Climate change:

What do we urgently need a clean energy transition?

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Former IPCC Vice-Chair (2008 - 2015)

Twitter: @JPvanYpersele

The Clean Energy Transition: From Vision to Reality,
High Level Policy Event, European Energy Research Alliance (EERA),
Brussels, 20 October 2021

Thanks to the Walloon Government (funding the Walloon Platform for IPCC)
to my team at UCLouvain for their support

The Essential Truth About Climate Change in Ten Words

The basic facts of climate change, established over decades of research, can be summarized in five key points:

IT'S REAL	Global warming is happening.
IT'S US	Human activity is the main cause.
EXPERTS AGREE	There's scientific consensus on human-caused global warming.
IT'S BAD	The impacts are serious and affect people.
THERE'S HOPE	We have the technology needed to avoid the worst climate impacts.

Source: @JohnfoCook

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…)

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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

Fact: Because we use the atmosphere as a free dustbin for our greenhouse gases, we thicken the thermal insulation layer around the planet

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

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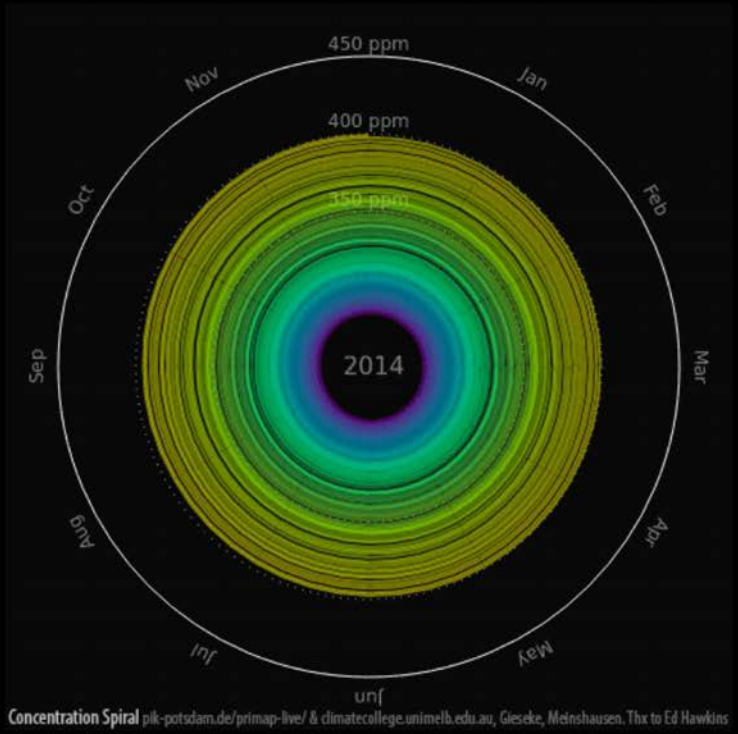
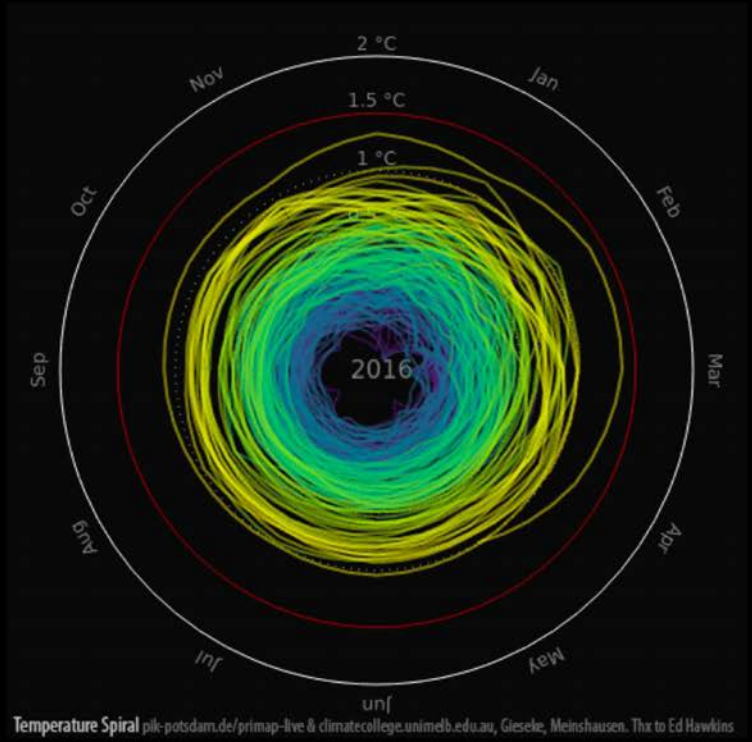
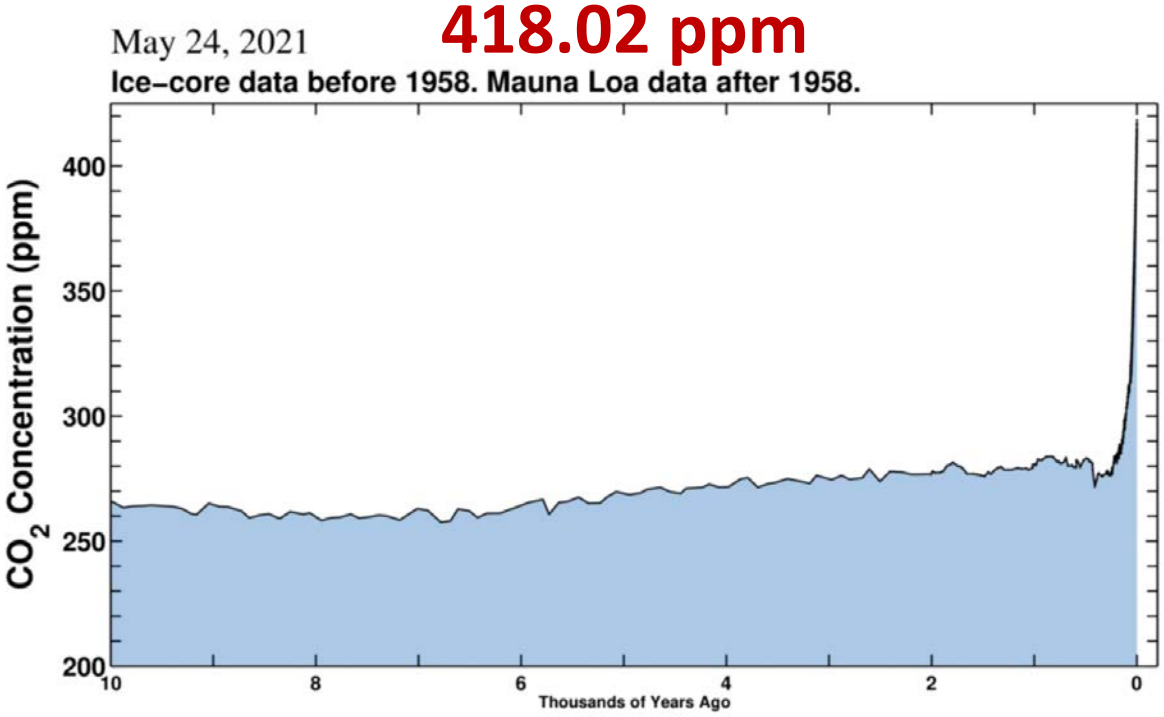
CO_2 Concentration and Temperature spirals





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 24 May 2021 (Keeling curve + last 10000 years)



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

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

The science about this is now crystal clear

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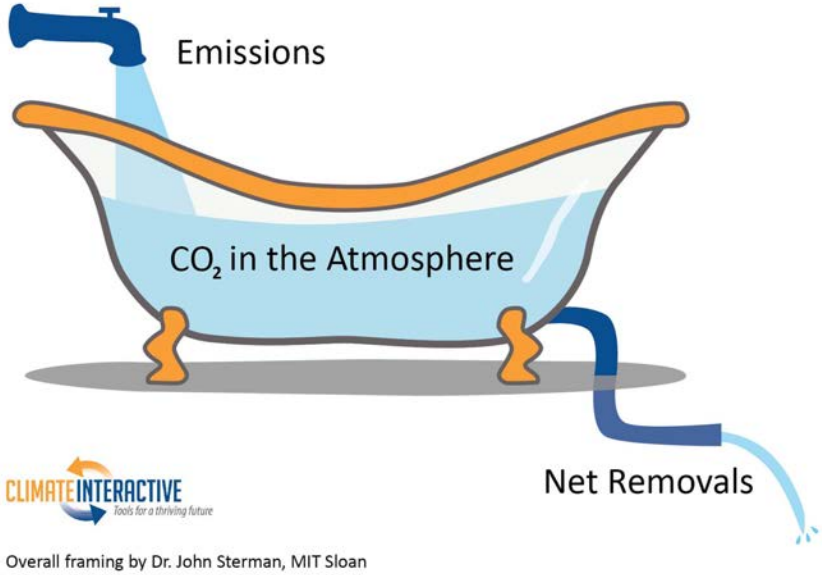
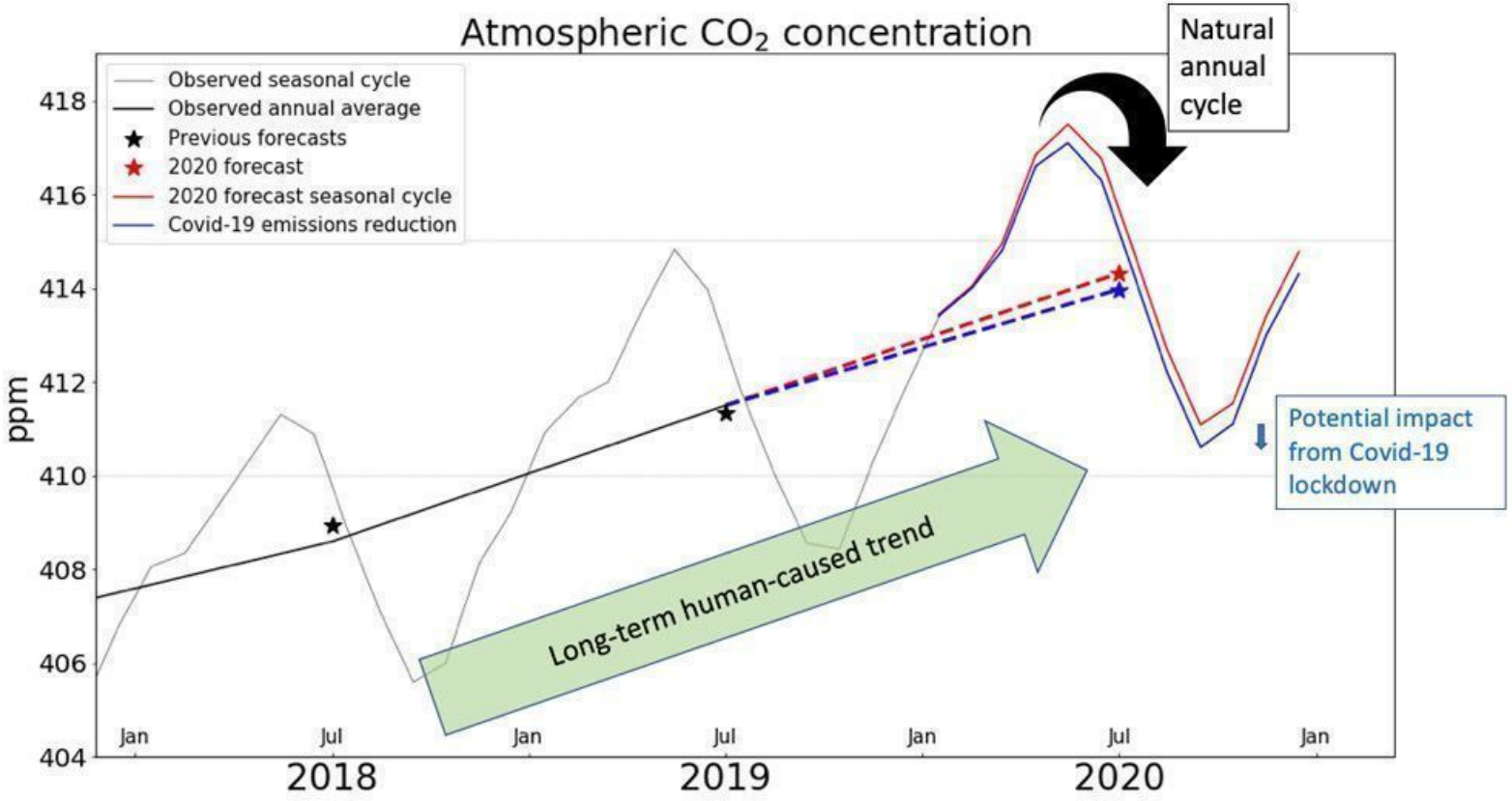
The Carbon Bathtub



Source: @CarbonInteractive

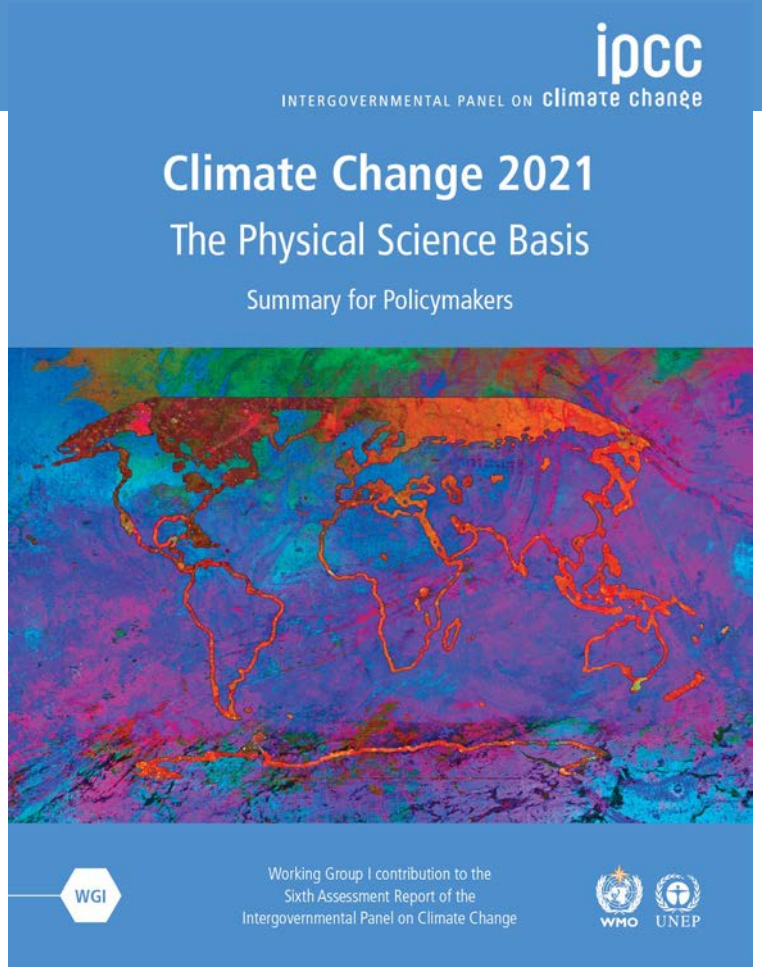
« Covid19 »: a very small effect on CO_2 concentration



Source: @CarbonBrief, mai 2020 @JPvanYpersele

SIXTH ASSESSMENT REPORT

Working Group I – The Physical Science Basis



BY THE NUMBERS

Author Team

234 authors from **65** countries

28% women, **72%** men

30% new to the **IPCC**

Review Process

14,000 scientific publications assessed

78,000+ review comments

46 countries commented on Final Government Distribution

Human influence has warmed the climate at a rate that is unprecedented in at least the last 2000 years

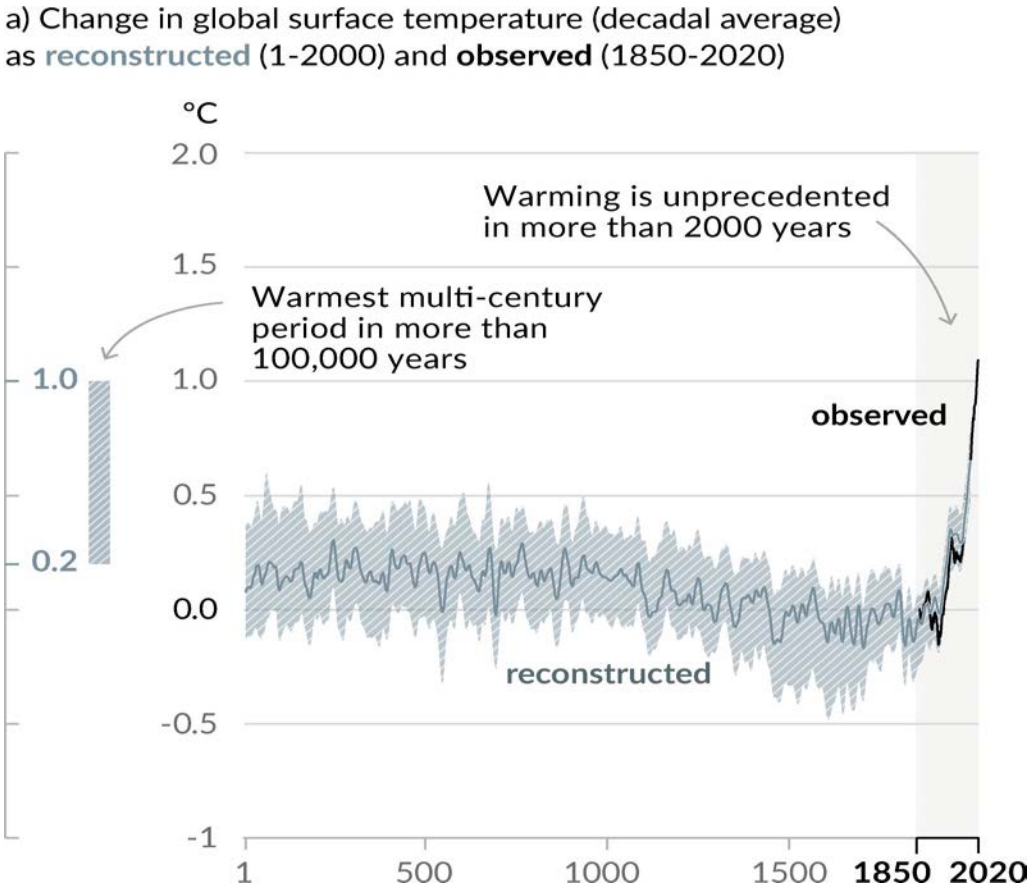


Figure SPM.1

Progression of Understanding: Greater and Greater Certainty in Attribution

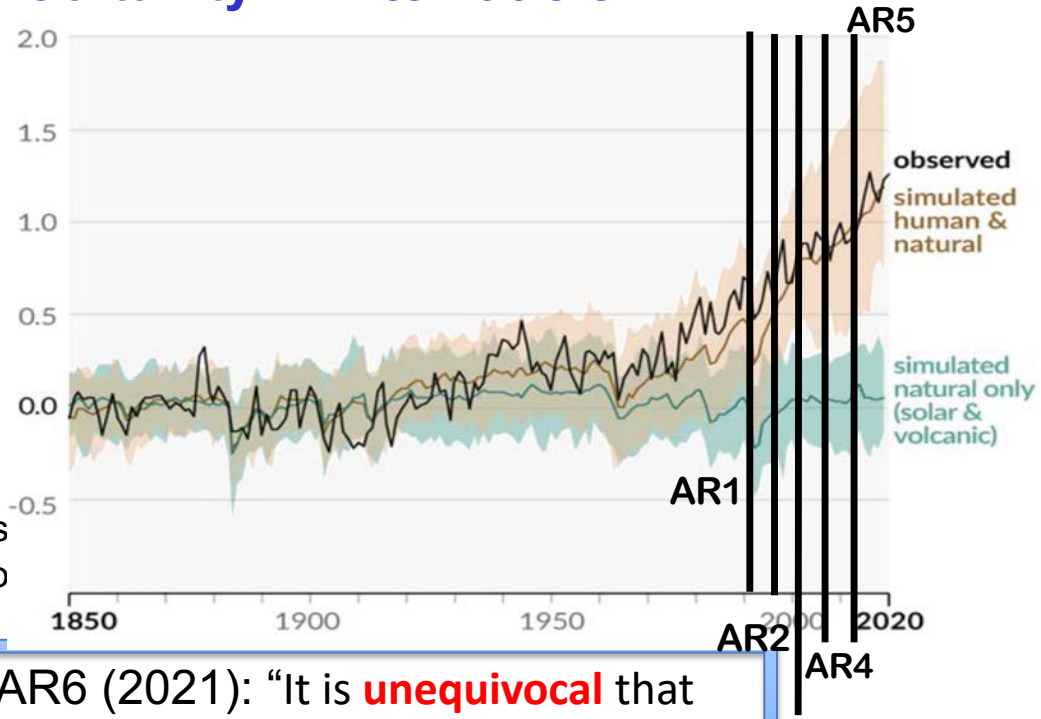
AR1 (1990): “unequivocal detection not likely for a decade”

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”

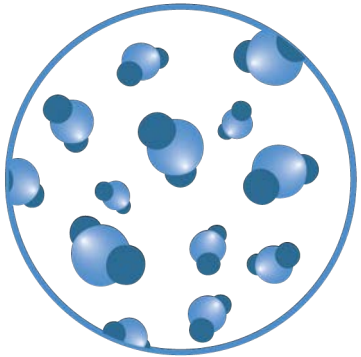
AR5 (2013) «It is **extremely likely** (odds 95 out of 100) that human influence has been the dominant cause… »



AR6 (2021): “It is **unequivocal** that human influence has warmed the atmosphere, ocean, and land.”

IPCC

CO_2
concentration



Highest

in at least

2 million years

Sea level
rise

Fastest rates

in at least

3000 years

Arctic sea ice
area

Lowest level

in at least

1000 years

Glaciers
retreat

Unprecedented

in at least

2000 years

Human-induced climate change is already affecting many weather and climate extremes in every region across the globe

Extreme heat

More frequent

More intense

Heavy rainfall

More frequent

More intense

Drought

Increase in some regions

Fire weather

More frequent

Ocean

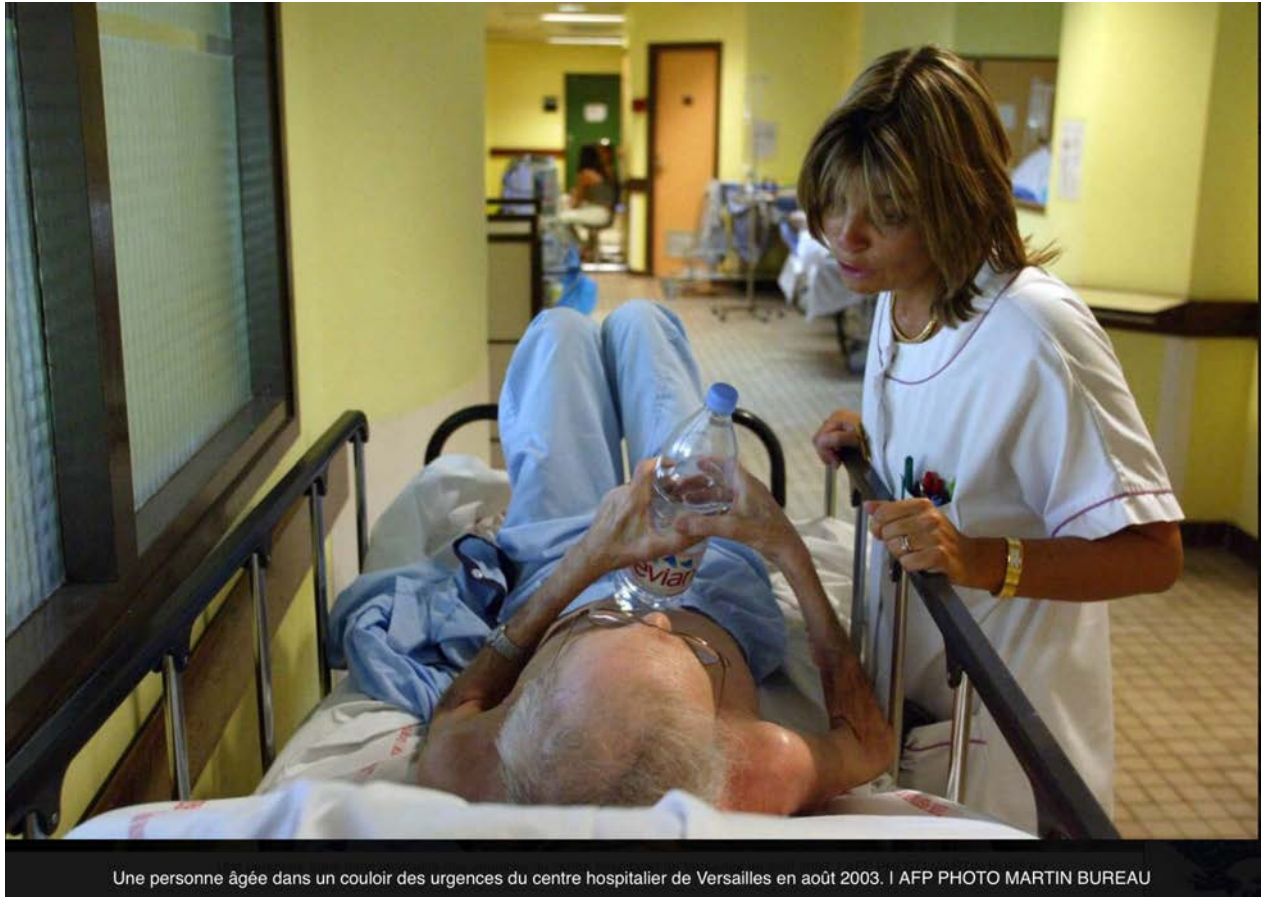
Warming

Acidifying

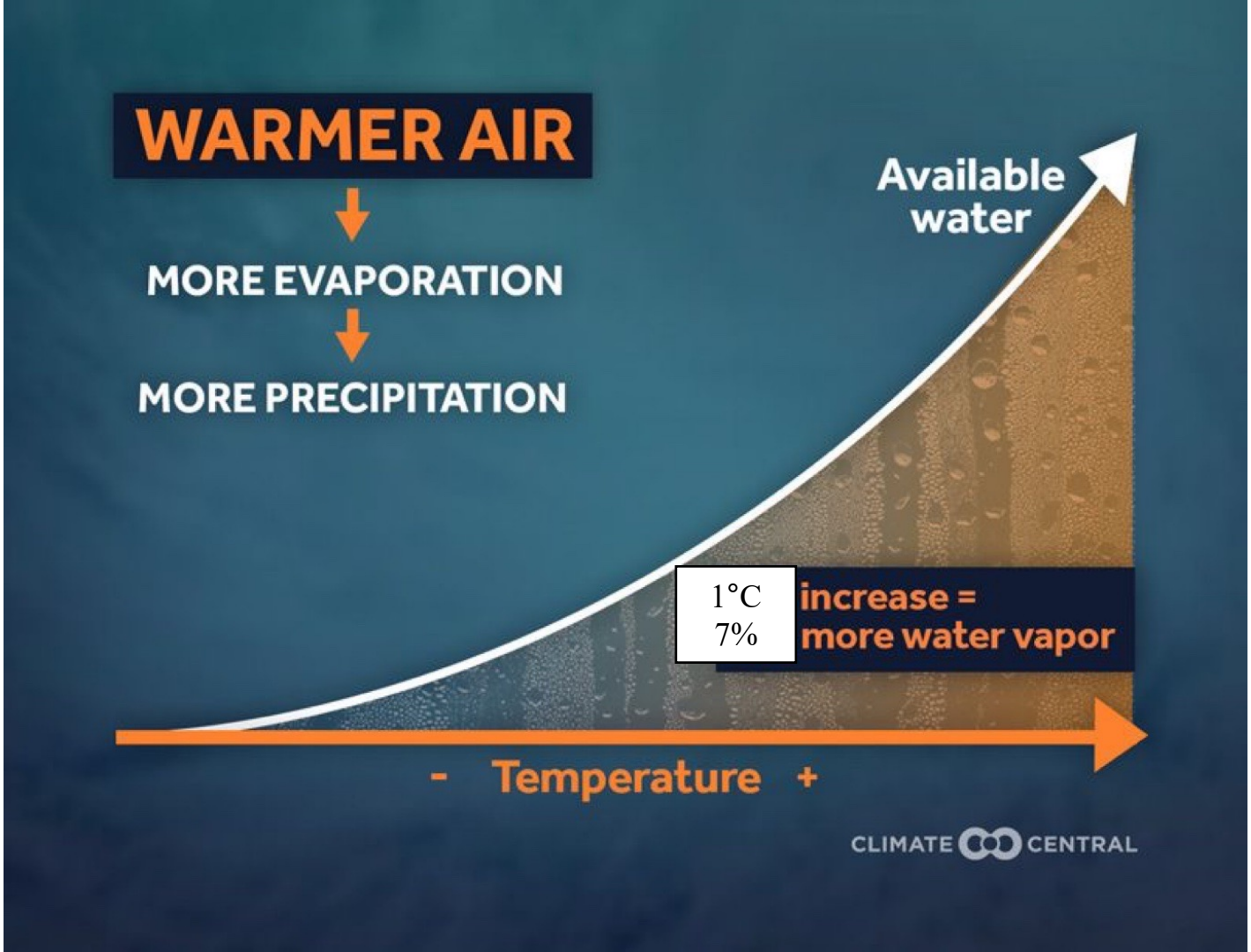
Losing oxygen

Photo Credits from left: 1. Luiz Guimaraes 2. Jonathan Ford 3. Peter Burdon 4. Ben Kuo 5. NOAA

Heat waves kill (Ex: 2003 summer in EU: 70000 deaths)

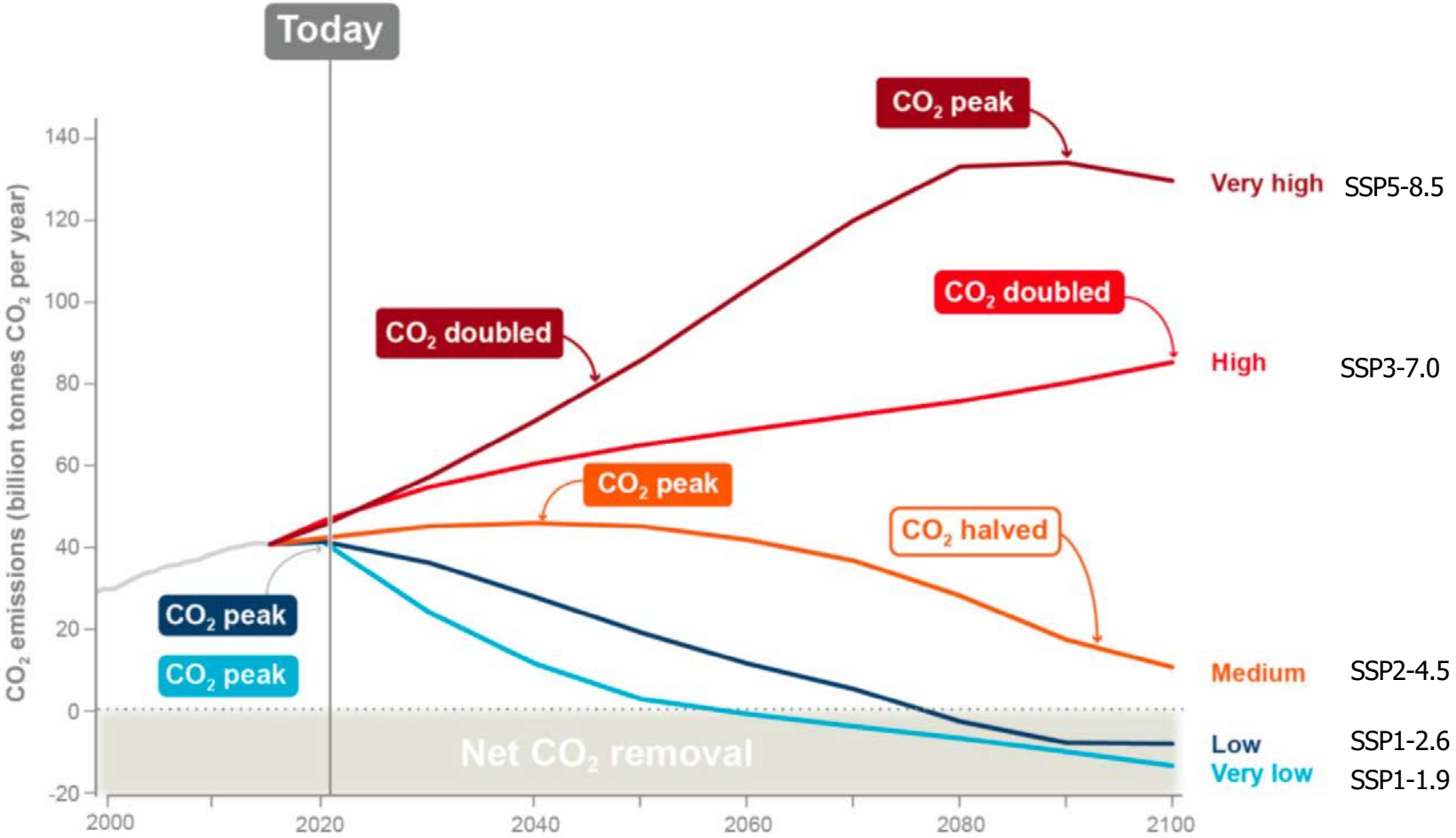


Une personne âgée dans un couloir des urgences du centre hospitalier de Versailles en août 2003. I AFP PHOTO MARTIN BUREAU


WARMER AIR
MORE EVAPORATION
MORE PRECIPITATION
Available water
1°C
7%
increase =
more water vapor
- Temperature +
CLIMATE CENTRAL

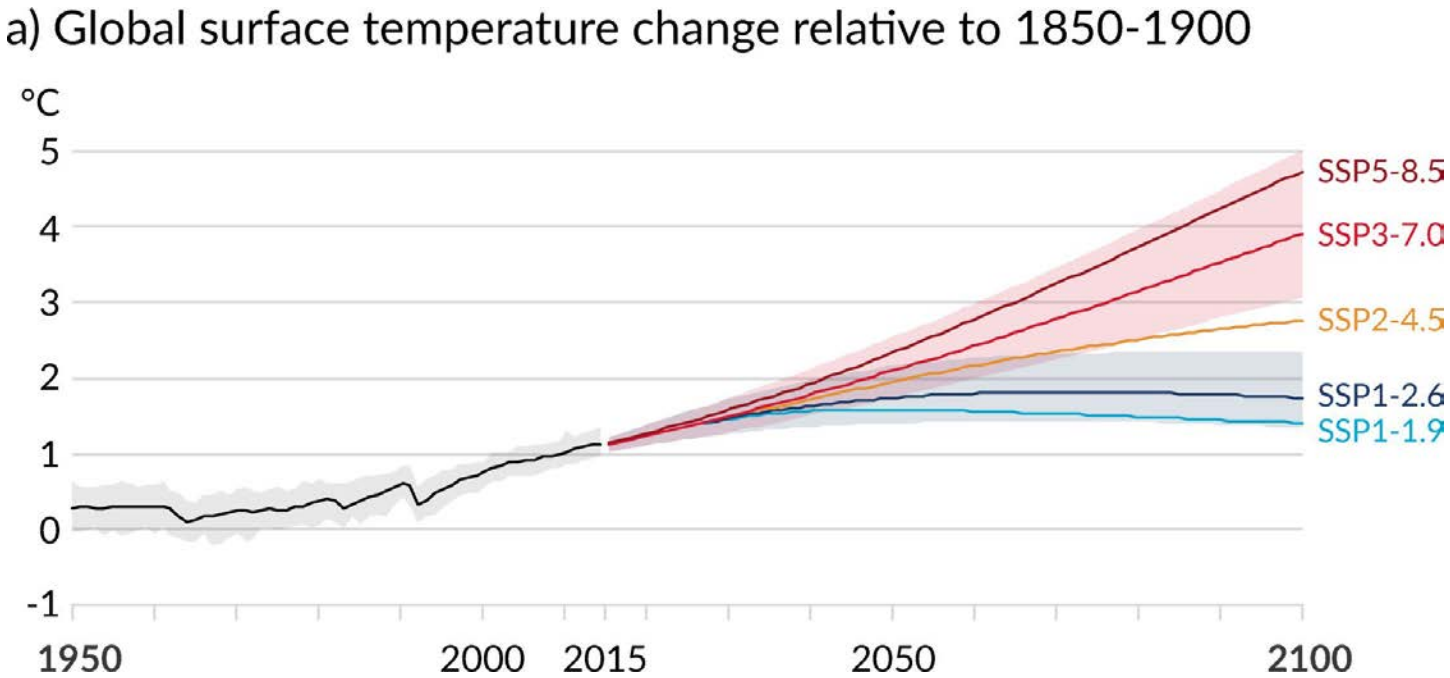
Wallonia Floods, July 2021

Source:
VRT Nieuws


Today
CO_2 peak
Very high
SSP5-8.5
CO_2 doubled
CO_2 doubled
High
SSP3-7.0
CO_2 peak
CO_2 halved
Medium
SSP2-4.5
CO_2 peak
CO_2 peak
Low
SSP1-2.6
Very low
SSP1-1.9
Net CO_2 removal
CO_2 emissions (billion tonnes CO_2 per year)
140
120
100
80
60
40
20
0
-20
2000
2020
2040
2060
2080
2100

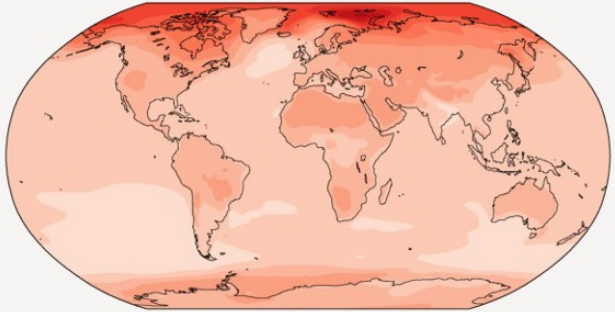
Human activities affect all the major climate system components, with some responding over decades and others over centuries

Figure SPM.8

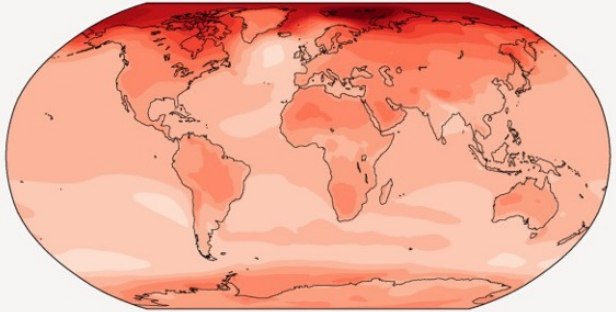


Across warming levels, land areas warm more than oceans, and the Arctic and Antarctica warm more than the tropics

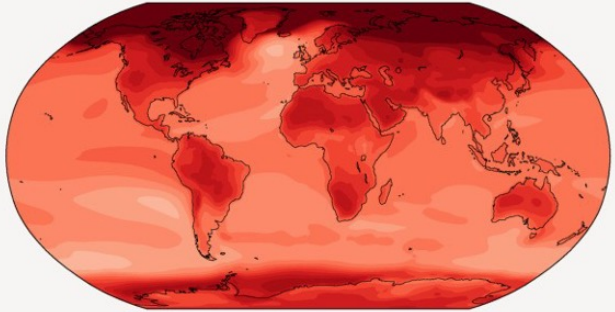
+1.5° C

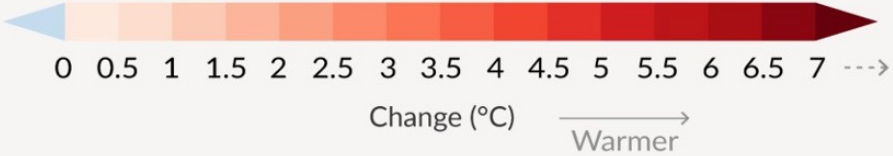


+2° C



+4° C



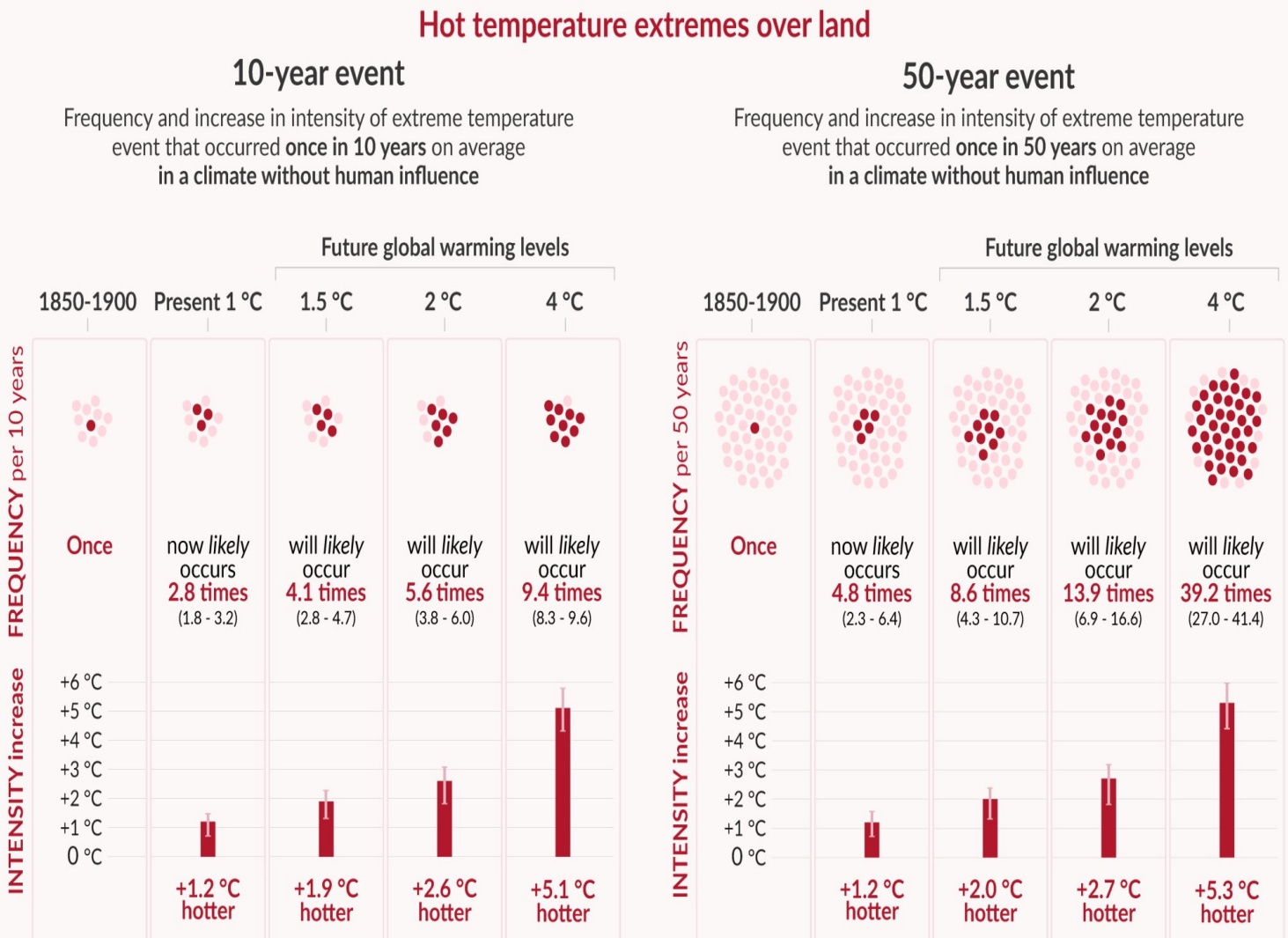


IPCC 6th ASSESSMENT REPORT

Working Group I – The Physical Science Basis

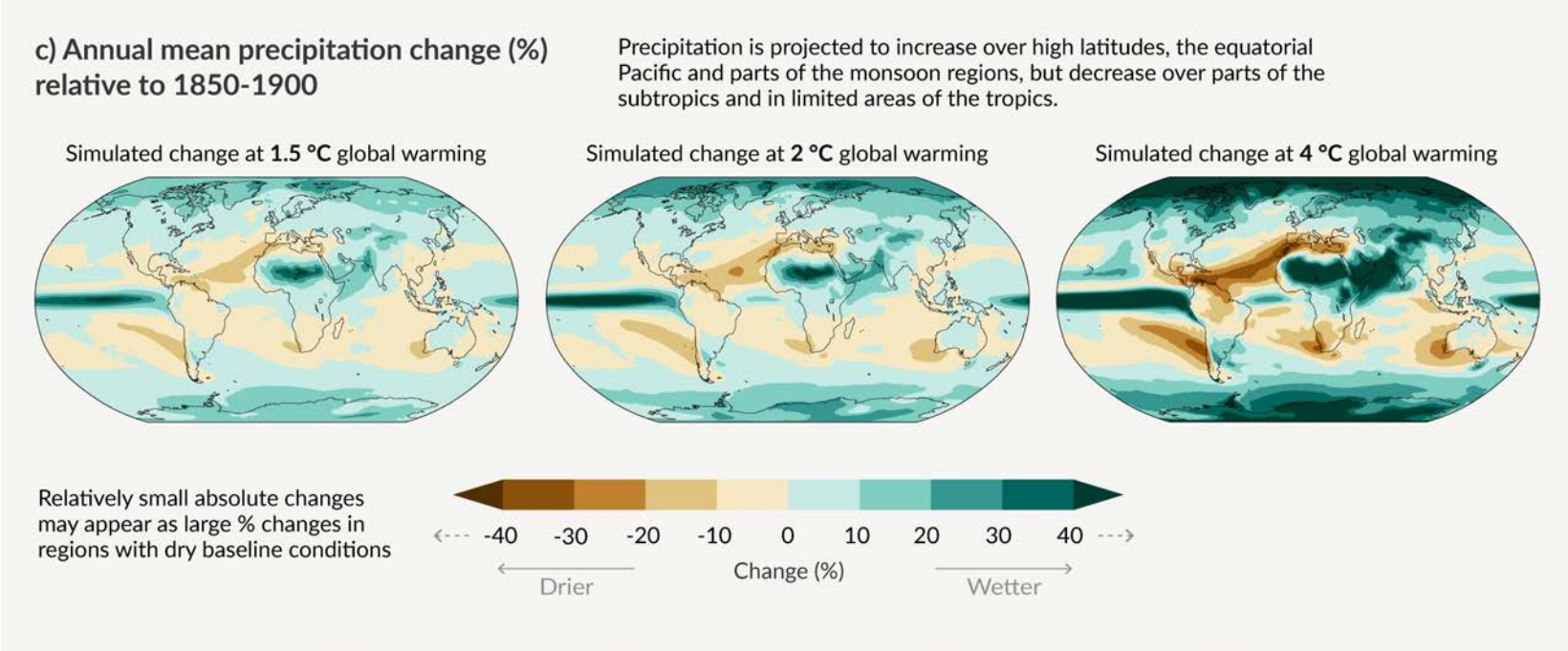
Projected changes in extremes are larger in frequency and intensity with every additional increment of global warming

Figure SPM.6



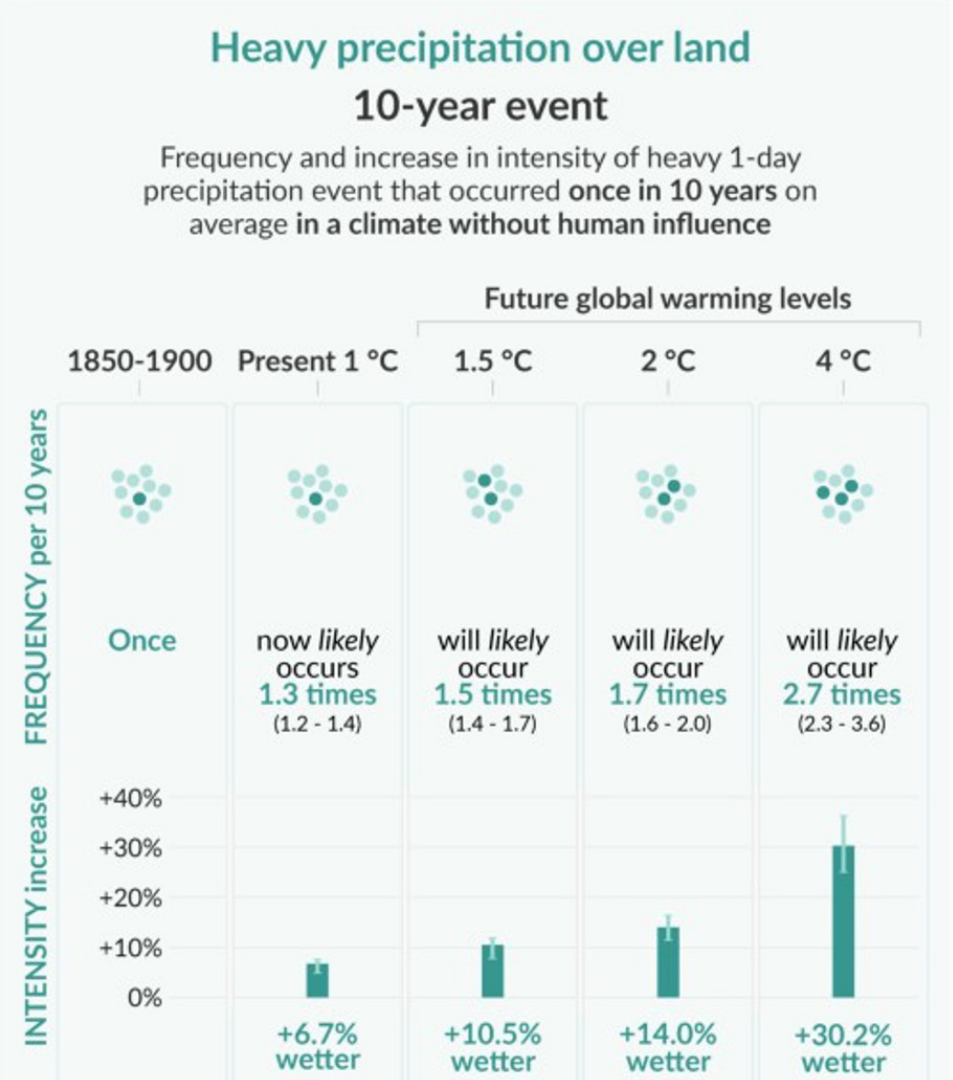
With every increment of global warming, changes get larger in regional mean temperature, precipitation and soil moisture

Figure SPM.5



IPCC 6th ASSESSMENT REPORT

Working Group I – The Physical Science Basis



IPCC AR6 WGI SPM
Figure SPM.6

Fact: Average temperature is on its way to exceed the « conservation temperature » for the Greenland and (some of the) Antarctic ice sheet

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

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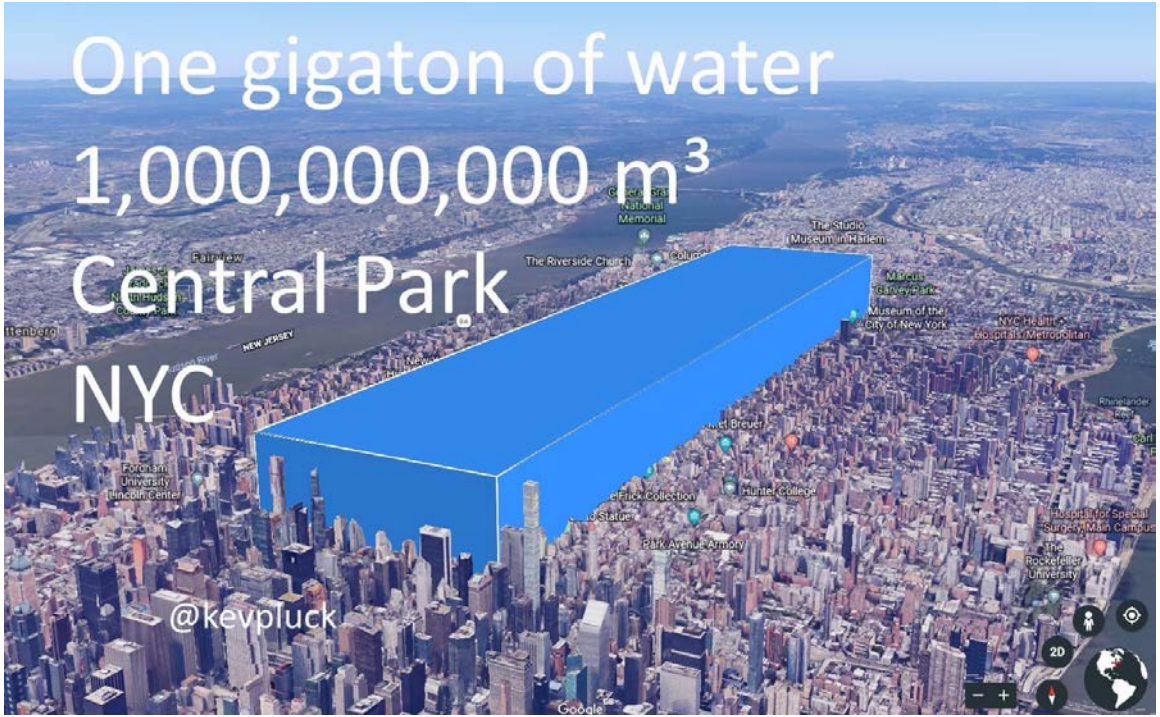
The Antarctic Ice Sheet presently loses 1 Gt of ice every 1.5 day

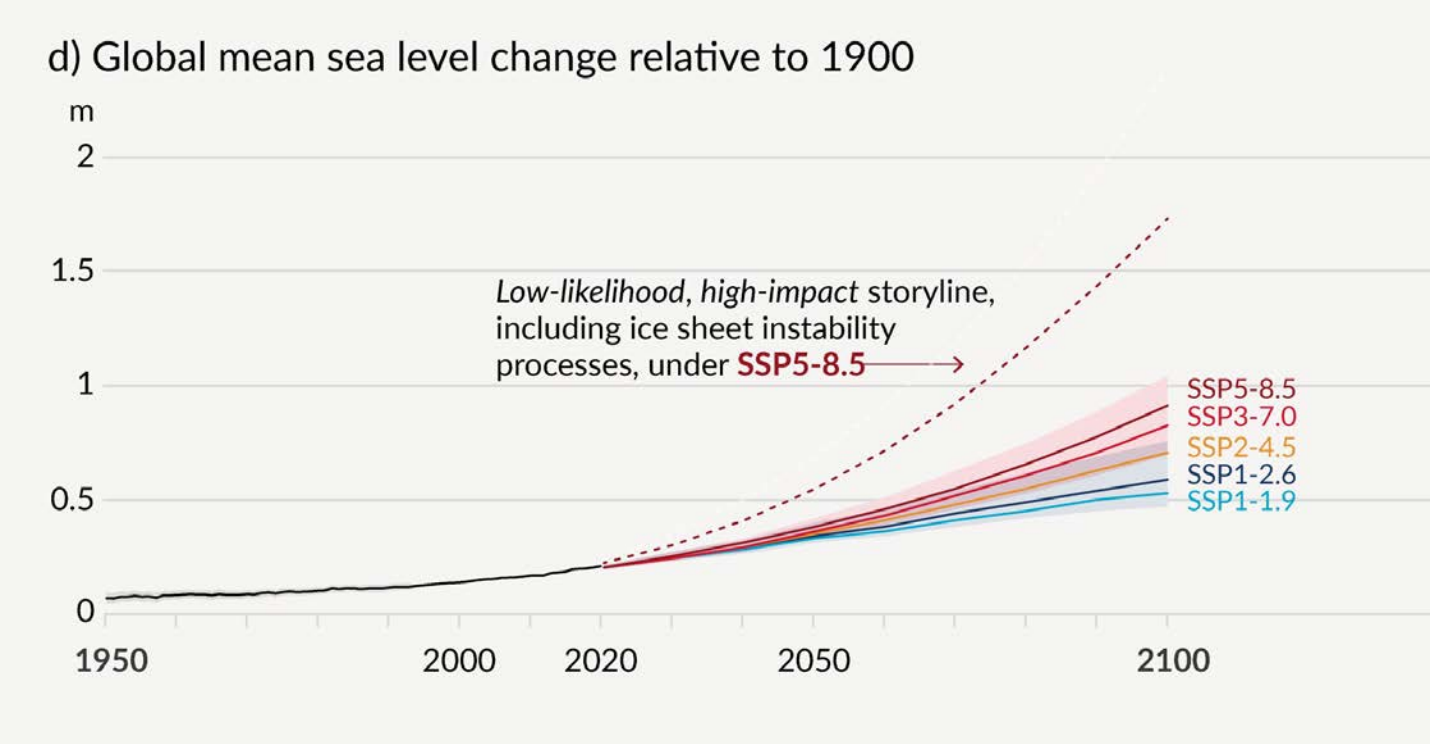


Source: @Kevpluck, June 2018

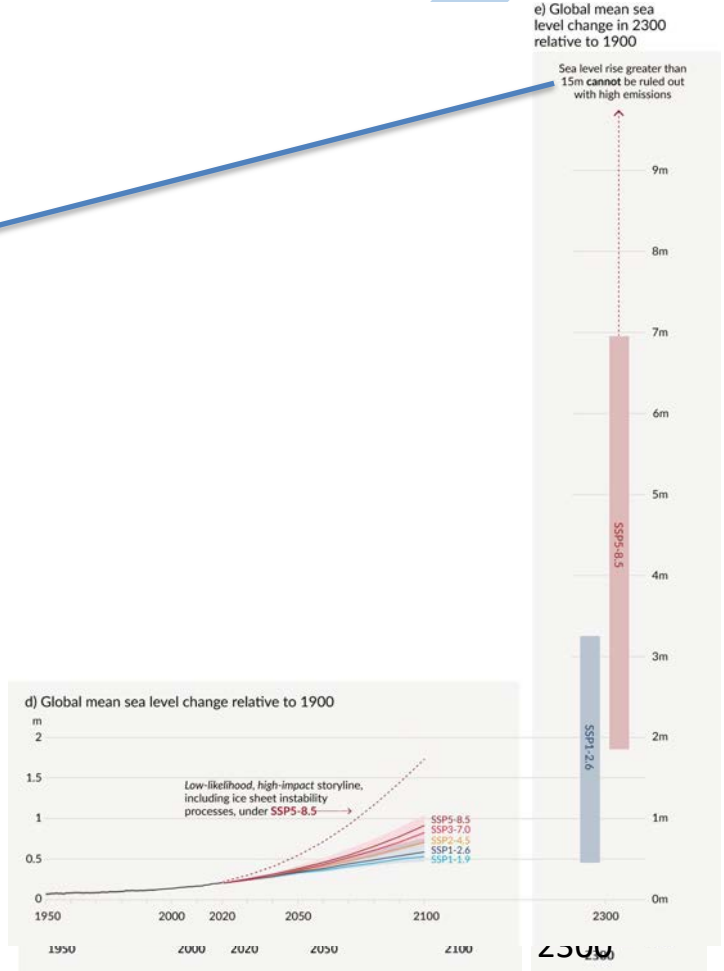
Sea Level

Human activities affect all the major climate system components, with some responding over decades and others over centuries

Figure SPM.8



« Sea level rise **greater than 15 m** cannot be ruled out with high emissions »



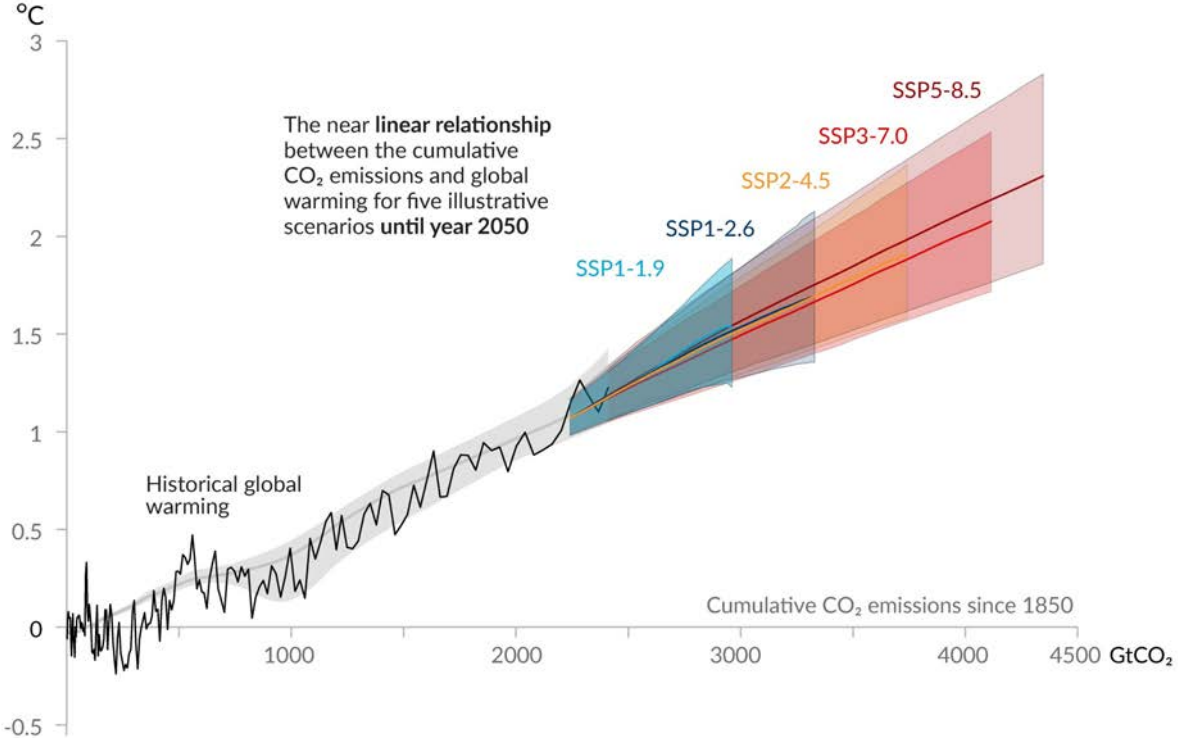
7 m

2 m

Every tonne of CO_2 emissions adds to global warming

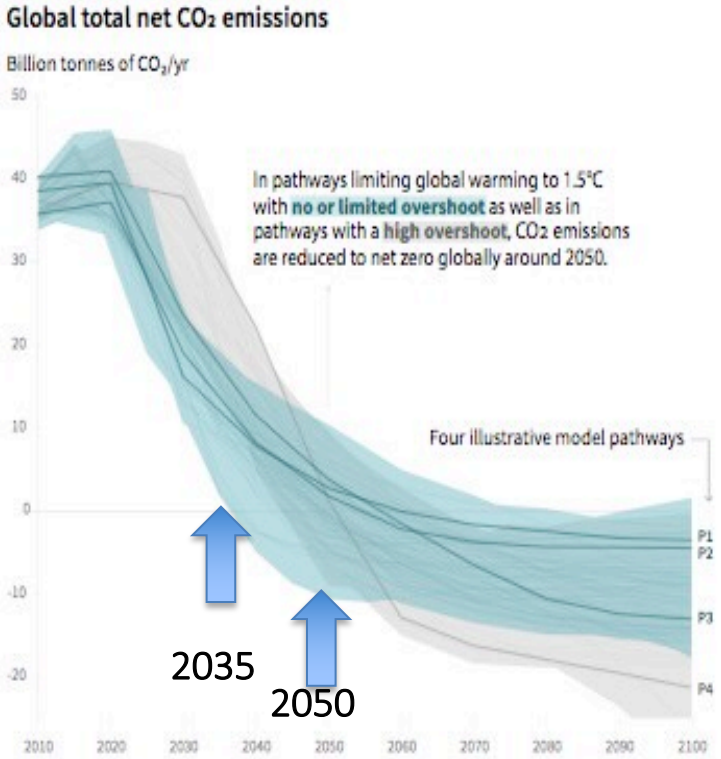
Figure SPM.10

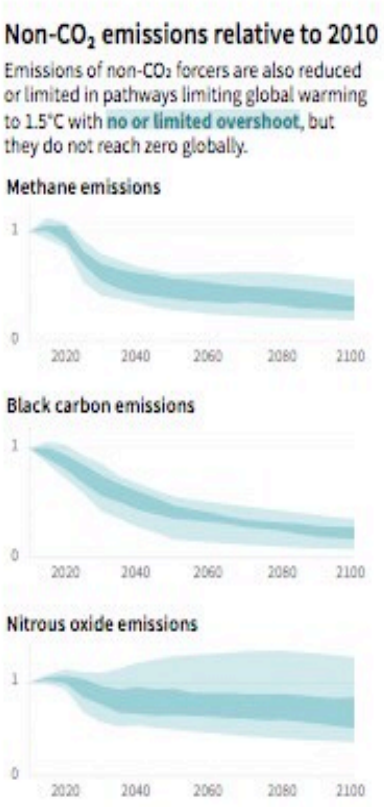
Global surface temperature increase since 1850-1900 (°C) as a function of cumulative CO_2 emissions ($GtCO_2$)



Emission pathways compatible with below 1.5° C warming:

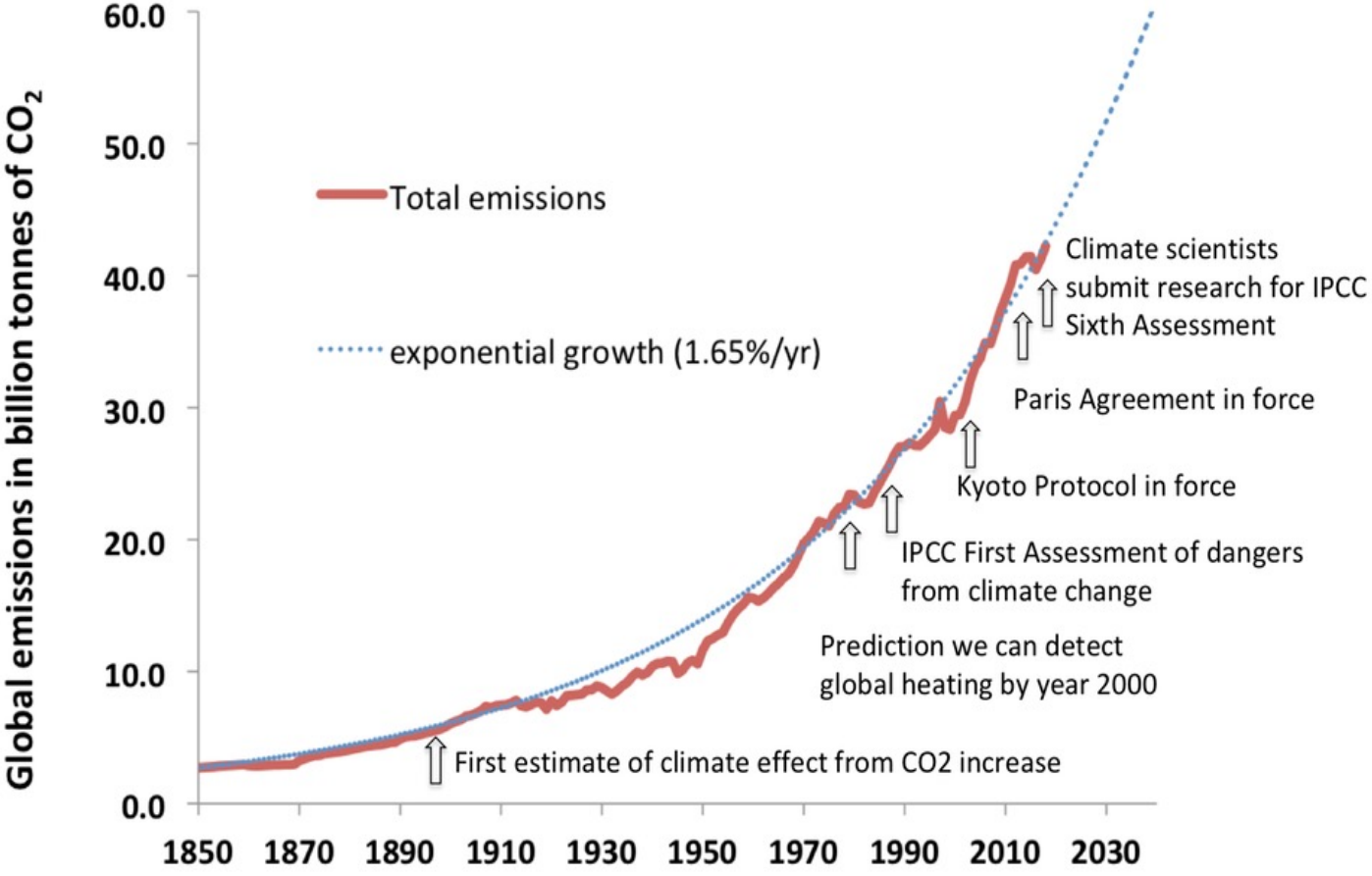
Net ZERO:





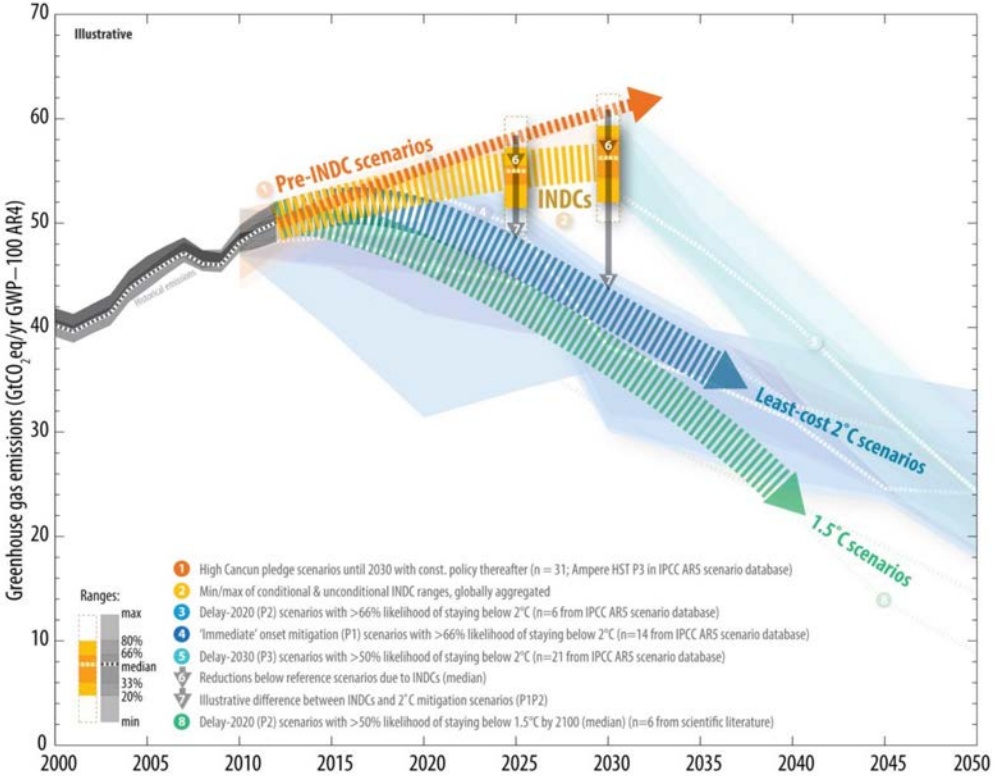
Source: IPCC Special Report on Global Warming of 1.5°C

Source: IPCC SR15



Source: Wolfgang Knorr, in The Conversation (2019)

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

RCP2.6 **RCP8.5**

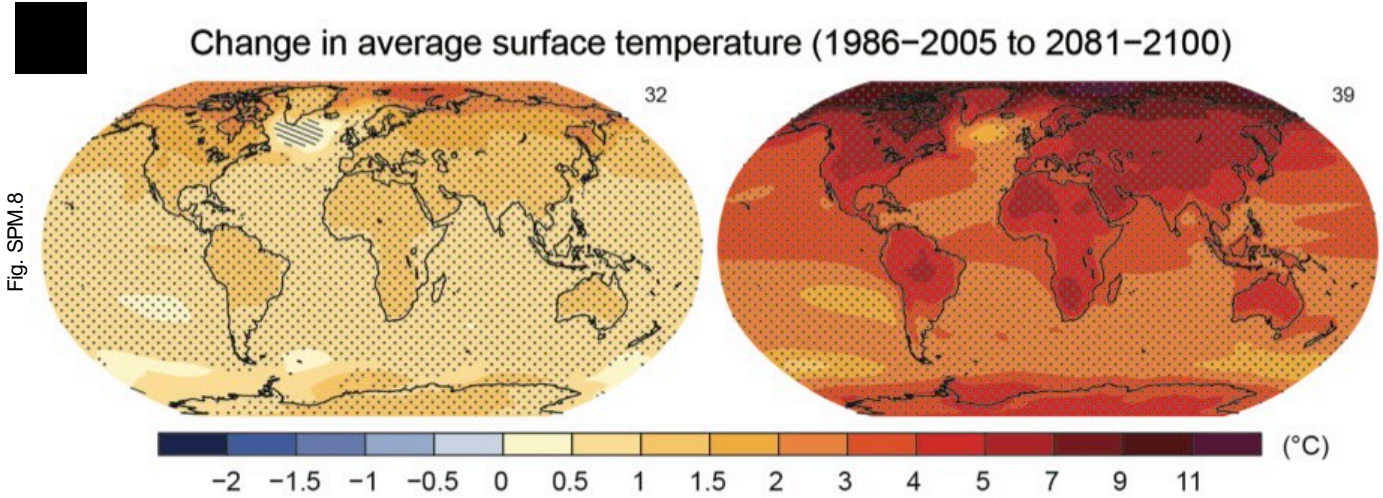
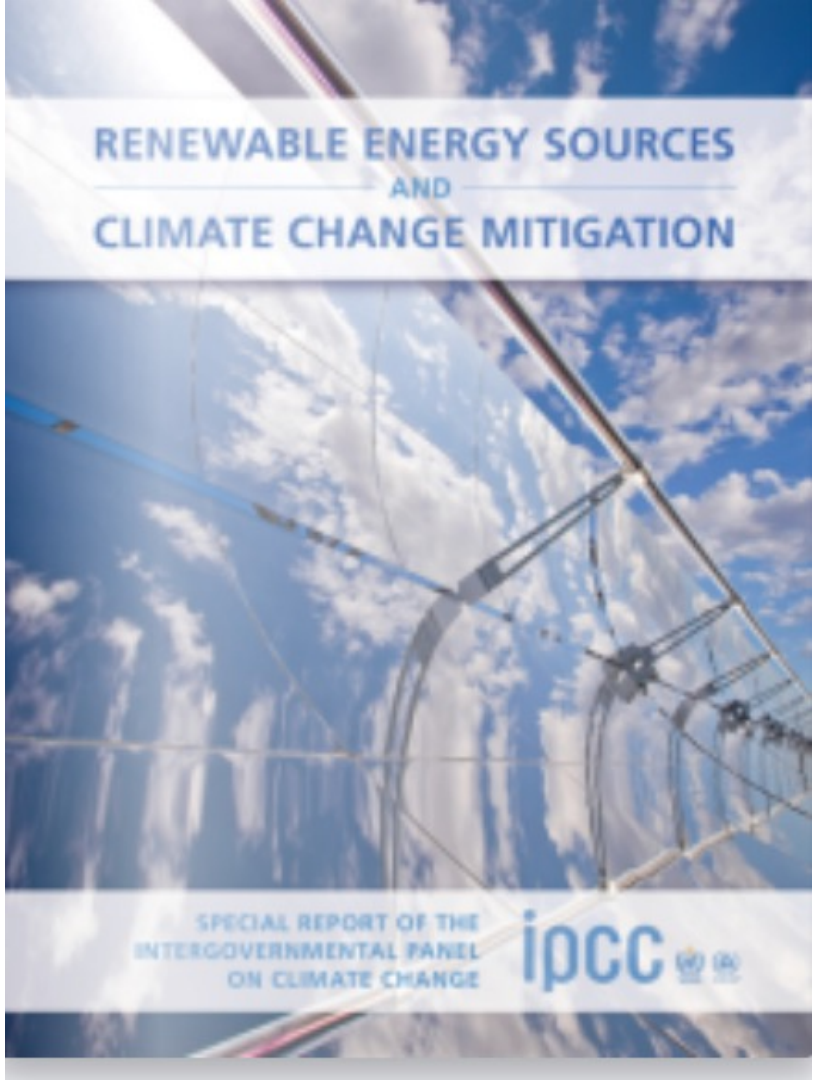


Fig. SPM.8

Humanity has the choice

SUSTAINABLE DEVELOPMENT GOALS

IPCC Special Report (2011)



Conclusions (1/2)

The IPCC AR6 WGI report confirmed that the inhabitability of the Earth is at stake due to climate change

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, to stop deforestation, and to store more carbon in soils and biomass (while protecting biodiversity)

Conclusions (2/2)

The challenge is huge: transform the world in a few decades so that the whole world activities are decarbonized, while the other Sustainable Development Goals are achieved (eliminating poverty and hunger, providing decent jobs, protecting nature, …)

Addressing this challenge offers many opportunities, especially if it is made in a synergistic manner

A just transition to a much more sober and cleaner energy system is urgently needed

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

Plateforme Wallonne pour le GIEC

Lettre N°13 - avril 2019

'Sauver le climat' : les bases

Suite à l'intense mobilisation des jeunes, les changements climatiques ont fait l'objet de beaucoup d'attention au cours des derniers mois. Elèves du secondaire, étudiants, professeurs, parents et grand-parents sont descendus dans la rue pour montrer leur désarroi face à la lenteur de l'action vis-à-vis des changements climatiques.

Nous nous réjouissons de cette mobilisation, car notre rôle nous met encore plus fréquemment que l'ensemble de la population en position de témoin des risques que font courir les changements climatiques, ainsi que de l'ampleur des efforts nécessaires pour mettre en œuvre les objectifs que se sont fixés les membres des Nations Unies à Paris en 2015 (COP21).

Une démarche essentielle en faveur de ces jeunes est de les aider à se former, à appréhender les principaux éléments de la problématique du climat, et plus largement, de l'influence de nos activités sur notre environnement et sur le futur de l'humanité. L'éducation est un des instruments essentiels pour évoluer vers une société plus durable et plus juste.

Pour y contribuer, nous présentons ici une brève synthèse de la problématique et une sélection de références commentées. Nous espérons que cette Lettre aidera enseignants et élèves à disposer d'une base d'information solide et ainsi à prendre leur part dans la solution à ce problème planétaire : agir à leur niveau et favoriser l'action dans leur entourage et au niveau sociétal.

Plusieurs témoignages d'élèves ou de professeurs sont également présentés.

Nous vous souhaitons une bonne lecture !

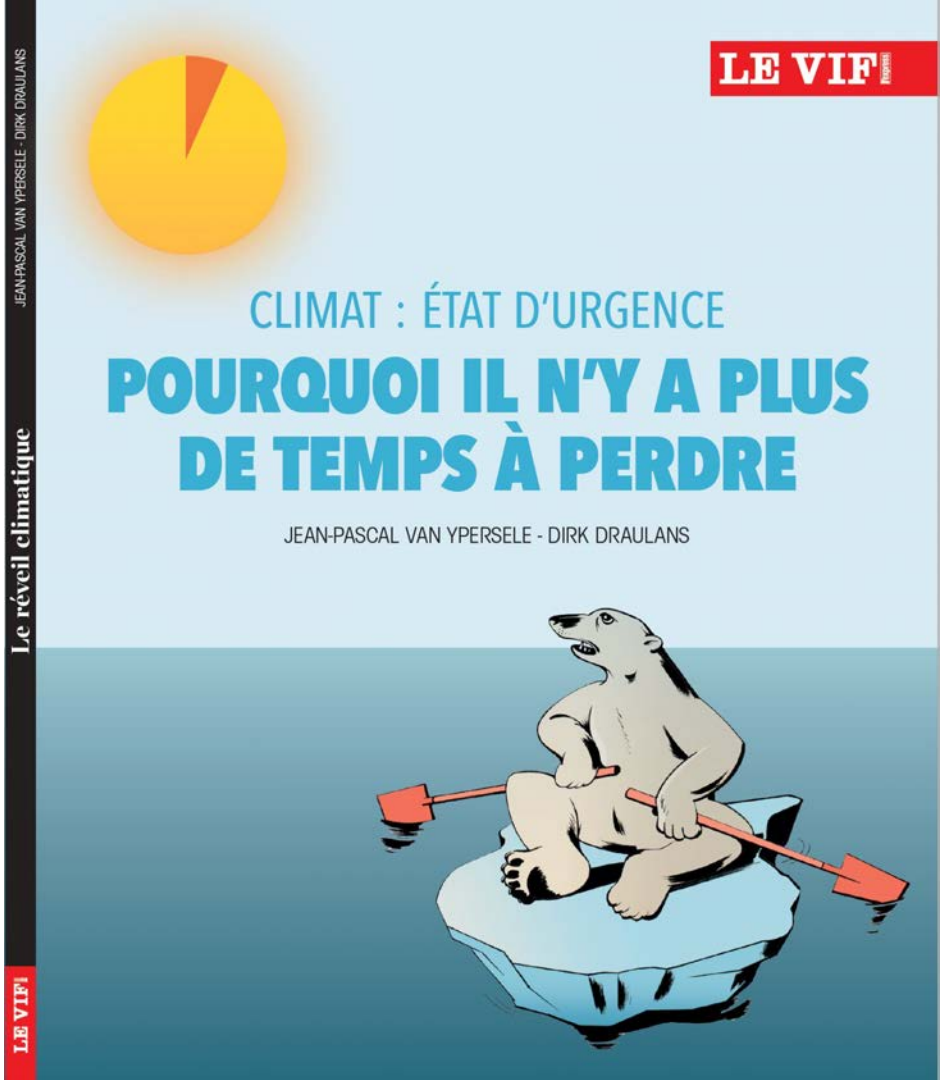
Jean-Pascal van Ypersele, Philippe Marbaix et Bruna Gaino

Sommaire

Wallonie environnement Awac

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

Knack

To go further :

- www.climate.be/vanyp : my slides (under «conferences»)
- www.ipcc.ch : IPCC
- www.skepticalscience.com : answers to the merchants of doubt arguments
- www.plateforme-wallonne-giec.be : IPCC-related in French, Newsletter, latest on climate, basic climate science
- **Twitter: @JPvanYpersele & @IPCC_CH**

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