IPCC (Intergovernmental Panel on Climate Change): Origin, role, reports, and the role of science in policymaking

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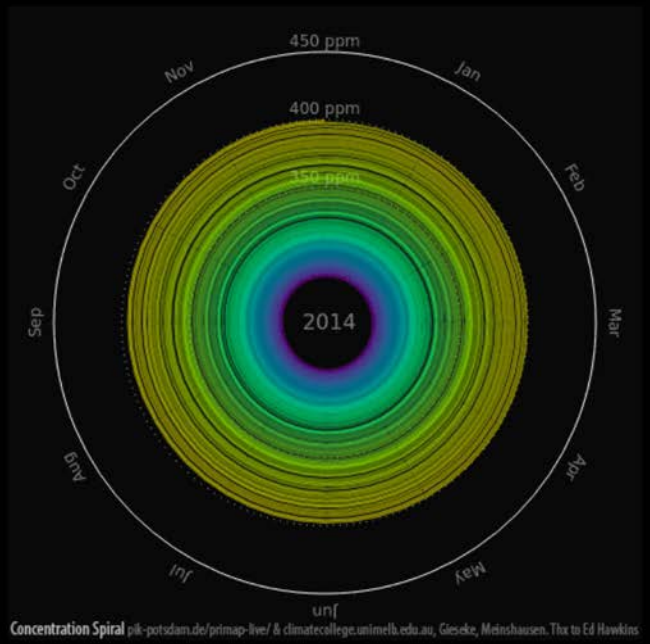
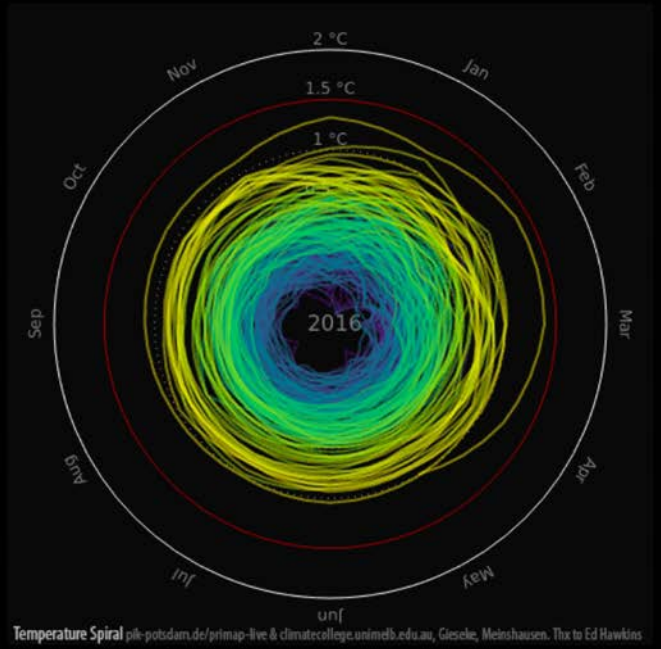
Postgraduate course « Energy & Climate », University of Antwerp, Antwerpen, 15 September 2021

Thanks to the Government of Wallonia, supporting the Walloon Platform for IPCC and to my team at the Université catholique de Louvain

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/

Source: @JohnfoCook

Why the IPCC ?

Established by WMO and UNEP in 1988

to provide policy-makers with an objective source o 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

Donald J. Trump
@realDonaldTrump

Suivre

The concept of global warming was created by and for the Chinese in order to make U.S. manufacturing non-competitive.

Voir la traduction

RETWEETS 99 789 JAIME 63 394

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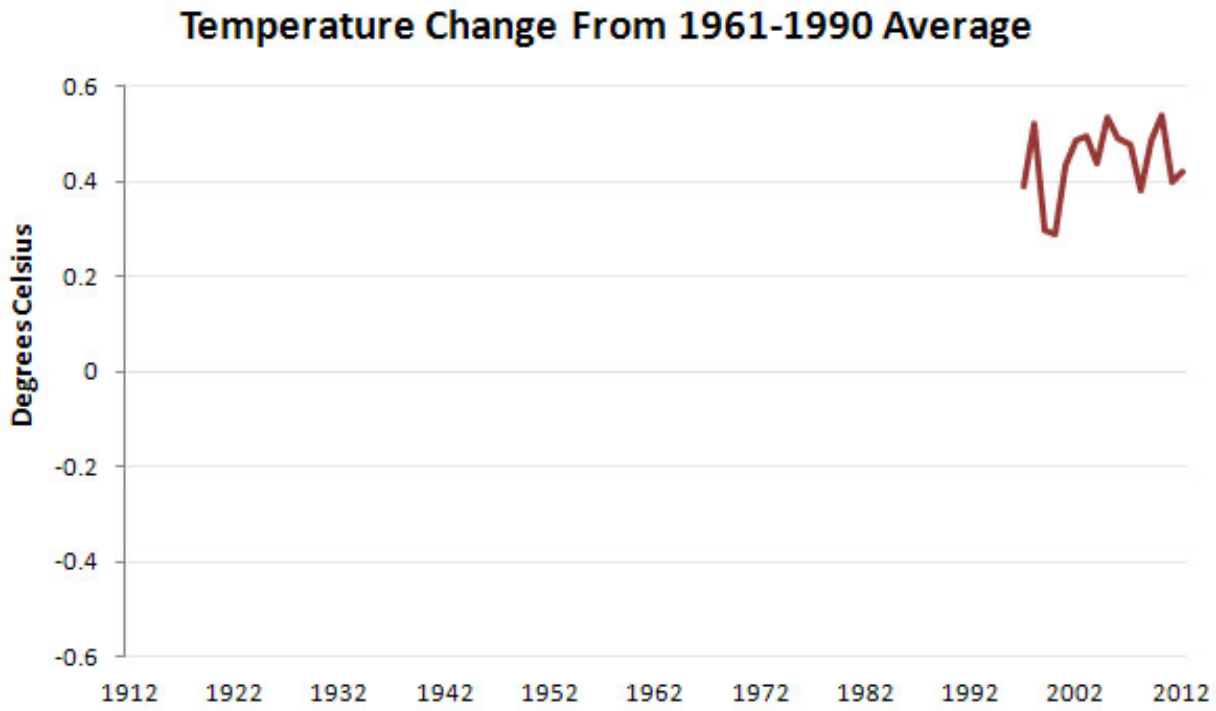
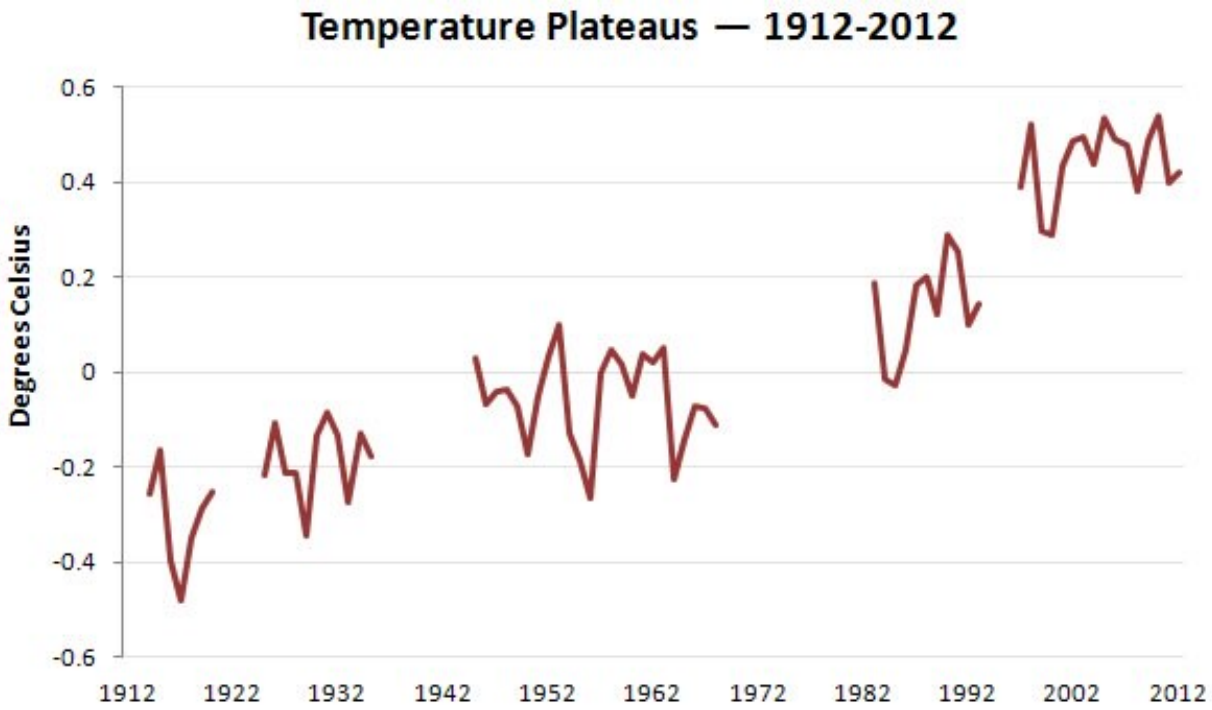
100 k 63 k •••



http://www.motherjones.com/kevin-drum/2012/10/lying-statistics-global-warming-edition

Lying With Statistics, Global Warming Edition



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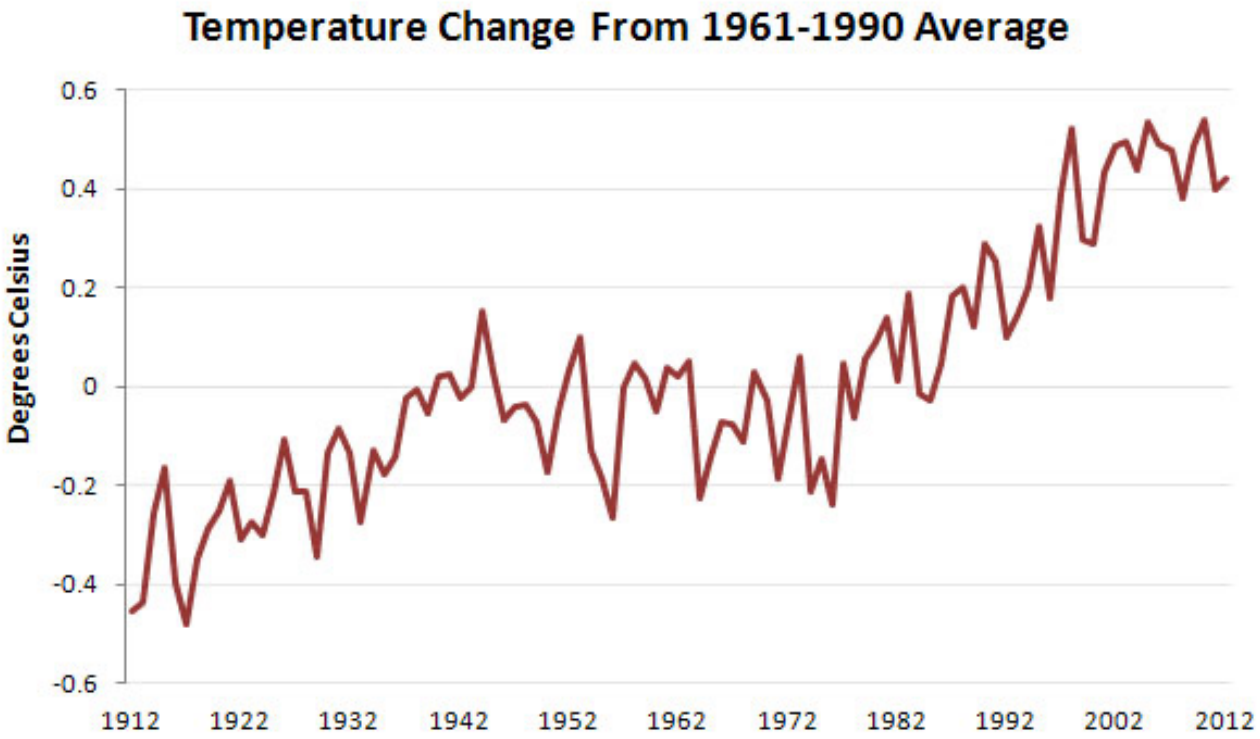
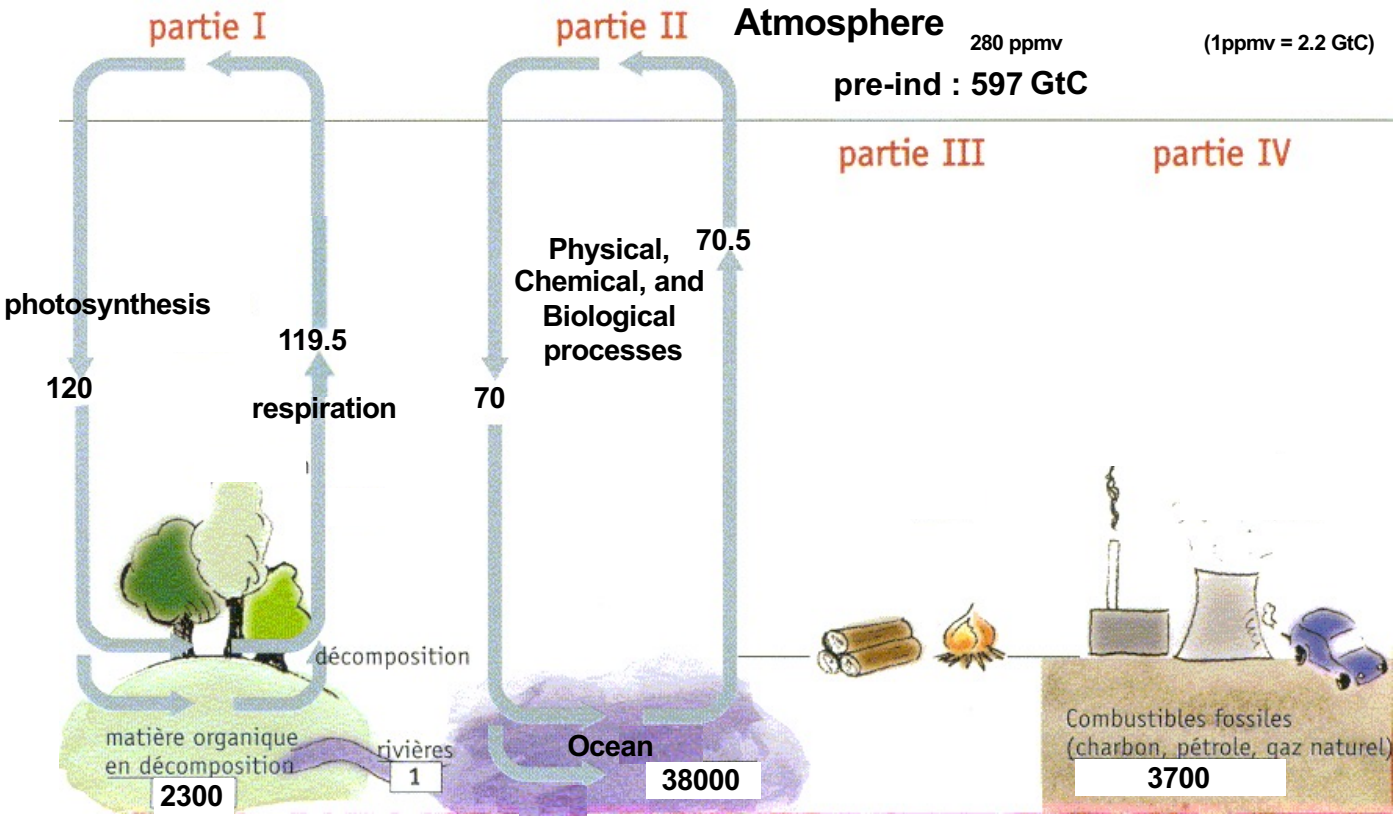
Lying With Statistics, Global Warming Edition



http://www.motherjones.com/kevin-drum/2012/10/lying-statistics-global-warming-edition

Carbon cycle: unperturbed fluxes

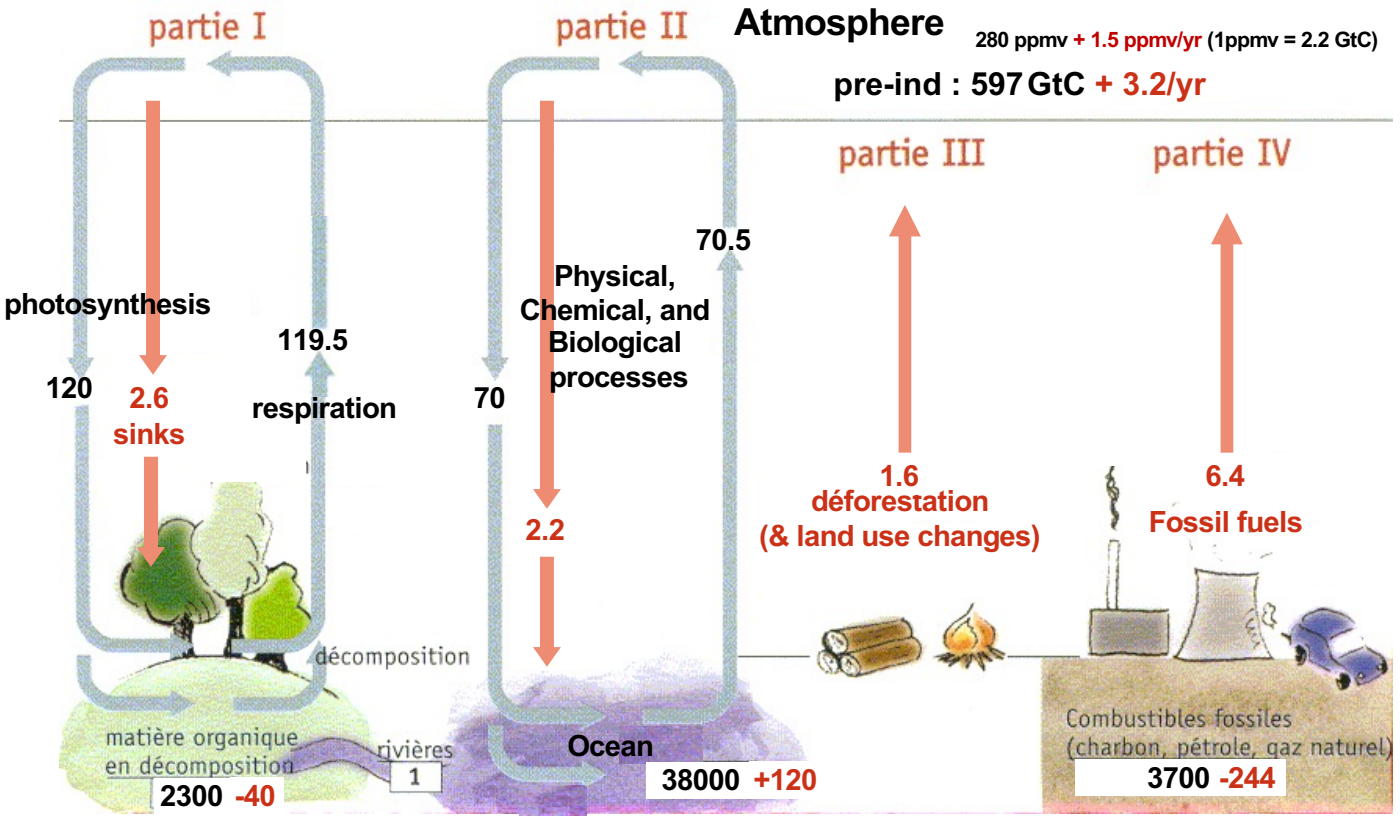


Units: GtC (billions tons of carbon) or GtC/year (multiply by 3.7 to get $GtCO_2$)

vanyp@climate.be

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!

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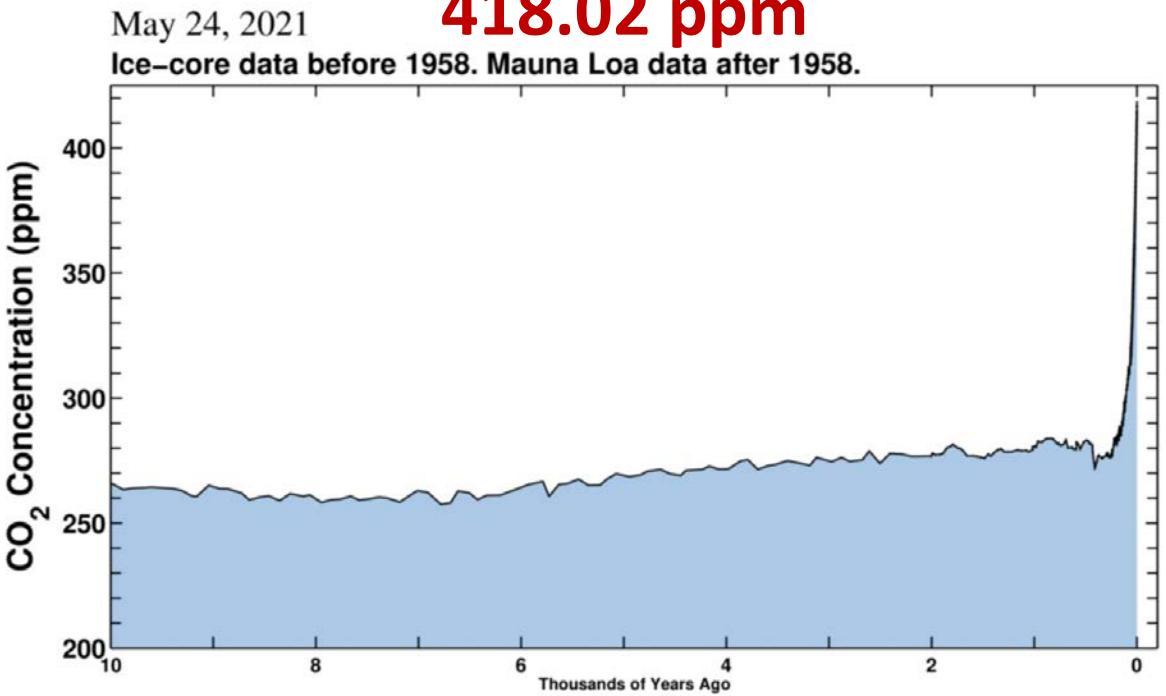
CO_2 Concentration 24 May 2021 (Keeling curve + last 10000 years)

418.02 ppm



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

Climatic Change: Are We on the Brink of a Pronounced Global Warming? (Broecker,1975)

Table 1. Reconstruction and prediction of atmospheric CO_2 contents based on fuel consumption data.

Year	Chemical fuel CO_2 ($\times 10^{16}$ g)	Excess atmospheric CO_2* ($\times 10^{16}$ g)	Excess atmospheric CO_2 (%)	Excess atmospheric CO_2 (ppm)	CO_2 content of the atmosphere† (ppm)	Global temperature increase‡ (°C)
1900	3.8	1.9	0.9	2	295	0.02
1910	6.3	3.1	1.4	4	297	.04
1920	9.7	4.8	2.2	6	299	.07
1930	13.6	6.8	3.1	9	302	.09
1940	17.9	8.9	4.1	12	305	.11
1950	23.3	11.6	5.3	16	309	.15
1960	31.2	15.6	7.2	21	314§	.21
1970	44.0	22.0	10.2	29	322§	.29
1980‖	63	31	14	42	335	.42
1990‖	88	44	20	58	351	.58
2000‖	121	60	28	80	373	.80
2010‖	167	83	38	110	403	1.10

*On the assumption that 50 percent of the CO_2 produced by the burning of fuel remains in the atmosphere. †The preindustrial atmospheric partial pressure of CO_2 is assumed to be 293 ppm. ‡Assumes a 0.3°C global temperature increase for each 10 percent rise in the atmospheric CO_2 content. §Value observed on Hawaii for 1960, 314 ppm; value for 1970, 322 ppm (*8*). ‖Post-1972 growth rate taken to be 3 percent per year.

Once upon a time, a US climatologist said this in Belgium (1):

- **Net accumulation of carbon as CO_2 in the atmosphere is about 3 gigatons per year. There is no quantitative explanation why the annual accumulation is 3 GtC when emissions are 8 GtC.**
- **There is no reason to expect that existing trends between emissions and atmospheric buildup will continue in the future.**

Once upon a time, a US climatologist said this in Belgium (2):

- **Contrary to what you may believe from accounts of the IPCC report, these observations still do not confirm that human activities have led to any global warming.**
- **Warming amounts to about 0.5°C over the last 140 years. This increase is entirely within the range of natural variability. The pattern does not agree with trends in greenhouse gases.**

Once upon a time, a US climatologist said this in Belgium (3):

- **Projections are based on unverified models of natural and social science.**
- **Results from climate models are known to be wrong.**
- **It is impossible today to project future impacts of climate change.**
- **Progress to advance the science will require major effort and many years of study.**

I was there, and confronted him

- **This US climatologist was Dr. B. Flannery, science advisor to Exxon Research and Engineering, with a Ph.D in astrophysics**
- **He was speaking (and sowing doubt) to the Belgian delegation about to leave for the final negotiations of the Kyoto Protocol, in 1997**
- **This was at a lunch event organised by the Belgian Oil Industry Federation (Fédération pétrolière) on 21 November 1997**

Exxon efforts did not stop there…

- **The next day, Dr. B. Flannery presented a similar talk to a few hundreds secondary school science teachers in Ghent**

Facsimile Cover Sheet

TO: **John Howard**
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Date/Time: 6 Feb 2001, 10:00 a.m.

Pages including Cover: 18

Regarding: *Bush Team for IPCC Negotiations*

Attached is a brief memo outlining the issues related to the on-going IPCC negotiations on the Third Assessment Report. I have also attached other material that may be useful to you.

I will call to discuss the recommendations regarding the team that can better represent the Bush Administration interests until key appointments and re-assessments are made.

Randy

Issue: Can Watson be replaced now at the request of the U.S.?

Issue: Have Bierbaum and MacCracken been removed from their positions of influence?

Falsely argues that because we don't know everything, we know nothing.

False: In the 1990s, scientists had already formed a consensus that humans were causing global warming.

Just because climate has changed naturally in the past does not mean it's natural now.

Unsettled Science

Cast doubt on the scientific consensus on climate change.

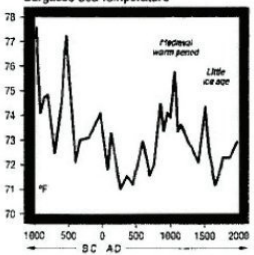
Knowing that weather forecasts are reliable for a few days at best, we should recognize the enormous challenge facing scientists seeking to predict climate change and its impact over the next century. In spite of everyone's desire for clear answers, it is not surprising that fundamental gaps in knowledge leave scientists unable to make reliable predictions about future changes.

A recent report from the National Research Council (NRC) raises important issues, including these still-unanswered questions: (1) Has human activity already begun to change temperature and the climate, and (2) How significant will future change be?

The NRC report confirms that Earth's surface temperature has risen by about 1 degree Fahrenheit over the past 150 years. Some use this result to claim that humans are causing global warming, and they point to storms or floods to say that dangerous impacts are already under way. Yet scientists remain unable to confirm either contention.

Geological evidence indicates that climate and greenhouse gas levels experience significant natural variability for reasons having nothing to do with human activity. Historical records and current scientific evidence show that Europe and North America experienced a *medieval warm period* one thousand years ago, followed centuries later by a *little ice age*. The geological record shows even larger changes throughout Earth's history. Against this backdrop of large, poorly understood natural variability, it is impossible for scientists to attribute the recent small surface temperature increase to human causes.

Sargasso Sea Temperature



Moreover, computer models relied upon by climate scientists predict that lower atmospheric temperatures will rise as fast as or faster than temperatures at the surface. However, only within the last 20 years have reliable global measurements of temperatures in the lower atmosphere been available through the use of satellite technology. These measurements show little if any warming.

Contradicts themselves: they already talk about 1 degree warming.

Even less is known about the potential positive or negative impacts of climate change. In fact, many academic studies and field experiments have demonstrated that increased levels of carbon dioxide can promote crop and forest growth.

So, while some argue that the science debate is settled and governments should focus only on near-term policies—that is empty rhetoric. Inevitably, future scientific research will help us understand how human actions and natural climate change may affect the world and will help determine what actions may be desirable to address the long-term.

Uses the same delay argument as the tobacco industry: "Let's wait before we act".

Science has given us enough information to know that climate changes may pose long-term risks. Natural variability and human activity may lead to climate change that could be significant and perhaps both positive and negative. Consequently, people, companies and governments should take responsible actions now to address the issue.

One essential step is to encourage development of lower-emission technologies to meet our future needs for energy. We'll next look at the promise of technology and what is being done today.

ExxonMobil

Figure 4: ExxonMobil 2000 advertorial in The New York Times.
The fossil fuel industry implemented their plans to promote climate denial in the 1990s-2010s.

Source: @GeoffreySupran

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…)

@JPvanYpersele

The « merchants of doubt » have evolved in their arguments:

- Existence of global warming
- Human responsability in the warming
- Uncertainties around the science
- More research needed before taking measures
- Cost of decarbonization
- Drawbacks from alternatives

(recent example: so-called enormous needs of cobalt for electric mobility reported on CNN; see critical analysis on https://www.desmogblog.com/2018/05/02/cnn-wrongly-blames-electric-cars-unethical-cobalt-mining)

Why I prefer to speak about « climate confusers »

- I reserve the word « denialist » to those who deny the Holocaust, out of respect for the victims of the Shoah
- I don’t speak of « climate skeptics » either, as skepticism is at the root of the scientific method, and those « climate confusers » should not be given the monopoly of skepticism
- « Climate confuser » is an expression suggested to me by Kees van der Leun (@Sustainable2050)

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Mandate of the IPCC

"The General Assembly […] endorses action of the World Meteorological Organisation and the United Nations Environment Programme in jointly establishing an Intergovernmental Panel on Climate Change to provide **international coordinated scientific assessments** of the magnitude, timing and potential environmental and socio-economic impact of climate change and realistic response strategies […]."

United Nations General Assembly
43rd session resolution, 6th December 1988

Role of IPCC

"The IPCC does not carry out research nor does it monitor climate related data or other relevant parameters. It bases its assessment mainly on peer reviewed and published scientific/technical literature."

(source: www.ipcc.ch)

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IPCC Reports are policy-relevant, NOT policy-prescriptive

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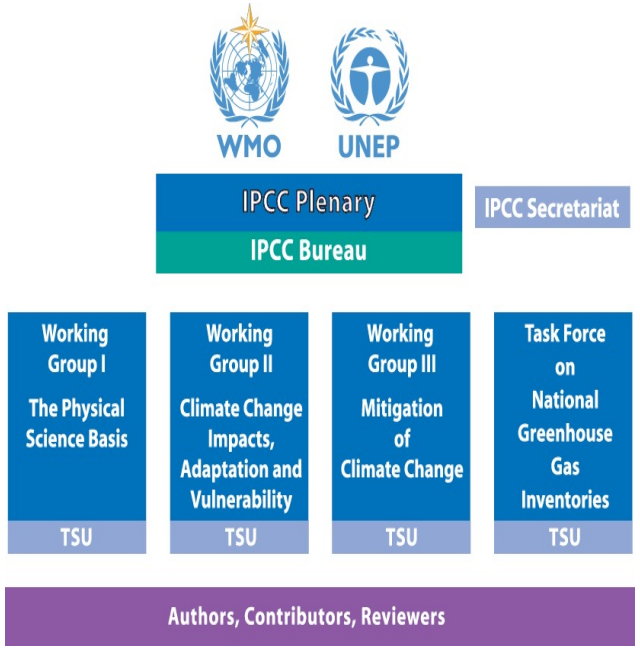
Inter-governmental Panel on Climate Change (IPCC): Organization Structure



- IPCC plenary comprises of all countries in the world
- IPCC Bureau comprises of 34 elected members; IPCC elects its Bureau every 6-7 years
- 3 Working Groups & a Task Force on National Greenhouse Gas Inventories
- Authors, Contributors, Reviewers, Review Editors

IPCC writing cycle (4 years, 831 Lead authors)

- **Plenary decides table of content of reports**
- **Bureau appoints world-class scientists as authors, based on publication record**
- **Authors assess all scientific literature**
- ***Draft* – Expert review (+ Review editors)**
- ***Draft 2 (+ Draft 1 Summary for Policy Makers (SPM)* – Combined expert/government review**
- ***Draft 3 (+ Draft 2 SPM)*– Government review of SPM**
- **Approval Plenary (interaction authors – governments) – *SPM and full report***
- ***NB: the scientists have the last word!***

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

Progression of Understanding: Greater and Greater Certainty in Attribution

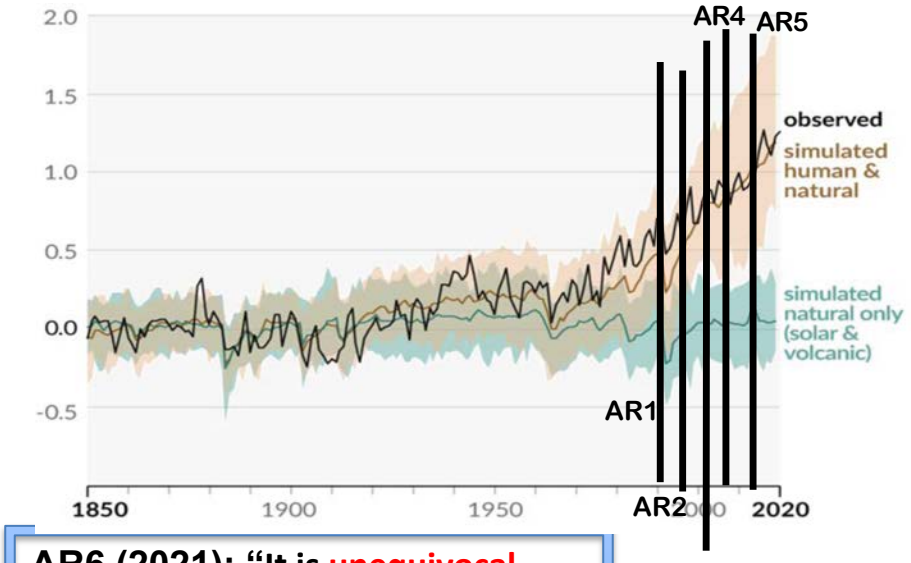
AR1 (1990): "unequivocal detection not likely for a decade"

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… »

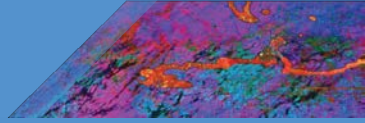


AR6 (2021): "It is unequivocal that human influence has warmed the atmosphere, ocean, and land."

IPCC

Key messages from IPCC AR5

- → **Human influence on the climate system is clear**
- → **Continued emissions of greenhouse gases will increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems**
- → **While climate change is a threat to sustainable development, there are many opportunities to integrate mitigation, adaptation, and the pursuit of other societal objectives**
- → **Humanity has the means to limit climate change and build a more sustainable and resilient future**



THE WGI AR6 BY THE NUMBERS:

Author Team

234 authors from **65** countries

28% women, **72%** men

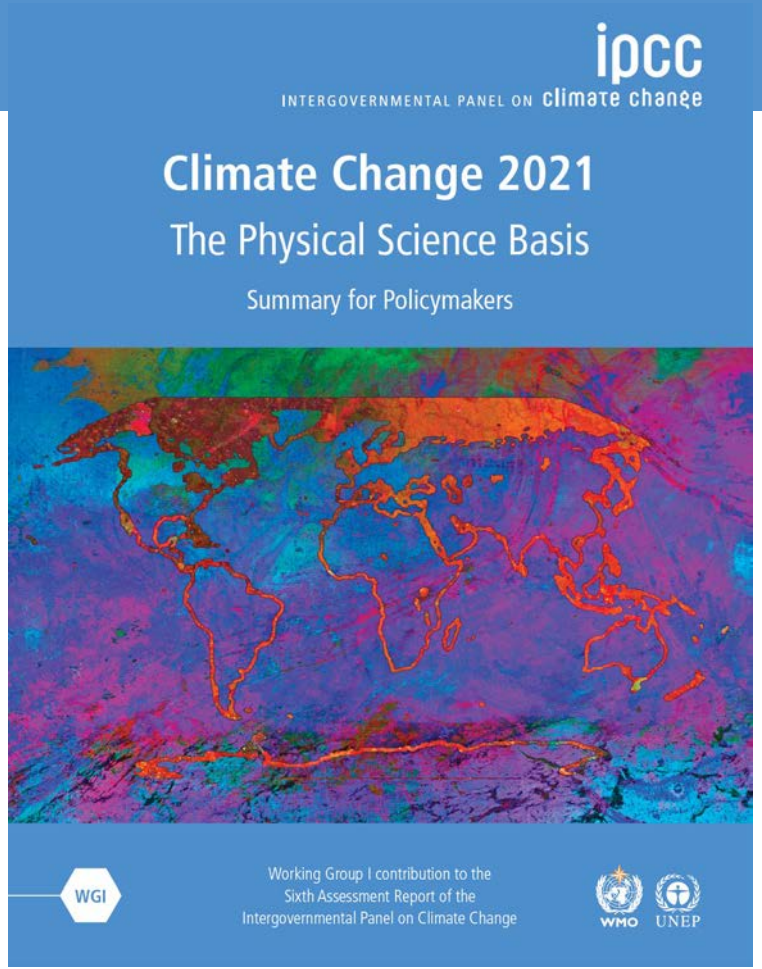
30% new to the **IPCC**

Review Process

14,000 scientific publications assessed

78,000+ review comments

46 countries commented on Final Government Distribution


ipcc
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
WMO
UNEP

Key messages from the latest WGI AR6 IPCC Report:

A. The Current State of the Climate

A.1 It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred.

A.2 The scale of recent changes across the climate system as a whole and the present state of many aspects of the climate system are unprecedented over many centuries to many thousands of years.

A.3 Human-induced climate change is already affecting many weather and climate extremes in every region across the globe. Evidence of observed changes in extremes such as heatwaves, heavy precipitation, droughts, and tropical cyclones, and, in particular, their attribution to human influence, has strengthened since the Fifth Assessment Report (AR5).

A.4 Improved knowledge of climate processes, paleoclimate evidence and the response of the climate system to increasing radiative forcing gives a best estimate of equilibrium climate sensitivity of 3°C, with a narrower range compared to AR5.

Key messages from the latest WGI AR6 IPCC Report:

B. Possible Climate Futures

B.1 Global surface temperature will continue to increase until at least the mid-century under all emissions scenarios considered. Global warming of 1.5°C and 2°C will be exceeded during the 21st century unless deep reductions in carbon dioxide (CO_2) and other greenhouse gas emissions occur in the coming decades.

B.2 Many changes in the climate system become larger in direct relation to increasing global warming. They include increases in the frequency and intensity of hot extremes, marine heatwaves, and heavy precipitation, agricultural and ecological droughts in some regions, and proportion of intense tropical cyclones, as well as reductions in Arctic sea ice, snow cover and permafrost.

B.3 Continued global warming is projected to further intensify the global water cycle, including its variability, global monsoon precipitation and the severity of wet and dry events.

B.4 Under scenarios with increasing CO_2 emissions, the ocean and land carbon sinks are projected to be less effective at slowing the accumulation of CO_2 in the atmosphere.

B.5 Many changes due to past and future greenhouse gas emissions are irreversible for centuries to millennia, especially changes in the ocean, ice sheets and global sea level.

Key messages from the latest WGI AR6 IPCC Report:

C. Climate Information for Risk Assessment and Regional Adaptation

C.1 Natural drivers and internal variability will modulate human-caused changes, especially at regional scales and in the near term, with little effect on centennial global warming. These modulations are important to consider in planning for the full range of possible changes.

C.2 With further global warming, every region is projected to increasingly experience concurrent and multiple changes in climatic impact-drivers. Changes in several climatic impact-drivers would be more widespread at 2°C compared to 1.5°C global warming and even more widespread and/or pronounced for higher warming levels.

C.3 Low-likelihood outcomes, such as ice sheet collapse, abrupt ocean circulation changes, some compound extreme events and warming substantially larger than the assessed *very likely* range of future warming cannot be ruled out and are part of risk assessment.

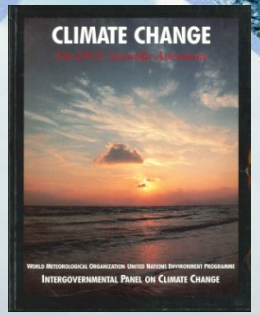
Key messages from the latest WGI AR6 IPCC Report:

D. Limiting Future Climate Change

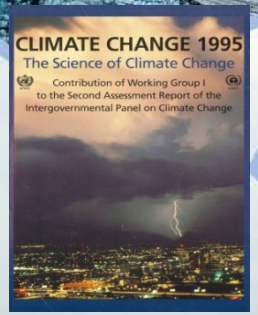
D.1 From a physical science perspective, limiting human-induced global warming to a specific level requires limiting cumulative CO_2 emissions, reaching at least net zero CO_2 emissions, along with strong reductions in other greenhouse gas emissions. Strong, rapid and sustained reductions in CH_4 emissions would also limit the warming effect resulting from declining aerosol pollution and would improve air quality.

D.2 Scenarios with low or very low greenhouse gas (GHG) emissions (SSP1-1.9 and SSP1-2.6) lead within years to discernible effects on greenhouse gas and aerosol concentrations, and air quality, relative to high and very high GHG emissions scenarios (SSP3-7.0 or SSP5-8.5). Under these contrasting scenarios, discernible differences in trends of global surface temperature would begin to emerge from natural variability within around 20 years, and over longer time periods for many other climatic impact-drivers (*high confidence*).

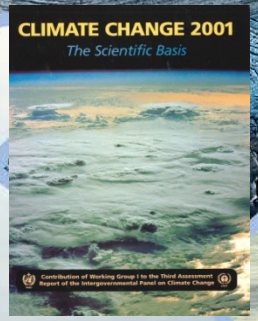
IPCC Assessment Reports



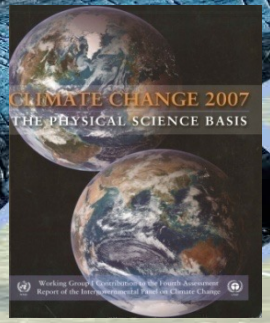
FAR 1990



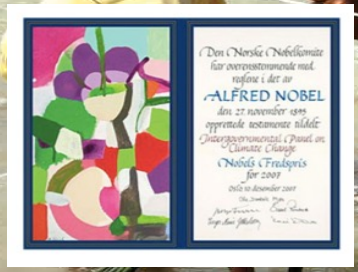
SAR 1995

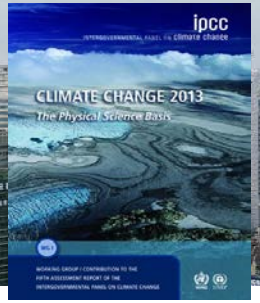


TAR 2001

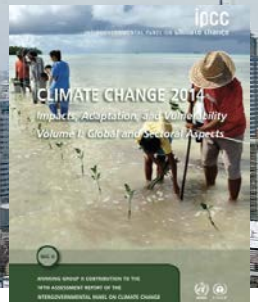


AR4 2007

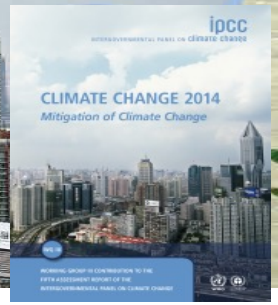




AR5 WGI 2013



AR5 WGII 2014



AR5 WGIII 2014

ipcc
INTERGOVERNMENTAL PANEL ON climate change

WMO UNEP

The IPCC assessments have influenced global action on an unprecedented scale

1. The First Assessment Report (FAR, 1990) had a major impact in defining the content of the UNFCCC

2. The Second Assessment Report (SAR, 1996) was largely influential in defining the provisions of the Kyoto Protocol

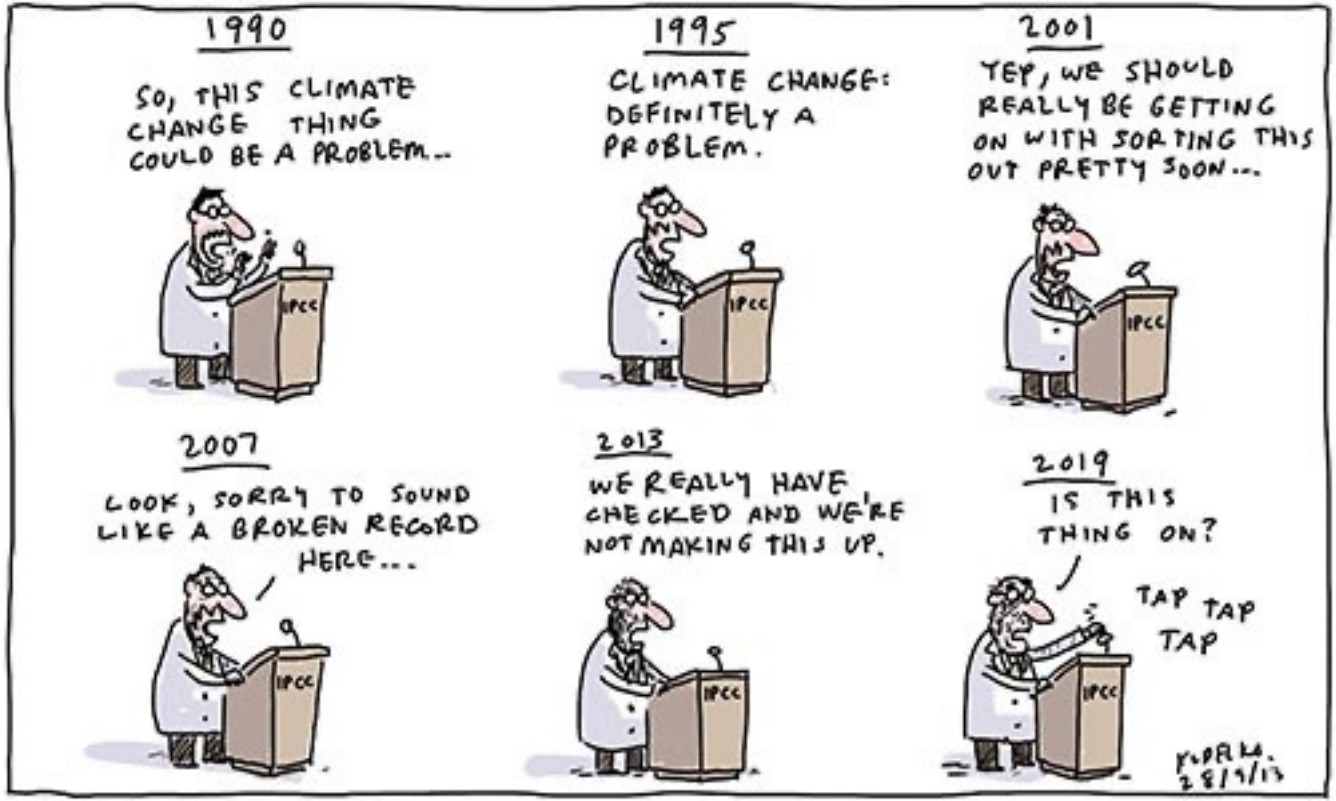
3. The Third Assessment Report (TAR, 2001) focused attention on the impacts of climate change and the need for adaptation

4. The Fourth Assessment Report (AR4, 2007) informed the decision on the ultimate objective (2° C) and is creating a strong basis for a post Kyoto Protocol agreement

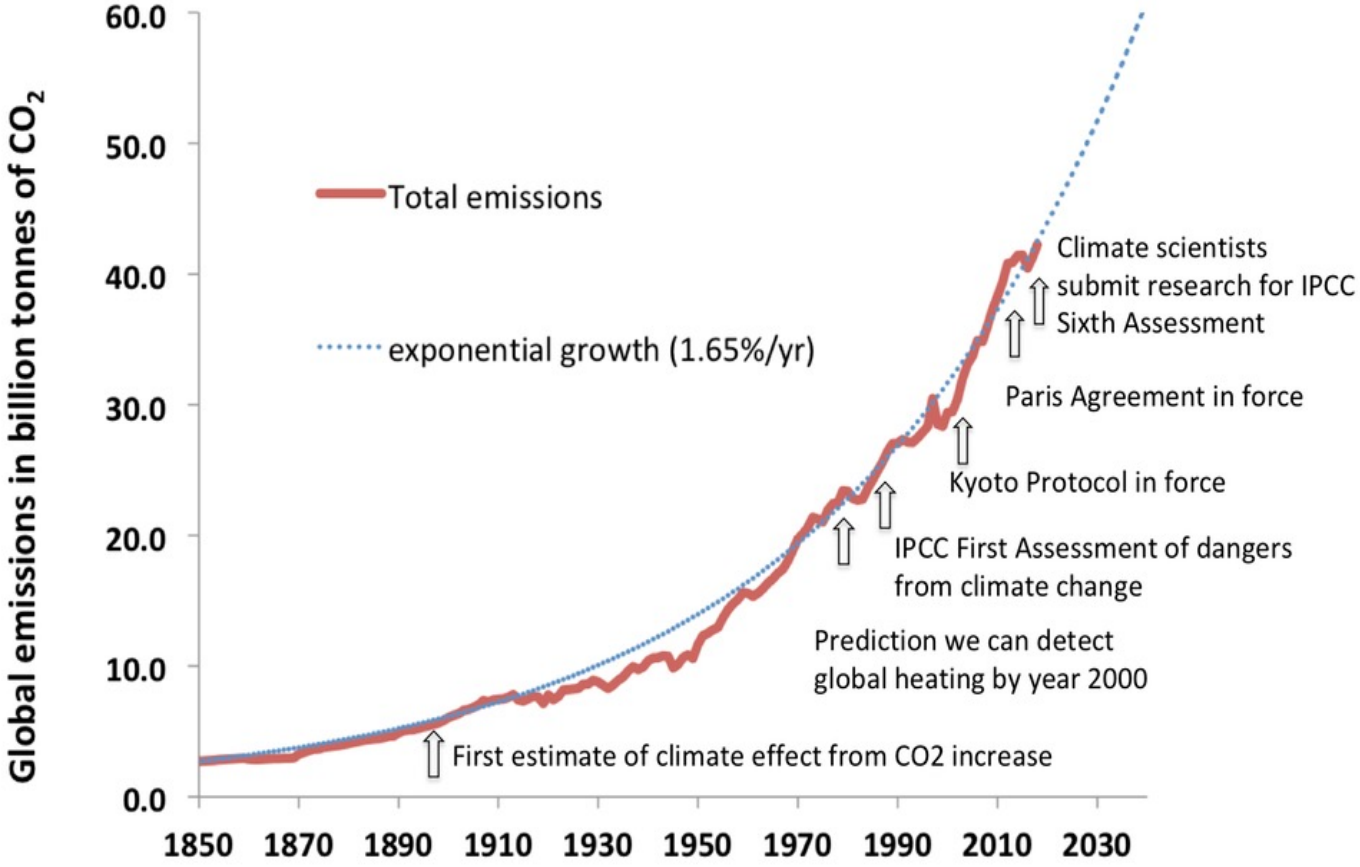
5. The Fifth Assessment Report (AR5, 2013-14) has informed the review of the 2° C objective, and the preparation of the Paris 2015 agreement

6. Three Special Reports (SR15, SRLand), SROCC) and the Sixth Assessment Report (AR6, 2021-22) are informing the update of the Paris Agreement commitments

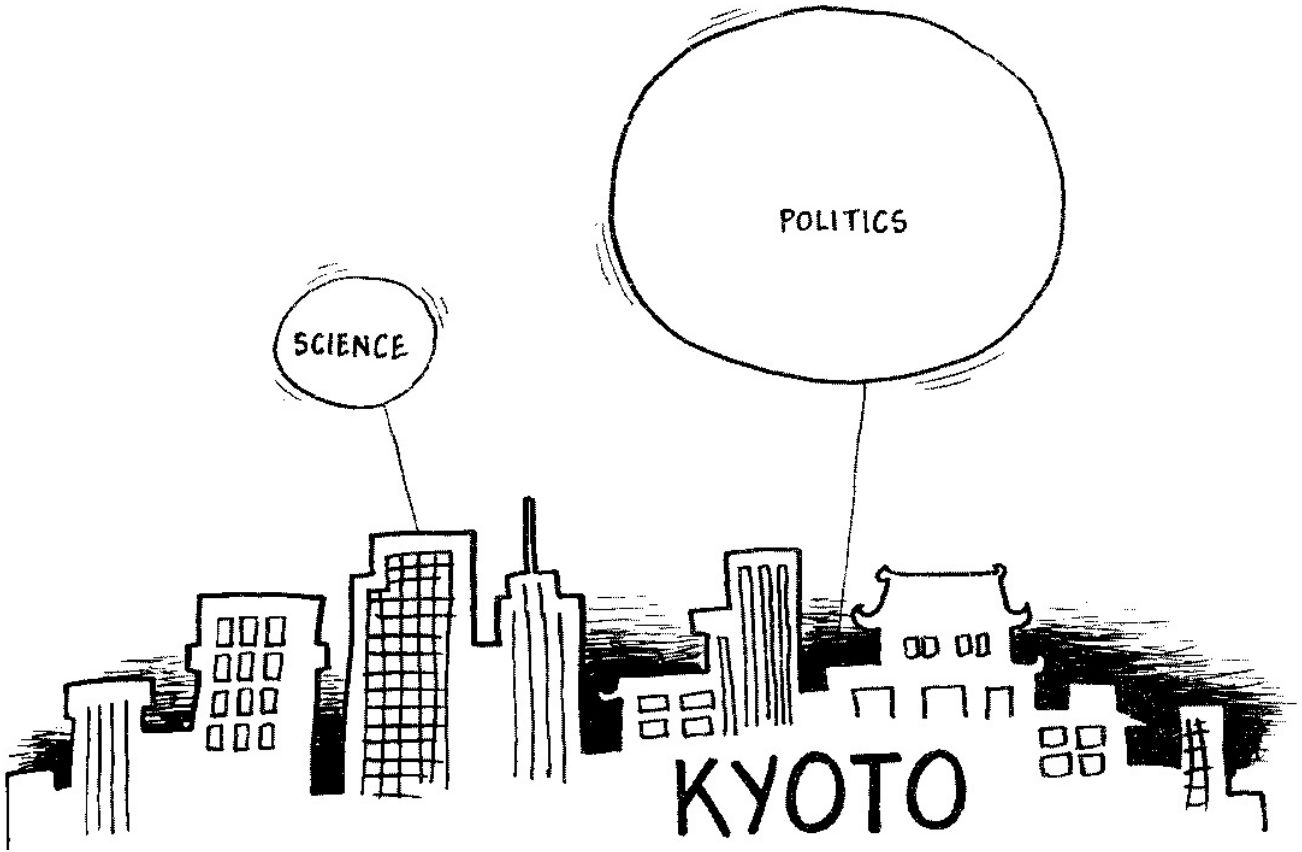
None So Deaf



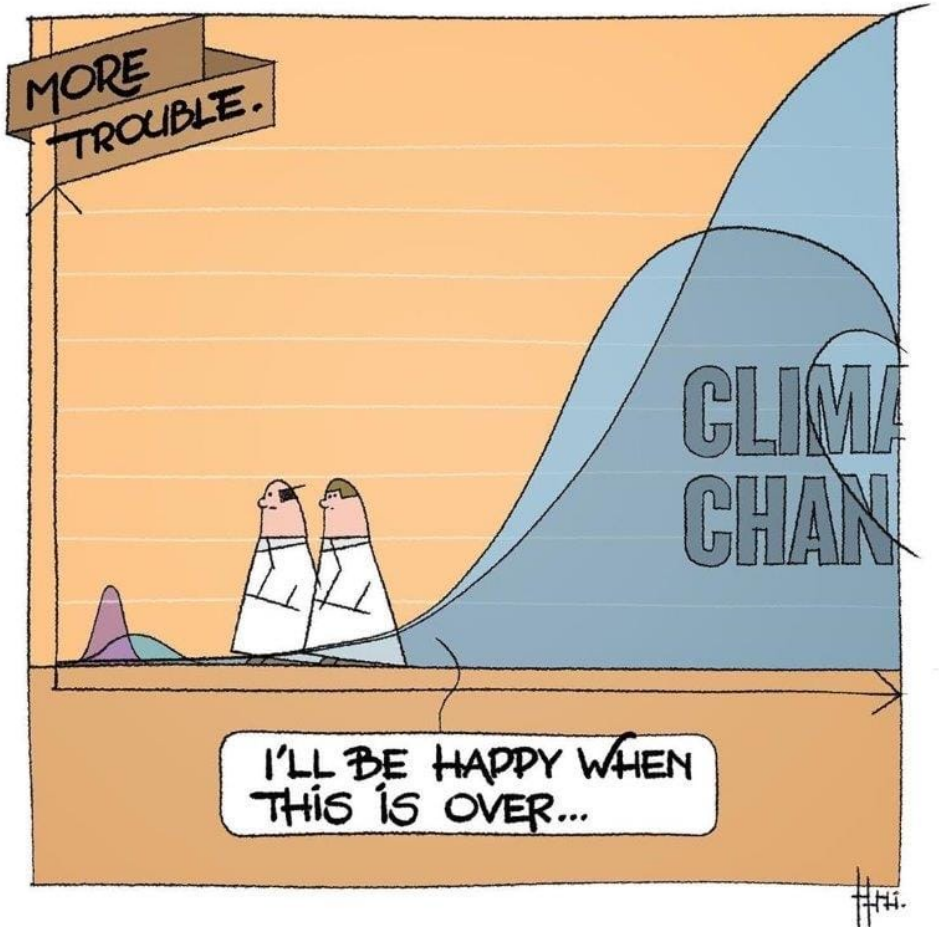
http://www.kudelka.com.au/2013/09/none-so-deaf/ @JohnKudelka, in *The Australian 28 September 2013*



Source: Wolfgang Knorr, in The Conversation (2019)



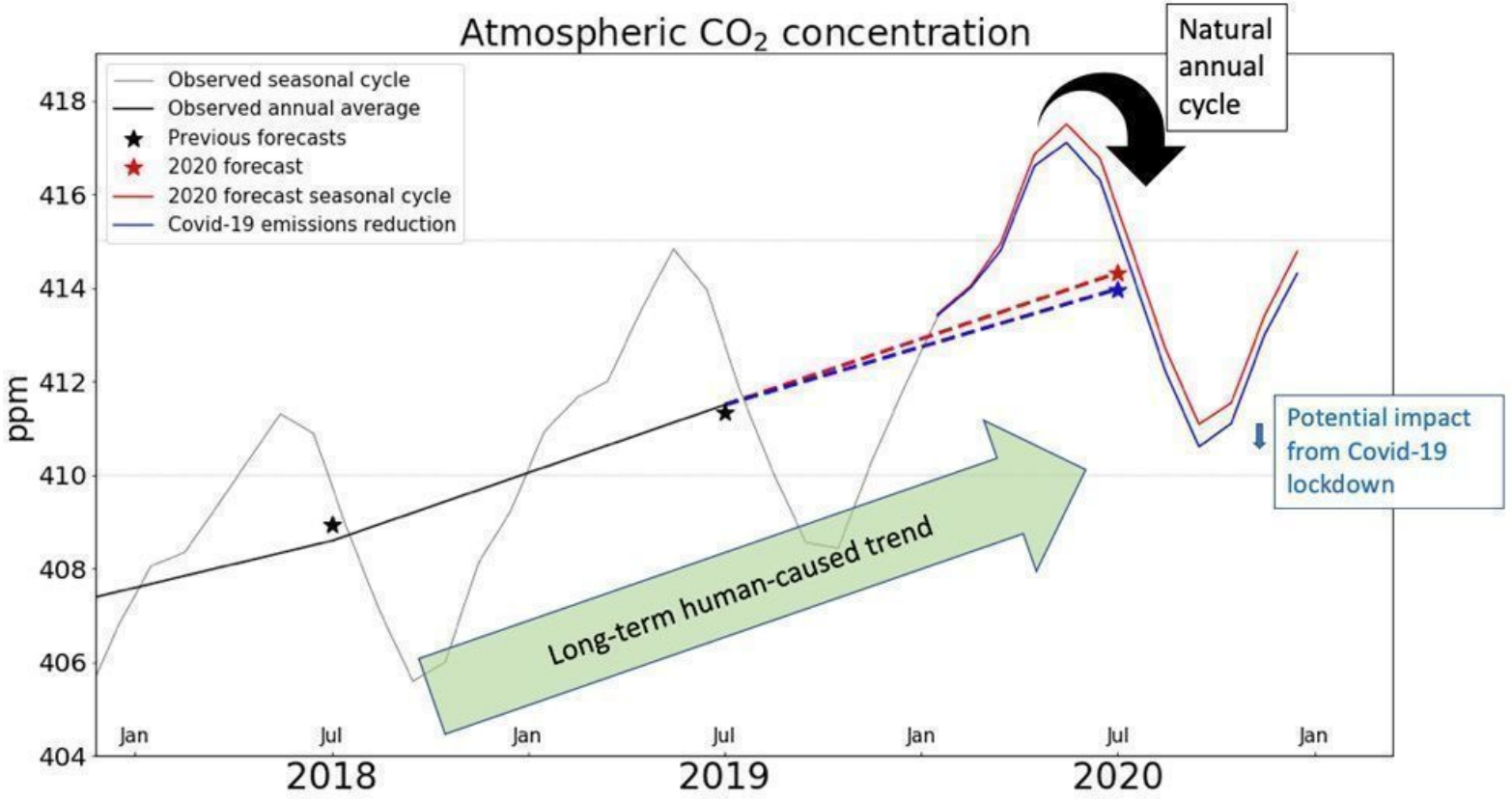
Agarwal et al., 1999



Source: @StatisticallyCartoon

@JPvanYpersele

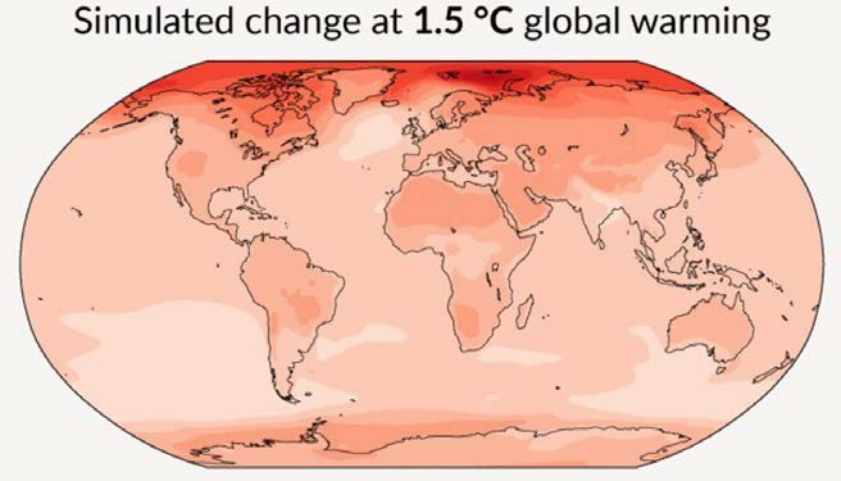
« Covid19 » slowdown: very small effect on CO_2 concentration



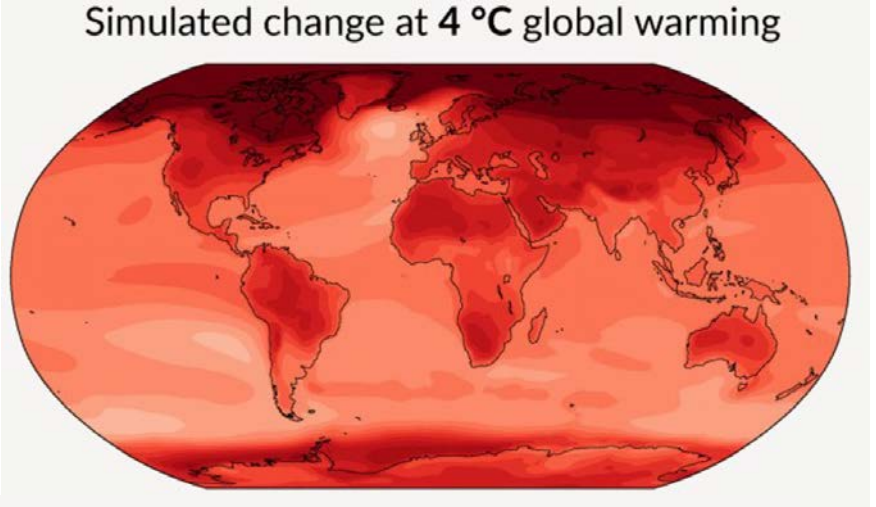
Source: @CarbonBrief, May 2020 @JPvanYpersele

Humanity has the choice

+1.5°C



+4°C




EST-CE QU'IL NE SERAIT PAS TEMPS DE FAIRE QUELQUE CHOSE ?
PAS DE PANIQUE
Café?
Kroll

@Kroll

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 truth[1]

Jean-Pascal van Ypersele (@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/vanyp

Conclusions

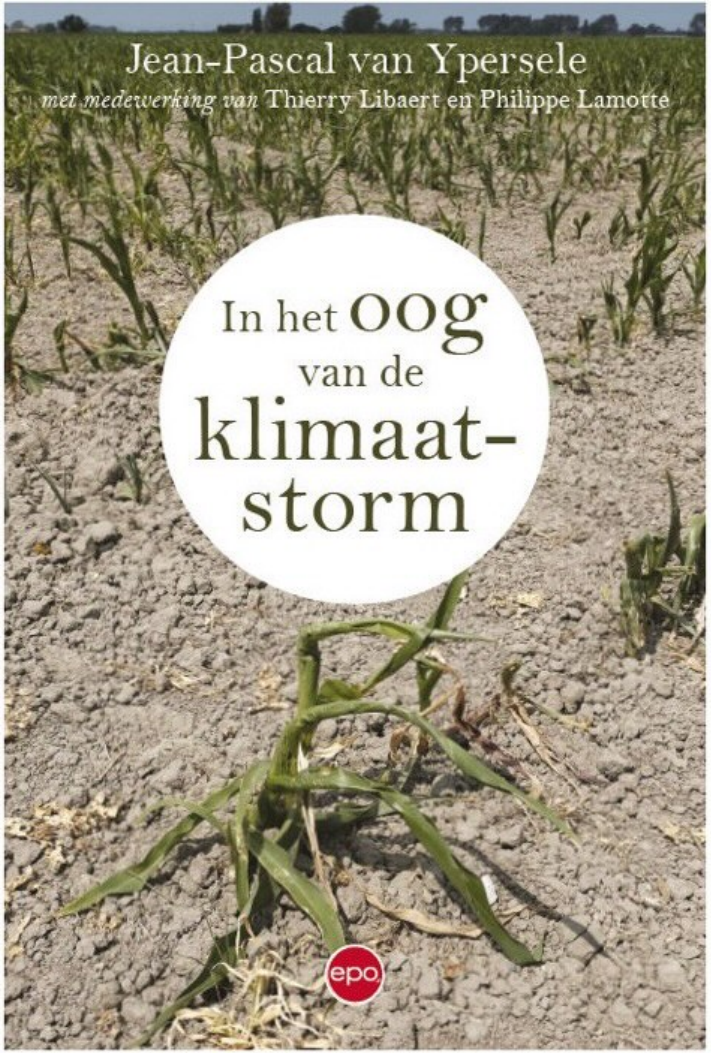
- **Knowledge about the climate problem and its solutions is more than enough to lead to the urgent action needed**
- **Climate confusers efforts, including those funded by fossil fuel lobbies, are slowing things down**
- **IPCC has an essential role to inform citizens and policymakers**

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

Om meer te weten:

Bij EPO (2018)

Voorwoord:
Jill Peeters



Pour en savoir plus: Lisez mon livre, où j'aborde tous ces sujets

Publié chez De Boeck supérieur

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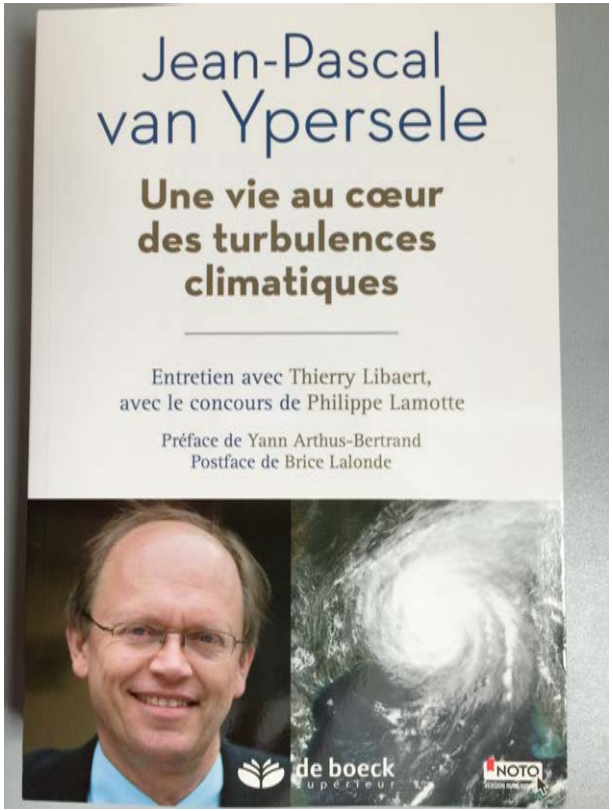
Postface: Brice Lalonde



Additional book references

- Oreskes, N. & E. Conway (2010) ”The Merchants of Doubt - How a Handful of Scientists Obscured the Truth on Issues from Tobacco Smoke to Global Warming.” Bloomsbury Press.
- Schneider, S.H. (2009) “Science as a contact sport – Inside the battle to save Earth’s climate”, National Geographic Society.
- Bolin, B. (2007) “A History of the Science and Politics of Climate Change -- The Role of the Intergovernmental Panel on Climate Change“, Cambridge University Press

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

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

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

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

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

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

HET KLIMAATALARM

HET KLIMAAT ALARM

Dirk Draulans en Jean-Pascal van Ypersele

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Gratis pdf op : www.knack.be/klimaatalarm

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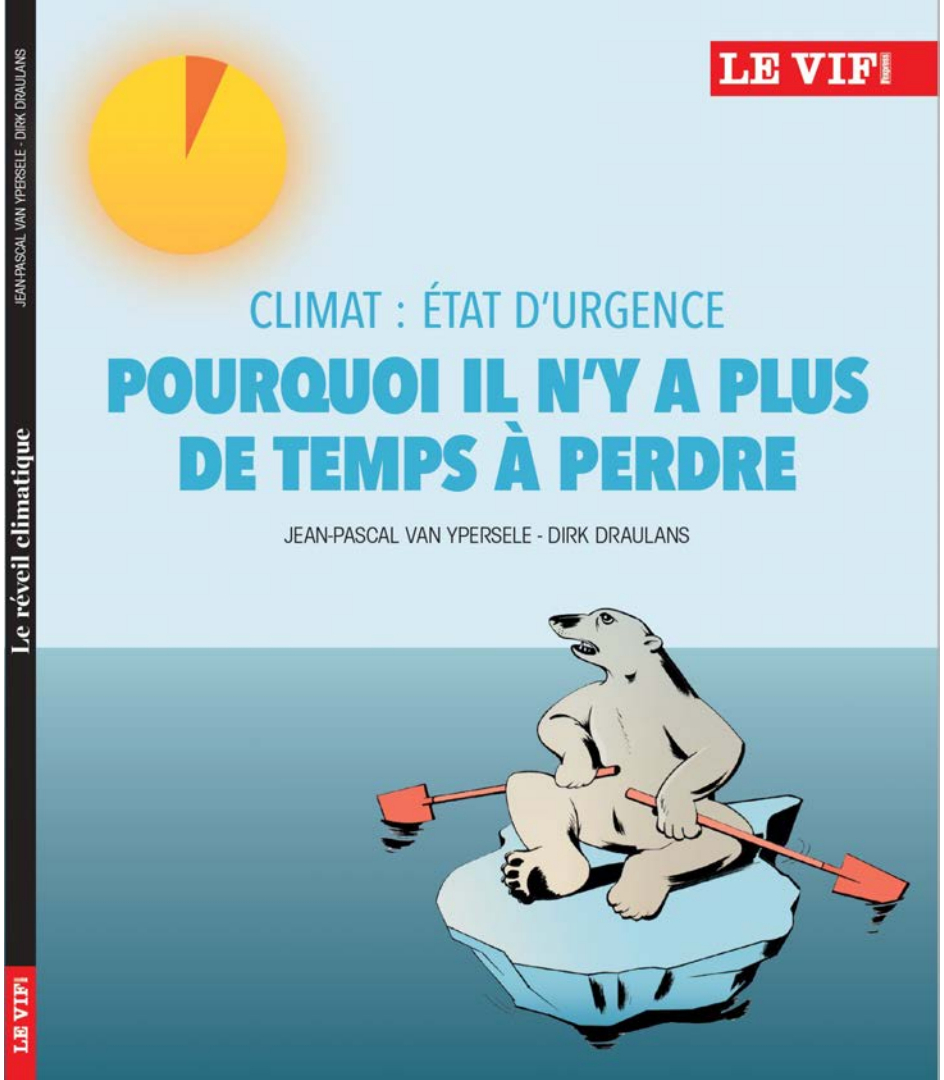

To go further :

- 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.desmogblog.com: analysis of contrarians strategies
- www.plateforme-wallonne-giec.be : IPCC-related in French, Newsletter, latests on SR15, basic climate science
- **Twitter: @JPvanYpersele & @IPCC_CH**

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