A few arguments about the urgency of addressing climate change and biodiversity together, and some remarks about the EU

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IPCC Vice-Chair from 2008 to 2015

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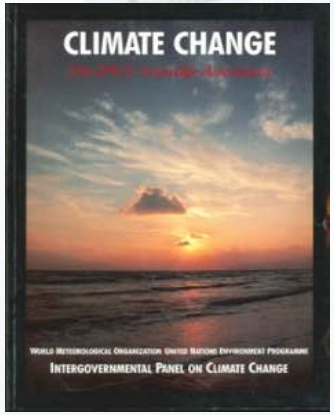
Keynote lecture at the Council of the European Union Working Party on International Environment Issues (Climate change/Biodiversity) joint meeting

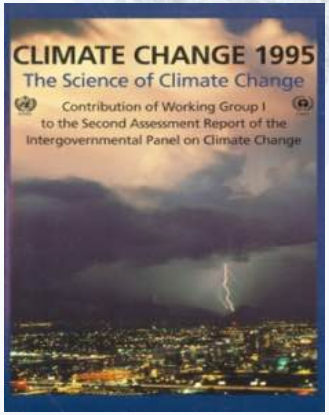
Brussels, 19 September 2018

Thanks to the Walloon government for supporting www.plateforme-wallonne-giec.be & my team at UCLouvain

IPCC Assessment Reports



FAR 1990



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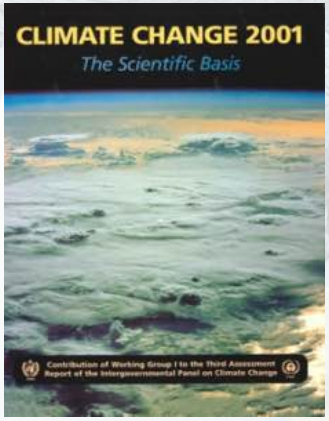
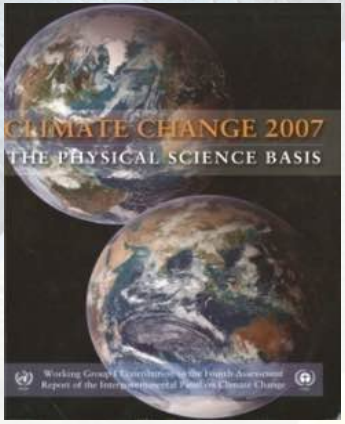
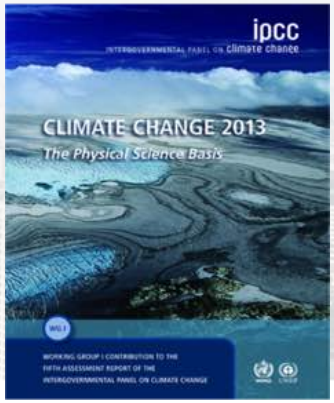


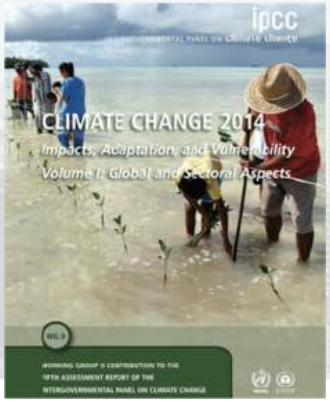
TAR 2001



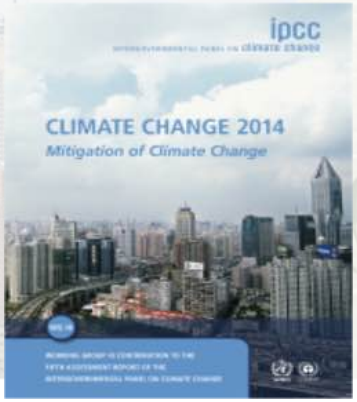
AR4 2007



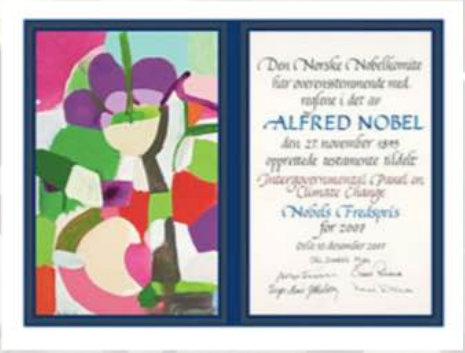
AR5 WGI 2013



AR5 WGII 2014



AR5 WGIII 2014



IPCC AR5 Synthesis Report

ipcc
INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

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**

The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

www.ipbes.net

Key messages from 2018 IPBES Report on Land Degradation and Restoration

A. Land degradation is a pervasive, systemic phenomenon: it occurs in all parts of the terrestrial world and can take many forms. **Combating land degradation** and restoring degraded land is an **urgent priority to protect the biodiversity and ecosystem services** vital to all life on Earth **and to ensure human well-being**.

B. **Unless urgent and concerted action is taken, land degradation will worsen in the face of** population growth, unprecedented consumption, an increasingly globalized economy and **climate change**.

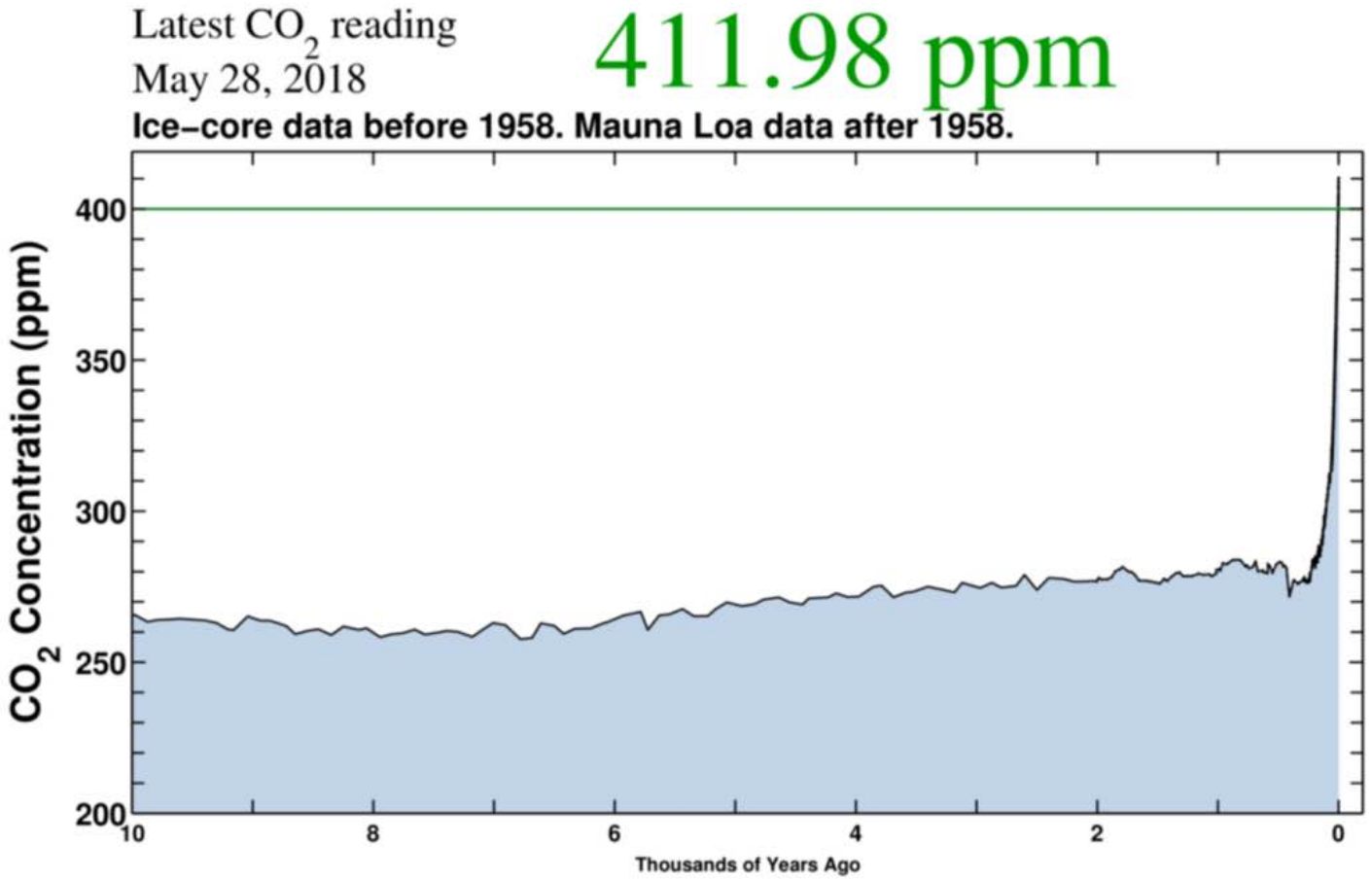
C. The implementation of known, proven actions to combat land degradation and thereby transform the lives of millions of people across the planet will become **more difficult and costly over time**. An urgent **step change in effort** is needed to prevent irreversible land degradation and accelerate the implementation of restoration measures.

From 2018 IPBES Report on Land Degradation and Restoration

(B5) **Land degradation is a major contributor to climate change, while climate change can exacerbate the impacts** of land degradation and reduce the viability of some options for avoiding, reducing and reversing land degradation. The impact of almost **all direct drivers of land degradation will be worsened by climate change**. These include, among others, accelerated soil erosion on degraded lands as a result of more extreme weather events, increased risk of forest fires and changes in the distribution of invasive species, pests and pathogens. **Sustainable land management and land restoration can assist climate change mitigation and adaptation**. **Long-established** land management and restoration **practices may no longer be viable in the face of climate change**. Notwithstanding this risk, **nature-based climate mitigation and adaptation actions remain promising**.

Argument n° 1: We have changed the composition of the atmosphere on an extraordinary speed and scale

CO_2 Concentration, 28 May 2018 (Keeling curve)



Source: scripps.ucsd.edu/programs/keelingcurve/

Argument n° 2: Because we use the atmosphere as a dustbin for our greenhouse gases, we thicken the insulation layer around the planet

That is why we must cut emissions to ZERO as soon as possible

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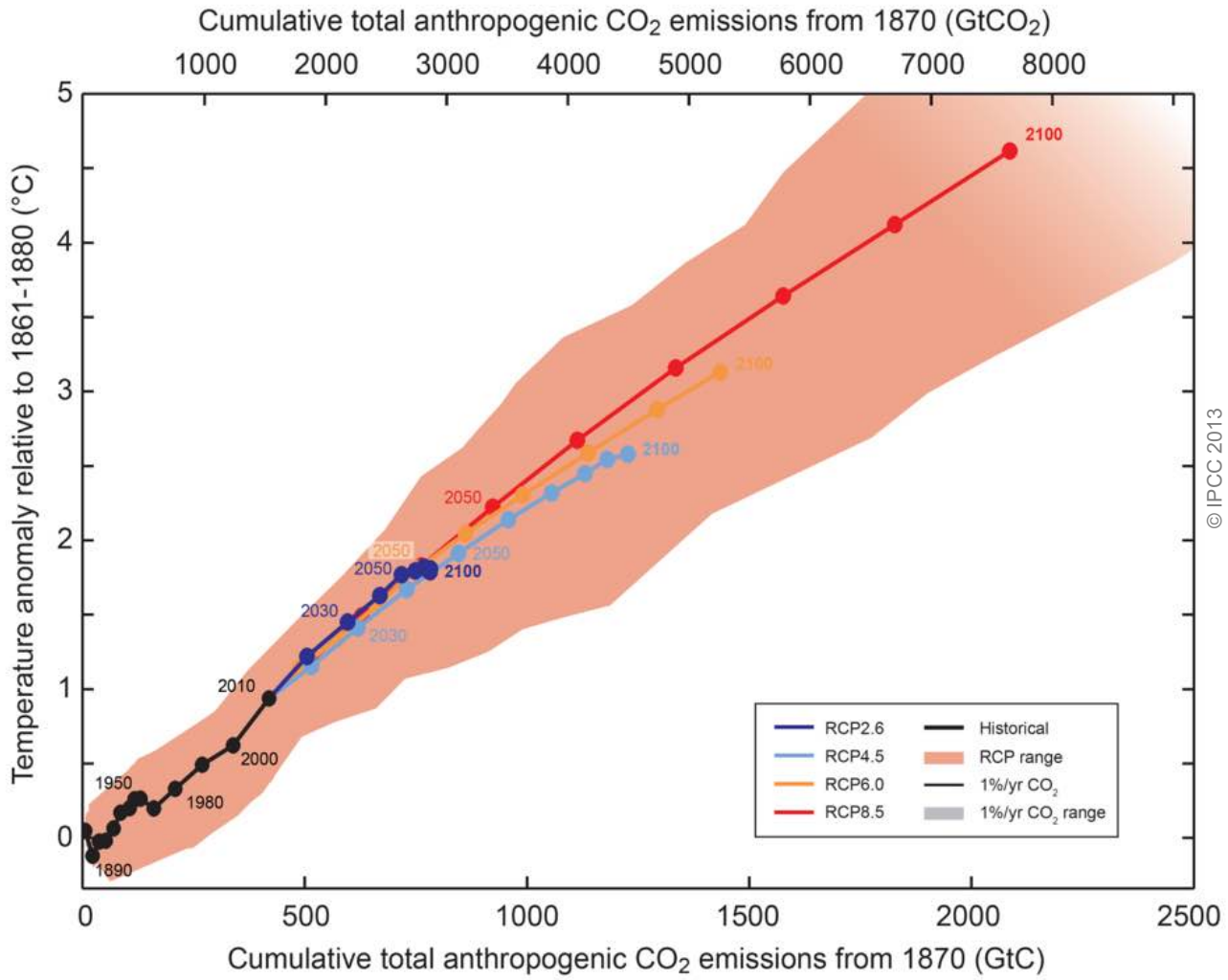
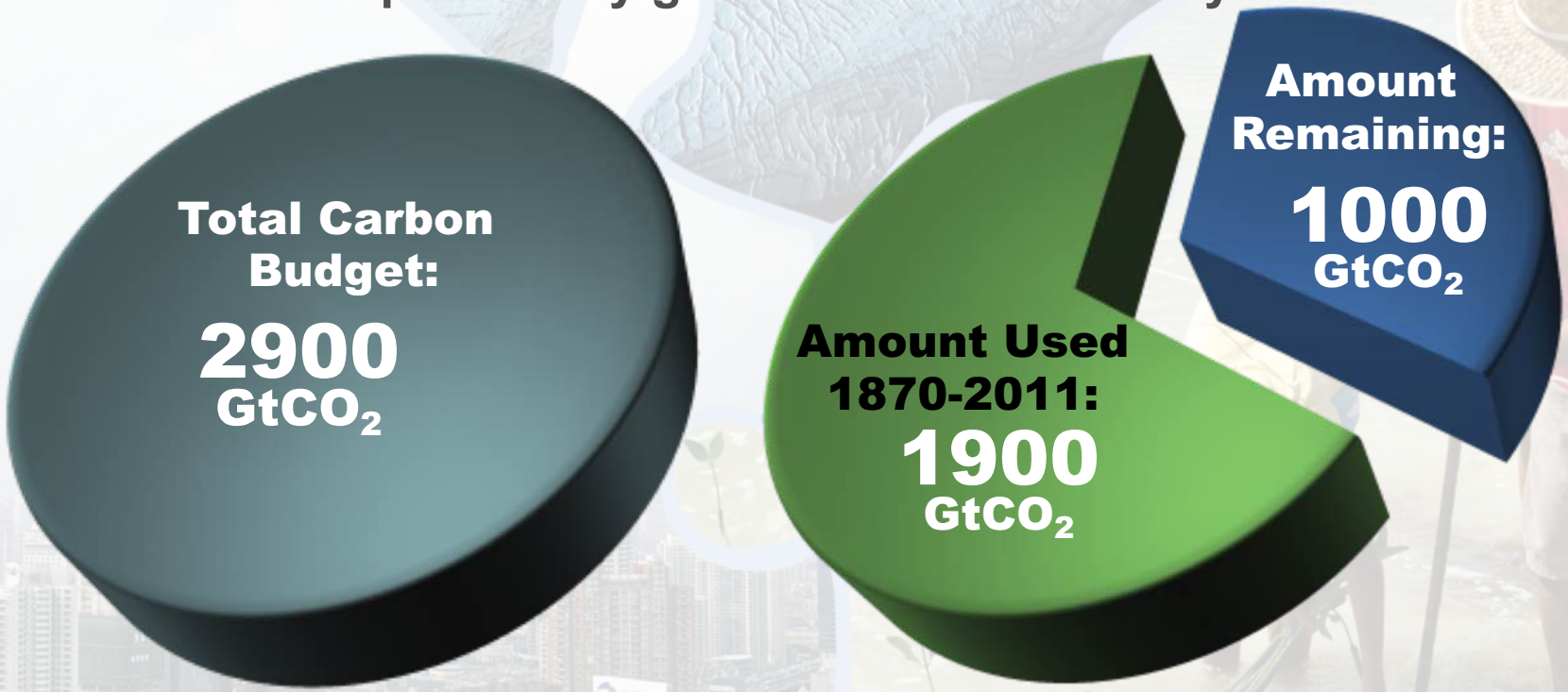


Fig. SPM.10

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



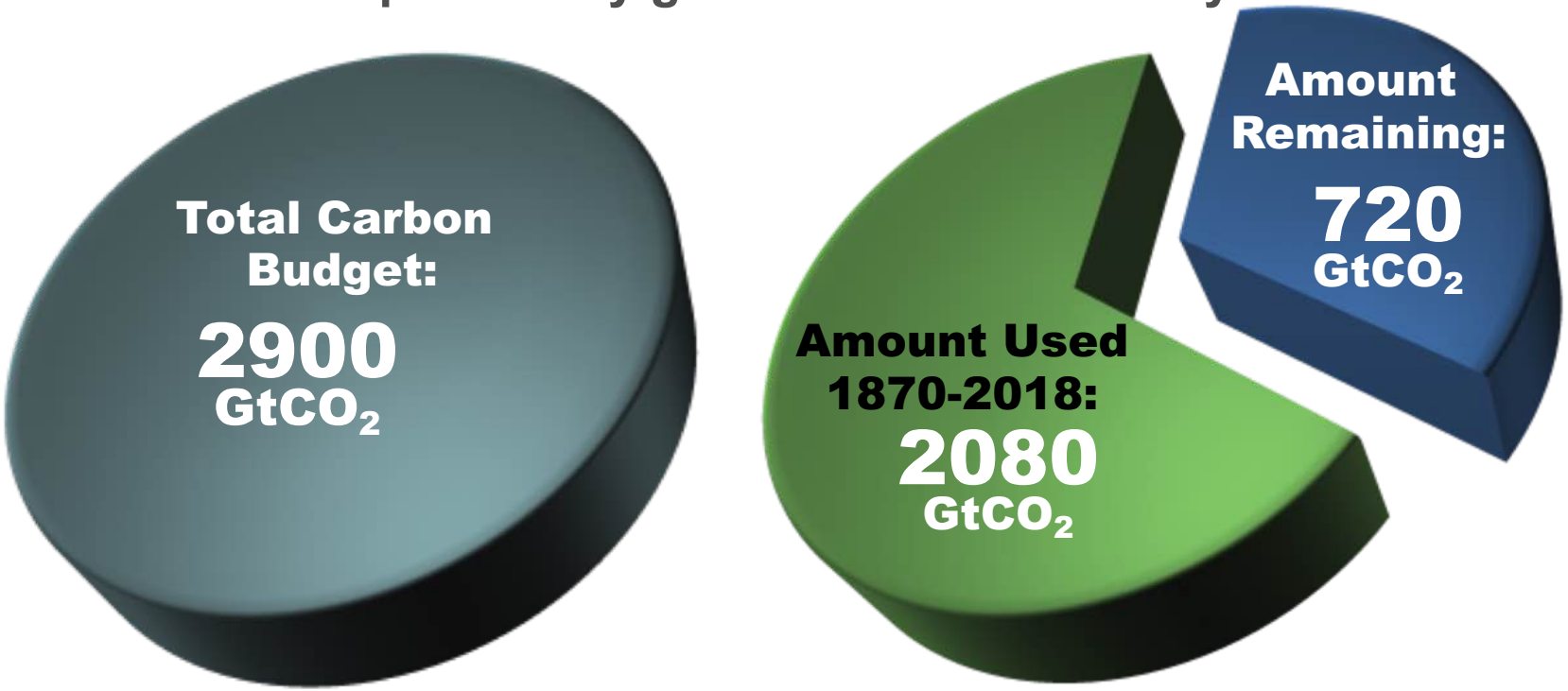
NB: Emissions in 2011: 38 GtCO2/yr

AR5 WGI SPM

My personal update (2018):
The window for action is VERY rapidly closing

75% 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

Adapted by @JPvanYpersele from the IPCC AR5

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)

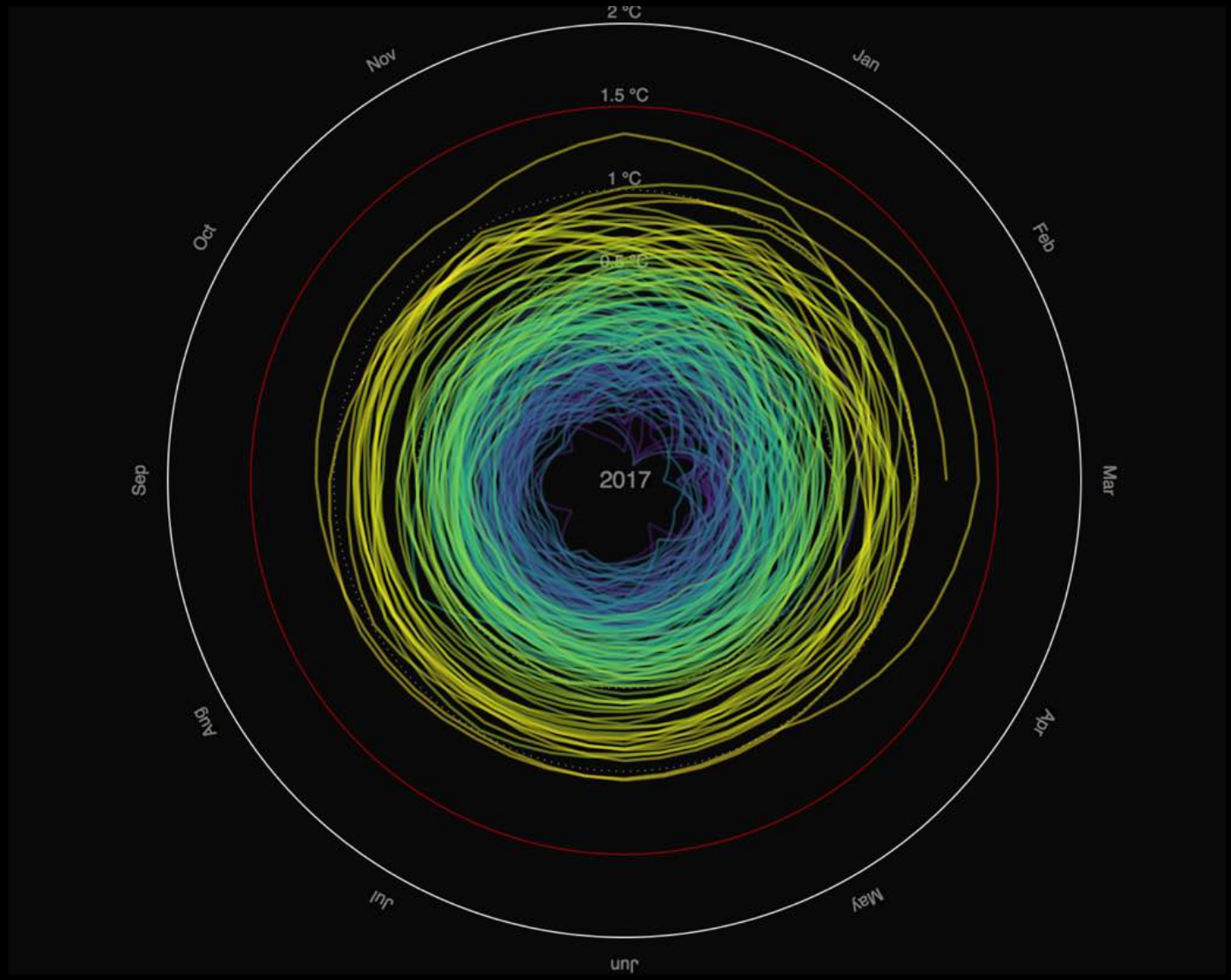
possible?
implications?

ranges likely to change
at least due to more studies

(Source: AR5 Synthesis report table 2.2)

Argument n° 3: Global surface temperature is increasing fast, some extreme events become more frequent or intense, and glaciers are melting

Temperature spiral



Global Mean Temperature in °C relative to 1850 – 1900
Graph: Ed Hawkins (Climate Lab Book) – Data: HadCRUT4 global temperature dataset
Animated version available on http://openclimatedata.net/climate-spirals/temperature

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

Argument n° 4: Average temperature is probably on its way to exceed the « conservation temperature » for the Greenland and (some of the) Antarctic ice sheet

There is therefore a very high risk that average sea level would increase by several metres over the next century or two

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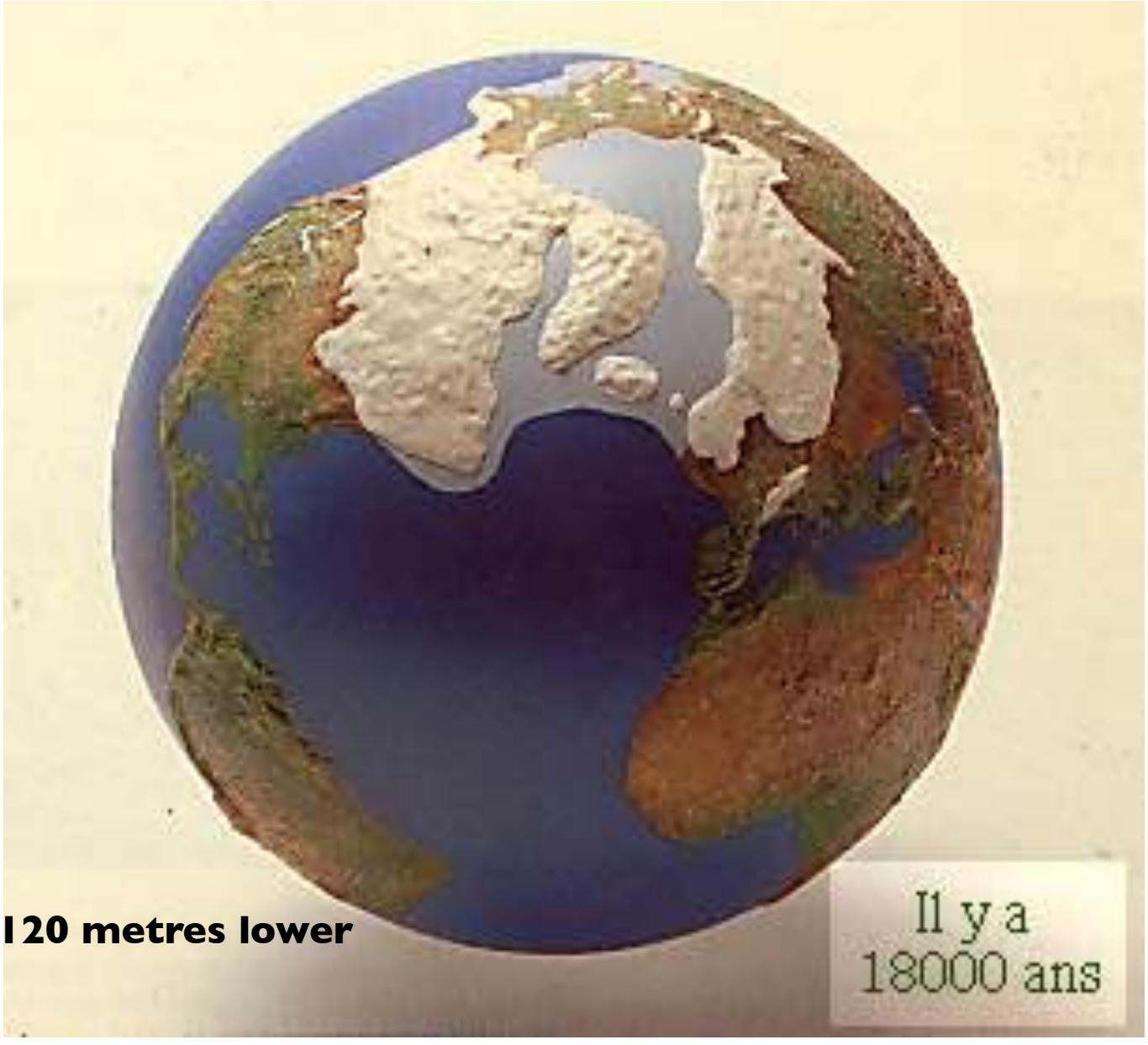
18-20000 years ago (Last Glacial Maximum)

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



Sea level: 120 metres lower

Today, with +4-5° C globally

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

Argument n° 5: Climate change impacts poor people first, but we are all on the same spaceship

« Boomerang » effect:

Belgian Prime Minister Charles Michel (RTBF, 4 May 2018): « when there is a geopolitical instability, we pay the cost as well »

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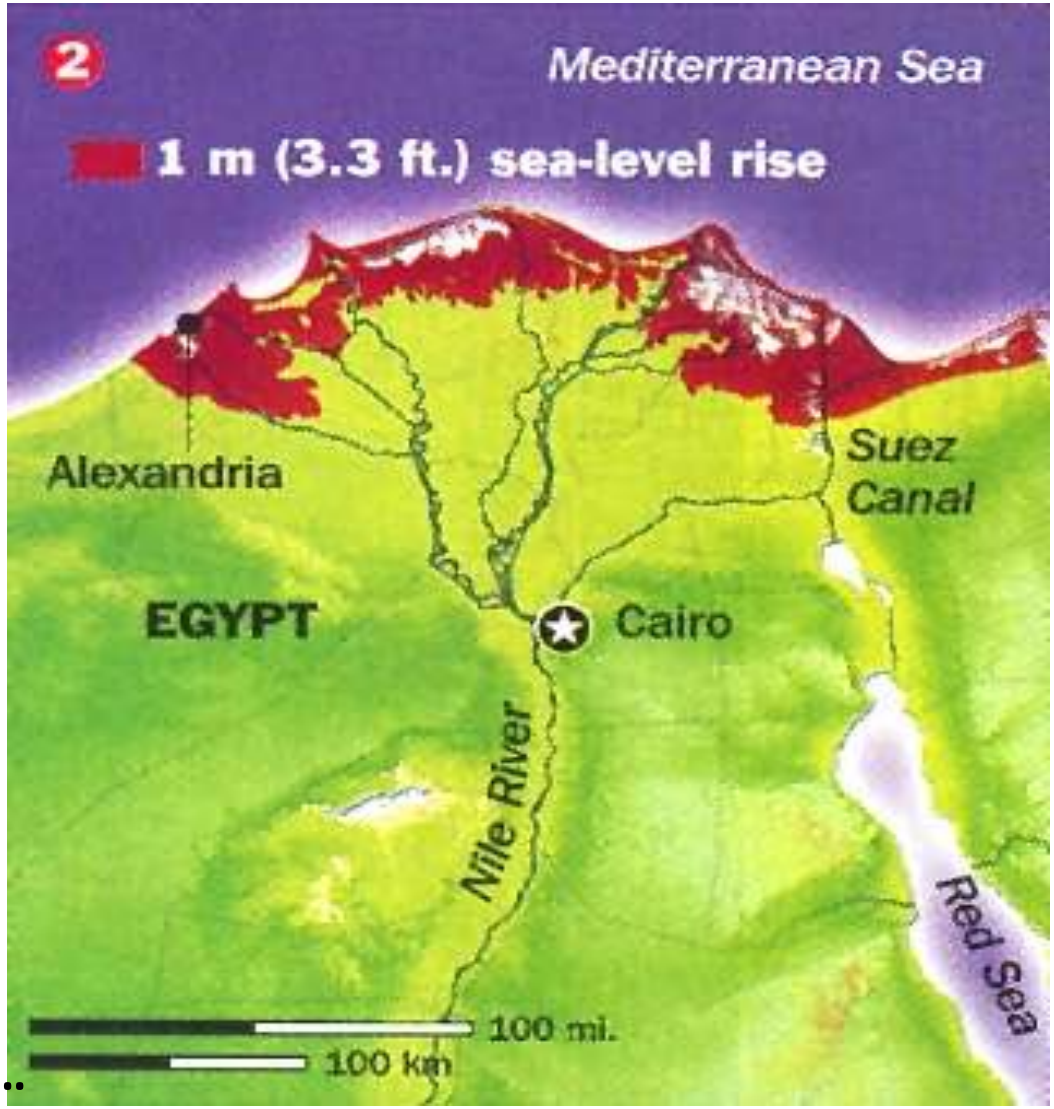
Risk = Hazard x Vulnerability x Exposure

(Victims of New Orleans floods after Katrina in 2005)

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

Effects on the Nile Delta, where more than 10 million people live less than 1 m above sea level



NB: + 1 m is possible in the next 100 years…

(Time 2001)

Argument n° 6: Ecosystems suffer more and more, while our wellbeing depends on their good state

The « 6th Extinction » has started

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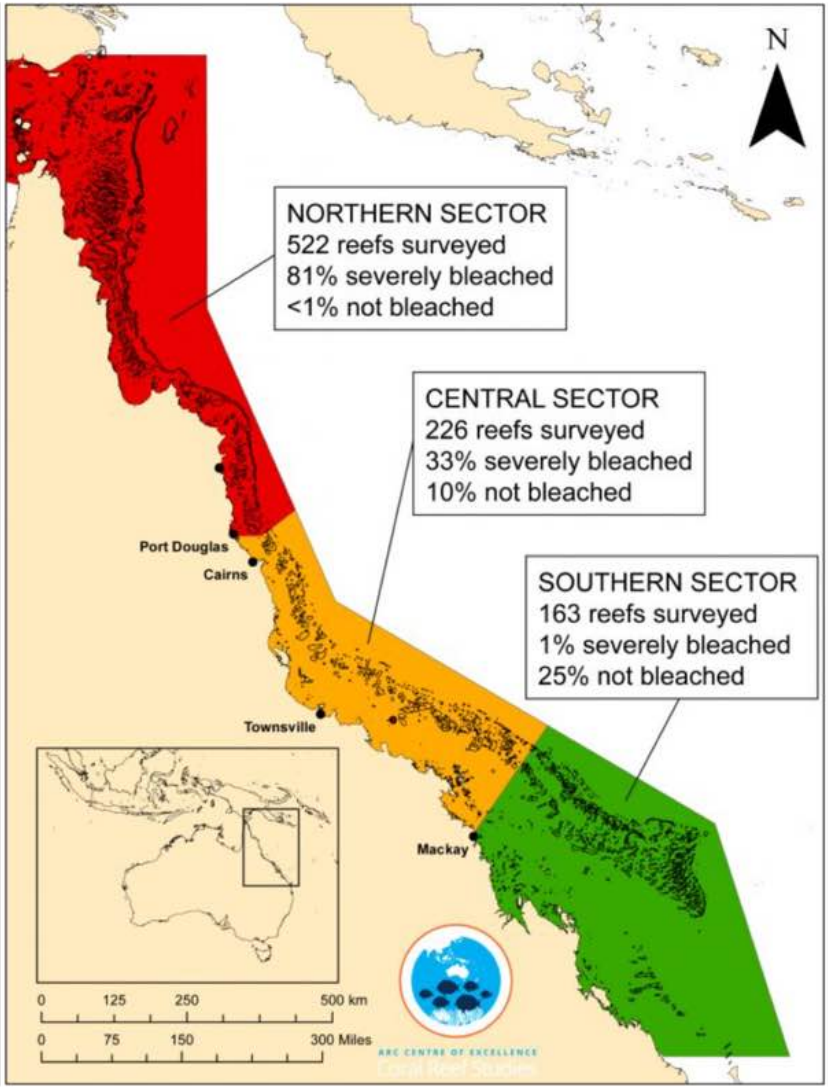
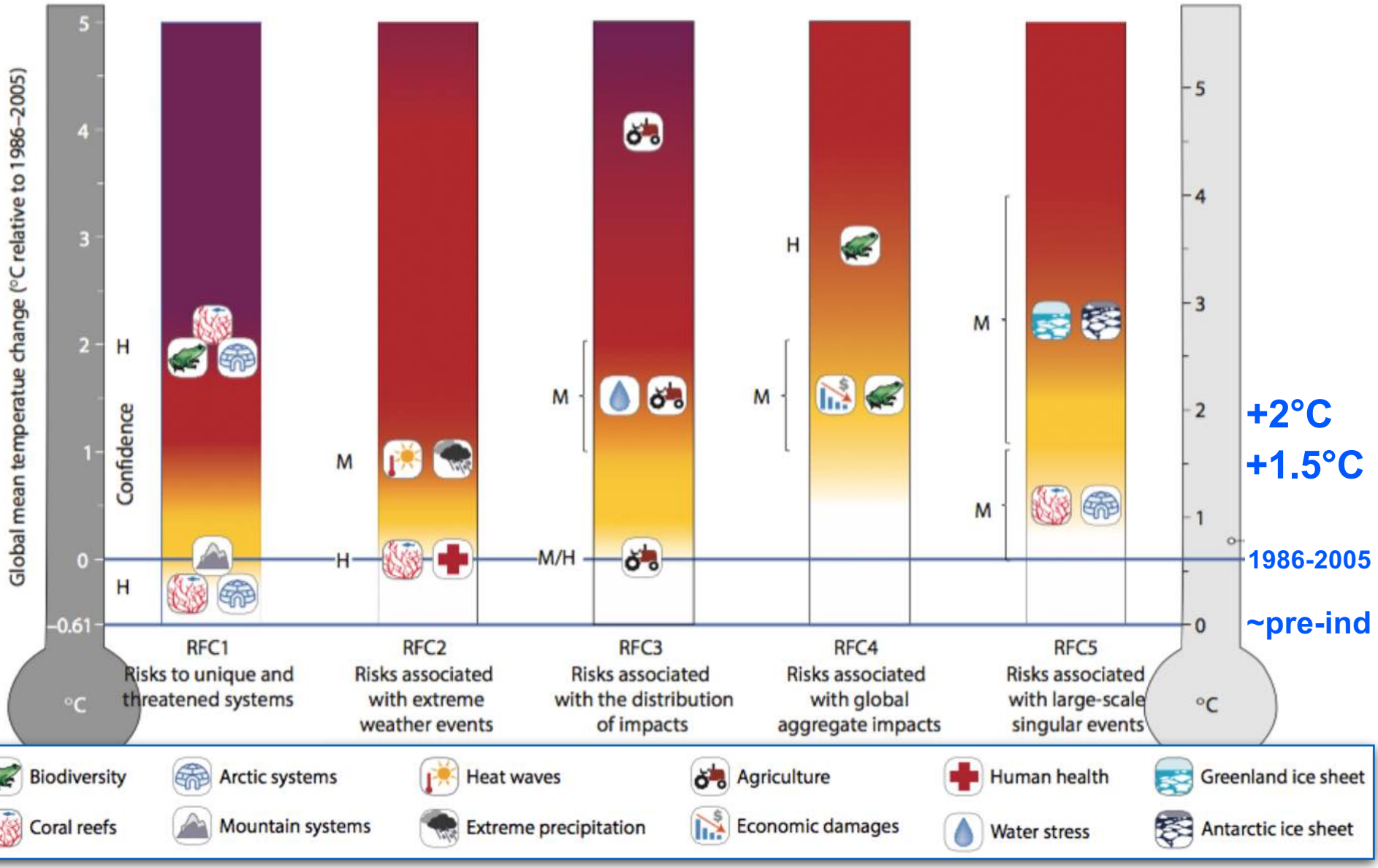
2016: Only 7% of the Great Barrier Reef has avoided coral bleaching



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

IPCC reasons for concern / climate change risks

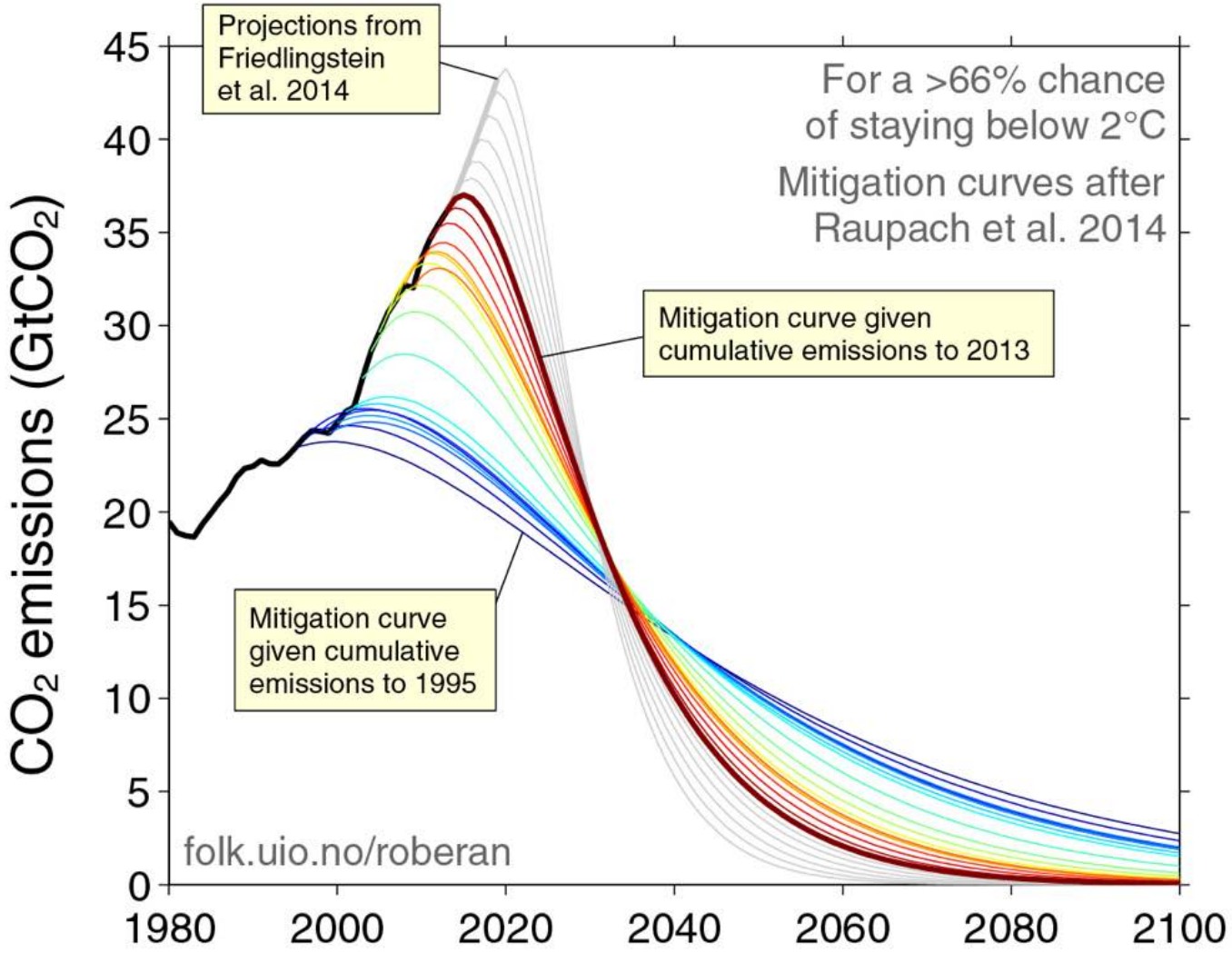
(Nat Climate Change 2017)



Argument n°7: The longer we wait to reduce emissions, the more we have to reduce them

15 to 40% of the CO_2 emitted today will still be in the atmosphere in 1000 years from now

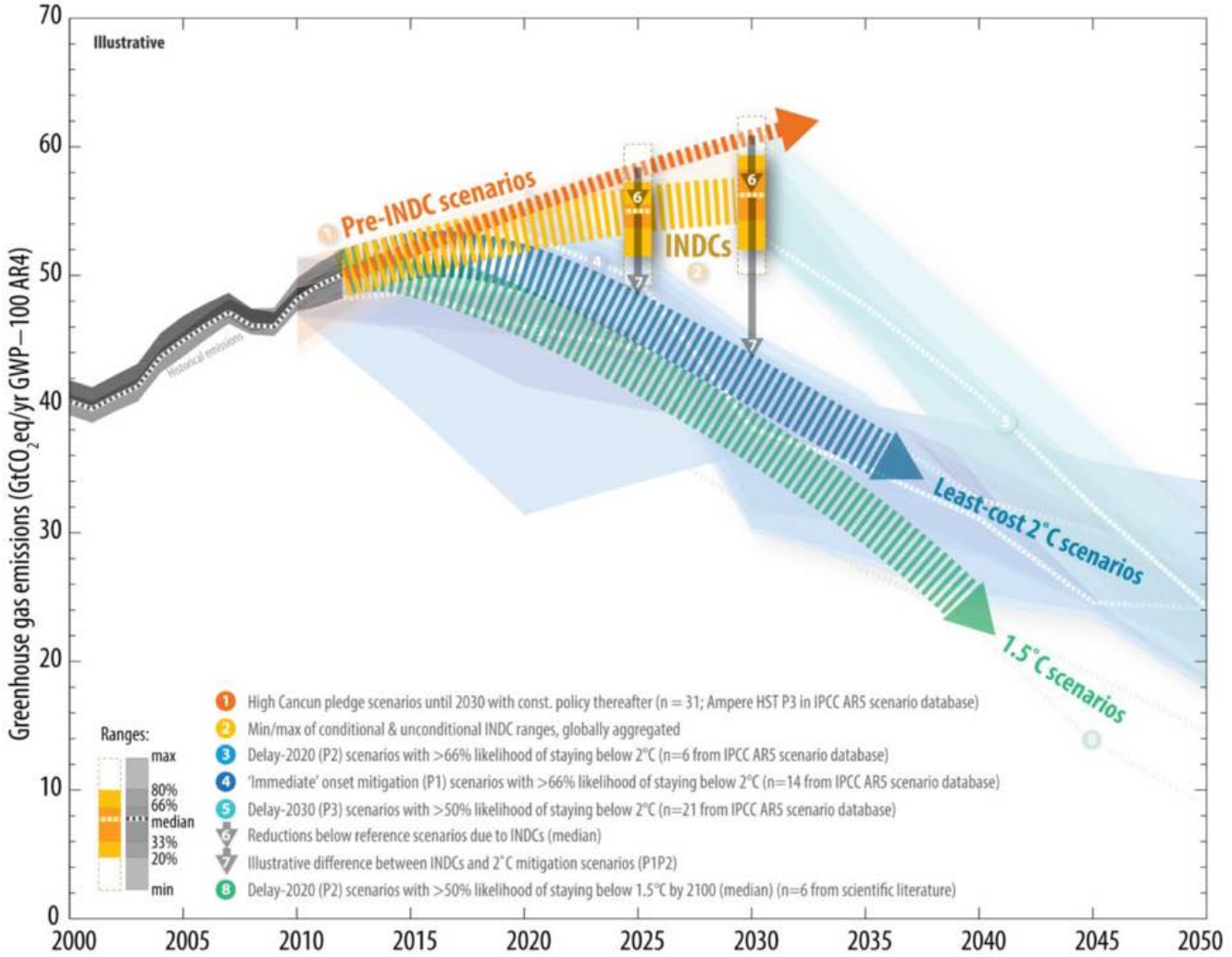
Limiting warming becomes much more difficult when the peak happens later



Source and details:

http://folk.uio.no/roberan/t/global_mitigation_curves.shtml

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

Argument n° 8: Combustion of fossil fuels, wood, and biomass also cause air pollution, which kills 7 million people per year (including 500 000 in Europe)

(World Health Organization, 2018)

Opportunity: Addressing the causes of climate change can also improve air quality and wellbeing

Fine particulates from fossil fuel and wood burning kill

Photo: Jerzy Gorecki, Pixabay

Children are particularly sensitive to air pollution

Photo: Indiatoday.in, 6-12-2017

Argument n° 9: European Union loses at least 1 billion euros *per day* simply to buy fossil fuels outside its borders

True, decarbonizing the EU economy will cost, but not doing it could cost much more in impacts. Saving these 400 billions €/year could offer many opportunities

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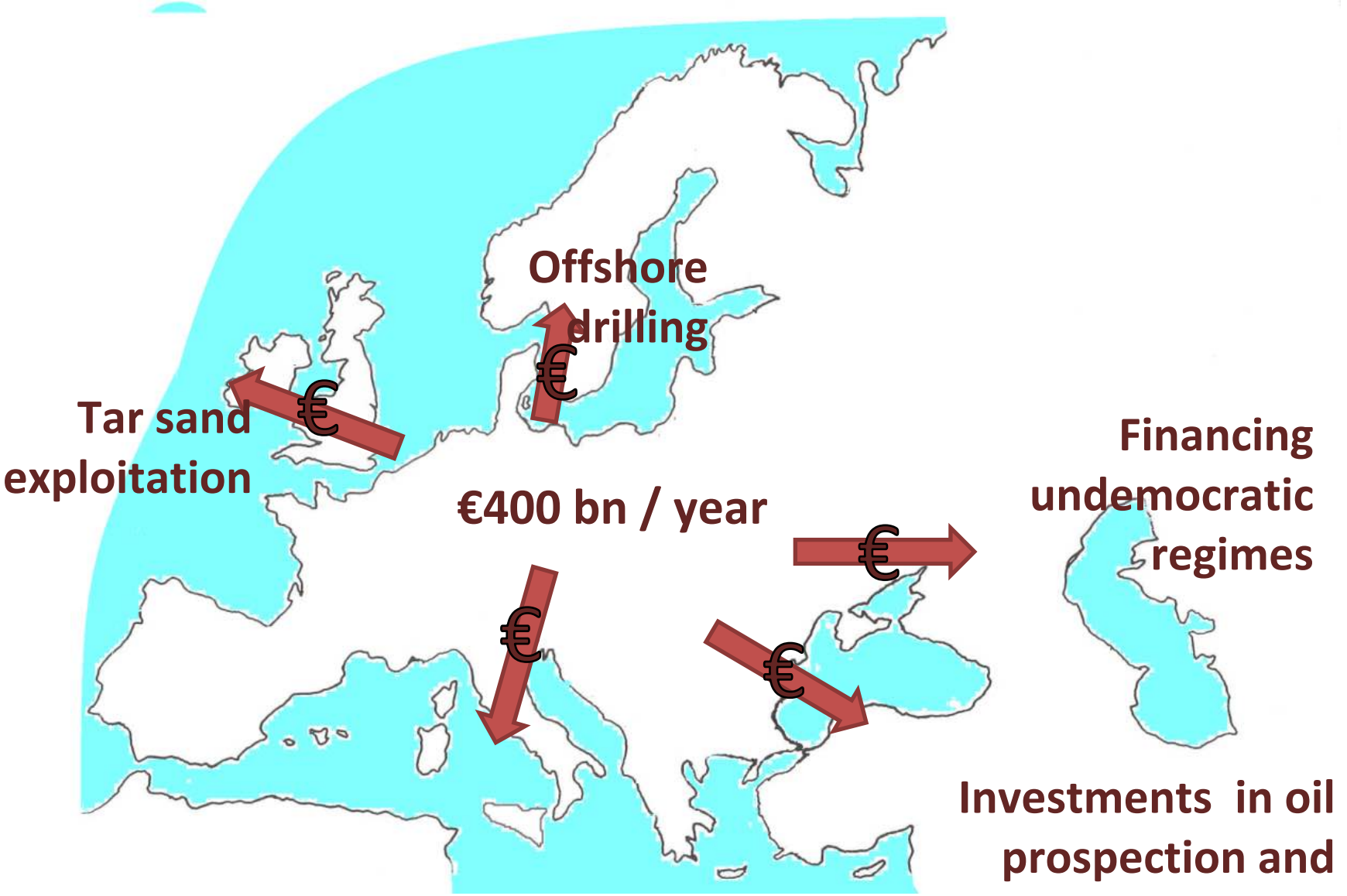
EU: annual cost of buying fossil fuels



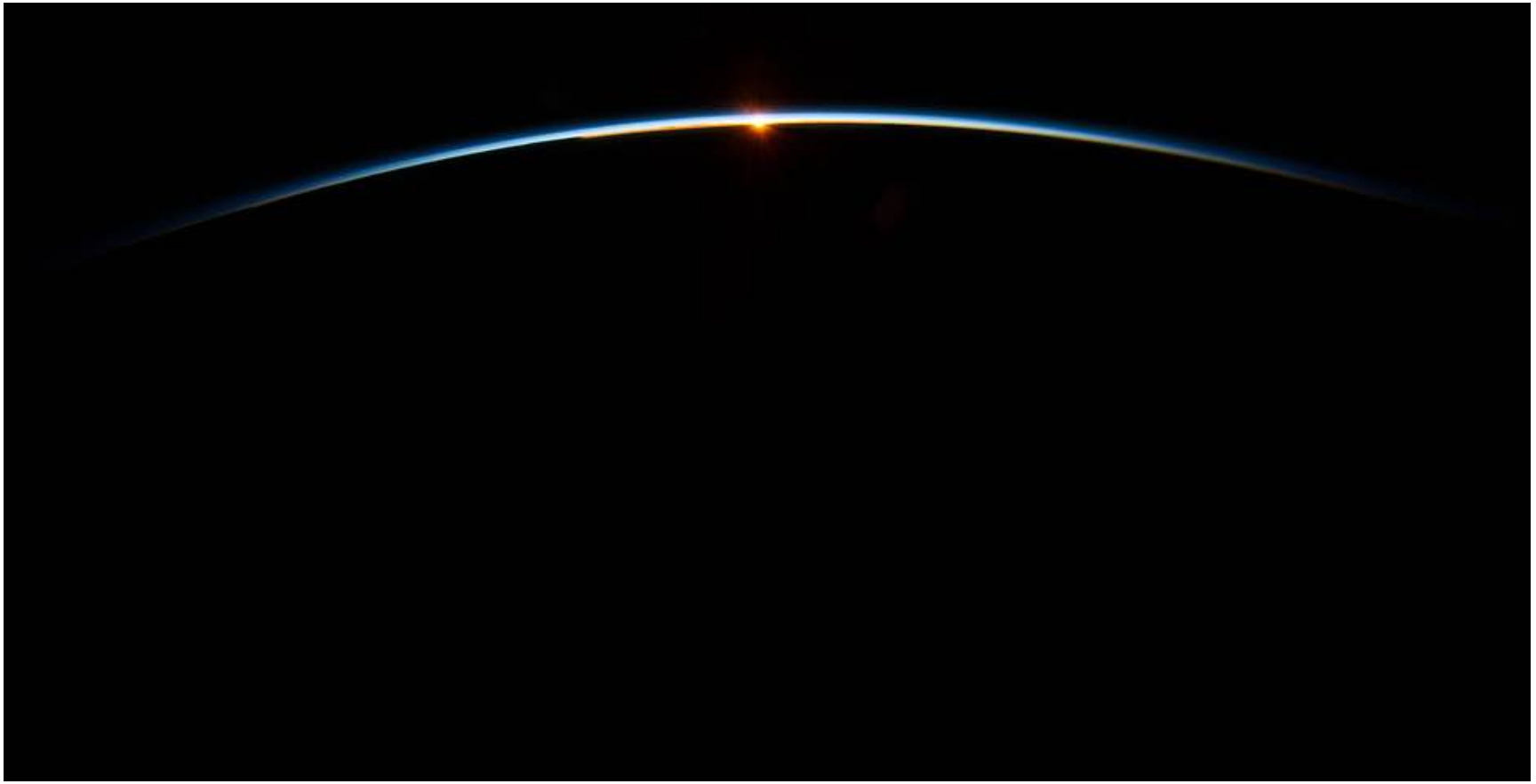
Source: www.energycoalition.eu

- **Substantial reductions in emissions to stay under 2° C would require large changes in investment patterns e.g., from 2010 to 2029, in billions US dollars/year:** (mean numbers rounded, IPCC AR5 WGIII Fig SPM 9)
- **energy efficiency: +330**
- **renewables: + 90**
- **power plants w/ CCS: + 40**
- **nuclear: + 40**
- **power plants w/o CCS: - 60**
- **fossil fuel extraction: - 120**

Final argument:
There is no planet B

That small blue dot is the Earth, a seen from Cassini, orbiting Saturn, 1.44 billion km from us, on 19-7-2013

Our atmosphere is thin and fragile (as seen by ISS crew on 31 July 2013)



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RCP2.6 RCP8.5

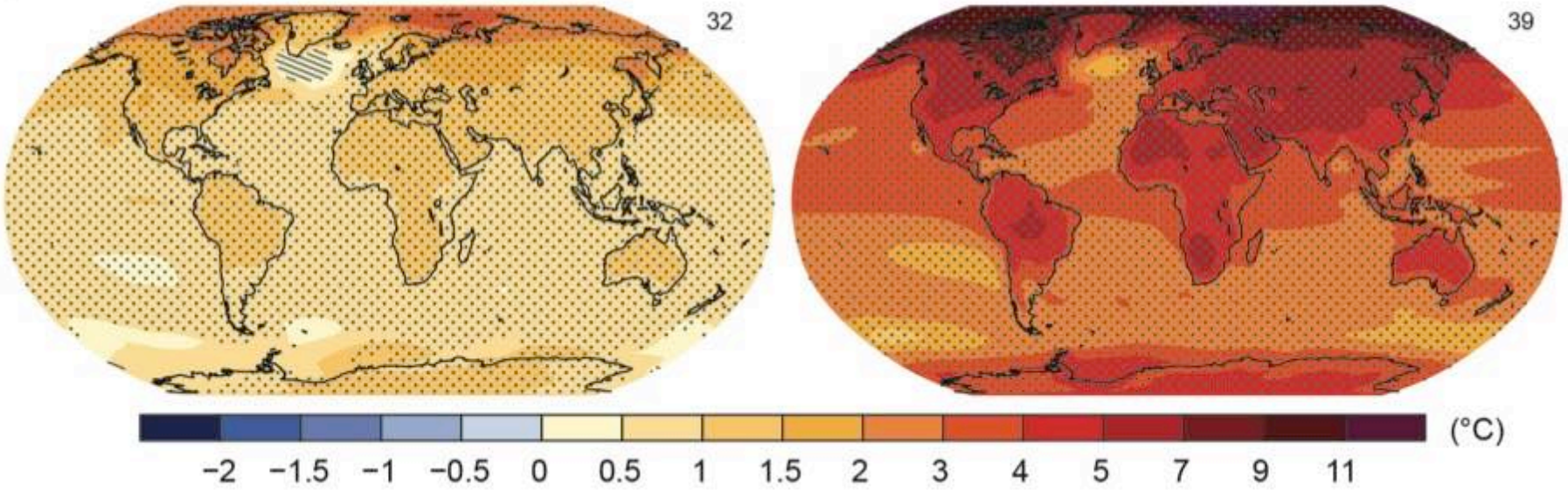

Fig. SPM.8

Humanity has the choice

SUSTAINABLE DEVELOPMENT GOALS

Just a few remarks about the EU

- Its climate leadership role needs work to be maintained, otherwise China…
- Example: the EU has not yet updated its 2014 plans (« NDCs ») to the new objectives of the Paris Agreement (« well below 2°C », not « below 2°C, and the 1.5°C objective…)

Just a few remarks about the EU (2)

- The Renewable Energy Directive considers wood as carbon neutral. That is fundamentally wrong (see letter signed by 800 scientists in December 2017, & article Searchinger et al.(2018, Nature Comm. https://rdcu.be/6ssN)
- Considering climate change and biodiversity, in the context of the achievement of the SDGs would certainly have multiple benefits for the EU

Global warming of 1.5°C

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***

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 (10 pages)

Tentative and personal conclusions

(The SR1.5 has not been finalized yet!)

1.5°C matters: reducing the warming, even by tenths of a °C, can make large differences for impacts, as many of these are non-linear, that is they worsen faster with warming than the warming itself.

The probability of extremes (heat waves, drought, floods, extreme sea level) is significantly lower in a 1.5°C world than in a 2°C world

1.5°C is much safer than 2°C in terms of long-term sea-level rise associated to ice-sheet processes, particularly for low-lying regions

Tentative and personal conclusions

(The SR1.5 has not been finalized yet!)

1.5°C lower impacts will make 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 fast enough to ZERO for a 1.5°C long-term average temperature above pre-industrial objective; a little easier with overshoot above 1.5°C for a short period

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 to raise ambition without waiting for it

To go further :

- www.climate.be/vanyp : my slides (under « conferences)
- www.ipcc.ch : IPCC
- www.realclimate.org : answers to the merchants of doubt arguments
- www.skepticalscience.com : same
- **Twitter: @JPvanYpersele**
  @IPCC_CH