Climate Change Challenges and Opportunities for Small Islands States

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Belgian Embassy in Canberra, Australia, 11 August 2015

Thanks to the Belgian Federal Science Policy Office (BELSPO) and Ministry of Foreign Affairs, and to my team at the Université catholique de Louvain for their support

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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 Organizatior

UNEP= United Nations Environment Programme

What is happening in the climate system?

What are the risks?

What can be done?

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Key messages from IPCC AR5

- Human influence on the climate system is clear
- Continued emissions 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
- Humanity has the means to limit climate change and build a more sustainable and resilient future

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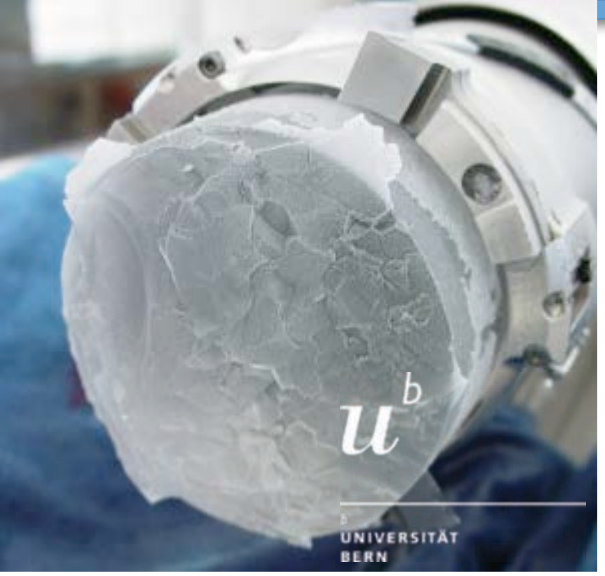


(Lüthi et al.,2008, NOAA)

The atmospheric concentrations of carbon dioxide, methane, and nitrous oxide have increased to levels unprecedented in at least the last 800,000 years.

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

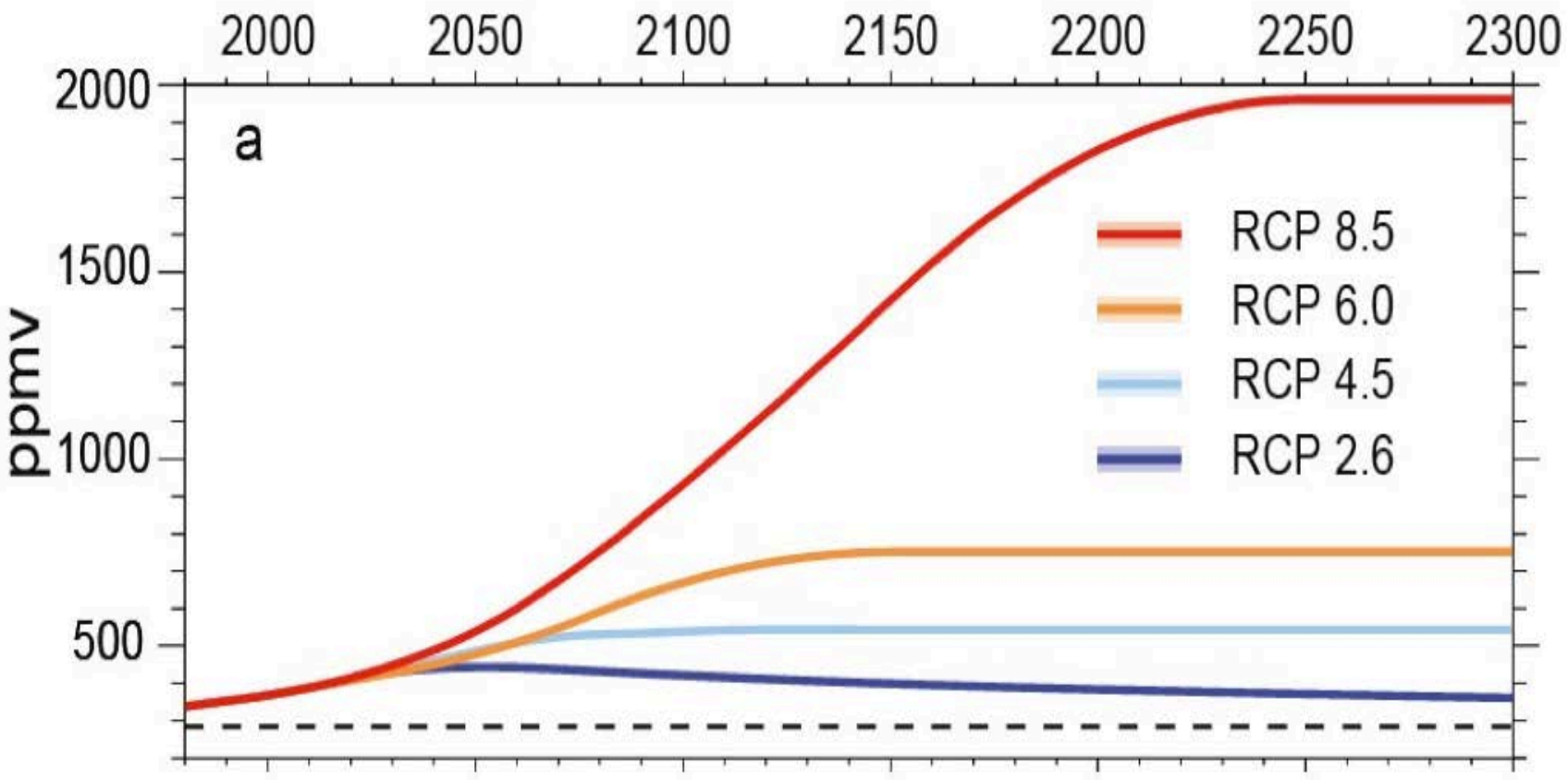
Impacts are already underway

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



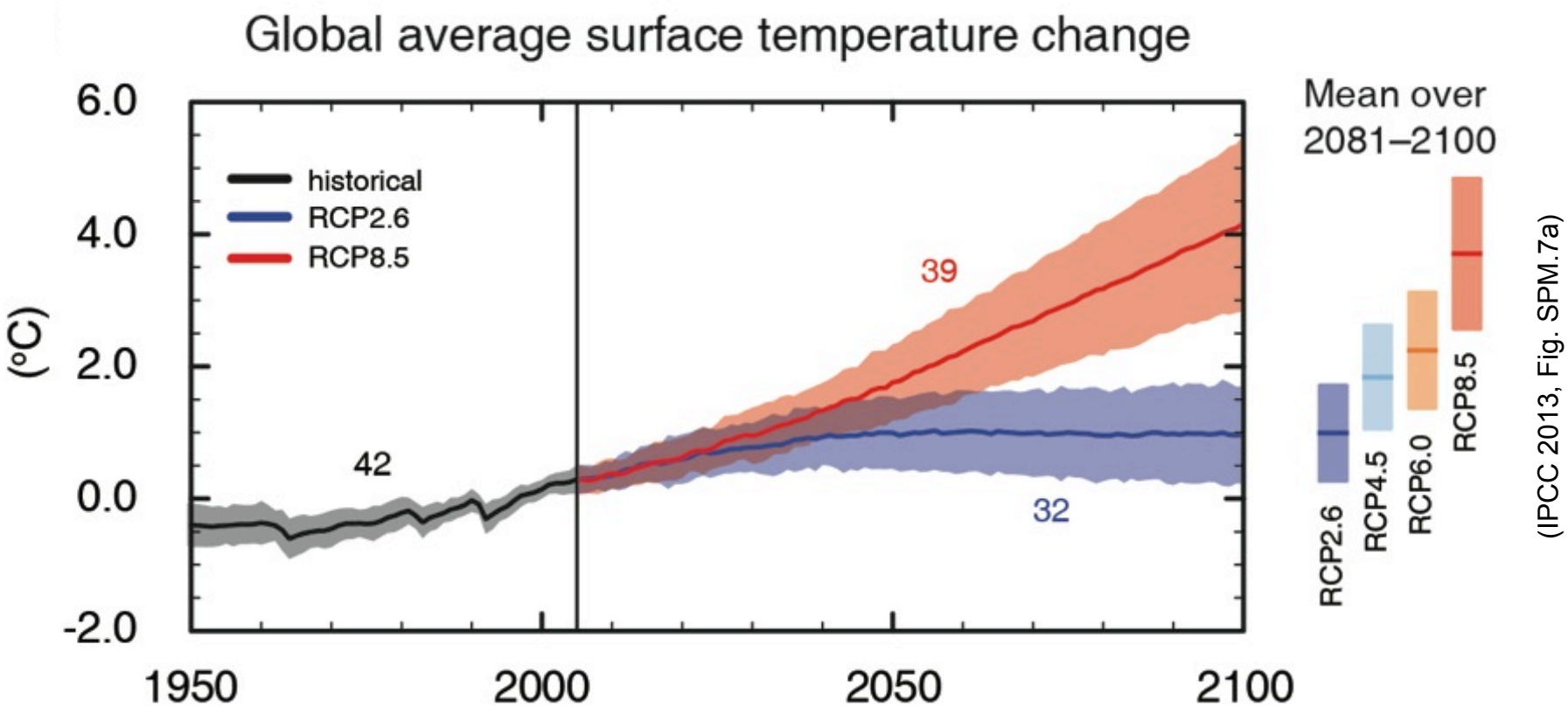

AR5 WGII SPM

RCP Scenarios: Atmospheric CO_2 concentration



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

AR5, chapter 12. WGI

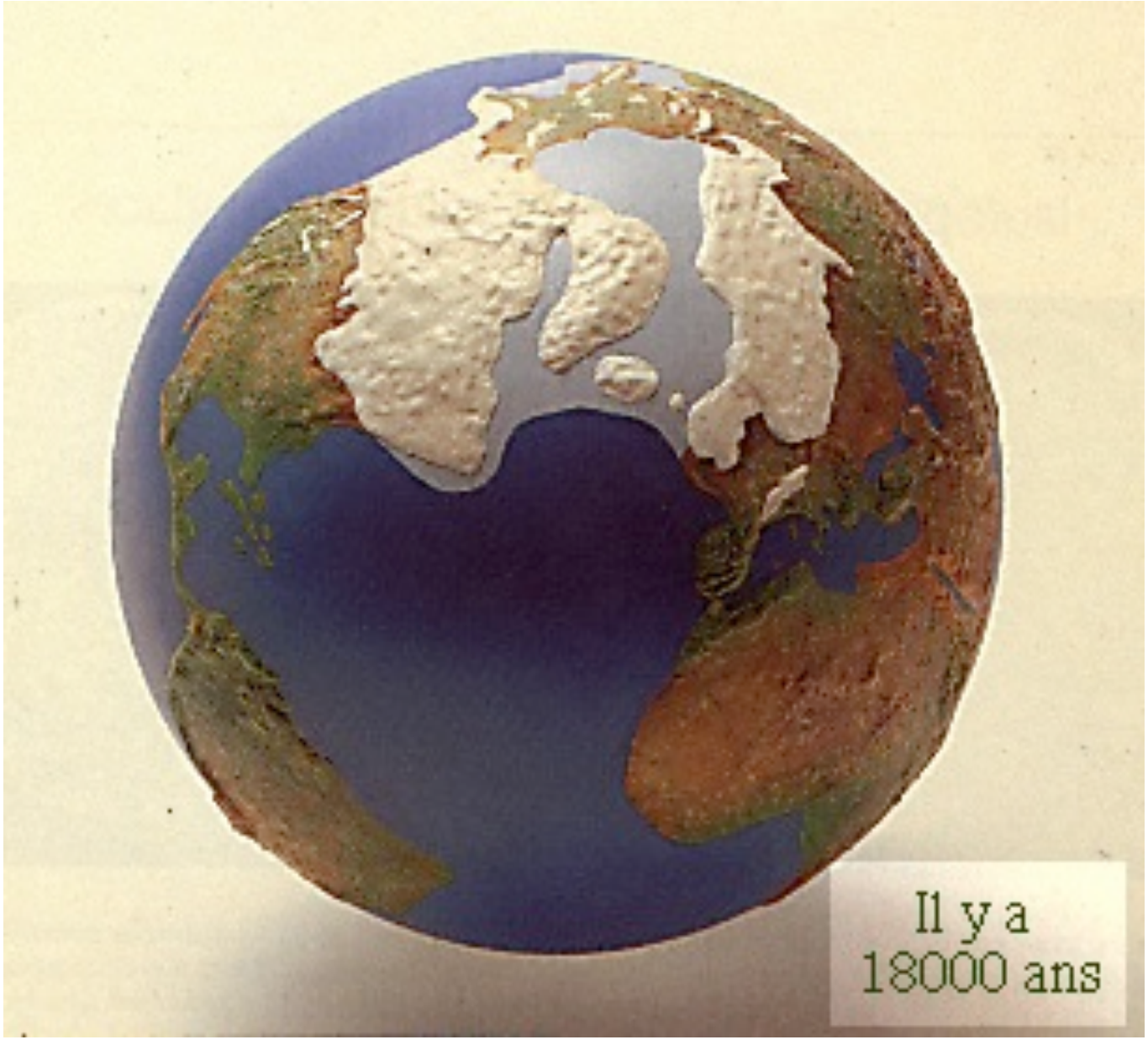


(IPCC 2013, Fig. SPM.7a)

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

18-20000 years ago (Last Glacial Maximum)

With permission from Dr. S. Joussaume, in « Climat d'hier à demain », CNRS éditions.



Today, with +4-5°C globally

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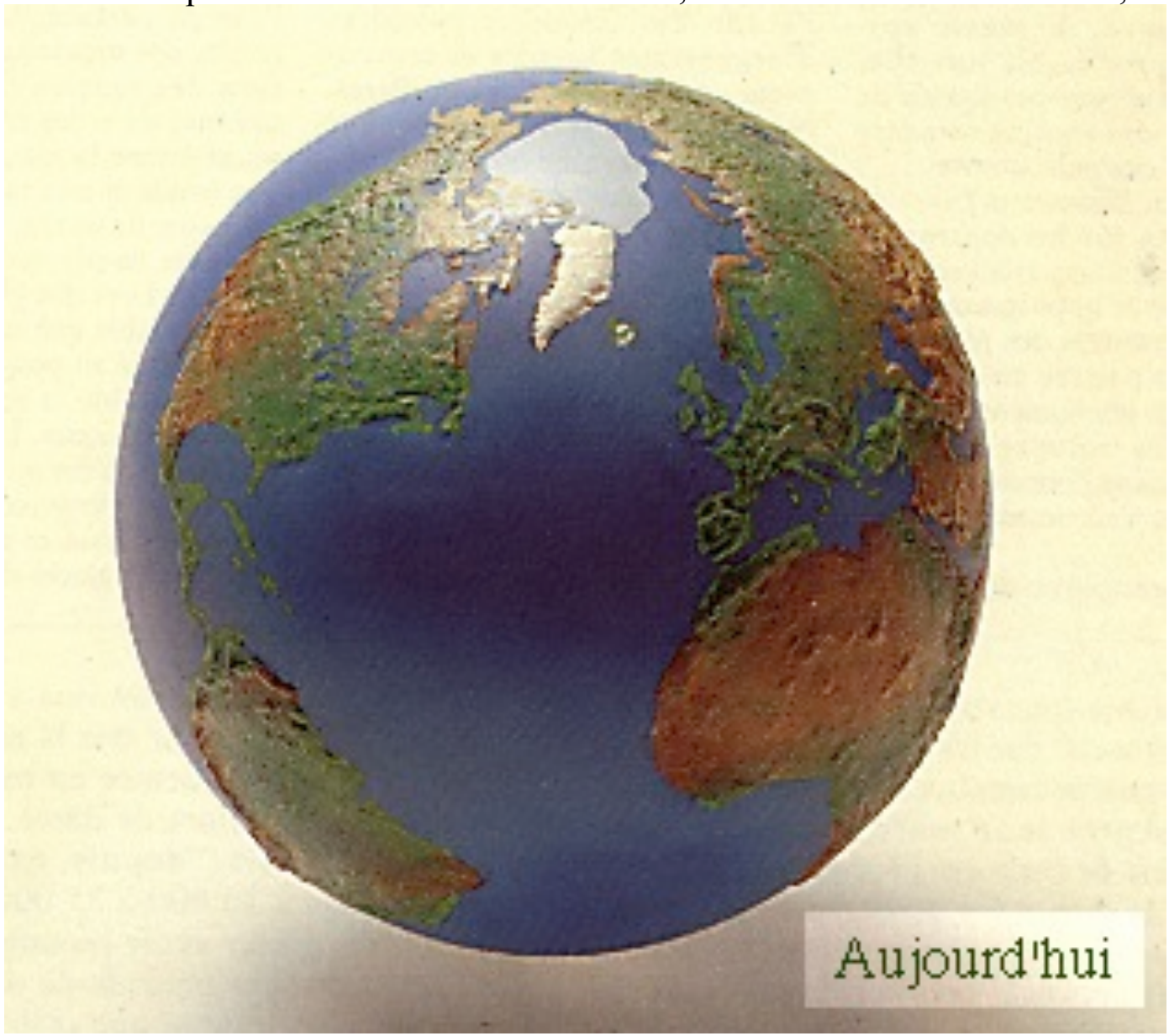


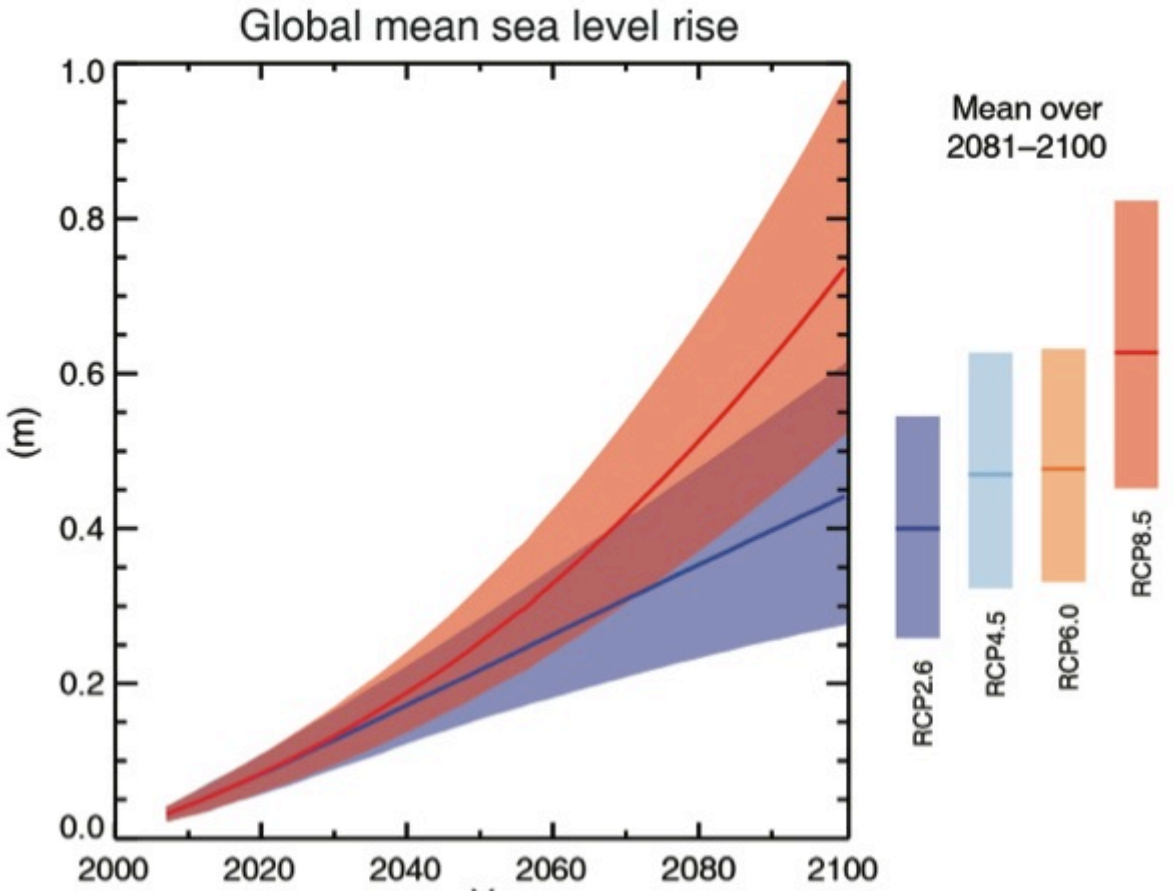


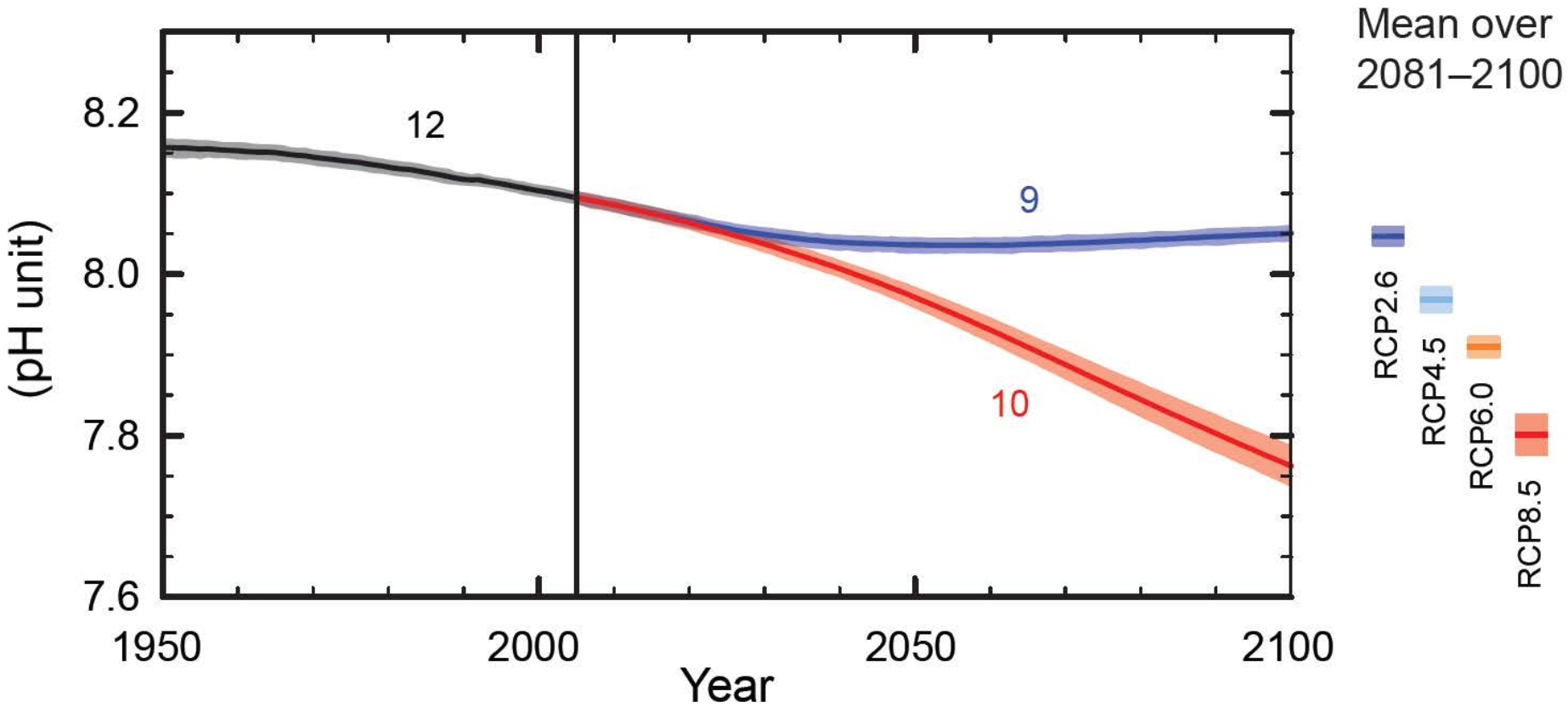
Fig. SPM.9

RCP2.6 (2081-2100), *likely* range: **26 to 55 cm**

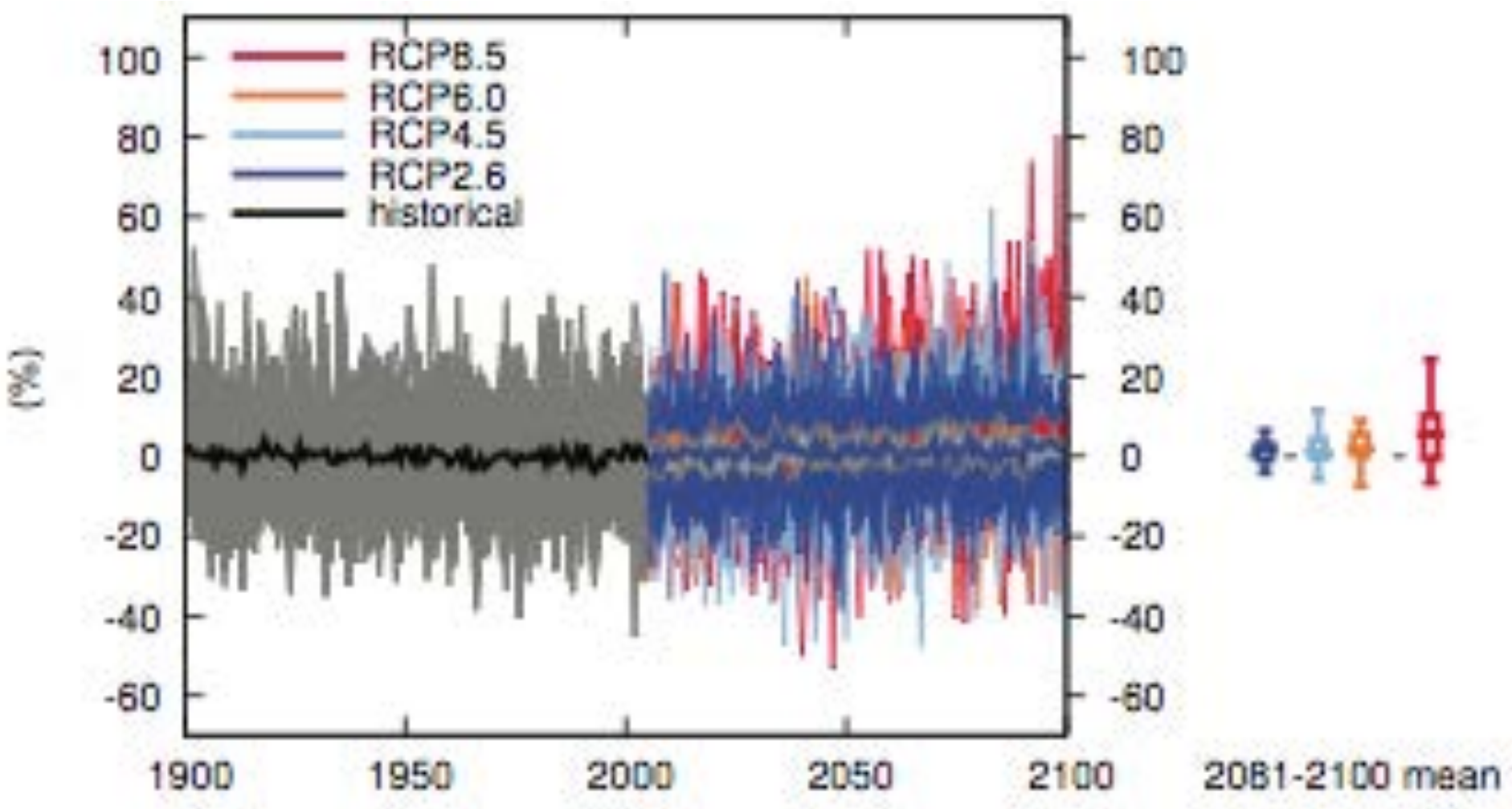
RCP8.5 (in 2100), *likely* range: **52 to 98 cm**

Figure SPM.7c
Global ocean surface pH

Acidification: the lower the pH, the more acid

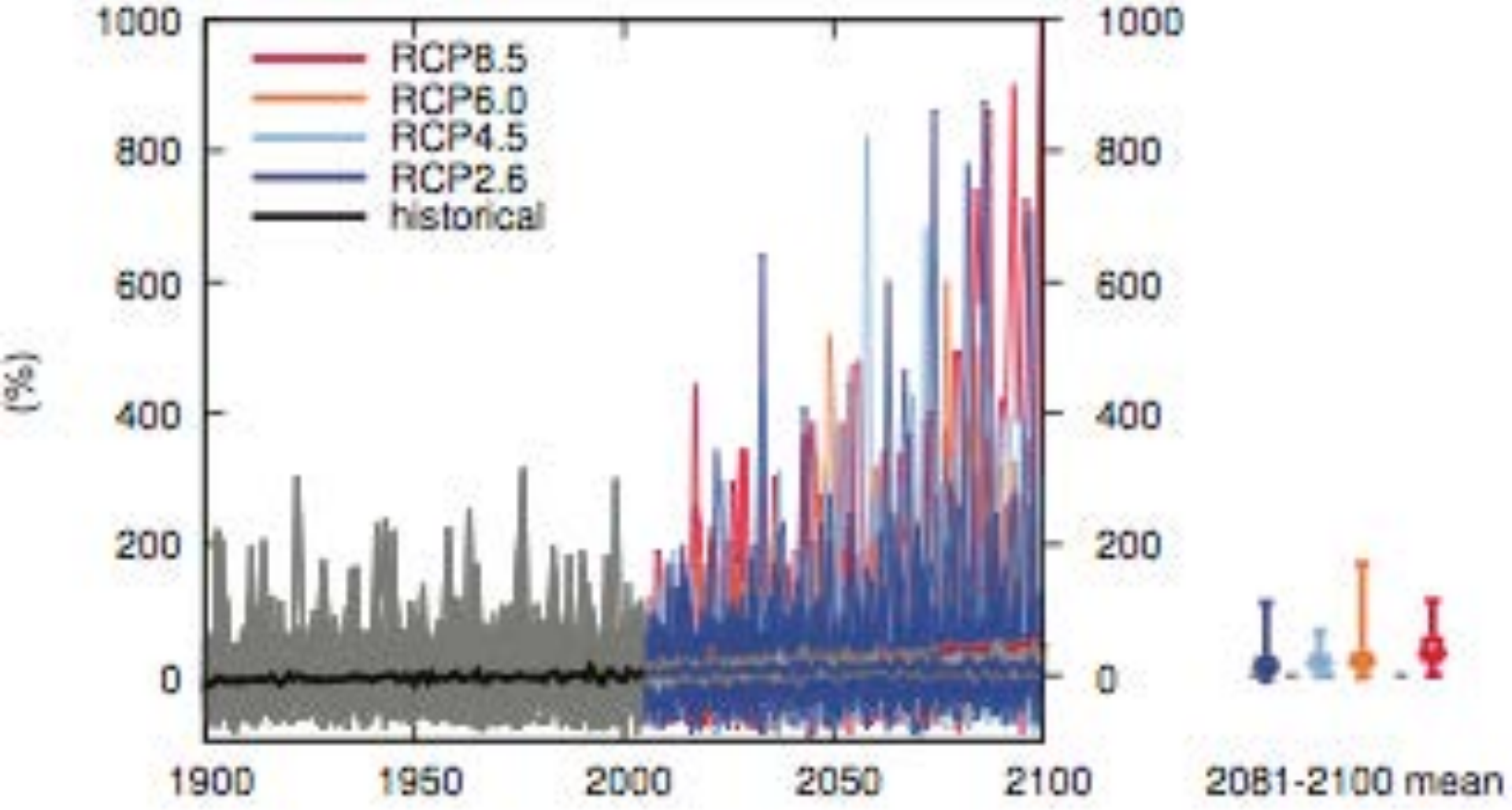


Precipitation change Northern Tropical Pacific (annual)



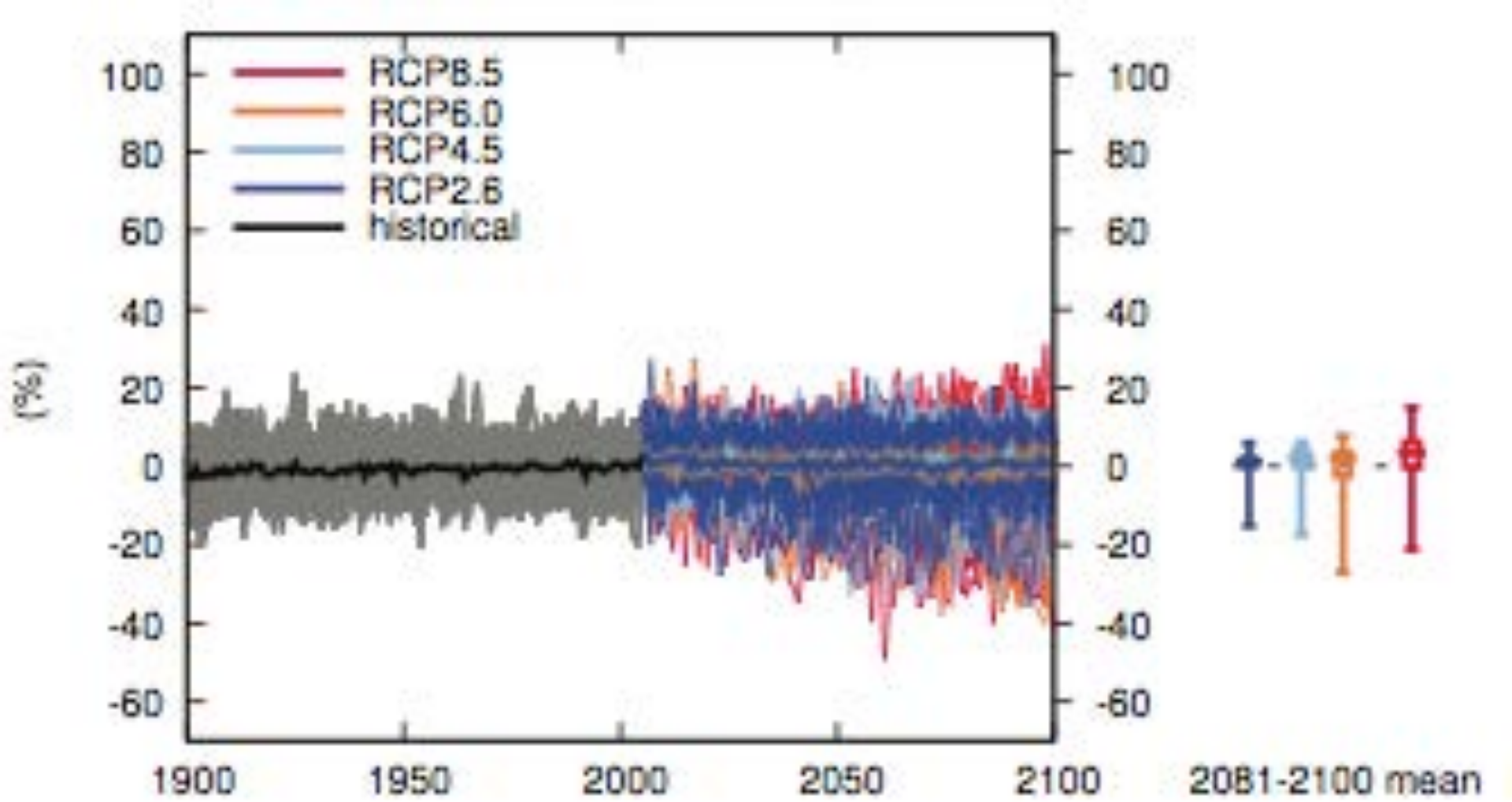
IPCC, WGI, Annex I: Atlas of Global and Regional Climate Projections Supplementary Material RCP8.5

Precipitation change Equatorial Pacific (annual)



IPCC, WGI, Annex I: Atlas of Global and Regional Climate Projections Supplementary Material RCP8.5

Precipitation change Southern Tropical Pacific (annual)



IPCC, WGI, Annex I: Atlas of Global and Regional Climate Projections Supplementary Material RCP8.5

Potential Impacts of Climate Change

Food and water shortages

Increased displacement of people

Increased poverty

Coastal flooding

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IPCC AR5 cycle: coastal areas & small islands

WGI

- Ocean Observations (Ch. 3), sea-level change (Ch.13)…
- FAQs (13.1: regional sea-level…)
  and TFEs (2: SLR uncertainties, 5: irreversibility…)

WGII

- Coastal Systems and Low-Lying Areas (Ch.5)
- Regional part: Small Islands (Ch.29), Oceans (Ch.30)
- Cross-chapter boxes : coral reefs, ocean acidification, tropical cyclone resilience, upwelling ecosystems

+ SRREN (Wind energy, ocean energy), SREX

Risks from sea-level rise

Coastal and low-lying areas will experience **more flooding and coastal erosion**

Local sea-level rise can differ substantially from global, due to e.g. subsidence, glacial isostatic adjustment, sediment transport, coastal development

Population exposed and pressure from human activities will increase significantly in the coming decades due to population growth, economic development, and urbanization

Sea-level rise: costs and adaptation

The relative costs of coastal adaptation vary strongly among and within regions and countries for the 21st century

For the 21st century**, the benefits of protecting** against increased coastal flooding and land loss due to submergence and erosion at the global scale **are larger than the social and economic costs of inaction** (limited evidence, high agreement)

Some low-lying developing countries and small island states are **expected to face very high impacts** that, in some cases, could have associated damage and adaptation costs of several percentage points of GDP

Small islands: risks

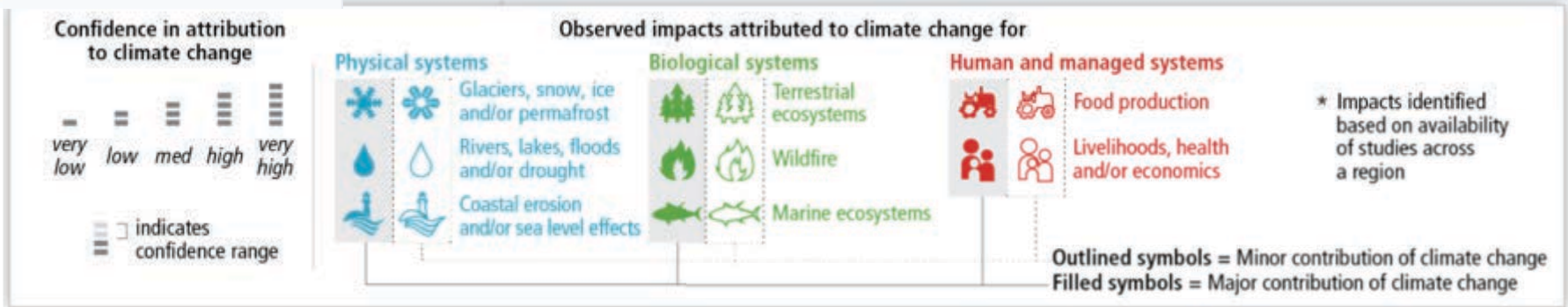
Projected increases < 2100 + extreme sea level events -> **severe sea *flood and erosion risks*** for low-lying coastal areas and atoll islands

seawater will **degrade fresh groundwater** resources

coral reef ecosystem degradation will negatively impact coastal protection, subsistence fisheries, and tourism, thus affecting livelihoods

Widespread impacts attributed to climate change based on the available scientific literature since literature since the AR4: SMALL ISLANDS

IPCC, AR5, SYR, SPM 4




ADAPTATION IS
ALREADY OCCURRING
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Small islands: adaptation

Adaptation generates **larger benefit to small islands when delivered in conjunction with other development activities**,
such as disaster risk reduction and community-based approaches to development

- address current social, economic, environmental issues,
- raise awareness, communicate future risks to local communities

Adaptation and mitigation on small islands are not always trade-offs - they **can be complementary**

- examples include energy supply, tourism infrastructure, coastal wetland services

Appropriate **assistance from the international community may help**

AR5 ch 29

The approaches available to help coastal communities adapt to the impacts of climate change fall into three general categories:

1. **Protection** of people, property, and infrastructure is a typical first response. This includes **"hard"** measures such as building seawalls and other barriers, along with various measures to protect critical infrastructure. **"Soft" protection measures are increasingly favored.** These include enhancing coastal vegetation and other coastal management programs to reduce erosion and enhance the coast as a barrier to storm surges.

IPCC, AR5, WG II, Chap. 5, p. 387

The approaches available to help coastal communities adapt to the impacts of climate change fall into three general categories:

2. **Accommodation** is a more adaptive approach involving changes to human activities and infrastructure. These **include retrofitting buildings to make them more resistant** to the consequences of sea level rise, raising low-lying bridges, or increasing physical shelter capacity to handle needs caused by severe weather. Soft accommodation measures include adjustments to land use planning and insurance programs.

IPCC, AR5, WG II, Chap. 5, p. 387

The approaches available to help coastal communities adapt to the impacts of climate change fall into three general categories:

3. **Managed retreat** involves moving away from the coast and may be the only viable option when nothing else is possible.

IPCC, AR5, WG II, Chap. 5, p. 387

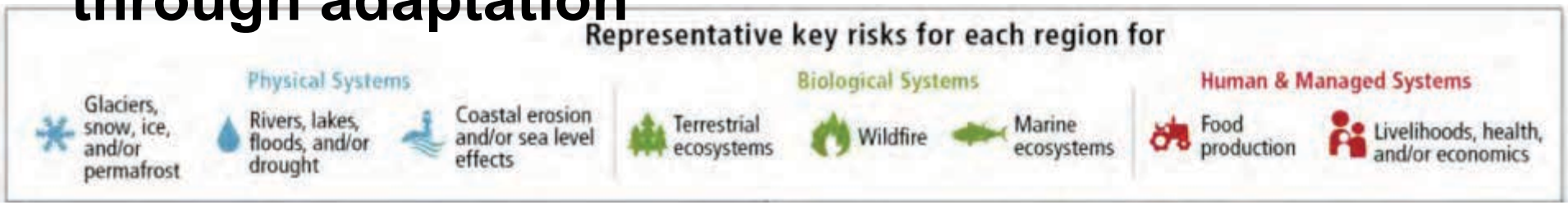
Community-based adaptation measures
(examples from WGII ch5 table 5.4)

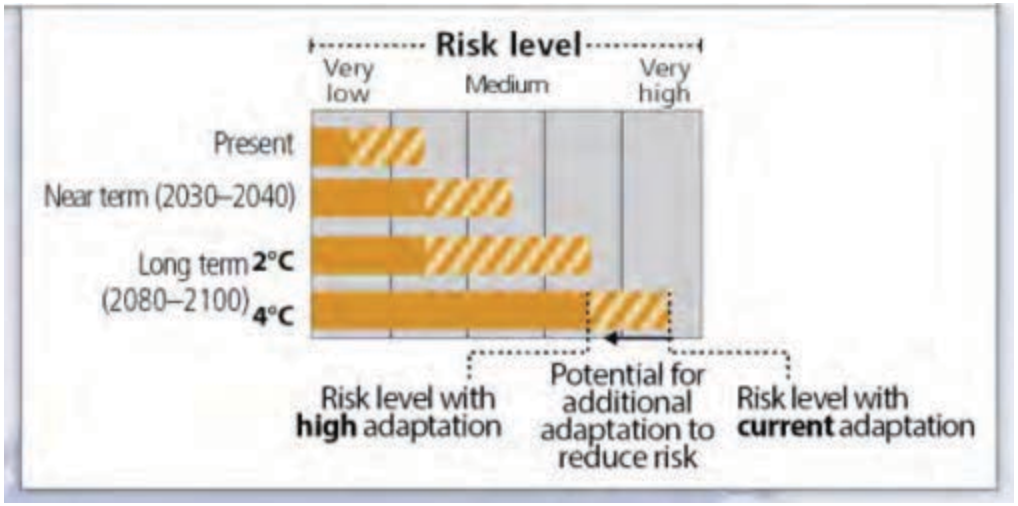
Impact	Measures
Increased salinity	*Saline-tolerant crop cultivation*
Flooding/ inundation	*Disaster management committees (discuss preparedness and response)* *Early flood warning systems*
Cyclones/ storm surges	*Low-cost retrofitting to strengthen household structures,* *Plantation of specific fruit trees around homestead area*
Sea level rise	*Farmers educated on comprehensive risk insurance*
Multi-coastal impacts	*Integrating climate change into education* *Integrated coastal zone management (ICZM) plan*

Flood risk adaptation in Bangladesh (example): cyclone shelters, awareness raising, forecasting and warning

photo: Dr Thorsten Klose/German Red Cross (2010), evaluation of the Community Based Disaster Preparedness Programme run by the Red Cross in1996-2002

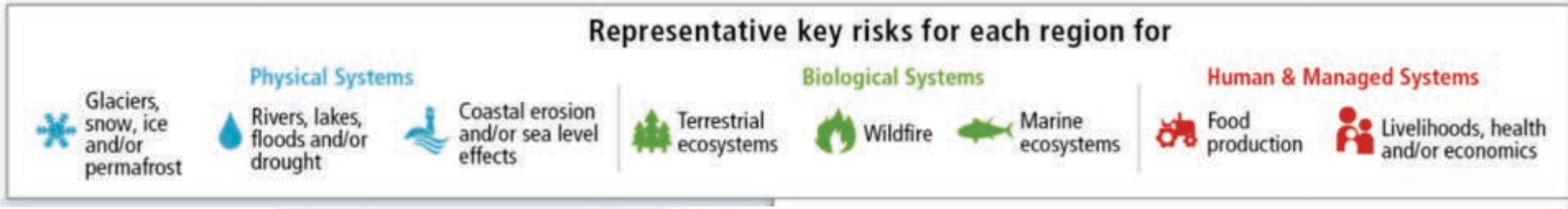
Regional key risks and potential for risk reduction through adaptation



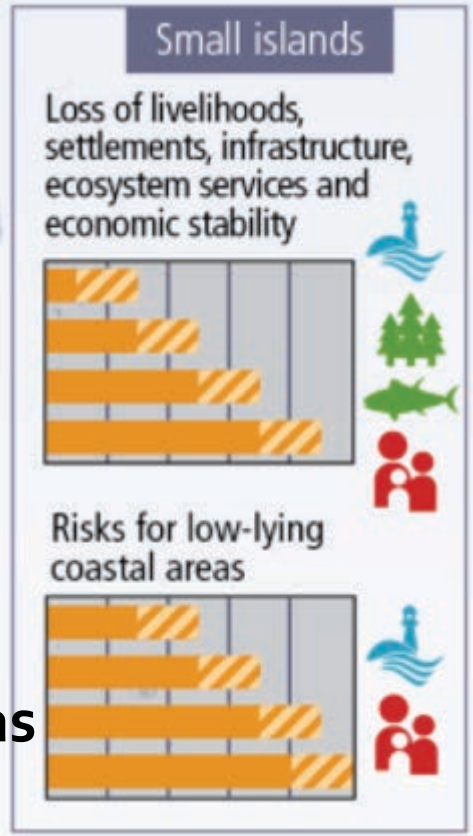


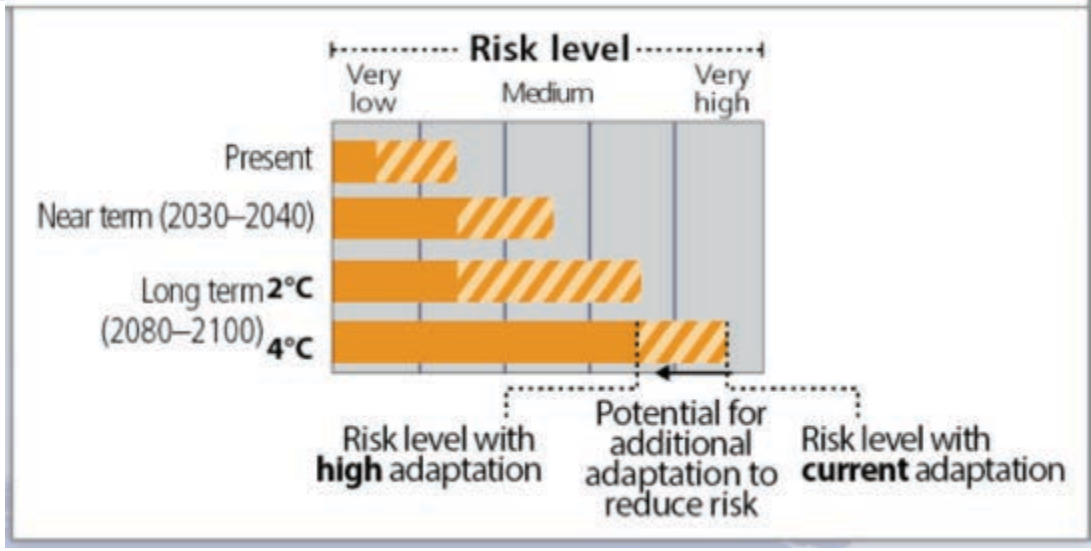
IPCC, AR5, SPM, Figure SPM.8

Regional key risks and potential for risk reduction: Small Islands



Losses





Risk to coastal areas

IPCC, AR5, SYR, SPM 8

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RISKS OF
CLIMATE CHANGE
INCREASE
WITH CONTINUED
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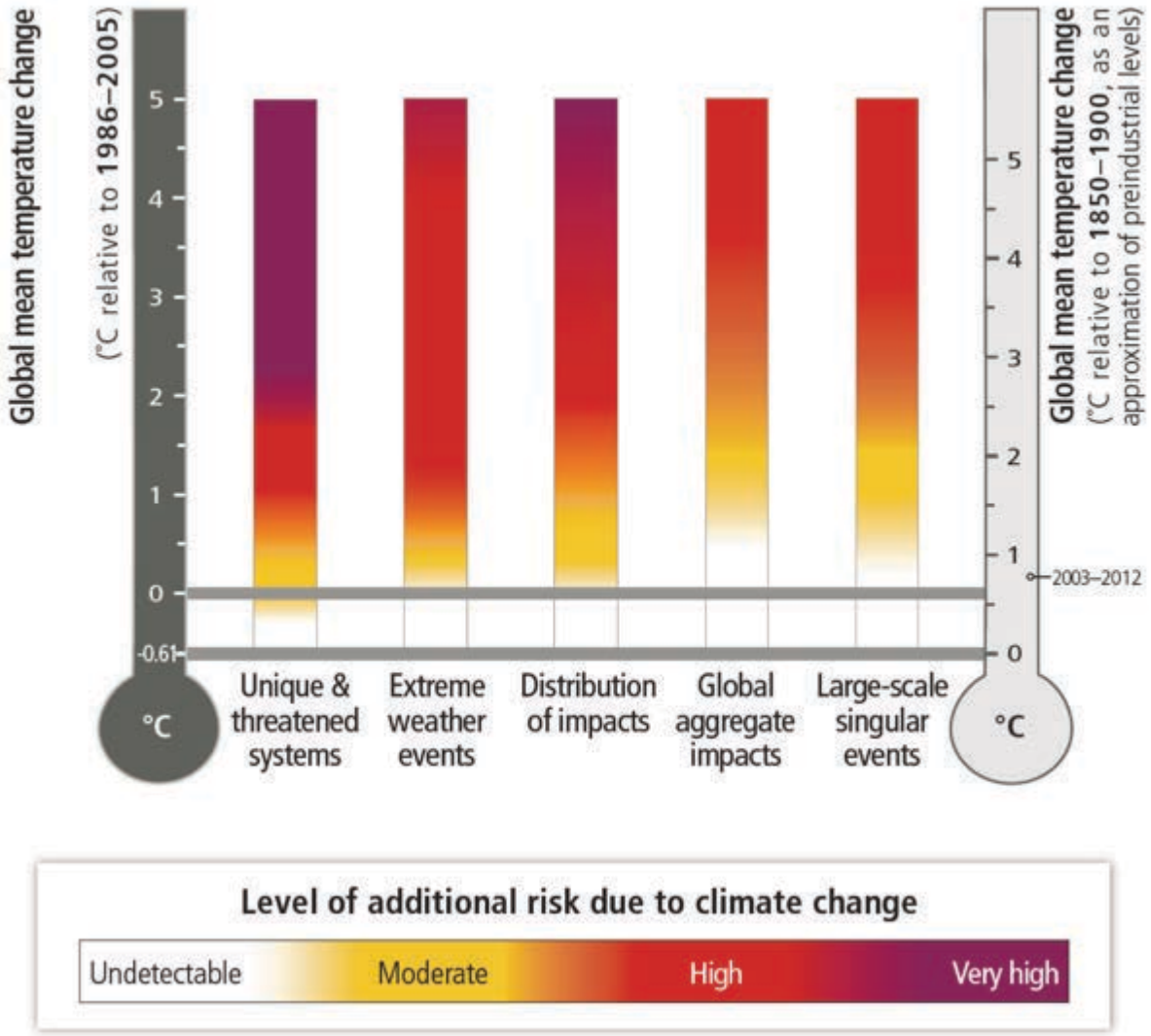
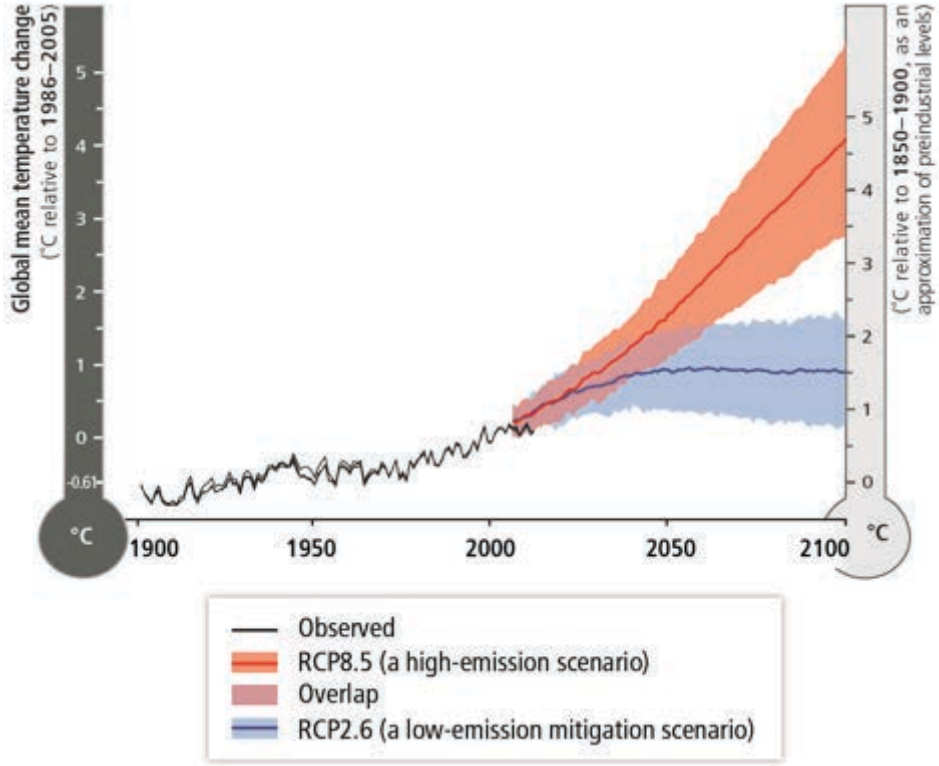
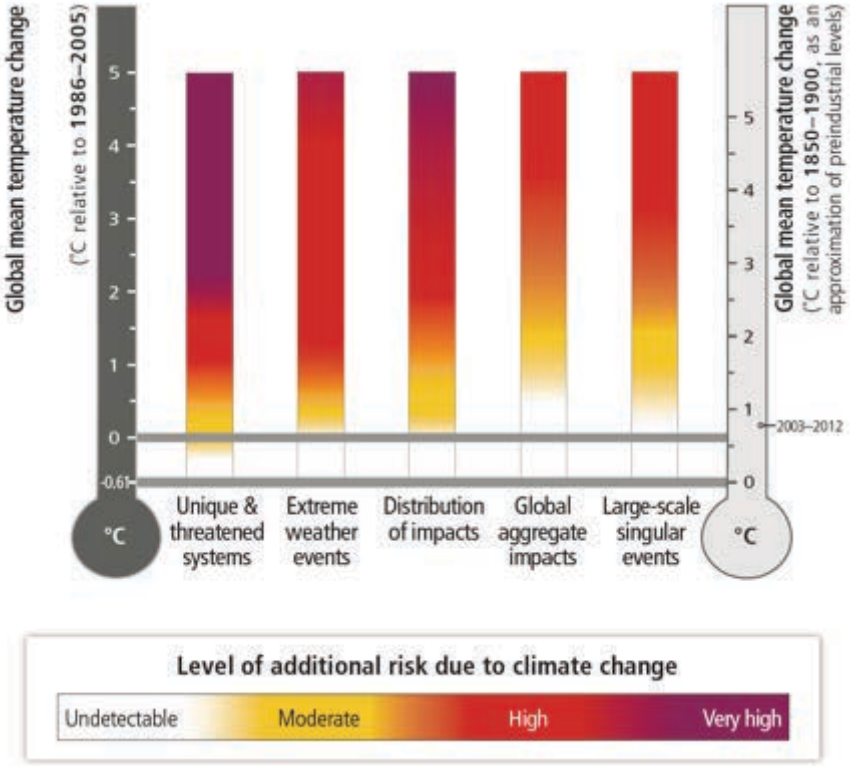


AR5, WGII, Box SPM.1 Figure 1





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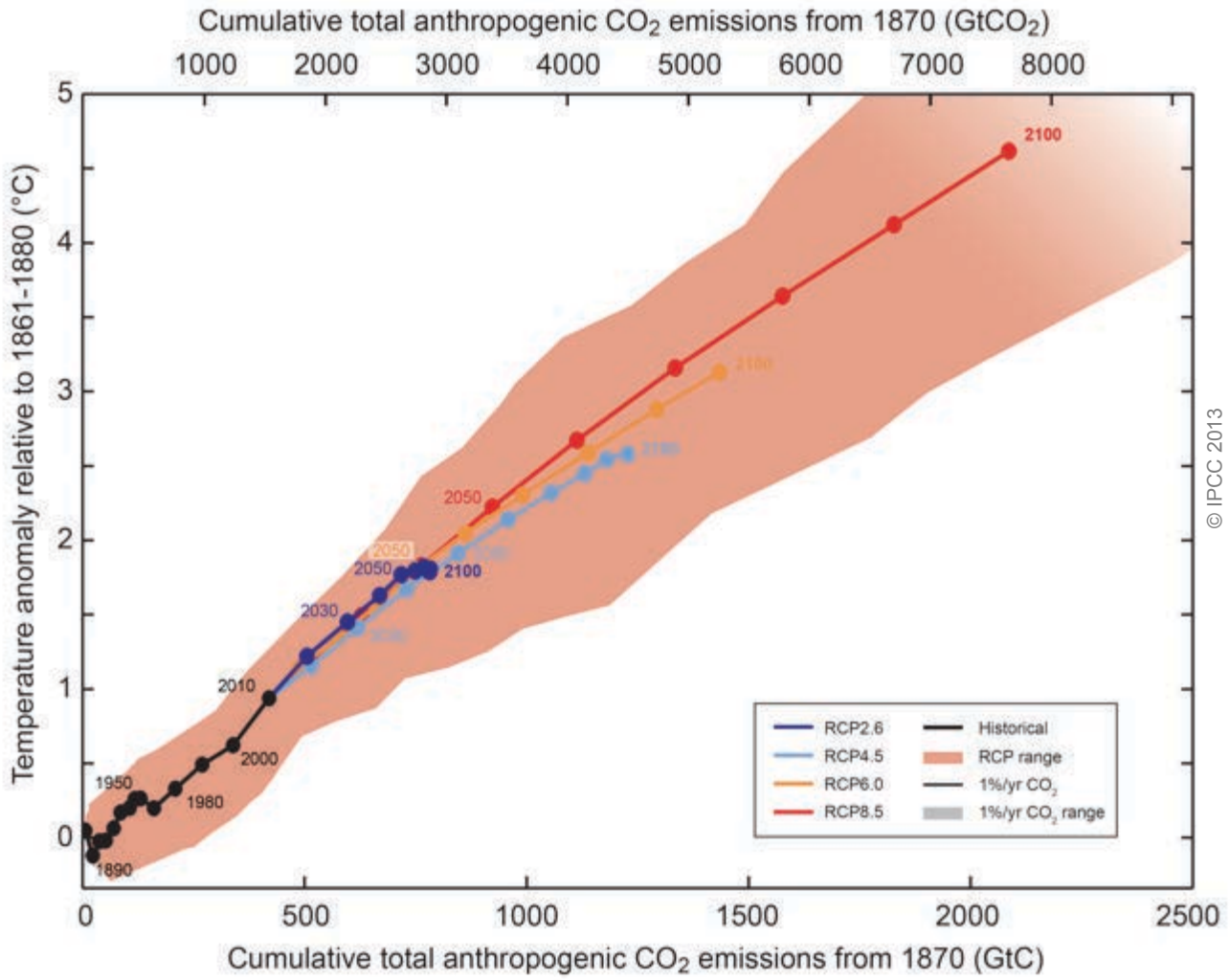
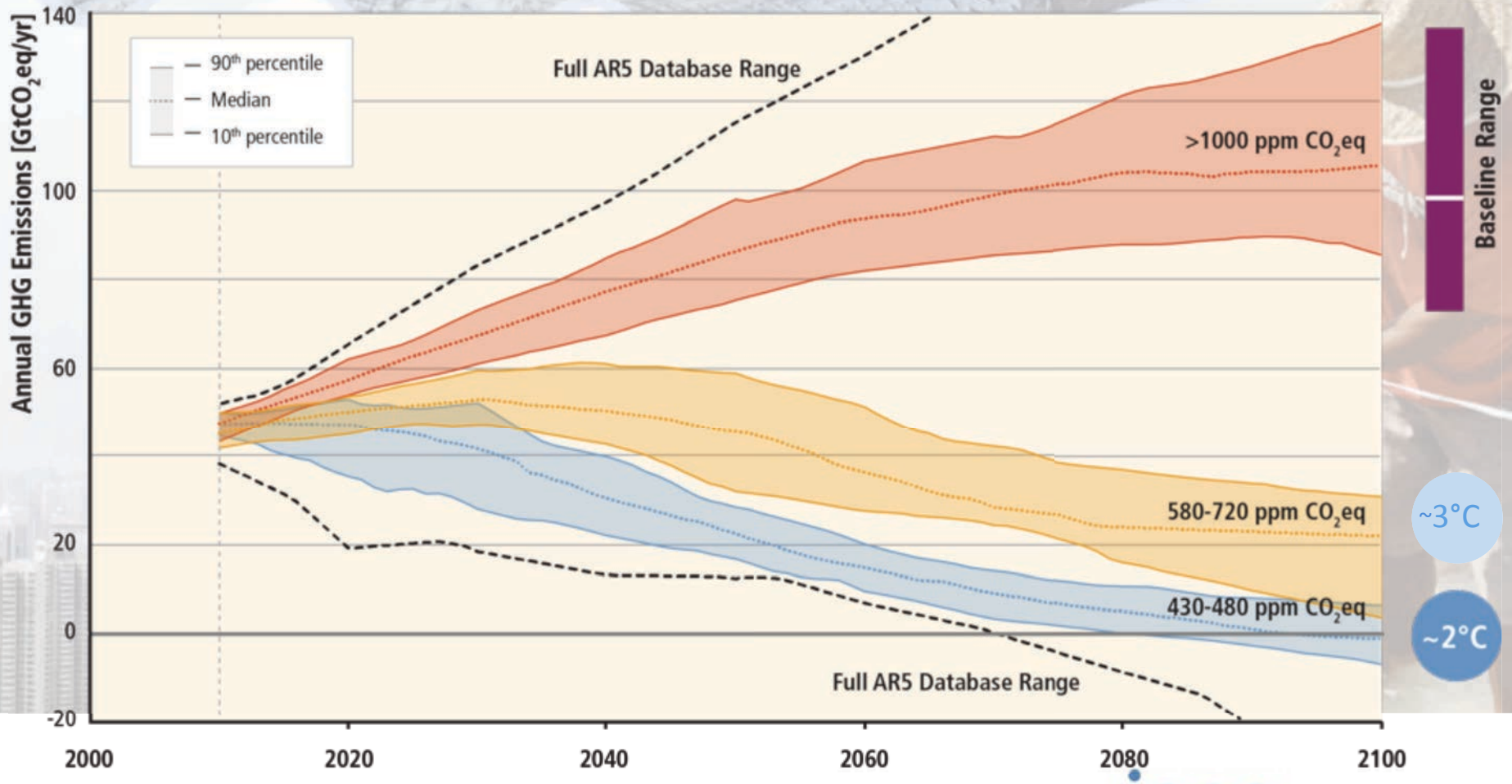


Fig. SPM.10

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

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IPCC AR5 Synthesis Report

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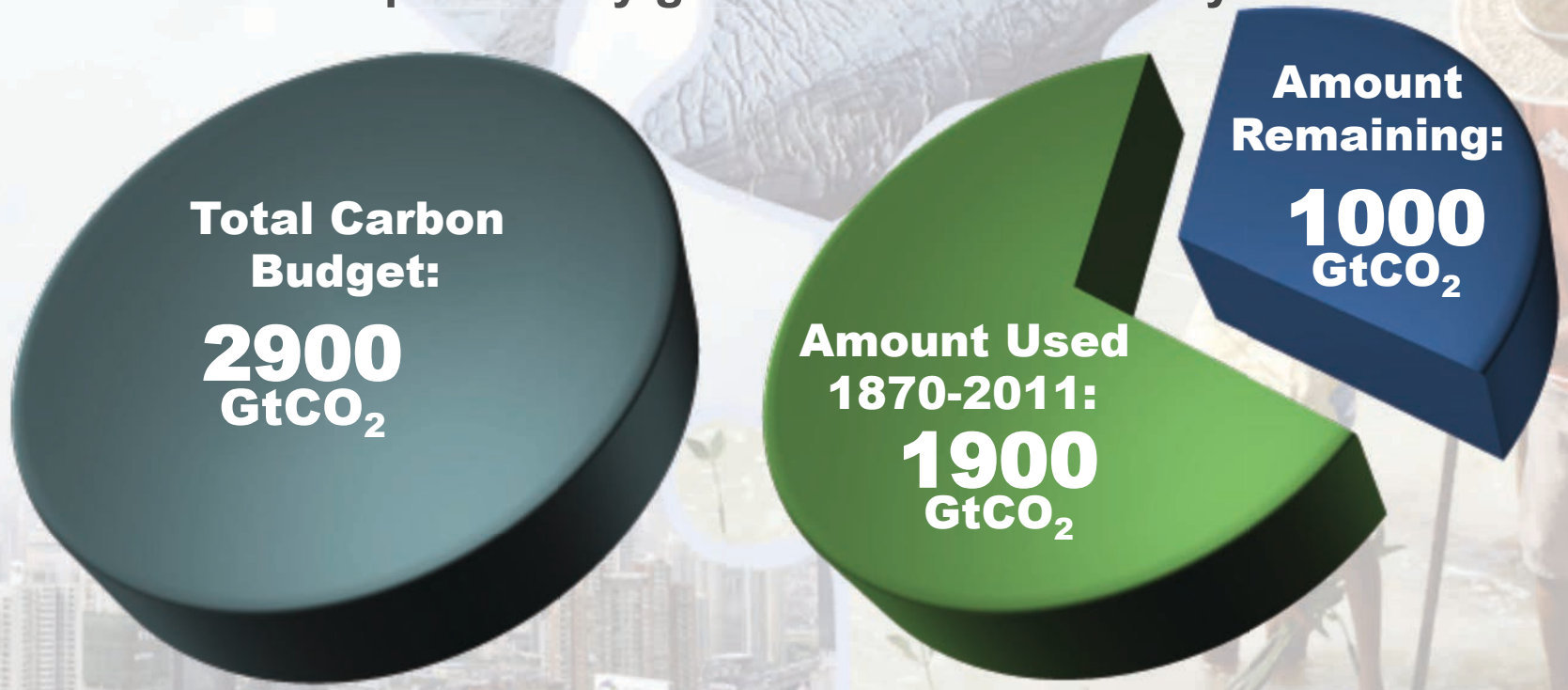
The window for action is rapidly closing

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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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

Can temperature rise still be kept below 1.5 or 2°C (over the 21st century) compared to pre-industrial ?

- **Many scenario studies confirm that it is technically and economically feasible to keep the warming below 2°C, with more than 66% probability ("likely chance").** This would imply limiting atmospheric concentrations to 450 ppm CO_2-eq by 2100.
- **Such scenarios** for an above 66% chance of staying below 2°C **imply reducing by 40 to 70% global GHG emissions compared to 2010 by mid-century, and reach zero or negative emissions by 2100.**

- **Sustainable development and equity provide a basis for assessing climate policies and highlight the need for addressing the risks of climate change**

- **Issues of equity, justice, and fairness arise with respect to mitigation and adaptation**

Equity is an integral dimension of Sustainable development (*high confidence*)

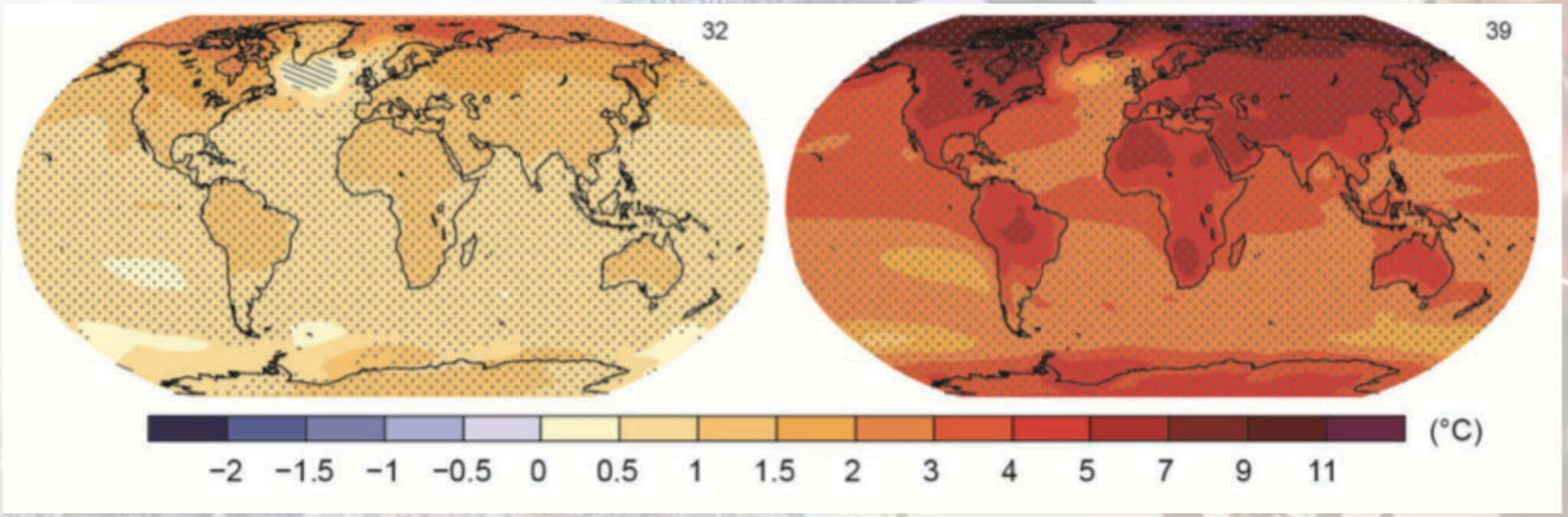
- Intergenerational equity underlies the concept of sustainability;
- Intra-generational equity is also often considered an intrinsic component of SD.
- In the particular context of international climate policy discussions, several arguments support giving equity an important role:
  - a moral justification that draws upon ethical principles;
  - a legal justification that appeals to existing treaty commitments …;
  - and an effectiveness justification that argues that a fair arrangement is more likely to be agreed internationally ...

AR5, WGIII, Ch.4, p.4

The Choices Humanity Makes Will Create Different Outcomes (and increase prospects for effective adaptation)

With substantial mitigation

Without additional mitigation



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

AR5 WGI SPM

Useful links:

- www.ipcc.ch : IPCC (reports and videos)
- www.climate.be/vanyp : my slides and my platform as candidate IPCC Chair
- **On Twitter: @JPvanYpersele and @IPCC_CH**