About the next IPCC Special Report :

Global warming of 1.5°C

(…) in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty

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& Philippe Marbaix

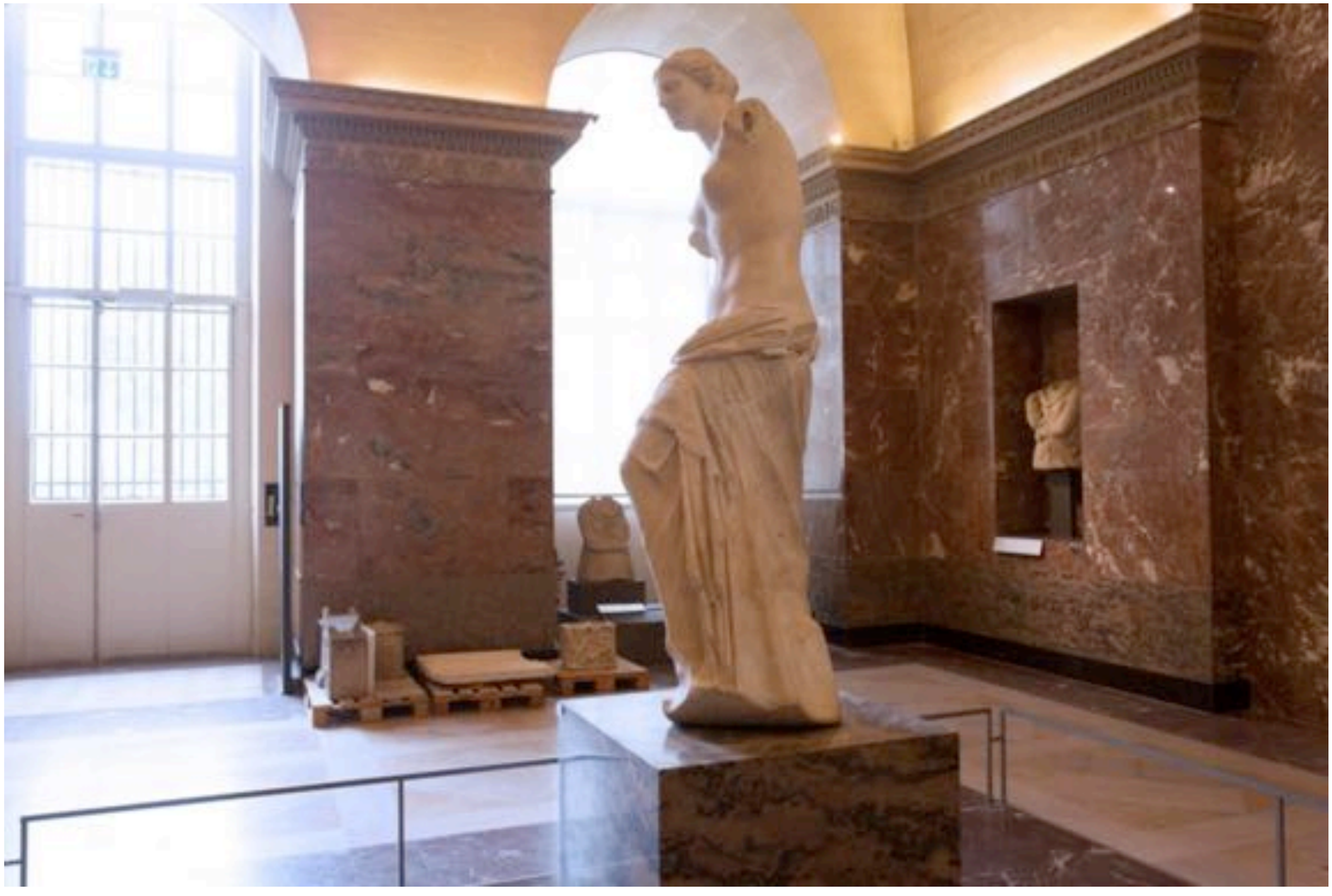
Université catholique de Louvain (Belgium)

Brussels (ITCSD event), 11 January 2017

(*) Twitter: @JPvanYpersele, Former IPCC Vice-Chair (2008-2015)

Thanks to the Walloon government (funding the Walloon Platform for IPCC) for its support

The Louvre and Musée d'Orsay in Paris evacuated their vaults (May 2016)

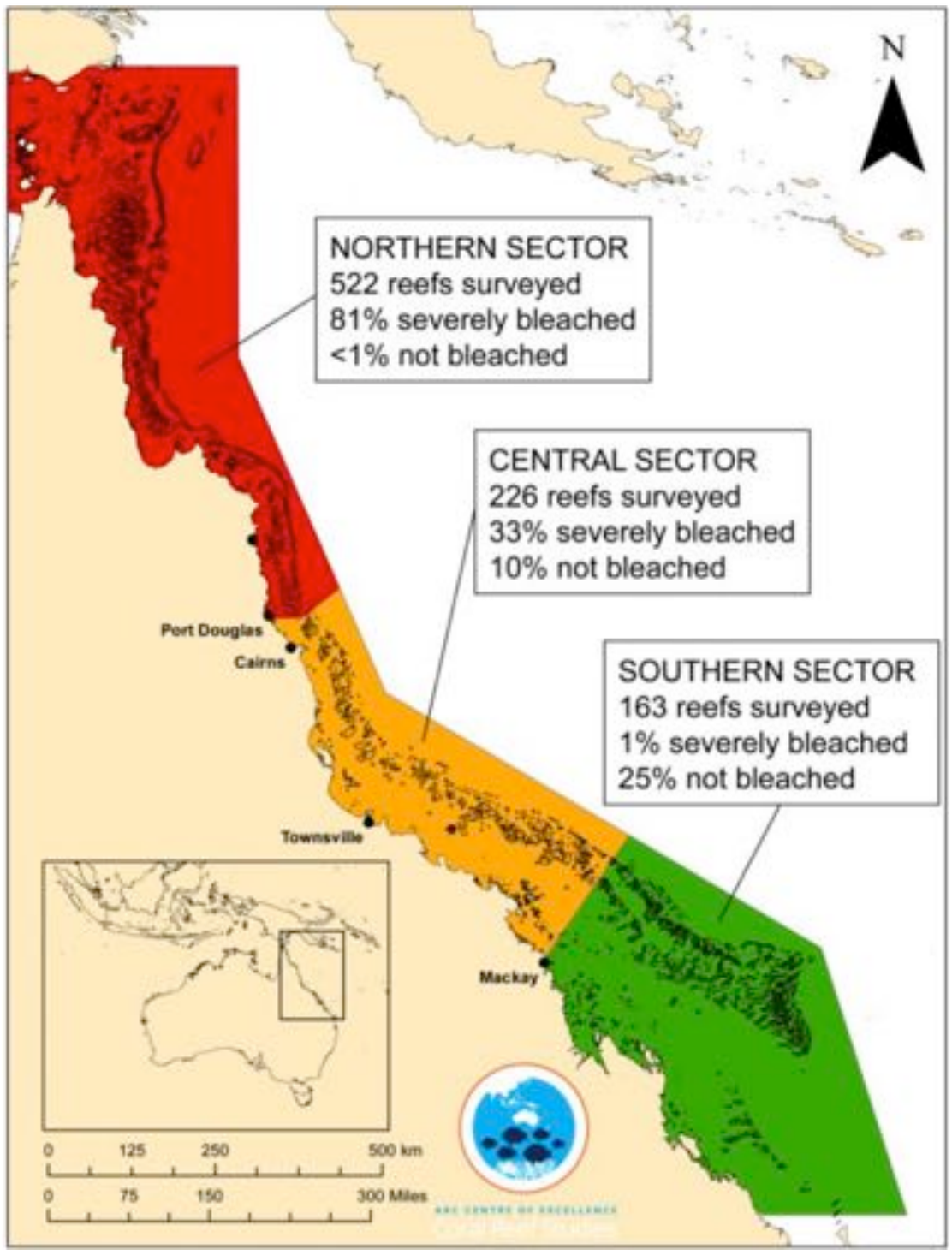


Geoffroy Van Der Hasselt / Getty Images

In Germany, many residents weren't prepared for the mass flooding as the rain pelted down (May 2016)

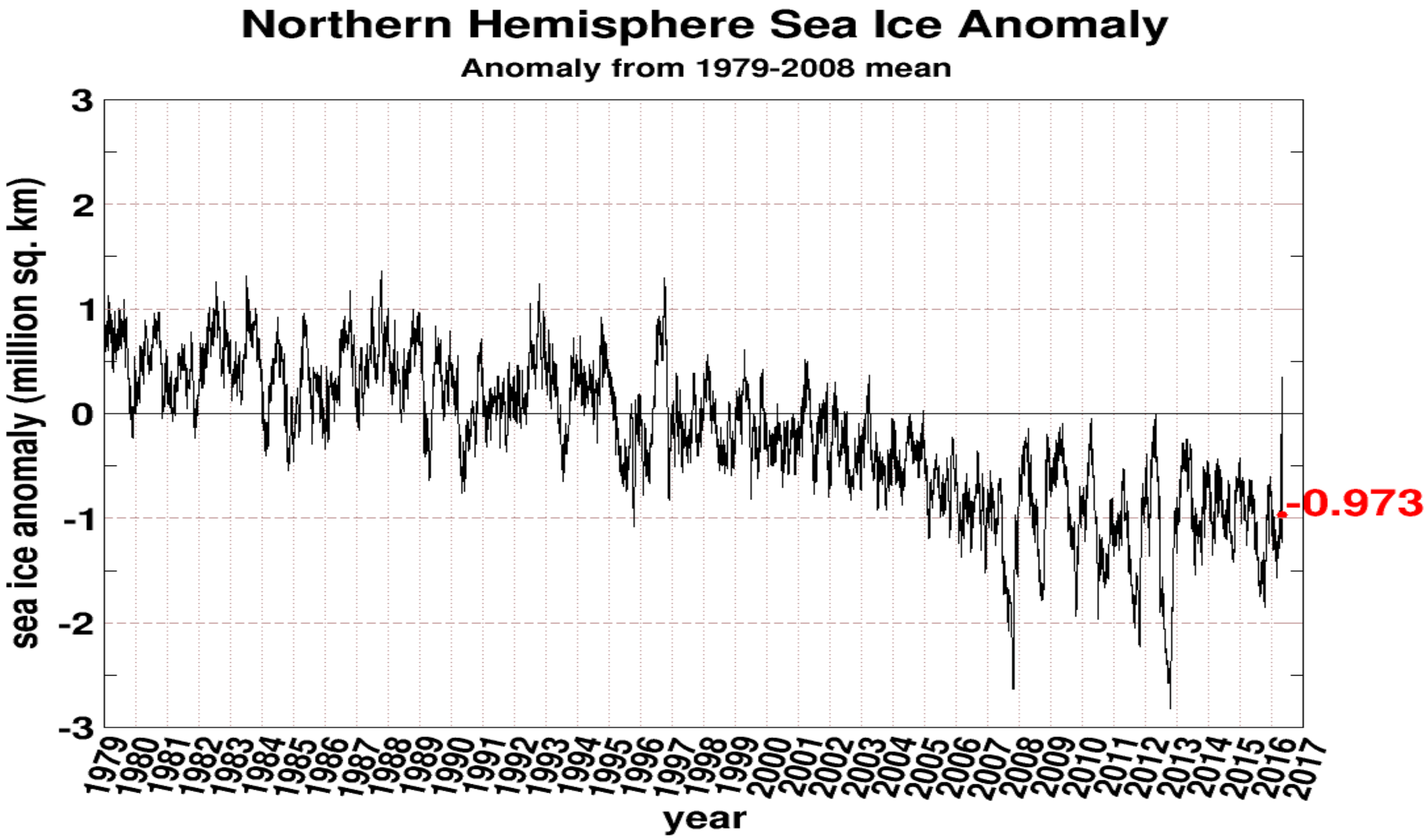
Matthias Schrader / AP

Only 7% of the Great Barrier Reef has avoided coral bleaching (May 2016)



JCU Australia - ARC Centre of Excellence for Coral Reef Studies / Tom Bridge and James Kerry

Arctic Sea Ice Cover (1979-2016)



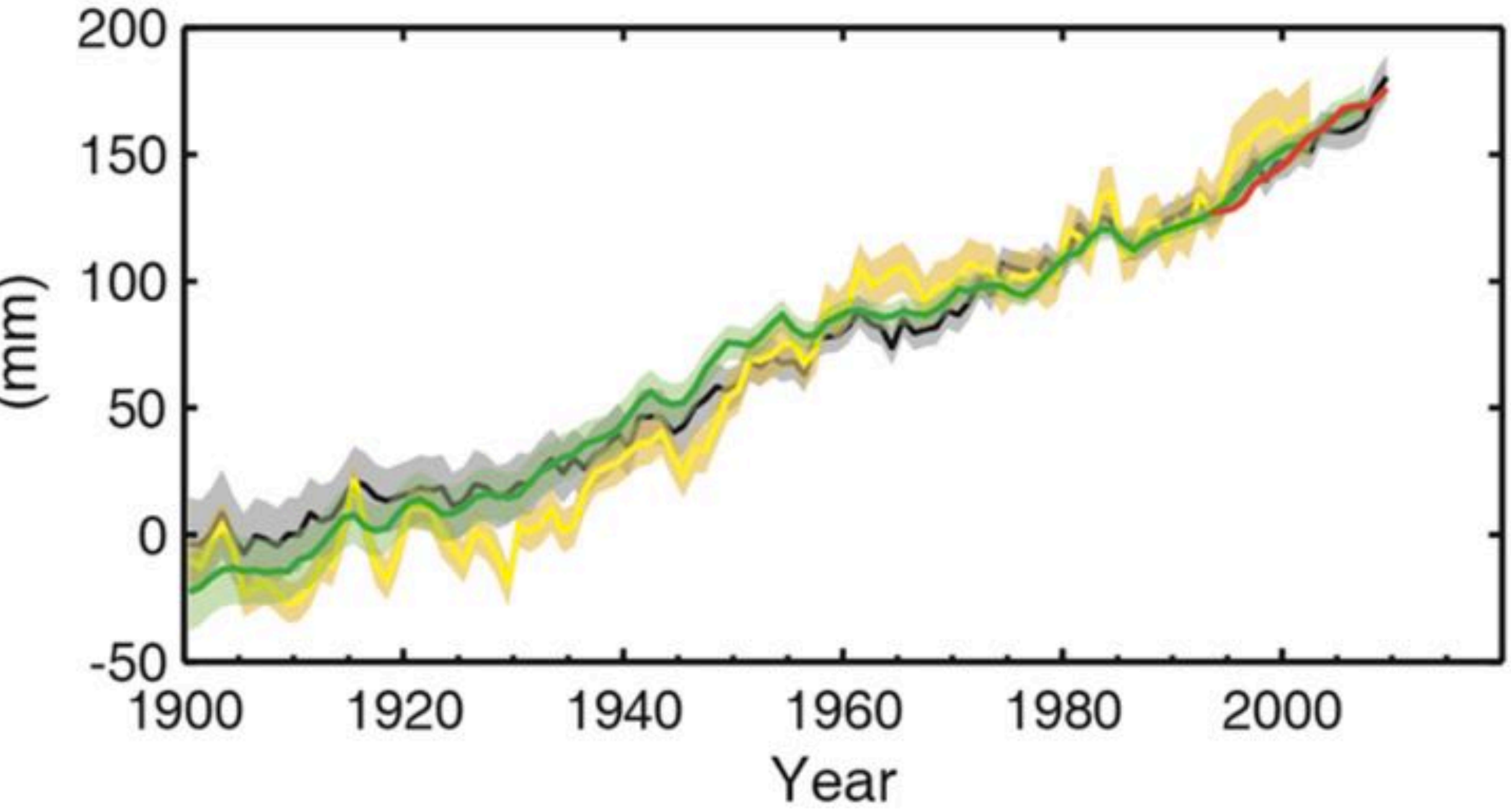
Plateau Glacier (1961)
(Alaska)

http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share

Plateau Glacier (2003)
(Alaska)

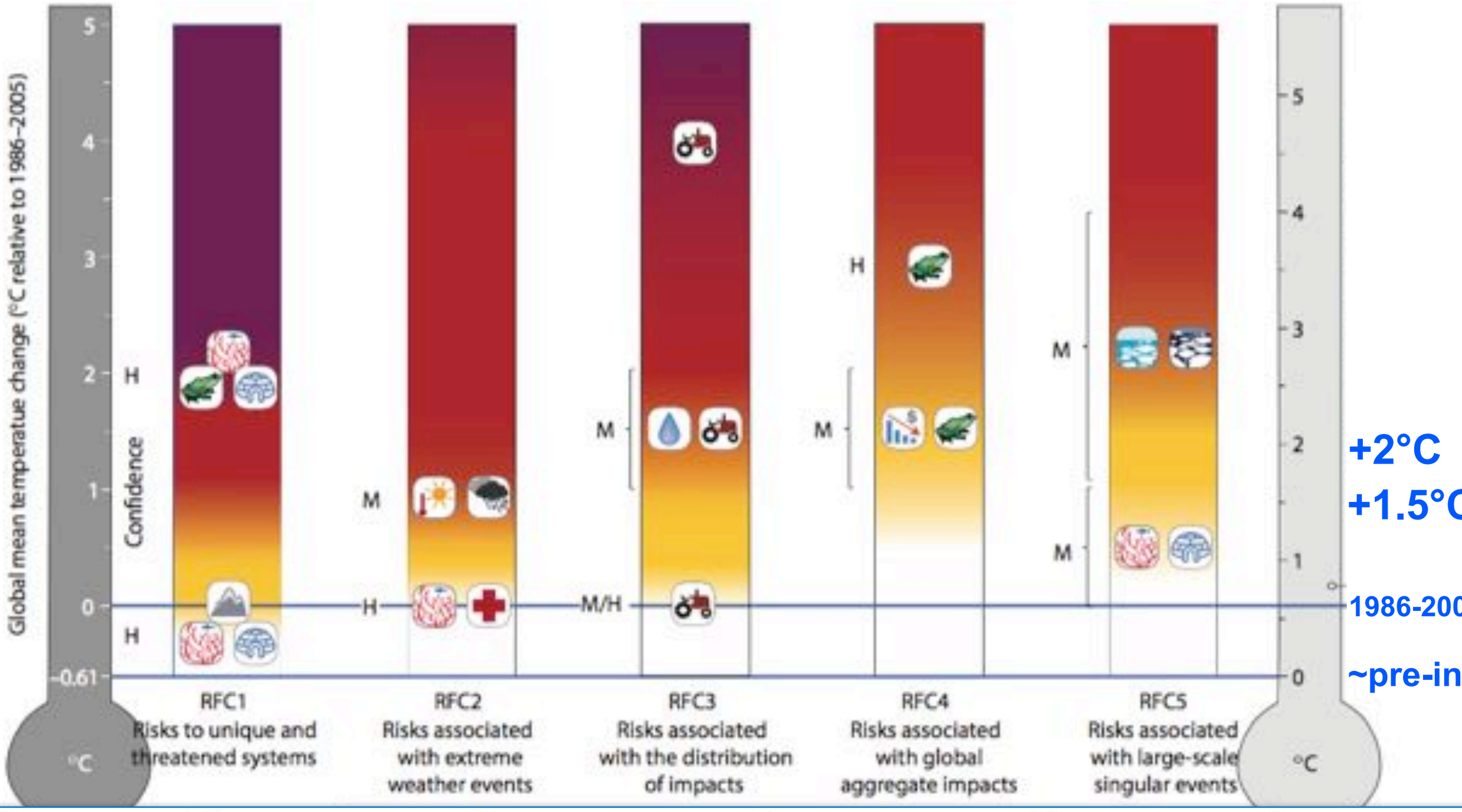
http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share

Change in average sea-level change

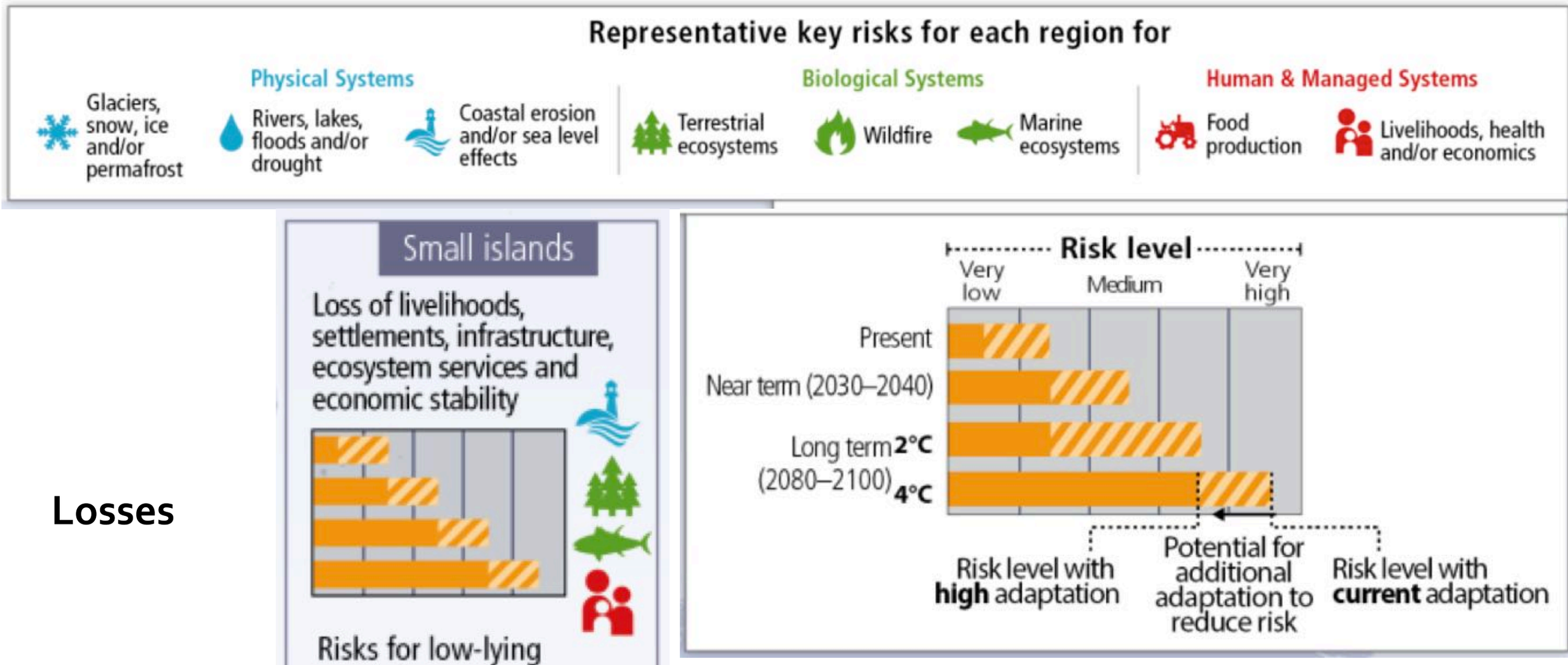


AR5 WGI SPM - Approved version / subject to final copyedit

IPCC reasons for concern / climate change risks
(Nat Climate Change 2017)



Regional key risks and potential for risk reduction: Small Islands



Losses

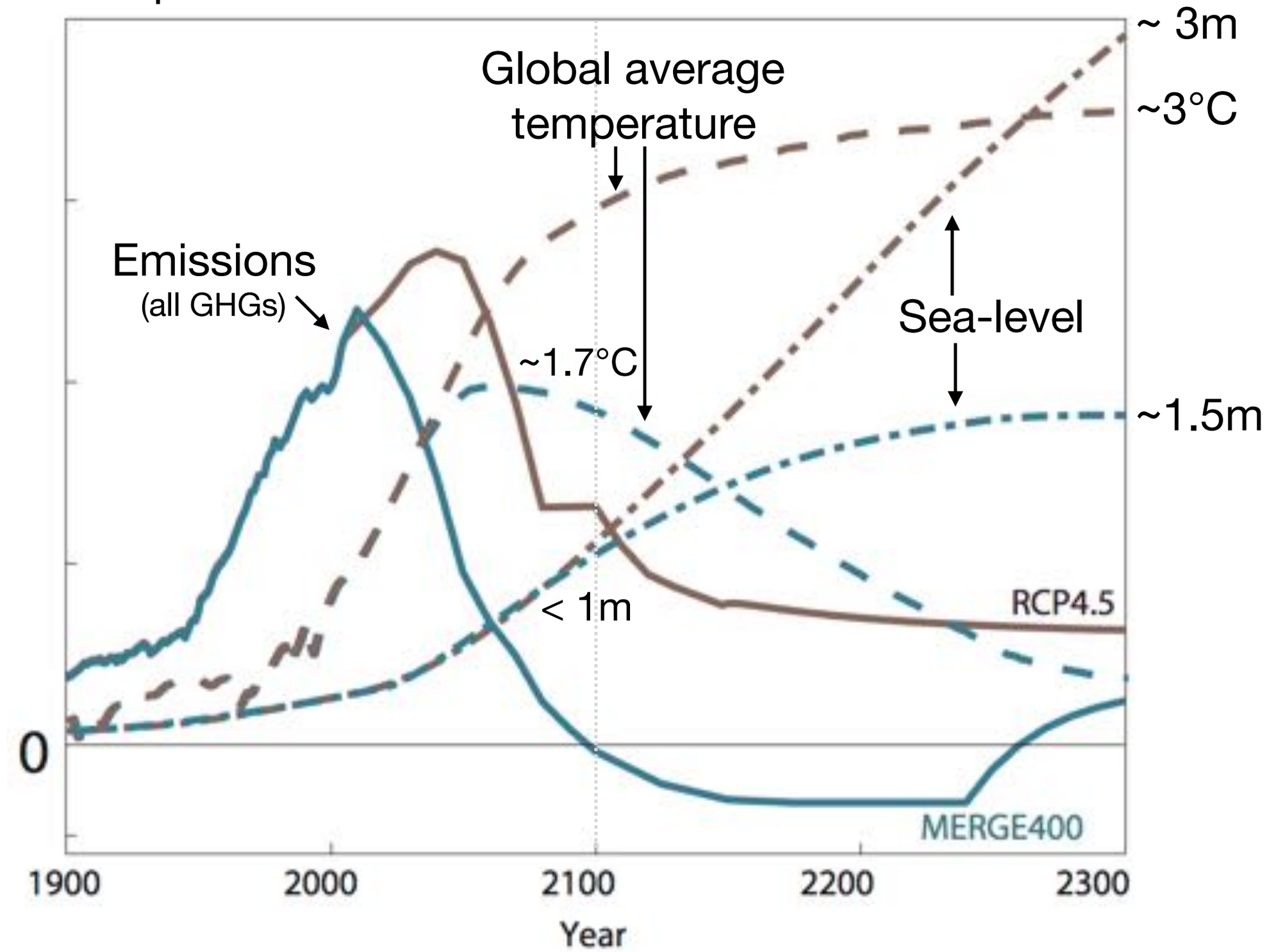
Risk to coastal areas

IPCC, AR5, SYR, SPM 8

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

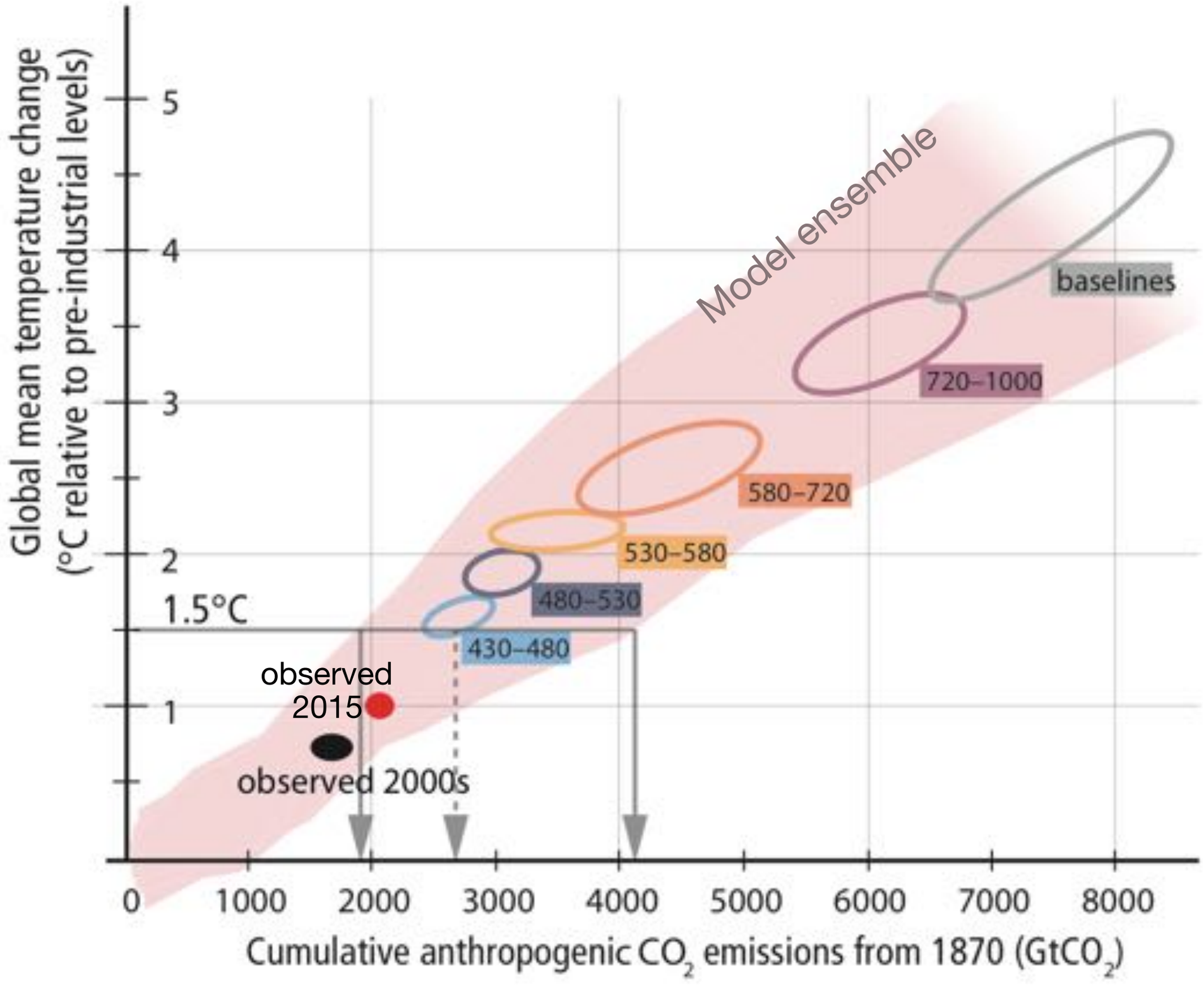
Emissions (-> concentrations) -> temperature -> sea-level

Illustrative example based on 2 scenarios



Numbers are plausible examples but should not be regarded as up-to-date projections;
Uncertainties are not shown because the intent is to focus on principles and key aspects
Source: adapted from Schaeffer et al., Nature clim. chg. (2012)

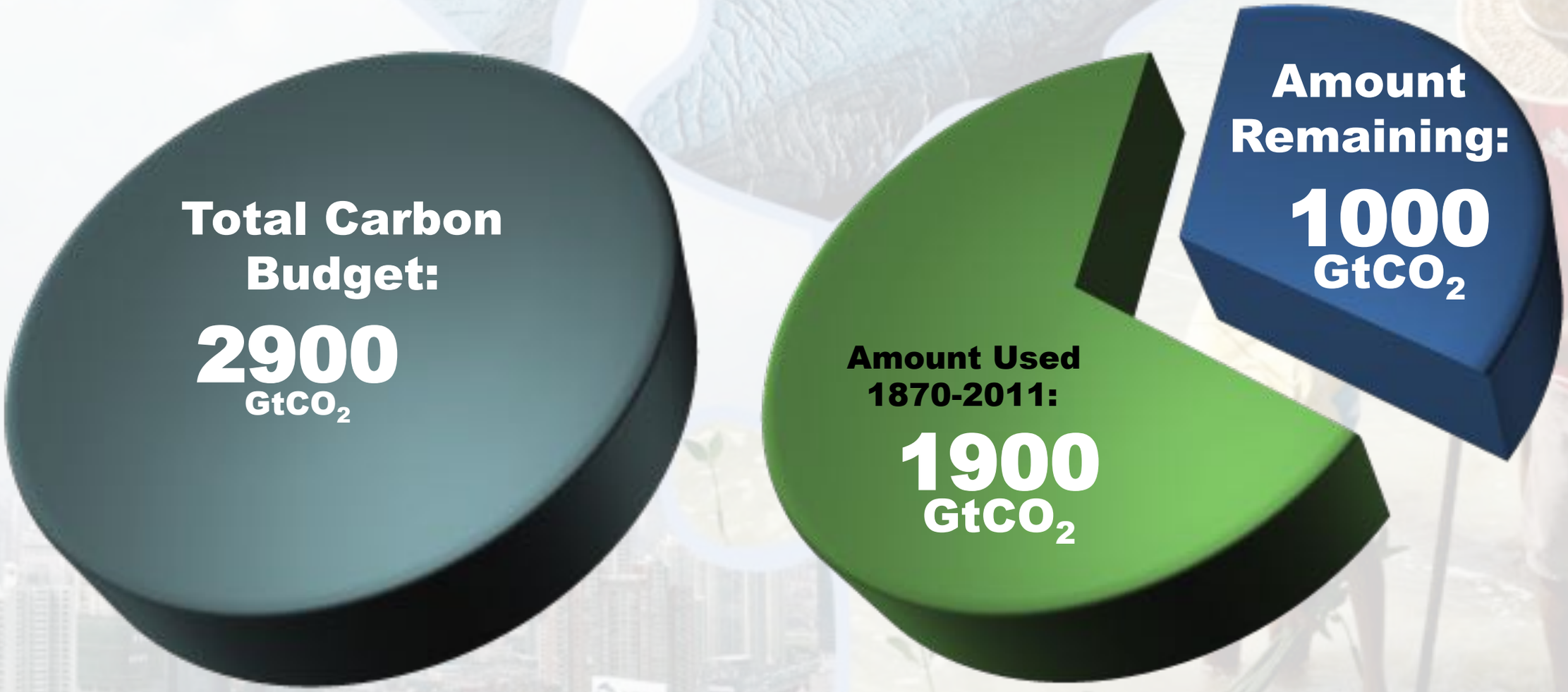
Cumulative emissions (budgets) approximately determine global warming



Based on IPCC AR5, Synthesis report (2014)

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

IPCC AR5 Synthesis Report

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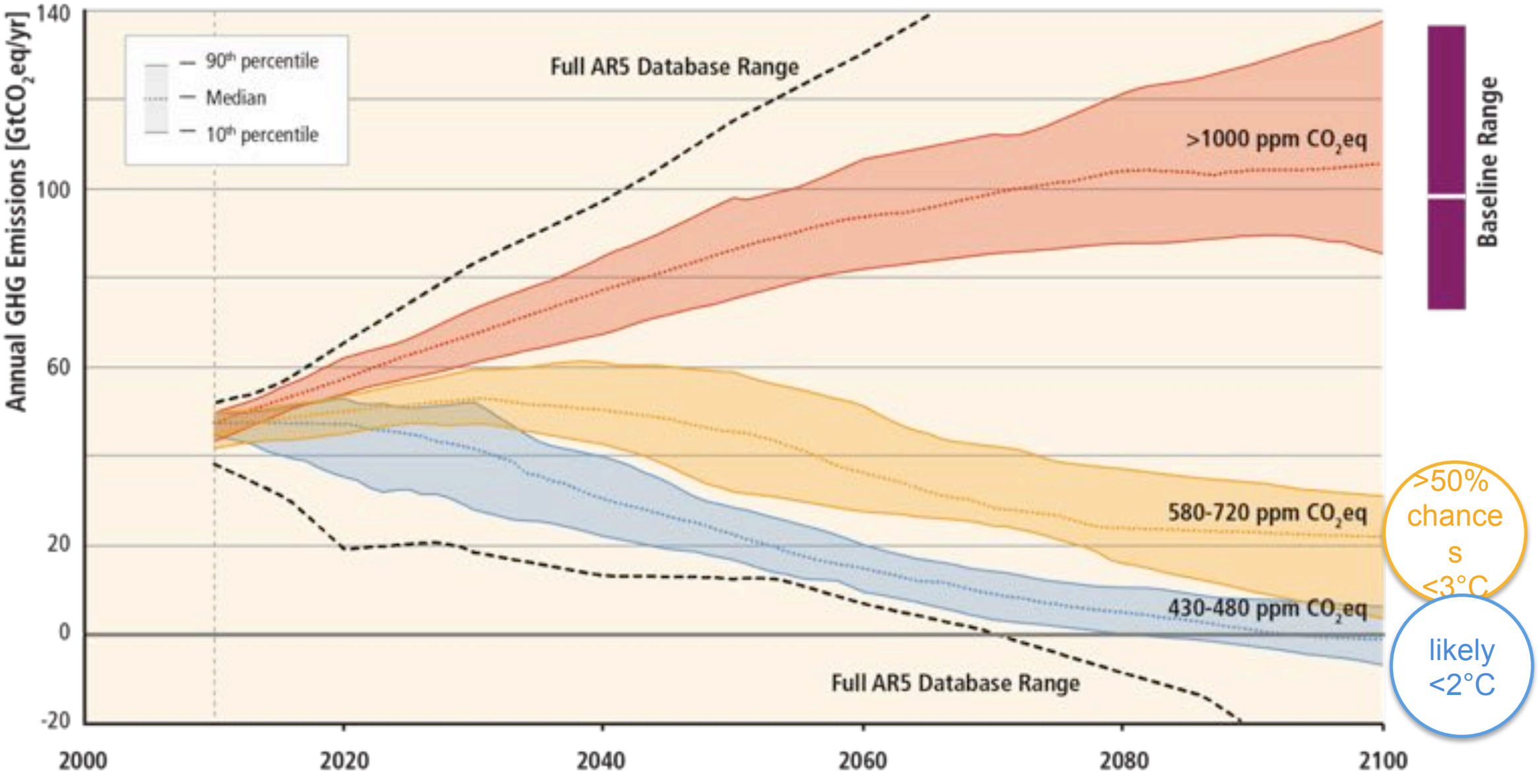
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

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



Based on AR5 WGIII Figure 6.7

WGIII Scenarios groups : key characteristics

CO_2eq Concentrations in 2100 (CO_2 eq) Category label (conc. range)	Subcategories	Change in CO_2eq emissions compared to 2010 (in %)		Temperature change in 2100 - median climate sensitivity	Likelihood of staying below specific temperature levels (relative to 1850-1900 = « pre-industrial »)
		2050	2100		
< 430	*Only a limited number of individual model studies have explored levels below 430 ppm CO_2eq*				
450 (430 – 480)	Total range[1]	-72 to -41	-118 to -78	1.5-1.7	Likely (66%) to stay below **2°C,** < *50%* chances to stay below **1.5°C**
500 (480 – 530)	No overshoot of 530 ppm CO_2eq	-52 to -42	-107 to -73	1.7-1.9	> 50% chances to stay below **2°C**
	Overshoot of 530 ppm CO_2eq	-55 to -25	-114 to -90	1.8-2.0	About 50% chances to stay below **2°C**
550 (530 – 580)	No overshoot of 580 ppm CO_2eq	-47 to -19	-81 to -59	2.0-2.2	Likely (66%) to stay below **3°C,** < 50% chances to stay below 2°C
	Overshoot of 580 ppm CO_2eq	-16 to 7	-183 to -86	2.1-2.3	
(580 – 650)	Total range	-38 to 24	-134 to -50	2.3-2.6	

Based WGIII table SPM.1 (incomplete : higher emissions scenarios not shown)

AR5 SYR: Carbon dioxide « budgets »

Cumulative CO_2 emissions from 1870 in $GtCO_2$						
Net anthropogenic warming [a]	<1.5°C			<2°C		
Fraction of simulations meeting goal [b]	66%	50%	33%	66%	50%	33%
Complex models, RCP scenarios only [c]	2250	2250	2550	2900	3000	3300
Simple model, WGIII scenarios [d]	No data	2300 to 2350	2400 to 2950	2550 to 3150	2900 to 3200	2950 to 3800
Cumulative CO_2 emissions from 2011 in $GtCO_2$						
Complex models, RCP scenarios only [c]	400	550	850	1000	1300	1500
Simple model, WGIII scenarios [d]	No data	550 to 600	600 to 1150	750 to 1400	1150 to 1400	1150 to 2050

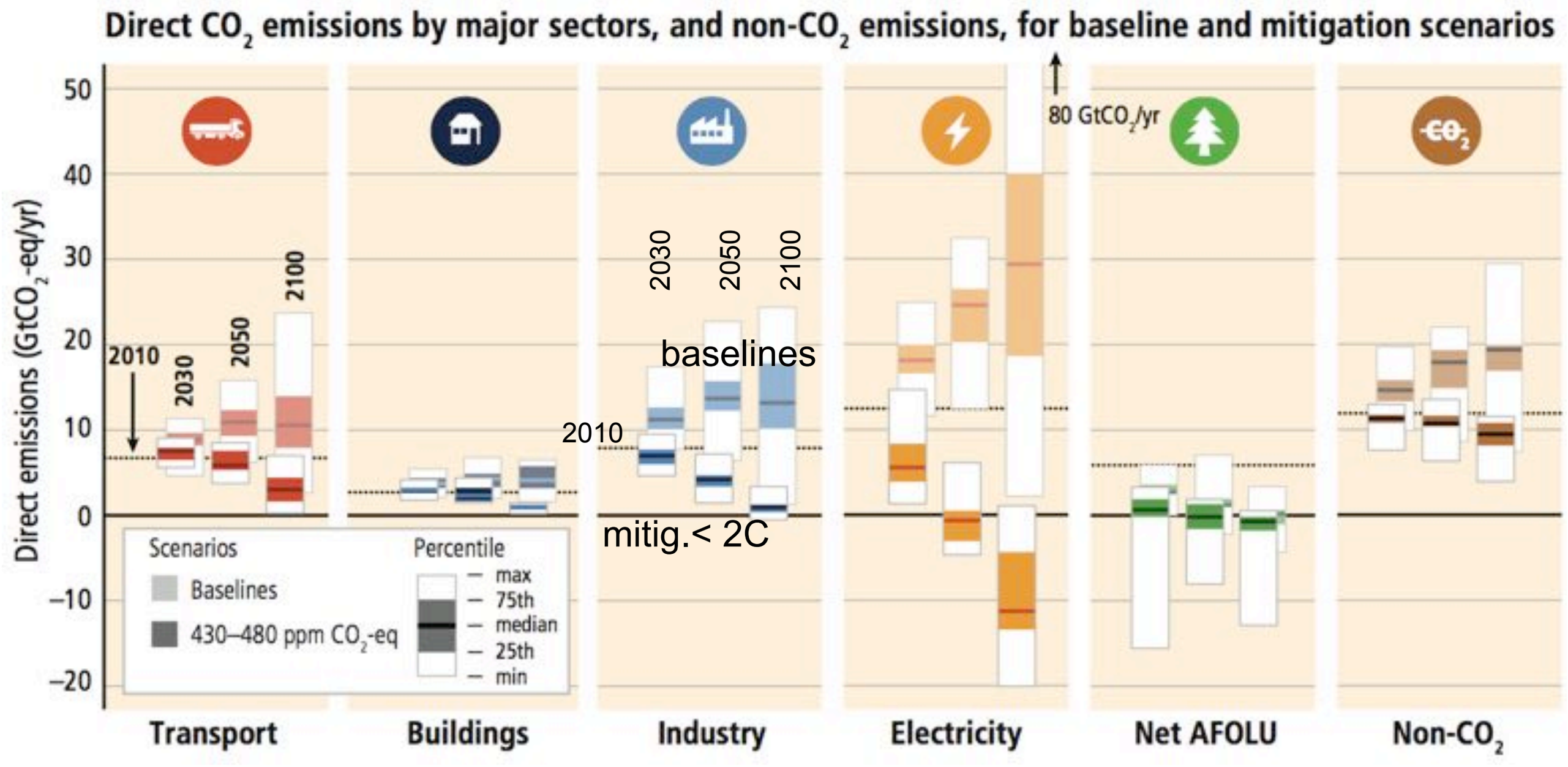
<3°C (see AR5 SYR)

possible?
implications?

ranges likely to change
at least due to more studies

(Source: AR5 Synthesis report table 2.2)

Emissions in sectors: baselines and « likely < 2°C »



AR5 SYR figure SPM.14

Paris agreement

- Article 2:
  - (…) to strengthen the global response to the threat of climate change, in the context of sustainable development and efforts to eradicate poverty, including by:
    - Holding the increase in the global average temperature to well below 2 °C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5 °C above pre-industrial levels, recognizing that this would significantly reduce the risks and impacts of climate change;
    - Increasing the ability to adapt (…) and foster climate resilience and low greenhouse gas emissions development, in a manner that does not threaten food production;
    - Making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development

Global warming of 1.5°C

An 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***

Proposed 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

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Understanding 1.5°C; reference levels, probability, transience, overshoot, stabilization (…)

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Pathways compatible with 1.5°C compared with 2°C (…) Technological, environmental, institutional and socio-economic opportunities and challenges

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Key global and regional climate changes, vulnerabilities, impacts, and risks at 1.5°C, taking into account adaptation potential (…)

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- Boxes (integrated c…
- FAQs

Current and emerging adaptation and mitigation options, including negative emission methodologies, and associated opportunities and challenges (…) Case studies

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Linkages between achieving SDGs and 1.5°C (…)

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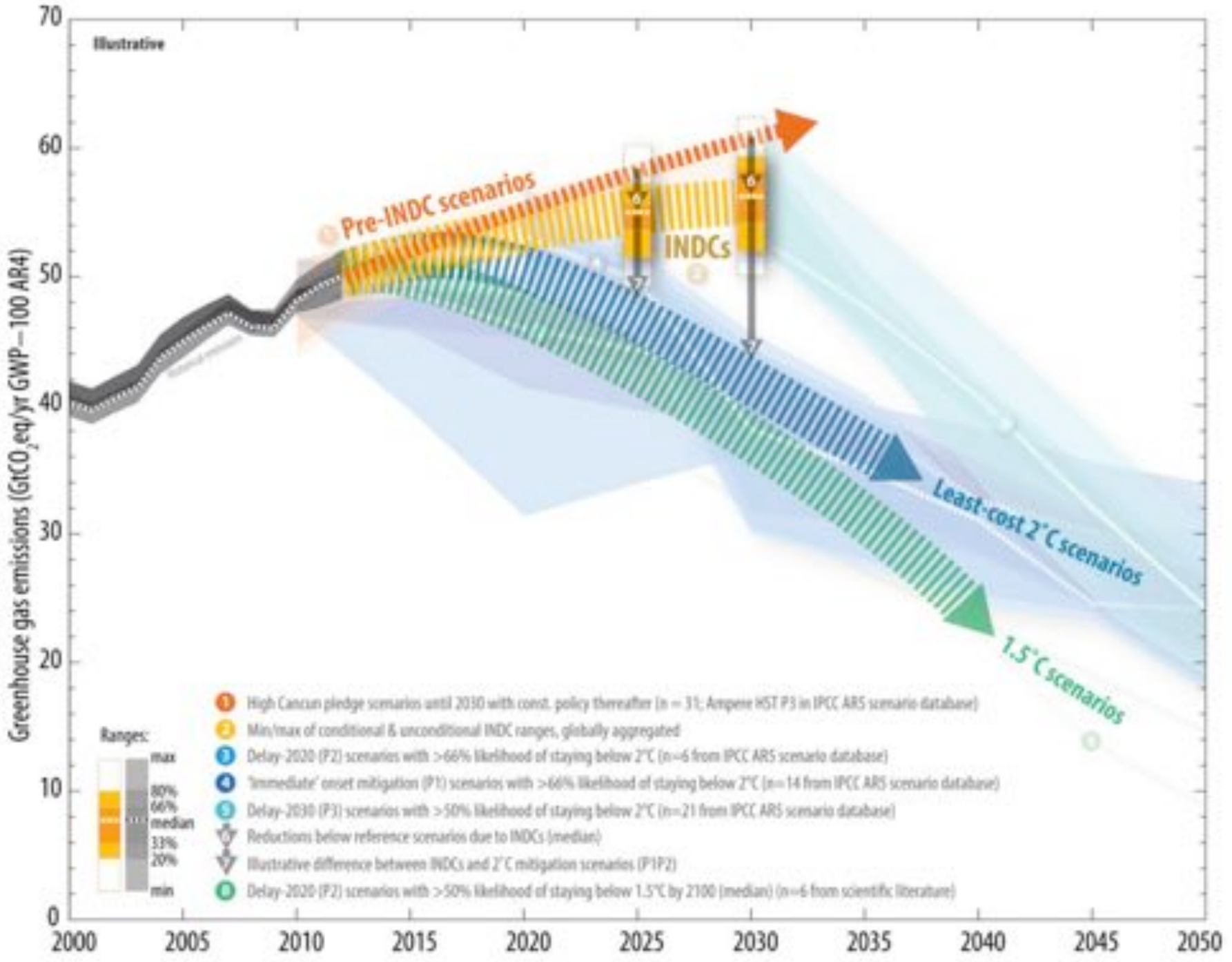
Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the intended nationally determined contributions

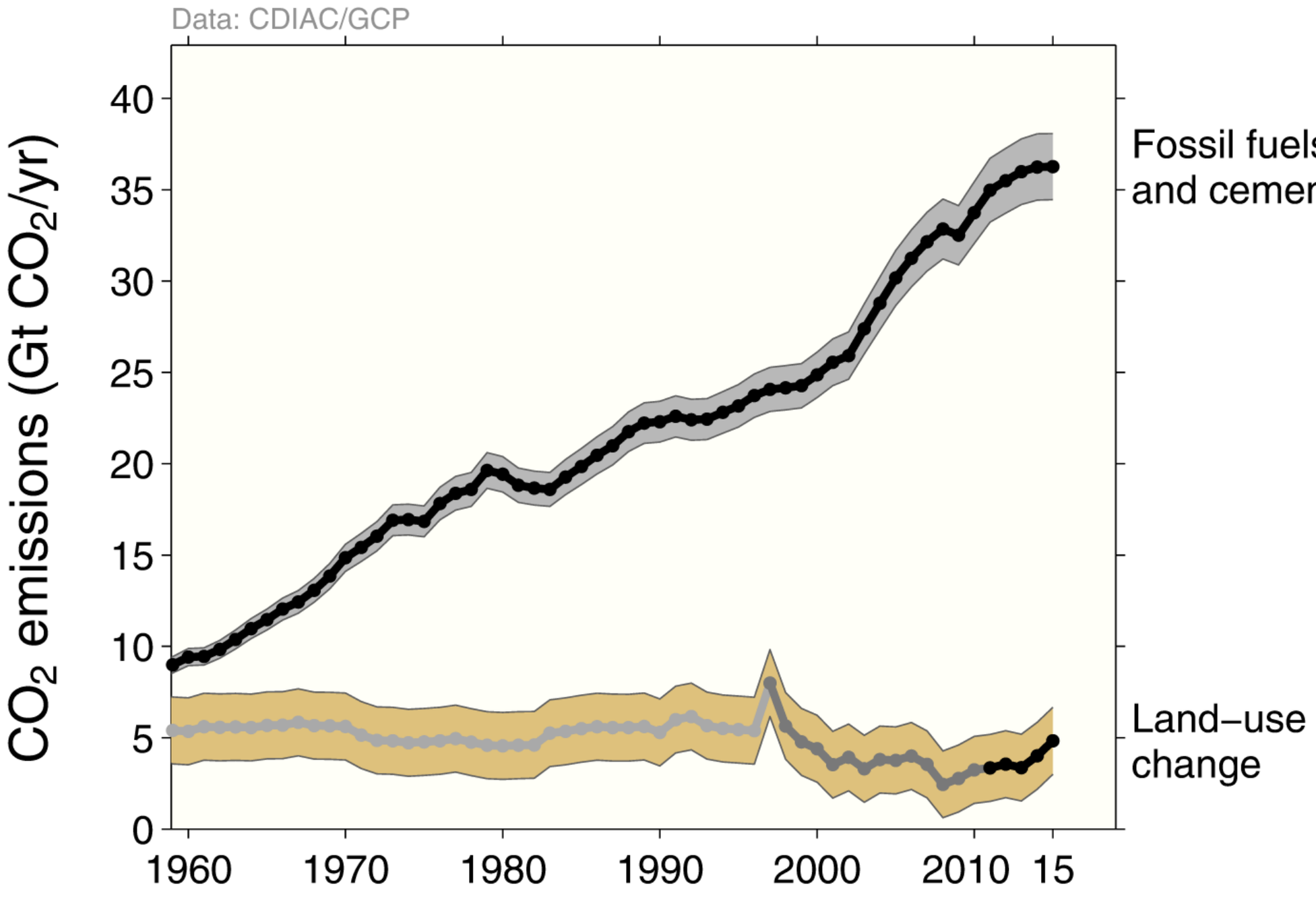


UNFCCC, Aggregate effect of the intended nationally determined contributions: an update
http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf

Total global emissions

Total global emissions: 41.9 ± 2.8 $GtCO_2$ in 2015, 49% over 1990

Percentage land-use change: 36% in 1960, 9% averaged 2006-2015



Source: CDIAC; Houghton et al 2012; Giglio et al 2013; Le Quéré et al 2016; Global Carbon Budget 2016

Tentative and personal conclusions
(writing of the SR1.5 did not start yet!)

1.5°C matters: lower impacts, adaptation less costly than in 2°C world, even if there is a temporary overshoot above 1.5°C

It is very ambitious to reduce emissions enough for a 1.5°C long-term average temperature above pre-industrial objective; a little easier with overshoot

The slower radical changes in emission patterns take place, the more we may need uncertain or risky technologies, such as large use of carbon dioxide removal from the atmosphere (possibly at the expense of bio-energy competition with food production)

Decision making needs the best scientific information possible – the IPCC SR 1.5 will be essential, but much can be done without waiting for it

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**

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