

Challenging the National Science Teaching Association's Position Statement on Climate Change

Audiatur et altera pars

March 23, 2023



About the CO₂ Coalition

The CO₂ Coalition was established in 2015 as a non-partisan educational foundation operating under Section 501(c)(3) of the IRS code for the purpose of educating thought leaders, policy makers and the public about the important contribution made by carbon dioxide to our lives and the economy. The Coalition seeks to engage in an informed and dispassionate discussion of climate change, humans' role in the climate system, the limitations of climate models and the consequences of mandated reductions in CO₂ emissions.

In carrying out our mission, we seek to strengthen the understanding of the role of science and the scientific process in addressing complex public policy issues like climate change. Science produces empirical, measurable, objective facts and provides a means for testing hypotheses that can be replicated and potentially disproven. Approaches to policy that do not adhere to the scientific process risk grave damage to the economy and to science.

The Coalition is comprised of more than 100 of the top experts in the world who are skeptical of a theoretical link between increasing CO₂ and a pending climate crisis while embracing the positive aspects of modest warming and increasing CO₂. They include physicists, chemists, engineers, geologists, economists and more. More than 70% of the members hold doctorates or commensurate degrees and include three members of the National Academy of Sciences.

Background

In early 2021, a group of CO₂ Coalition members decided to act on their concerns about the state of science education in America. They recognized that the teaching of science had strayed from the 400-plus-year-old scientific method and was less inclined to encourage inquisitiveness in students and more prone to require conformity to the opinions of teachers. At present, much of the instruction on climate change resembles an indoctrination into a political agenda rather than the provision of necessary tools for critical thinking.

It is our knowledge of science and commitment to the scientific method – not *political narratives* – that make the CO₂ Coalition uniquely qualified to lead in the development of a fact-based program of climate-science education.

Introduction

The CO₂ Coalition has reviewed the National Science Teaching Association's Position Statement on Climate Change and has found that it has serious problems, which we address in this assessment. Our objections to this document are many but can be separated into two major categories:

- Reliance on “consensus” science and a rejection of critical thinking skills and the scientific method.
- NSTA's embrace of the hypothesis of “harmful man-made warming” despite its basis in flawed science and government opinions and its rejection of all contradictory science.

A primary role for the NSTA should be to develop critical thinking skills for students and to instill in them knowledge and use of the scientific method. Students should be encouraged to review all facts on a subject (in this case climate change) and make up their own minds rather than be indoctrinated into an established political agenda.

Unfortunately, the NSTA has taken a strong position that is antithetical to the scientific method, critical thinking and open scientific debate. Its position is one of censorship of any scientist or science that does not support the NSTA-approved “science.” The NSTA Position Statement on Climate Change fails to delineate between real science and political science.

NSTA Promotes “Consensus” Science Over The Scientific Method

The National Science Teaching Association's Position Statement on Climate Change promotes the education of students through indoctrination instead of critical thinking skills and the scientific method. Throughout the document, promotion of “consensus” is advanced, while all dissenting scientific facts are censored or derided.

For example, the words “consensus,” “cumulative weight” or “scientific foundation” were used eight times to describe NSTA-approved information, while consistently disparaging any contrary science by deeming them “non-scientific” and stating that they “misrepresent” the science.

The Statement contends that any and all science and data that deviate from the consensus opinion are pseudoscience, logical fallacies, misinformation or unscientific denial. The following quotes from the Position Statement are directly at odds with the more than 400 years of acceptance of the scientific method in western academia:

“Any apparent controversies about the fundamental observations related to climate change science come from social, economic, or political domains, not from the scientific community.”

“This requires that a person be able to distinguish between opinions and evidence, and between scientific debate and unscientific denial.”

What is correct in science is not determined by consensus but by experiment and observations. Historically, scientific consensuses have often turned out to be wrong. The greatest scientists in history are great precisely because they broke with consensus. The frequent assertion that there is a consensus behind the idea that there is an impending disaster from climate change is not how the validity of science is determined. To quote the profoundly true observation of Michael Crichton:

“If it’s consensus, it isn’t science. If it is science, it isn’t consensus.”

Reliable scientific knowledge is determined by the scientific method, where theoretical predictions are validated by observations or rejected by failing to do so. Agreement with observations is the measure of scientific truth. Scientific progress proceeds by the interplay of theory and observation. Observations anchor understanding and weed out theories that do not work. This has been the scientific method for more than 400 years.

The objective of persons of science is to discern the truth. Unfortunately, the NSTA and too many climate scientists have abandoned that mission, and they have done so at great cost to their own institutions and to the reputation of science itself.

Science, as the Islamic mathematician and empiricist al-Haytham (965 to 1040 A.D.) could have told the NSTA, is not done by mere head count:

“The seeker after truth does not put his faith in any consensus, however venerable or widespread. Instead he questions what he has learned of it, applying to it his hard-won scientific knowledge, and he inspects and inquires and investigates and checks and checks and checks again. The road to the truth is long and hard, but that is the road we must follow.”

Prof. Richard Feynman, a Nobel Laureate in Physics, incisively explained the scientific method and provided his thoughts on consensus in science:

“[W]e compare the result of [a theory’s] computation to nature...compare it directly with observations, to see if it works. If it disagrees with experiment, it is wrong. In that simple statement is the key to science.”

“If you thought that science was certain – well, that is just an error on your part.”

“I would rather have questions that can’t be answered than answers that can’t be questioned.”

Thus, the scientific method is very simple and very profound: Does a hypothesis work with observations? If not, it is rejected and not used.

However, scientific knowledge is not determined by omitted contradictory data. Since hypotheses are tested with observations, omitting contradictory facts to make a theory work is an egregious violation of the scientific method.

Richard Feynman (1974) stated this fundamental principal of the scientific method:

“If you’re doing an experiment, you should report everything that you think might make it invalid – not only what you think is right about it...Details that could throw doubt on your interpretation must be given, if you know them.”

The U.S. Supreme Court has adopted essentially the same view of science, starting in 1993 with its landmark Daubert decision:

“[I]n order to qualify as ‘scientific knowledge,’ an inference or assertion must be derived by the scientific method,” “any and all scientific testimony or evidence admitted [must be] ...reliable,” “tested,” and “supported by appropriate validation.” (emphasis added).

Scientific evidence must be derived by the scientific method – or not be used.

Choose Science, Not Government

Science, not government opinions, should drive scientific thought. Nobel physicist Richard Feynman put it unambiguously:

“No government has the right to decide on the truth of scientific principles.”

The importance of the principle that government does not determine science was chillingly underscored recently in Sri Lanka. In a recent landmark paper detailing the benefits of nitrogen and its minimal warming effect on the atmosphere, Dr. William Happer (2022) had this to say about consensus science driving harmful and misguided political agendas:

“Ideologically driven government mandates on agriculture have usually led to disaster. The world has just witnessed the collapse of the once bountiful agricultural sector of Sri Lanka as a result of government restrictions on mineral [nitrogen] fertilizer.”

Early in the 20th century, Stalin made Trofim Lysenko the czar of Russian biology and agriculture. False biology prevailed for 40 years in the Soviet Union because Lysenko gained dictatorial control, providing

one of the most thoroughly documented and horrifying examples of the politicization of science. Lysenko was strongly supported by “scientists” who benefited from his patronage. Millions died as a result of his ruthless campaign against science in agriculture (Happer 2003).

Critical Thinking Versus Groupthink

One of the two principles of natural justice recognized in the law of the English-speaking countries is *Audiatur et altera pars*—“Let both sides be fairly heard.” Our mission, as scientists, is to distinguish “what is” from “what is not” in the climate debate.

Critical thinking recognizes no racial boundaries or economic limitations. As such, it is a powerful tool for minorities and financially disadvantaged students and citizens to make their life better. Much better. Martin Luther King, Jr. fully appreciated this and famously said:

“The function of education is to teach one to think intensively, and to think critically.”

Repeating Nobel physicist Richard Feynman:

“If you thought that science was certain – well, that is just an error on your part.”

“I would rather have questions that can’t be answered than answers that can’t be questioned.”

The NSTA should adhere to its own recommendation at the close of the introduction of their position statement in which they appear to agree with our recommendations before veering wildly into a case for consensus and censorship:

“(O)ur knowledge of all the sciences, including climate science, grows and changes through the continual process of scientific exploration, investigation, and dialogue.”

Information that the NSTA Does Not Want You to Know

As outlined in the previous section, the National Science Teaching Association’s Position Statement on Climate Change contends that any and all science and data that deviate from the consensus opinion are pseudoscience, logical fallacies, misinformation or unscientific denial.

We present in this section just a small sampling of some important scientific data that the NSTA is likely to deem to be misinformation in support of science “denial.” Please note that all are fully sourced and referenced and drawn from peer-reviewed or government sources.

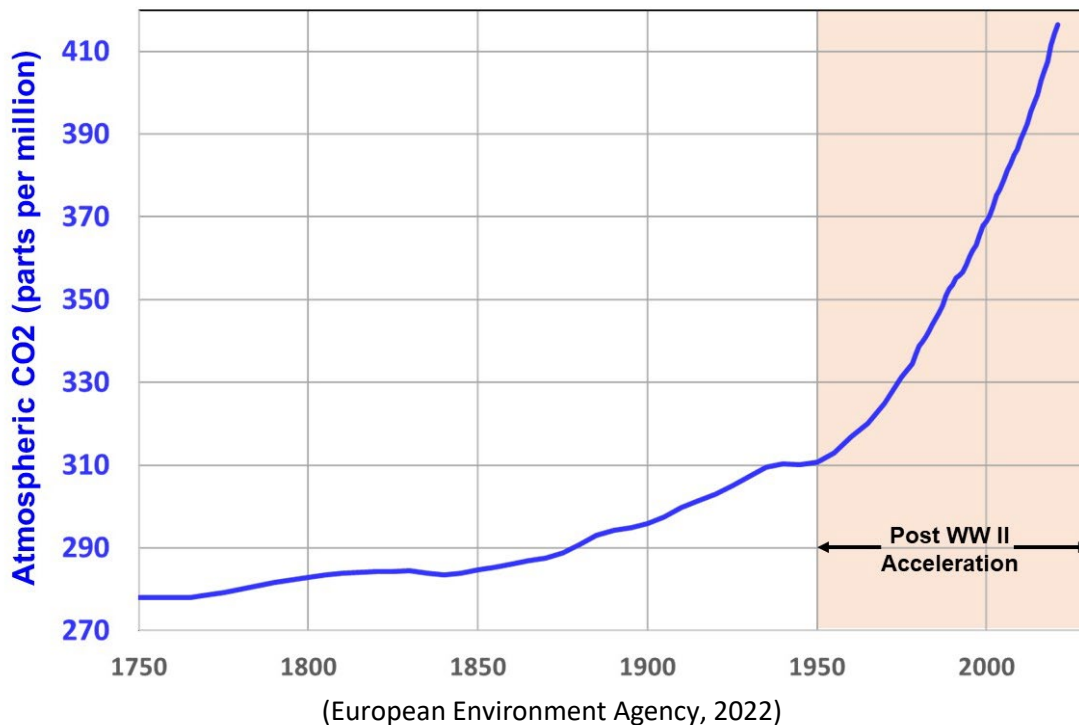
Consideration of this science is absolutely essential to the restoration of true science and to the ultimate triumph of objective truth on the subject of climate change.

Carbon dioxide through time

Atmospheric carbon dioxide (CO₂) is currently 419 ppm (January 2023), which is an increase of about 140 ppm or 50% over its pre-industrial level of 280 ppm (Figure 1).

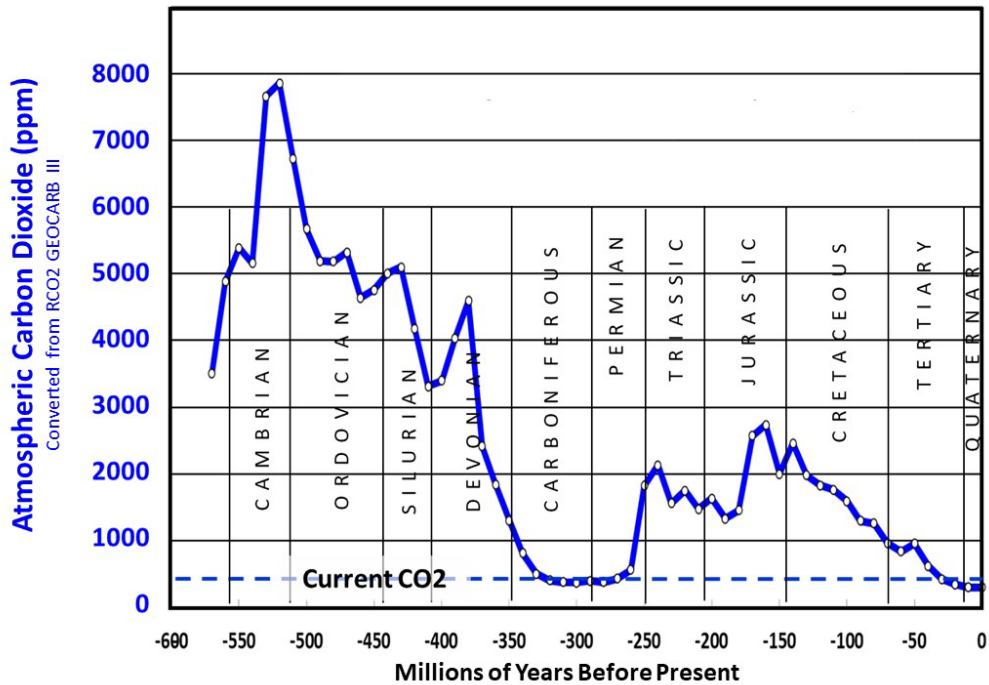
Note that carbon dioxide began increasing in earnest in the mid-twentieth century. If CO₂ is a primary driver of modern warming, we should be able to recognize a linkage between more CO₂ and temperature beginning in the post World War II period.

Figure 1: Atmospheric CO₂ Levels Since 1750



Viewed in the narrow time scale of hundreds of years, this appears to be significant; however, when placed in the long-term geological scale, we find that the recent CO₂ concentrations in the modern era are near historic lows. The average CO₂ concentration dating to the Precambrian was 2,600 ppm, more than six times our current level. In this context, we do not have too much CO₂. In fact, we are CO₂ impoverished.

Figure 2: CO₂ Levels During the Paleozoic



(Source data: Berner 2001)

It is important to note that near the end of the last ice advance, 15,000 years ago, the Earth's CO₂ levels plummeted to the dangerously low level of 182 ppm. That was within 32 ppm of the minimum threshold for plant life to survive. Concentrations below that level would have ushered in an actual climate apocalypse.

Temperature and CO₂ through time

According to the NSTA statement:

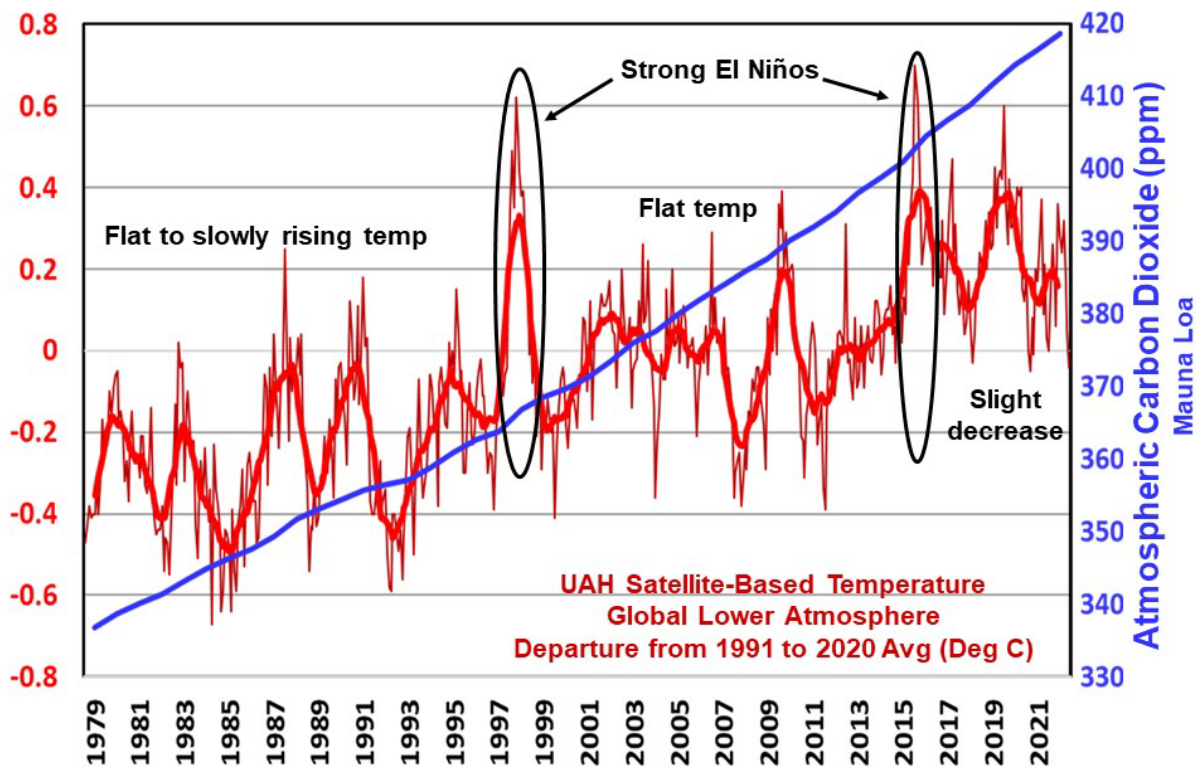
“...overwhelming scientific consensus indicates with increasing certainty that Earth's climate is changing, largely due to human-induced increases in the concentrations of heat-absorbing gases.”

If CO₂ is the dominant driver of atmospheric temperature changes, then a comparison of historical temperatures and carbon dioxide should validate that assumption quite easily. We will perform that evaluation here, looking first at the most recent data and then going deeper into our geologic past.

Global temperature is measured most accurately by satellites, but these records only began in 1979. The University of Alabama at Huntsville provides temperature data shown in Figure 3. Note that the two largest spikes in temperature occurred in 1998 and 2016 during very strong Pacific ocean events known as El Niños and were followed by lengthy periods of either no warming or slight cooling.

The increase of CO₂ rose in a linear fashion, but the temperatures deviated substantially in a stepwise manner not predicted or explained by climate models. Note that since the 2016 spike, we have been in a seven-year trend of slight global cooling.

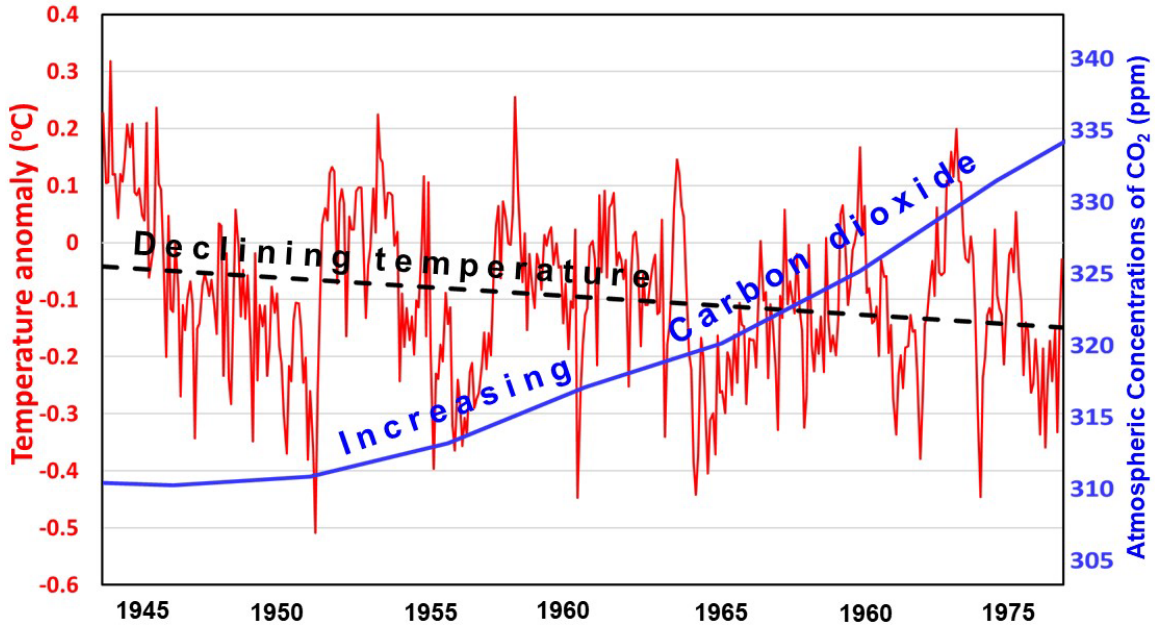
Figure 3: UAH Satellite-Based Temperature of the Global Lower Atmosphere (Version 6.0)



(Spencer 2023)

Just as we began adding prodigious amounts of CO₂ to the atmosphere in the post-WW II period, global temperatures went into a 33-year cooling trend (Figure 4).

Figure 4: No Correlation for 33 Years of Cooling: 1944 to 1978, yet CO₂ Rose Significantly

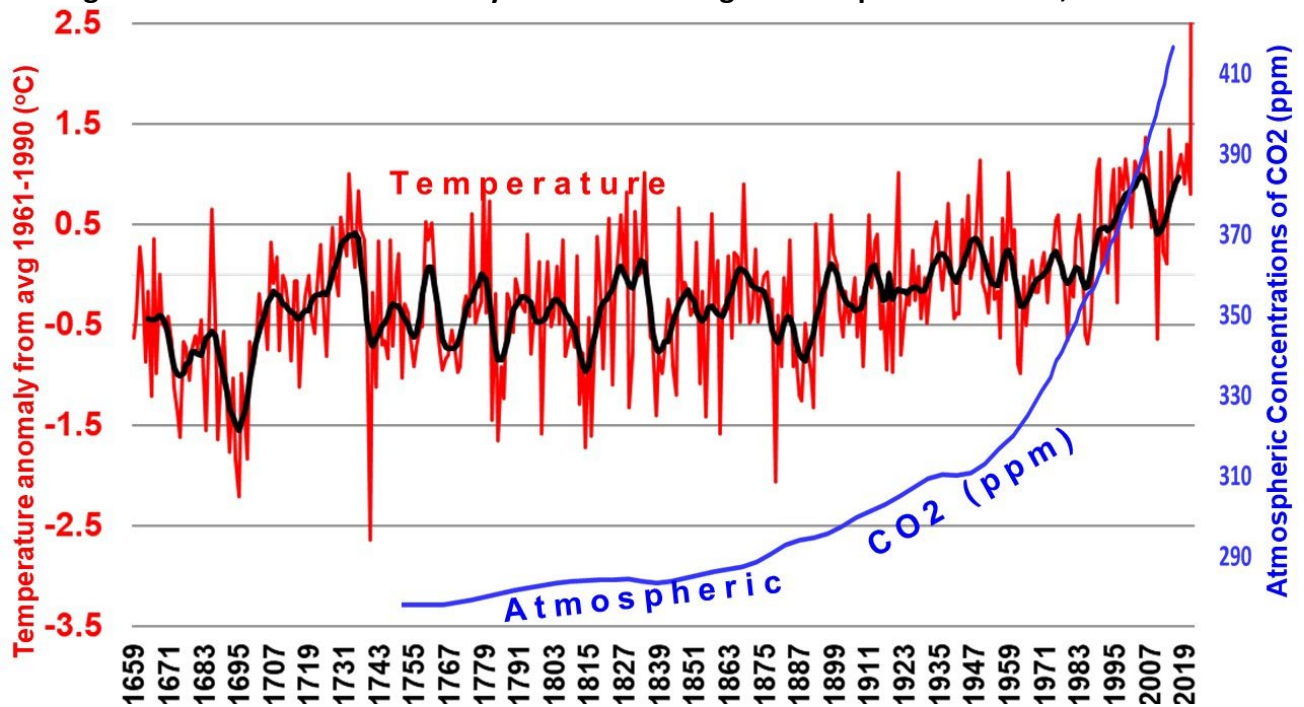


(Source temp: HadCRUT5 2023)

(Source CO₂: European Environment Agency 2022)

The longest continuous thermometer record is the Central England Temperature record (Figure 5) and reveals that our current Modern Warming Period began in the late 17th century, 250 years before increasing CO₂ could have impacted atmospheric temperature.

Figure 5: No Correlation for 370 years - Central England Temperature Series, 1772 – 2022

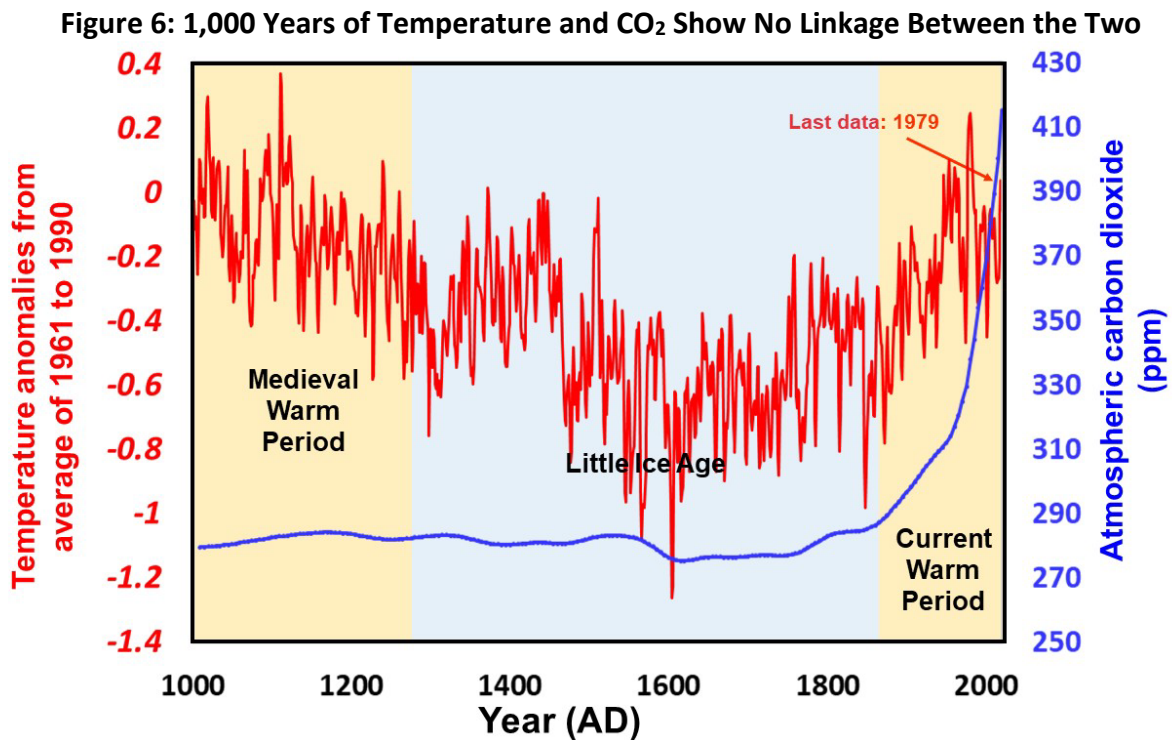


(Source temperature Parker 2023)

(Source CO₂: European Environment Agency 2022)

Before climate science became politicized in the late-1980s, past warm periods were called “climate optima” by climatologists and historians. They were called “optima” for a very good reason: Ecosystems flourished and humanity prospered during the periods that were warmer than our current temperatures. That terminology is no longer employed by the climate intelligentsia, as that would impart beneficial connotations to higher temperatures and would not fit the narrative of predicted doom from more warming.

Temperature and CO₂ reconstruction of the last 1,000 years using proxy data (Figure 6) show that the very warm Medieval Warm Period or Optima (850 to 1250 A.D.) occurred during a time of very low CO₂ levels. Recall that the Vikings were growing barley on Greenland at this time, something that cannot be done today.

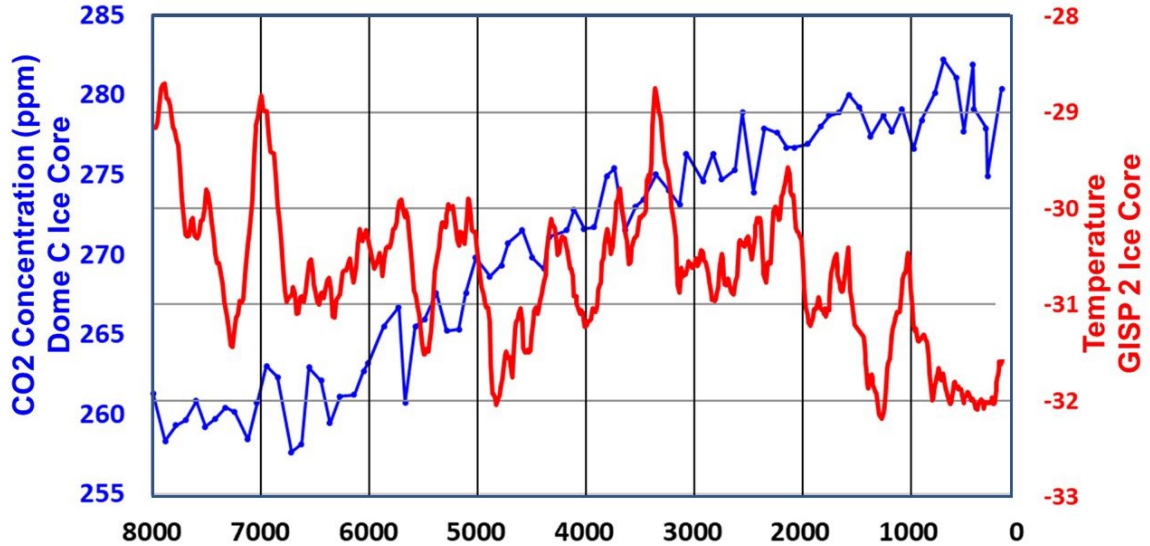


(Source data: Temperature: Moberg 2005; CO₂: EEA 2022, Law Dome C)

A still longer view dates back to the warmest temperatures of the last 10,000 years, a period known as the Holocene Climate Optimum. Since that time, temperature fell in fits and starts and all the while CO₂ steadily rose.

This is known as the Holocene Temperature Conundrum because it cannot be resolved or explained using the climate models favored by the NSTA. Since it is exceedingly difficult to promote a linkage between rising CO₂ and rising temperatures using these data, it is nearly always simply ignored by proponents of catastrophic global warming.

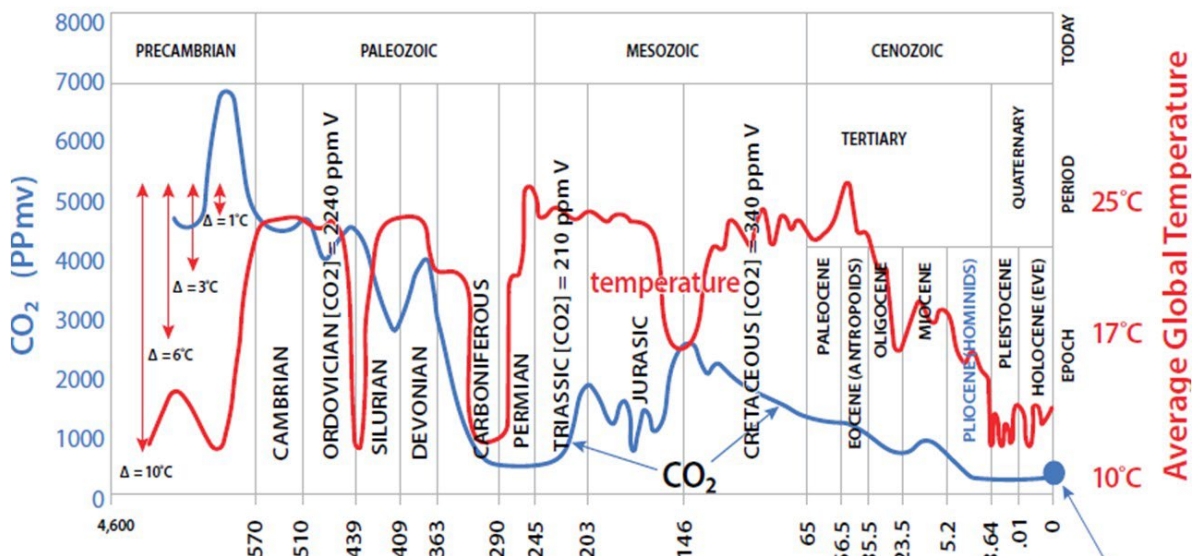
Figure 7: Temperature Fell as CO₂ Rose for the Last 8,000 Years



(Source data: Temperature: Jouzel 2007a; CO₂: Smith 1999)

During 4.6 billion years of Earth's long history, there were occasionally periods when high CO₂ levels coincided with high temperature. Just as often, though, very high CO₂ concentrations were accompanied by very low temperatures and the reverse as well.

Figure 8: No Correlation Between Temperature and CO₂ for 4.6 Billion Years



(Source data: Temperature: Scotese 2002; CO₂: Berner 2001)

Severe weather falsehoods

The NSTA Climate Statement endorses the climate catastrophe narrative that continued use of fossil fuels will lead to more carbon dioxide and thence to a threat to humanity.

“Carbon-dense fossil fuels led to the Industrial Revolution and ultimately made our modern way of life possible. The continued extensive use of these same fuels now jeopardizes that very way of life.” (Emphasis added)

Are claims of climate catastrophe resulting from CO₂-driven warming supported by scientific evidence? The following charts and data from government and peer-reviewed sources reveal that natural disasters, severe weather-related deaths and extreme weather of various types are not increasing and many are in decline.

Natural disasters declining

In many cases we have discovered that those intent on furthering an apocalyptic climate agenda manipulate data to achieve pre-ordained conclusions of a looming planetary apocalypse. In what should be a case study on how to torture the data to achieve the desired result, the World Meteorological Organization recently published a review of natural disasters. In it, the primary claim was that the number of disasters “has increased by a factor of five” since 1970 and that human additions of carbon dioxide are to blame.

The data source was the very reputable Centre for Research on Epidemiology of Disasters (CRED), a Brussels-based organization that collaborates with the U.N. The claimed five-fold increase in disasters occurred in the initial 30 years (1970 to 2000) when the system for collecting information was being developed by CRED.

Our suspicions of questionable reporting were confirmed in an email exchange with Regina Below, CRED database manager and documentalist. When asked if the difference between disaster totals in 1970 and the late 1990s was the result of an increase in reporting rather than a greater incidence of disasters, she answered:

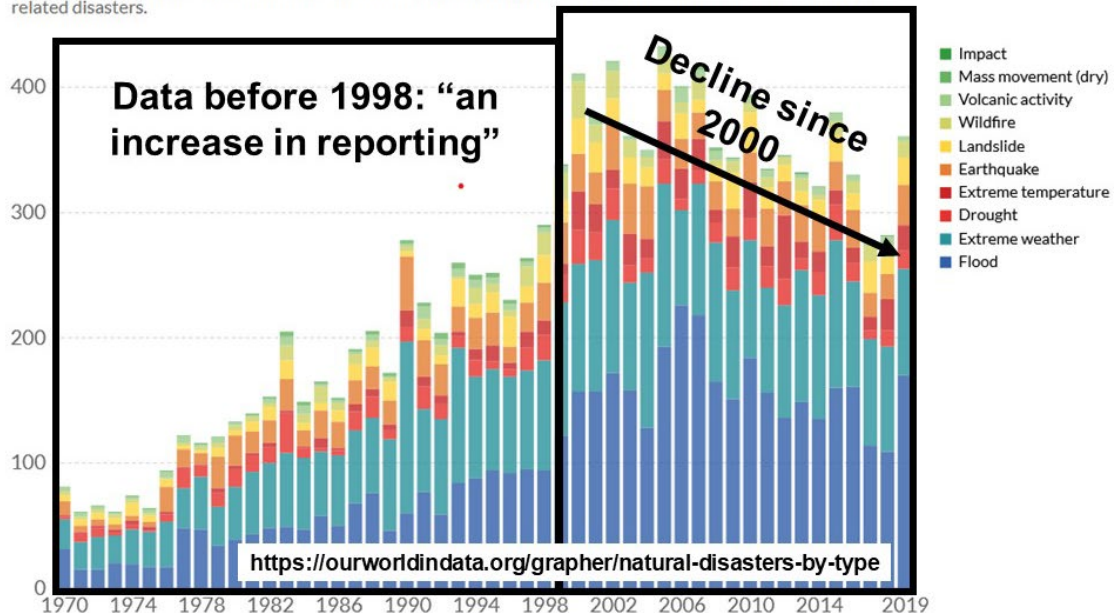
“You are right, it is an increase in reporting.”

Since complete development of reporting systems in the late 1990s, natural disasters have decreased 10%.

Figure 9: Number of Reported Disasters Explained

Global reported natural disasters by type, 1970 to 2019

The annual reported number of natural disasters, categorised by type. This includes both weather and non-weather related disasters.



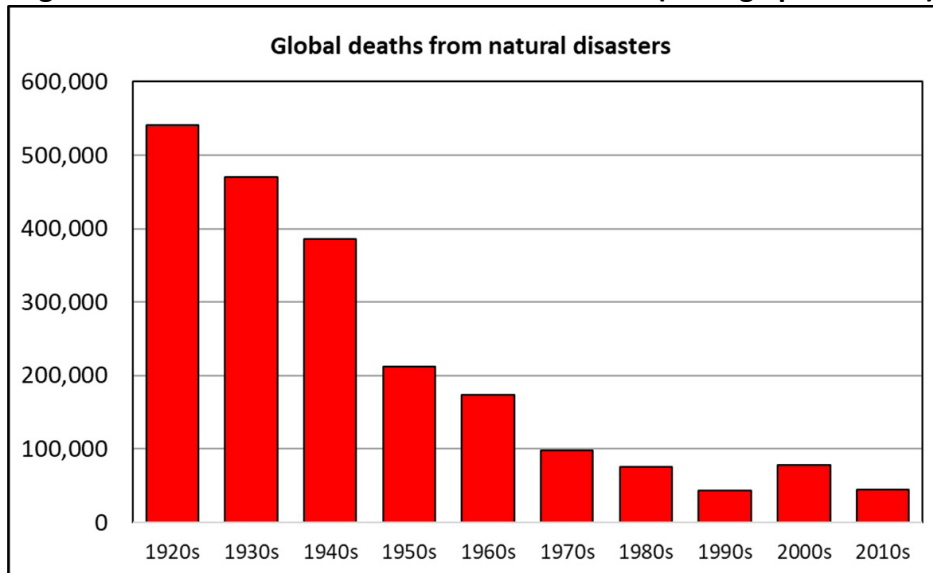
(Our World in Data 2021)

(Source data: World Meteorological Organization 2021)

Severe weather-related deaths in significant decline

As reported above, the Centre for Research on the Epidemiology of Disasters does a fine job of collecting data on natural disasters. According to their data (Figure 10), deaths from natural disasters have plunged more than 90 percent from a yearly average of 54,000 in the 1920s to 4,500 in the last decade.

Figure 10: Global Deaths from Natural Disasters (average per decade)

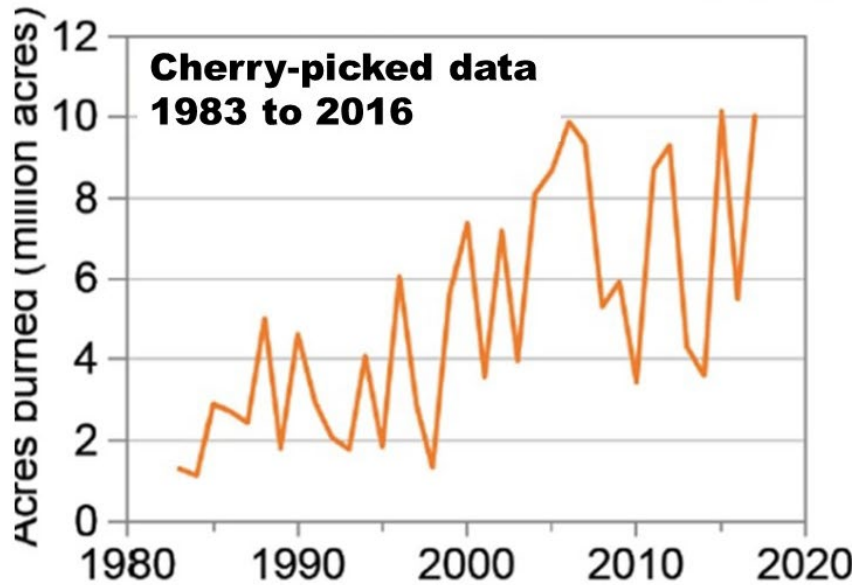


(EM-DAT CRED 2022)

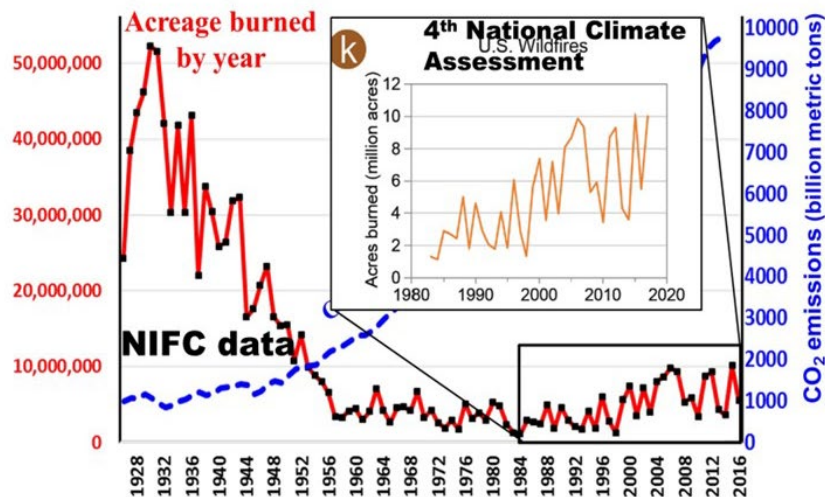
Wildfires in the United States are declining

The Fourth National Climate Assessment (NCA4) was published in 2018 and contained an egregious example of selective reporting of fire data in the continental United States. The upper chart in Figure 11 is from NCA4 and shows an apparent alarming increase in area burned. The chart cherry-picks data beginning in 1983 even though data are available dating to 1928. The full data reveal that burned area in America has declined significantly over the last century.

Figure 11: Area Burned in the Continental United States



NIFC Acreage burned 1928 to 2016



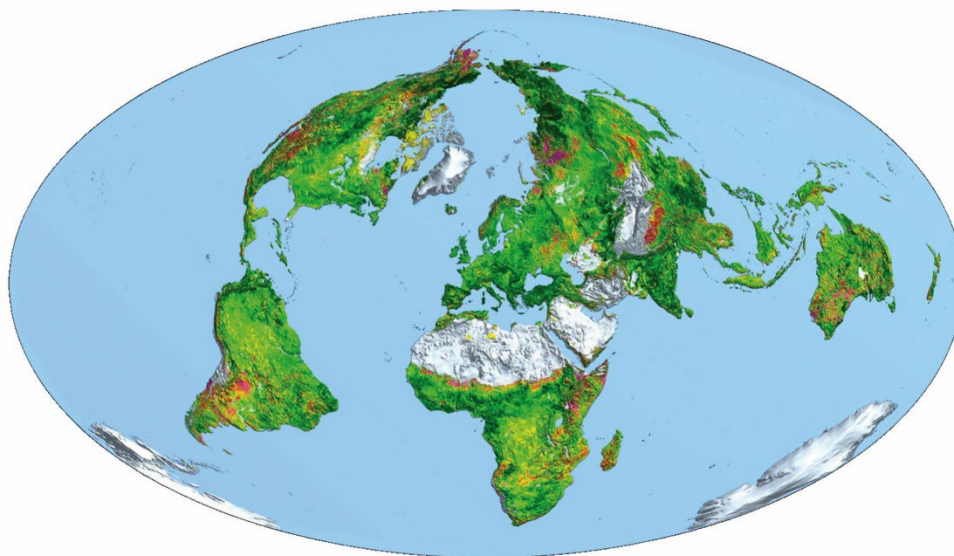
(Source data: Fires: NCA4 & NIFC 2017; CO₂: Tans 2017)

Modest warming and more CO₂ are benefiting ecosystems and humanity

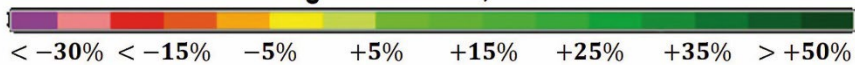
Modest warming combined with increasing carbon dioxide are fueling a huge increase in vegetation, forests and crops worldwide. Warmer temperatures are leading to longer growing seasons and plant growth in areas of higher altitudes and latitudes. More CO₂ is leading to increased plant growth from increasing CO₂ fertilization.

According to NASA, there has been a surge in vegetation over the last 40 years (Zhu 2016). Up to 50% of the Earth’s surface has seen increasing plant biomass, while less than 4% of the planet has experienced a decrease in growth.

Figure 12: Greening of the Earth



Change in leaf area, 1982-2015



(Zhu 2016)

Conclusion

The National Science Teaching Association's position on climate change reflects a disregard for the scientific method and discourages the critical thinking necessary for robust scientific inquiry and a viable civilization. This is clear in its unquestioning acceptance that the teaching of the science should be controlled by consensus and censorship of dissenting views.

As a result, students are undergoing an indoctrination into a dangerous political agenda that ignores the enormous benefits of CO₂ – a gas critical to life – and promotes an impossible objective of supporting modern economies without carbon-based energy sources.

We respectfully urge the National Science Teaching Association to seriously consider a rejection of their previous endorsement of scientific censorship and return science education to the foundations of reason, open scientific debate and tolerance for alternative thinking.

Appendix

NSTA Climate Change Declarations From Their Position Statement On Climate Change

Below are fifteen declarations included in the National Science Teaching Association's Position Statement on Climate Change. Our response is in red below each declaration.

To ensure a high-quality K–12 science education constructed upon evidence-based science, including the science of climate change, NSTA recommends that teachers of science:

- Recognize the cumulative weight of scientific evidence that indicates Earth's climate is changing, largely due to human-induced increases in the concentration of heat-absorbing gases (IPCC 2014; Melillo, Richmond, and Yohe 2014);

As explained in the first section above, “cumulative weight” has no place in determining the scientific validity of any scientific discussion. This is especially reinforced by the silencing and censorship of contradictory data.

- Emphasize to students that no scientific controversy exists regarding the basic facts of climate change and that any controversies are based on social, economic, or political arguments and are not science;

Contrary to the claim that there is no scientific controversy on the subject of climate change and that any controversies are not science, we listed in Section 2 a very abbreviated number of fully referenced data that calls into question man-made catastrophic warming.

- Deliver instruction using evidence-based science, including climate change, human impacts on natural systems, human sustainability, and engineering design, as recommended by the *Framework for K–12 Science Education (Framework)*;

We agree that evidence-based science should be used in instruction on climate change. It is also imperative that teachers also include the many benefits that ecosystems and humanity are realizing from modest warming and increased CO₂.

- Expand the instruction of climate change science across the K–12 span, consistent with learning progressions offered in the *Framework*;

We support the teaching of the science of the many aspects of climate change appropriate to the grade level of the student as long as a false climate crisis narrative is not a focus of the instruction.

- Advocate for integrating climate and climate change science across the K–12 curriculum beyond STEM (science, technology, engineering, and mathematics) classes;

Integration of climate and climate change “science” across the K–12 curriculum beyond STEM is nothing more than a radical attempt to involve non-existent climate alarm in order to foster a climate of fear among students.

- Teach climate change as any other established field of science and reject pressures to eliminate or de-emphasize climate-based science concepts in science instruction;

We support the teaching of evidence-based non-alarmist science. Focus should be on the many benefits of climate accruing to the ecosystems and the human condition.

- Recognize that scientific argumentation is not the same as arguing beliefs and opinions. It requires the use of evidence-based scientific explanations to defend arguments and critically evaluate the claims of others;

We could not agree more.

- Plan instruction on the premise that debates and false-equivalence arguments are not demonstrably effective science teaching strategies;

We support debate on the subject.

- Help students learn how to use scientific evidence to evaluate claims made by others, including those from media sources that may be politically or socially biased;

Students indeed need to know that media sources are commonly politically or socially biased in order to promote a non-existent climate crisis.

- Provide students with the historical basis in science that recognizes the relationship between heat-absorbing greenhouse gases—especially those that are human-induced—and the amount of energy in the atmosphere;

We absolutely support the promotion of the historical relationship between CO₂ and temperature through time, and we provided a series of six charts showing the lack of correlation between the two in Section 2.

- Highlight for students the datasets from which scientific consensus models are built and describe how they have been tested and refined;

As we describe in some detail in Section 1, consensus has no role in the scientific method or with critical thinking. “If it is consensus, it is not science. If it is science, it is not consensus,” explained Michael Crichton.

- Recognize that attempts to use large-scale climate intervention to halt or reverse rapid climate change are well beyond simple solutions and will likely result in both intended and unintended consequences in the Earth system (NRC 2015; USGCRP 2017);

We agree completely. The unintended consequences of large-scale climate intervention like geo-engineering are large and potentially catastrophic.

- Analyze different climate change mitigation strategies with students, including those that reduce carbon emissions as well as those aimed at building resilience to the effects of global climate change;

Climate change mitigation strategies and reductions in carbon emissions are neither needed nor beneficial to our ecosystems and the human condition. CO₂ is a huge net benefit to both. More CO₂ is better.

- Seek out resources and professional learning opportunities to better understand climate science and explore effective strategies for teaching climate science accurately while acknowledging social or political controversy;

We support this enthusiastically and recommend the CO₂ Coalition website as a great source for facts on climate change: <https://co2coalition.org>

- Analyze future climate change scenarios and their relationships to societal decisions regarding energy-source and land-use choices.

The future climate change scenarios promoted by the NSTA have been shown to be fatally flawed by Dr. John Christy and others. Christy's analysis indicates that modelled future temperatures overestimate warming by 2.5 times globally and 3.0 times in the tropics.

**CO₂ Coalition Review Panel for the
National Science Teaching Association
Position Statement on Climate Change**

***Jan Breslow, MD (Genetics)** – Fredrick Henry Leonhardt Professor Rockefeller University; Head Laboratory of Biochemical Genetics and Metabolism; Senior Physician Rockefeller Hospital.

Sharon Camp, PhD (Chemistry) – High school teacher of AP Science, developed broad-based science curricula for grades 3-5. Currently a reader for the yearly national AP Environmental Science exam.

John Droz, MS (Physics) – Independent physicist and environmental advocate. Creator and editor of WiseEnergy.org, a broad-based educational resource and Energy & Environmental Newsletter.

Bruce Everett, PhD (Economics) – PhD in Economics from The Fletcher School. Adjunct professor at the Fletcher School and the Georgetown School of Foreign Service.

Gordon Fulks, PhD (Physics) – Laboratory for Astrophysics and Space Research at the Enrico Fermi Inst. of the Univ. of Chicago; studying the solar modulation of galactic cosmic rays using giant stratospheric balloons flown in the Arctic. Mission Research Corporation, studying nuclear weapon effects, disproving Carl Sagan's "Nuclear Winter" hypothesis, and hardening various embassies, including the US Embassy in Moscow. Consulting for government and business on the many scientific scares of recent decades.

***William Happer, PhD (Physics)** – Professor Emeritus in the Dept of Physics at Princeton Univ. Specialist in modern optics, optical and radiofrequency spectroscopy of atoms and molecules, radiation propagation in the atmosphere, and spin-polarized atoms and nuclei. He has published over 200 peer-reviewed scientific papers. He is a Fellow of the American Physical Society, the American Association for the Advancement of Science, and a member of the American Academy of Arts and Sciences, the National Academy of Sciences and the American Philosophical Society.

Hugh Kendrick, PhD (Nuclear Engineering) – Research in pure and applied sciences including condensed matter physics that led to the co-discovery of the first order magnetic phase change in chromium. Pioneered ways to assess and reduce nuclear weapons proliferation risks from commercial nuclear fuel cycles. Retired VP of employee-owned Science Applications International Corp where he helped grow annual revenues from \$10 million to \$5+ billion.

Payne Kilbourn, MA (Political Science) – Retired Navy, Commanding Officer of USS Omaha (SSN 692) nuclear attack submarine. Founder and CEO of Unmanned Ocean Vehicles and co-author of the patent for the company’s autonomous, unmanned surface vessel for military applications and oceanographic research.

***Richard Lindzen, PhD (Atmospheric Physics)** – Professor Emeritus in the Department of Earth, Atmospheric, and Planetary Sciences at MIT. Formerly MIT Alfred P. Sloan Professorship in Atmospheric Sciences. Doctorate from Harvard with a thesis on the interaction of photochemistry, radiation and dynamics in the stratosphere.

Patrick Moore, PhD (Ecology) – Co-founder of Greenpeace (1971-1986). Chairman and Chief Scientist, Ecosense Environmental. Leader, Campaign to Allow Golden Rice Now.

Rafaella Nascimento, PhD (Chemistry) – Co-developer of nanomaterials for environmental decontamination, bio-imaging and additive manufacturing. Founder and president of Brazilian Association CARAVEL, an institution dedicated to creating educational content for Brazilians.

Dan Nebert, MD (Genetics) – Professor emeritus Human Genetics Division, Dept of Pediatrics and Molecular & Developmental Biology at Cincinnati Children’s Hospital Medical Center. Nebert has published more than 650 papers in several scientific fields.

Tom Sheahen, PhD (Physics) – Chairman of the Science and Environment Policy Project (SEPP), Director Emeritus of the Institute for Theological Encounter with Science and Technology (ITEST), and president/CEO of Western Technology, Inc., an independent consulting firm specializing in energy technology issues with business implications.

James Steele MA (Biology) – Retired, Director of San Francisco State University’s Sierra Nevada Field Campus. Principal Investigator for the Neotropical Migratory Bird Monitoring of Riparian Habitats and author of Landscapes and Cycles: An Environmentalist’s Journey to Climate Skepticism.

Gregory Wrightstone MS (Geology) – Executive Director CO₂ Coalition, geologist, bestselling author (Inconvenient Facts), and an Expert Reviewer for the Intergovernmental Panel on Climate Change (AR6).

Bob Zybach, PhD (Environmental Sciences) – Writer, researcher, photographer focused on the human and landscape history of Oregon over the past 15,000 years including forest and fire history; the Oregon Trail; Indian and Black communities and individuals; endangered species habitat; and reforestation planning.

*Member of the US National Academy of Sciences

References

- Berner RA, Kothavala Z (2001) GEOCARB III: A revised model of atmospheric CO₂ over Phanerozoic time, IGBP PAGES and World Data Center for Paleo-climatology, Data Contribution Series # 2002-051. NOAA/NGDC Paleoclimatology Program, Boulder CO, USA.
- EM-DAT (2022) EM-DAT Center of research on the Epidemiology of Disasters (CRED)
<https://www.emdat.be/>
- European Environment Agency (2022) Trends in atmospheric concentrations of CO₂ (ppm), CH₄ (ppb) and N₂O (ppb), between 1800 and 2017, European Environment Agency
- Feynman R (1965) The Character of Physical Law (1965), p. 150. The MIT Press
Feynman (1974) 1974 Caltech commencement address, Surely, You're Joking, Mr. Feynman! (1985), p. 311-12.
- Feynman (2005) The Meaning of It All: Thoughts of a Citizen-Scientist,
<https://www.amazon.com/Meaning-All-Thoughts-Citizen-Scientist/dp/0465023940>
- Happer W (2003) Chapter 1 "Harmful Politicization of Science," Michael Gough Ed., Politicizing Science (2003), pp. 29-35.
- HadCRUT5 (2023) The Hadley Climate Research Unit (HadCRUT5) annual global mean surface temperature dataset,
<http://www.metoffice.gov.uk/hadobs/hadcrut5/data/current/download.html>
- Happer W (2022) Nitrous oxide and climate <https://co2coalition.org/publications/nitrous-oxide-and-climate/>
- King ML Jr (1947) The Purpose of Education, Morehouse College Maroon Tiger
<https://kinginstitute.stanford.edu/king-papers/documents/purpose-education>
- Monckton (2017) Foreword for Inconvenient Facts, Wrightstone pp vi – vii
- NIFC (2017) National Interagency Fire Center - Total Wildland Fires and Acres (1960 – 2015),
https://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html

NSTA (2023) NSTA Position Statements, The Teaching of Climate Science <https://www.nsta.org/nstas-official-positions/teaching-climate-science>

Our World in Data (2021) Global reported natural disasters by type, 1970 to 2019, <https://ourworldindata.org/grapher/natural-disasters-by-type>

Parker DE, Legg TP, Folland CK (2023) A new daily Central England Temperature Series, 1772 – 1991. Int. J. Clim., Vol 12, pp 317–342, https://www.metoffice.gov.uk/hadobs/hadcet/data/meantemp_seasonal_totals.txt

Spencer R (2023) UAH Satellite-Based Temperature of the Global Lower Atmosphere (Version 6.0), <http://www.drroyspencer.com/latest-global-temperatures/>

World Meteorological Organization (2021) The Atlas of Mortality and Economic Losses from Weather, Climate and Water Extremes (1970–2019) WMO-No 1267, ISBN: 978-92-63-11267-5

Zhu Z, et al. (2016) Greening of the Earth and its drivers, Nature Climate Change 6, 791–795