Hot Blobs
Oceanic geothermal heat: out of sight, out of mind

Challenging NASEM Claims on CO2-induced Ocean Warming

With files from Arthur Viterito, Ph.D.

FRIENDS OF SCIENCE
Providing Insight into Climate Science

Prof. Stefan Rahmstorf @rahmstorf · 8h

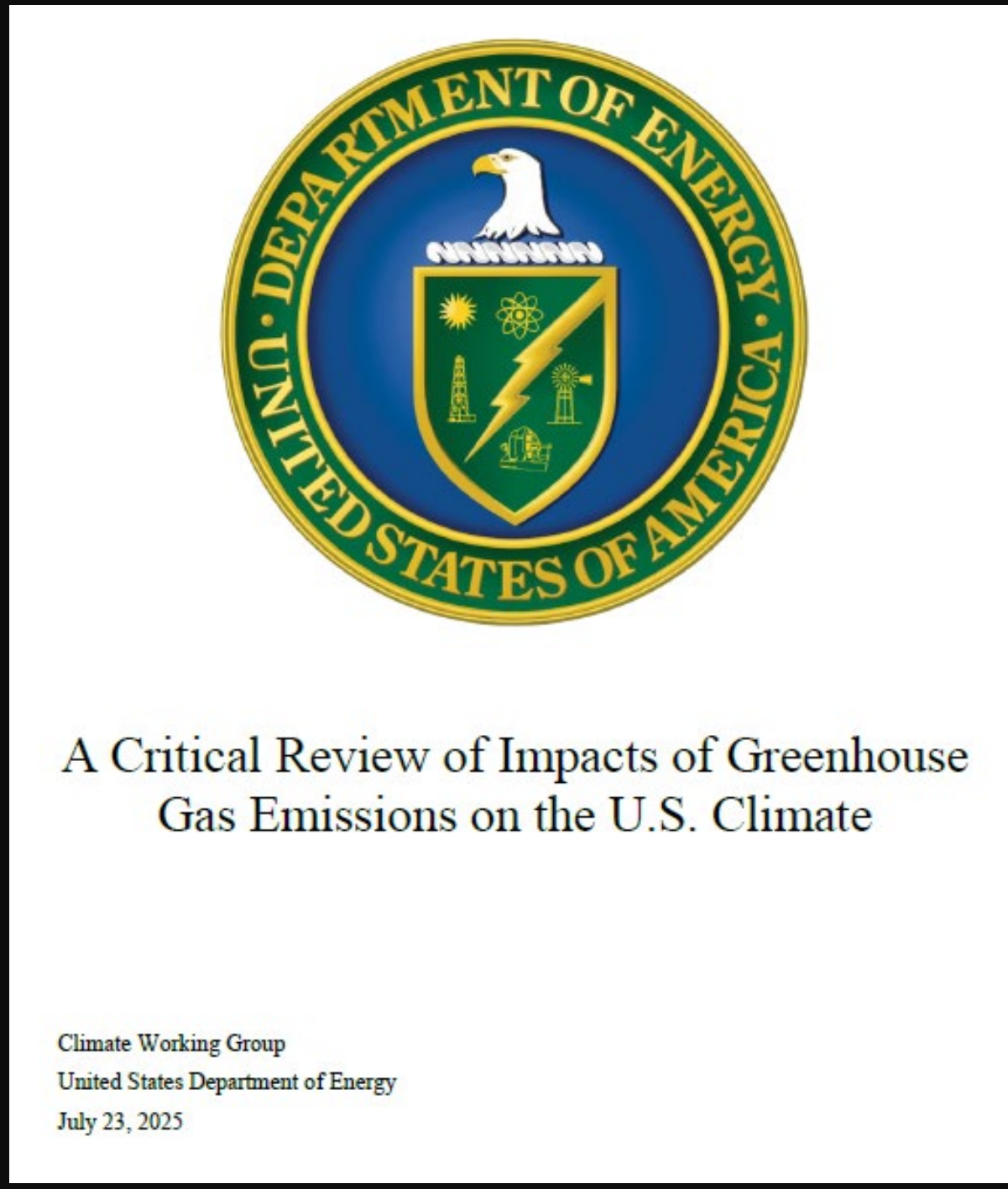
Around 6,000 ocean scientists are meeting in Glasgow at the AGU Ocean Sciences Meeting, discussing how fossil-fuel-caused climate change is affecting sea levels, ocean currents and life in our oceans. #OSM26

A New View of Climate Science

- A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate

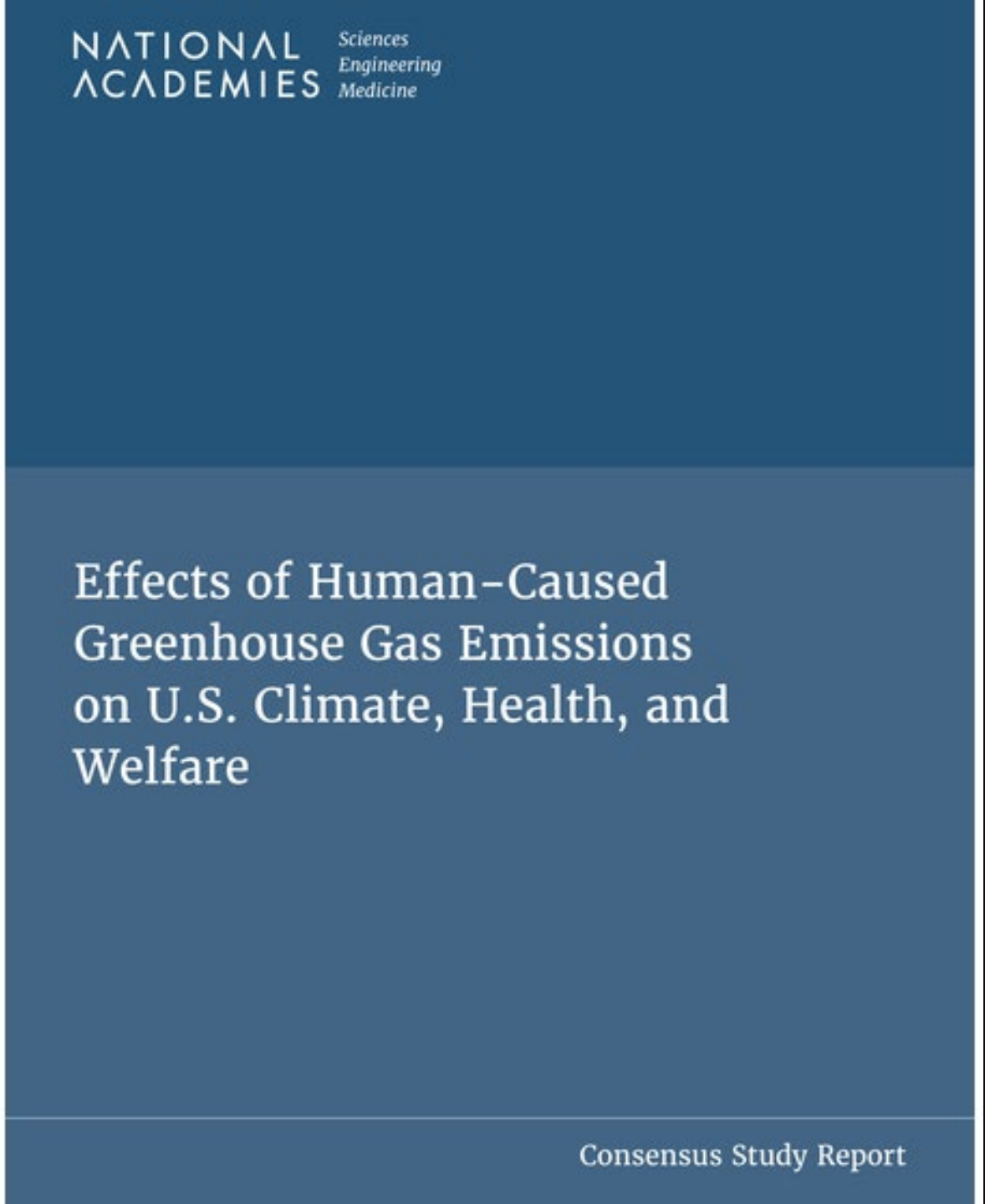
- Climate Working Group
- United States Department of Energy
- July 23, 2025

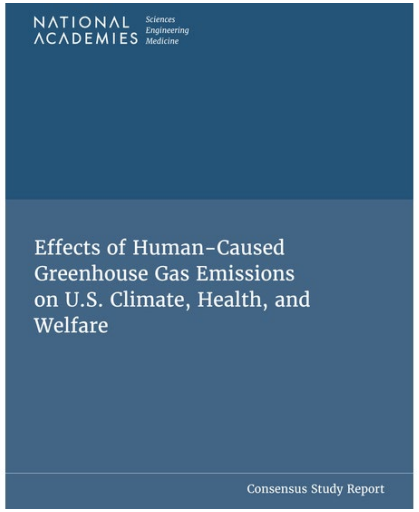
- Climate Working Group (2025) A Critical Review of Impacts of Greenhouse Gas Emissions on the U.S. Climate. Washington DC: Department of Energy, July 23, 2025



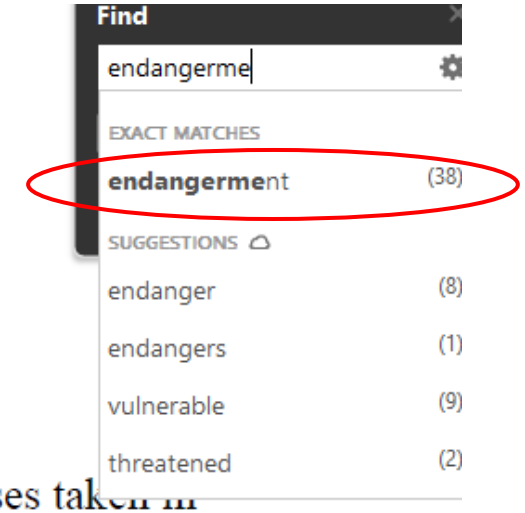
A Rebuttal ‘Consensus’ View

- National Academies of Sciences, Engineering, and Medicine. 2025. Effects of Human-Caused Greenhouse Gas Emissions on U.S. Climate, Health, and Welfare. Washington, DC: The National Academies Press. https://doi.org/10.17226/29239. September 17, 2025 https://nap.nationalacademies.org/catalog/29239/effects-of-human-caused-greenhouse-gas-emissions-on-us-climate-health-and-welfare





Foreword



The U.S. Environmental Protection Agency (EPA) concluded that "six greenhouse gases taken in combination endanger both the public health and the public welfare of current and future generations" in its 2009 "Endangerment Finding." In a Federal Register Notice published on August 1, 2025, EPA stated that the agency "unreasonably analyzed the scientific record" in making the 2009 Endangerment Finding and that subsequent "developments cast significant doubt on the reliability of the findings." Such significant claims about the scientific record deserve careful review. The Federal Register Notice proposed repealing the Endangerment Finding and invited public comments.

In response to EPA's request for public input, the National Academies of Sciences, Engineering, and Medicine undertook this independent assessment of the science underpinning the Endangerment Finding. In the Clean Air Act, the U.S. Congress instructed EPA to draw on findings, recommendations, and comments from the Clean Air Science Advisory Committee (CASAC) and the National Academy of Sciences (NAS) (42 U.S. Code § 7607(D)(3)(c)). Advice from CASAC was not available to EPA during the window when it was considering this proposed rulemaking because CASAC was disbanded in January 2025 and EPA was in the process of appointing new members (FR Doc. 2025-07538 (90 FR 18658)).

- Part of the Rationale for these Reports is related to the EPA's "CO2 endangerment finding" which the Trump Admin wants to repeal.

Endangerment finding on CO2 from 2009 drastically affected emissions regulations and costs in the USA

- https://www.epa.gov/newsreleases/epa-releases-proposal-rescind-obama-era-endangerment-finding-regulations-paved-way

EPA Releases Proposal to Rescind Obama-Era Endangerment Finding, Regulations that Paved the Way for Electric Vehicle Mandates

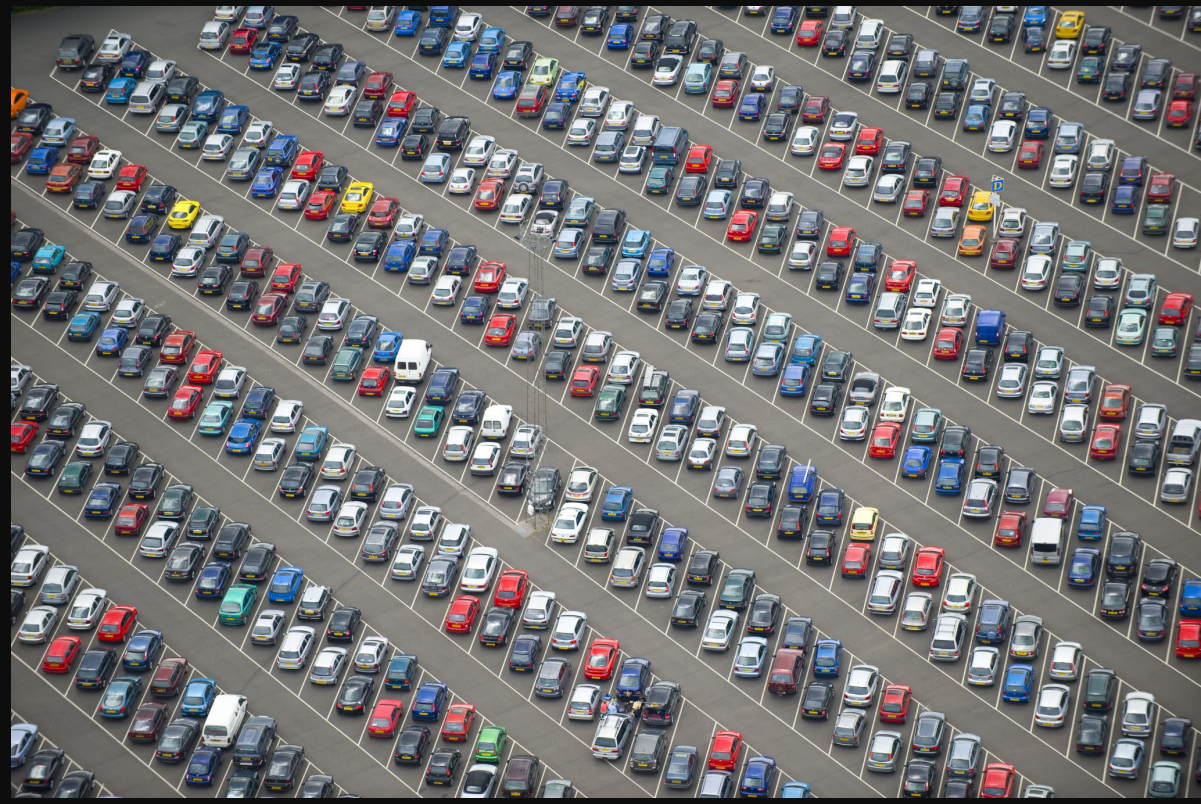
If finalized, this proposal would undo the underpinning of $1 trillion in costly regulations, save more than $54 billion annually

July 29, 2025

Contact Information
EPA Press Office (press@epa.gov)

What is it?

- The Endangerment Finding is the legal prerequisite used by the Obama and Biden Administrations to regulate emissions from new motor vehicles and new motor vehicle engines. Absent this finding, EPA would lack statutory authority under Section 202(a) of the Clean Air Act (CAA) to prescribe standards for greenhouse gas emissions. This proposal, if finalized, is expected to save Americans $54 billion in costs annually through the repeal of all greenhouse gas standards, including the Biden EPA's electric vehicle mandate, under conservative economic forecasts.
- If finalized, this proposal would remove all greenhouse gas standards for light-, medium- and heavy-duty vehicles and heavy-duty engines, starting with EPA's first greenhouse gas set in 2010 for light-duty vehicles and those set in 2011 for medium-duty vehicles and heavy-duty vehicles and engines—which includes off-cycle credits like the much-hated start-stop feature on most new cars.
- EPA's proposal also cites updated scientific data that challenge the assumptions behind the 2009 Endangerment Finding. Cited data includes the updated studies and information in the Department of Energy's 2025 Climate Work Group study that is concurrently being released for public comment.



Lee Zeldin Says It's 'Very Telling' China Wants To Keep 'Biden EPA Rule In Place'

2 hours ago · Guest Blogger · 7 Comments

From THE DAILY CALLER

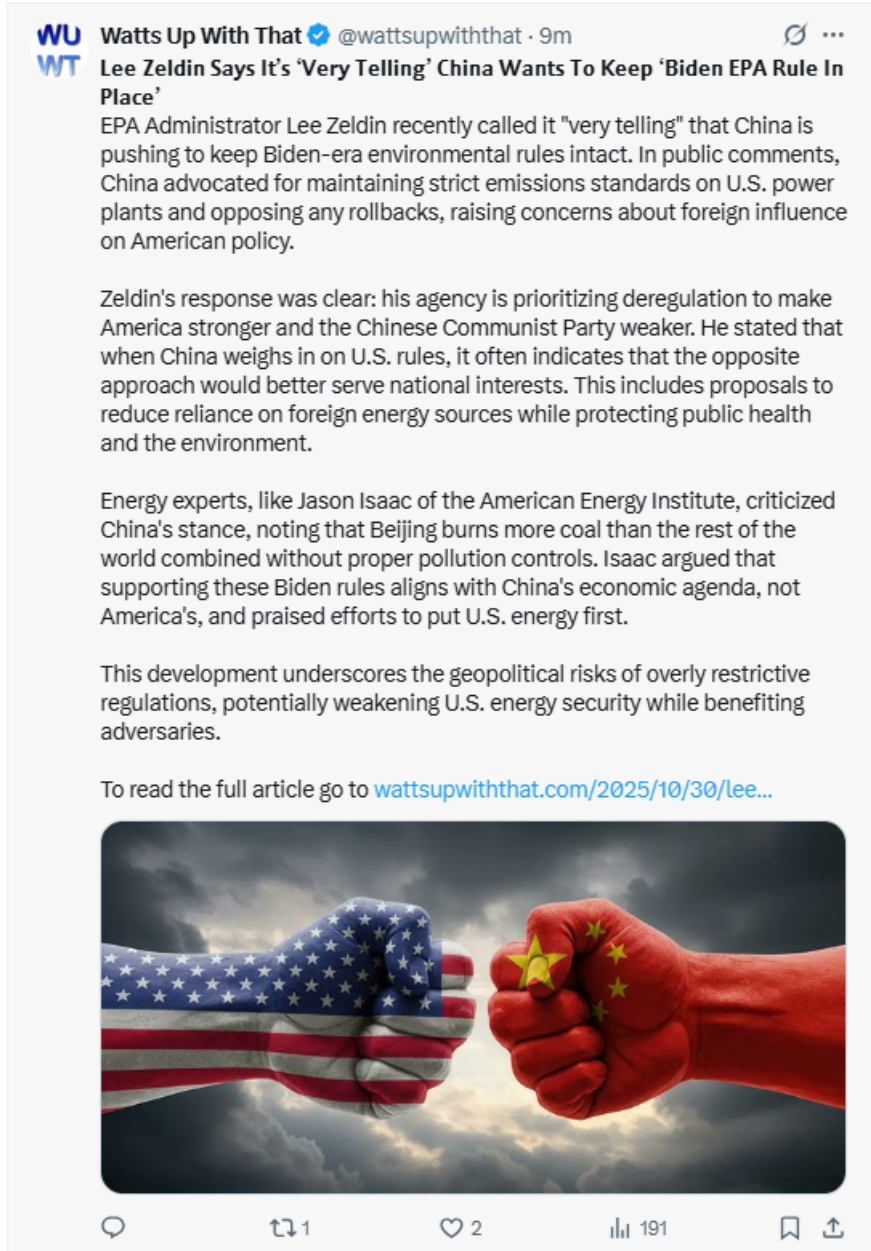
DAILY CALLER NEWS FOUNDATION

AUDREY STREB
DCNF ENERGY REPORTER

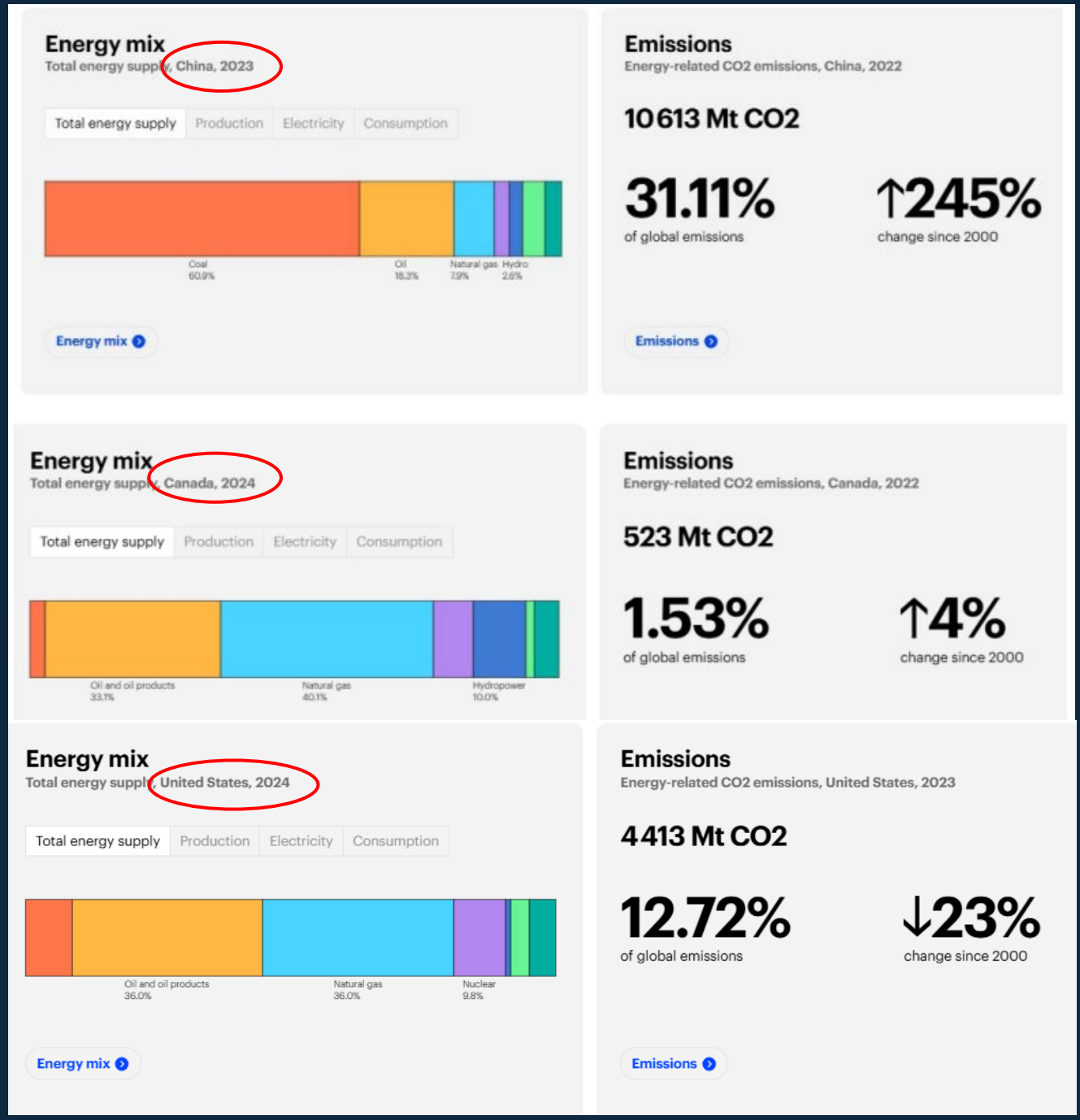
The People's Republic of China left at least three different public comments on EPA rule proposals that would cut or reform some aggressive Biden-era regulations that energy policy experts have previously told the DCNF could devastate America's power grid. Zeldin has proposed several deregulatory actions to boost American energy while safeguarding human health and the environment, including rules that drew China's attention in August.

Specifically, China urged the EPA to preserve its emissions rules for coal- and oil-fired power plants, maintain existing greenhouse gas standards for fossil fuel plants and refrain from imposing restrictions on foreign renewable fuel imports. The EPA introduced the three proposed rules to roll back strict Obama and Biden-era emissions standards and to update renewable fuel standards as part of "reducing reliance on foreign sources of oil," according to the agency.

https://wattsupwiththat.com/2025/10/30/lee-zeldin-says-its-very-telling-china-wants-to-keep-biden-epa-rule-in-place/



Who is the large emitter?



Endangerment Finding Eliminated by the Trump Administration on Feb. 12, 2026

https://www.epa.gov/newsreleases/president-trump-and-administrator-zeldin-deliver-single-largest-deregulatory-action-us

President Trump and Administrator Zeldin Deliver Single Largest Deregulatory Action in U.S. History

Trump Admin Eliminates Obama-Era Endangerment Finding, off-cycle credits, start-stop feature

February 12, 2026

Contact Information
EPA Press Office (press@epa.gov)

WASHINGTON – Alongside President Trump in the White House's Roosevelt Room, U.S. Environmental Protection Agency (EPA) Administrator Lee Zeldin announced the single largest deregulatory action in U.S. history. In this final rule, EPA is saving American taxpayers over $1.3 trillion, eliminating both the Obama-era 2009 Greenhouse Gas (GHG) Endangerment Finding and all subsequent federal GHG emission standards for all vehicles and engines of model years 2012 to 2027 and beyond. The action also eliminates all off-cycle credits, including for the almost universally hated start-stop feature. EPA's historic move restores consumer choice, makes more affordable vehicles available for American families, and decreases the cost of living on all products by lowering the cost of trucks. This major deregulatory process included substantial public input and robust analysis of the law following the U.S. Supreme Court decision in *Loper Bright Enterprises v. Raimondo and West Virginia v. EPA.*

*"The Endangerment Finding has been the source of 16 years of consumer choice restrictions and trillions of dollars in hidden costs for Americans," **said Administrator Zeldin**. "Referred to by some as the 'Holy Grail' of the 'climate change religion,' the Endangerment Finding is now eliminated. The Trump EPA is strictly following the letter of the law, returning commonsense to policy, delivering consumer choice to Americans and advancing the American Dream. As EPA Administrator, I am proud to deliver the single largest deregulatory action in U.S. history on behalf of American taxpayers and consumers. As an added bonus, the off-cycle credit for the almost universally despised start-stop feature on vehicles has been removed."*

The 2009 Endangerment Finding was used to justify trillions of dollars in regulations, including the Obama and Biden Administrations' illegal push towards Electric Vehicle (EV) mandates and compliance requirements, while simultaneously driving up the cost of vehicles for American families and small businesses— limiting economic mobility and the American Dream. The final rule will save Americans over $1.3 trillion by removing the regulatory requirements to measure, report, certify, and comply with federal GHG emission standards for motor vehicles, and repeals associated compliance programs, credit provisions, and reporting obligations that exist solely to support the vehicle GHG regulatory regime. Americans will have certainty, flexibility and regulatory relief, allowing companies to plan appropriately, and empowering American families.

The DOE Climate Report played no role. Rationale for Rescission of CO_2 Endangerment Finding

Legal – the EPA "agency concludes that Section 202(a) of the CAA [Clean Air Act] does not provide statutory authority for EPA to prescribe motor vehicle and engine emission standards in the manner previously utilized, including for the purpose of addressing global climate change, and therefore has no legal basis for the Endangerment Finding and resulting regulations."

Scientific – "EPA now finds that even if the U.S. were to eliminate all GHG emissions from all vehicles, there would be no material impact on global climate indicators through 2100. Therefore, maintaining GHG emission standards is not necessary for EPA to fulfill its core mission of protecting human health and the environment, but regardless, is not within the authority Congress entrusted to EPA."

No Justification in the First Place

Matt Ridley @mattwridley · 2h

Nonsense. The scientific evidence of current benefit from global greening is stronger than the scientific evidence of future harm from global warming.

Calling carbon dioxide a danger to public health is mad – it is an odourless, invisible, non-toxic plant food produced by human lungs at far higher concentrations than found in normal air.

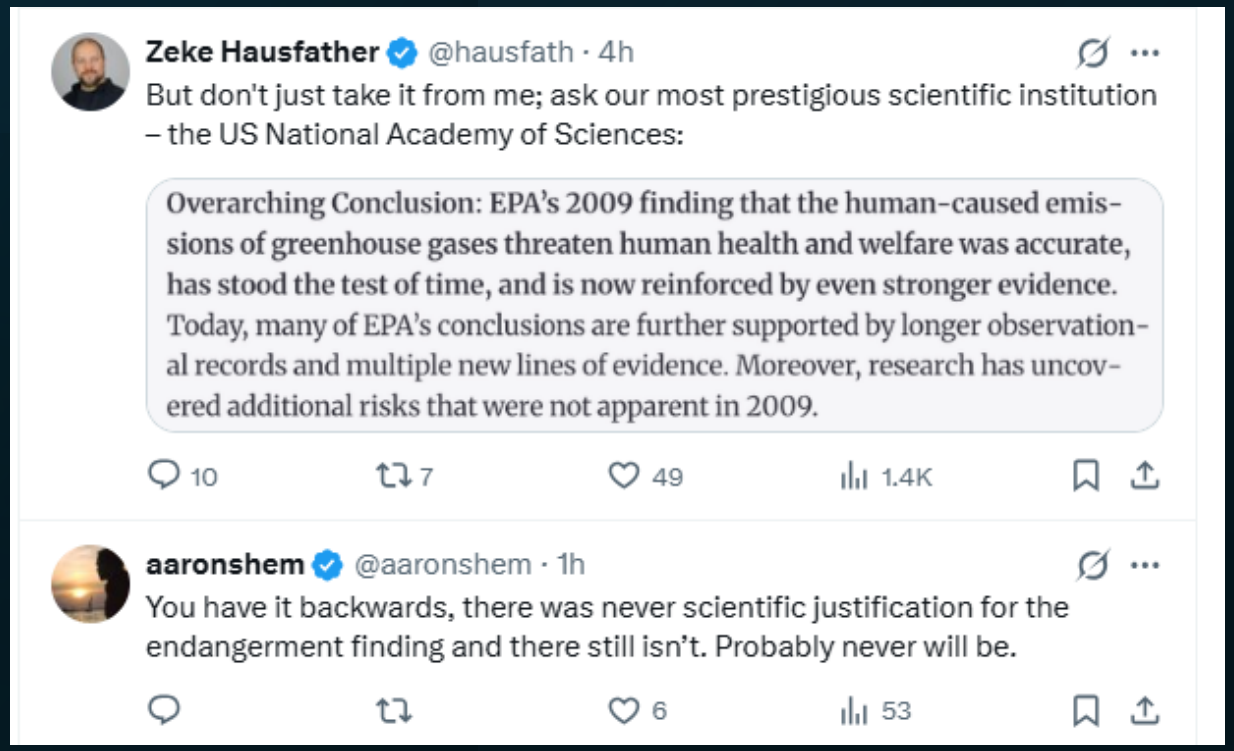
If it's a danger, then so is dihydrogen monoxide, which regularly kills people.

The only scientific justification for the endangerment finding was that a child in Chad, say, might die of heat stroke in 50 years' time as a result of carbon dioxide-induced global warming.

But it's more likely that the same child might NOT die of starvation TODAY as a result of carbon dioxide-induced global greening – an effect that has increased crop yields and goat fodder by roughly 15-20 per cent in 40 years.

> **Zeke Hausfather** @hausfath · 4h
> The scientific understanding of human-driven climate change is much stronger today than it was in 2009 when the EPA first issued the endangerment finding. There is no scientific basis for the Trump administration's decision to repeal it nationalacademies.org/read/29239/cha...

24 101 359 12K



Zeke Hausfather @hausfath · 4h

But don't just take it from me; ask our most prestigious scientific institution – the US National Academy of Sciences:

> Overarching Conclusion: EPA's 2009 finding that the human-caused emissions of greenhouse gases threaten human health and welfare was accurate, has stood the test of time, and is now reinforced by even stronger evidence. Today, many of EPA's conclusions are further supported by longer observational records and multiple new lines of evidence. Moreover, research has uncovered additional risks that were not apparent in 2009.

10 7 49 1.4K

aaronshem @aaronshem · 1h

You have it backwards, there was never scientific justification for the endangerment finding and there still isn't. Probably never will be.

6 53

Not everyone was happy about it.

Meanwhile, in Canada – Carbon Taxes are Calculated based on this now non-existent US ruling

- The updated estimates herein are identical to those adopted by the U.S. EPA in their draft technical update, converted to Canadian currency in constant 2021 dollars. The U.S. EPA's draft guidance is undergoing review by an external expert peer-review panel into spring 2023, witha formal update to U.S. EPA guidance anticipated by fall 2023 or winter 2024. https://www.canada.ca/en/environment-climate-change/services/climate-change/science-research-data/social-cost-ghg.html

Meanwhile, in Canada – Carbon Taxes are Calculated based on this now non-existent US ruling

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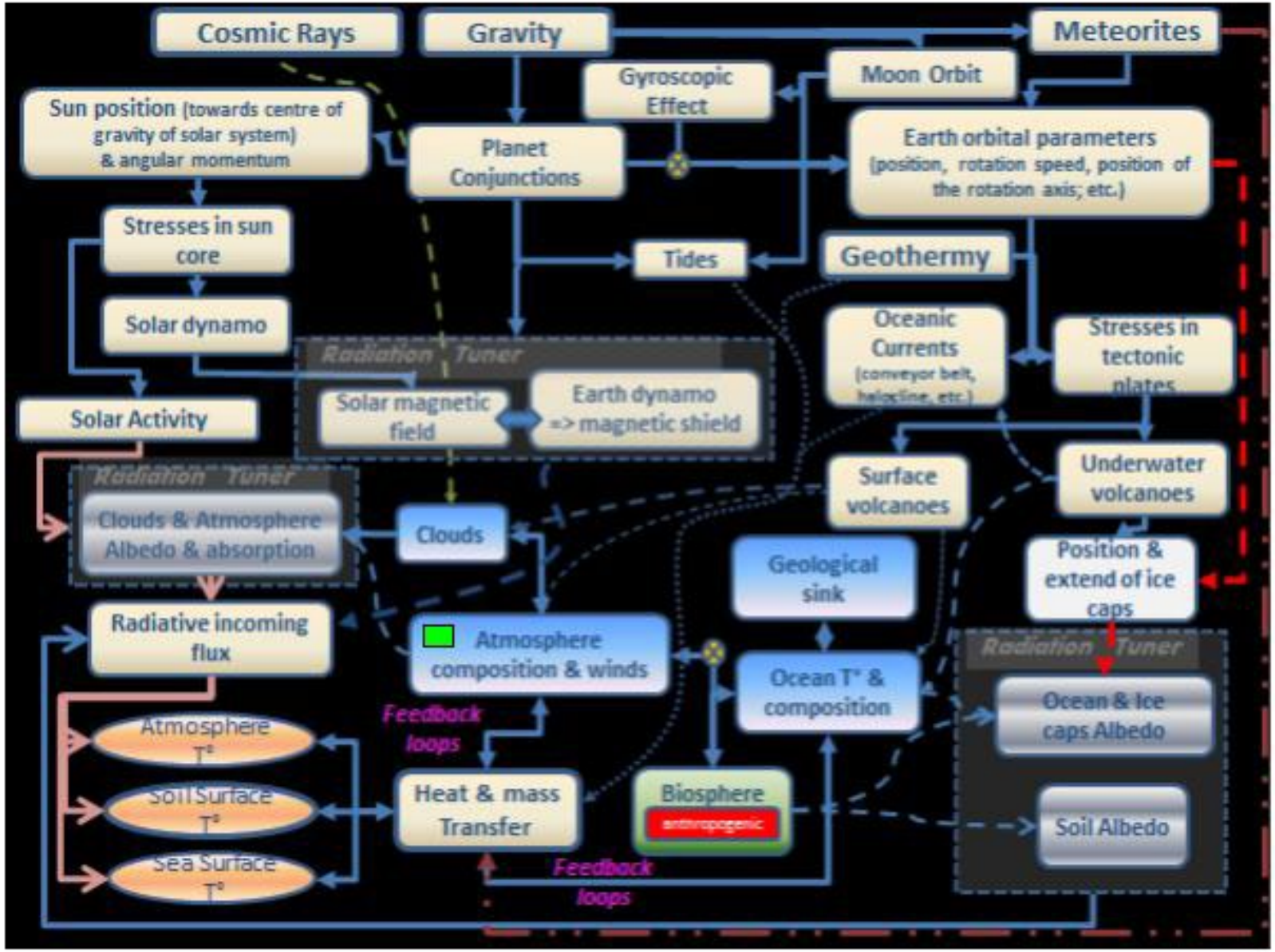
https://www.canada.ca/en/environment-climate-change/services/climate-change/science-research-data/social-cost-ghg.html


Climate Science is Complex and Multi-disciplinary. We usually only hear about the claim that human industrial GHG emissions drive climate. What if there's more to it?

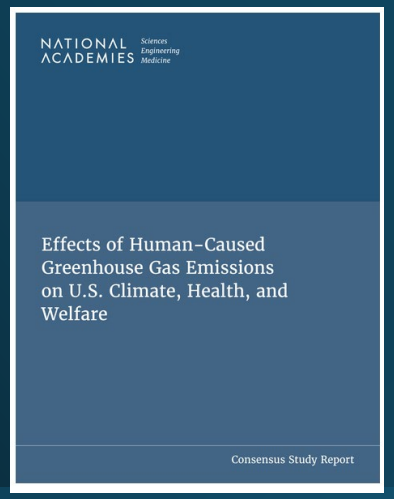
Climate Change occurs in a coupled non-linear chaotic system.



Visualization by Henri Masson, complex systems expert

"In climate research and modelling, we should recognize that we are dealing with a coupled non-linear chaotic system, and therefore that long-term prediction of future climate states is not possible."

~ The Intergovernmental Panel on Climate Change ~
(IPCC)
Third Assessment Report (2001)
Section 14.2.2.2, page 774



Do Human-caused Greenhouse Gases Drive Marine Heat Waves?

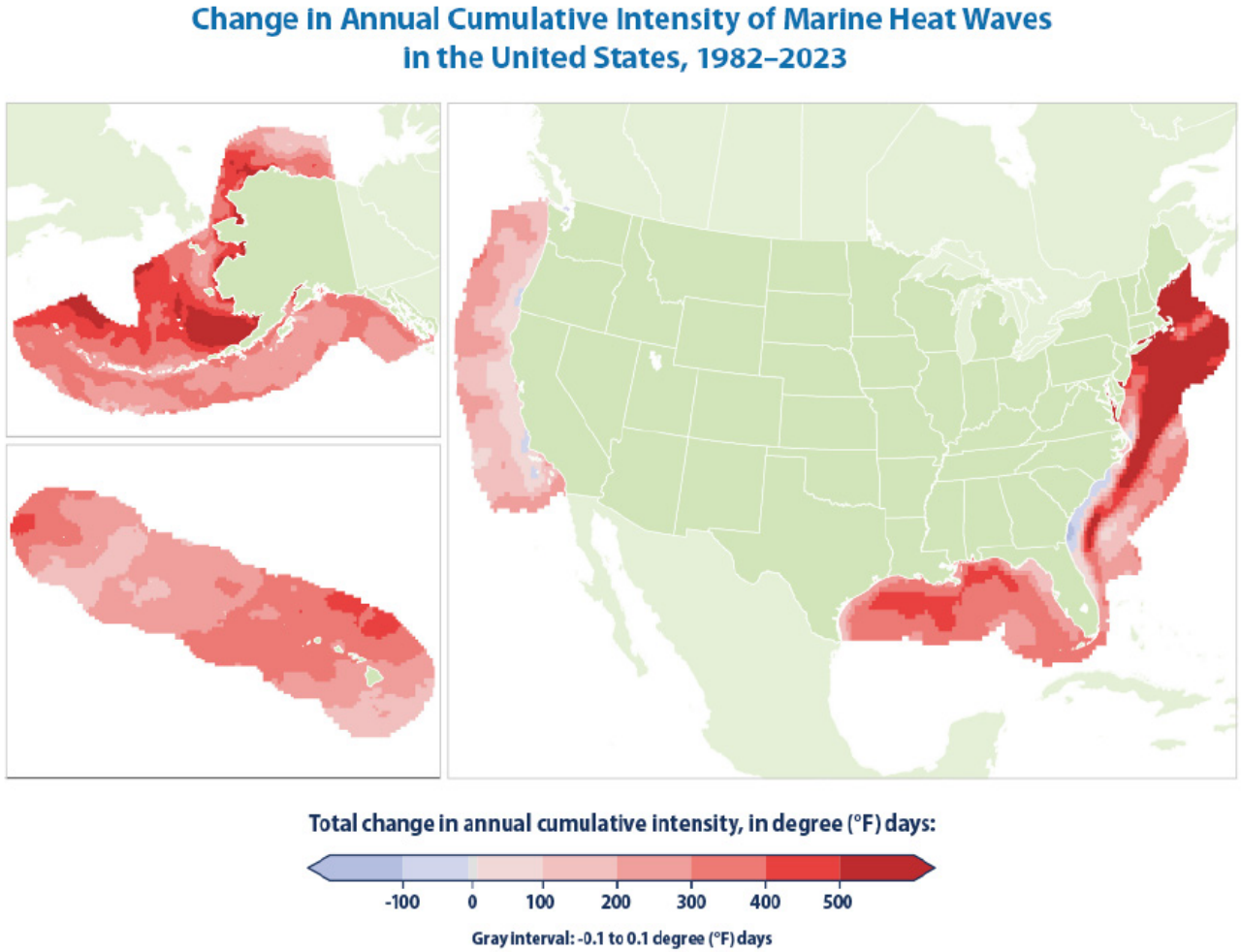


FIGURE 3.4 Change in annual cumulative intensity of marine heat waves in the United States, 1982-2023. Cumulative intensity is measured in degree days—marine heat wave intensity multiplied by duration. Areas with increases are shown in red, with darker colors indicating greater change. The map shows total change, which is the annual rate of change (trend slope) multiplied by the number of years analyzed. Data from NOAA NCEI.
SOURCE: U.S. Environmental Protection Agency. Climate Change Indicators in the United States. Marine Heat Waves. Accessed September 2025. https://www.epa.gov/climate-indicators/climate-change-indicators-marine-heat-waves.

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The Ignored Geothermal Hotspot off the Kamchatka Peninsula

SEPTEMBER 19, 2025 / 0 COMMENTS

https://blog.friendsofscience.org/2025/09/19/the-ignored-geothermal-hotspot-off-the-kamchatka-peninsula/

Written by **Dr. Arthur Viterito Ph.D.** on September 9, 2025. Republished with permission from Arthur Viterito.

The amount of seismic activity around the Kamchatka peninsula has been extraordinarily high the past few months, and climate alarmists deliberately ignore it

This is noteworthy because the area has become a geothermal "hotspot" driving significant warming of the Kuroshio Current, the Pacific's equivalent to the Gulf Stream.

The "culprit" here is the Eastern Volcanic Front, a fore arc basin off Kamchatka's east coast.

The hypothesis is that geothermal heating is a much bigger contributor to ocean warming than CO_2.

NASEM Climate Report

- 3.4 OCEAN HEAT AND CHEMISTRY Ocean Heat Content The evidence that the ocean has warmed as a result of excess GHGs has grown stronger since EPA (2009). Because water has a much higher heat capacity than the atmosphere, the ocean is the main reservoir for heat in the climate system. Ocean warming starts at the surface but is transferred to deeper layers by ocean circulation. An accurate estimate of ocean heat content is fundamental to understanding the evolving climate system and fundamental in the estimation of the Earth energy imbalance (Section 2.3). …

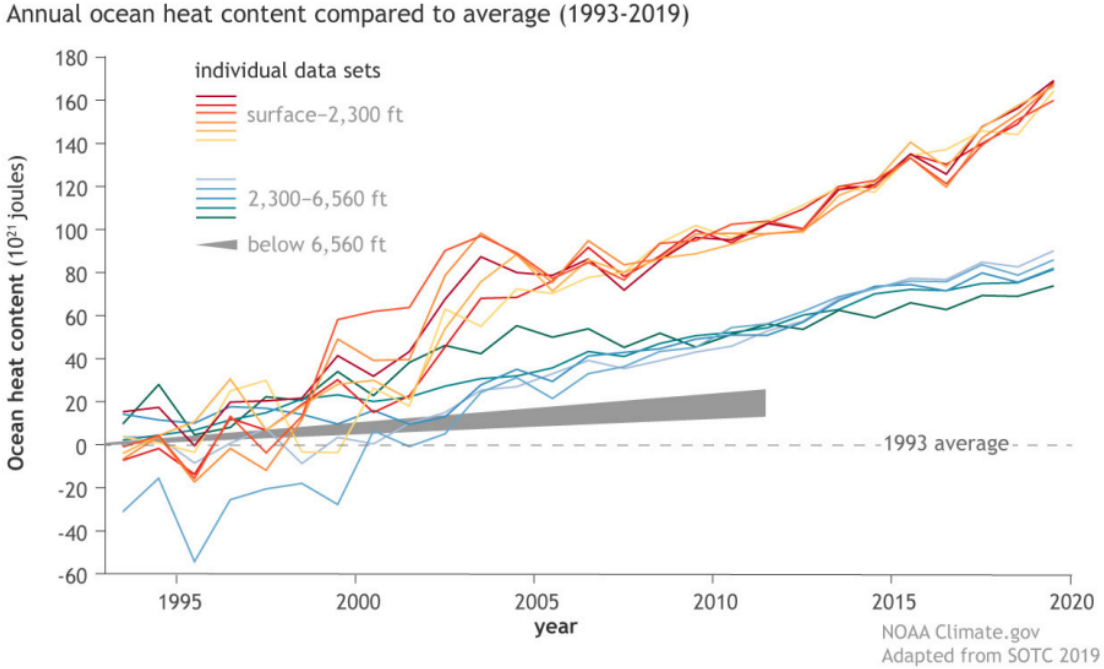
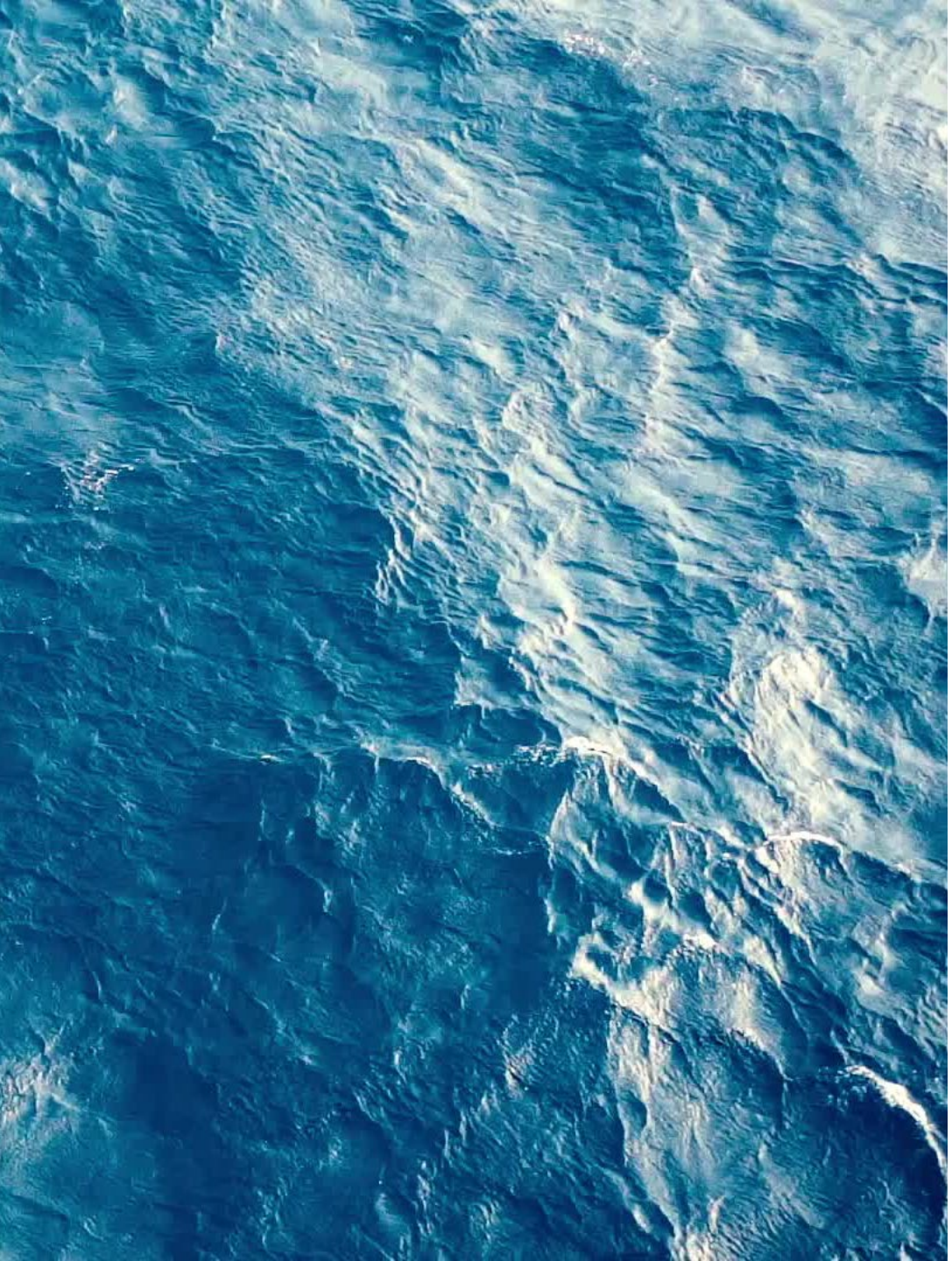


FIGURE 3.3 Annual ocean heat content compared to the 1993 average from 1993-2019, based on multiple data sets: surface to depths of 2,300 feet (700 meters) in shades of red, orange, and yellow; from 2,300-6,650 feet (700-2,000 meters) in shades of green and blue; and below 6,650 feet (2,000 meters) as a gray wedge. Graph by NOAA Climate.gov, adapted from Figure 3.6 in State of the Climate in 2019.
SOURCE: NOAA, 2025.



NASEM continues…

- A robust increase in global sea surface temperature has been observed since 1900 (Garcia-Soto et al., 2021) and increases in summer upper-ocean stratification are apparent from 1970-2018 (Sallée et al., 2021). Increases in the heat content of the upper approximately 6,560 feet (2,000 meters) of the ocean are also evident since 1960 throughout the global oceans (Garcia-Soto et al., 2021), consistent with the Earth's energy imbalance.
- The advent of the Argo float network in 2004 greatly improved the spatial and temporal coverage of in situ measurements of temperatures in the upper layer of the ocean, which previously had been measured by electronic instruments lowered from ships.
- Currently, more than 3,900 Argo floats provide about 140,000 temperature (and salinity) profiles per year from the sea surface to about 6,560 feet (2,000 meters) depth at places across the globe (NASEM, 2017).
- The Deep Argo program, which began in 2014 and expanded in 2016, advanced sampling of temperatures down to about19,685 feet (6,000 meters) depth and enabled estimation of ocean heat gain over the full water column.

ARGOS POWERED BY CLS

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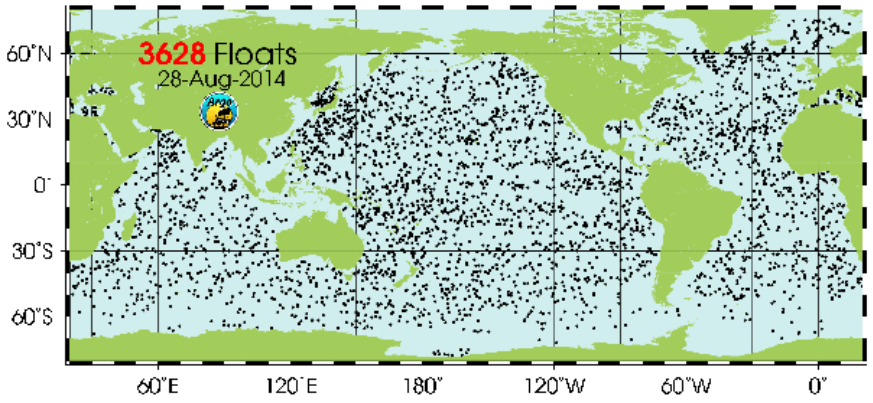
HOME > PROJECTS > ARGO: GLOBAL OCEAN OBSERVING PROGRAM

Argo: Global Ocean Observing Program

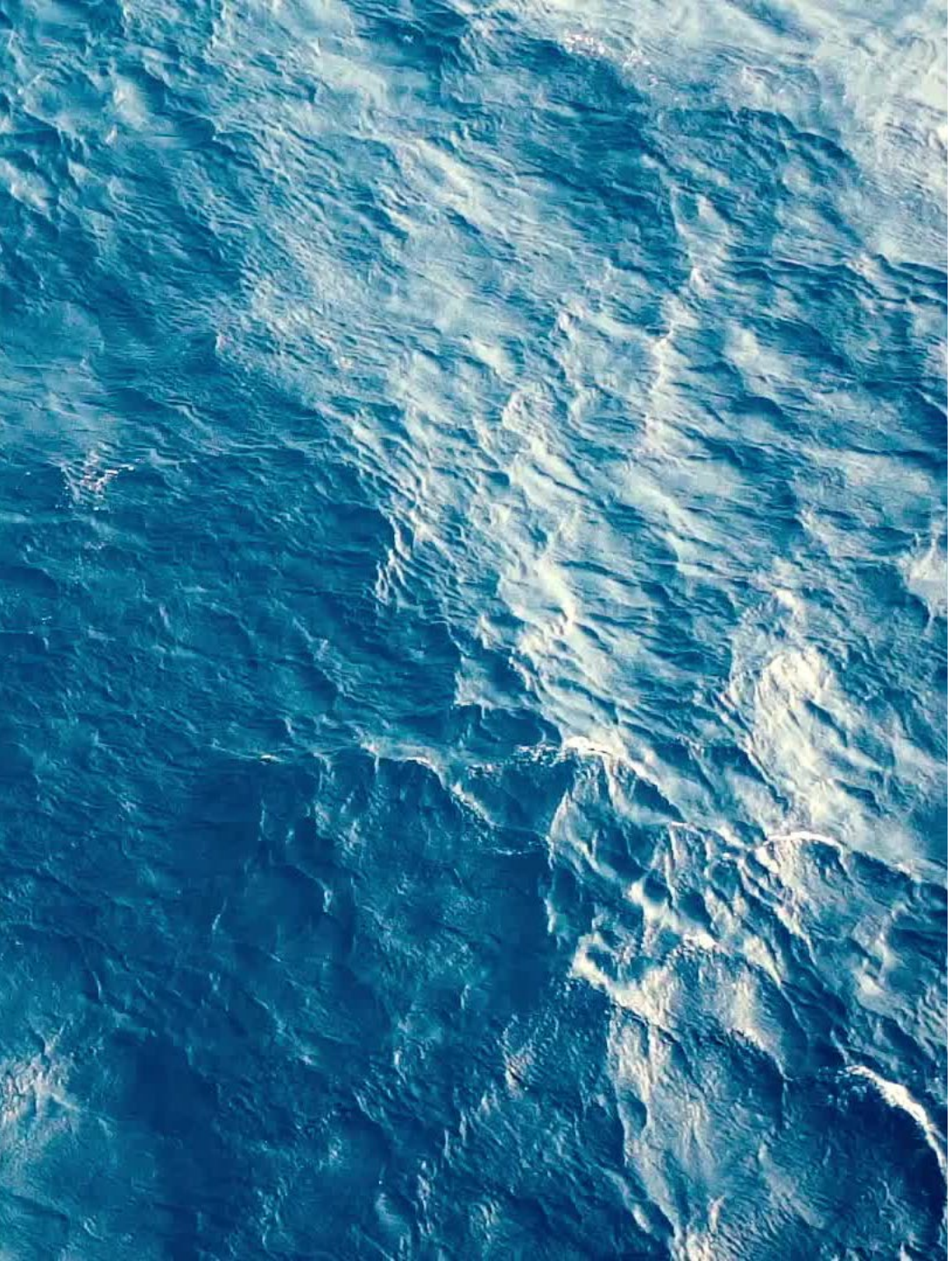
https://www.argos-system.org/project/argo-global-ocean-observing-program/

The Argo program comprises a network of oceanography floats belonging to 25 countries. The program's ultimate objective is to release 3,000 floats covering ice-free areas to study long-term ocean variability. Some data collected from these floats, including temperature and salinity profiles, are relayed by Argos.

Then distributed worldwide and posted on websites as well as specialized information networks. These data are giving scientists valuable information about the oceans and their role in shaping climate – a key element of the Global Ocean Observing System (GOOS) seeking to ensure sustainable development of our planet.



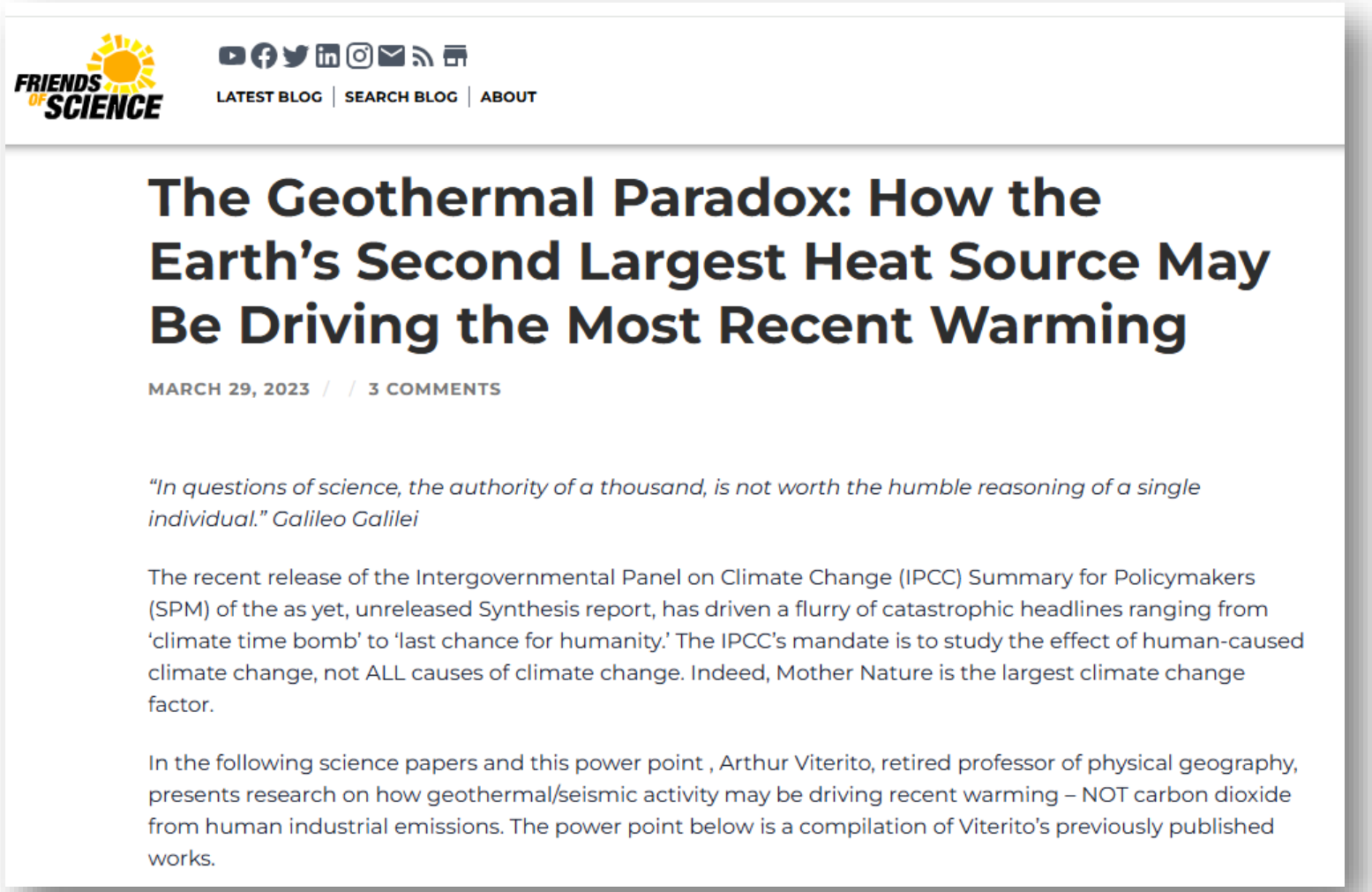
Access Argo Website



NASEM continues…

- Heat absorbed by surface ocean waters is transported laterally and vertically through the layers and basins of the ocean via mixing and currents. Regionally, subsurface ocean temperature can also vary substantially with climate patterns such as El Niño, the Pacific Decadal Oscillation, the North Atlantic Oscillation, and large variations in wind stress over the ocean.
- On a regional basis, closure of the heat budget requires observations of ocean heat content, air-sea heat exchange, heat transport by ocean currents, and mixing.
- Ocean warming has contributed to increases in rainfall intensity, rising sea levels due to thermal expansion, the destruction of coral reefs, declining ocean oxygen levels, and declines in ice sheets, glaciers, and ice caps in the polar regions (Cheng et al., 2019; Hamlington et al., 2022).
- This warming is also one of many factors that has increased the number of low-oxygen dead zones in many places around the United States (USGCRP, 2023).

What of the Correlation of Seismic Activity and Recent Global Warming?



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The Geothermal Paradox: How the Earth's Second Largest Heat Source May Be Driving the Most Recent Warming

MARCH 29, 2023 / / 3 COMMENTS

"In questions of science, the authority of a thousand, is not worth the humble reasoning of a single individual." Galileo Galilei

The recent release of the Intergovernmental Panel on Climate Change (IPCC) Summary for Policymakers (SPM) of the as yet, unreleased Synthesis report, has driven a flurry of catastrophic headlines ranging from 'climate time bomb' to 'last chance for humanity.' The IPCC's mandate is to study the effect of human-caused climate change, not ALL causes of climate change. Indeed, Mother Nature is the largest climate change factor.

In the following science papers and this power point , Arthur Viterito, retired professor of physical geography, presents research on how geothermal/seismic activity may be driving recent warming – NOT carbon dioxide from human industrial emissions. The power point below is a compilation of Viterito's previously published works.

https://blog.friendsofscience.org/2023/03/29/the-geothermal-paradox-how-the-earths-second-largest-heat-source-may-be-driving-the-most-recent-warming/

Arthur Viterito explained:

- As a first response, let me just say this: the ARGO data is misunderstood by a large number of researchers. When you look at it through the lens of geothermal heating, it suddenly makes A LOT of sense:
- "Liquid water efficiently absorbs terrestrial infrared (thermal) radiation due to strong absorption bands caused by O-H stretching vibrations and hydrogen bonding. ***This absorption primarily occurs within micrometers of the surface, preventing significant heating of deeper water bodies*** and contributing to the ocean's thermal skin layer. The absorption is strongest in the far-infrared, or thermal infrared, region, which is where Earth's surface radiates most of its heat."
- Keep in mind, the thermal IR from earth's atmosphere is absorbed in the first few MICROMETERS. A MICROMETER IS 1/1,000 OF A METER, or the thickness of a single bacterium!

Note From Friends of Science team: IR penetrating to within a few micrometers of the surface contributes to warming of the "well mixed" surface layer which ranges to depths of 10 to 200 meters, depending on such parameters as wind, temperature and salinity. However, it takes a long, long time for temperature changes in the well mixed layer to influence ocean temperature down to 6000 meters.

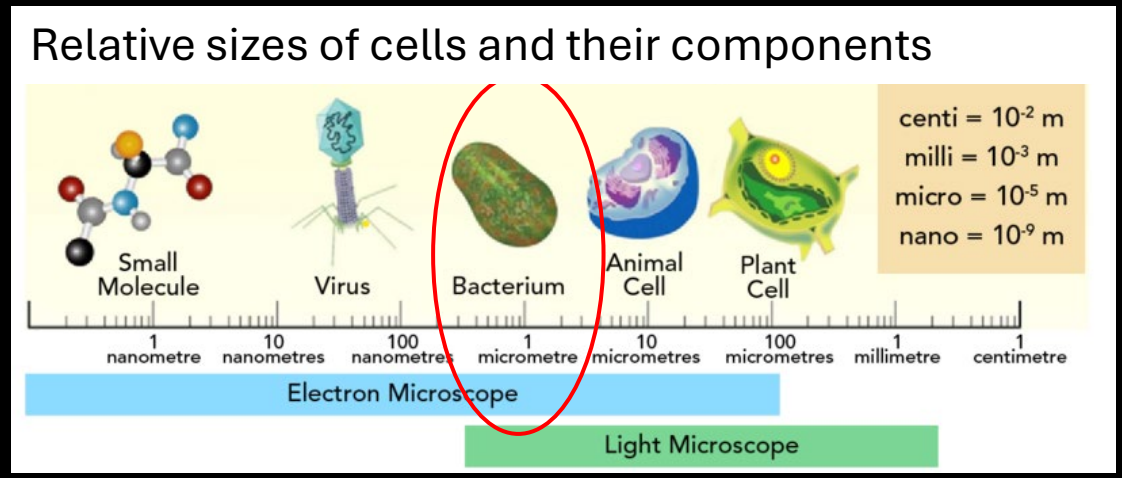

Diagram showing the relative sizes of some very small things including bacteria, which are typically around 1 to 2 µm in diameter (Source Michigan Nanotechnology Institute for Medicine and Biological Sciences

https://letstalkscience.ca/educational-resources/backgrounders/introduction-bacteria

Journal of
Earth Science & Climatic Change

ISSN: 2157-7617

Viterito, J Earth Sci Clim Change 2016, 7:4
DOI: 10.4172/2157-7617.1000345

Research Article Open Access

The Correlation of Seismic Activity and Recent Global Warming

Arthur Viterito*

However, the majority of earth's geothermal heat is released along the mid-ocean spreading zones [4,6], a 67,000 km tectonic complex for which we have very little data (Figure 1). The problem in accurately assessing heat flow from these high geothermal flux areas (HGFA) is that they are poorly sampled. Located in the middle of ocean basins at great depths, they are far removed from the predominantly land-based seismic network. According to Langmuir and Forsythe [7], we are still in the "very early stages of understanding" these extensive, complex tectonic systems. ...For the experiment, seismic activity is used as a proxy for geothermal flux. The rationale for the design is well understood and amply documented in the literature: seismicity is strongly associated with geothermal flow [19-21] and it is easily deduced that increasing seismicity will indicate increasing geothermal flux.

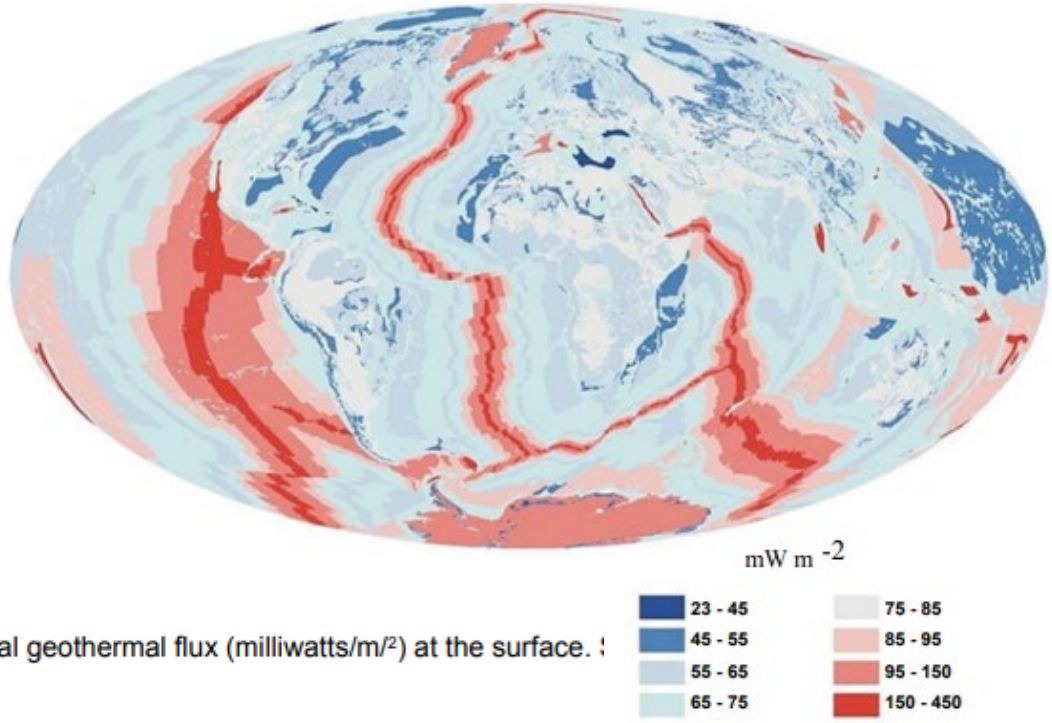

Figure 1: Global geothermal flux (milliwatts/m/²) at the surface. S

Source: Davies JH, Davies DR (2010) Earth's surface heat flux. Solid Earth 1: 5-24.

https://www.omicsonline.org/open-access/the-correlation-of-seismic-activity-and-recent-global-warming-2157-7617-1000345.pdf

The Geothermal Paradox: How the Earth's Second Largest Heat Source May Be Driving the Most Recent Warming

MARCH 29, 2023 / / 3 COMMENTS

"In questions of science, the authority of a thousand, is not worth the humble reasoning of a single individual." Galileo Galilei

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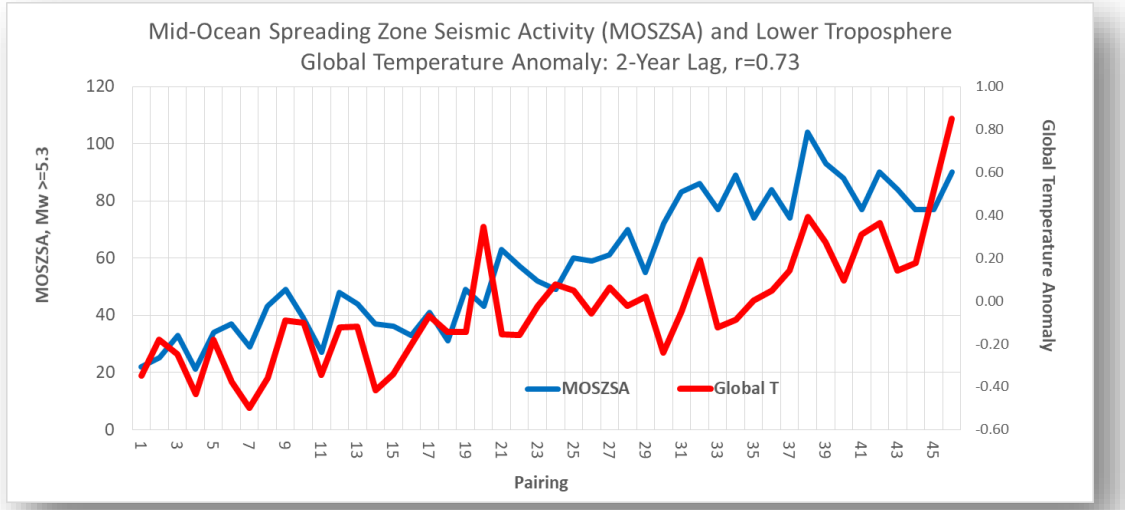
https://blog.friendsofscience.org/2023/03/29/the-geothermal-paradox-how-the-earths-second-largest-heat-source-may-be-driving-the-most-recent-warming/

Mid-Ocean Spreading Zone Seismic Activity (MOSZSA) and Global, Lower Troposphere Temperatures

- In the meantime, here is the most up-to-date graph (through 12/2024) depicting the relationship of mid-ocean spreading zone seismic activity (MOSZSA) and global, lower troposphere temperatures (Global T).

- The statistical inference from this relationship is compelling: MOSZSA accounts for 53% of the variation in global atmospheric temperatures. The odds that this relationship is "spurious" (i.e. random) are 0.00000103%! Visual inspection alone tells you that the two phenomena are inextricably bound in a meaningful way.
- Furthermore, the tenets of good experimental design strongly argue in favor of MOSZSA driving Global Temperature: There is a two-year lag built into the relationship. That is, changes in MOSZSA occur first, and Global T responds 2 years later. The correct inference here is that changes in MOSZSA are "driving" (i.e. causing) changes in Global T. In statistics, this is referred to as Granger causality. (Meaning - a change of seismic activity causes a lower troposphere temperature change two years later.)



EPA page from late 2025

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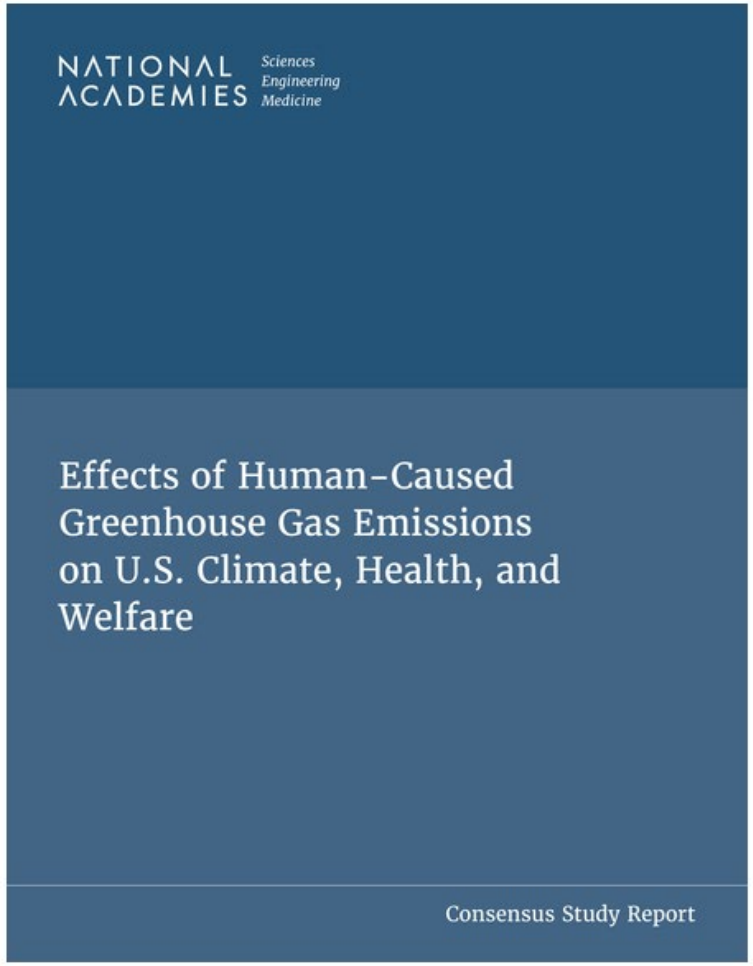
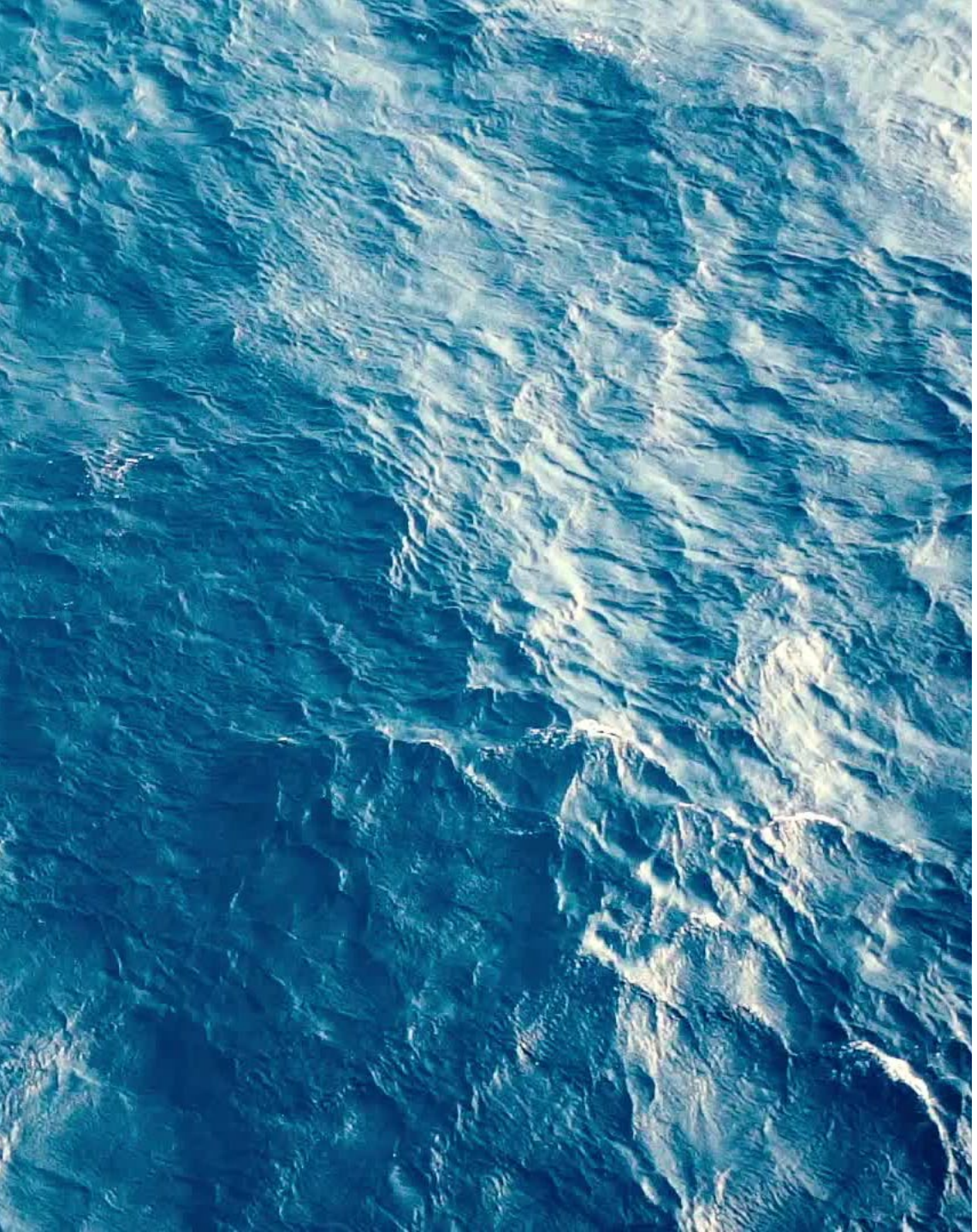
On NASEM… “They have willfully ignored the millions of eruptions of underwater volcanoes and thermal vents that occur annually” -Arthur Viterito

- There are other errors in the NAS analysis, but more importantly, the basic predicates of their analysis are HIGHLY suspect. That is, they attribute virtually all current warming to GHG emissions, claiming little or no impact from natural drivers. In fact, the only volcanic forcing they discuss is subaerial, willfully ignoring submarine eruptions, such as the coastal Kamchatka eruptions detailed in my recent article. To quote from the NAS report (page 17):
- "Volcanic forcing is highly irregular and sporadic, with large eruptions which inject material into the stratosphere driving short-term cooling but with no evidence for long-term trends over the last two centuries (Forster et al., 2021). CO2 emissions from volcanoes are negligibly small. Hence, natural forcing is both very small over the time since industrialization and has very likely caused a minor amount of cooling over recent decades rather than contributing to the observed warming."
- They have willfully ignored the millions of eruptions of underwater volcanoes and thermal vents that occur annually. These geothermal "hotspots" cause oceanic convection and impact the thermohaline circulation flow, a critical driver of ocean temperatures.

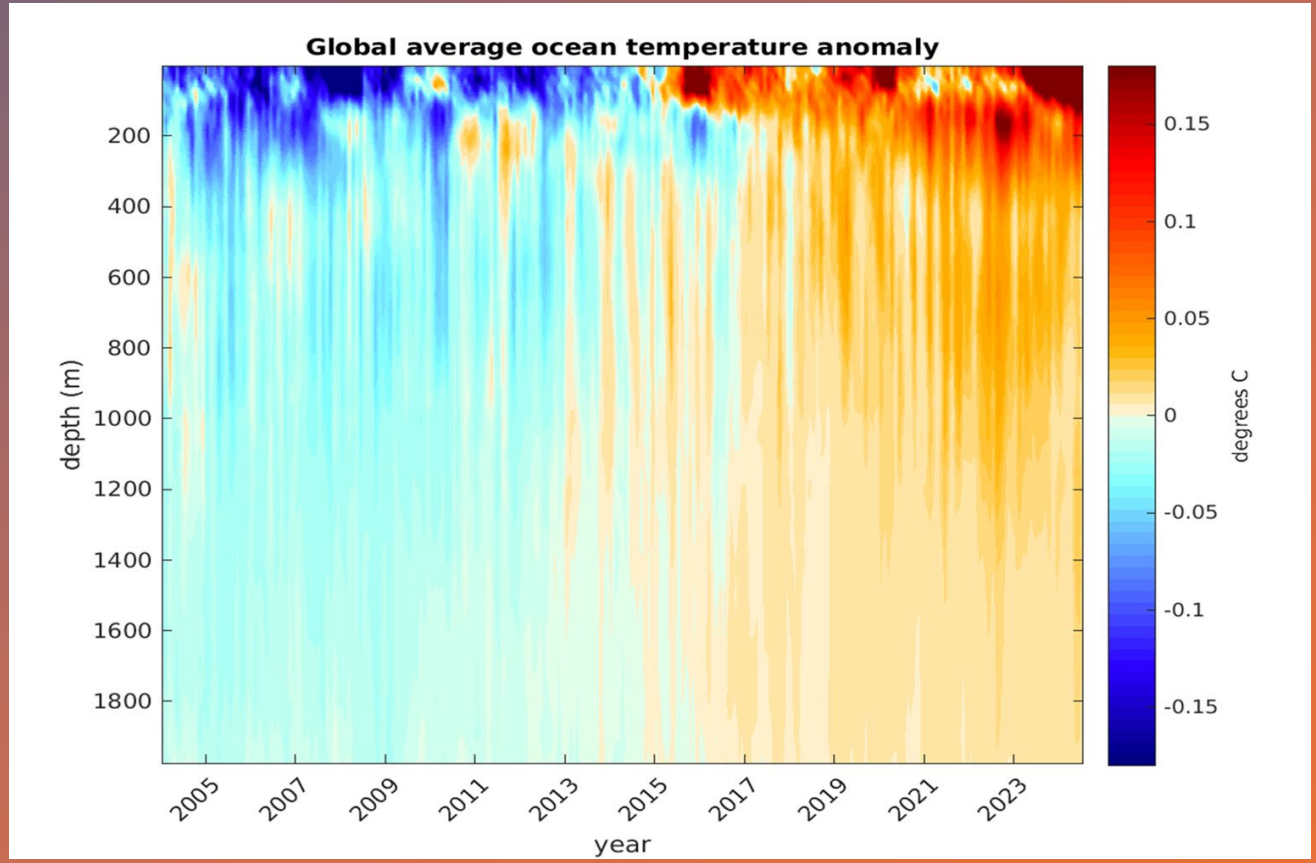




Much of the oceanic heat content is migrating from lower depths…

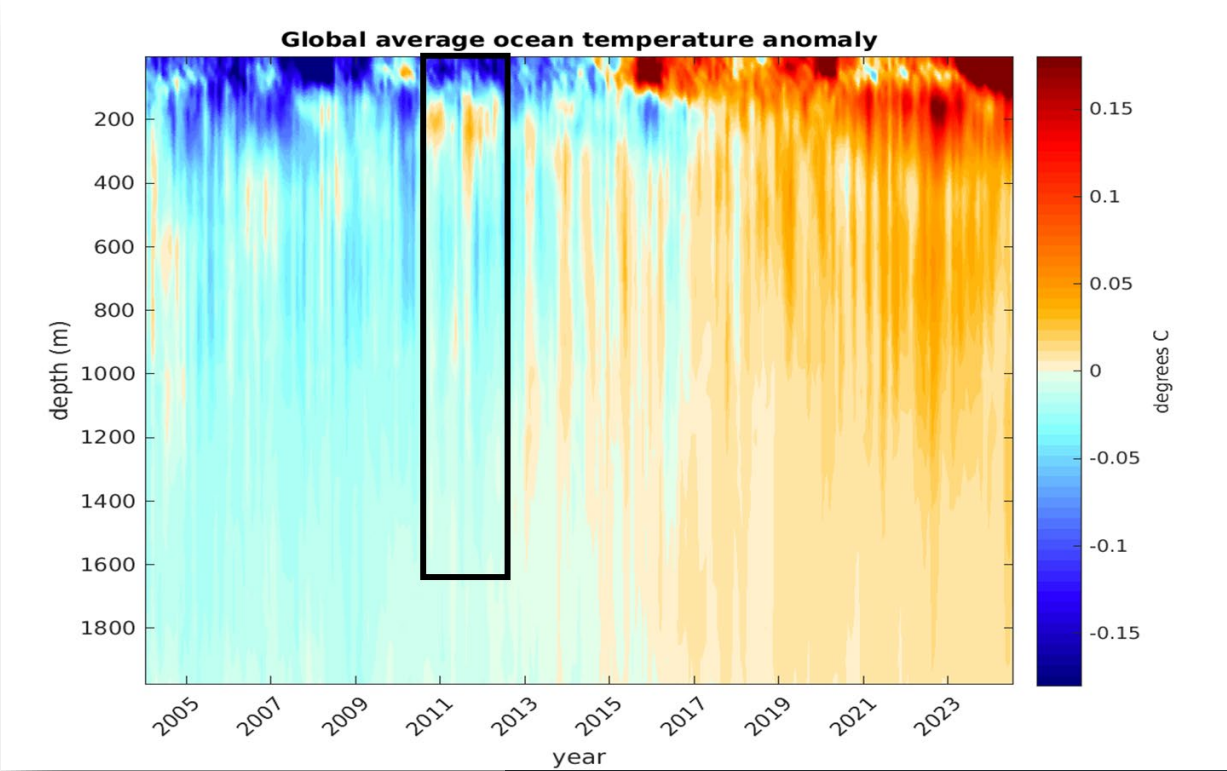
- Viterito writes: Here I will further address the geothermal impacts on global climate. As I showed in an earlier email, the mid-ocean spreading zone seismic activity (MOSZSA) is highly correlated with global temperatures. My current research looks at a number of "subsystems" of the global total that have responded to the uptick in MOSZSA, to include sea surface temperatures, the AMO Index, and Arctic sea ice. Also, a close examination of the ARGO data show that much of the oceanic heat content is migrating from lower depths.

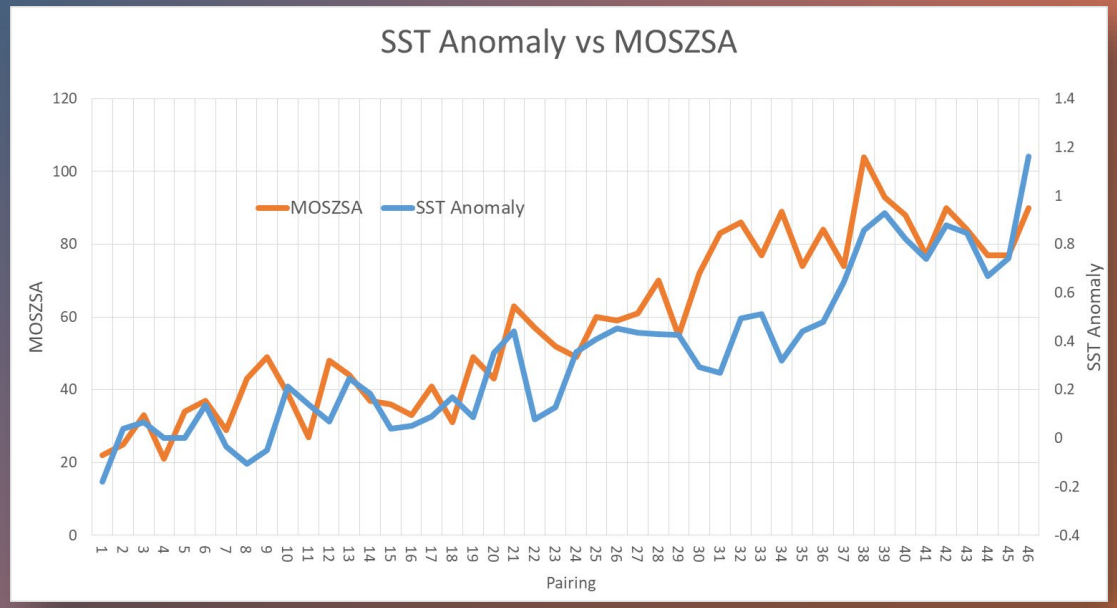
Here is the latest time series of the ARGO data.



Heat must be moving from the bottom and not from the top

- If we look closely at the boxed area of the graph, we see a remarkable phenomenon: warm anomalies that are sitting below cold anomalies! The boxed area in this diagram is but one example of a colder-than normal layer at the surface sitting on top of a warmer-than normal layer directly beneath it! Heat is always transferred from warm bodies to cold ones. Therefore, heat must be moving from the bottom and not from the top.

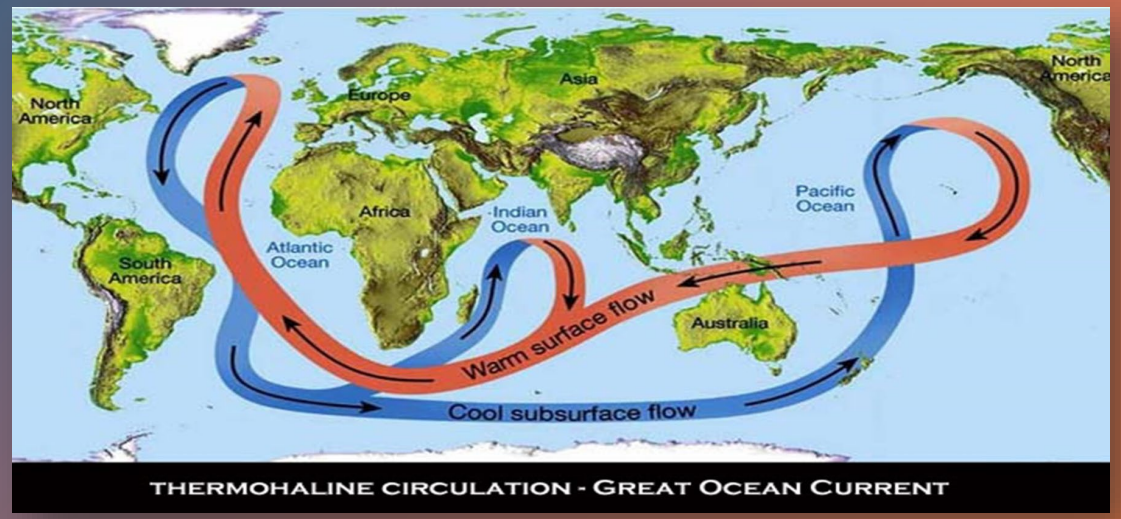




Sea Surface Temperatures and MOSZSA

- If we look to the relationship between sea surface temperatures (SSTs) and MOSZSA, we see the following:

Great Ocean Current



- As in the case of total global temperatures (land + sea), we see a very high correlation of SSTs and MOSZSA of 0.84. The difference between the two correlations is that the lag in this case is only 1 year and not 2. This makes perfect sense as, with underwater geothermal flux as the driver, it will take some time for the SSTs to reflect the new energy inputs into the system, but it would take more time for the land surfaces to reflect the new inputs as changes to snow and ice, along with cloud cover will take longer (in this case, 1 year longer).

- One important aspect of this whole process is that the release of geothermal heat along the ocean ridge system is that the thermohaline circulation becomes intensified.

Many Peer-reviewed papers

There is a respectable body of literature on this subject,t and the conclusions are clear**: increased heating of the bottom will cause the oceans to circulate faster**. Here is a listing of the relevant literature on this:

Thompson L, Johnson GC (1996) Abyssal currents generated by diffusion and geothermal heating over rises. Deep Sea Research Part I: Oceanographic Research Papers 43(2): 193-211.

Downes SM, Hogg AM, Griffies SM, Samuels BL (2016) The transient response of Southern Ocean circulation to geothermal heating in a global climate model. J Climate 29(16): 5689-5708.

Adcroft A, Scott J, Marotzke J (2001) Impact of geothermal heating on the global ocean circulation. Geophys Res Lett 28(9): 1735-1738.

Hofmann M, Morales Maqueda MA (2009) Geothermal heat flux and its influence on the oceanic abyssal circulation and radiocarbon distribution. Geophys Res Lett 36(3): L03603.

Urakawa LS, Hasumi H (2009) A remote effect of geothermal heat on the global thermohaline circulation. J Geophys Res Oceans 114: C07016.

Mullarney JC, Griffiths RW, Hughes GO (2006) The effects of geothermal heating on the ocean overturning circulation. Geophys Res Lett 33: L02607.

Scott JR, Marotzke J, Adcroft A (2001) Geothermal heating and its influence on the meridional overturning circulation. J Geophys Res 106(C12): 31141-31154.

Patara L, Böning CW (2014) Abyssal ocean warming around Antarctica strengthens the Atlantic overturning circulation. Geophys Res Lett 41(11): 3972-3978

Emile-Geay, J. and Madec, G. (2009) Geothermal heating, diapycnal mixing and the abyssal circulation, Ocean Sci., 5, 203–217, https://doi.org/10.5194/os-5-203-2009, 2009.

Purkey, S. G., and G. C. Johnson, 2010: Warming of global abyssal and deep Southern Ocean waters between the 1990s and 2000s: Contributions to global heat and sea level rise budgets. J. Climate, 23, 6336–6351, doi:10.1175/2010JCLI3682.1.

Purkey, S. G., and G. C. Johnson, 2012: Global contraction of Antarctic Bottom Water between the 1980s and 2000s. J. Climate, 25, 5830–5844, doi:10.1175/JCLI-D-11-00612.1.

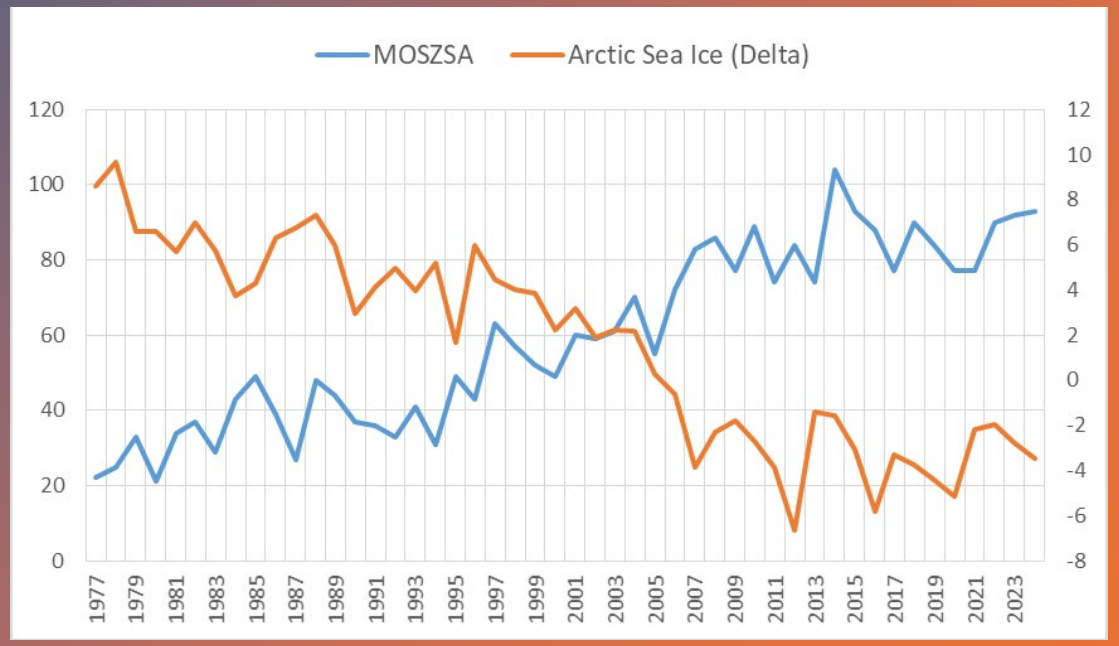
Mashayek, A., Ferrari, R., Vettoretti, G., & Peltier, W. R. (2013). The role of the geothermal heat flux in driving the abyssal ocean circulation. Geophysical Research Letters, 40(12), 3144-3149.

Park, Y.-G., J.-H. Park, H. J. Lee, H. S. Min, and S.-D. Kim (2013), The effects of geothermal heating on the East/Japan Sea circulation, J. Geophys. Res. Oceans, 118, 1893–1905, doi:10.1002/jgrc.20161.

Downes, S. M., Sloyan, B. M., Rintoul, S. R., & Lupton, J. E. (2019). Hydrothermal heat enhances abyssal mixing in the Antarctic Circumpolar Current. Geophysical Research Letters, 46, 812–821. https://doi.org/10.1029/2018GL080410

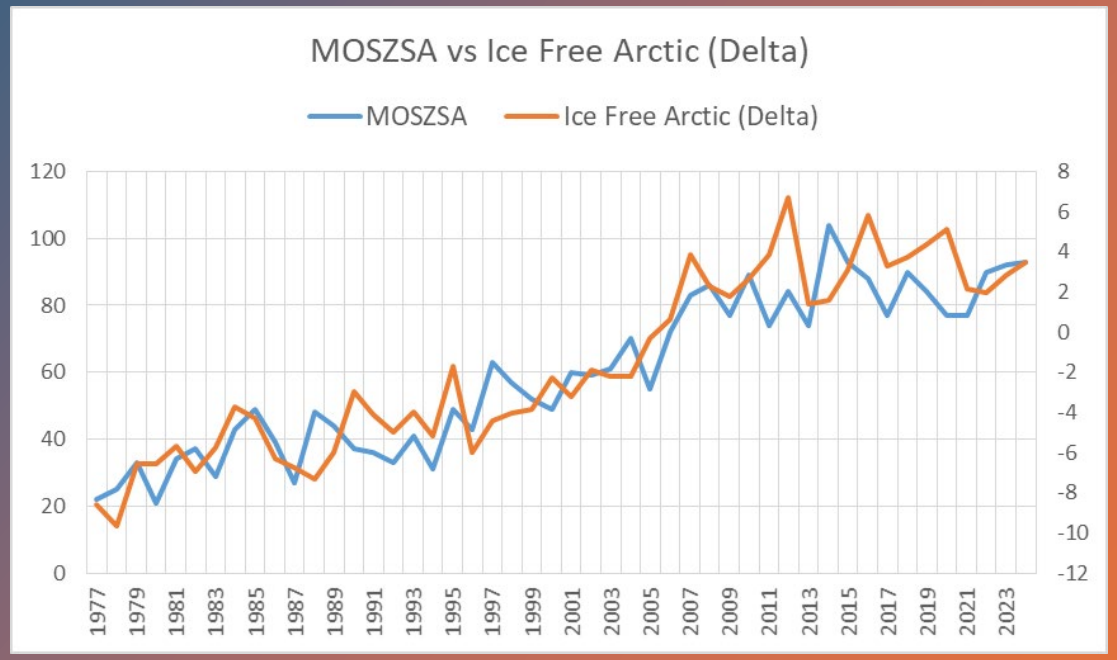
Ballarotta, M. et al., (2015), "Impact of the oceanic geothermal heat flux on a glacial ocean state", Climate of the Past Discussions, 11, 3597-3624.

Jowan M. Barnes, Miguel A. Morales Maqueda, Jeff A. Polton, Alex P. Megann, Idealized modelling of ocean circulation driven by conductive and hydrothermal fluxes at the seabed, Ocean Modelling, Volume 122,2018, Pages 26-35, ISSN 1463-5003, https://doi.org/10.1016/j.ocemod.2017.12.005.



Warm waters from the South Atlantic move into Arctic Basin

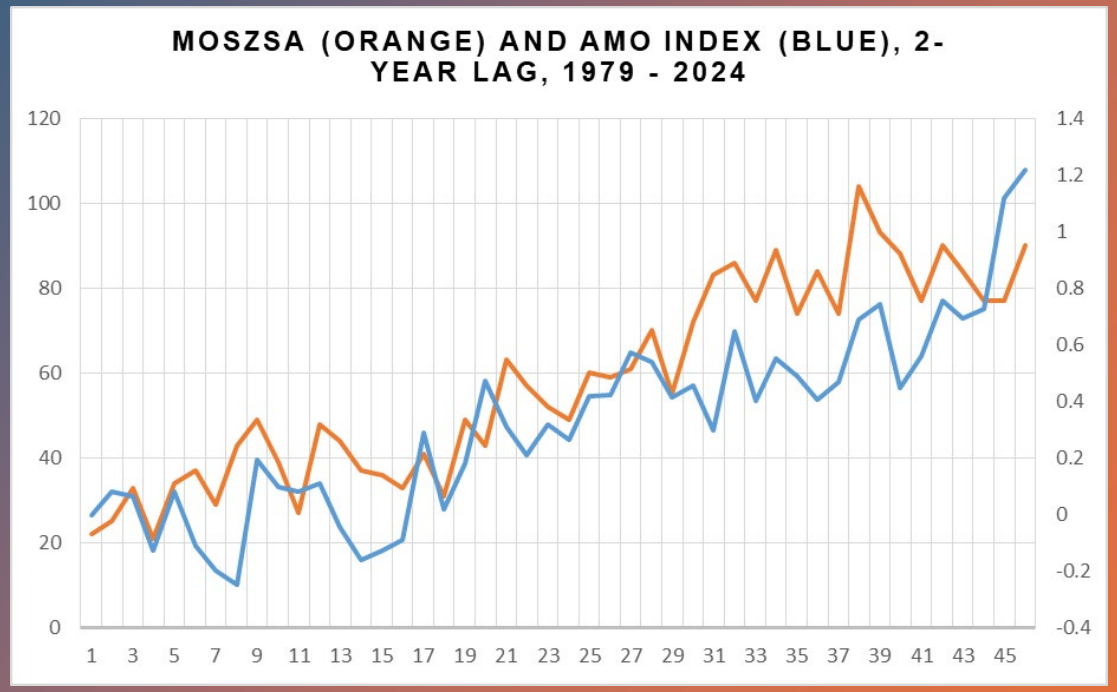
- The net effect of this is to strengthen the movement of warm waters from the South Atlantic into the Arctic Basin.
- This intensified flow from the south Atlantic into the Arctic is reflected in the loss of ice cover in the Arctic. Here we see the correlation of MOSZSA and Arctic sea ice concentration since 1977:



Ice Free Arctic

- Here the correlation is -0.91. This is a nearly perfect negative correlation, and it tells us that as MOSZSA increases, Arctic sea ice decreases in (reverse) linear fashion. If we "invert" the phenomenon of Arctic sea ice loss, we have its opposite corollary, the increase in ice free Arctic Ocean area. Here is that "inverted" relationship:

Warmer oceans also release more CO2



- As you can see, the more mid-ocean seismic activity we have, the more geothermal heat that is released, intensifying the warm "Gulf Stream" system of currents in the north Atlantic. This results in a corresponding loss of sea ice, and its corollary, the growth of the ice-free area of the Arctic Ocean.

- This is also reflected in the Atlantic Multidecadal Oscillation Index. This index parameterizes the average temperature for the North Atlantic, and is used in a wide array of applications. Here is the graph of MOSZSA and the AMO Index back to 1977:

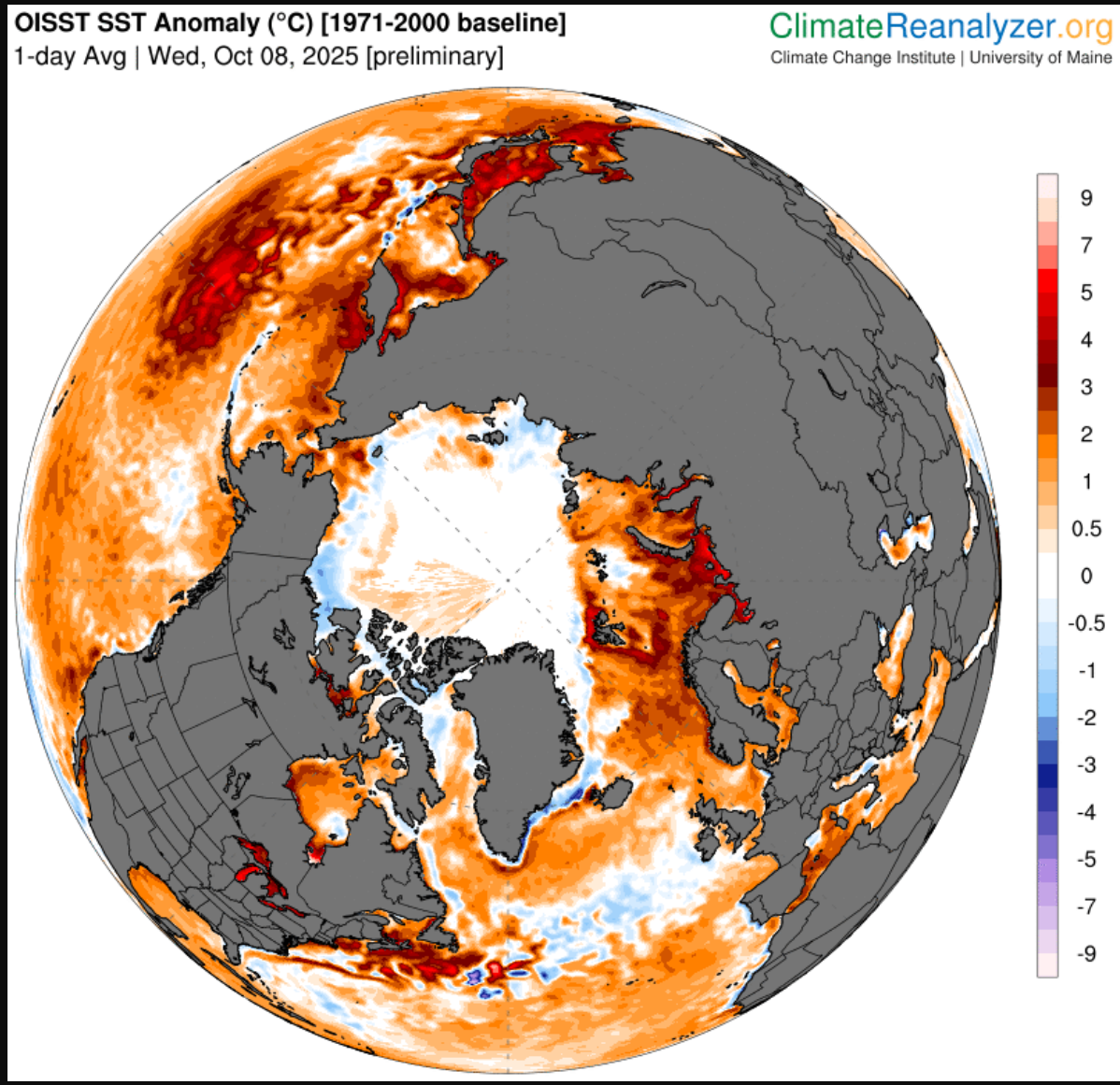
Earthquake Swarms in Shallow Waters do Cause direct impact on SSTs

- According to the oceanographic literature, anywhere from 5% to 30% of the hydrothermal and volcanic activity on the ocean ridges will convect. Of the events that cause convection, only a small percentage will directly heat the ocean surface. In the case of the recent activity around Kamchatka, there has been a tremendous amount of seismic activity in shallow water. Thousands of earthquake swarms in shallow waters will directly impact sea surface temperatures. These are the "blobs" or "hotspots" that I and Professor Wyss Yim are referring to.

- In the deep ocean, however, the convective activity only directly impacts the deeper currents of the thermohaline circulation (please see the list of 16 studies that I sent in an earlier email). That will, in turn, impact warm surface currents, such as the Gulf Stream and Kuroshio Currents, causing them to intensify and push warm tropical waters farther north than they normally would.

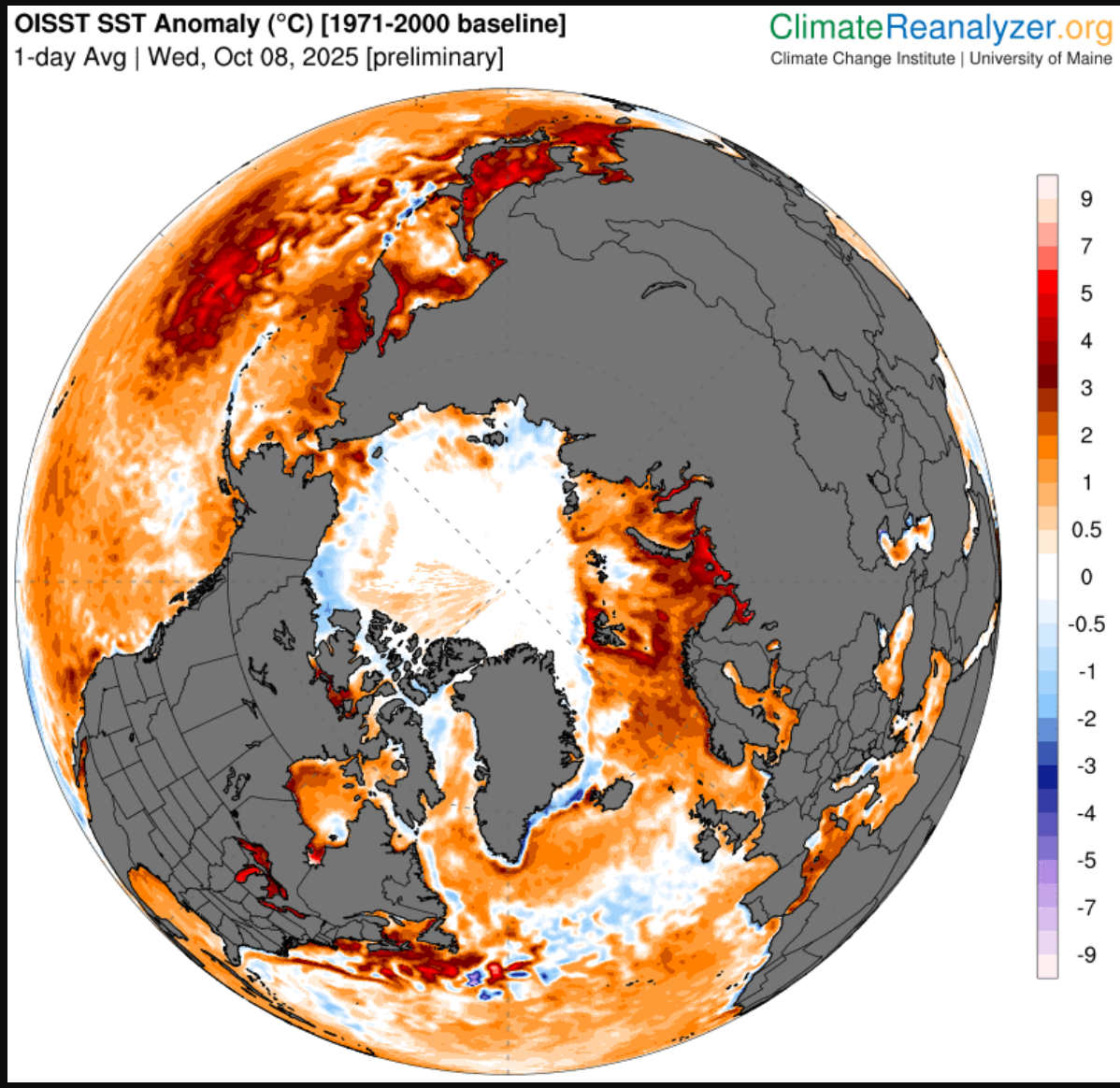
Debunking CO2 as the main driver of Global T

- These three graphical products help to debunk the idea that CO2 is the main driver of the recent rise in global temperatures. The first image shows the current sea surface temperature (SST) anomaly for the northern hemisphere. This image's perspective is from atop the North Pole:



High Sea Surface Temps in the North

- Here we see anomalously high SSTs for most of the hemisphere, and the warming is most pronounced where the Gulf Stream extends into the Arctic, and along the path of the Kuroshio Current in the north central Pacific. As I've argued previously, intensification of the thermohaline circulation will drive more warm water from the tropics into the Western Pacific and Western Atlantic Warm Pools. These warm pools serve as the primary heat sources of the Kuroshio Current and the Gulf Stream respectively. In the case of the Western Pacific, heat has also been added to the Kuroshio via high geothermal flux in the forearc and back-arc basins around the Kamchatka Peninsula and the Ryukyu Islands.



Global Price on Carbon is Unnecessary if CO2 is not the main Driver of Global Warming/Climate Change

IMO INTERNATIONAL MARITIME ORGANIZATION

11 April 2025

IMO approves net-zero regulations for global shipping

$100 to $380/t

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Billions at Stake: UN Panel's Article 6.4 Recommendation Could Transform Global Carbon Trading

October 21, 2025 | **Updated:** October 29, 2025

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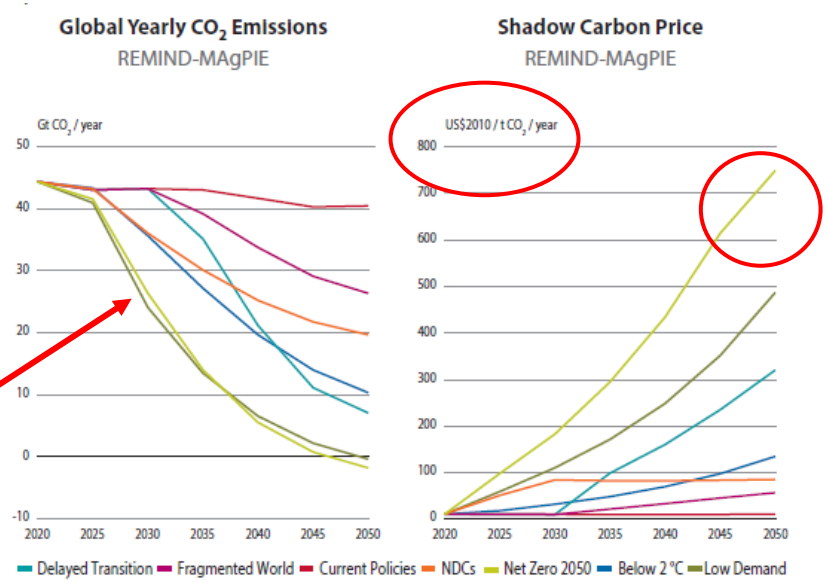
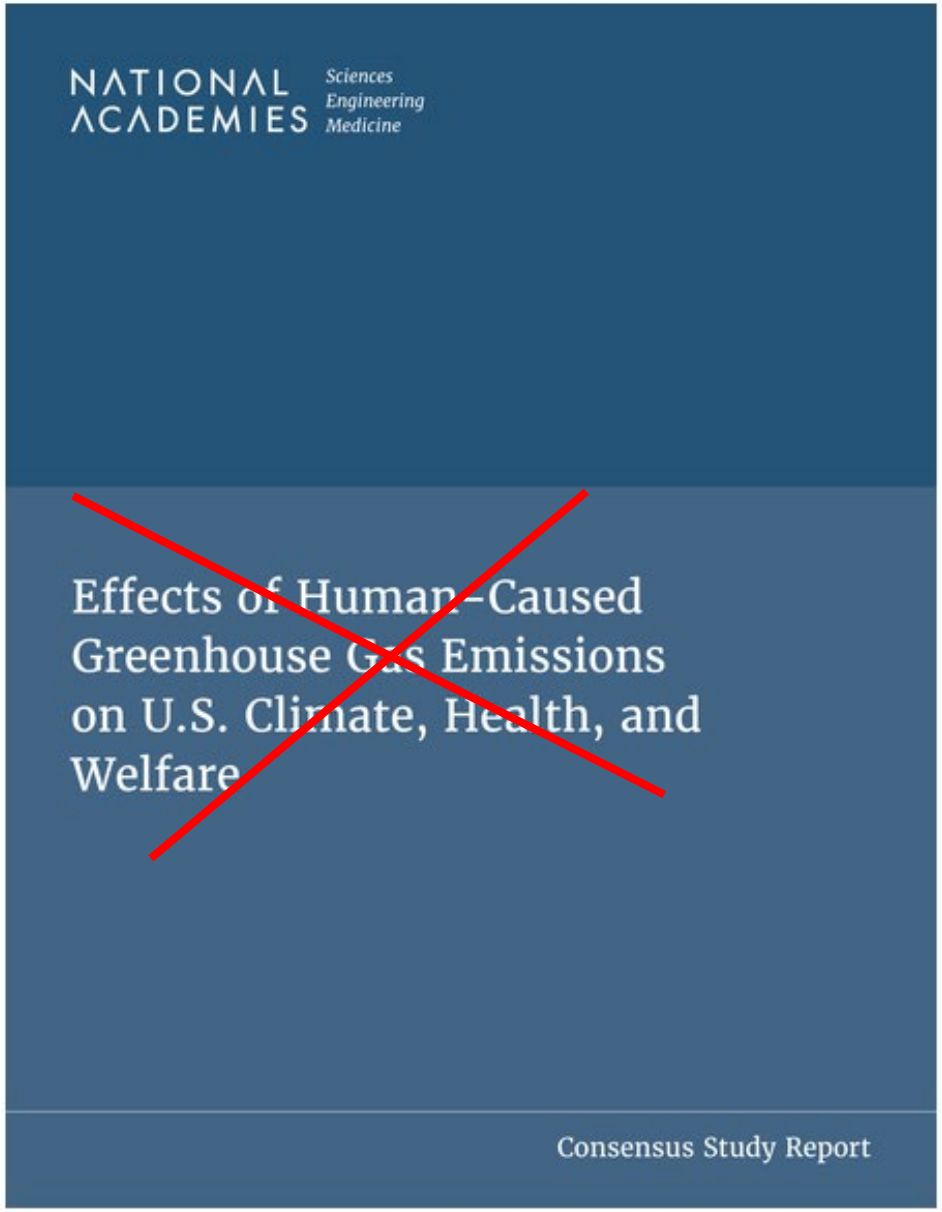


Source: IIASA NGFS Climate Scenarios Database, REMIND-MAgPIE model. World aggregates mask strong differences across sectors and jurisdictions. Regionally and sectorally granular information is available in the IIASA Portal.
End of century warming outcomes shown. 5-year time interval data.

Source: IIASA NGFS Climate Scenarios Database, REMIND-MAgPIE model.
Shadow carbon prices are weighted global. Regionally and sectorally granular information is available in the IIASA Portal. End of century warming outcomes shown.
5-year time interval data.

The EPA Endangerment finding on CO2 is not supported by the evidence.



Prof. Stefan Rahmstorf @rahmstorf · 8h

Around 6,000 ocean scientists are meeting in Glasgow at the AGU Ocean Sciences Meeting, discussing how fossil-fuel-caused climate change is affecting sea levels, ocean currents and life in our oceans. #OSM26

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Co-author Ross McKitrick on last year's DoE-report on climate: 'The 'follow the science' crowd succeeded in using litigation to shut down the debate [about the report]. But if the legalities get sorted out, we will finish what we started by releasing a final report and a complete set of responses to the public comments.'

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