

Time to act: managing the impact of climate change on women's health

3 May 2024



Disclosures



Lecturer, Member of advisory boards, and/or Consultant:

Abbott, Astellas, Bayer Pharma, Besins Healthcare, Exeltis, Fidia, Gedeon Richter, Merck & Co., Novo Nordisk, Organon & Co., Shionogi Limited, Theramex, Viatris, Vichy Laboratoires.



Your expert panel today



Hugh Montgomery

Professor of Intensive Care Medicine; Director of Centre for Human Health and Performance; Co-lead, Lancet Countdown on Climate and Health

University College London, UK



Rossella Nappi

Symposium Chairperson

Professor of Obstetrics and Gynaecology & Head of Reproductive Medicine Unit

University of Pavia, Italy



Ali Kubba

Senior Specialist in Community Gynaecology / Sexual and Reproductive Health

Guy's Hospital, London, UK

DISCLAIMER:

Any unreferenced claims reflect the speaker's own experience or beliefs. If patient cases are included, these are assumed to be fictional in nature.



Key objectives of today's session



- 1) Appreciate the urgent need for action regarding climate change and individual health, particularly when it comes to women
- 2) Understand how different stages of women's life cycle are impacted by climate change
- 3) Consider solutions applicable in daily practice to manage health problems that women may experience and promote ways to mitigate the impact of climate change within their communities
- 4) Recognise that women can play a central role when it comes to curbing climate change and its impact on individual health
- 5) Appreciate that Bayer is committed to the impact of climate change as it relates to women's health



Agenda for the symposium



Time (CET)	Focus of session	Led by
12:45 to 13:05	Introduction: The urgent need for action	Prof. Hugh Montgomery
13:05 to 13:30	Impact of climate change on women's individual health across their lifespan	Prof. Rossella Nappi
13:30 to 13:55	Practical experience sharing of ideas, policies, and solutions	Prof. Ali Kubba
13:55 to 14:00	Questions and answers	All



The urgent need for action

Hugh Montgomery



Disclosures



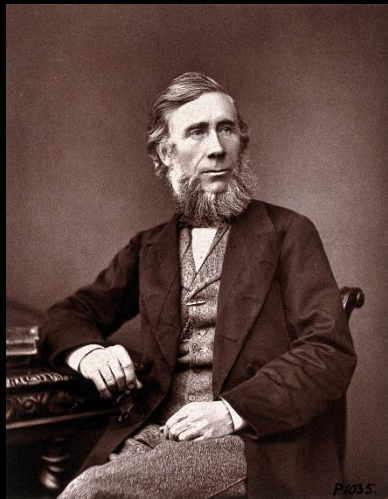
Founder & co-director of RealZero, a non-profit charity-funded organisation trying to help mitigate climate change.
Received consultancy fees for Bayer relating to climate change issues.

**Too Little.
(Not?) Too Late?**

What We Have To Do, And Why.

Hugh Montgomery

1859



John Tyndall

27 Years Ago

1995, COP1

Emissions must peak



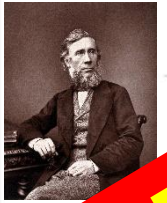
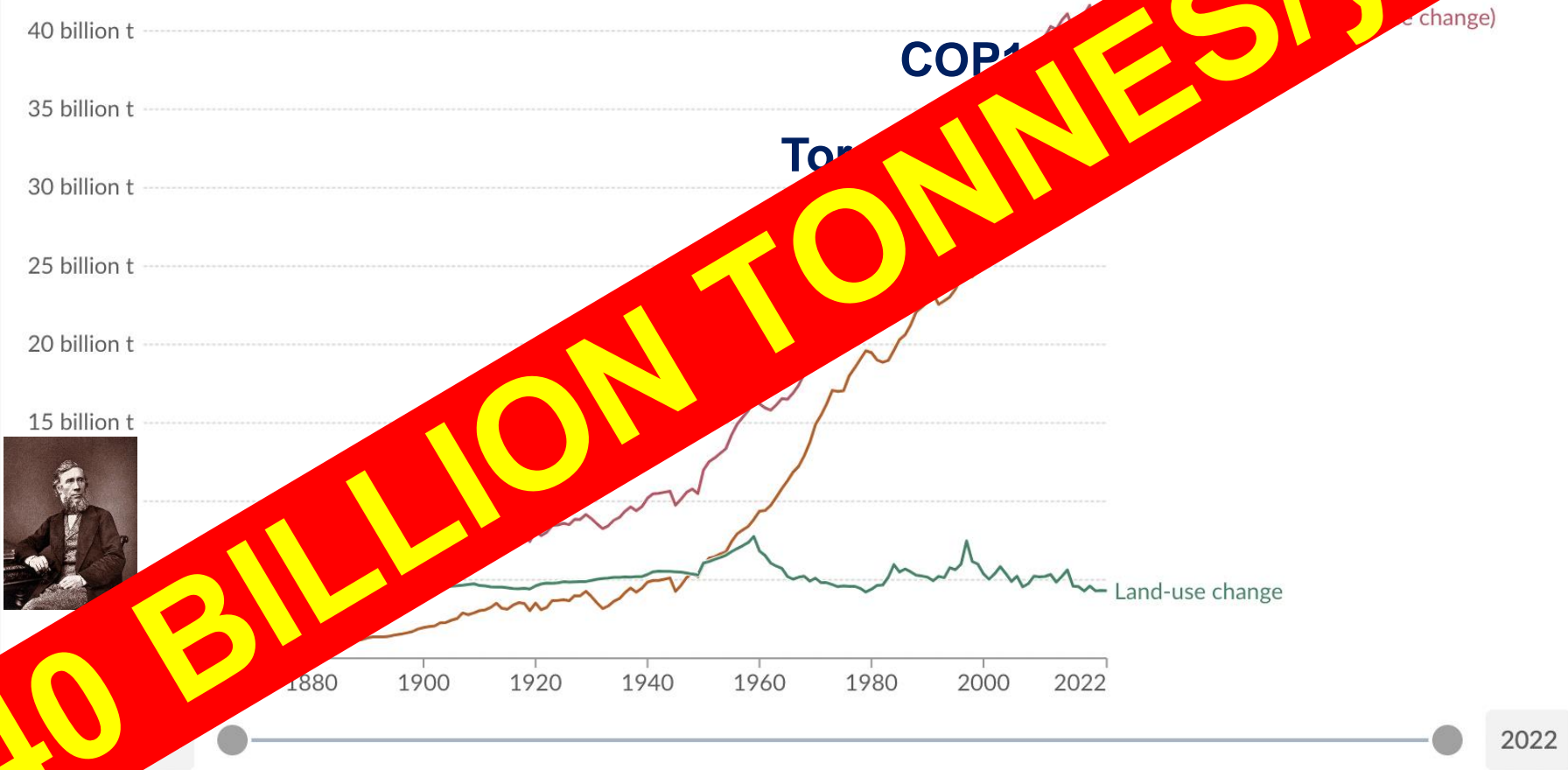
2021: “Any delay in concerted global
action will be brief and rapidly closing

Aim to peak in 2025 removed
COP27/28
secure a liveable future¹”

Human-derived CO₂ emissions Gt/year

Table Chart

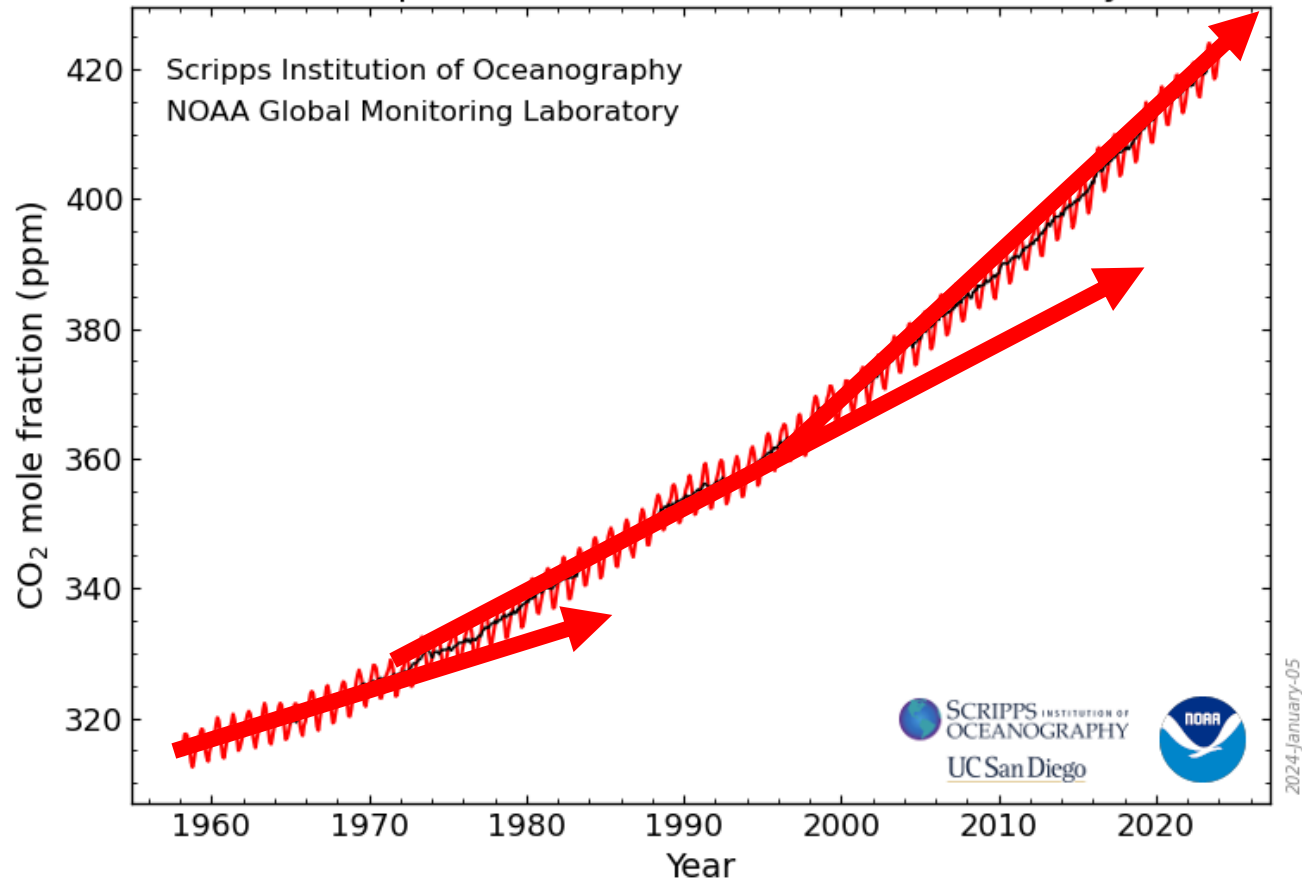
Change Settings



Data source: Global Carbon Budget (2023) - [Learn more about this data](#)
 OurWorldInData.org/co2-and-greenhouse-gas-emissions | CC BY

Download Share Enter full-screen

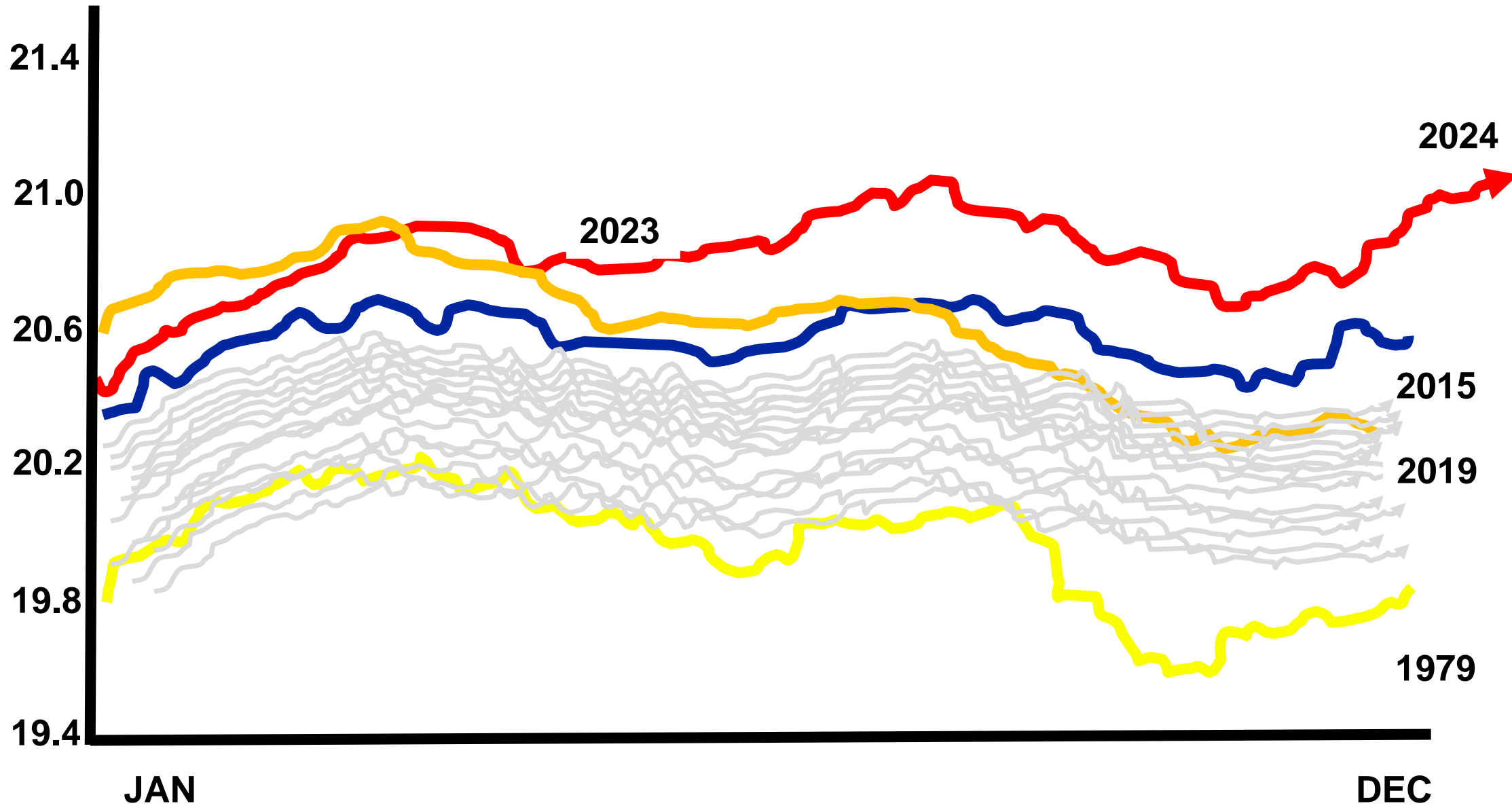
Atmospheric CO₂ at Mauna Loa Observatory



Ocean Heat Gain

Enough to boil (from 0°C)
OVER 1 TRILLION
Olympic Swimming Pools

Daily Sea Surface Temperature 60°N- 60°S

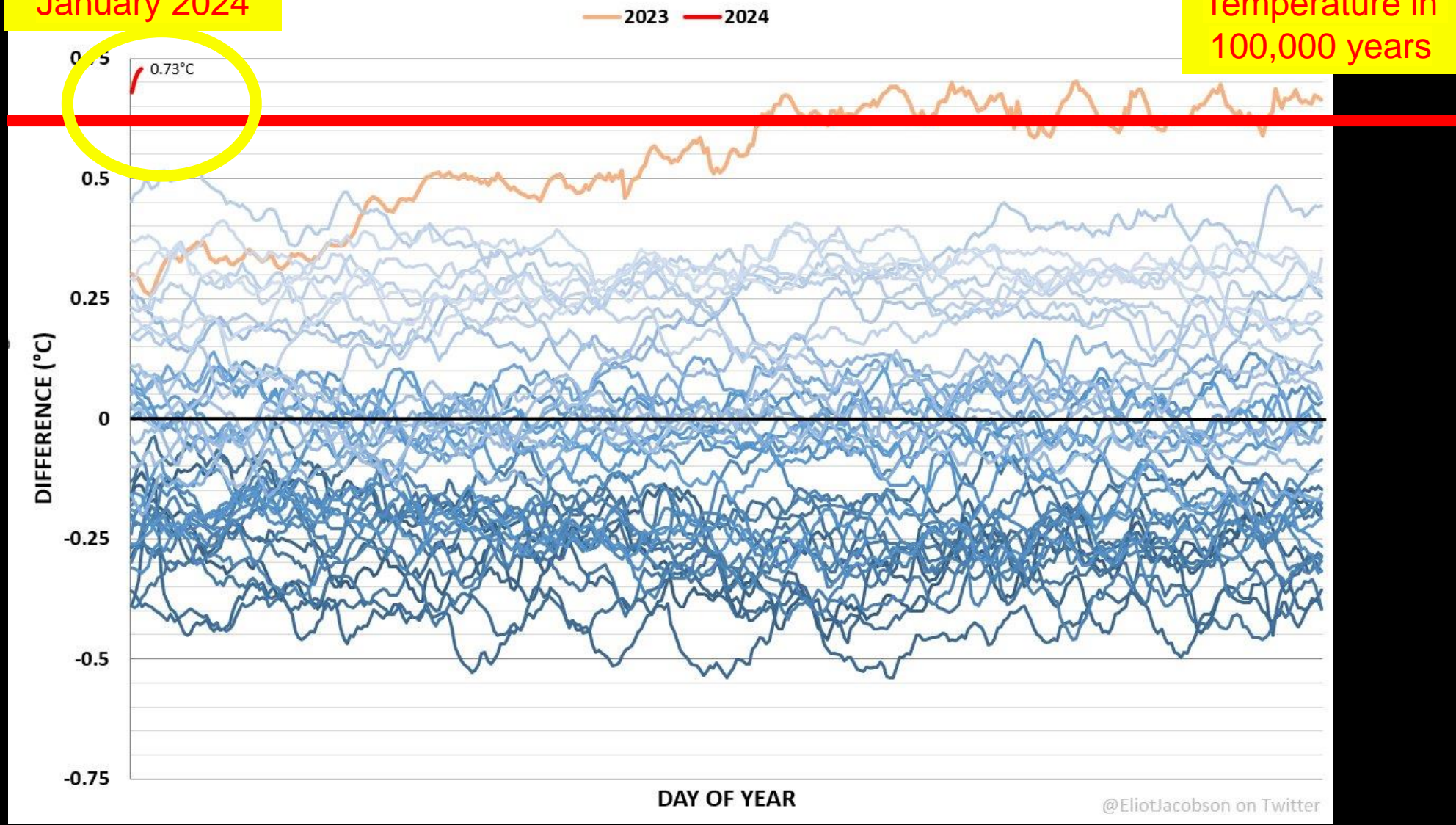


Global Sea Surface Temperature Anomaly: 1982-2024 (Difference from 1991-2020 Mean)

Data: https://climatereanalyzer.org/clim/sst_daily/json/oisst2.1_world2_sst_day.json

January 2024

Highest Temperature in 100,000 years

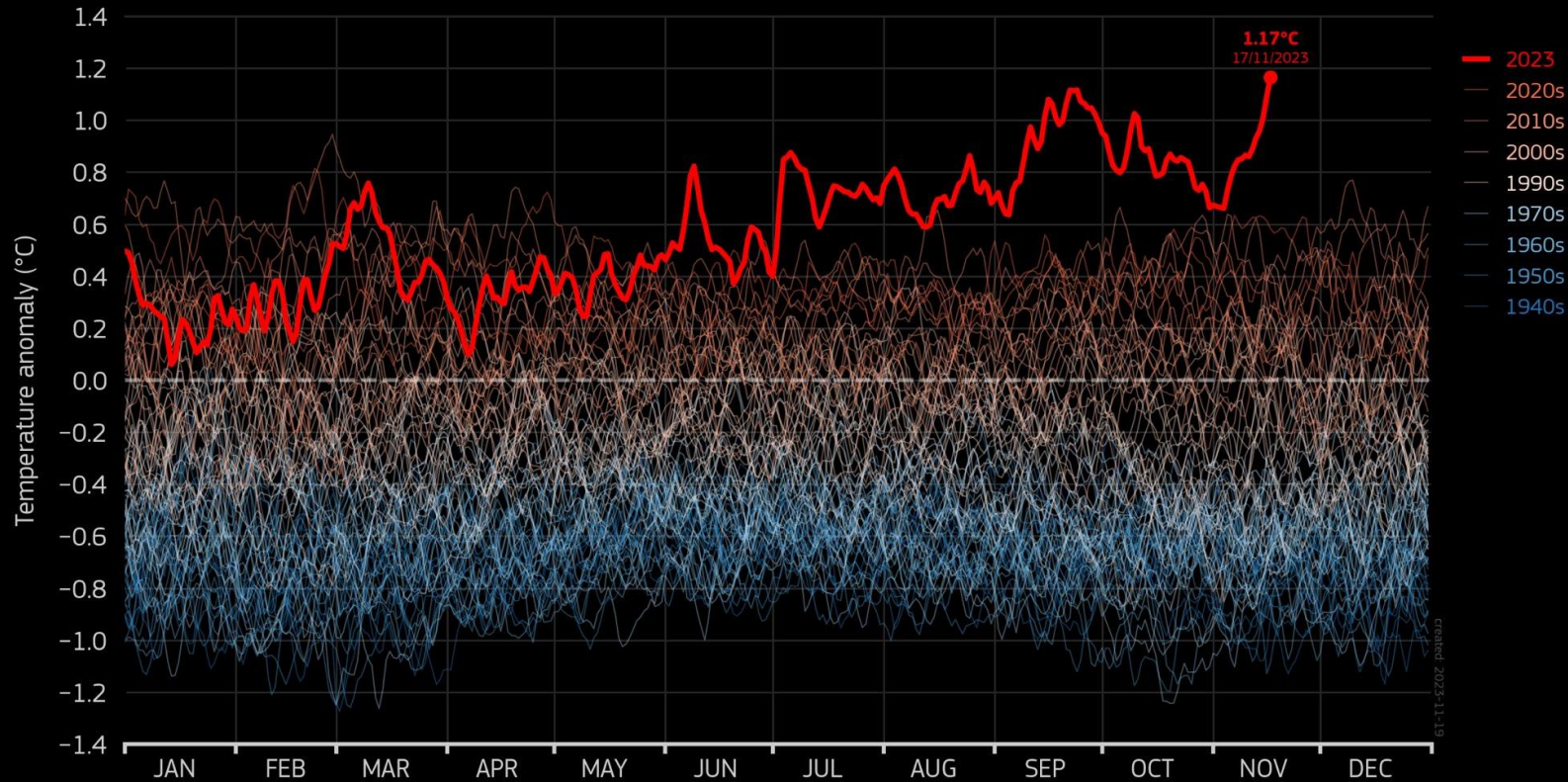


@EliotJacobson on Twitter

AIR: Nov 17th 2023: 1st day 2°C > preindustrial average

DAILY GLOBAL SURFACE AIR TEMPERATURE ANOMALY

Data: ERA5 1940–2023 • Reference period: 1991–2020 • Credit: C3S/ECMWF



PROGRAMME OF
THE EUROPEAN UNION



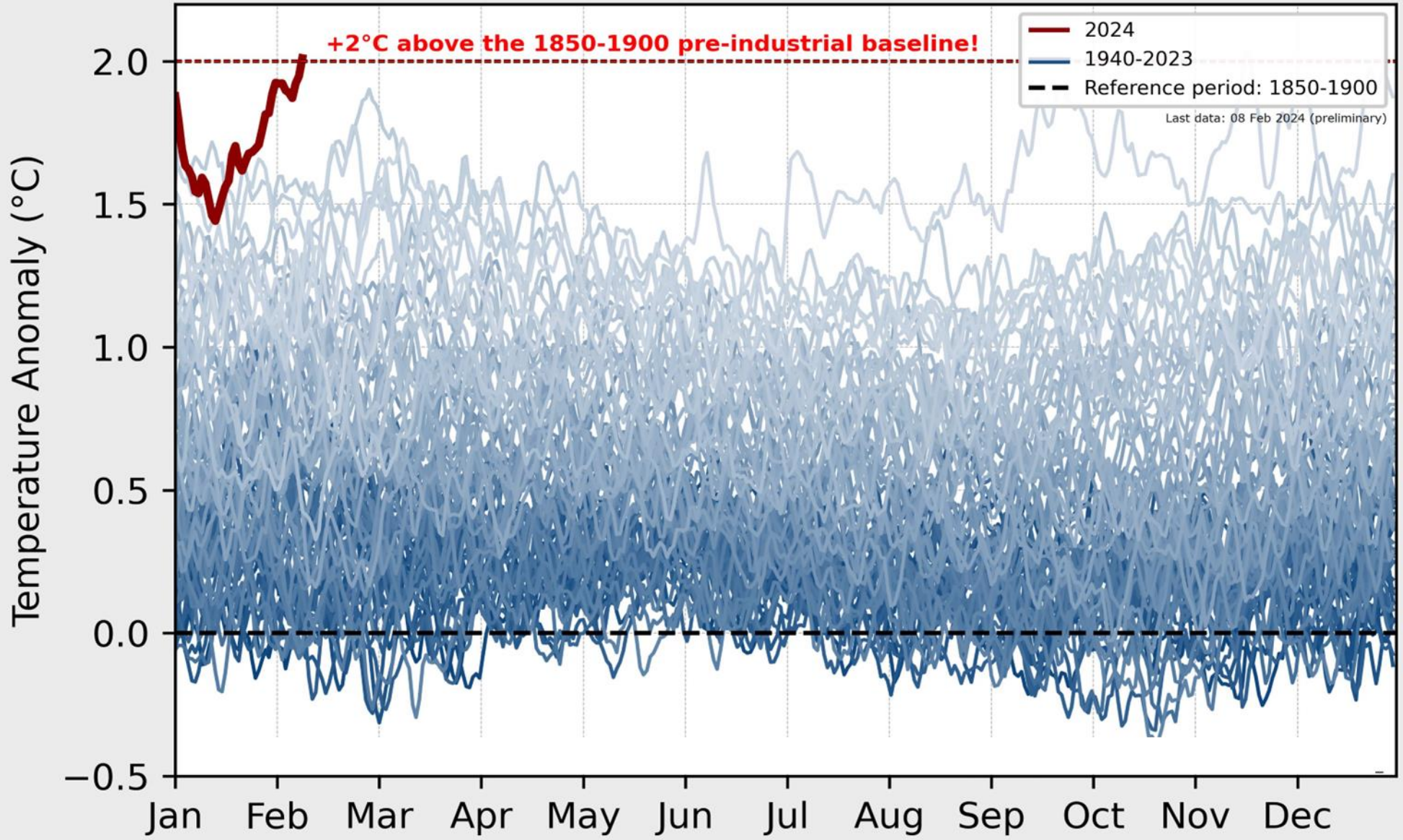
IMPLEMENTED BY



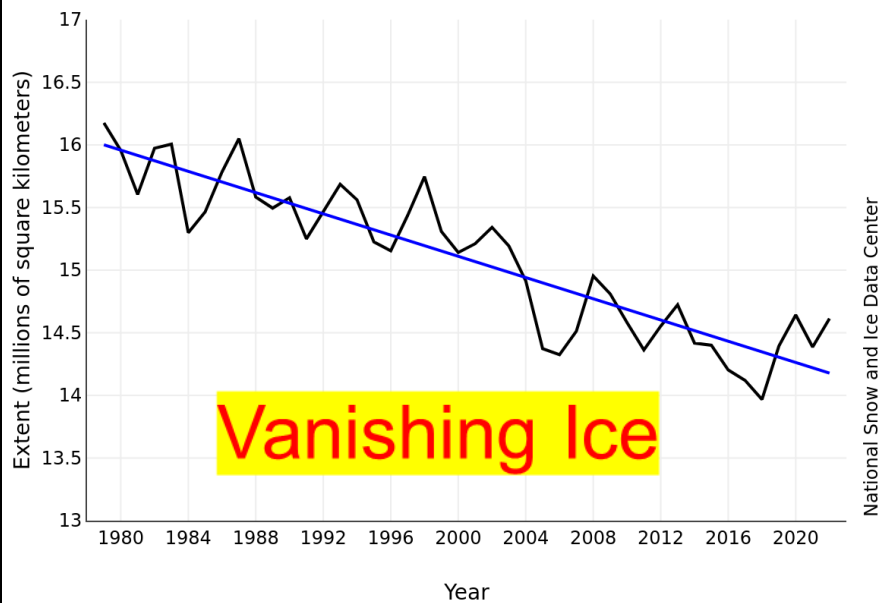
Credit: European Union, Copernicus Climate Change Service

Copernicus EU. ERA5 1940–2023. Available at: <https://climate.copernicus.eu/global-temperature-exceeds-2degc-above-pre-industrial-average-17-november>. Accessed 18 March 2023.

Daily Global Surface Air Temperature Anomaly



Average Monthly Arctic Sea Ice Extent
February 1979 - 2022



<https://doi.org/10.5194/essd-15-1597-2023>
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Data description paper |

**Greenland Icesheet losing
30m tonnes ice/hour²**

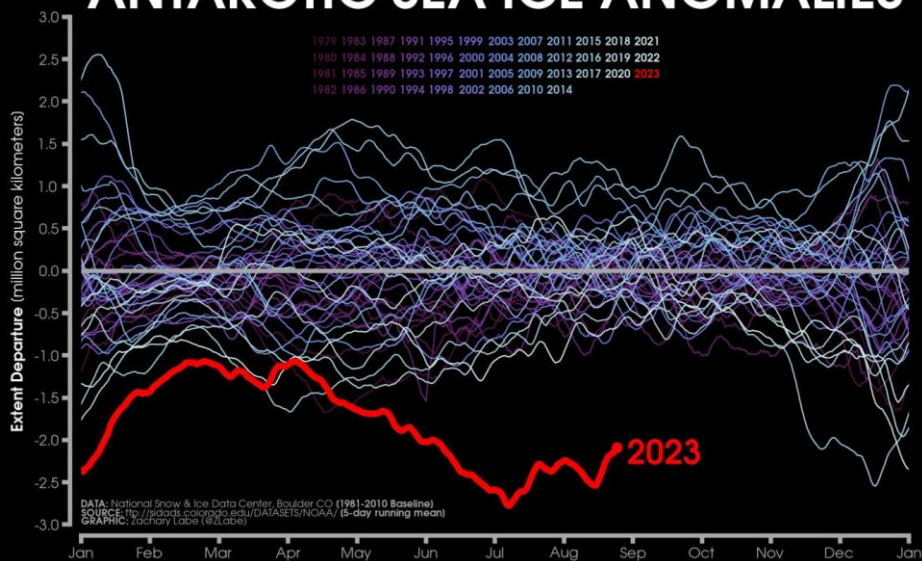
Mass balance of the Greenland and Antarctic ice sheets from 1992 to 2020

Ubiquitous acceleration in Greenland Ice Sheet calving from 1985 to 2022

<https://doi.org/10.1038/s41586-023-06863-2> Chad A. Greene^{1✉}, Alex S. Gardner¹, Michael Wood² & Joshua K. Cuzzone³

**Since 1985, Greenland Ice Sheet has lost
- 5,091 km² of area
- 1,034 BILLION tonnes of ice⁴**

ANTARCTIC SEA ICE ANOMALIES



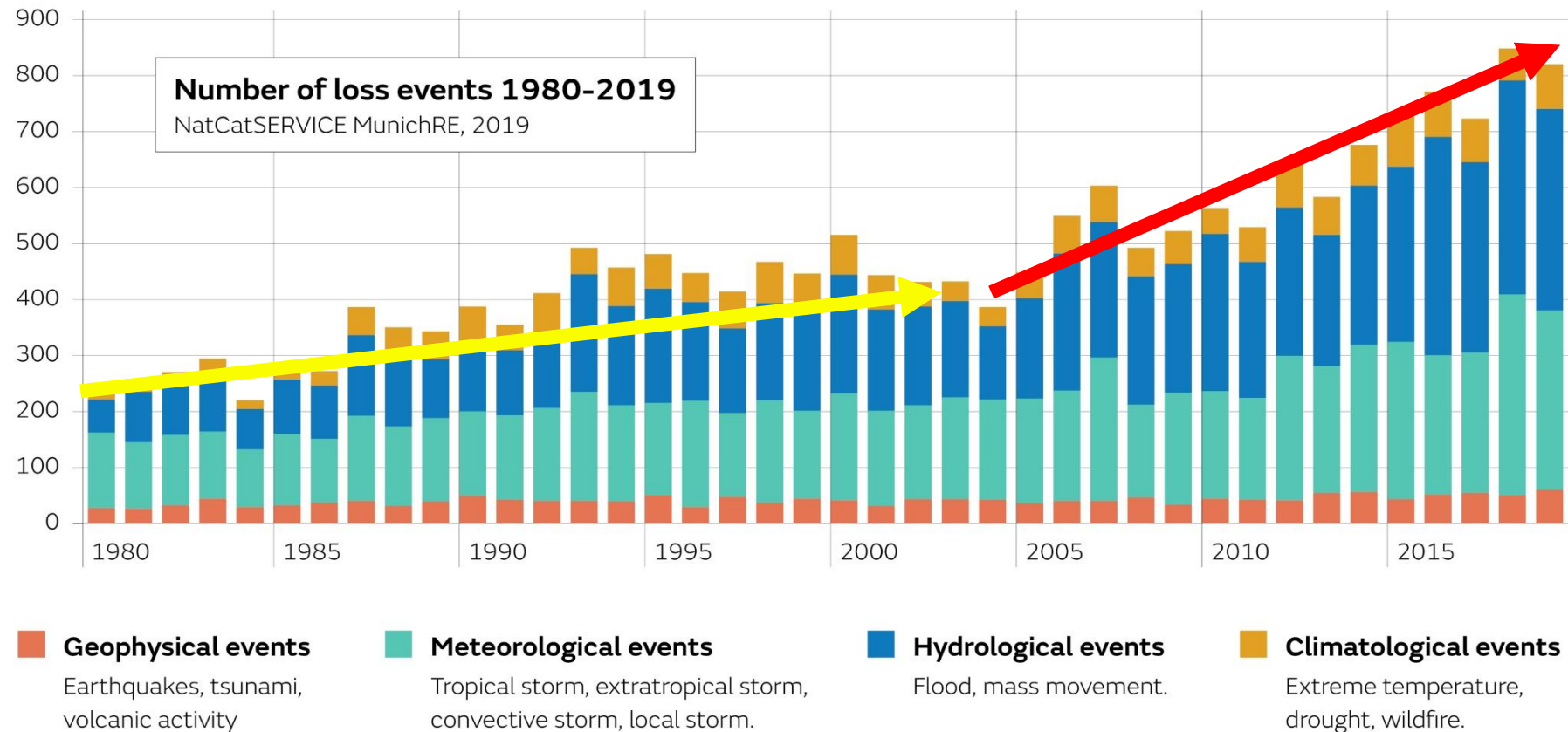
1. Arctic Sea Ice News & Analysis. Available at: <https://nsidc.org/arcticseaicenews/2022/03/arctic-sea-ice-approaches-maximum-record-low-minimum-in-the-south/>. Accessed 22 January 2024;
2. Otosaka IN, *et al.* Mass balance of the Greenland and Antarctic ice sheets from 1992 to 2020. Available at: <https://essd.copernicus.org/articles/15/1597/2023/>. Accessed 22 January 2024;
3. WIRED. Available at <https://www.wired.com/story/antarctic-sea-ice-is-at-record-lows-is-it-an-alarmed-shift/>. Accessed 22 January 2024;
4. Greene CA, *et al.* Ubiquitous acceleration in Greenland Ice Sheet calving from 1985 to 2022. *Nature* 2024;625(7995):523–8.



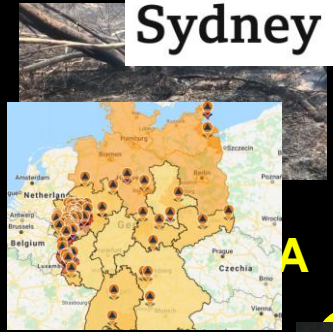
**SWISS GLACIERS:
10% LOSS IN 2 YEARS¹**

1. World Economic Forum. 2023. Available at: <https://www.weforum.org/agenda/2023/10/switzerland-glacier-ice-melt/>. Accessed March 18 2024.

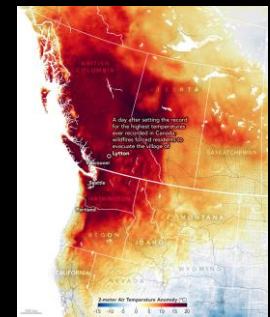
MORE FREQUENT EXTREME WEATHER



Australia floods: 50,000 on evacuation alert after deluge hits Sydney



C/



CANADA



TURKEY



AMAZON



GREECE

2021



ITALY

SUMMER 2021 ANGOLO Malaya & Congo

71,000 displaced

A



SIBERIA



BC Dec 2021

18,000 displaced



SPAIN



COLORADO





Pakistan floods: One third of country is under water - minister

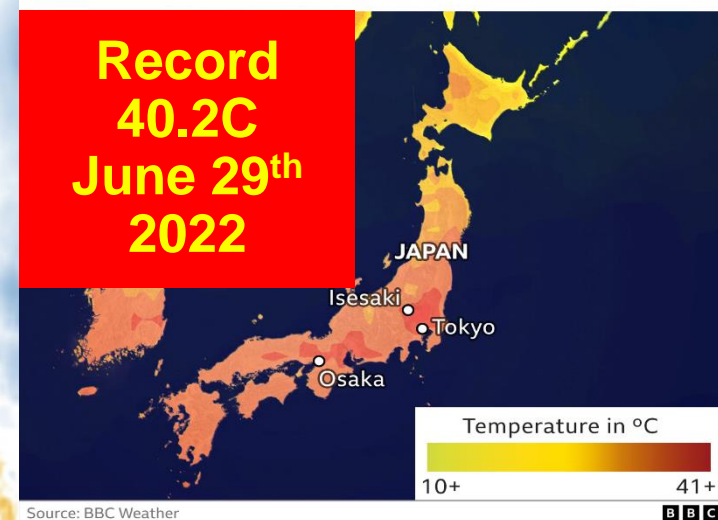
'We are living in hell': Pakistan and India suffer extreme spring heatwaves

April temperatures at unprecedented levels have led to critical water and electricity shortages



Japan is dealing with an intense heatwave

Maximum daily temperature forecast for 29 June



2023 January

- **Bilbao [mid-winter]: 25°C (normal average 10°C)**



Today 7 March hundreds if not thousands of stations in Asia are at record high temperatures levels, in some cases up to 5C above the previous highest temperatures for early March; in China 102 stations are above the early March (1-10) records. 21C in North Korea, 24C in South Korea

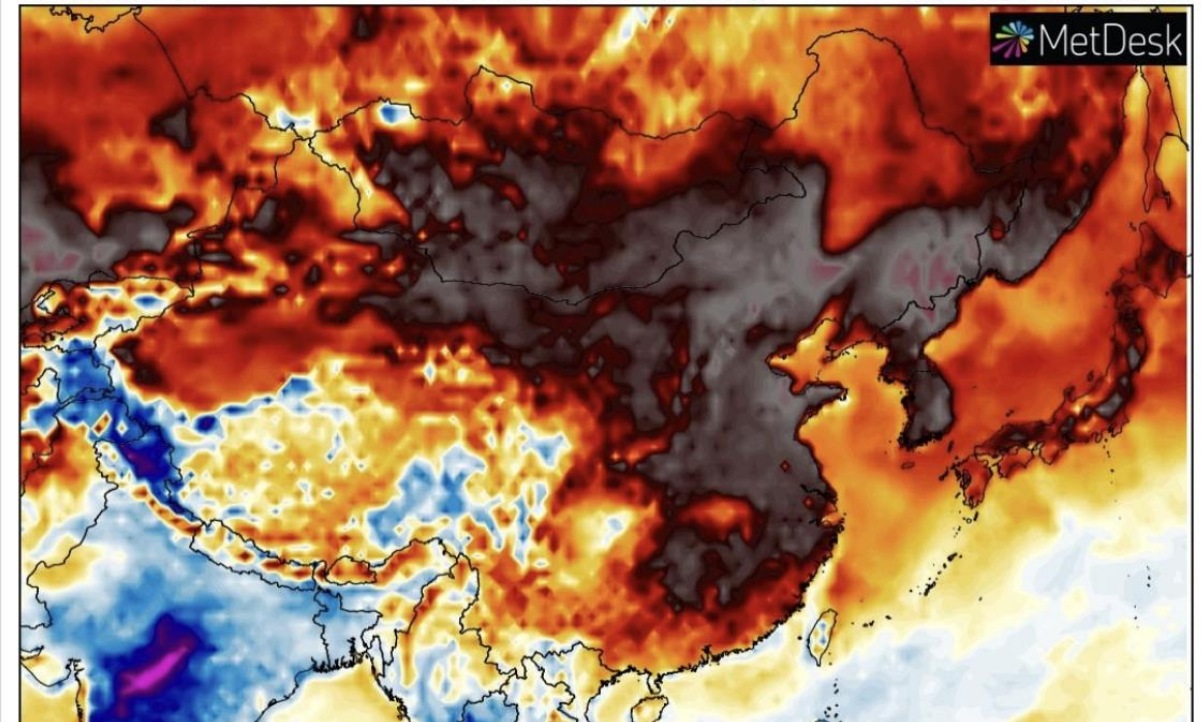
2 m Temperature Anomaly (°C)

ECMWF HRES 0.1°

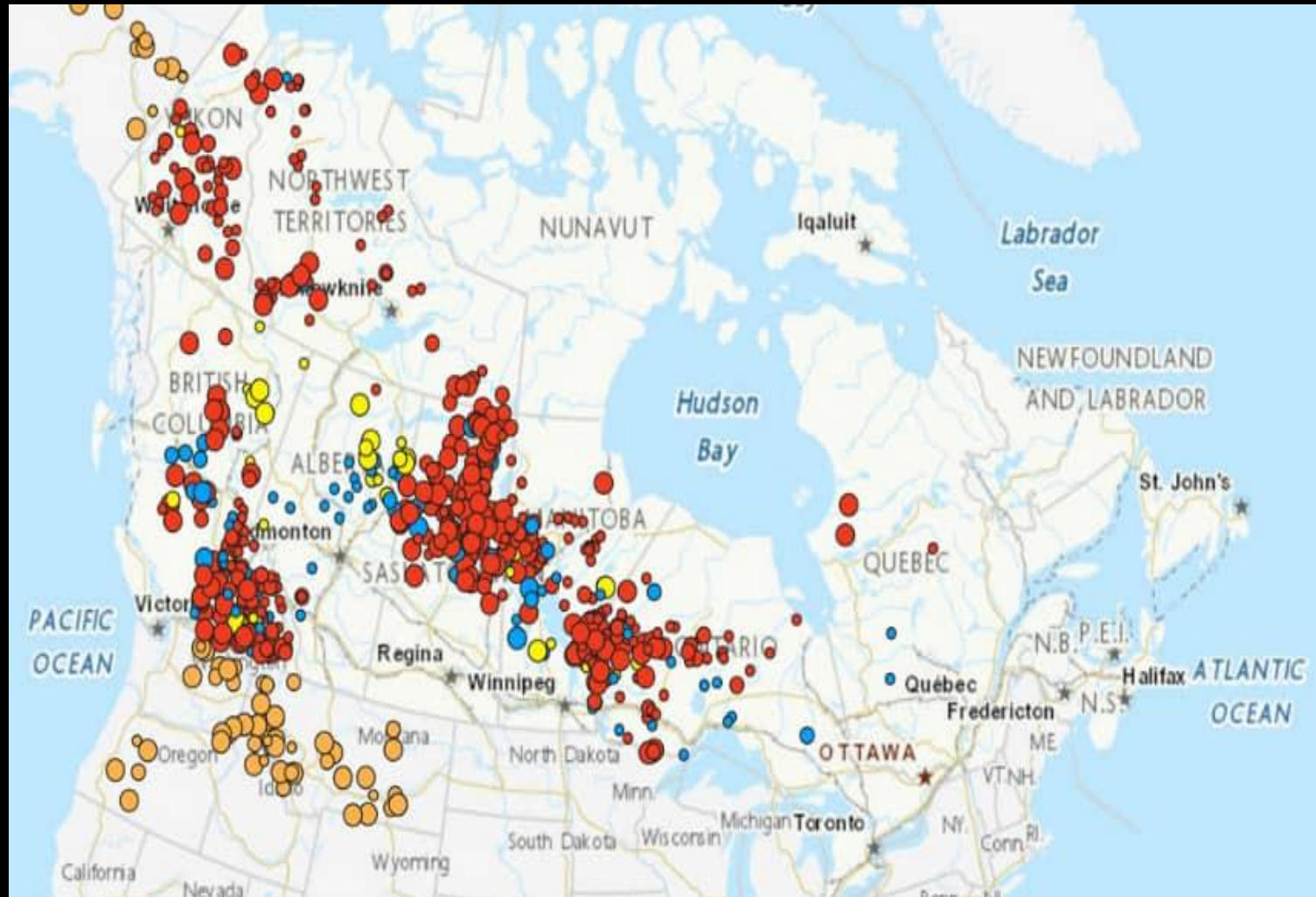
Base: CFSR 1979-2010 climatology

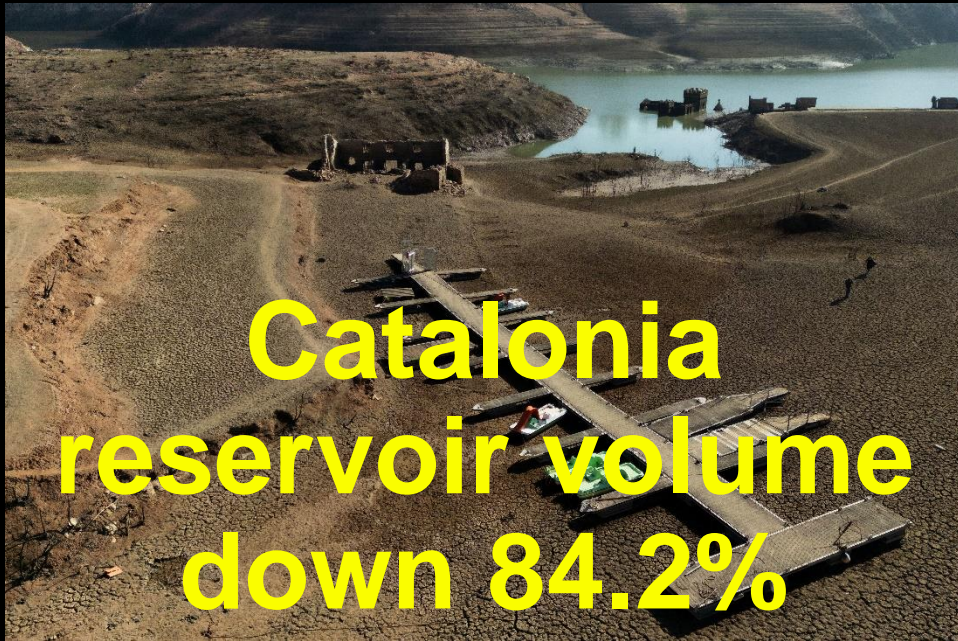
Run: Tue 7 Mar 00Z

Valid: Tue 7 Mar 06:00 UTC



Canadian Fires: Smoke in New York





**Catalonia
reservoir volume
down 84.2%**

Swiss ski spot left snowless, deserted by mild January

By Denis Balibouse

February 3, 2024 5:19 PM GMT · Updated 5 days ago



Deadly California storm triggers flooding, mudslides, power outages

By Steve Gorman and Daniel Trotta

February 6, 2024 7:44 AM GMT · Updated 2 days ago



**Los Angeles County
38m affected**



**Feb 4th 2024
Chile 33°C (normal
21.8°C)**



Chile wildfires: 51 dead as wildfire tears through Valparaiso region



ECONOMIC COLLAPSE

The global costs of extreme weather that are attributable to climate change

[Rebecca Newman](#) & [Ilan Noy](#) 

[Nature Communications](#) **14**, Article number: 6103 (2023) | [Cite this article](#)

\$143 billion per year costs of climate change extreme events¹

\$4,534 PER SECOND

Economic costs of weather-related disasters
soars

WMO May 2023²

US\$4.3 trillion and rising

“Our economy may not exist at all if we do not mitigate climate change.”

“We have left it too late to tackle climate change incrementally. It now requires transformational change.”

1.43°C clearly unsafe

“Any further delay in concerted global action will miss a brief and rapidly closing window ***to secure a liveable future***.”

YET WE DO NOTHING

NOTHING AT ALL

IN 2023, HUMANITY BURNED....

- 269,533 kg of coal¹.....
- 188,333 litres of oil².....
- 124,936,580 litres of natural gas^{3,4}...

..... ***A SECOND***

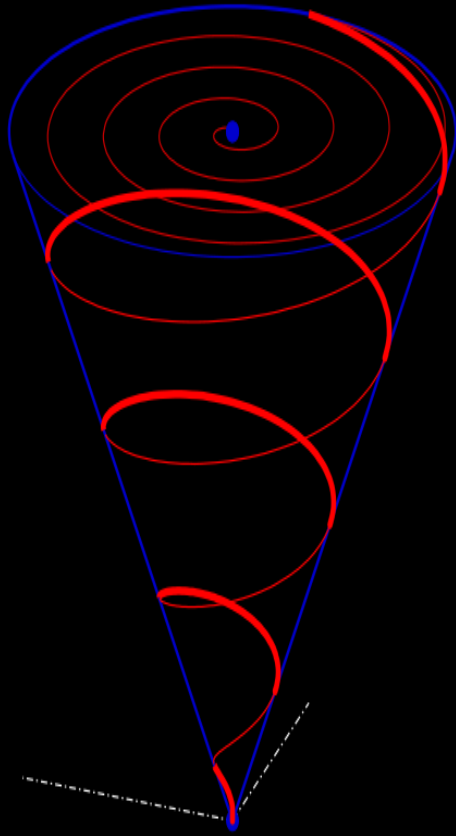
1. IEA Report. Coal 2023. Available at: <https://www.iea.org/reports/coal-2023/supply>. Accessed 4 April 2024;

2. IEA Report. Oil 2023. Available at: <https://www.iea.org/reports/oil-2023>. Accessed 4 April 2024;

3. SEI, Climate Analytics, E3G, IISD, and UNEP. (2023). The Production Gap: Phasing down or phasing up? Top fossil fuel producers plan even more extraction despite climate promises. Stockholm Environment Institute, Climate Analytics, E3G, International Institute for Sustainable Development and United Nations Environment Programme. <https://doi.org/10.51414/sei2023.050>;

4. Enerdata. Available at: <https://yearbook.enerdata.net/natural-gas/world-natural-gas-production-statistics.html>. Accessed 5 April 2024.

Now >10 +VE FEEDBACKS

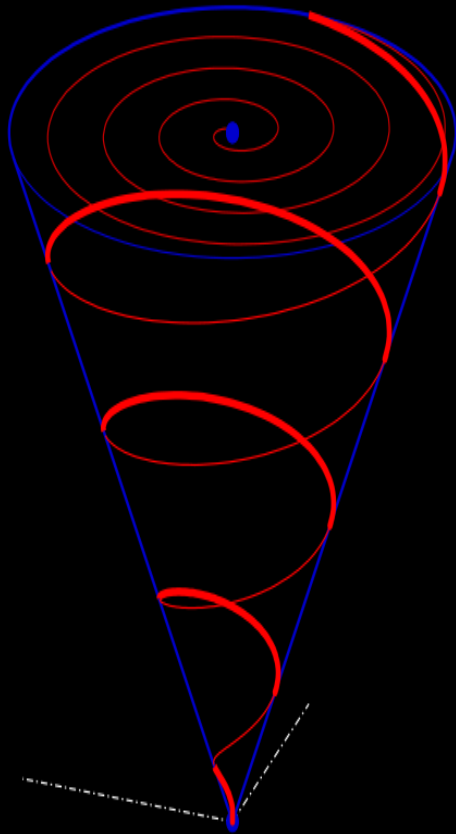


Rate of Earth's **energy gain**
has **doubled in only 14 years**



CO₂

**Summer 2023, Canadian Fires
added 6% to total GHG
Emissions**

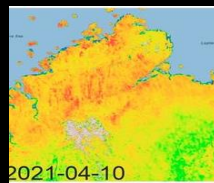


Rate of Earth's **energy gain**
has **doubled in only 14 years**

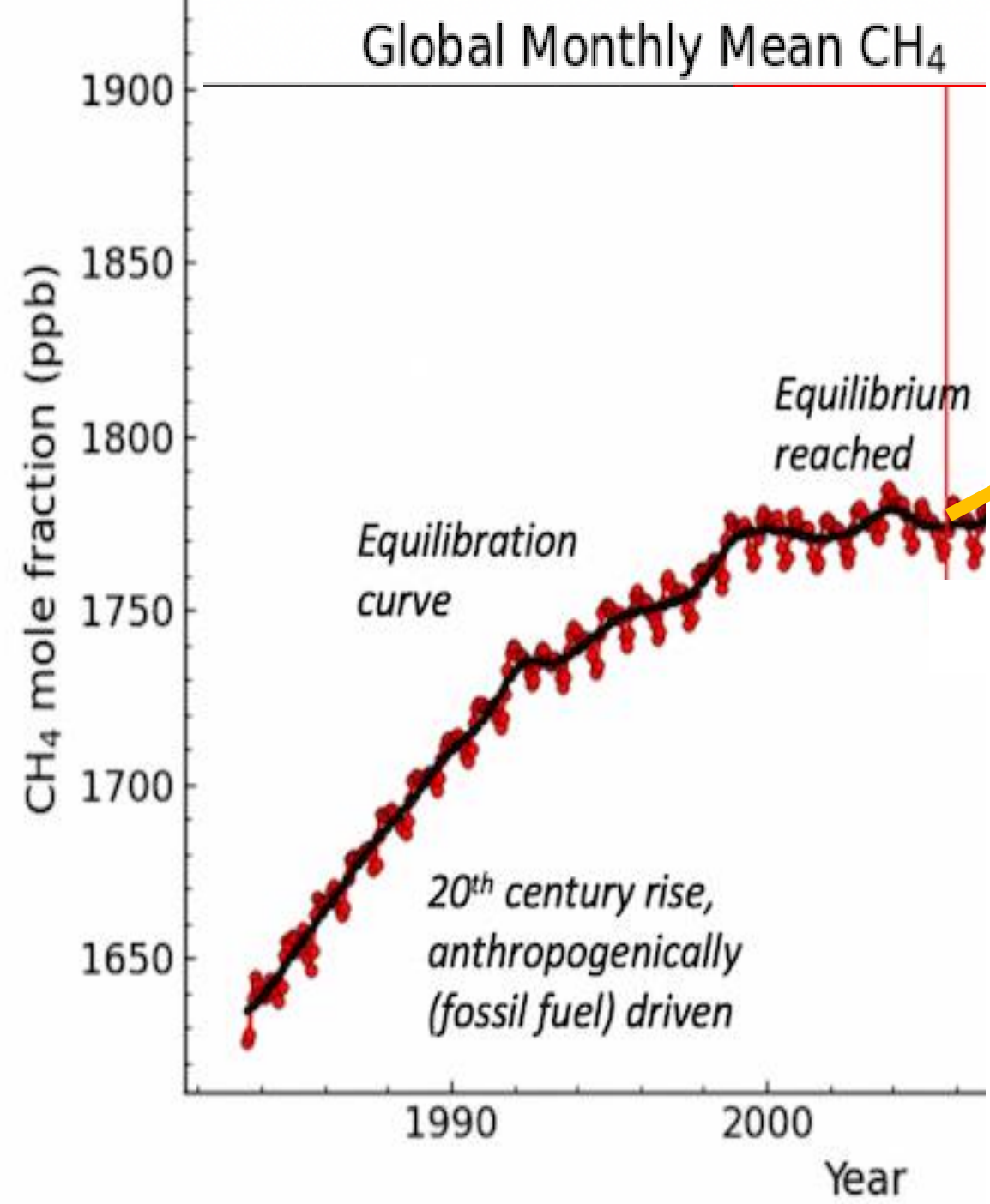


CO₂

CO mops up -OH, which would clear methane



Methane Carbonate rocks
Melting hydrates
Warming wetlands



CH₄, methane.
NOAA. Available at:
https://gml.noaa.gov/ccgg/trends_ch4/.
Accessed 22 January 2024.

Storms inject (GHG) water vapour 19km up¹

Amazon rainforest now emitting more CO₂ than it absorbs

Cutting emissions more urgent than ever, say scientists, with forest producing more than a billion tonnes of carbon dioxide a year



16 soccer pitches lost to fire every minute^{2,3}

GHG, greenhouse gas.

1. Homeyer CR, *et al.* Extreme altitudes of stratospheric hydration by midlatitude convection observed during the DCOTSS field campaign. *Geophys Res Lett* 2023;50:e2023GL104914. <https://doi.org/10.1029/2023GL104914>;

2. The Guardian. Available at: <https://www.theguardian.com/environment/2021/jul/14/amazon-rainforest-now-emitting-more-co2-than-it-absorbs>. Accessed 22 January 2024;

3. Jacobo J. ABC News. Available at: <https://southernillinoisnow.com/2022/08/17/forest-fires-destroyed-nearly-23-million-acres-of-land-in-2021-and-its-expected-to-get-worse-experts-say/>. Accessed 22 January 2024.

Worse Still

BINARY CLIMATE STATES

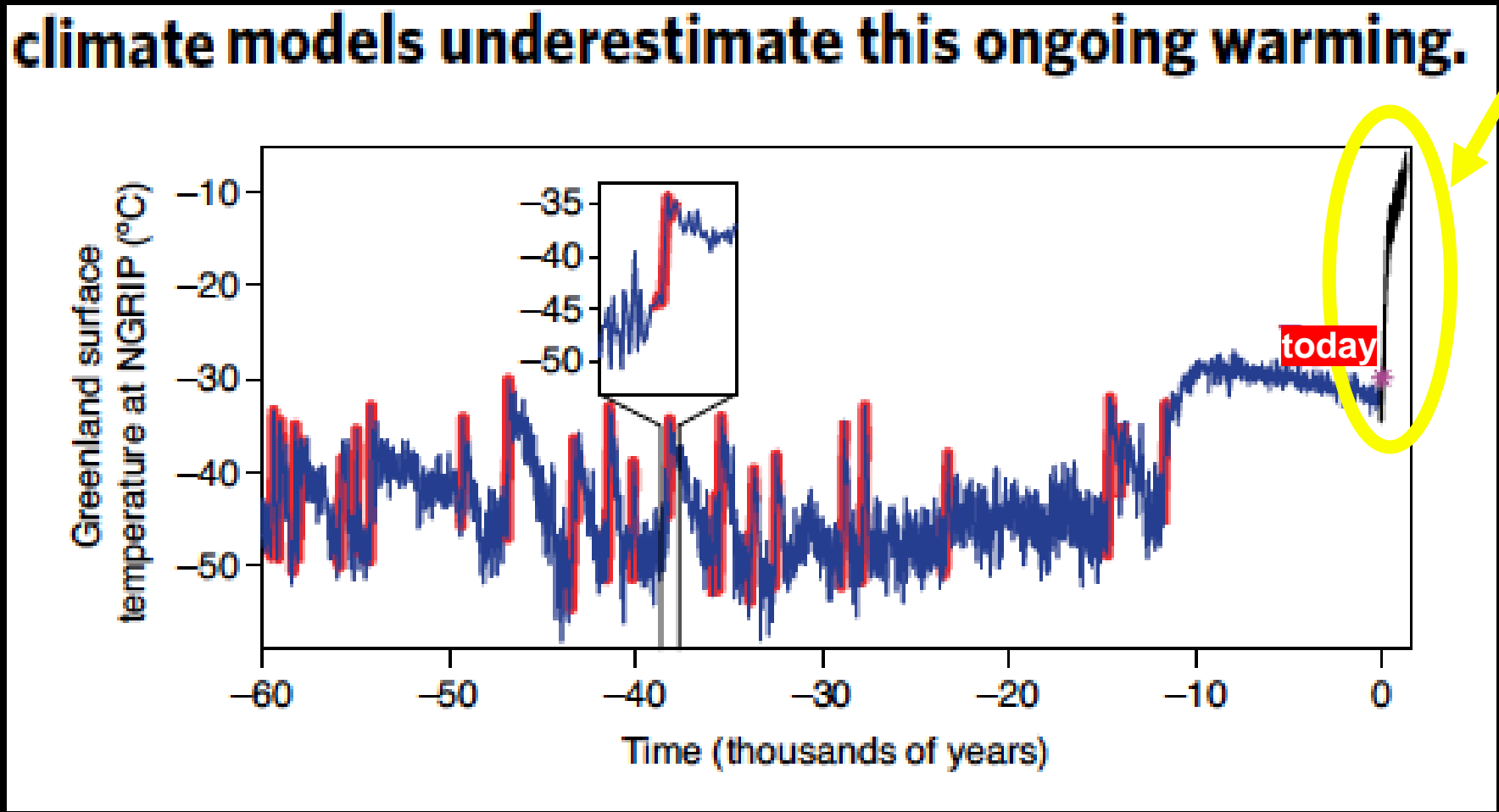


the Arctic is currently experiencing an abrupt climate change event,

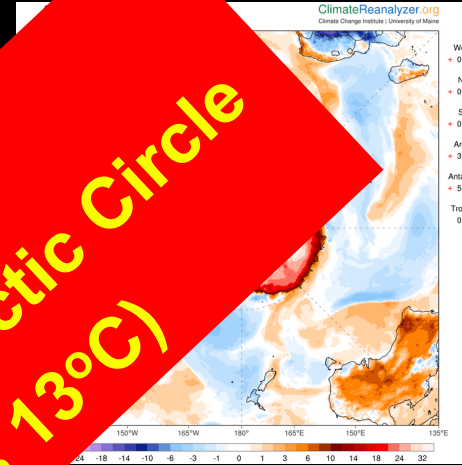
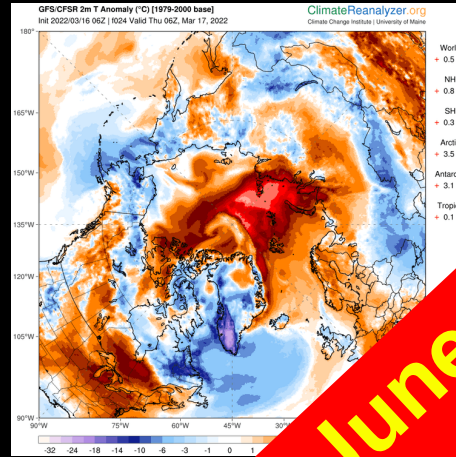
(DANSGAARD-OESCHGER [D-O] EVENTS)

New projections

climate models underestimate this ongoing warming.



March 22nd 2022

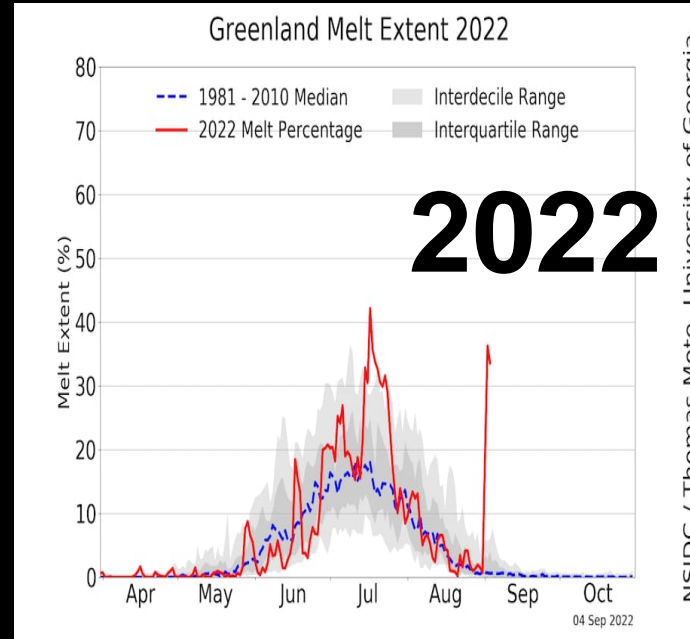
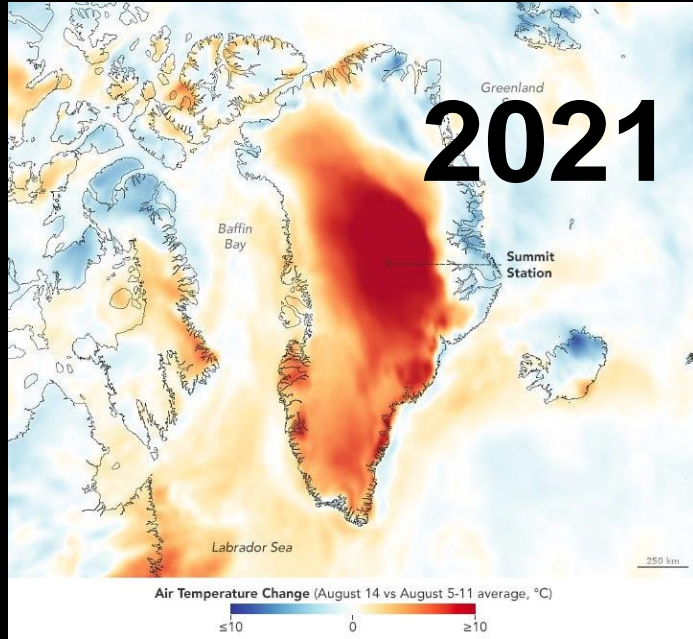


Heatwaves at both of Earth's poles alarm climate scientists

Antarctic area is not normal at same time as north pole regions hit 30C levels

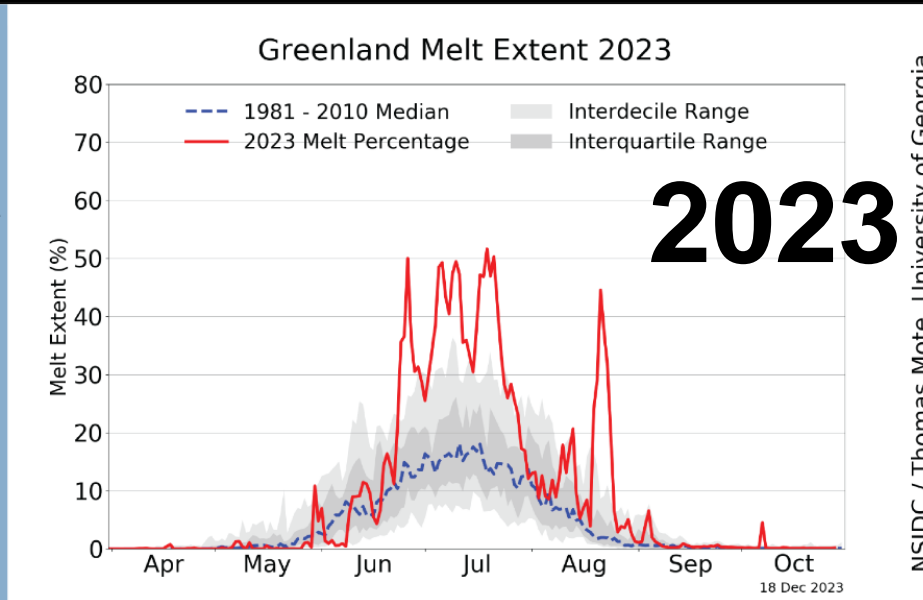
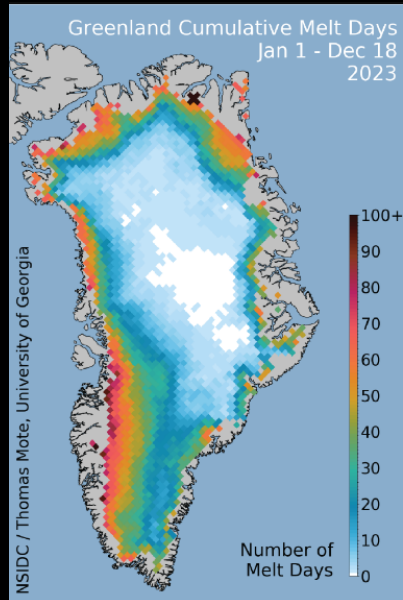
**June 2022
PLUS 32.5°C in Arctic Circle
(average is 13°C)**

Greenland¹⁻³



NSIDC / Thomas Mote, University of Georgia

- 20°C above normal
- 20 billion tonnes lost in one weekend (7% of annual total)



NSIDC / Thomas Mote, University of Georgia

1. NASA Earth Observatory. Available at: <https://earthobservatory.nasa.gov/images/148720/rain-and-warmth-trigger-more-melting-in-Greenland>. Accessed 3 April 2024;
 2. Columbia Climate School. Available at: <https://news.climate.columbia.edu/2022/09/29/greenlands-long-and-intense-melt-season-is-a-worrying-sign-for-sea-level/>. Accessed 18 March 2024;
 3. National Snow and Ice Data Center, University of Colorado, Boulder. Available at: https://nsidc.org/sites/default/files/images/Data/figure_4_gtmeltmap.png. Accessed 18 March 2024.

Overshooting the critical threshold for the Greenland ice sheet

<https://doi.org/10.1038/s41586-023-06503-9>

Nils Bochow^{1,2,3✉}, Anna Poltronieri¹, Alexander Robinson^{3,4,5}, Marisa Montoya^{5,6},
Martin Rypdal¹ & Niklas Boers^{3,7,8}

Received: 20 January 2023

- Global mean \uparrow 1.7–2.3°C causes “abrupt ice-sheet loss”
- “Even temporarily overshooting leads to sea level rise [of] metres”

nature climate change



Article

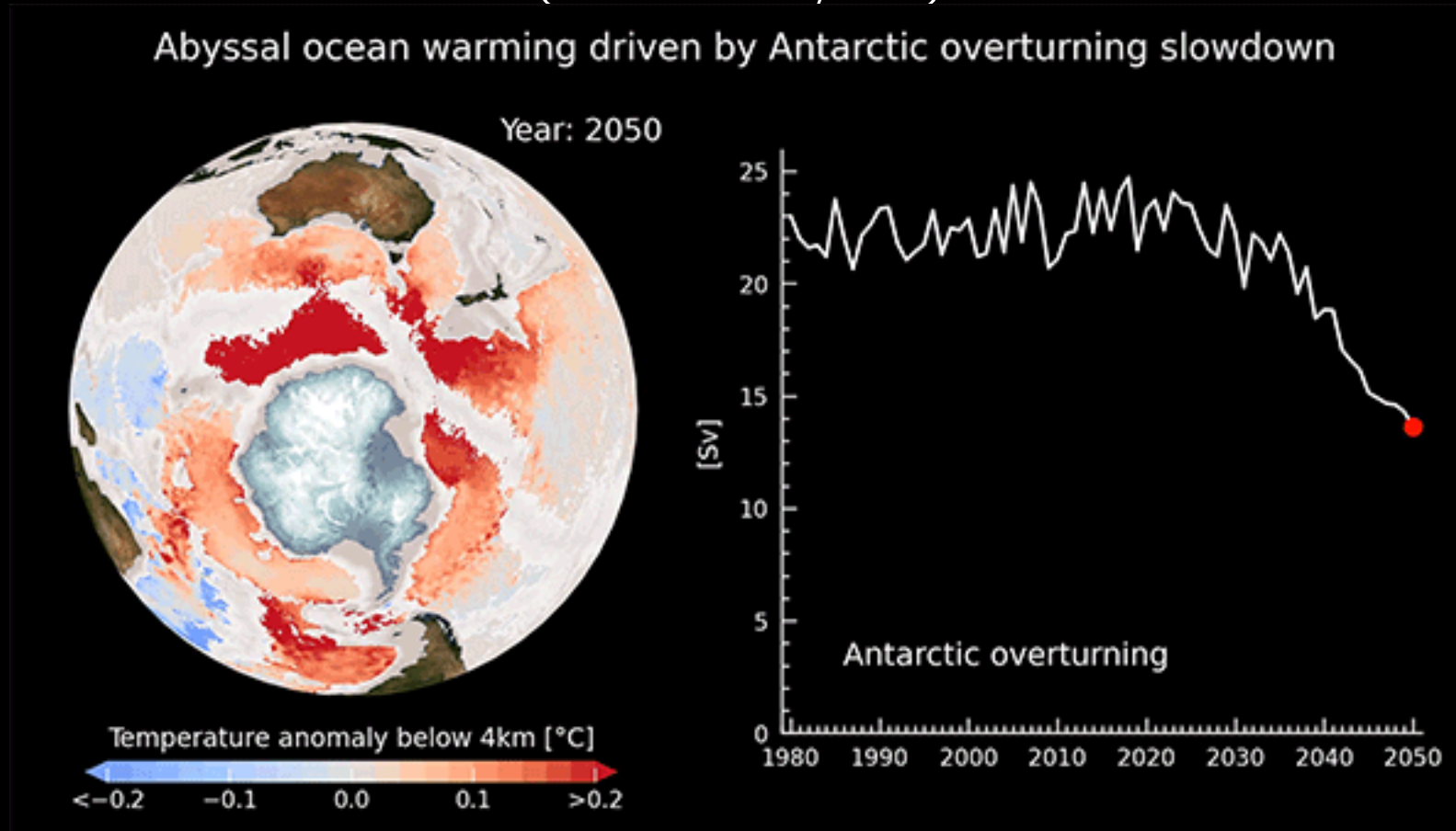
<https://doi.org/10.1038/s41558-023-01919-7>

300 years of sclerosponge thermometry shows global warming has exceeded 1.5 °C

2 °C global warming projected by the late 2020s, nearly two decades earlier than expected.

The Antarctic Abyssal Overturning Circulation¹

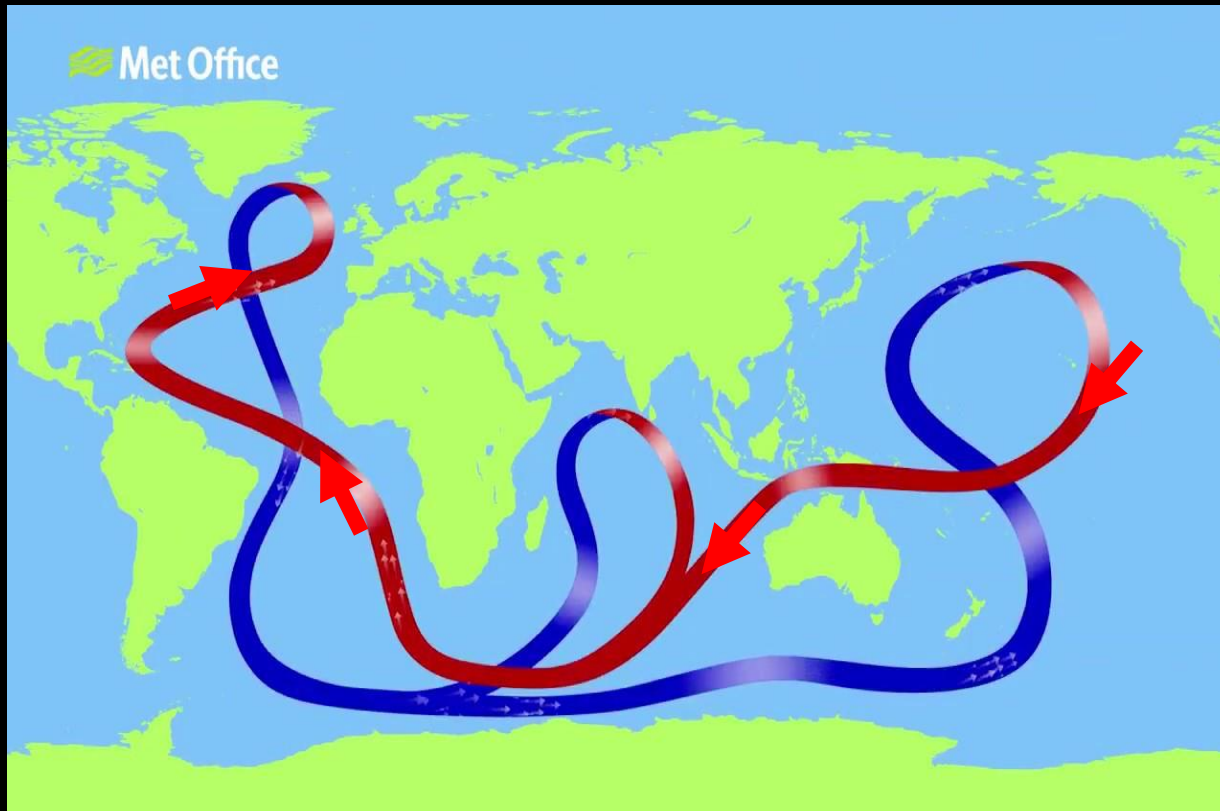
Warming in the abyssal ocean — water from 3,000 to 6,500 metres deep²
(1sv = 1m³/min)



1. Li Q, *et al.* Abyssal ocean overturning slowdown and warming driven by Antarctic meltwater. *Nature* 2023;615(7954):841–7;

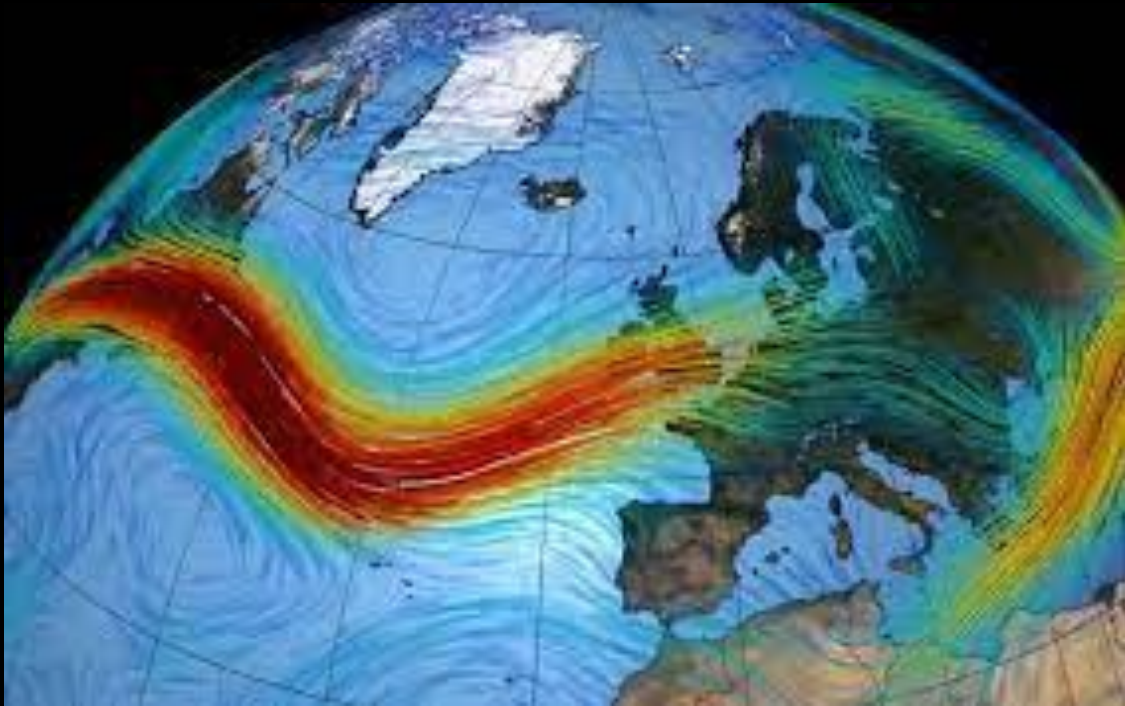
2. Graham F. Daily briefing: Deep-ocean circulation around Antarctica could be collapsing. *Nature*. Published online March 30, 2023. doi:10.1038/d41586-023-00943-z

The Atlantic Meridional Overturning Circulation (AMOC)



- Collapse -> **severe global impacts**
- We are **now** at “a point close to a critical transition.”
- Sudden cooling 3°C/decade, to ‘ice-age’ conditions

Jet Stream



‘progressive
migration of the
jet stream
northward’ is
anticipated

by 2060

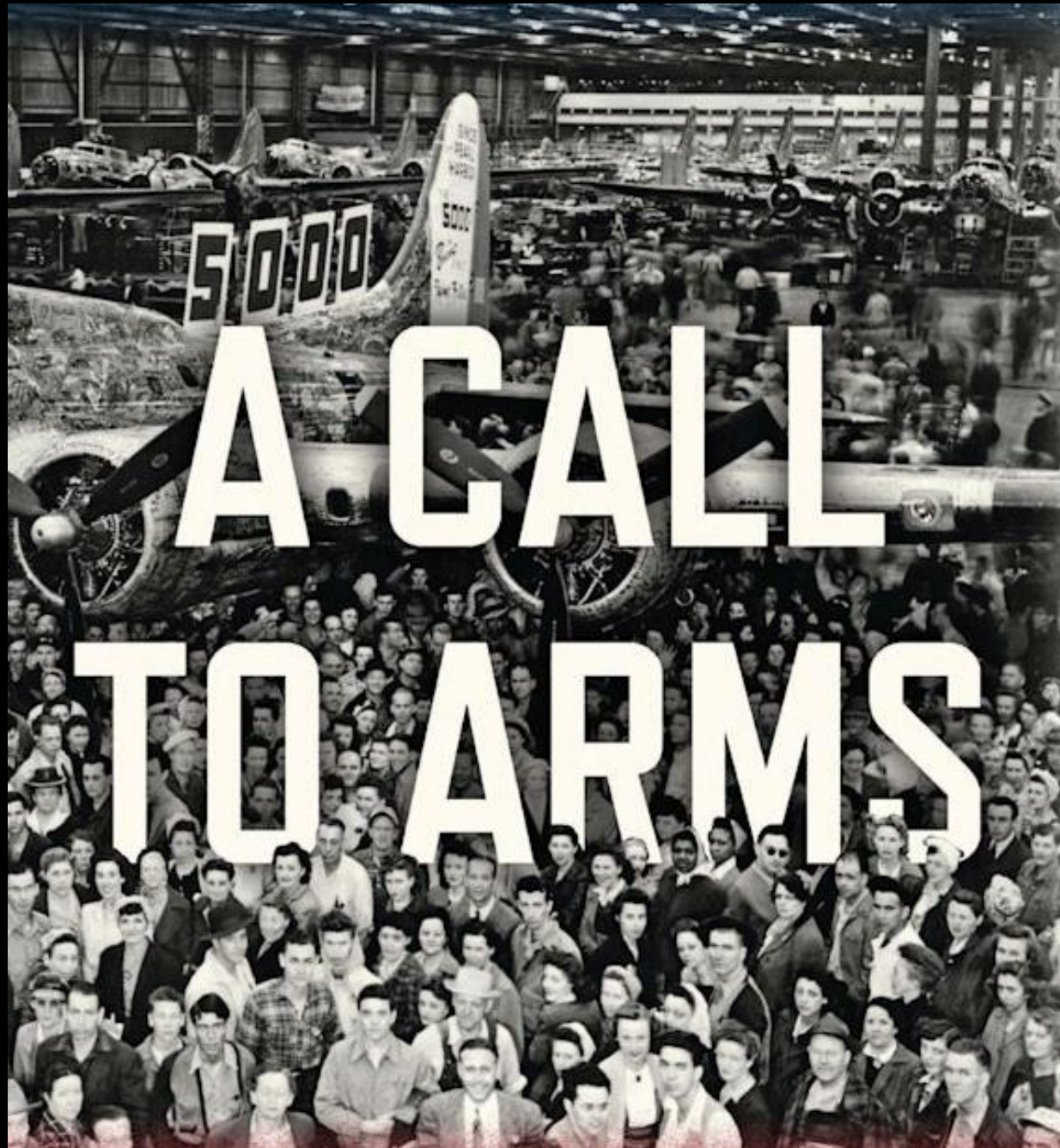
- **Drought in Spain**
- **Altered storm tracks – heavier rain in N Europe**

Lloyds of London Oct 2023

Plausible global economic losses of \$5 trillion in extreme weather events linked to climate change in next 5 years

1:300 chance of a \$17.6Tn loss

“species losses...within a century...
culminate in a mass extinction
rivaling those in Earth’s past”



Healthcare can do it alone

- **5% of global GHG emissions**
- **11.7% of Global Domestic Product**
- **1.4m NHS staff alone; 151m HCW worldwide**

- **YOU have to commit. Fully.**
- **YOU have to lead**
- **YOU have to act, whether or not others do**

But you have to do it NOW

Action	Personal	Work

YOU can be Heroes, for ever and ever
What d'you say?

David Bowie



Audience question 1



How many of you consider the impact of climate change on patients' health during consultations?

- A. Yes
- B. No
- C. Sometimes





Discussion



Impact of climate change on women's individual health across their lifespan

Rossella Nappi



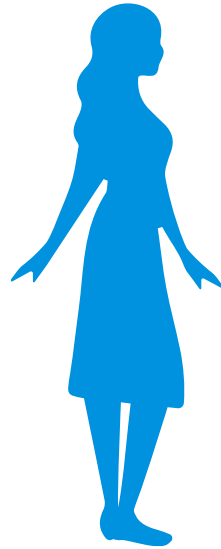
Women are increasingly vulnerable to the impacts of climate change



Climate and environmental changes (CECs) can affect women's health at any age, from sexual maturation and fertility to pregnancy outcomes and menopause^{1,2}

CECs

- Rising temperature
- Air & water pollution
- Natural disasters (flooding and drought)
- Infectious diseases
- Endocrine disrupting chemicals (EDCs)²



Puberty



Sexual maturation



Pregnancy



Lactation & breastfeeding



Pre-menopause



Menopause

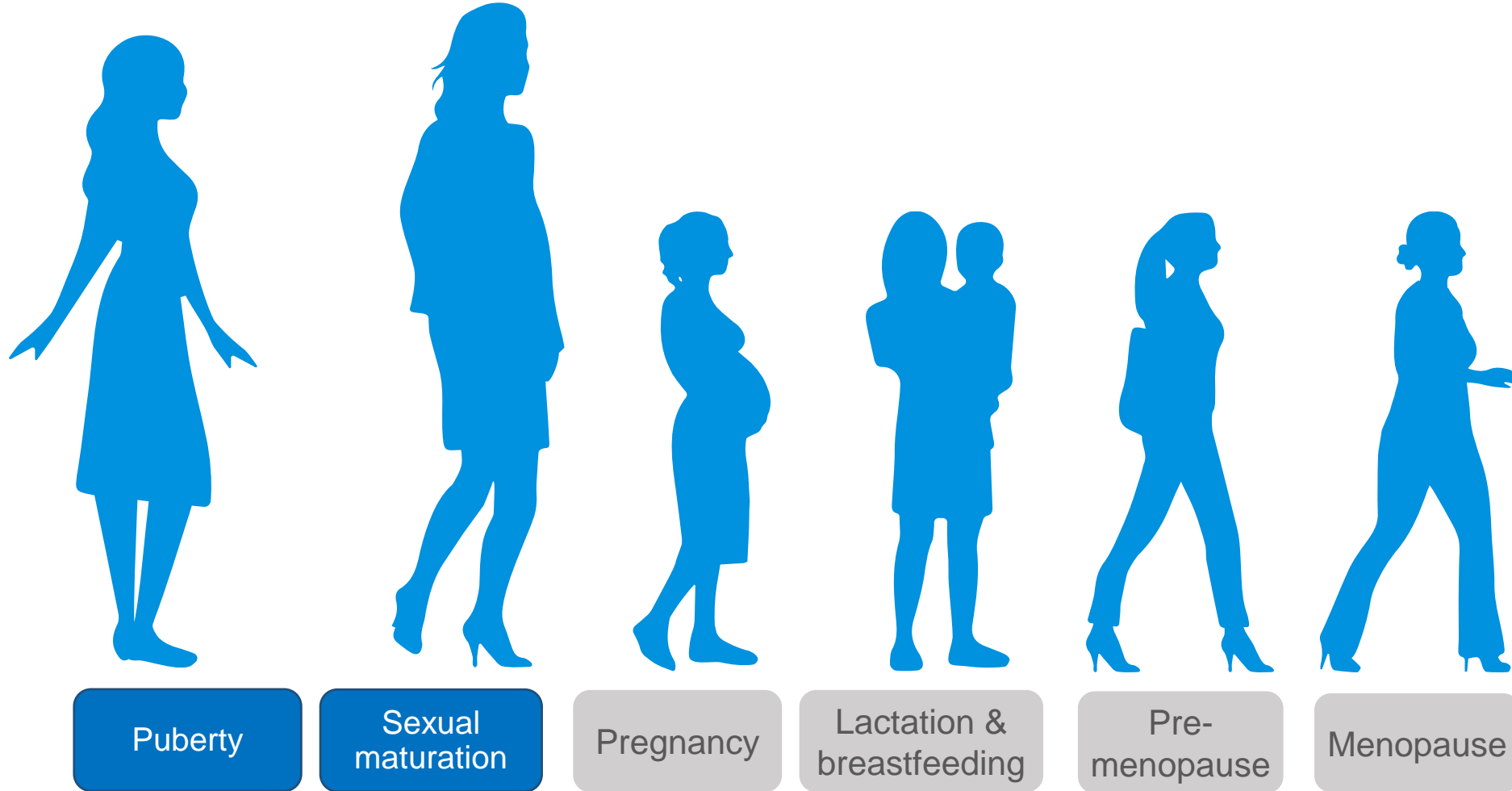
CEC, climate and environmental change.

1. UN WomenWatch. Available at: https://www.un.org/womenwatch/feature/climate_change/downloads/Women_and_Climate_Change_Factsheet.pdf. Accessed 25 March 2024;

2. Girardi G, Bremer AA. *J Womens Health (Larchmt)* 2022;31(6):755-7.



Puberty and sexual maturation





Puberty and sexual maturation



Altered timing of menarche through

- disrupted food availability
- nutritional factors
- increased toxin/pollutant release and EDCs^{1,2}

Perturbations in the timing of menarche can further worsen the burden of

- **mental health conditions**
- **fertility-related conditions**
- **cardiovascular diseases**
- **bone health²**

Endometriosis and fibroids through EDCs³

Endometriosis and fibroids are the leading causes of **impaired fertility³**

PCOS and its related symptoms through air pollutant particles and particle gases⁴

PCOS is associated with an increased risk of

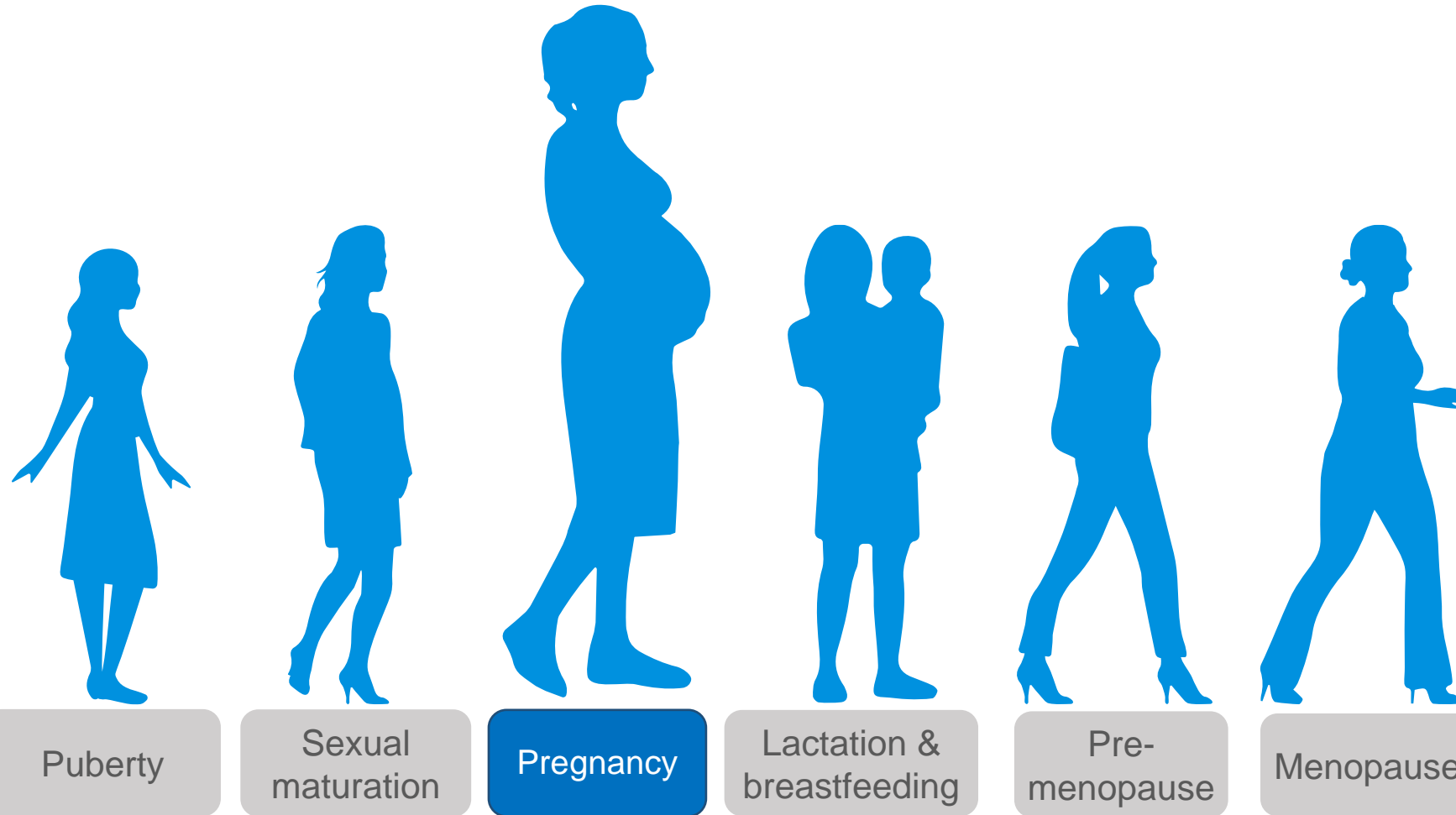
- **type 2 diabetes mellitus**
- **cardiovascular diseases⁵**

EDC, endocrine disrupting chemical; PCOS, polycystic ovary syndrome.

1. Girardi G, Bremer AA. *J Womens Health (Larchmt)* 2022;31(6):755–7; 2. Canelón SP, Boland MR. *Int J Environ Res Public Health* 2020;17(5):1703; 3. Hunt PA, et al. *J Clin Endocrinol Metab* 2016;101(4):1562–70; 4. Merkin SS, et al. *Fertil Steril* 2016;106(1):16–24; 5. Lin SY, et al. *Int J Environ Res Public Health* 2019;16(23):4816.



Pregnancy





Pregnancy



Heat stress

Can cause poor pregnancy outcomes due to gestational changes in hormonal status, immune system, thermoregulation, and metabolism¹⁻³

Maternal heat exposure is associated with

- congenital heart defects
- preterm birth
- low birth weight
- stillbirth^{3,4}

Air pollutants

Pregnant women are particularly vulnerable to **air pollutants** due to physiological changes, e.g. higher breathing volume^{1,5}

Higher air pollution levels can result in greater risk for

- miscarriage
- gestational diabetes
- preterm birth
- stillbirths¹

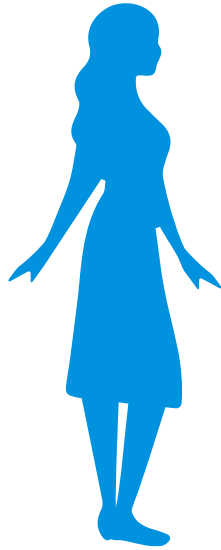
Infectious diseases

Higher temperatures **encourage transmission of infectious diseases**, which can lead to adverse pregnancy outcomes and birth defects

- **Zika virus** associated with congenital microcephaly^{1,6}
- **Dengue infection** associated with increased mortality in pregnant women⁶
- Placental **malaria infection** at delivery⁶



Lactation and breastfeeding



Puberty



Sexual maturation



Pregnancy



Lactation & breastfeeding



Pre-menopause



Menopause



Lactation and breastfeeding



Breast milk can be **contaminated by pollutants** associated with climate change^{1,2}

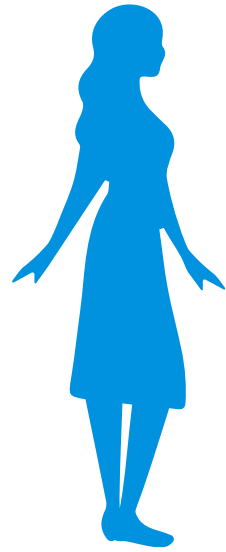
Organic lipophilic pollutants can easily enter human milk and pose danger to newborns due to their immature internal organs and nervous system²

Heavy metals have been associated with

- abnormal immune function
- allergy
- endocrine disorders
- neurodevelopment delay in children
- neuropsychiatric disorders later in life^{1,2}



Pre-menopause and menopause



Puberty



Sexual maturation



Pregnancy



Lactation & breastfeeding



Pre-menopause



Menopause



Pre-menopause and menopause



Earlier menopause

- Decline in ovarian function
- Early reduction of ovarian reserve¹

Symptom exacerbation

- Increased frequency and severity of **vasomotor symptoms**^{1,2}
- **Decreased sleep quality**²

Increased risk of underlying disorders

- **Increased risk of cardiometabolic disorders**
- **Accelerated bone loss**, which may be further exacerbated by changes during menopausal transition²



Across the lifespan

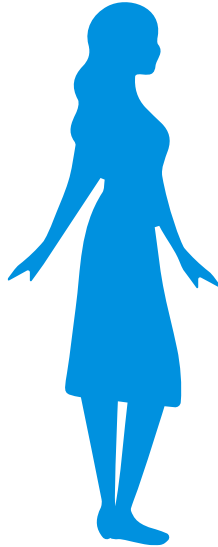


Infections

Urinary tract infections¹, fungal infections^{2,3}

Mental health

Climate anxiety, mood changes, post-traumatic stress disorder^{4,5}



Puberty



Sexual maturation



Pregnancy



Lactation & breastfeeding



Pre-menopause



Menopause

1. Simmering JE, et al. *J Urol* 2021;205(2):500-6; 2. Centers for Disease Control and Prevention. Available at: <https://www.cdc.gov/fungal/climate.html>. Accessed December 2023; 3. Gadre A, et al. *J Clim Change Health* 2022;6:100156; 4. Pandipati S, et al. *Int J Gynaecol Obstet.* 2023;160(2):394-399; 5. Rothschild K, *Int J Gynaecol Obstet.* 2023;160(2):405-413.



Audience question 2



How aware were you of the impact of climate change on women raised in these few slides?

- A. Not aware
- B. Somewhat aware
- C. Aware
- D. Very aware





Audience question 3



Are there any other ways in which climate change is having an impact on women's health now or in the next few years?





Discussion



Practical experience sharing of ideas, policies, and solutions

Ali Kubba



Disclosures



Participated in sponsored educational activity and served on advisory boards for Bayer, Merck, and Exeltis.



Practical solutions to address this vulnerability and empower women to bring about changes



Who should be in the room?

What actions can we take at different levels?



Who should be in the room?



V


Women's Voices

I

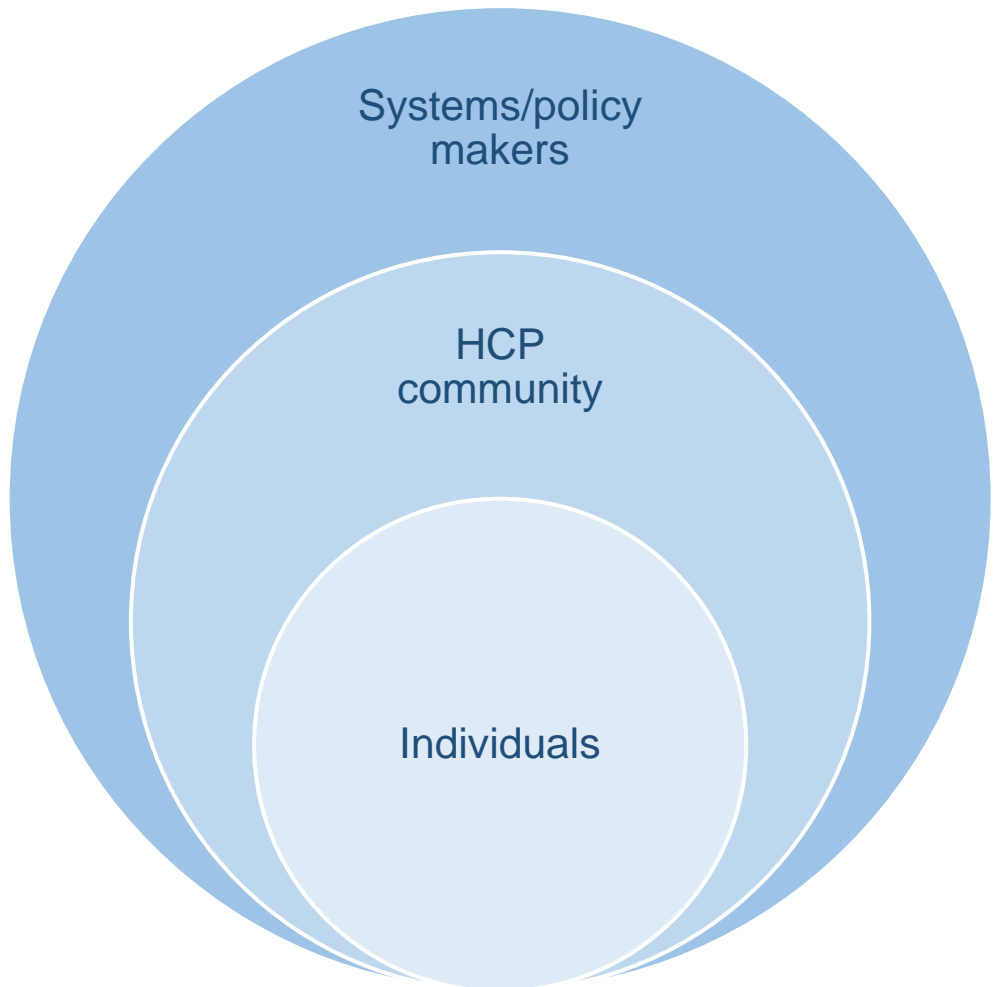
Policy makers / Institutions

P

Healthcare Practitioners



What actions can we take at different levels?



HCP, healthcare practitioner.

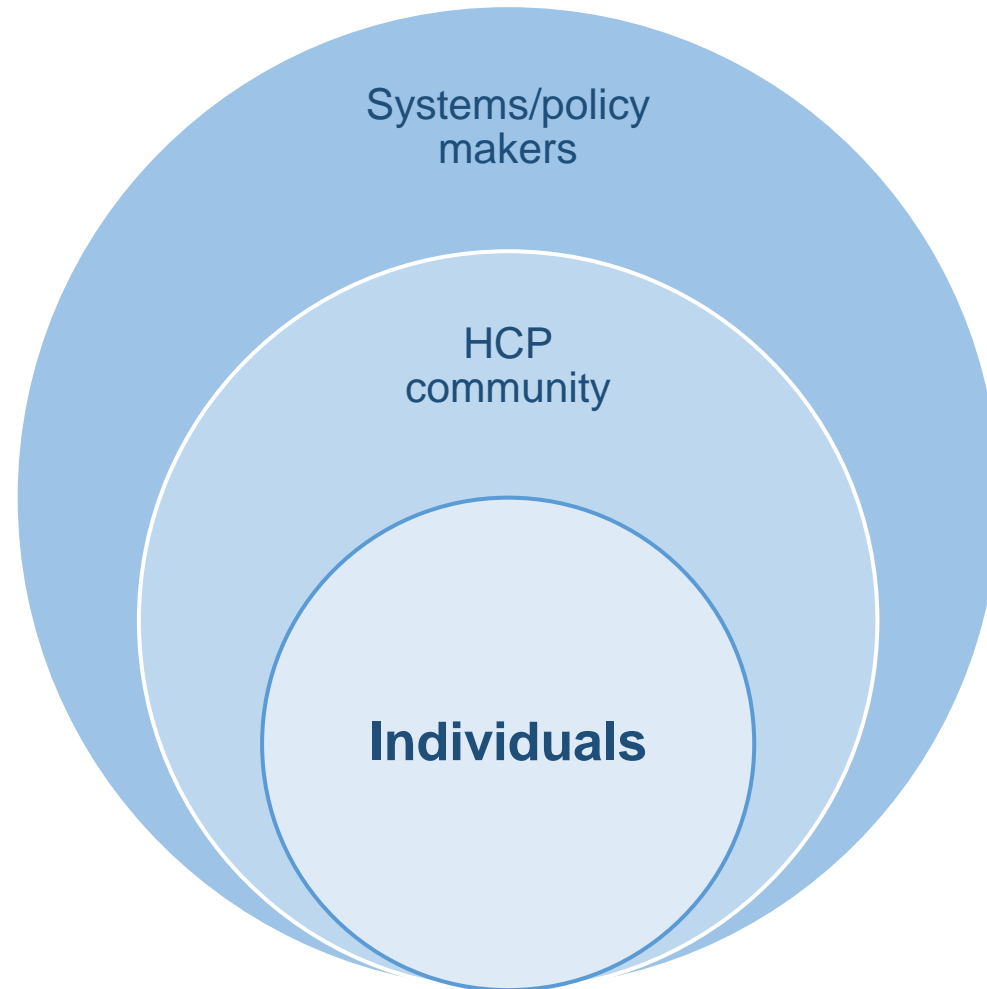


Actions at the individual level



Empower women to bring about change, e.g.

- adapt to and influence the carbon footprint
- avoid intense heat
- consume more plant-based food
- menstrual hygiene to protect against infections



Getting women to take ownership of the action

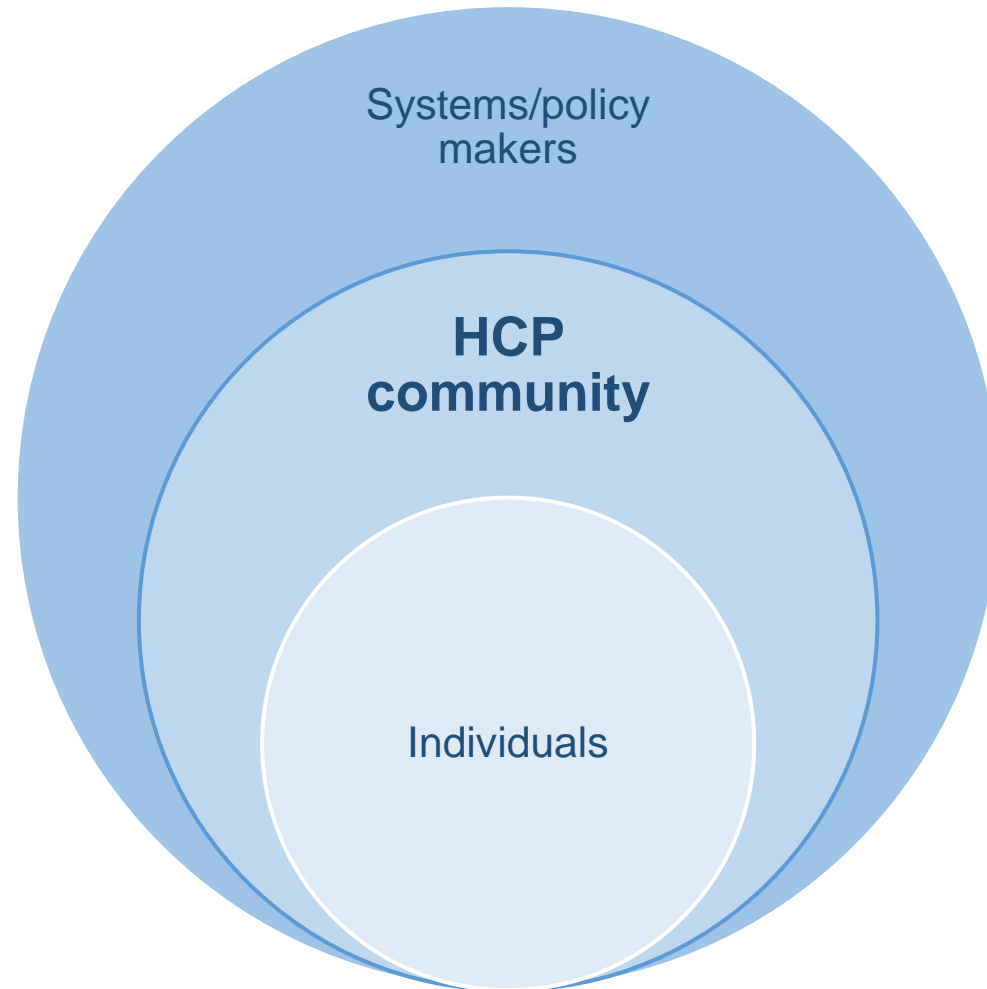
Education on the use and benefits of contraceptives



Actions at the HCP community level



Shift the focus from macro to micro systems and focus on the individual communities you are engaging with, e.g. what can you do if you run out of pills?



Implement clinical protocols to make access to contraception as easy as access to Diet Coke

Educate prescribers on how to counsel their patients and challenge myths 'Amenorrhoea Rules'



Actions at the systems/policy makers level



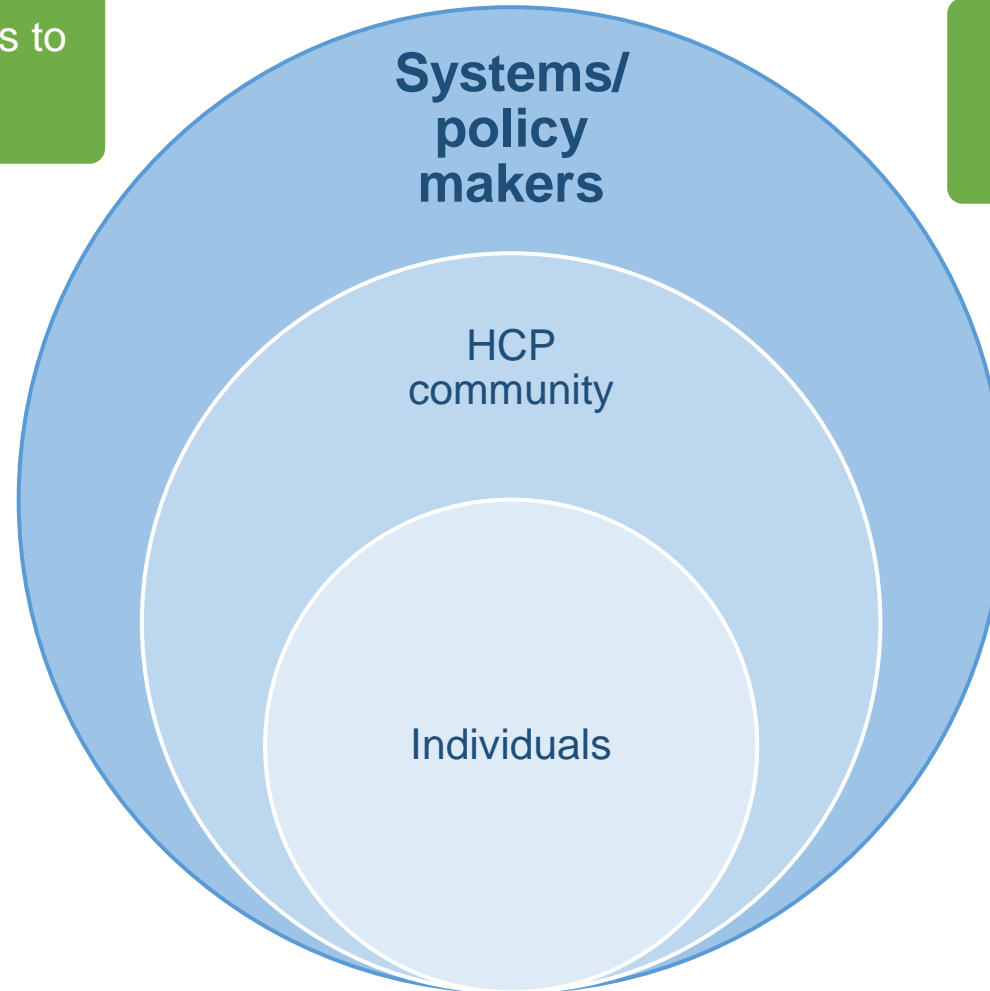
Deregulation of contraceptives to improve access

Increase funding for women's health

Emphasise women's health rights and equality

Policy and guidelines that consider gender differences
Ask SIRI!
SHE IS SO HEAT SENSITIVE

Develop resilient healthcare systems; digital, mobile, networks, AI





Further information sharing



Further resources

- Lancet Countdown: <https://www.lancetcountdown.org/>
- JAMA Insights Climate Change and Health series: <https://jamanetwork.com/>
- NEJM Climate Change: <https://www.nejm.org/browse/specialty/climate-change>
- BMJ: <https://www.bmj.com/campaign/climate-emergency>

Questions and/or suggestions

- ESCRH DocMatter Community: <https://escrh.eu/member-community/>



Audience question 4



In your opinion, what are the key priorities for action?

- A. Information
- B. Establishing protocols
- C. Responsive systems
- D. Individual effort



Audience question 5



Would you **NOW** consider the impact of climate change on patients' health during consultations?

- A. Yes
- B. No
- C. Sometimes



Audience question 6



How will you encourage patients **to act on** climate change?

- A. Inform them of the impact on their health
- B. Encourage lifestyle changes
- C. Have plans for emergencies



Audience question 7



Please share any examples or approaches you have shared, or could share, with your patients to address climate change





Discussion



Q & A



Thank you

Please complete the survey with your feedback on this symposium