Climate Change, the IPCC, and Opportunities and Limits of Adaptation

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Why the IPCC ?

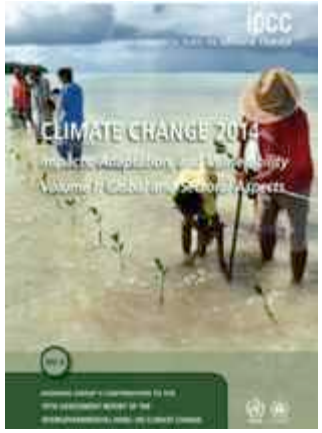
Established by WMO and UNEP in 1988

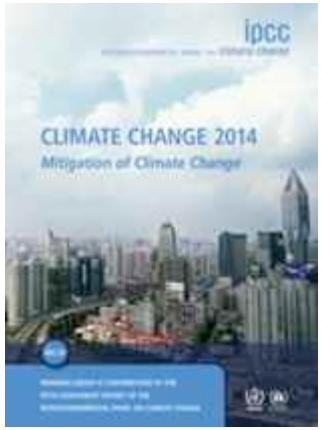
to provide policy-makers with an objective source of information about

- 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

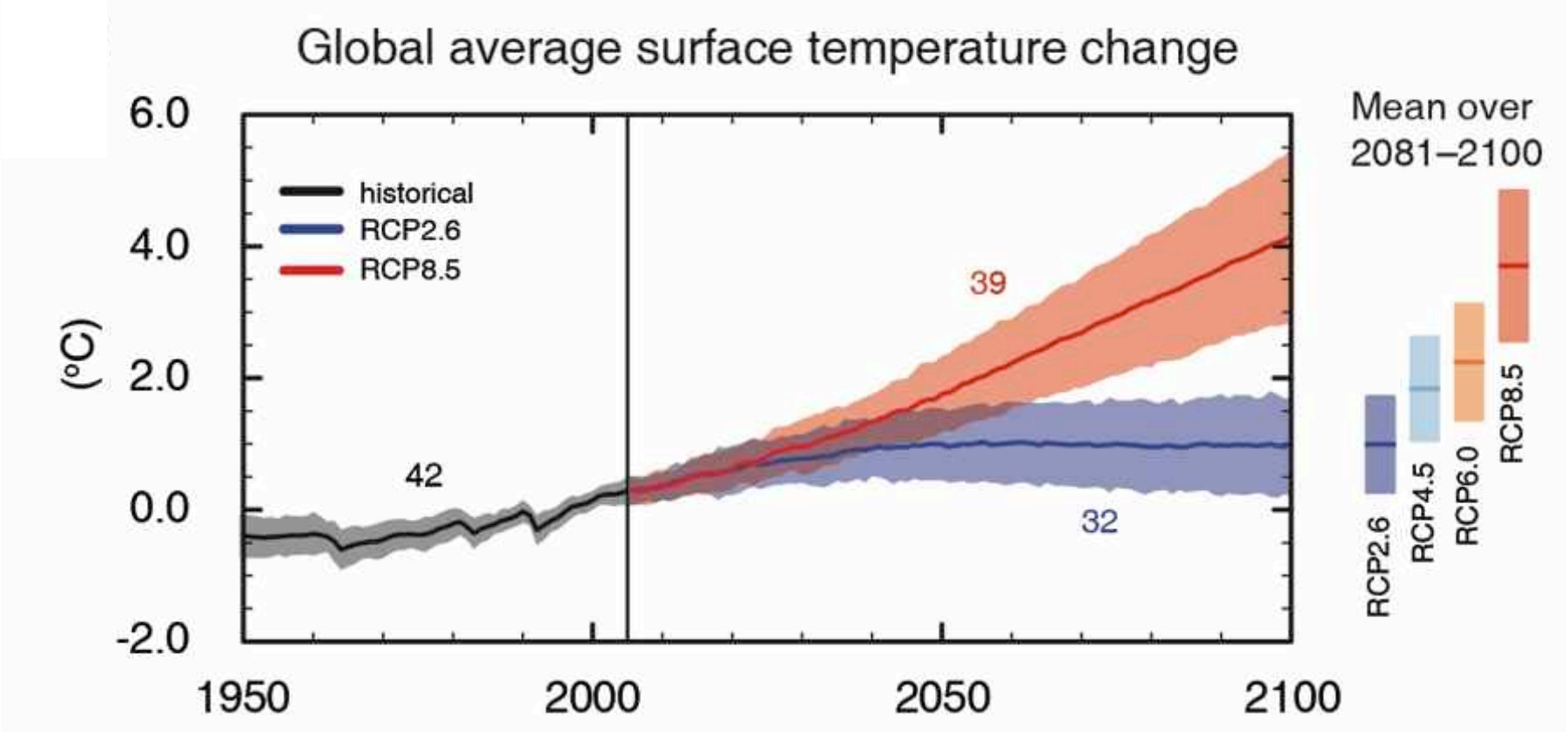
Since 1950, extreme hot days and heavy precipitation have become more common

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



(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

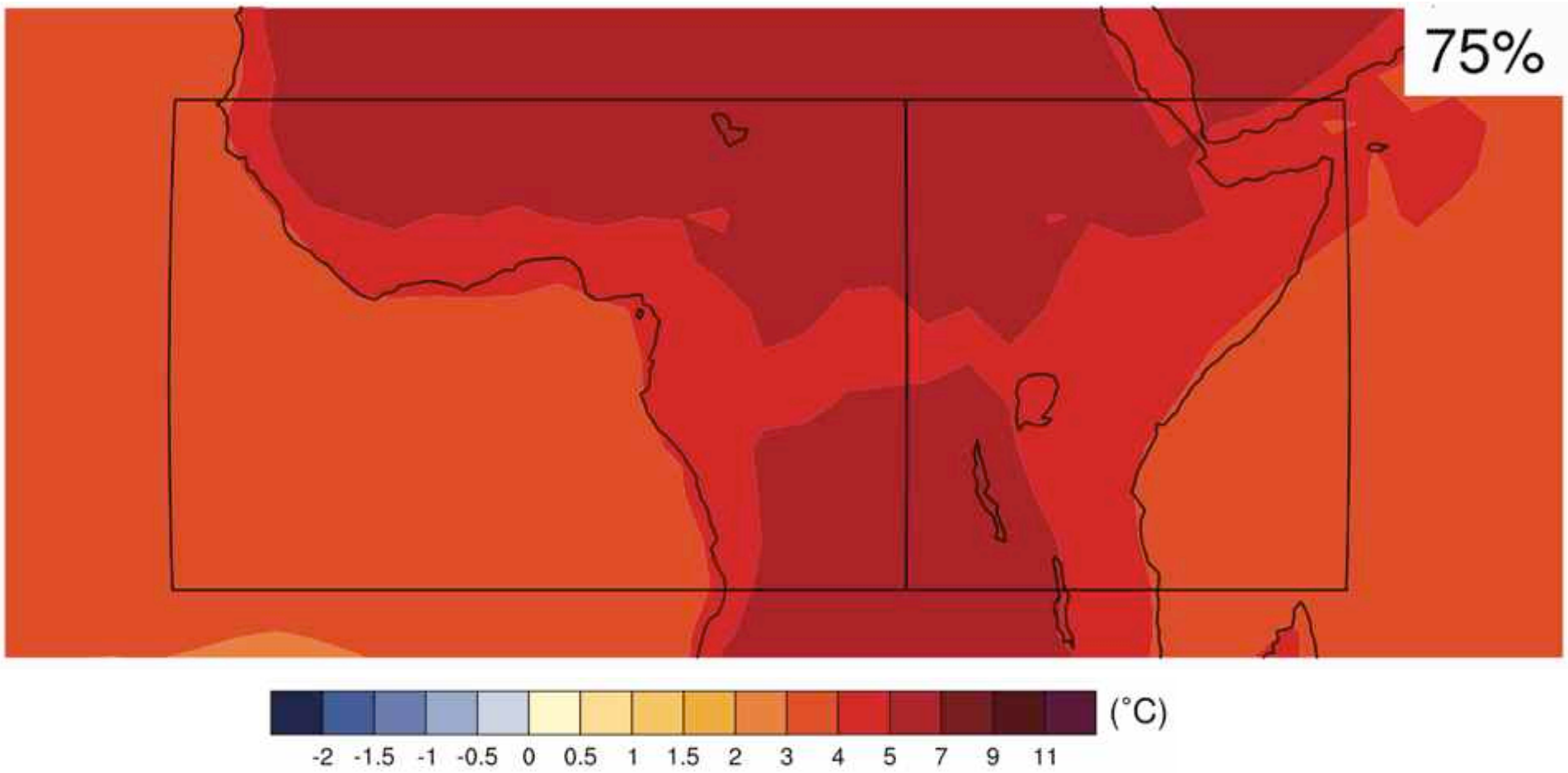
18-20000 years ago (Last Glacial Maximum)

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

Today, with +4-5°C globally

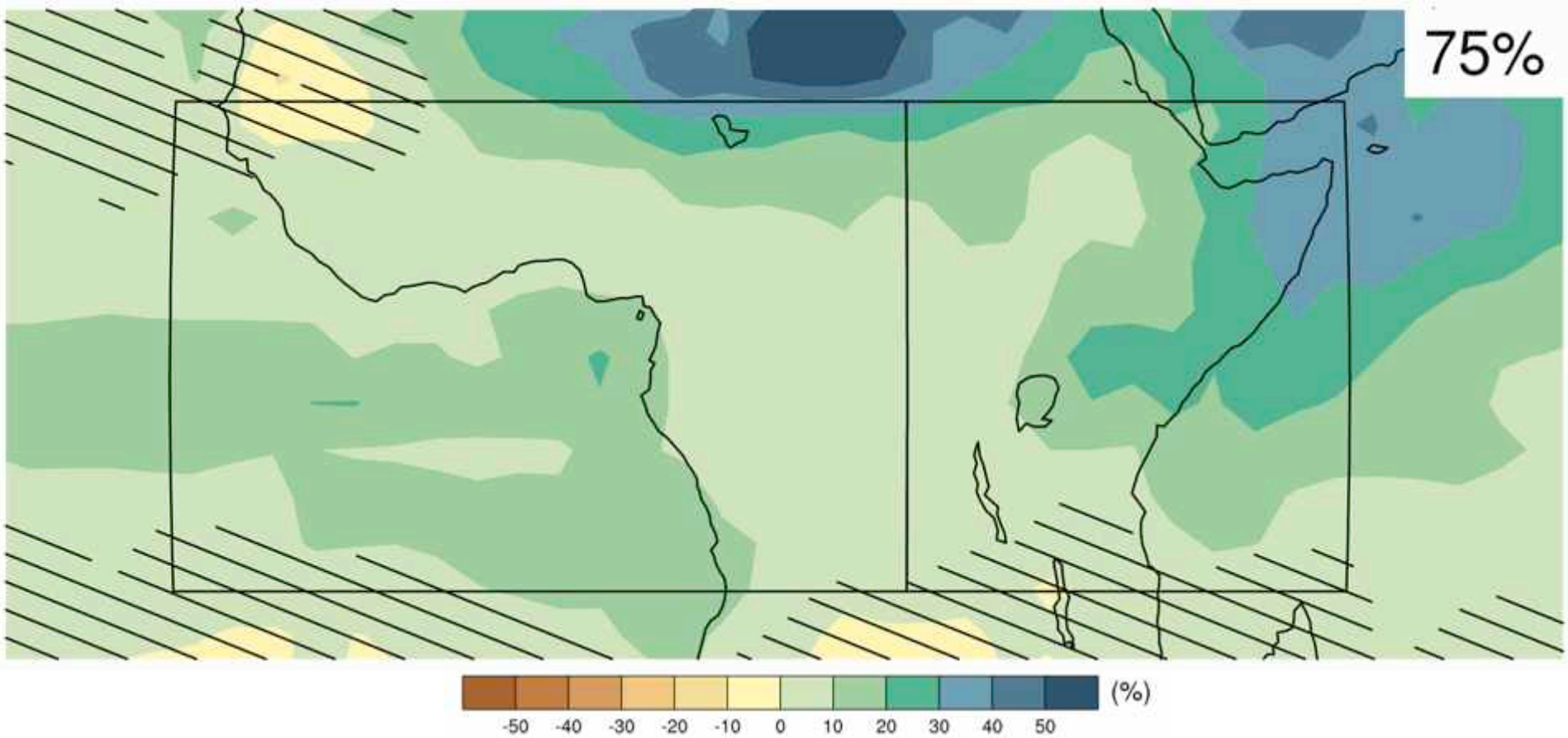
With permission from Dr. S. Joussaume, in « Climat d'hier à demain », CNRS éditions.

Maps of temperature changes in 2081–2100 with respect to 1986–2005 in the RCP8.5 scenario



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

Maps of precipitation changes in 2046–2065, with respect to 1986–2005 in the RCP8.5 scenario



Regions where the projected change is less than one standard deviation of the natural internal variability

Regions where the projected change is large compared to natural internal variability, and where at least 90% of models agree on a sign of change

National Assessments

In Kenya, a study by the Stockholm Environment Institute (SEI) estimated the economics of climate change under a range of scenarios and estimated that, **by 2050, more than 300,000 people could be flooded per year under a high-emissions scenario**.

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IPCC, AR5, WG II, Chap. 14, p. 852

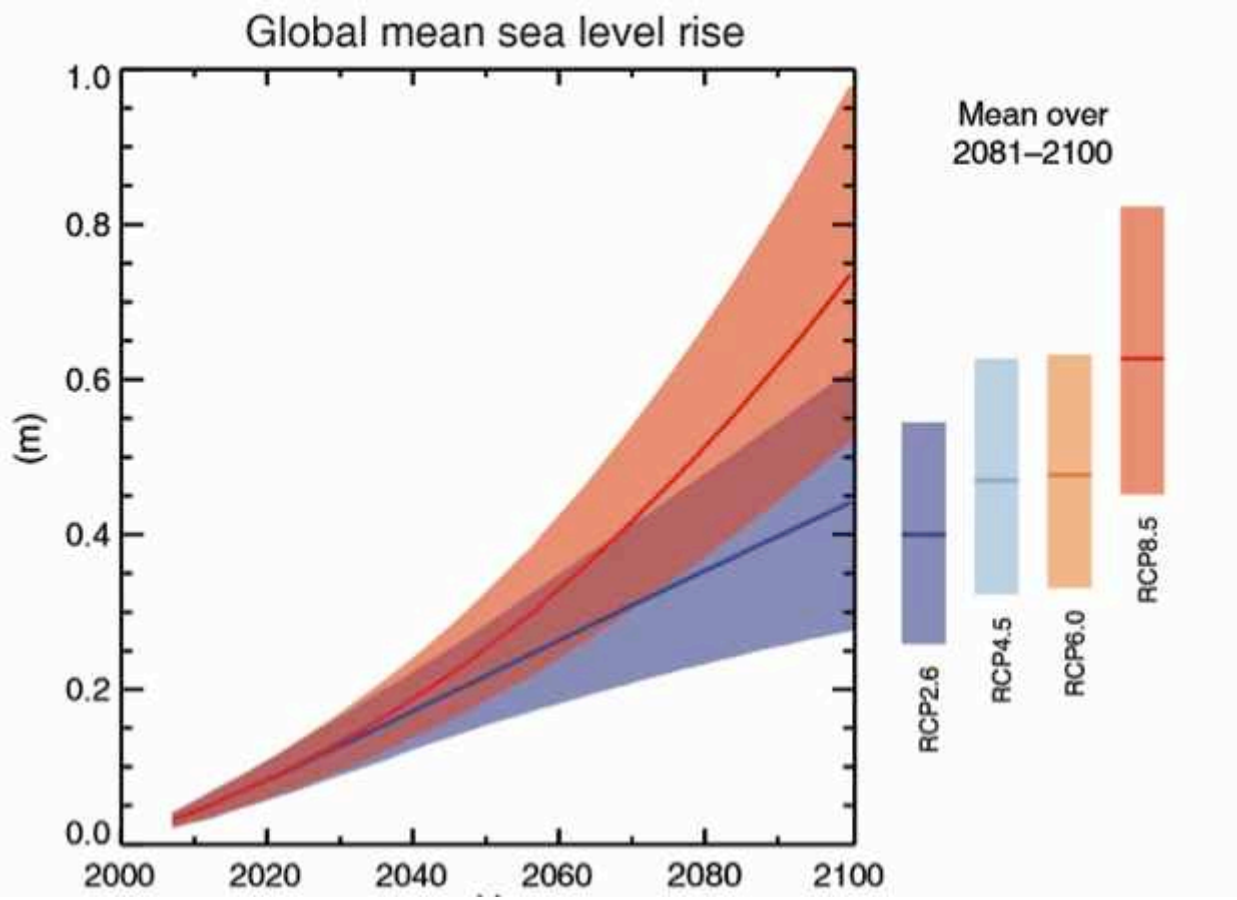

Fig. SPM.9

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

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

Potential Impacts of Climate Change

- Food and water shortages
- Increased displacement of people
- Increased poverty
- Coastal flooding

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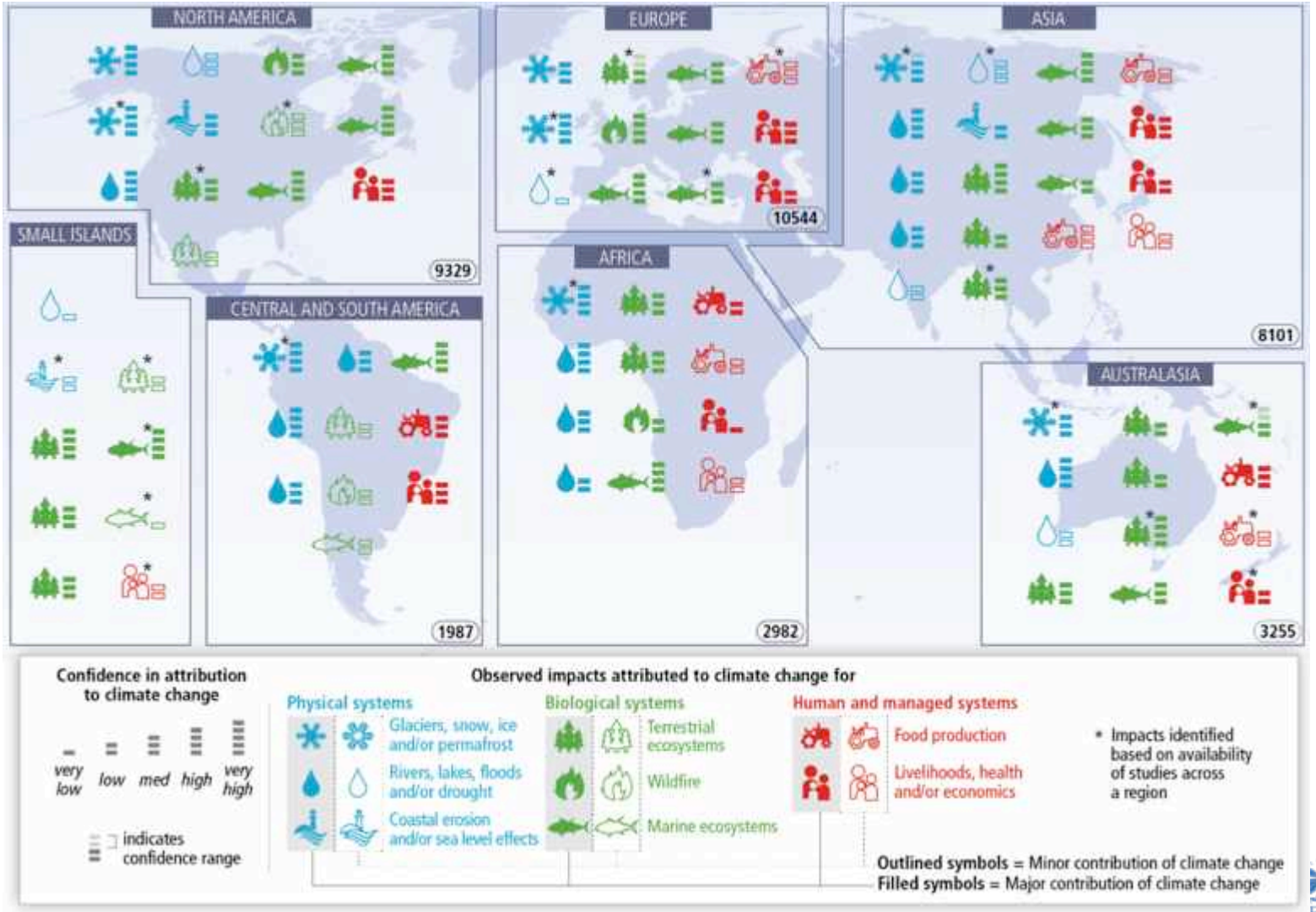
Risk = Hazard x Vulnerability x Exposure (Katrina flood victim)

AP Photo - Lisa Krantz (http://lisakrantz.com/hurricane-katrina/zspbn1k4cn17phidupe4f9x5t1mzdr)

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



IPCC, AR5, SYR, SPM 4

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

AR5 ch 5 (ExSum)

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

ADAPTATION IS

ALREADY OCCURRING

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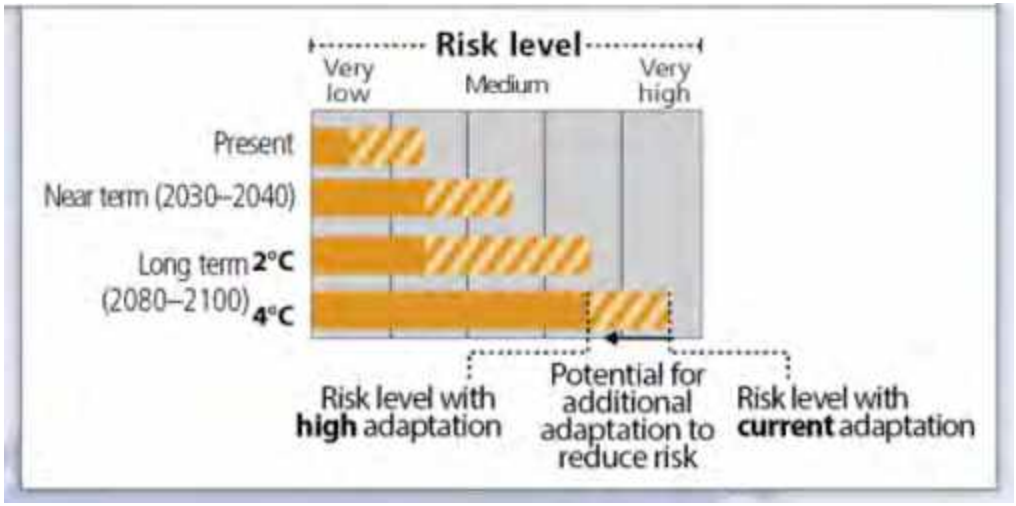
Flood risk adaptation in Bangladesh (example): cyclone shelters, awareness raising, forecasting and warning

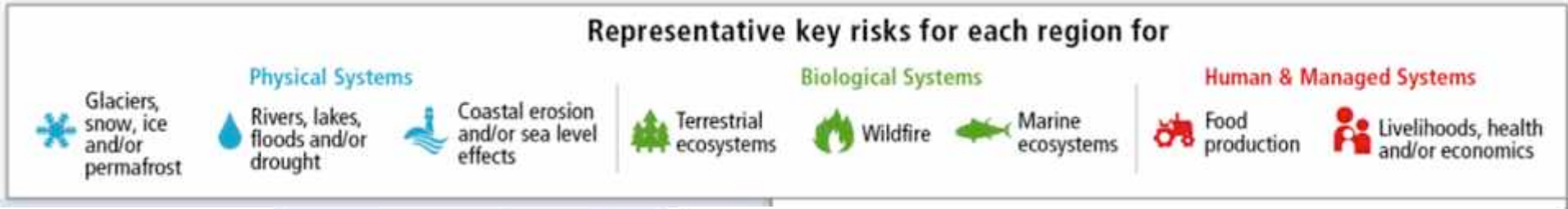
photo: Dr Thorsten Klose/German Red Cross (2010), evaluation of the Community Based Disaster Preparedness Programme run by the Red Cross in1996-2002

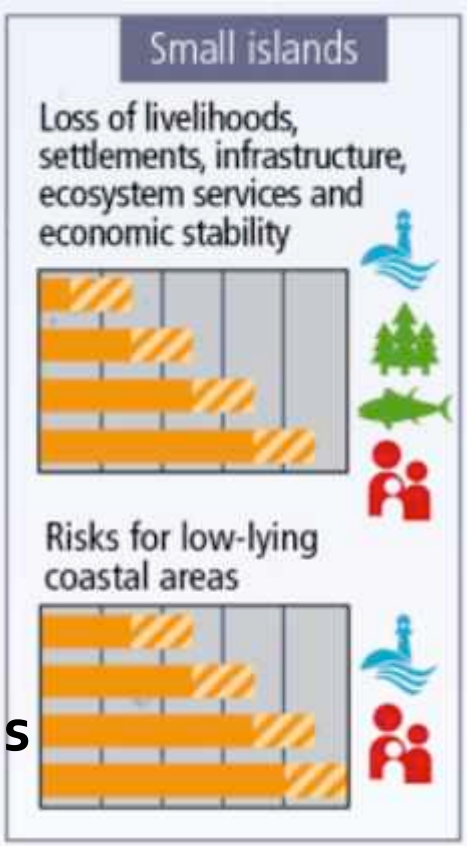
Regional key risks and potential for risk reduction through adaptation

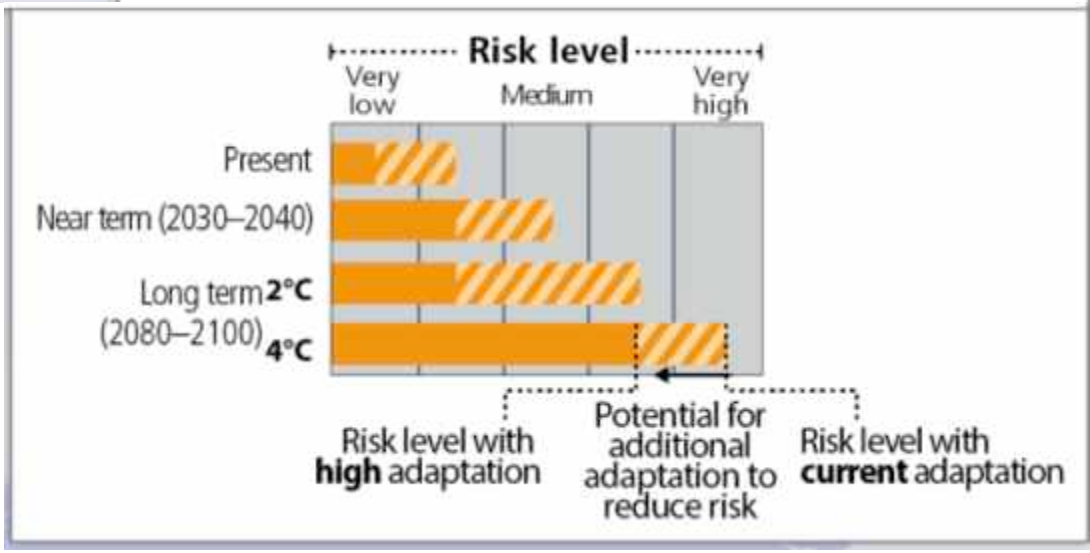


IPCC, AR5, SPM, Figure SPM.8

Regional key risks and potential for risk reduction: Small Islands







Losses

Risk to coastal areas

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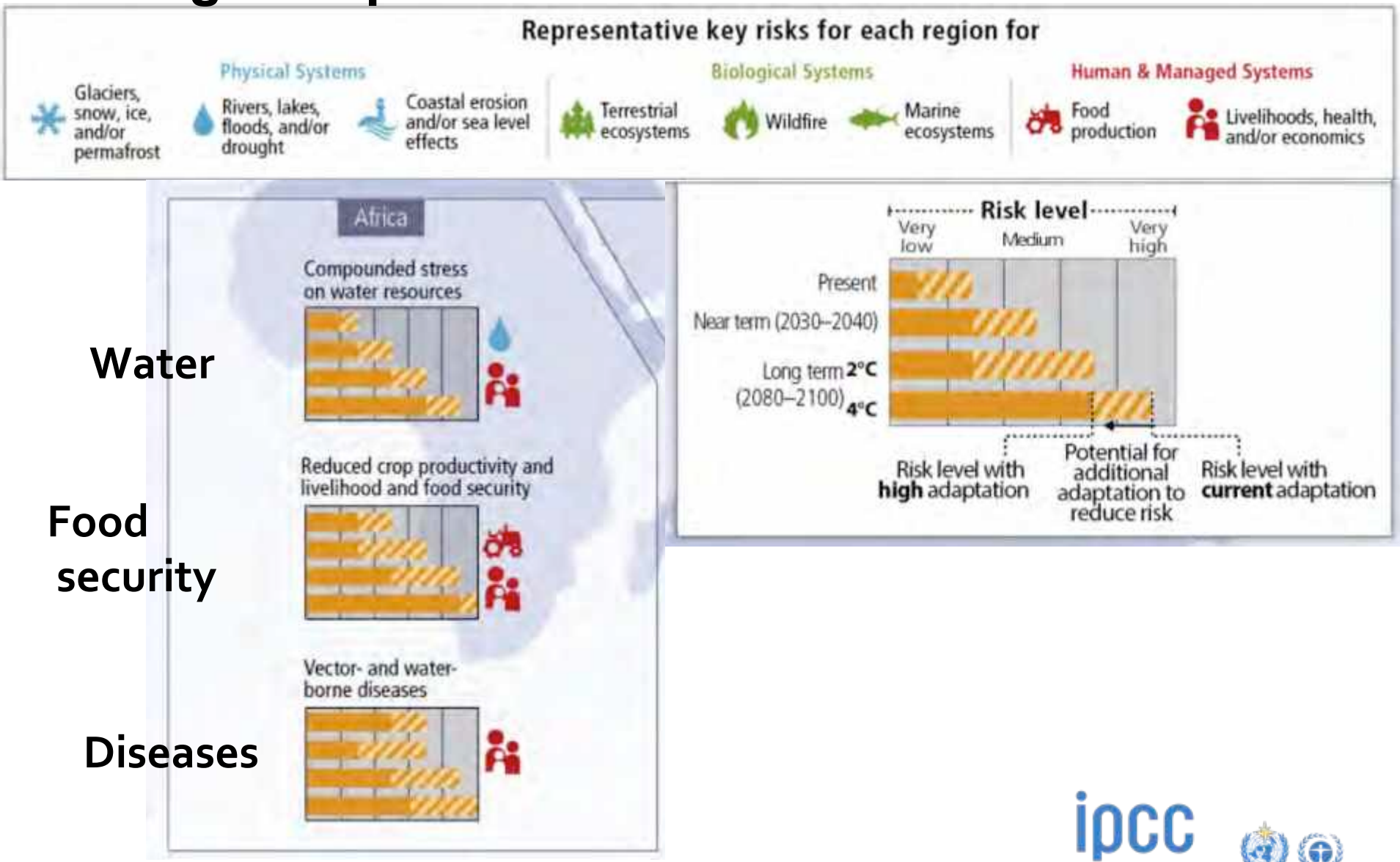
Regional key risks and risk reduction through adaptation



Water

Food security

Diseases

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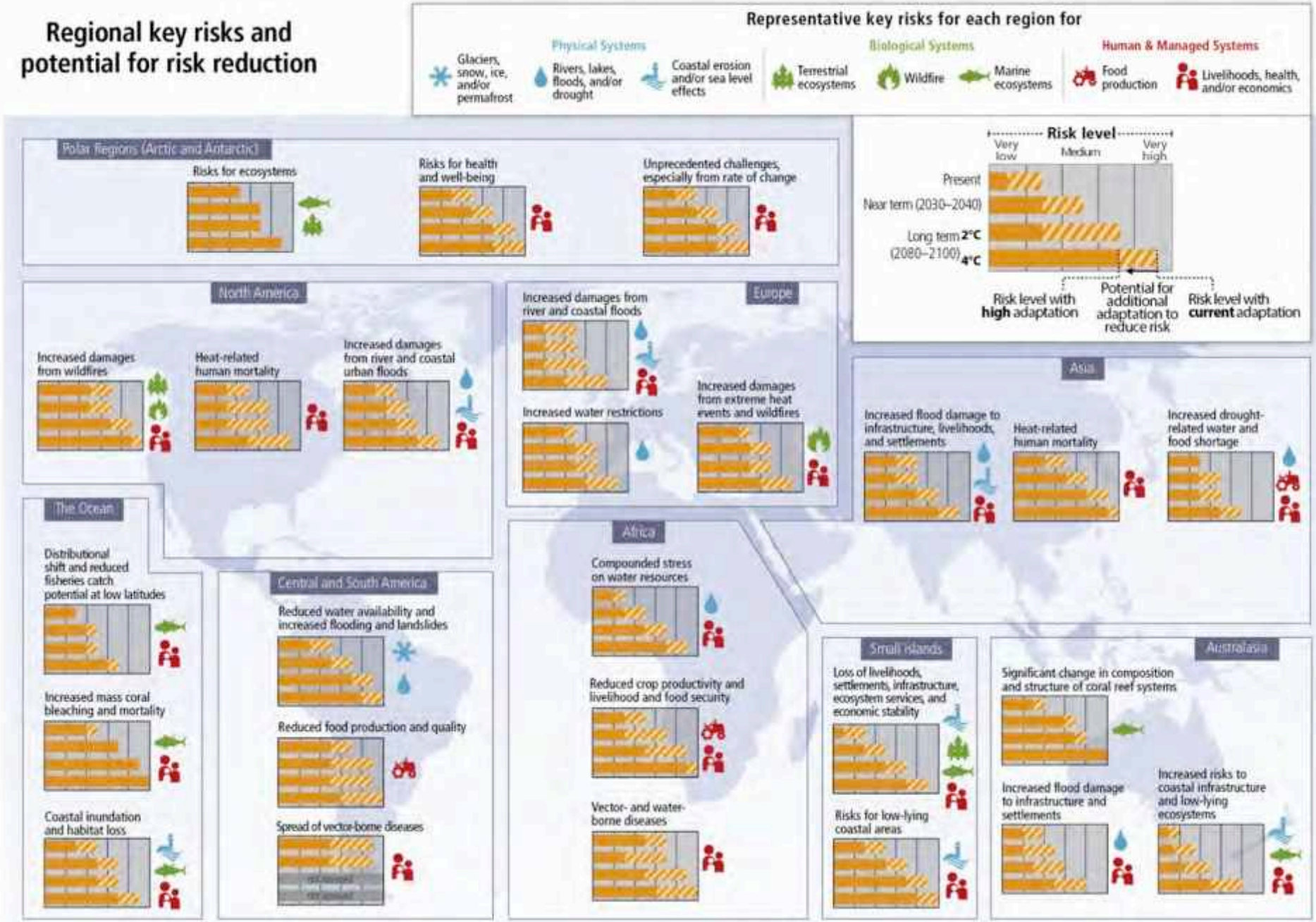
Regional key risks and potential for risk reduction



IPCC, AR5, SPM, Figure SPM.8

RISKS OF CLIMATE CHANGE **INCREASE** WITH CONTINUED HIGH EMISSIONS

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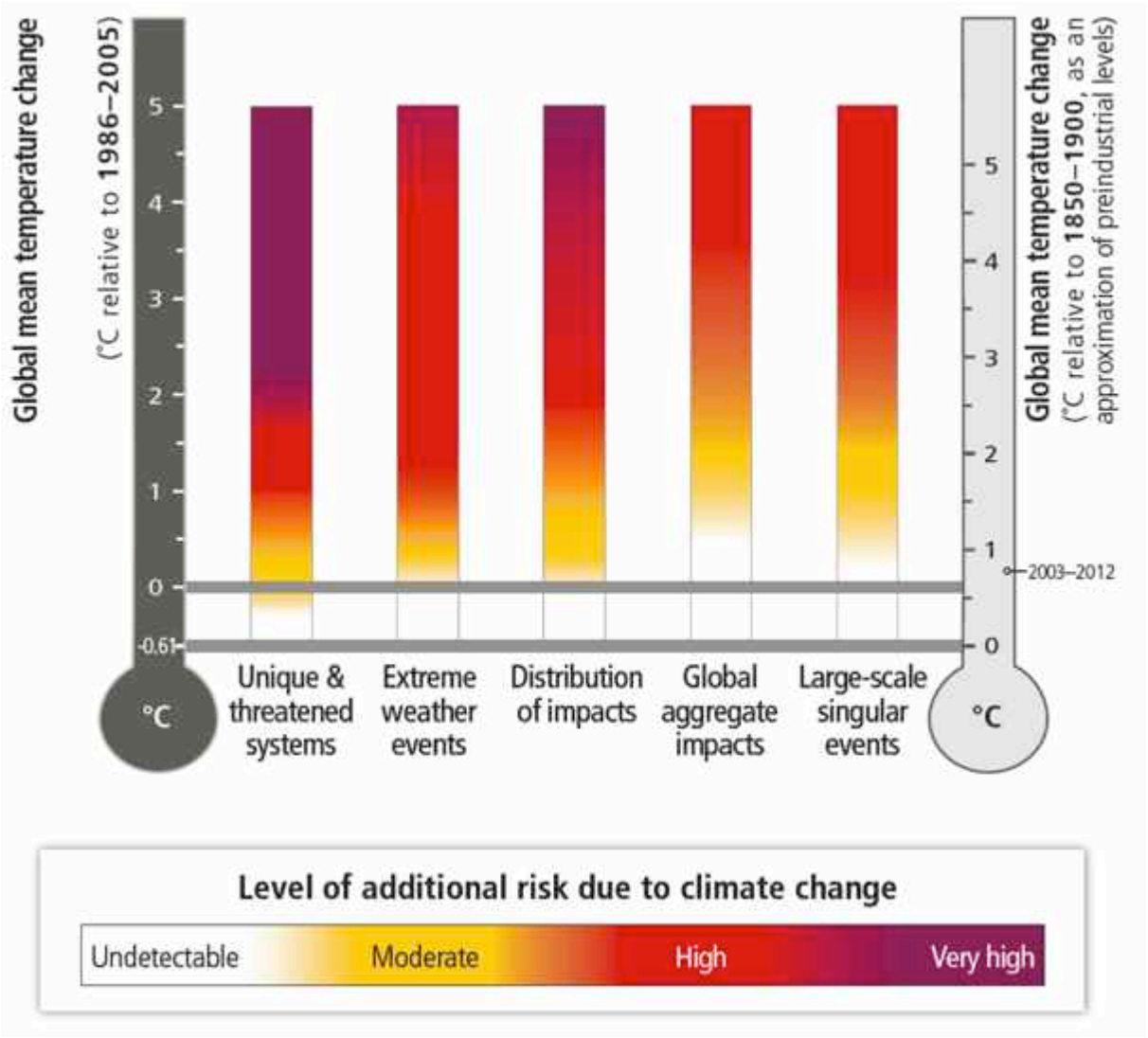
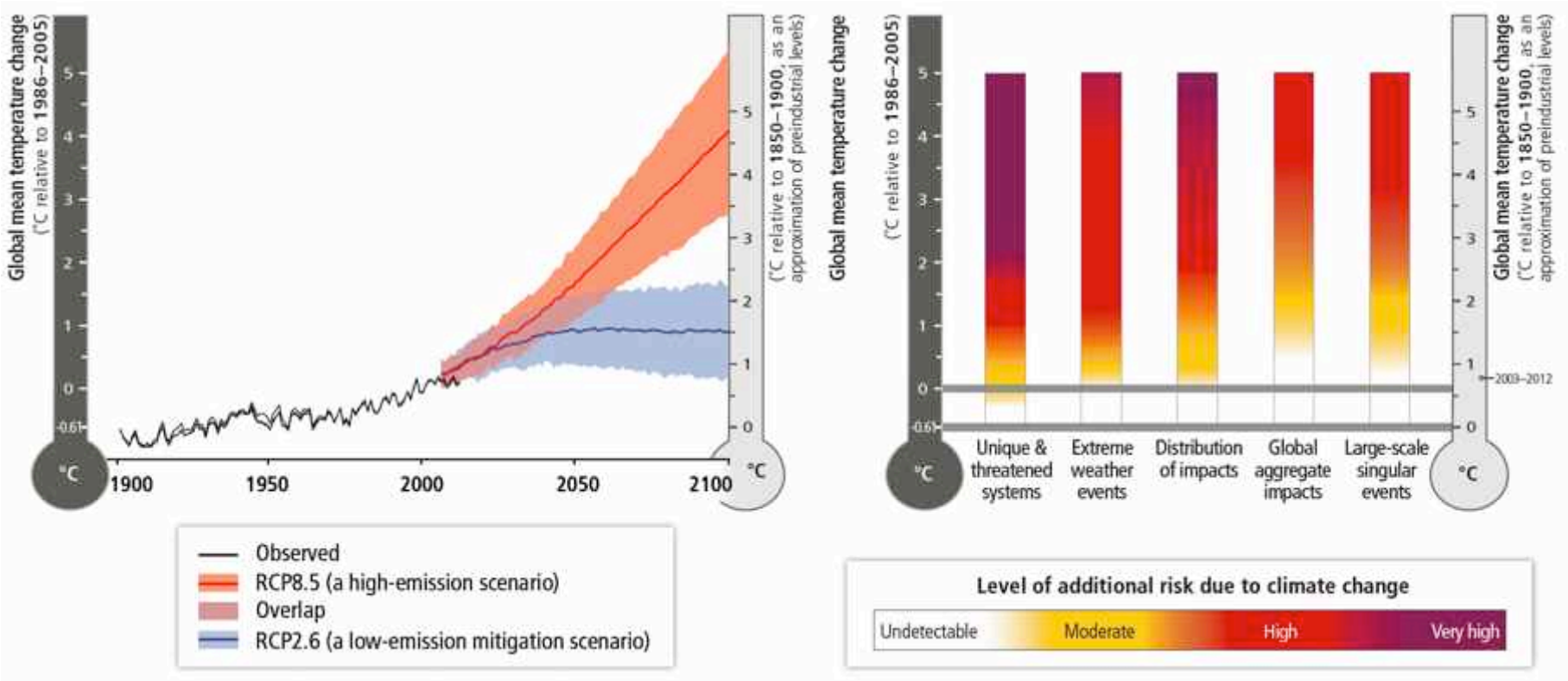


AR5, WGII, Box SPM.1 Figure 1



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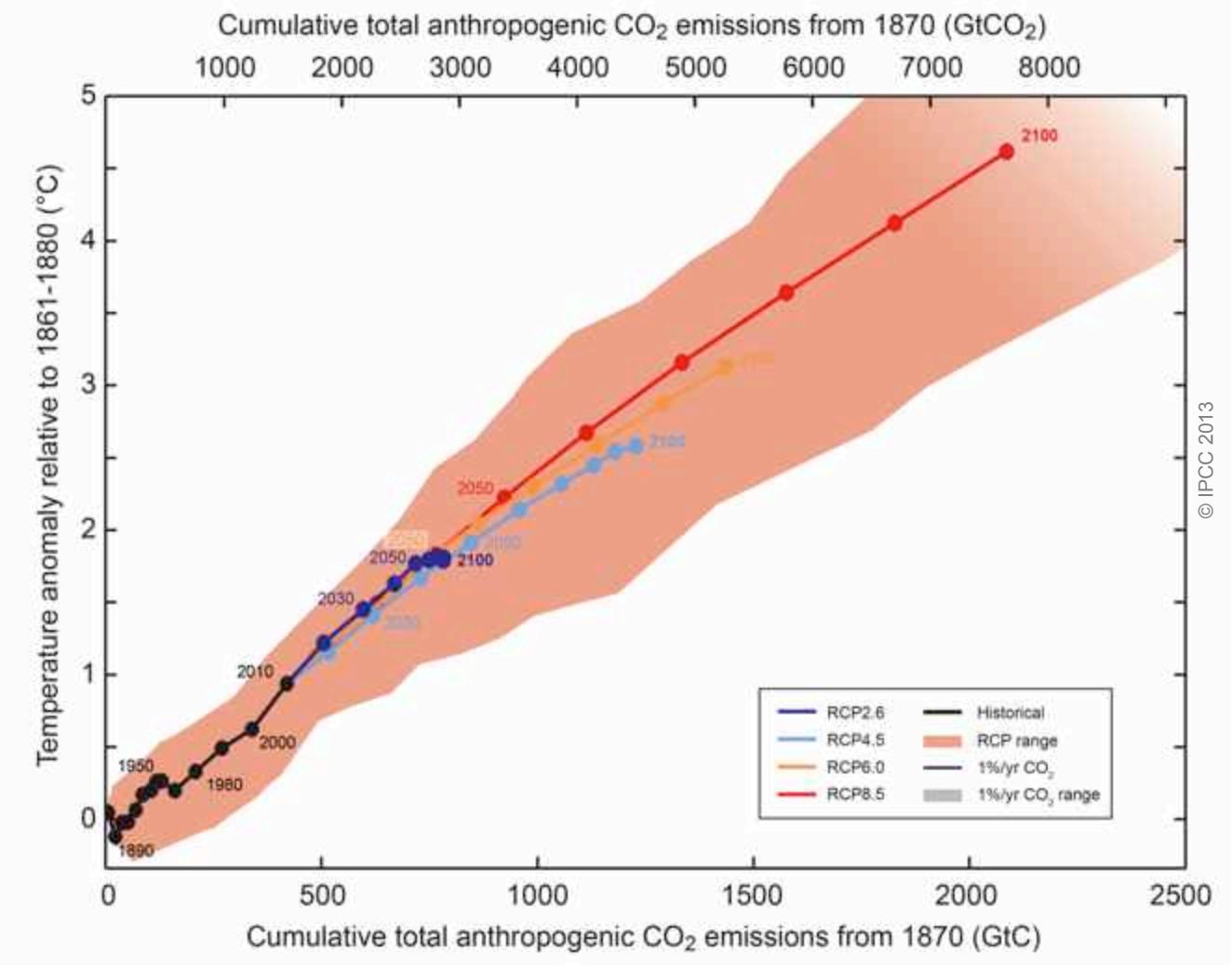
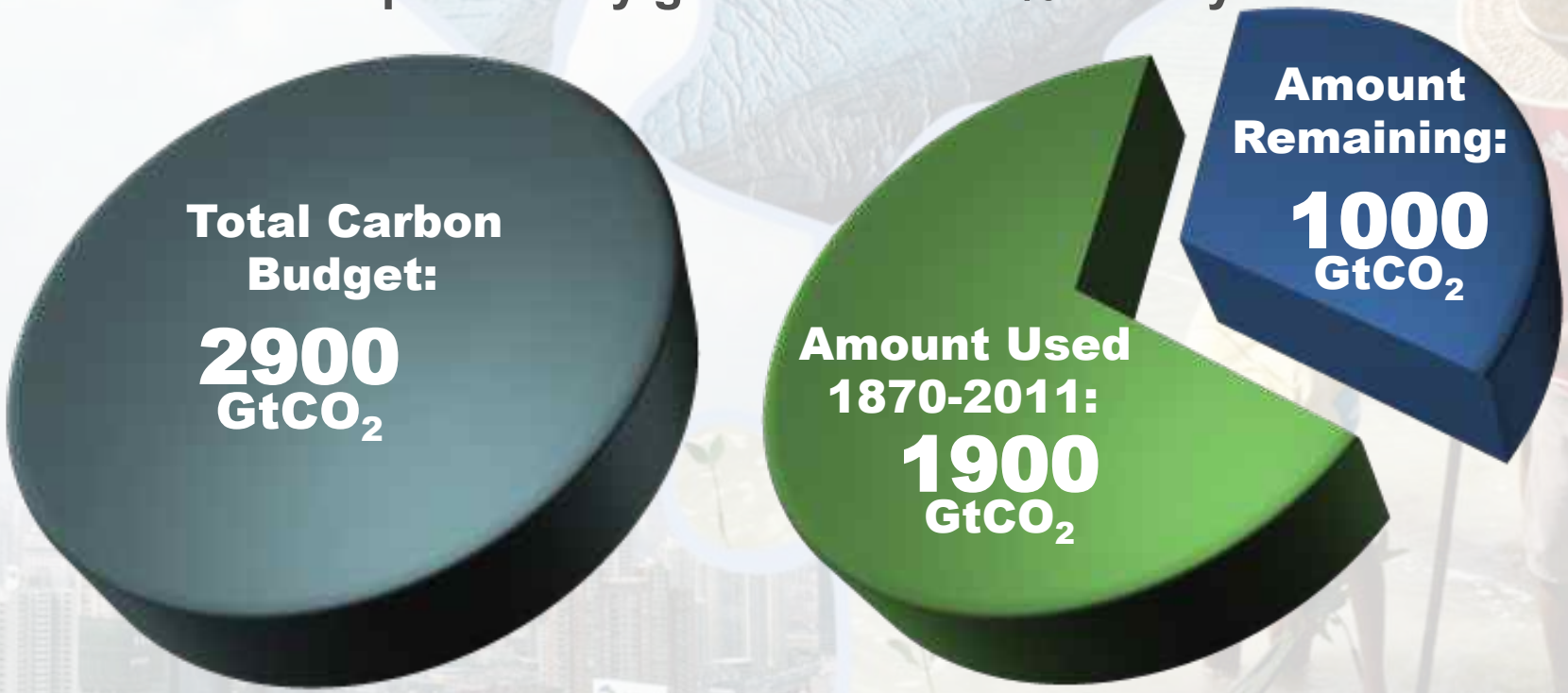


Fig. SPM.10

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

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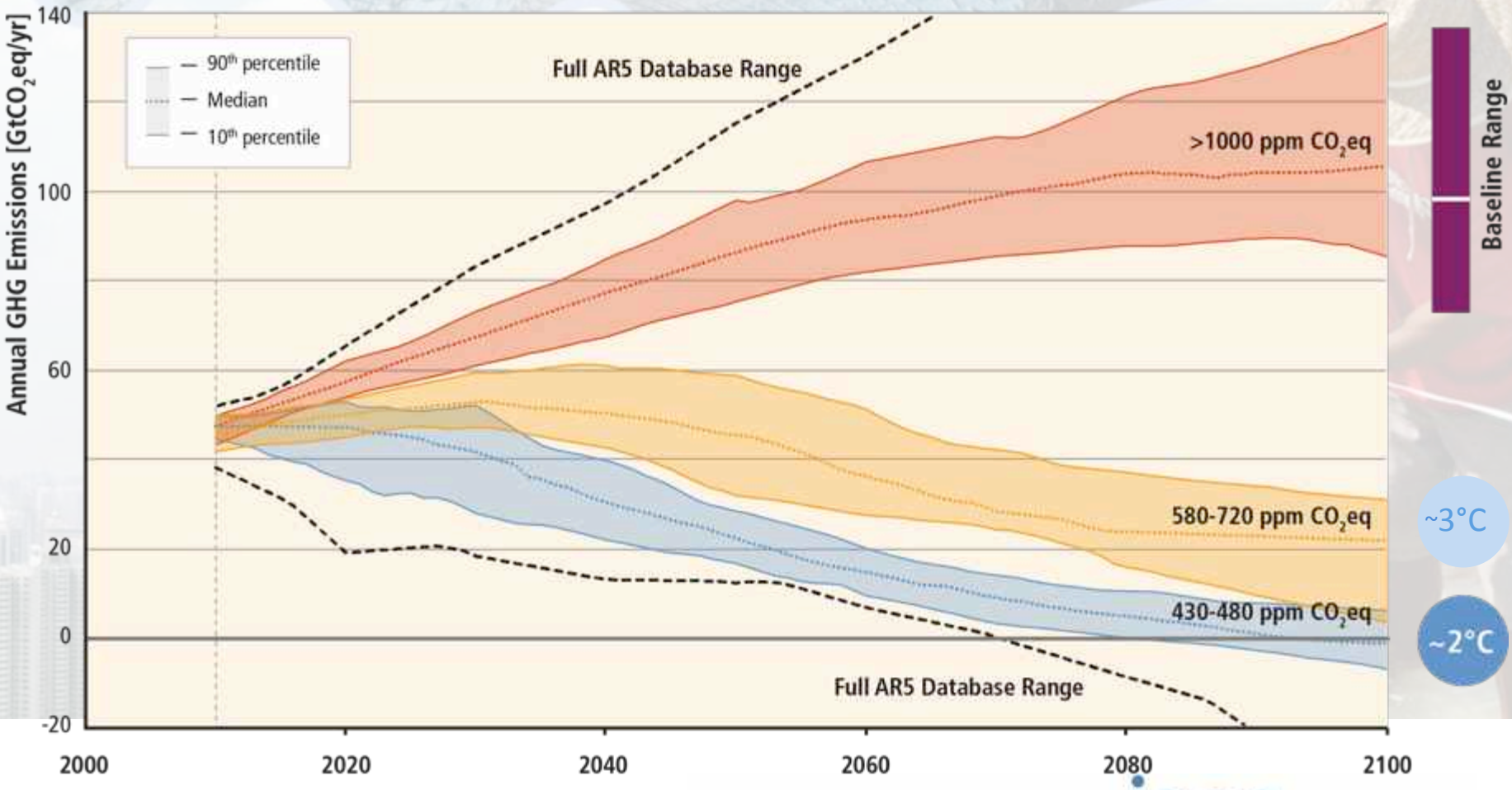
Stabilization of atmospheric concentrations requires moving away from the baseline – regardless of the mitigation goal.



Based on Figure 6.7

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IPCC AR5 Synthesis Report

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- **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**

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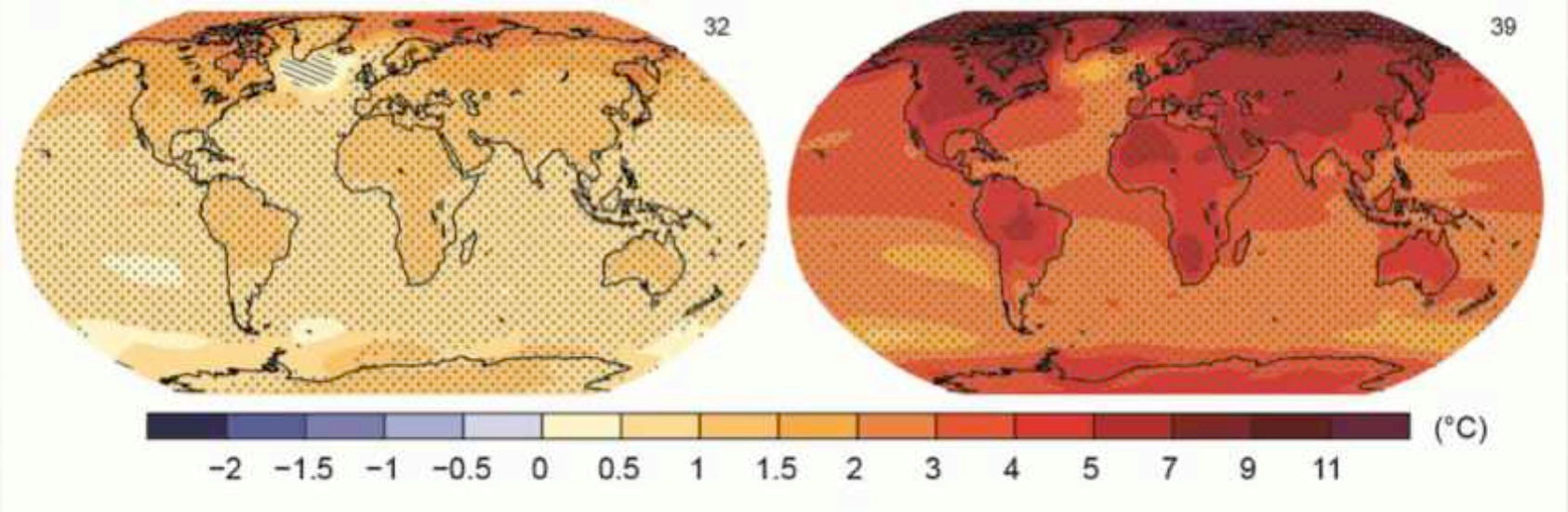
The Choices Humanity Makes Will Create Different Outcomes & increase prospects for effective adaptation

With substantial mitigation

Without additional mitigation



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

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Only together…

Source: UNICEF

Useful links:

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