

Some of the reasons for climate urgency, and for keeping hope

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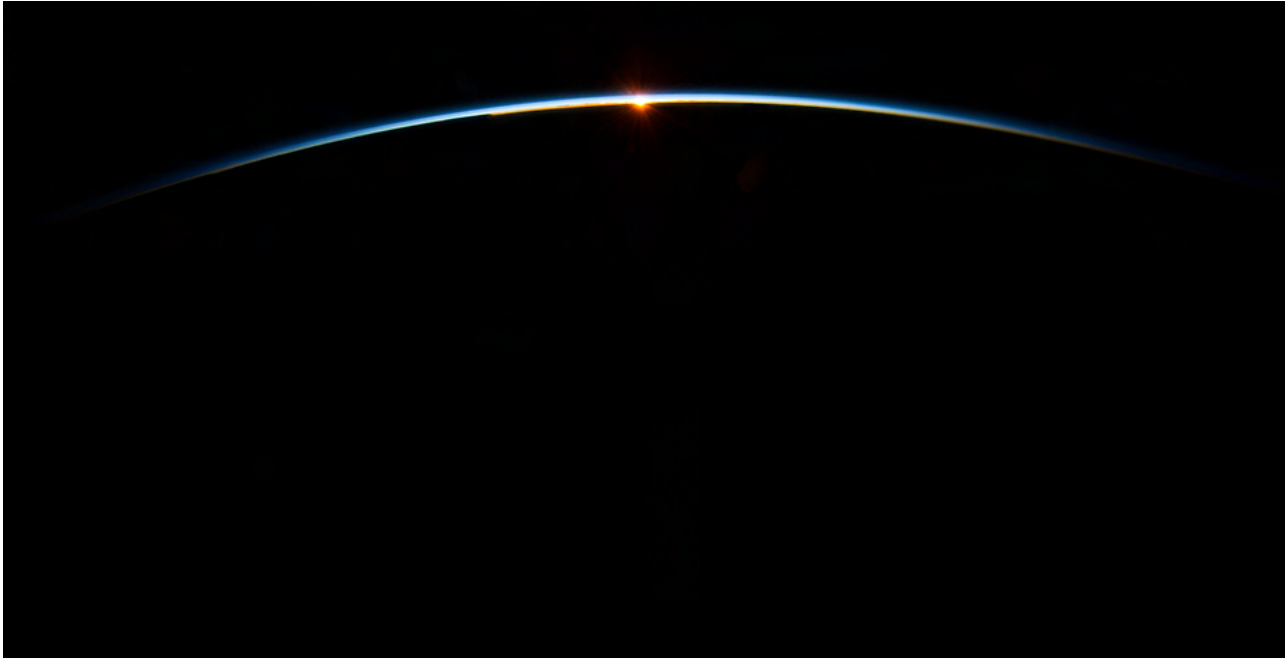
Twitter: @JPvanYpersele

Briefing for Members of the European Parliament climate roundtable on board the Greenpeace ship Rainbow Warrior, Antwerp, 7 October 2019

Thanks to the Walloon government for supporting www.pplateforme-wallonne-giec.be & my team at UCLouvain

Reminder: There is no planet B

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

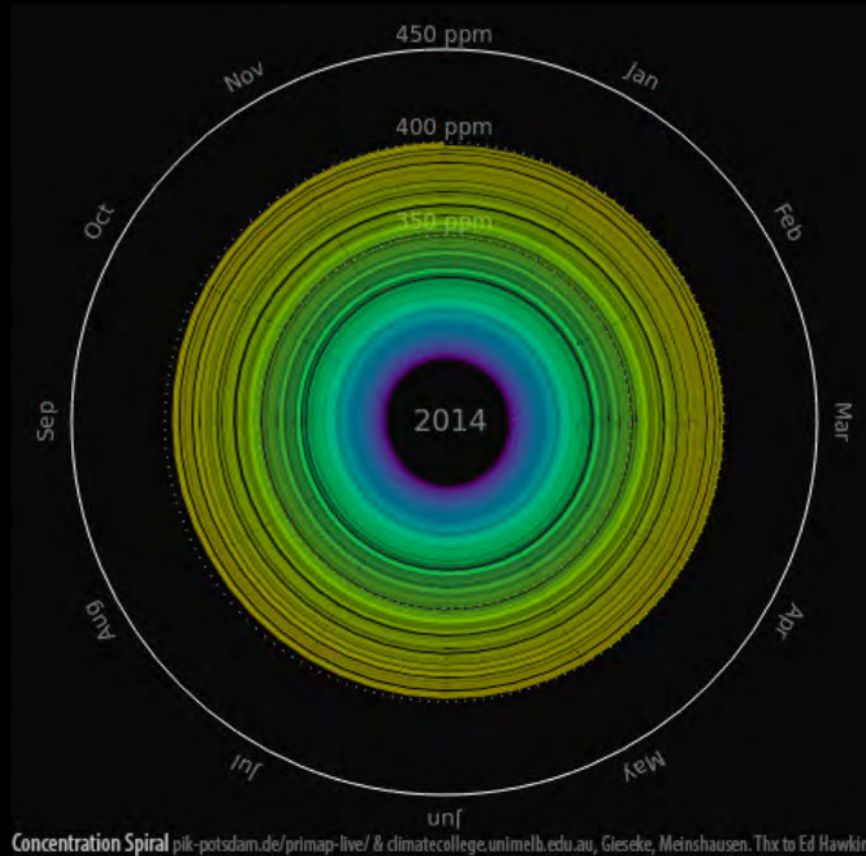


Jean-Pascal van Ypersele
(vanyp@climate.be)

**Reminder: Because we use the atmosphere
as a dustbin for our greenhouse gases, we
thicken the insulation layer around the
planet**

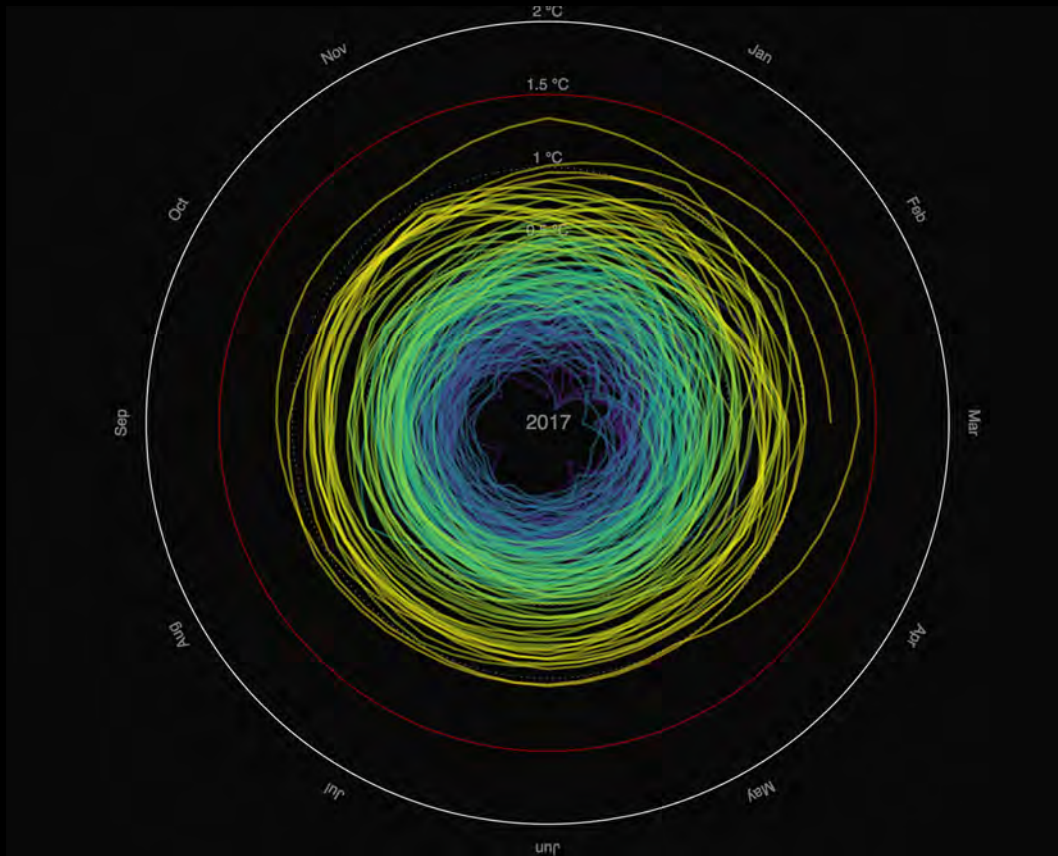
**That is why we must cut emissions
to ZERO as soon as possible**

CO₂ concentration spiral: the insulation thickens!



CO₂ concentration spiral 1851-2014 (ppm), by Gieseke & Meinshausen,
Available on <http://pik-potsdam.de/primap-live>

Temperature spiral

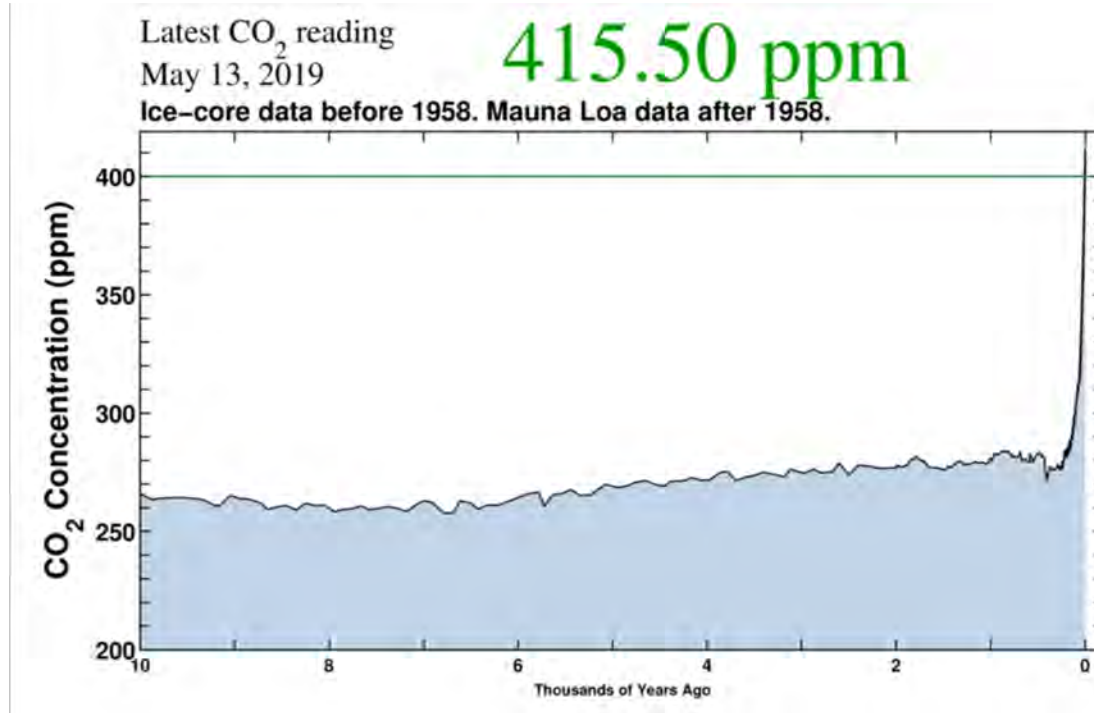


Global Mean Temperature in °C relative to 1850 – 1900

Graph: Ed Hawkins (Climate Lab Book) – Data: HadCRUT4 global temperature dataset

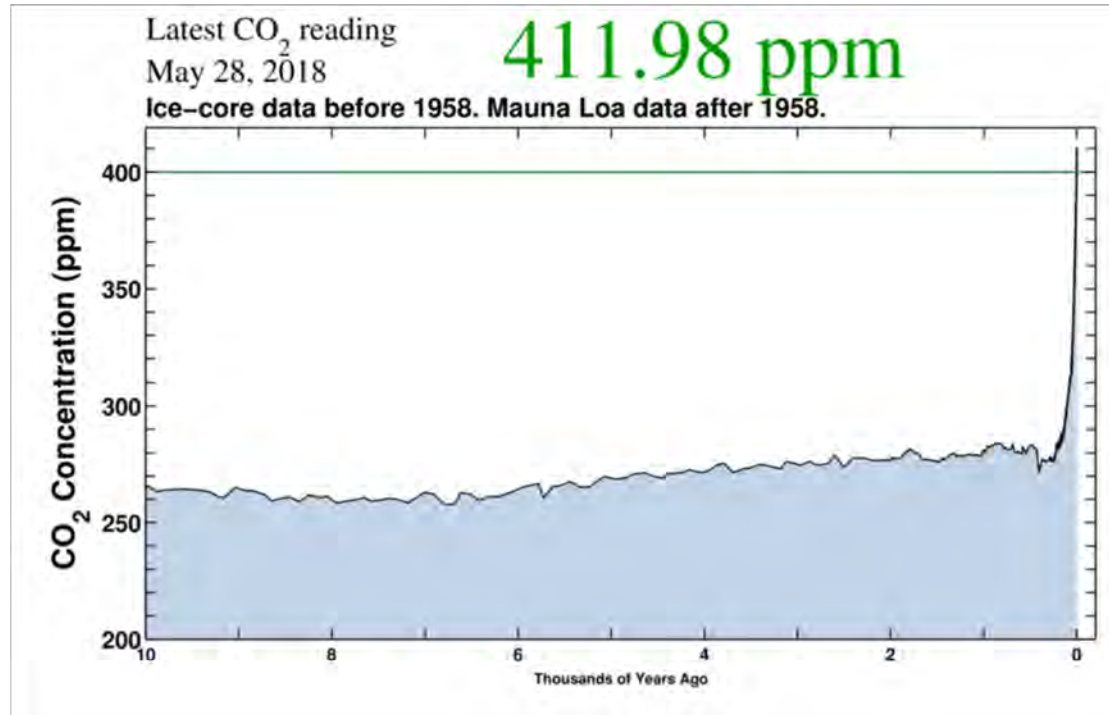
Animated version available on <http://openclimatedata.net/climate-spirals/temperature>

CO₂ Concentration, 13 May 2019 (Keeling curve)



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

CO₂ Concentration, 28 May 2018 (Keeling curve)



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

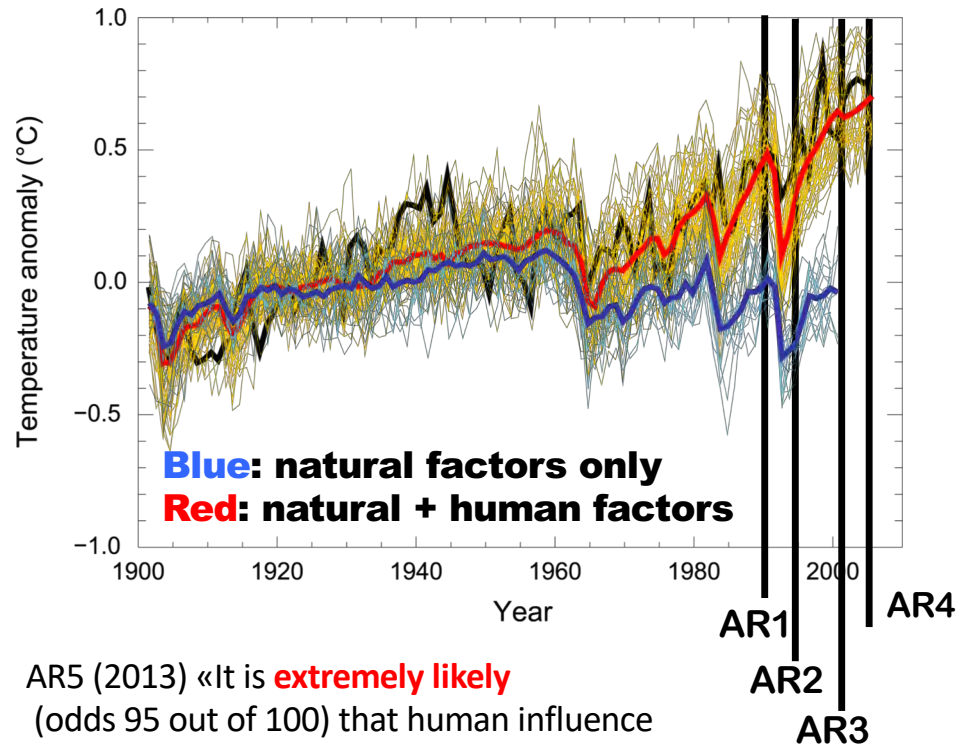
A Progression of Understanding: Greater and Greater Certainty in Attribution

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... »

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

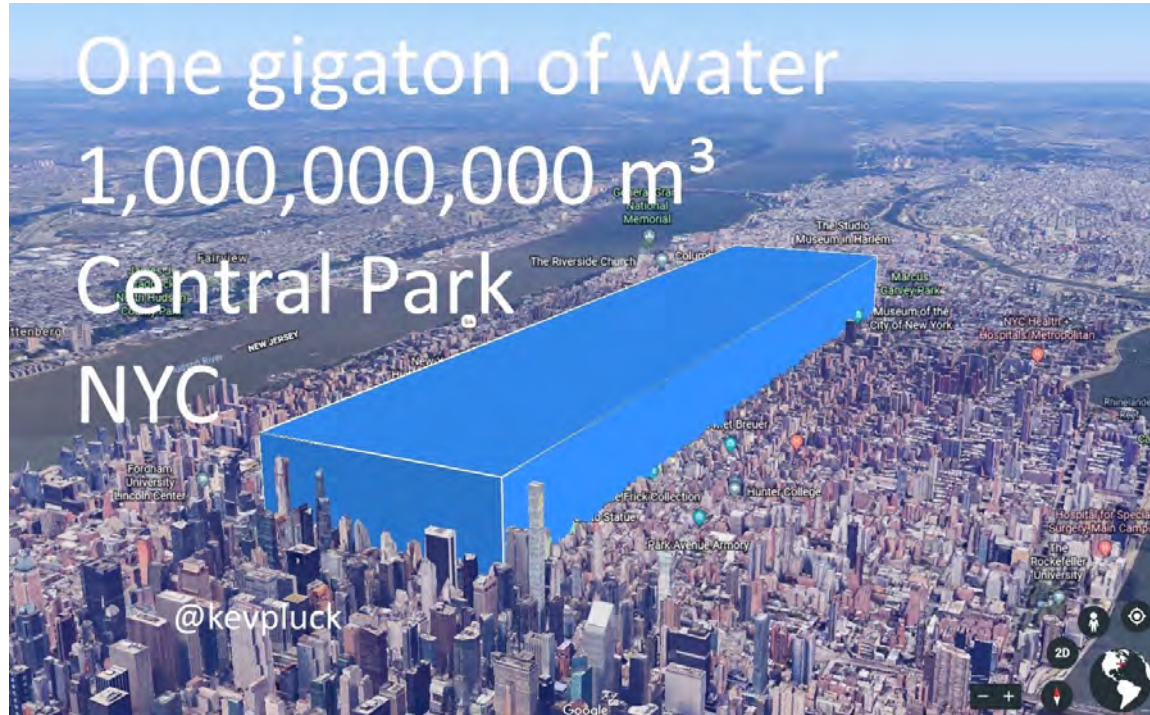


There is evidence that anthropogenic influences, including increasing atmospheric **greenhouse gas concentrations**, have changed these extremes

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

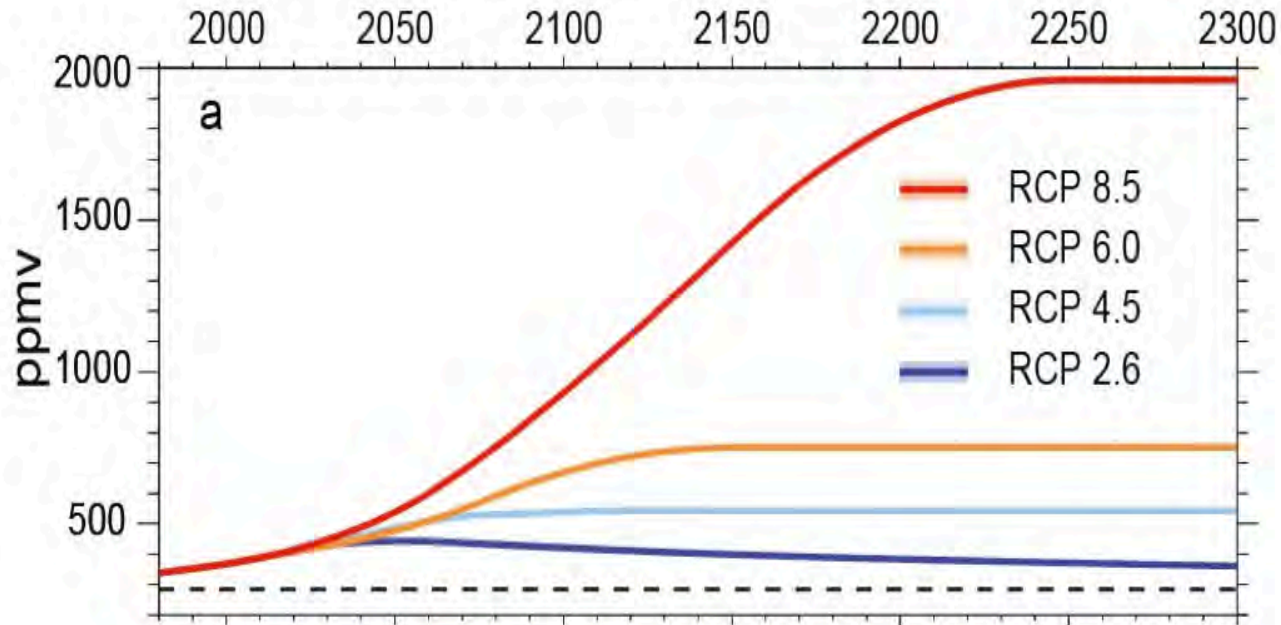
There is therefore a very high risk that average sea level would increase by several metres over the next century or two

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



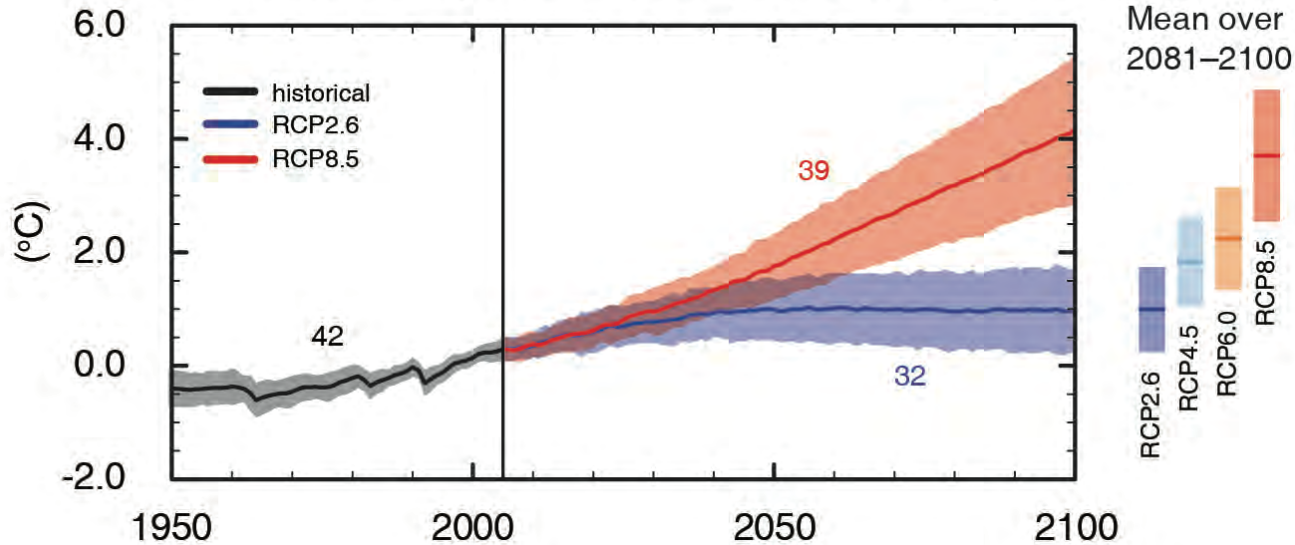
Source: @Kevpluck, June 2018

RCP Scenarios: Atmospheric CO₂ concentration



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

Global average surface temperature change



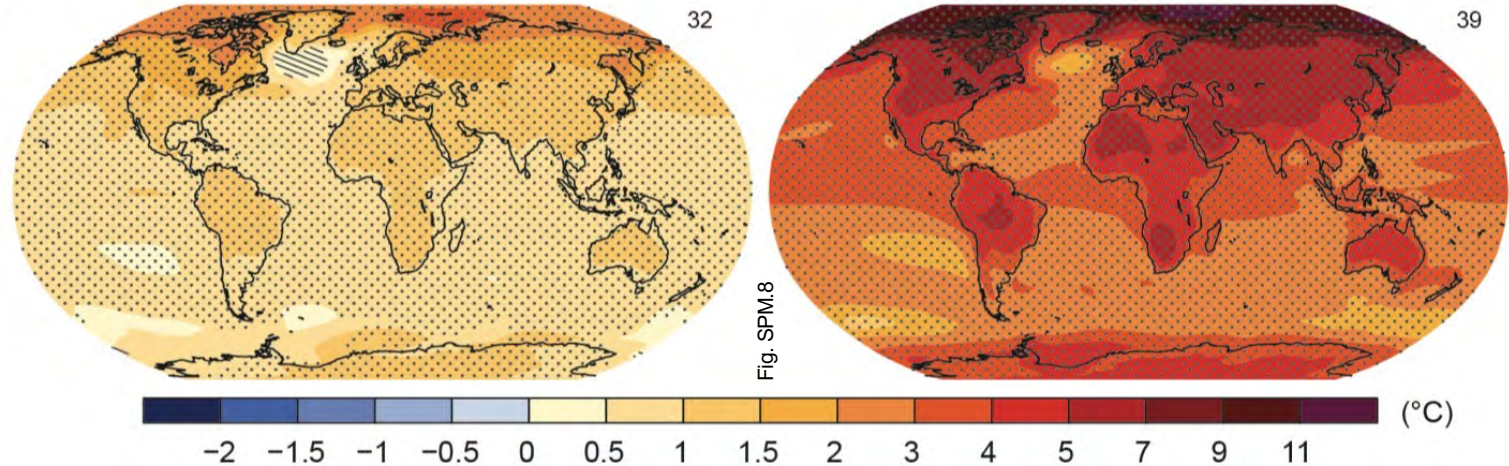
(IPCC 2013, Fig. SPM.7a)

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

RCP2.6

RCP8.5

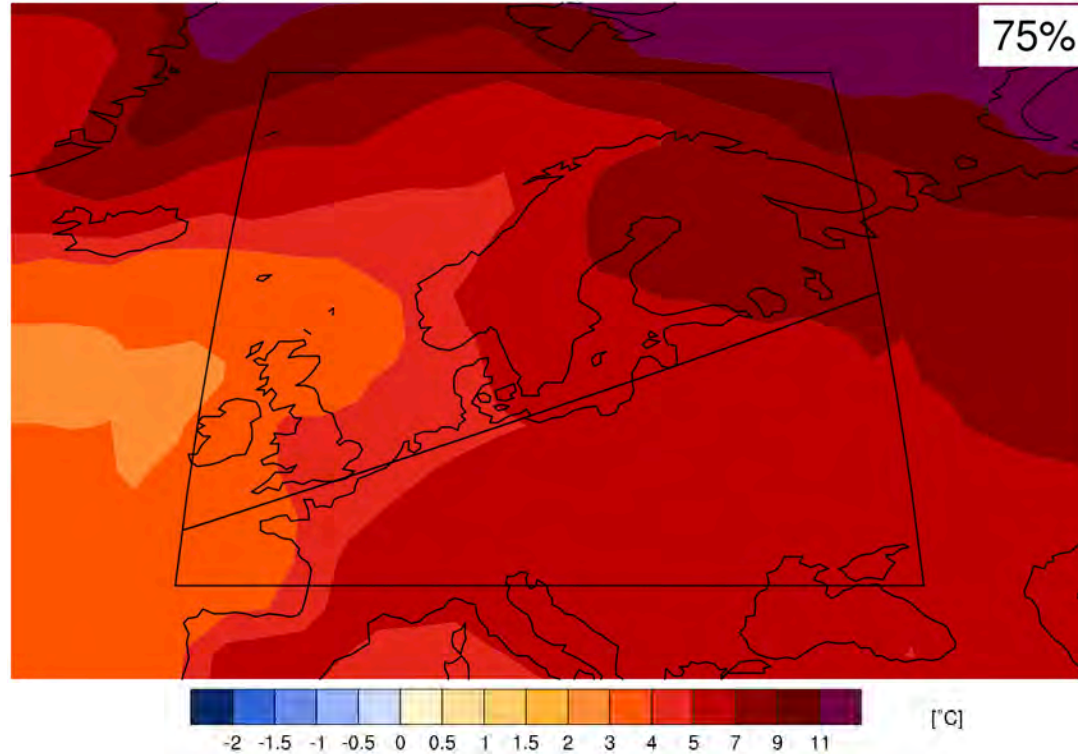
a) Change in average surface temperature (1986–2005 to 2081–2100)



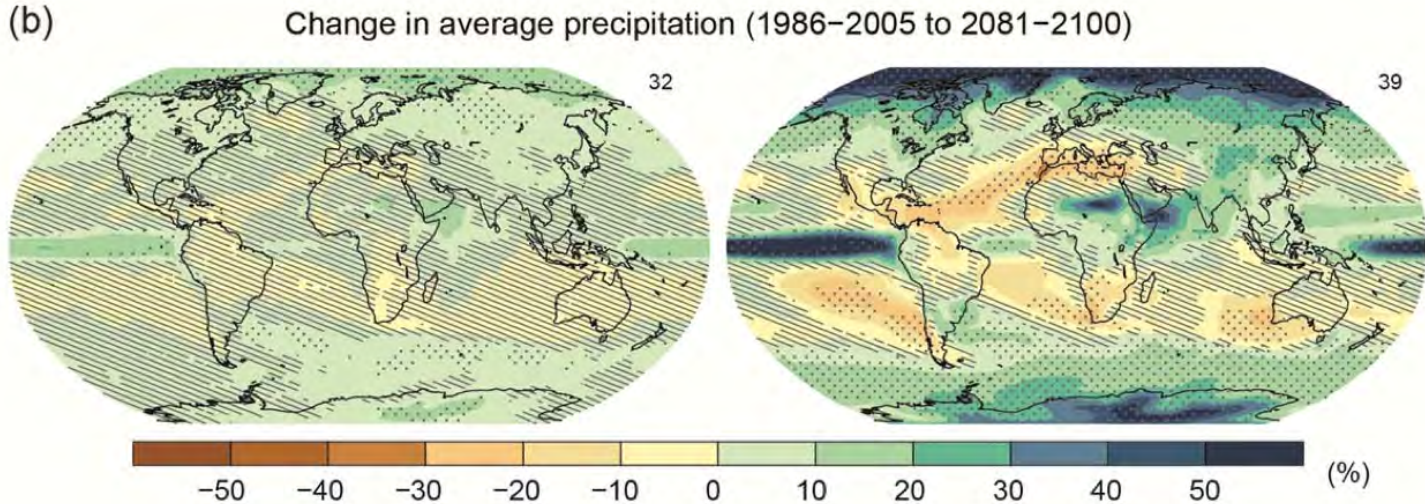
Hatching [hachures] indicates regions where the multi-model mean is small compared to natural internal variability (i.e., less than one standard deviation of natural internal variability in 20-year means).

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

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



Projected Change in Precipitation



Hatching 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 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

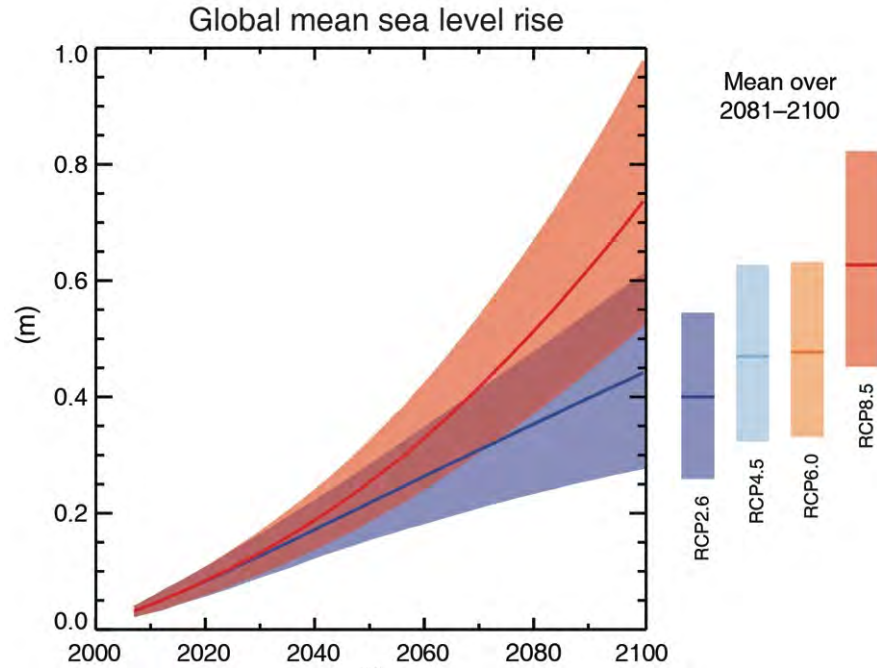


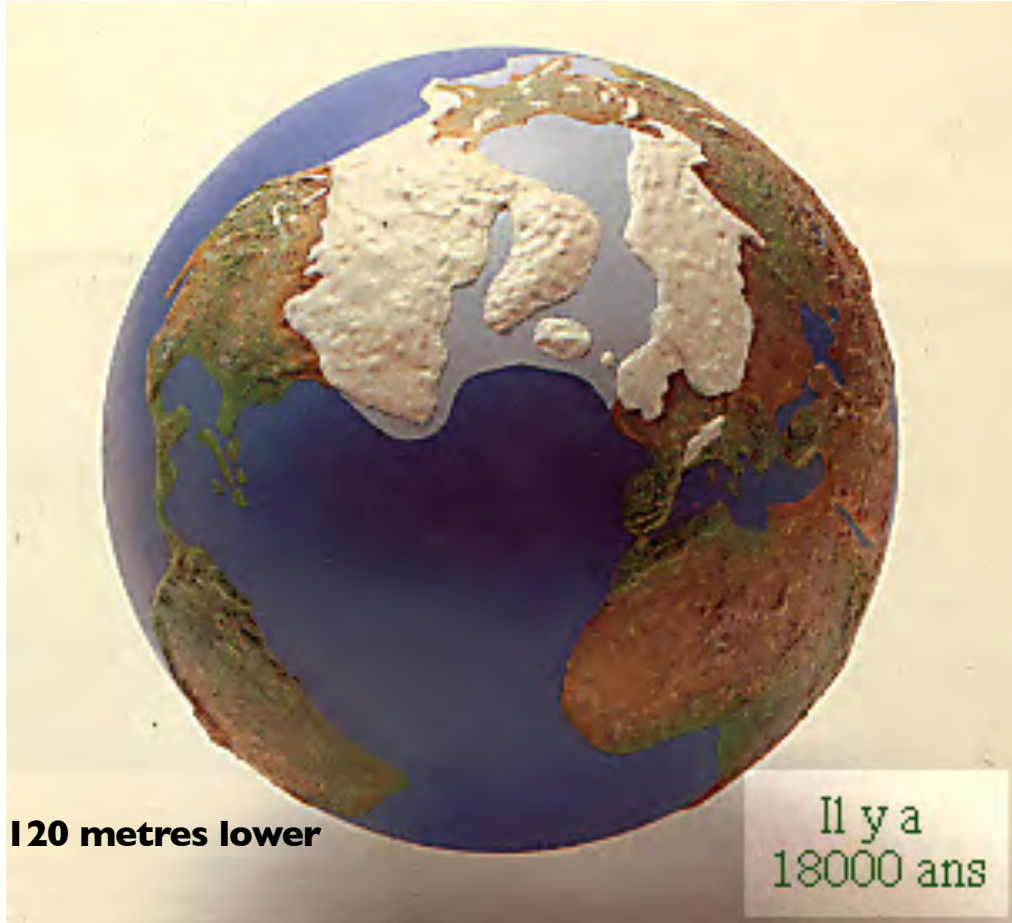
Fig. SPM.9

RCP2.6 (2081-2100), *likely* range: 26 to 55 cm
RCP8.5 (in 2100), *likely* range: 52 to 98 cm

Source: IPCC AR5 (2013); See update in IPCC SROCC (2019): add 10 cm to maximum

18-20000 years ago (Last Glacial Maximum)

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



Sea level: 120 metres lower

Il y a
18000 ans

Today, with +4-5° C globally

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



**Fact: Climate change impacts
poor people first, but we are all
on the same spaceship**

Belgian Prime Minister Charles Michel
(RTBF, 4 May 2018): « when there is a
geopolitical instability, we pay the cost as
well »

@JPvanYpersele

Risk = Hazard x Vulnerability x Exposure
(Victims of New Orleans floods after Katrina in 2005)



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

Effects on the Nile Delta, where more than 10 million people live less than 1 m above sea level



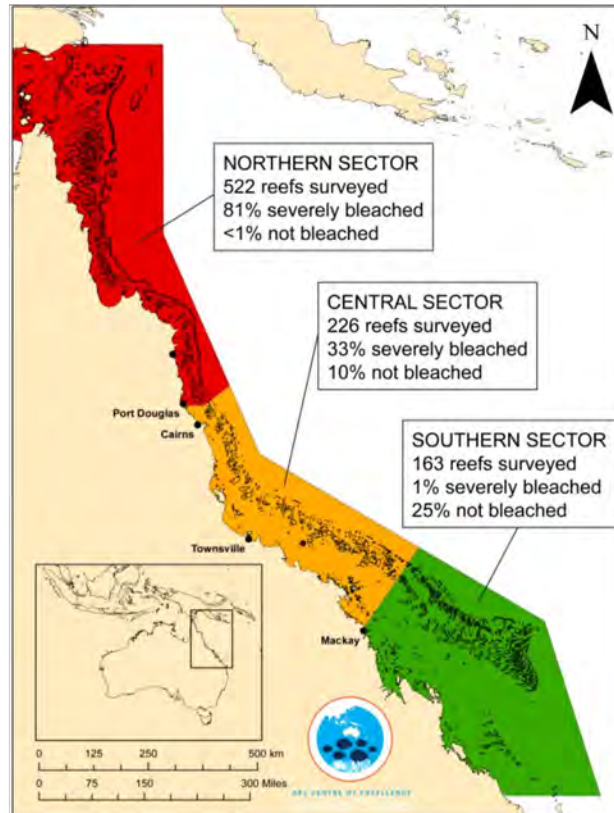
NB: + 1 m is possible
in the next 100 years..

(Time 2001)

Fact: Ecosystems suffer more and more, while our wellbeing depends on their good state

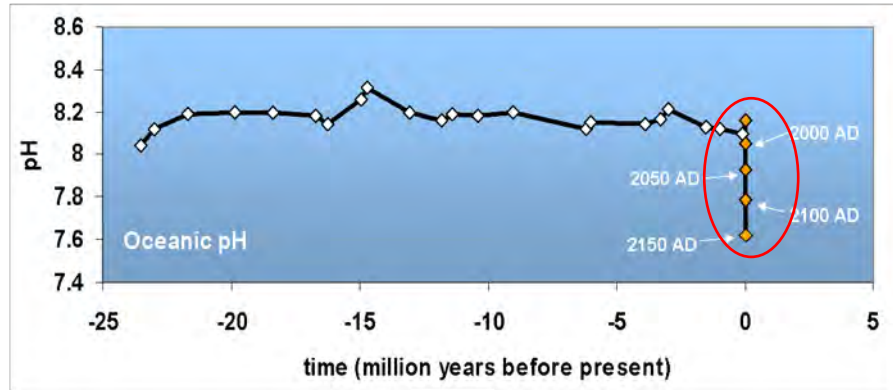
The « Sixth Extinction » has started, and climate change is one of the causing factors

2016: Only 7% of the Great Barrier Reef has avoided coral bleaching



Oceans are Acidifying Fast

Changes in pH over the last 25 million years



“Today is a rare event in the history of the World”

- It is happening now, at a **speed and to a level** not experienced by marine organisms for about 60 million years
- Mass extinctions linked to previous ocean acidification events
- Takes 10,000's of years to recover

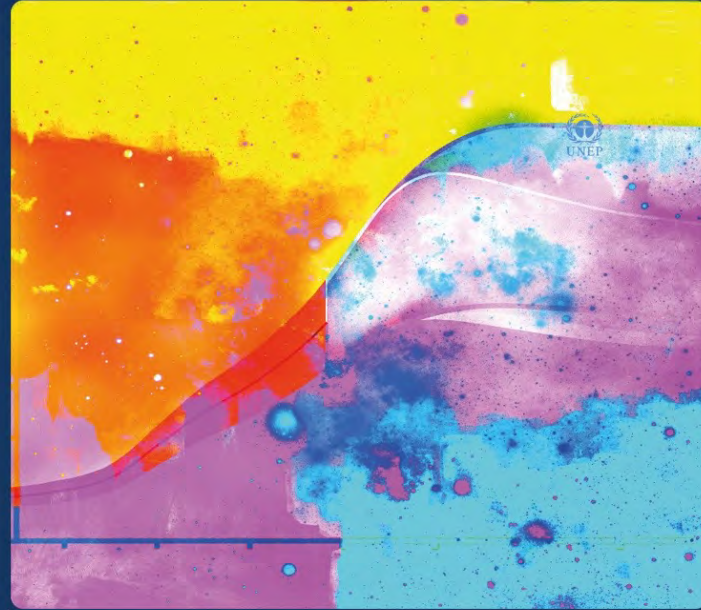
Turley et al. 2006

Slide courtesy of Carol Turley, PML

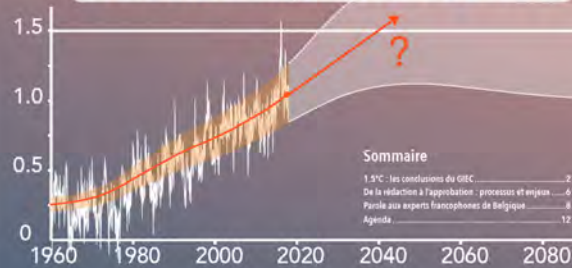
The SR15

Global Warming of 1.5°C

An IPCC special report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty.



Le rapport spécial du GIEC Réchauffement planétaire de 1.5°C



Sommaire

1.5°C : les conclusions du GIEC	2
De la rédaction à l'approbation : processus et enjeux	6
Parole aux experts francophones de Belgique	8
Agenda	12

Pour de nombreuses populations et écosystèmes, il est essentiel de limiter le réchauffement à 1.5°C ou de ne dépasser ce niveau que temporairement. Et c'est potentiellement encore réalisable. Le 6 octobre 2018, l'Assemblée Plénière du GIEC a adopté le Rapport Spécial sur un « Réchauffement planétaire de 1.5°C », qui fait le point au sujet des impacts et scénarios correspondant à ce niveau de réchauffement.

Ce rapport conclut que pour limiter le réchauffement climatique à 1.5°C, il faut des transformations radicales et rapides dans tous les domaines de notre société. Il précise que ces changements sont sans précédent en termes d'échelle, mais pas nécessairement en termes de rapidité.

L'origine du rapport est une demande formelle au GIEC de la part des Parties à la Convention cadre des Nations Unies sur les changements climatiques (CCNUCC) lors de l'adoption de l'Accord de Paris, en 2015 (12^e Conférence des Parties, COP21). La COP21 avait aussi indiqué que le rapport du GIEC devrait identifier le niveau auquel les émissions mondiales devraient être ramenées en 2050 pour contenir l'élévation de température en dessous de 1.5°C.

Image de fond : extrait adapté de la figure SP.M1 du Rapport spécial.

Le rapport a été adopté à l'issue d'une semaine de discussions intenses au sujet de la formulation du Résumé à l'intention des décideurs, sur la base des chapitres et du projet de résumé rédigés par les scientifiques - qui ont toujours le dernier mot en ce qui concerne le contenu. Il forme une base scientifique essentielle pour les prochaines négociations internationales dans le cadre de la CCNUCC, qui auront lieu à Katowice (Pologne) en décembre 2018 (COP24).

Dans cette lettre, nous donnons d'abord un aperçu des conclusions du rapport, ensuite un aperçu du processus d'approbation et des enjeux associés. Pour ouvrir le débat et fournir un ensemble de points de vue, nous avons ensuite donné la parole aux experts francophones de Belgique, qui nous ont aimablement fait part des commentaires que vous trouverez en troisième partie. L'agenda indique les prochaines périodes de lecture de rapports du GIEC et annonce deux événements à venir en Belgique.

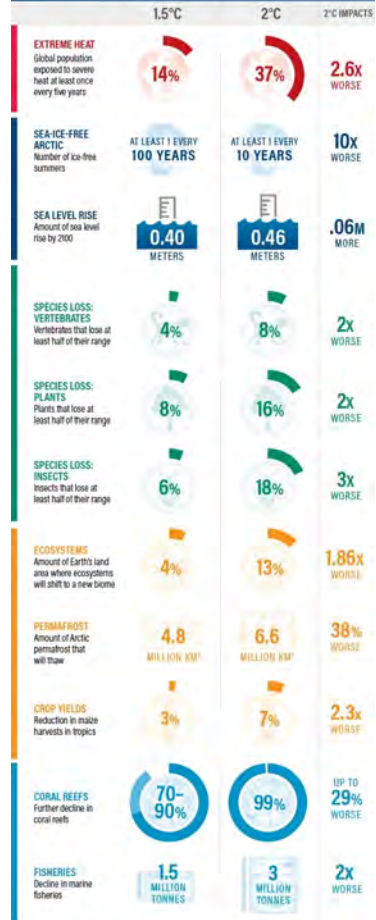
Nous vous en souhaitons une bonne lecture,
Jean Pascal van Ypersele, Bruna Gaino et Philippe Marbaix



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

HALF A DEGREE OF WARMING MAKES A BIG DIFFERENCE:

EXPLAINING IPCC'S 1.5°C SPECIAL REPORT

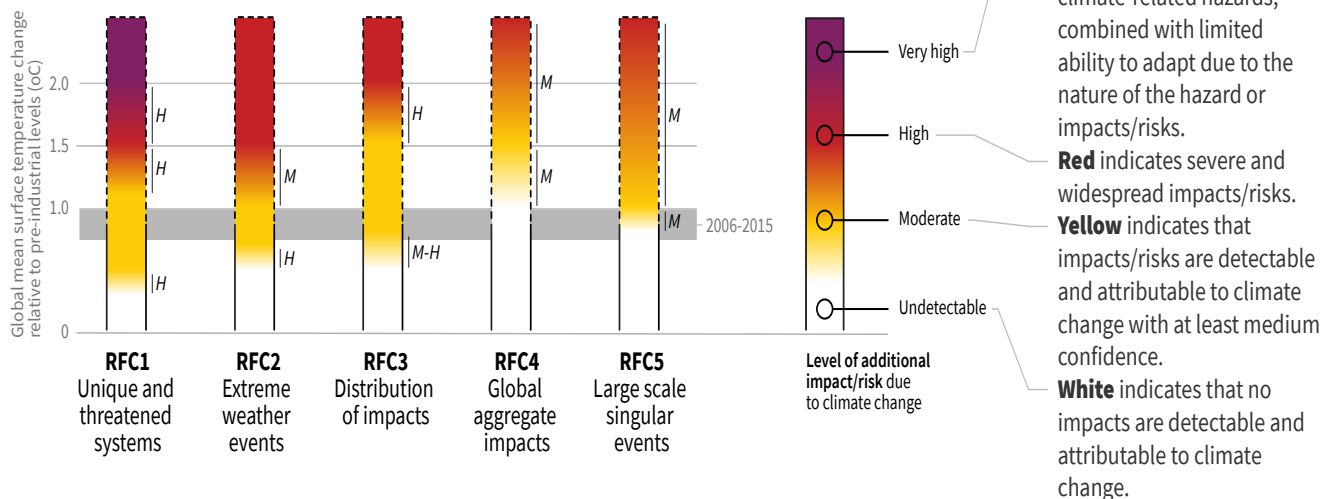


Responsibility for content: WRI

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)

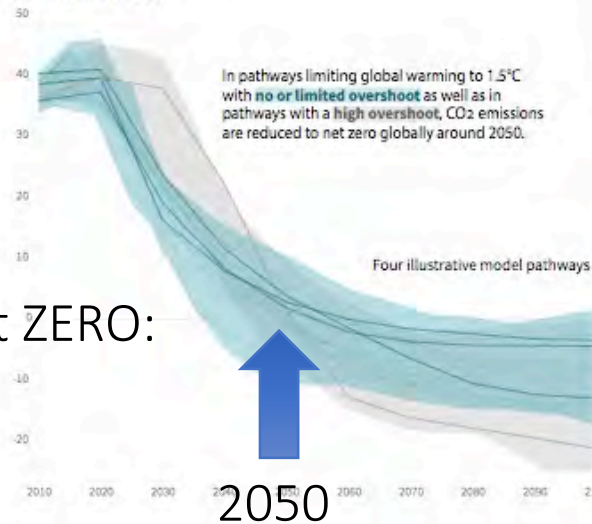


Global emissions pathway characteristics

General characteristics of the evolution of anthropogenic net emissions of CO₂, and total emissions of methane, black carbon, and nitrous oxide in model pathways that limit global warming to 1.5°C with no or limited overshoot. Net emissions are defined as anthropogenic emissions reduced by anthropogenic removals. Reductions in net emissions can be achieved through different portfolios of mitigation measures illustrated in Figure SPM3B.

Global total net CO₂ emissions

Billion tonnes of CO₂/yr



Net ZERO:



2050

Timing of net zero CO₂

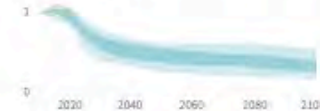
Line widths depict the 5-95th percentile and the 25-75th percentile of scenarios



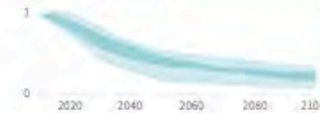
Non-CO₂ emissions relative to 2010

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





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

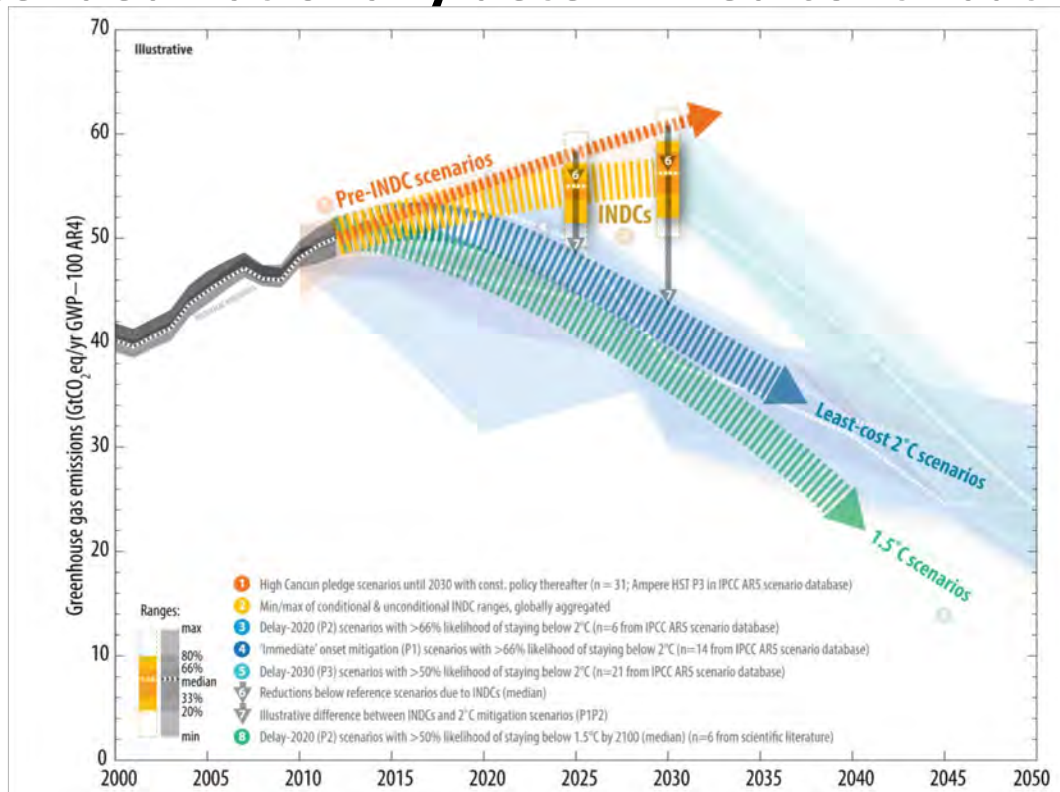
Fact: European Union spends at least 1 billion euros *per day* simply to buy fossil fuels outside its borders.

True, decarbonizing the EU economy will cost, but not doing it could cost much more in impacts. Saving these 400 billions €/year could offer many opportunities

Fact: The present national plans (NDCs) introduced ahead of the Paris Agreement are far from what is needed to respect the 1.5° C objective, and even to stay (well) below 2° C warming

Please note that the Paris Agreement speaks about 1.5° C and « *well below 2° C* » warming, not just 2° C

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>

- **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)

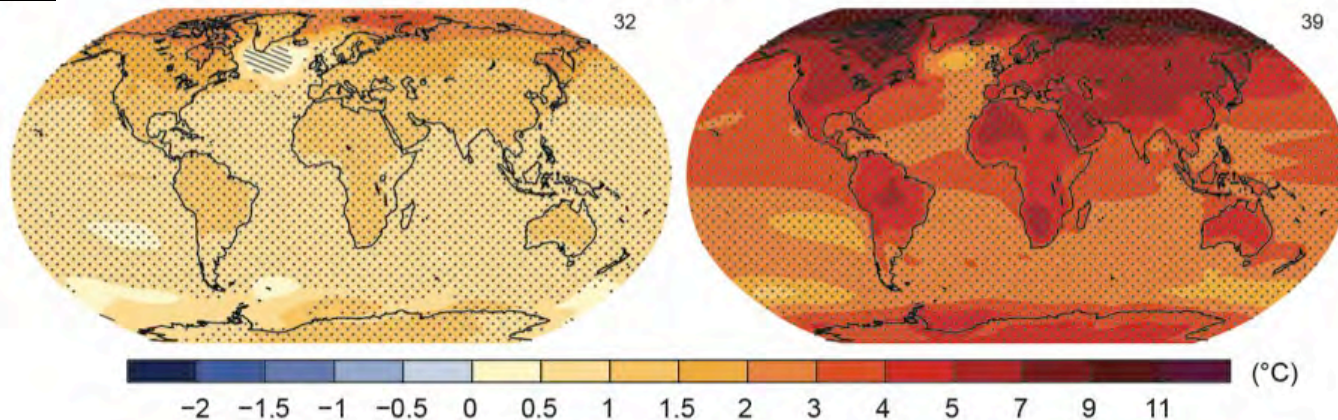
- **energy efficiency: +330**
- **renewables: + 90**
- **power plants w/ CCS: + 40**
- **nuclear: + 40**
- **power plants w/o CCS: - 60**
- **fossil fuel extraction: - 120**

RCP2.6

RCP8.5

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

Fig. SPM.8



Humanity has the choice

This gives me
hope:

Well-
informed
young people
speaking
truth to
power

With @GretaThunberg at COP24



Greta is inconvenient, like the truth

Greta is inconvenient, like the truth¹

Jean-Pascal van Ypersele ([@JPVanypersele](https://twitter.com/JPVanypersele))

*Professor of climatology at the Université catholique de Louvain (Belgium)
Former IPCC Vice-Chair (2008-2015),
Member of the Académie royale de Belgique*

Greta Thunberg is inconvenient, and has been the subject of renewed criticism since her [speech](#) to the United Nations in New York. Some, often older white men, criticize her appearance or her so-called "mental illness." They call her "unstable" and seem to take pride in bullying her.

But maybe they feel threatened because Greta is gifted. She understands the challenges of the climate crisis much better than most political or economic leaders.

I have seen this myself. As a physicist and climate scientist for nearly 40 years, and a former Vice-Chair of the [Intergovernmental Panel on Climate Change](#) (IPCC), I am no stranger to the climate crisis. But Greta has raised awareness about the climate crisis to a level never before seen.

I first saw Greta at the Katowice Climate Conference in December 2018. She was alone on a podium at a United Nations climate conference, answering questions from a host and the audience. She has no cards, but answers without hesitation, sometimes simply saying: "I don't know, I'm only 15 years old, ask the experts." But she already knows a lot. She also recognizes that "no one is too small to make a difference." I am blown away by the accuracy of her words, based on a serious knowledge of the mechanisms at work and the causes of the climate crisis.

A few days later, I heard Greta addressing the diplomats and negotiators in the plenary room. "The year 2078, I will celebrate my seventy-fifth birthday. If I have children, then maybe they will spend that day with me. Maybe they will ask about you. Maybe they will ask why you didn't do anything, while there still was time to act. You say that you love your children above everything else. And yet you are stealing their future." The [video](#) of her speech was shared around the world.

In all my years working on climate change in the United States, Belgium, and with the IPCC, and having participated in each meeting of the UN's climate treaty, I had never heard such a strong and moving climate speech. Her heart was talking, and she was right.

Greta read the IPCC reports. She understands the immense risks that the accumulation of greenhouse gases poses to life on Earth. She does not confuse the ozone hole, air pollution or the daily weather forecast with the climate crisis.

Few leaders can say the same.

Greta speaks without any shame about her Asperger's syndrome. In fact, it probably helps her see the contradiction between the speeches of world leaders and their actions. With great emotional intelligence, she expresses her fear of this gap. A fear that is shared by millions of young people.

The adults who blame Greta for sharing her concern would do better to listen to this fear, and to take action. Many adults defend themselves by attacking or devaluing youth. They try to make people believe that the decarbonization Greta is demanding implies a return to the Stone Age and poverty. They believe that they must protect the status quo of unlimited economic growth that relies on fossil fuels—their status quo.

Clearly these critics of Greta and the climate strikers have not read the IPCC reports. A just energy and ecological transition can lead to a better quality of life for everyone, particularly if it's integrated with the pursuit of the 17 Sustainable Development Goals adopted by the United Nations in 2015. The recent [UN Global Sustainable Development Report](#) has just emphasized this point.

Greta is no longer alone, as she was at the beginning of the [movement](#) she started. In many countries, including the United States, young people are rising to the challenge through dialogue and collective non-violent action. Greta's leadership and ability to speak truth to power has earned her a nomination for the Nobel Peace Prize...and I hope she receives this prize of prizes.

We have so much to learn from them. It is our generation's short-term thinking and actions that have brought us to the brink. We must listen to these young people who dare to speak about their fears for their future, and stop believing that we know better than they do. We must change our attitudes, and utilize the technological, economic, and political tools that will make it possible to transform young people's fears into a force of hope for a sustainable and just future.

Those who refuse to do this have signed their own death wish – for themselves, their children and their grandchildren.

I support Greta because she supports life.

¹ Adapted from the tribune published in « Le Monde » on Octobre 1st 2019 (https://www.lemonde.fr/idees/article/2019/10/01/jean-pascal-van-ypersele-greta-derange-comme-la-verite_6013798_3232.html); this text is available on www.climate.be/vany

To go further :

- www.climate.be/vanyp : my slides (under « conferences)
- www.ipcc.ch : IPCC
- www.realclimate.org : answers to the merchants of doubt arguments
- www.skepticalscience.com : same
- www.platforme-wallonne-giec.be : IPCC-related in French, Newsletter, recent on SR15, basic climate science
- **Twitter: @JPvanYpersele & @IPCC_CH**