Climate Change: Global Challenge, Global Opportunity

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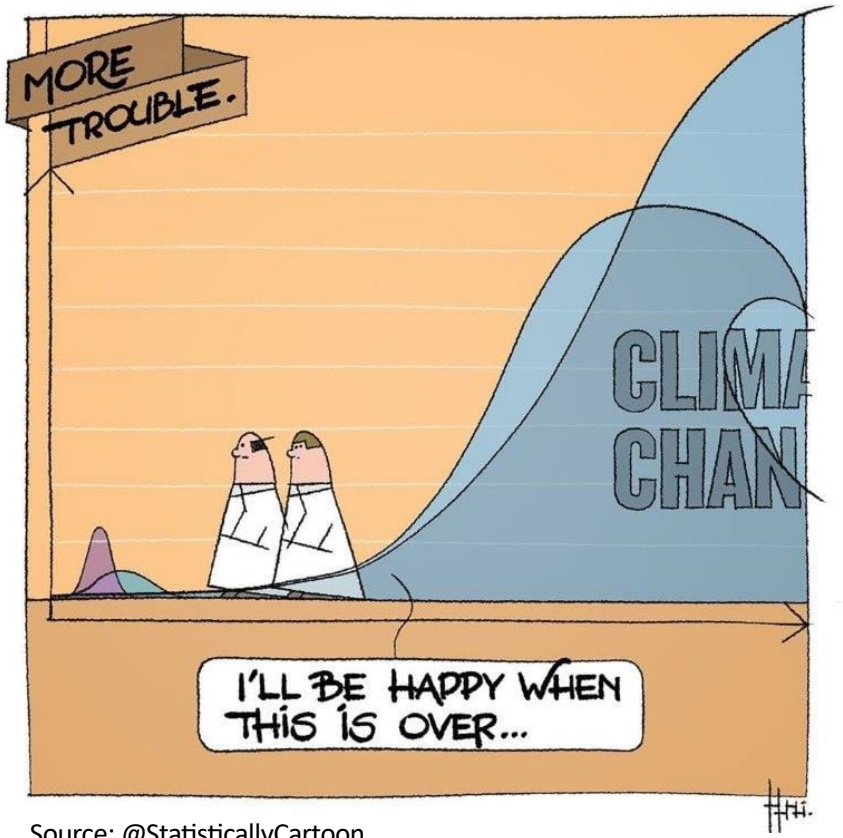
Twitter: @JPvanYpersele

15th Philippine Summit on European Studies,

UP Euro-Filipino Understanding and Relations Organization, on line, 17 April 2021

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



Source: @StatisticallyCartoon

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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

Source: @JohnfoCook

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

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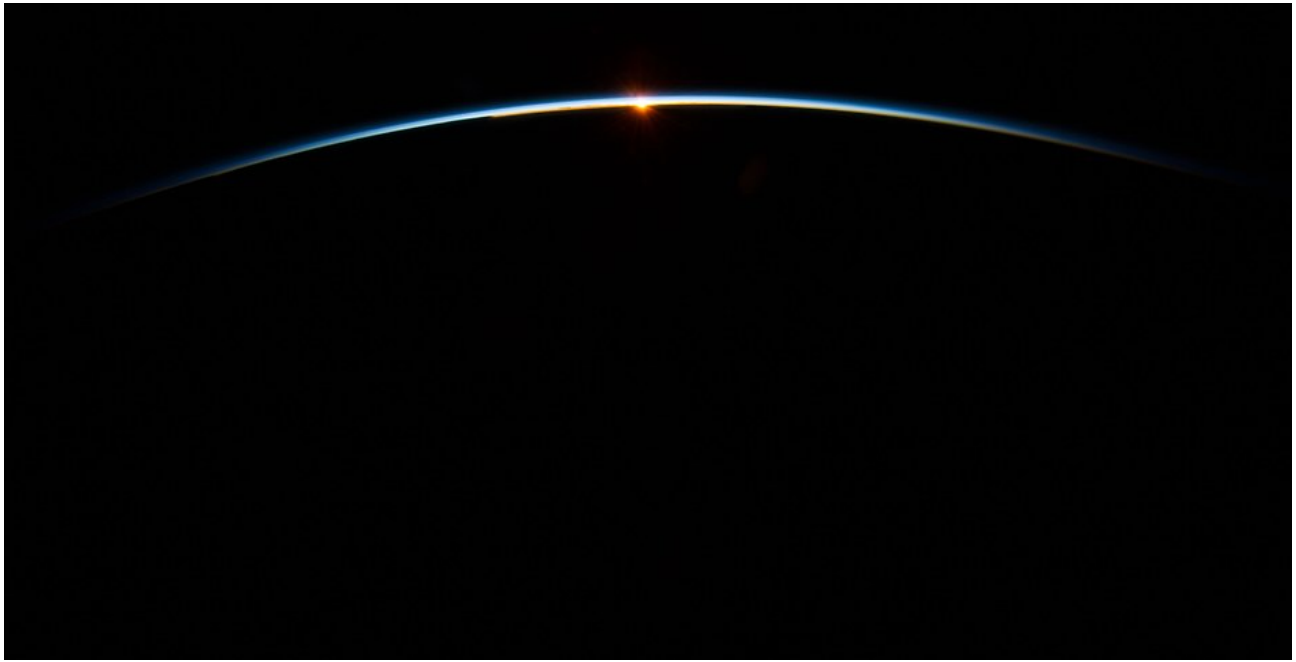
Our atmosphere is thin and fragile (as seen by ISS crew on 31 July 2013)



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Fact: 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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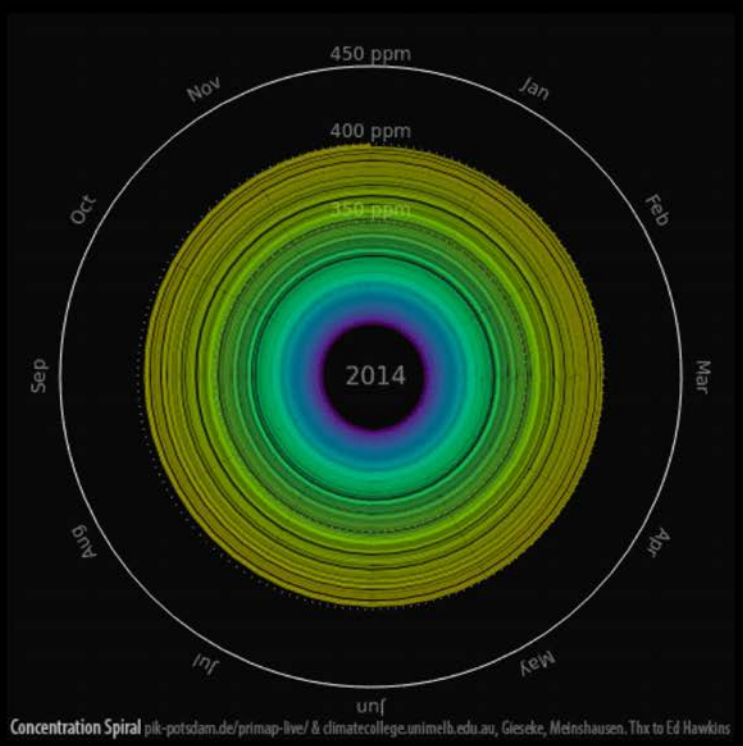
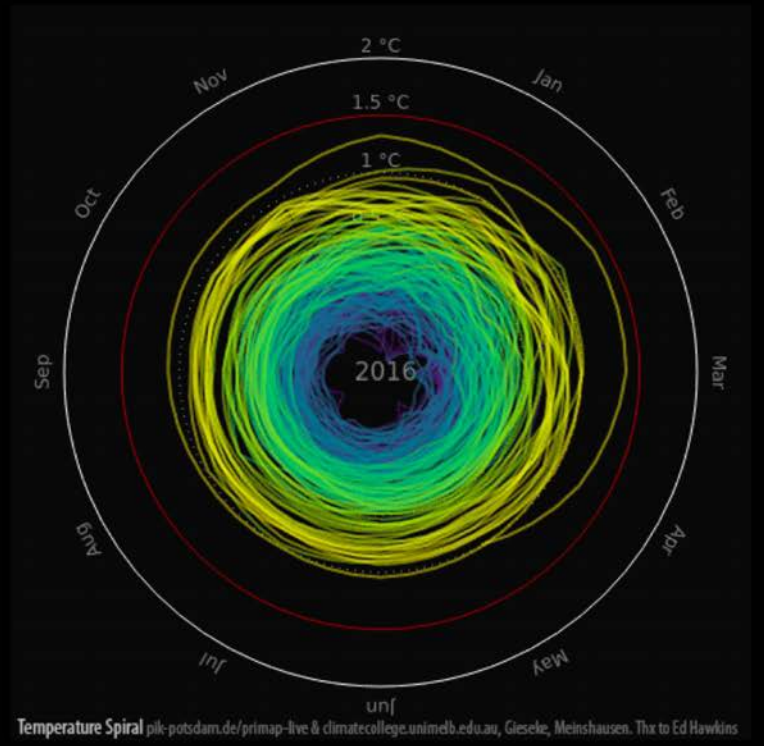
CO_2 Concentration and Temperature spirals

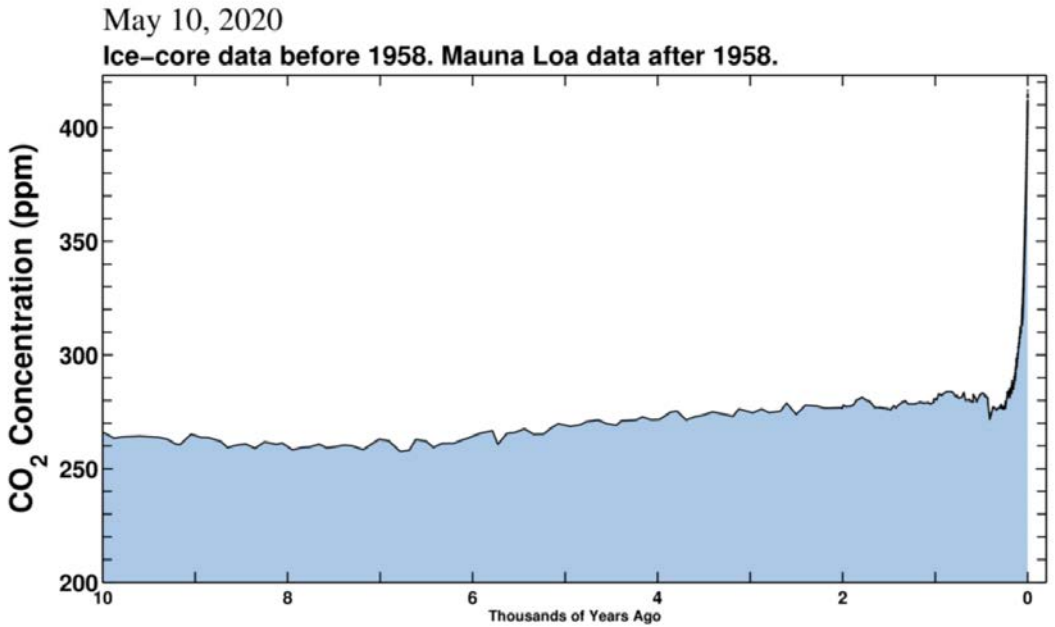




CO_2 Concentration since 1850 and Global Mean Temperature in °C relative to 1850 – 1900
Graph: Ed Hawkins (Climate Lab Book) – Data: HadCRUT4 global temperature dataset
Animation available on http://openclimatedata.net/climate-spirals/concentration-temperature/

CO_2 Concentration, 10 May 2020 (Keeling curve + last 10000 years)

Latest CO_2 reading: 417.10 ppm



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

Fact: The changing composition of the atmosphere and the resulting climate chenge are due to our usage of fossil fuels, cement, and to deforestation

The science about this is now crystal clear

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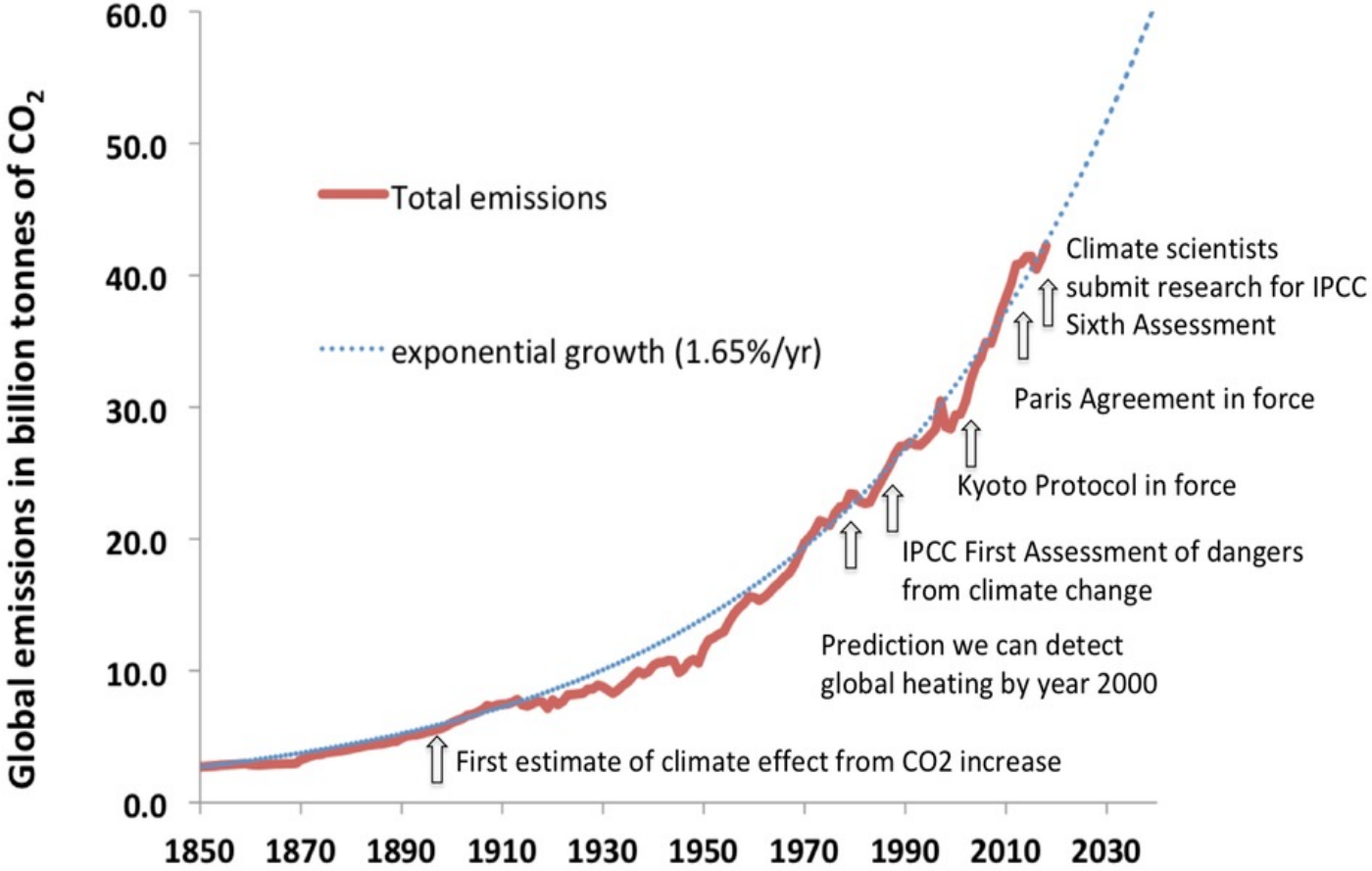
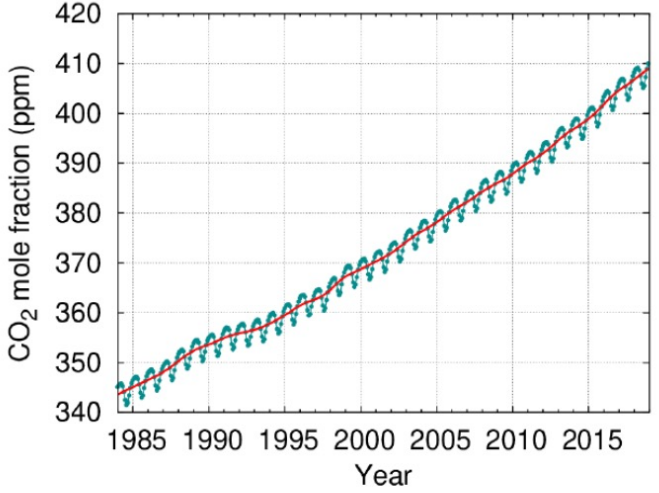
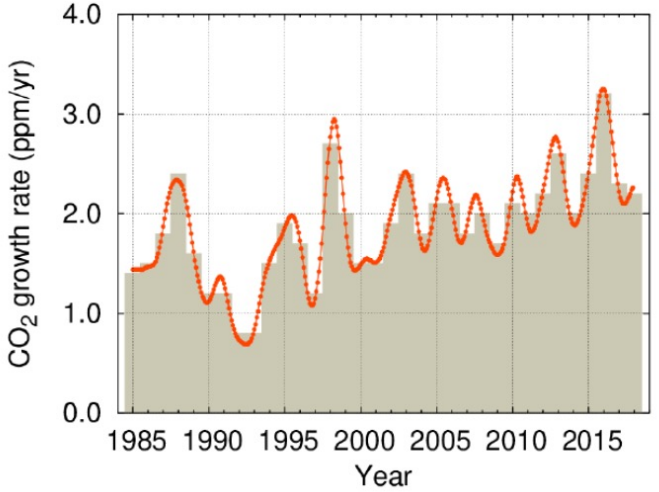


Source: Wolfgang Knorr, in The Conversation (2019)

The effect of the Covid-19 crisis on climate will be negligible:

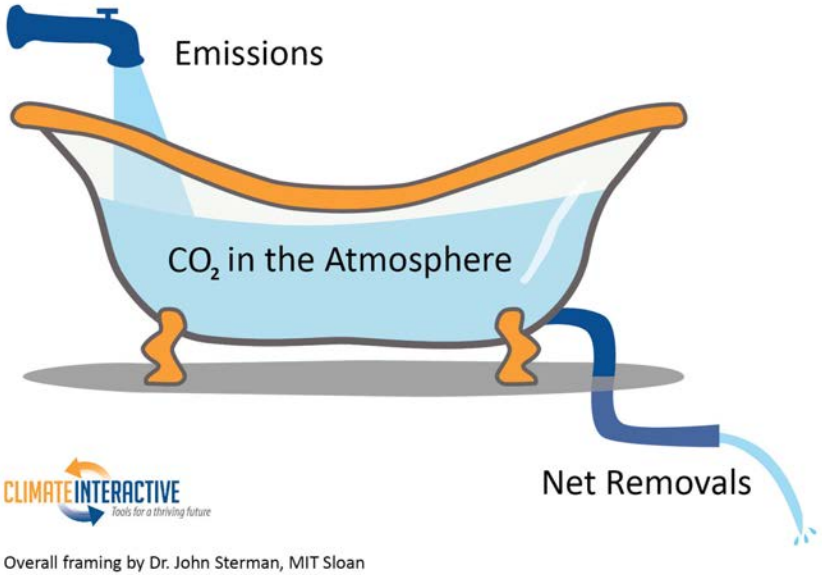
The estimated decline for 2020 due to the COVID-19 shutdown (4%–7% compared to 2019 levels, according to the Global Carbon Project) would result in a final change of 0.08 ppm/yr to 0.23 ppm/yr in the annual growth rate, well within the 1 ppm natural interannual variability.





Source: « United Science » report (UN, 2020)

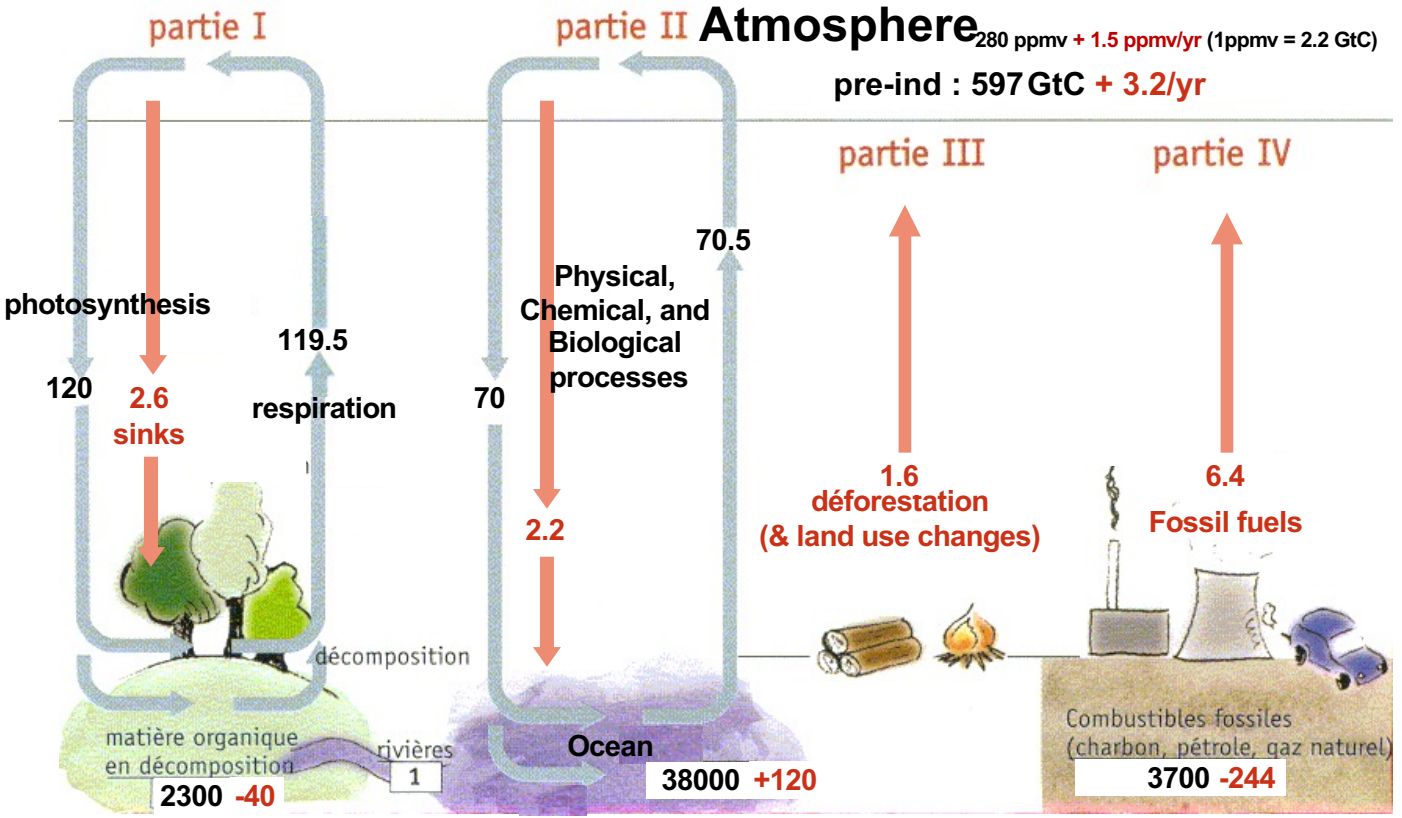
The Carbon Bathtub



Source: @CarbonInteractive

Carbon cycle: perturbed by human activities

(numbers for the decade 1990-1999s, based on IPCC AR4)



Units: GtC (billions tons of carbon) or GtC/year

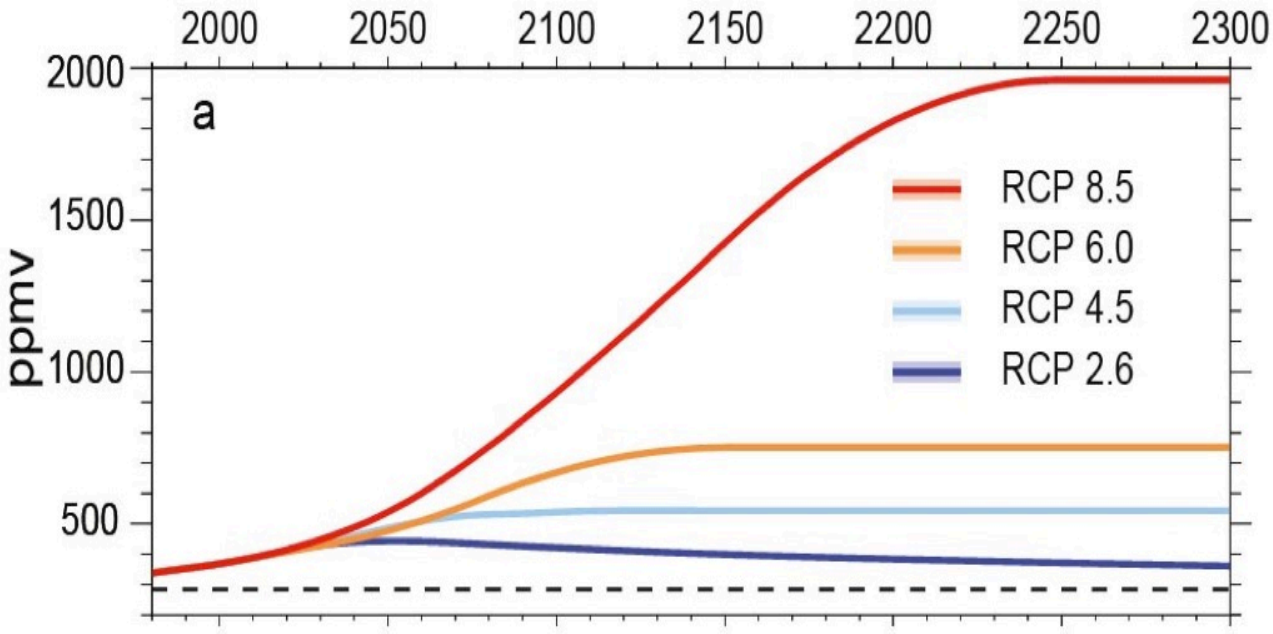
Stocks!

vanyp@climate.be

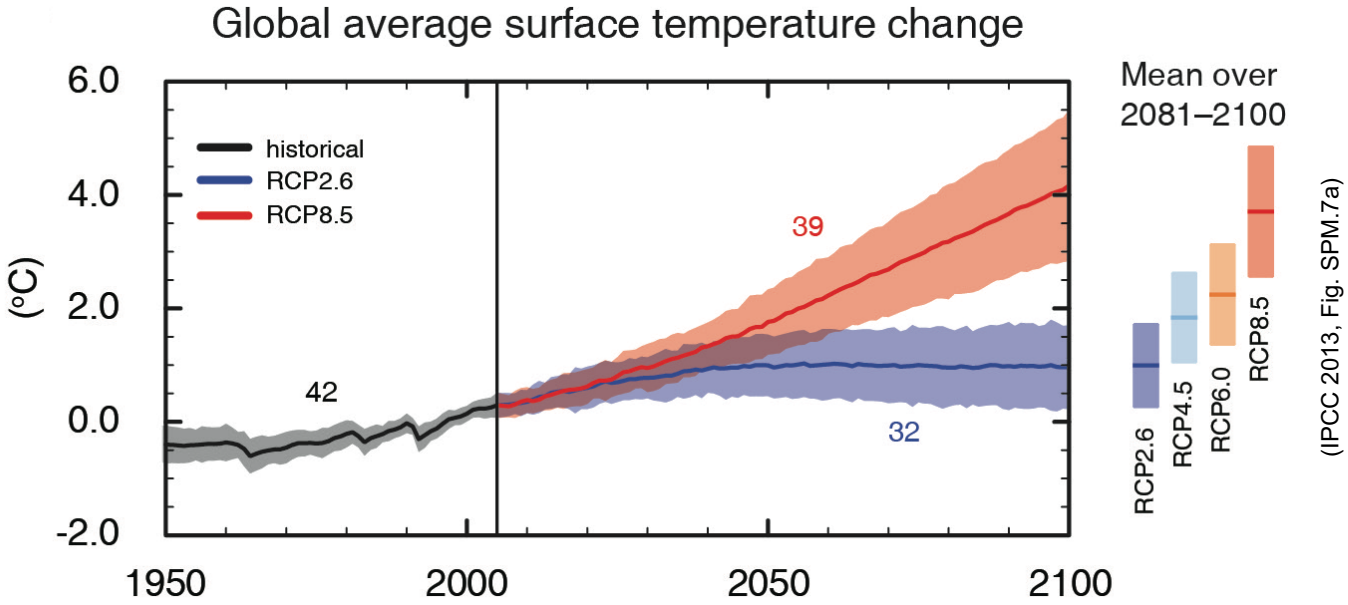
The carbon cycle is policy-relevant

- **CO_2 accumulates in the atmosphere as long as human emissions are larger than the natural absorption capacity**
- **Historical emissions from developed countries therefore matter for a long time**
- **As warming is function of cumulated emissions, the carbon « space » is narrowing fast (to stay under 1.5 or 2° C warming)**

RCP Scenarios: Atmospheric CO_2 concentration

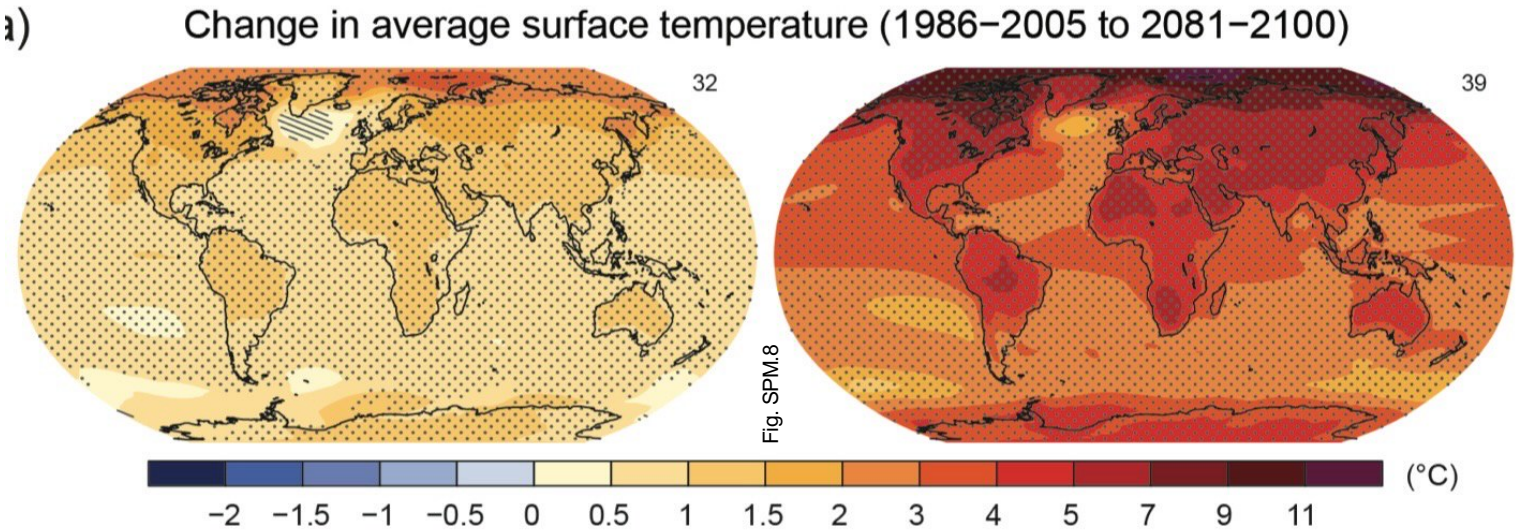


Three stabilisation scenarios: RCP 2.6 to 6
One Business-as-usual scenario: RCP 8.5



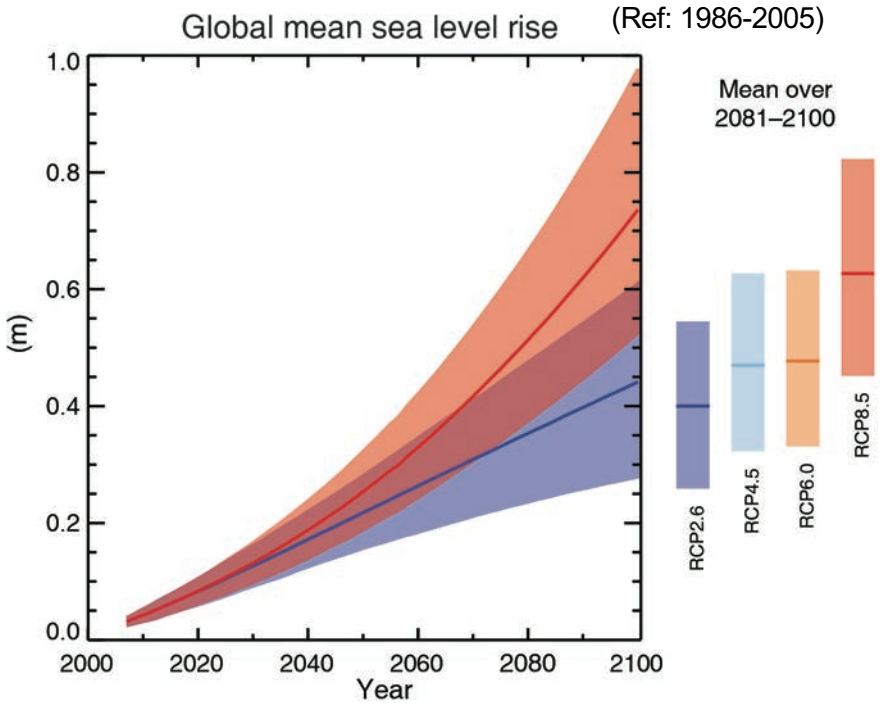
Only the lowest (RCP2.6) scenario maintains the global surface temperature increase above the pre-industrial level to less than 2° C with at least 66% probability

RCP2.6 RCP8.5



Hatching [hachures] indicates regions where the multi-model mean is small compared to natural internal variability (i.e., less than one standard deviation of natural internal variability in 20-year means).

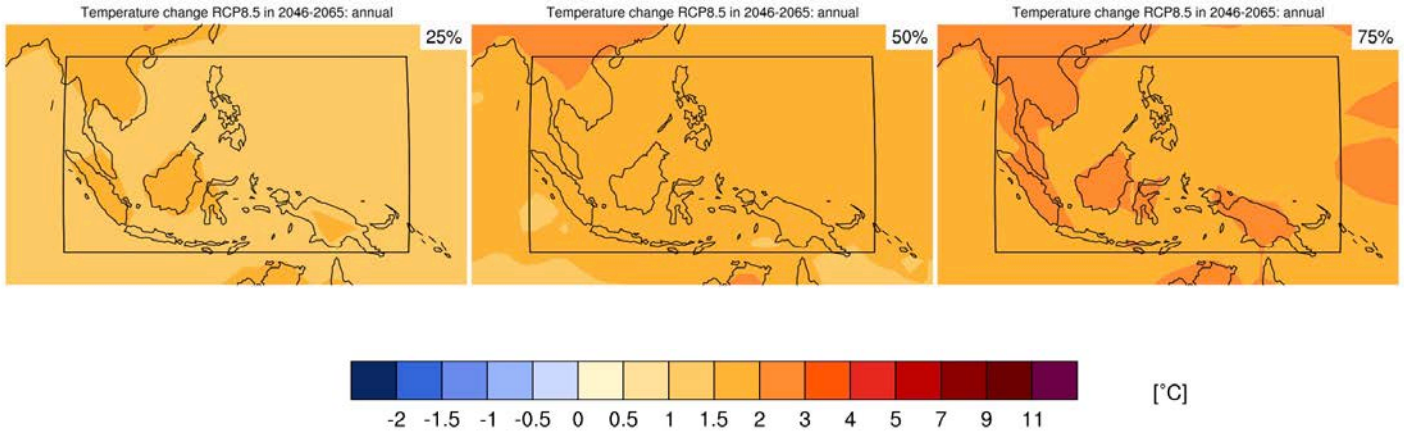
Stippling [pointillés] indicates regions where the multi-model mean is large compared to natural internal variability (i.e., greater than two standard deviations of natural internal variability in 20-year means) and where at least 90% of models agree on the sign of change



(IPCC 2013, Fig. SPM.9)

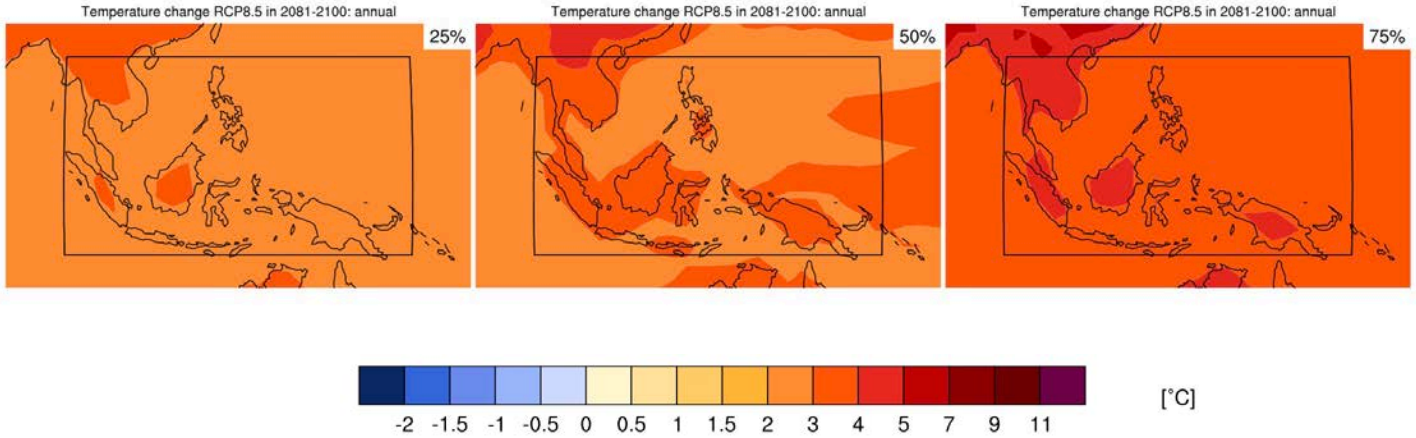
Sea level due to continue to increase

Southeast Asia: Maps of temperature changes in 2046–2065 with respect to 1986–2005 in the RCP8.5 scenario



IPCC WG1 Fifth Assessment Report (Final Draft)

Southeast Asia: Maps of temperature changes in 2081–2100 with respect to 1986–2005 in the RCP8.5 scenario



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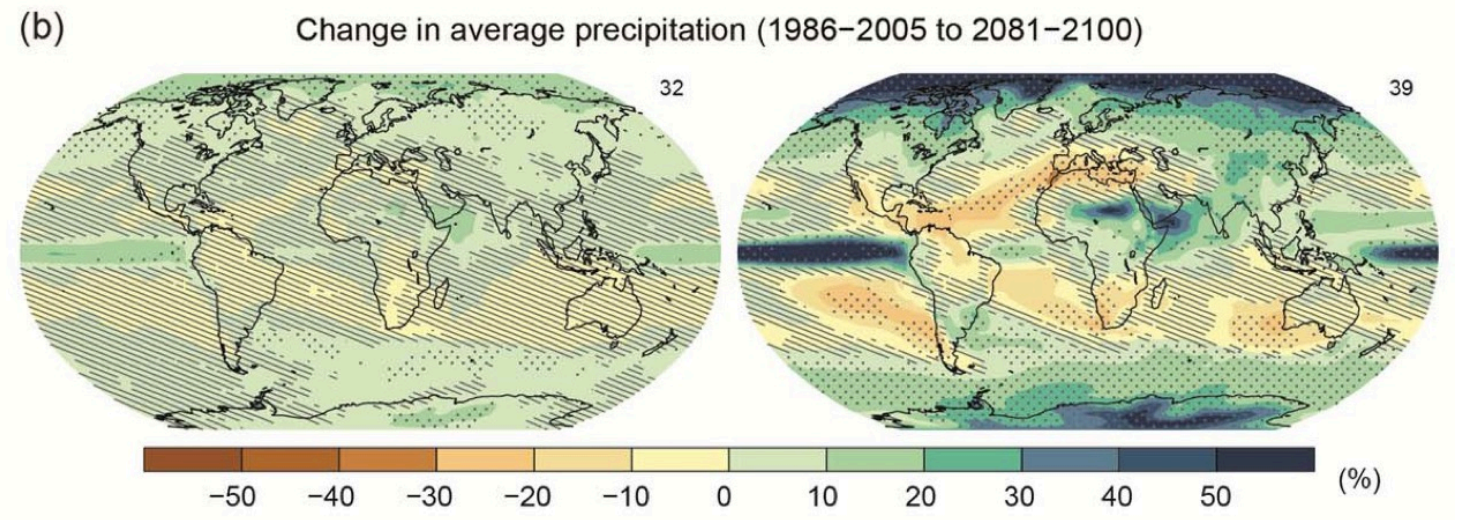
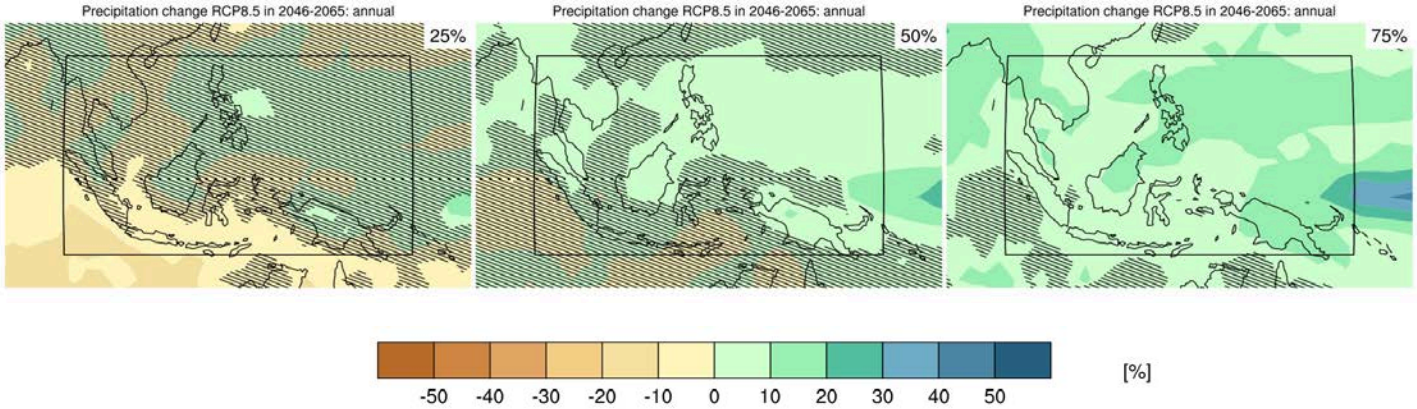
Projected Change in Precipitation



Southeast Asia: Maps of precipitation changes in 2046–2065 with respect to 1986–2005 in the RCP8.5 scenario



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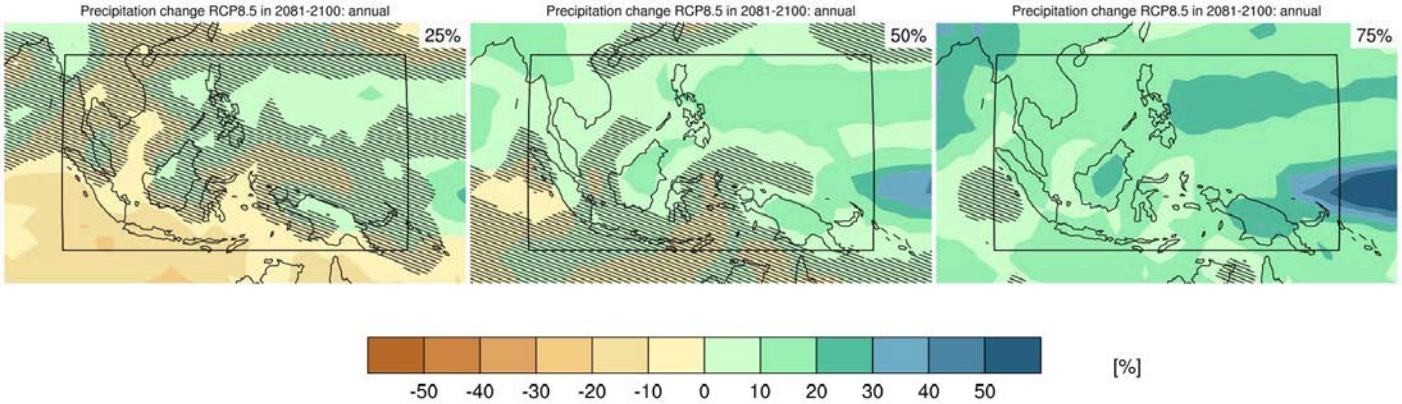


IPCC WG1 Fifth Assessment Report (Final Draft)

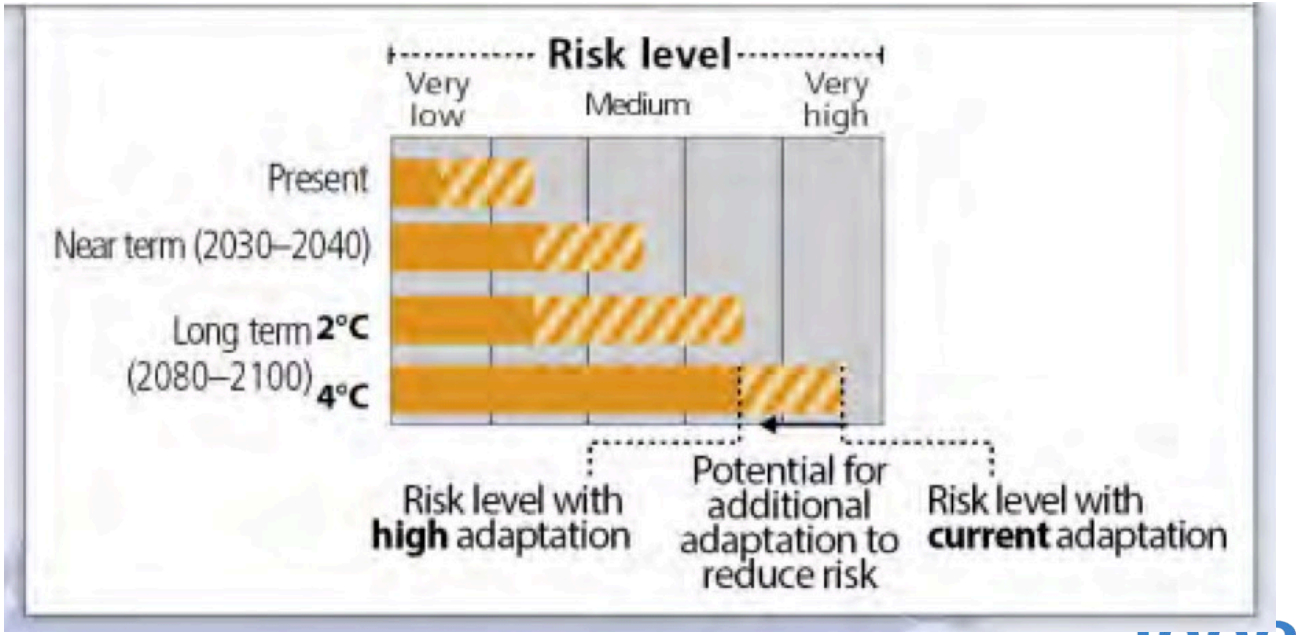
Fact: Extreme weather events are becoming more frequent or intense due to climate change, sealevel rise threatens coastal communities…

Since 1950, extreme hot days and heavy precipitation have become more common

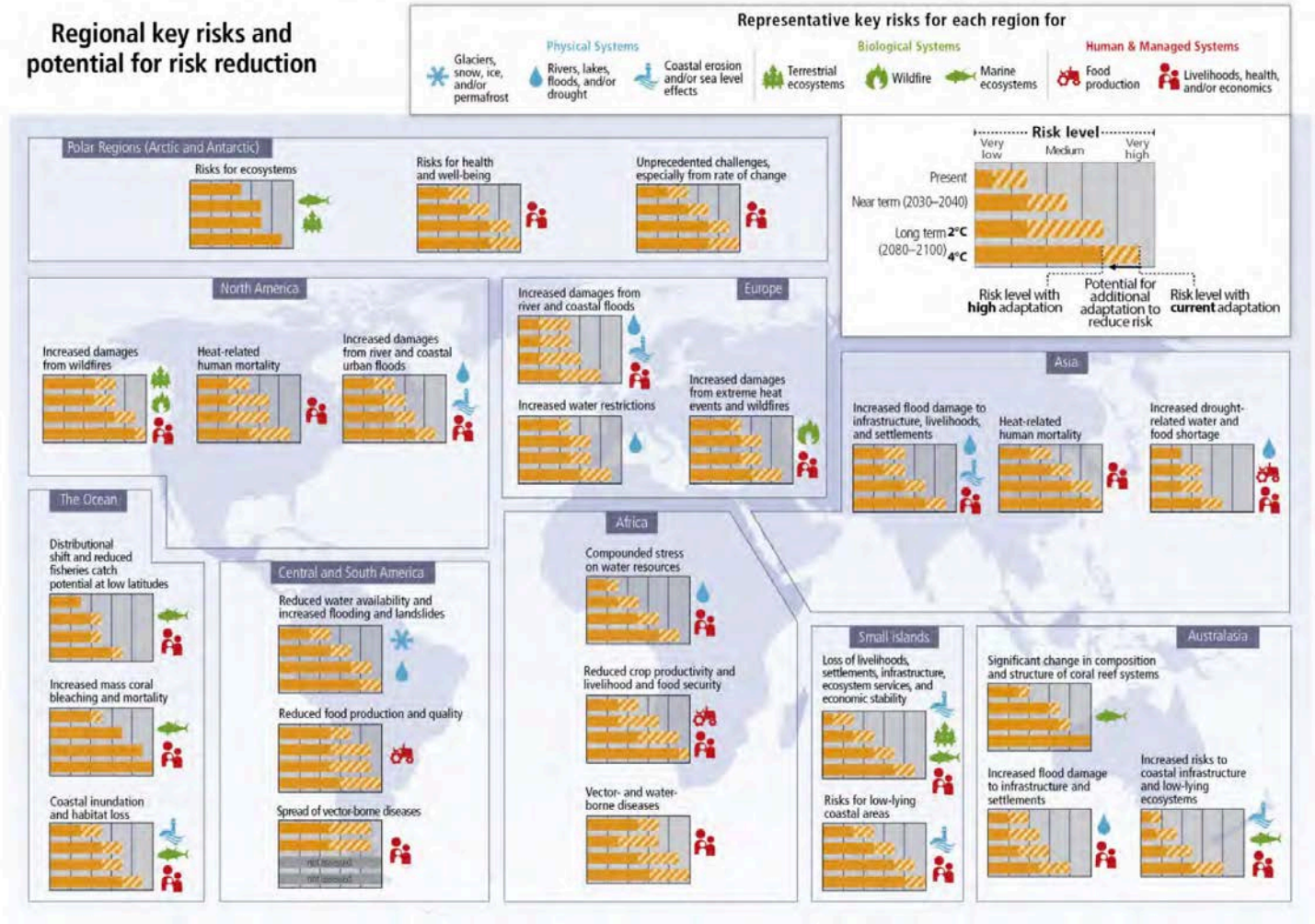
There is evidence that anthropogenic influences, including increasing atmospheric greenhouse gas concentrations, have changed these extremes


VULNERABILITY
AND EXPOSURE
IN THE ENTIRE WORLD
ipcc
INTERGOVERNMENTAL PANEL ON climate change

Regional key risks and potential for risk reduction through adaptation

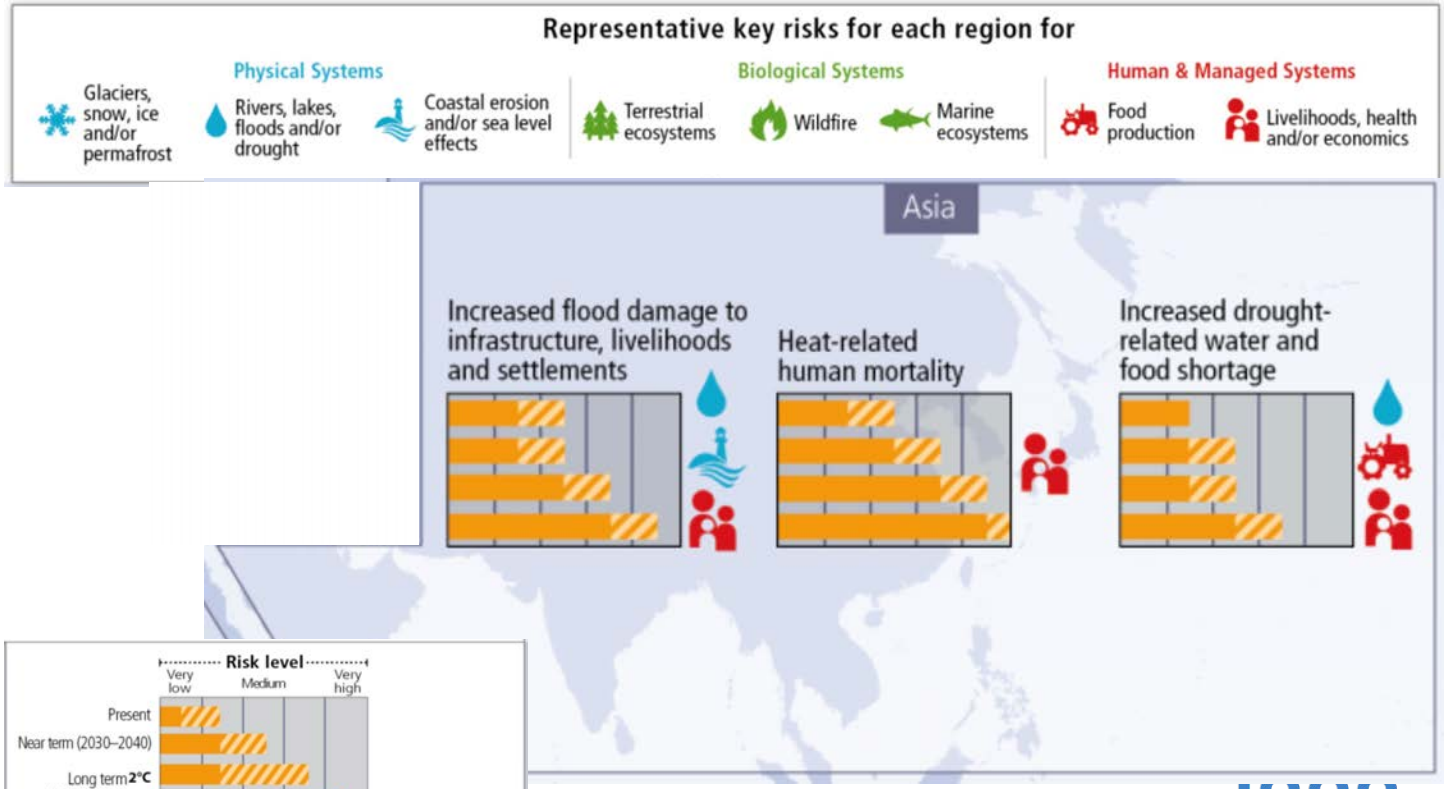


IPCC, AR5, SPM, Figure SPM.8



IPCC, AR5, SPM, Figure SPM.8

Regional key risks and potential for risk reduction: Asia (IPCC, AR5, SPM, Figure SPM.8)



INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

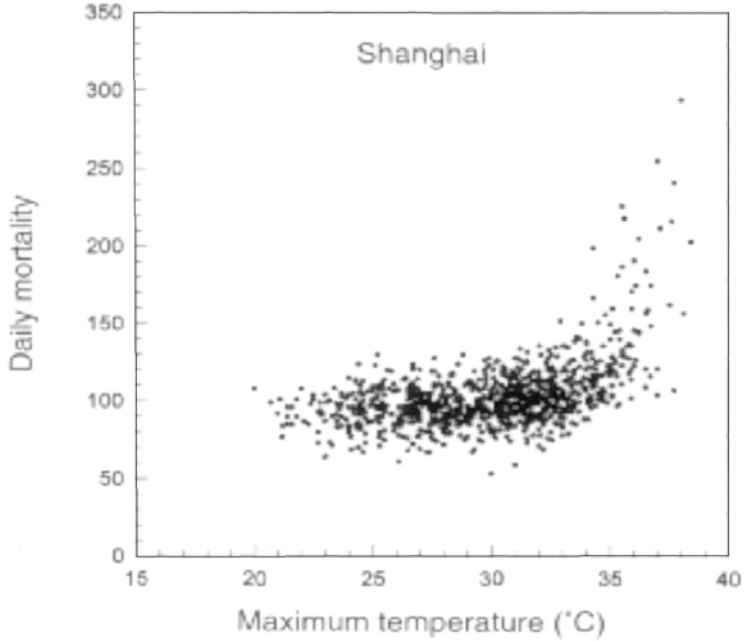
Risk = Hazard x Vulnerability x Exposure (Katrina flood victim, New Orleans, 2005)

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

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

Relationship between maximum temperature and mortality in Shanghai, China, 1980-89



Référence : ClLIMATE CHANGE AND HUMAN HEALTH, 1996

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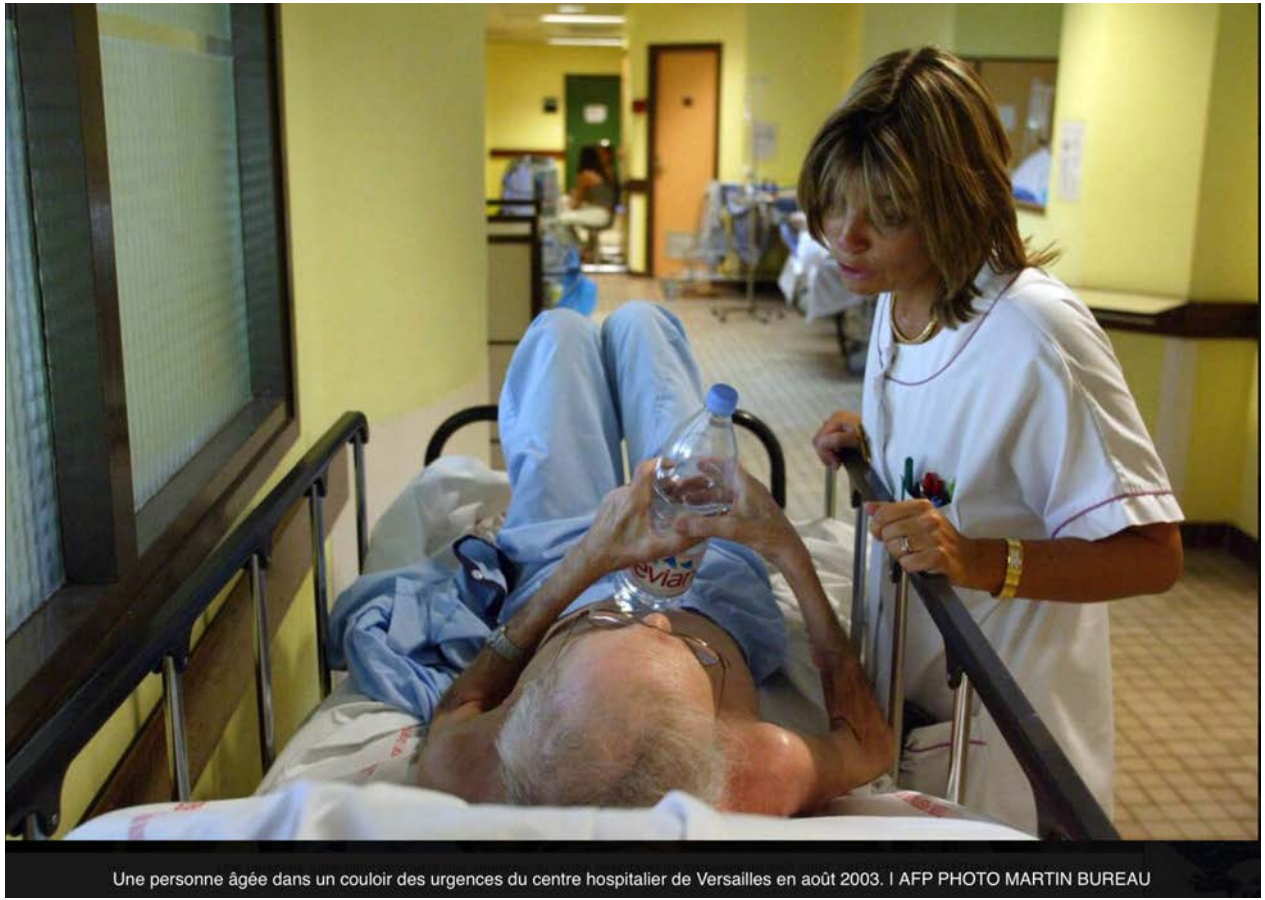
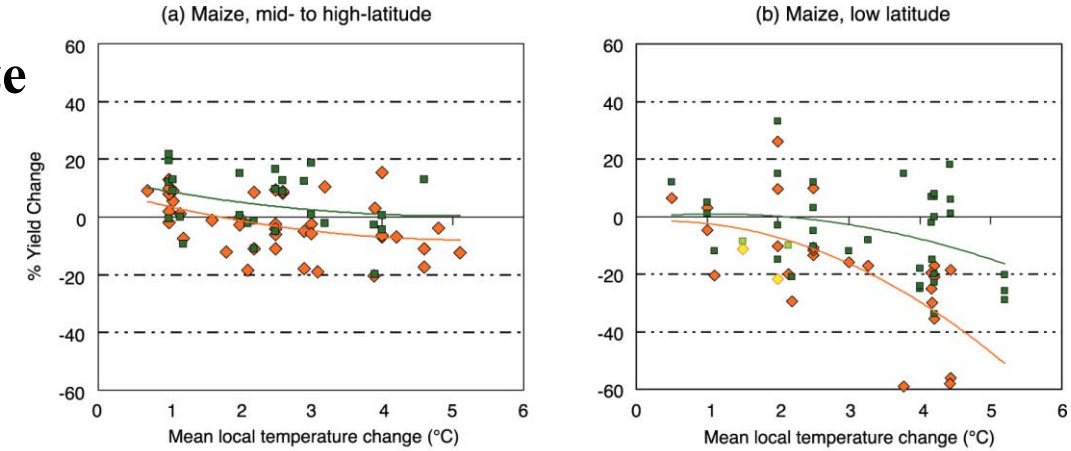
Heat waves kill



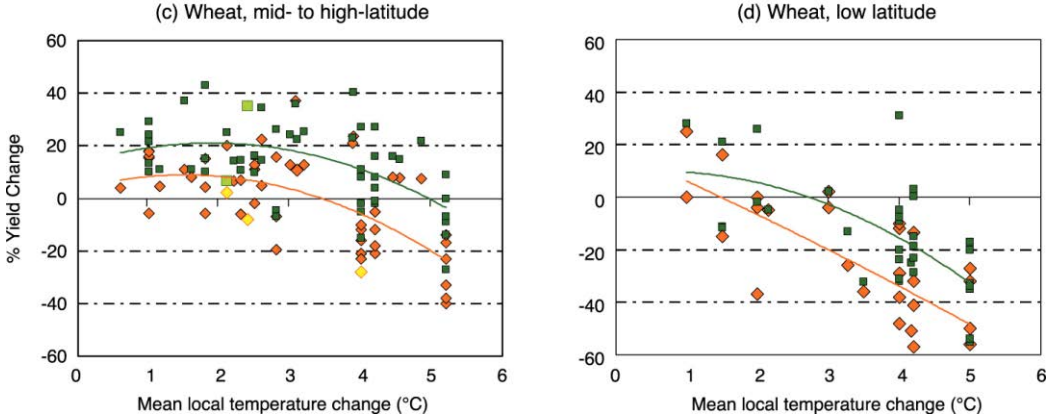
Une personne âgée dans un couloir des urgences du centre hospitalier de Versailles en août 2003. I AFP PHOTO MARTIN BUREAU

Figure TS.7. Sensitivity of cereal yield to climate change

Maize



Wheat



IPCC AR4 WGII


RISKS OF
CLIMATE CHANGE
INCREASE
WITH CONTINUED
HIGH EMISSIONS
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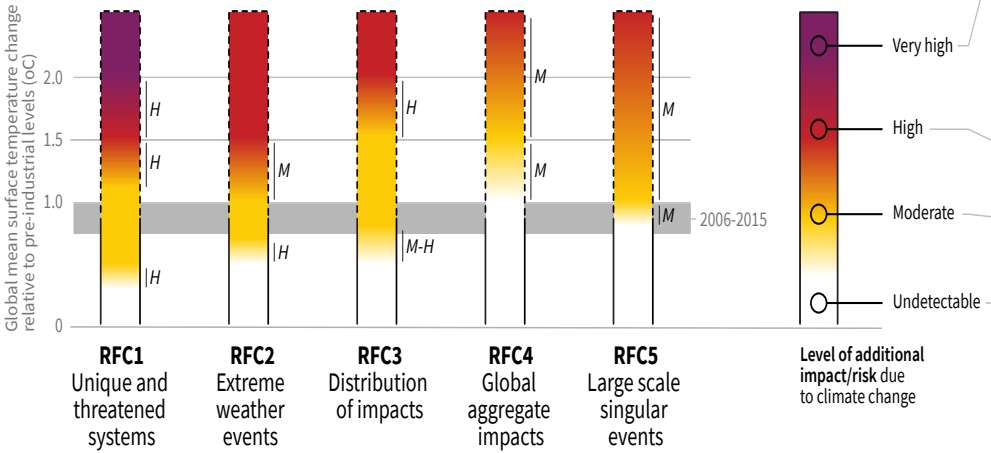
INTERGOVERNMENTAL PANEL ON climate change

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)

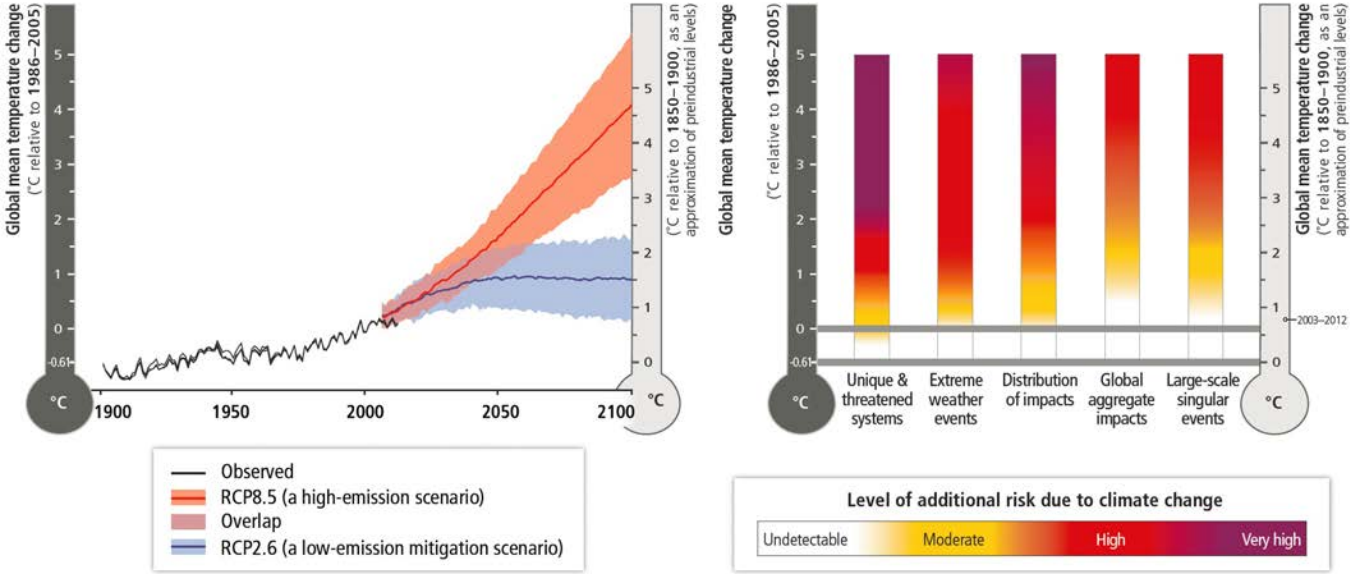


Purple indicates very high risks of severe impacts/risks and the presence of significant irreversibility or the persistence of climate-related hazards, combined with limited ability to adapt due to the nature of the hazard or impacts/risks.

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.



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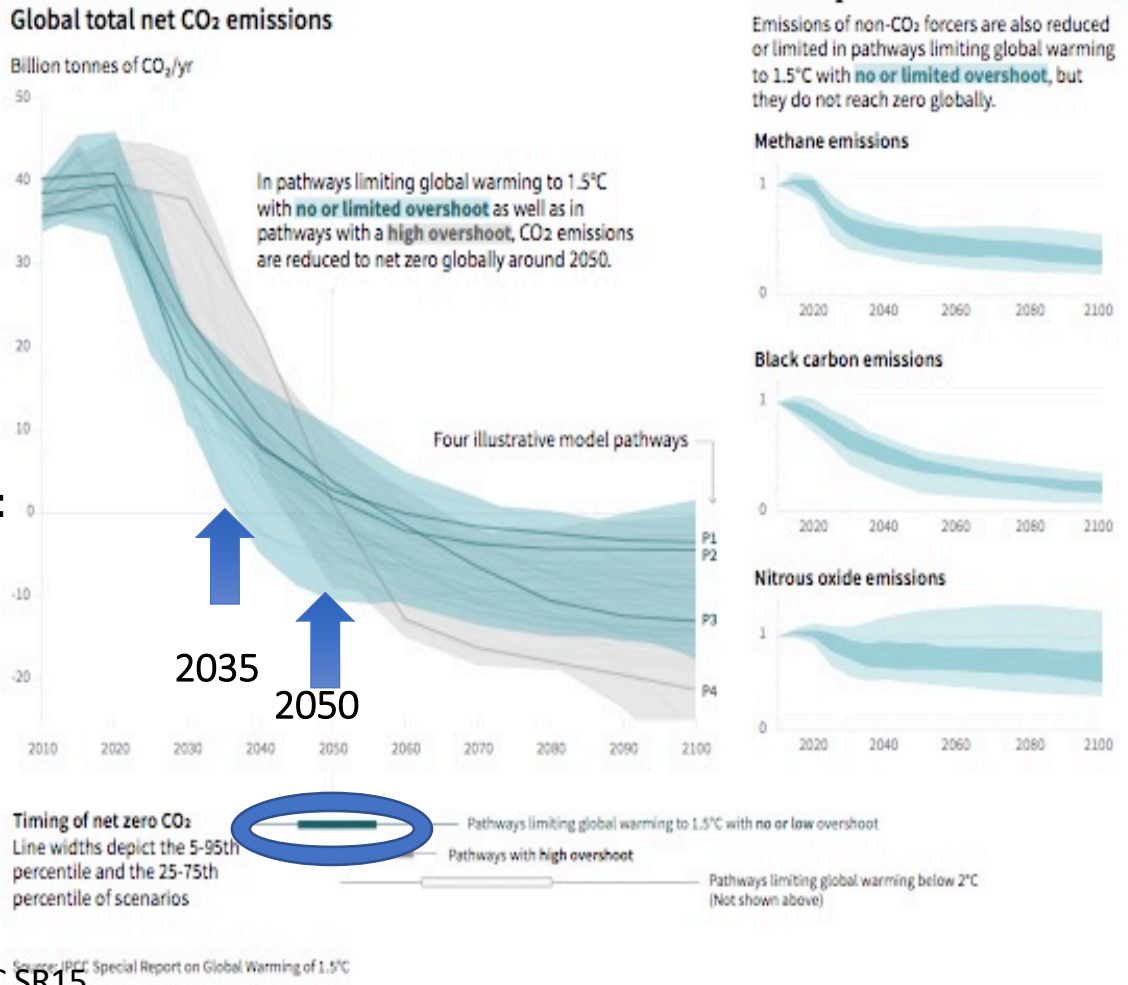
INTERGOVERNMENTAL PANEL ON climate change

Emission pathways compatible with below 1.5° C warming:

Net ZERO:



Source: IPCC SR15

Greenhouse gas emissions pathways

- Limiting warming to 1.5° C would require changes on an unprecedented scale
  - Deep emissions cuts in all sectors
  - A range of technologies
  - Behavioural changes
  - Increase investment in low carbon options

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…

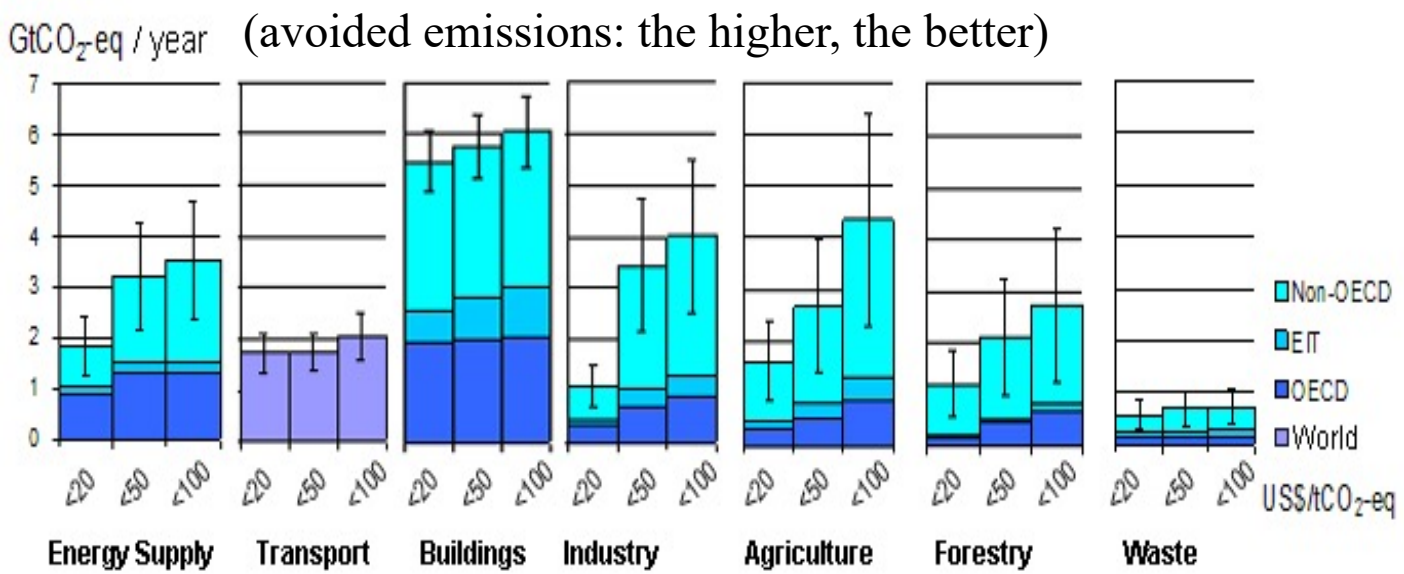
Improved carbon sinks

- **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

All sectors and regions have the potential to contribute by 2030



IPCC AR4 (2007)

Note: estimates do not include non-technical options, such as lifestyle changes.

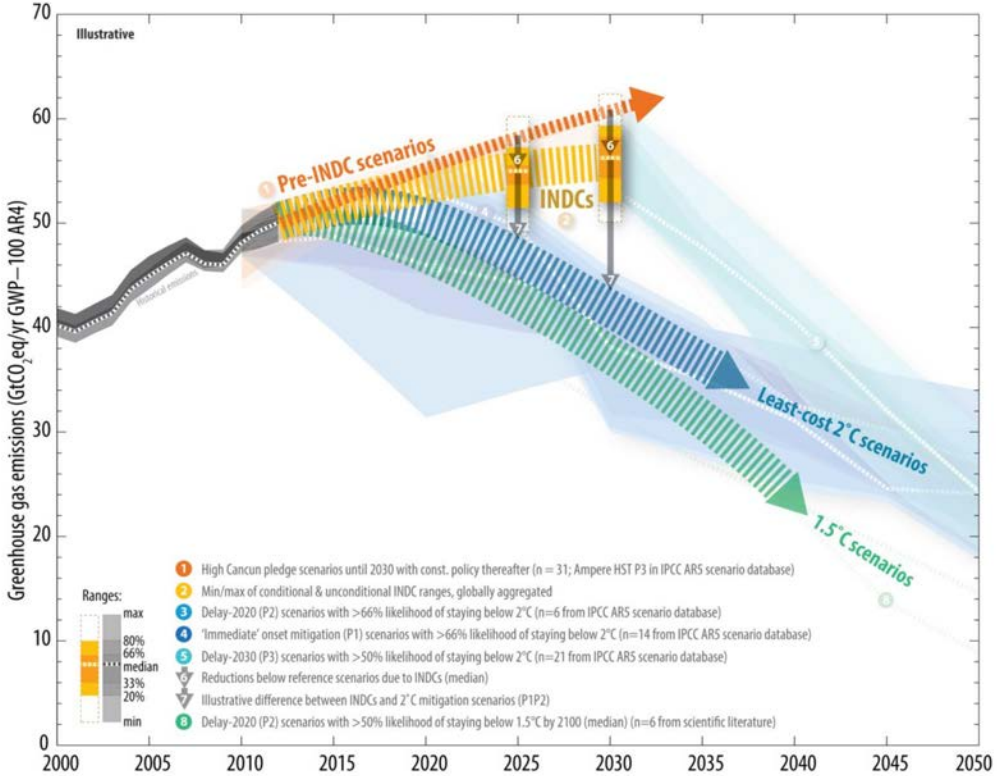
(Element) of solution: The survival of humanity and ecosystems must become a much higher political priority

… as if we were all running for our life.

@JPvanYpersele


Nations Unies
onférence sur les Changements Climatiques
COP21/CMP11
Paris, France
SECRETAIRE EXECUTIVE CCNUCC
PRESIDENT

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

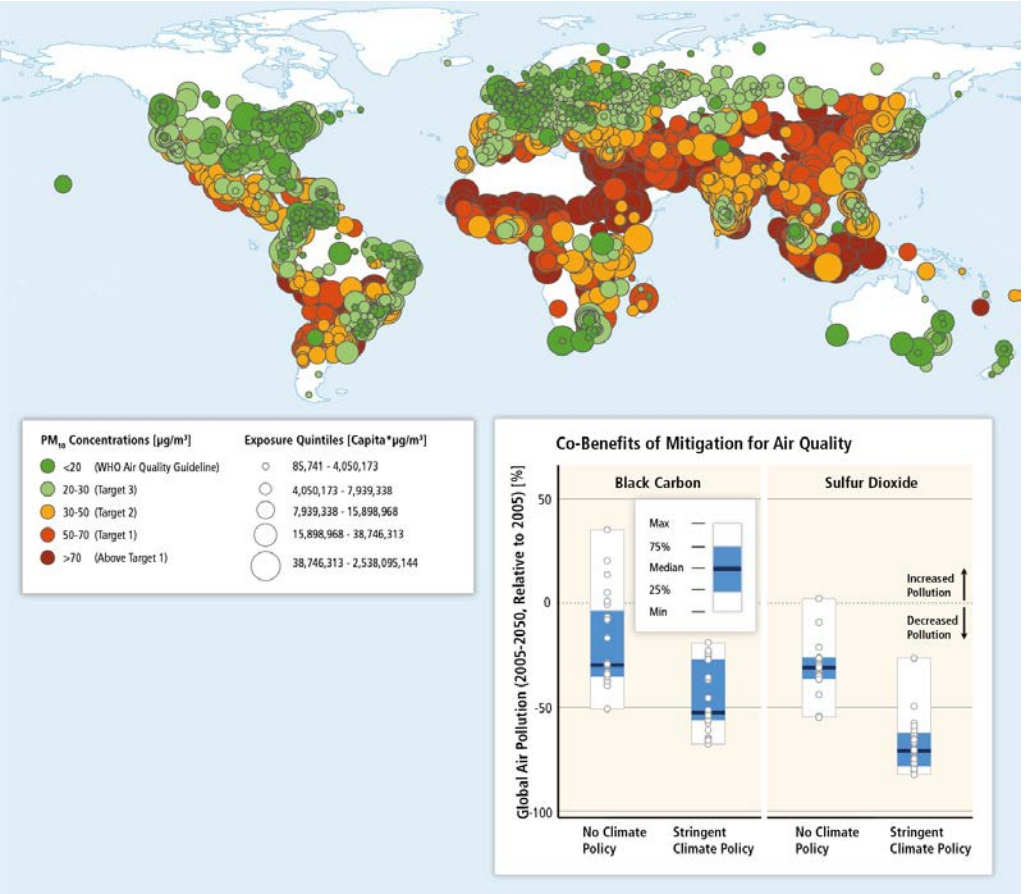


UNFCCC, Aggregate effect of the intended nationally determined contributions: an update
http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf

Solution: Economic actors must be confronted much more clearly with their responsibilities

Degrowth of climate-unfriendly activities must be accepted, while growth of activities helping climate protection and poverty eradication must be encouraged

Solution: Transition towards a clean and sustainable economy and energy system must be « just », and other synergies with the SDGs must be seeked



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

IPCC AR5

SUSTAINABLE DEVELOPMENT GOALS

Solution: Before looking at how to produce energy cleanly, much more attention must be given to reducing energy demand and efficiency, in all sectors

All production and consumption patterns must be reconsidered, helped by energy audits, etc.

- **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**

Solution: Building sector: offers many opportunities in energy saving, economic activity, improving wellbeing…

Solution: Mobility : much more space and priority to pedestrians, bicycles, and public transport; reduce priority given too long to individual transport in urban planning

Electrify remaining vehicles (with clean electricity). Fly less, only if essential.

Solution: The Sun gives us in two hours about as much energy as the world uses in *one year*, all forms of energy considered

The cost of solar kWh is crashing, wind power, heat and electricity storage, and smart grids are moving forward

@JPvanYpersele

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)

Trying to be coherent...

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**
- **Opportunities to integrate research results in a useful, policy-relevant way, accross disciplines (including social sciences)**

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Joel Pett, USA Today

RCP2.6 RCP8.5

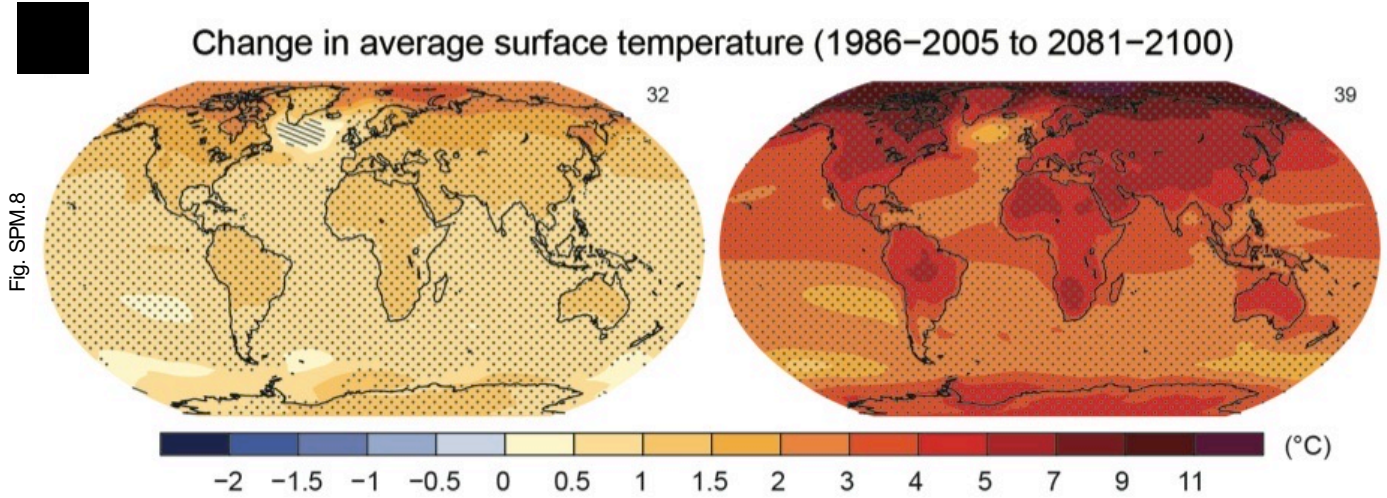

Fig. SPM.8

Humanity has the choice

Conclusions

The inhabitability of the Earth is at stake due to climate change

Adaptation is key, and resources need to be much better shared and managed, but adaptation will not be sufficient at all

Stabilizing the temperature as close as possible to no more than 1.5°C above the pre-industrial is essential, and requires to move away quickly from fossil fuels, and to stop deforestation

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

Addressing this challenge opens so many opportunities, including opportunities to address in a synergistic manner other societal goals, such as the 17 Sustainable Development Goals.

Useful links:

- www.ipcc.ch : IPCC (reports and videos)
- www.unfccc.int : Climate Convention
- 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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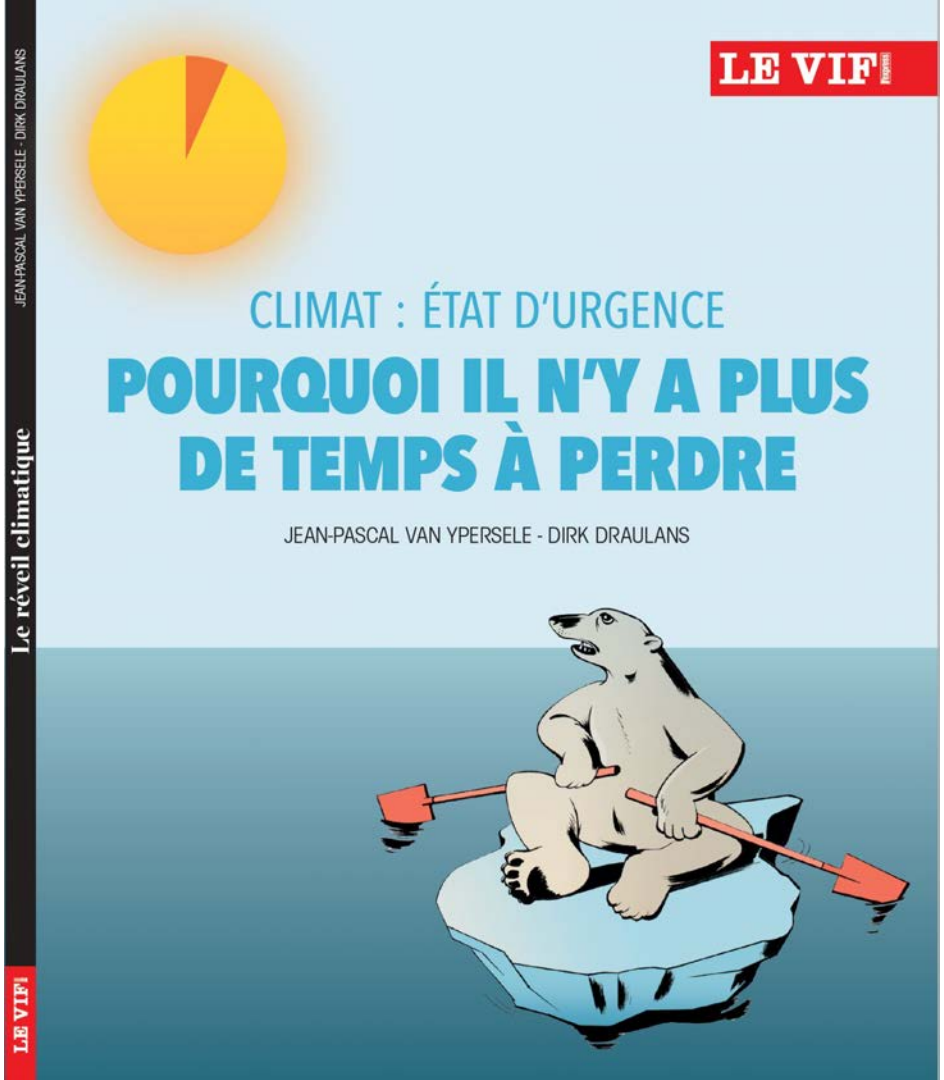
Ecrit pour les jeunes (et moins jeunes), avec des liens vers des ressources utiles

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

Gratuit sur
www.levif.be/reveil-climatique



Gratis op
www.knack.be/klimaatalarm

DAT POLITICI OVER TWINTIG JAAR NIET KOMEN JANKEN DAT ZE HET NIET WISTEN.

DIRK DRAULANS (1956) is bioloog, doctor in de wetenschappen en was gastonderzoeker aan de University of Oxford. Sinds 1987 is hij journalist bij Knack.

JEAN-PASCAL VAN YPERSELE (1957) is fysicus en klimatoloog. Hij is hoogleraar klimatologie en milieuwetenschappen aan de UCLouvain en was ondervoorzitter van het Intergovernmental Panel on Climate Change (IPCC).

BIJLAGE BIJ KNACK VAN 16 SEPTEMBER 2020. MAG NIET LOS VERKOCHT WORDEN.

HET KLIMAATALARM

HET KLIMAAT ALARM

Dirk Draulans en
Jean-Pascal van Ypersele

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