

Climate change and the urgency to decarbonise while pursuing the SDGs*

Jean-Pascal van Ypersele

(Université catholique de Louvain)

Former IPCC Vice-Chair (2008 - 2015)

Twitter: @JPvanYpersele

**Think tank on « Global mineral supply and meeting the challenge
of future demand », Bluebridge, Ostende, 22 October 2021**

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

*** SDG = Sustainable Development Goals, adopted by the UN in 2015**

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
IT'S US
EXPERTS AGREE
IT'S BAD
THERE'S HOPE

Global warming is happening.

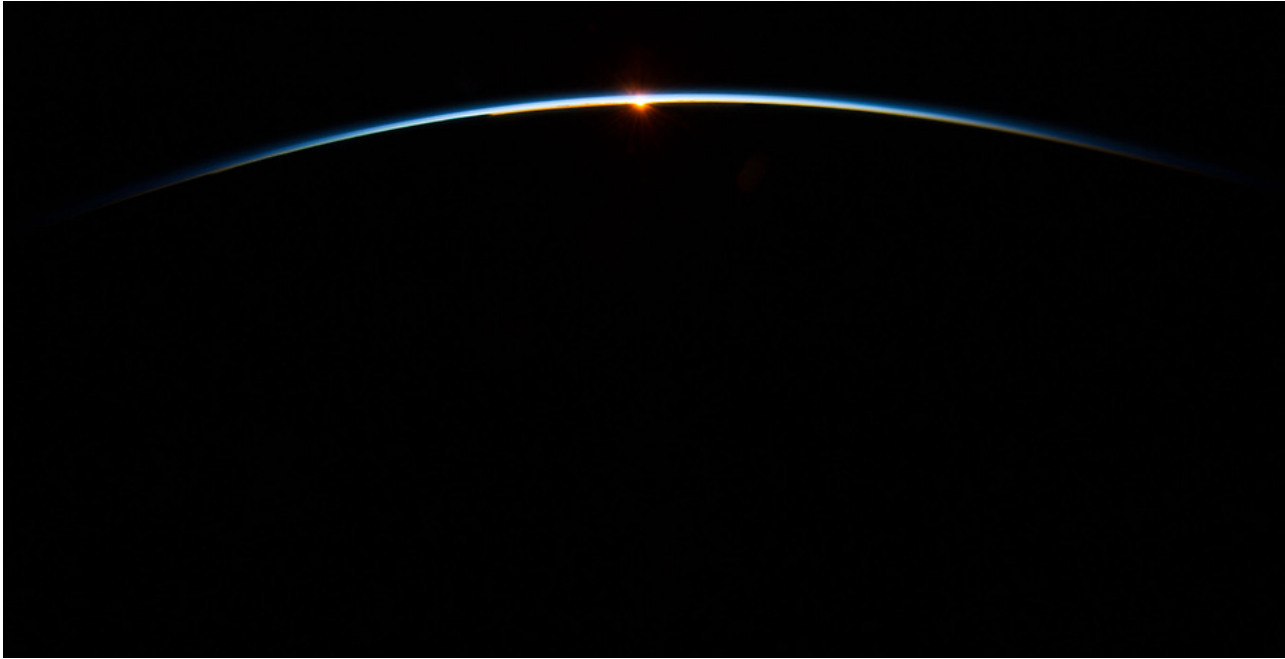
Human activity is the main cause.

There's scientific consensus on human-caused global warming.

The impacts are serious and affect people.

We have the technology needed to avoid the worst climate impacts.

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



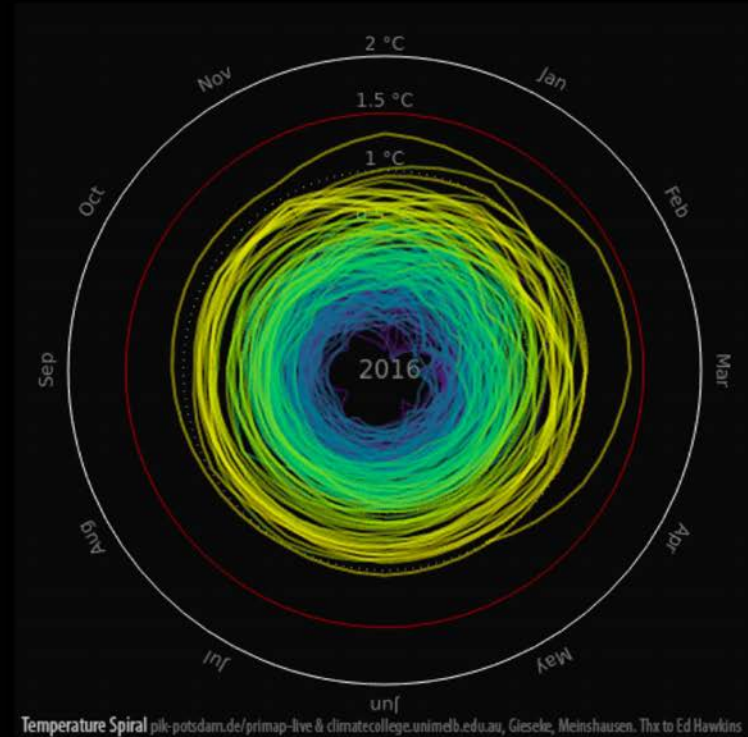
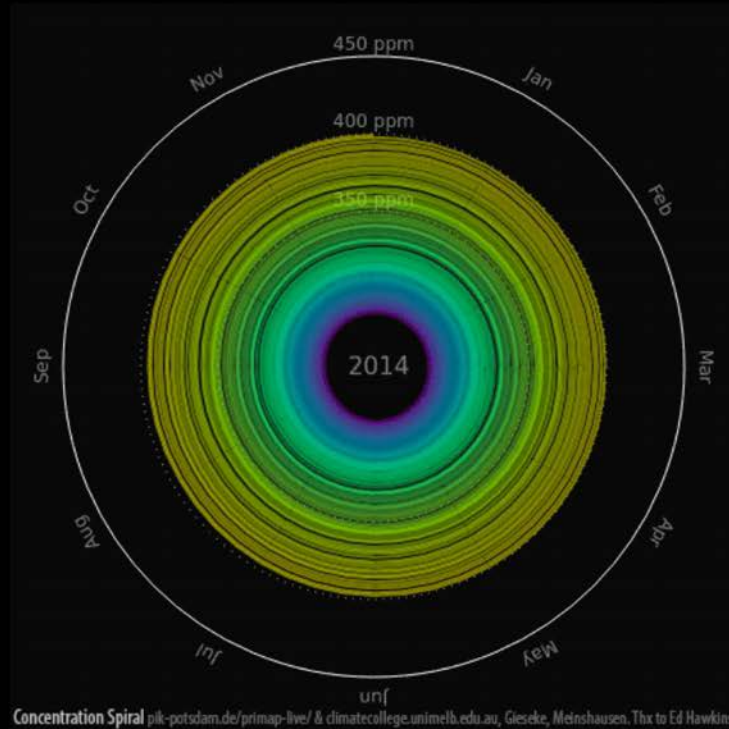
Source: NASA

Jean-Pascal van Ypersele
(vanyp@climate.be)

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

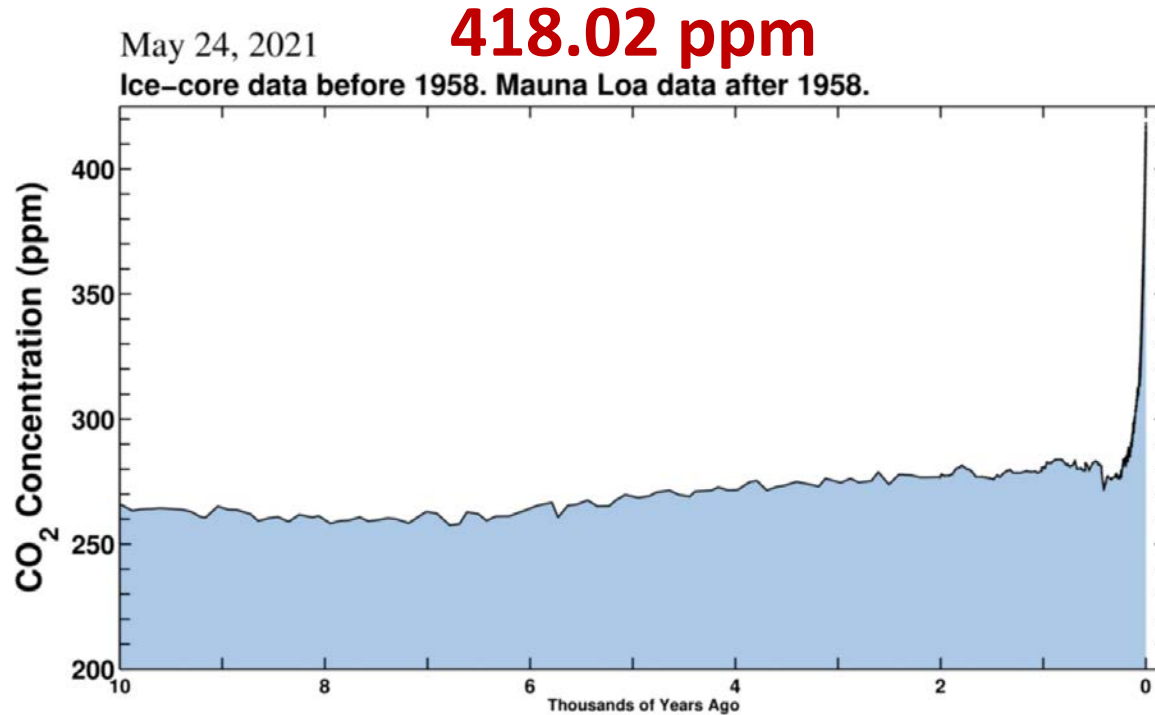
That is why we must cut emissions to net ZERO as soon as possible

CO₂ Concentration and Temperature spirals



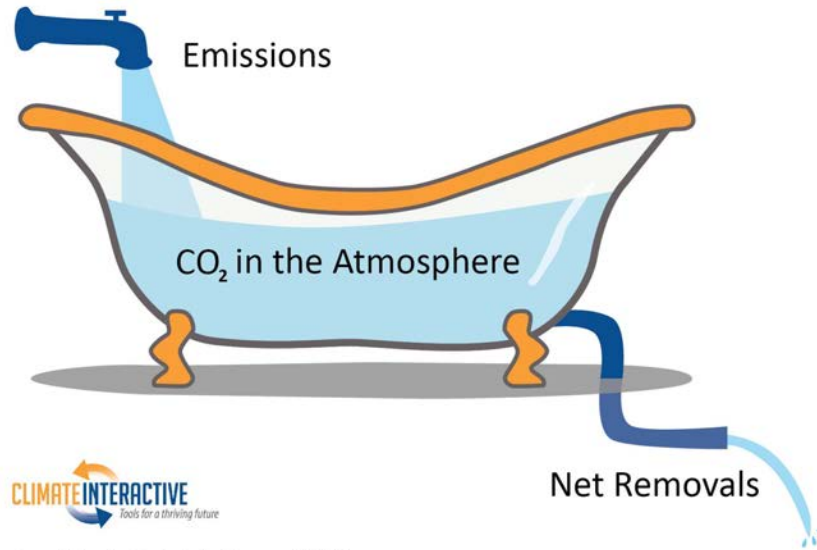
CO₂ Concentration since 1850 and Global Mean Temperature in °C relative to 1850 – 1900
Graph: Ed Hawkins (Climate Lab Book) – Data: HadCRUT4 global temperature dataset
Animation available on <http://openclimatedata.net/climate-spirals/concentration-temperature/>

CO₂ Concentration 24 May 2021 (Keeling curve + last 10000 years)



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

The Carbon Bathtub



Overall framing by Dr. John Sterman, MIT Sloan

Source: @CarbonInteractive

SIXTH ASSESSMENT REPORT

Working Group I – The Physical Science Basis

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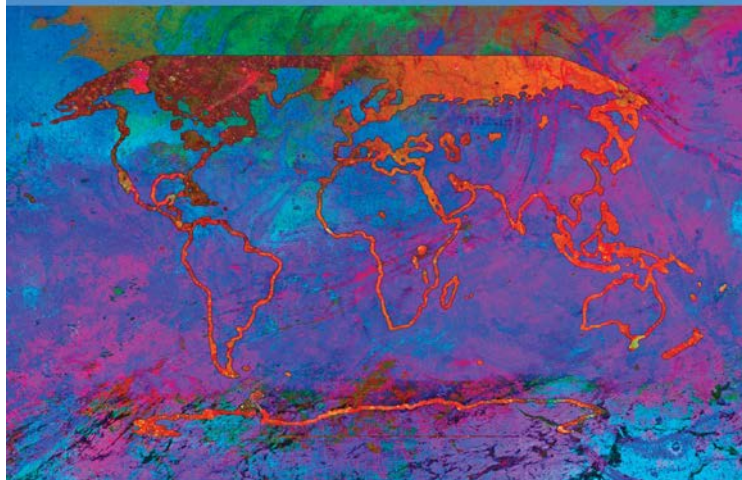
INTERGOVERNMENTAL PANEL ON climate change



Climate Change 2021

The Physical Science Basis

Summary for Policymakers



WGI

Working Group I contribution to the
Sixth Assessment Report of the
Intergovernmental Panel on Climate Change



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

a) Change in global surface temperature (decadal average)
as **reconstructed** (1-2000) and **observed** (1850-2020)

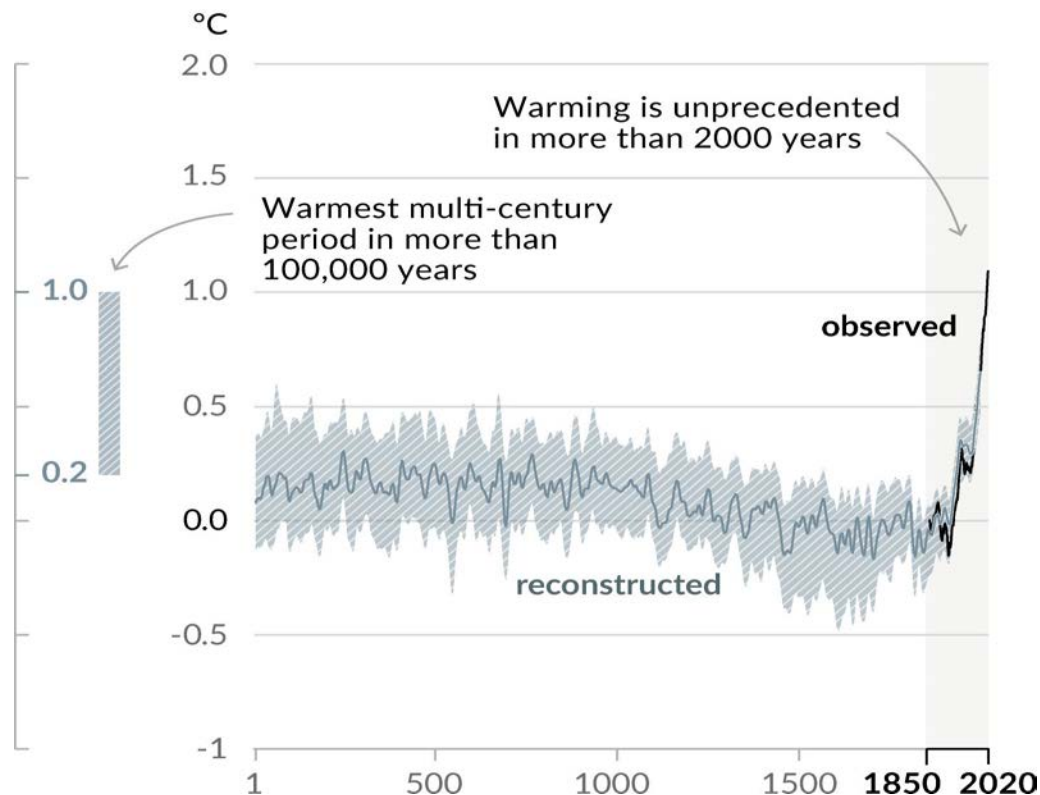
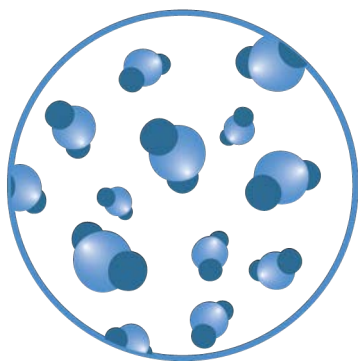


Figure SPM.1

CO₂
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



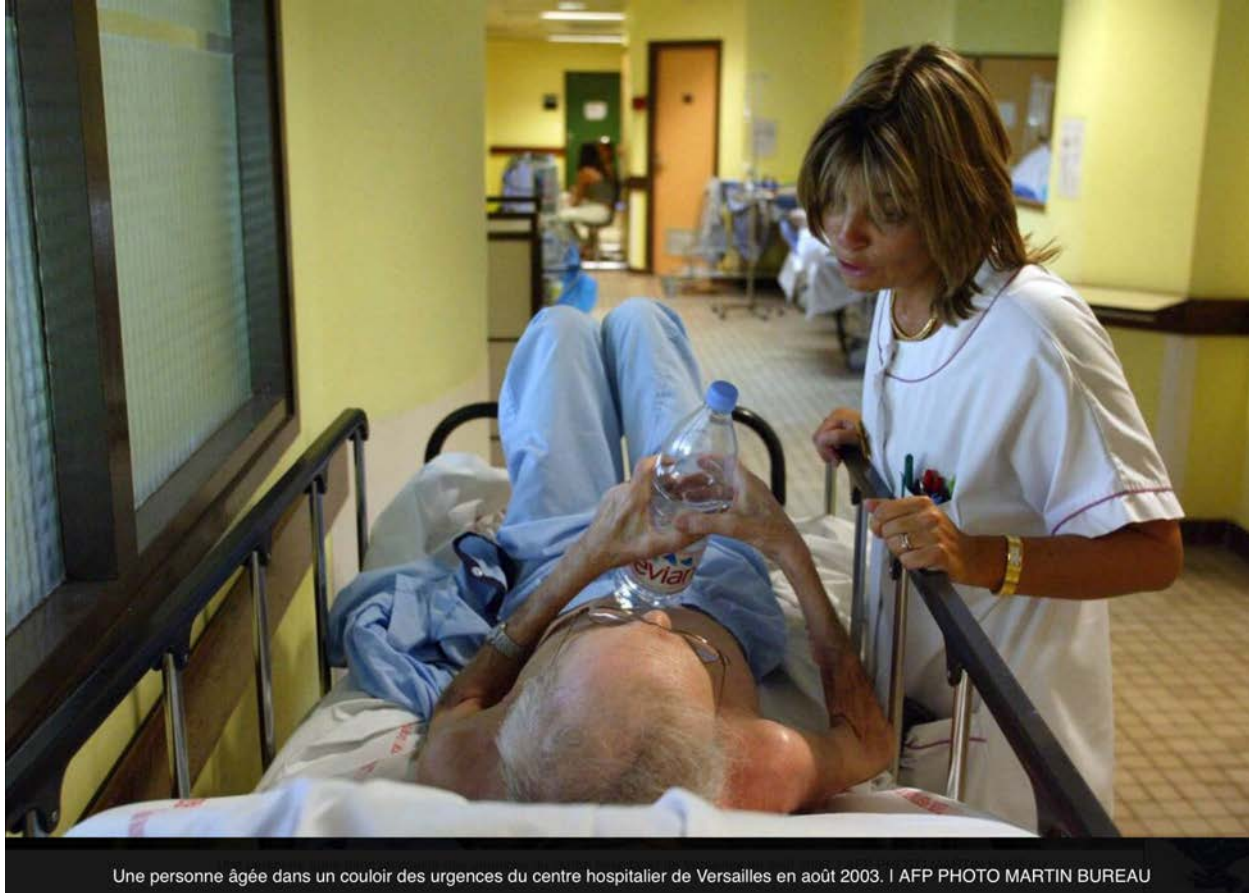
Ocean

Warming

Acidifying

Losing oxygen

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. | AFP PHOTO MARTIN BUREAU

Wallonia Floods, July 2021



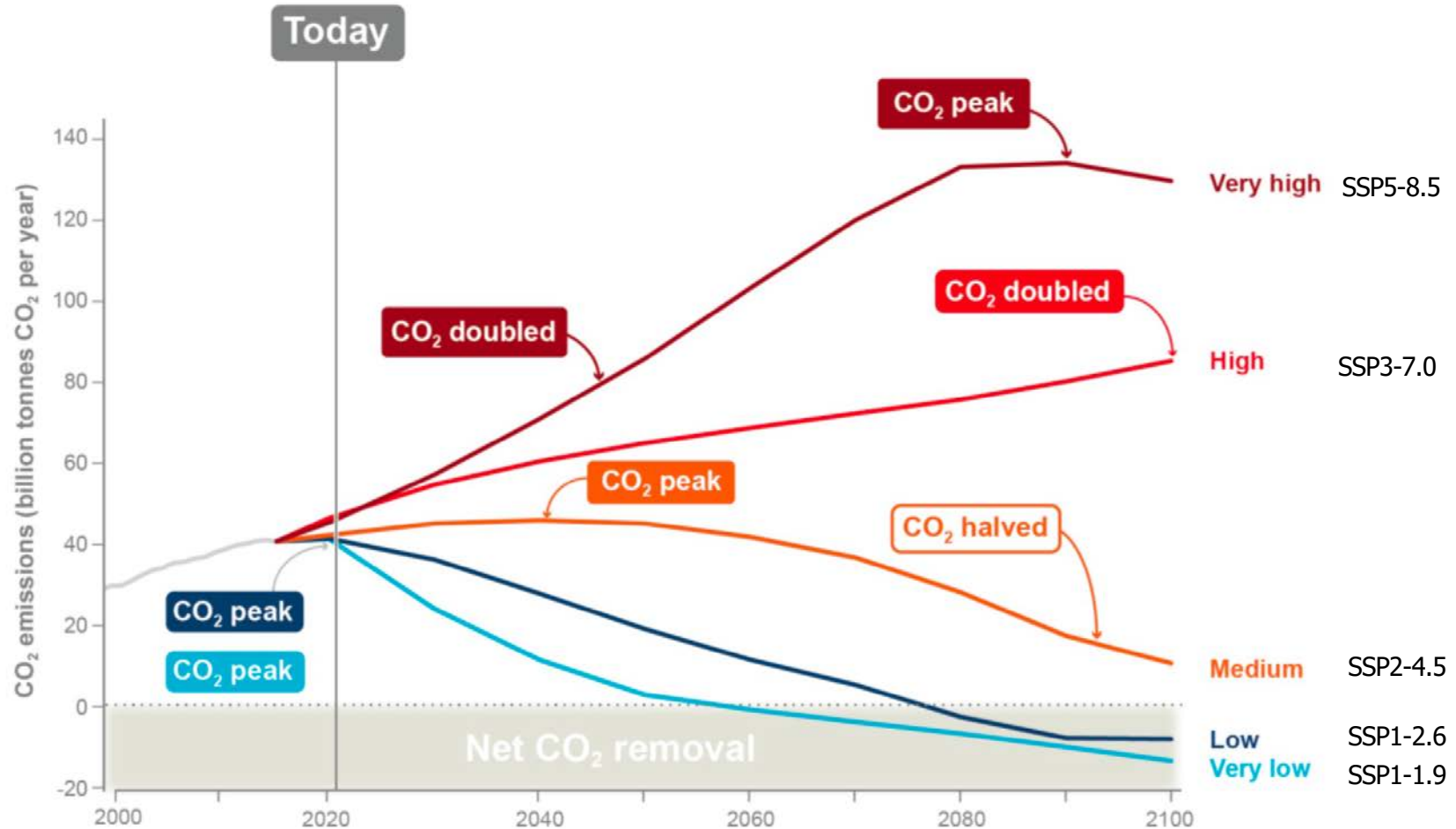
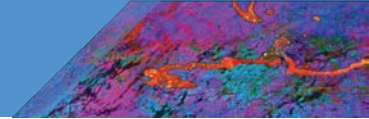
Source:
VRT Nieuws

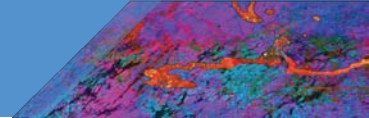
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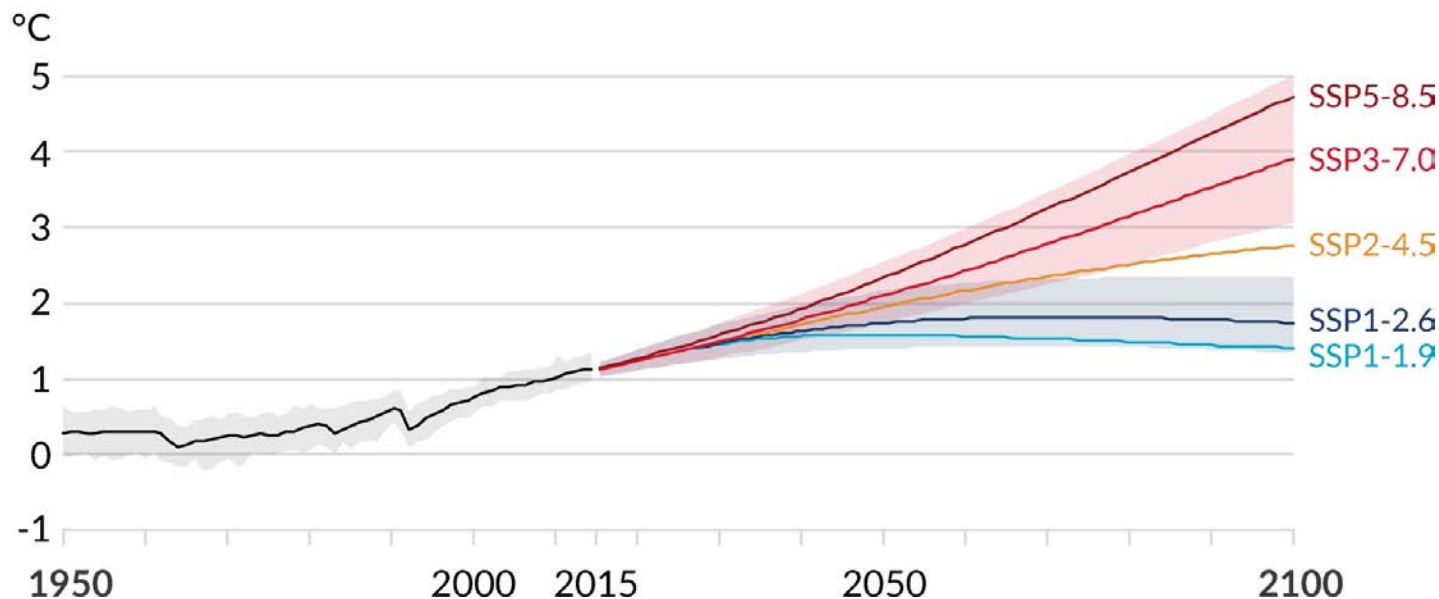
INTERGOVERNMENTAL PANEL ON climate change





Human activities affect all the major climate system components, *Figure SPM.8* with some responding over decades and others over centuries

a) Global surface temperature change relative to 1850-1900



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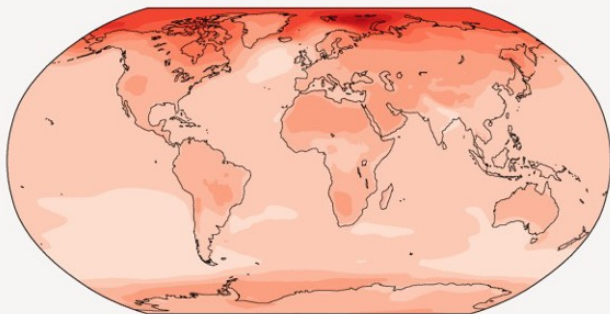
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Across warming levels, land areas warm more than oceans, and the Arctic and Antarctica warm more than the tropics

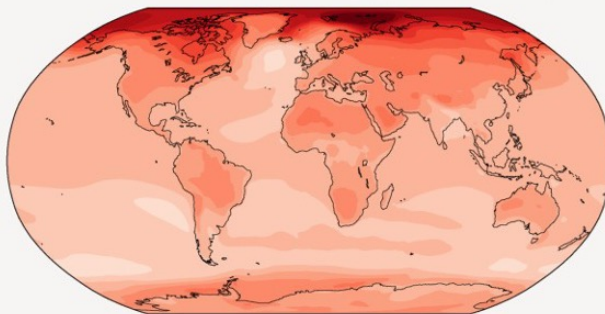
+1.5° C

Simulated change at 1.5 °C global warming



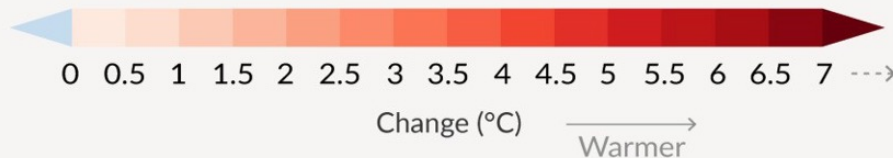
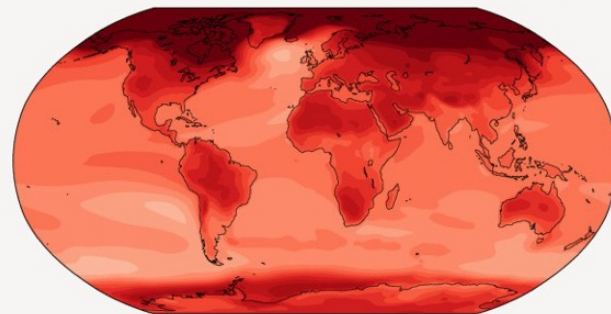
+2° C

Simulated change at 2 °C global warming



+4° C

Simulated change at 4 °C global warming

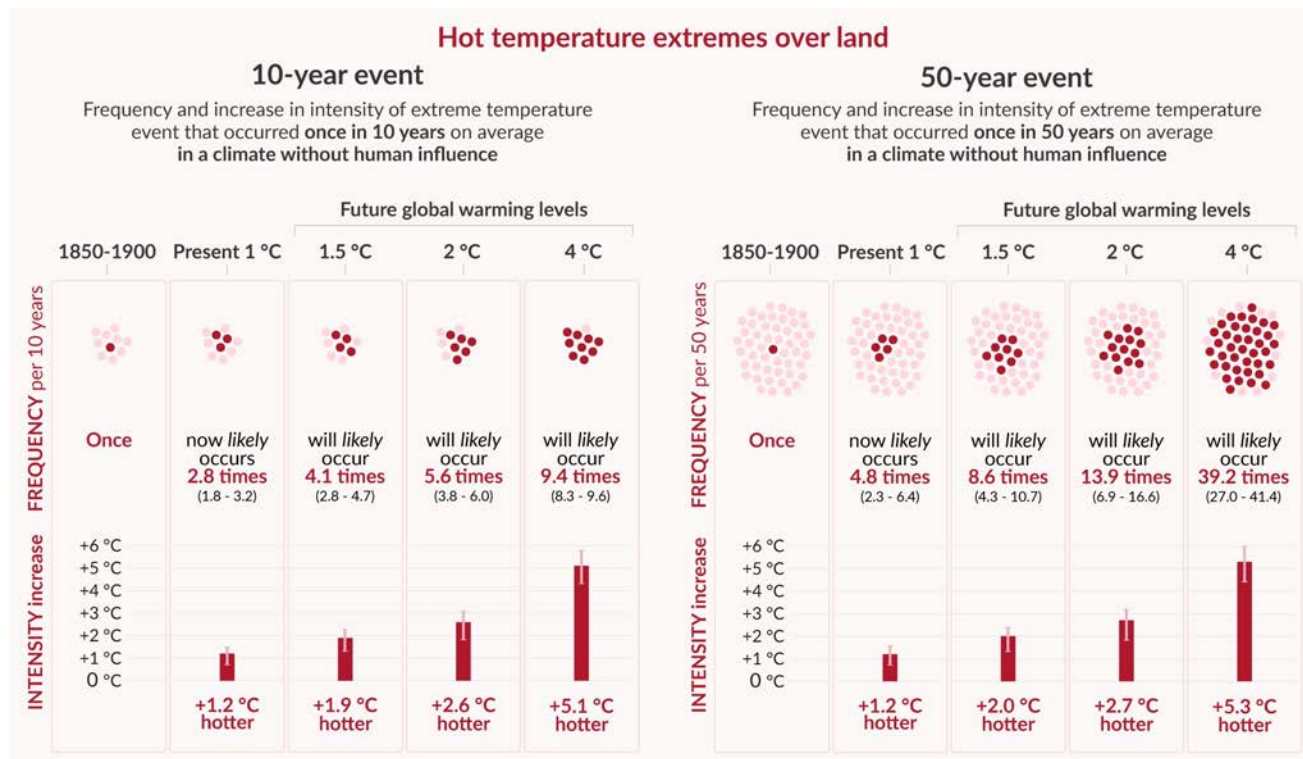


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Projected changes in extremes are larger in frequency and intensity with every additional increment of global warming

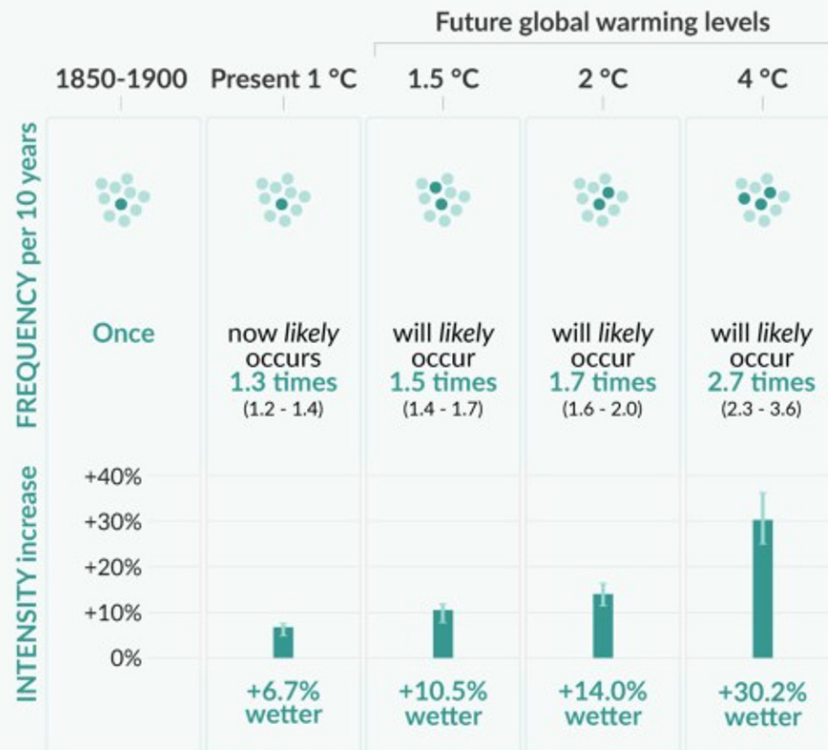
Figure SPM.6



Heavy precipitation over land

10-year event

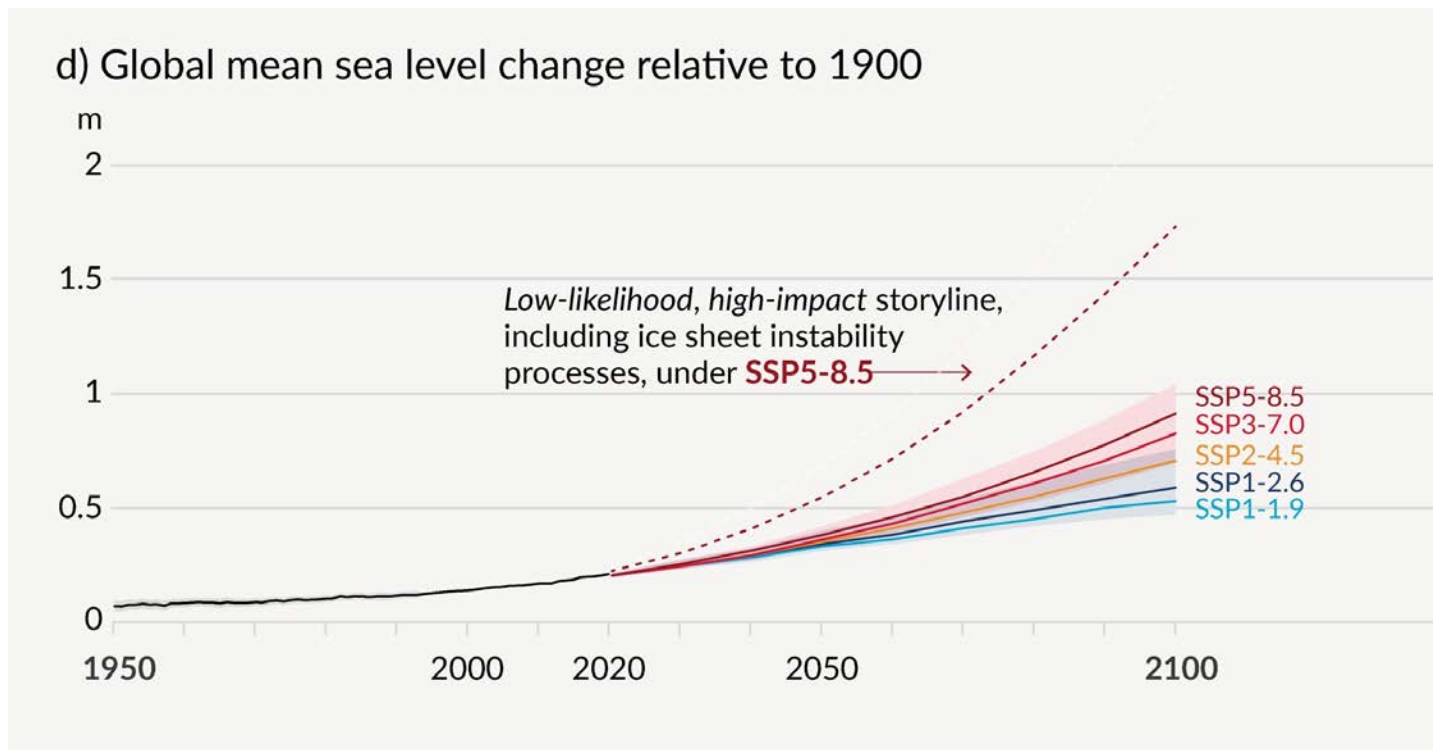
Frequency and increase in intensity of heavy 1-day precipitation event that occurred **once in 10 years** on average in a climate without human influence



IPCC AR6 WGI SPM
Figure SPM.6

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

Figure SPM.8

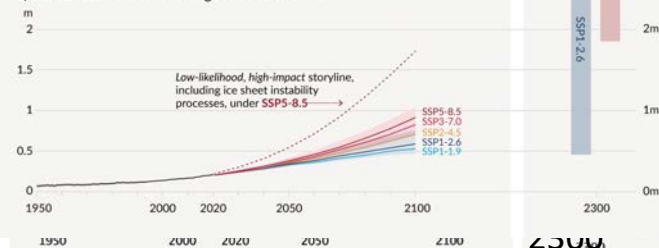


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« Sea level rise **greater than 15 m** cannot be ruled out with high emissions »

d) Global mean sea level change relative to 1900



e) Global mean sea level change in 2300 relative to 1900

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



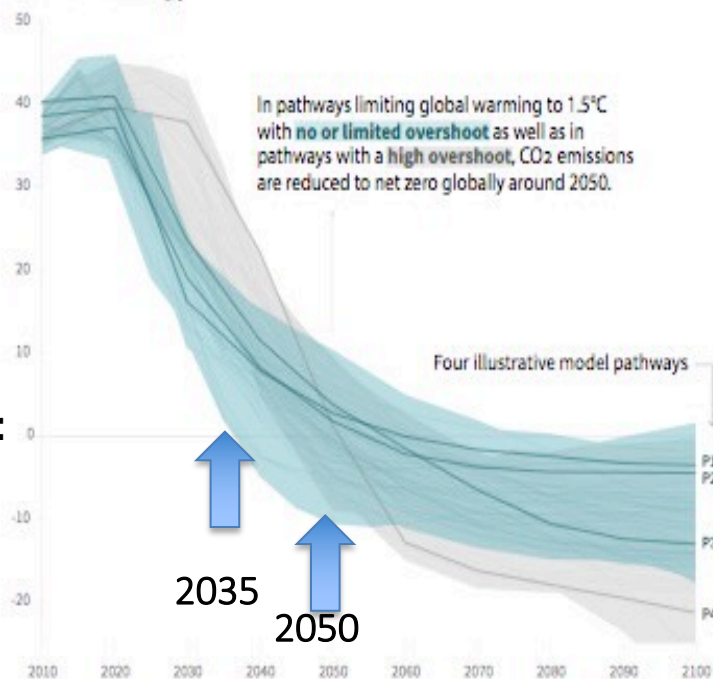
7 m

2 m

Emission pathways compatible with below 1.5° C warming:

Global total net CO₂ emissions

Billion tonnes of CO₂/yr



Net ZERO:

2035

2050

Timing of net zero CO₂

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



Pathways limiting global warming to 1.5°C with **no or low overshoot**

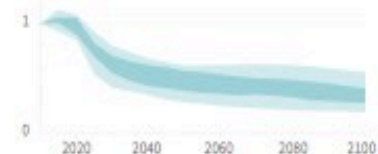
Pathways with **high overshoot**

Pathways limiting global warming below 2°C
(Not shown above)

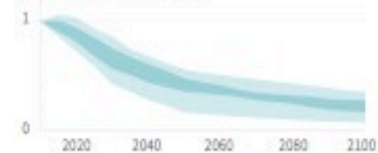
Non-CO₂ emissions relative to 2010

Emissions of non-CO₂ 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.

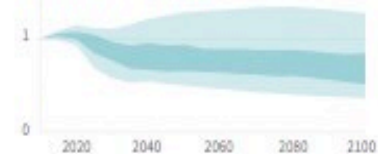
Methane emissions

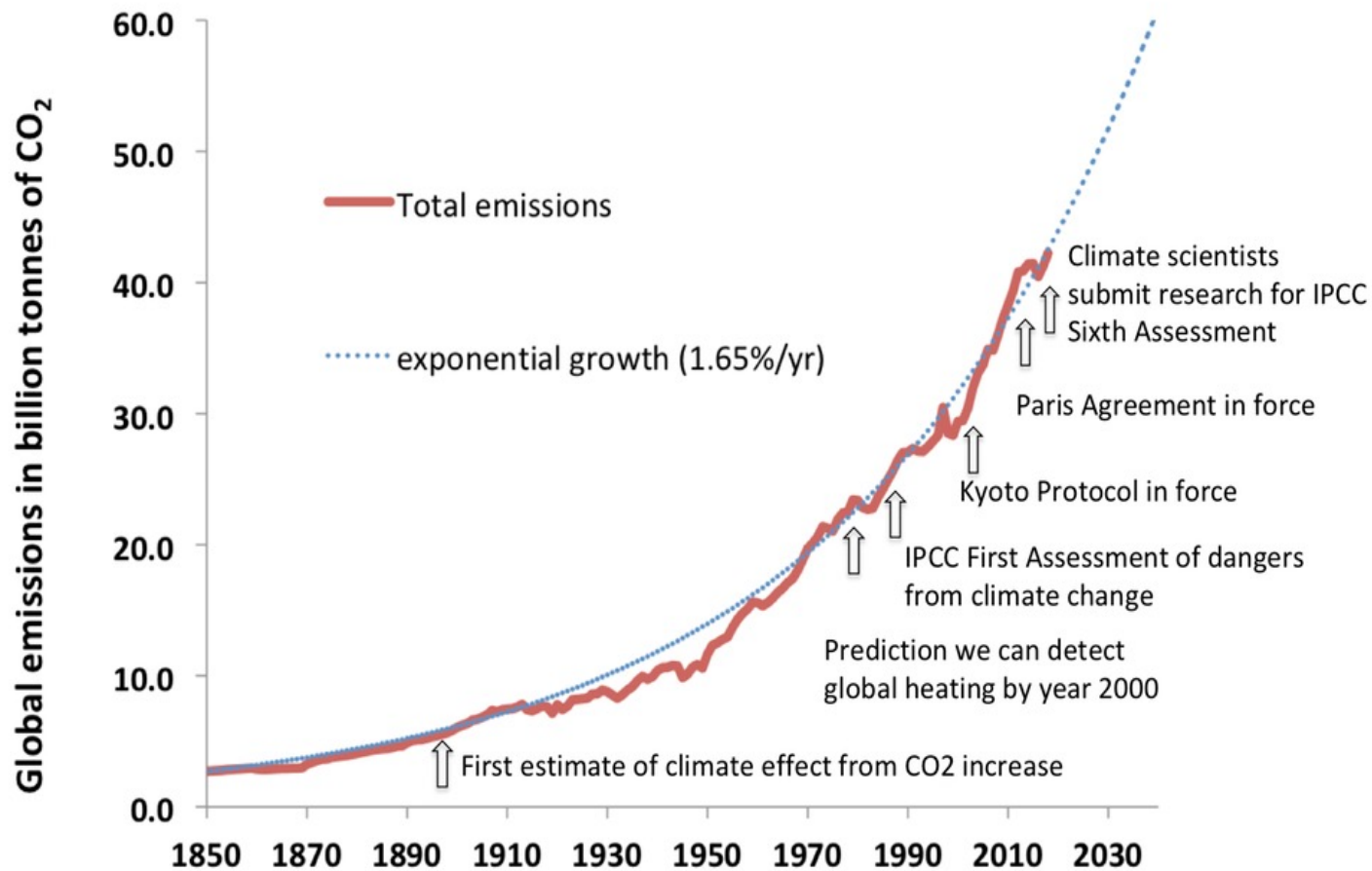


Black carbon emissions



Nitrous oxide emissions





Source: Wolfgang Knorr, in The Conversation (2019)

Emissions $\text{CO}_2 = \text{Population} \times \text{tCO}_2/\text{cap}$

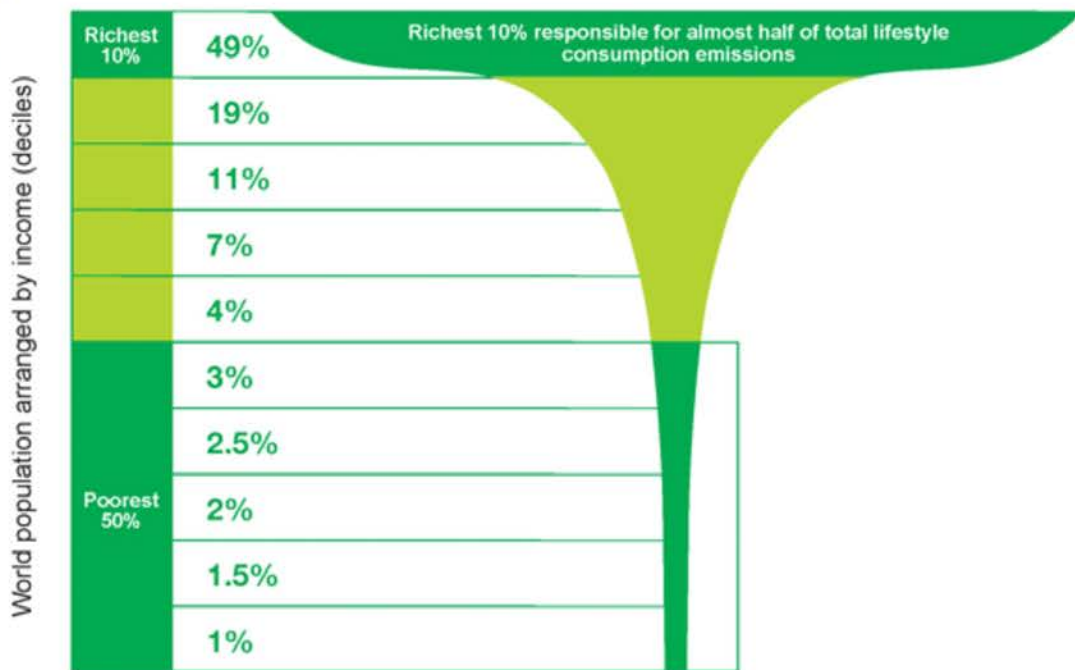


OXFAM

The poorest **50%** is only responsible for around **10%** of total lifestyle consumption emissions.

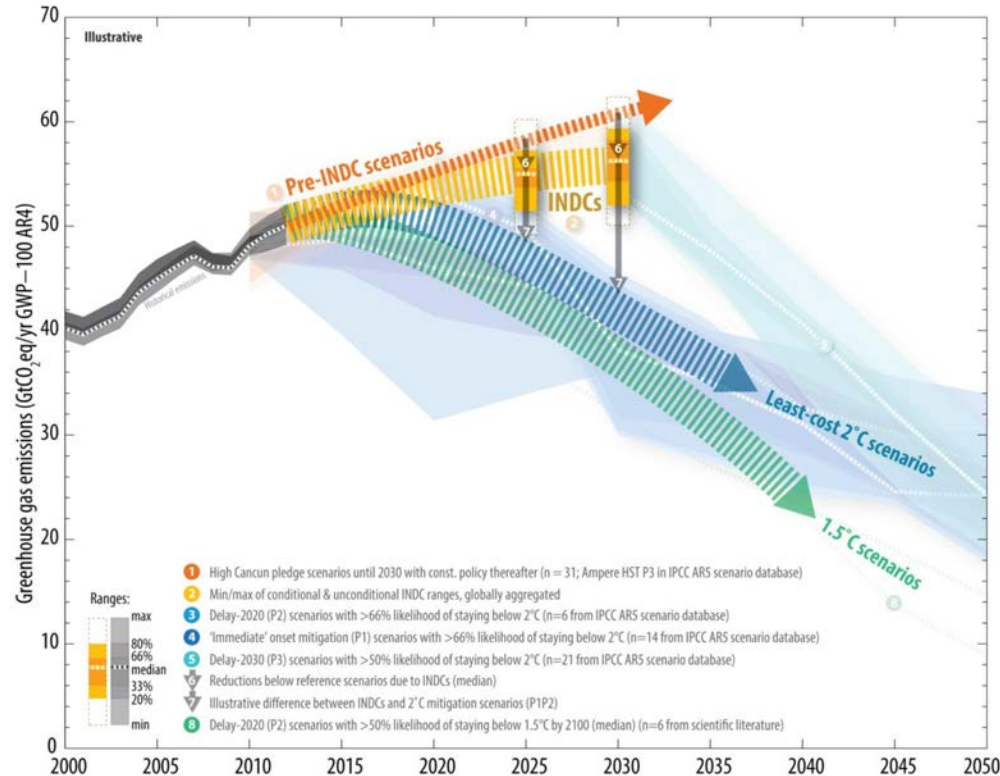
OXFAM MEDIA BRIEFING:
EXTREME CARBON INEQUALITY

Percentage of CO_2 emissions by world population



Source: Oxfam (2015)

2016 Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the intended nationally determined contributions

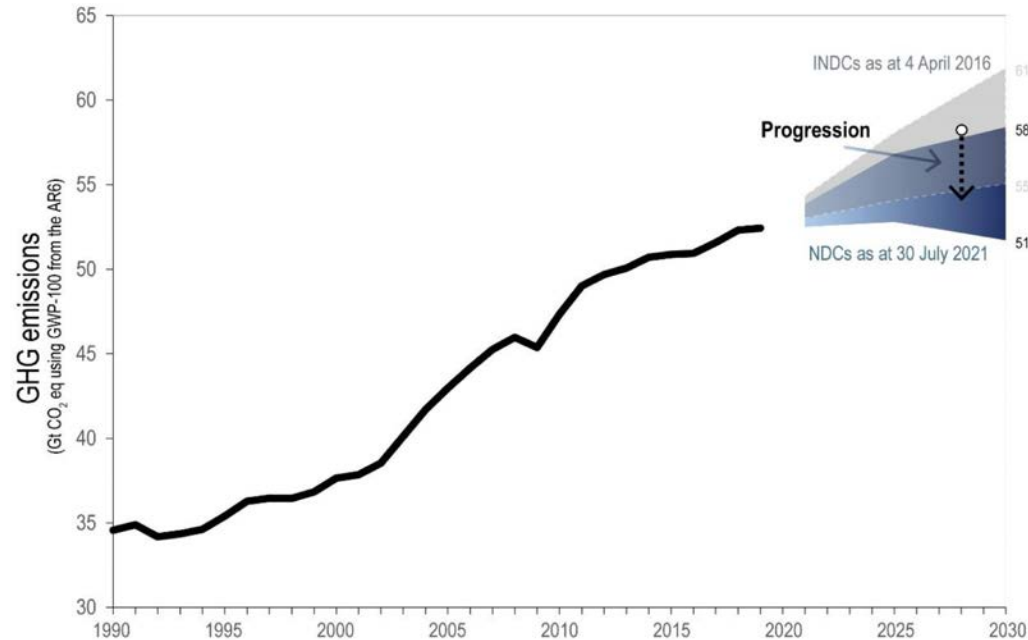


UNFCCC, Aggregate effect of the intended nationally determined contributions: an update

<http://unfccc.int/resource/docs/2016/cop22/eng/02.pdf>

Update (July 2021) :Comparison of global emission levels in 2025 and 2030 resulting from the implementation of the nationally determined contributions (NDCs)

Projected range and progression of emission levels



UNFCCC, Aggregate effect of the nationally determined contributions: an update (2021)

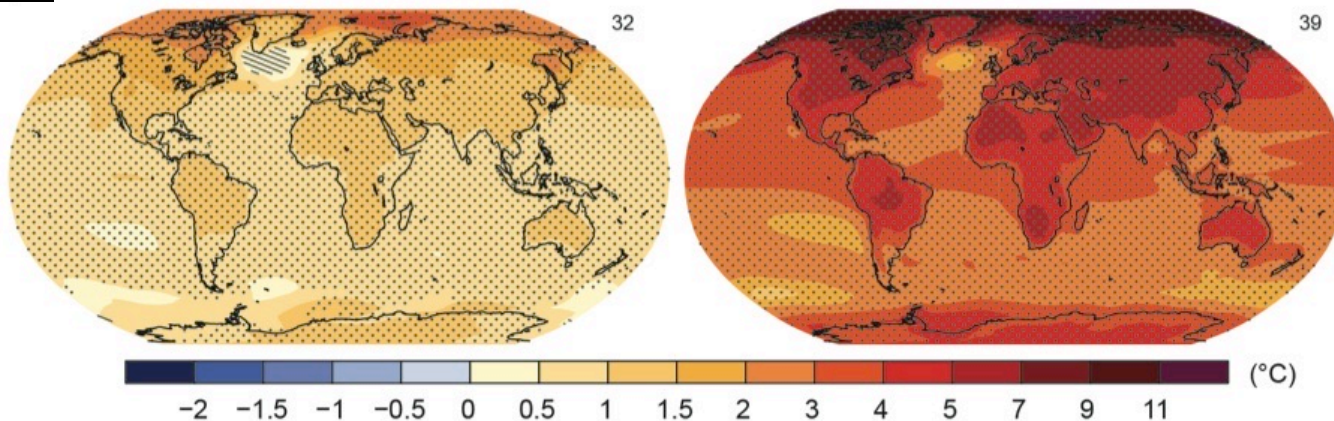
https://unfccc.int/sites/default/files/resource/cma2021_08_adv_1.pdf

RCP2.6

RCP8.5

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

Fig. SPM.8



Humanity has the choice



SUSTAINABLE DEVELOPMENT GOALS



Conservationists call for urgent ban on deep-sea mining

Motion at Marseille summit wins global support for warning of permanent biodiversity loss and unknown effect on ecosystem



▲ A deep-sea mining robot being trialled in the Pacific Ocean in April. Photograph: GSR/Reuters

A motion calling for a ban on deep-sea mining has been adopted in Marseille at the world's biggest biodiversity summit since the pandemic, after an overwhelmingly supportive vote by governments and civil society groups.

The world congress of the International Union for the **Conservation** of Nature recognised scientists' concerns that biodiversity loss will be inevitable, is likely to be permanent and the consequences for the ocean's ecosystem unknown if deep-sea mining is permitted.

**Next to SDG₁₃ (Climate Action):
SDG₁₄ (Life below water)**

Source: [The Guardian, 9 September 2021](#)
See also: [The Guardian, 27 September 2021](#)

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 biodiversity, ...)

SDGs need to be considered as a package, and all SDGs are important

Listen to climate scientists, and also to biodiversity scientists

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



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

6^e rapport d'évaluation du GIEC

Changements climatiques 2021 : Les éléments scientifiques

[Aspects physiques du climat : en anglais *The Physical Science Basis*]

Aperçu du Résumé pour les décideurs

Après les terribles inondations qui ont frappé la Wallonie et l'Allemagne, et alors que des incendies détruisent des milliers d'hectares de forêt dans le Sud de l'Europe, en Sibérie et en Amérique du Nord, il nous a semblé utile de publier cette édition spéciale dès la parution du nouveau rapport du GIEC. Elle donne un aperçu du Résumé pour les décideurs du rapport, sous la forme de ses 14 messages clés. Cet automne, une Lettre plus substantielle sera consacrée à ce nouveau rapport de près de 4000 pages, mais vous disposez ainsi déjà de l'essentiel, en français (la traduction officielle paraîtra dans plusieurs mois).

Le texte intégral est bien entendu disponible sur le site du GIEC : [ipcc.ch/ar6](https://www.ipcc.ch/ar6). Vous pourrez aussi y expérimenter un des éléments les plus novateurs de ce rapport: l'Atlas interactif, qui permet d'obtenir pour chaque région du monde des informations sur l'évolution de nombreux paramètres climatiques au cours du 21^e siècle, et ce pour différents scénarios d'émission de gaz à effet de serre.

Les autres parties du 6^e rapport d'évaluation seront toutes publiées en 2022. En février, le GIEC adoptera la deuxième partie du rapport, qui sera consacrée aux impacts des changements climatiques, à la vulnérabilité et aux mesures d'adaptation. En mars, ce sera la troisième, consacrée aux mesures d'atténuation (réductions d'émissions de gaz à effet de serre). Le rapport de synthèse, transversal, sera publié en septembre⁽¹⁾.

Bonne lecture !

Jean-Pascal van Ypersele, Philippe Marbaix, Pénélope Lamarque et Elisabeth Rondiat.

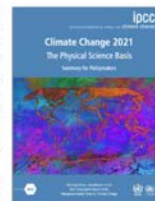
⁽¹⁾La 17^e Lettre donne un aperçu de l'ensemble du rapport, et le plan du rapport de synthèse est disponible sur [plateforme-wallonne-giec.be](https://www.pfwallonnie-giec.be).

> Le rapport et son approbation

Le 6 août 2021, l'assemblée Plénière du GIEC a adopté la première partie du 6^e rapport d'évaluation du GIEC (RE6). Cette partie du rapport concerne principalement l'observation du climat, la compréhension des processus qui influencent le climat, l'évaluation des modèles, et les projections pour le futur.

Les délégués des 195 États membres du GIEC ont également approuvé le Résumé pour les décideurs de ce rapport, après l'avoir discuté phrase par phrase pendant une réunion qui s'est tenue du 26 juillet au 6 août. La délégation belge était placée sous la responsabilité du Pr Jean-Pascal van Ypersele. Ce processus permet aux représentants des gouvernements de demander de reformuler des phrases pour les rendre plus claires et pertinentes selon leurs critères, mais une phrase n'est approuvée que moyennant la confirmation de sa validité scientifique par les auteurs du rapport. Les chapitres du rapport détaillé sont entièrement sous la responsabilité des auteurs scientifiques, supervisés par les co-présidents et vice-présidents du groupe de travail concerné (ici le GT1) et du GIEC.

Trois scientifiques de nationalité belge ont participé à la rédaction de ce rapport du GIEC en tant qu'auteurs principaux d'un chapitre : le Dr Rafiq Hamdi (IRM), le Pr Philippe Huybrechts (VUB), et le Dr. Joeri Rogelj (Imperial College London).



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

Gratuit sur
www.levif.be/reveil-climatique

Le réveil climatique

JEAN-PASCAL VAN YPERSELE - DIRK DRAULANS

LE VIF



LE VIF

CLIMAT : ÉTAT D'URGENCE POURQUOI IL N'Y A PLUS DE TEMPS À PERDRE

JEAN-PASCAL VAN YPERSELE - DIRK DRAULANS



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 KLIMAAT ALARM

Dirk Draulans en
Jean-Pascal van Ypersele



Knack

HET KLIMAATALARM

Gratis op
www.knack.be/klimaatalarm

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**