

# **Changements climatiques et santé après l'Accord de Paris**

**Jean-Pascal van Ypersele (UCL)**

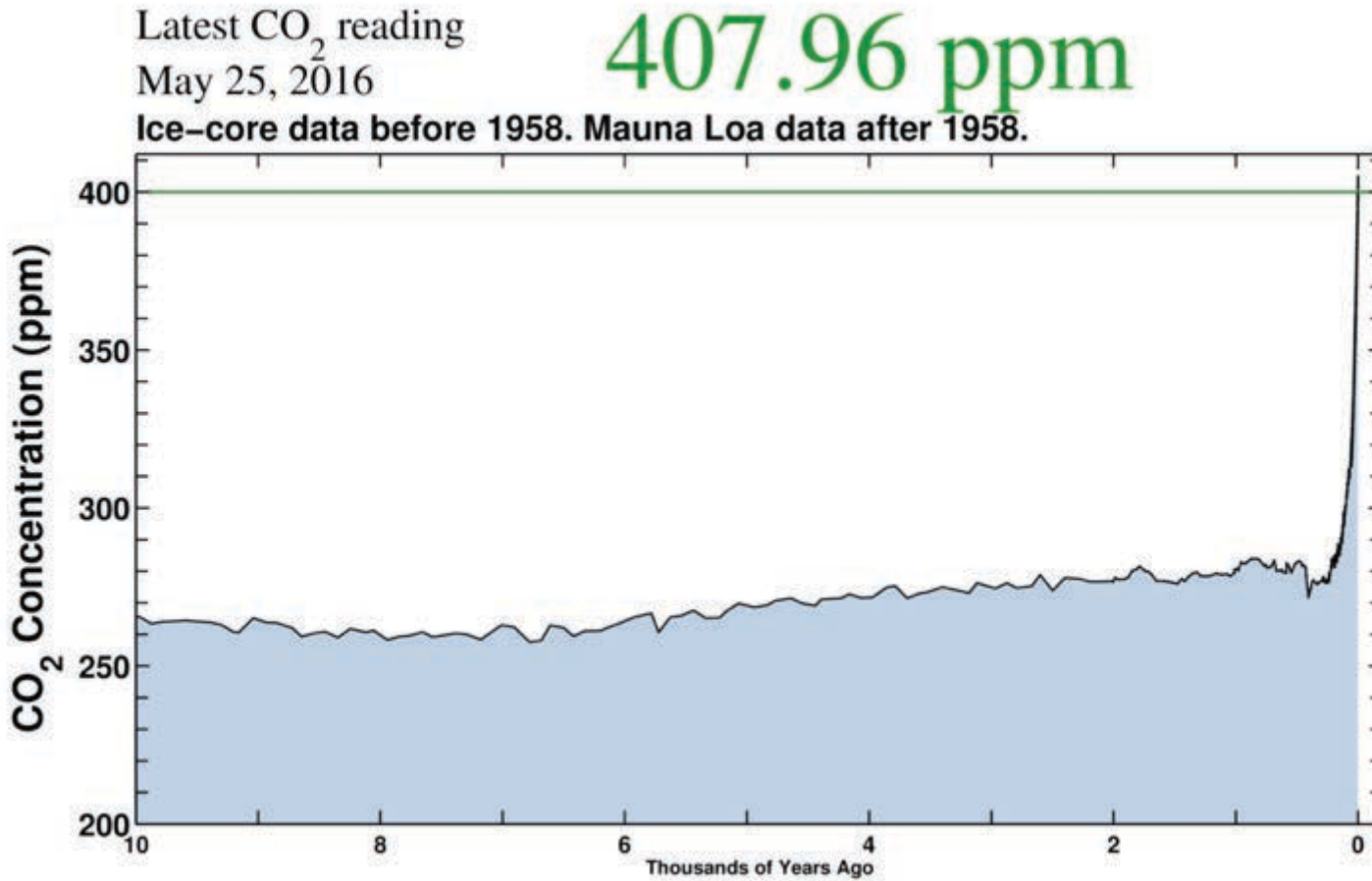
**Vice-président du GIEC de 2008 à 2015**

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**ULB, Ecole de santé publique, Bruxelles,  
25-11-2016**

**Merci au Gouvernement wallon et à mon équipe à l'Université catholique de Louvain pour leur soutien, et au « American College of Physicians » pour certaines diapos sur la santé et le climat**

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



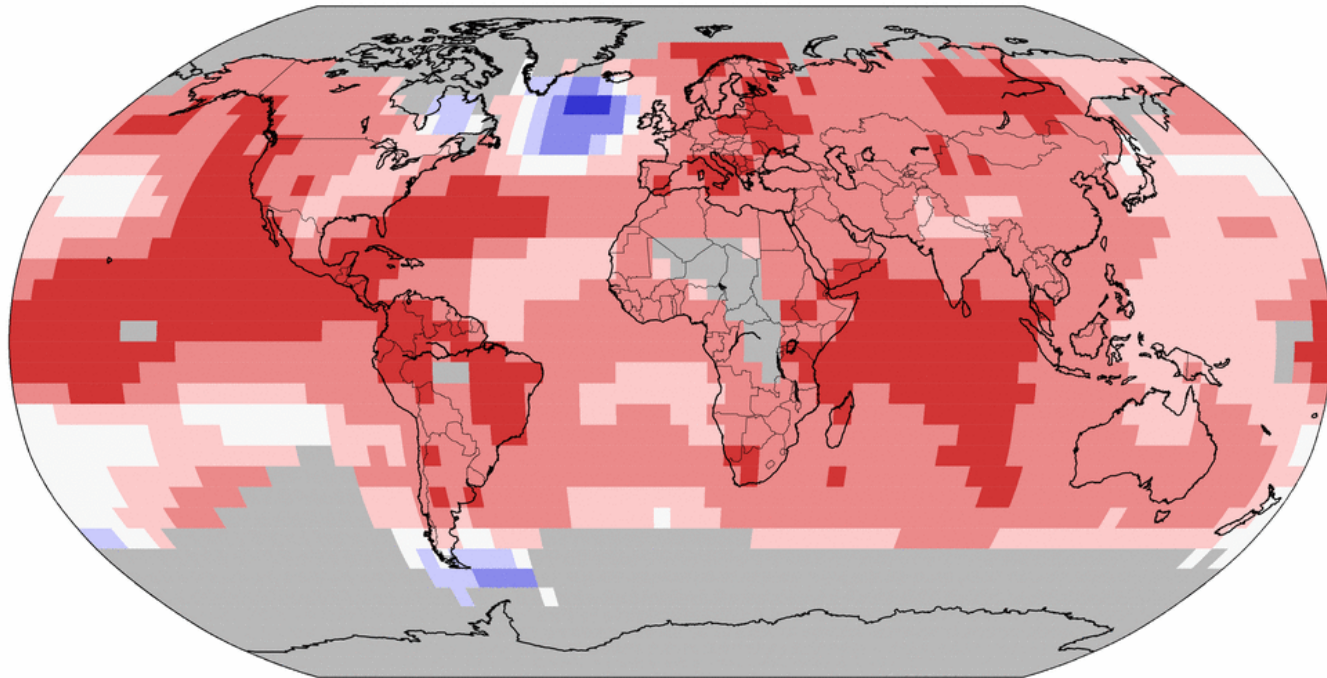
Source: [scripps.ucsd.edu/programs/keelingcurve/](http://scripps.ucsd.edu/programs/keelingcurve/)

# 2015= année la plus chaude depuis 1880

## Land & Ocean Temperature Percentiles Jan–Dec 2015

NOAA's National Centers for Environmental Information

Data Source: GHCN–M version 3.3.0 & ERSST version 4.0.0



  
Record  
Coldest

  
Much  
Cooler than  
Average

  
Cooler than  
Average

  
Near  
Average

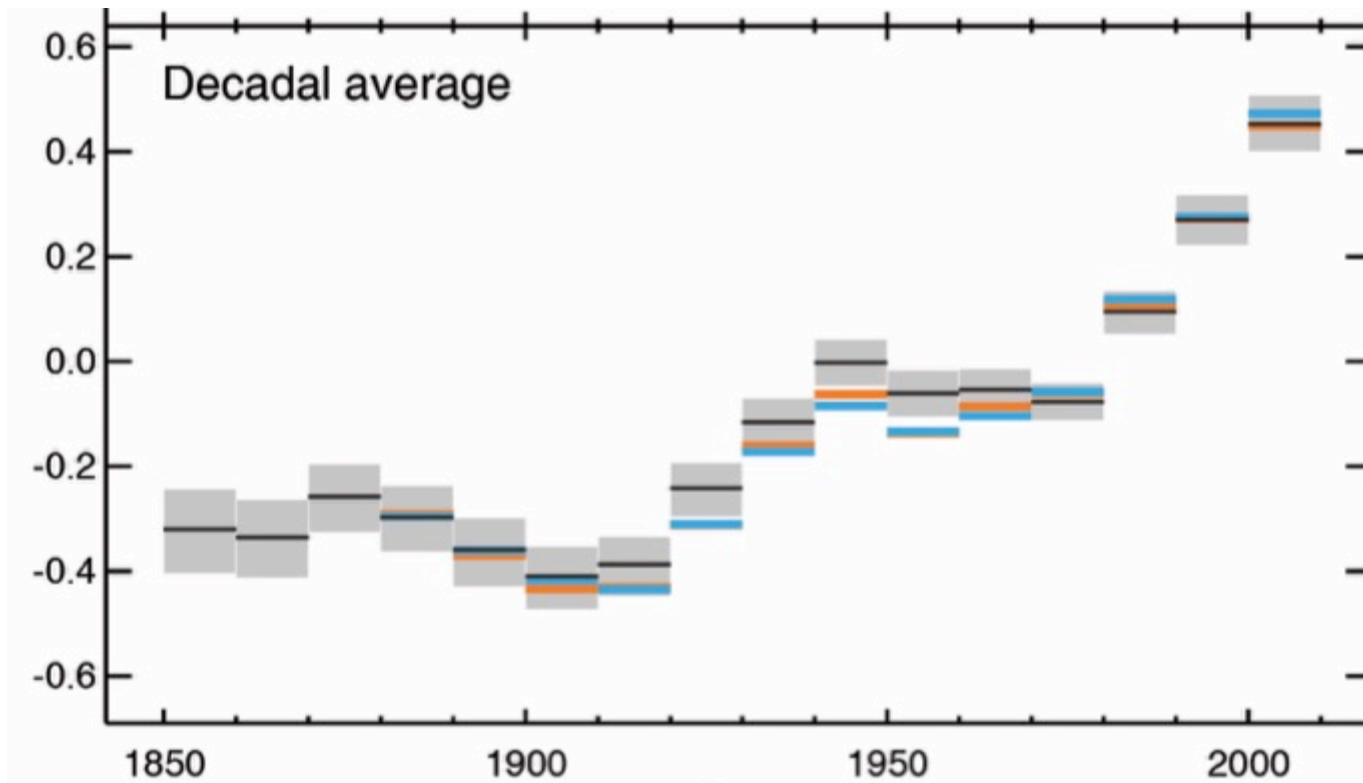
  
Warmer than  
Average

  
Much  
Warmer than  
Average

  
Record  
Warmest



Wed Jan 13 12:15:02 EST 2016



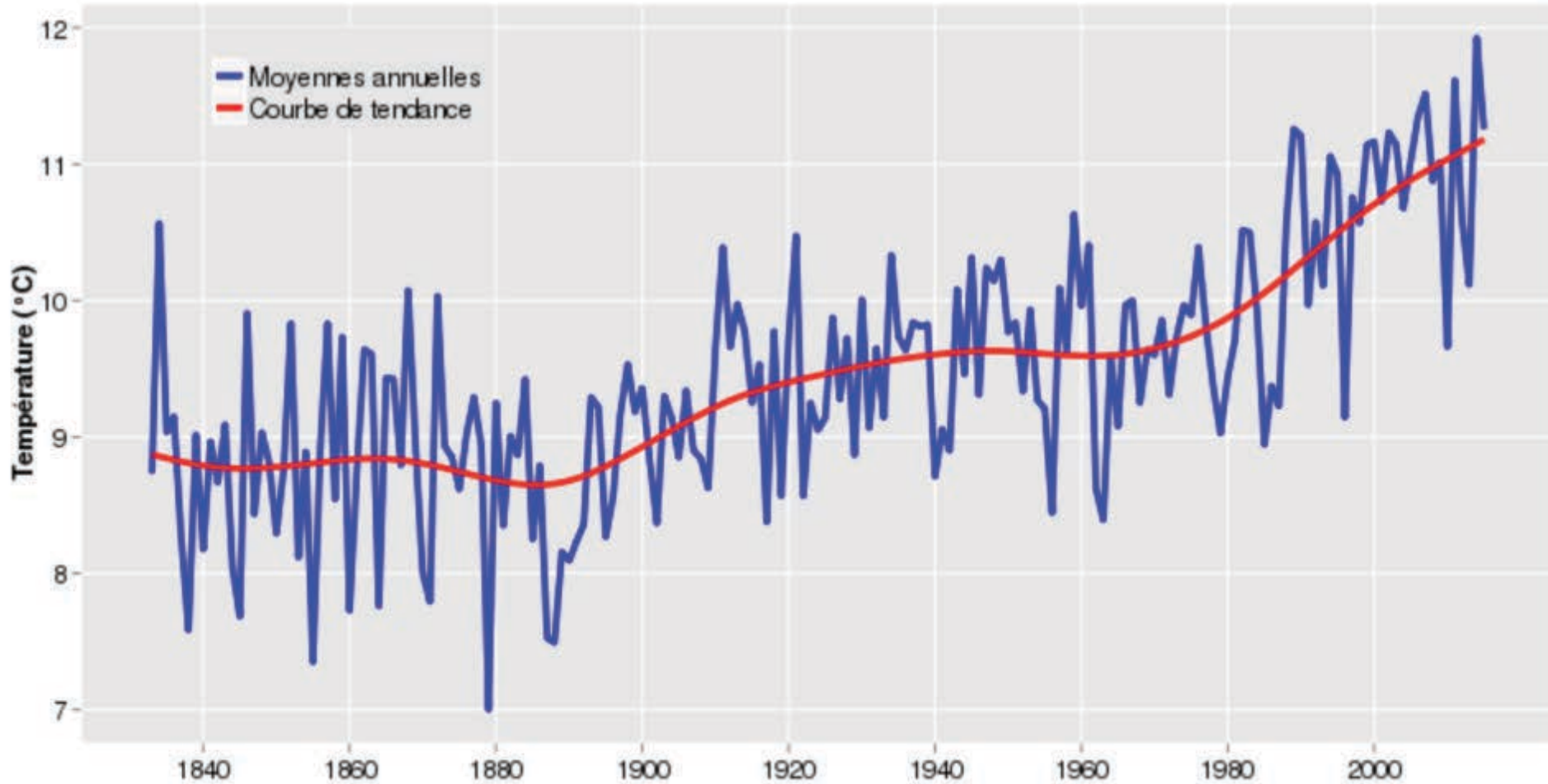
(IPCC 2013, Fig. SPM.1a)

**Each of the last three decades has been successively warmer at the Earth's surface than any preceding decade since 1850.**

**In the Northern Hemisphere, 1983–2012 was *likely* the warmest 30-year period of the last 1400 years (*medium confidence*).**

# Uccle n'est pas en reste:

Evolution de la température moyenne annuelle à Bruxelles - Uccle de 1833 à 2015



# Les récifs coralliens meurent

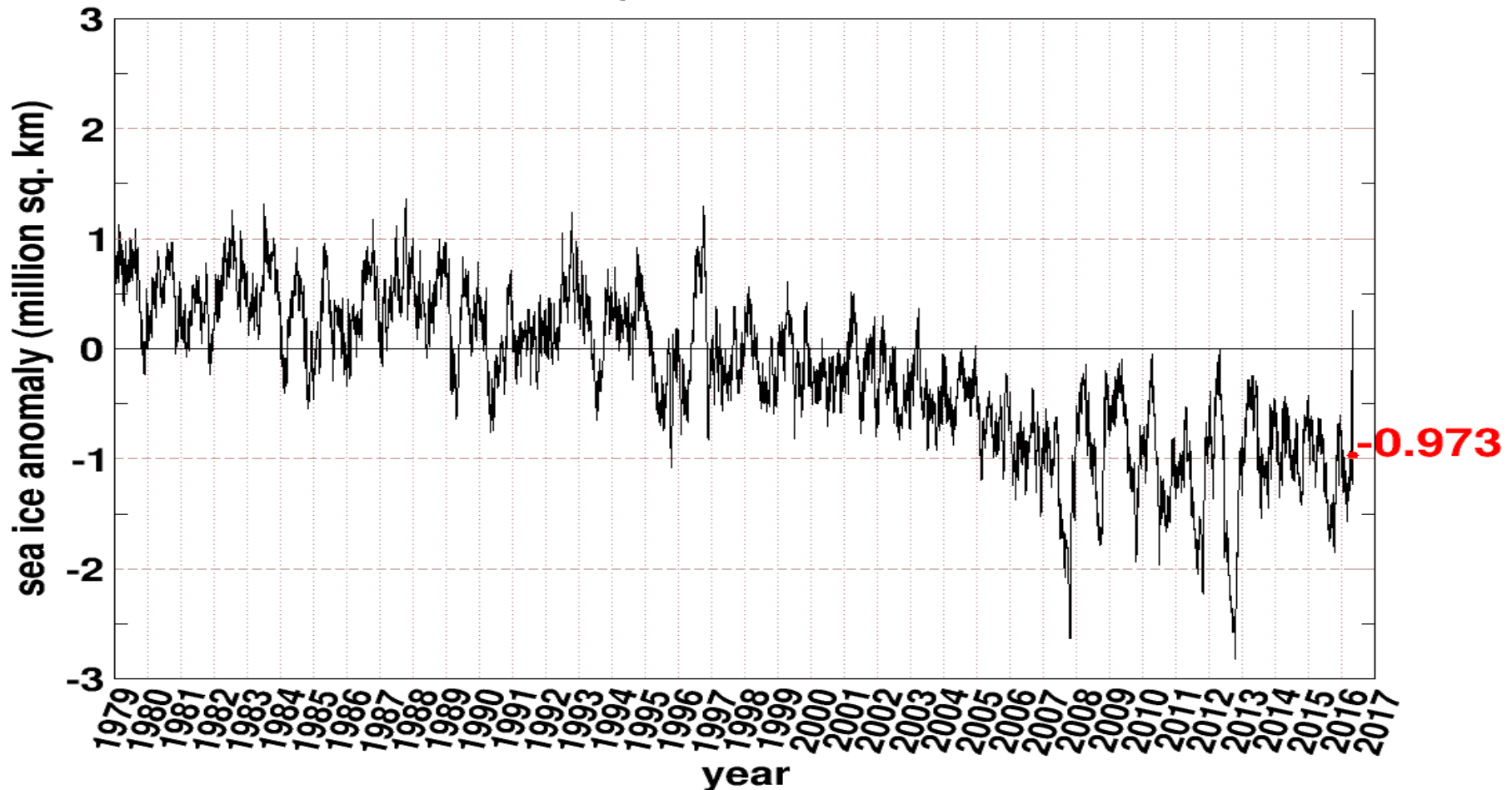


American Samoa (from [www.globalcoralbleaching.org](http://www.globalcoralbleaching.org))

# Surface de la glace de mer arctique (écart par rapport à la moyenne)

## Northern Hemisphere Sea Ice Anomaly

Anomaly from 1979-2008 mean



# Qori Kalis Glacier (Pérou): juillet 1978



Source: Dr. Lonnie Thompson (OSU),  
via <http://climate.nasa.gov/images-of-change#543-melting-qori-kalis-glacier-peru>



# Qori Kalis Glacier (Pérou): juillet 2011

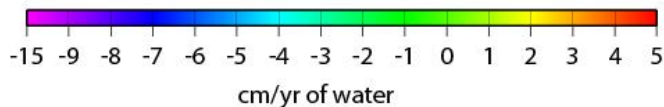
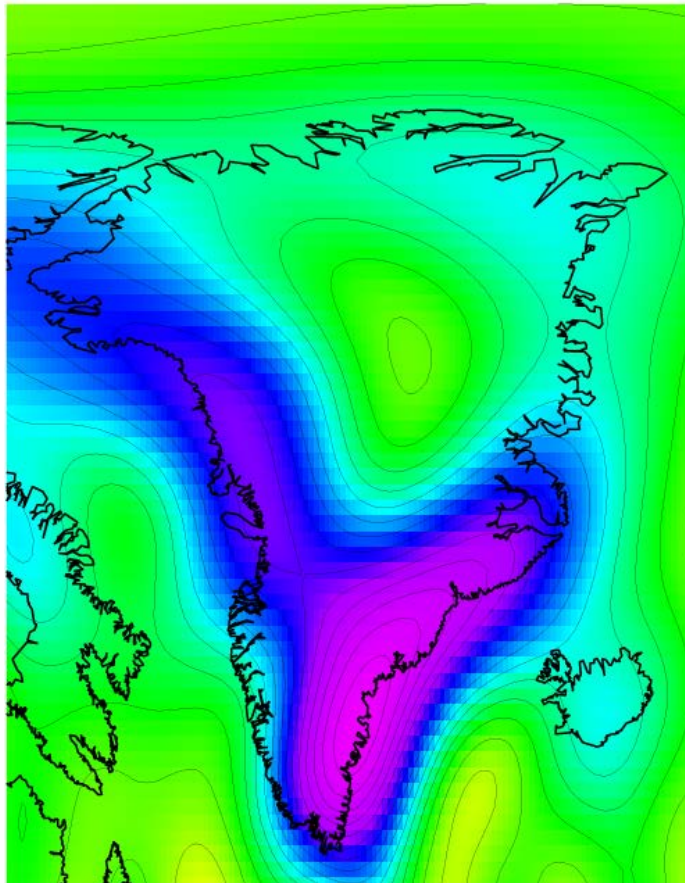


Source: Dr. Lonnie Thompson (OSU),  
via <http://climate.nasa.gov/images-of-change#543-melting-qori-kalis-glacier-peru>

# Greenland Ice Mass Loss 2002-2009

## Derived From NASA GRACE Gravity Mission

### Greenland

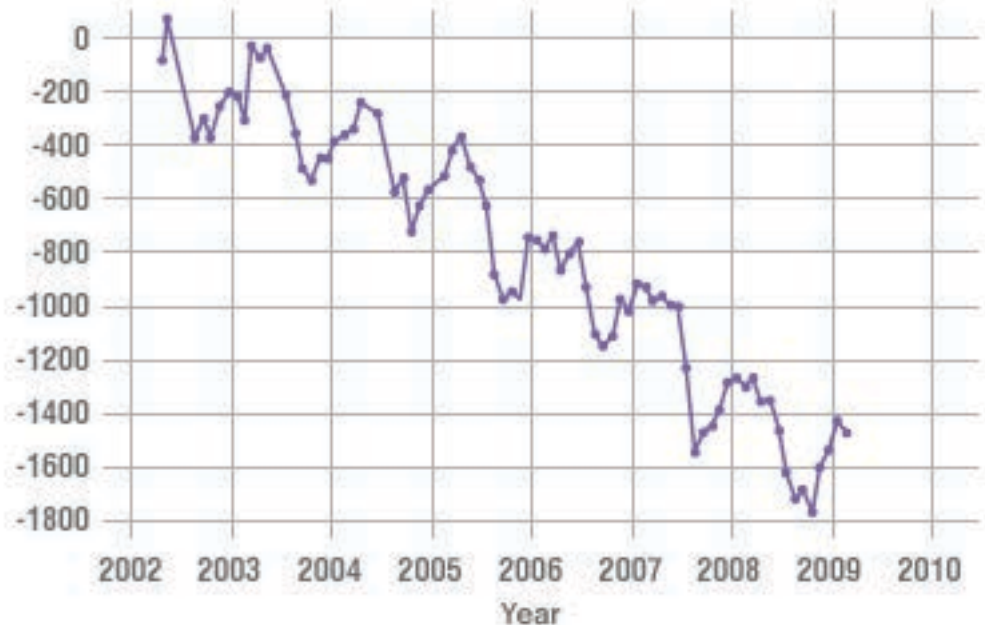


J. Wahr, U. Colorado

### GREENLAND MASS VARIATION SINCE 2002

Data source: Ice mass measurement by NASA's Grace satellites.

Change in Ice Mass Loss Gigatons



Velicogna, Geophysical Research Letters, 2009

•Contributes to sea level rise

# Scale Of Flooding Across Europe



# Six weeks worth of rain has fallen in three days over parts of France



# The Louvre and Musee d'Orsay in Paris evacuated their vaults



# In Germany, many residents weren't prepared for the mass flooding as the rain pelted down



# Pourquoi le GIEC (Groupe d'experts

Intergouvernemental sur l'Evolution du Climat) ?

Etabli par l'OMM et le PNUE en 1988

Mandat: fournir aux décideurs une **source objective d'information** à propos:

- des causes des changements climatiques
- des scénarios possibles d'évolution
- des conséquences observées ou futures pour l'environnement et les activités humaines
- les options de réponse possibles (adaptation & atténuation = réduction des émissions).

OMM = Organisation Météorologique Mondiale  
PNUE = Programme des Nations Unies pour l'Environnement

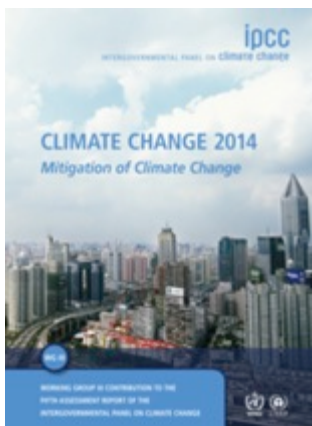




**Que se passe-t-il dans le système climatique ?**



**Quels sont les risques ?**



**Que peut-on faire ?**

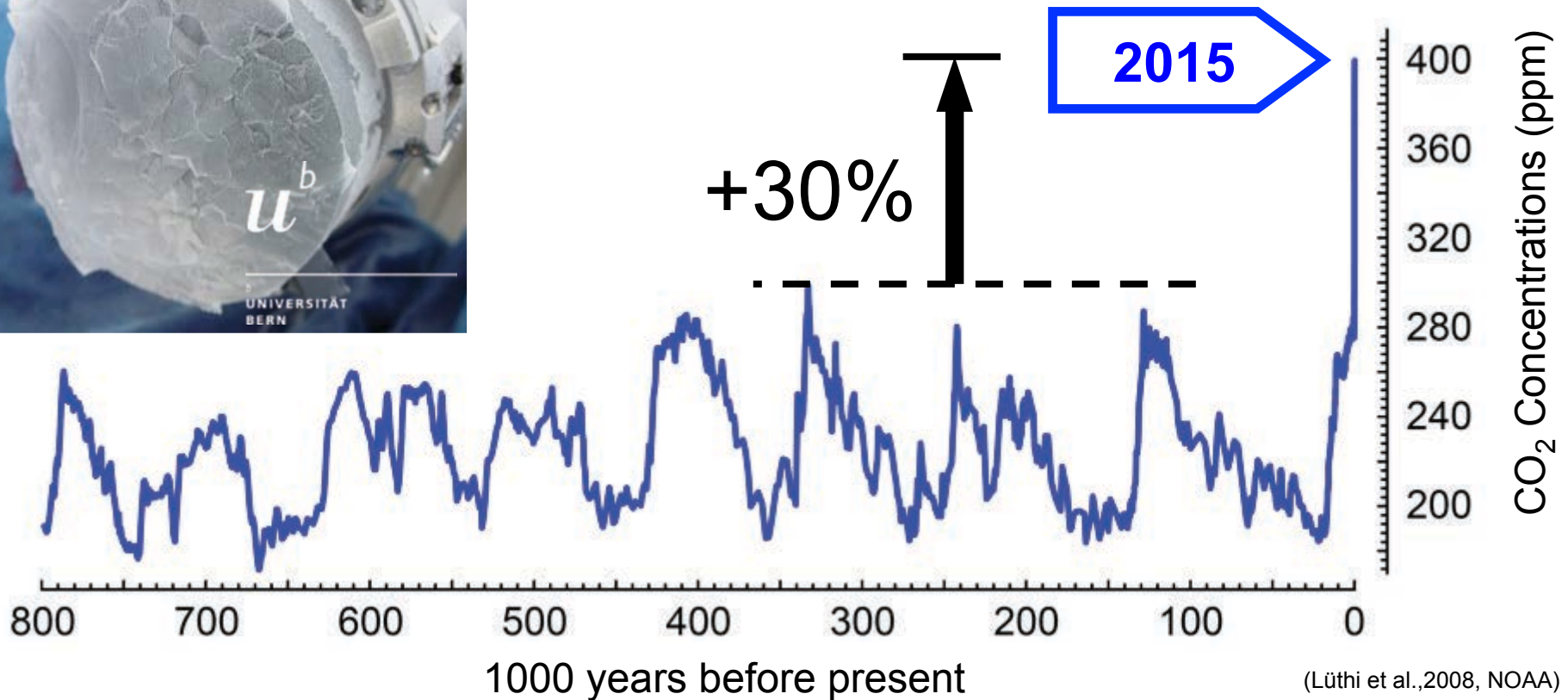


# Messages clés

- **L'influence humaine sur le système climatique est claire**
- **La poursuite des émissions de gaz à effet de serre augmentera le risque d'impacts graves, répandus et irréversibles pour les populations et les écosystèmes**
- **Alors que les changements climatiques représentent une menace pour le développement durable, il existe de nombreuses opportunités pour intégrer l'atténuation, l'adaptation, et la poursuite d'autres objectifs sociétaux**
- **L'Humanité a les moyens de limiter les changements climatiques et de construire un avenir plus durable et plus résilient**

AR5 WGI SPM, AR5 WGII SPM, AR5 WGIII SPM

# Atmospheric concentrations of CO<sub>2</sub>



**The concentrations of CO<sub>2</sub> have increased to levels unprecedented in at least the last 800,000 years.**

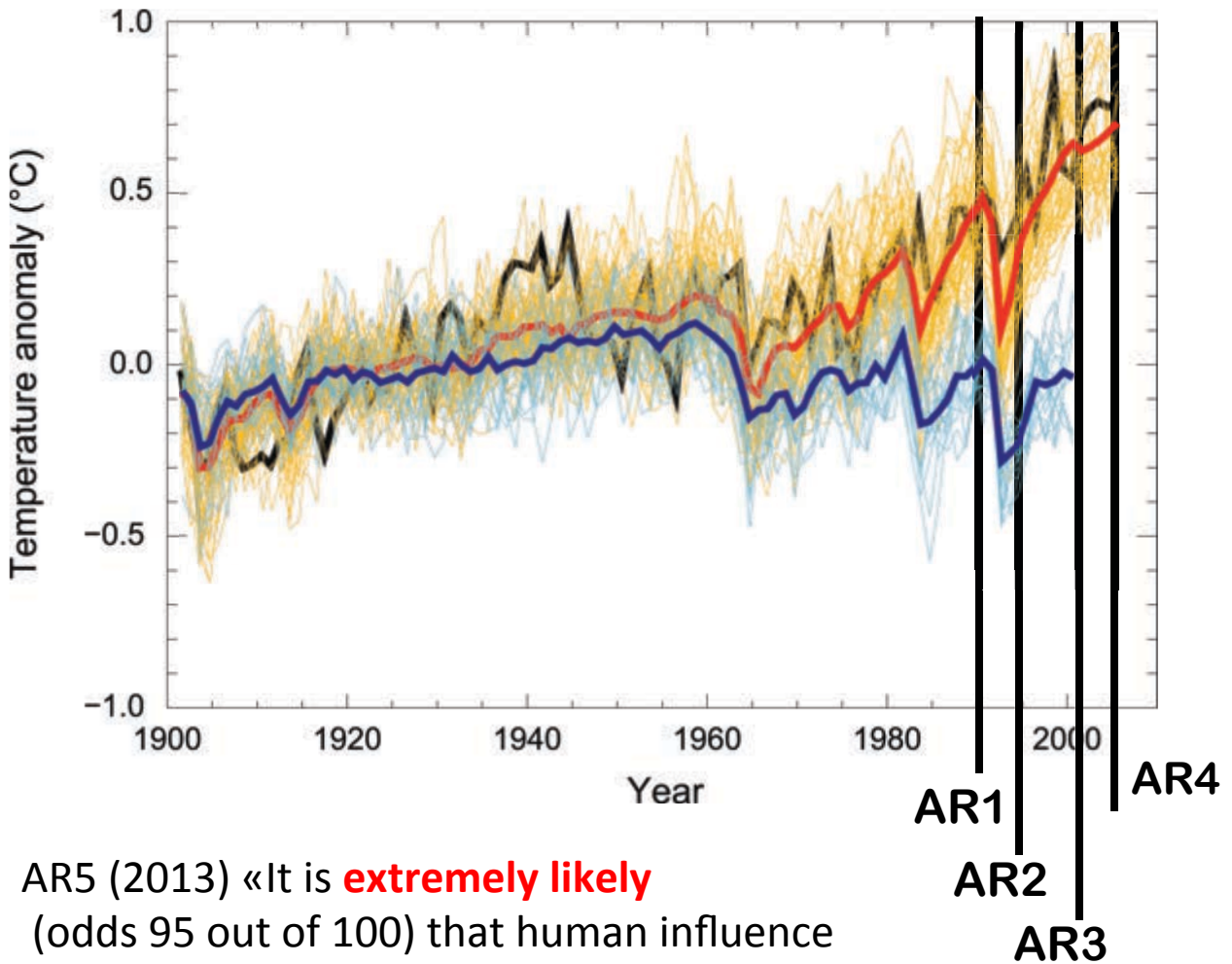
# A Progression of Understanding: Greater and Greater Certainty in Attribution

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

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

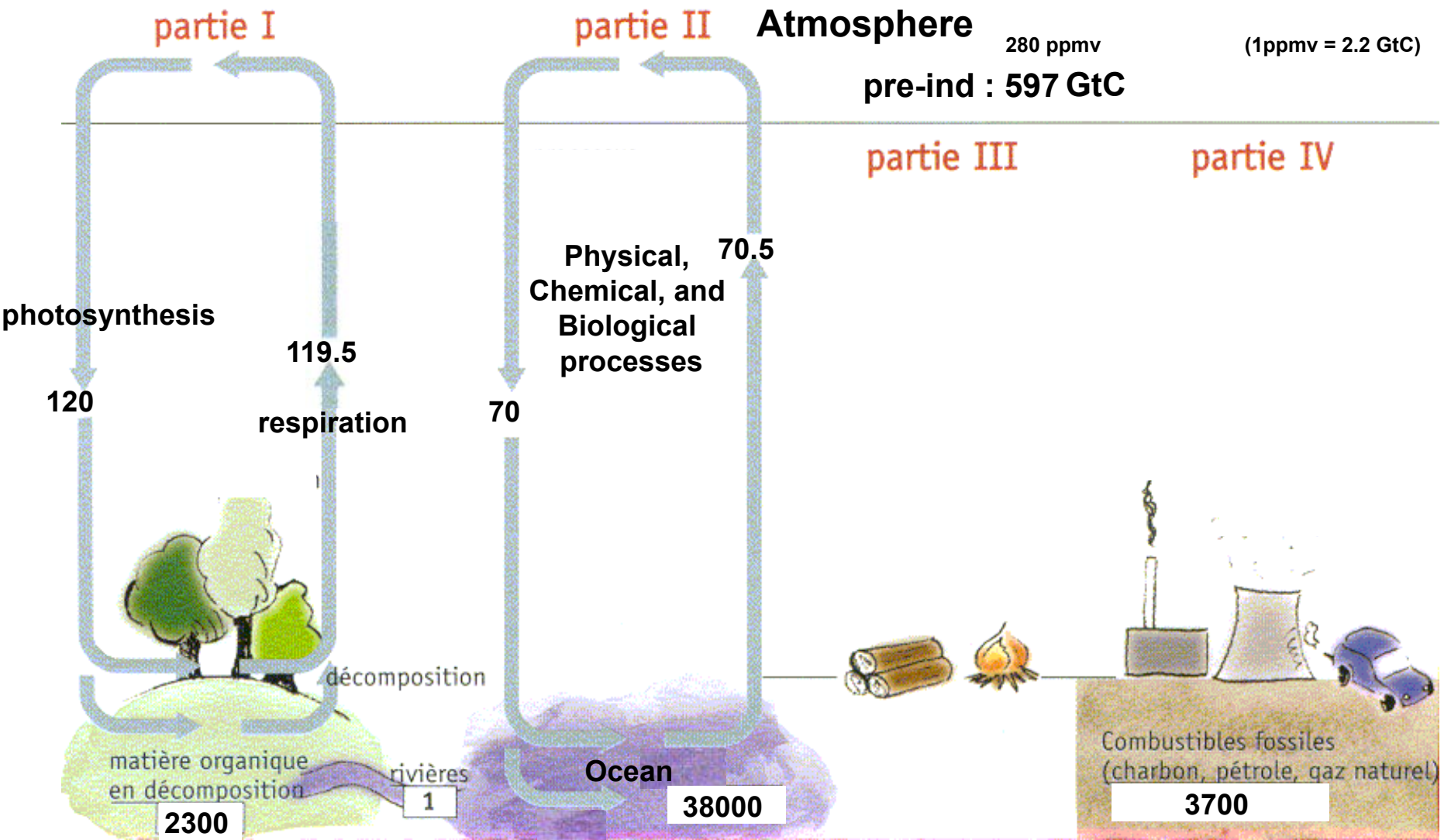
AR3 (2001): “most of  
the warming of the  
past 50 years is **likely**  
(odds 2 out of 3) due  
to human activities”

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... »

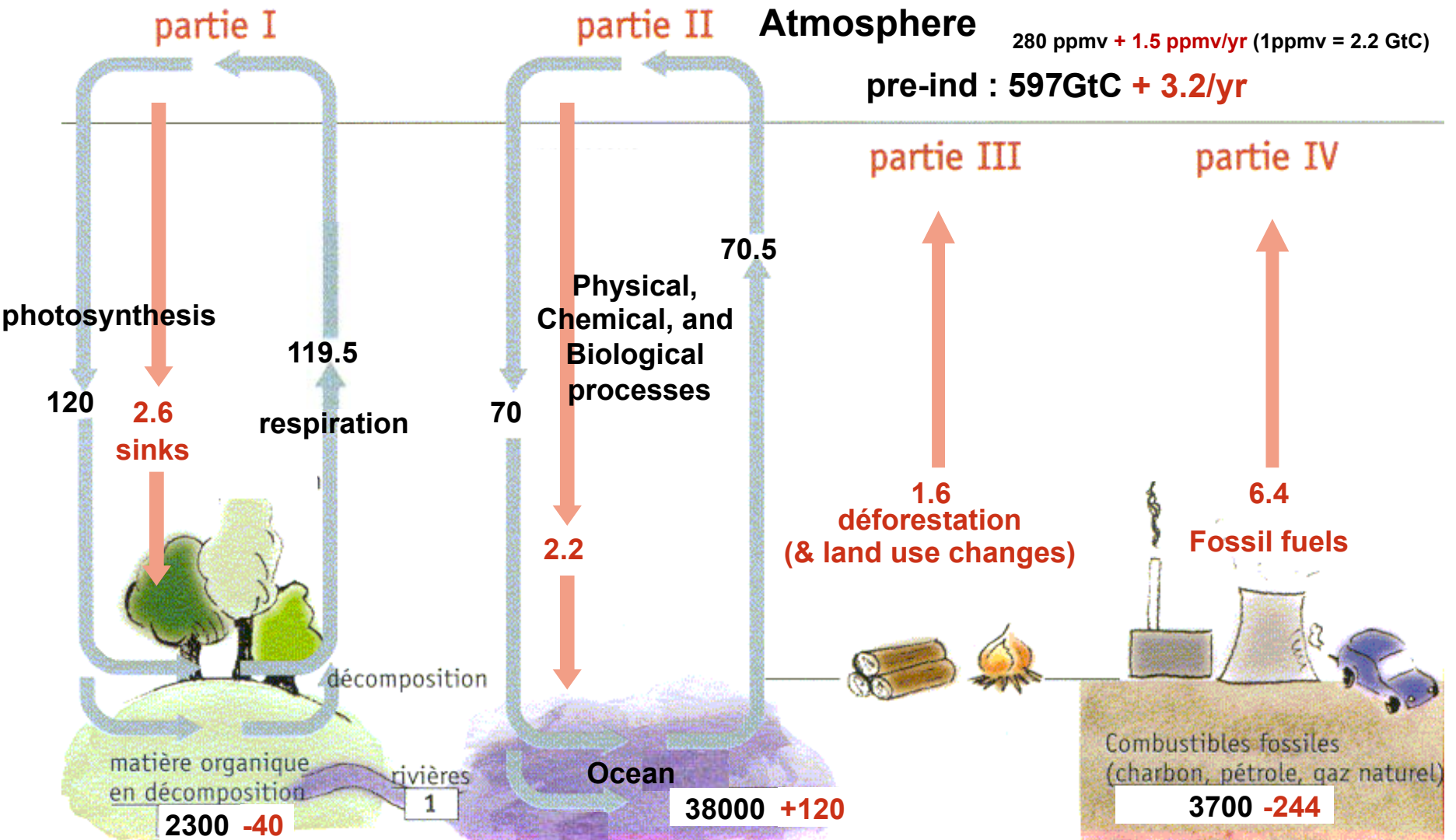
# Carbon cycle: unperturbed fluxes



Units: GtC (billions tons of carbon) or GtC/year (multiply by 3.7 to get GtCO<sub>2</sub>)

# Carbon cycle: perturbed by human activities

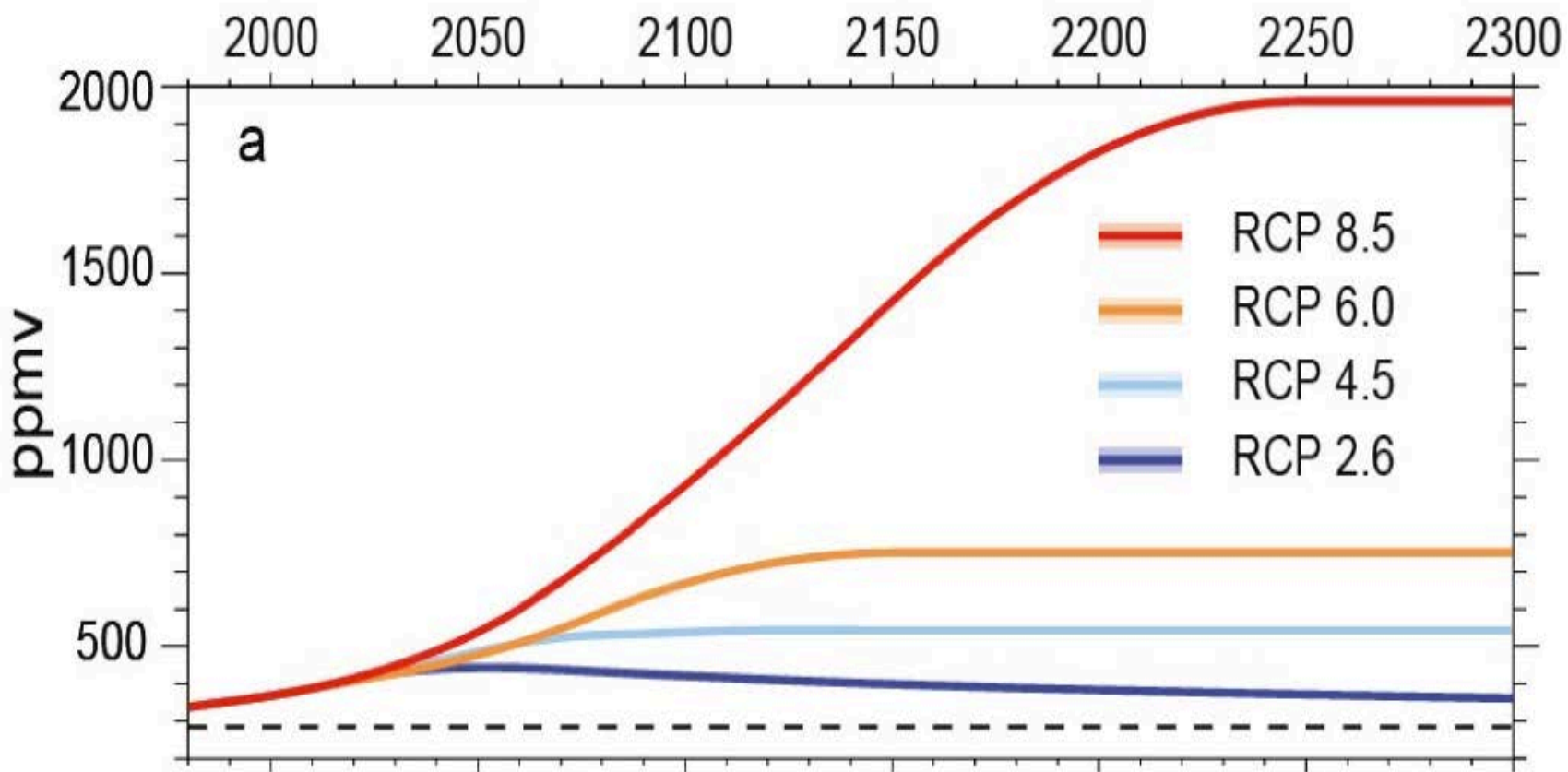
(numbers for the decade 1990-1999s, based on IPCC AR4)



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

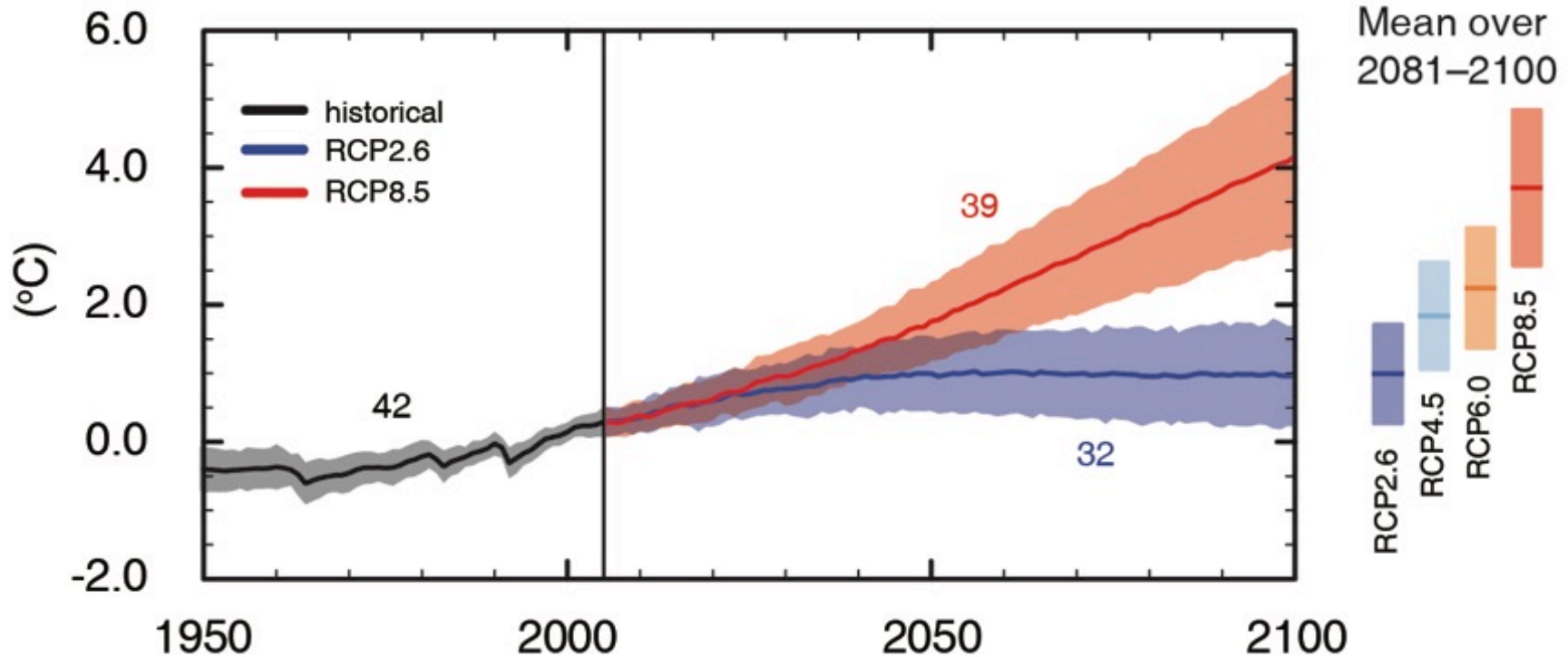
Stocks!

# 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

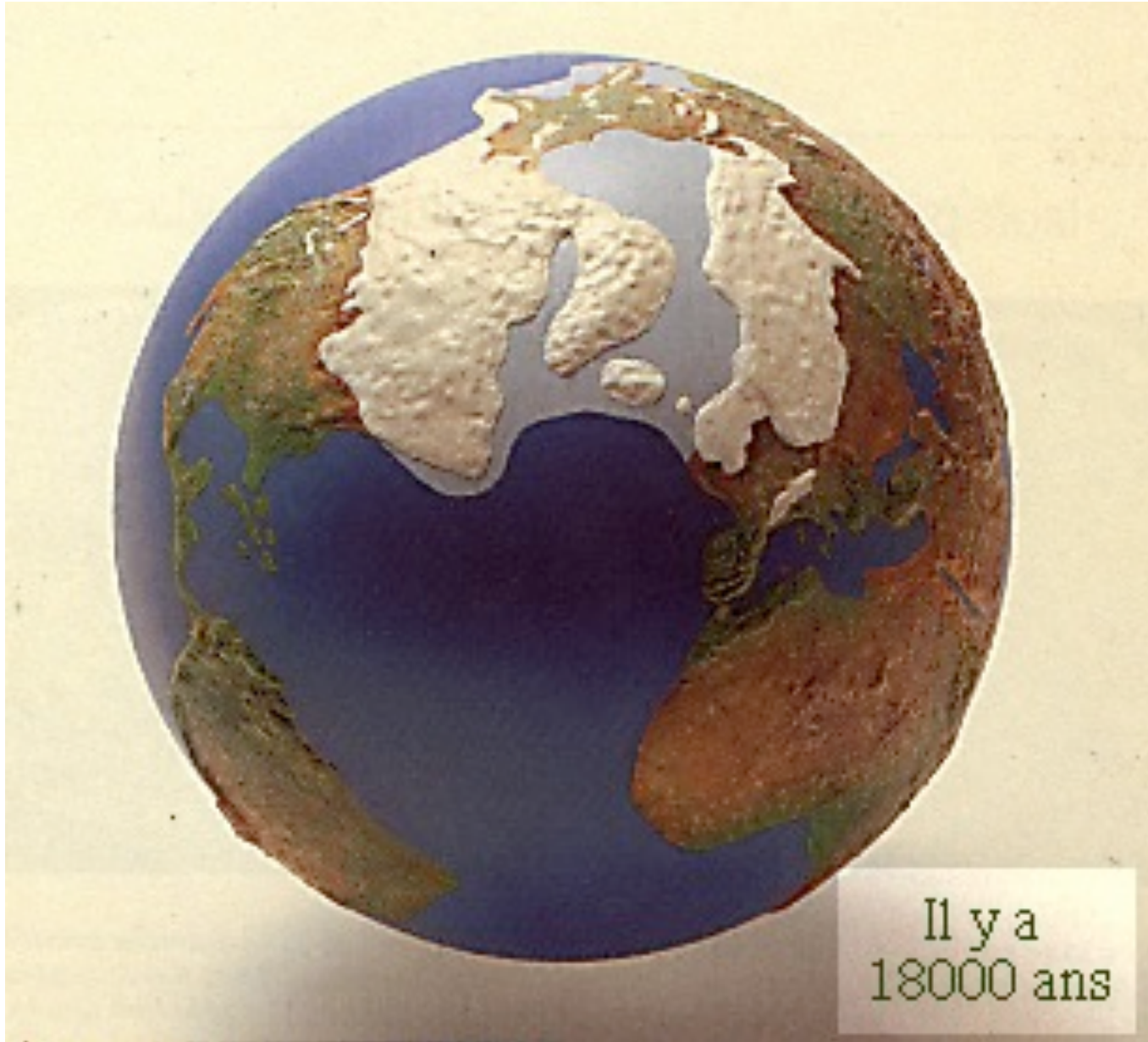


(IPCC 2013, Fig. SPM.7a)

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

# 18-20000 years ago (Last Glacial Maximum)

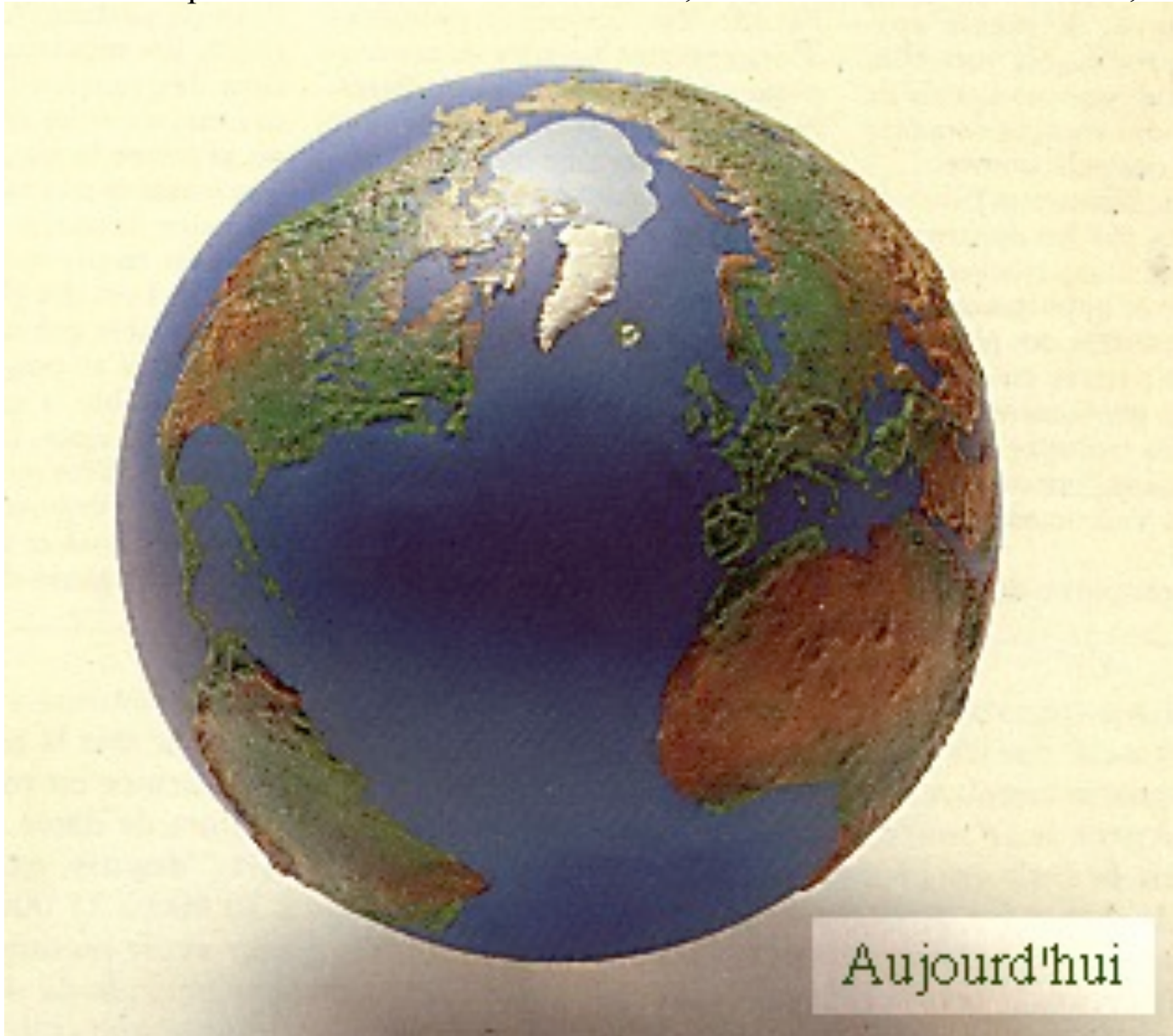
With permission from Dr. S. Joussaume, in « Climat d'hier à demain », CNRS éditions.



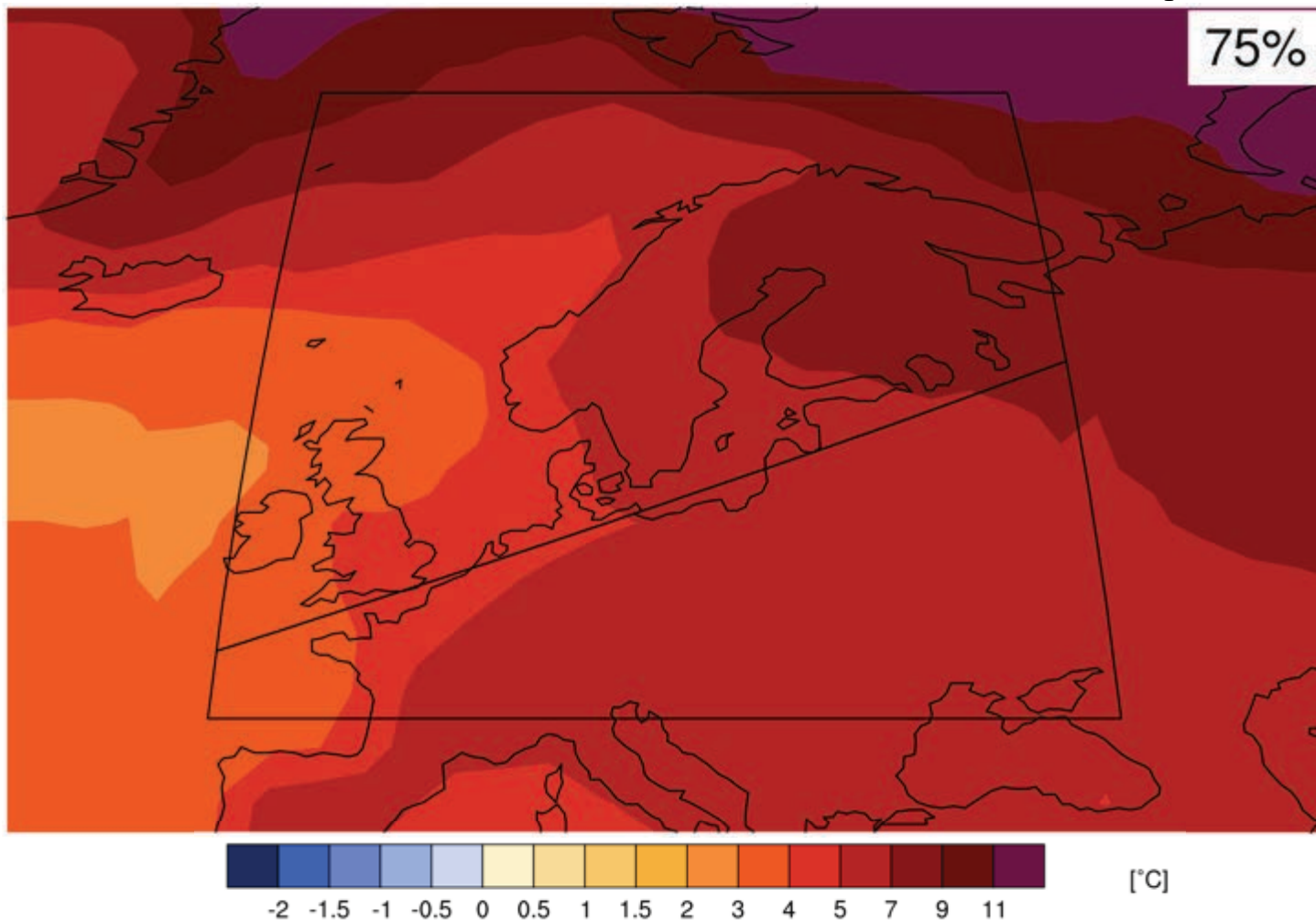


# Today, with +4-5°C globally

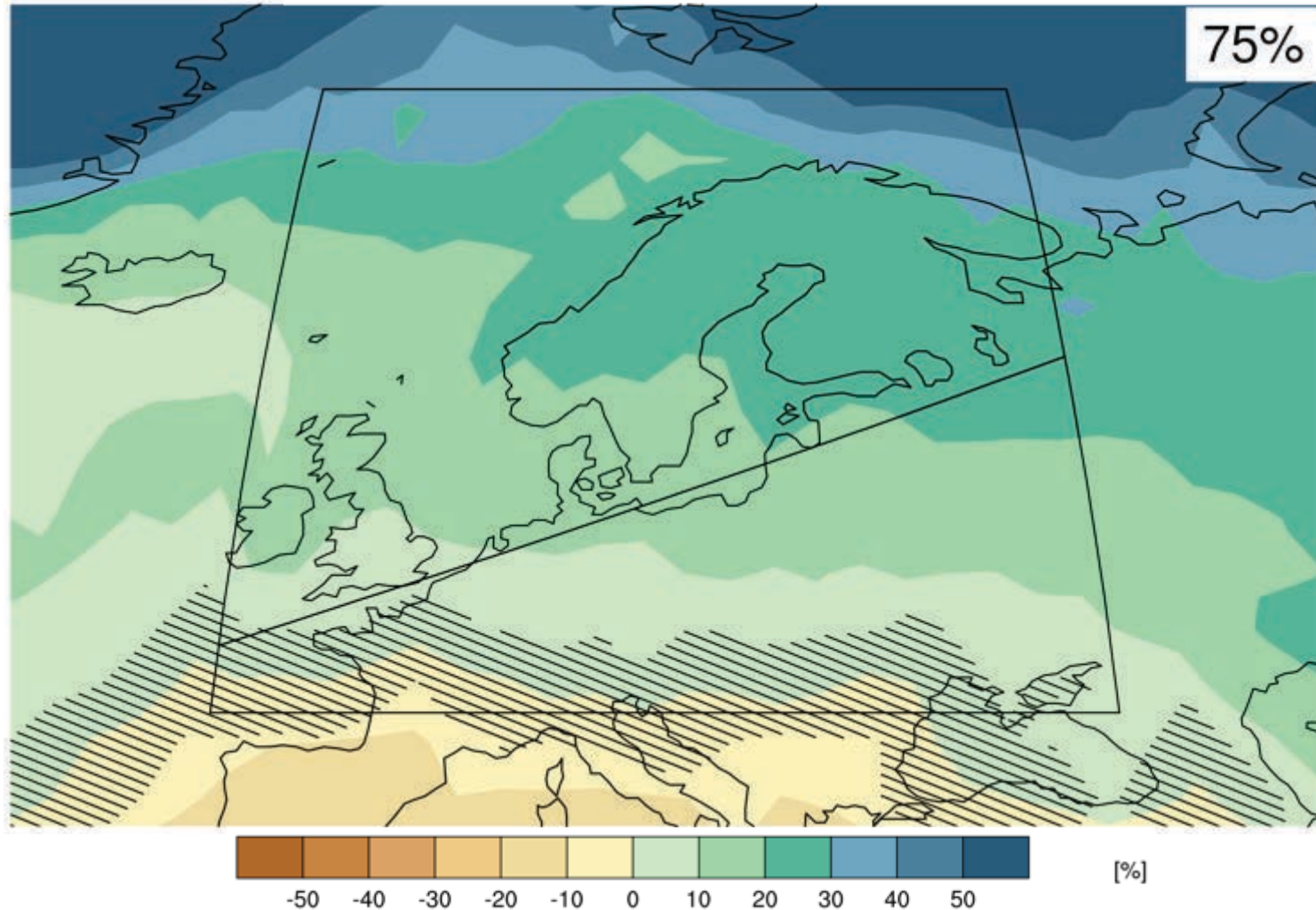
With permission from Dr. S. Joussaume, in « Climat d'hier à demain », CNRS éditions.

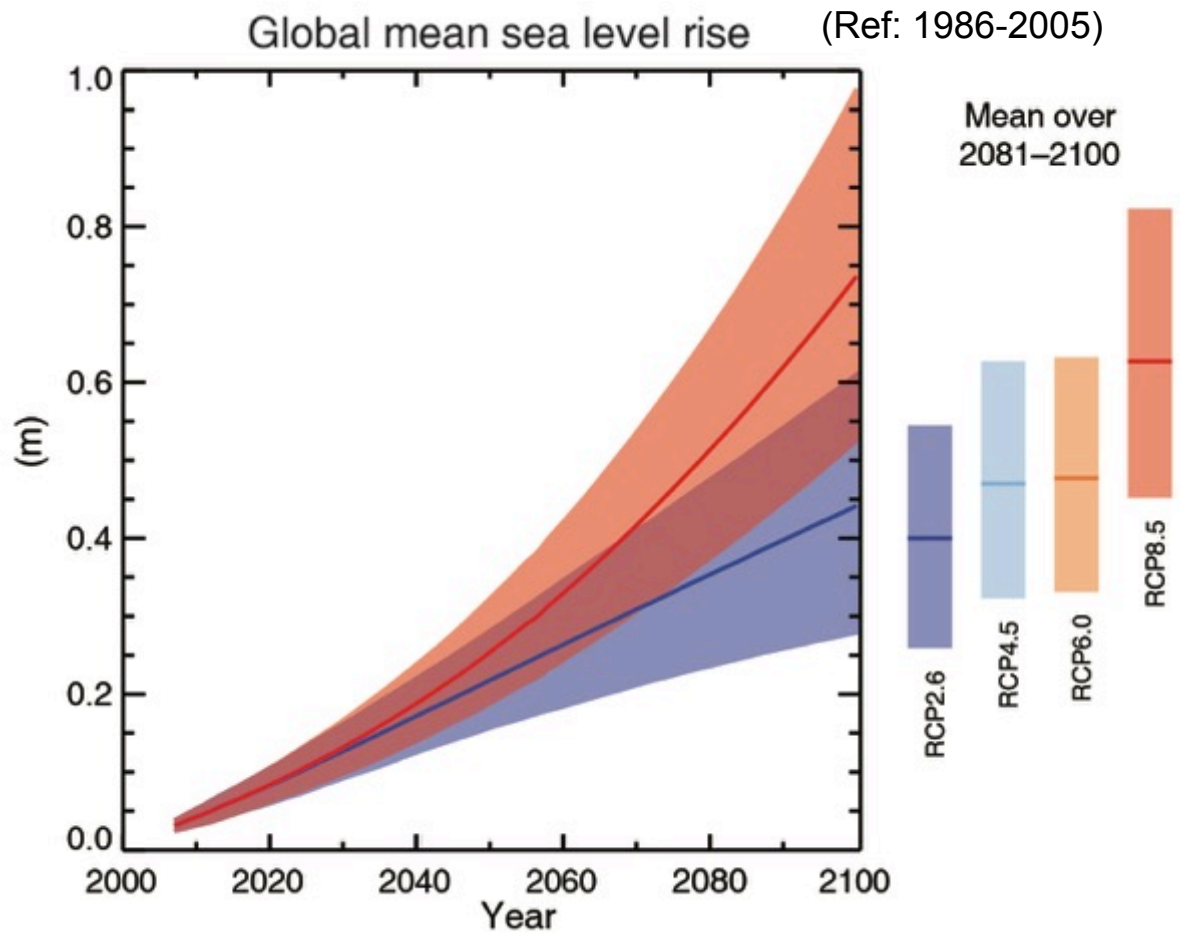


# North Europe - Map of temperature changes: 2081–2100 with respect to 1986–2005 in the RCP8.5 scenario (annual)



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





(IPCC 2013, Fig. SPM.9)

Sea level due to continue to increase

# Effets sur le Delta du Nil, où vivent plus de 10 millions de personnes à moins d'1 m d'altitude

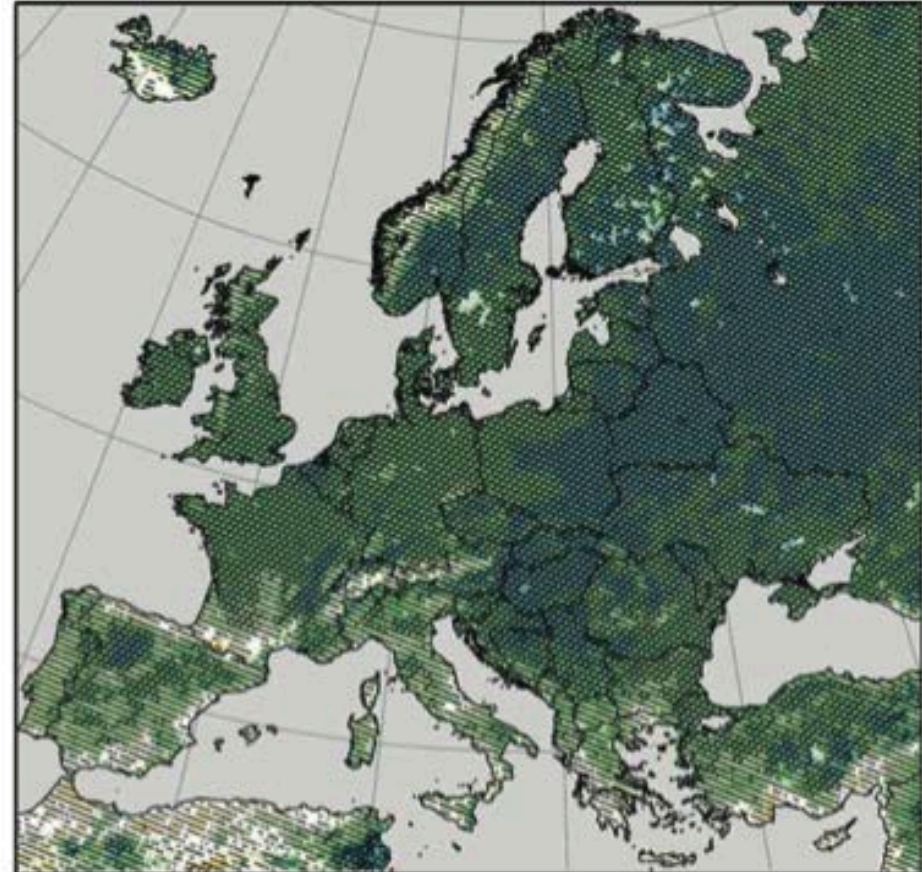


(Time 2001)

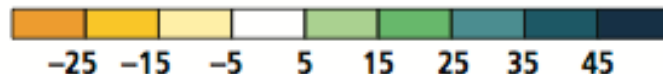
# DJF seasonal changes in heavy precipitation (%), 2071-2100 compared to 1971-2000

RCP4.5

RCP8.5



Seasonal changes in heavy  
precipitation in percent



//// Significant change

\\\\ Robust change

# 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

# Risk = Hazard x Vulnerability x Exposure (Katrina flood victim)





# Potential Impacts of Climate Change



Food and water shortages



Increased displacement of people



Increased poverty

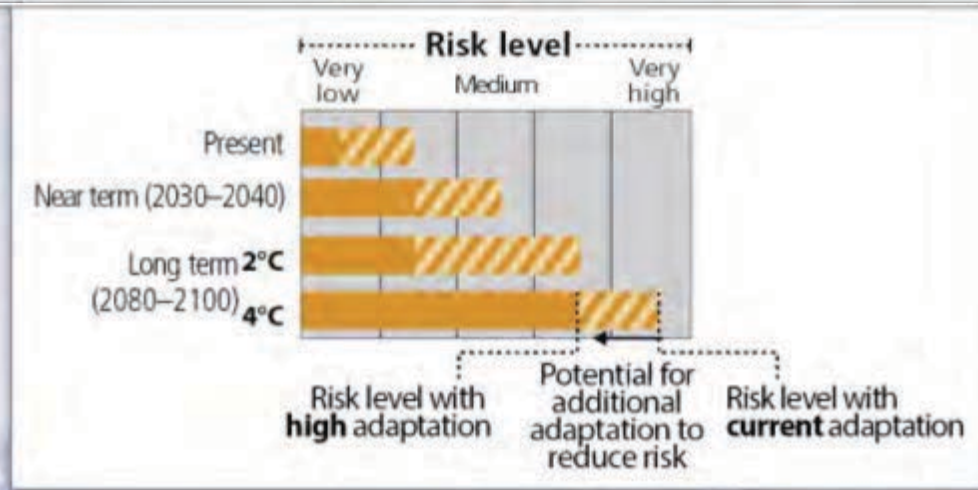
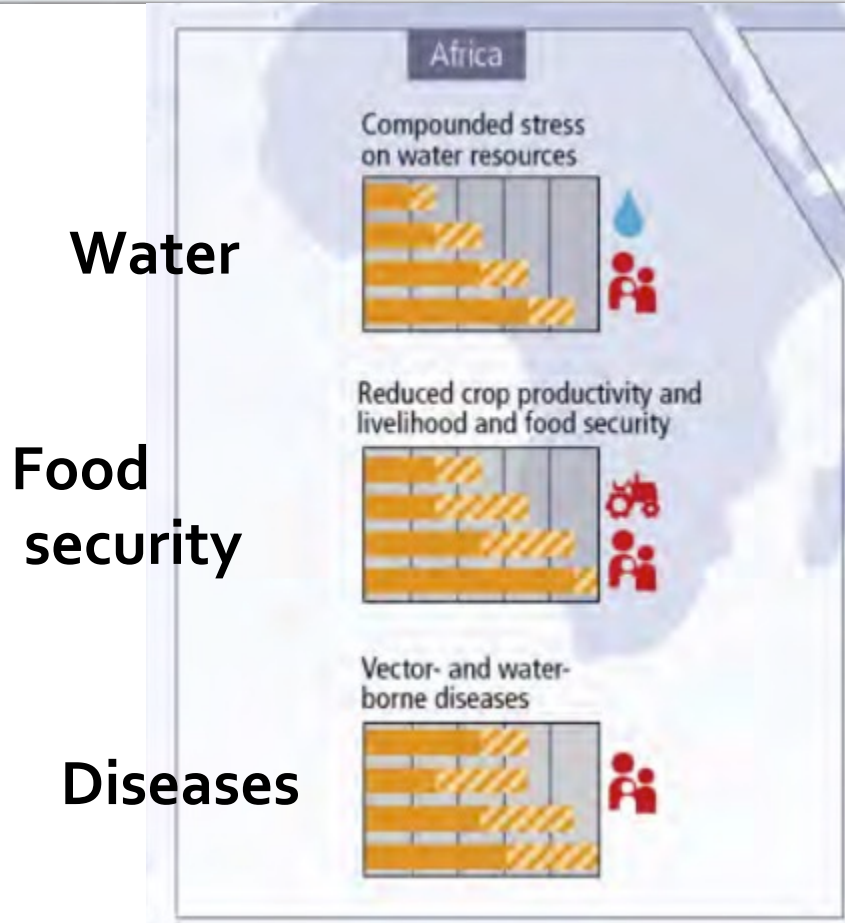


Coastal flooding

AR5 WGII SPM

# Regional key risks and risk reduction through adaptation

Representative key risks for each region for



# Human Health: Impacts, Adaptation, and Co-Benefits (1)

- The health of human populations is sensitive to shifts in weather patterns and other aspects of climate change (*very high confidence*).
- Until mid-century climate change will act mainly by exacerbating health problems that already exist (*very high confidence*).

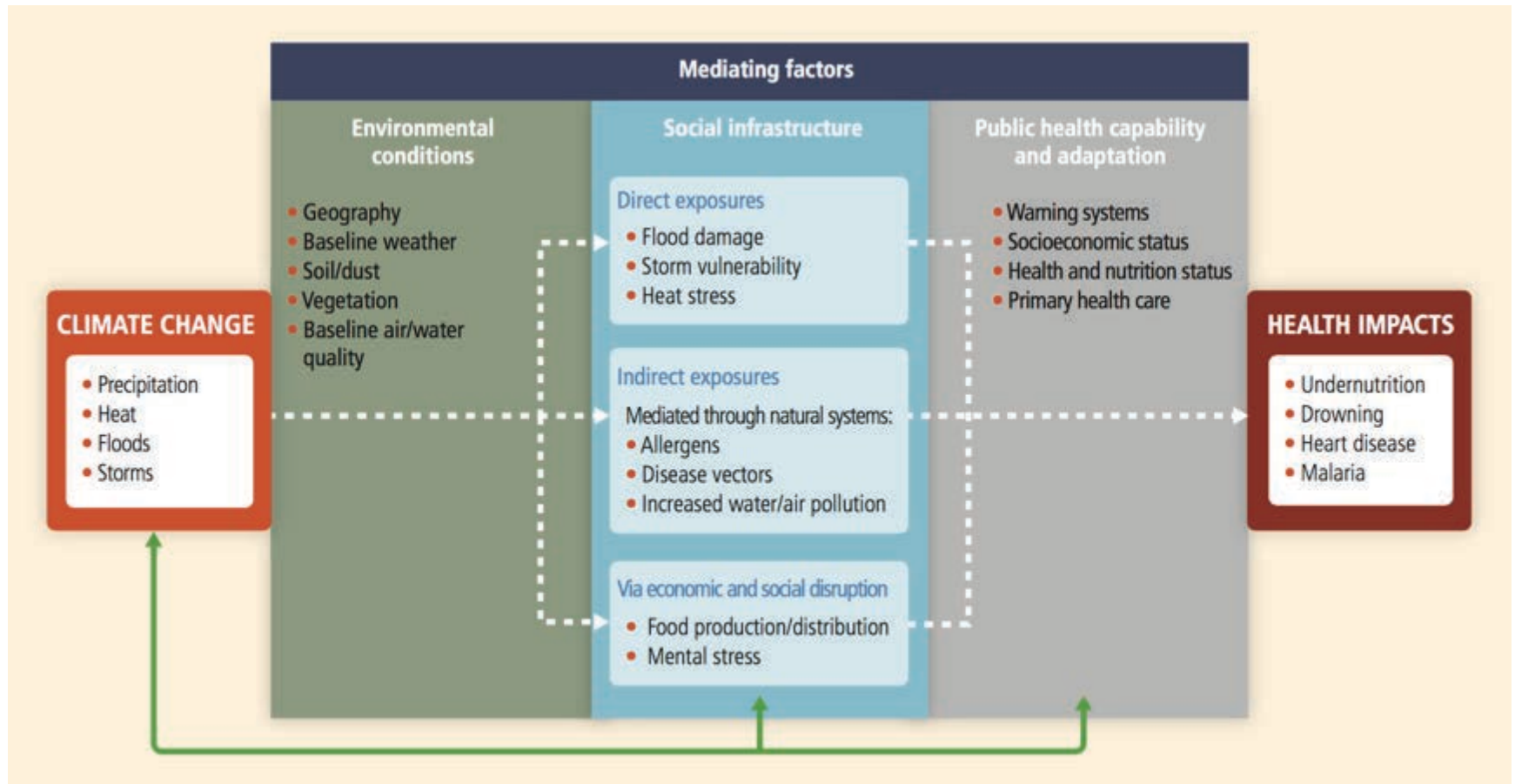
# Human Health: Impacts, Adaptation, and Co-Benefits (2)

- In recent decades, climate change has contributed to levels of ill health (*likely*) though the present worldwide burden of ill health from climate change is relatively small compared with other stressors on health and is not well quantified

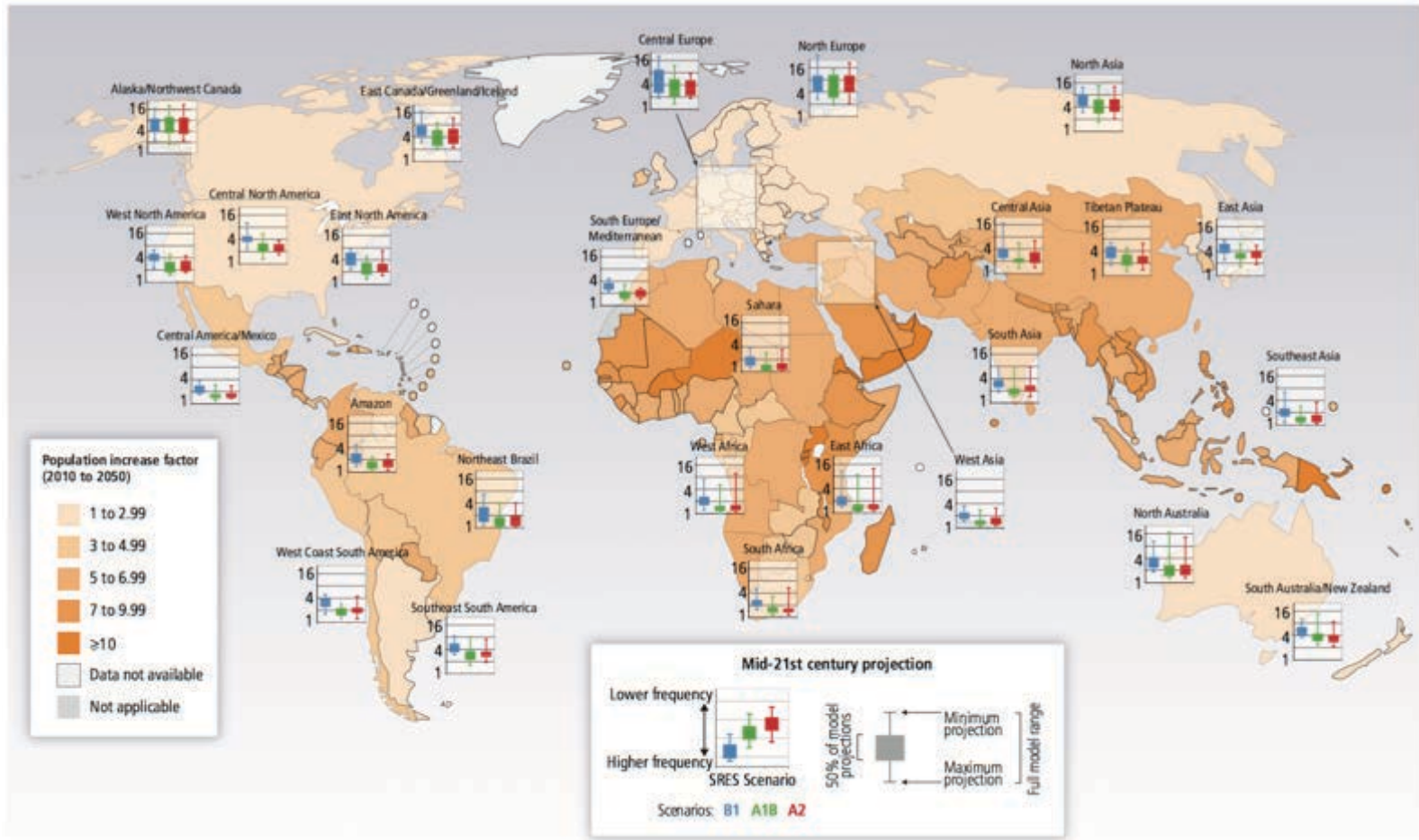
# Human Health: Impacts, Adaptation, and Co-Benefits (3)

- Impacts on health will be reduced, but not eliminated, in populations that benefit from rapid social and economic development (high confidence), particularly among the poorest and least healthy groups (very high confidence).
- In addition to their implications for climate change, essentially all the important climate-altering pollutants (CAPs) other than carbon dioxide (CO<sub>2</sub>) have near-term health implications (*very high confidence*)

# Conceptual diagram showing three primary exposure pathways by which climate change affects health



# Increasingly frequent heat extremes will combine with rapidly growing numbers of older people living in cities



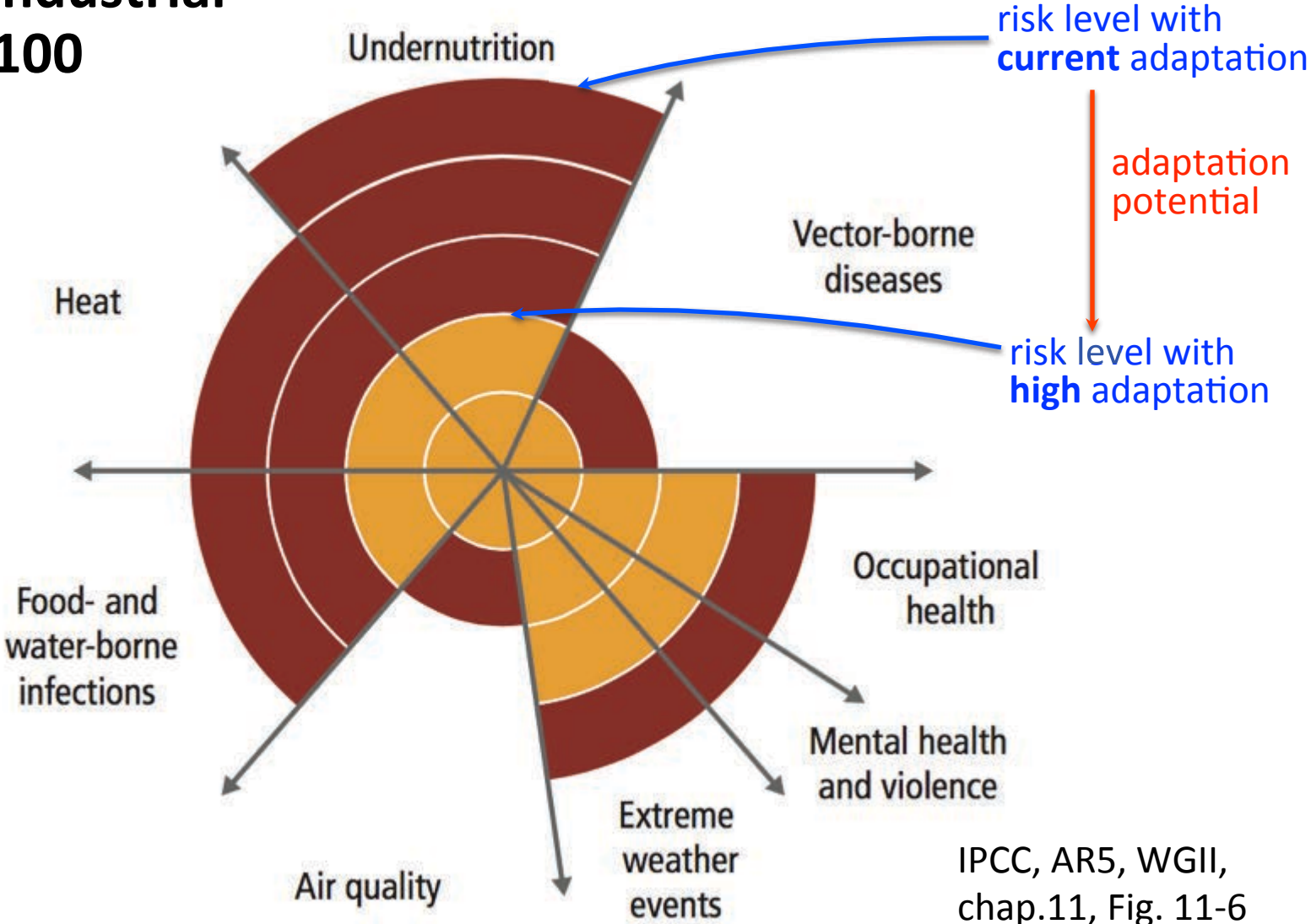
# Association between different climatic drivers and the global prevalence and geographic distribution of selected vector-borne diseases observed over the period 2008-2012

Disease	Area	Cases per year	Climate sensitivity and confidence in climate effect	Key references
<b>Mosquito-borne diseases</b>				
Malaria	Mainly Africa, SE Asia	About 220 million		WHO (2008); Kelly-Hope et al. (2009); Alonso et al. (2011); Omumbo et al. (2011)
Dengue	100 countries, esp. Asia Pacific	About 50 million		Beebe (2009); Pham et al. (2011); Astrom et al. (2012); Earnest et al. (2012); Descloux (2012)
<b>Tick-borne diseases</b>				
Tick-borne encephalitis	Europe, Russian Fed., Mongolia, China	About 10,000		Tokarevich et al. (2011)
Lyme	Temperate areas of Europe, Asia, North America	About 20,000 in USA		Bennet (2006); Ogden et al. (2008)
<b>Other vector-borne diseases</b>				
Hemorrhagic fever with renal syndrome (HFRS)	Global	0.15–0.2 million		Fang et al. (2010)
Plague	Endemic in many locations worldwide	About 40,000		Stenseth et al. (2006); Ari et al. (2010); Xu et al. (2011)



# Health impacts and potential for adaptation

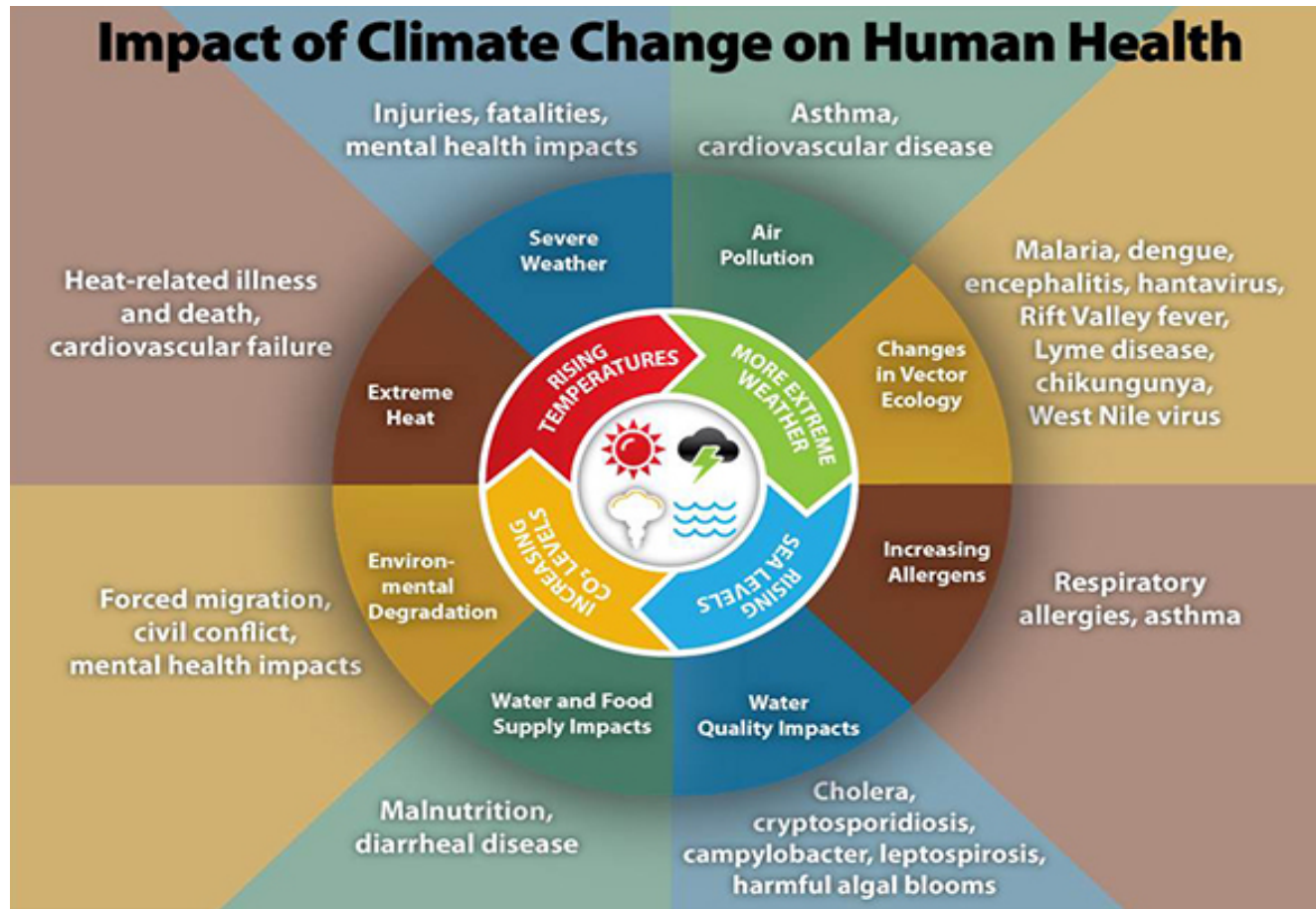
As it could be with  
+4°C/pre-industrial  
by 2080-2100

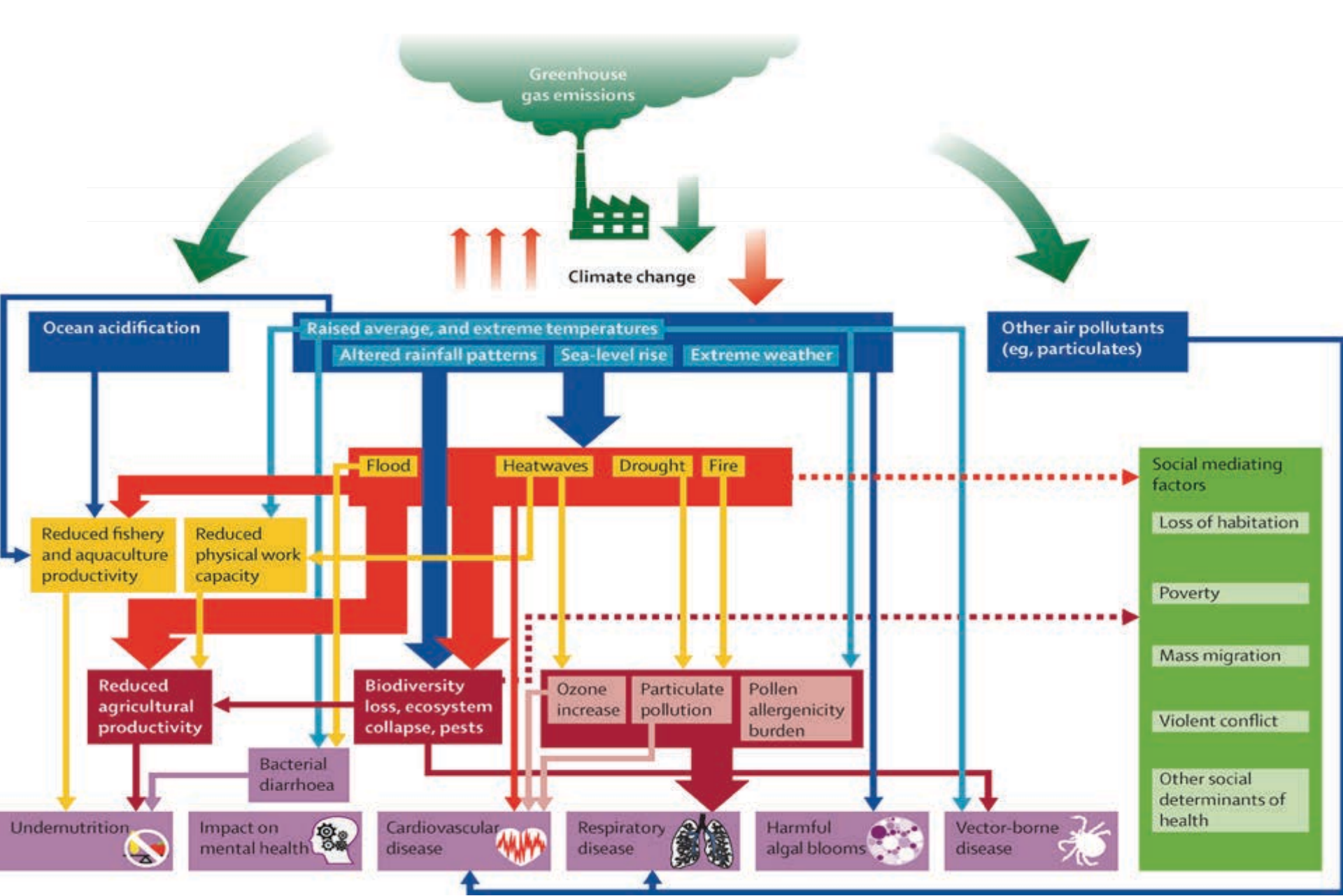


# Climate Change Poses Risks and Opportunities Related to Health

- The 2015 *Lancet Commission on Climate Change and Health* report stated: “The effects of climate change are being felt today, and future projections represent an unacceptably high and potentially catastrophic risk to human health.”
- BUT it also underscored that **Tackling climate change could be the greatest global health opportunity of the 21st century.**

# Climate Change Impacts Human Health





# Heat-related disorders, including heat stress



- As the climate warms, more people could be susceptible to heat-related illness, including rashes, cramps, heat exhaustion and heat stroke.
- Some [sources](#) predict that extreme heat events that currently happen every 20 years in the U.S. will occur about every other year by the end of the 21<sup>st</sup> century under a higher emissions scenario.
- Across Europe about 70,000 premature deaths were attributed to the 2003 [heat wave](#).
- The [elderly](#), children, and urban area dwellers are at elevated risk of heat-related illness.

# *Respiratory disorders, including asthma and allergies*

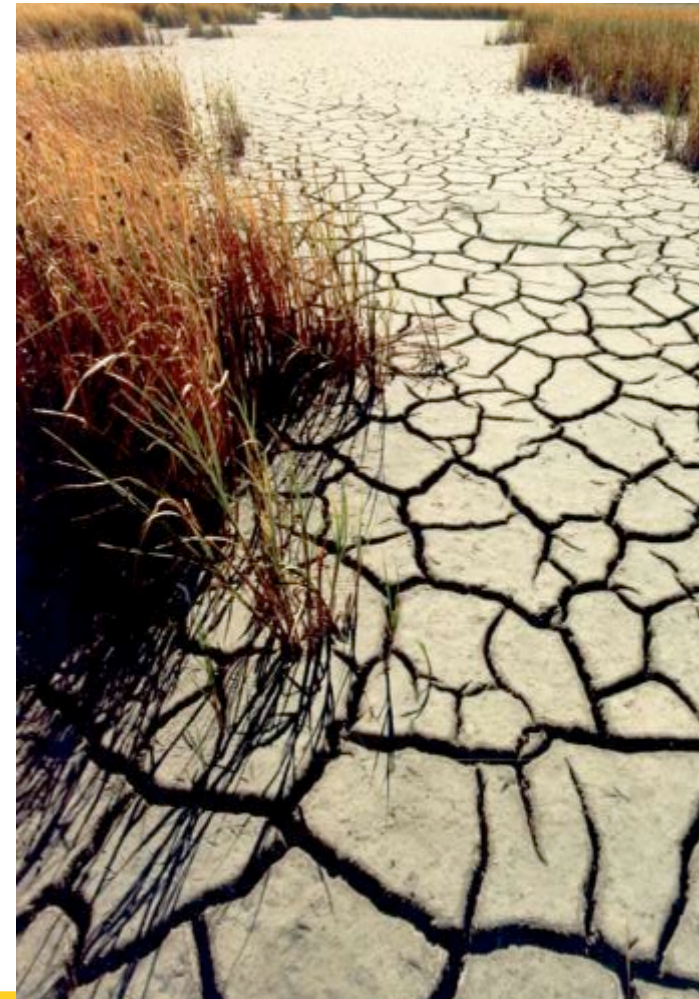
- Higher temperatures and increased pollen load may exacerbate respiratory problems. Elevated ground-level ozone concentrations could affect lung function.
- In 2012, 7 million deaths were connected to the joint effects of outdoor ambient air pollution and household indoor air pollution, according to the [WHO](#).
- Pollen season has lengthened in central North America as temperatures have risen and the frost-free period has extended ([1,2](#)).
- Elevated carbon dioxide concentration may facilitate the increased growth of allergen-producing weeds grasses, trees and fungus. ([1,2](#))
- Heavy rainfall and flooding can cause dampness in homes, potentially leading to indoor mold and fungal growth, associated with nasal and throat symptoms, coughing, wheezing, asthma exacerbation, and other problems. ([1,2](#))

# Vector- and water-borne diseases

- A warmer climate and changing rainfall patterns may also create hospitable environments for climate-sensitive vectors like mosquitos and ticks that spread diseases like dengue fever and chikungunya([1,2](#))
- Some models predict that climate change could be a factor in extending Lyme disease into Canada. ([1](#))
- Water-borne diseases may also thrive in flooded regions as well as those where water is scarce.
- For example, cholera may develop and spread in drought-stricken areas where lack of water leads to poor sanitation ([1](#))



# Food security problems and water scarcity



- As the population grows and food demand rises, "climate change could result in an increase of 20% of people at risk of chronic hunger."[\(1\)](#)
- Under some forecasts, rice, maize, and wheat crop yields may suffer in areas that do not implement adaptation plans; in high elevation areas, yields may increase with the temperature.[\(1\)](#)
- Water scarcity may be accelerated as the climate changes and more regions experience drought. Risk is especially pronounced in presently dry regions.
- One study estimates that about 100 million additional urban dwellers will experience perennial water shortages under climate change conditions than under current climate.[\(1\)](#)



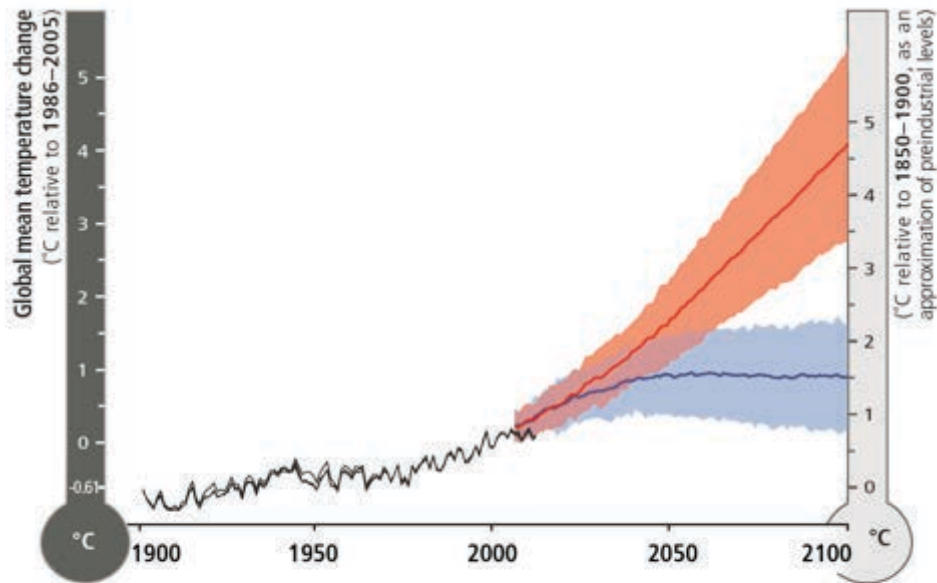
## *Mental health disorders, including post-traumatic stress disorder and depression connected to natural disasters.*

- Disasters caused by climate change may have a negative effect on mental health. Extreme weather events can cause stress that may result in a decline in mental health and prolonged heat or cold events may cause chronic stress problems that exacerbate health issues ([1](#))
- Mental health problems can occur due to displacement, relocation and loss of property and personal finances in the aftermath of a disaster. ([1](#))
- Nearly half of surveyed New Orleans residents affected by Hurricane Katrina reported anxiety mood disorder and a substantial number reported post-traumatic stress disorder. ([1](#))
- The U.S. military considers climate change to be a “threat multiplier,” a factor that exacerbates existing problems, such as food insecurity, pandemic disease, and conflict over resources. ([1](#))

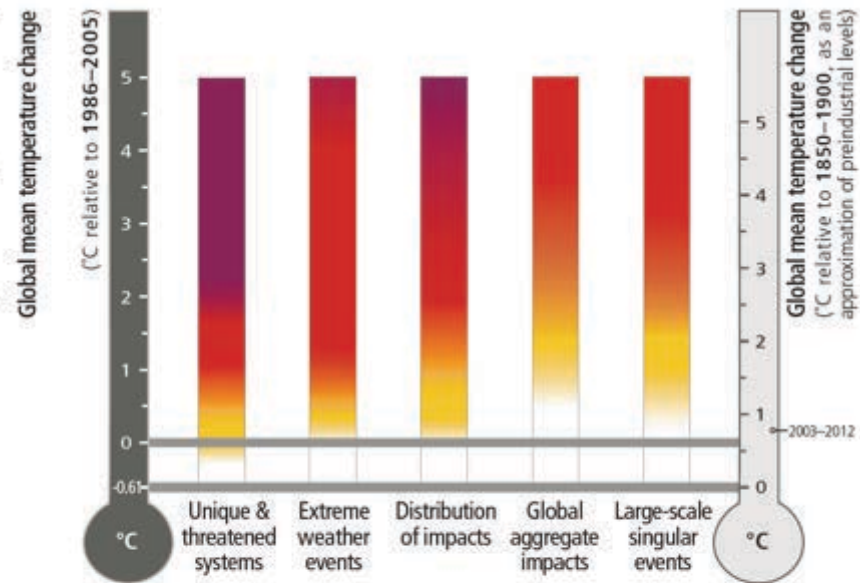




RISKS OF  
CLIMATE CHANGE  
**INCREASE**  
WITH CONTINUED  
HIGH EMISSIONS



- Observed
- RCP8.5 (a high-emission scenario)
- Overlap
- RCP2.6 (a low-emission mitigation scenario)



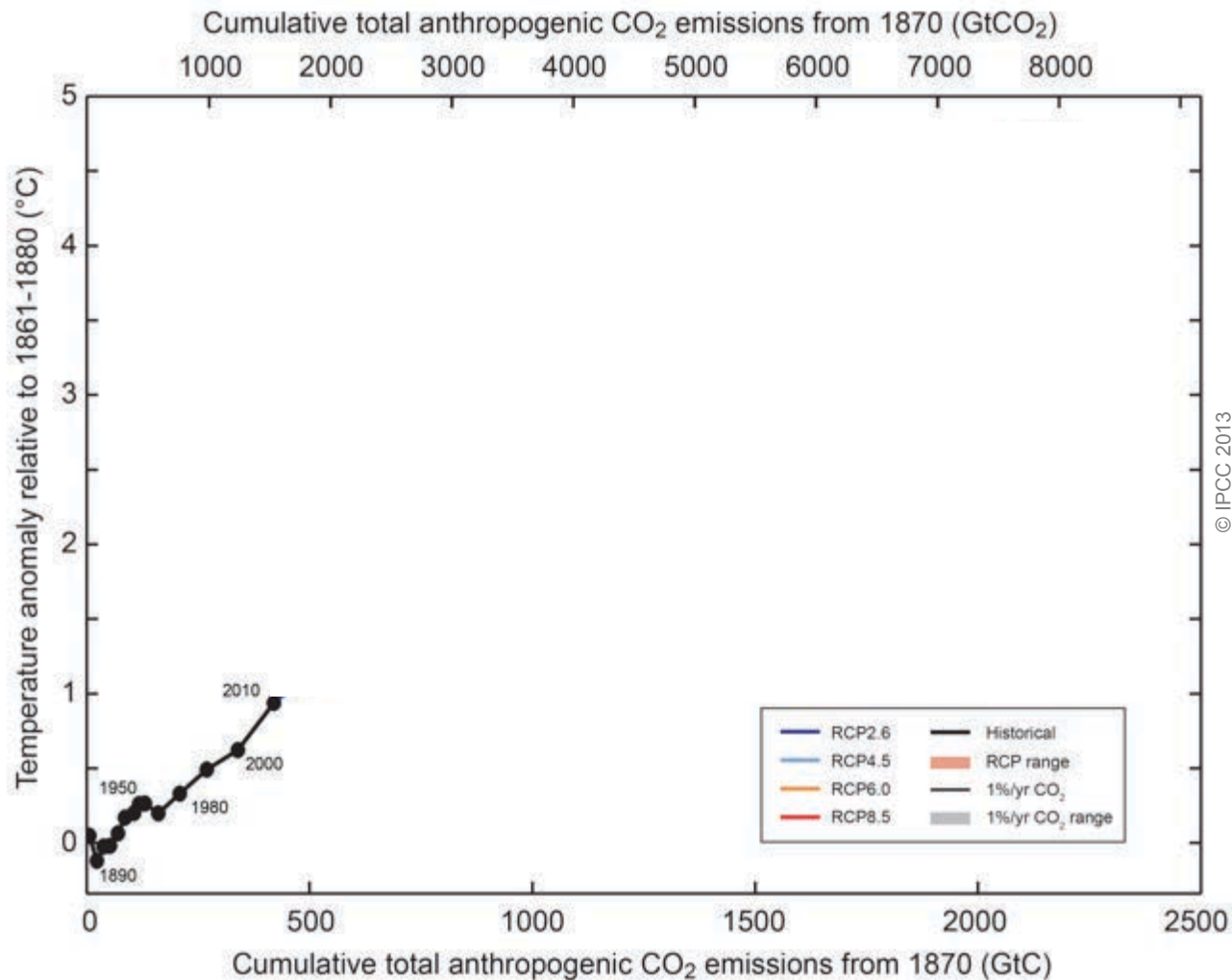
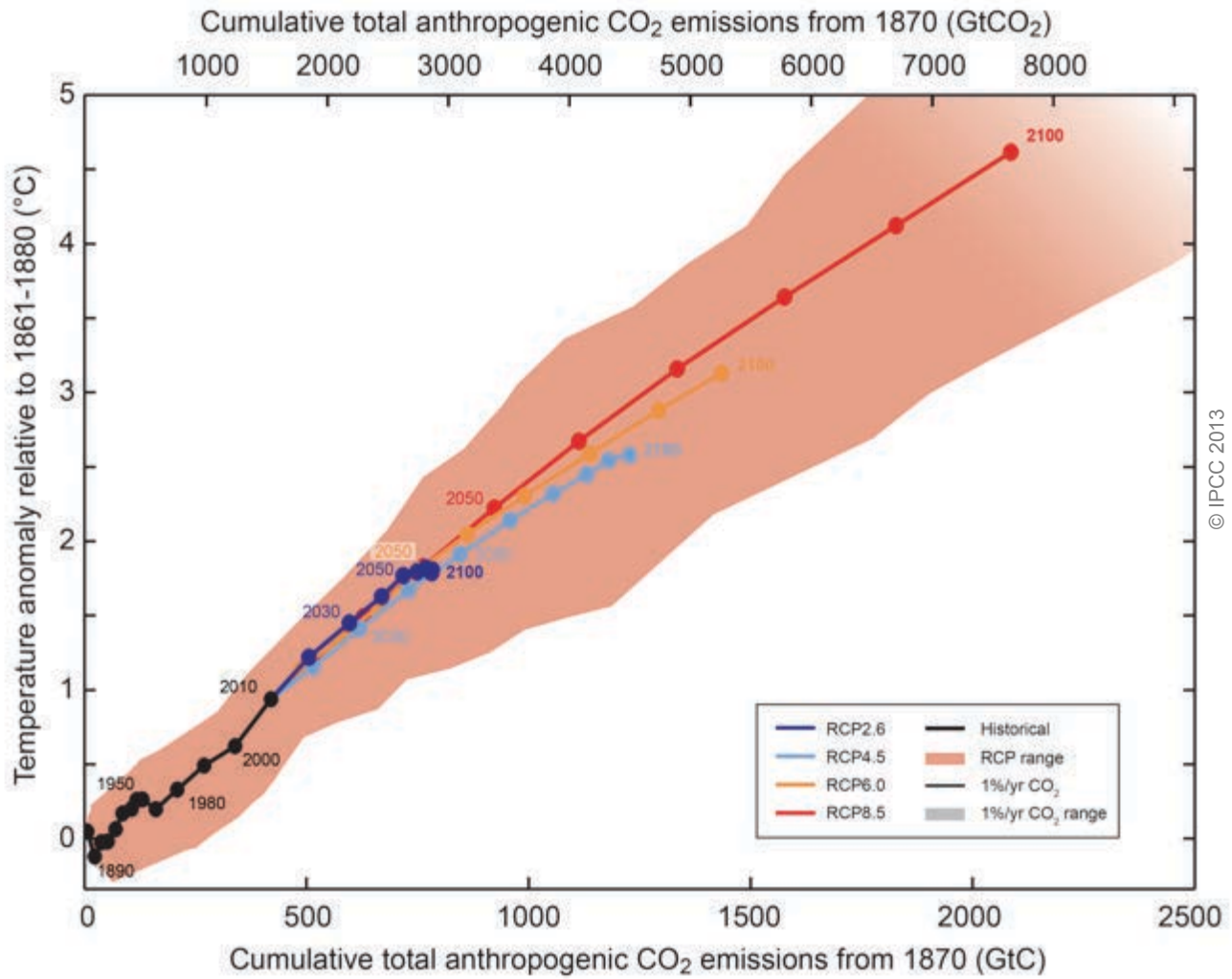


Fig. SPM.10

Cumulative emissions of CO<sub>2</sub> largely determine global mean surface warming by the late 21st century and beyond.



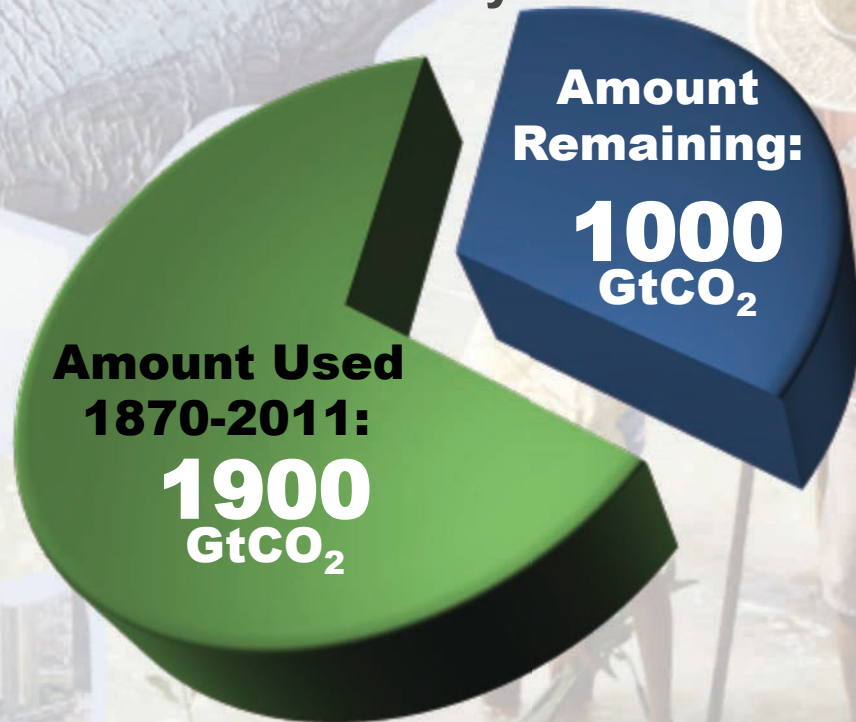
© IPCC 2013

Fig. SPM.10

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

# The window for action is rapidly closing

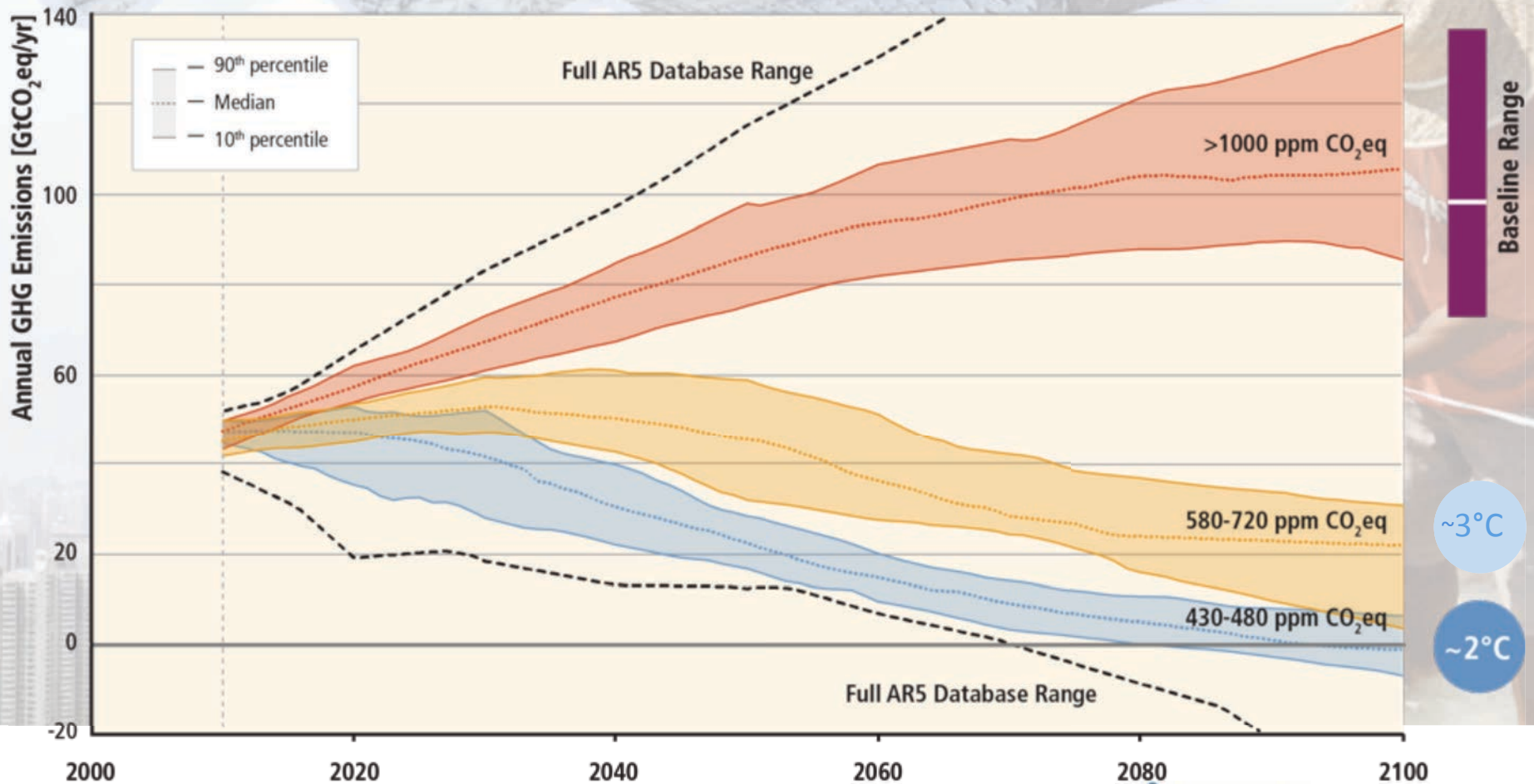
65% of the carbon budget compatible with a 2°C goal is already used  
NB: this is with a probability greater than 66% to stay below 2°C



**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

# Can temperature rise still be kept below 1.5 or 2°C (over the 21<sup>st</sup> century) compared to pre-industrial ?

- **Many scenario studies confirm that it is technically and economically feasible to keep the warming below 2°C, with more than 66% probability (“likely chance”).** This would imply limiting atmospheric concentrations to 450 ppm CO<sub>2</sub>-eq by 2100.
- **Such scenarios for an above 66% chance of staying below 2°C imply reducing by 40 to 70% global GHG emissions compared to 2010 by mid-century, and reach zero or negative emissions by 2100.**



# 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**



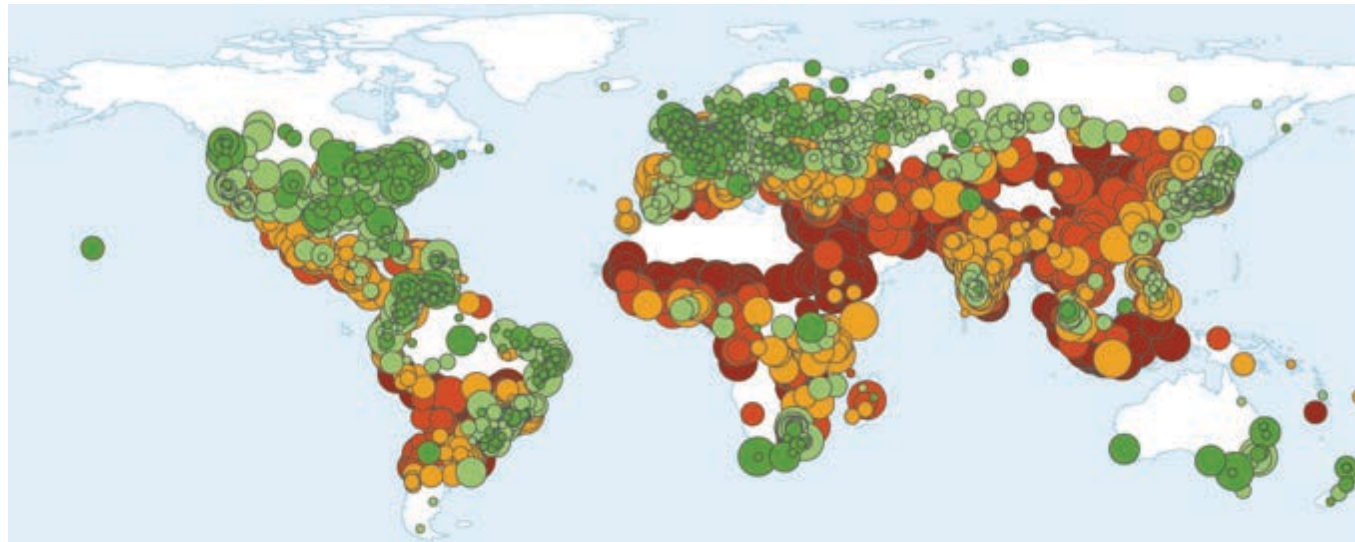
Lifestyle and behavioural changes

AR5 WGIII SPM

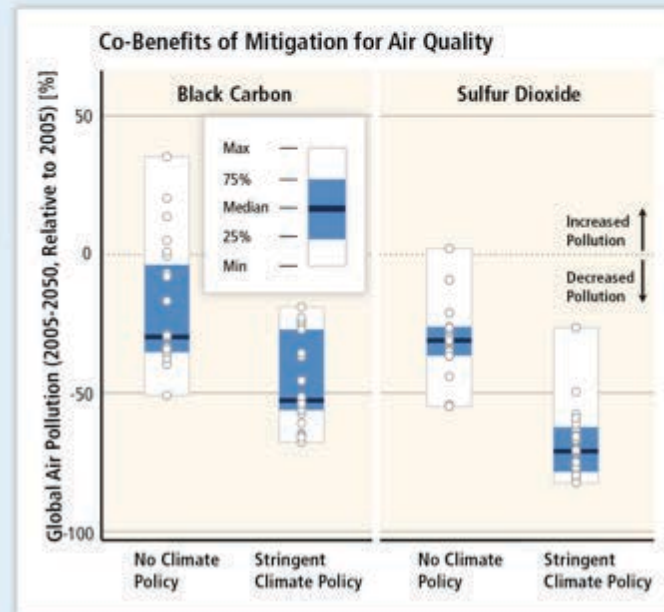
- **Substantial reductions in emissions would require large changes in investment patterns e.g., from 2010 to 2029, in billions US dollars/year:**

(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**



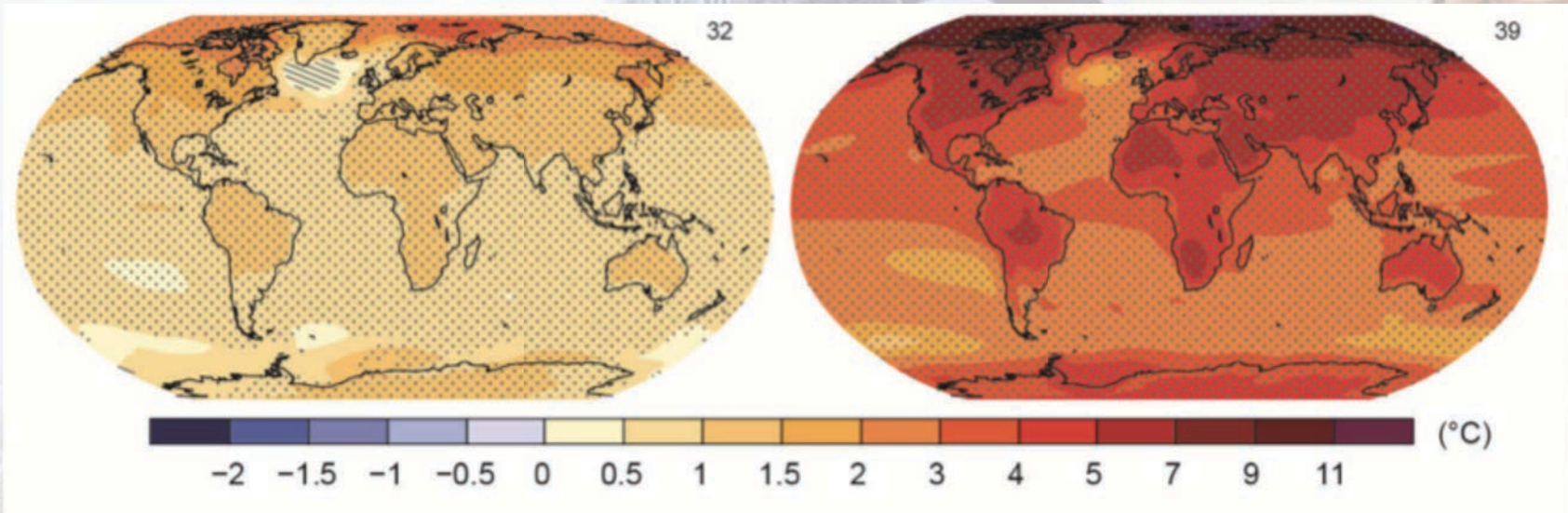
**Mitigation can result in large co-benefits for human health and other societal goals.**



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

With substantial mitigation

Without additional mitigation



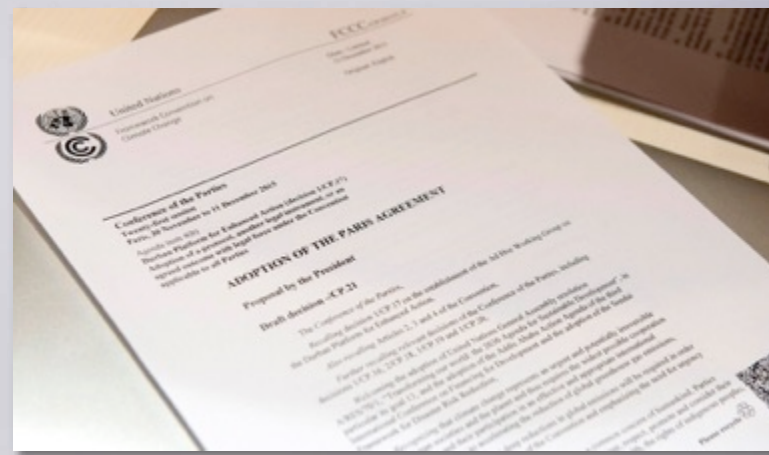
Change in average surface temperature (1986–2005 to 2081–2100)

AR5 WGI SPM

# Sur les Changements Climatiques 2015

COP21/CMP11

## Paris, France



# 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

# Paris Agreement

- Article 3:
  - ◆ As nationally determined contributions to the global response to climate change, **all Parties** are to undertake and communicate ambitious efforts (...) with the view to achieving the purpose of this Agreement as set out in Article 2.  
The efforts of all Parties will represent **a progression over time**, while recognizing the **need to support developing country** Parties for the effective implementation of this Agreement.

# Paris Agreement

- Article 4:
  - ◆ 1. (...) Parties aim to reach **global peaking** of greenhouse gas emissions **as soon as possible**, recognizing that **peaking will take longer for developing country Parties**,
  - ◆ and to undertake **rapid reductions thereafter in accordance with best available science**,
  - ◆ so as to achieve a **balance between anthropogenic emissions by sources and removals by sinks of greenhouse gases in the second half of this century**, on the basis of equity, and in the context of sustainable development and efforts to eradicate poverty
  - ◆ 3. **Each Party's successive nationally determined contribution will represent a progression(...)**



# Paris Agreement

- Article 4 (cont.):
  - ✦ 4. Developed country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets.
  - ✦ Developing country Parties should continue enhancing their mitigation efforts, and are encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances.
  - ✦ **Each Party shall communicate a nationally determined contribution every five years**
  - ✦ Parties shall take into consideration in the implementation of this Agreement the **concerns of Parties with economies most affected by the impacts of response measures**, particularly developing country Parties.

# Paris Agreement

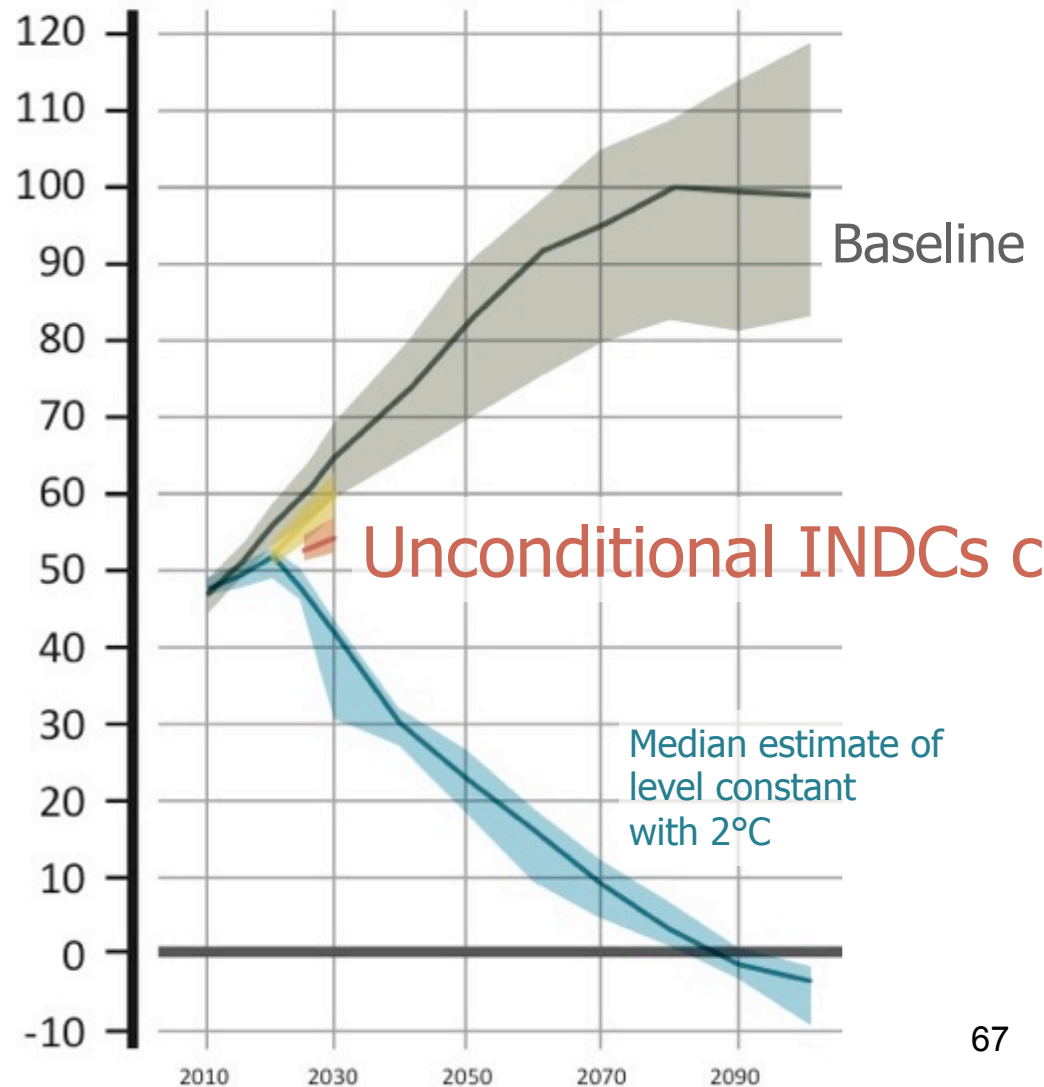
- Article 5:
  - ◆ Parties should take action to conserve and enhance, as appropriate, sinks and reservoirs of greenhouse gases (...) including forests.
  - ◆ Parties are encouraged to take action to implement and support (...) policy approaches and positive incentives for activities relating to reducing emissions from deforestation and forest degradation,
- Article 6
  - ◆ 4. A mechanism to contribute to the mitigation of greenhouse gas emissions and support sustainable development is hereby established under the authority and guidance of the Conference of the Parties (...) for use by Parties on a voluntary basis.



# Intended Nationally Determined Contributions (INDCs)

- UN emissions gap report

Annual Global Total Greenhouse Gas Emissions (GtCO<sub>2</sub>e)



# Physician and public health organizations have spoken up about climate change and health

“The changing climate is causing physical, chemical, and ecological changes that are fundamentally altering the planet. These changes pose significant threats to human health, with children representing a uniquely vulnerable group.” ([American Academy of Pediatrics](#))

“Our AMA supports the findings of the Intergovernmental Panel on Climate Change’s fourth assessment report and concurs with the scientific consensus that the Earth is undergoing adverse global climate change and that anthropogenic contributions are significant. These climate changes will create conditions that affect public health, with disproportionate impacts on vulnerable populations, including children, the elderly, and the poor.” ([American Medical Association](#))

“Climate change can harm the water supply, increase vector-borne disease and increase extreme weather events. Vulnerable populations such as communities of color, the elderly, young children, the poor and those with chronic illnesses bear the greatest burden of injury, disease and death related to climate change. As an APHA priority, we believe in the need for strong climate change strategies and interventions that protect people's health. The public health community plays a critical role.” ([American Public Health Association](#))

# ACP Recommendations

- A global effort is required to reduce anthropogenic greenhouse emissions and address the health impact of climate change. The United States must commit to taking both a leadership and collaborative role in developing, implementing and ensuring the success of such a global effort and in reducing its own contributions to greenhouse emissions. Climate change adaptation strategies must be established and mitigation measures must be adopted.

# Adaptation: Limiting the Damage Done by a Changing World

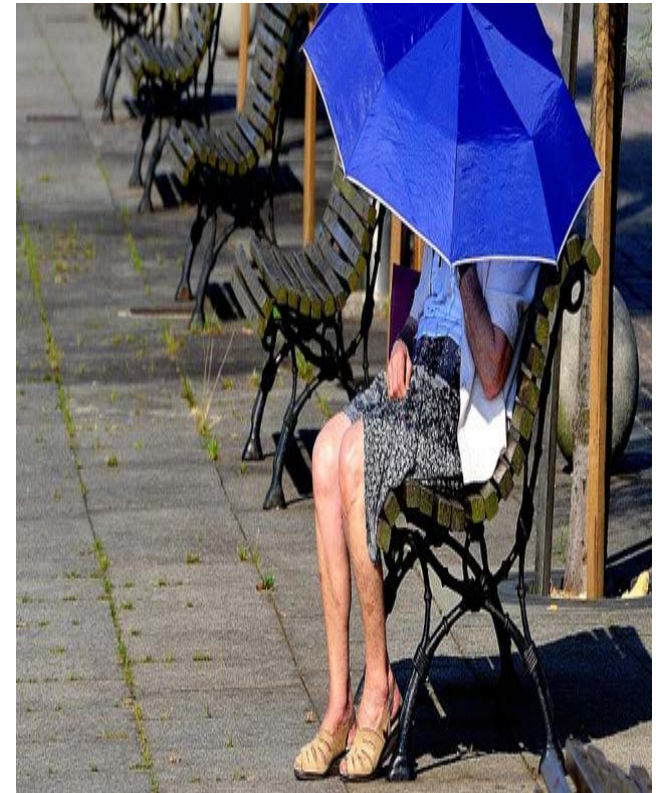
**Adaptation is “adjustment in natural or human systems to a new or changing environment that exploits beneficial opportunities or moderates negative effects.” (1)**

## Problem

- Drought in Africa
- Extreme Heat Events in Europe
- Urban flooding in North America

## Adaptation Strategy (1)

- Reducing non-climate stressors on water rec., sustainable urban devel., strengthen institutional capacities for demand mgmt.
- Warning systems, reduced emissions to improve air qual., residence, workplace modifications
- Use of pervious surfaces, rooftop gardens; wetland conservation, planting of mangroves, coast-protecting vegetation.



# Climate Change Mitigation: The Key to Stopping Further Climate Change

- Climate change mitigation is the **goal of “implementing policies to reduce greenhouse gas emissions and enhance sinks,”** ([1](#)) including
  - more efficient use of energy
  - expanded use of carbon neutral or low-carbon energy
  - reductions in deforestation and increases in reforestation
  - lifestyle and behavioral changes (such as energy conservation and reduced energy demand).

# Mitigation could have major health benefits

## Action

- Increasing safe active transport and use of lower-emission vehicles
- Increase use of clean-burning stoves
- Reduction in use of coal-generated electricity

## Outcome

- Reduce heart disease, cerebrovascular disease, dementia, depression([1](#))
- Reduce indoor air pollution exposure, respiratory illness([1](#))
- Lower air pollution, better respiratory health



# Addressing Climate Change is a Win-Win Situation

- Fossil fuel combustion creates dirty energy, endangering respiratory health
  - Switching to clean energy or reducing consumption can improve the air breathed by children, elderly, people with chronic illness
- Agriculture industry emits massive amounts of methane and other greenhouse gases
  - Reducing meat consumption in favor of more fruits and vegetables may contribute to a more healthy, balanced diet
- Healthy buildings – recycled construction materials, encourage use of stairs over elevators, use of natural lighting
  - Less construction-related pollution, improved physical activity from stair use, better mental health from day-lighting.(1)

# ACP Recommendation

- **The health care sector, within the United States and globally, must implement environmentally sustainable and energy-efficient practices and prepare for the impacts of climate change to ensure continued operations during periods of elevated patient demand.**

# The Health Care Industry is One of the Largest Consumers of Energy

- The health care sector is ranked second in energy use after the food industry
- It spends about \$9 billion annually on energy costs
- Power plant emissions are connected to premature deaths, chronic bronchitis, asthma attacks, emergency room visits and more.([1](#))
- Hospitals in the United States produce a massive amount of garbage/waste (>2.3 million tons per year)



# How Can You Help “Green” Your Facility?

- Transportation
- Energy operations
- Energy in the built environment
- Waste
- Food Service

(Source: [Health Care without Harm](#))



# Green Transportation Strategies

- Transportation is 27% of Total U.S. Greenhouse Gas Emissions ([1](#))
- **Reduce fleet emissions** – *Hospital fleets to include high-fuel efficiency, hybrid, alt fuel vehicles*
- **Help commuters reduce emissions** – *Encourage use of mass transit, carpooling, telecommuting for employees; shuttles to public transit*
- **choose suppliers with efficiency or alternate-fuel standards**
- **prefer local suppliers** – *reduce transportation and shipping distance, fuel consumption*
- **purchase energy-efficient shipping** – *choose lighter products with less packaging, encourage environmentally sustainable packaging* ([1](#))

# Case Study: Seattle Children's Hospital

- Hospital proposed **Comprehensive Transportation Plan** ([1](#))
  - Reduce vehicle traffic by shuttle links to transit hubs, parking changes, encourage carpooling, free transit for employees, vanpool service
  - Make area more walk-, cycling-friendly through capital investments that link hospital and surrounding community to larger walking/biking networks, free bikes to employees who pledge to bike to work, cash for those who don't drive to work, on-site bike maintenance, discounts on gear from in-house bike shop.
- “Seattle Children's Hospital is already more than halfway to its goal of getting from 50 percent car commuting to 30 percent.” ([1](#))

# Reduce Your Facility's Energy Use

- **Make buildings more energy efficient** – *switch to energy efficient light bulbs (CFLs, LED bulbs), turn down thermostat, upgrade major equipment to most energy-efficient model*
- **Install On-Site Renewable Energy Capability** - *Solar panels can generate a portion of facility's energy, solar hot-water heating system*
- **Purchase Energy-Efficient Products** – *Buy Energy Star or Federal Energy Management Program-designated products.*
- **Reduce Standby Energy Use** – *Plug computers/electronic equipment into power strip and turn off when not in use.*
- **Purchase Green Power** – *Use power generated from renewable sources like wind, solar.*

# Case Study: Boston Green Ribbon Commission Health Care Working Group

- 22 Boston-area hospitals participate. Commission's goal is 25% drop in GHG emissions by 2020, 80% by 2050
- Member hospitals achieved cuts in electricity, natural gas use, GHG reductions for all fuels.
- Sector energy use dropped by 6% from 2011-2013, "equal to eliminating GHG impact of an average care traveling over 85 million miles."
- Mass General cut GHG emissions by 35% in 2014, Boston Medical on track for a 45% cut in 2020, Brigham & Women's will reach 35% in 2020.
- **"Cost savings are conservatively estimated at \$11.9 million, enough to pay for healthcare for 1055 Massachusetts Medicare enrollees." (1)**





# Energy – The Built Environment

- **incorporate green building principles** – *Use day lighting, natural ventilation, green roofs.*
- **consider overall transportation impacts of facility siting** – *Site facility near public transportation hub, build in developed areas.*
- **use native vegetation and plant trees on site, use local and regional building materials** – *Trees, vegetation can reduce heat island effect, act as carbon sinks, native plants need less water.*
- **offset emissions from building construction** – *less energy required to transport local products to building site.*
- **purchase only lumber products certified by the Forest Stewardship Council** – *support sustainable forestry practices.*

# Case Study: Group Health Puyallup Medical Center



- Washington State facility first in nation to receive LEED for Healthcare Gold certification. ([1](#))
- Facility includes ground-level vegetation and green roof
- Designed for water use reduction – Special sensors activate cold water for cooling sanitized medical equipment only when necessary
- Uses a more efficient steam generator boiler
- Used local and/or recycled construction materials
- Car charging stations and bike racks on site.

# Reducing Health Care Waste for a Healthier Future

- **recycle and buy recycled products** – *Recycle all recyclable products, including electronics*
- **collect and recycle nitrous oxide anesthetic gases** – *limit the amount that escapes into atmosphere during use*
- **dispose of waste locally** – *Local disposal reduces travel-related emissions*
- **prevent waste** – **through recycled material use, reduced use of virgin material**
- **divert at least 90% of constructed waste** – *produced during construction and demolition*

# Case Study: Virginia Mason Single-Use Device Reprocessing Project

- Single-use devices, including arthroscopic/orthopedic, laparoscopic devices, end up in landfills and use energy during manufacturing, disposal and transport.
- VM worked with a reprocessing vendor to help them reduce costs and waste.
- Reprocessed devices must meet FDA safety standards
- Physicians on leadership team were consulted and visited reprocessing facility to observe quality control and inspection process.
- As a result purchasing costs dropped by \$3 million since 2012, in 2014 VM reported it had reprocessed or recycled nearly 19,000 pounds of devices.
- Education about benefits of reprocessing and sharing clinical data and research on the quality and safety comparability of reprocessed devices is key to achieving support. ([1](#))



# Food Service: Healthy Food, Healthy Planet

- **Reduce the amount of meat protein on menus** – Agriculture/meat protein production is a major source of greenhouse gas emissions.
- **buy local and seasonal food** – reduce long-distance food transport leads to lower emissions
- **procure organic food when possible** – Would reduce use of fossil fuel-related pesticides, fertilizers
- **compost food waste** - creates a recycled product (compost) that can replace fertilizer
- **eliminate bottled water** – encouraging tap water use will reduce waste.

# Case Study: Palomar Health's Sustainable, Local, Organic Food Initiative

- Increased purchasing of sustainable, local, organic (SLO) food
- Resulted in higher cafeteria revenue
- Worked with local produce vendors to purchase seasonal and bumper crops at reasonable prices
- Educated food service team, leading to better buy-in and promotion efforts
- 13% of total food purchasing is now SLO ([1](#))

# Green Tips for Small Practices

- **Energy Efficiency** – Turn off electronics when not in use; install energy-efficient lighting; lower thermostat 74F in summer, 68F in winter
- **Renewable Energy** – Purchase renewable energy from your utility company (or credits)
- **Water Efficiency** – Use tap instead of bottled water, promptly fix water leaks, install efficient fixtures.



(Source: My Green Doctor)

# Advocacy: How to Communicate about Climate Change

When discussing the issue with your colleagues, grand rounds audience, or your community, mention the following key points:

- Climate change is real and human-caused.
- Climate change is bad for us and our community in a number of ways.
  - *Localize the issue (if you live in S. Florida, talk about how climate change could worsen flooding, leading to displacement, dampness-related respiratory illness, etc.)*
- We need to start taking action now to protect the health of our community's most vulnerable members—including our children, our seniors, people with chronic illnesses, and the poor—because our climate is already changing and people are already being harmed.
- Taking action creates a “win-win” situation for us because, in addition to dealing with climate change, most of these actions will benefit our health too.
  - *For example, walking or biking instead of driving short distances could reduce the risk of cardiovascular disease as well as reduce greenhouse gas emissions.*



# To consider also:



- Internal carbon pricing

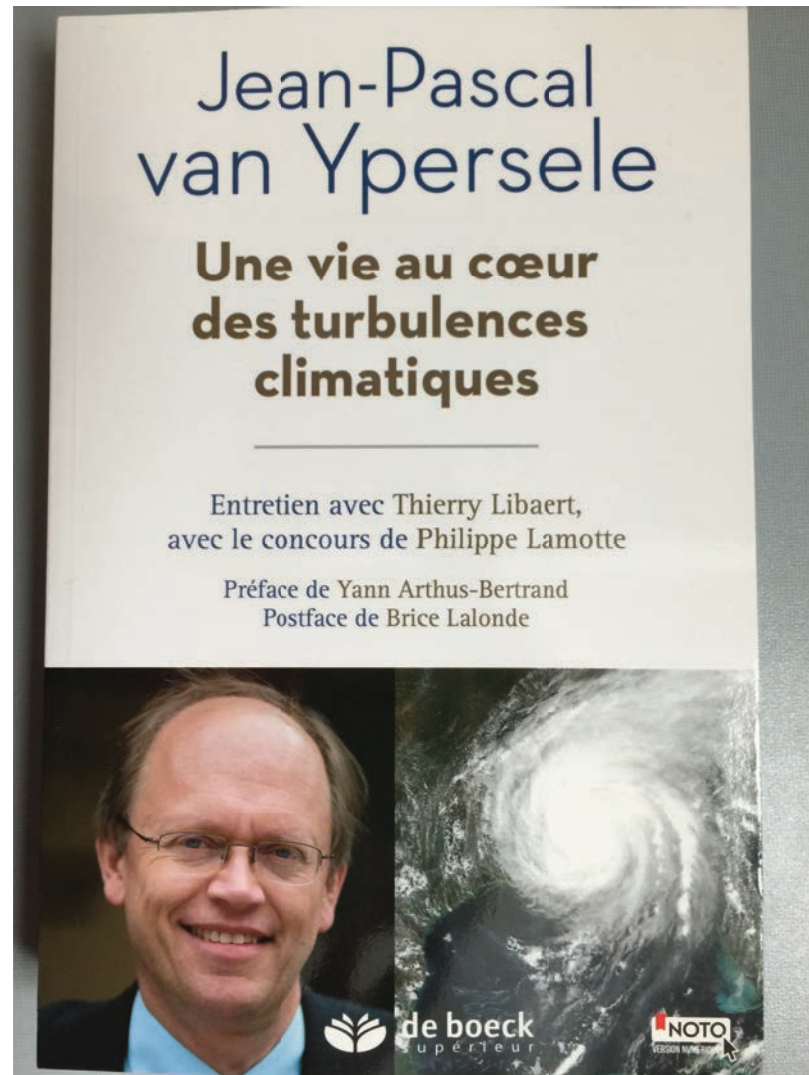
# Useful links:

- [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**

# More Resources

- Intergovernmental Panel on Climate Change (IPCC) - <http://www.ipcc.ch/>
- U.S. Global Change Research Program - <http://www.globalchange.gov/>
- Health Care without Harm (U.S./Canada) - <https://noharm-uscanada.org/>
- My Green Doctor - <http://www.mygreendoctor.org/>
- Climate for Health - <http://climateforhealth.org/>

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# Messages clés

- **Le climat se réchauffe sous l'effet des émissions humaines de gaz à effet de serre**
- **D'ici la fin du siècle, la température globale risque d'être plus élevée que jamais au cours des 2 à 3 derniers millions d'années**
- **Le niveau des mers, les ressources en eau, les écosystèmes, la santé humaine et animale risquent d'en être sérieusement affectés**
- **Toutes les régions seront frappées, et les PeD d'abord**
- **L'adaptation est nécessaire, mais a ses limites**
- **La prévention (réduction des émissions) est indispensable et doit être ambitieuse, mais est de longue haleine**
- **Bien conçues, des politiques de réduction d'émission de GES peuvent contribuer à améliorer la qualité de l'air, ce qui a des effets rapides sur la santé**
- **Les rapports du GIEC ([www.ipcc.ch](http://www.ipcc.ch)) sont une très bonne source d'information**
- **Le corps médical a un rôle important à jouer**