

WE NEED TO ACT...WITHOUT DELAY

YOU DO WHAT YOU CAN

LEARNING AND ACTION

What To Know About The Climate Crisis (and Health): THE WHAT, WHY, HOW, WHERE, WHEN, WHO AFFECTED, WHAT AFFECTED and HOW TO DEAL WITH IT ALL

Global Health Fair, Faculty of Medicine and Dentistry

University of Alberta

Edmonton, February 5, 2026

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- I just want to say how wonderful it is to be back in Edmonton, especially knowing quite a few friends are with us here today and knowing that many others too are here. We all share a love for healing, life and learning. We have a desire to do the best we can for our communities and beyond. I have been working in primary health care since my first job treating malnourished children in Honduras, Central America, more than 45 years ago. WOW, time and life pass quickly.

- I am so happy to be with you today. I had some really great years here at UofA, 2011-2015, when I made many amazing friends, people with true heart. Amongst the many activities I engaged in was starting the Global Health Fair. How wonderful to feel it still happening. Keep up the great work.
- Today I'm with you to get or keep you on board with one of the greatest challenges of our age.
- And that is to build a sustainable world and not see it ruined by climate change.
- We are currently not on track.

Just before starting I'd like to thank Dr. Dominic Allain and Patricia Grell, the organizers of today's event.

And thanks so much to all of You for coming today.

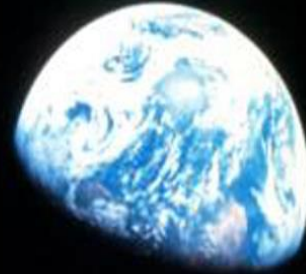
I feel very welcome coming back.

- About 12 years ago I started publishing a weekly newsletter called Global Health Weekly when I was Professor of Preventive Medicine here at the University. BUT THEN one day I realized that my focus on global health and primary health care was not complete any longer unless I integrated all the issues related to the changing climate which was just starting to accelerate, as greenhouse gas emissions (GHGs) like Carbon Dioxide and Methane were now being released and polluting our atmosphere at rates never experienced before in the long history of Earth.





Earth Rising



The photograph that changed
the way we see ourselves

(NASA - December 24, 1968)

<https://www.bing.com/videos/riverview/relatedvideo?q=earthrise+photo+nasa&mid=EABF205D9469F043E140EABF205D9469F043E140&FORM=VIRE>

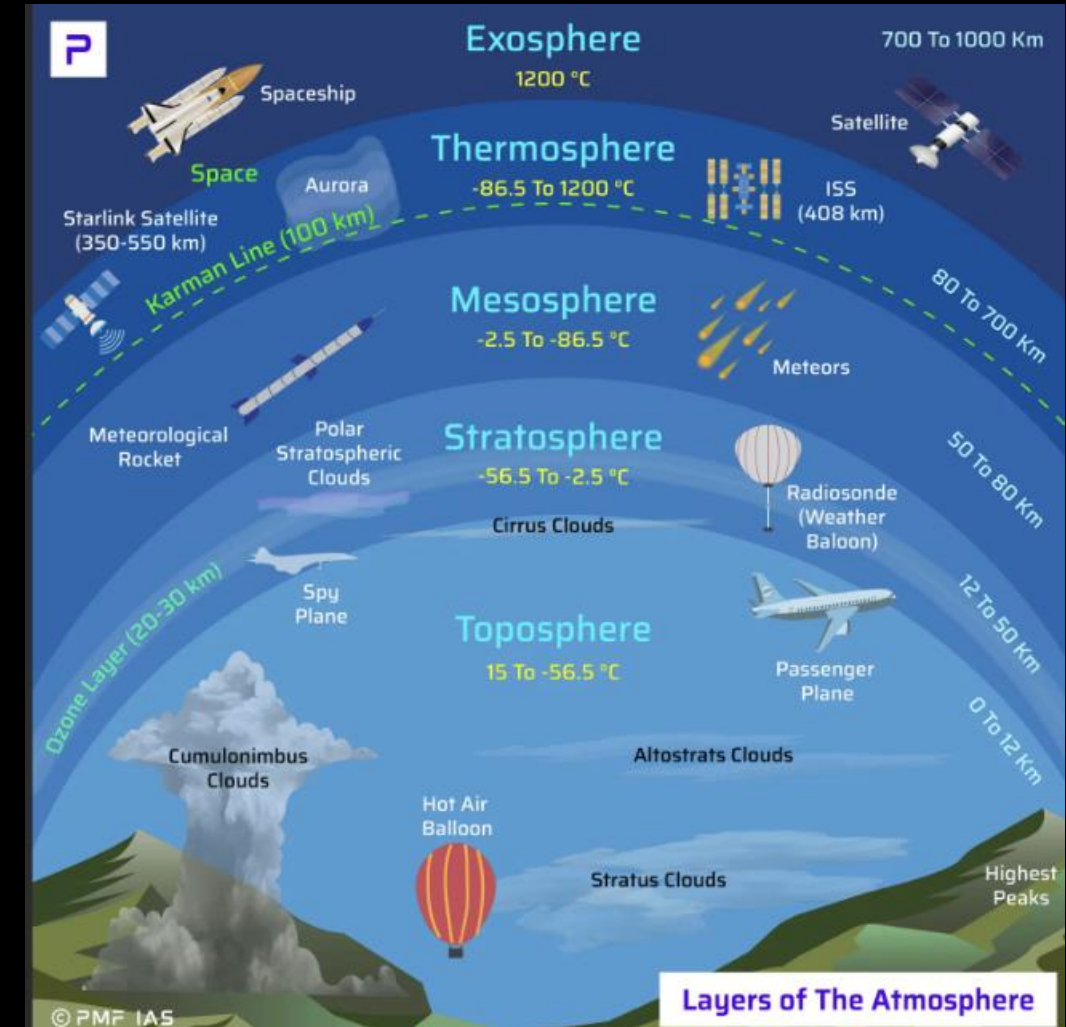
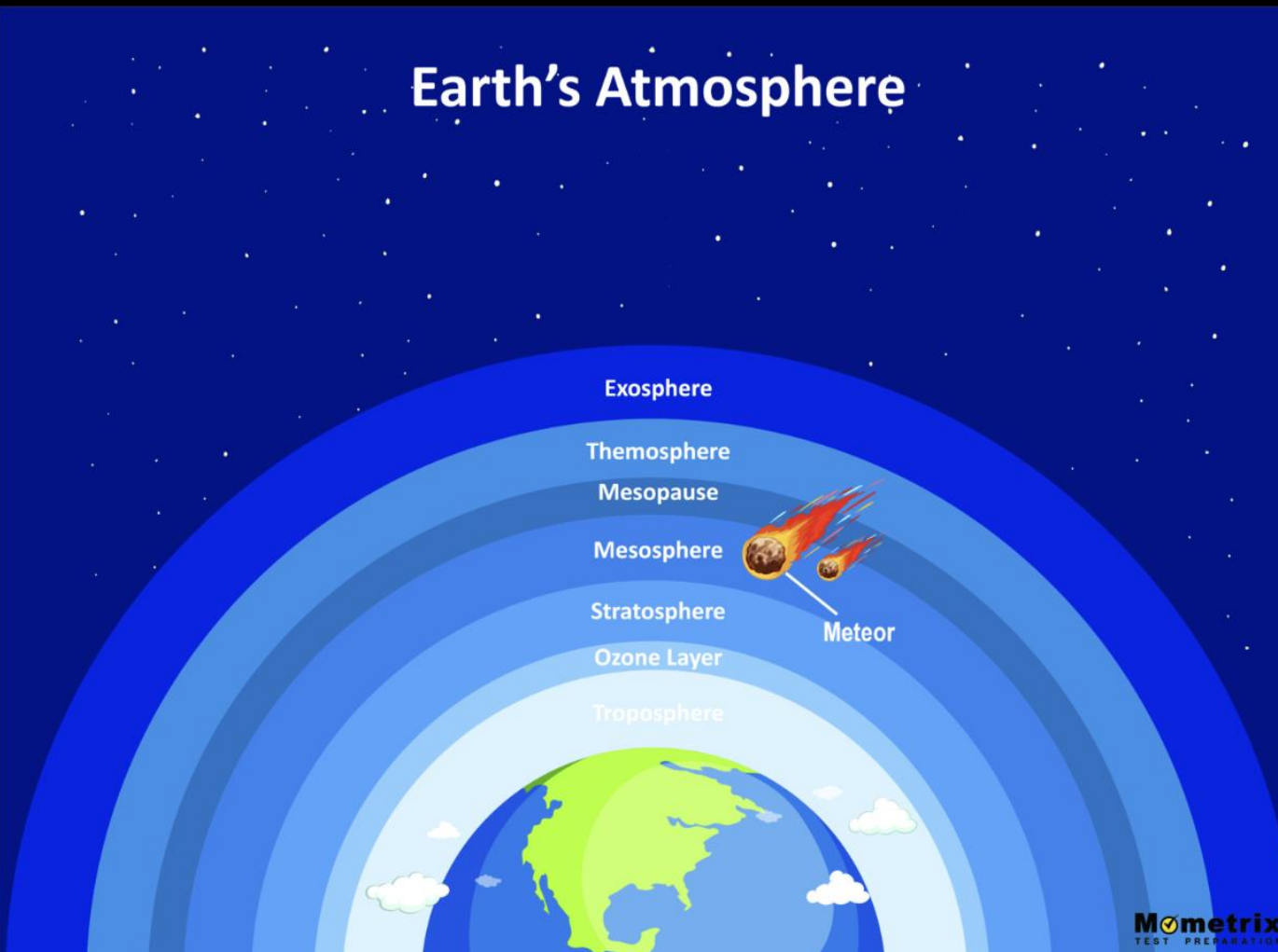


OUR HOME

ONLY ONE

THIN SKIN

The Toposphere, where the life sustaining gases reside is only about double the Radius of Earth
~6400 km



- **What to know about the Climate Crisis (and Health): WHO, WHAT, WHERE, WHY, WHEN and HOW and How To Deal With It All** (but not in that order 😊)
- WHAT IS IT? Explain atmosphere, balance of elements/chemicals; atm heating
- HOW IS IT? Sun's energy/light/
- WHEN IS IT? Started with the industrial revolution mid 19th Century
- WHERE IS IT? Everywhere; atmospheric homogenization with some variation; north to south; east to west; harsher in tropical areas; ocean/air/land
- WHO IS IT? All but some more vulnerable; small island states; already dry areas/deserts (just in Spain) Extreme Temps of the World
- WHY IS IT? Explain oligarchic wealth; wealth at any cost (nothing new/slavery); political capture; misinformation; disinformation; lies; greenwashing; greenhushing; conspiracy theories
- HOW TO DEAL WITH IT? Mitigation; Adaptation; Finance; Governance; Scale (personal to family to community to organizations (education; business; health care); Politics (regulation)
- And there evolved my challenge to the conference participants to disrupt the status quo:
 - 1) Embrace “context” as a signal to amplify rather than noise to filter out
 - 2) Reject processes that are not inclusive; engage all relevant voices
 - 3) Morph the evidence hierarchy into a mosaic, and
 - 4) Call out capacity building intentions that promote knowledge sovereignty.

We need to stay true to our quest in advancing an [#equity](#)-centred evidence system as we [#learn](#) and [#lead](#) amongst [#complexity](#), [#change](#) and [#uncertainty](#) in our [#evidenceecosystem](#).

- No roadmap for climate crisis, though one is promised by the President of COP30 at the end of the conference

WHAT IS CLIMATE CHANGE?

So simple:

It's the repeated and increasing unusual changes to our usual and historical climate and weather patterns/fluctuations.

This has been going on since about 1960 on an observable scale, but especially in this 21st Century and particularly the last ten years.

NOW: IT'S A CLIMATE CRISIS

- The confluence of so many highly damaging related climate events in recent years affecting all parts of the world;
YEAR AFTER YEAR WITHOUT CHANGE OR SLOWDOWN
- Huge destruction of life and infrastructure.
- Huge economic losses
(Heatwaves alone brought on by human-caused climate breakdown have cost the global economy more than \$16tn since the 1990s)
(<https://www.theguardian.com/environment/2022/oct/28/climate-crisis-heatwaves-cost-global-economy>)

(e.g.,in 2022: Hurricane Fiona, which bulldozed across Atlantic Canada in September, caused more than 25 deaths, displaced 13,000 people and cost nearly CDN\$4 billion in damages. Hurricane Ian's damages in the U.S. and Cuba in same month topped \$100 billion and displaced 40,000. Floods in Pakistan from June-September, displaced 7 million).

We know the climate crisis is fact because we can observe it in so many ways with our own eyes, ears , skin, body and mind, noting all the CLIMATE RELATED CHANGES over a VERY short period of time, the last 50 years.

Observation, measurement and analysis are the basis of science, and there is so much evidence. Here's a few:



The Eagle Bluff Wildfire crosses the border from Washington state on July 30, 2023, prompting evacuation orders in Osoyoos, B.C. (Jesse Winter/Reuters). From: CBC <https://www.cbc.ca/radio/ideas/world-on-fire-canada-s-worst-wildfire-season-on-record-1.6946472>

EXAMPLES OF CLIMATE RELATED EVENTS IN 2025

******The March ice storm in Ontario and Quebec topped the list of most expensive weather events in 2025, followed by May wildfires in Manitoba and Saskatchewan, storms across the Prairies in August, and flooding in southern British Columbia and parts of Alberta.

It was the tenth costliest year on record for weather-related losses in Canada. Insured damages caused by severe weather last year topped \$2.4 billion, the Insurance Bureau of Canada says. (\$37 billion of losses between 2016 and 2025.)

Two decades ago, insured damages seldom exceeded \$500 million per year. But now, annual costs of weather events surpassing the billion-dollar mark have become the norm.

Weather-related insured losses in 2024 hit a record high of \$9.4 billion from a slew of weather events including the Jasper, Alta. wildfires; flash floods in the Greater Toronto Area; a hailstorm in Calgary; and remnants of hurricane Debby in Quebec.



Photo by iStock/DenisTangneyJr

(<https://www.msn.com/en-ca/public-safety-and-emergencies/natural-disasters/severe-weather-caused-more-than-2-4b-in-insured-losses-in-2025-insurance-bureau/ar-AA1UB9bb?ocid=BingNewsSerp>)

WILDFIRES IN CANADA

Climate change is having a significant impact on wildfires around the world and across Canada (coast to coast to coast), the U.S., Mexico, Brazil, Turkey, Greece, Europe, etc.

The wildfire season of 2023 was like no other in Canada's history.

With roughly 18.5 million hectares of Canadian land burned, 2023 was the worst wildfire season ever recorded BY FAR. It surpassed the previous record of 7.6 million hectares scorched in 1989.

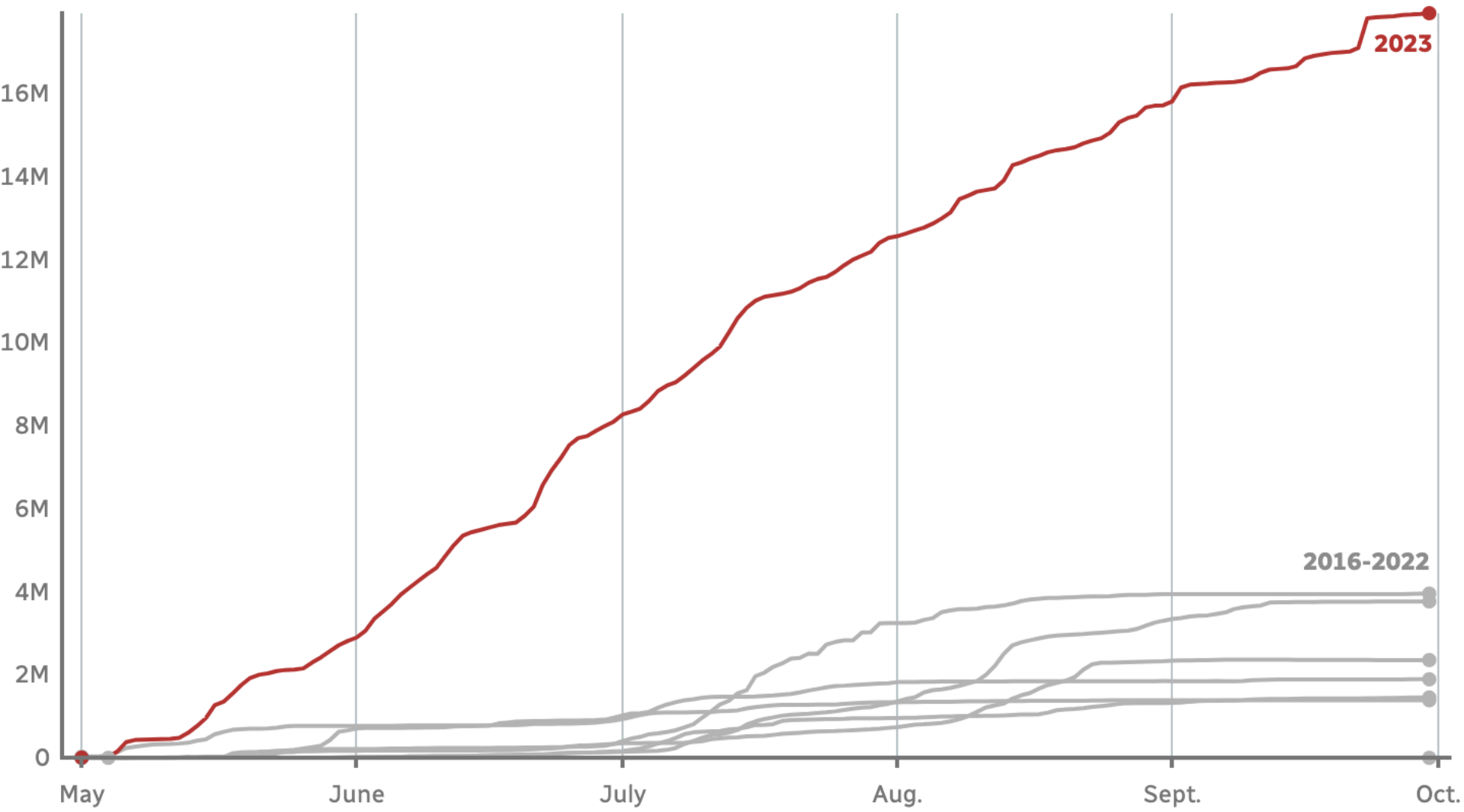
"I would say we've crossed a tipping point. This summer across Canada has been absolutely astounding in terms of wildfire," said Lori Daniels, a professor in the department of forest and conservation sciences at the University of British Columbia. "These are the types of fires that I think will be ecosystem changing. It will take decades to centuries for those ecosystems to recover, if they recover, given the confounding influence of climate change."

Reference: CBC, October 19, 2023 (<https://www.cbc.ca/news/climate/wildfire-season-2023-wrap-1.6999005>)

IN 2025 AS OF AUGUST: More than 7.3 million hectares have burned this year so far, more than double the 10-year average.

How much has burned so far this year in Canada

Estimated cumulative hectares burned in wildfires from satellite-detected hotspots



Reference: CBC, October 19, 2023
(<https://www.cbc.ca/news/climate/wildfire-season-2023-wrap-1.6999005>)

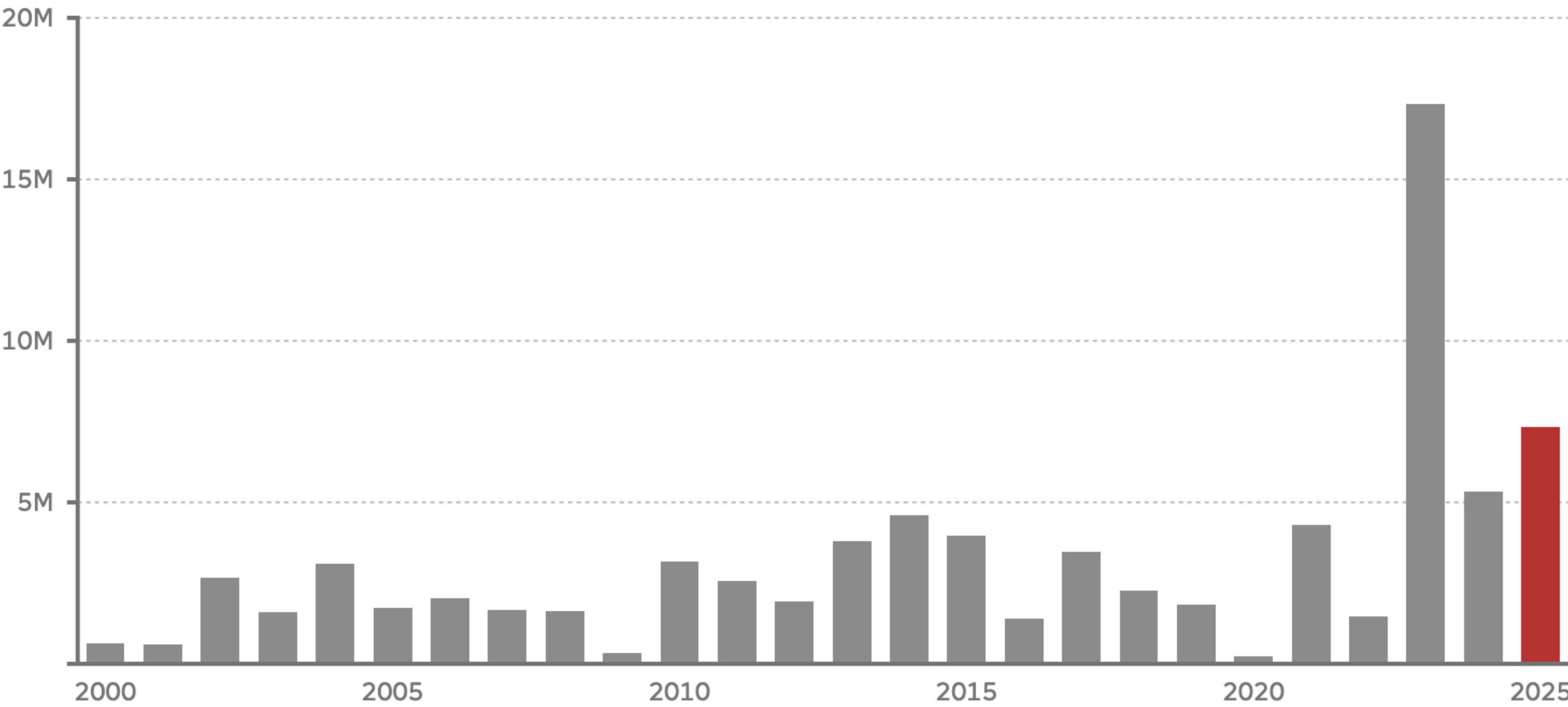
Source: Canadian Wildland Fire Information System (Graeme Bruce/CBC)



Fires are shown burning across Canada in this June 28, 2023 map created by NASA and the Fire Information for Resource Management System US/Canada. NASA / Screenshot

How much has burned so far this year in Canada?

Number of hectares burned in wildfires by year



As of Aug. 10, 2025 at 5:00 p.m. ET

WHY IS IT NOW A CLIMATE CRISIS?

- We, the global community, are pumping more than 100 million tons of CO₂ and huge quantities of other GHGs everyday into the atmosphere which we all share. The results of all this pollution are becoming clear: more and more health problems are resulting and more and more patients are showing up in general practitioners' clinics and emergency rooms every day -- with symptoms and diseases that are directly related to the carbon (and other) pollution we are dumping into our atmosphere. I think many of you know very well, from direct experience, these health problems, which are many, including: heat stroke; freezing; vector borne diseases; water borne diseases; NCDs; trauma from wind and floods.

Every day heat records are
being set somewhere in the world.
Sometimes cold records too.

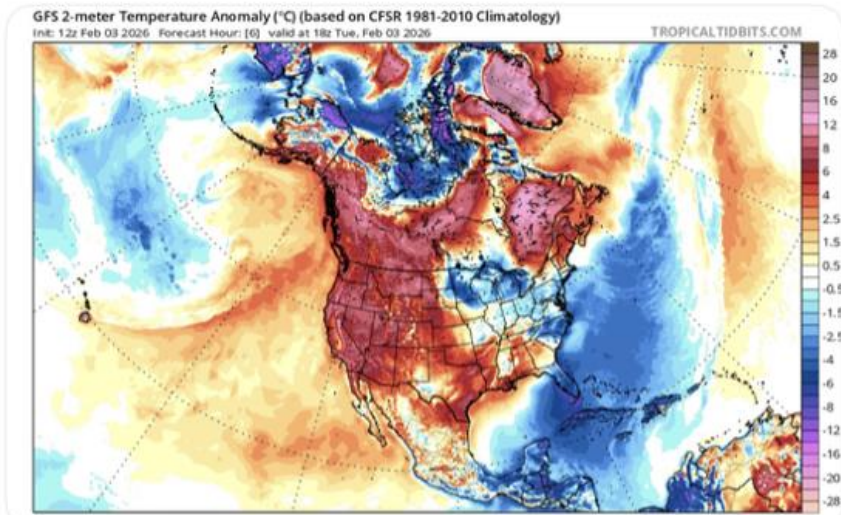
Everyday people around the world are
experiencing a negative impact of the
Climate Crisis. The results are very
damaging and serious.

Extreme Temperatures Around The... · 21h

Some more cold records in CENTRAL AMERICA

9.0C Flores /Tikal GUATEMALA all time low tied

3.5C Finca los Andes (1700m asl) EL SALVADOR monthly record



16 59 3.6K

Extreme Temperatures Around The... · 22h

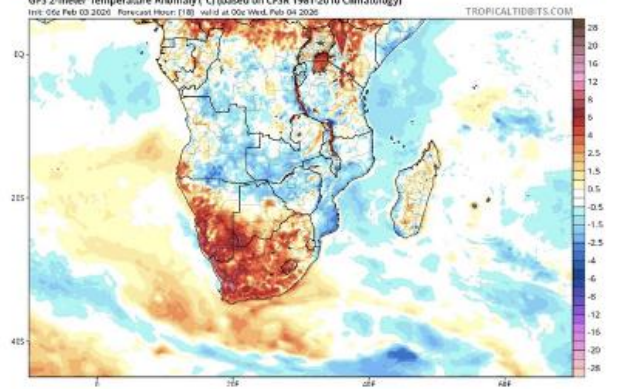
Records broken in CUBA

0.0 Indio Hatuey
New national record, previous 0.6C Bainoa Feb 1996

6.0 Santi Spiritus monthly R
6.9 Pinar del Rio monthly R tied

Extreme Temperatures Around The... · 3m

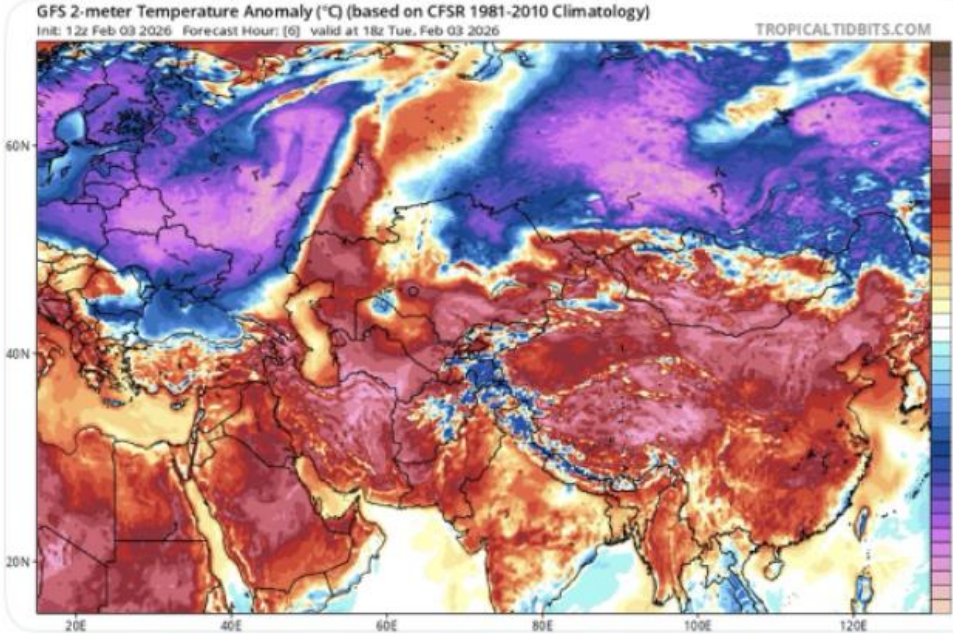
EXTRAORDINARY
Record heat allover the world like never before.
There had never been anything like what we are seeing these days
>170 countries are breaking heat records
CENTRAL AFRICA with record heat for months:
35.7C Franceville GABON
also breaks its February record !



Extreme Temperatures Around The... · 23h

THAT S BRUTAL
Again, Asia with the most possible contrasts you can imagine.

Next days/weeks THOUSANDS of heat records will be smashed from Algeria (35C+) all the way to CHINA through Central Asia (today up to 27C in the Caspian area !).



From X February 4, 2026

1. 2025 Third Warmest Year on Record (after 2024 and 2023)

2. No Mention of Planet-Warming Fossil Fuels in COP30 Agreement

3. 'Abject Failure': Global Plastic Treaty Negotiations End Without Deal For Second Time

4. World's Top Court Lays Out Historic Protections For Climate-Impacted Nations in Landmark Ruling

5. Scientists Confirm Largest Coral Bleaching Event on Record Affecting Nearly 84% of World's Reefs

6. Climate Change 'Supercharged' Deadly Asian Storms That Killed More Than 1,800, Study Finds

7. Trump Signs Executive Orders to Revive 'Beautiful Clean Coal' in Blow to US Emissions Reduction Efforts, to reduce green energy, and withdraws from the WHO and IPCC

8. Fossil Fuel Companies Intensified Hundreds of Heatwaves Worldwide This Century

9. Even if CO2 emissions were to be drastically cut down starting today, the world economy is already committed to an income reduction of 19 % until 2050 due to climate change, a new study published in "Nature" finds. These damages are six times larger than the mitigation costs needed to limit global warming to two degrees.

>50% of Global Fossil Fuel Carbon Emissions in 2024 came from 32 Companies, many of which are expanding fossil fuel output and blocking climate action.

<https://insideclimatenews.org/news/21012026/half-of-fossil-fuel-carbon-emissions-in-2024-came-from-32-companies/>

- Systems to produce, package and distribute food generate a third of greenhouse gas emissions. More sustainable production would mitigate climate impacts and support more nutritious diets that could prevent close to 11 million premature deaths a year.

- biodiversity loss has not galvanized the health sector like climate change has

- ***45 climate goals, 0 on track: The Earth's failing report card (see chart)**

<https://www.devex.com/news/45-climate-goals-0-on-track-the-earth-s-failing-report-card-111101>



ExxonMobil's refinery in Baytown, Texas. Credit: Brandon Bell/Getty Images

***“Global biodiversity loss, ecosystem collapse and national security: A national security assessment”** *Department for Environment, Food & Rural Affairs, HM Government (UK). January 20, 2026.*

“We have high confidence in our assessment of global ecosystem degradation trends, and in their biological and physical impacts. We have high confidence that every critical ecosystem is degrading.”

- “Nature is a foundation of national security. The Climate Crisis and Biodiversity Loss is putting at risk the ecosystem services on which human societies depend, including water, food, clean air and critical resources. The impacts will range from crop failures, intensified natural disasters and infectious disease outbreaks to conflict within and between states, political instability, and erosion of global economic prosperity. Increasingly scarce natural resources will become the focus of greater competition between state and non-state actors, exacerbating existing conflicts, starting new ones and threatening global security and prosperity.”
- See Milner’s PHM Blog “What is the Price of a Whale?” in Feb. 1/26 edition (<https://preview.mailerlite.com/b9s6h9k7b4>)

HOW THE CLIMATE CRISIS?

HOW DOES IT HAPPEN?

HOW DOES ADDING GHGs CREATE IT?



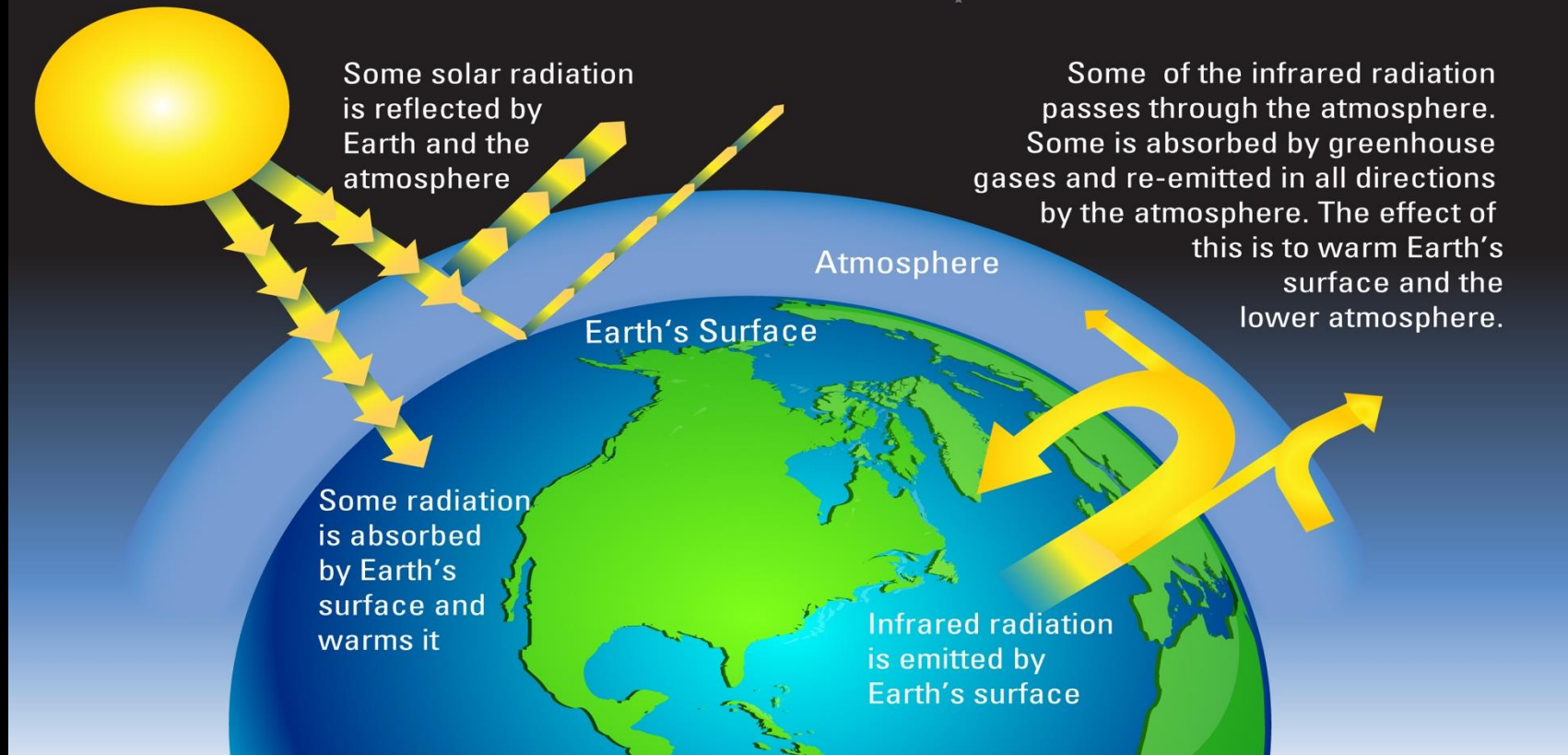
ENVIRONMENTAL DEGRADATION/DESTRUCTION

- Pollution: Air, Waters, Soil
- Deforestation
- Ocean Acidification and Warming
- Coral Reef Destruction
- Urbanization (now over 50%, 70% in <20 years)
- Waste
- Global Climate Change and Global Climate Heating → CLIMATE CRISIS
- Biodiversity Loss -> BIODIVERSITY CRISIS
- OVER POPULATION re Earth's carrying capacity (+225,000/day)
- Treating Earth like a commodity to be exploited and trashed

Incoming Versus Outgoing Radiation

THE GREENHOUSE EFFECT

SHORT
WAVE
RADIATION
IN



LONG
WAVE
RADIATION
OUT

Earth absorbs Short Wave light (no effect on CO₂); then re-emits Long Wave (infrared()) radiation out with which CO₂ molecules in Atmosphere radiate heat, thereby warming it up, GLOBAL WARMING.

(Koshland Science Museum)

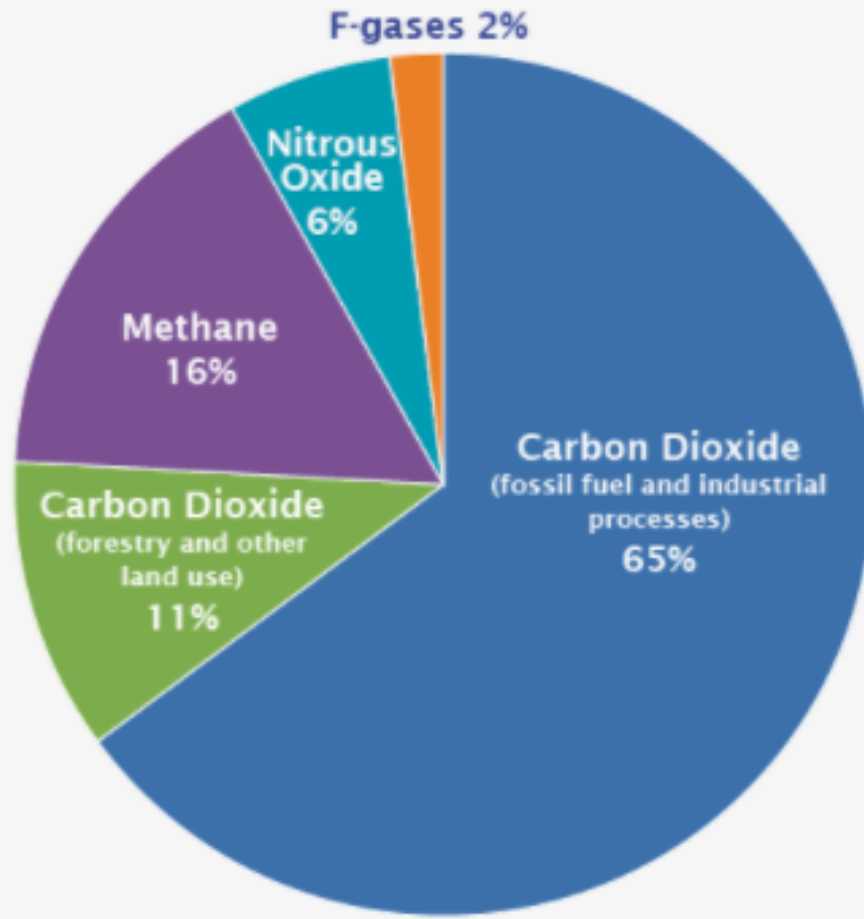
A photograph of an industrial facility, likely a refinery or chemical plant, with numerous tall smokestacks and complex piping. Thick white smoke is being emitted from several stacks, rising into a hazy, orange-tinted sky, suggesting a sunset or sunrise. The foreground shows more industrial structures and scaffolding.

How much CO₂ is emitted each year?

In 1950 the world emitted 6 billion tonnes of CO₂.
By 1990 this had almost quadrupled, reaching more than 20 billion tonnes.

Globally, we now in 2026, emit over 37 billion tonnes each year and it's still increasing
i.e., ~100m+ tons/day of just CO₂

Global Greenhouse Gas Emissions by Gas



Source: [IPCC \(2014\)](#). [EXIT](#) [Exit](#) based on global emissions from 2010. Details about the sources included in these estimates can be found in the [Contribution of Working Group III to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change](#). [EXIT](#) [Exit](#)

What's in the Air?

By volume, the dry air we breathe in Earth's atmosphere is about

- 78.08% nitrogen,
- 20.95% oxygen, and
- 0.93% argon.

A brew of trace gases accounts for the other approximately 0.04%, including the greenhouse gases carbon dioxide, methane, nitrous oxide and ozone. (NASA)

Methane & NO₂ way more dangerous than CO₂, but much shorter lived (20 yrs vs 200).

CO2 Carbon Dioxide – Atmospheric Concentrations

- Around 1850 (start of Industrial Revolution): 280 ppm/ .03% of the atmosphere
- Now it's ~430 ppm (a 50% increase)/.043% of the atmosphere (tiny component, so easily affected by large increases (remember: 100 million tons/day)
- CO2 operates in a fine balance, with 'normal' fluctuation. When it goes higher Earth warms; when lower it cools. It's been known for a long time, as is the physics of how the heating happens (over 125 years)
- Any large changes can/will cause problems.
- Earth also has mechanisms to keep it controlled. Especially Ocean, which absorbs about 80% of current CO2 emissions, and also the Forests and all Vegetation.

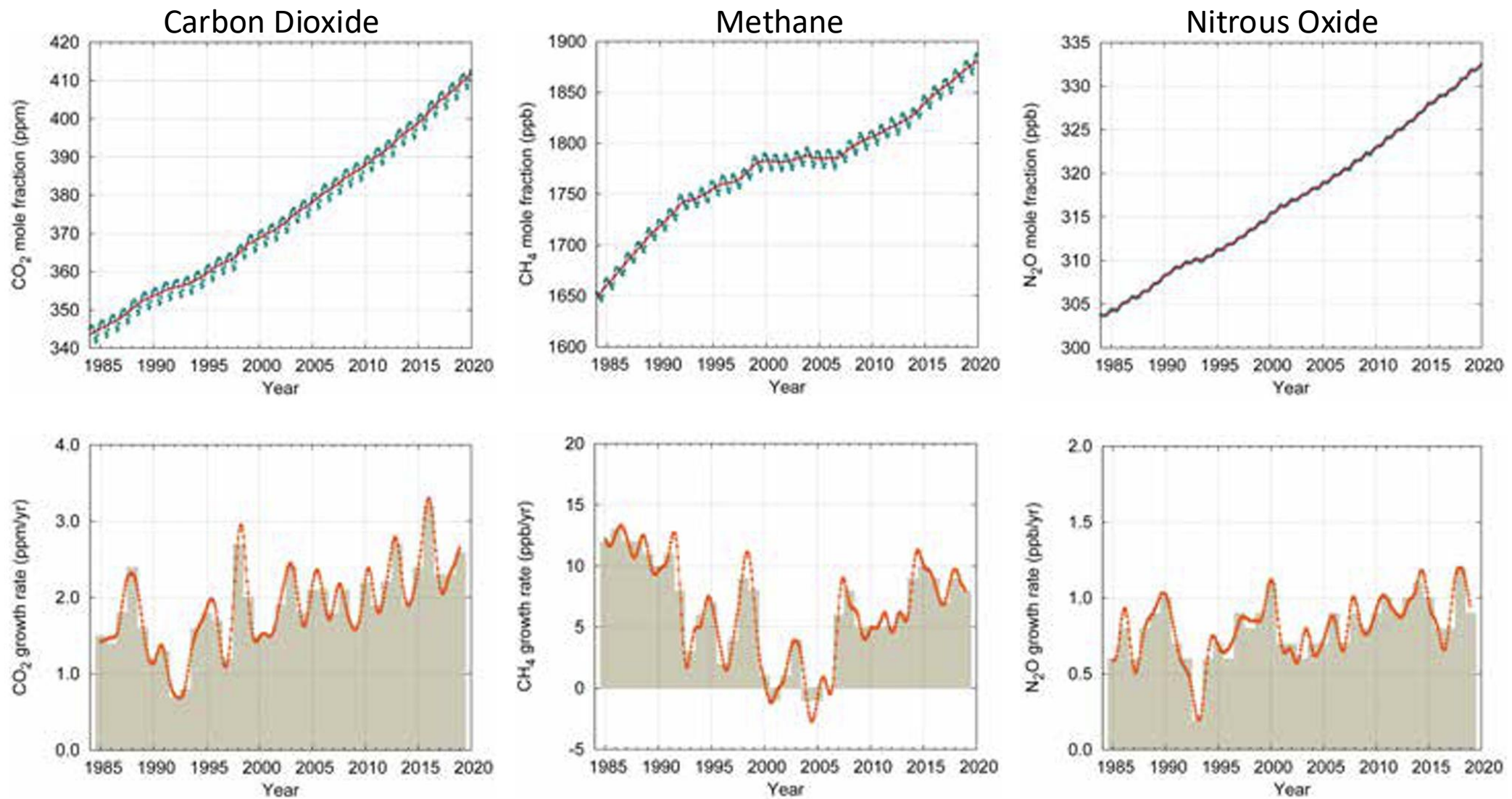
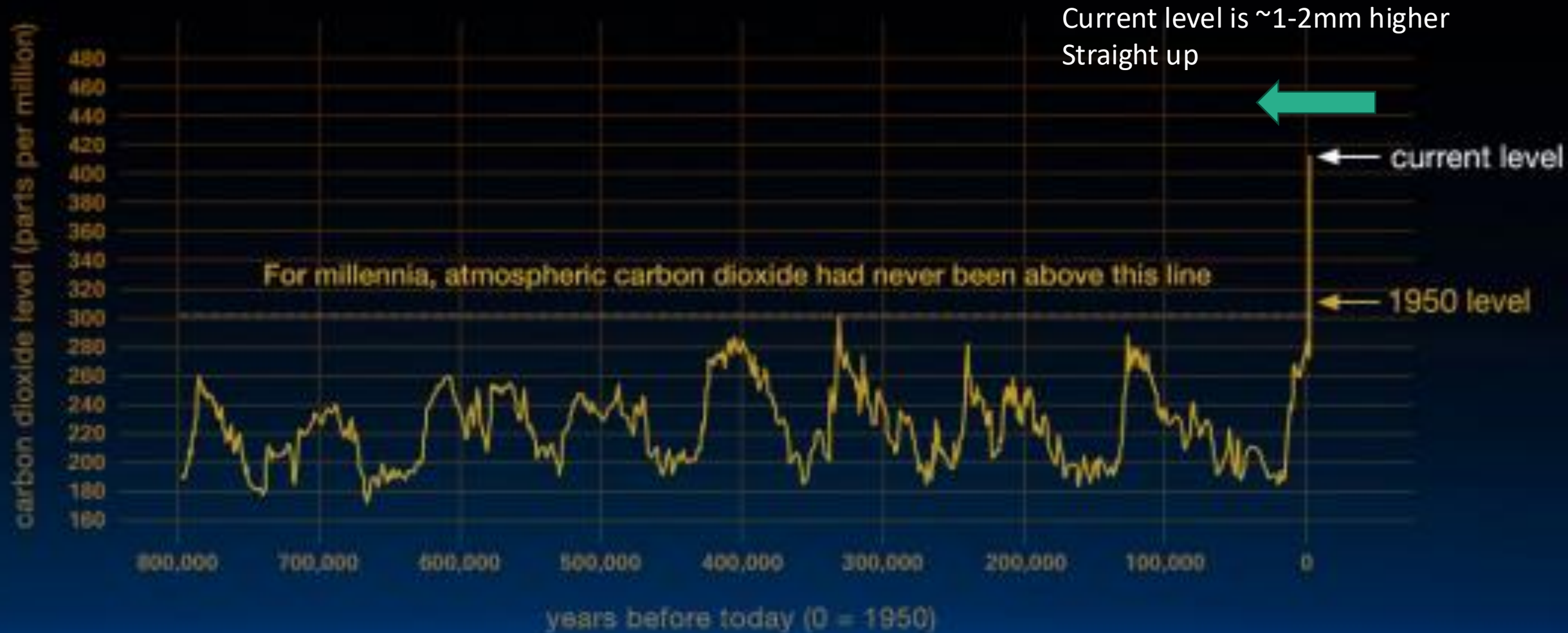
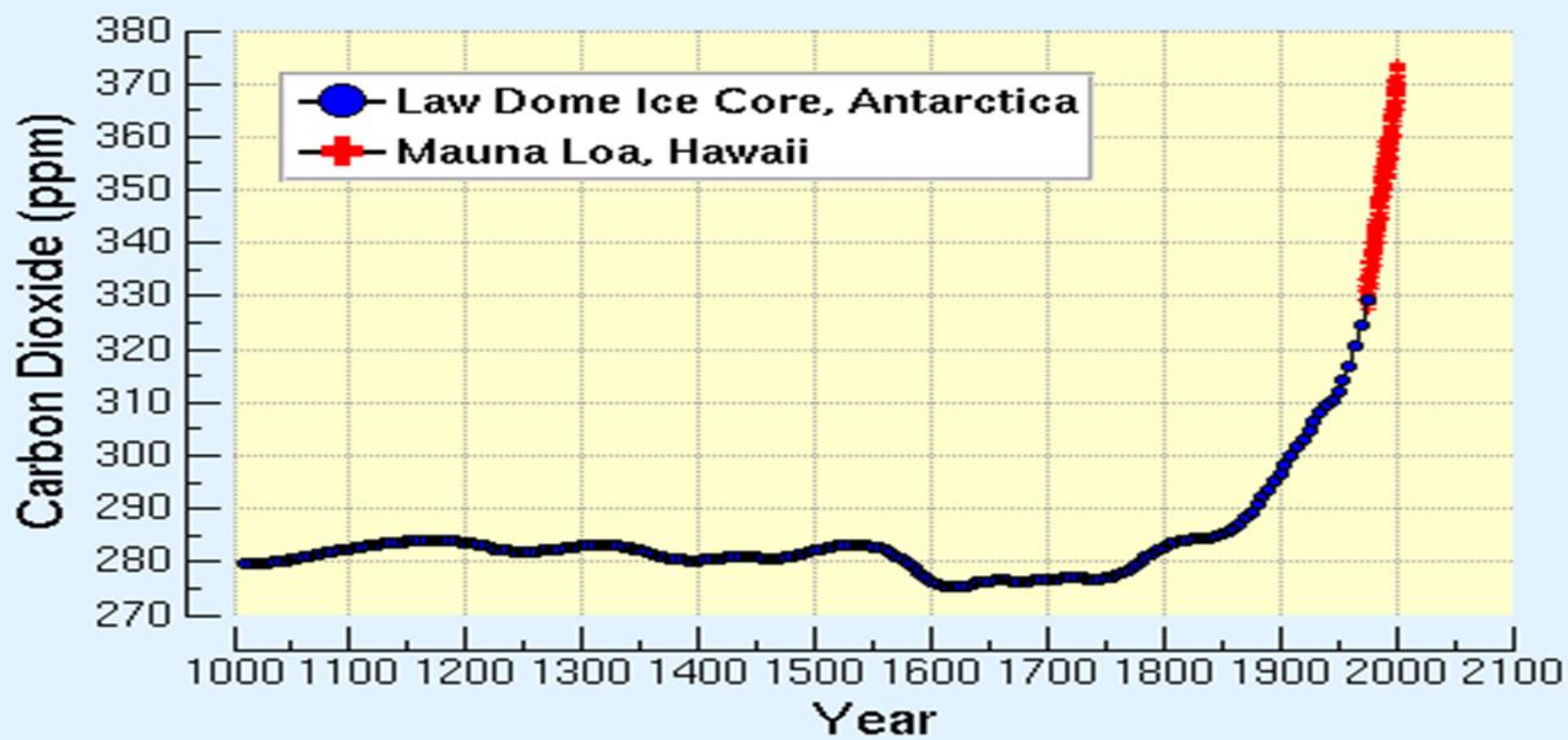


Figure 1. (upper row) Globally averaged CO₂, CH₄ and N₂O mole fraction in ppm (CO₂) and ppb (CH₄, N₂O, respectively) and its growth rates (bottom row) from 1984 to 2019. Increases in successive annual means are shown as the shaded columns in the bottom row. The red line in the upper row is the monthly mean with the seasonal variation removed; the blue dots and line depict the monthly averages

Source: United in Science 2022

https://library.wmo.int/index.php?lvl=notice_display&id=22128#.YyBH1exBwvo

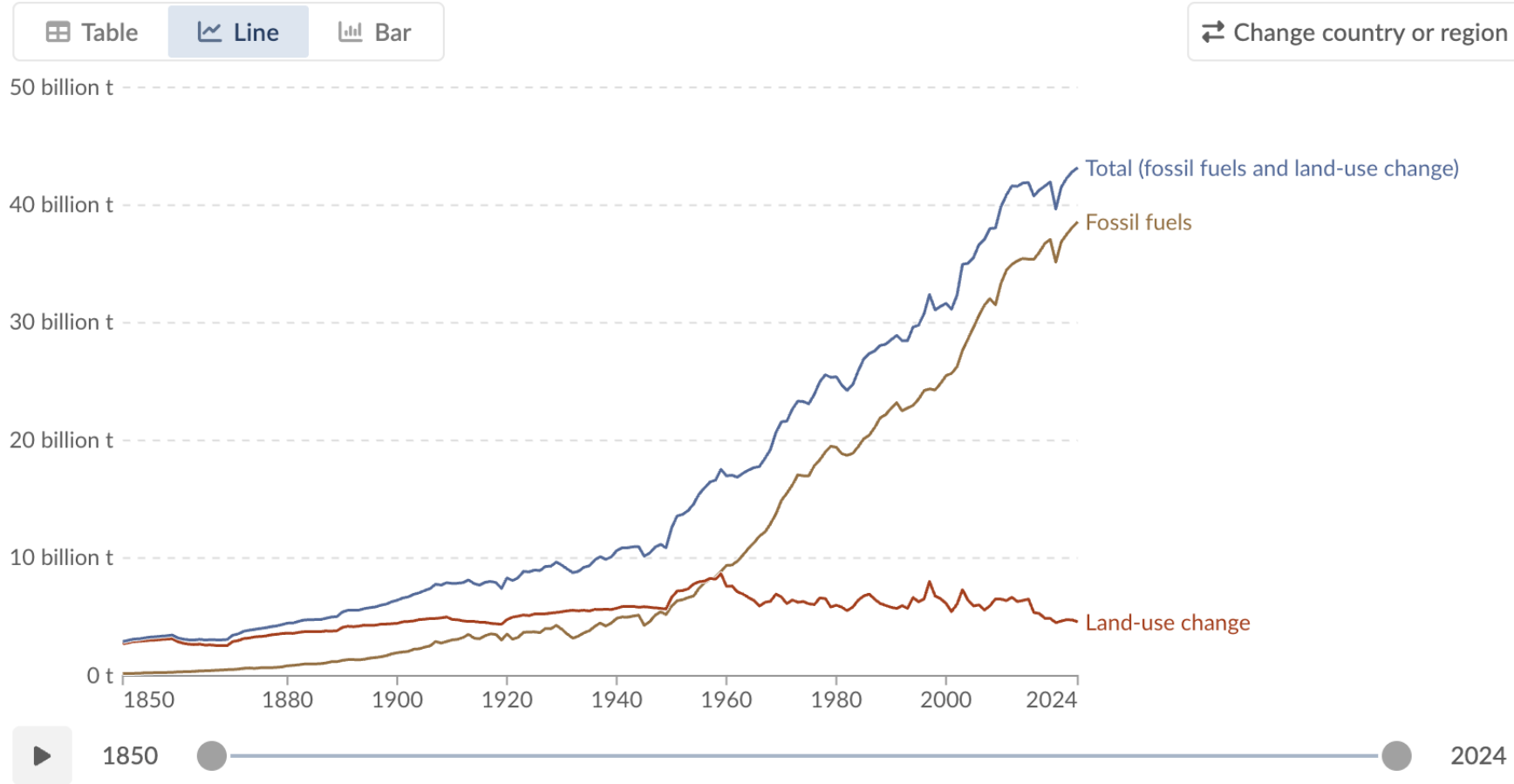




CO₂ emissions from fossil fuels and land-use change, World

Our World
in Data

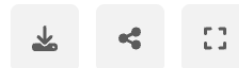
Carbon dioxide emissions from fossil fuels and land-use change, measured in tonnes per year.



Data source: Global Carbon Budget (2025) – [Learn more about this data](#)

Note: Emissions from land-use change can be positive or negative depending on whether carbon is emitted or sequestered.

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY



SOURCES OF GREENHOUSE GASES

FIGURE 6
Global emissions by sector
Percent share of 2022 net GHG emissions

Buildings

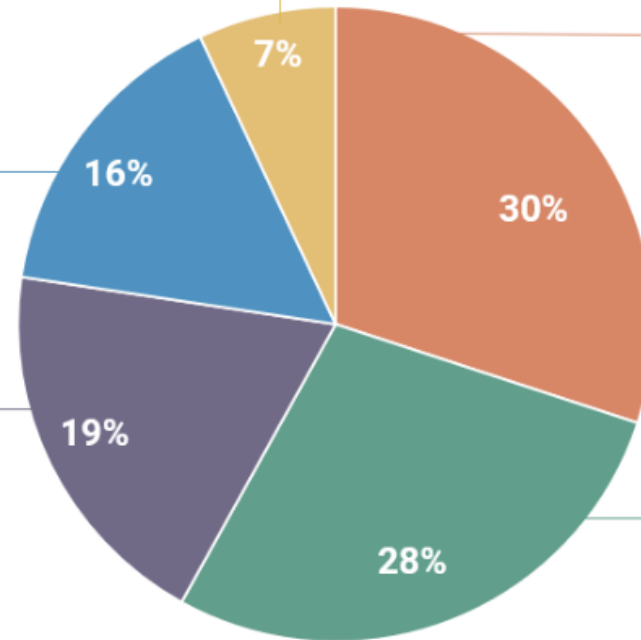
4% Residential
1% Commercial
2% Refrigerants

Transport

12% Road
2% Ships
1% Aviation

Agriculture, land use and landfills

6% Livestock
6% Crops
4% Landfills & waste
3% Land use & forests
<1% Agriculture fuel
combustion



Industry

6% Oil & gas production
5% Iron & steel
5% Cement
3% Chemicals
2% Coal mining
2% Refining
7% Other industries

Electricity

20% Coal
6% Natural gas
1% Oil

Source: Rhodium Group

Annual CO₂ emissions by world region

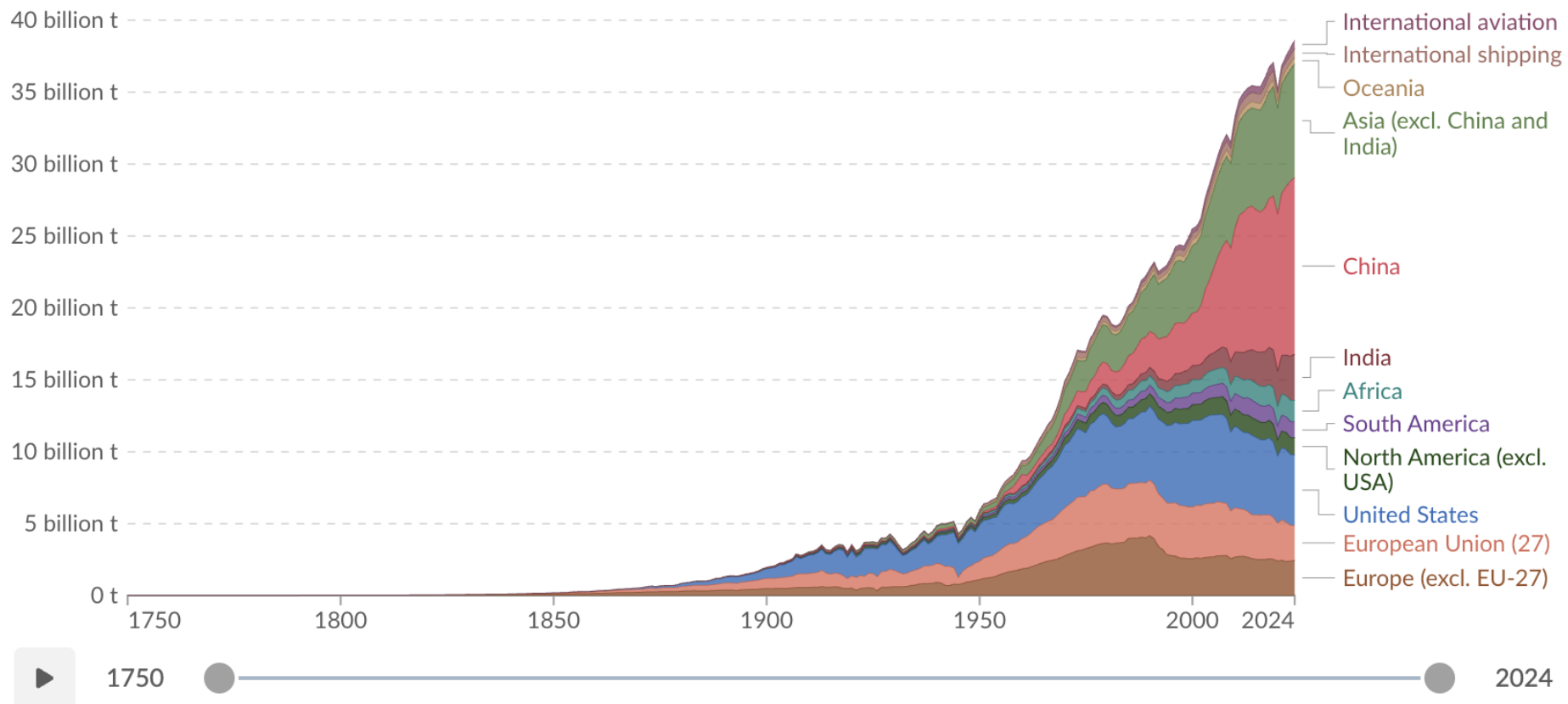
Our World
in Data

Emissions from fossil fuels and industry are included, but not land-use change emissions. International aviation and shipping are included as separate entities, as they are not included in any country's emissions.

Table

Chart

Settings



Data source: Global Carbon Budget (2025) - [Learn more about this data](#)

OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY

Download

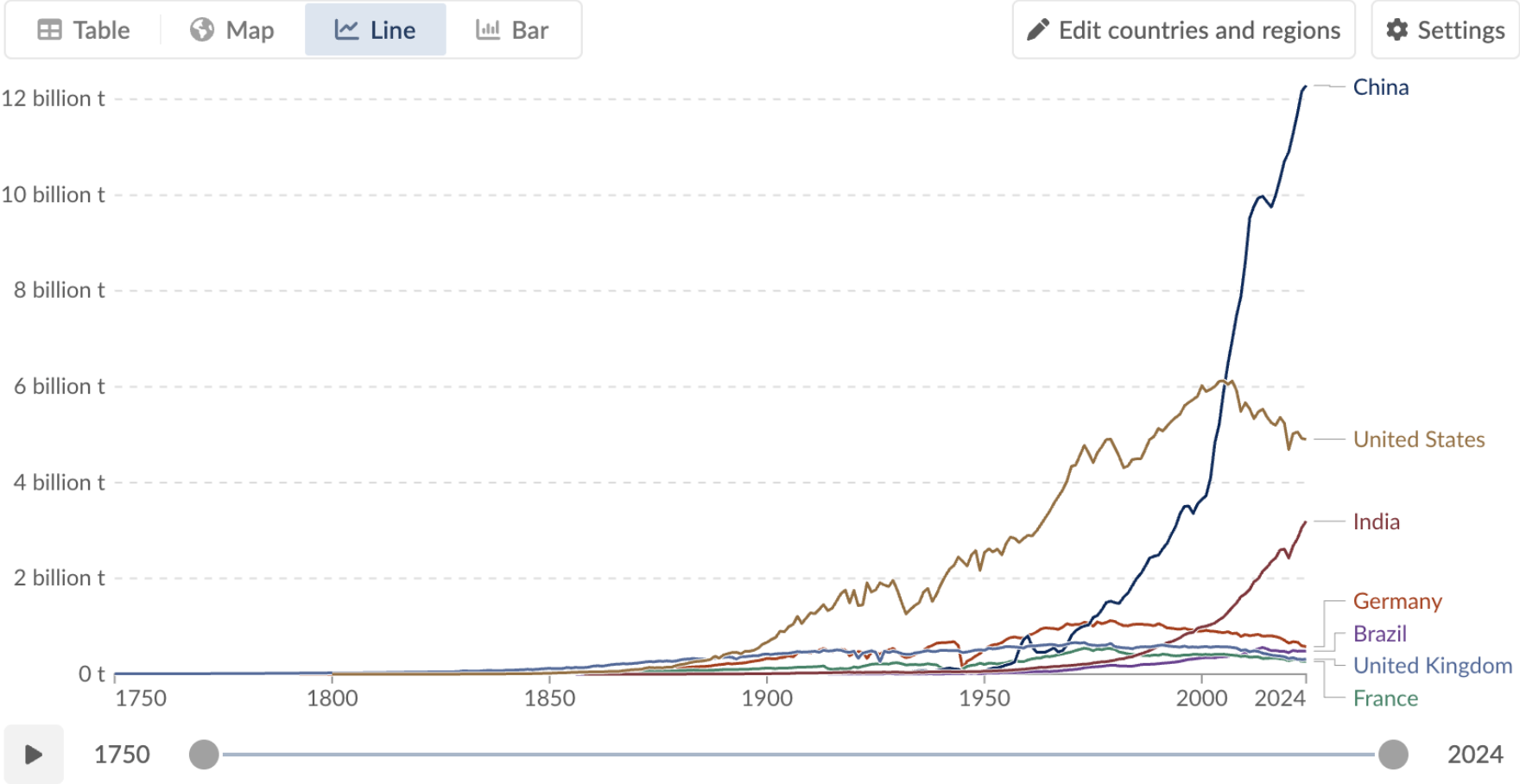
Share

Enter full-screen

Annual CO₂ emissions

Our World
in Data

Carbon dioxide (CO₂) emissions from fossil fuels and industry. Land-use change emissions are not included.



Data source: Global Carbon Budget (2025) – [Learn more about this data](#)
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Annual CO₂ emissions

Carbon dioxide (CO₂) emissions from fossil fuels and industry. Land-use change emissions are not included.

Our World
in Data

Table

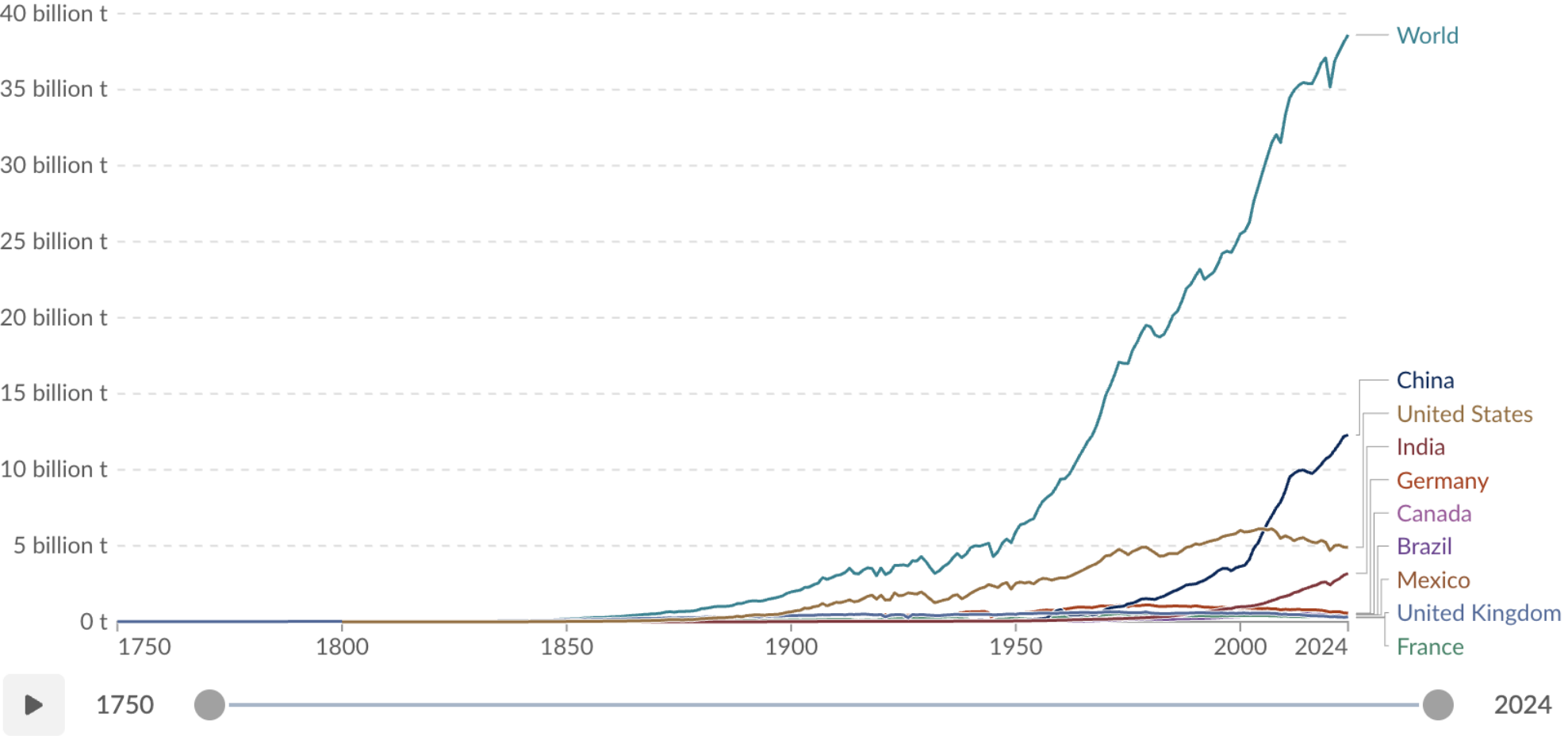
Map

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Edit countries and regions

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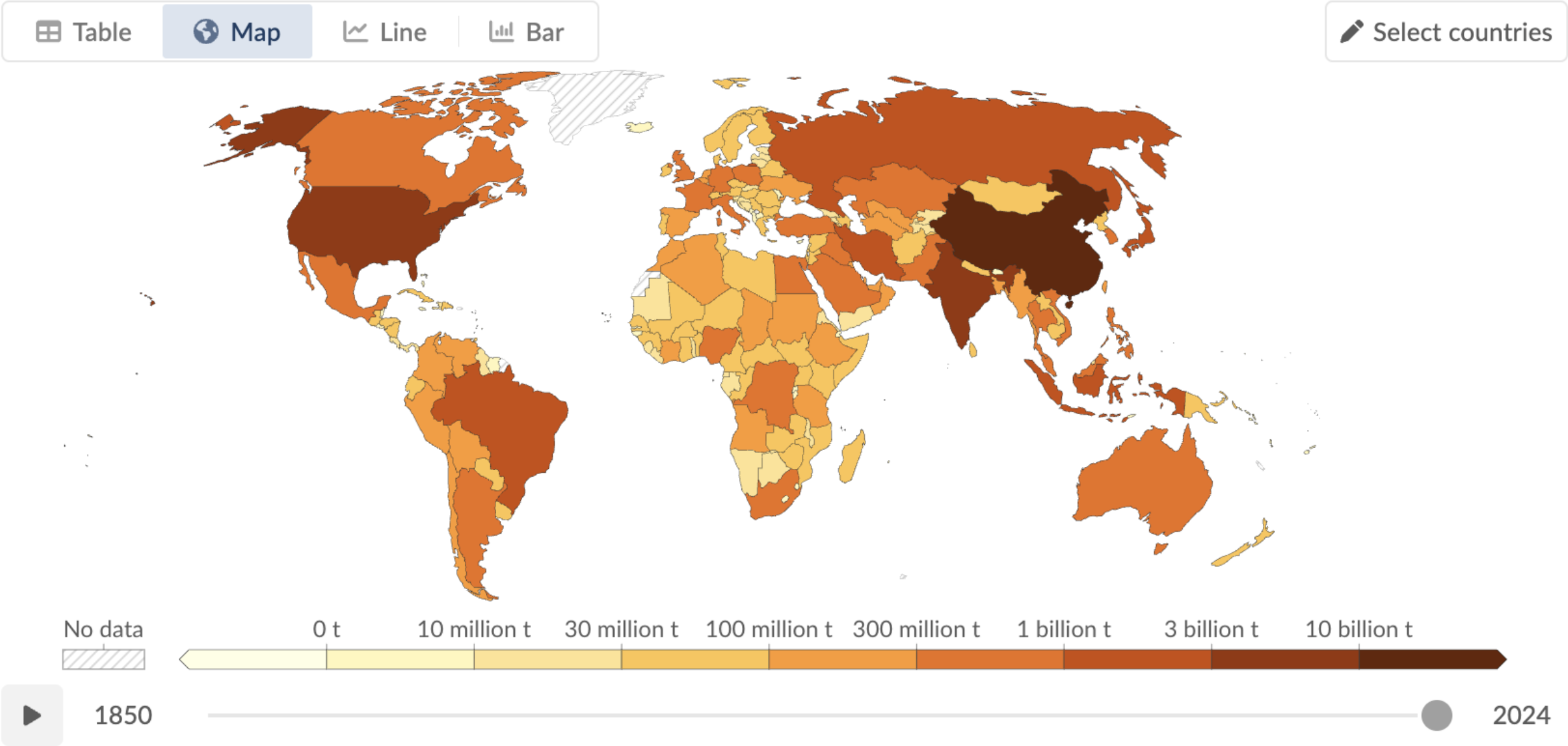


Jason Whitman / NurPhoto via Reuters Connect

Pollution and steam rise from a power station in Cincinnati, Ohio. Photo by: Jason Whitman / NurPhoto via Reuters Connect

Greenhouse gas emissions, 2024

Greenhouse gas emissions include carbon dioxide, methane and nitrous oxide from all sources, including land-use change. They are measured in tonnes of carbon dioxide-equivalents over a 100-year timescale.



Data source: Jones et al. (2025) – [Learn more about this data](#)

CO₂ emissions per capita

Our World
in Data

Carbon dioxide (CO₂) emissions from burning fossil fuels and industrial processes. This includes emissions from transport, electricity generation, and heating, but not land-use change.

Table

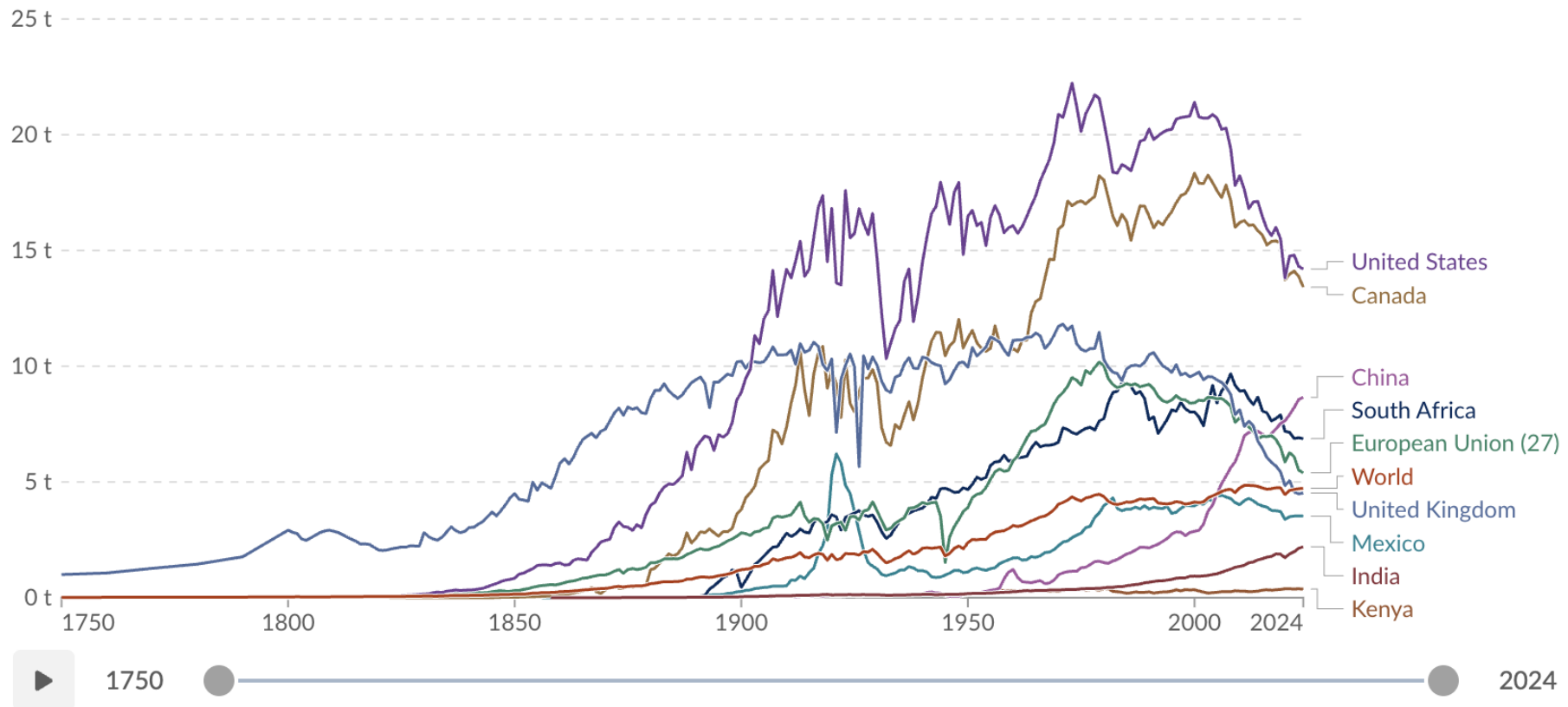
Map

Line

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Edit countries and regions

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Data source: Global Carbon Budget (2025); Population based on various sources (2024) – [Learn more about this data](#)
OurWorldinData.org/co2-and-greenhouse-gas-emissions | CC BY



A [Washington Post analysis](#) found that **breathing the polluted air in Delhi is equivalent to smoking roughly nine cigarettes a day**. Coal power plants, millions of vehicles and rampant industrialization have made India's capital region one of the most polluted in the world, particularly in the winter. Millions of people are harmed by this toxic air, which can increase cancer risk, worsen respiratory problems and cause reproductive issues.

Systems to produce, package and distribute food generate a third of greenhouse gas emissions. More sustainable production would mitigate climate impacts and support more nutritious diets that could prevent close to 11 million premature deaths a year.

Since the last time Italy's Cortina d'Ampezzo hosted in 1956, February temperatures have warmed in the area by 6.4 degrees Fahrenheit, according to [a recent analysis by the nonprofit Climate Central](#)

The United States officially withdrew from the Paris Agreement last month, one year after President Donald Trump began the process of dropping out from the global climate accord, [Lisa Friedman reports for The New York Times](#). Trump made the same move during his first term, but the U.S. rejoined under former President Joe Biden. This latest withdrawal means the world's second-largest greenhouse gas emitter is the only major country no longer part of the Paris Agreement, and reflects a broader effort by the Trump administration to stop fighting climate change, continually calling it a hoax. And also withdrew at the same time from the World Health Organization

WHERE THE CLIMATE CRISIS?

- Everywhere - atmospheric homogenization with some variation
- North to South; East to West
- Harsher in tropical areas

ALL PEOPLE/ALL LIFE
OCEAN/AIR/LAND

WHEN THE CLIMATE CRISIS?

YESTERDAY
TODAY
TOMORROW

WHO IS AFFECTED BY THE CLIMATE CRISIS?

The poor and vulnerable always and everywhere suffer the most (including small islands states and already dry areas/deserts; Spain).

In the end, **EVERYONE** is affected. Just look at incredibly rich Canada and we're not alone.

You here in Alberta for sure (prolonged drought in the SW). TODAY!! All of Canada. Even look at the north where temperatures have risen faster than anywhere else in the world and are changing a people's way of life.

Many millions of farmers, sailors, scientists, journalists, health care, teachers, politicians, business and students - all professionals.

WHAT MAJOR EFFECTS AND IMPACTS
FROM CLIMATE CHANGE?

MAJOR EFFECTS FROM HEATING THE ATMOSPHERE FROM CONTINUALLY HIGHER LEVELS OF CO₂ AND OTHER GHGs – IT'S JUST GETTING WORSE WITHOUT STOP NOR REVERSAL

- **Global average temperatures have risen, with an uneven distribution throughout the world (now about 1.4C above pre-industrial average). In reality we've overshoot 1.5C**
- **Ocean warms, expands and rises (especially the top 700m); it also acidifies as it absorbs huge quantities of CO₂ (~80%) from the atmosphere; changes circulation patterns**
- **Startling Arctic and now Antarctic sea ice melt/decline; glacial retreat (all over the world). Huge melt in Greenland.**
- **Increasing frequency and intensity of extreme weather events (e.g. hurricanes/typhoons/cyclones, rain flooding, drought, heat waves, wildfires. (Recent changes in the climate system are unprecedented in over many 1000s of years.)**

“The Big Thaw” in Norway



(National Geographic)

Our Future Today! What Impacts?

What Impacts From Global Climate Change, Now That IT IS A CRISIS?

- Extreme weather events leading to injury, morbidity and mortality (heat, cold, rain, floods, drought) and shifting seasons
- Hunger, famine, malnutrition (from changing agriculture)
- Decrease in fresh and safe water supplies (e.g. from rising Ocean, pollution, overuse, drought, poverty)
- Increase in disease, both infectious and non-communicable (INCLUDING MENTAL and SURGICAL DISEASE)
- Decrease in biodiversity and widespread damage
- Huge economic impacts (\$145 billion insured losses in 2025; \$38 trillion by 2050)

The United Nations even labeled climate change “the single biggest health threat facing humanity.”

The impacts are already harming health through:

- air pollution,
- disease,
- extreme weather events,
- forced displacement,
- food AND water insecurity, and
- Stress pressures on mental health.

Every year, environmental factors take the lives of around 13 million people. Morbidity???

How Does Coral Bleaching Occur?

CORAL BLEACHING

Have you ever wondered how a coral becomes bleached?

HEALTHY CORAL

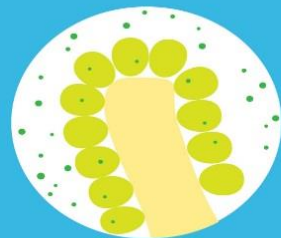
1 Coral and algae depend on each other to survive.



Corals have a symbiotic relationship with microscopic algae called zooxanthellae that live in their tissues. These algae are the coral's primary food source and give them their color.

STRESSED CORAL

2 If stressed, algae leaves the coral.



When the symbiotic relationship becomes stressed due to increased ocean temperature or pollution, the algae leave the coral's tissue.

BLEACHED CORAL

3 Coral is left bleached and vulnerable.



Without the algae, the coral loses its major source of food, turns white or very pale, and is more susceptible to disease.

WHAT CAUSES CORAL BLEACHING?



Change in ocean temperature

Increased ocean temperature caused by climate change is the leading cause of coral bleaching.



Runoff and pollution

Storm generated precipitation can rapidly dilute ocean water and runoff can carry pollutants — these can bleach near-shore corals.



Overexposure to sunlight

When temperatures are high, high solar irradiance contributes to bleaching in shallow-water corals.



Extreme low tides

Exposure to the air during extreme low tides can cause bleaching in shallow corals.



500,000
directly
depend
on
them

Ecosystem degradation is occurring across all regions and ecosystems (same 2026 UK report).

“The rate of extinction is tens to hundreds of times higher than the average over the past 10 million years. It suggests that a sixth mass extinction may be underway...Food production is the most significant cause of terrestrial biodiversity loss.^{6, 7} As the global population grows, reaching 9.7 billion by 2050,⁸ the impact of food production on natural systems will intensify and it will become even more challenging to produce sufficient food sustainably. ”

https://assets.publishing.service.gov.uk/media/696e0eae719d837d69afc7de/National_security_assessment_-_global_biodiversity_loss__ecosystem_collapse_and_national_security.pdf

Biodiversity loss impacts national security

“Nature is a foundation of national security. Biodiversity loss is putting at risk the ecosystem services on which human societies depend, including water, food, clean air and critical resources. The impacts will range from crop failures, intensified natural disasters and infectious disease outbreaks to conflict within and between states, political instability, and erosion of global economic prosperity. Increasingly scarce natural resources will become the focus of greater competition between state and non-state actors, exacerbating existing conflicts, starting new ones and threatening global security and prosperity.”

Realities of the Climate Crisis



The potential future effects of global climate change include more frequent wildfires, longer periods of drought in some regions and an increase in the number, duration and intensity of tropical storms. Credit: Left - Mellimage/Shutterstock.com, center - Montree Hanlue/Shutterstock.com.

Climate Change on Human Health

Causal Pathways: Intense heat wave and fires

- Great risk of injury, disease and death
- Increased risks of food, water-borne and vector borne diseases
- Geographical shifts in food production; increased risk of undernutrition
- Lost work capacity in vulnerable populations
- Modest reductions in cold-related mortality and morbidity in some areas due to fewer cold extremes; and some reduced capacity of disease-carrying vectors

(Woodward et al., 2014)

IMPACT OF RISING TEMPERATURES: HEAT STRESS

- Heat-related mortality expected to double in cities by 2050, triple by 2080
- Urbanization and aging expected to exacerbate heatwave effects
- Heat stress events have affected most areas of Canada to varying degrees

Impacts on Global Health: Canadian Heat

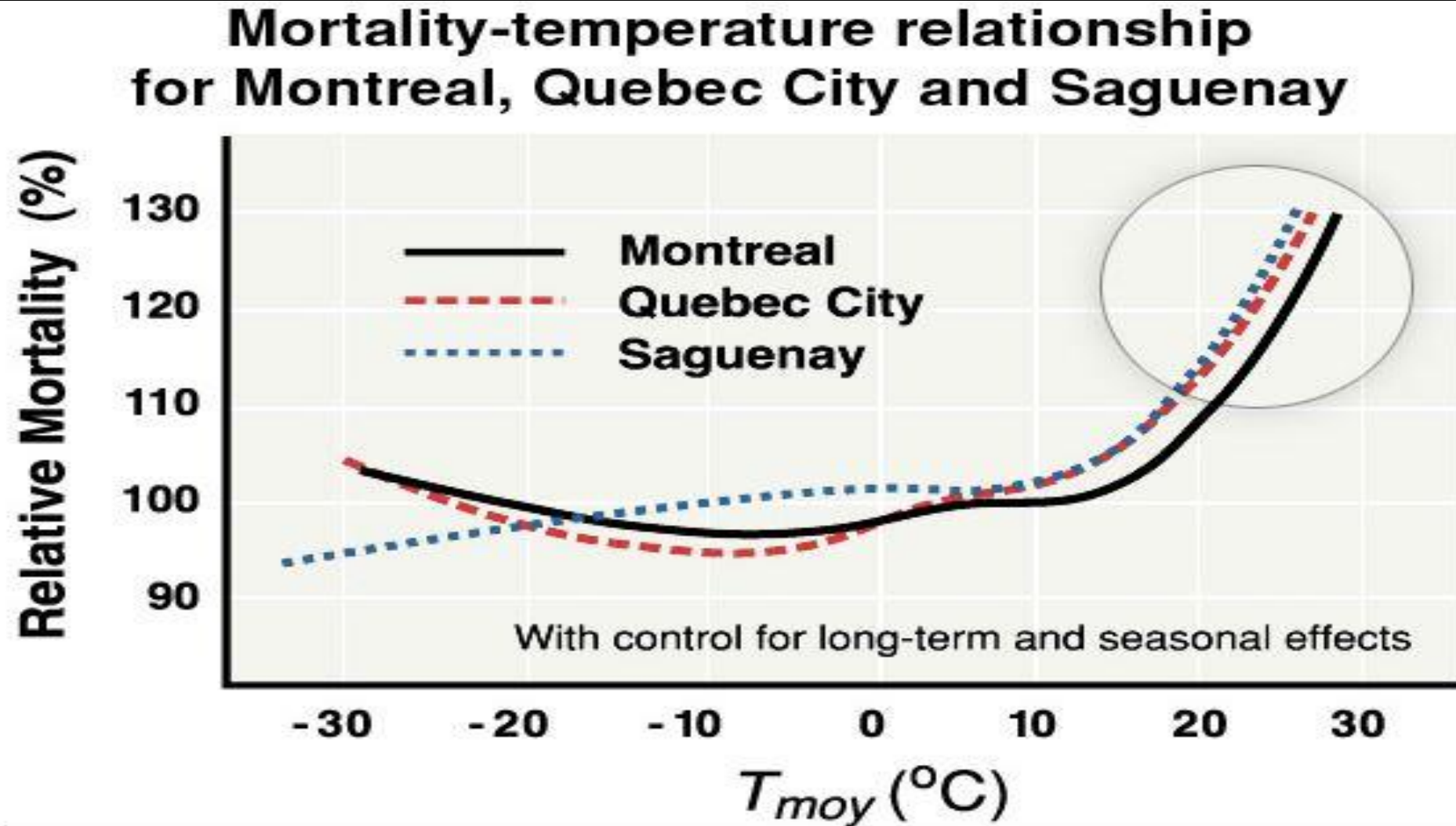


Figure 2. More deaths occur at both low and high temperature extremes, as illustrated by the U-shaped curves in this graph. (8)

Climate Change and Human Health

Causal Pathways: Floods

- Flooding - considered the most common type of natural disaster - causes morbidity, mortality, and puts stress on health services
- Increased risk of disease outbreaks: hepatitis E, gastrointestinal disease and leptospirosis
- Physical illness increases 8.6% to 53% two years post-flood from psychological distress
- Increase in diarrheal deaths in low-income countries

Alderman et al., 2012

Climate Change on Human Health

Causal Pathways: Floods (con't)

- Increase mortality up to 50% post floods; exacerbate poverty, malnutrition and non-communicable diseases (including mental)
- Risk for disease outbreaks increases with population displacement and poor hygiene, poor water

(Alderman et al., 2012, Woodward et al., 2014)

Climate Change on Human Health

Decrease in Water Supplies - Food; Desertification

- By 2025: 5 billion persons under severe water stress
- Climate change leads to 1-7% decreases in cereal production
 - Developing countries: 9-11% decrease in cereal production
 - Developed countries: small increases in cereal production
 - 500 million presently at risk from hunger; climate change would increase the risk by 20 million by 2050, and 80 million by 2080 (this factors in to account the impact of economic and social development).
- Mitigating climate change, decreases the risk from hunger

See Notes

History repeats in Ethiopia 1984 / 2016



CLIMATE CRISIS IMPACTS ON MENTAL HEALTH

IMPACTS FROM DROUGHT, HEAT, DISASTERS (RAINS, FLOODS, RISING SEAS, FIRES);

ON GENERAL POPULATION & PARTICULAR GROUPS

- ISOLATION AND LONELINESS
- SUICIDE (FARMERS IN INDIA)
- POST-TRAUMATIC STRESS DISORDER (PTSD):
 - STUDY IN USA AFTER HURRICANE KATRINA IN 2005
 - IN FIRST RESPONDERS (FIRES; DEATHS)
 - LOSS OF LIVELIHOOD/UNEMPLOYMENT (FARMERS IN INDIA; ANIMAL DEATHS IN MONGOLIA)
 - WAR/CONFLICT (E.G., SYRIA)

CLIMATE CRISIS IMPACTS ON MENTAL HEALTH (continued)

- INCREASE IN VIOLENCE: increases in rates of domestic violence and child abuse after hurricanes and wildfires
- DEPRESSION (AND DECREASING HAPPINESS)
 - YOUTH FEARING FUTURE; HOPELESSNESS;
 - CHILDREN (AND ALL) WITNESSING DEATH AND DISASTER, LOSS OF PARENTS
 - DISPLACEMENT FROM HOMES/COUNTRY
 - FORCED MIGRATION
 - URBANIZATION++ (CROWDING; POOR SANITATION; POVERTY)
- SLEEP DISRUPTION (HEAT WITHOUT A/C: ELDERLY; CHILDREN)
- INCREASE IN AUTISM (ASD) (wrt SOCIAL MEDIA; ADULTS/KIDS SPENDING MORE TIME INDOORS, ETC.)

Mental Health

Wildfires can take a heavy toll on mental health. Here's what researchers say should be done to help evacuees

<https://www.cbc.ca/news/health/wildfires-mental-health-1.7289606>

PTSD After Hurricanes

SOME REFERENCES FOR PREVIOUS PAGES:

Effect of Media Exposure on Social Development in Children (re: media)

<https://journals.sagepub.com/doi/full/10.1177/2333794X231159224>

**Indian farmers are killing themselves in record numbers.
Is climate change to blame?**

<https://www.eco-business.com/news/indian-farmers-are-killing-themselves-in-record-numbers-is-climate-change-to-blame/#:~:text=In%202022%2C%2011%2C%2090%20farmers%20took,numbers%20are%20increasing%20each%20year.>

Children and youth in the climate crisis

<https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8499628/#:~:text=By%20disrupting%20families%20and%20communities,abuse%20after%20hurricanes%20and%20wildfires.>

Moving mental health into the disaster-preparedness spotlight

<https://pubmed.ncbi.nlm.nih.gov/20860498/>

increases in rates of domestic violence and child abuse after hurricanes and wildfires

WHAT TO DO ABOUT
THE CLIMATE CRISIS?

TWO MAJOR RESPONSES TO THE CLIMATE CRISIS:

- **MITIGATION:** eliminating or reducing the causes of the crisis (mainly fossil fuel production and use and various agricultural practices)
- **Adaptation** – responses to the impacts and effects from the Climate Crisis

A Little Maybe Too Late



MITIGATING AND ADAPTING TO THE CLIMATE CRISIS

There is a **central role** for all HEALTH professionals, including PRIMARY CARE, SPECIALISTS, PUBLIC HEALTH and HEALTH SYSTEM in dealing with the climate crisis AND RESEARCHERS, EDUCATORS and COMMUNICATORS

MITIGATING AND ADAPTING TO THE CLIMATE CRISIS

- PATIENT CARE/HOSPITALS AND PUBLIC HEALTH
- EDUCATION (FORMAL AND CONTINUING)
- HEALTH SYSTEM
- ORGANIZATIONAL and PERSONAL ADVOCACY
- PROVIDE DIRECTION, LEADERSHIP AND INSPIRATION

PATIENT CARE AND COMMUNITY HEALTH

- Treating heat related diseases, trauma and problems (heat stroke; dehydration; heart problems; arthritis; kidney; skin; liver; mental health; many infectious diseases; emergency room preparation)
- Disaster Management: prevention – planning and preparing people and communities, immediate responses, and follow-up (deaths can occur many years later)

- Advise patients and public: How to deal with heat extremes particularly for the very young and elderly; those working outside; effects of exercise;
- After floods: drinking water contamination (many water borne diseases including cholera); preparing for emergencies at home, work and car/transport.

EDUCATION (FORMAL AND CONTINUING)

- Appropriate training in medical schools, nursing faculties, public health and all health science education programs, including teaching hospitals and traditional medicine.

HEALTH SYSTEM

- Adapting health centres and hospitals to deal with climate crisis patients and infrastructure emissions/waste, enhanced primary care with referral, supplies, family and community engagement; influencing colleagues and the health system; structural change; policy change)

PLANETARY HEALTH WEEKLY



“Physicians have expressed alarm at their lack of preparation to care for and counsel patients experiencing the impacts of Global Climate Change and other Environmental Impacts,¹ which also disproportionately affect socially vulnerable populations.”

Environmental Determinants of Health—Time to Redefine the Social History?

<https://jamanetwork.com/journals/jama/article-abstract/2824422>

Europe's medical students to receive training for climate-related health problems

https://www.telegraph.co.uk/global-health/science-and-disease/climate-change-training-for-medical-students-europe/?WT.mc_id=e_DM433746&WT.tsrc=email&etype=Edi_GHS_New_Wed&utm_source=email&utm_medium=Edi_GHS_New_Wed20241016&utm_campaign=DM433746

We need to stay true to advancing equity-centred evidence system as we learn and lead amongst complexity, change and uncertainty in our evidence ecosystem.

- PERSONAL AND ORGANIZATIONAL ADVOCACY for campus, city, provincial, national and global issues (need to convince major decision makers to take action especially to reduce production and use of fossil fuels (coal, gas, oil) and reduce emissions of greenhouse gases (GHGs: carbon dioxide; methane, nitrous oxide) and air pollution in general (kills millions every year); and advocate within the health system, e.g., green clinics/hospitals (e.g. anesthetists); hospital and clinic waste reduction/safe disposal; safe work environment; disaster management (Mitigate and Adapt)

- **Provide direction AND leadership AND inspiration; realign priorities and goals; strive for direct action.**
- **You're among the most educated citizens in our society.**

Male polar bear starved to death



(NBC News, 2014)

KEY ORGANIZATIONS TO BE AWARE OF:

CANADIAN ASSOCIATION OF PHYSICIANS FOR THE
ENVIRONMENT

CANADIAN PUBLIC HEALTH ASSOCIATION

CANADIAN MEDICAL ASSOCIATION

ROYAL COLLEGE OF PHYSICIANS AND SURGEONS

DAVID SUZUKI FOUNDATION

CLIMATE ACTION NOW; CLIMATE FAST

INSIDE CLIMATE NEWS; CLIMATE BRIEF

DEVEX; NATIONAL GEOGRAPHIC

MAJOR NEWSPAPERS; NATIONAL OBSERVER; GUARDIAN;

EURO NEWS THE TYEE

CBC AND OTHERS, APTN

ANYTHING BY BILL MCGUIRE AND BILL MCKIBBEN

PLANETARY HEALTH MONTHLY



CURRENT NEWS ON ECOLOGICAL WELLNESS AND GLOBAL HEALTH

Free to sign up;
check latest edition:

[www.planetaryhealth
weekly.com](http://www.planetaryhealthweekly.com)

It's published every Thursday at 7PM EST
Still using old website name, since the
change a month ago from weekly to
monthly editions. DZ , two volunteers,
two bloggers.

Responsible Leadership

Essential to the Achievement of the
UN Sustainable Development Goals



Edited by Mike Saks

2023



****Chapter 16:**

“Responsible Leadership,
the Climate Crisis and
Preserving Planetary
Health” by David Zakus

****Chapter 17:**

“Biodiversity and
Responsible Leadership”
by Edward Milner

<https://www.amazon.co.uk/Responsible-Leadership-Achievement-Sustainable-Development/dp/0367653788>

THANKS SO MUCH!!

IT'S TRULY A GREAT PLEASURE TO BE WITH YOU TODAY.
I AM VERY HAPPY TO COME BACK TO UofA/EDMONTON!!

FEEL FREE TO CONTACT ME ANYTIME: dzakus@torontomu.ca

AND

I'M ALWAYS LOOKING FOR VOLUNTEERS FOR THE
PLANETARY HEALTH MONTHLY 😊