On the urgency of addressing climate change

Jean-Pascal van Ypersele

Université catholique de Louvain, Belgium
Former IPCC Vice-Chair (2008-2015)

Twitter: @JPvanYpersele

Veolia, Brussels, 17 May 2019

Thanks to the Walloon Government (funding the Walloon Platform for IPCC) and to my team at the Université catholique de Louvain for their support

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 Organization

UNEP= United Nations Environment Programme

In the USA alone, organizations which sow doubt about climate change spend almost a billion dollars/year! (Brulle 2014, average numbers for 2003-2010)

The European Union fares a little better, but many Brussels lobbyists try to dilute the EU environmental efforts (see the car industry…)

@JPvanYpersele

The « merchants of doubt » have evolved in their arguments:

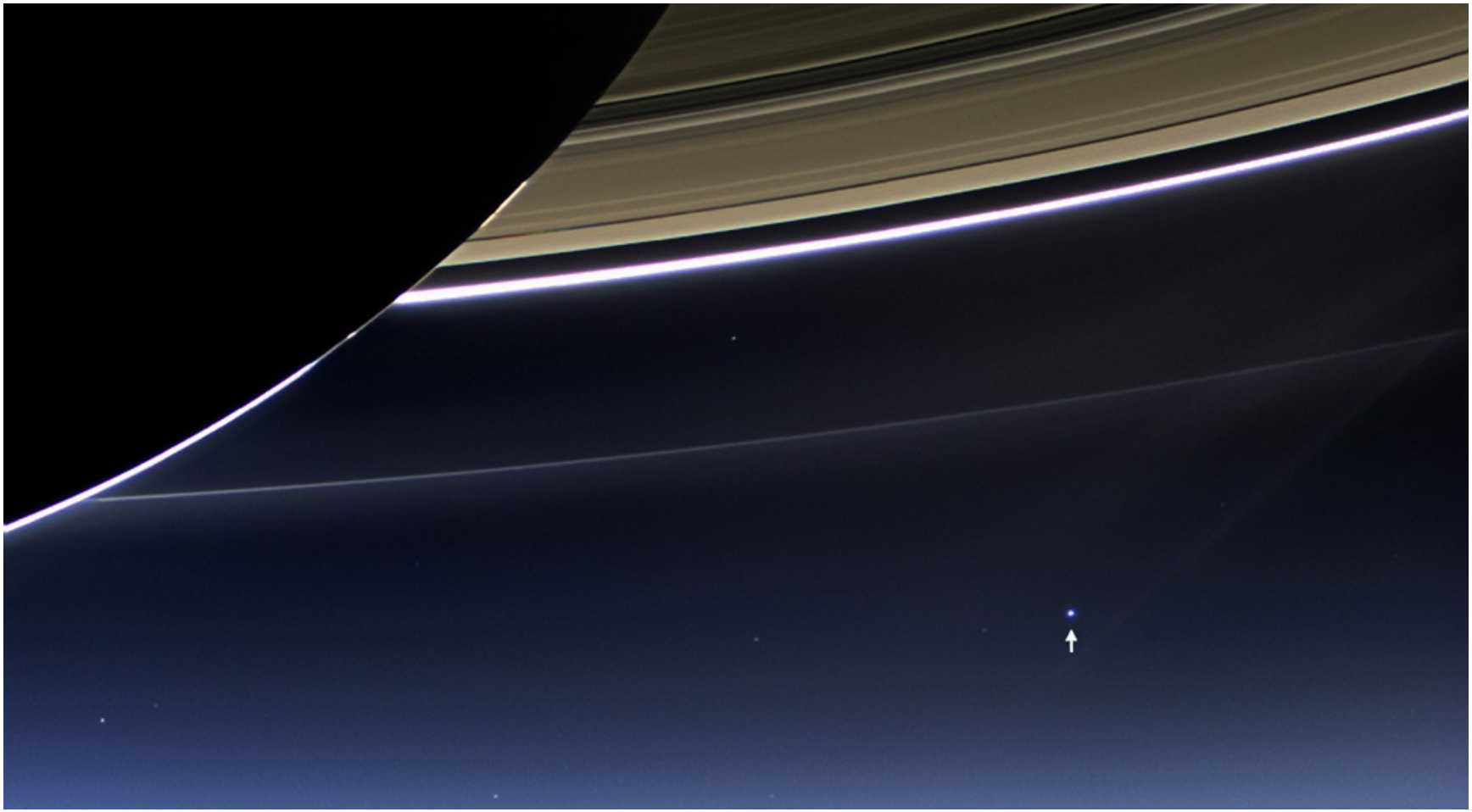
- Existence of global warming
- Human responsability in the warming
- Cost of decarbonization
- Drawbacks from alternatives

(recent example: so-called enormous needs of cobalt for electric mobility reported on CNN; see critical analysis on https://www.desmogblog.com/2018/05/02/cnn-wrongly-blames-electric-cars-unethical-cobalt-mining)

Felix Schaad (Tages Anzeiger, Switzerland)

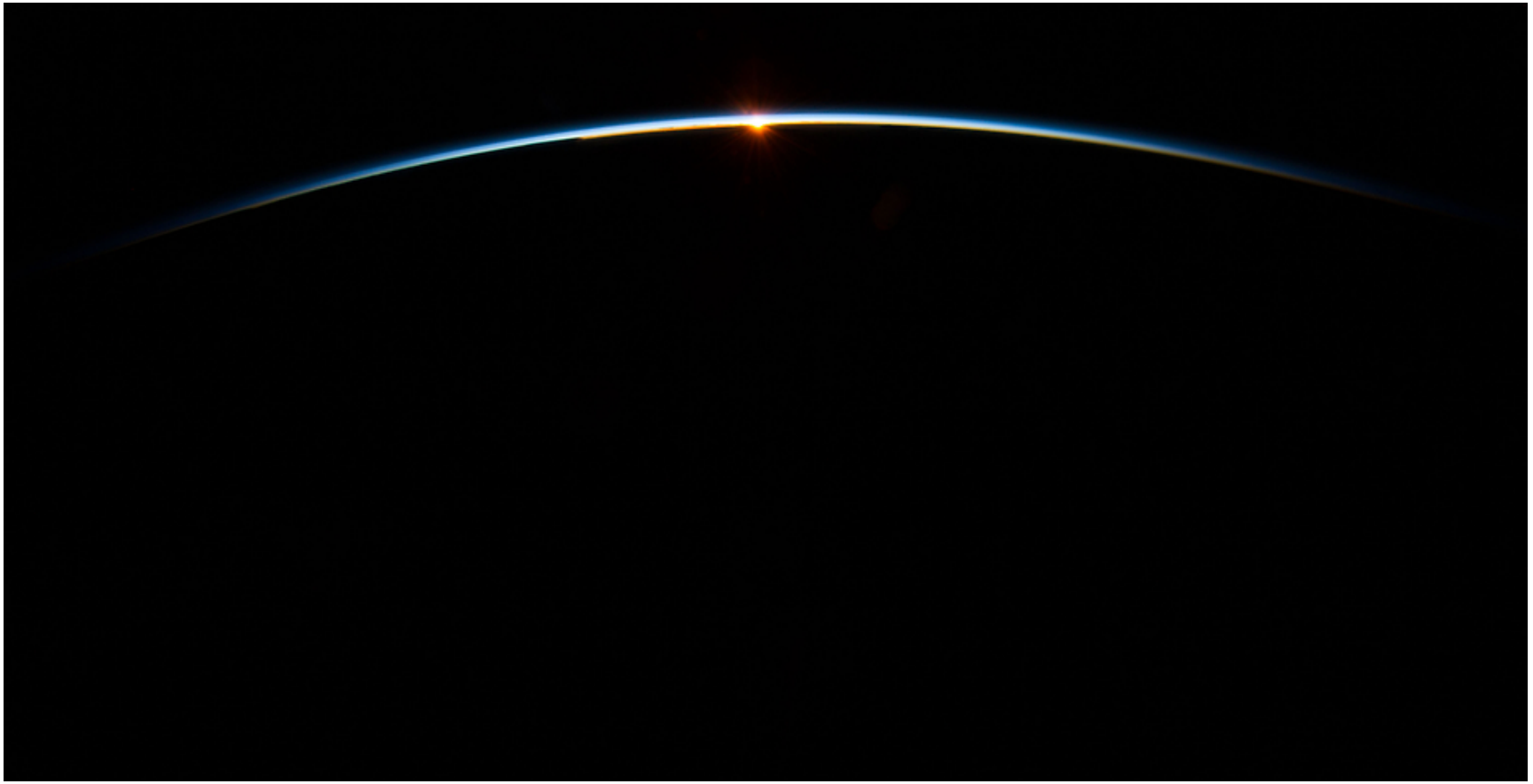
I want you to panic… **and act**

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



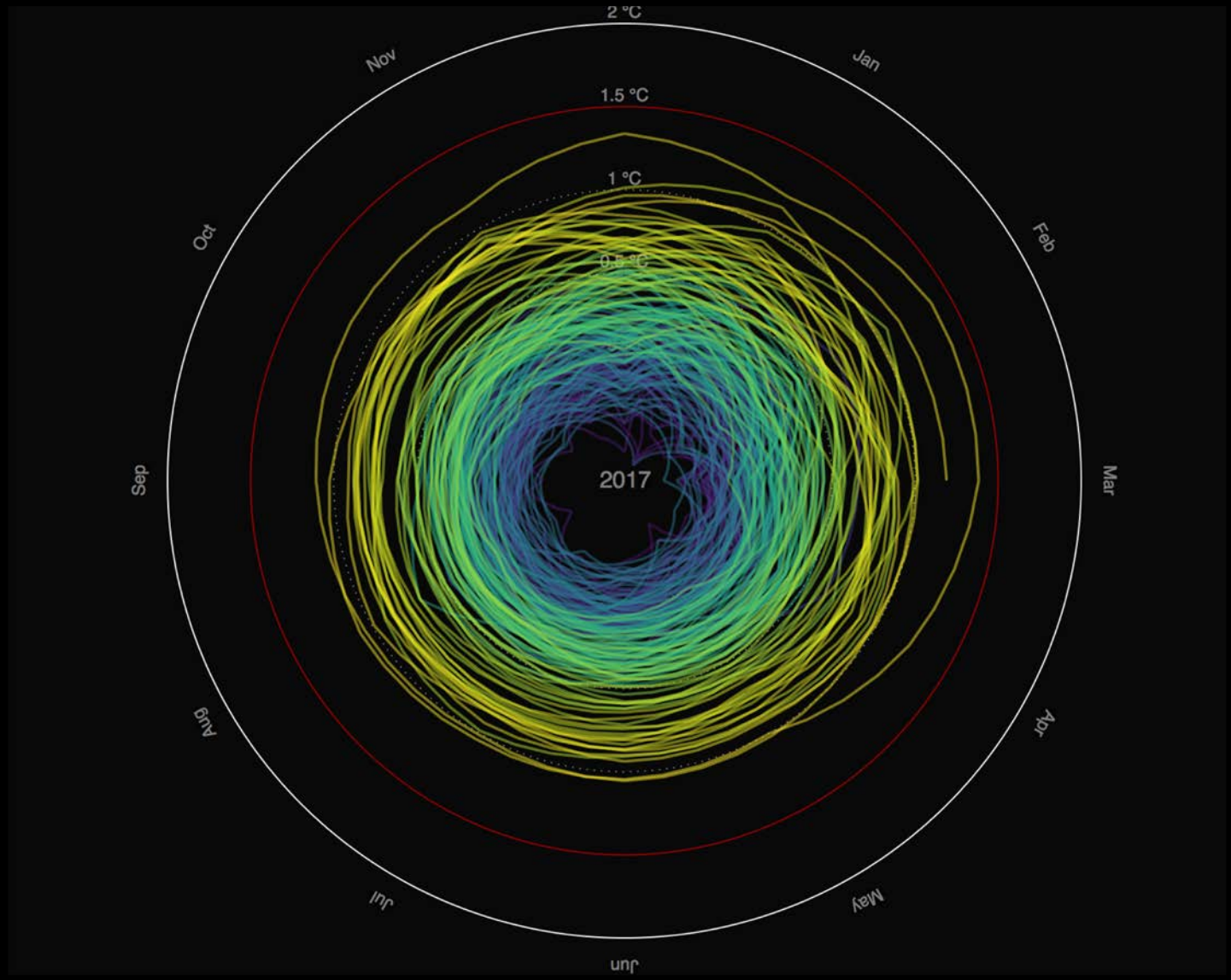
@JPvanYpersele

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



@JPvan Ypersele

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

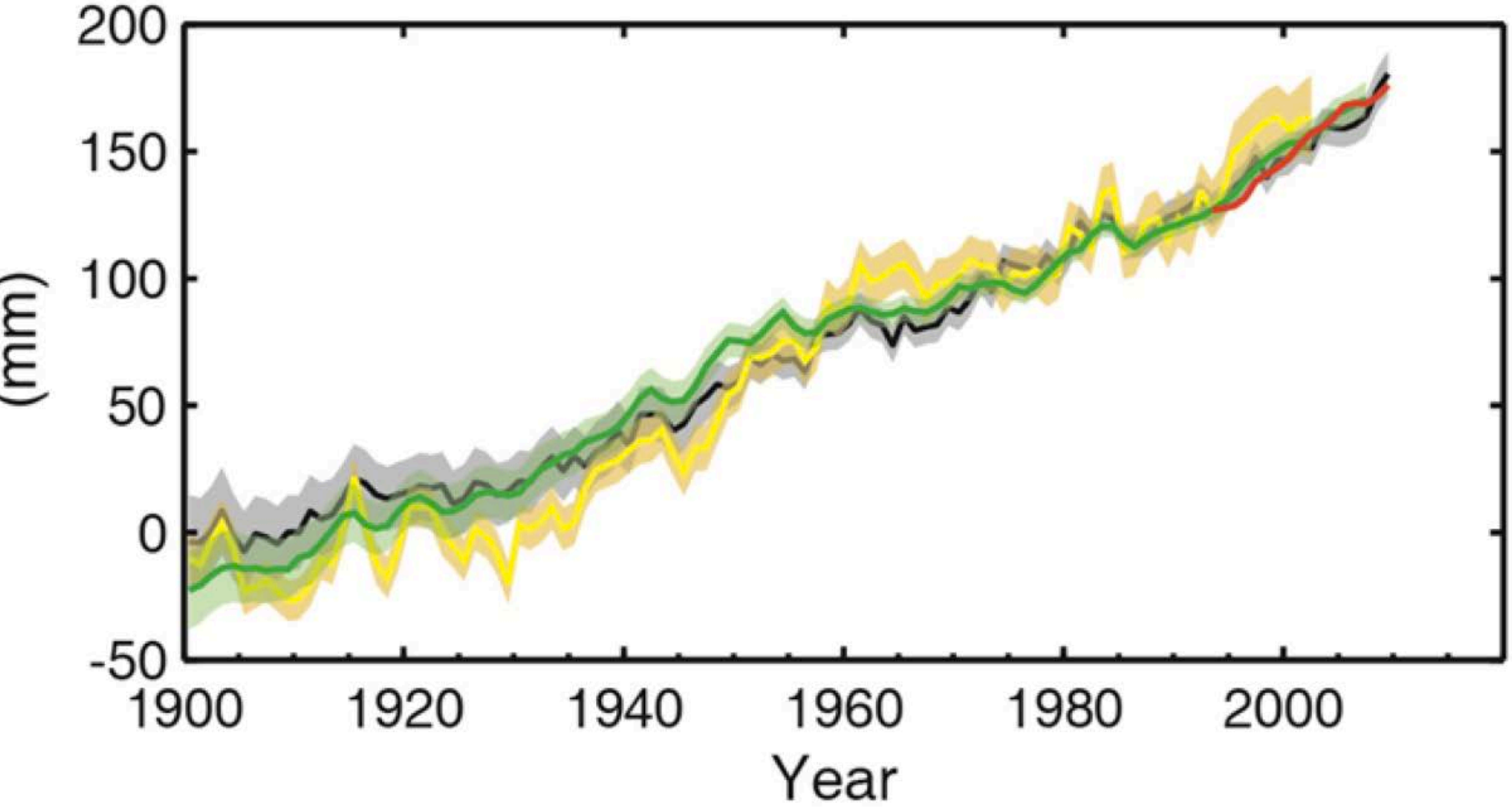
Plateau Glacier (1961)
(Alaska)

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)

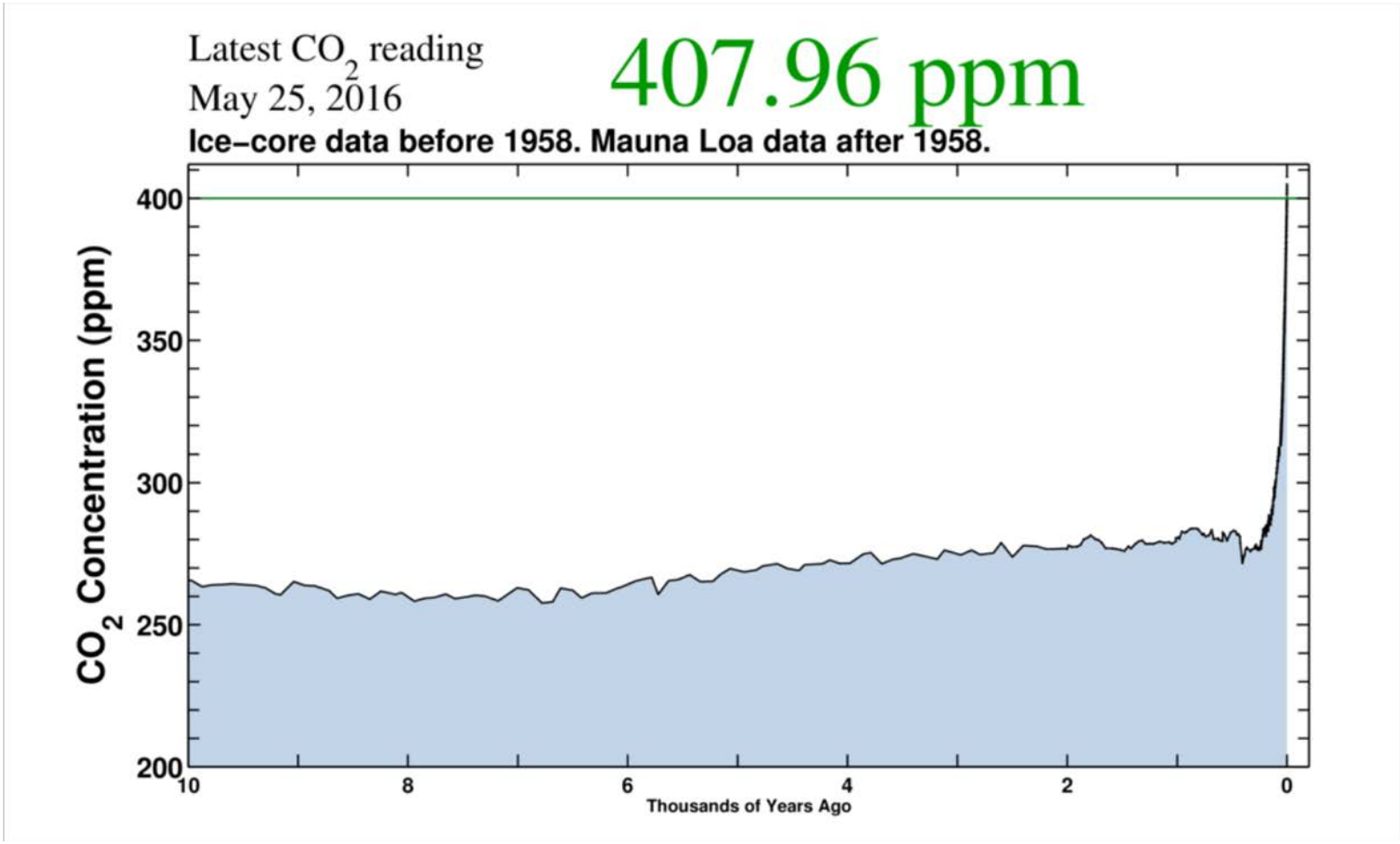
http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share

Change in average sea-level change



AR5 WGI SPM - Approved version / subject to final copyedit

CO_2 Concentration, 25 May 2016 (Keeling curve)



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

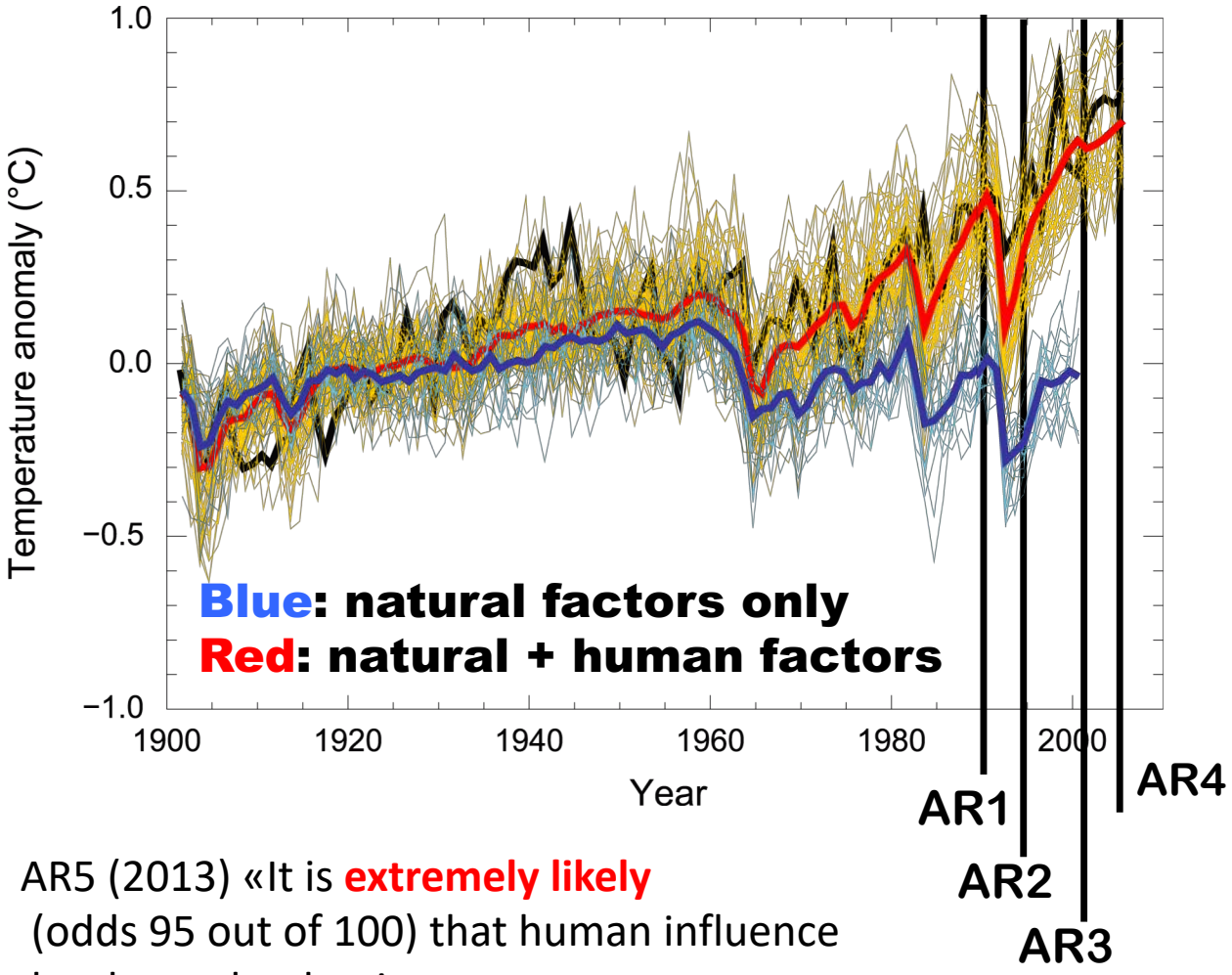
A Progression of Understanding: Greater and Greater Certainty in Attribution

AR1 (1990): "unequivocal detection not likely for a decade"

AR2 (1995): "balance of evidence suggests **discernible** human influence"

AR3 (2001): "most of the warming of the past 50 years is **likely** (odds 2 out of 3) due to human activities"

AR4 (2007): "most of the warming is **very likely** (odds 9 out of 10) due to greenhouse gases"



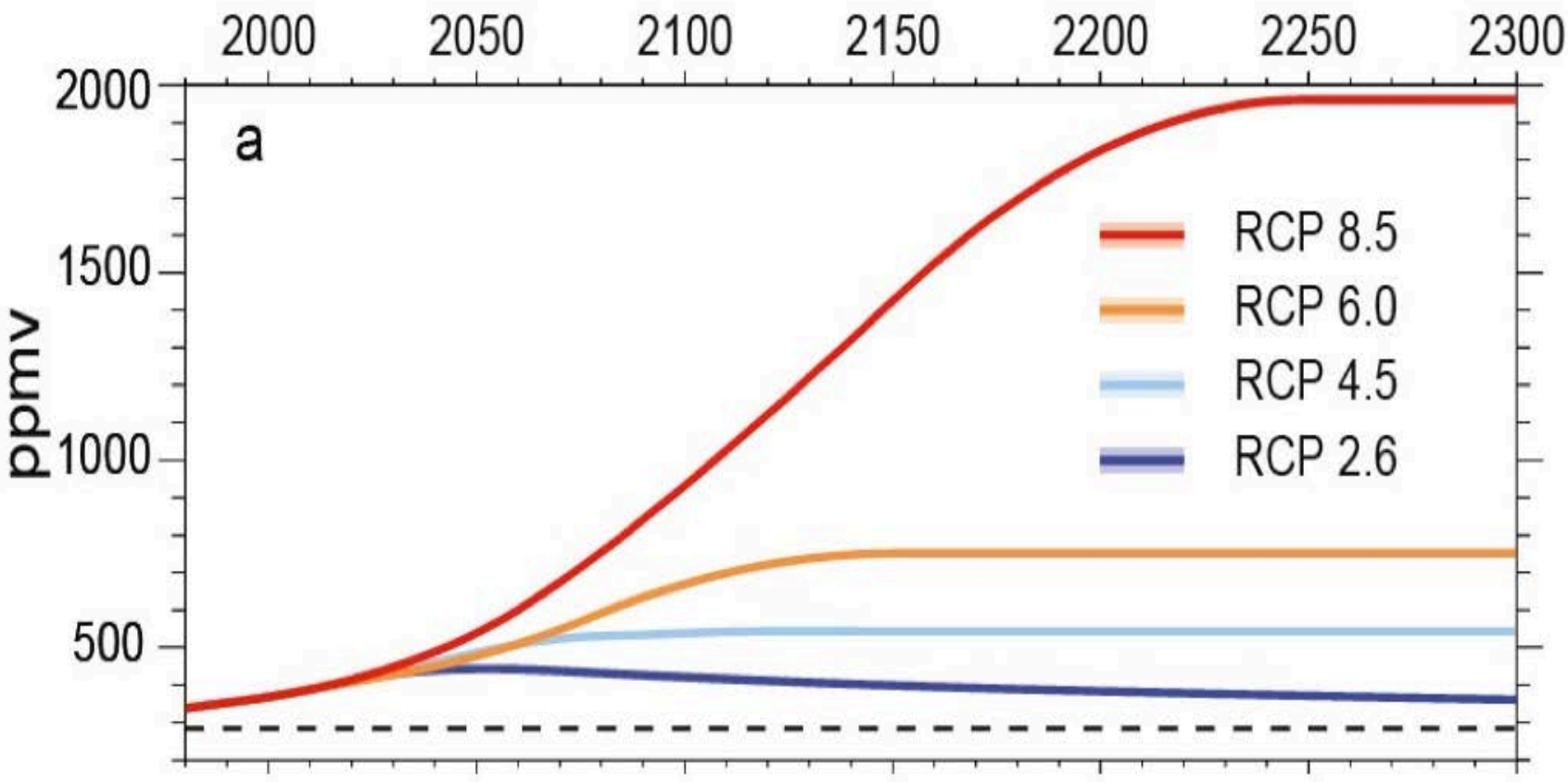
AR5 (2013) «It is **extremely likely** (odds 95 out of 100) that human influence has been the dominant cause… »

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 (net) ZERO as soon as possible

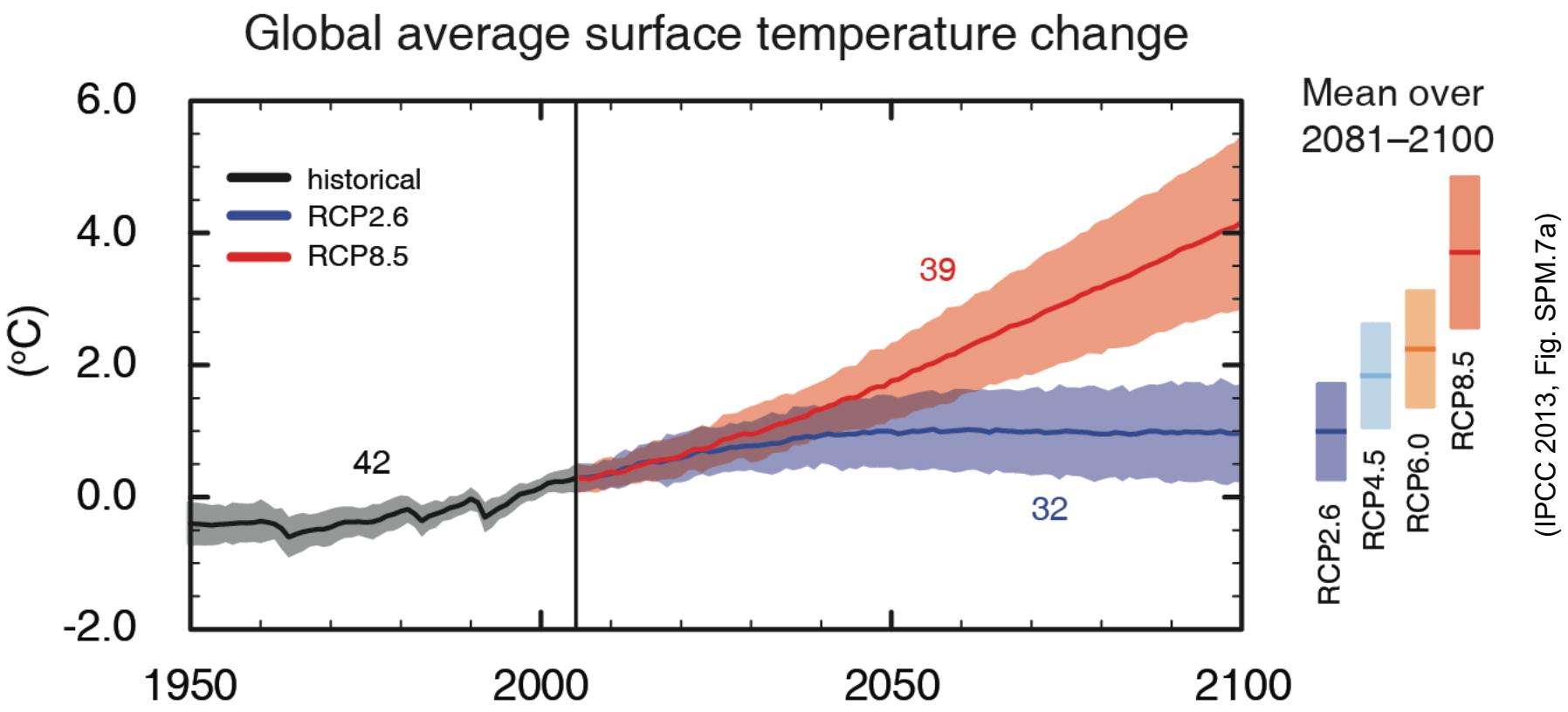
@JPvanYpersele

RCP Scenarios: Atmospheric CO_2 concentration



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

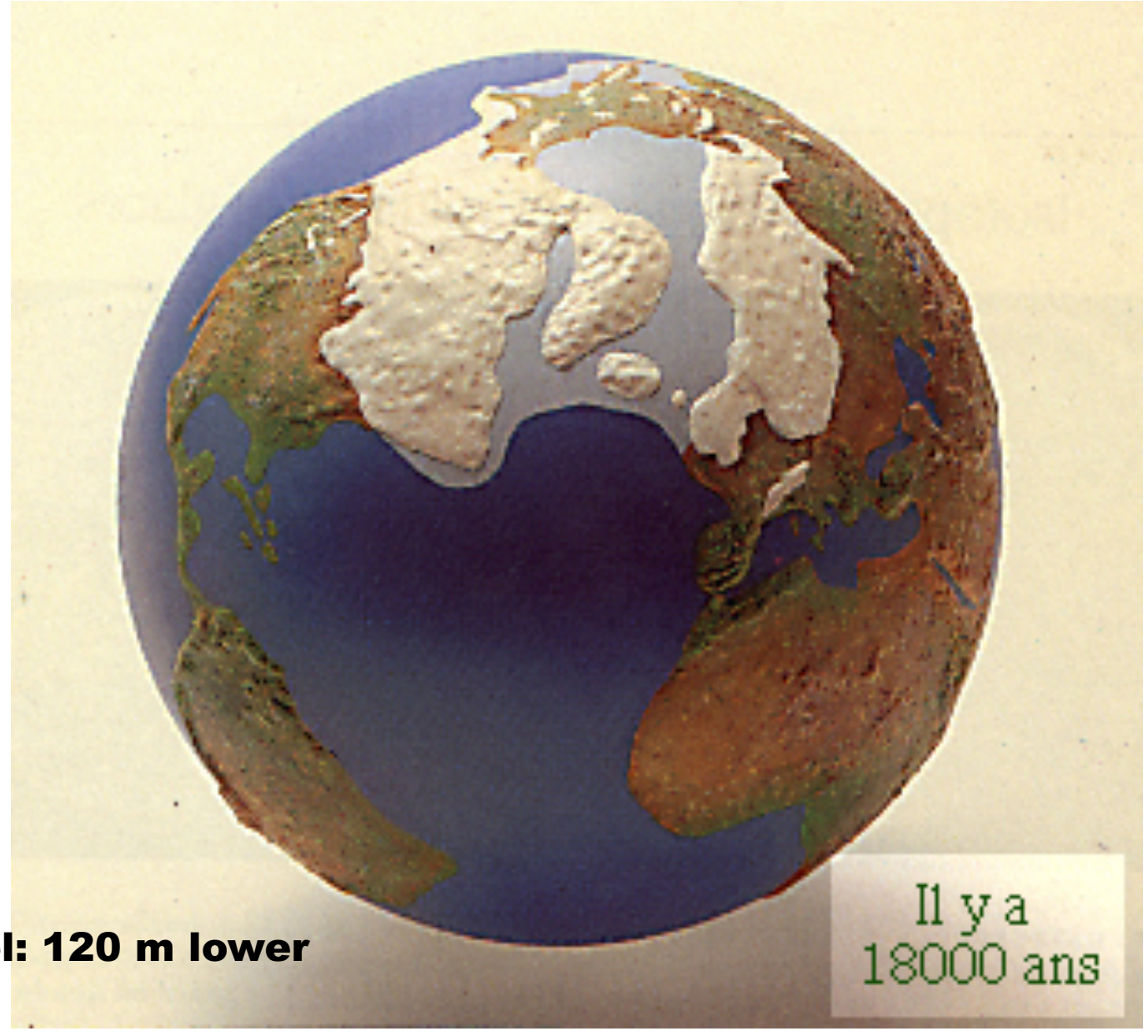
AR5, chapter 12. WGI- Adopted version / subject to final copyedit



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)

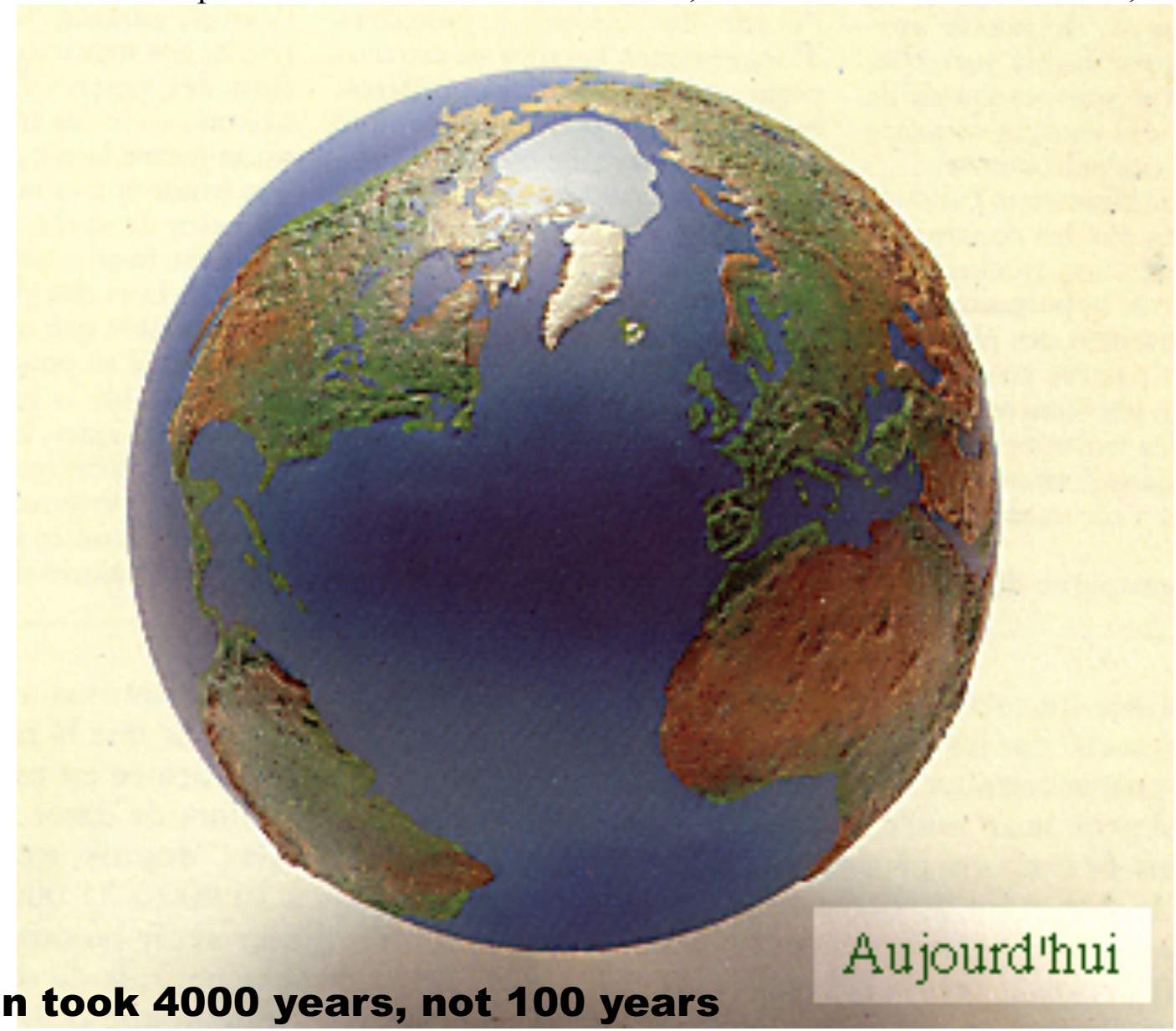
With permission from Dr. S. Joussaume, in « Climat d'hier à demain », CNRS éditions.



Sea level: 120 m lower

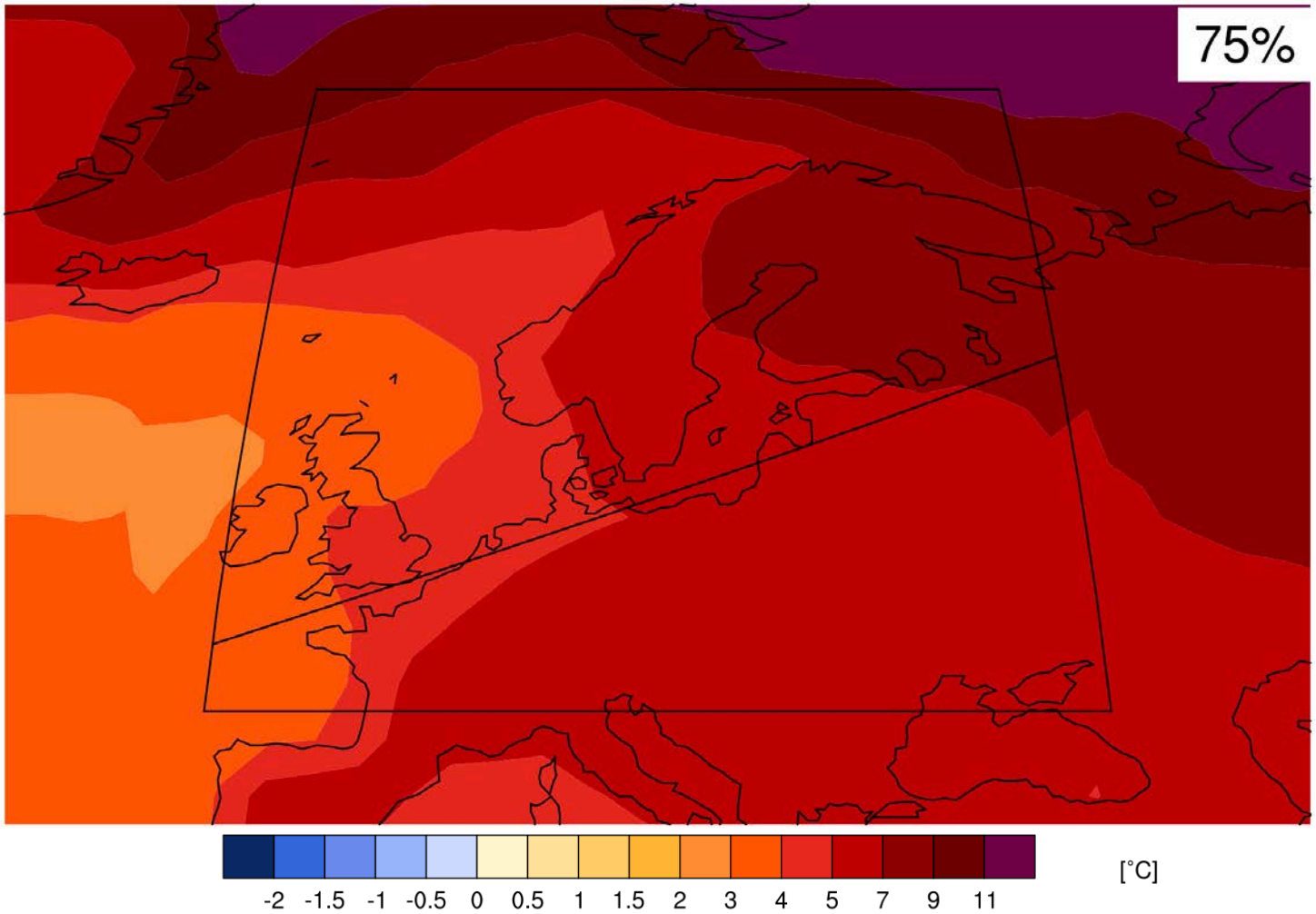
Today, with +4-5° C globally

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



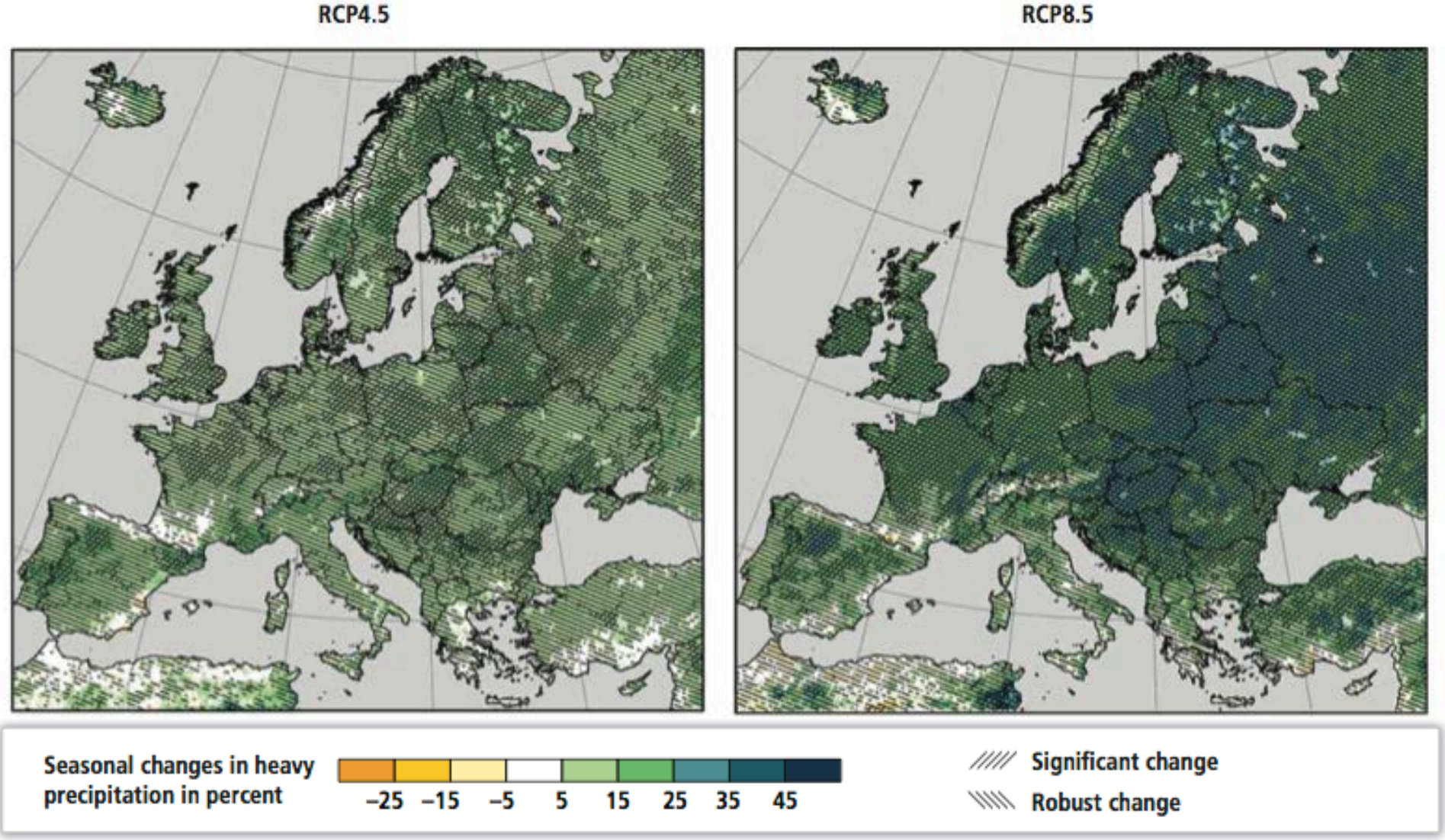
Transition took 4000 years, not 100 years

North Europe - Map of temperature changes: 2081–2100 with respect to 1986–2005 in the RCP8.5 scenario (annual)



IPCC WG1 Fifth Assessment Report (Final Draft)

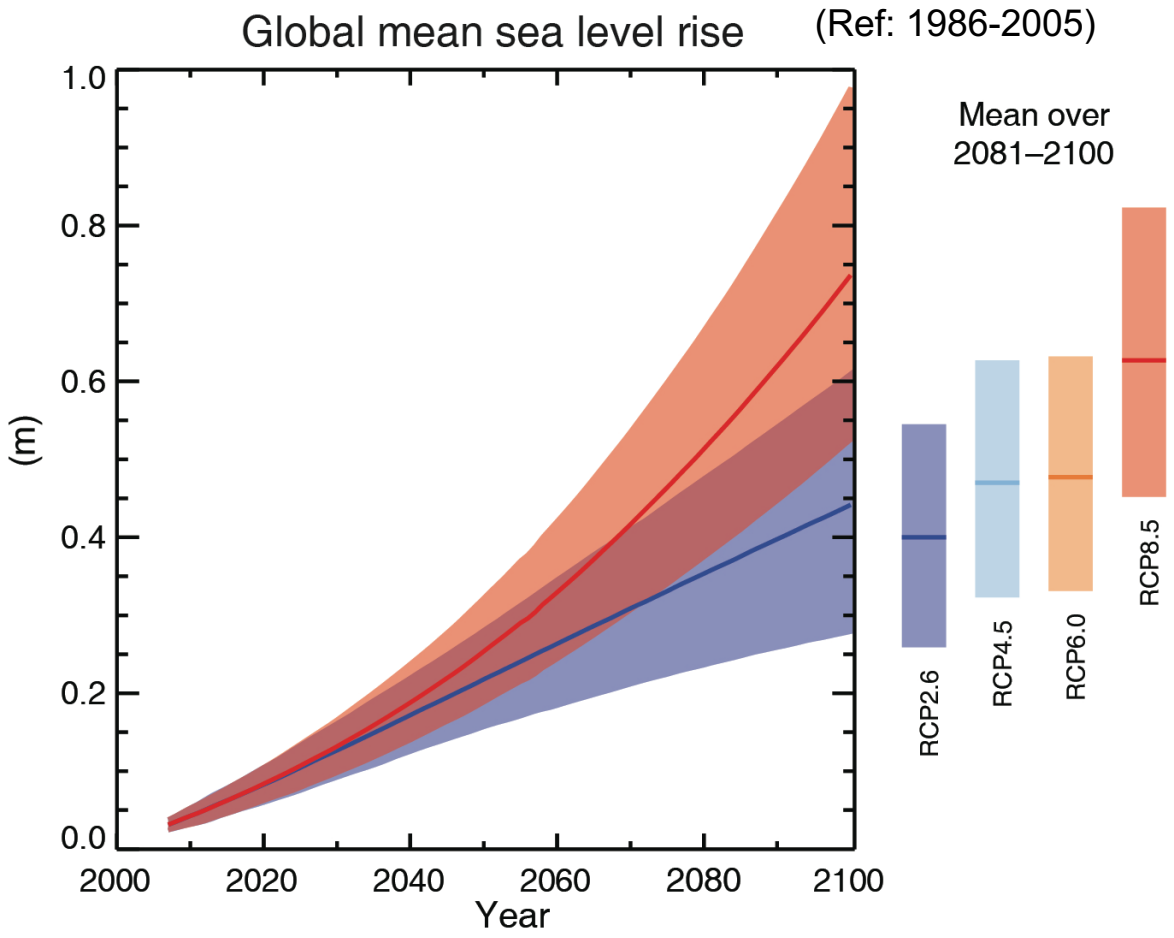
DJF seasonal changes in heavy precipitation (%), 2071-2100 compared to 1971-2000



IPCC, AR5, WG II, Chap. 23, p. 1277

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

Matthias Schrader / AP



(IPCC 2013, Fig. SPM.9)

Sea level due to continue to increase

Nile Delta: more than 10 million people live in the red zone, which is less than 1 metre above sea level

(Time 2001)

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)

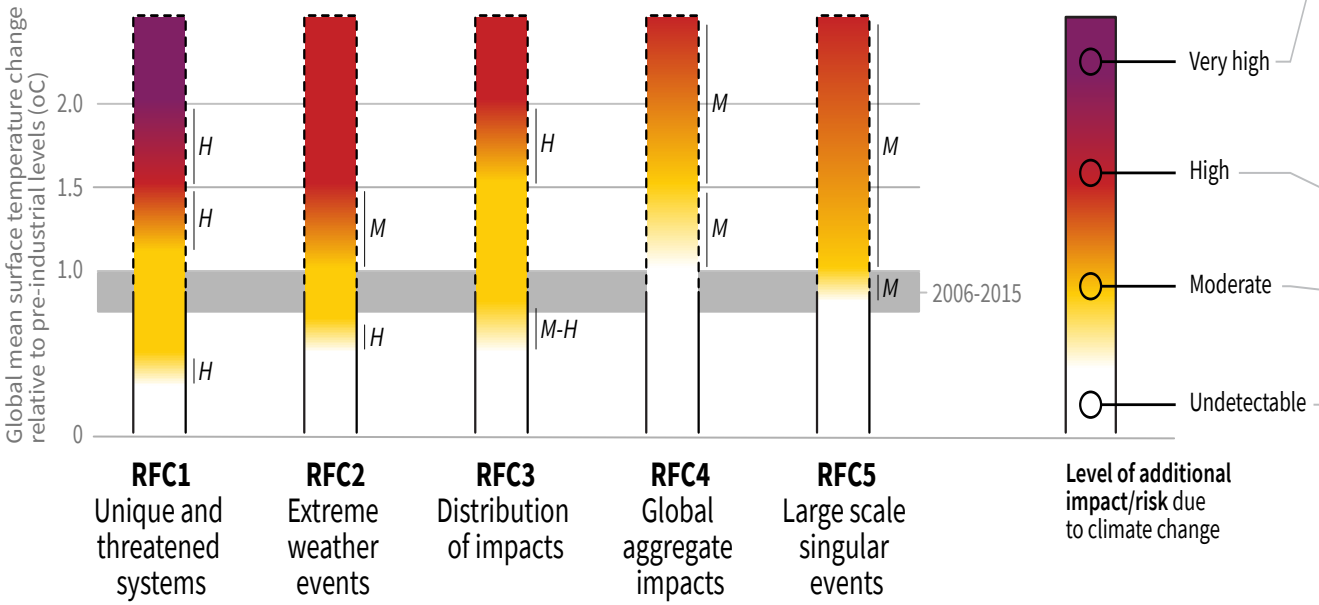



AR5 WGII SPM

How the level of global warming affects impacts and/or risks associated with the Reasons for Concern (RFCs) and selected natural, managed and human systems

Five Reasons For Concern (RFCs) illustrate the impacts and risks of different levels of global warming for people, economies and ecosystems across sectors and regions.

Impacts and risks associated with the Reasons for Concern (RFCs)



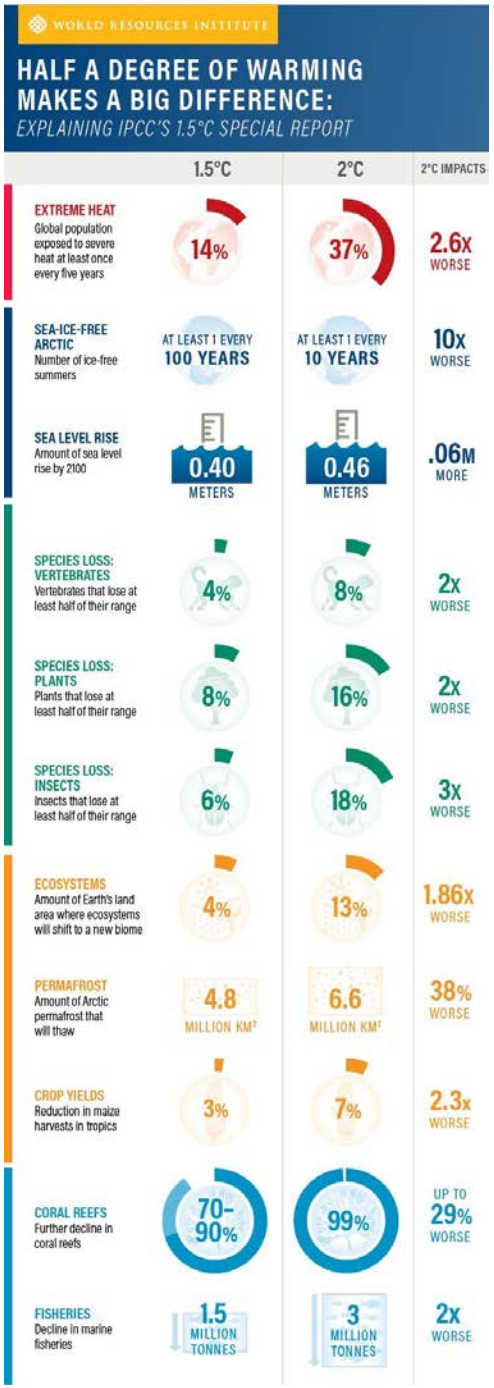
Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

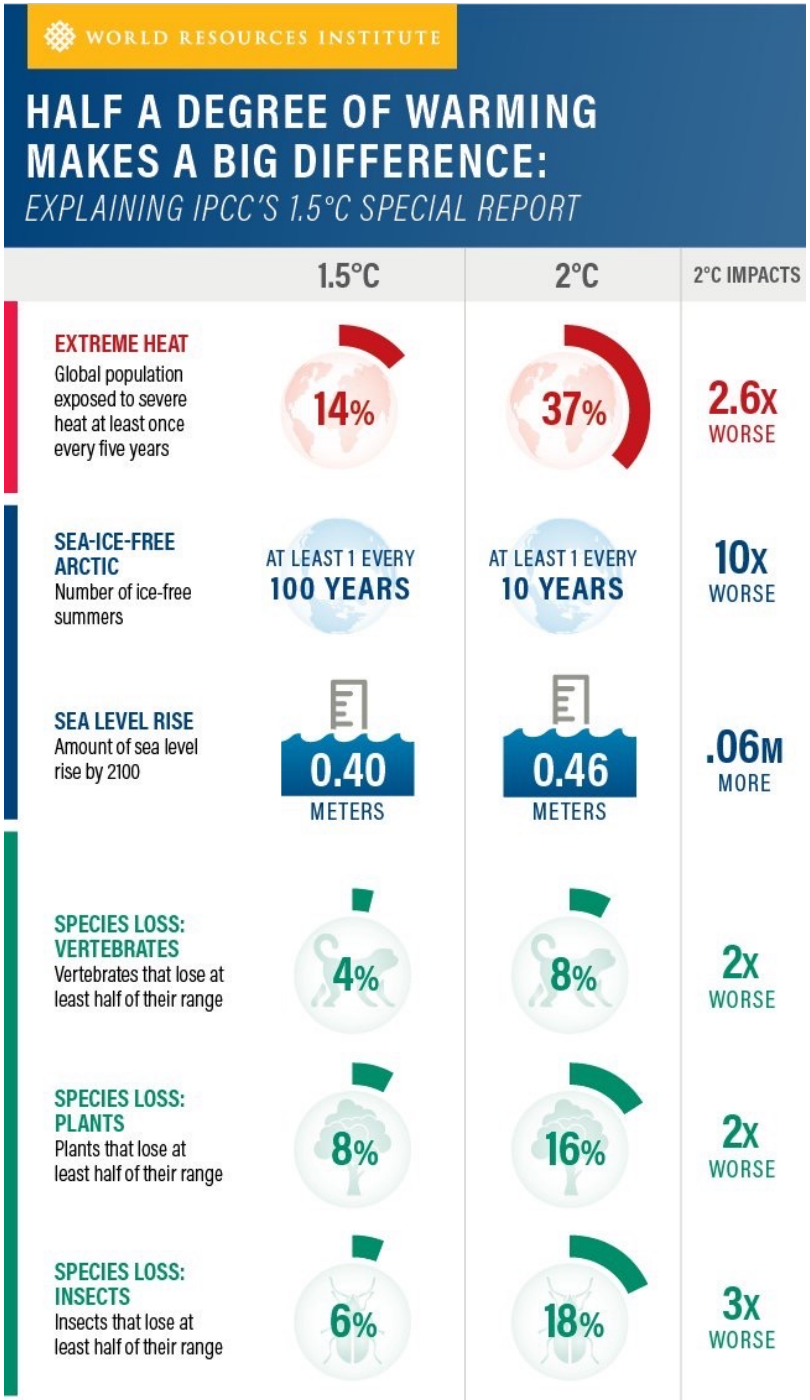
Red indicates severe and widespread impacts/risks.

Yellow indicates that impacts/risks are detectable and attributable to climate change with at least medium confidence.

White indicates that no impacts are detectable and attributable to climate change.

Responsibility for content: WRI

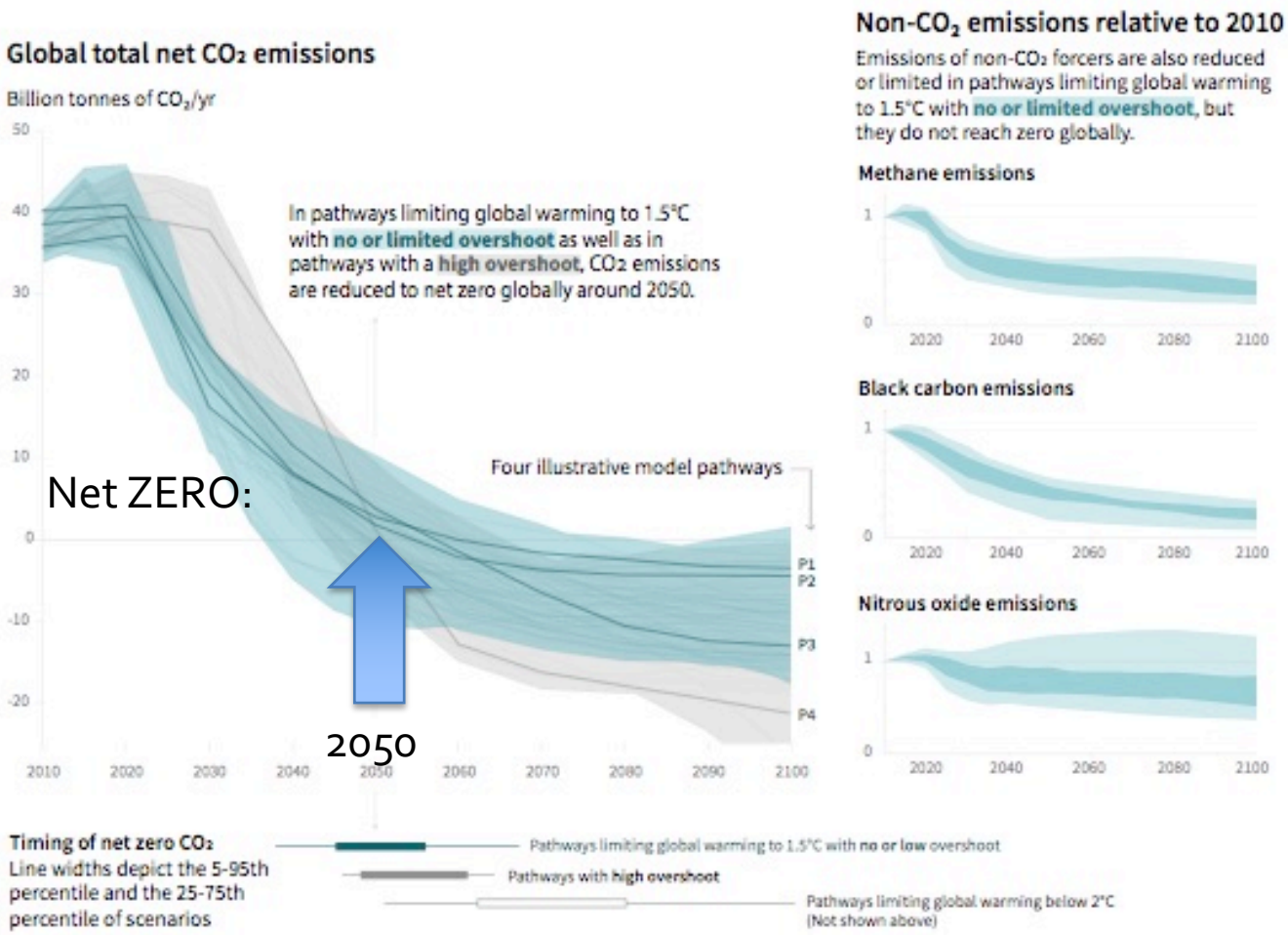




Responsibility for content: WRI

Global emissions pathway characteristics

General characteristics of the evolution of anthropogenic net emissions of CO_2, and total emissions of methane, black carbon, and nitrous oxide in model pathways that limit global warming to 1.5°C with no or limited overshoot. Net emissions are defined as anthropogenic emissions reduced by anthropogenic removals. Reductions in net emissions can be achieved through different portfolios of mitigation measures illustrated in Figure SPM3B.



Source: IPCC Special Report on Global Warming of 1.5°C

Greenhouse gas emissions pathways

- To limit warming to 1.5° C, CO_2 emissions fall by about 45% by 2030 (from 2010 levels)
  - Compared to 20% for 2° C
- To limit warming to 1.5° C, CO_2 emissions would need to reach 'net zero' around 2050
  - Compared to around 2075 for 2° C
- Reducing non-CO_2 emissions would have direct and immediate health benefits

Mitigation Measures

More efficient use of energy

Greater use of low-carbon and no-carbon energy

- Many of these technologies exist today
- But worldwide investment in **research** in support of GHG mitigation is small…

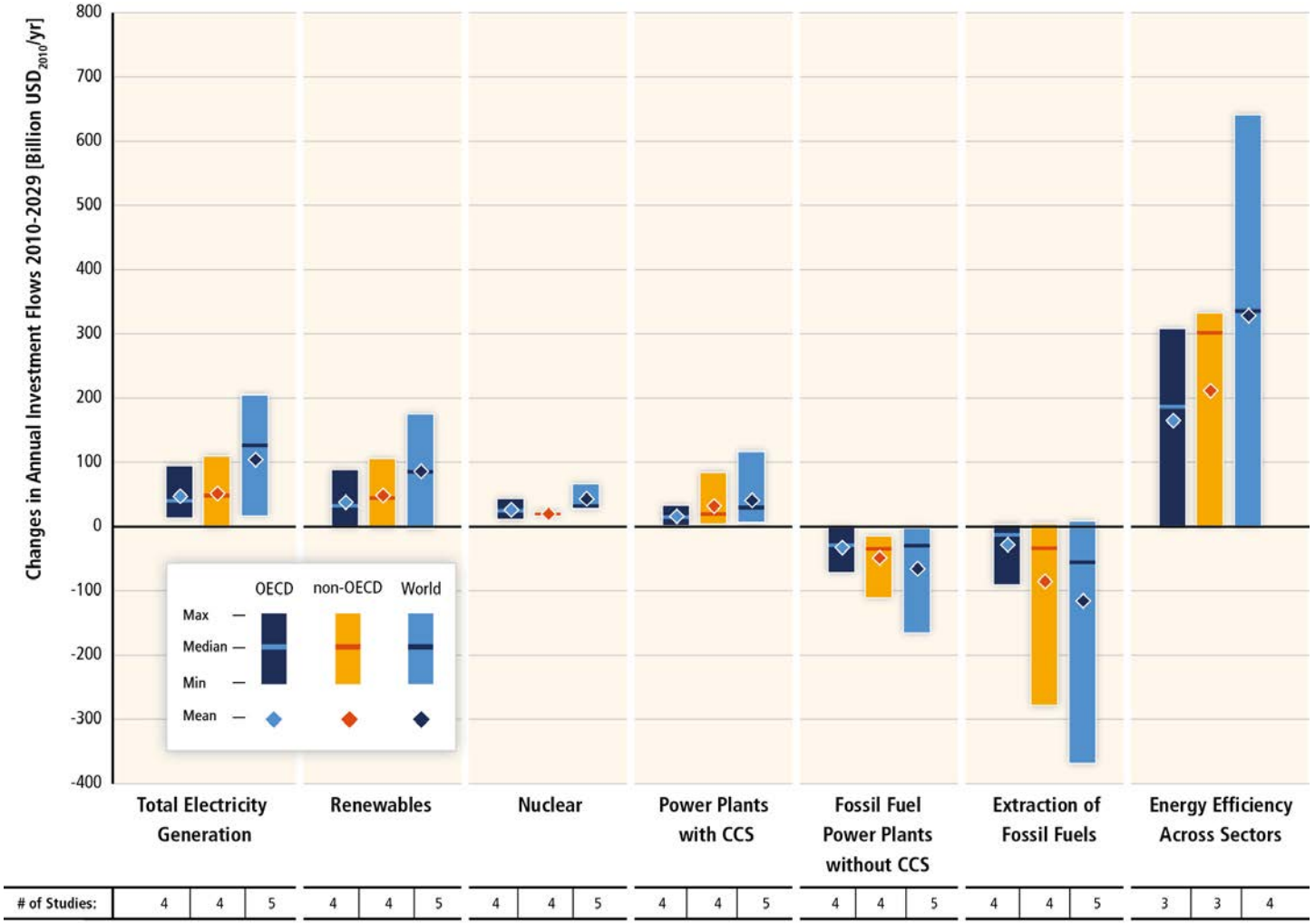
Improved carbon sinks

- **Reduced deforestation** and improved forest management and planting of new forests
- **Bio-energy with carbon capture and storage**

Lifestyle and behavioural changes

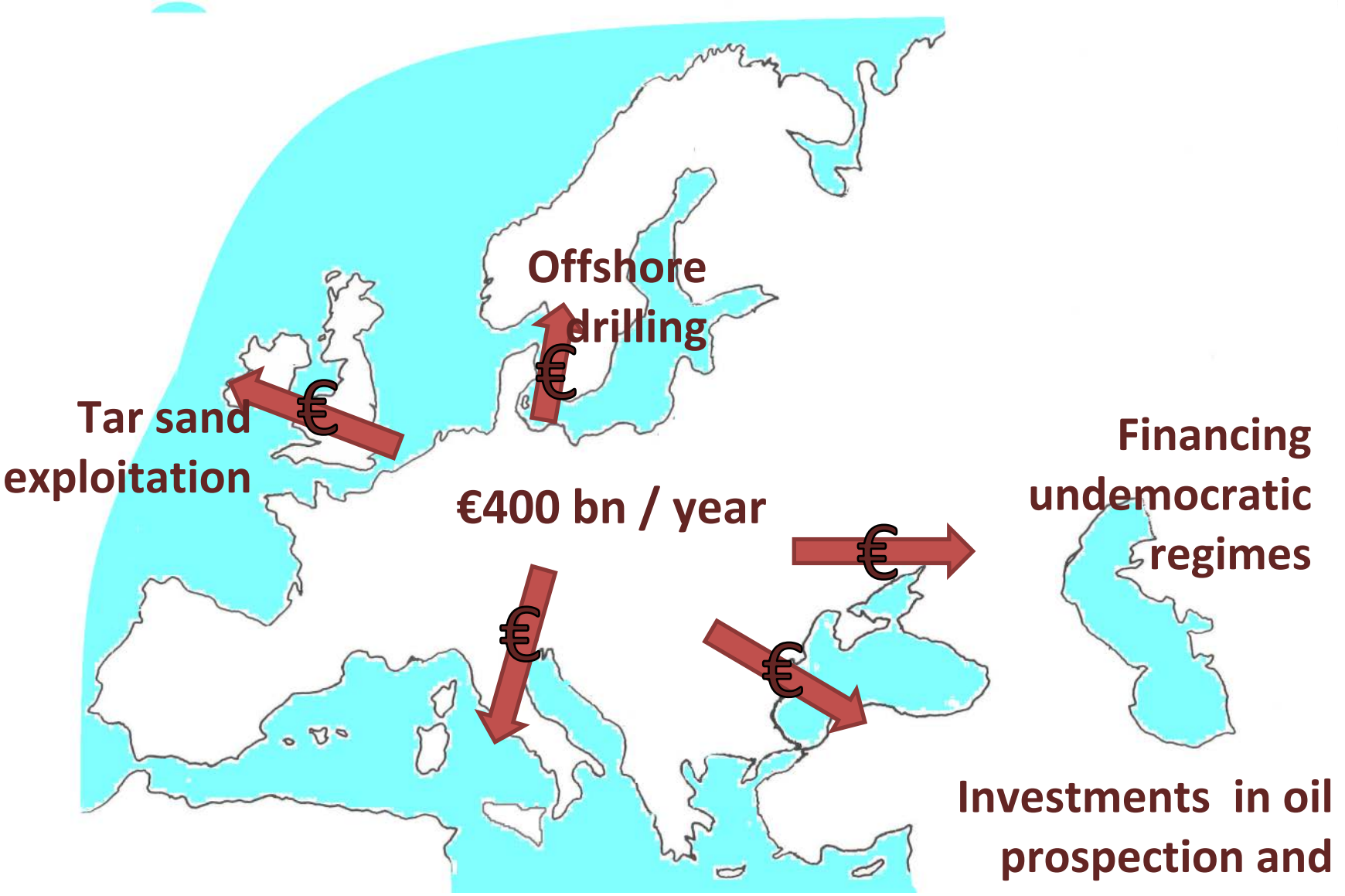
AR5 WGIII SPM

Substantial reductions in emissions would require large changes in investment patterns.

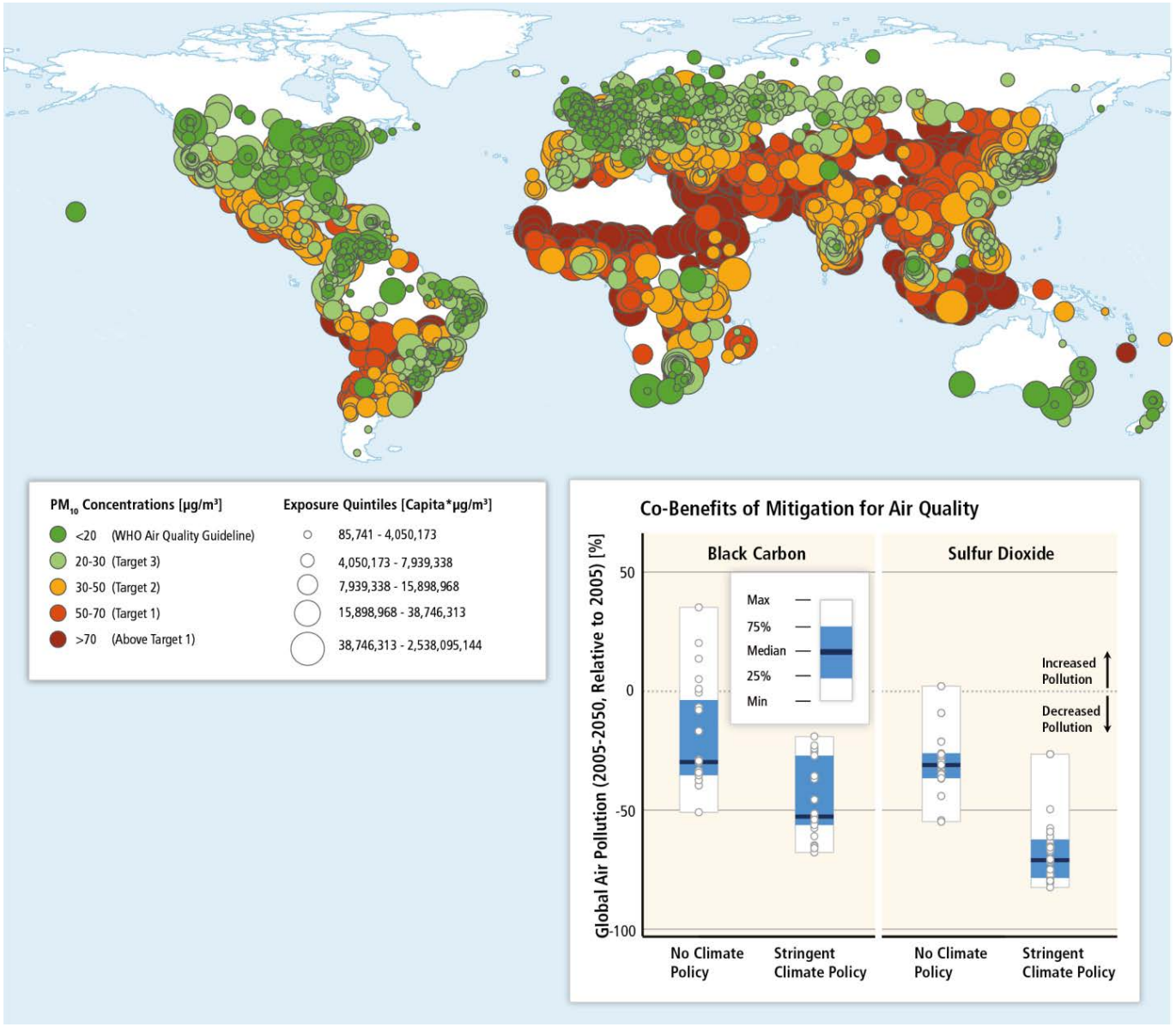


- **Substantial reductions in emissions would require large changes in investment patterns e.g., from 2010 to 2029, in billions US dollars/year:**
  (mean numbers rounded, IPCC AR5 WGIII Fig SPM 9)
- **energy efficiency: +330**
- **renewables: + 90**
- **power plants w/ CCS: + 40**
- **nuclear: + 40**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

EU: annual cost of buying fossil fuels



Source: www.energycoalition.eu



Mitigation can result in large co-benefits for human health and other societal goals.

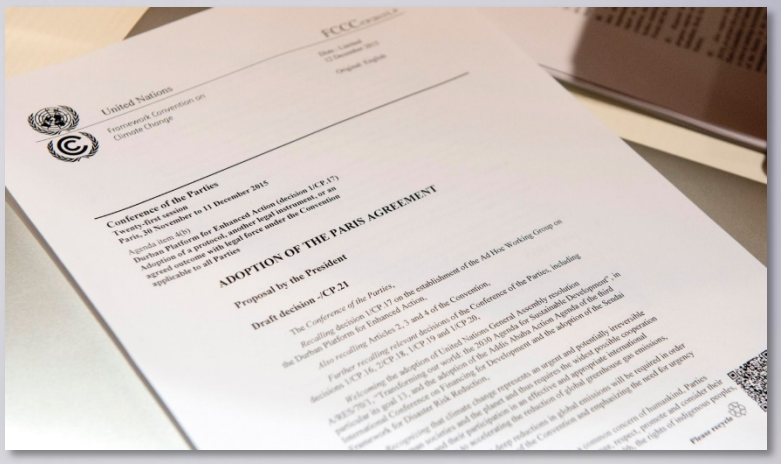
Joel Pett, USA Today

SUSTAINABLE DEVELOPMENT GOALS

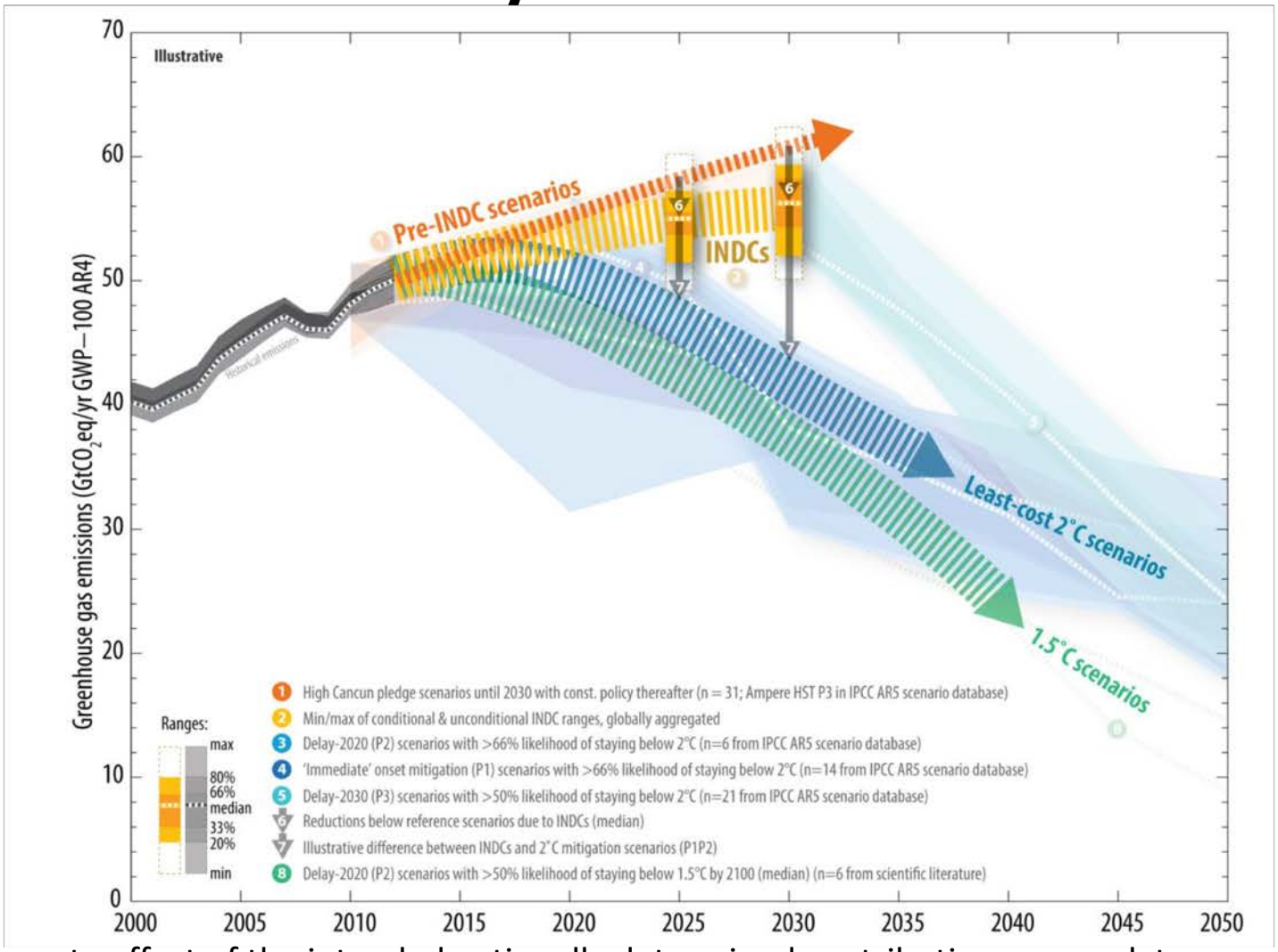
ur les Changements Climatiques 2015

COP21/CMP11

Paris, France



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

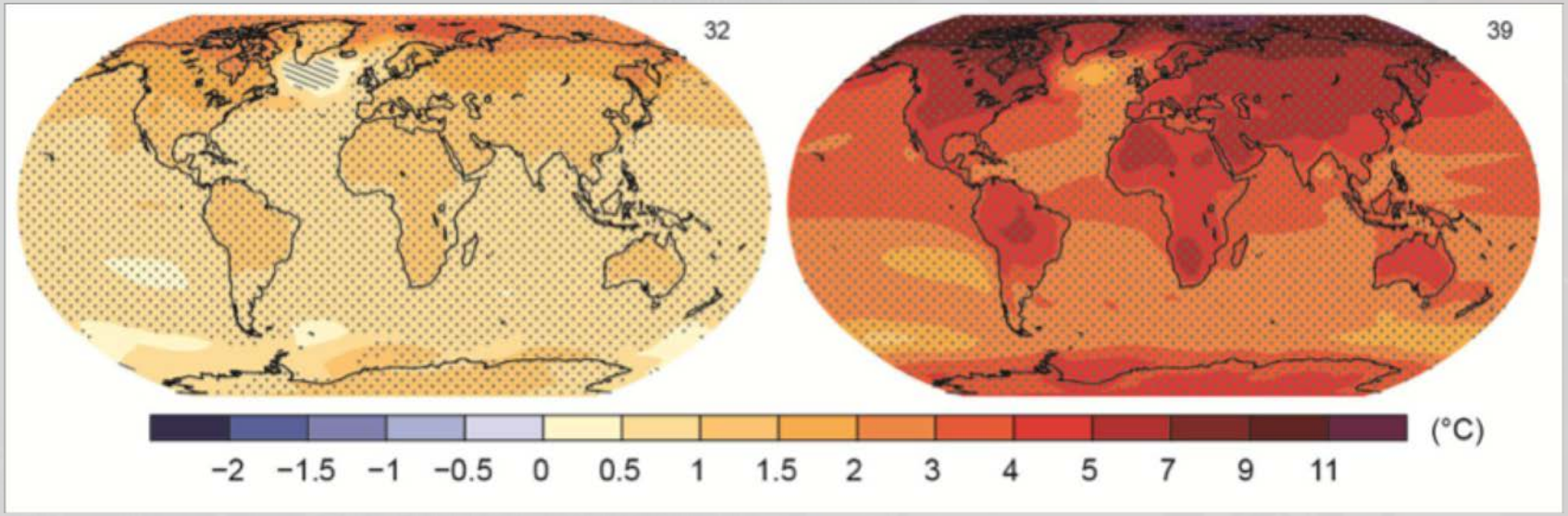


UNFCCC, Aggregate effect of the intended nationally determined contributions: an update http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf

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

With substantial mitigation

Without additional mitigation



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

AR5 WGI SPM

ipcc INTERGOVERNMENTAL PANEL ON climate change
WMO UNEP

Yes, the planet got destroyed. But for a beautiful moment in time we created value for shareholders

"Yes, the planet got destroyed. But for a beautiful moment in time we created a lot of value for shareholders."

http://www.newyorker.com/humor/issuecartoons/2012/11/26/cartoons_20121119#slide=6

What did « The Economist » say in 1990 already?

- **“Being dirty has lots of costs: being greener than the competition may have many advantages”**

- **“For far-sighted companies, the environment may turn out to be the biggest opportunity for enterprise and invention the industrial world has seen.”**

(Frances Cairncross, The Economist, 8 September 1990)

Final remarks

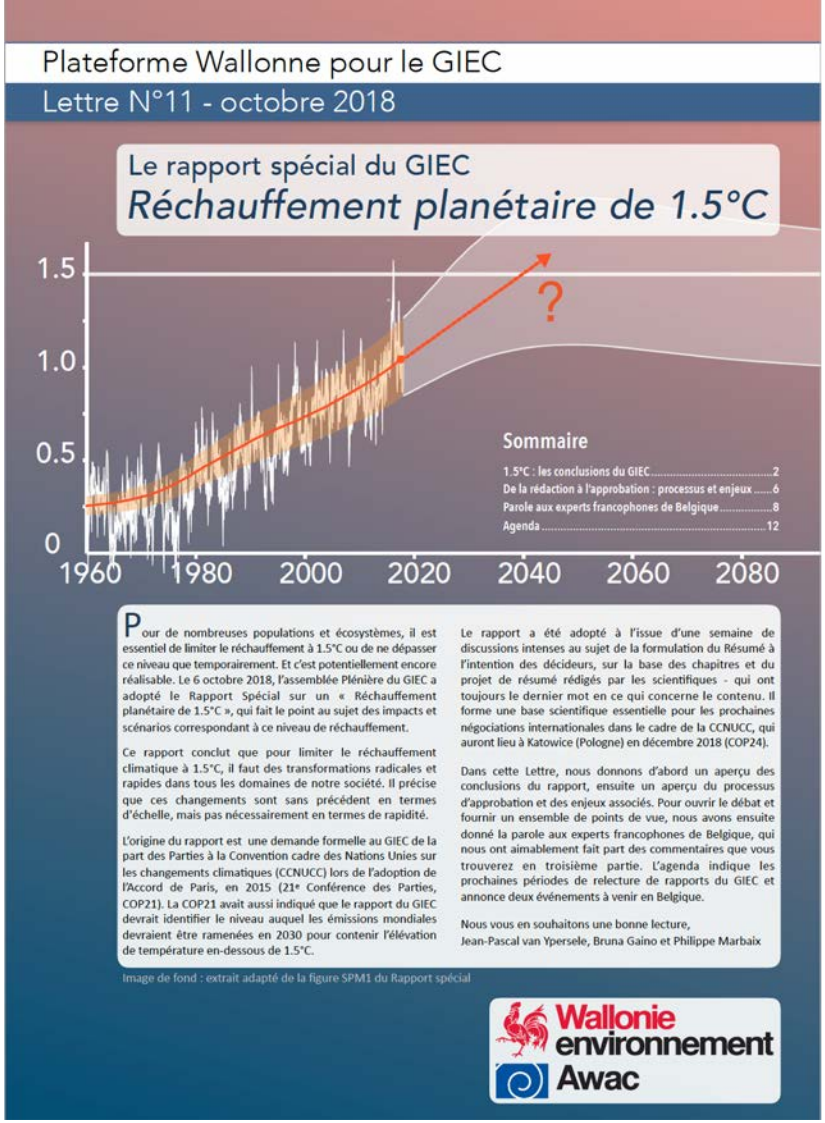
1) There is no business on a too hot planet

2) There is no climate mitigation without ambitious business action

This gives me hope:

Well-informed young people speaking truth to power

With @GretaThunberg at COP24



Disponible gratuitement, 6X/an: www.plateforme-wallonne-giec.be

Ecrit pour les jeunes (et moins jeunes), avec des liens vers des ressources utiles

Disponible gratuitement, 6X/an: www.plateforme-wallonne-giec.be

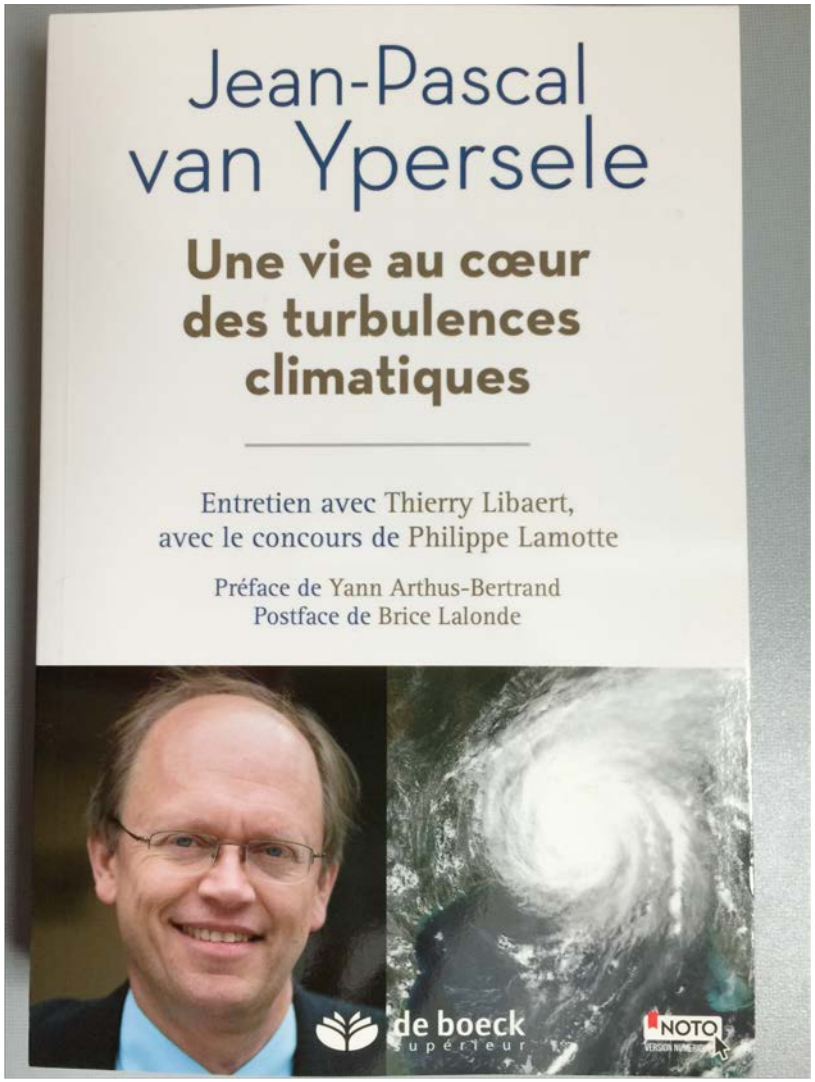
Pour en savoir plus:

Lisez mon livre, où j'aborde tous ces sujets

Publié chez De Boeck supérieur

Préface:Yann Arthus-Bertrand

Postface: Brice Lalonde



Bij EPO (2018)

Voorwoord:
Jill Peeters

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
- www.plateforme-wallonne-giec.be : IPCC-related in French, Newsletter, latest on SR15, COP24, basic climate change
- **Twitter: @JPvanYpersele & @IPCC_CH**