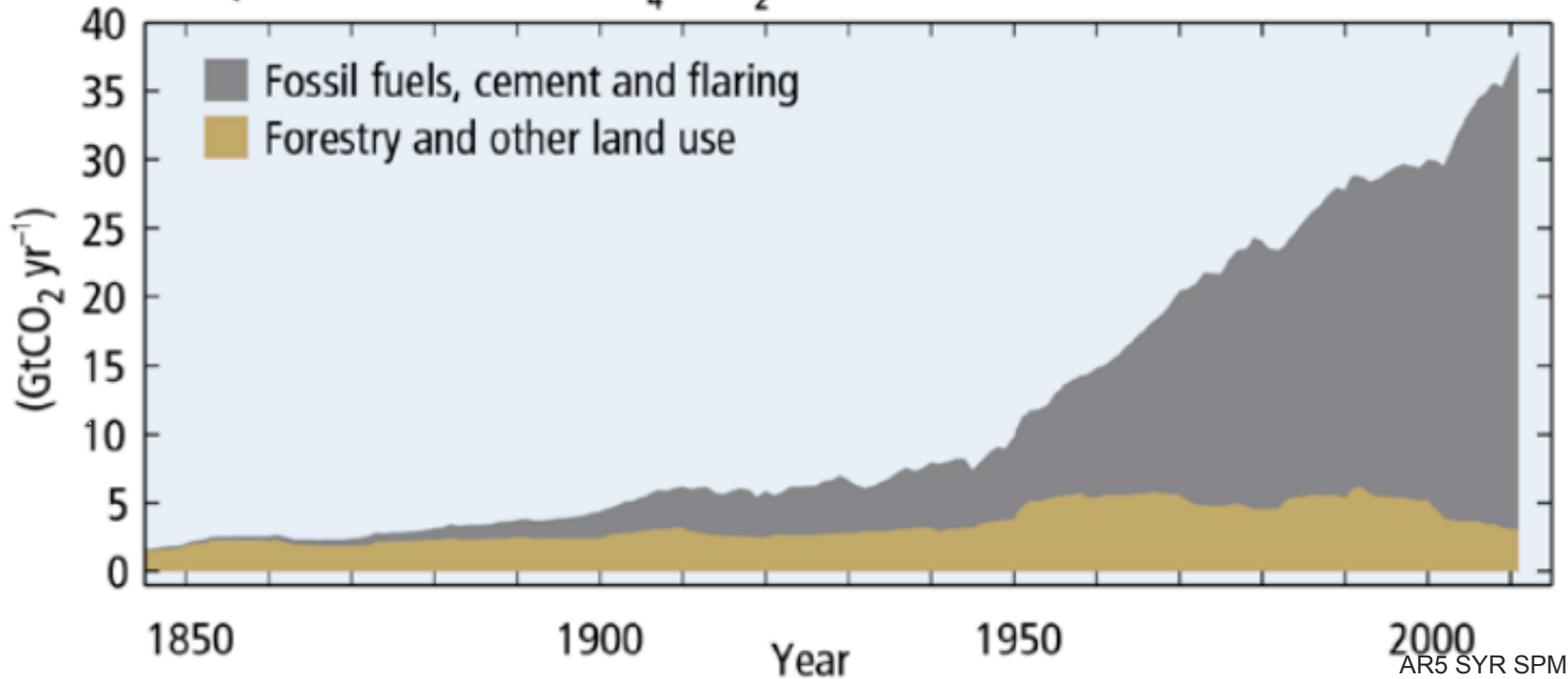
Atmospheric CO₂ over the last 800,000 years



Lüthi *et al.*; Tans; IIASA²



(d) Global anthropogenic CO₂ emissions
 Quantitative information of CH₄ and N₂O emission time series from 1850 to 1970 is limited



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Sources of emissions

Energy production remains the primary driver of GHG emissions



2010 GHG emissions

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Since 1950, extreme hot days and heavy precipitation have become more common



There is evidence that anthropogenic influences, including increasing atmospheric greenhouse gas concentrations, have changed these extremes

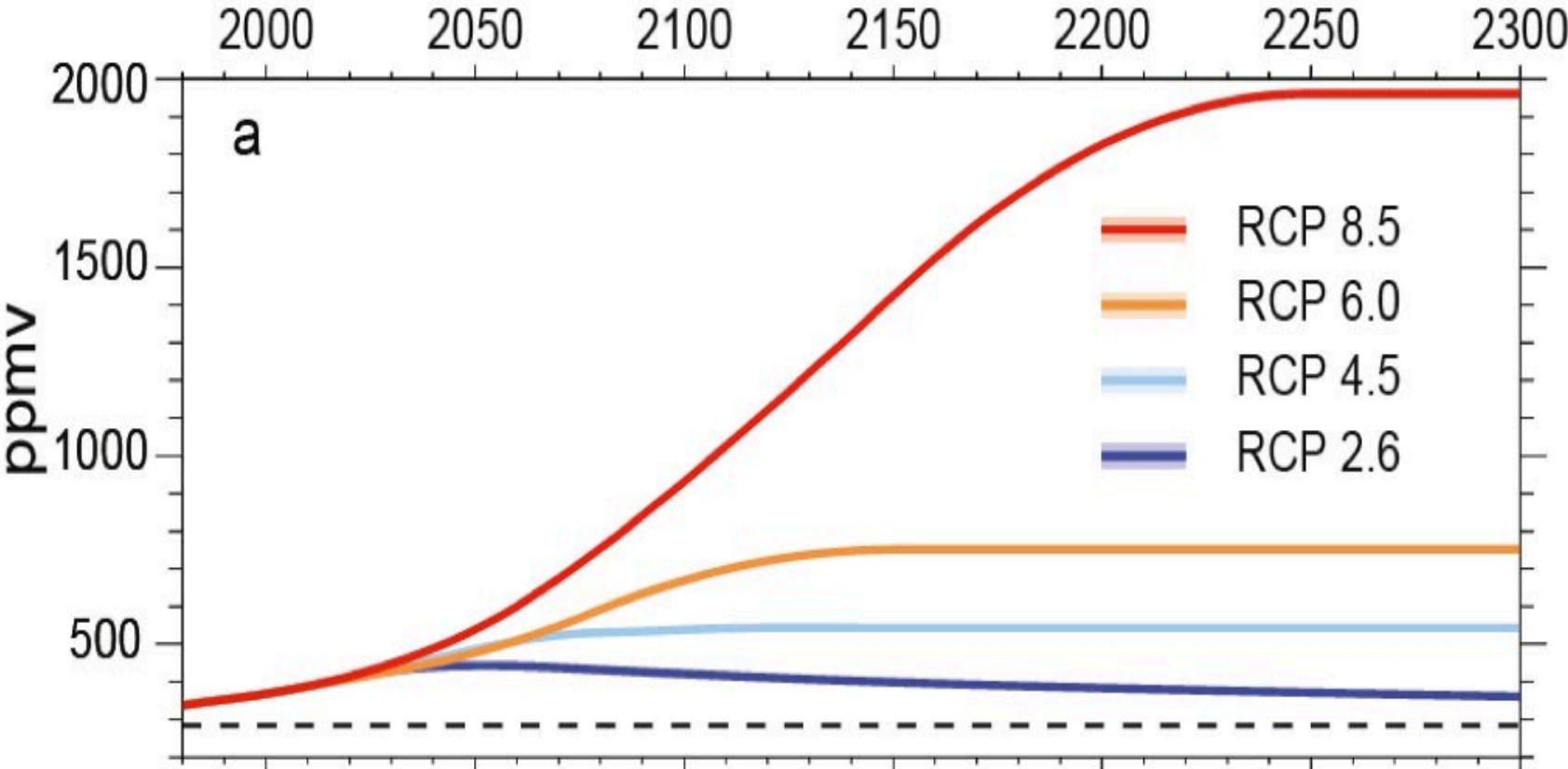
Impacts are already underway

- **Tropics to the poles**
- **On all continents and in the ocean**
- **Affecting rich and poor countries (but the poor are more vulnerable everywhere)**



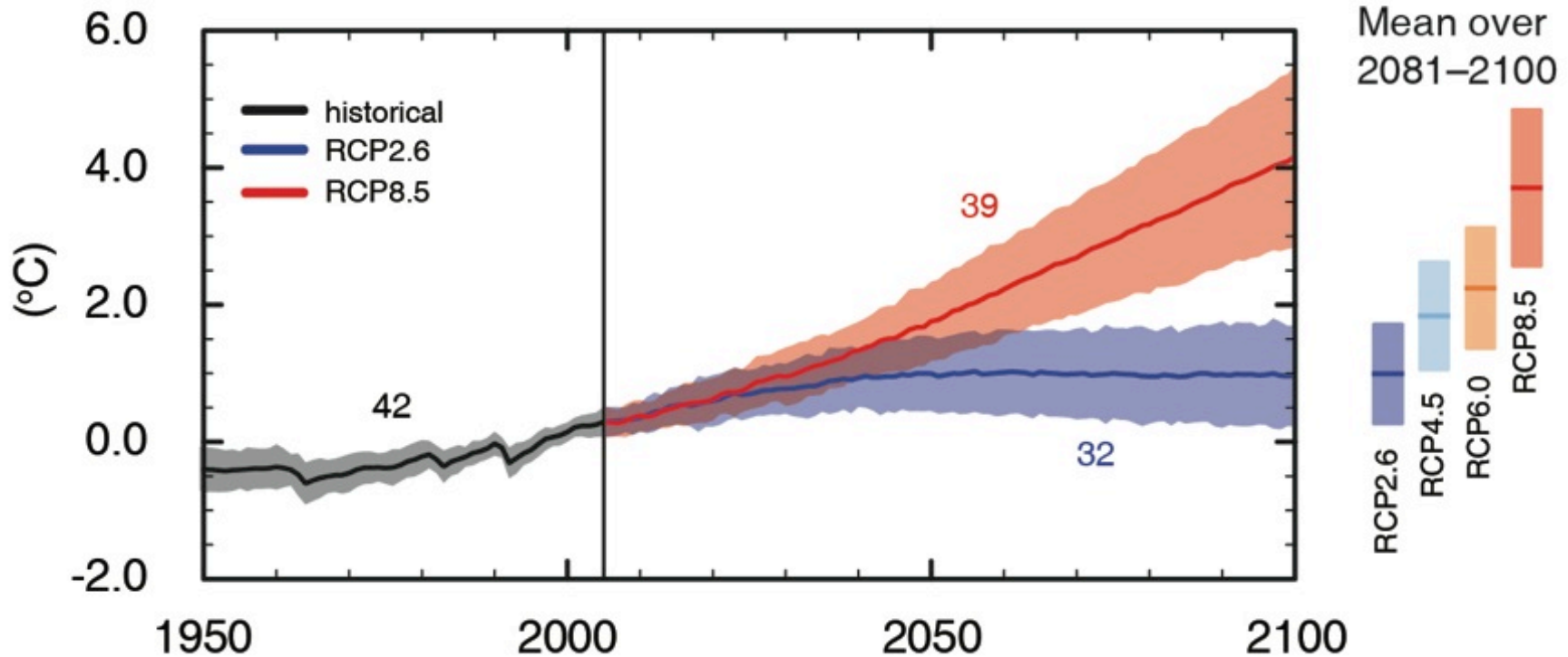
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RCP Scenarios: Atmospheric CO₂ concentration



Three stabilisation scenarios: RCP 2.6 to 6
One Business-as-usual scenario: RCP 8.5

Global average surface temperature change



(IPCC 2013, Fig. SPM.7a)

Only the lowest (RCP2.6) scenario maintains the global surface temperature increase above the pre-industrial level to less than 2°C with at least 66% probability

Potential Impacts of Climate Change



Food and water shortages



Increased displacement of people



Increased poverty



Coastal flooding

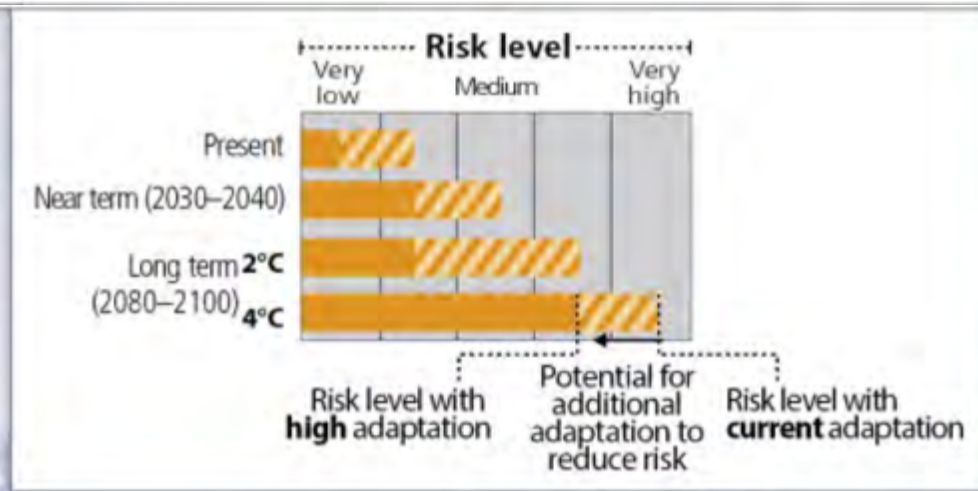
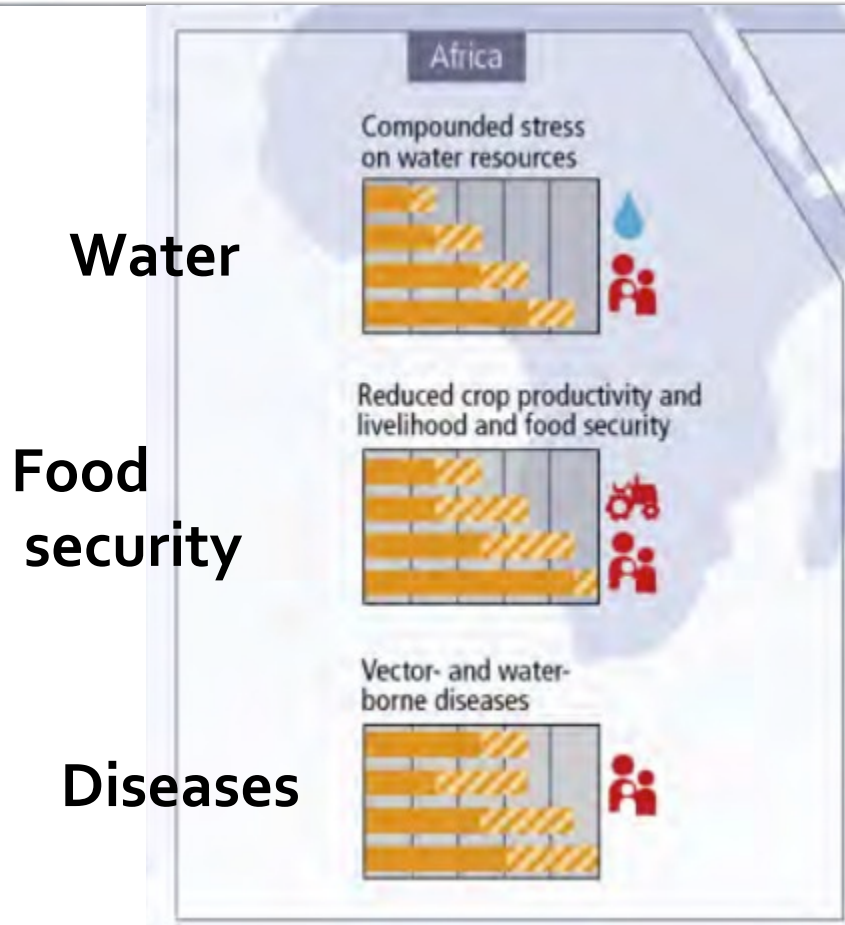
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ADAPTATION IS ALREADY OCCURRING

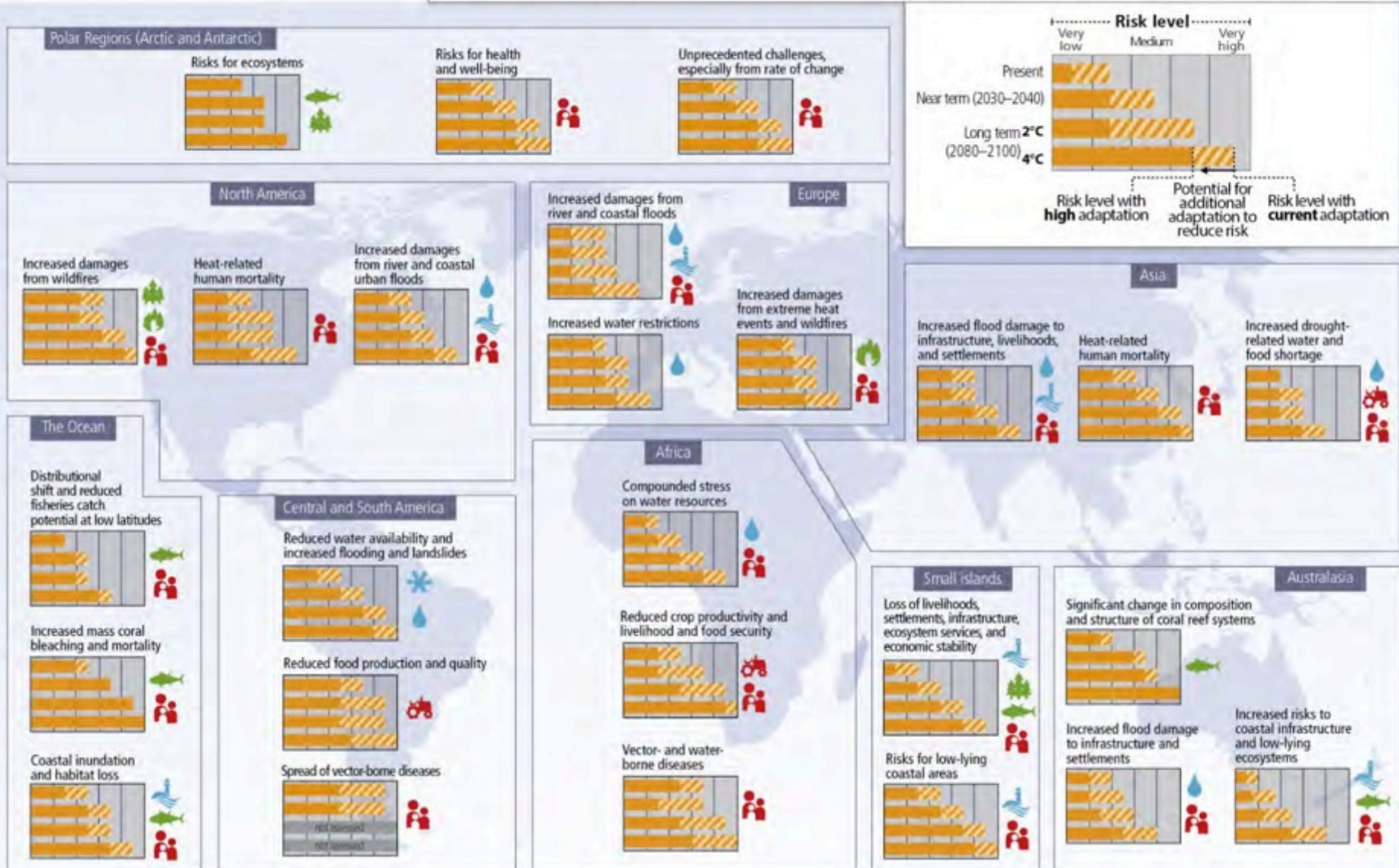
Regional key risks and risk reduction through adaptation; Ex: Africa

Representative key risks for each region for



Regional key risks and potential for risk reduction

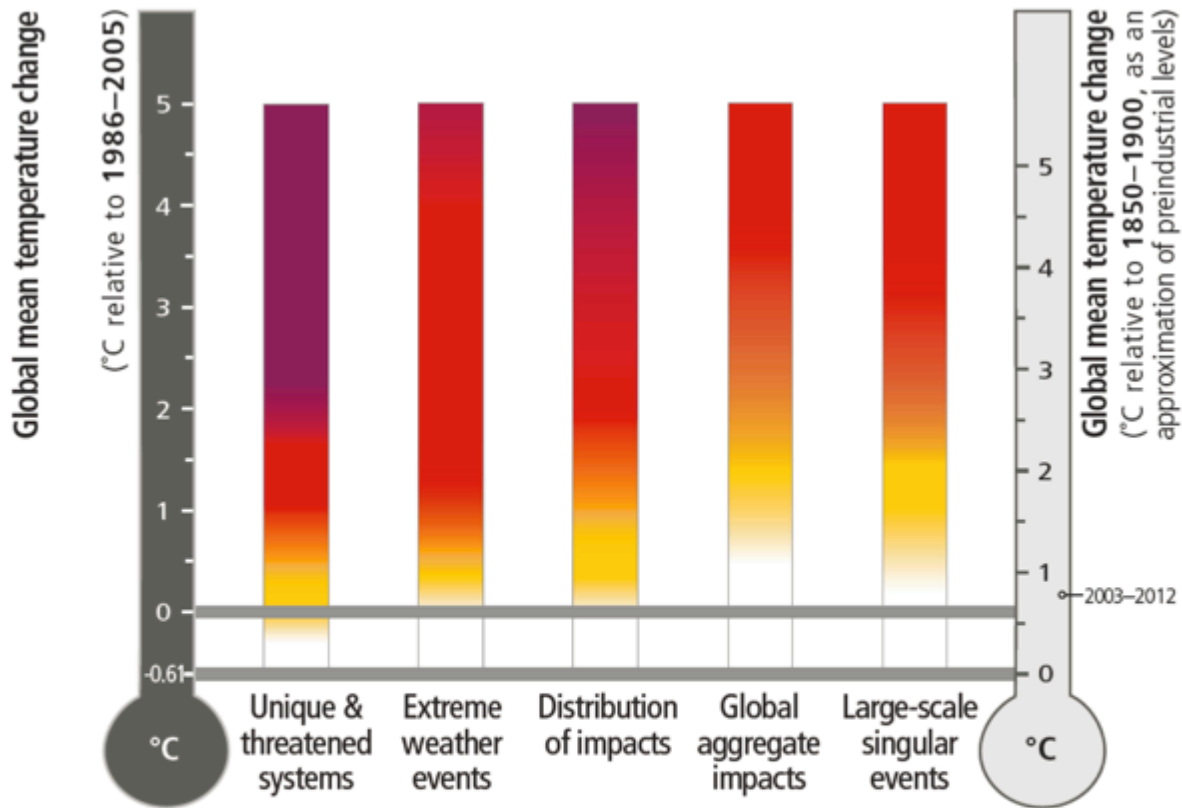
Representative key risks for each region for

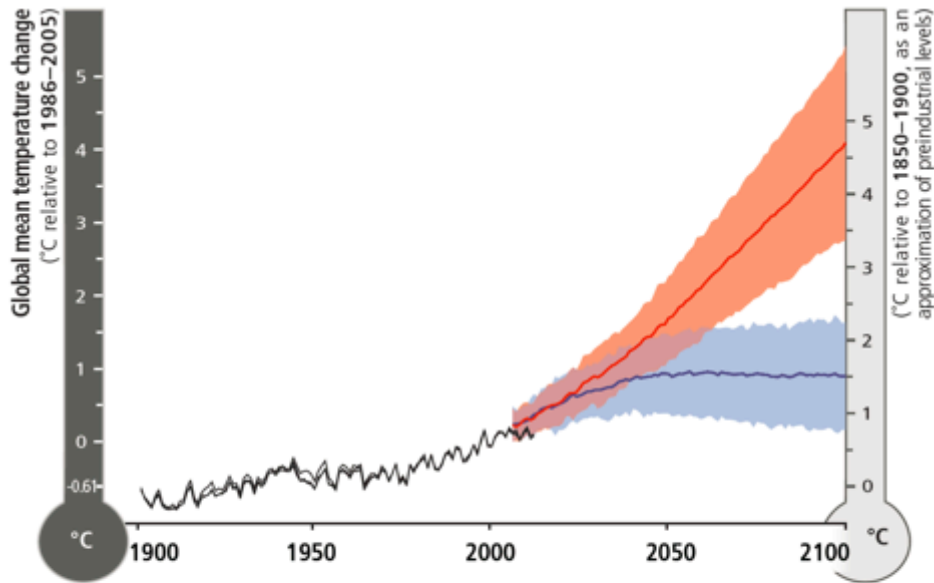


IPCC, AR5, SPM, Figure SPM.8

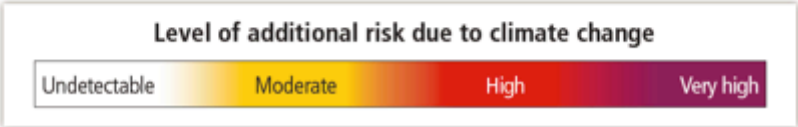
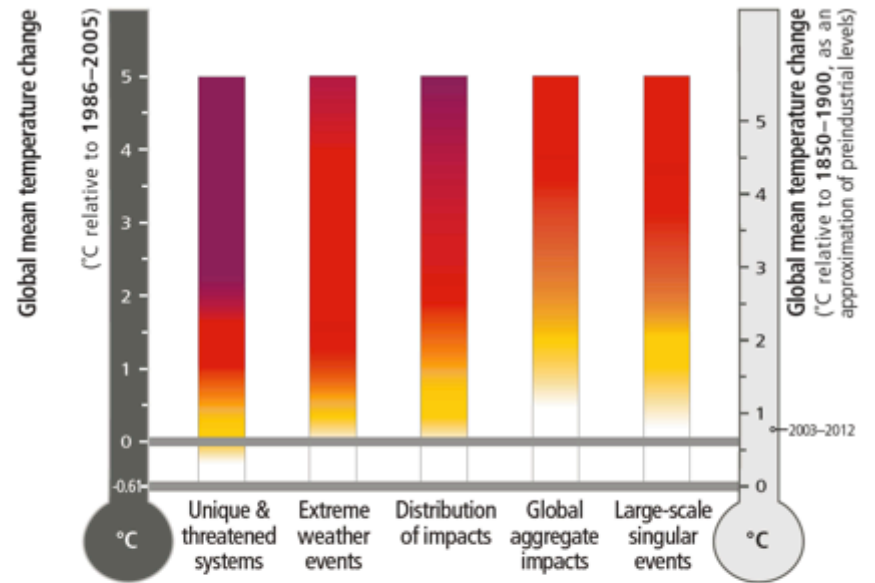


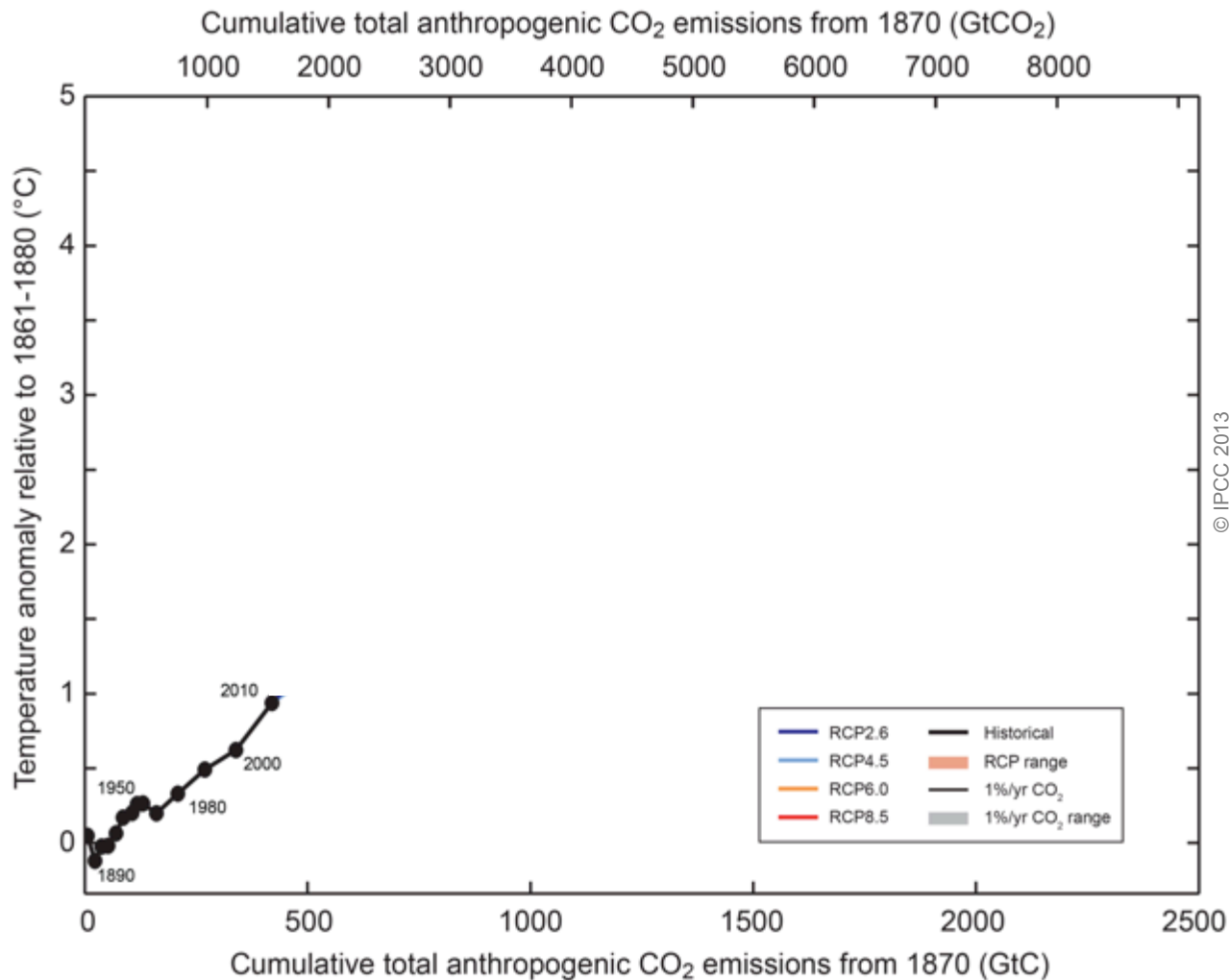
RISKS OF
CLIMATE CHANGE
INCREASE
WITH CONTINUED
HIGH EMISSIONS





- Observed
- RCP8.5 (a high-emission scenario)
- Overlap
- RCP2.6 (a low-emission mitigation scenario)

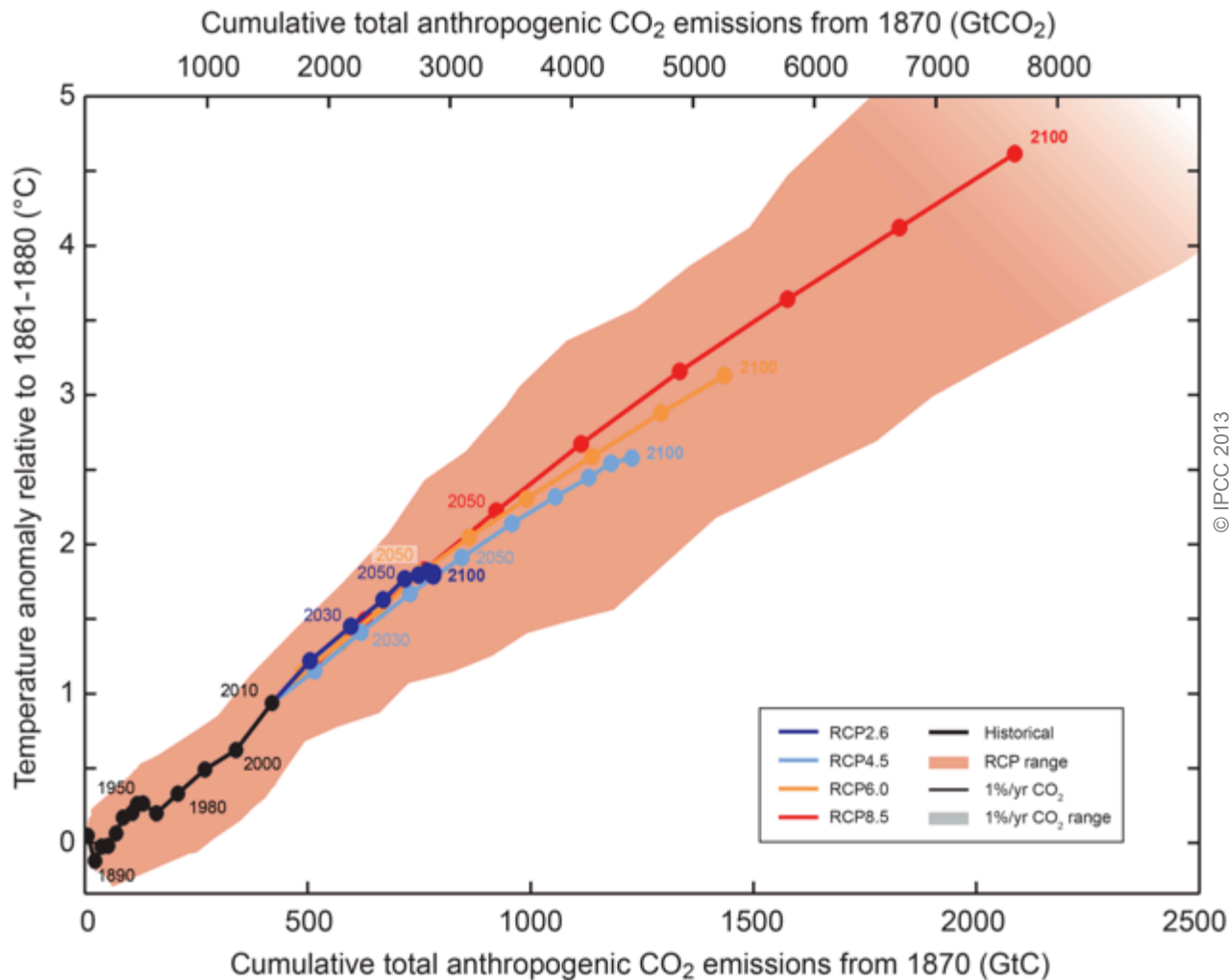




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Fig. SPM.10

Cumulative emissions of CO₂ largely determine global mean surface warming by the late 21st century and beyond.

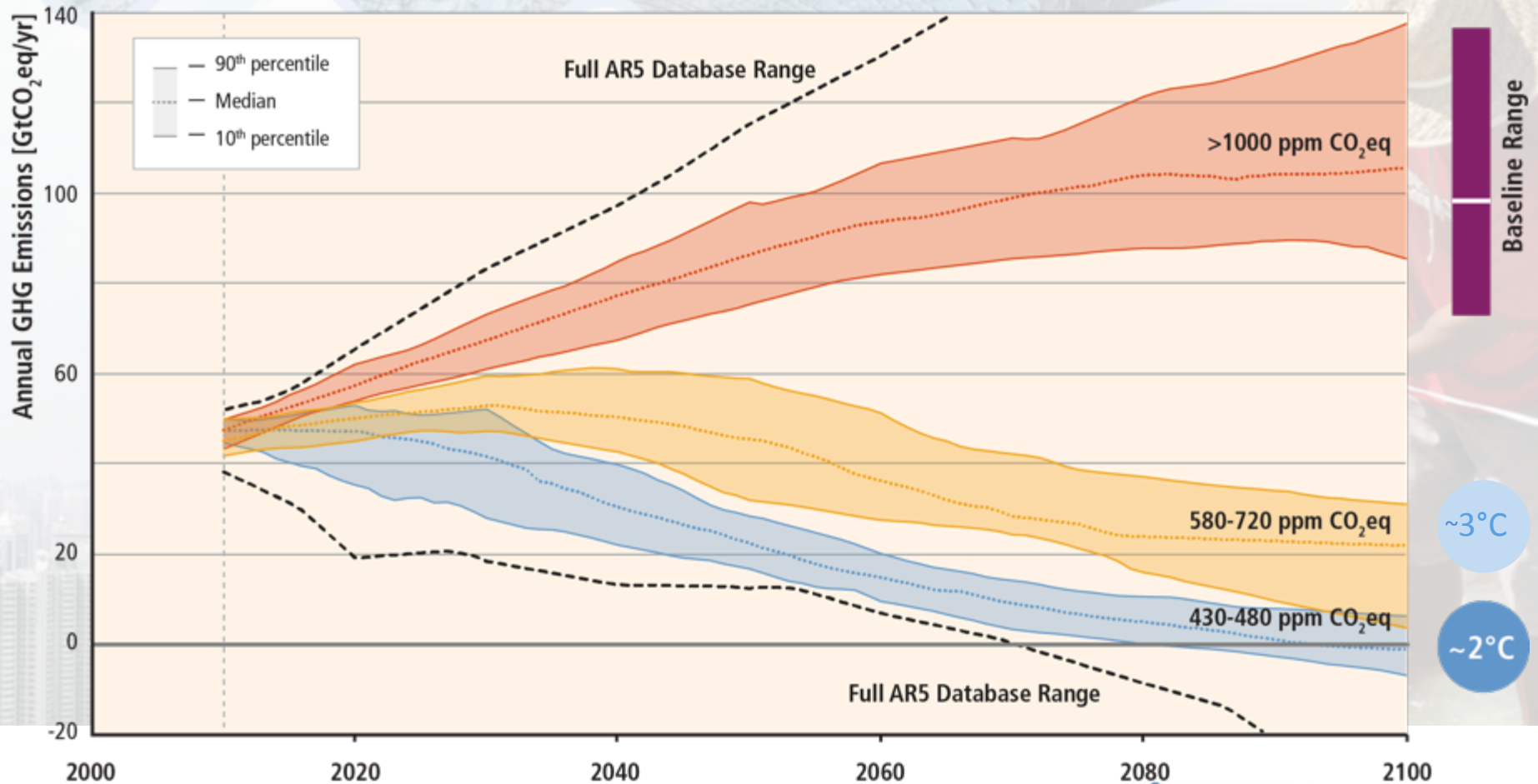


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Fig. SPM.10

Limiting climate change will require substantial and sustained reductions of greenhouse gas emissions.

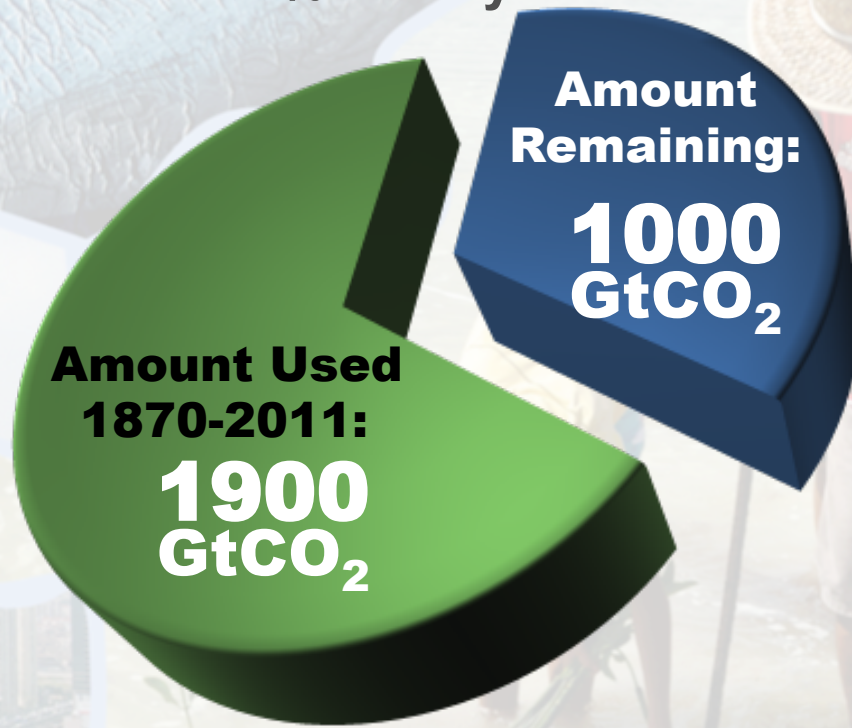
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.



Based on Figure 6.7

The window for action is rapidly closing

65% of the carbon budget compatible with a 2°C goal is already used
NB: this is with a probability greater than 66% to stay below 2°C



NB: Emissions in 2011: 38 GtCO₂/yr

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Limiting Temperature Increase to 2°C



Measures exist to achieve the substantial emissions reductions required to limit likely warming to 2°C



A combination of adaptation and substantial, sustained reductions in greenhouse gas emissions can limit climate change risks



Implementing reductions in greenhouse gas emissions poses substantial technological, economic, social, and institutional challenges



But delaying mitigation will substantially increase the challenges associated with limiting warming to 2°C

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Mitigation Measures



More efficient use of energy



Greater use of low-carbon and no-carbon energy

- Many of these technologies exist today



Improved carbon sinks

- Reduced deforestation and improved forest management and planting of new forests
- Bio-energy with carbon capture and storage



Lifestyle and behavioural changes

AR5 WGIII SPM

Ambitious Mitigation Is Affordable

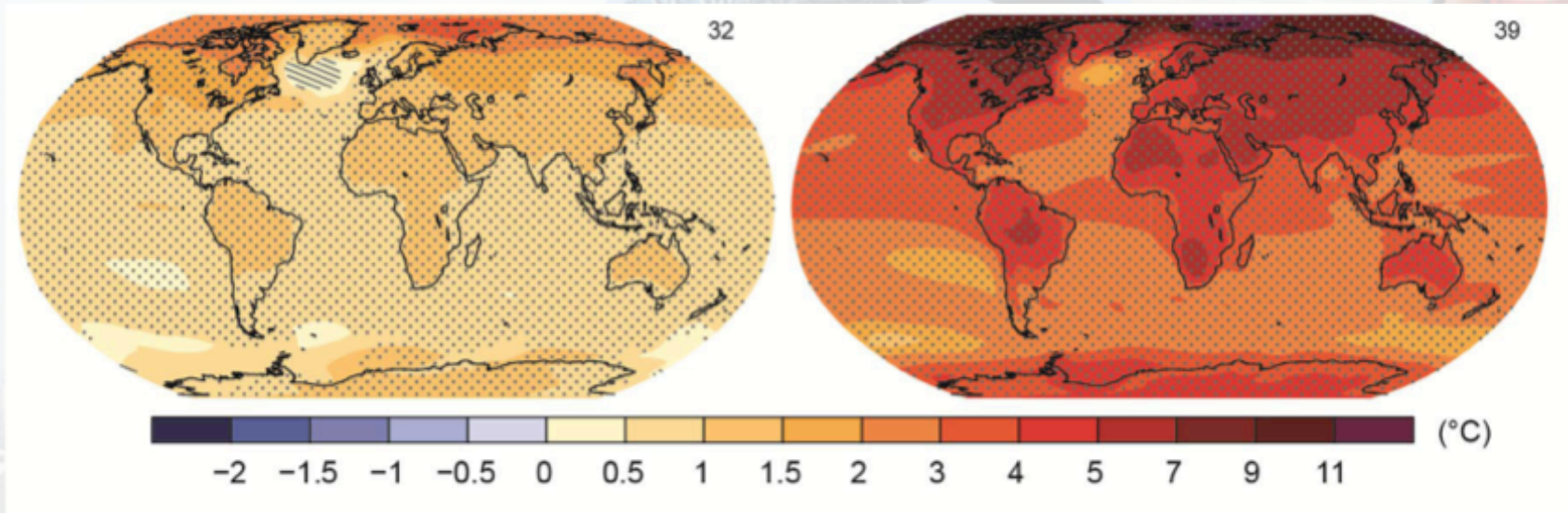
- Economic growth reduced by ~ 0.06% (BAU growth 1.6 - 3%/year)
- This translates into delayed and not forgone growth
- Estimated cost does not account for the benefits of reduced climate change
- Unmitigated climate change would create increasing risks to economic growth and reduce adaptation options

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The Choices we Make Will Create Different Outcomes (and improve or not prospects for effective adaptation)

With substantial
mitigation

Without additional
mitigation



Change in average surface temperature (1986–2005 to 2081–2100)

AR5 WGI SPM

Implications for a climate deal in Paris (2015)

- To limit warming $< 2^{\circ}\text{C}$, there is need for more ambitious **mitigation**, contributing to the goal of global **zero net** emissions well before 2100
- There is also need for **adaptation**, as climate has changed already
- **International cooperation** increases effectiveness, reduces costs
- The evidence suggests that outcomes seen as **equitable** can lead to more effective cooperation

Useful links:



- www.ipcc.ch : IPCC (reports and videos)
- www.climate.be/vanyp : my slides and other documents
- www.skepticalscience.com: excellent responses to contrarians arguments
- **On Twitter: @JPvanYpersele
and @IPCC_CH**