Climate Change Challenges and Opportunities for Small Islands States: Perspective Based on the IPCC Work

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Plan

Challenges

- Risk factors: Hazard, Vulnerability, Exposure
- Hazards: Acidification, Warming,
- **Interactions of factors can be destructive**

Opportunities

- Adaptation helps, but only so much
- Mitigation is essential, & must be ambitious
- **Integration of efforts can be constructive** (e.g., climate policies & SDGs)

With 1 metre sea-level rise: 63000 ha below sea-level in Belgium (likely in 22nd century, not impossible in 21st century)

(NB: flooded area depends on protection)

Source: J.P. van Ypersele et P. Marbaix (2004) See www.climate.be/impacts

With 8 metre sea-level rise: 3700 km^2 below sea-level in Belgium (very possible in year 3000) (NB: flooded area depends on protection)

Source: J.P. van Ypersele et P. Marbaix (2004) See www.climate.be/impacts

Trying to be coherent (external insulation)

Trying to be coherent (& carbon neutral) …

On the frontline: The Maldives

In front of Environment Ministry, Maldives, Aug. 2015

In front of Ministry of Foreign Affairs, Maldives, Aug. 2015


MINISTRY OF FOREIGN AFFAIRS

Climate-related drivers of risk for small islands include:

- Sea level rise (SLR),
- Tropical and extratropical cyclones,
- Increasing air and sea surface temperatures, and changing rainfall patterns

(+ Acidification)

Why the IPCC ?

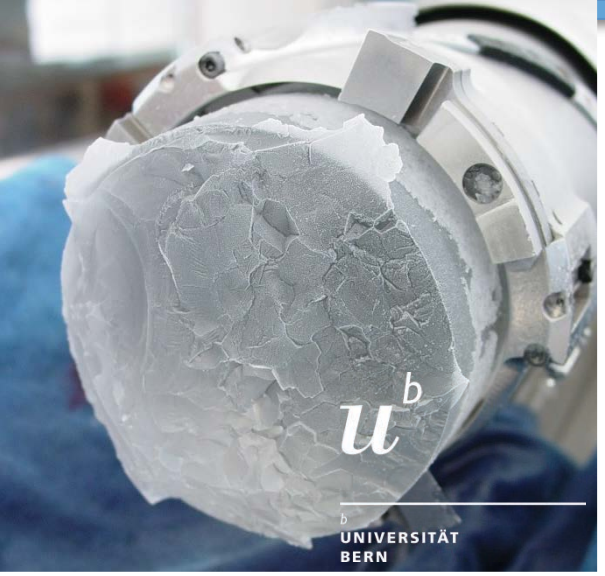
Established by WMO and UNEP in 1988

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

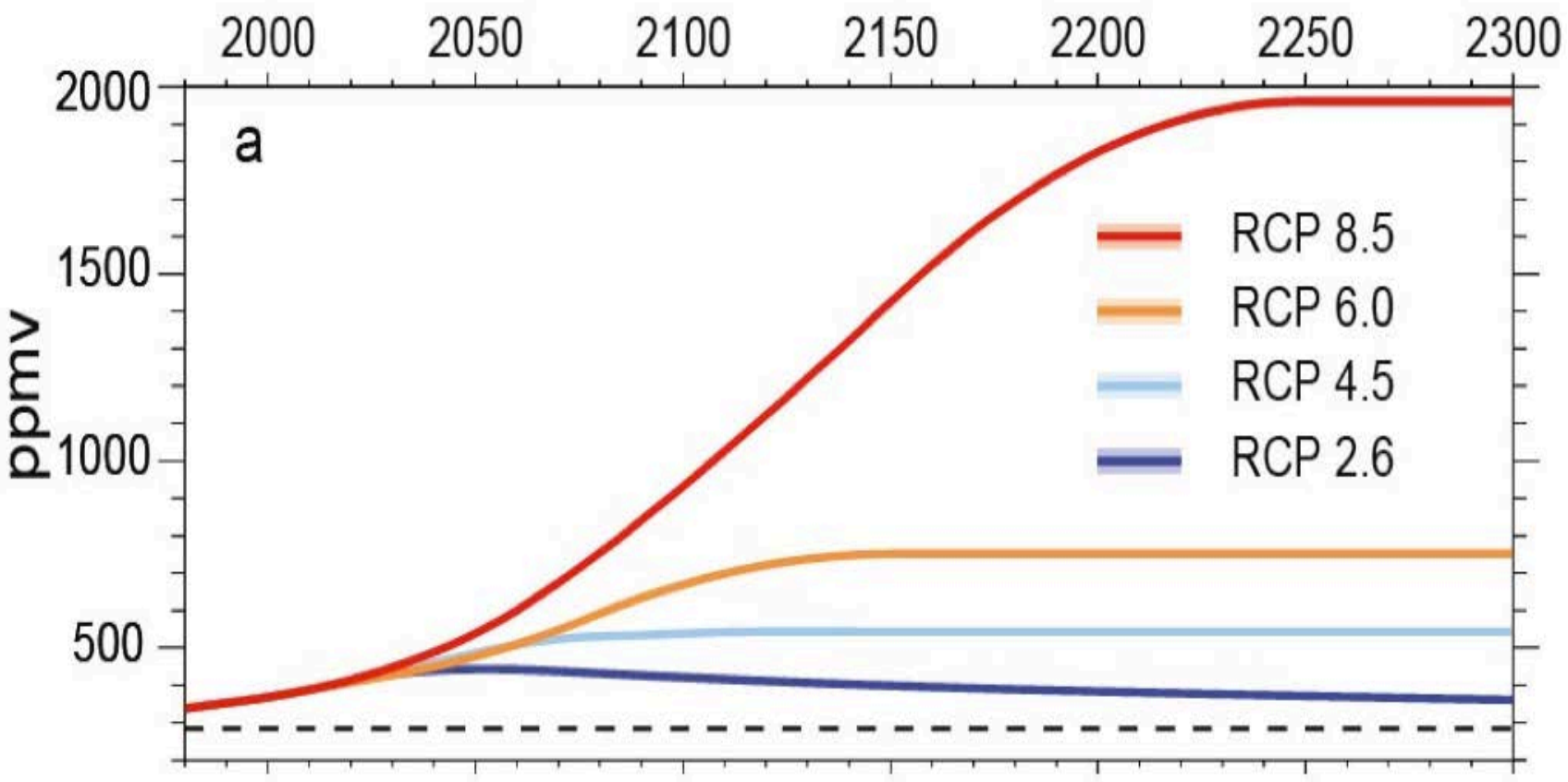


Atmospheric concentrations of CO_2

(Lüthi et al.,2008, NOAA)

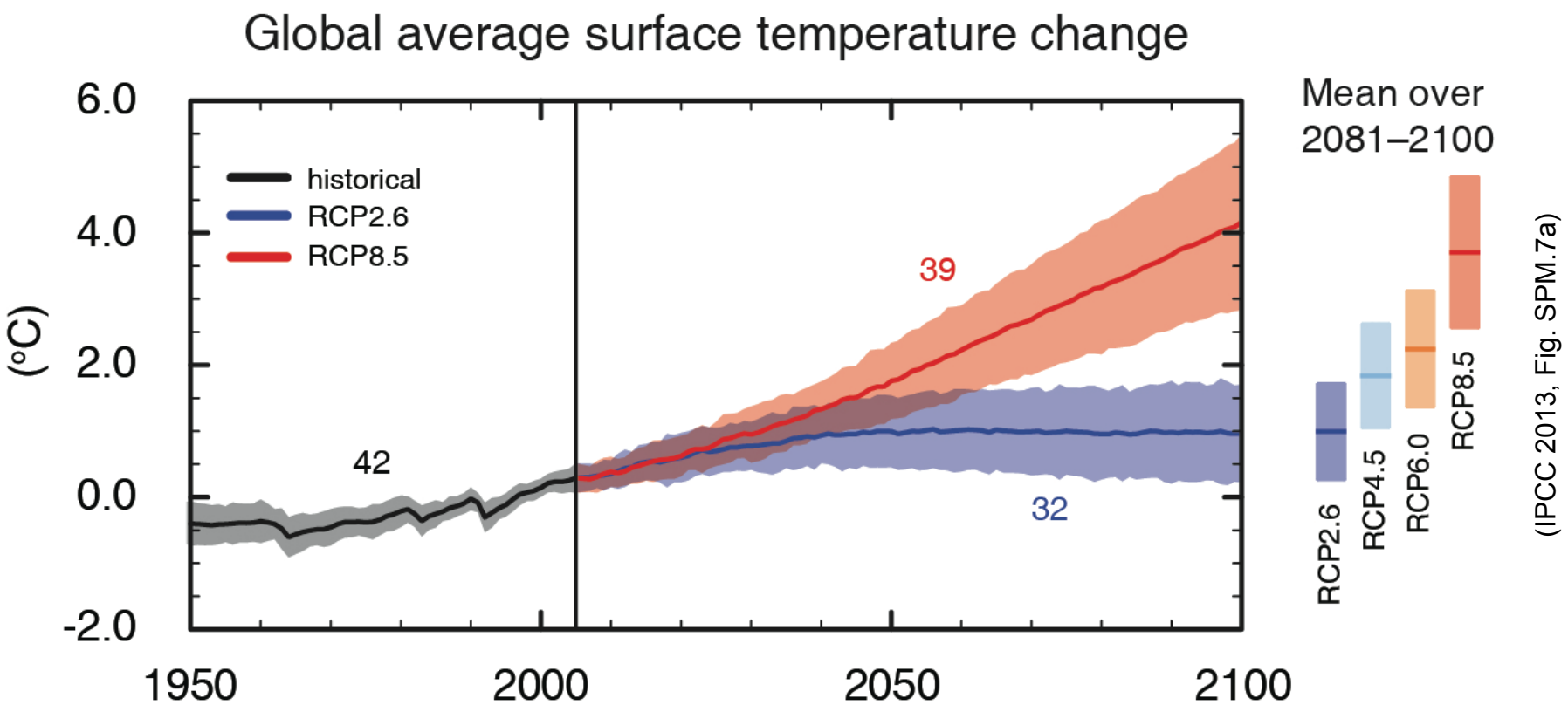
The concentrations of CO_2 have increased to levels unprecedented in at least the last 800,000 years.

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



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

Sea level:

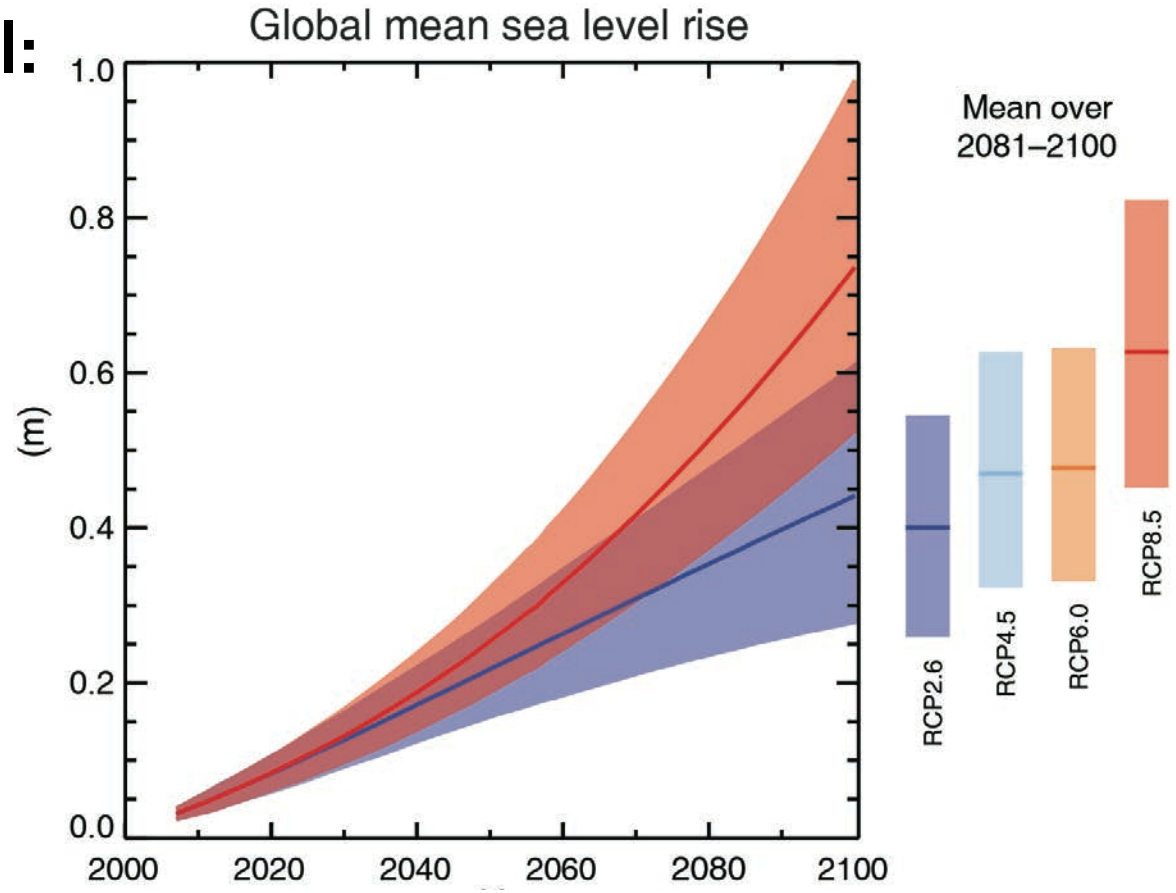


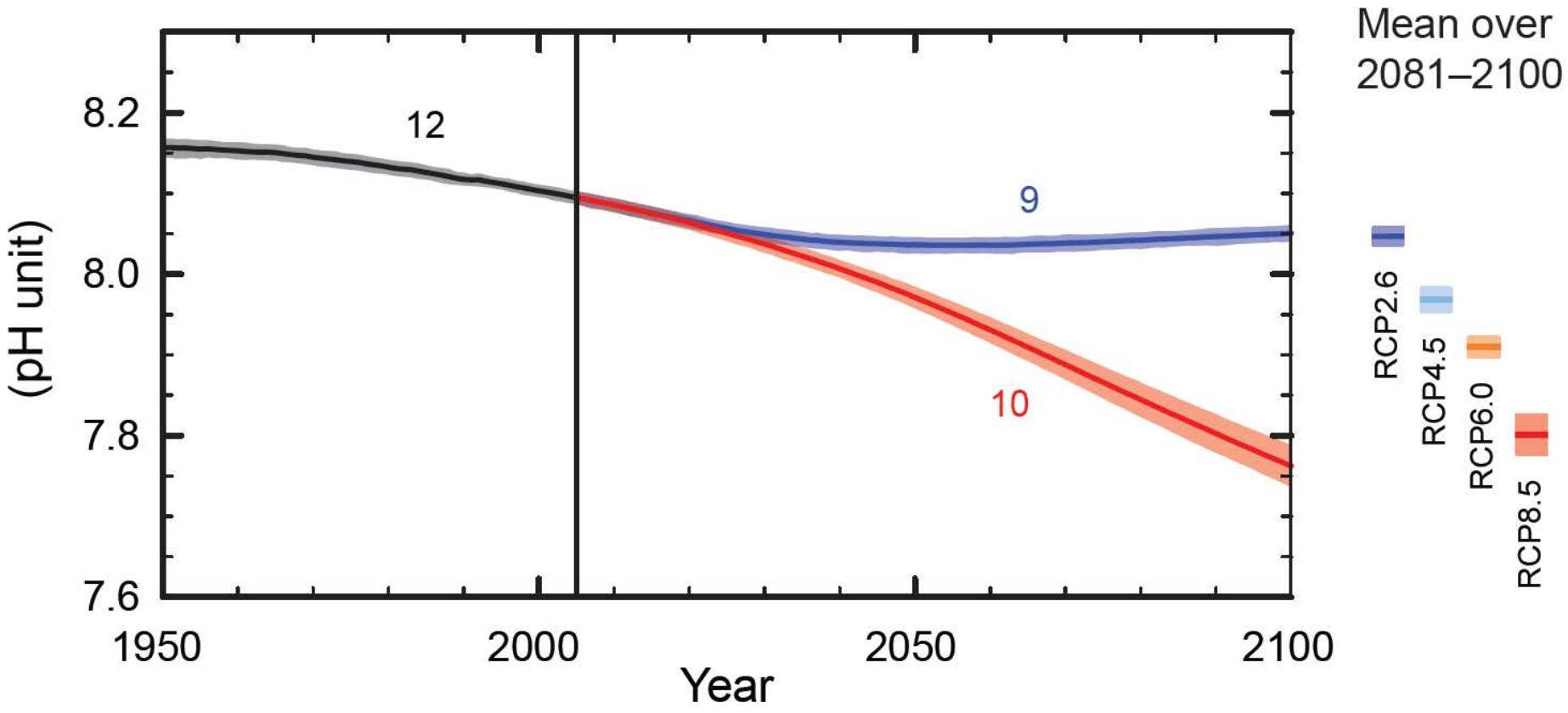
Fig. SPM.9

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

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

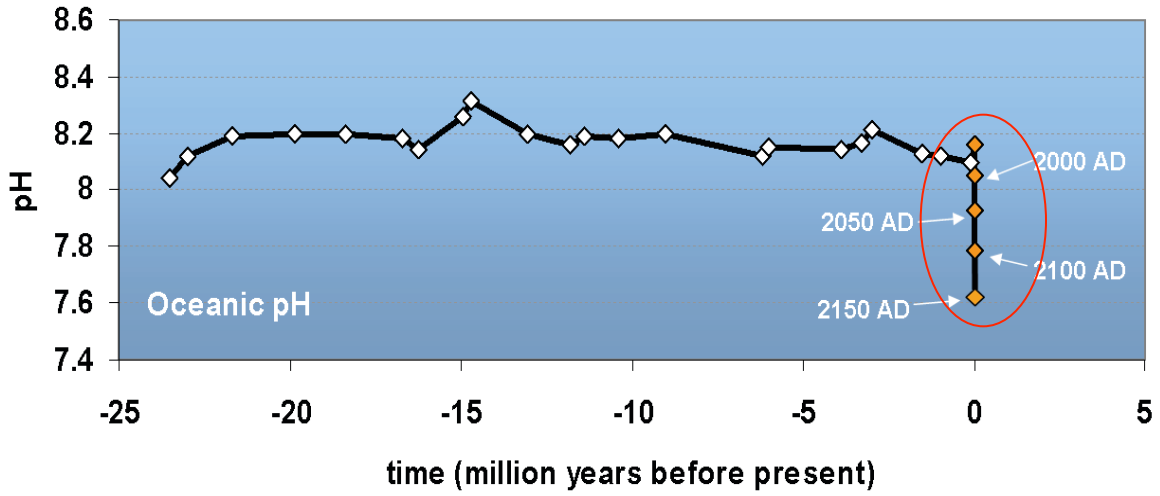
Figure SPM.7c
Global ocean surface pH

Acidification: the lower the pH, the more acid



Oceans are Acidifying Fast ……..

Changes in pH over the last 25 million years



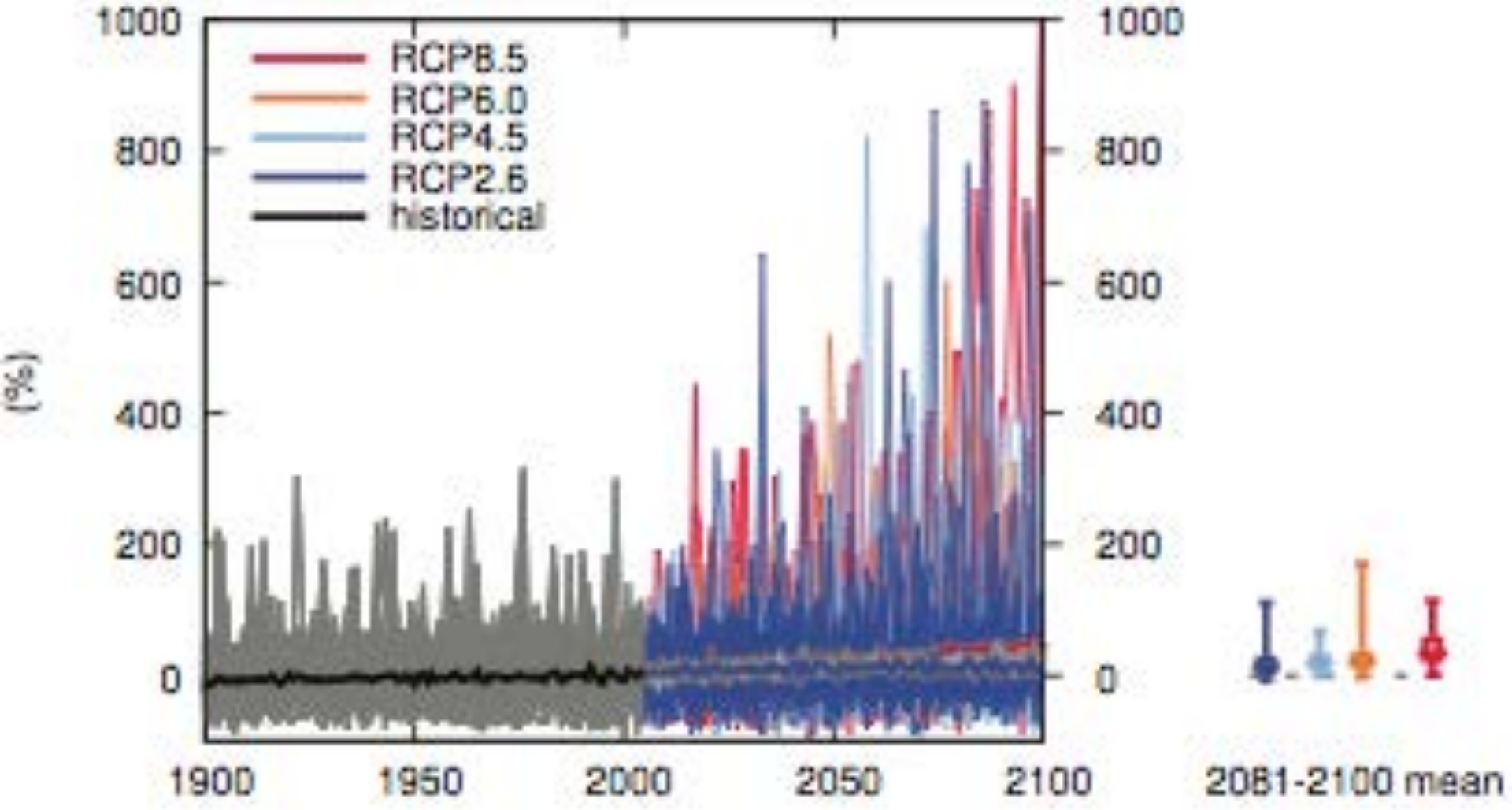
"Today is a rare event in the history of the World"

- **It is happening now, at a speed and to a level not experienced by marine organisms for about 60 million years**
- **Mass extinctions linked to previous ocean acidification events**
- **Takes 10,000's of years to recover**

Turley et al. 2006

Slide courtesy of Carol Turley, PML

Precipitation change Equatorial Pacific (annual)

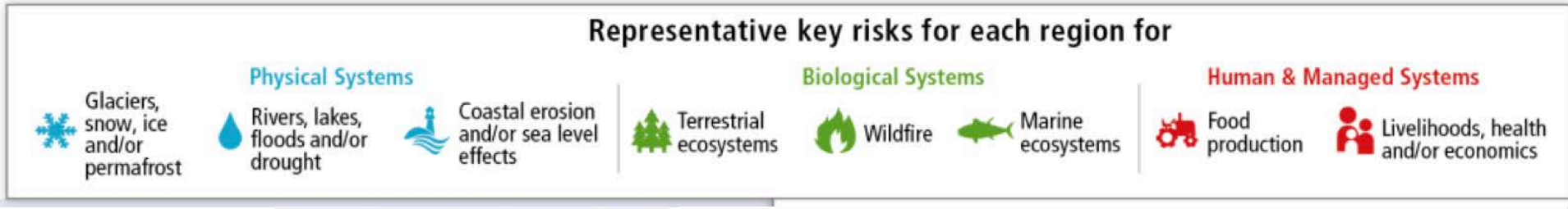


IPCC, WGI, Annex I: Atlas of Global and Regional Climate Projections Supplementary Material RCP8.5

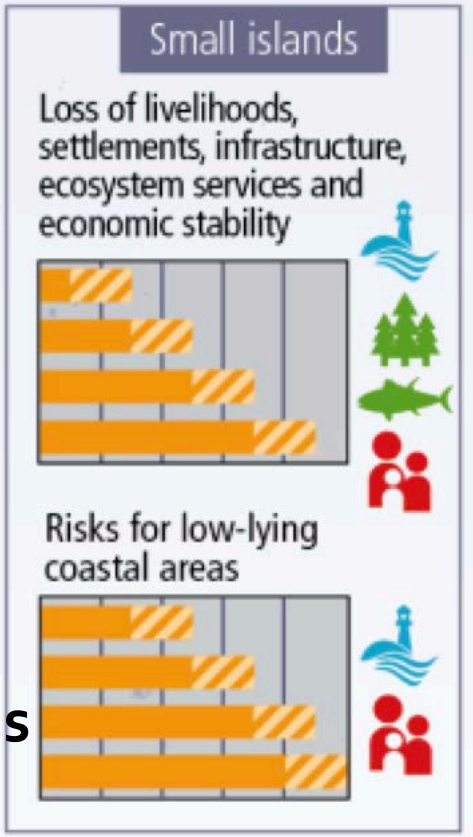
Risk = Hazard x Vulnerability x Exposure (Katrina flood victim, New Orleans, 2005)

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

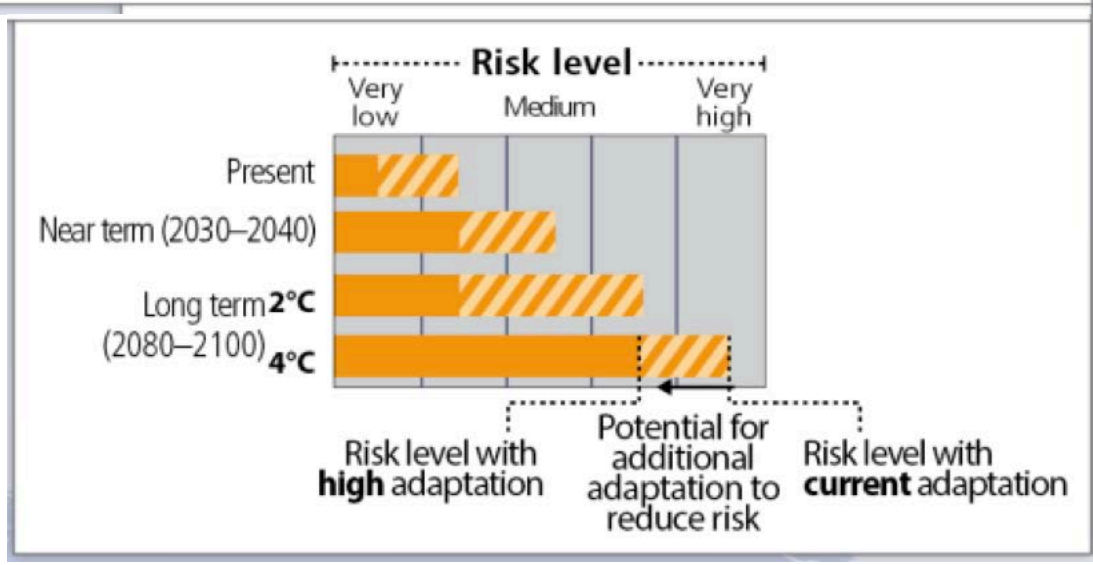
Regional key risks and potential for risk reduction: Small Islands



Losses



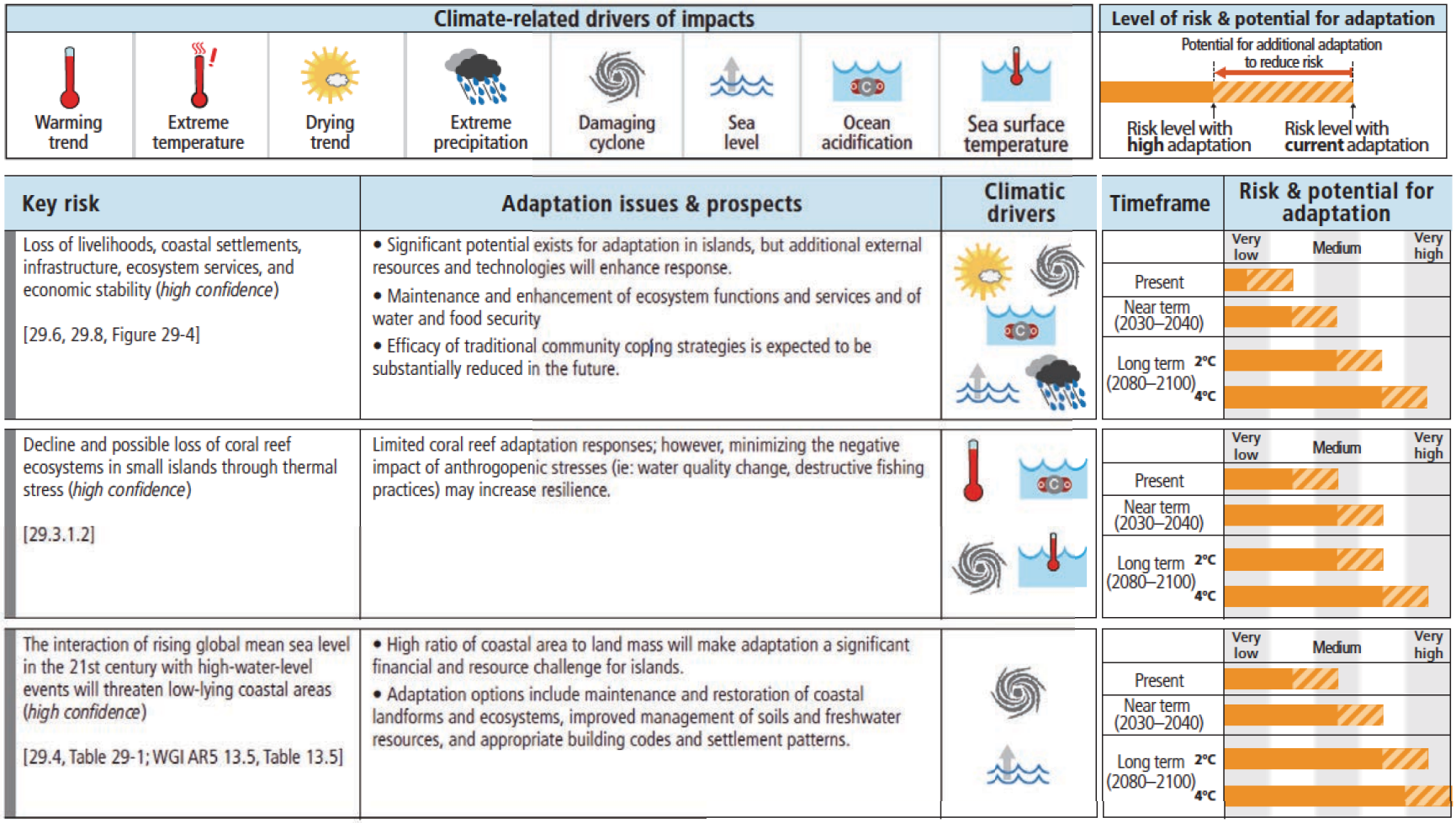
Risk to coastal areas



IPCC, AR5, SYR, SPM 8

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

Selected key risks and potential for adaptation for small islands



IPCC AR5 (2014) WGII Table 29-4

ipcc INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP


ADAPTATION IS
ALREADY OCCURRING
ipcc
INTERGOVERNMENTAL PANEL ON climate change

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

Why is the cost of adaptation so high in small islands ?

- Infrastructural works generally requires large up-front overhead costs, which
- In the case of small islands cannot be easily downscaled in proportion to the size of population or territory➔unit cost of shoreline protection per capita much higher for SIDS
- In addition, extreme events such as tropical cyclones have disproportionate impact on SIDS GDP

IPCC AR5 WGII FAQ 29.2, p. 1626

Disproportionate storm impact (1998-2009) on Asia-Pacific SIDS population & GDP

Table 29-5 | Top ten countries in the Asia–Pacific region based on absolute and relative physical exposure to storms and impact on GDP (between 1998 and 2009; after Tables 1.10 and 1.11 of ESCAP and UNISDR, 2010).

Rank	Absolute exposure (millions affected)	Relative exposure (% of population affected)	Absolute GDP loss (US$ billions)	Loss (% of GDP)
1	Japan (30.9)	Northern Mariana Islands (58.2)	Japan (1,226.7)	Northern Mariana Islands (59.4)
2	Philippines (12.1)	Niue (25.4)	Republic of Korea (35.6)	Vanuatu (27.1)
3	China (11.1)	Japan (24.2)	China (28.5)	Niue (24.9)
4	India (10.7)	Philippines (23.6)	Philippines (24.3)	Fiji (24.1)
5	Bangladesh (7.5)	Fiji (23.1)	Hong Kong (13.3)	Japan (23.9)
6	Republic of Korea (2.4)	Samoa (21.4)	India (8.0)	Philippines (23.9)
7	Myanmar (1.2)	New Caledonia (20.7)	Bangladesh (3.9)	New Caledonia (22.4)
8	Vietnam (0.8)	Vanuatu (18.3)	Northern Mariana Islands (1.5)	Samoa (19.2)
9	Hong Kong (0.4)	Tonga (18.1)	Australia (0.8)	Tonga (17.4)
10	Pakistan (0.3)	Cook Islands (10.5)	New Caledonia (0.7)	Bangladesh (5.9)

Note: Small islands are highlighted in yellow.

(Yellow= Small Islands)

IPCC AR5 WGII Chapter 29

Adaptation and Mitigation for and by SIDS

Adaptation to climate change 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 (medium confidence).

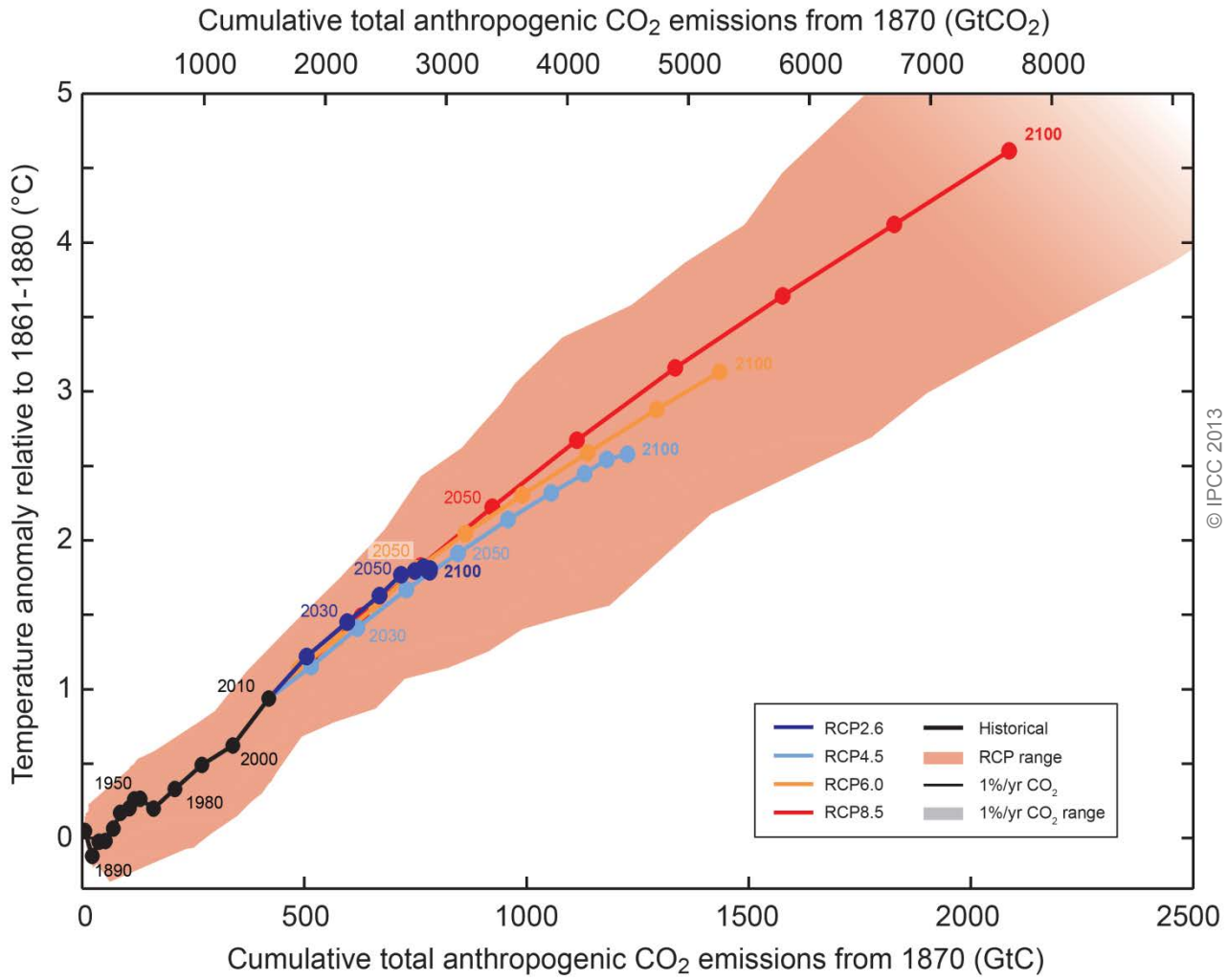
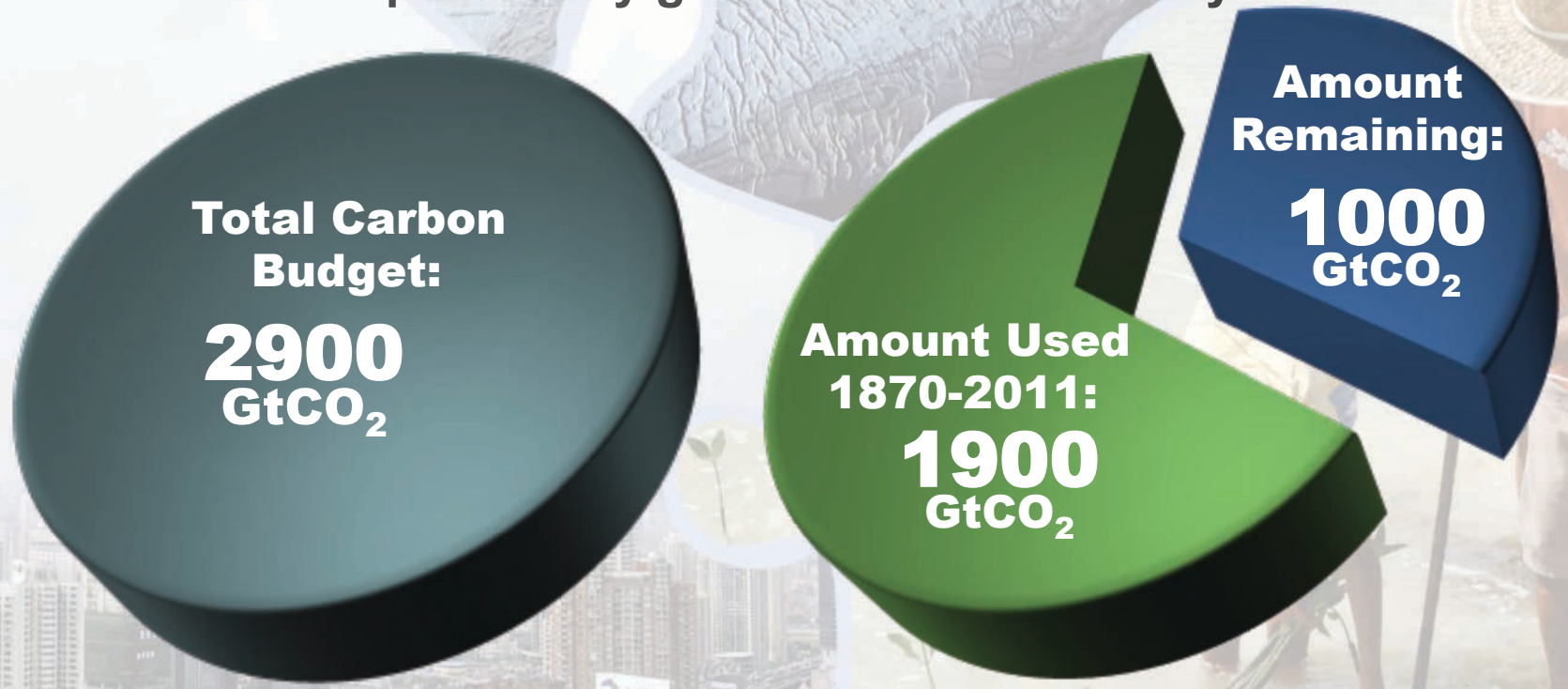


Fig. SPM.10

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



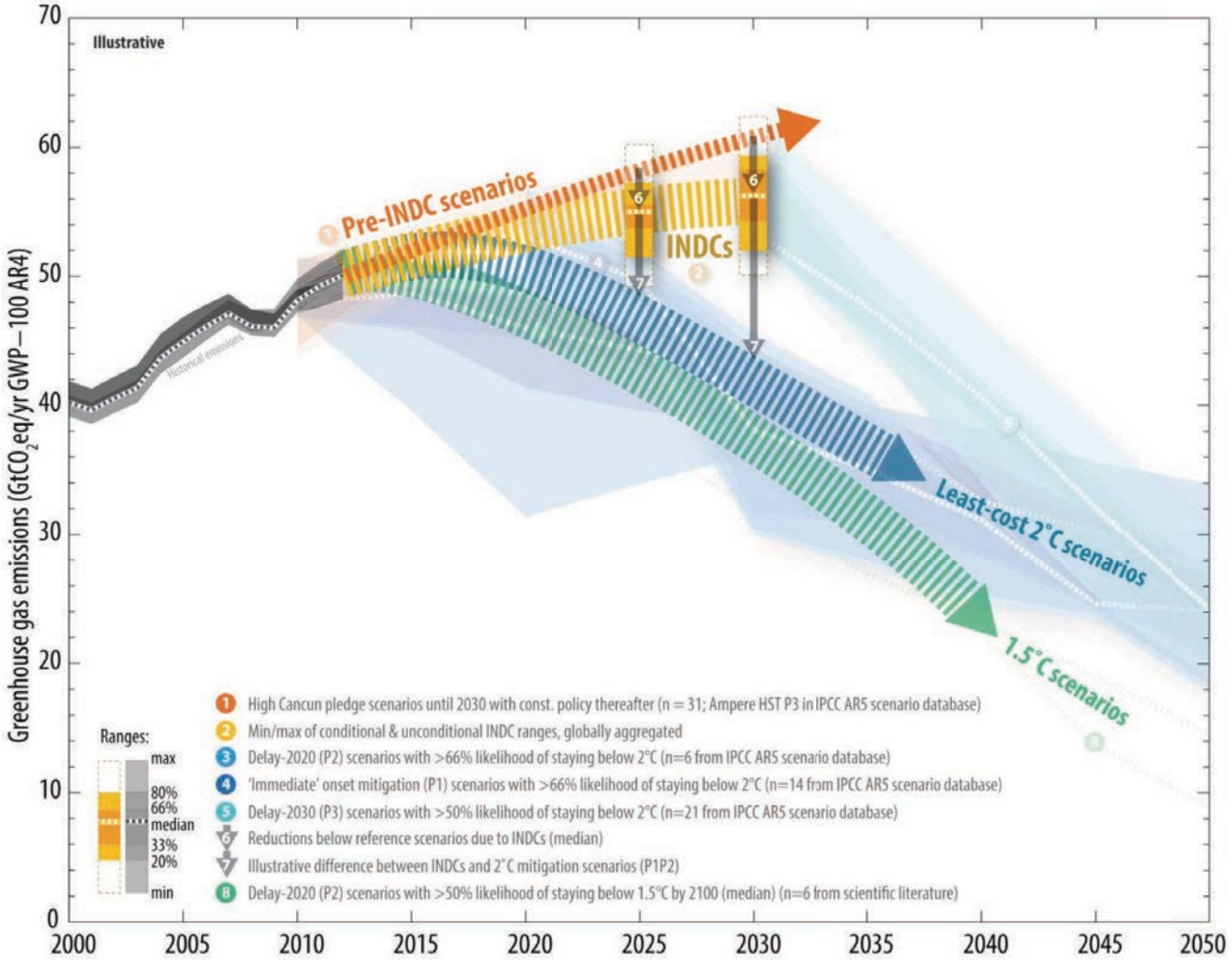
NB: Emissions in 2011: 38 GtCO2/yr

AR5 WGI SPM

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 ...

Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the intended nationally determined contributions



UNFCCC, Aggregate effect of the intended nationally determined contributions: an update
http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf

Adaptation and Mitigation for and by SIDS

Adaptation and mitigation on small islands are not always trade-offs, but can be regarded as **complementary** components in the response to climate change (medium confidence).

Examples of adaptation-mitigation interlinkages in small islands include energy supply and use, tourism infrastructure and activities, and functions and services associated with coastal wetlands.

The alignment of these sectors for potential **emission reductions, together with adaptation, offer co-benefits and opportunities** in some small islands.

IPCC AR5 WGUU Chapter 29, P1616

Adaptation and Mitigation for and by SIDS

Lessons learned from adaptation and mitigation experiences in one island may offer some guidance to other small island states, though there is **low confidence in the success of wholesale transfer of adaptation and mitigation options** when the local lenses through which they are viewed differ from one island state to the next, given the diverse cultural, socioeconomic, ecological, and political values.

Adaptation and Mitigation for and by SIDS

The **ability of small islands** to undertake adaptation and mitigation programs, and their effectiveness, **can be substantially strengthened through appropriate assistance** from the international community.

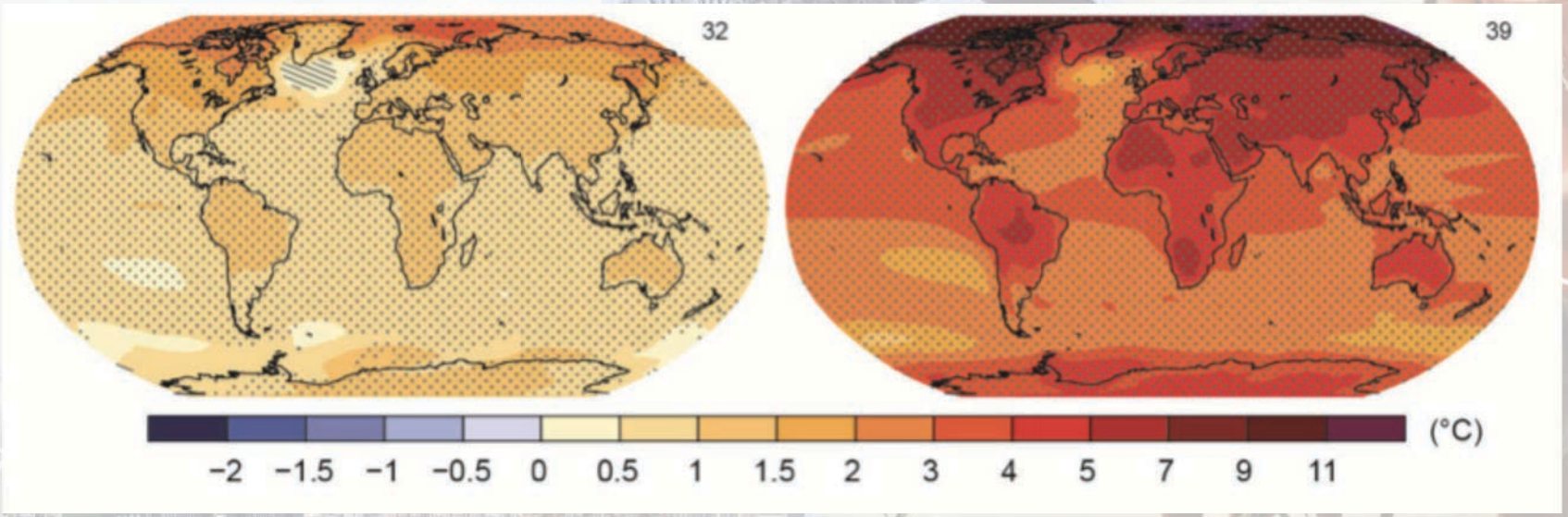
However, **caution is needed to ensure such assistance is not driving the climate change agenda in small islands**, as there is a risk that critical challenges confronting island governments and communities may not be addressed.

IPCC AR5 WGUU Chapter 29, P1616

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

Integration of efforts can be constructive

Global warming of 1.5°C: IPCC Special Report

A IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, ***in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty***

Outline (as adopted in October 2016; report to be finalized in 2018):

- Summary for policy makers (max 10 pages)
- Chapters :
  - 1. Framing and context
  - 2. Mitigation pathways compatible with 1.5°C in the context of sustainable development
  - 3. Impacts of 1.5°C global warming on natural and human systems
  - 4. Strengthening and implementing the global response to the threat of climate change
  - 5. Sustainable development, poverty eradication and reducing inequalities
- Boxes (integrated case studies/regional and cross-cutting themes),
- FAQs (10 pages)

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**