

# **The need for a fast transition path to net zero carbon emissions**

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**Thanks to my team at the Université catholique de Louvain and to  
the Walloon Government (funding the [www.plateforme-wallonne-giec.be](http://www.plateforme-wallonne-giec.be))  
for their support**



Felix Schaad (Tages Anzeiger, Switzerland)

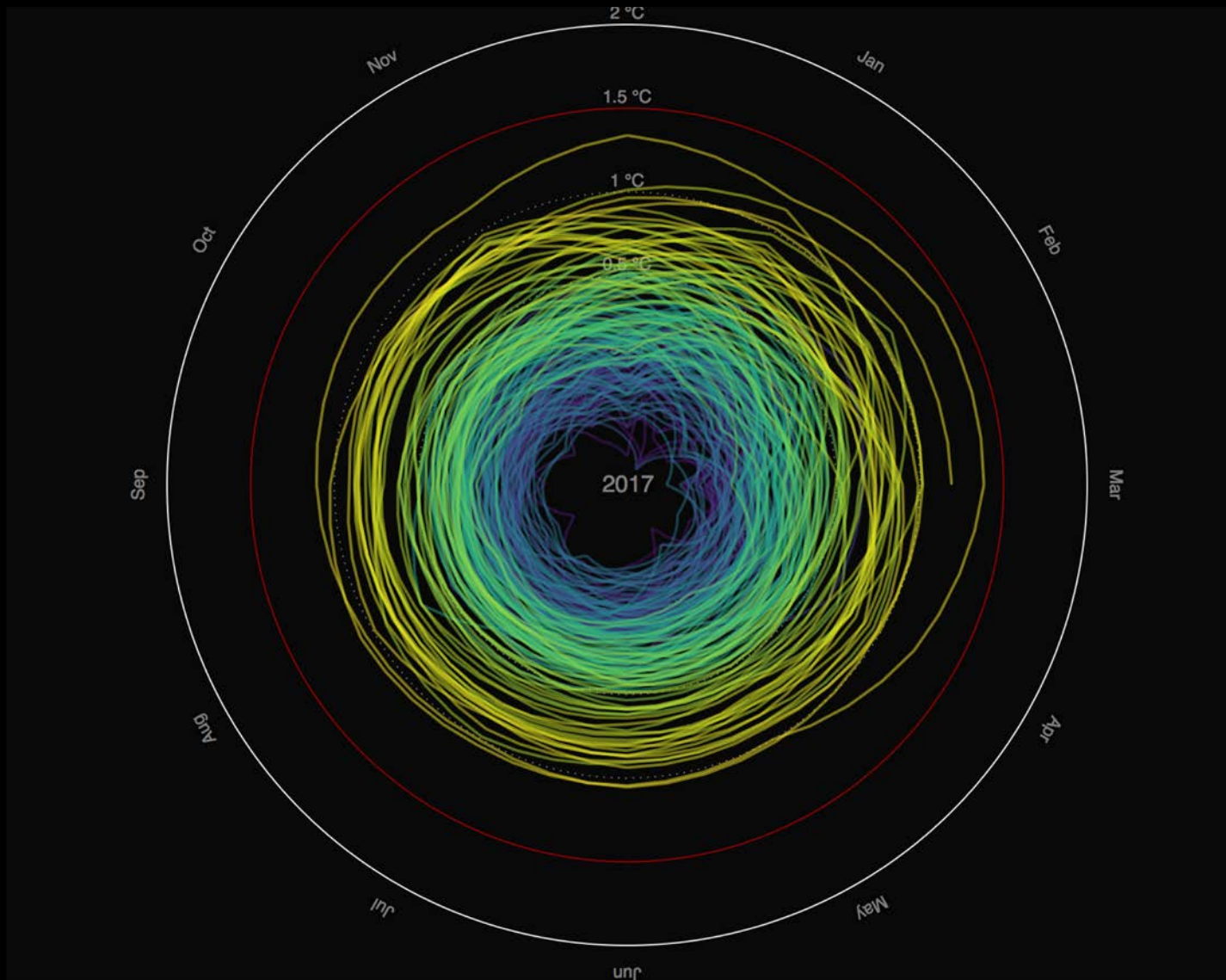
# Walking the talk...

- Energy audit of our home
- Strong external insulation (wood fibre)
- Ultra-efficient windows
- Airtightness inspecting + heat-recovery mechanical ventilation
- Oil furnace replaced by geothermal heat pump principally fed with PV pannels
- Non-tropical wood
- Small, used electric car
- Electric bicycles

# Trying to be coherent (external insulation)



# 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>

**Fact n° 3: 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**

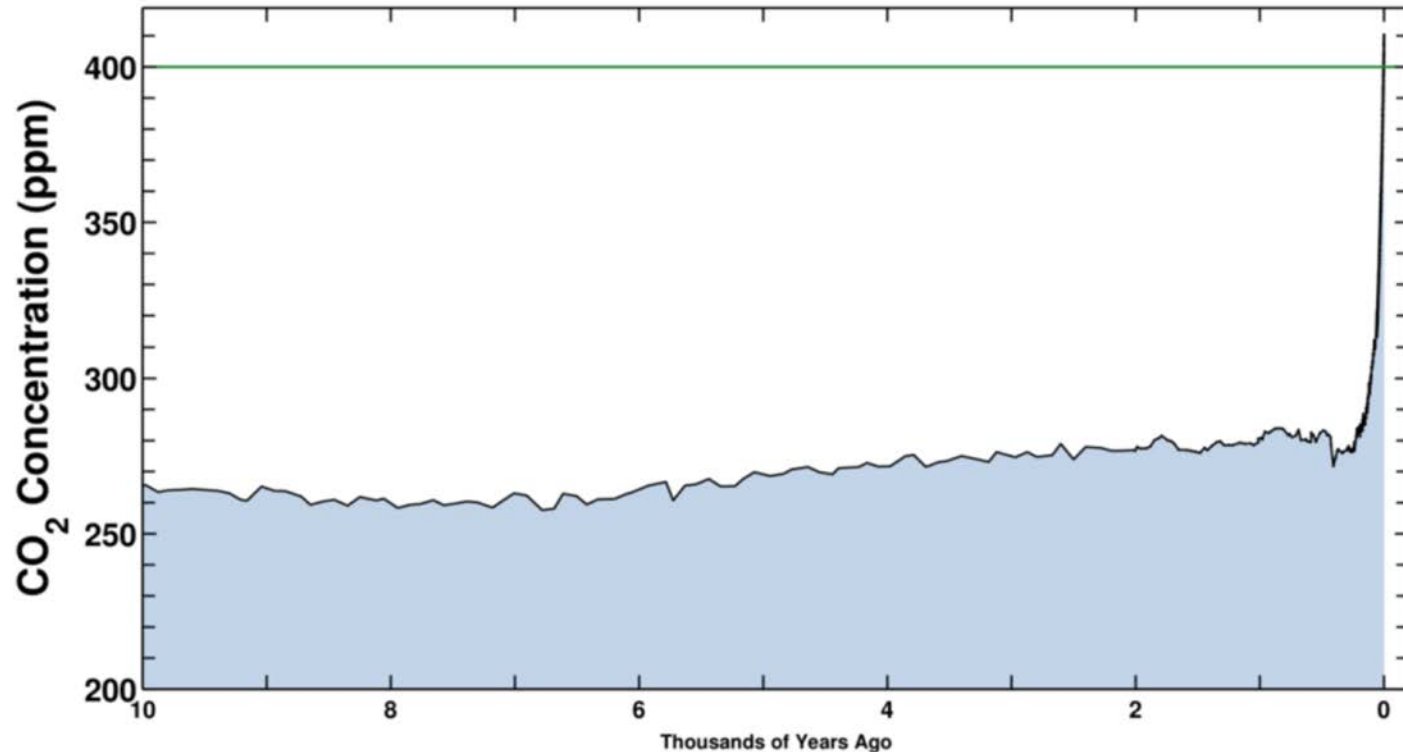


# CO<sub>2</sub> Concentration, 28 May 2018 (Keeling curve)

Latest CO<sub>2</sub> reading  
May 28, 2018

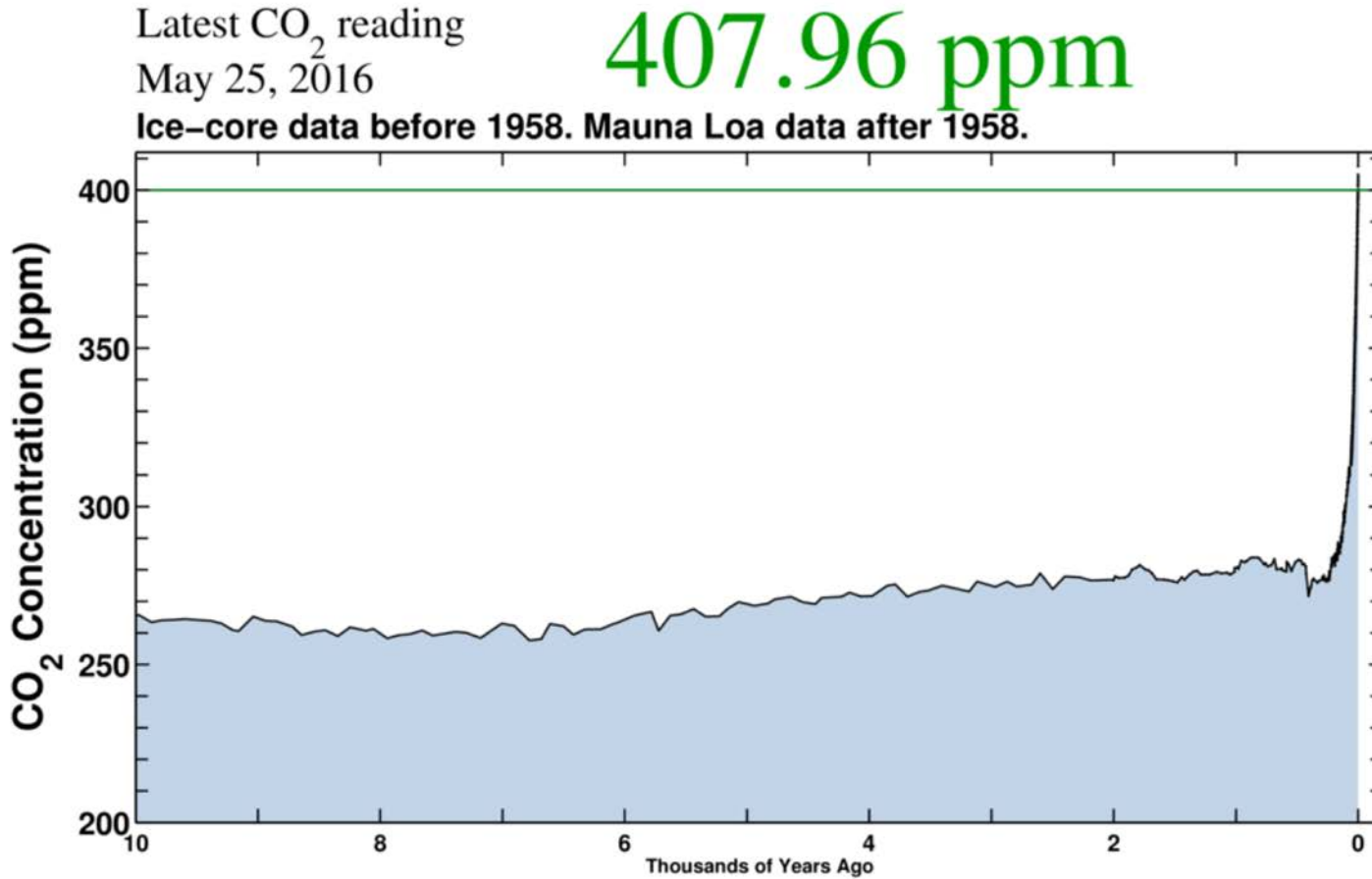
411.98 ppm

Ice-core data before 1958. Mauna Loa data after 1958.



Source: [scripps.ucsd.edu/programs/keelingcurve/](https://scripps.ucsd.edu/programs/keelingcurve/)

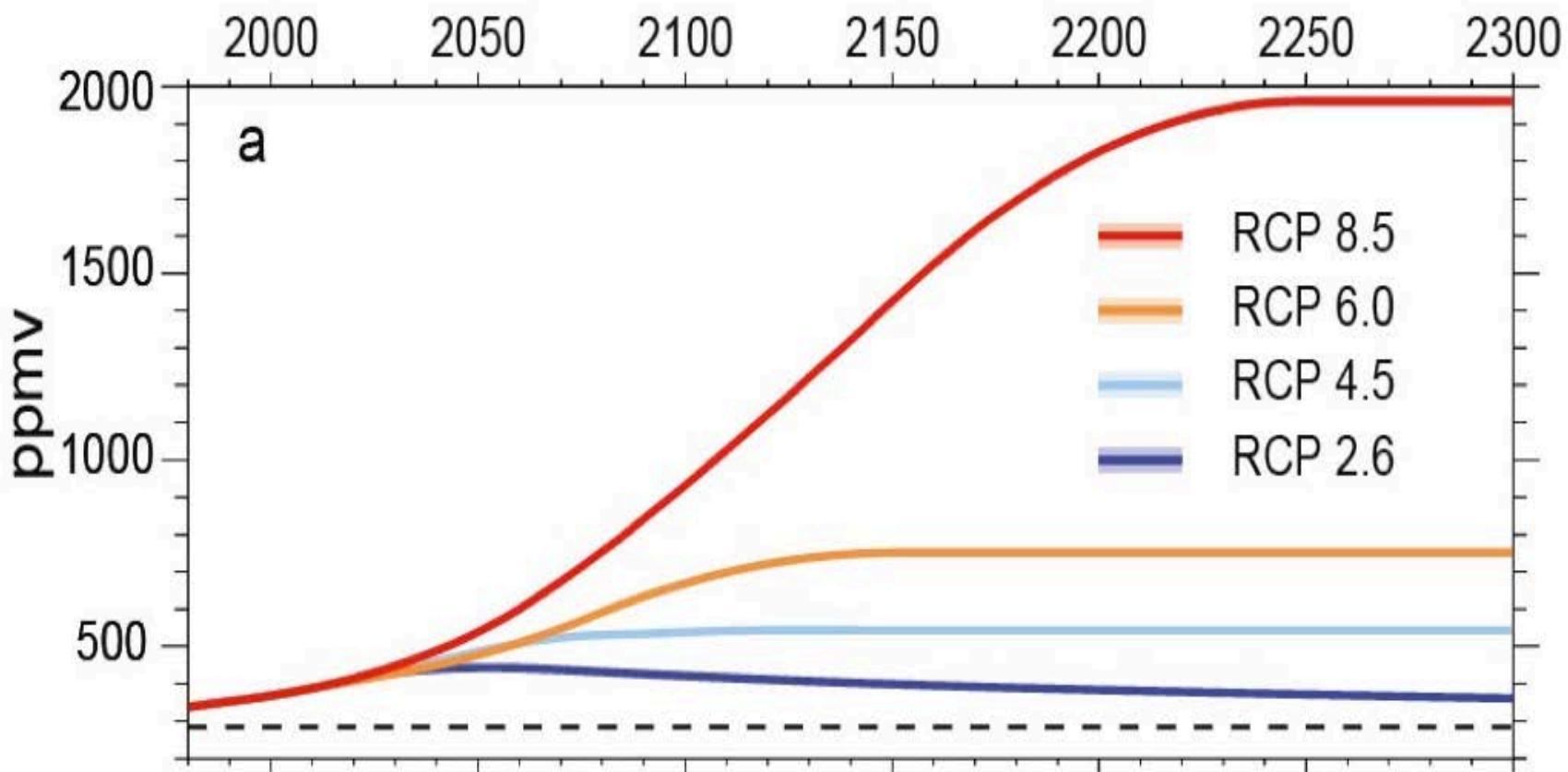
# CO<sub>2</sub> Concentration, 25 May 2016 (Keeling curve)



**Source:** [scripps.ucsd.edu/programs/keelingcurve/](http://scripps.ucsd.edu/programs/keelingcurve/)

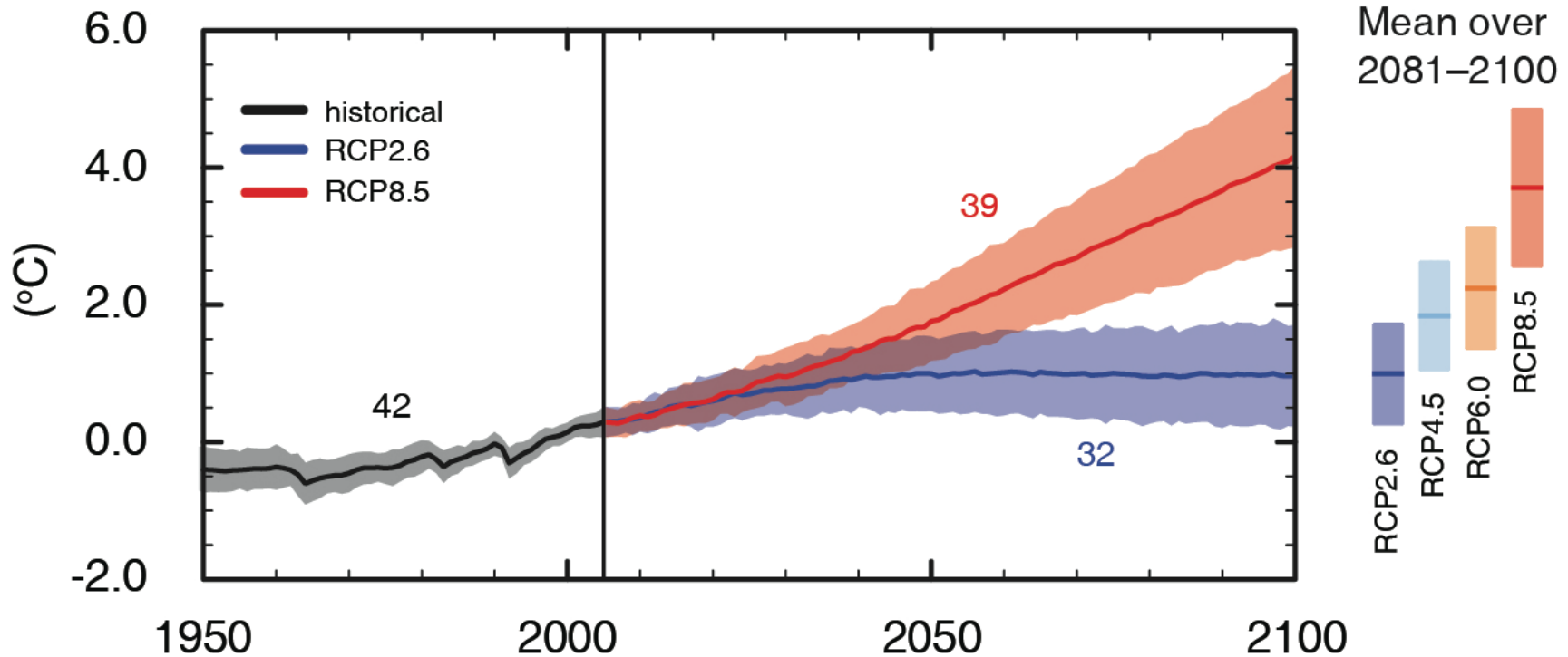


# RCP Scenarios: Atmospheric CO<sub>2</sub> concentration



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

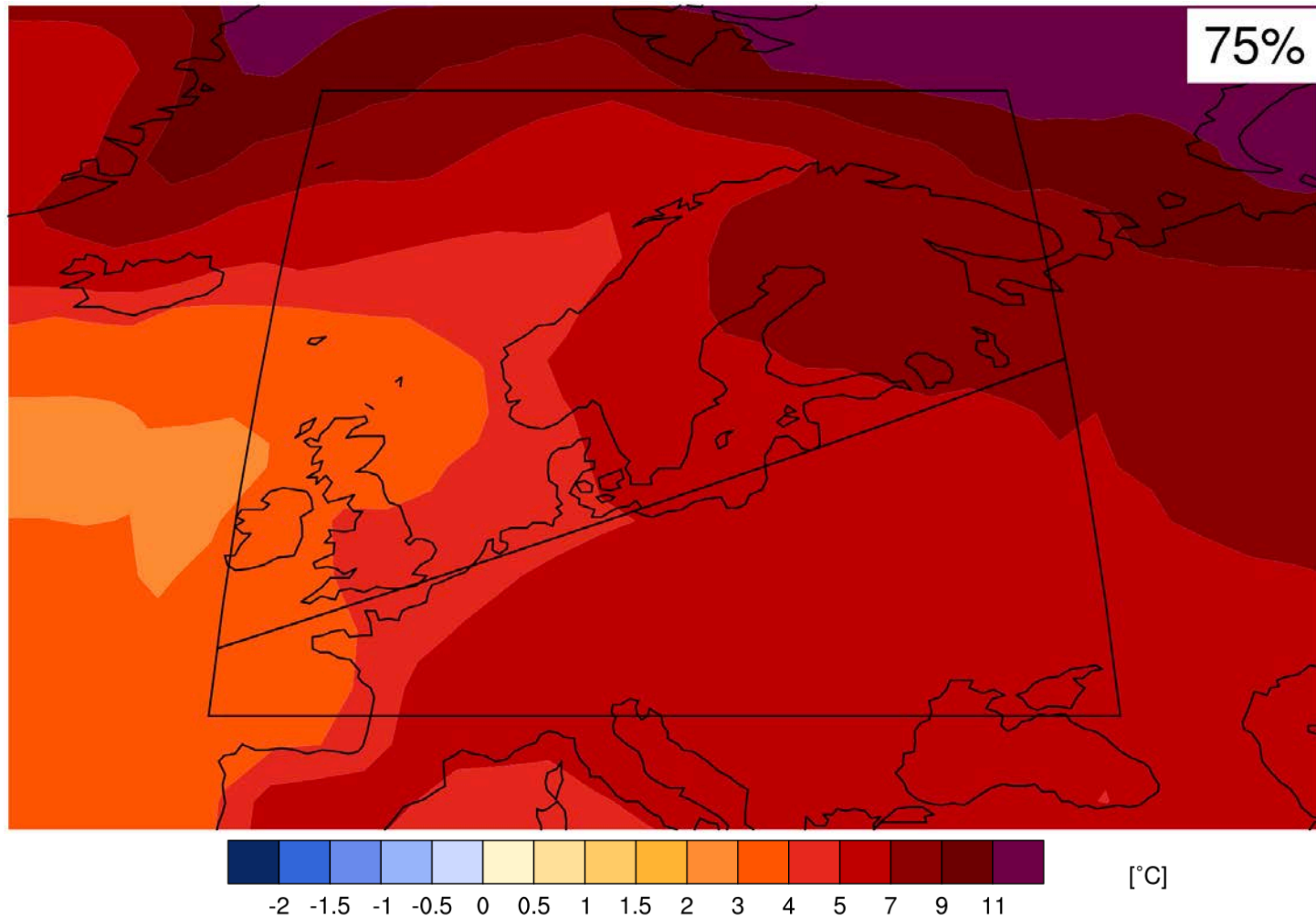
## Global average surface temperature change



(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

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

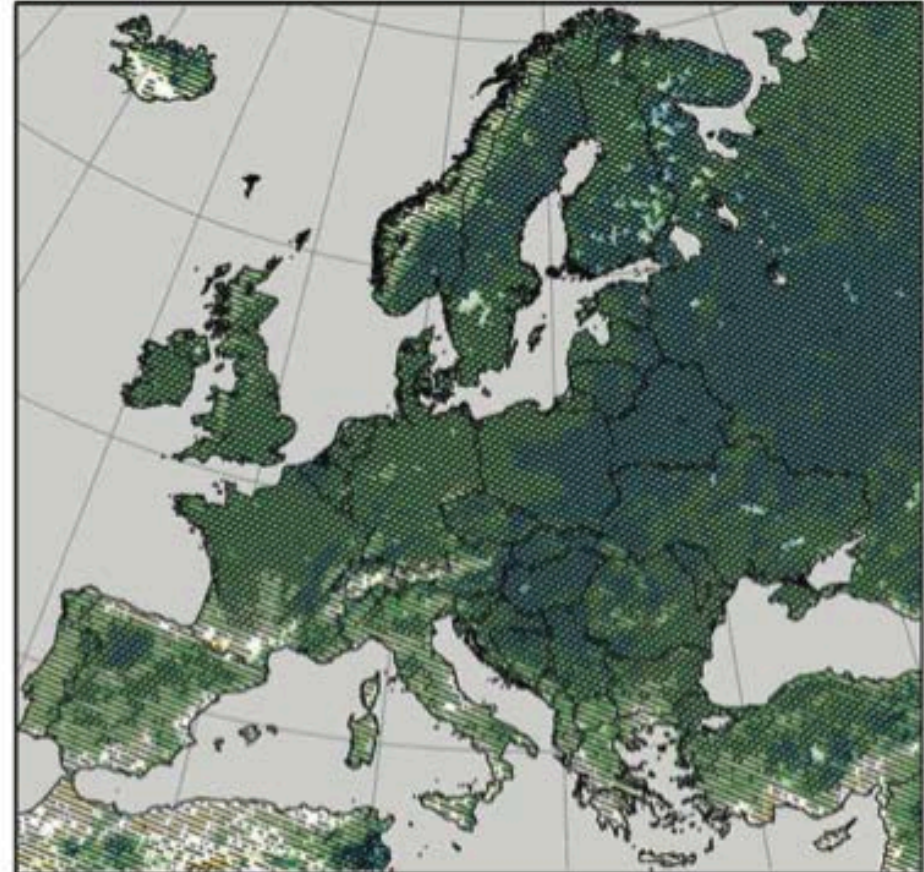
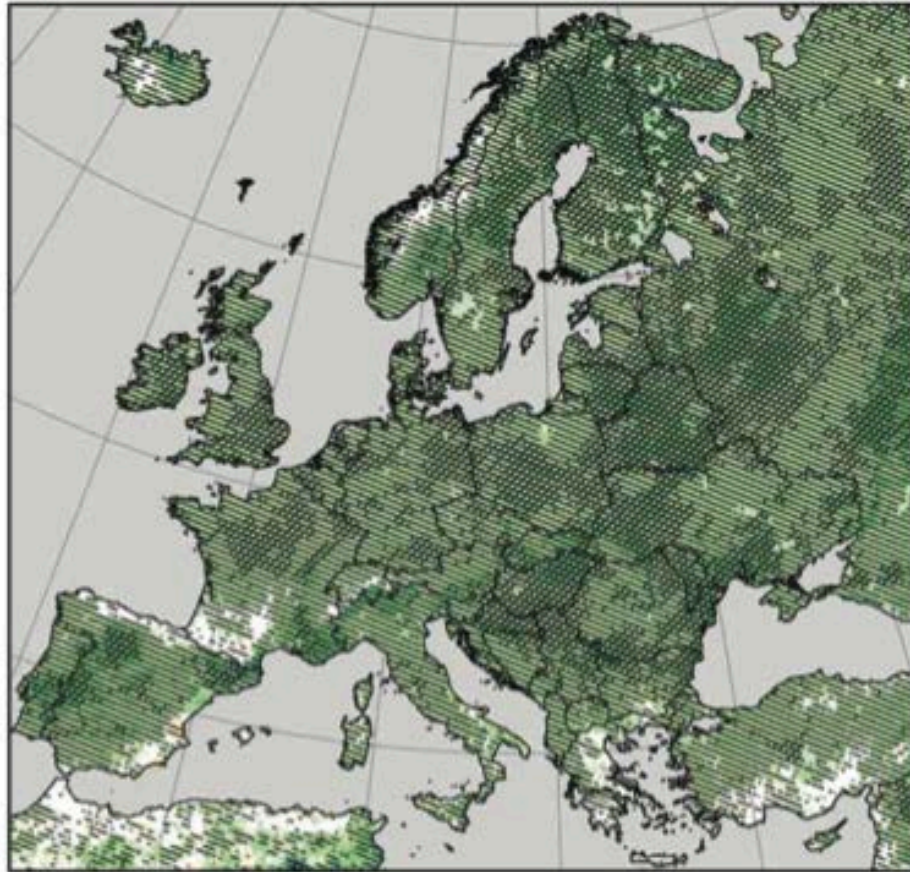




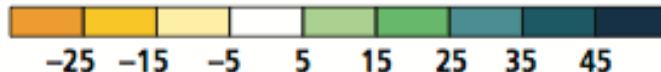
# DJF seasonal changes in heavy precipitation (%), 2071-2100 compared to 1971-2000

RCP4.5

RCP8.5



Seasonal changes in heavy  
precipitation in percent



//// Significant change

\\\\ Robust change

**Fact 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

# 18-20000 years ago (Last Glacial Maximum)

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



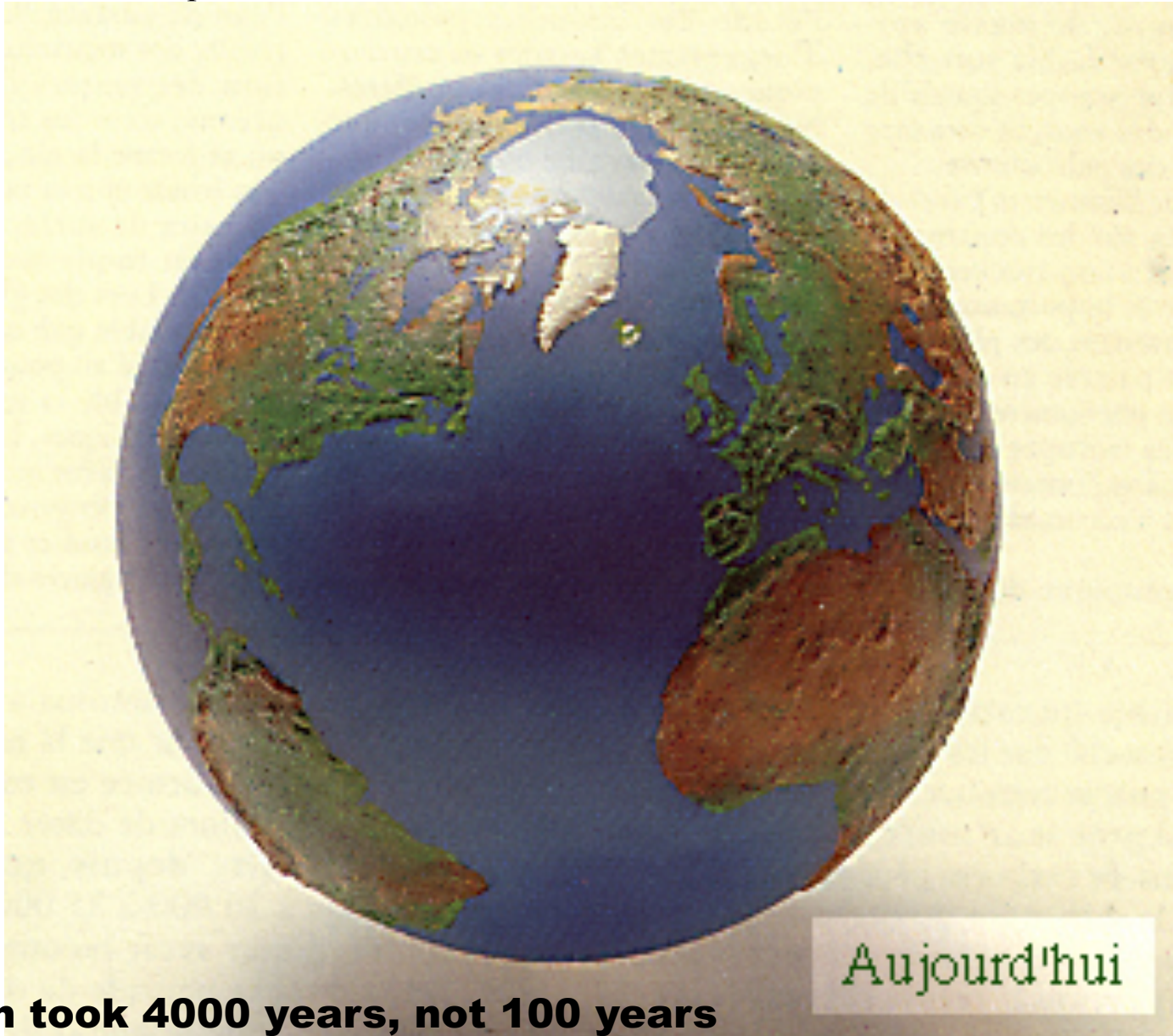
**Sea level: 120 m lower**

Il y a  
18000 ans



# 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**

# Plateau Glacier (1961) (Alaska)



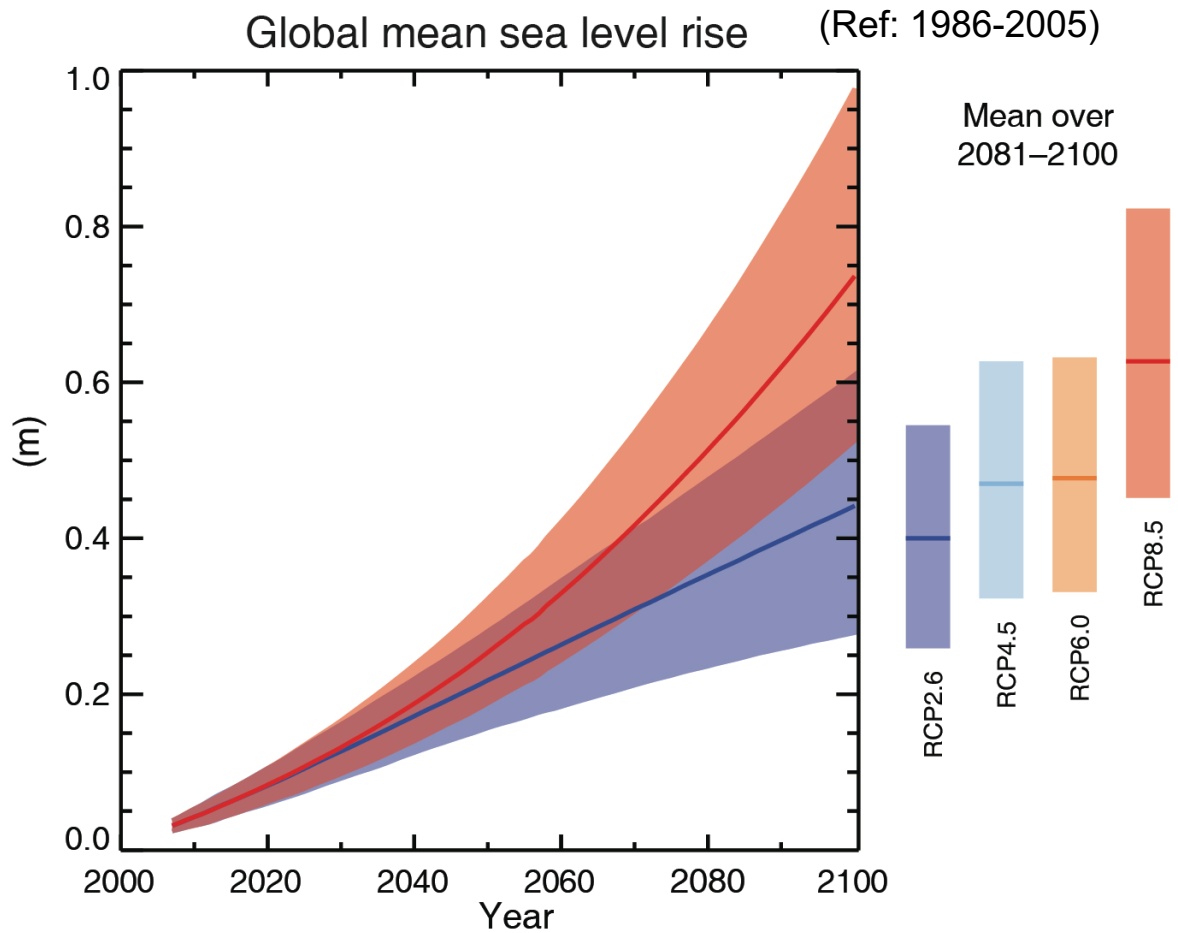
[http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm\\_ven=Email&cm\\_cat=ENVIRONMENT\\_us\\_share](http://www.weather.com/news/science/environment/alaskas-glaciers-capturing-earth-changing-our-eyes-20131125?cm_ven=Email&cm_cat=ENVIRONMENT_us_share)



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



(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)**

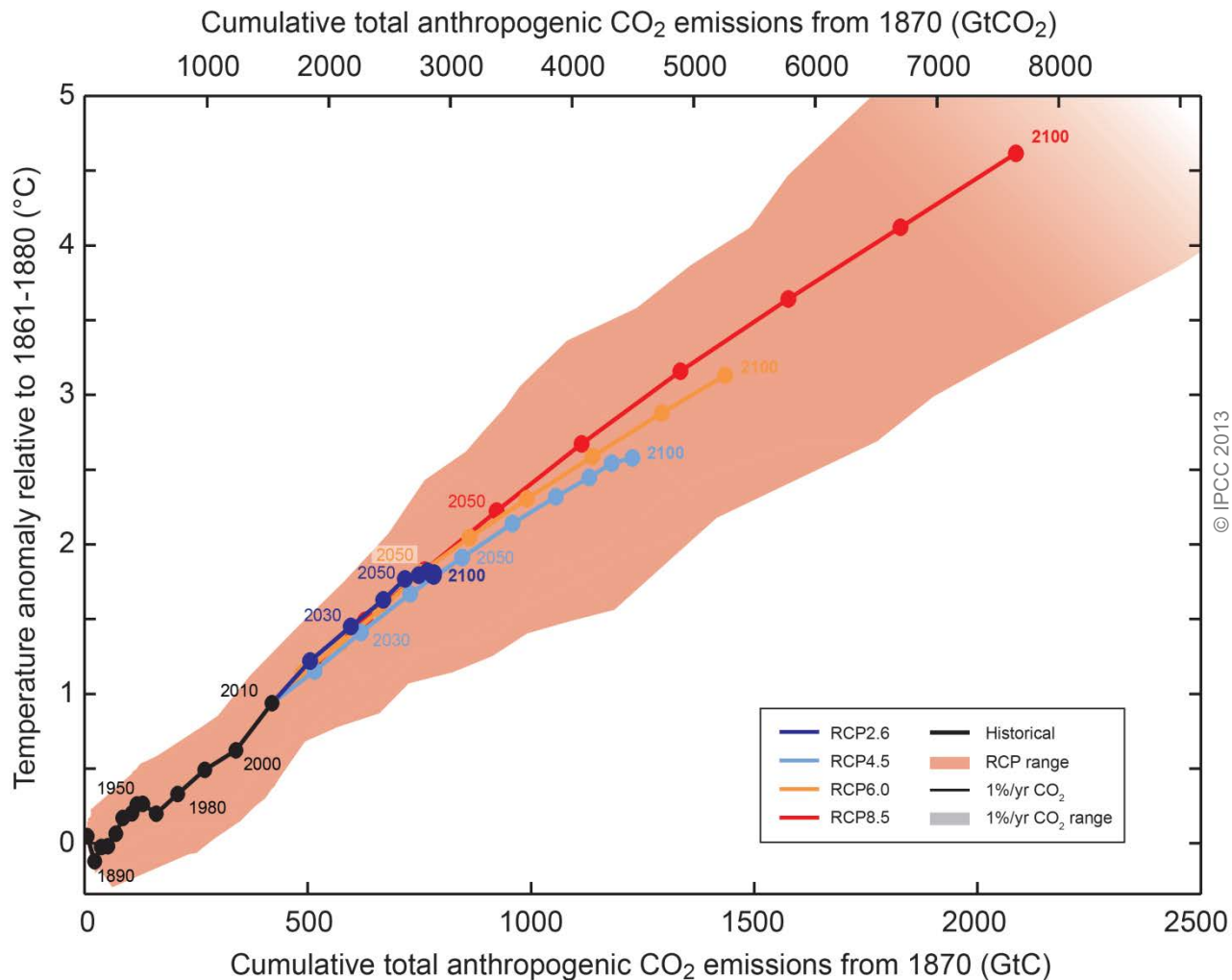


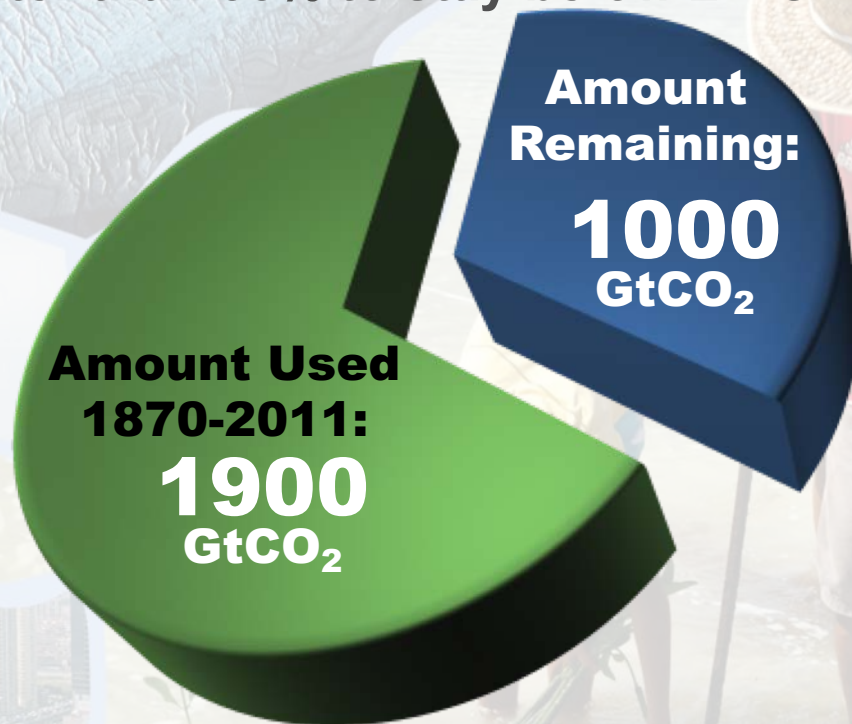
Fig. SPM.10

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



# The window for action is rapidly closing

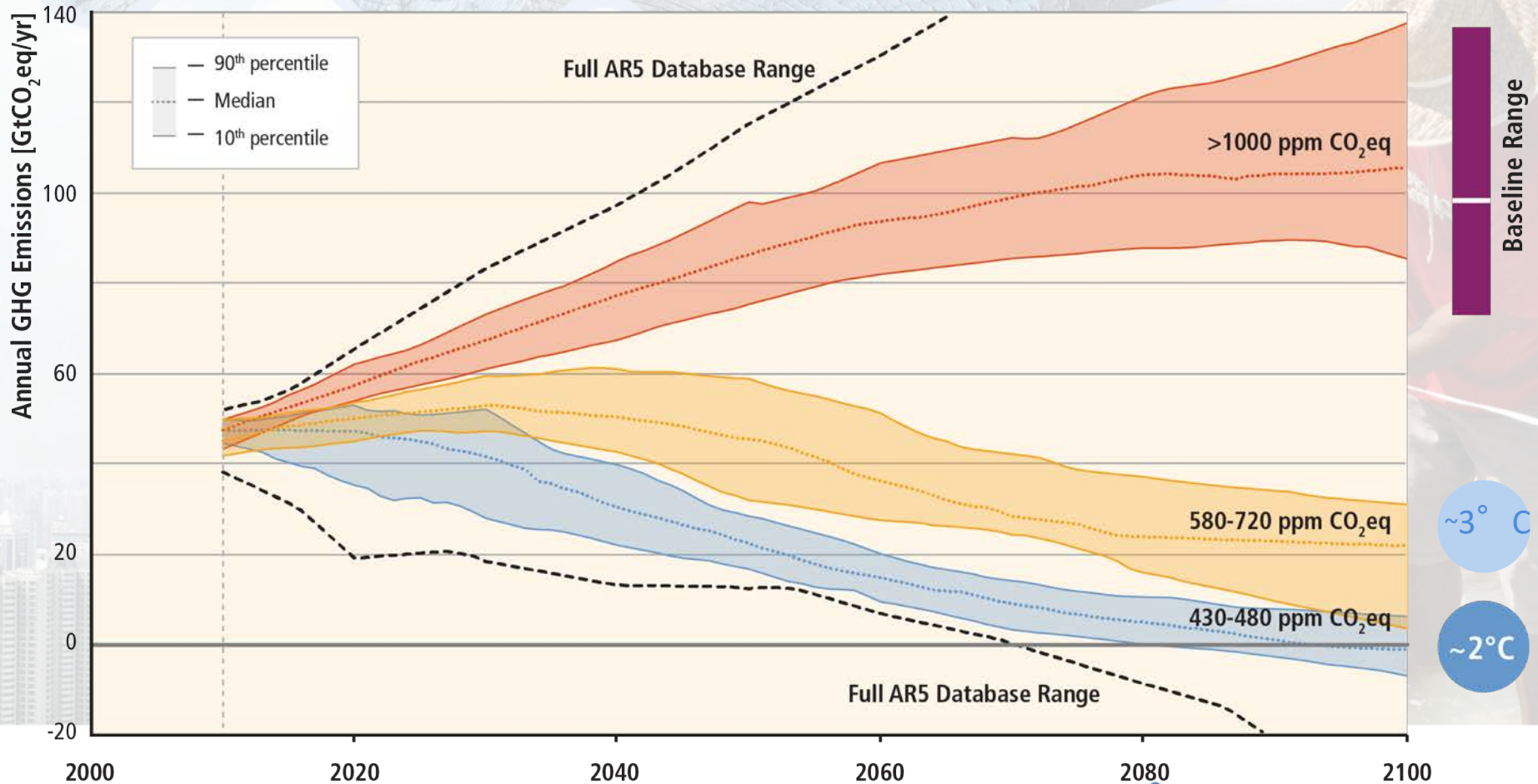
65% of the carbon budget compatible with a 2° C goal is already used  
NB: this is with a probability greater than 66% to stay below 2° C



**NB: Emissions in 2011: 38 GtCO<sub>2</sub>/yr**

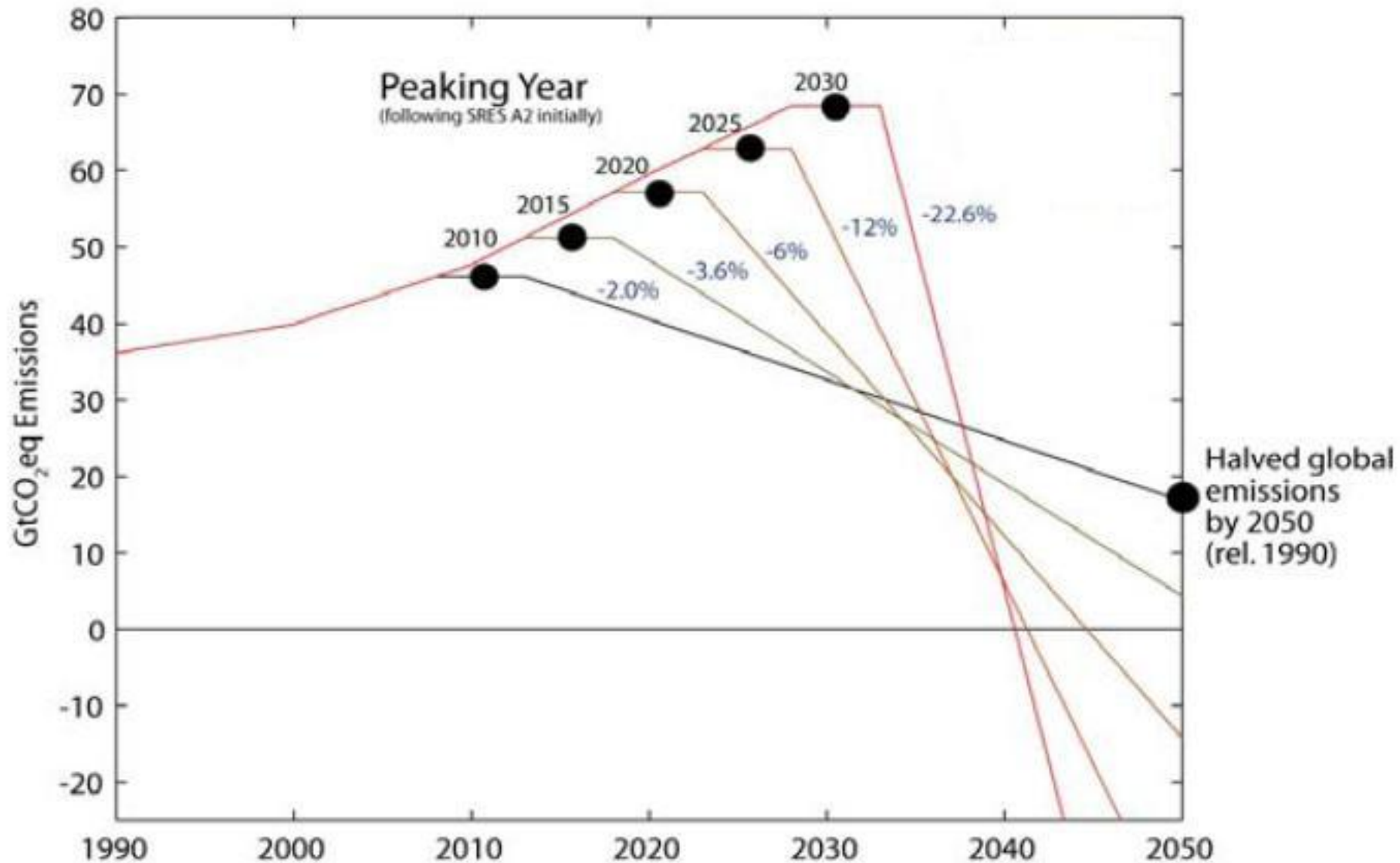
AR5 WGI SPM

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



Based on Figure 6.7

# The more we wait, the more difficult it will be



Source: Meinshausen et al. - Nature, 30th April 2009

- **Substantial reductions in emissions would require large changes in investment patterns e.g., from 2010 to 2029, in billions US dollars/year:**

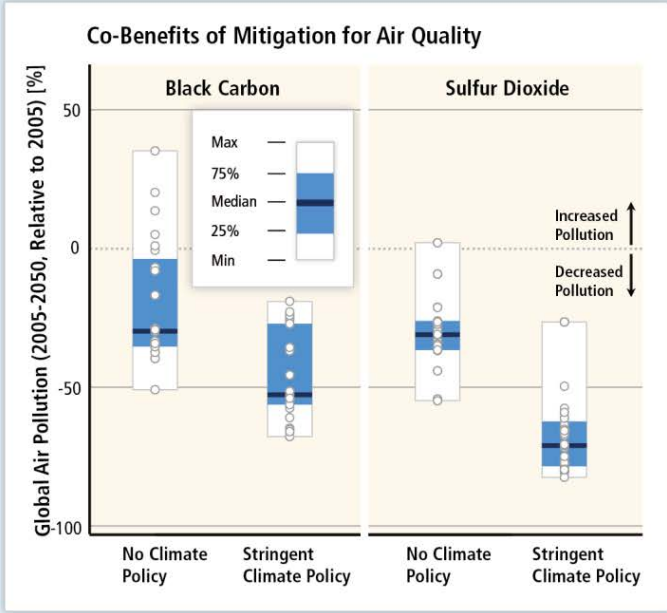
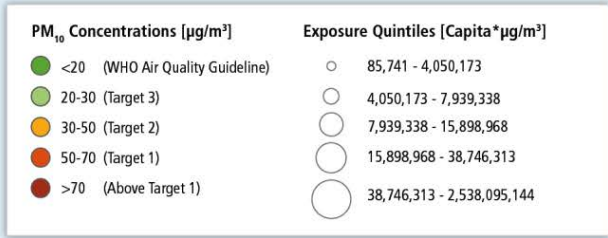
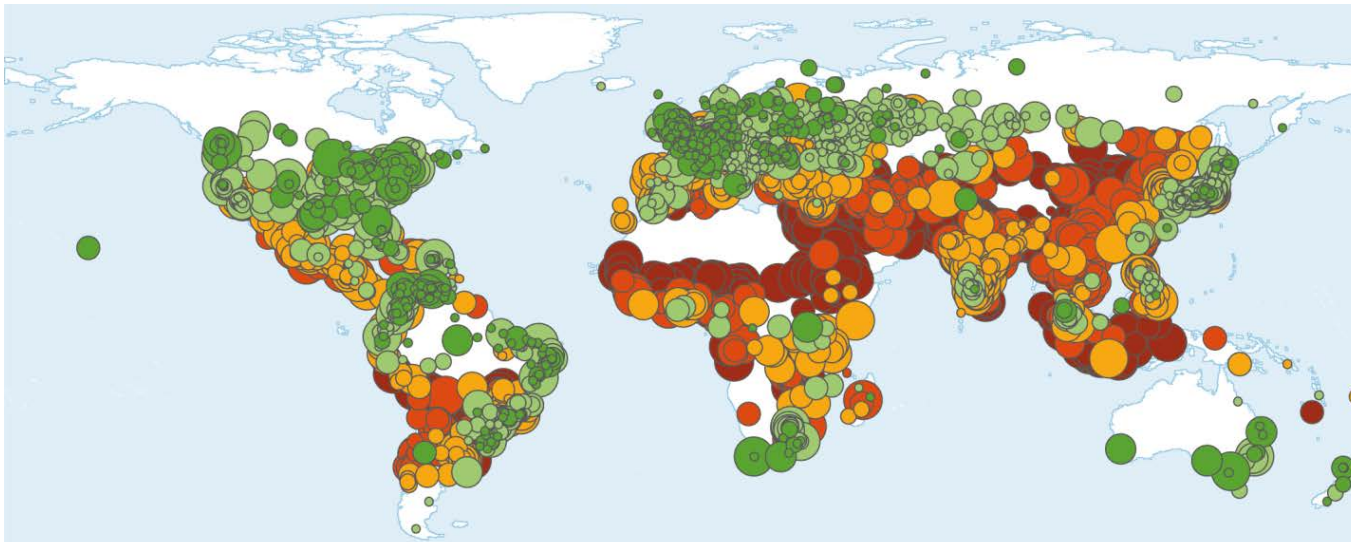
(mean numbers rounded, IPCC AR5 WGIII Fig SPM 9)

- **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







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





# SUSTAINABLE DEVELOPMENT GOALS



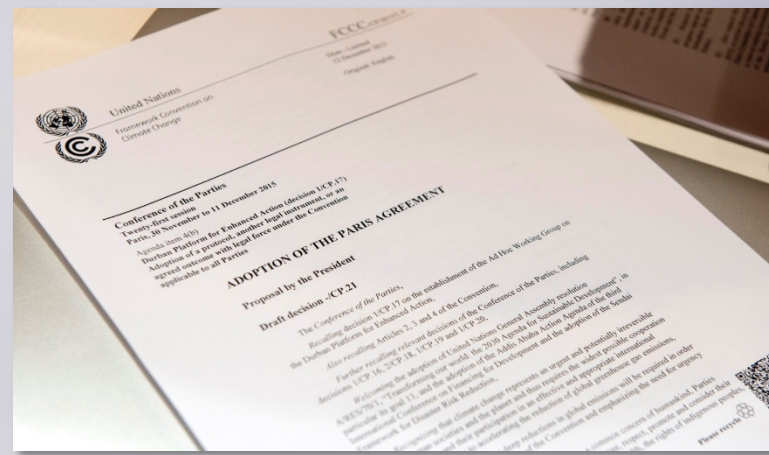
# **If well designed, measures to prevent climate change could offer so many opportunities:**

- Co-benefits in reduced pollution, health improvement, employment, gender equality, food security, reduced poverty, energy independence...**
- Opportunities to shift the tax burden away from labour and implement sustainable development**

# Les Changements Climatiques 2015

COP21/CMP11

## Paris, France

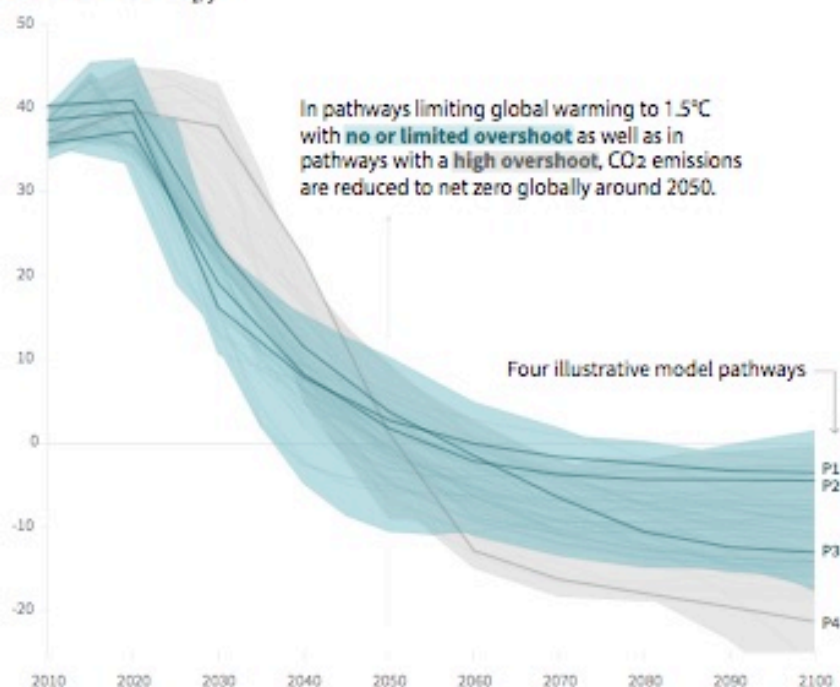


## Global emissions pathway characteristics

General characteristics of the evolution of anthropogenic net emissions of CO<sub>2</sub>, 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.

### Global total net CO<sub>2</sub> emissions

Billion tonnes of CO<sub>2</sub>/yr



#### Timing of net zero CO<sub>2</sub>

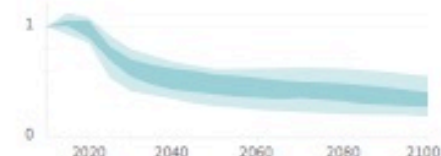
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios



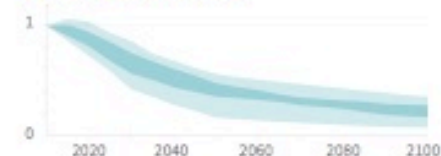
### Non-CO<sub>2</sub> emissions relative to 2010

Emissions of non-CO<sub>2</sub> forcers are also reduced or limited in pathways limiting global warming to 1.5°C with **no or limited overshoot**, but they do not reach zero globally.

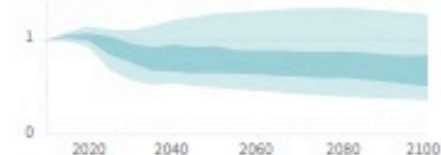
#### Methane emissions



#### Black carbon emissions

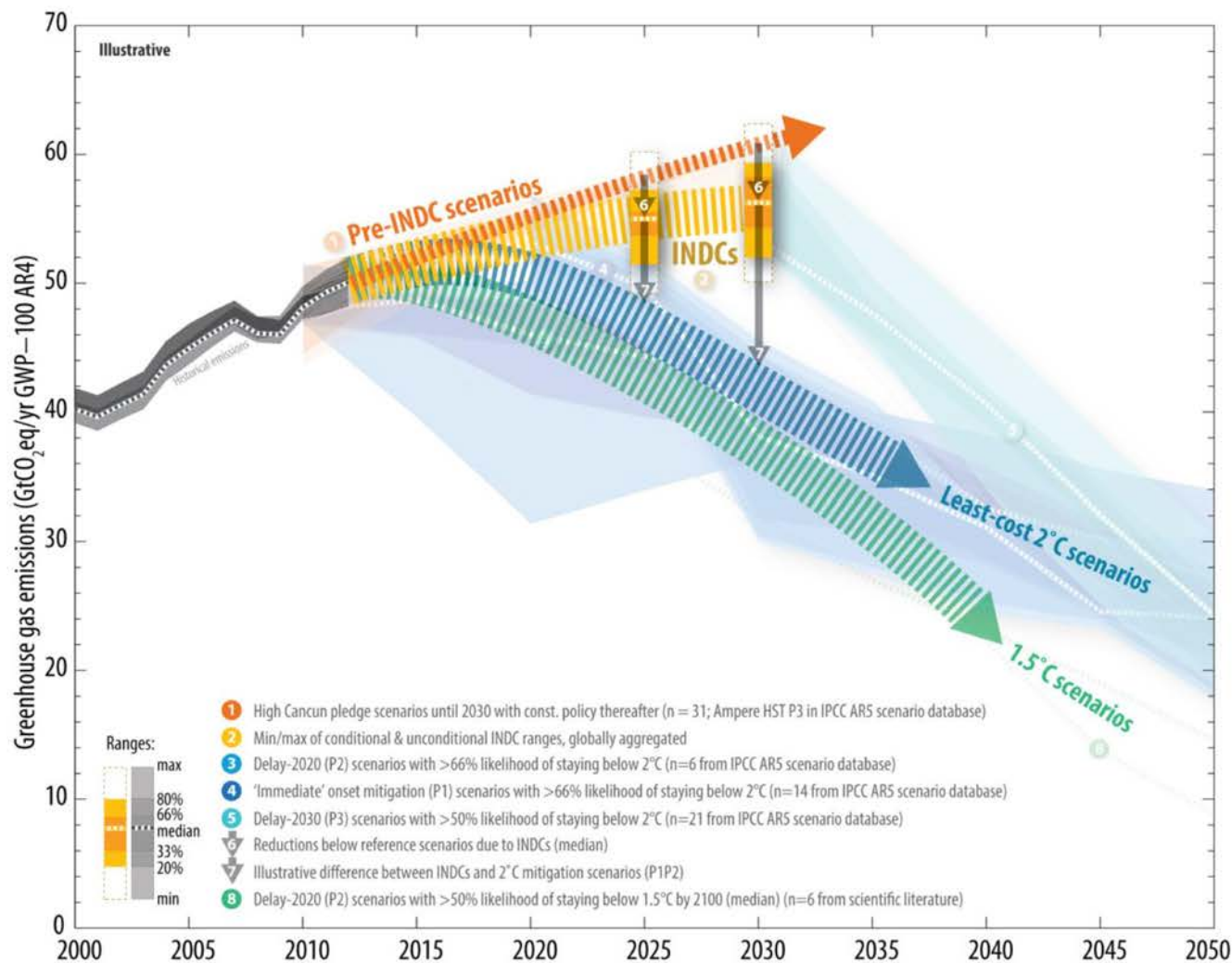


#### Nitrous oxide emissions





# 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>

# 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)*



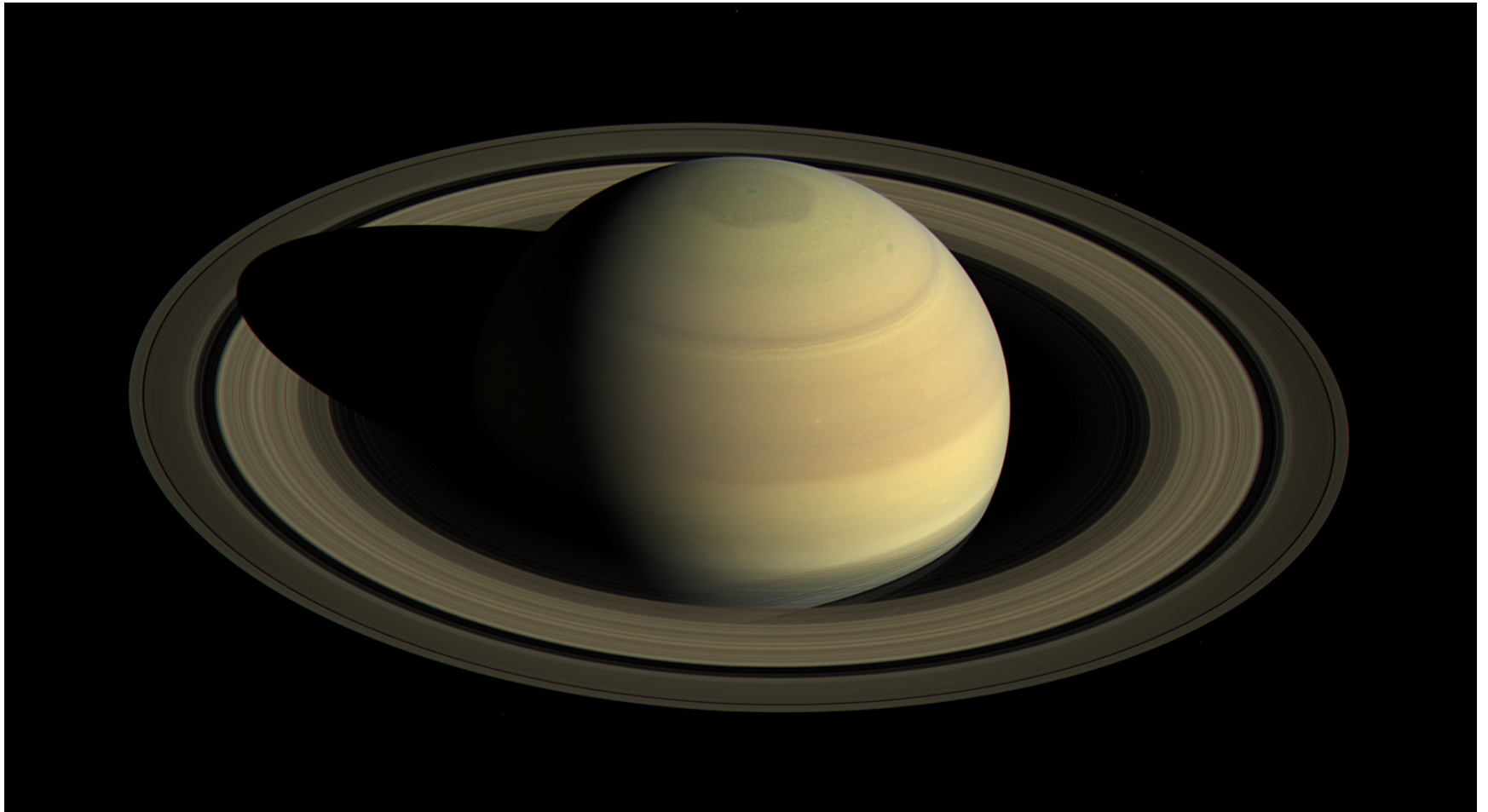
# Conclusions (1/2)

- **The challenge is huge: transform the world in a few decades so that the whole world activities are decarbonized, while poverty and hunger are eliminated in a few decades**
- **It opens many economic opportunities, and opportunities to address in a synergistic manner other societal goals, such as the 17 Sustainable Development Goals.**

# Conclusions (2/2)

- **Last but not least, addressing this challenge, together, will allow us to look our children and grand children into their eyes when they will ask us how we contributed to avoiding the announced environmental collapse.**
- **The finance world has a key role to play!**

**Saturn, as seen on 25-4-2016 from a 3 million km distance by the Cassini satellite launched in October 1997, 40 years after Sputnik**



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





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

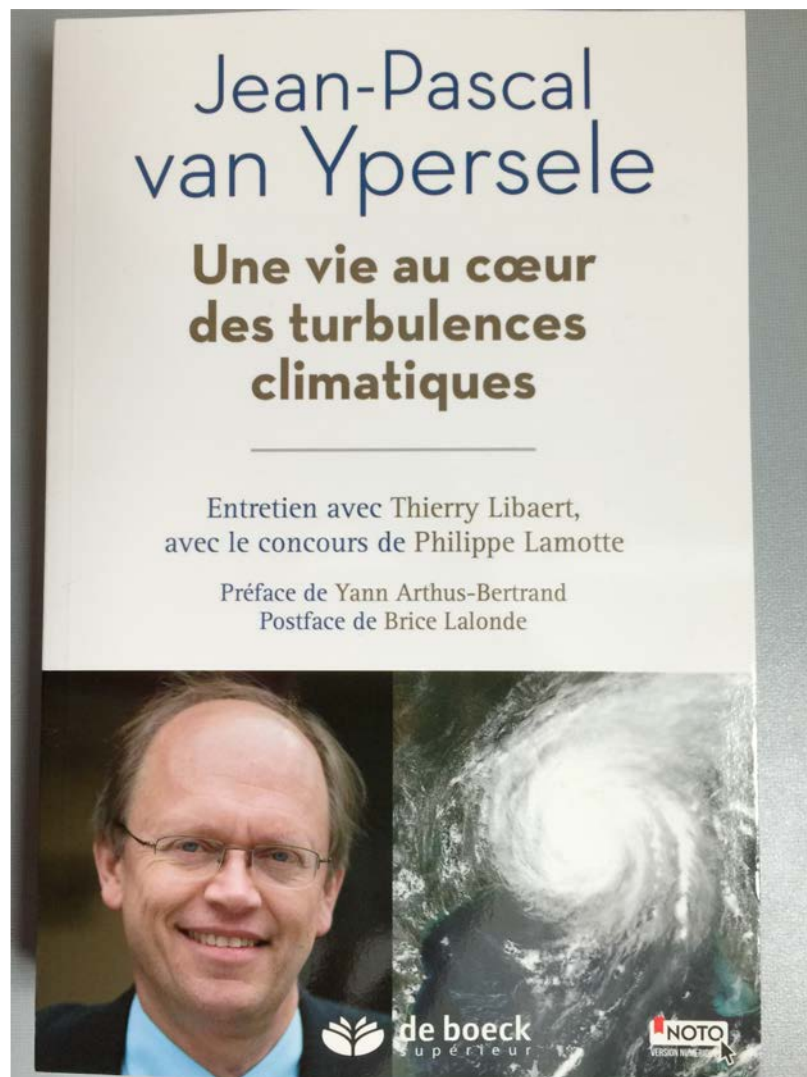


*"Yes, the planet got destroyed. But for a beautiful moment  
in time we created a lot of value for shareholders."*

**Pour en savoir plus:**

**Lisez mon livre, où  
j'aborde tous ces sujets**

**Publié chez De Boeck  
supérieur**



**Bij EPO (2018)**

**Voorwoord:  
Jill Peeters**



# Useful links:

- [www.ipcc.ch](http://www.ipcc.ch) : IPCC (reports and videos)
- [www.climate.be/vanyp](http://www.climate.be/vanyp) : my slides and other documents
- [www.skepticalscience.com](http://www.skepticalscience.com): excellent responses to contrarians arguments
- **On Twitter: @JPvanYpersele  
and @IPCC\_CH**