

Post-printing additions to the book, *The Science of Global Warming*

So many new things relevant to this book kept coming up that I have initiated this service to cover them. I will divide the reports by season, i.e. Fall, Winter, Spring and Summer, by month, equinox and solstice)

- **Fall (Autumn):** September (22nd), October, November
- **Winter:** December (21), January, February
- **Spring:** March (20th), April, May
- **Summer:** June (21st), July, August.

So, this site is basically a continuous, running account of the latest literature on climate change and global warming and on Trump's anti-climate change and anti-science policies.

Fall 2025

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1. Trump's EPA Bans Greenhouse Gas Reporting Program

In several places in this book, I have pointed out that methane is 25 to 80 times more potent a greenhouse gas than CO₂ (p 35, 57). As such, it is extremely important to identify sites of methane leakage, world-wide, to reduce the accumulation of this dangerous greenhouse gas. Despite this, on September 12, 2025, Trump's EPA proposed to eliminate GHG reporting requirements.

The Greenhouse Gas Reporting Program (GHGRP), established by EPA in 2009, consistent with congressional direction, **forms the bedrock of greenhouse gas reporting from industrial sources in the US.**

This program is vital for fighting climate change because it provides accurate data showing who is polluting, how much they emit, and where emissions come from. Ending it would blindfold communities, scientists, and public officials — making it impossible to hold major polluters accountable or design effective climate policy.

Repealing the GHGRP would harm companies working to reduce emissions and their workers, giving an unfair advantage to fossil fuel execs wishing to pollute our communities

without accountability or transparency. It would stifle innovation, setting the country back in developing pollution-reduction technologies of the future.

Repealing this program would benefit major polluters at the expense of public health and safety. The Greenhouse Gas Reporting Program must be kept intact. **Without disclosure, oil, gas, and coal companies could expand pollution unchecked, leaving taxpayers to bear the costs of climate disasters, health impacts, and infrastructure damage.**

2. COPs and Renewable Energy

A recent book by Peter Betts (2025) reviews his life-long history of serving as a negotiator for the UK and the EU at many COP conferences. A common thread is **the concern by developed or developing countries, that any significant restrictions on emission from fossil fuels would have a deleteriously negative effect on their economy.**

As described in the book, page 58 – 60, **renewable energy is now cheaper than fossil fuels. This negates the above issue. Decreasing a country's output of CO₂ from fossil fuels, would simply require increasing the country's renewable energy sources, i.e., more solar, more wind, more hydrothermal, or more geothermal.** Once in place this would be a permanent resource.

Trump's policy is to reduce or remove all efforts at increasing renewable energy, especially wind. There is absolutely no rational reason to do this. The old reason was the fossil fuels were cheaper, but that is no longer true. The only reason that makes sense is that because of their financial contributions to his campaign, **Trump is so beholden to the fossil fuel companies that he is intent on destroying all our renewable energy resources. That means he values his campaign money more than the welfare of the nation. By destroying renewable energy sources, he is leaving the country far less great than it was before he took office.**

It is not even clear that this is doing the fossil fuel companies a favor. These companies would benefit greatly by **investing some of their billions into renewable energy themselves. This will be profitable indefinitely while their fossil fuels resources are limited and will soon be exhausted.** In addition, as described on page 153 and 158, the fossil fuel companies could be part of the solution by using their expertise to find, process, sell and distribute ground olivine and other climate rocks.

Betts, Peter (2025) *The Climate Diplomat. A Personal History of the COP conferences.* Profile Books, Ltd, London, UK.

3. Immigrants

The Horrors of ICE. I live in the Los Angeles area. Almost every day the evening news reports on the horrors of ICE operations in various U.S. cities. While this may seem unrelated to the subject of global warming, it is relevant to a related issue – **the many misguided policies of the Trump administration.** Claiming climate change is a hoax and destroying all efforts to mitigate it, is a disastrous policy. Trump’s approach to immigrants is also a disaster.

I do agree with his efforts deport undocumented immigrants with a criminal record. However, his approach of using Nazi Storm Trooper-like tactics, ICE, is misguided.

According to Syracuse University’s Transactional Records Access Clearinghouse nearly **three-quarters of immigrants in ICE detention as of September 2025 have no criminal convictions.**

“The latest attack against the metropolis of Chicago by Trump’s deportation leviathan, whose so-called Operation Midway Blitz this fall has made its earlier occupation of Los Angeles look like a play date.” (Arellano 2025).

“Armed agents have sauntered through downtown and manned a flotilla of boats on the Chicago River. They shot and killed a fleeing immigrant and raided an apartment building with the help of a Black Hawk helicopter. In nearby Broadview, home to the region’s main Immigration and Customs Enforcement detention facility, rooftop migra shot pepper balls at protesters below, including a pastor. They even tear-gassed a neighborhood that was about to host a Halloween children’s parade, for chrissakes.”

This is just a sample of the horrific ICE tactics, driven by Trump’s chief of staff for policy, Stephen Miller’s hatred of immigrants.

Is there a better way to do it? Of course. **The local and state police, the FBI and other resources, are perfectly capable of identifying and finding the immigrants with significant criminal records.** By affording them due process, something that does not happen now, we can be assured that any deportations do not violate the constitution. There is no need for an army of unidentified, masked, heavily armed, ICE bullies and huge detention centers which combined, cost an estimated 100+ billion dollars. **That is the connection to global warming. That money would be much better spent doing climate change mitigation.**

While I am at it, I would like to discuss **some of the positive thing’s immigrants do for the United States.** The most obvious are the jobs they perform that most other citizens are not interested in – farm work, lawn maintenance, house cleaning, and service jobs for our major hotels and restaurants. All of these industries have suffered following ICE raids.

Birth Rate Crises. This is a subject that is rarely discussed. Some 29 countries have a **fertility crisis because of birth rates of <1.5 children per couple, are so far below replacement levels of 2.1, that it seriously threatens their economic future due to a**

disappearing and aging work force. This is such a serious problem in Japan that they are considering opening the country to immigration, for the first time. The U.S. does not yet have such a birth rate crisis because of its immigrants, something the Trump administration ignores in its rush to deport millions.

Nobel Prize Winners The following diagram³ shows the number of Nobel Prize winners by country of residence. The top diagram shows that the highest number (41) resided in the United States, far more than any other country. Before we bend over backwards congratulating ourselves, look at the bottom diagram showing Nobel Laureates by country of birth. Now the U.S. is way down the list with only 3. The UK was on the top of the list with 13. The reason for this discrepancy is that **most of the 41 Nobel Prize winners that resided in the U.S. - were immigrants that came in during the pre-Trump days when the U.S. encouraged diversity. The level of diversity was so great that it required eight different countries to make up the 41 laureates.** The authors asked the Trump administration for comment but got only silence.

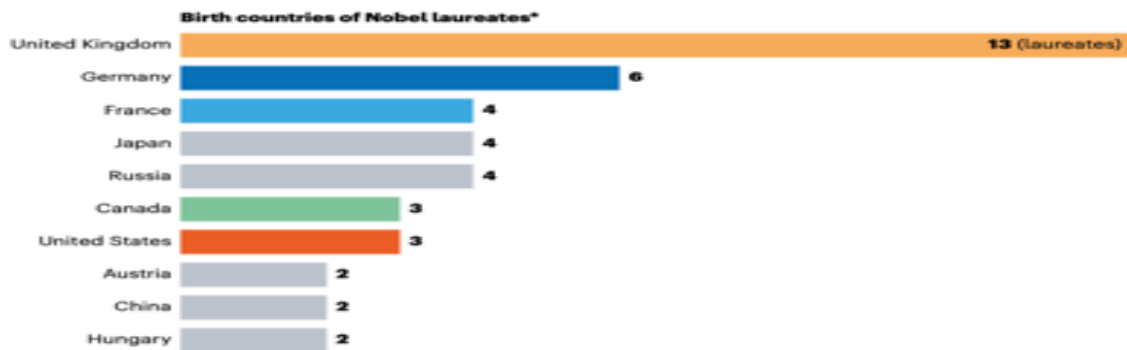
NOBEL LAUREATE STOMPING GROUNDS

Almost two-thirds of people who received a Nobel prize after emigrating from their birth nation were living in the United States when they received the award (colour-coded bars are also shown in 'Nobel flows').



POINTS OF DEPARTURE

The United Kingdom exported the highest number of eventual Nobel laureates of any country (colour-coded bars are also shown in 'Nobel flows').



Stephen Miller is Trump's Chief of Staff for Policy and U.S. Homeland security advisor. He has a lifelong history of hating immigrants, Muslims and all others that are not *WASPS*. Rather than reviewing the details here, the interested reader can Google 'Stephen Miller and Immigrants' or 'Why does Stephen Miller hate immigrants?' The disturbing issue in

not why Stephen Miller hates immigrants, **but why Trump has chosen this hateful person as one of his closest advisers? He clearly agrees with his views.**

Wives of the President and Vice President. It is worth noting that the wives of the two highest ranking officials in the U.S. government – are recent immigrants.

References

Gustavo Arellano (2025). Latinos blowing the whistle on Trumpism. LA Times November 8.

News in Focus. The Science Nobel Prize Winners Who Migrated. Nature 646, October 23, 2025.

4. Trump Officials Accused of Bullying Tactics to Kill a Climate Measure

More than 100 nations were poised to approve a historic deal to **slash CO₂ pollution from cargo ships**. That’s when the United States launched a pressure campaign that officials around the world have called extraordinary, even by the standards of the Trump administration’s combativeness, according to nine diplomats on its receiving end. (Lisa Freedman, et al, 2025, [link](#)).

These and other threats, including tariffs, sanctions and the revocation of diplomats’ U.S. visas, effectively [killed the deal](#).

Foreign diplomats said they were stunned by what they described as “nasty” and “very personal” threats made by State Department officials, which were mostly aimed at leaders from poorer or small countries that are economically dependent on the United States. Some of the delegations were summoned to the U.S. Embassy in London for these discussions, these people said:

“The deal would have imposed a fee on heavily polluting vessels to push the industry to clean up. It was negotiated over several years by the International Maritime Organization, a United Nations agency that oversees shipping policy.”

The Trump administration was able to block the vote, the nine diplomats said, after numerous countries backed away in the face of the threats from the Americans. The Trump administration said the shipping fee would have hurt the American economy, the same lame excuse as discussed above.

David Goldwyn, a former American diplomat and U.S. Energy Department official during the Obama and Clinton administrations, said the Trump administration's tactics were over the top. "This is like using a cruise missile, to redress a traffic violation."

Senator Sheldon Whitehouse, Democrat of Rhode Island said, "It was like a bunch of gangsters coming into the neighborhood and smashing windows and threatening shop owners."

To top it off, **for the first time in 30 years, the United States was not sending high level representatives to the annual U.N. climate talks, COP-30, in Brazil. However, California is sending a large contingent of climate experts to fill in.** (Hayley Smith and Melody Gutierrez (2025).

References

Lisa Friedman Max Bearak and Jeanna Smialek (2025) Trump Officials Accused of Bullying Tactics to Kill a Climate Measure. NY Times. Nov 6.

https://www.nytimes.com/2025/11/06/climate/trump-climate-international-bullying.html?campaign_id=54&emc=edit_clim_20251109&instance_id=166084&nl=climateforward®i_id=34412468&segment_id=210269&user_id=15f669e9f46d7a1c8f0ca3a40cf4f6ab

Hayley Smith and Melody Gutierrez (2025) California steps in as U.S. skips climate summit. LA Times November 10.

5. Trump kills the CMB-S4 Telescope

I have discussed elsewhere in the book how the Trump administration is devastating our country's longstanding world prominence in science (p199-213). One more of many examples is his stopping support for the CMB-S4 telescope.⁷ **CMB-S4 stands for Cosmic Microwave Background** – stage 4. This telescope would have given us insight into what was happening during the very earliest time after the big bang. What seemed like a bit of background noise in radio signals turned out to be a messenger from the early cosmos. For decades, we have scrutinized these photons: their wavelength and associated temperature, their intensity and their variation across space.

Chanda Prescod-Weinstein (2025) stated that "**The CMB is almost a literal gold mine**, in the sense that it provides a lot of information about where everything we can see came from, including the stars whose explosions make gold. If we scan the entire sky and look at the temperature associated with the photons, we see small variations in the temperature. Their

locations are random, but the size of the variation is consistent across them all. Places where there was a little bit more were essentially the starting point of gas that gravitationally accumulated into protostars, which became stars that clustered together into what eventually became galaxies. **So, those little variations in the CMB are the beginning of us.”**

These actions tell us that the Trump administration is totally lacking in any curiosity about the physical and biological world – the last thing we need in our so-called leaders.

The authors state, **“The pullback from the project is part of the US’s reckless retreat from global science collaboration.”**

References

Chanda Prescod-Weinstein (2025). The end of US support for the CMB-S telescope is devastating. New Scientist October 2025.

6. Climate sensitivity.

I bring up this subject because it is relevant to predicting the earth’s temperature 50 to 70 years from now when our youth will be mature adults.

Climate sensitivity is most often defined as **the temperature increase expected from a doubling of atmospheric carbon dioxide concentrations from pre-industrial levels.**

There are two types.

Equilibrium Climate Sensitivity (ECS): This measures the long-term temperature rise that would occur after the climate system has had time to fully adjust to a sustained doubling of CO₂. This can take centuries or more, due to the slow warming of the deep ocean. The Intergovernmental Panel on Climate Change (IPCC) Sixth Assessment Report (AR6) estimated the "likely" range for ECS to be between 2.5°C and 4°C, with a best estimate of 3°C. (Charney, J. et al, 1979). It is of interest that Charney, J. (1979)⁷ in his summary what skeptics about rising global temperatures say, **“A wait and see policy means waiting until it is too late.”**)

Transient Climate Response (TCR): This measures the temperature increase at the *time* the atmospheric CO₂ concentration has doubled. TCR is lower than ECS because the deep oceans have not yet fully warmed and absorbed all the excess heat. The IPCC estimates the likely range for TCR to be between 1.4°C and 2.2°C.

Equation relating the Earth’s temperature and CO₂ levels.

The Keeling curve data shows that both the amount of atmospheric CO₂ and rate of increase in atmospheric CO₂ levels, are increasing (p13-15). This raises the important

question - at a given CO₂ level, what is the expected global temperature? The relevant equation is complex, but it can be simplified to the following direct, relationship between CO₂ concentration and temperature change.

It is logrhythmic meaning that constant concentration *increases* have a progressively smaller additional warming effect (diminishing returns).

$$\Delta T = \lambda \times 5.35 \times \ln \left(\frac{C}{C_0} \right)$$

Where λ is the climate sensitivity parameter (or "gamma factor"), which represents how much the temperature will rise per W/m² of forcing (a commonly used value is approximately 0.5°C per W/m²).

C is the new or present atmospheric CO₂ level.

C_0 is the reference or pre-industrial atmospheric CO₂ concentration (typically 280 ppm, the level in 1750).

5.35 is a constant determined from radiative transfer calculations.

The results of this equation are shown below.

References

Charney, J. et al. (1979). Carbon dioxide and climate: a scientific assessment. Washington DC: National Academy of Sciences.

7. Greenland Ice Sheets are Melting Faster than Expected

The following figure shows crevasses in Greenland Ice Sheets.



Figure 1. Portion of a figure from Holly Smith (2025). Credit: Jason Edwards/Alamy.

As the glacial ice flows, stress fractures that run tens of meters deep form in the glacier's surface (see above). These crevasses increase the rate of ice movement, which creates more cracks in a self-reinforcing loop that has the potential to exacerbate ice loss from the land and contribute to rising sea levels. (Smith 2025, Chudley et al, 2025). Chudley *et al.* (2025) used high-resolution digital elevation models to map the three-dimensional volume of crevasse fields across the Greenland Ice Sheet in 2016 and 2021.

They reported that in most parts of Greenland, ice crevasses in glaciers are getting deeper and larger — and **this is happening more quickly than previously estimated**. The researchers warned that the effects of crevassing could worsen over the next few years as one of Greenland's fastest-flowing glaciers picks up speed.

References

Holly Smith (2025) The Greenland Ice Sheet is fracturing faster than expected. *Nature* 638, 327.

Chudley, T.R., Howat, I.M., King, M.D. et al. Increased crevassing across accelerating Greenland Ice Sheet margins. *Nat. Geosci.* 18, 148–153 (2025).

8. Alert: Our Youth are at Risk. What they have to look forward to.

The Trump Administrant's policy of ignoring climate change and global warming will be dangerous to our children and grandchildren, to our earth and to our planet.

Here is why.

1. Scientific instruments on Mauna Loa in Hawaii, have been measuring atmospheric CO₂ levels since 1959. Initially the level was 315 ppm.
2. These levels have progressively increased to current levels of 465 ppm.
3. Studies of isotopes of carbon, C¹² and C¹³ prove that the CO₂ comes from the burning of fossil fuels.
4. As long as emissions continue, this progressive increase in levels is to be expected.
5. What is unexpected and rarely commented on, is that both the amount and the rate of increase of atmospheric CO₂ are increasing.
6. The rates of increase are:
 - in 1967 - 1.0 ppm/year,
 - in 1987 - 1.5 ppm/year,
 - in 2007 - 2.0 ppm/year,
 - in 2017 - 2.5 ppm/year,
 - in 2023 - 2.8 ppm/yr, and
 - in 2025 –3.5 ppm/yr
7. When the rate is measured by GtC/year (gigatons of carbon/year) the results are the same:
 - In 1960 it was 1.8 GtC/year,
 - In 1990 it was 3.8 GtC/year,
 - In 2020 it was 5.0 GtC/year.
8. It has been assumed that if we get to Net Zero, these progressive increases will stop – but as shown in this book (p 196), this may not be the case.
9. The earth's Heat Imbalance is the ratio of the amount of the sun's heat irradiation entering the earth to the amount radiated back into space.
10. The Earth's Heat Imbalance is enormous. It is equivalent to 432,000 atomic bombs going off in our oceans every day.
11. This high degree of heat imbalance is due to two things:
 - a. The high level of greenhouse gases (CO₂ and methane) that trap the heat, the greenhouse effect.
 - b. The loss of the earth's albedo.

12. Albedo refers to the ability of the earth to reflect heat irradiation back to space. The major components of albedo are glaciers and sea ice, both of which are melting.

13. The high level of the earth's heat imbalance heats the oceans, causing them to release the CO₂ they contain, further increasing the heat imbalance. This CO₂ feedback loop will cause the level of atmospheric CO₂ to increase even after Net Zero.

14. The average global temperature increases are 0.20 °C per decade which is more than three times faster than the long-term average since 1850.

15 Our youth will be living on this planet for another 50 to 70+ years or 5 to 7 decades.

16. As of September 2025, the current global average temperature was approximately 1.51°C above pre-industrial levels over the last 12 months.

17. The 2024 summer temperatures were higher than at any time in the past 2,000 years.

18. The current level of CO₂ is 465 ppm. Until we reach Net Zero, the increase in atmospheric CO₂ levels is estimated to be 26 ppm/decade. This equates to 595 to 647 ppm at a time our current youth are 5 to 7 decades older.

19. If we ignore the problem and make no efforts at mitigation, as is the policy of the current Trump administration, global temperatures in 5 to 7 decades will be 3.26°C to 3.63°C.

20. Using the equation for calculating the global temperature for a given ppm level (see above), for the lower value of 595 ppm, the estimated global temperature would be 3.26 °C in 50 years.

21. For the higher value of 647 ppm, the estimated global temperature would be 3.63 °C in 50 years. This is consistent with several of a recently published summary of estimates of global temperatures by 2100¹ as shown in Figure 1.

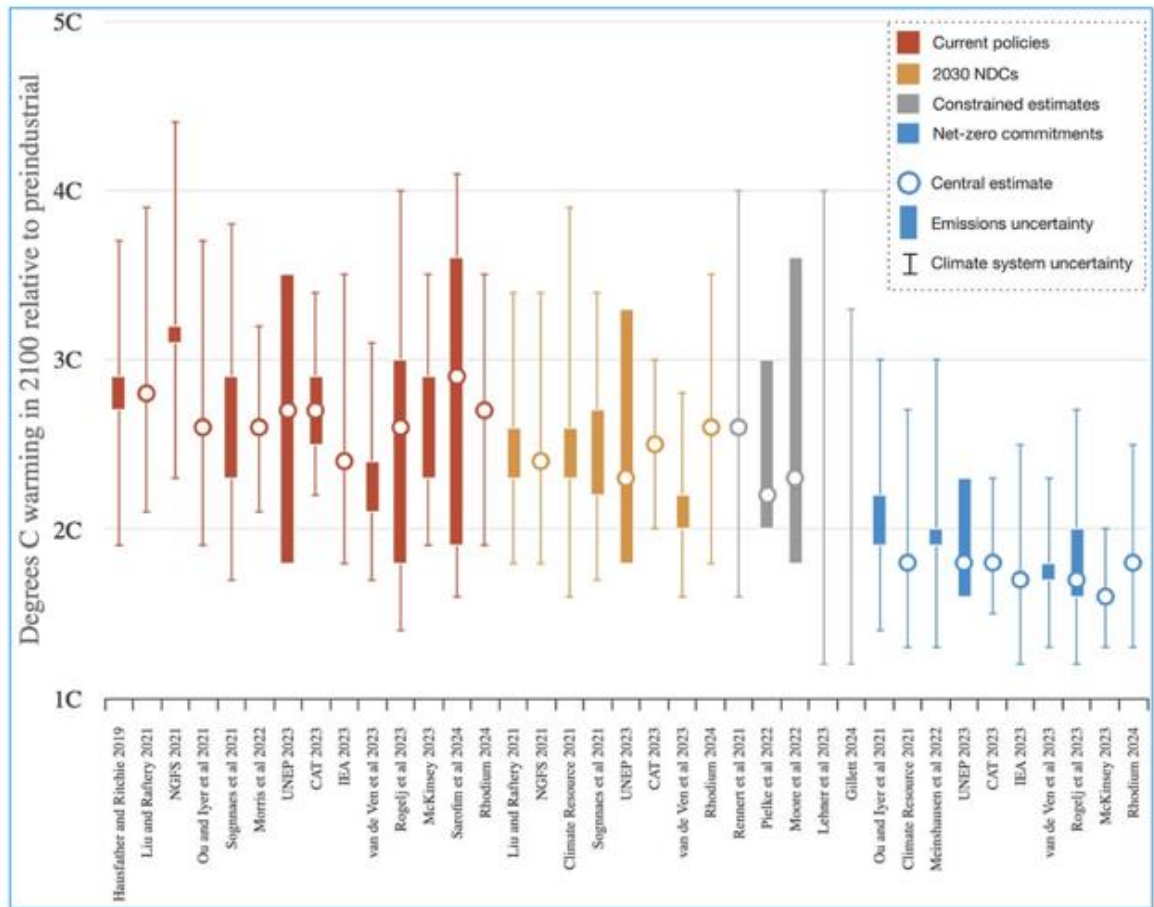


Figure 1. Estimates of Global Temperatures by 2100. c/o Hausfather, Z. (2025)

20. The effects of global temperature of 3.26 – 3.63°C or more, over pre-industrial levels would push the planet well into the range of major tipping points and severe human and ecological consequences and dangerous destabilization.

- 50-60% of the population would be exposed to deadly heat,
- sea levels would rise 0.6 to 1.1 meters (3.6 ft),
- there would be a 10 to 20% global GDP loss,
- 99% of coral reefs would be lost,
- global crop yields would be down 10 to 20%,
- with multiple breadbasket failures,
- megadroughts in some areas, floods in other places
- in some places this would result in crop failures with mass starvation, and
- mass migration of climate refugees, with
- 200 to 400 million displaced, and
- enormous political stress on some countries,
- worldwide wildfire seasons intensify dramatically.

- freshwater scarcity for up to 3 billion people,
- arctic sea ice fully lost in the summer,
- Greenland icesheets show irreversible melting,
- permafrost melting would produce large releases of methane,
- methane is 25 times more potent of a greenhouse gas than CO₂,
- large areas of the Amazon rain forest would die.
- this level of biodiversity loss would likely mark the planet's sixth mass extinction, with irreversible ecosystem collapse in coral reefs, tropical forests, and polar regions. (IPCC)

In summary: climate change and global warming are real, not a hoax, and will be a great danger to our children and grandchildren.

If the Trump administration does not care about the fate of their children and grandchildren, stick with your present policies.

If you do care – change your policies.

References

1 Hausfather, Z. (2025) Exploring newly released estimates of current policy warming. The Climate Brink, November 14.

9. Land May Now Contribute More to Sea Level Rise than Melting Polar Ice Caps

It has generally been assumed that a rising sea level is due to the melting of polar and Greenland ice and glaciers. However, a 2023 study by Hilton and Jasechko^{1,2} came to a different conclusion. They compiled and analyzed **ten thousand** well water observations made more than a century ago. This showed that upward flowing pressurized artians, characterized ~61% of wells before 1910 but only ~4% of wells today. **This change was due to the drying out of large areas of land due to climate change. To allow continued agriculture on the drying lands, farmers have drained water from the aquifers which has depressurized the artians. The pumped water eventually makes its way into the ocean via evaporation and runoff.**

The authors concluded that this depressurization of confined aquifers has profoundly changed groundwater storage and flow, increasing the vulnerability of deep aquifers to pollutants and contributing to land subsidence. Using satellite observations from 2002 to 2024, they tracked water storage across land surfaces (in lakes, rivers, snow, soil, aquifers, and plants). **They found a**

significant net transfer of freshwater from land to the ocean and this now contributing more to the rate of global sea-level rise than melting ice sheets.

It is interesting that the Hilton A, Jasechko S. (2023) paper seems to have two titles listed, both in the same journal and same issue,^{1,2} and a second paper by Chandanpurkar, et al. (2025)⁴, in the same journal and on the same subject has the same conclusions, but the authors do not mention the Hilton, Jasechko paper. I presume this can sometimes happen if the first paper is accepted but not printed when the second paper was submitted.

So, what did Chandanpurkar, et al. (2025) have to say? They speak of the variable **TWS (Terrestrial Water Storage)** and use NASA GRACE/ GRACE- FO data to show that **the continents have undergone unprecedented TWS loss since 2002**. Changes in TWS are driven by droughts and groundwater depletion. **Areas experiencing drying increased by twice the size of California annually, creating “mega-drying” regions across the Northern Hemisphere.** **The drying regions now contribute more to sea level rise than land glaciers and ice caps.**

These changes portend serious loss of usable cropland in the future, with its inevitable effect on crop loss and starvation. Urgent action is required to prepare for the major impacts of these events.

References

1. Hilton A, Jasechko S. (2023) Unprecedented continental drying, shrinking freshwater availability, and increasing land contributions to sea level rise. Science Advances. 2023 Sep 13; 9 (37):eadh2992
2. Hilton A, Jasechko S. (2023) Widespread aquifer depressurization after a century of intensive groundwater use in USA. Science Advances. 2023 Sep 13;9(37):eadh2992.
3. Pearson, E. (2025) The surprising truth of how land, not ice, is now driving sea level rises. BBC Science Focus, July 25, 2025.
4. Chandanpurkar, Hrishikesh A., et al. (2025) "Unprecedented continental drying, shrinking freshwater availability, and increasing land contributions to sea level rise." Science Advances 11.30 (2025): eadx0298.

10. It doesn't take much heat to kill coral.

What is a coral? Coral is made of a living colony of small animals called **polyps**, which build on a hard **calcium carbonate skeleton**.

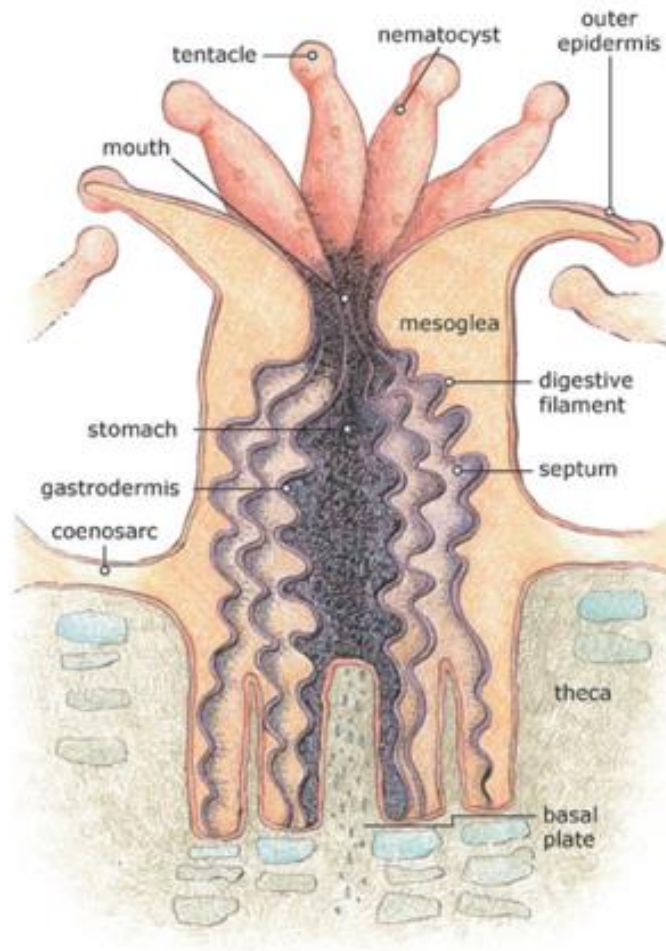


Figure 1. Coral with polyps c/o NOAA's Ocean Service

The calcium carbonate skeleton is at the bottom in tan and light blue color. The typical appearance of coral with polyps is shown in Figure 2.



Figure 2. Coral Polyps c/o NOAA's National Ocean Service.

The polyps are connected by tissue and have a symbiotic relationship with **algae called zooxanthellae which provide color and energy through photosynthesis**. Zooxanthellae are unicellular, golden-brown algae (dinoflagellates) that live inside the tissue of other organisms. Their location in polyps is shown in Figure 3.

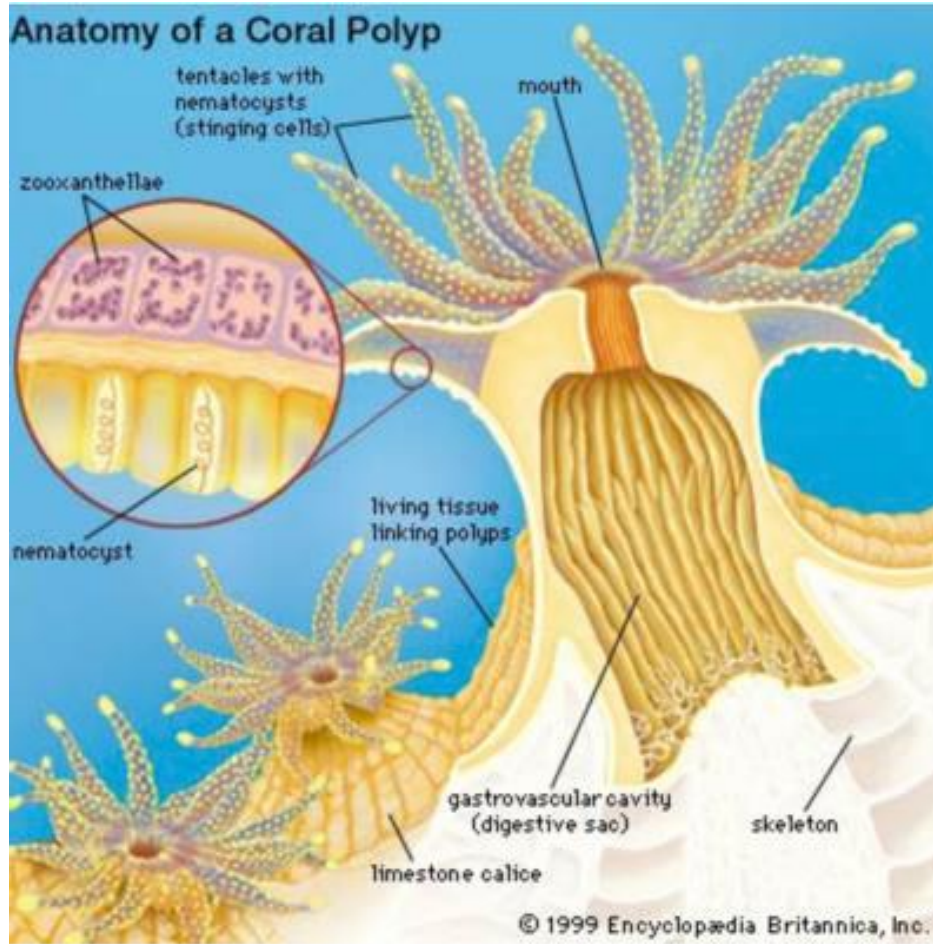


Figure 3. Location of zooxanthellae in polyps.

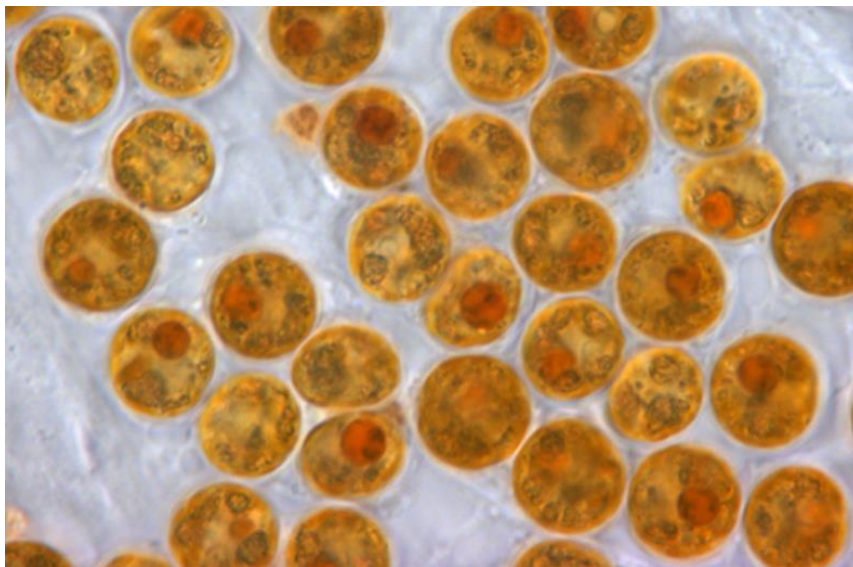


Figure 4. Single celled Zooxanthellae

Zooxanthellae are single celled algae. They provide the colors typical of coral. The corals and zooxanthellae have a mutualistic relationship, that is, both benefit from the relationship. Corals provide the zooxanthellae with a protected environment, and the coral polyp cells produce carbon dioxide and water that the zooxanthellae need for photosynthesis. The zooxanthellae use energy from the sun to turn the carbon dioxide and water into oxygen and help the coral to remove wastes. Zooxanthellae supply the coral with the sugars and proteins, which are the products of photosynthesis. The coral uses these products to make proteins, fats, and carbohydrates, and produce calcium carbonate which leads to coral growth and reproduction.

What does bleached coral look like? Unbleached and bleached coral are shown in Figure

5



Figure 5. On the left, the coral's polyps are full of zooxanthellae, giving the coral color. On the right, the coral lacks zooxanthellae, revealing the coral's bright white skeleton. Brent Durand / Getty Images

If zooxanthellae die, the coral loses its color and main food source and turns white (a process called **bleaching**). It becomes vulnerable to starvation, disease, and death. The coral can recover if stressful conditions are temporary, allowing it to take on new algae, but if the stress continues, the coral will die, and its skeleton will be left behind.

Reference

Manzello, D.P. et al. (2025) Heat-driven functional extinction of Caribbean *Acropora* corals from Florida's Coral Reef. *Science* 390, October 23.

11. Mangrove blue carbon

Mangrove forests play an important role in combating climate change because during their rapid growth **they sequester CO₂ four times faster than land forests and worldwide, they could hold over 21 gigatons of CO₂.** They are referred to as Mangrove Blue Carbon. For obvious reasons, maintaining their health is important.

A typical mangrove forest is shown in Figure 1.



Figure 1. A mangrove forest. c/o NOAA National Ocean Service

There are about 80 different species of mangrove. Because their roots are in water, the world distribution of mangrove forests is along the intertidal coastline. They only grow at tropical and subtropical latitudes near the equator because they cannot withstand freezing temperatures.

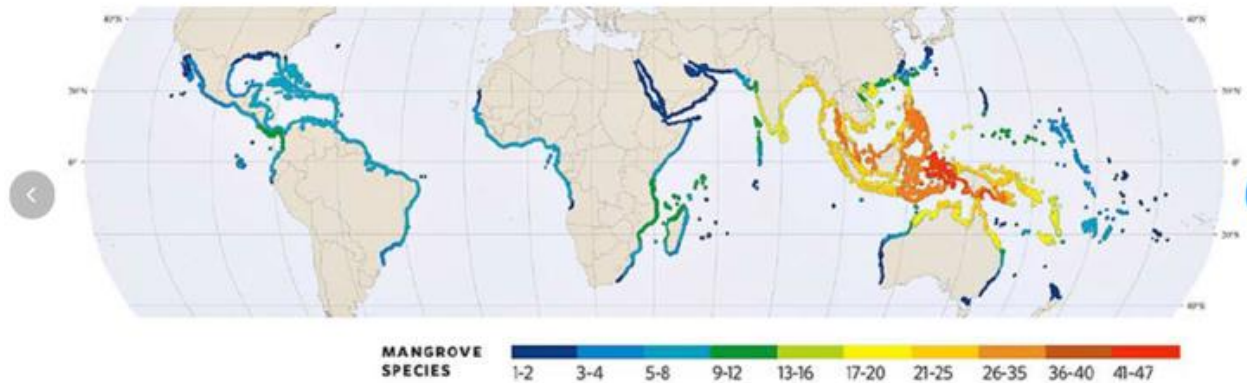


Figure 2. Worldwide location of mangrove forests. Note the high frequency of multiple species in Indonesia. c/o Research Gate.

Mangrove forests stabilize the coastline, reducing erosion from storm surges, currents, waves, and tides. The intricate root system of mangroves also makes these forests attractive to fish and other organisms seeking food and shelter from predators. NOAA's coastal blue carbon activities are a collaborative effort across many different branches of NOAA.

An additional carbon sink are seagrasses. They are the only flowering plants which grow in marine environments. They constitute only - 0.1% of world's seafloor, but store up 10%-18 of the ocean's carbon annually. Individual meadows can capture carbon up to 35 times faster than tropical rainforests. This captured carbon is stored in the sediment for decades or centuries. For more information, see Seagrasses Wikipedia.

12. Heatquakes

There are many different weather phenomena that are made worse by global warming, i.e. hurricanes, floods, droughts, tornados, heat waves, and now it seems, earthquakes.¹⁻³ As global heating continues to drive longer and more intense heatwaves, meltwater sourced by accelerated glacier melting and more prolonged rainstorms can be expected to increase seismic activity across the world's mountain ranges. This apparently works by water seeping into fault zones and lubricating them, thus making an earthquake set to spring - spring. This has been documented by the Swiss Seismological Service which has linked swarms of small tremors beneath Mont Blanc in the European Alps to rapid thawing of ice and snow during a heatwave in 2015.^{2,3}

References

- 1 McGuire, Bill (2025) HEATQUAKES. Climate change isn't just warming the planet, it's shaking Earth's foundations. Science Focus September 2025.
- 2 Voosen, Paul (2025) Global warming is triggering earthquakes in the Alps. Science 25 September.
3. Simon. et al (2025) Climate-change-induced seismicity: The recent onset of seasonal micro seismicity at the Grandes Jorasses, Mont Blanc Massif, France/Italy. Earth Planet. Sci. Lett. 666 119372

13. More evidence of the destructiveness of Trump on U.S. science.

In Chapter 14, I outlined the many ways that the Trump administration is destroying U.S. science. The following headline of an article by Alexandra White¹ is further evidence of his destructiveness

US PHD ADMISSIONS SHRINK AS FEARS OVER TRUMP'S CUTS TAKE HOLD

Some doctoral programmes are taking no students at all amid uncertainty about federal science funding.

She states that, “Across scientific disciplines, US university departments are cutting the numbers of PhD candidates they plan to accept in the current application cycle, for students due to begin in 2026. **Some plan to pause admissions altogether. Some of the most elite institutions are taking this step out of an abundance of caution.**”

- 1 White, A (2025) US PHD Admissions Shrink as fears over Trump's Cuts take Hold. Nature 647, p15, 6 November.

14. What is the relationship between ppm and GtC (gigatons Carbon)?

$$1 \text{ ppm} = 2.124 \text{ GtC}^{1,2}$$

1. Ballantyne, A.P. et al. (2012) Increase in observed net carbon uptake by land and oceans during the last 50 years. *Nature* 488, 70-72.

2. Friedlingstein, P. et al. (2025) Emerging climate impact on carbon sinks in a consolidated carbon budget. *Nature* <https://doi.org/10.1038/s41586-025-09802-5>

15. What is the Clean Water Act? Google

The Clean Water Act (CWA) is the primary federal law in the United States that protects the nation's surface waters (such as rivers, lakes, and wetlands) from pollution.

In simple terms, its main goal is to "restore and maintain the chemical, physical, and biological integrity of the Nation's waters" by making it unlawful to discharge any pollutant into navigable waters without a permit.

Key Functions

- **Requires Permits for Pollution:** The Act established the National Pollutant Discharge Elimination System (NPDES) program. This means any facility or person that releases pollutants from a "point source" (a discrete conveyance like a pipe or ditch) into U.S. waters must obtain a permit. These permits set specific limits on the types and amounts of pollutants allowed to be discharged.
- **Sets Water Quality Standards:** The federal government (primarily the [Environmental Protection Agency \(EPA\)](#)) sets national standards, and states and authorized tribes then develop specific water quality criteria for their local bodies of water, which are approved by the EPA. These standards designate uses for the water (e.g., swimming, fishing, drinking water supply) and establish the maximum concentration of pollutants allowed to support those uses.
- **Regulates Dredging and Filling:** The U.S. Army Corps of Engineers (USACE) manages a separate permit program under Section 404 of the CWA to regulate the discharge of dredged or fill materials (like dirt, rock, or construction debris) into waters and wetlands.

- Provides Funding: The CWA has provided billions of dollars in grants and low-interest loans (through the Clean Water State Revolving Fund) to communities to upgrade outdated wastewater treatment plants and manage other water quality projects.

16. What did the U.S. Supreme Court do to limit the effectiveness of the CWA? ChatGPT

The U.S. Supreme Court has limited the effectiveness of the Clean Water Act (CWA) in several key rulings over the past two decades, primarily by narrowing the geographic scope of waters subject to federal protection and restricting the types of pollution limits the Environmental Protection Agency (EPA) and states can enforce.

Key Supreme Court Decisions and Limitations

Case	Year	Key Limitation
<i>Solid Waste Agency of Northern Cook County v. U.S. Army Corps of Engineers</i> (SWANCC)	2001	Limited federal authority over isolated, intrastate ponds and wetlands solely based on their use by migratory birds, concluding they were not "navigable waters" under the Act.
<i>Rapanos v. United States</i>	2006	The Court issued a fractured opinion that created confusion over which wetlands were covered. The most narrow opinion required that a wetland must have a "significant nexus"—a strong hydrologic and ecological connection—to a traditional navigable water to be federally protected.
<i>Sackett v. EPA</i>	2023	The Court drastically narrowed the CWA's jurisdiction, holding that only wetlands with a "continuous surface connection" to a "relatively permanent, standing or continuously flowing body of water" (like a major river or lake) are protected. This ruling removed federal protection from many wetlands and intermittent or ephemeral streams that flow only after rainfall or snowmelt.

City and County of San Francisco v. EPA

2025 The Court held that the EPA cannot impose "end-result" conditions in permits that make a facility responsible for the ultimate water quality of a receiving body of water. Instead, the EPA must specify concrete, achievable actions and "effluent limitations" the permittee must follow, effectively preventing agencies from holding permittees accountable if, despite following permit steps, the water quality standard is still violated.

Overall Impact

These decisions, particularly the 2023 ruling in *Sackett*, **have significantly reduced the number of U.S. waterways under federal protection, shifting regulatory authority to states and leaving many aquatic ecosystems more vulnerable to pollution and development.** The recent 2025 decision further weakens enforcement by limiting the EPA's ability to require permit holders to achieve specific water quality outcomes in the water bodies receiving their discharges.

17. Trump's EPA to limit wetland protections

Quotes from Matthew Daly *LA Times* November 19, 2025

Lee Zeldin, The Republican administrator of the EPA attacks what he calls 'climate change religion.' The EPA under Zeldin, announced it is redefining the scope of the nation's bedrock clean water act to significantly limit the wetlands it covers, building on a Supreme Court decision two years ago that removed federal protections for vast areas.

When finalized, the new "*Waters of the United States*" rule will ensure that federal jurisdiction of the Clean Water Act is focused on relatively permanent, standing or continuously flowing bodies of water, such as streams, oceans, rivers and lakes, along with wetlands that are directly connected to such bodies of water,

The proposal is among dozens of environmental regulations being rolled back by the Trump administration as part of what EPA Administrator Lee Zeldin says is a concerted effort to accelerate economic prosperity while putting "**a dagger through the heart of climate change religion.**" Critics call the water rule **a giveaway to ranchers and industry.**

Zeldin said the new rule, the WOTUS rule, will fully implement the direction provided by the Supreme Court in a case known as *Sackett vs. EPA* (see above). The 2023 ruling sharply limited the federal government's authority to police water pollution into certain wetlands and boosted property rights over concerns about clean water in a ruling in favor of Michael and Chantell Sackett, an Idaho couple who sought to build a house near a lake.

Zeldin, a former Republican congressman who has led a **drive to roll back regulations perceived as climate-friendly**, said Democratic administrations had long **“weaponized the definition of navigable waters to seize more power from American farmers, landowners and families.”**

The rule, which faces at least 45 days of public comment, will cut red tape and provide clarity for farmers, ranchers, industry and other private landowners, Zeldin said. The proposal will also protect water quality by striking a balance between federal and state authority, he said, adding that any lands that are removed from federal jurisdiction will still face regulation from states and tribes.

Environmentalists slammed the proposal as a giveaway to industry by President Trump. “The Trump EPA’s shortsighted push to encourage industries to plow over more wetlands and streams **will destroy thousands of miles of waterways critical to wildlife across the United States,**” said J.W. Glass, a policy specialist at the Center for Biological Diversity, an environmental group. “This political gift from Trump to the polluters that support him will wipe out life-sustaining waterways in every corner of the nation, and it will destroy countless natural areas that protect us from increasingly destructive storm surges driven by the climate crisis.”

“By gutting protections for wetlands and streams, EPA is trying to disown its legal obligation to protect our drinking water and our communities,” added Andrew Wetzler, senior vice president at the Natural Resources Defense Council, another environmental group. **“Wetlands are nature’s safeguard against flooding, and stripping away protections for them puts millions of people in harm’s way.”**

Zeldin said The Trump administration has listened to concerns from farmers and other groups worried about federal interference in how they use their land, he said, and has moved to set limited, predictable and lasting rules defining which waterways the Clean Water Act protects. “If you want to really appreciate the impact of the WOTUS rule — past, present and future — I would encourage you to speak to all of those impacted stakeholders, all those impacted landowners,” Zeldin said.

Trump sought to shrink the water law’s reach in his first term, while Democratic administrations have expanded federal power to regulate the nation’s lakes, rivers, streams, wetlands and oceans. The change in administrations has created drastic swings in how the water law is interpreted and applied.

The Supreme Court ruling in the Sackett case largely agreed with the Trump administration’s limited approach and led the Biden administration to rewrite protections to comply with the ruling. Some conservative groups have complained that the revised rule still protected too many wetlands and improperly limited private property rights. Damien Schiff, a senior attorney at the Pacific Legal Foundation who represented the Sacketts in court, said the latest proposal “represents a meaningful step toward relief for property owners still burdened by unjustified and illegal Clean Water Act regulations.”

18. What is the WOTUS Rule?

WOTUS rule is the regulatory definition for the phrase "**waters of the United States**" used in the [Clean Water Act \(CWA\)](#). This definition is critical because it establishes the geographic scope of federal jurisdiction, determining which rivers, streams, lakes, and wetlands are subject to federal environmental protection and requiring landowners or developers to obtain permits for activities that might impact these waters.

The rule has been the subject of frequent litigation and changing definitions across different presidential administrations and Supreme Court decisions, leading to regulatory uncertainty for decades.

Key Aspects of the Current (Proposed) Rule

The current interpretation of the WOTUS definition stems from the Supreme Court's May 2023 decision in *Sackett v. EPA*, which significantly narrowed federal authority. In response, the Environmental Protection Agency (EPA) and the U.S. Army Corps of Engineers (USACE) have proposed a new rule (**announced in November 2025**) that aligns with this decision.

Key elements of the proposed rule include:

- Focus on permanent waters: **Jurisdiction is limited to "relatively permanent, standing or continuously flowing bodies of water" such as oceans, rivers, and lakes.**
- Restricted wetland jurisdiction: Wetlands are only considered jurisdictional if they have a "continuous surface connection" to a covered water, meaning they must physically touch and have surface water present at least during the wet season. This removes federal protection for many wetlands that do not meet this strict standard.
- Defined terms: Key terms like "relatively permanent," "tributary," and "continuous surface connection" are explicitly defined to provide clarity and predictability.
- Exclusions: The rule reaffirms and clarifies exclusions for certain features, including prior converted cropland, specific ditches, waste treatment systems, and, for the first time, explicitly excludes groundwater.
- Emphasis on state authority: The changes aim to strengthen the role of states and tribes as primary regulators of their own land and water resources by reducing the scope of federal oversight.

The proposed rule is open for public comment before it is finalized and is intended to provide clear, durable rules to reduce permitting uncertainty for industries, farmers, and landowners.

19. Belém and the Tropical Forests Forever Facility

One of the positive things to come out of the Belém COP 30 is the TFFF (**Tropical Forests Forever Facility**). At the meeting, commitments were made for initial investments that would allow Brazil and other nations to borrow around \$100 billion from large private investors at low interest rates to fund the TFFF whose goal is to protect tropical forests.

20. Global Warming is providing the fuel for Category 5 hurricanes.

Jamacia was devastated by Hurricane Melisa (November 2025) after a hurricane rapidly intensified to a Category 5, with 185 mph winds and gusts to 200 mph, flattening whole communities. It ripped the roofs off 120,000 homes. Dozens of people were killed. The damage was estimated at \$7 billion, early a third of Jamacia's GDP.

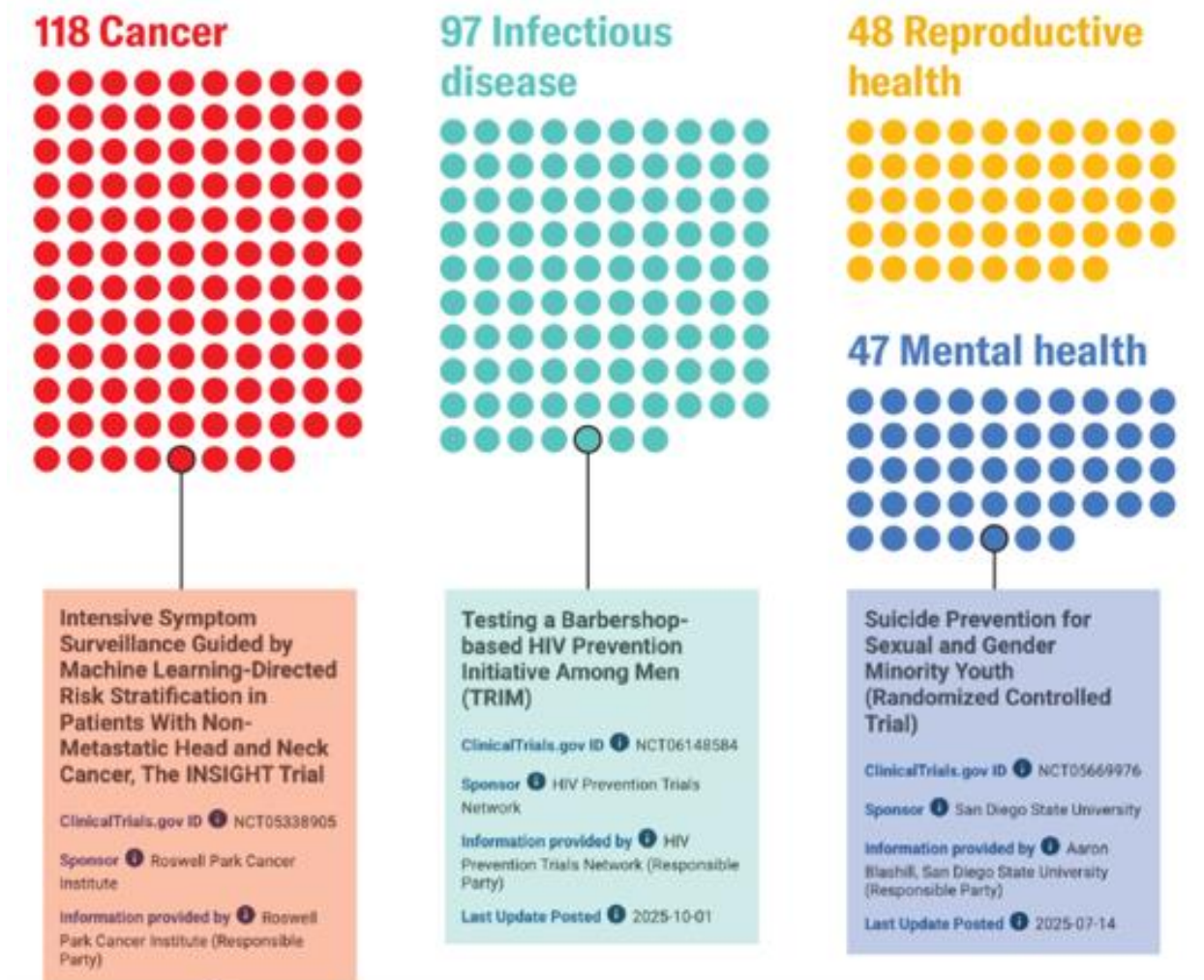
The number of hurricanes that rapidly grew from Category 1 to 3 has more than doubled in the past two decades because of warmer seas. In a warming world more and more communities will be experiencing these devastating events.

The future threats we once feared from climate change are here now.

21. Canceled Clinical Trials

The Trump Administration has canceled NIH Grants for at least 383 clinical trials affecting 1 in 30 of all clinical trials and some **74,000 patients**. The cuts include more than 100 studies on cancer treatments, 97 on infectious diseases, and more.

Top 4 Conditions Studied in 383 Shelved Trials



RCTs or Randomized Controlled Trials are the "gold standard" for testing the efficacy and safety of a new treatment. The design involves randomly assigning participants to either the experimental group (receiving the new treatment) or the control group (receiving a placebo, or inactive substance). Participants are randomly assigned to different groups to minimize bias and ensure that the groups are comparable at the start of the study. In a double-blind trial, neither the participants nor the researchers know who is receiving the active treatment and who is receiving the placebo. This prevents bias in reporting or evaluating the results.

Carefully designed RCTs guard against the use of testimonial evidence in medical practice, where some patients claim a given treatment was effective for them. During the COVID epidemic this led to claims by **Trump 1** and **Fox News** that **Ivermectin could cure COVID**. **Well-designed RCTs showed it was not effective, yet many took it when they should be taking drugs such as Paxlovid, that really worked.**

Another potential source of error occurs when an under-powered (not enough test subjects) reports that a certain drug works, while a study with many more subjects, is negative.

Now, **“practicing without a license,” Trump 2** is at it again, this time, again without any real evidence they (Trump and Robert Kennedy Jr.) claim Tylenol taken by pregnant mothers, can cause autism. In a press conference seen by millions he said, “Don’t take it if you’re pregnant. Don’t take Tylenol,” President Trump said, repeatedly emphasizing that pregnant people with fever should “tough it out” as much as they can, despite **evidence that uncontrolled fever and infections during pregnancy can themselves increased risk of autism.**

The moral of the story is, **don’t take medical advice from politicians who are not physicians and who have a political axe to grind.**

22. CDC alters vaccines and autism page with misleading statement.

The U.S. Centers for Disease Control and Prevention has altered its website on autism and vaccines, removing unequivocal statements that immunizations don’t cause the neurodevelopmental disorder and **replacing them with inaccurate and misleading information about the links between the shots and autism.**

The new statement, “The claim ‘vaccines do not cause autism’ is not an evidence-based claim because studies have not ruled out the possibility that infant vaccines cause autism.” In fact, many studies have shown that vaccines do not cause autism.

The news was met with outrage and alarm by scientists and advocates.

It clearly demonstrates what happens when politicians with an agenda, rather than scientists, are appointed as heads of scientific institutions like the CDC.

This fallacy stems from a paper by Wakefield, claiming there was such a link. The paper was subsequently shown to be fraudulent, and Wakefield was stripped of his license and the paper was withdrawn.

Kennedy and other interested parties should read the book entitled, *The Doctor Who Fooled the World: Science, Deception, and the War on Vaccines* by award-winning investigative reporter Brian Deer. This book clearly lays out just how grossly fraudulent the Wakefield study was.

23. A move to make landfills safer

New regulations are supposed to better identify and more quickly respond to methane leaks and underground fires

By Tony Briscoe, LA Times November 20, 2025

“Landfill emissions, produced by decaying food, paper and other organic waste, are a major source of planet-warming greenhouse gases and harmful air pollution statewide. But mismanagement, aging equipment and inadequate oversight have worsened this pollution in recent years, according to environmental regulators and policy experts.”

“The California Air Resources Board voted to adopt a new slate of requirements to better identify and more quickly respond to methane leaks and disastrous underground fires at large landfills statewide.”

“The changes call for using satellites, drones and other new technologies to more comprehensively investigate methane leaks. They also require landfill operators to take corrective action within days of finding methane leaks or detecting elevated temperatures within their pollution control systems.”

“More recently, a new state satellite program detected 17 methane plumes from nine landfills between July and October, potentially leaking the flammable gas into unwanted areas and contributing to climate change.”

“Proponents of the new rule say the added oversight will help reduce California's second-largest source of methane.”

This is an example of a state filling in when the Trump administration has canceled programs designed to track methane emissions – see #1 above.

24. Climate Change Causes Increased Home Prices

Claire Brown and Mira Rojanasakul, Home prices on a warming planet, NY Times November 20, 2025

In some areas of the country that are exposed to disasters, homes are not selling because prospective buyers can't afford both the mortgage and the insurance. Owning a home is thought of as a way of locking in predictable housing costs. But some of the homeowners had seen insurance rates double or quadruple, making it difficult to afford to stay in their homes.

25. What is obliquity?

Obliquity refers to the tilt of the earth's axis as it moves around the sun (see Figure 1.)

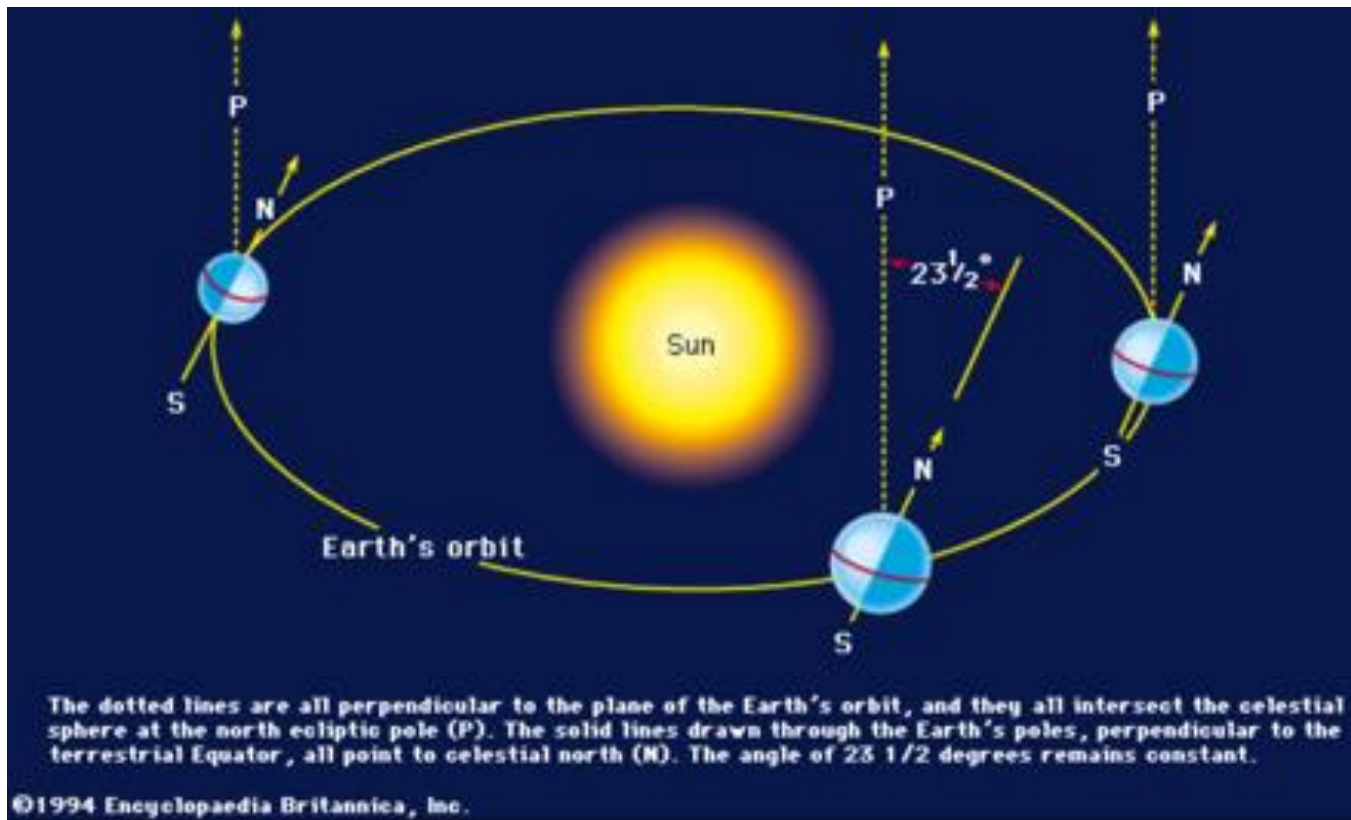


Figure 1. Obliquity of the earth's axis. c/o Encyclopedia Britannica, Inc. 1994.

The dotted lines are all perpendicular to the plane of the Earth's orbit, and they all intersect the celestial sphere at the north ecliptic pole (P). The solid lines drawn through the Earth's poles, perpendicular to the terrestrial Equator, all point to celestial north (N). **The angle of 23.5 degrees is the earth's obliquity.** There is also a wobble of a few degrees over time.

The earth obliquity is what causes the seasons. When the earth is in the position shown on the left, the northern hemisphere gets more sunlight (summer). The reverse is true when the earth has moved to its position on the right.

26. The Link Between Milankovitch Cycles & Climate Change

So, the reader may wonder why I suddenly brought up the subject of obliquity. The reason is that I wanted to explore Milankovitch Cycles which explain the ice ages, a subject often brought up by climate change deniers. Figure 1 shows the three elements of Milankovitch cycles – a. Eccentricity. The orbit of the earth around the sun is not a circle but elliptical. Changes in the of eccentricity change over time with a 96,000-year cycle. b. Obliquity or the tilt of the earth changes over a 41,000-year cycle, and c. Precession or wobble of the axis occurs over a 26,000-year cycle. Combined these result in a 21,000-year Milankovitch Cycles. These relationships are shown in Figure 1.

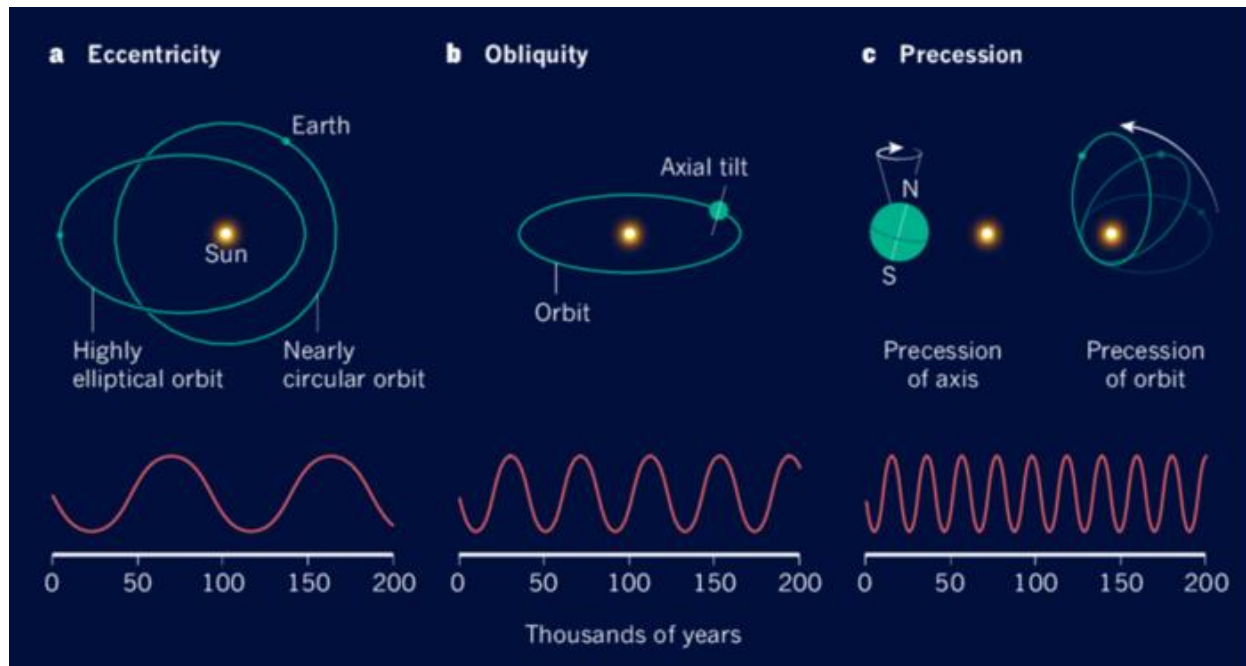


Figure 1. The three elements of Milankovitch Cycles.

An excellent discussion of Milankovitch Cycles can be seen at <https://youtu.be/Mqzs5VSjObE?si=GJiWCS-AixQ28821>.

27. COP-30 What Happened?

c/o Climate Home News November 21, 2025

The crux of the negotiations in the Amazon city of Belém hosting COP 30, is finding a balance between increasing emissions-cutting ambition and boosting finance to help vulnerable countries adapt to worsening climate change impacts - a longstanding and unmet demand.

Texts were a mixed bag. Campaigners and developing countries were happy to see the inclusion of a just transition mechanism intended to serve as a hub to support countries to take concrete steps to ensure their shift from dirty to clean energy systems is fair and equitable.

Colombia said it would drive things forward at the first global conference on a fair phase-out of fossil fuels it will host with the Netherlands next April. Colombia said it would drive things forward at the first global conference on a fair phase-out of fossil fuels it will host with the Netherlands next April.



28. U.S. conspicuous by its absence at G-20 summit

**Rift with South Africa may undercut agenda focusing on impact of global climate change.
c/o Gerald Imray LA Times November 21, 2025**

“World leaders arrived Friday for a historic first Group of 20 summits in Africa that aims to put the problems of poor countries at the top of the global agenda. But the talks have been undermined by a rift between host South Africa and the United States over a Trump administration boycott.”

“The weekend summit in Johannesburg will be attended by delegations from 18 of the world’s richest and top developing economies — minus the U.S., which has branded South Africa’s hosting a “disgrace” and won’t participate in the talks.”

“The boycott by the world’s biggest economy and founding G-20 member was ordered by President Trump over his claims that majority-Black South Africa is persecuting its white Afrikaner minority.”

“ ‘We will not agree to be bullied’ Strong U.S. opposition threatens to undercut South Africa’s chosen agenda for the summit, where the host wants to focus world leaders’ attention on issues such as the **impact of climate change on the developing world**, debt burdens for poor countries and widening global inequality.”

Once again, where the U.S. used to be the leader on the world stage, Trump has now withdrawn from multiple stages.

29. Some Final Assessments of COP-30

There have several final assessments of COP-30. These include the following:

Inside Climate News Bob Berwyn - **COP30 Backpedals on Climate Action.** Offering no new plans to cut fossil fuels, the UN’s climate conference failed to produce a roadmap to stop global warming.

“After negotiators at COP30 retreated from meaningful climate action by failing to specifically mention the need to stop using fossil fuels in the final conference documents published Saturday, the disappointment inside the COP30 conference center was as pervasive as the diesel fumes from the generators outside the tent.”

COP30 President André Corrêa do Lago, acknowledged the disappointment. “We know some of you had greater ambitions for some of the issues at hand. I know the **youth civil society will demand us to do more to fight climate change**,” he said during the opening of the final plenary.

The New York Times. **Oil Producers, but Maybe Not the Planet, Get a Win.** The final agreement, with no direct mention of the fossil fuels dangerously heating Earth, was a victory for countries like Saudi Arabia and Russia.

The LA Times. **Climate summit viewed as flop by many.** The COP30 talks held in Belem, Brazil, end without a timeline for reducing fossil fuel.

By Peter Prengaman. It didn’t mention the words “fossil fuels,” much less include a timeline to reduce their use. Instead of being remembered as historic, the conference probably will further erode confidence in a process that many environmentalists and even some world leaders have argued isn’t up to the challenge of confronting global temperature rise, which is creating more frequent and intense extreme weather events such as floods, storms and heat waves.

The criticism was withering and came from many corners. “A climate decision that cannot even say ‘fossil fuels’ is not neutrality, it is complicity,” Panama negotiator Juan Carlos Monterrey Gomez said. “Science has been deleted from COP30 because it offends the polluters.”

Brazilian President Luiz Inácio Lula da Silva, an influential and charismatic leader on the international stage known for his ability to bring people together. And encouraged by Lula's rousing speeches in the summit's beginning days, more than 80 nations called for a detailed road map for the world to sharply reduce the use of gas, oil and coal, the main drivers of climate change. In the end, none of that mattered.

Lula said, "Earth can no longer sustain the development model based on the intensive use of fossil fuels that has prevailed over the past 200 years," Lula said Nov. 7, adding: "The fossil fuel era is drawing to a close."

In late 2023, during COP28 in Dubai, the final resolution declared that the world needed to "transition away" from fossil fuels. The last two years, though, nothing had been done to advance that. Indeed, **instead of phasing away, greenhouse gas emissions worldwide continue to rise. Trump is doing his best to contribute to that.**

Bloomberg Green. In the end, nearly 200 countries agreed to an eight-page document that calls for stronger efforts on national goals on emissions and boosting financial support to poor countries that need help defending against intensifying heat, storms and droughts. But the outcome of COP30 revealed deep fractures, particularly around which countries should pay for adaptation and how to get the world off fossil fuels.

The two largest economies and historical emitters, the US and China, were conspicuous in their lack of impact. President Donald Trump declined to send representatives as the US exits from global climate accords; China focused [more on its own interests](#) in trade rather than stepping into a stronger leadership role.

"This COP was the manifestation of a new geopolitical reality," said Linda Kalcher, executive director at Strategic Perspectives.

Adaptation was elevated at this year's COP, a recognition that climate damage is happening now and the need to adapt is here. Worsening storms, floods, droughts and fires pose a huge burden, especially on developing countries and small island states.

The US makes its absence felt. This was the first COP without American attendance since President Donald Trump returned to the White House — and that absence was felt, for both good and bad. Developed country negotiators, like those in the EU, missed the presence of the US to act as a driver of ambition, using its diplomatic heft during critical moments with countries like China and Saudi Arabia. There was little sign of others being willing to step up into the vacuum. Beijing submitted an underwhelming climate pledge ahead of the summit and kept a [low profile](#) at the talks. Europe remained on the defensive against accusations of not providing enough finance and unfair trade measures.

SEMAFOR. COP30 has a carbon trading problem. The market for voluntary carbon offset and removal credits has been struggling for the last several years to repair a reputation sullied by numerous greenwashing scandals. COP negotiators, meanwhile, settled on new rules at last year's Baku climate talks to stand up a parallel global market, overseen by the UN, that would allow national governments to trade carbon credits directly with each other.

But so far, only about a dozen Article 6 trades — named after the section of the Paris Agreement outlining the plan a decade ago — have been executed. And the market shows no signs of growing to the point where it could make a notable contribution to climate finance, Allister Furey, CEO of Sylvera, a leading platform for carbon market data, told Semafor.

30. Problems with Carbon Credits

by Tim McDonnell, climate and energy editor for SEMAFOR

Carbon trading is a notoriously fraught enterprise; making an accurate assessment of a given project's capacity to draw down CO₂ and keep it permanently out of the atmosphere is a process prone to technical pitfalls and net zero claims that, intentionally or not, can easily cross into greenwashing. Since the 2015 Paris COP, Article 6 negotiations were the forum for some of the most arcane and hair-splitting debates in climate politics, and a reliable target for activists claiming the whole thing is a scam. But when the rulebook was finally settled last year, it seemed like most issues had been resolved, more or less, to everyone's satisfaction. The one problem negotiators didn't seem to consider is that many countries would simply choose not to participate in the market.

The fundamental problem with Article 6 trading, Furey said, is that it essentially constitutes the subsidization by taxpayers in one country usually a rich one with a big carbon footprint — of carbon projects in another, most likely poorer, country. That makes it a hard sell politically, he said.

There's another problem, from the perspective of potential sellers. Say a country in Africa stands up a big reforestation project and sells credits from it, via Article 6, to a European country struggling to meet its ambitious carbon reduction goals. The selling country is prohibited from counting those credits against its own emissions targets. And so far, it seems many potential sellers would rather keep those reductions inhouse, rather than sell them off and then have to find some other, probably more expensive way of meeting their target, said Guy Turner, managing director of carbon markets at the ratings firm MSCI. "A lot of governments are sitting on the sidelines while they make that decision," he said. And many developing countries simply lack the institutional capacity to properly vet and accredit projects, he said.

31. Mayors pledge climate action at Brazil summit.

Gabriela Sá Pessoa - Leaders of major cities gather to address global warming ahead of a U.N. conference.

SAO PAULO — Just days ahead of the U.N. climate conference to be held in Brazil, a group of 300 mayors gathered in Rio de Janeiro to pledge coordinated climate action and address rising heat that is hurting many of their residents. The summit Monday was organized by C40, a network of mayors from big cities that has pushed to be included in decisions on how to combat global warming and adapt to its effects.

"In the midst of all the geopolitical tensions and divisions, it is truly amazing and inspirational to see what is happening in this room and on the ground in your cities," Hart said,

adding that local leaders are needed “more than ever” as the world enters the second decade of implementing the 2015 Paris Agreement.

Ana Toni, Brazil’s climate change chief and chief executive of COP30, said meeting The Paris Agreement Goals goals would be possible only by engaging mayors.

London Mayor Sadiq Khan said “Now, it is an existential fight between the climate wreckers and climate defenders,” Khan said. “Among the wreckers is the president of the United States of America, someone who stood up at the U.N. only a matter of weeks ago and called the climate crisis a scam.”

The Phoenix Mayor Kate Gallego drew applause from the audience after saying she was bringing “good news from the United States” and asked fellow American city leaders to raise their hands. **“We have 50 cities from the U.S. that are here, all committed to ambitious climate action. So, while our national government goes backward, these cities go forward,”** Gallego said.

Gallego addressed how extreme heat is affecting her city, which has repeatedly broken temperature records in recent years. “This year, we hit 118 degrees — nearly 48 Celsius — not once, but twice,” the mayor said. She then introduced the city’s plan to plant trees and install shade structures, develop pilot cool-surface technology, and offer heat-relief training to first responders, such as paramedics handling heat emergencies.

Scientists say that 4 billion people, about half the world’s population, experienced at least one extra month of extreme heat because of human-caused climate change from May 2024 to May 2025. The extreme heat caused illness, death and crop losses and strained energy and healthcare systems, according to the analysis from World Weather Attribution, Climate Central and the Red Cross. Yvonne Aki-Sawyerr, C40 co-chair and mayor of Freetown, Sierra Leone’s capital, said that extreme heat stands now as the deadliest weather-related disaster and **contributed to an estimated 489,000 deaths each year.**

“And the economic consequences are staggering. Global extreme heat is projected to cause **\$2.4 trillion of loss productivity by 2030**, as it becomes too dangerous for working outdoors,” she said, mentioning businesses like construction and agriculture. Cooling cities down On Monday, the C40 mayors launched a global coalition to prepare cities for a hotter future through an effort called the **Cool Cities Accelerator.**

A coalition of 33 cities — including Austin, Texas; Boston; Buenos Aires; Freetown; London; Nairobi; Phoenix; Paris and Singapore — has pledged to collaborate, share best practices and report progress on emergency measures such as strengthening early warning systems and ensuring access to cooling projects. Within five years, cities aim to improve building standards, expand urban tree cover and shade, and future-proof critical infrastructure.

Cities will report back every two years on progress toward protecting residents from heat, said Emilia Carrera, the foundation’s director of health. Key metrics will include the establishment of cooling centers, the design of cooler urban spaces and updated building codes.

Cities, however, have reduced emissions faster than national governments, according to the C40 group.

“In this year of major geopolitical shifts, that’s an understatement, city leadership has become even more important,” said Catherine McKenna, Canada’s former climate minister who also served at the U.N. as the chair of the Net-Zero Emissions Commitments.

32. Trump’s Plans to Expand Offshore Drilling Meet Bipartisan Opposition

California and Florida lawmakers oppose the plan. It’s the latest in the president’s doubling down on fossil fuels, and a rare example of Republican pushback.

By Keerti Gopal *Inside Climate News*. November 21, 2025

“It’s not often that the governors of California and Florida are on the same page, but this week they’re aligned in opposition to the White House’s latest plan to expand offshore oil drilling near both their shores.”

“The Trump administration’s plans, announced Thursday by the Department of the Interior, propose offering as many as 34 offshore drilling leases across nearly 1.3 billion acres off the coasts of Alaska, California and Florida. That would open waters that haven’t had new leases in decades—or in some cases ever, environmental groups said—and reverse previous policy by the Biden administration that aimed to slow down offshore oil development.”

“The Biden administration slammed the brakes on offshore oil and gas leasing and crippled the long-term pipeline of America’s offshore production,” said Interior Secretary Doug Burgum in a statement with the plan’s announcement. “By moving forward with the development of a robust, forward-thinking leasing plan, we are ensuring that America’s offshore industry stays strong.”

“Donald Trump’s idiotic proposal to sell off California’s coasts to his Big Oil donors is dead in the water,” Newsom wrote Thursday on X, echoing his own earlier words. “We will not stand by as our coastal economy and communities are put in danger.”

DeSantis reiterated his support for a 2020 memorandum preventing offshore oil and gas leasing in parts of the Gulf of Mexico—including off Florida’s coast—through 2032.

Mike Sommers, CEO of the American Petroleum Institute, an oil and gas industry group, said in a statement that the plan is a “historic step” in developing the country’s offshore oil resources. API has for decades lobbied to block climate action and support fossil fuel expansion.

33. Perspective on Placing Painted Plastic Squares to Repair Albedo.

To put things in perspective, it is estimated that The **Great Pyramid of Giza** (the largest pyramid in Egypt, originally built for Pharaoh Khufu) is estimated to contain about **2.3 million**

stone blocks. Each of the larger blocks **weighed 15 tons**, The original block of stone from the quarries, were placed on boats for a two-to-three-day journey to the pyramid site. After stone finishing, they were hauled up steep ramps for placement in the pyramids ¹

If the ancient Egyptians could accomplish this, using only human power, then placing several million or billion painted plastic squares on flat surfaces, with workers having power tools at their disposal, should be relatively easy.

1 Rethinking How the Egyptians Built the Pyramids. National Geographic 248: December 2025.

34. Bill Gates Disturbing Statement at COP30.

At COP30, Bill Gates announced a \$1.4 billion investment over four years to help farmers in sub-Saharan Africa and South Asia adapt to climate change. The investment aims to provide farmers with tools and resources to improve their resilience and adapt to extreme weather, such as droughts and floods.

He also argued that the focus of climate efforts should shift to include preventing suffering and poverty, rather than solely focusing on emissions and temperature change, and warned that cutting aid for health and development would hurt resilience efforts.

He called for a "strategic pivot" in climate efforts, suggesting that while emissions reductions are important, the primary focus should be on adapting to the impacts of climate change and helping the most vulnerable populations. He stated that the main goal should be to prevent suffering, particularly in the world's poorest countries, and that climate strategies should center on human welfare. He stated that innovation is crucial for both cutting emissions and adapting to a changing climate.

I disagree with his statement, “the primary focus should be on adapting to the impacts of climate change and helping the most vulnerable population.” It is analogous to fighting poverty by giving people money, rather than giving them jobs. In other words, instead of focusing on adoption, we need to focus on a cure, making adoption unnecessary. I think \$1.4 billion would go a long way toward funding the four proposals in the book and combating global warming at its roots.

I also disagree with the implication that the dangers of global warming are exaggerated. The following item #35 **shows that unless governments take global warming seriously, by 2100 the world could be a very dangerous place.**

Michael Mann also disagreed with Gates ¹, calling his comments a distraction and fodder for the deniers.

References

1 Mann, Michael (2025) Bill Gates’s climate comments are a distraction. Nature World View 647, P561.

35. Representative Concentration Pathways (RCPs) Wikipedia

RCPs numbered 1.9 to 8.5 are climate change scenarios to project future greenhouse gas concentrations. All were considered possible depending on the amount of greenhouse gases (GHG) emitted in the years to come. The four original PCPs were RCP2.6, RCP4.5, RCP6, and RCP8.5. They were labelled after the expected changes in radiative forcing values from the year 1750 to 2100. These pathways or *trajectories*, describe future greenhouse gas concentrations.

They represent different levels of effort to control emissions.

RCP 1.9 is a pathway that limits global warming to below 1.5 °C, the aspirational goal of the Paris Agreement.

RCP 2.6 is a "very stringent" pathway requiring that carbon dioxide (CO₂) emissions start declining by 2020 and go to zero by 2100

RCP 3.4 represents an intermediate pathway that includes considerable removal of greenhouse gases from the atmosphere.

RCP 4.5 is a scenario where emissions peak around 2040, then decline.

RCP 6 - emissions peak around 2080, then decline.

RCP 8.5 - emissions continue to rise throughout the 21st century

The following figure 1 compares the outcomes, in terms of atmospheric CO₂ concentrations, of the different RCPs.

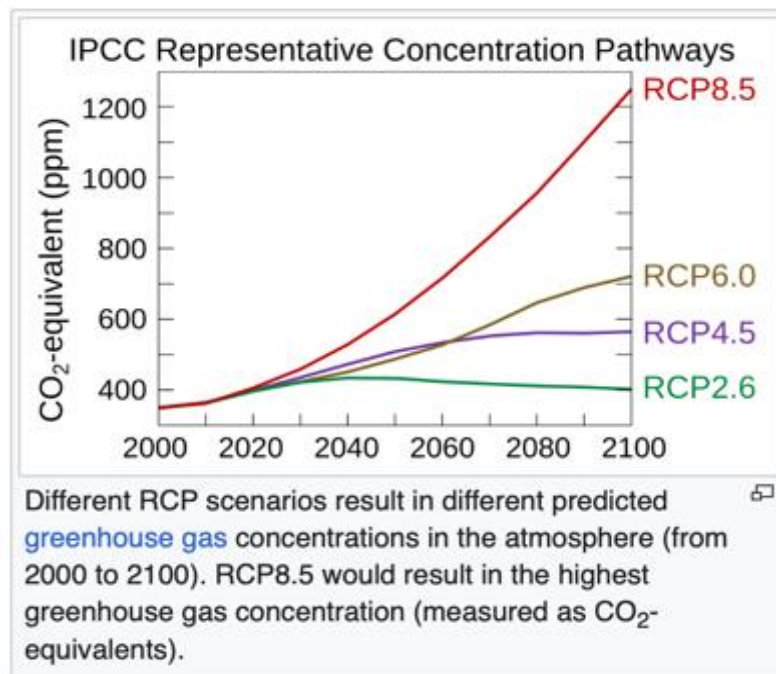


Figure 1. CO₂ levels by 2100 for the different RCPs. (Wikipedia)

This can also be shown table form (Figure 2).

Scenario	2046–2065	2081–2100
	Mean (<i>likely</i> range)	Mean (<i>likely</i> range)
RCP2.6	1.0 (0.4 to 1.6)	1.0 (0.3 to 1.7)
RCP4.5	1.4 (0.9 to 2.0)	1.8 (1.1 to 2.6)
RCP6	1.3 (0.8 to 1.8)	2.2 (1.4 to 3.1)
RCP8.5	2.0 (1.4 to 2.6)	3.7 (2.6 to 4.8)

Figure 2. Projected temperatures for the different PCPs (Wikipedia).

Since currently the CO₂ concentration in the atmosphere is progressively increasing (see book), **this suggests we are now in the PCP8.5 scenario**. If this is not changed, by having governments take climate change seriously, based on this table the global temperatures in 2100 could be as high as 4.8°C over pre-industrial level.

It could be even worse. If we use the data in Figure 1, for PCP8.5 the CO₂ concentration could be as high as 1,200 ppm by 2100. Using a ECS of 3,0 (see above) the equation for determining the global temperature at this CO₂ level gives a temperature of **6.3 °C** above preindustrial levels. **This would be truly disastrous.**

36. How good are climate models in predicting future temperatures?

One of the favorite targets of climate change deniers, are the models that predict future temperatures. The accuracy of these predictions can be tested after a significant duration of time has passed. The approach was used by Zeke Hausfather and colleagues.¹ Using the temperature versus time metric, **10 of the 17 model projections show results consistent with observations. Of the remaining seven model projections, four project more warming than observed, while three project less warming than observed. Not bad!**

37. Report of Forster et al, 2025 - 7th IGCC

A multi-author report by Forster et al (2025)¹ entitled *Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence*, provides a series of interesting observations.

The **Indicators of Global Climate Change (IGCC)** was initiated to provide policymakers with **annual updates** of the latest scientific understanding on the state of selected critical indicators of the climate system and where possible of the quantified human influence upon these. Our aim is to rigorously track both climate system change and evolving methodological improvements between IPCC report cycles, thereby increasing transparency and consistency in between successive reports.

These gases include CO₂ emissions from fossil fuels and industry (CO₂ -FFI); net CO₂ emissions from land use, land-use change and forestry (CO₂ -LULUCF); CH₄ emissions; N₂O emissions; and fluorinated gas (F-gas) emissions comprising hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆) and nitrogen trifluoride (NF₃) – hereafter the “**UNFCCC F-gases.**” Emissions data are gathered by countries and submitted to the UNFCCC in the form of national inventory reports and common reporting tables. However, these “national inventories” are generally incomplete and are not kept up to date for all countries. Emissions reporting therefore often relies on “third-party” datasets compiled by multiple research organizations. There are too many complexities in this study to include in this summary. The interested reader can read the original paper.

The latest global methane budget estimates indirect anthropogenic CH₄ fluxes from wetlands and freshwater bodies of approximately **2.4 Gt CO₂e yr⁻¹**. The term CO₂e refers to CO₂ equivalents.

The following table shows the progressive increases over the years 1970 to 2023.

Units:								
Gt CO ₂ e	1970–1979	1980–1989	1990–1999	2000–2009	2010–2019	2014–2023	2023	2024 (projection)
GHG	30.9±4.5	34.6±4.6	39.3±5.1	45.1±5.1	52.9±5.4	53.6±5.2	55.4±5.1	
CO ₂ -FFI	17.3±1.4	20.3±1.6	23.6±1.9	28.9±2.3	35.4±2.8	36.3±2.9	37.8±3.0	38.2±3.0
CO ₂ -LULUCF	5.2±3.7	5.1±3.6	5.7±4.0	5.2±3.6	4.9±3.4	4.1±2.9	3.6±2.5	4.2±2.8
CH ₄	6.3±1.9	6.7±2	7.2±2.2	7.7±2.3	8.4±2.5	8.7±2.6	9.2±2.7	
N ₂ O	1.9±1.1	2.2±1.3	2.3±1.4	2.5±1.5	2.7±1.6	2.8±1.7	2.9±1.7	
UNFCCC F-gases	0.2±0.01	0.4±0.1	0.5±0.2	0.8±0.3	1.4±0.4	1.6±0.5	1.9±0.6	

Figure 1 shows the concentrations of the three major greenhouse gases.

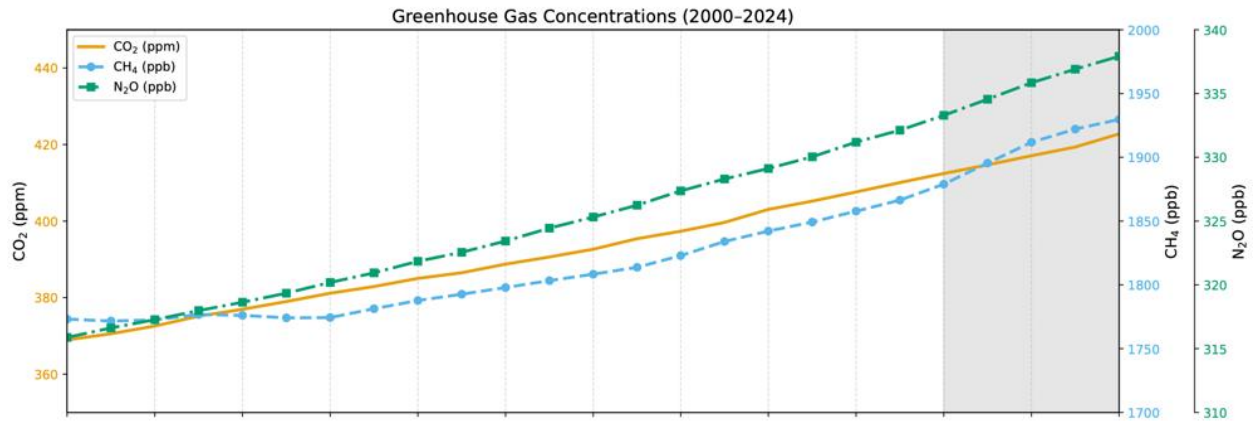


Figure 1. Foster et al, 2025. GHG concentrations.
The abscissa shows the years from 2000 to 2024

Note that the levels of CH₄ and N₂O are in parts per billion while CO₂ is in parts per million. Figure 2 shows the total GHG emissions.

(a) Global total greenhouse gas emissions

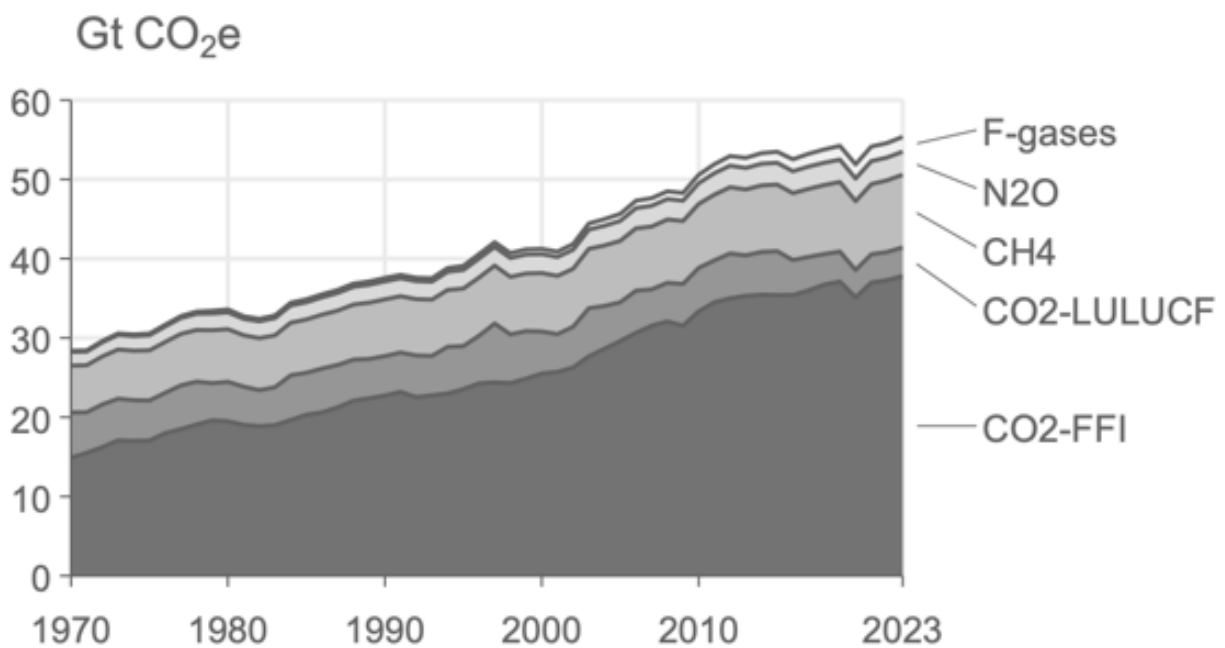


Figure 2. Total GHGs Foster et al (2025)

The average decadal GHG emissions have increased steadily since the 1970s across all major groups of GHGs, driven primarily by increasing CO₂ emissions from fossil fuel and industry but also rising emissions of CH₄ and N₂O. Emissions of UNFCCC F-gases have grown more rapidly than other GHG, but from low levels.

I have pointed out before that **over 20 years, CH₄ is 80 times as potent a greenhouse gas as CO₂, and N₂O is roughly 265 to 300 times more potent as a greenhouse gas than CO₂. The fluorinated or F-gases can be thousands of times more powerful at warming the atmosphere than CO₂ and can remain in the atmosphere for hundreds to thousands of years. Clearly there is a need to reduce these emissions.**

Although the F-gases are the most potent GHGs compared to CO₂ as shown in Figure 3, they have dropped considerably since the Montreal Protocol.

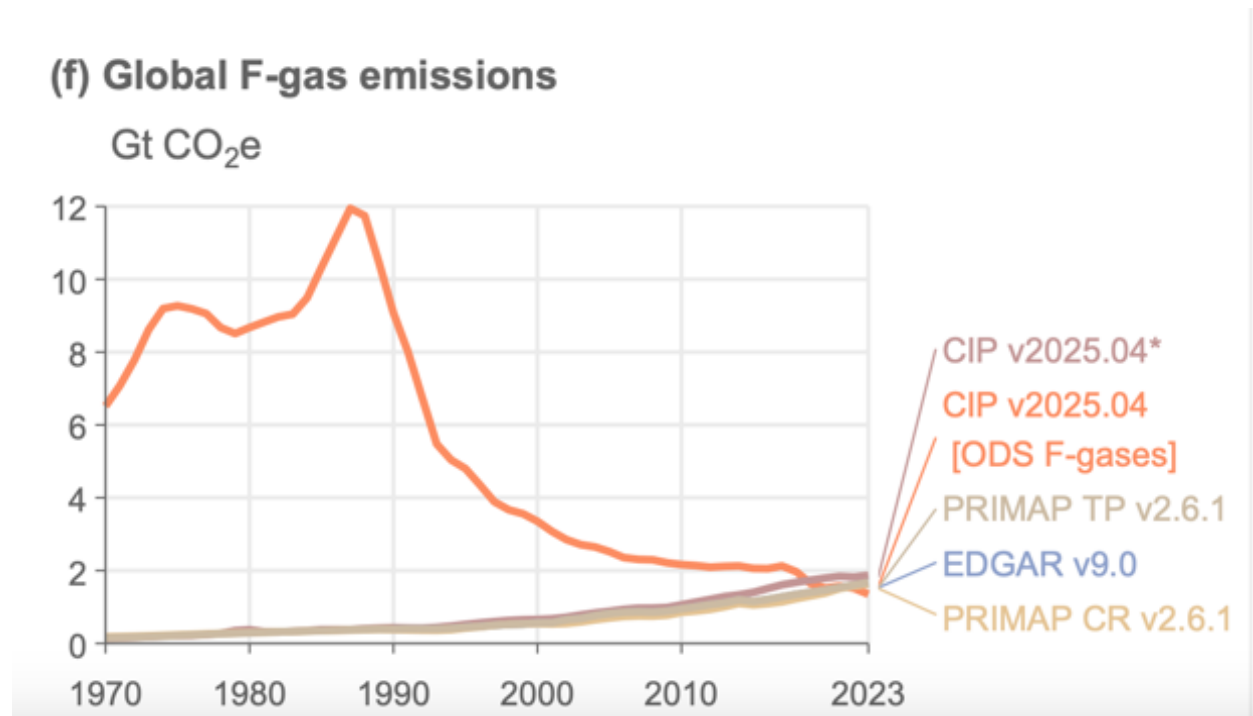


Figure 3. F-gas emissions since 1970

The Montreal Protocol was originally signed in 1987. It was an international treaty to phase out ozone-depleting fluorinated substances like CFCs (chlorofluorocarbons) and HCFCs (hydrofluorocarbons) which are man-made chemicals that were once widely used as refrigerants. An amendment to the Montreal Protocol, the Kigali Amendment, was adopted in 2016. It specifically targeted HFCs.

Effective Radiative Forcing (ERF) is the bottom line. **It is measure of how much the Earth's energy balance is changed by a specific factor**, like a gas or a change in land use. It's the difference between the amount of energy coming in from the sun and the energy leaving the Earth, measured in watts per square meter (W/m²). A positive value means the planet is warming (more incoming energy), while a negative value means it's cooling (more outgoing energy).

Figure 4 shows the different contributions to radiative forcing.

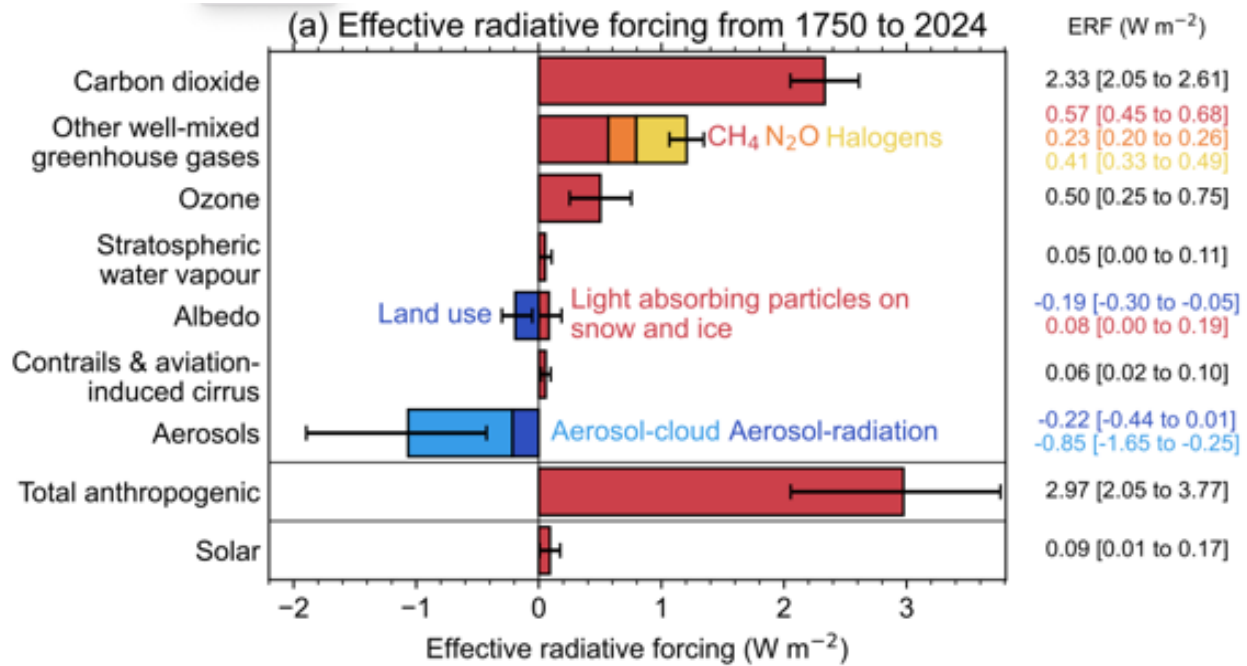


Figure 4. Effective radiative forcing (ERF) from 1750–2024.(Forster, et al, 2025)

This shows that while CO₂ causes the greatest EFR, CH₄ and N₂O together account for about half the EFR of CO₂, even though they are present at much smaller levels and are measured in ppb (parts per billion) instead of ppm (parts per million). This reflects the much greater effectiveness of these gases as GHGs. It also it again shows that aerosols have a negative EFR.

Forster et al (2025) conclude that **human-induced warming has been increasing at a rate that is unprecedented in the instrumental record**, reaching 0.27 [0.2–0.4] °C per decade over 2015–2024. This high rate of warming is caused by a combination of greenhouse gas emissions being at an all-time high of **53.6±5.2 Gt CO₂ e yr⁻¹** over the last decade (2014–2023), as well as reductions in the strength of aerosol cooling. Despite this, there is evidence that the rate of increase in CO₂ emissions over the last decade has slowed compared to the 2000s.

They also concluded that that human activities are increasing the Earth's energy imbalance and **driving faster sea-level rise compared to the AR6 assessment**.

Reference

1 Forster, P. M., Smith, C., Walsh, T., Lamb, W. F., Lamboll, R., Cassou, C., Hauser, M., Hausfather, Z., Lee, J.-Y., Palmer, M. D., von Schuckmann, K., Slangen, A. B. A., Szopa, S., Trewin, B., Yun, J., Gillett, N. P., Jenkins, S., Matthews, H. D., Raghavan, K., Ribes, A., Rogelj, J., Rosen, D., Zhang, X., Allen, M., Aleluia Reis, L., Andrew, R. M., Betts, R. A., Borger, A., Broersma, J. A., Burgess, S. N., Cheng, L., Friedlingstein, P., Domingues, C. M., Gambarini, M., Gasser, T., Gütschow, J., Ishii, M., Kadow, C., Kennedy, J., Killick, R. E., Krummel, P. B., Liné, A., Monselesan, D. P., Morice, C., Mühle, J., Naik, V., Peters, G. P., Pirani, A., Pongratz, J., Minx, J. C., Rigby, M., Rohde, R., Savita, A., Seneviratne, S. I., Thorne, P., Wells, C., Western, L. M., van der Werf, G. R., Wij"els, S. E., Masson-Delmotte, V., and Zhai, P.: Indicators of Global Climate Change 2024: annual update of key indicators of the state of the climate system and human influence, *Earth Syst. Sci. Data*, 17, 2641–2680, <https://doi.org/10.5194/essd-17-2641-2025>, 2025.

38. Are We Now in the RCP8.5 Trajectory?

Several years ago, when I first heard of the PCP trajectory classification I thought, “thank God we are working hard with COPs and the expansion of renewable energy and are in the RCP2.6 category. Now, however, with the Keeling Curve data showing a progressive increase in both the amount and rate of increase of CO₂ accumulation in the atmosphere, and a massive heat imbalance, it is beginning to look like we are instead in the RCP8.5 trajectory. Does anyone else also feel that way? The answer is yes – Christopher Schwalm, Spencer Glendon and Phillip Duffy wrote an article in PNAS entitled, *RCP8.5 tracks cumulative CO₂ emissions*.¹

The defining property of the RCP family of scenarios is **radiative forcing**. A radiative forcing is the additional amount of energy in Earth’s climate system, with each RCP having a prescribed increase by 2100 relative to preindustrial levels. **RCP8.5 by design has an additional 8.5 W/m² radiative forcing by 2100.**

Schwalm, C.R. *et al* state, that “Not only are the emissions consistent with RCP8.5 in close agreement with historical total cumulative CO₂ emissions (within 1%), but RCP8.5 is also the best match out to midcentury under current and stated policies with still highly plausible levels of CO₂ emissions in 2100.” (see Figure 1)

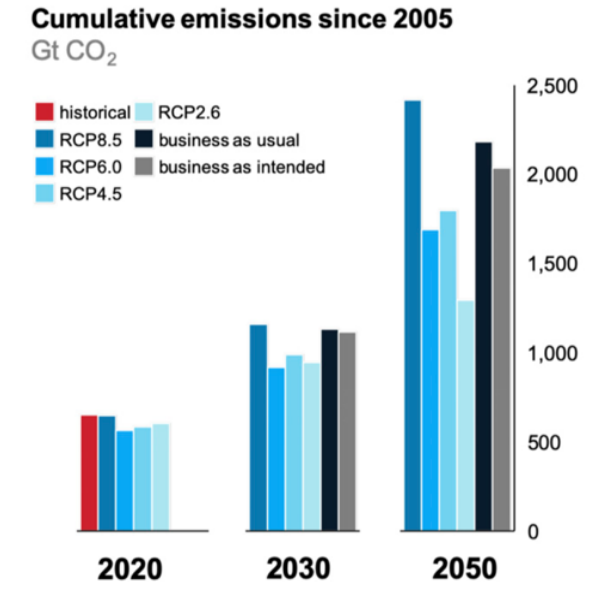


Figure 1. Total cumulative CO₂ emissions since 2005 through 2020, 2030, and 2050. For full description see Schwalm, *C.R. et al* (2025).

Note that RCP8.5 more accurately predicts the amount of CO₂ emitted, better than the other three RCPs. **In other words, Schwalm. *et al* agree that currently we may be in a RCP8.5 trajectory.**

However, by contrast, others claim the proposal that we are in RCP8.5 is extreme, alarmist, and “misleading”^{2,3}, with some commentators going so far as to dismiss any study using RCP8.5. Hausfather and Peters (2025)² said “RCP8.5 is a problematic scenario for near-term emissions.” They felt that RCP6.0 or 4.6 were adequate. They stated, “This conclusion holds when we replicate the Schwalm et al. approach, comparing IEA fossil CO₂ cumulative emissions to those of the RCPs (Fig. 1)”

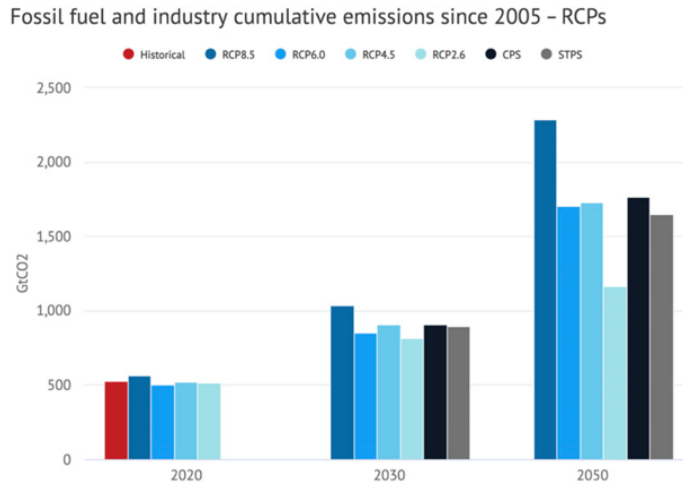


Figure 1 of Hausfather and Peters.

This Hausfather and Peters opinion article was rebutted by Schwalm, C.R. et al (2020).⁴

These articles were written in 2020. It is now November 2025, 5 years later. As I have reviewed in the book, multiple findings suggest that RCP8.5 best accounts for the global temperatures we are currently experiencing and the data showing a progressive increase in the rate of increase of CO₂ accumulation, the increase in the earth's heat imbalance, the CO₂ feedback loop, and the Forester report (above) are **consistent with the earth being in one of the high emission pathways**. In addition, having the President Trump, leader of the country with the second highest emission rate, claim climate change is a hoax, and advocate switching to coal - will not help. Five more years will probably decide the issue.

References

- 1 Schwalm, C.R. et al (2025) RCP8.5 tracks cumulative CO₂ emissions. *PNAS* 117, 19656–19657.
- 2 Hausfather, Z. and Peters, G. P. (2025) RCP8.5 is a problematic scenario for near-term emissions. *PNAS* 117, 27791–27792. November 10.
- 3 Hausfather, Z. and Peters, G.P. (2020). Emissions—the “business as usual” story is misleading. *Nature* 577, 618–620.
4. Schwalm, C.R, Glendon, S. and Duffy, P.B. (2029). REPLY TO HAUSFATHER AND PETERS. RCP8.5 is neither problematic nor misleading. *PNAS* 117, 27793–27794.

39. Texas Workers Keep Dying in the Heat. Despite its blazing temperatures, Texas has no labor protections for heat. That leaves workers, especially immigrants, vulnerable on the job.¹

The authors, Martha Pskowski and Keerti Gopal describe an 18-year-old immigrant from Honduras who died of heat exhaustion after working all day at a Texas construction site in a temperature of 104 heat index. The U.S. Occupational Safety and Health Administration investigators, classified the fatality as a heat death. They found that his employer did not sufficiently prepare him to work in high heat.

Several Texas cities have proposed legislation that would require employees to provide measures to protect workers from high heat. None have passed. At a national level the Biden administration introduced a draft of what could become the first federal heat safety rule, requiring employers to address heat hazards in the workplace. In the Trump administration Republicans in the house have already opposed it.

What is the **heat index**? The heat index is a measure of how hot it feels when air temperature and relative humidity are combined. High humidity makes it harder for the body to cool itself through sweat evaporation. The National Weather Service (NWS) uses the heat index to communicate heat risks. The calculation is based on shady, light wind conditions; direct sun increases the perceived temperature.

The NWS provides a chart showing heat index values based on temperature and humidity, along with corresponding health risks. For example, a heat index between 80°F and 90°F is classified as **Caution**, with fatigue possible from prolonged exposure or activity. **Extreme Caution** (90°F - 103°F) suggests heat stroke, cramps, or exhaustion are possible. **Danger** (103°F - 124°F) indicates these conditions are likely, and **Extreme Danger** (125°F or higher) means heat stroke is highly likely. A complete heat index chart and tools can be found on the [National Weather Service website](#).

Reference

1 Pskowski, M. and Gopa, K. (2025) Texas Workers Keep Dying in the Heat. *Inside Climate News*. November 24.

40. JFK Jr is Destroying the CDC

When Trump appointed JFK Jr, the least well qualified person in the world, to head the Department of Health and Human Services, the handwriting was on the wall for the CDC (and other institutions).

Prior to the Trump administration, the CDC had the reputation as the place to go to get solid scientific advice about infectious disease, vaccines, controlling epidemics, diagnosing mystery diseases, and many others. **No more!** In a short period of less than a year, JFK Jr has shown that he lied about the promises he gave during his appointment hearing and has destroyed the CDC's pristine reputation.

In a recent LA Times column by Michael Hiltzik, entitled *Hitting new low, CDC discards vaccine science* outlined how JFK Jr lied at his hearing and set about destroying the CDC. Under Kennedy, the CDC has deteriorated into an untrustworthy "propaganda machine for RFK Jr.'s fixed, immutable, science-resistant theories."

During the confirmation hearings, Senator Dr. Cassidy, the only M.D. on the panel had serious misgivings about JFK Jr. Only after JFK promised not to claim autism was due to vaccines, and after he promised not to alter vaccine recommendations, did Dr. Cassidy relent and cast the deciding vote approving JFK Jr's nomination.

So, what happened? As outlined in paragraph #22 above, he claims he kept his promise to Dr. Cassidy by placing a statement on the CDC website that "vaccines do not cause autism" but it had an asterisk to a statement that stating, "The claim 'vaccines do not cause autism' is not an evidence-based claim because studies have not ruled out the possibility that infant vaccines cause autism." There was also a statement that he, Kennedy, was forced to make the statement that vaccines do not cause autism "due to an agreement with the chair of the U.S. Senate Health, Education, Labor, and Pensions Committee [that is, Cassidy] that it would remain on the CDC website."

In addition, "Kennedy summarily fired the 17 public members of the CDC's authoritative Advisory Committee on Immunization Practices, replacing its cadre of experienced physicians and vaccine experts with a collection of established anti-vaxxers and others without detectable scientific expertise. The harvest of that change was an inaugural meeting of the new panel that was enveloped in a miasma of confused, uninformed debate."

That was clearly a shiv into Dr. Cassidy's back, said Hiltzik.

Numerous well designed scientific studies have shown that vaccines do not cause autism. The interested reader just needs to do is call up ChatGPT and ask, "I need a list of references that show that vaccines do not cause autism." If you keep saying "yes, please" to statements about whether you want more information, you will get many pages and a list of all relevant studies that Kennedy claimed did not exist. When I did that, here are the highlights:

1. More than 40 high-quality studies — encompassing several countries and more than 5.6 million individuals — have found no link between childhood vaccines and autism.

*2. Independent reviews by major institutions (CDC, AAP, National Academies, public-health schools) all conclude that vaccines remain one of the most **well-studied environmental factors in autism research**; none have demonstrated a causal link.*

3. Key Evidence:

- *The largest meta-analysis (Taylor et al., 2014) covering **over 1.2 million children** found **no association** between vaccines and autism.*
- *A Danish nationwide cohort of **657,000+ children** (Hviid et al., 2019) found **no increased autism risk** after MMR vaccination — even in genetically susceptible children.*
- *Studies have examined thimerosal, aluminum adjuvants, total antigen load, and vaccine timing — **none show a causal link** to autism.*

Given the easy to access to this information it is clear that either JFK Jr did not bother to spend even a few minutes accessing the literature, which would have shown that his asterisked statement was an outright lie, or he is so invested in this position that nothing will change his mind – a clear sign of being mentally disturbed.

Kennedy's persistent claims that vaccines can cause autism led to many parents refusing to vaccinate their children, with devastating effects on their health often leading to death.

Hiltzik stated, “We already have seen the ramifications from the vaccine hesitancy encouraged by Kennedy and his fellow anti-vaxxers: Reported measles cases in the U.S. reached 1,753 as of Nov. 18, the largest case load since 1991. There have been 13 deaths. Other vaccine-preventable diseases such as whooping cough also are on the rise.” Kenney, with his antivax propaganda is directly responsible for most of those deaths.

Other crazy things Kennedy and Trump have done is claim, without evidence, that Tylenol can cause autism and pregnant women should not take Tylenol. In fact, an untreated high fever in pregnancy is a risk factor for autism. On the basis of the fact that autism is more common in males they even floated the idea that circumcision may cause autism! It is ok for individual citizens to have these off-the-wall thoughts, but when the president uses the bully pulpit to express them to millions of people, the harm can be great. As the phrase goes, he should “stay in his lane.”

JFK Jr. and Vice President J. D. Vance appeared together with a huge sign with the letters, MAHA for “Make America Healthy Again.” while actuality they are making America less healthy. This is like how the slogan, MAGA should be MALG, Make America Less Great (p 242 of the book).

References

Hiltzik, Michael (2025) *Hitting new low, CDC discards vaccine science*. LA Times November 27.

41. Trump's EPA to abandon rule protecting us from soot pollution

Daly, D. (2025) Trump EPA moves to abandon rule that sets tough standards for deadly soot pollution. LA TIMES November 25.

The following are quotes from the Daly article.

Soot, made up of tiny toxic particles that lodge deep in the lungs, can result in severe health harms, including premature death, and comes from sources such as vehicle exhaust pipes, power plants and factories.

Michael Regan was head of the EPA in the Biden administration. He was aware of the fact that fine particle soot pollution was a particularly deadly health risk because **the tiny size of if the micro particles can reach deep into the lungs**. The Obama administrations *was also aware of his danger and their rule set 12 micrograms per liter as the maximum allowed*. The rule sets an air quality level that states and counties must achieve.

The Biden Administration made the rule even stricter setting 9 micrograms per liter as the air quality level that states and counties must achieve in the coming years to reduce pollution from power plants, vehicles, industrial sites and wildfires.

The Biden EPA under Regan said in creating the rule that the new standard would avoid 800,000 cases of asthma symptoms, 2,000 hospital visits and 4,500 premature deaths, adding up to about \$46 billion in health benefits by 2032. They also said the rule would especially benefit children, older adults and those with heart and lung conditions, as well as those living near highways, factories and power plants.

Despite this, Twenty-five Republican-led states and a host of business groups filed lawsuits seeking to block the rule in court. A suit led by attorneys general from Kentucky and West Virginia argued that the EPA rule would raise costs for manufacturers, utilities and families and could block new manufacturing plants.

In a court filing this week, the Trump EPA essentially took the side of the challengers, saying the Biden-era rule was done "without the rigorous, stepwise process that Congress required" and was therefore unlawful. "EPA now confesses error and urges this Court to vacate the Rule" before Feb. 7, the agency said in a brief filed with the U.S. District Court of Appeals for the District of Columbia Circuit. Vacating the Biden-era rule would revert the soot standard to a level established a dozen years ago under the Obama administration.

The Trump EPA is set to propose its own rule early next year.

*Environmental groups said the agency's action — which follows a pledge by EPA Administrator Lee Zeldin to roll back the soot rule and dozens of other environmental regulations **threatens public health and undermines its obligations under the Clean Air Act.***

"EPA's motion is a blatant attempt to avoid legal requirements for a rollback, in this case for one of the most impactful actions the agency has taken in recent years to protect public health," said Hayden Hashimoto, an attorney at the nonprofit Clean Air Task Force.

The Trump EPA press secretary Carolyn Holran, said the 2024 rule would cost "hundreds of millions, if not billions of dollars to American citizens if allowed to be implemented. The rule "was not based on the full analysis of available science that the statute requires," she said, adding that EPA will conduct a thorough review as required by the Clean Air Act.

*"Walking away from these clean-air standards doesn't power anything but disease," said Patrice Simms, vice president of healthy communities at Earthjustice, a nonprofit law firm that represents environmental groups in the legal case. President Trump "has made it clear that his agenda is **all about saving corporations money,**" Simms said, adding that under Zeldin, the EPA "has nothing to do with protecting people's health, saving lives or serving children, families or communities."*

41. Something else to worry about - CF4 and PFAS ('forever chemicals')

As shown below, forever chemicals have a great deal to do with global warming. An article in Science Focus, October 2025 was entitled **"New Type of acid rain could threaten life on Earth. With a subtitle of "We don't know the long-term consequences of this, but if a long-term consequence occurs, it will occur on a global scale."**

At issue is the widespread occurrence of CF4, a fluorinated compound found in insecticides, pharmaceuticals, and gases used in refrigeration and air conditioning, in landfills and sewage. CF4 is the smallest of the Poly-fluoroalkyl substances (PFAS) known as 'forever chemicals. It is the end product of the breakdown of larger PFAS's. The following figures show the extent of the PFAS problem.

50% = the number of fruits and vegetables in the UK that contain PFAS.

97% = the number of U.S. citizens with PFAS positive blood tests.

1,000 years = the time PFAS can exist without breaking down.

The story was based on an interview with Prof Hans Peter Arp, of the Norwegian University of Science and Technology.

Because of its small size it dissolves easily in water. As a result, it is found in rivers, lakes, groundwater, and the ocean. It is almost impossible to remove from drinking water.

The question is, “Does it harm humans and other living organisms? Some have argued that because of its small size, it passes quickly through the body into the urine. However, Prof Arp said it can enter cells and become part of the building blocks for lipids, proteins, and cell walls. He said that until more research is done to determine its threat level, we should do all we can to lower emissions.

Another question is, are ‘forever chemicals related to global warming’? The answer is absolutely!! "Forever chemicals" (PFAS) can act as greenhouse compounds, contributing to climate change, and can be far more potent than carbon dioxide, although their atmospheric concentrations are currently much lower. Their production can emit potent greenhouse gases like HCFC-22.

Global Warming Potentials (GWP100)

Gas	Type	GWP100	Notes
CO₂	Baseline GHG	1	Reference gas
Methane (CH₄)	GHG	~30	30× CO ₂ over 100 years
HCFC-22 (R-22)	HCFC	1,810	Ozone-depleting + strong GHG
HFC-134a (R-134a)	HFC	1,430	High GWP but no ozone depletion
HFC-404A	HFC blend	3,922	Very high GWP refrigeration gas

Production and import of HCFC-22 for new equipment is banned in many countries, and existing systems may continue to use recycled or reclaimed HCFC-22 until fully retired. Controlling the emission of ‘forever chemicals’ should be added to the addenda of future COPs.

43. Another example of the incredible inhumanity of the Trump Administration.

Sarah Wildman New York Times November 2025

Jemmy Jimenez Rosa was returning from vacation when a Border Patrol officer at Boston's Logan Airport took her into a back room and told her to bid her daughters farewell, said

Sarah Wildman. "I keep thinking this is a nightmare," she said, as the agent separated her from her three kids and husband, all of whom are citizens. Rosa, 43, has been a legal permanent resident since she was 9, but was held in airport detention for five days without a shower. Panic attacks sent her to the hospital twice, once in shackles. She was briefly transferred to a rat-infested Maine detention facility before ICE finally released her on a rainy street in Massachusetts without money or a phone. Rosa is one of the many green-card holders and people with legal visas caught in the dragnet of President Trump's mass-deportation project. With no due process, ICE and the Border Patrol are arresting and holding legal residents and citizens for days or weeks in squalid, dehumanizing conditions. These unseen abuses are immoral and unconstitutional and should alarm us all. "The deprivation of due process will not stop with immigrants if we allow ourselves to look away."

It is hard to believe this is occurring the United States of America. If we did that to our enemies, we could be convicted of war crimes, but to our own legal, U.S. citizens?

44. Kelp staging a comeback in California.

An article by Evan Schwartz in the December 2025 issue of the **Smithsonian Magazine** was entitled *Underwater Forests Return to Life off the Coast of California, and That Might be Good News for the Entire Planet. These are some quotes.*

Kelp is important for controlling climate change because **it can adsorb as much as 20 times more CO₂ compared with the same sized terrestrial forest.** In addition to its ability to adsorb CO₂, it also serves as a protective site for a great deal of biodiversity. This is the reason why these forests were treasured by native peoples, such as the Chumash.

Kelp is an umbrella term for 30 types of algae that grow along nearly a third of the world's coastlines—in Maine and Long Island, in the United Kingdom and Norway, in Tasmania and southern Africa, in Argentina and Japan. **With a global coverage of more than two million square miles, kelp takes up roughly the same space as the Amazon rainforest.** But few places in recorded history have had more **abundant kelp forests than the 840 miles along California's coastline.** Kelp isn't a plant. It's a **very large type of algae** that can grow to be 150 feet tall. Gas-filled compartments allow kelp blades to float upright. Tangled extensions keep them anchored to the seafloor.

On January 28, 1969, one of the Union Oil Company's main offshore platforms had a blowout, the largest in U.S. history at the time. As many as 4.2 million gallons of crude oil poured into the sea, killing thousands of seabirds, seals and sea lions, and also destroying the kelp forests.

In 1980, pushback by environmentalists resulted in the development of the **Channel Islands National Marine Sanctuary.** In 2015, the Northern Chumash Tribal Council submitted a

nomination to the federal government for its own marine protected area. In November 2024, it became official. The *Chumash Heritage National Marine Sanctuary* which now begins at the tip of the Channel Islands and stretches north over 116 miles of shore, more than 13 percent of California's coastline. More than 4,500 square miles of tidal waters are now protected from offshore oil drilling, pollution, industrial development, overfishing and habitat destruction. These marine sanctuaries are shown in the following Figure 1.



Figure 1. c/o The Smithsonian Magazine.

Over the decades, there have been several notable stories of successful kelp revival. In the waters near Monterey, scientists and enthusiasts boat out weekly to dive into and monitor the aquatic forests. Ever since 1984, **the Monterey Bay Aquarium** has been helping protect the local waters from pollution and industrial development. **The Monterey Bay National Marine Sanctuary**, established in 1992, expanded the effort, and now some 3,000 sea otters thrive between Half Moon Bay near San Francisco and Point Conception near Santa Barbara. The kelp's ebbs and flows depend mostly on water temperature.

It is obviously important to continue efforts to preserve and expand kelp forests worldwide.

45. Violence over water

This is one of the things that climate scientists predicted would happen as the global temperatures increased and the access to fresh water decreased. Well, this **violence over water is already happening**. Documenting this was an article in the LA Times December 3, by Ian James entitled *Violence over water feuds at global high*.

There were **420 water-related conflicts** researchers documented for 2024 in the latest update of the **Pacific Institute's Water Conflict Chronology, a global database of water-related violence**. Peter Gleick is the Pacific Institute's co-founder and senior fellow. The researchers found that violence over water has **more than quadrupled in the last five years**.

The researchers found water scarcity and drought are prompting a growing number of violent conflicts. **"Climate change is making those problems worse," Gleick said.**

There's an increase in conflicts over irrigation, disputes pitting farmers against cities, and violence arising in places where only some water is safe to drink.

Gleick said, "Water shortage contributes to ill health, cholera, dysentery, typhoid, water-related diseases, and it contributes to conflicts over water."

During extreme drought in Iran worsened by climate change, farmers were desperate enough to go up against security forces, demanding access to river water. Iran's water crisis, compounded by decades of excessive groundwater pumping, has grown so severe that the president said Tehran no longer can remain the capital and the government will have to move it to another city.

46. Trump seeks to expel millions of legal immigrants

By Josh Boak LA Times December 3, 2025

This is such a miscarriage of justice that I would like to re-print the entire article.

President Trump says he wants to **"permanently pause migration" from poorer nations and is promising to seek to expel millions of immigrants from the United States by revoking their legal status**. Trump is blaming immigrants for problems as diverse as crime and housing shortages as part of what he calls "social dysfunction" in America and demanding **"REVERSE MIGRATION."**

His most severe social media post against immigration since returning to the Oval Office in January came after the shooting Wednesday of two National Guard members who were patrolling the streets of the nation's capital under his orders. One died and the other is in critical condition.

On Friday, his administration announced it is halting all asylum decisions. The director of U.S. Citizenship and Immigration Services, Joseph Edlow, said in a post on the social platform X that this will be paused "until we can ensure that every alien is vetted and screened to the maximum degree possible."

Rahmanullah Lakanwal, a 29-year-old Afghan national who worked with the CIA during the Afghanistan war, is facing charges in this week's attack. The suspect came to

the U.S. as part of a program after U.S. withdrawal from Afghanistan to resettle those who had helped American troops.

Lakanwal applied for asylum during the Biden administration, but his asylum was approved under the Trump administration, according to #AfghanEvac, a nonprofit that works with the U.S. government to resettle Afghans here.

Trump’s threat to stop immigration would be a serious blow to a nation that has long defined itself as welcoming immigrants.

Since Wednesday’s shooting near the White House, administration officials have pledged to reexamine millions of legal immigrants, building on a 10-month campaign to reduce the immigrant population. In a lengthy social media post late Thursday, the Republican president asserted that millions of people born outside the U.S. and now living in the country bore a large share of the blame for America’s societal ills.

“Only REVERSE MIGRATION can fully cure this situation,” Trump posted on his Truth Social platform. “Other than that, HAPPY THANKSGIVING TO ALL, except those that hate, steal, murder, and destroy everything that America stands for — You won’t be here for long!”

Trump was elected on a promise to crack down on illegal migration, and raids and deportations undertaken by his administration have disrupted communities across the country. Construction sites and schools have been frequent targets. **The prospect of more deportations could be economically dangerous, as America’s foreign-born workers account for nearly 31 million jobs,** according to the Bureau of Labor Statistics. The president said on Truth Social that “most” foreign-born U.S. residents “are on welfare, from failed nations, or from prisons, mental institutions, gangs, or drug cartels” as he blamed them for crime across the country that is predominantly committed by U.S. citizens.

There are roughly 50 million foreign-born residents in the U.S., and **multiple studies have found that immigrants are generally less likely to commit crimes than are people who were born in the country.** The perception that immigration breeds crime “continues to falter under the weight of the evidence,” according to a review of academic literature last year in the Annual Review of Criminology.

“With few exceptions, studies conducted at both the aggregate and individual levels demonstrate that **high concentrations of immigrants are not associated with increased levels of crime and delinquency across neighborhoods and cities in the United States,**” it said.

A study by economists initially released in 2023 found **immigrants are 60% less likely to be incarcerated than people born in the U.S.** Immigrants have been imprisoned at lower rates for 150 years, the study found, adding to past research undermining Trump’s claims. Trump seemed to have little interest in a policy debate in his post, which the White House, on its own rapid response social media account, called “one of the most important messages ever released by President Trump.”

He pledged to “terminate” millions of admissions to the country made during the term of his predecessor, Democrat Joe Biden. He also wants to end federal benefits and subsidies for those who are not U.S. citizens, denaturalize people “who undermine domestic tranquility” and deport foreign nationals deemed “non-compatible with Western Civilization.”

Trump claimed immigrants from Somalia were “completely taking over the once great State of Minnesota” as he used a dated slur for intellectually disabled people to demean that state’s governor, Tim Walz, the Democratic vice-presidential nominee last year. On Wednesday night, Trump called for the reinvestigation of all Afghan refugees who had entered under the Biden administration. On Thursday, Edlow, the Citizenship and Immigration Services chief, said the agency would take additional steps to screen people from 19 “high-risk” countries “to the maximum degree possible.” Edlow did not name the countries. But in June, the administration banned travel to the U.S. by citizens of 12 countries and restricted access from seven others, citing national security concerns.

Lakanwal is accused of driving across the country to the District of Columbia and shooting two West Virginia National Guard members, Army Spc. Sarah Beckstrom, 20, and Air Force Staff Sgt. Andrew Wolfe, 24. Beckstrom died Thursday; Wolfe is in critical condition. Lakanwal, now in custody, was also shot and had wounds that were not believed to be life-threatening. Boak writes for the Associated Press.

A rational person would state that it is not right or fair to penalize an entire group of people based of actions of one. If that held every citizen in the U.S. would be subject to deportation.

47. Cuts could push thousands back to homelessness¹

City mayors and state governors across the country are working hard to cut down on homelessness. The Trump administration, in another example of its cruelty, is fighting those efforts.

Between 5,000 and 7,000 households could become homeless because their rent in permanent homes is paid by a separate federal program known as continuum of care, the Los Angeles Homeless Services Authority (LAHSA) said.

Last month, the Trump administration announced it was slashing the amount that program would distribute for permanent housing and shift dollars to temporary housing options that mandate people enroll in services such as job training and mental health treatment.

Last week, more than 15 states, including California, sued to stop that policy change. If the lawsuit fails and the cuts go through, LAHSA and nonprofit service providers say they expect thousands of people to return to homelessness.

In all, LAHSA said it would take at least \$323 million to backfill all the money expected to be lost and keep the 14,500 households housed.

References

1 Andrew Khouri, Cuts could push thousands back to homelessness. LA Times December 4, 2025

48. Shared Socioeconomic Pathways (SSPs) Wikipedia

SSPs are climate change scenarios of projected socioeconomic global changes up to 2100 as defined in the IPCC Sixth Assessment Report on climate change in 2021. They are used to derive greenhouse gas emissions scenarios with different climate policies. The SSPs provide narratives describing alternative socio-economic developments. These storylines are a qualitative description of logic relating elements of the narratives to each other. In terms of quantitative elements, they provide data accompanying the scenarios on national population, urbanization and GDP (per capita). The SSPs can be quantified with various Integrated Assessment Models (IAMs) to explore possible future pathways both with regard to socioeconomic and climate pathways.

The five scenarios are:

SSP1: Sustainability ("Taking the Green Road")

SSP2: "Middle of the Road"

SSP3: Regional Rivalry ("A Rocky Road")

SSP4: Inequality ("A Road Divided")

SSP5: Fossil-fueled Development ("Taking the Highway")

Possible future pathways both with regard to socioeconomic and climate pathways.

The relationship between SSPs and atmospheric CO₂ levels are shown in Figure 1.

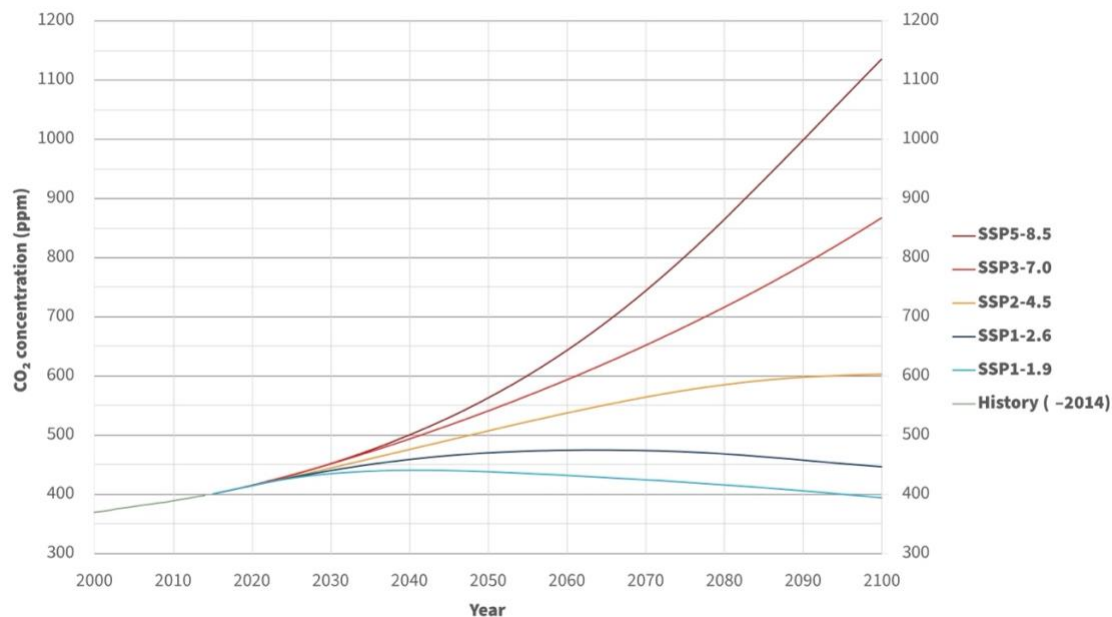


Figure 1. Predicted atmospheric CO₂ concentrations for different shared socioeconomic pathways (SSPs) across the 21st century (projected by MAGICC7, a simple/reduced complexity climate model). Each data point represents an

average of simulated values generated from five integrated assessment models
Wikipedia

SSPs are closely tied to the representative concentration pathways, or RCPs, the scenarios used in CMIP5, which are based entirely on greenhouse gas concentrations in the atmosphere. RCPs tell where we could end up without helping us understand the path we took to get there.

49. Effect of Wildfires on Health

In the November 27, 2025, issue of Nature there were two articles on the effect of wildfires on health.^{1,2}

Projections by Zhao et al, (2025) showed a surge in the number of premature deaths from wildfire smoke, reaching 1.40 million people annually during 2095–2099—roughly six times higher than current levels.

Qiu et al, (2025) noted that wildfire activity has increased in the USA and is projected to accelerate under future climate change. They quantified the mortality burden in the USA due to wildfire smoke fine particulate matter (PM2.5) under climate change. They constructed an ensemble of statistical and machine learning models that link climate to wildfire smoke PM2.5 and empirically estimate smoke PM2.5–mortality relationships using data on all recorded deaths in the USA.

They projected that smoke PM2.5 **could result in 71,420 excess deaths** (95% confidence interval: 34,930–98,430) per year by 2050 under a high-warming scenario (**shared socioeconomic pathway scenario 3-7.0, SSP3-7.0**)—a 73% increase relative to the estimated 2011–2020 average annual excess deaths from smoke. Cumulative excess deaths from smoke PM2.5 could reach 1.9 million between 2026 and 2055.

49. Trump’s AI ‘Genesis Mission’: what are the risks and opportunities?¹

The White House has launched a plan to accelerate research in the United States, by building artificial intelligence (AI) models on the rich scientific data sets held by the country’s 17 national laboratories, as well as harnessing their enormous computing resources.

The effort, dubbed the [Genesis Mission](#), aims to “double the productivity and impact of American research and innovation within a decade”, in a variety of fields from fusion energy to medicine. The project expects to “unlock breakthroughs in medicine, energy, materials science and beyond”, says Michael Kratsios, the US president’s science adviser.

The “DoE has been making a case for ‘AI for science’ for over seven years, and this executive order is the starting pistol to get on with it”, says Michael Norman, an astrophysicist at

the University of California, San Diego, and former director of the San Diego Supercomputer Center.

Trump's team has been working to funnel money and attention to AI projects even **as it guts federal research spending more broadly.**

This gives a ray of hope that the Trump administration is not totally anti-science. But I have my doubts that this project is better than the half a trillion dollars' worth of individual well-vetted grants over a wide range in institutes and a wide range of subjects, including curing Alzheimer's Disease, autoimmune diseases and cancer, that Trump canceled.

References

Elizabeth Gibney, E. Alexandra Witze, A. & Jenna Ahart, J. **(2025) Trump's AI 'Genesis Mission': what are the risks and opportunities?** Nature 647, November 26

51. Emissions by region bought up to date

It is well known that China is the largest emitter of CO₂, and that the U.S. is the second largest. How are these areas doing now. This is shown in Figure 1.

WHICH REGIONS EMIT THE MOST GREENHOUSE GASES?

The majority of greenhouse-gas emissions come from Asian countries, notably China, which have rapidly expanded their fossil-fuel energy sectors and cement-production capacities. European countries, the United States and Canada have reduced their emissions.

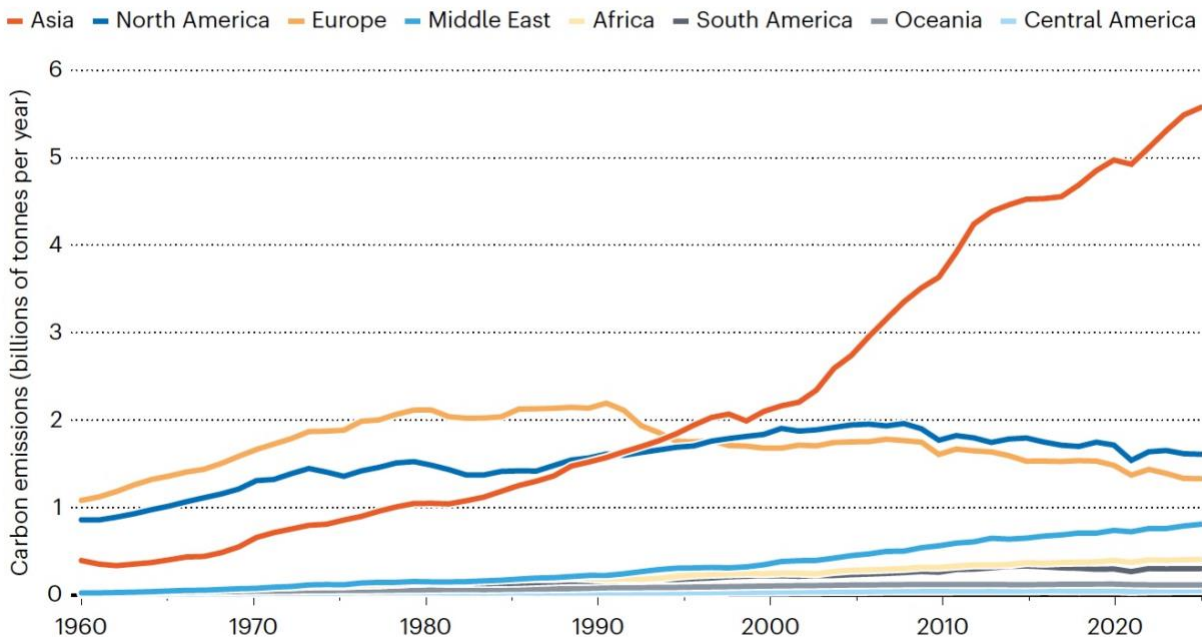


Figure 1. c/o Reference 1.

Although the red line reads Asia, it is predominantly China. Their emissions are so high because of their size and the fact that much of their electricity is produced by coal-driven plants which burned nearly 2.3 billion tons of coal last year. However, China is now leading the global clean-energy sector. The country is rapidly turning to electric vehicles as well as wind and solar energy and has committed to reducing its overall greenhouse-gas emissions by at least 7% from peak levels by 2035. When China's emissions peak, so, too, will global emissions.

Reference

Jeff Tollefson (2025) When will global greenhouse-gas emissions peak?
 Nature 647, 27 November.

52. U.S. deletes ‘renewable’ from name of Colorado energy lab

By Ari Natter LA Times December 5, 2025

The Trump administration is renaming the National Renewable Energy Laboratory the National Laboratory of the Rockies, in its latest move to recharacterize federal entities associated with clean energy.

The Golden, Colo.-based Energy Department lab, one of 17 national laboratories managed by the agency, has been dedicated to the research, development, commercialization and deployment of renewable energy and energy efficiency, according to its website. The lab has spearheaded innovations in solar cell efficiency and wind energy.

Its renaming, effective Dec. 1, follows a series of attacks on wind and solar power as the Trump administration seeks to reshape the U.S. energy landscape and reverse the green agenda championed by the previous administration.

“For decades, this laboratory and its scientific capabilities have pushed the boundaries of what’s possible and delivered impact to the nation,” said Jud Virden, laboratory director. “This new name embraces a broader applied energy mission entrusted to us by the Department of Energy to deliver a more affordable and secure energy future for all.”

Democrats, such as Colorado Sen. Michael Bennet, vowed to ensure the facility would continue its groundbreaking work on low-carbon energy sources.

“President Trump’s ‘Drill Baby Drill’ slogan will never solve our nation’s most complex energy challenges,” Bennet said in a statement.

53. Deadly Asian floods seen as a climate warning

By Aniruddha Ghosal and Anton L. Delgado LA Times December 5, 2025

Southeast Asia is being pummeled by unusually severe floods this year, as late-arriving storms and relentless rains wreak havoc that has caught many places off guard.

Deaths have topped 1,500 across Indonesia, Sri Lanka and Thailand, with more than 1,000 still missing in floods and landslides. In Indonesia, entire villages remain cut off after bridges and roads were swept away. Thousands in Sri Lanka lack clean water, and Thailand’s prime minister acknowledged shortcomings in his government’s response.

Malaysia is still reeling from one of its worst floods, which killed three and displaced thousands. Meanwhile, Vietnam and the Philippines have faced a year of punishing storms and floods that have left hundreds dead.

What feels unprecedented is exactly what climate scientists expect: more punishing storms, floods and devastation. Asia faces full force of climate crisis

Atmospheric levels of heat-trapping carbon dioxide jumped by the most on record in 2024. That “turbocharged” the climate, the United Nation’s World Meteorological Organization says, resulting in more extreme weather.

Asia is bearing the brunt of such changes, warming nearly twice as fast as the global average. Scientists agree the intensity and frequency of extreme weather events are increasing.

Higher ocean temperatures provide more energy for storms, making them stronger and wetter, and rising sea levels amplify storm surges, said Benjamin Horton, a professor of Earth science at the City University of Hong Kong.

“While the total number of storms may not dramatically increase, their severity and unpredictability will,” Horton said.

What governments are not doing

The unpredictability, intensity and frequency of recent extreme weather events are overwhelming Southeast Asian governments, said Aslam Perwaiz of the Bangkok-based intergovernmental Asian Disaster Preparedness Center. He attributes that to a tendency to **focus on responding to disasters rather than preparing for them.**

“Future disasters will give us even less lead time to prepare,” Perwaiz warned.

Countries are losing billions of dollars a year because of climate change.

Vietnam estimates that it lost more than \$3 billion in the first 11 months of this year because of floods, landslides and storms.

Indonesia doesn’t have data for losses for this year, but its annual average losses from natural disasters are \$1.37 billion, its finance ministry says.

Costs from disasters are an added burden for Sri Lanka, which contributes a tiny fraction of global carbon emissions but is at the front line of climate effects, while it spends most of its wealth to repay foreign loans, Thudugala said.

“There is also an urgent need for vulnerable countries like ours to get compensated for loss and damages we suffer because of global warming,” Thudugala said.

At the COP30 global climate conference last month in Brazil, responding to increasingly desperate calls for help, countries pledged to triple funding for climate adaptation and make \$1.3 trillion in annual climate financing available by 2035. That’s still woefully short of what developing nations requested, and it’s unclear whether those funds will materialize.

Southeast Asia is at a crossroads for climate action, said Thomas Houlie of the science and policy institute Climate Analytics. The region is expanding use of renewable energy but still reliant on fossil fuels.

“What we’re seeing in the region is dramatic, and it’s unfortunately a stark reminder of the consequences of the climate crisis,” Houlie said.

Ghosal and Delgado write for the Associated Press. Delgado reported from Bangkok. AP writers Edna Tarigan in Jakarta, Indonesia; Jintamas Saksornchai in Bangkok; Sibi Arasu in Bengaluru, India; Eranga Jayawardena in Kandy, Sri Lanka; and Eileen Ng in Kuala Lumpur contributed to this report.

54. The universal thermal performance curve UTPC

The following is from a press release from Trinity College, October 21, 2025, which has some relevance to global warming

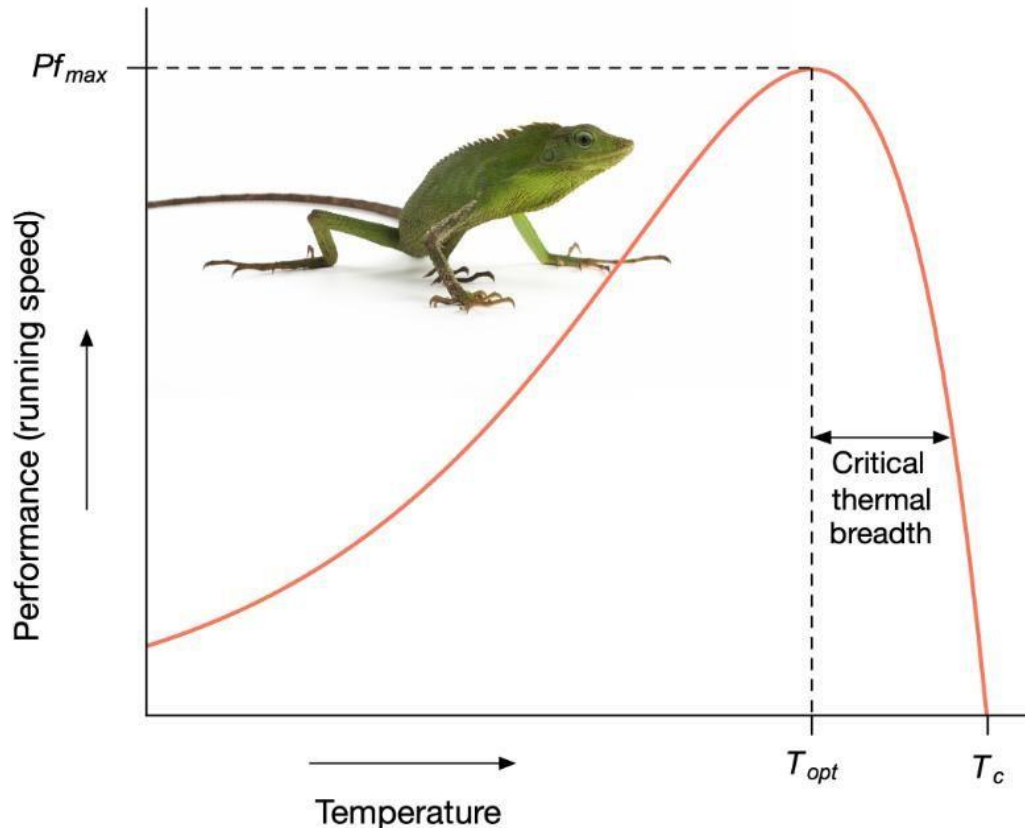
This “UTPC” seemingly applies to all species and dictates their responses to temperature change. It essentially “shackles evolution” as no species seem to have broken free from the constraints it imposes on how temperature affects performance.

All living things are affected by temperature, but the newly discovered UTPC unifies tens of thousands of seemingly different curves that explain how well “species work” at different temperatures.

And not only does the UTPC seem to apply to all species, but also to all measures of their performance with regard to temperature variation – whether you are measuring lizards running on a treadmill, sharks swimming in the ocean, or recording cell division rates in bacteria.

Crucially, the new UTPC shows that as all organisms warm:

1. performance slowly increases until they reach an optimum (where performance is greatest),
2. but then with further warming performance quickly declines.
3. **The rapid decline above optimum temperatures means overheating can be dangerous, risking physiological failure or even death.**



A hypothetical generalized thermal performance curve (TPC), illustrating how performance traits —such as running speed in lizards —exponentially increase with temperature until reaching a maximum performance at the optimal temperature. Beyond this peak, performance declines sharply as temperature continues to rise, eventually reaching a minimum or collapsing at the critical temperature. Image: Prof. Nicholas Payne and Prof. Andrew Jackson, Trinity College Dublin.

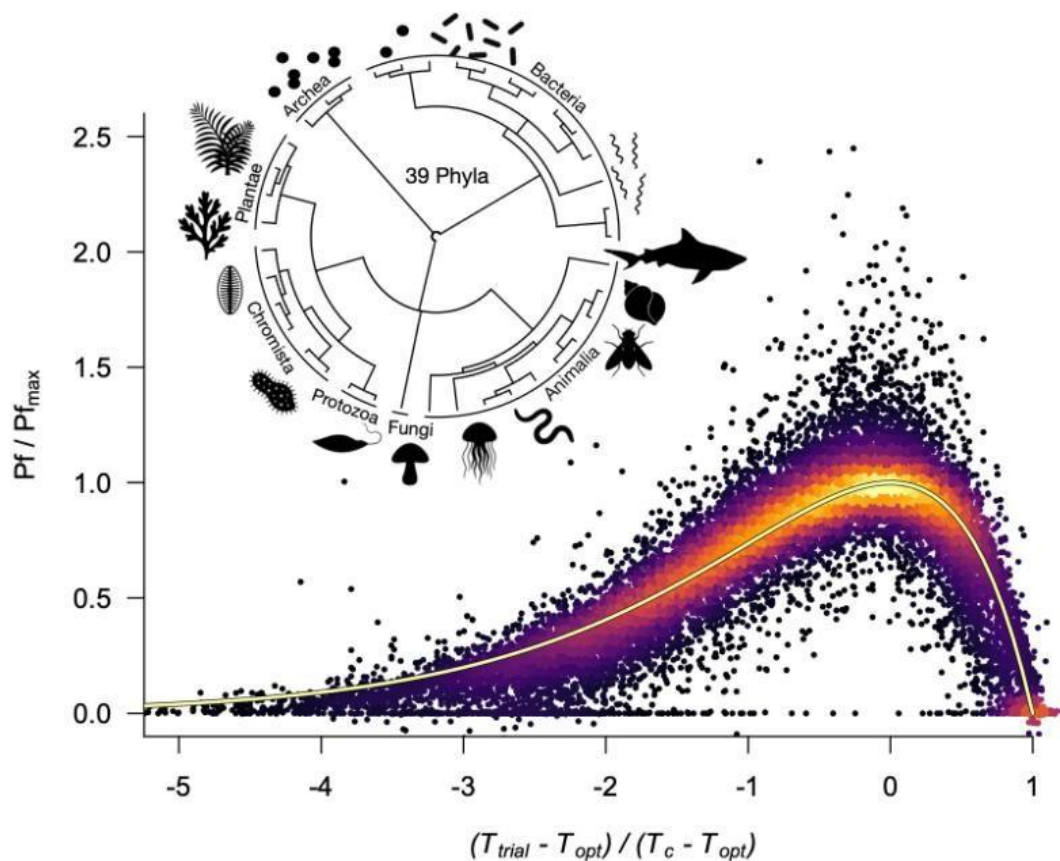
One obvious takeaway from the work, just published in leading international journal PNAS, is that species may be more constrained than feared when it comes to their ability to adapt to global climate change, given that in most places temperatures are accelerating.

Andrew Jackson, Professor in Zoology in Trinity’s School of Natural Sciences, and co-author said: “Across thousands of species and almost all groups of life including bacteria, plants, reptiles, fish and insects, the shape of the curve that describes how performance changes with temperature is very similar. However, **different species have very different optimal temperatures, ranging from 5°C to 100°C**, and their performance can vary a lot depending on the measure of performance being observed and the species in question.”

“That has led to countless variations on models being proposed to explain these differences. What we have shown here is that all the different curves are in fact the same exact curve, just stretched and shifted over different temperatures. And what’s more, we have shown that

the optimal temperature and the critical maximum temperature at which death occurs are inextricably linked.”

“Whatever the species, it simply must have a smaller temperature range at which life is viable once temperatures shift above the optimum.”



Biological performance across the tree of life collapses onto the Universal Thermal Performance Curve (UTPC). Shown are approx. 30,000 performance measurements derived from seven kingdoms, 39 phyla and 2,710 experiments. Performance is represented by diverse rates including metabolism, individual growth, foraging intensity, voluntary activity, and population growth. Data are presented on both axes relative to the parameters (T_{opt} , T_c and $P_{f_{max}}$) estimated by fitting the UTPC equation to each of the 2,710 experiments; the UTPC is overlaid as a yellow line. Data are colored by the relative density of neighboring points. Image credit: Prof. Nicholas Payne and Prof. Andrew Jackson, Trinity College Dublin.

Senior author, Dr Nicholas Payne, from Trinity’s School of Natural Sciences, added: “These results have sprung forward from an in-depth analysis of over 2,500 different thermal performance curves, which comprise a tremendous variety of different

performance measures for a similarly tremendous variety of different species – from bacteria to plants, and from lizards to insects.”

“This means the pattern holds for species in all major groups that have diverged massively as the tree of life has grown throughout billions of years of evolution. Despite this rich diversity of life, our study shows basically all life forms remain remarkably constrained by this ‘rule’ on how temperature influences their ability to function. The best evolution has managed is to move this curve around – life hasn’t found a way to deviate from this one very specific thermal performance shape.”

“The next step is to use this model as something of a benchmark to see if there are any species or systems, we can find that may, subtly, break away from this pattern. If we find any, we will be excited to ask why and how they do it – especially given forecasts of how our climate is likely to keep warming in the next decades.”

This work was supported by Research Ireland and a Marie Skłodowska-Curie Postdoctoral Fellow grant.

A relevant question is, what is the human TPC? This is what I found.

A Human Thermal Performance Curve (TPC) is a model showing how a human's physical or mental performance changes with body temperature, typically peaking at an optimal temperature (around 98.6°F or 37°C) and declining as core temperature rises or falls, illustrating our [homeostasis](#) and limits where enzymes denature or cold impairs function, charting performance metrics like endurance, cognitive speed, or even survival. It's generally unimodal (bell-shaped), but steeper on the hot side, reflecting enzyme sensitivity to heat.

What is the temperature that can lead to death? This was covered on page 32 of the book. It is highly dependent of the humidity and wet bulb temperature.

Reference

Arnoldi JF, Jackson AL, Peralta-Maraver I, Payne NL. A universal thermal performance curve arises in biology and ecology. *Proceedings of the National Academy of Sciences*. 2025 Oct 28;122(43):e2513099122.

55. How Trump's Policies threaten an Exciting New Approach to Curing Cancer

During the COVID epidemic a novel new approach to vaccinations, using mRNA (messenger RNA) saved millions of lives. The usual approach to vaccination is to inject either the inactivated virus or viral proteins, to induce an immune response to during an infection with the virus, as for example the measles virus. However, studies that were performed years before the epidemic, showed it was possible to use mRNA, which carries the code for the viral surface proteins, also worked well. Since it is possible to synthesize the stretches of RNA that are complementary to the DNA sequence of the virus proteins in question, once the DNA sequence of the virus is known, material for the vaccine can be made in a few days. This approach proved to be very powerful for making antiCOVID vaccines.

The same principal can be used to treat cancer. Since the human DNA sequence is well known, once surface proteins of given cancer are identified, it is possible to make an anti-cancer vaccine.

WOW!! Unfortunately, the anti-vaccine idiot, JFK Jr., that Trump appointed to run HHS, has deleted hundreds of millions of dollars of funding for mRNA vaccines, putting the brakes on this anti-cancer work. Not only does that potentially lead to the deaths of millions of cancers suffers, but it also cuts off a potential cure for Tatiana Schlossberg's terminal AML leukemia, JFK's granddaughter and JFK Jr's first cousin. Nice going JFK Jr! Now she can join the hundreds of children who died of measles because you wrote a book claiming measles was a benign disorder, and that the vaccine for preventing measles caused autism. That gives you a chance to see that your uninformed words coming from a person with nether an MD nor a Ph.D., can kill. JFK Jr. is the worst possible person to run the HHS.

56. Trump Cancels Life Saving Research on Intense Heat¹

Heat waves are becoming more common in the mountainous regions due to climate change, and researchers are concerned that a catastrophic heat event could soon shock the 120,000 or so people who call Missoula County home. "We've come to understand that heat is a major threat to our region," says Alli Kane, the Climate Action Program Coordinator for Missoula County. "And it's something that we're not prepared for."

In January, Missoula successfully applied to work with the **Center for Collaborative Heat Monitoring**, a federally funded partnership of science museums and heat experts tasked with mapping heat in communities across the country. The virtually based center had planned to provide expertise and \$10,000 in funding to Kane and her colleagues to identify the hottest places across Missoula County.

In the last decade, heat has on average killed more people each year than floods, tornadoes and hurricanes combined.

But in May, the Trump administration canceled federal funding for these Centers.

The center is **one of many casualties in the Trump administration's cuts to research into extreme heat nationwide.** Many of those cuts were **part of the administration's attack on climate science and environmental justice.** But the impacts to heat research have been especially rough, because many unanswered questions remain about how heat affects different populations, how to manage heat and how to keep people safe.

Recent history reveals the cost of being unprepared for extreme heat; in 2021, the **Pacific Northwest was caught off guard by the strongest heat wave the region had seen in a thousand years, resulting in more than 1,400 deaths.²** Figure 1.

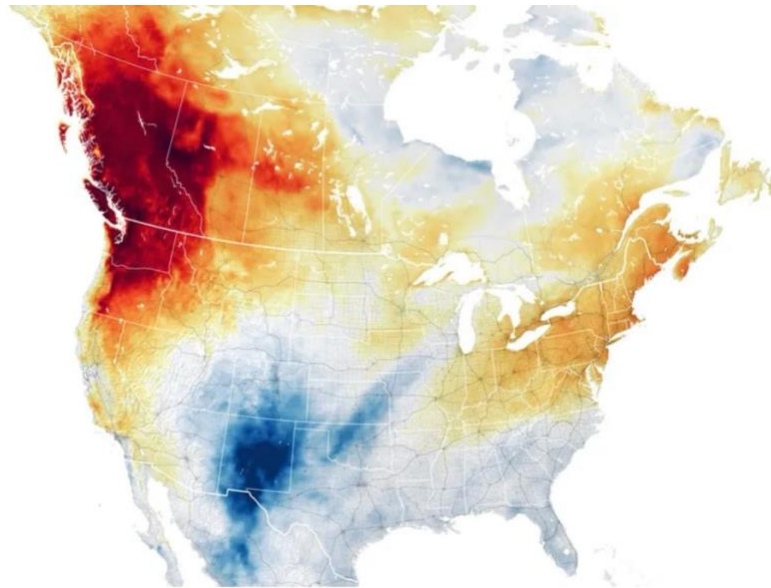


Figure 1. Climate change made the deadly heat wave that struck the northwestern United States and western Canada in late June at least 150 times more likely. NASA

The deadly heat wave that baked the Pacific Northwest in late June **would have “virtually impossible” without human-caused climate change** said Geert Jan van Oldenborgh, a climate scientist with the Royal Netherlands Meteorological Institute in De Bilt, at a news conference to announce the team's findings July 7. In fact, the temperatures were so extreme that Portland, Ore., reached a staggering 47° Celsius (**116° Fahrenheit**) on June 29, while Seattle surged to 42° C (108° F).

References

1. Nikk Ogasa (2025) Life-saving research on extreme heat comes under fire. Science News, December.
2. Gramling, C. (2021) Human-driven climate change sent Pacific Northwest temperatures soaring. Science News. JULY 7, 2021

