

# Science Societies' Climate Statements: Some Concerns

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## Abstract

The assertion that a climate crisis is rapidly approaching due to excess carbon dioxide (CO<sub>2</sub>) in the atmosphere is said to be based on science. This science is summarized in the statements of the major scientific societies. These statements, have motivated, governments, the media, and much of the public to commit to abandoning fossil, *i.e.* going to “net zero” at some time in the not-so-distant future, perhaps by 2050, 26 years from now. *The claims of these scientific societies clearly have a profound impact on the government, the media and the public, and therefore the scientific basis for these claims needs to be frequently and rigorously reexamined by the societies, and scrutinized by the public. This paper illustrates some serious concerns regarding the claims of these societies. It is not difficult to question these claims by comparing them with actual data from well-established organizations such as NOAA and NASA. Furthermore, the claims seem to go against such well-established scientific laws as the Stefan Boltzman radiation law, and le Chatelier's principle.* If the statements of the societies overstate the danger, or are even incorrect, they may be motivating the United States, the western world, or even the whole world to make an enormously expensive and unnecessary transition to an energy infrastructure that is more expensive, less reliable, and more environmentally damaging than the one we have today. This article suggests that these scientific societies reexamine their climate statements with the goal of making them more moderate and more scientifically correct.

## Keywords

APS Climate Statement, ACS Climate Statement AGU Climate Statement, AMETS Climate Statement

## 1. Introduction

This paper examines the statements of 5 prestigious scientific societies [1] [2] [3]

[4] [5] which assert additional CO<sub>2</sub> in the atmosphere, arising from burning fossil fuel promotes destructive climate change. It finds serious concerns about the accuracy of these statements. The statements of these societies form the basis of much of the scientific support for governmental, media, and public concerns of the use of fossil fuel. However greatly reducing the use of fossil fuel will mean enormous changes in lifestyle worldwide. If these statements greatly overstate the case for moving to “net zero”, as this author believes they do, it is important that the societies reexamine them and consider changing their statements to others which are more moderate in their suggestions, and more scientifically correct.

These societies are The American Physical Society (APS) (this author is a life fellow), The American Meteorological Society (AMETS), The National Academy of Science (NAS), The American Chemical Society (ACS), and the American Geophysical Union (AGU).

It is not hard to show that there are difficulties with many of the statements of these societies. It does not require doing an extensive, complex scientific study. All one needs do is take an assertion of the society at issue, check it out against, for instance, NOAA or NASA data, and see that there is a serious problem with the assertion. For instance, let's say that the statement says that hurricanes are becoming more frequent and intense due to extra CO<sub>2</sub> in the atmosphere. One must only examine the NOAA web site (for instance) and see that mostly but not totally; this statement is incorrect. This paper gives many such examples, which are in fact just a tiny part of the voluminous data contradicting the assertion of a CO<sub>2</sub> generated climate crisis. Also, the author makes use of a Friend of the Court Document by 3 well known authorities, which was used in an important trial in the Netherlands [6].

The assertion made by those believing in a fast-approaching climate crisis, is that a small change in the earth's radiation balance (~1%) [7] [8] [9] can not only produce a large temperature increase but can also trigger other physical processes which amplify this temperature increase [10] [11]. These assertions appear to contradict two important and well-established physical laws. These are the Stefan Boltzman radiation law, and Le Chatelier's principle for equilibrium of complex dynamic systems. This alone should motivate suspicion that something could be very wrong. At some point, likely sooner rather than later, these scientific societies may well have to answer some pretty tough questions. After all they are telling the public to make very difficult and expensive changes in lifestyle, changes that will cost many, many trillions, as estimated by the *advocates* of these changes [12] [13]. When the public focuses on these costs, and furthermore, sees that they are almost certainly not only unnecessary, but harmful scientifically, technically, economically, and environmentally, the public reaction to these scientific societies will not be kind and gentle. Better these societies should modify their climate change statements now, before the roof collapses on them.

Section 2 is a general summary of the situation as the author sees it. Section 3 examines the APS; Section 4, the AMETS; Section 5, the NAS; Section 6, the

ACS; and Section 7, the AGU. Section 8 briefly discusses sustainable energy and how the world might get there by breeding nuclear fuel by either fission or fusion. Finally, Section 9 gives a discussion of these results.

## 2. The Situation as the Author Sees It

Energy beyond what animals and humans can provide is essential for modern civilization. Without it, there would be few manufactured goods, no modern agriculture using nitrogen fertilizer (made from natural gas), no easy transportation, no high-tech medicine, no clean environment... Before fossil fuel, civilization was a thin veneer over a vast mountain of human squalor and misery. It was maintained by institutions such as tyranny, slavery, and colonies. Right now, fossil fuels, which many claim are or will soon be an existential threat for humanity, still provide ~85% of world energy cheaply, reliably, and with little environmental damage (assuming normal pollution controls are used).

There is no substitute on the horizon.

Solar and wind have been massively subsidized for over 25 years, certainly more than several trillion worldwide [12] [13], but they still provide ~1% - 2% of the world's power. There is simply no prospect that they will provide the necessary and reliable power anytime soon. China now is by far the largest CO<sub>2</sub> emitter and is still adding to its electric grid by building coal powered plants at a rapid pace. India is not that far behind, and soon the rest of Asia, Africa, and Latin America will do the same. There is no stopping this. These places are sick of poverty and want the same lifestyle, based on fossil fuel, that we have in for instance the United States.

But take away fossil fuel, *i.e.* go to “net zero”, which is the policy many nations claim is a goal, then civilization, which fully depends on fossil fuel, will collapse. It is not simply a matter of energy prices increasing by this or that percentage, we reemphasize, the *civilization will collapse!* If only western democracies go to “net zero” and the less developed world does not, then only western civilization will collapse, ultimately to be taken over by hostile forces. After all there are many countries, hostile to the west, that are not fooled by claims of a climate crisis caused by burning fossil fuel. The stakes are enormous.

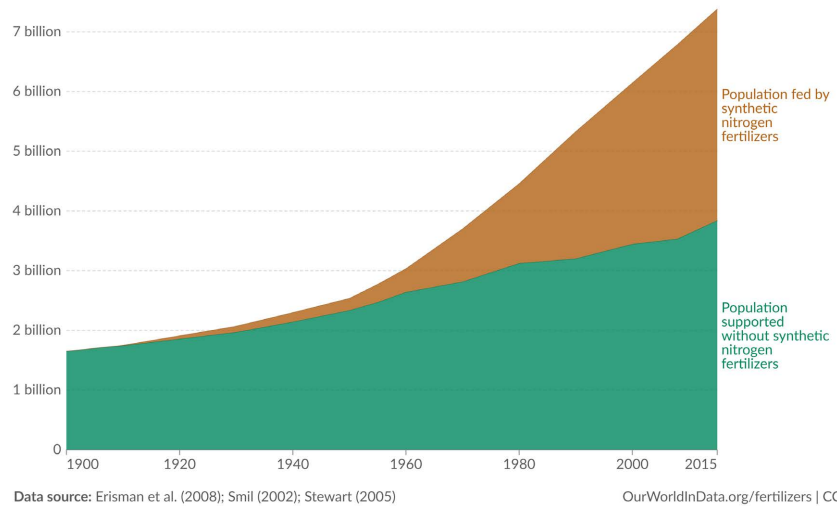
As one example, look at **Figure 1** of the additional world population which is supported by nitrogen fertilizer [6]. Without fossil fuel, there would be no such fertilizer. Take away the nitrogen fertilizer by going to “net zero”, and the premature deaths would be in the billions. Once again, the stakes are enormous!

Surprisingly there is not that much carbon for human use on the land surface of this planet. Every carbon atom in our bodies and in our food, has its origin in plant life, or in animal life which eats plant life; and/or decayed organic matter in the soil, all of which has its origin in atmospheric CO<sub>2</sub>. There is virtually no other source of the carbon necessary to sustain the life on earth. Without atmospheric CO<sub>2</sub>, (or more accurately if the atmospheric CO<sub>2</sub> fell below ~150 ppm) life on earth would not be possible. Greenhouses typically operate with

CO<sub>2</sub> rich atmospheres. There is good evidence that the *increase* in agricultural productivity over the past half century is in part due to the increase of CO<sub>2</sub> in the atmosphere. CO<sub>2</sub> is plant food.

### World population supported by synthetic nitrogen fertilizers

Best estimates project that just over half of the global population could be sustained without reactive nitrogen fertilizer derived from the Haber-Bosch process.



**Figure 1.** A graph of the world population and the people fed by nitrogen fertilizers. Without this fertilizer, world agriculture could support many fewer people.

Let those that speak of striving for net zero answer one simple question. What do they think is the optimum concentration of atmospheric CO<sub>2</sub> and why.

The assertion that 97% of scientists agree that CO<sub>2</sub> is an existential threat to humanity is simply false. It was not arrived at by an impartial polling organization, but by “climate crisis believers” interpreting the data as they saw fit. There are more than thirty thousand well qualified scientists, who have investigated the evidence, and willingly decided to publicly put their names on documents of one sort or other that dispute the standard assertion that that CO<sub>2</sub> is or will soon be triggering destructive climate change [14] [15] [16]. Let those who assert that 97% of qualified scientists support the assertion that CO<sub>2</sub> is planet destroying toxin, come up with public documents asserting this, signed by ~ a million qualified scientists. Only then will the 97% figure be believable.

There have been excellent books skeptical of the onrushing climate crisis written by top of the line scientists, environmentalists, and economists such as Steven Koonin [17], Michael Shellenberger [18], Patrick Moore [19] and Bjorn Lomborg [20] (listed on the Time Magazine’s list of the 100 most influential people), Gregory Wrightstone [21] (the head of the CO<sub>2</sub> Coalition, to which this author is proud to belong). The author [22] also wrote one entitled, entitled *Mass Delusions...*

However, *Mass Delusions* has something these books do not have. To plagiarize a bit from the Declaration of Independence, it “holds this truth to be

self-evident”, that the world’s goal is to bring energy use for the entire world up to that used in the western world. It treats the sustainable energy dilemma and the climate dilemma in unified fashion. In fact, its section on solar and wind, with 45 citations, argues that these can never reliably replace fossil fuels, at a reasonable quantity, price, and environmental cost. It shows that far from being environmentally benign, wind and solar, with battery backups, will constitute an environmental disaster. It has a large section on fusion and another on fusion breeding, which the author has spent about half of his career on. Also, the book is written in an irreverent style; it is even less politically correct than these other politically incorrect books just mentioned. It is shorter and depends more on including many color images. It is a very easy read.

Finally, it is more emphatic than these other books; it treats our ongoing switch to solar and wind not as something that will increase our energy price by this or that percent, but as a genuine threat to our civilization which depends on inexpensive, reliable, environmentally sound energy. For instance, it shows (22) in a very simple calculation, that in the United States alone, the cost of battery backups for our grid would be ~\$600T, and this assumes the cost of the Tesla battery could be reduced by 90%. Obviously, this battery backup can only occur in a dream world. Places that have made a major switch to solar and wind energy (*i.e.* ~25% or more of their electric power) have experienced higher electricity prices, reduced reliability, and in some case environmental devastation as wind and solar companies frequently abandon worn out solar panels and windmills and leave others to worry about the expensive clean up. Net zero would make the situation much worse. Not only that, solar panels and wind turbines depend on a number of exotic and rare materials for their construction, elements like praseodymium, terbium, cadmium, indium dysprosium... Currently these materials are available mostly from China, which produces them under who knows what mining and labor conditions. There is an old saying that if your enemy is destroying itself, don’t get in its way. The Chinese, who are still building a new coal fired power plant at the rate of one or two a week, are not only obeying this rule, but they also go one step further. They are getting rich selling us the rope to hang ourselves. What fools we are!

Wind and solar are only available when the sun shines, or when the wind blows. Batteries are nowhere ready to fill in the gaps, and probably never will be [22]. In other words, wind and solar constitute half a power supply. This reminds one of another tragic situation nearly 100 years ago. France, confronted by a powerful and hostile enemy wasted enormous resources and effort on building a gigantic white elephant in steel and concrete, half a wall. We all know how that worked out; the comparison is apt. Because of their disastrous error, France was basically enslaved for 4 years. Fortunately, others were able to save them. But who will save us when we go to “net zero”, our economy collapses, and hostile forces move in? To emphasize for a third time, the stakes are enormous!

However, there is something of a David vs Goliath nature to combating the powerful forces insisting that CO<sub>2</sub> in the atmosphere, is or will soon be an exis-

tential threat to humanity. In taking on such gigantic and powerful societal forces, this large number of more rational, but not well-organized scientists, just mentioned, are hopelessly overpowered while attempting to bring in some light and truth. Hopefully solar and wind have not gotten “too big to fail”. Nearly all the media, all western governments, even many energy companies, and many billionaires with their dollars, support this climate alarmism in one way or another. For the most part, the public, at least in the United States seems to believe it also.

Scientific societies are supposed to be the guardians of the scientific method, rely principally on data to form their conclusions, and test scientific theories by comparing them to experiment and measurements. They do not seem to be acting in this role, as the paper will show. Instead, these scientific societies seem to have become the bedrock, the foundation, upon which the gigantic edifice of the oncoming climate crisis rests. This article, and many others (6, 17-22) make the case that this ‘edifice’ is a real threat to civilization. Take down the foundation, and the edifice will ultimately collapse. These scientific societies could do civilization an enormous favor. They could change their statements to ones that are more moderate and more scientifically correct. This could be an important first step to bringing the world back to sanity. They could give David his sling shot.

So far, regarding the APS, many well established physicists [23] [24] [25], including two Nobel Prize winners [26] [27], and including the author [28] [29] have politely gone to the society management, hat in hand, and suggested a change in their climate alarmist statements, only to be ignored. I imagine that this has occurred in other scientific societies as well. It is long past the time to take this effort outside the ivory towers of these societies and involve the public in the struggle to convince these societies to reexamine and to change their statements to others that are more moderate and scientifically correct. This author has made one such attempt in the Washington Times [30]; this is a second attempt to do so in a scientific publication. He hopes many others follow suit, both within and outside of the scientific literature.

### **3. Concerns with the American Physical Society’s Climate Statement**

Here is an excerpt from that statement [31]:

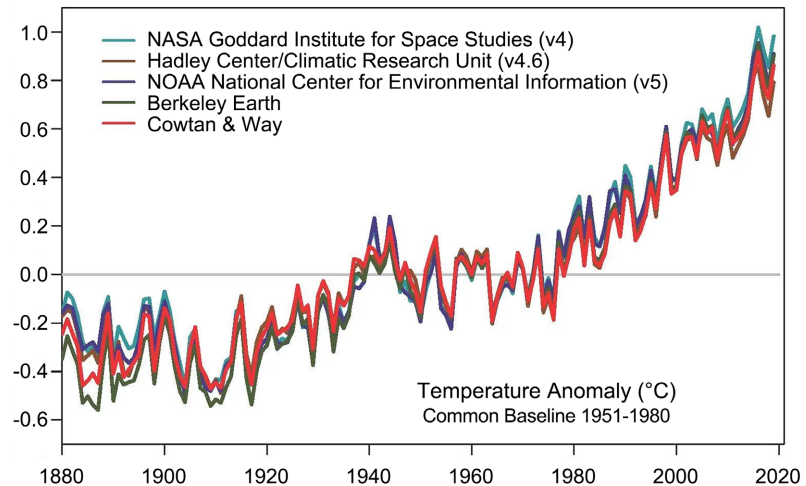
Earth’s climate is changing. This critical issue poses the risk of significant environmental, social and economic disruptions around the globe.

Multiple lines of evidence strongly support the finding that anthropogenic greenhouse gases have become the dominant driver of global climate warming observed since the mid-twentieth century.

The first sentence is obvious, the earth’s climate has always been changing, always will, and throughout the millennia of human civilization, warm periods have been more beneficial to human civilization than cold periods. We will discuss this in more detail shortly.

The second part is not correct, and it is a simple matter to show this. Simply

look at a graph of world temperature from 1880 to 2020, for instance from a NASA publication [32]. This is shown in **Figure 2**. The measurements were taken by NOAA, NASA and 2 other American agencies and one British (Hadley).



**Figure 2.** A graph of world temperature from 1880 to 2023 taken from the NASA publication [32]. Five different agencies came up with about the same results.

As the graph is rather jagged, it is difficult to get a precise measurement of the rates of change or temperature, but it is not difficult to see that the temperature rose from about  $-0.5^{\circ}\text{C}$  to about  $+0.2^{\circ}\text{C}$  (compared to the zero point on the graph) in the 30 years from 1910 to 1940, or a rise of  $\sim 0.23^{\circ}\text{C}$  per decade. This was a period during which there was little if any increase in atmospheric  $\text{CO}_2$ . Then from 1940 to 1980, it bounced around a constant value, the zero point of the graph as  $\text{CO}_2$  was increasing. However, from 1980 to 2020, there was roughly a 50% increase in atmospheric  $\text{CO}_2$ . Then the temperature rose from  $+0.2^{\circ}\text{C}$  to  $1^{\circ}\text{C}$ , or at a rate of  $\sim 0.2^{\circ}\text{C}$  per decade. This is just about the same rate of rise as from 1910 to 1940. The APS statement that “anthropogenic greenhouse gases have become the dominant driver of global climate warming” is indisputably incorrect. Whatever drove the current temperature increase, it is about as dominant as whatever drove the increase from 1910 to 1940 (but the current heating has persisted a decade longer so far). The next section shows that the 2020 temperature is lower than the maximum temperature during several periods of human civilization.

Admittedly there is a single large rise in 2023 (not shown in the graph shown ending in 2020). It remains to be seen if this is a singular event, or a harbinger of larger temperature rises yet to come. There have been other large single year rises in 1998 and 2016 as the graph shows, followed by large drops. In any case, the APS statement was written well before 2023.

Another unusual aspect of the APS statement is that it uses only a single source to back up its assertions. The statement has 14 citations, all of them to the

Intergovernmental Panel on Climate Change (IPCC) and its special reports. There is not a single citation to NOAA, NASA, EPA, Hadley... As was pointed out [6], the IPCC is an organization of governments, not scientists, and it prints what is in the government's interest, not what is in the interest of the best science. The IPCC rules are that the government bureaucrats can overrule anything the scientists write for the report. Reference [6] gives an interesting example from their 1995 report, reproduced here:

The draft by the independent scientists concluded:

“No study to date has positively attributed all or part (of the climate warming observed) to (manmade) causes.”

“None of the studies cited above has shown clear evidence that we can attribute the observed [climate] changes to the specific cause of increases in greenhouse gases.”

Frederick Seitz, “A Major Deception on Climate Warming”, *Wall Street Journal* (June 12, 1996).

However, the government written SPM proclaimed the exact opposite as to human influence:

“The balance of evidence suggests a discernible human influence on global climate.”

*1995 Science Report SPM*, p. 4.

This author finds it surprising that the APS has decided to base its climate statement on any single source, especially a source whose goal is government and politics, not science.

#### **4. Concerns with the American Meteorological Society Climate Statement**

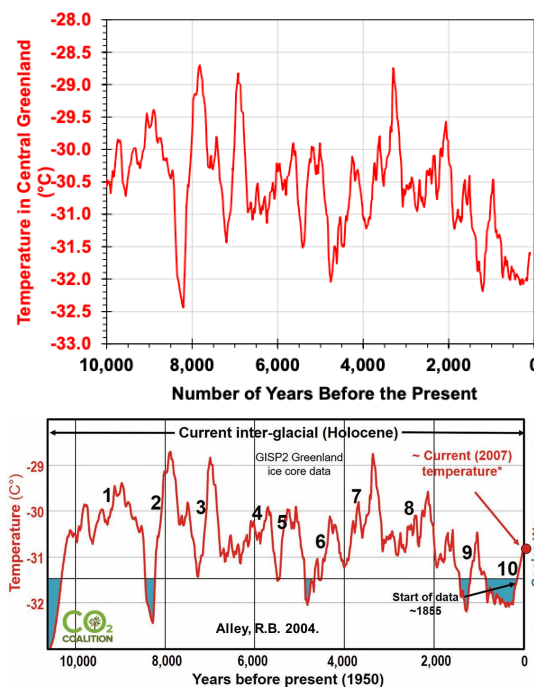
Here is a portion of the statement of the American Meteorological Society [33] [34]:

Warming of the climate system now is unequivocal, according to many different kinds of evidence... Due to natural variability, not every year is warmer than the preceding year globally. Nevertheless, all of the 10 warmest years in the global temperature records up to 2011 have occurred since 1997, with 2005 and 2010 being the warmest two years in more than a century of global record.

This statement is correct, but rather misleading. The earth is much more than a century old. Clearly it implies that the current temperature is the highest; period. Human civilization goes back ~10,000 years, while accurate thermometer-based temperature measurements have only been available for ~150 years. However, there are other ways of measuring temperature over the period of human civilization. One way of measuring temperatures in previous eras is with the ratio of  $^{18}\text{O}$  to  $^{16}\text{O}$  in the Greenland ice cores. About 0.1% of oxygen on earth is the heavier isotope. Water containing the heavier and lighter oxygen isotopes evaporate at a slightly different rates, a difference dependent on temperature [9].

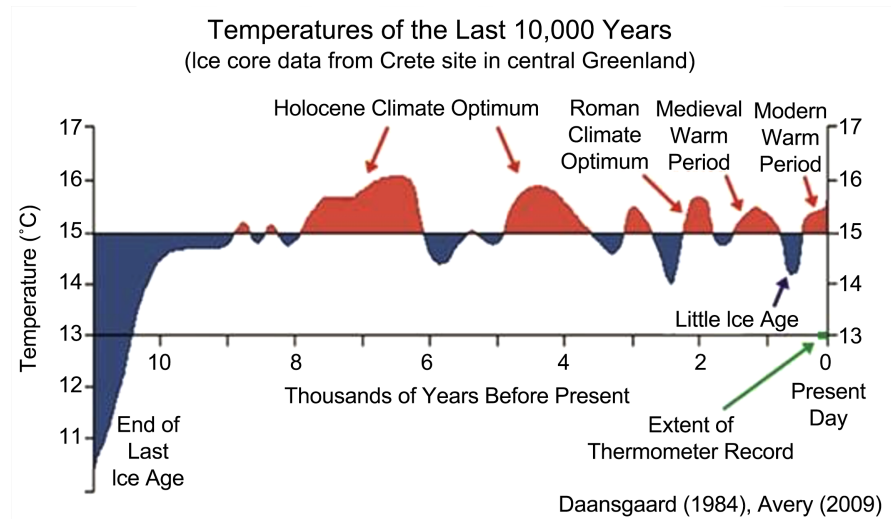
Hence measuring the isotope ratio as a function of depth in the ice caps (*i.e.* as a function of year) gives a very good indication of temperature as a function of year.

This is not a local Greenland measurement. The snow on Greenland is from ocean evaporation over a large part of the earth south and west of Greenland. It comes from water evaporated from the tropics and midlatitudes and carried by the prevailing westerly winds, and then carried up to the northern latitudes by general circulation. Hence it is an indication of the average temperature over a large patch of earth at those times. There is much less ocean evaporation in the colder regions. Richard Alley did a very careful analysis of the isotope ratio as a function of depth at one of the Greenland sites [35]. His paper concentrated on an accurate measurement of the rather sudden rise in temperature as the ice age terminated. However his technique applied at all depths (*i.e.* at later times after the ice age terminated). This raw information is archived in a data file stored on the internet by NOAA [36] so anyone can have access to the actual data and interpret it however he chooses. Additional data including unpublished graphs, is also available on the NOAA web site, or from the author. **Figure 3** shows a graph from one of Alley's data files. Also shown in **Figure 3** is the graph on the CO<sub>2</sub> coalition's web site [37] [38]. Clearly they are the same. Another paper to analyze the data is that by Cuffy and Clow [39]. Their graph (their **Figure 3**) is over a much larger time span, but on the left hand side of their graph (the last 10,000) years also confirms our **Figure 3**.



**Figure 3.** A graph of temperature during the 10,000 years of human civilization as measured from the Greenland ice caps. The upper version is directly from the data in Alley's data file [36], the lower version is the CO<sub>2</sub> coalition's version taken from the data file. They are obviously the same. It shows at least 9 periods with higher temperature than today from [35].

However graphs using a coarser averaging are also readily available, but obviously less accurate. One such is shown in **Figure 4**.



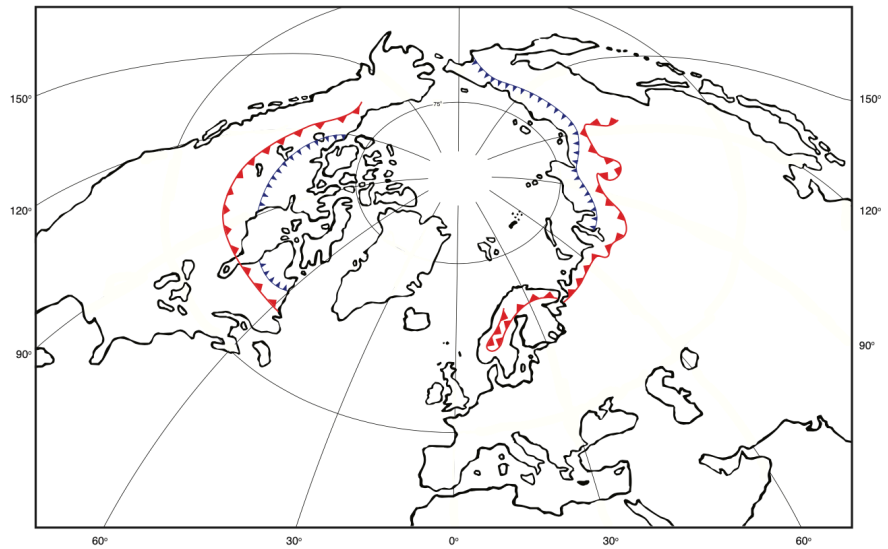
**Figure 4.** A smoothed plot of average temperature over the last 10,000 years as measured by the Greenland ice caps. Notice that the warm times are times when civilization advanced, and the cold times were mostly disastrous for humanity.

These graphs show that the current era is hardly the warmest during the period of human civilization. Furthermore, these graphs were primarily constructed by scientists who are members of these societies. The differences in evaporation rates, and their temperature dependences are tiny. Hence very accurate measurements are needed to get accurate results, and very sophisticated methods are needed to analyze the data. These graphs are a very great credit to the scientific profession.

As convincing as **Figure 3** and **Figure 4** are, it is far from the only evidence that these earlier periods were warmer than today. **Figure 5** is a plot of most of the northern hemisphere showing the northernmost limits of forest ~4000 years ago, in the Holocene Climate Optimum, about the time of the biblical exodus; and today. This was redrawn, (*i.e.* with some data left out) of Lamb' [9], which is the fundamental textbook on climate science. Remnants of these northern forests from 4000 years ago are still in place and can be examined today. Again, it is obviously not a local measurement. 4000 years ago these forests extended ~200 miles further north than they do today, indicating a considerably warmer climate then.

Lamb listed several similar examples, for instance remnants of forests at higher altitude on mountains, forests that cannot exist at these altitudes today. His book is perhaps the most well known textbook on the science of the climate; he is often regarded as the father of climate science. He does, in fact discuss the warming effect of atmospheric CO<sub>2</sub>, but not until page 330! His estimate of the effect of raising the concentration to 800 ppm, is roughly the same as that calculated by Wijngaarden and Happer (8) (*i.e.* ~1-1.5°C), and likely would be the es-

estimate of IPCC [7] (they looked at temperature rise over a different time period).



**Figure 5.** The smaller blue triangles are the limits of northernmost forest 4000 years ago during the Holocene climate optimum; and the larger red triangles, today. Clearly the Holocene climate was sufficiently warmer than today, so that the forests could exist ~200 miles further north. Redrawn of [9].

These are calculations of the additional radiation making it back to earth (or equivalently the reduction of radiation getting out into space). This radiation is measured in Watts per square meter. Amazingly both Ref [8], the IPCC calculation [7], and Lamb all get about the same result, the additional radiation making it back to earth is roughly 1% - 2% of the total solar radiation power per square meter, as a result of increasing CO<sub>2</sub> level in the atmosphere from ~400 ppm to 800 ppm (but the IPCC calculation was from a CO<sub>2</sub> increase from 280 to 420 ppm). Since the absorption lines saturate, further additional CO<sub>2</sub> in the atmosphere, impacts the radiation back to earth even less.

But what temperature increase does this additional radiation cause? It is not simple to estimate this, but the estimate should at least take account of the fundamental law relating radiation to temperature, the Stefan Boltzman law, which all undergraduate physics majors learn in their sophomore or junior year. This law is that the radiation from a black body denoted by  $I$ , in W/cm<sup>2</sup>, is proportional to the absolute temperature to the fourth power, *i.e.*:

$$I - T^4; \text{ or correspondingly; } T - I^{1/4}$$

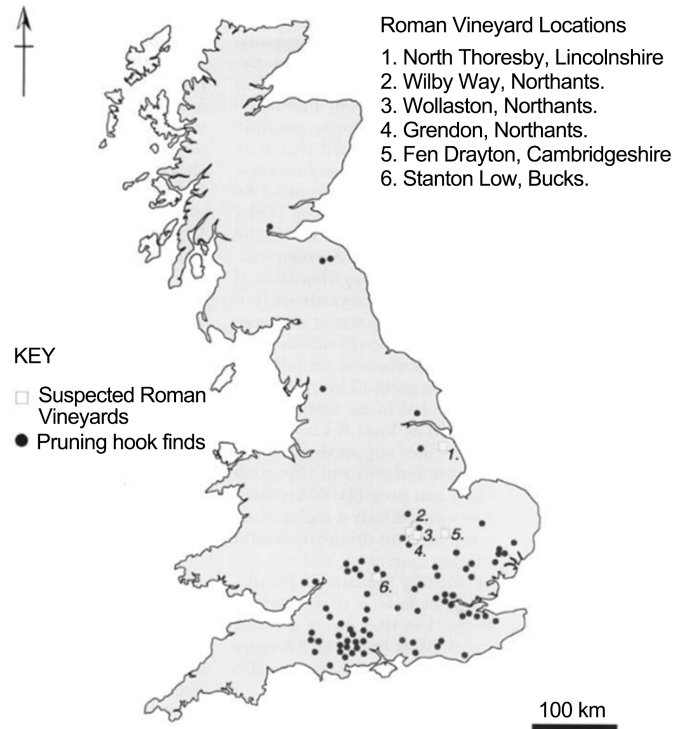
Hence a 1% - 2% increase in radiation would imply a rise in absolute temperature of 1/4% - 1/2%, or about a degree on the absolute temperature scale, just as Refs [8] and [9] predict.

How come the IPCC [7] regards this 1% increase in radiation as something which is an existential threat to humanity, while Refs [8] and [9] regard it as a fluctuation in temperature generally swamped by temperature changes caused by other physical processes?

The answer is that the IPCC stipulates a “positive feedback” that multiplies the effect of the CO<sub>2</sub> induced warming by some factor which may be 2 or greater [10] [11]. That is the 1° increases in temperature caused by heating from additional CO<sub>2</sub> causes other physical processes to further increase the temperature. For instance a warmer atmosphere might affect the further heating in two ways. First of all, more CO<sub>2</sub> could outgas from the ocean due to the hotter temperature. Second, ocean evaporation could increase due to a warmer temperature. Since water vapor is a more potent green house gas than CO<sub>2</sub>, this would also further increase the temperature. However the added heat to initially evaporate more of the ocean and outgas additional CO<sub>2</sub> does not have to come from added CO<sub>2</sub> caused heating. It can come from any other physical process that causes an initial heating, and the logic is the same. **Figure 3** and **Figure 4** show many times when some process or other caused some initial heating of the earth. At each time, there would also have been more CO<sub>2</sub> outgassing, and more evaporation from the oceans. However there was never runaway heating, but rather the oscillatory behavior as demonstrated in **Figure 3** and **Figure 4**.

Furthermore such a positive feedback violates LeChatelier’s principle, which states that that if a dynamic equilibrium is disturbed by changing the conditions, the position of equilibrium shifts to counteract the change in conditions. Let us consider this for the climate system, which is certainly a very dynamic system. Let’s say that a bit of added radiation comes into play, which on its own would increase the temperature by 1 degree. But radiation is not the only dynamic process controlling the temperature, other processes do as well. Who knows how the atmosphere will react? In addition to more evaporation, the atmosphere could alter its density profile, temperature profile, turbulence level, cloud content, aerosol content, chemical composition..., it has many, many ways of reacting to the added radiation. Le Chatelier’s principle then says that the net effect of these other degrees of freedom, is to fight back and partially counteract the change generated by the added radiation, so that that temperature rise would be less than one degree. According to this principle, the multiplying factor should not be greater than unity, but less. Those saying the absolute temperature increase will be greater than the 1°C for this or that reason, are ignoring both Le-Chatelier’s principle, and the Stefan Boltzman law.

Another example of a warmer time is the confirmed fact, established from both Roman historical records and archaeological discoveries, that in the Roman Climate Optimum, the Romans had vineyards all over England [40], extending up to Hadrian’s wall. The map in **Figure 6** shows places where Roman pruning hooks, used in vineyards, were excavated in England. Also it shows where the remnants of six Roman vineyards were found. Virtually all the literature on Roman wine in England point out that Britain then was considerably warmer than today. Grapes that survive now in say Quebec or Minnesota today are newer hybrid grapes, bred to thrive in cold climate [41] and were not available in Roman times.



**Figure 6.** A map of England showing where the Roman's grew wine 2000 years ago, when England had a warmer climate than today [40].

Finally, in the Medieval Warm Period, the Vikings settled Greenland and for hundreds of years, grew barley there, something not possible to do today. Modern explorers found some of this barley in Greenland firmly establishing that it was grown there ~1000 years ago [42]. **Figure 7** shows recently excavated remnants of 1000 year old barley grain found in Greenland in 2012. Certainly Greenland today is much too cold for cultivating barley.



**Figure 7.** Remnants 1000 year old of barley excavated in Greenland in 2012, planted at a time when Greenland was much warmer than today [39].

To summarize, the direct implication of the AMETS statement that today's temperature, partly generated by added CO<sub>2</sub> in the atmosphere, is unprecedented-

ed; is contradicted by a great deal of scientific, archaeological, and historical data. Not only that, in the warm periods, civilization advanced, in the cold periods, humanity suffered. This author believes it would be best for the AMETS to reexamine several of the claims of its climate statement in the light of actual data, and actually established physical laws, which seems to contradict its assertions.

## 5. Concerns with the Climate Statement of the National Academy of Science

At the time of this writing, there does not seem to be a concise statement of the NAS's stand on human induced climate change due to additional CO<sub>2</sub> in the atmosphere, but rather a 36-page pamphlet [3]. However, the incoming president of the NAS, Dr Marcia McNutt, wrote an editorial in Science Magazine [43] in 2015 on the subject. As she was the incoming NAS president at the time, this paper will use her editorial as a substitute. Excerpts are:

But now with climate change, we face a slowly escalating but long-enduring global threat to food supplies, ... to support a population of more than 7 billion people.

The time for debate has ended. Action is urgently needed ... to reduce their per-capita fossil fuel emissions even further...

To emphasize her assertion, Dr. McNutt went on to say that skeptics belong in one of the circles of Dante's inferno. **Figure 8** is her picture of this from her Science Magazine editorial.



**Figure 8.** “Where [would]...Dante...place all of us who are borrowing against this Earth...?” Dr. McNutt’s picture of one of the circles of hell where the skeptics of human induced climate change ought to go. From [43].

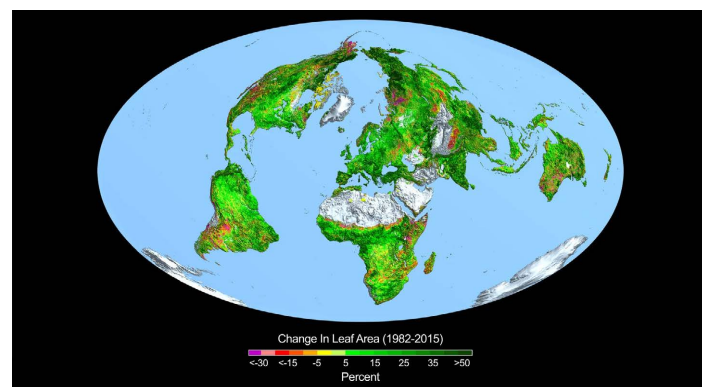
Notice that her primary point is climate change will be a great threat to global food supply for “a population of more than 7 billion people”, a threat so great that there can no longer be any scientific debate. To protect the world population from hunger and starvation, she proposes further reduction in fuel supply. But how does she think modern farms work? Modern agriculture is highly mechanized and is very dependent on fossil fuel, not only to till the land, but also to manufacture nitrogen fertilizer. As **Figure 1** shows, take away the gas produced nitrogen fertilizer, and billions will die.

Furthermore, Dr Idso performed an experiment on growth for a particular plant in a controlled environment with varying CO<sub>2</sub> concentrations, ambient, ambient plus 150, 300, and 450 PPM [6]. The results are shown in **Figure 9**.



**Figure 9.** Eldarica pine trees grown at the U.S. Water Conservation Laboratory in the mid-1980s by Dr. Sherwood Idso under ambient CO<sub>2</sub> air and air enriched with an extra 150, 300 and 450 ppm of atmospheric CO<sub>2</sub>.

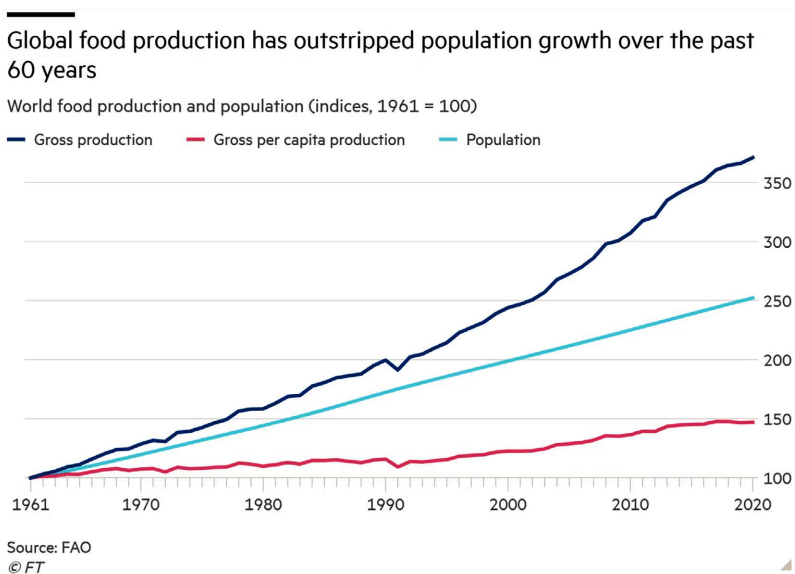
It is not only Eldarica pine trees that grow better with enhanced CO<sub>2</sub>, but plant life world wide. NASA has measured the “greening of the earth” during the period of space flight [44]. **Figure 10**, taken from [44] shows the percentage increase of leaf area from 1982 to 2015 as measured from space.



**Figure 10.** NASA image of the greening of the earth from 1982 to 2015 as measured from space [44].

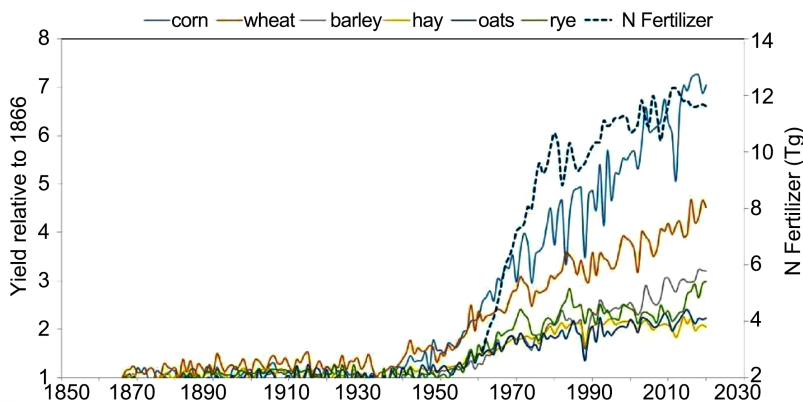
Clearly something has caused a great increase in plant life during this 33 year period. Reference [44] attributes it to additional fertilization by the extra CO<sub>2</sub> in the atmosphere. Hence any assertion of an imminent crisis for agriculture due to excess CO<sub>2</sub> in the atmosphere, must be regarded with great skepticism.

Dr. McNutt’s assertion directly involved food supply. Hence let’s look at the food supply over the last half century or so. The Financial Times [45] has given a graph of population, food production, and per capita food production from 1960 to 2020. Each of these graphs has significantly increased, as shown in **Figure 11**; they show no signs of “a slowly escalating but long-enduring global threat to food supplies”.



**Figure 11.** A graph of world population, gross food production, and per capita food production. In this figure there is no evidence of “a slowly escalating but long-enduring global threat to food supplies”.

To take another example, let’s look at production of cereal grains [6] shown in **Figure 12**.



**Figure 12.** Yield of a variety of cereal grains relative to 1866 showing the importance of the use of nitrogen fertilizer, made from natural gas.

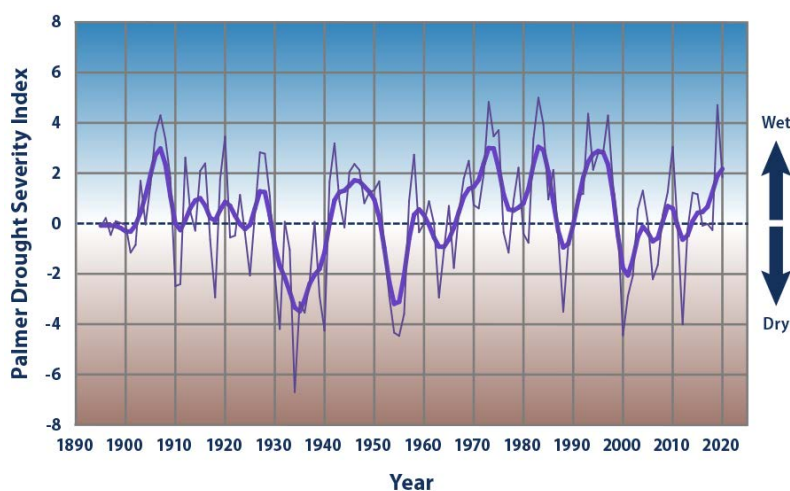
Thus at least at the present time, the data provides no indication that agriculture will suffer from additional CO<sub>2</sub> in the atmosphere, whether there is some climate change or not.

## 6. Concerns with the Climate Statement of the American Chemical Society

The ACS does have a 3 page statement on its web site [2], but not one that can be easily accessed with one or two clicks. Accordingly, parts of this statement are archived in the Appendix. Among other things it states:

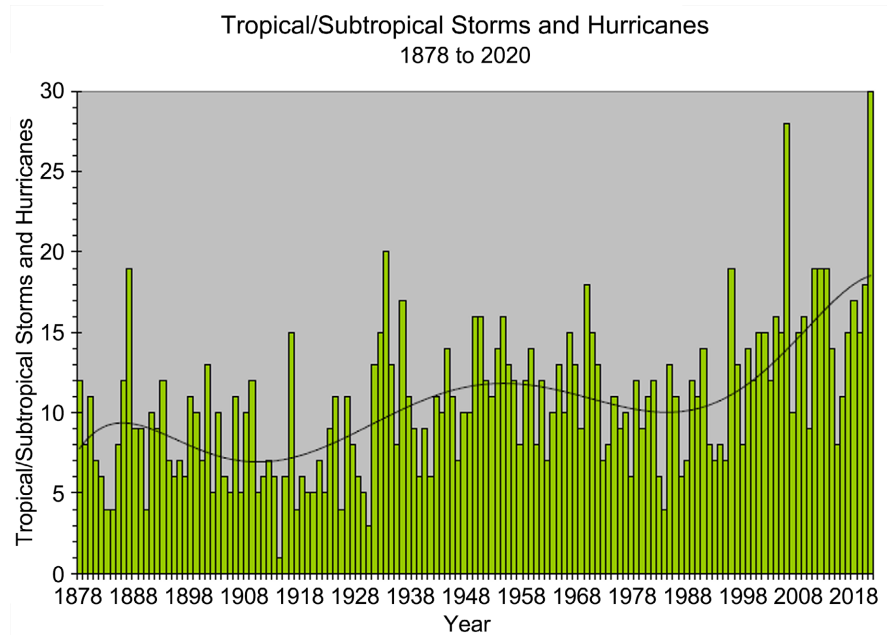
Extreme weather and related events, such as floods, droughts, hurricanes, heatwaves and wildfires, are increasing in frequency and intensity threatening Americans' physical, social, and economic well-being. Continued uncontrolled GHG emissions will compound the effects and risks of climate change well into the future.

Their statements that floods, droughts, hurricanes, and wildfires are increasing in frequency and intensity are mostly, but not totally incorrect, and showing this is a simple matter. All it takes is an internet search in the NOAA, NASA and EPA web sites to find the actual data; it does not confirm the ACS's assertions. The EPA records drought and flood measurements with what is called the Palmer Drought Severity Index [46]. For a particular region, this gives a number characterizing the drought or flood possibility from a variety of measurements, soil moisture, temperature... A positive number means a wet time; negative, drought. An index 3 or more indicates a rather severe drought or flood period. **Figure 13** shows the Palmer Drought Severity Index for the contiguous United States from 1890 to 2020.



**Figure 13.** The Palmer Drought Severity Index for the contiguous United States from 1890 to 2020. The light blue line is the instantaneous value, the heavy blue line is a 9-year average. Notice that the only periods of extended severe drought are the mid 1930's and mid 1950's. There is no extended period of severe flood, but the early 1970's, 1980's, and 1990's come close. There is certainly no increasing frequency and intensity of either droughts or floods in the last 30 years, contrary to the ACS assertion.

Now let us consider hurricanes, which the ACS asserts are increasing in both frequency and intensity over the period of increasing atmospheric  $\text{CO}_2$ . This data has been carefully accumulated by both the EPA and NOAA. **Figure 14**, from NOAA [47], is a graph of the number of North Atlantic hurricanes as a function of year.

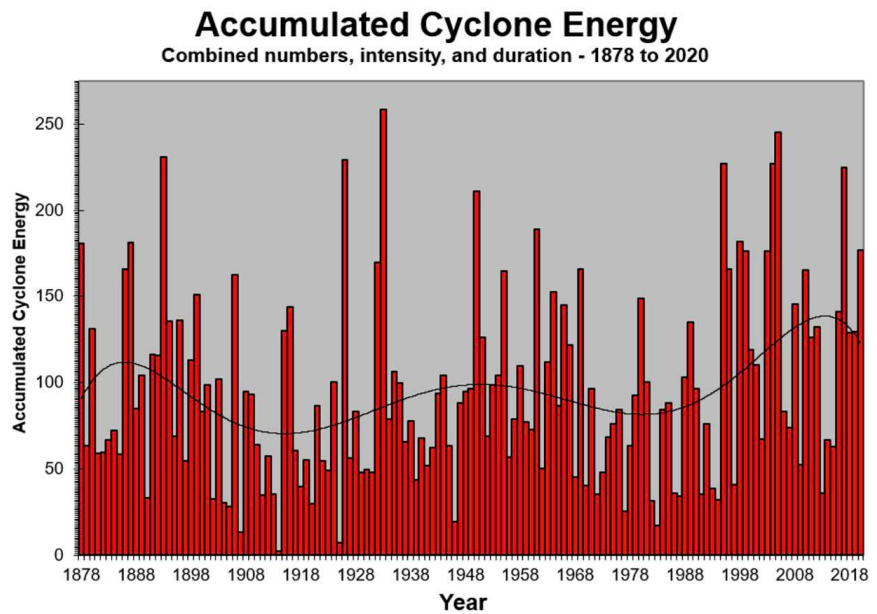


**Figure 14.** A NOAA plot of the number of North Atlantic hurricanes each year from 1878 to 2020. The black curve is a smoothed over local average [47].

Clearly the number has increased over the years. It has increases from 1878 to 1958 when there was no increase in atmospheric  $\text{CO}_2$ , and has increased more from 1958 to the present. Possibly the added  $\text{CO}_2$  was one of the causes of this increase, although that is hardly a certainty. However, until  $\sim 1908$  there was no airborne detection of hurricanes in the ocean, and until  $\sim 1965$  there was no spaceborne detection. It is likely that this would equalize the curve somewhat [48]. Furthermore, as [47] points out:

“For overall monitoring of tropical storm and hurricane activity, tropical meteorologists prefer a metric that combines how strong the peak winds reached in a tropical cyclone, and how long they lasted—called Accumulated Cyclone Energy or ACE. By this measure, 2020 was extremely busy, but not even close to record breaking. In fact, with a total ACE of 180 units, 2020 was only the 13<sup>th</sup> busiest season on record since 1878 with seasons like 1893, 1933, 1950, and 2005 substantially more active than 2020. One can also see that while there is a long-term increase in recorded ACE since the late 1800s, it’s quite a bit less dramatic than the increase seen with named storms.”

**Figure 15** is the plot of ACE, also from [47].



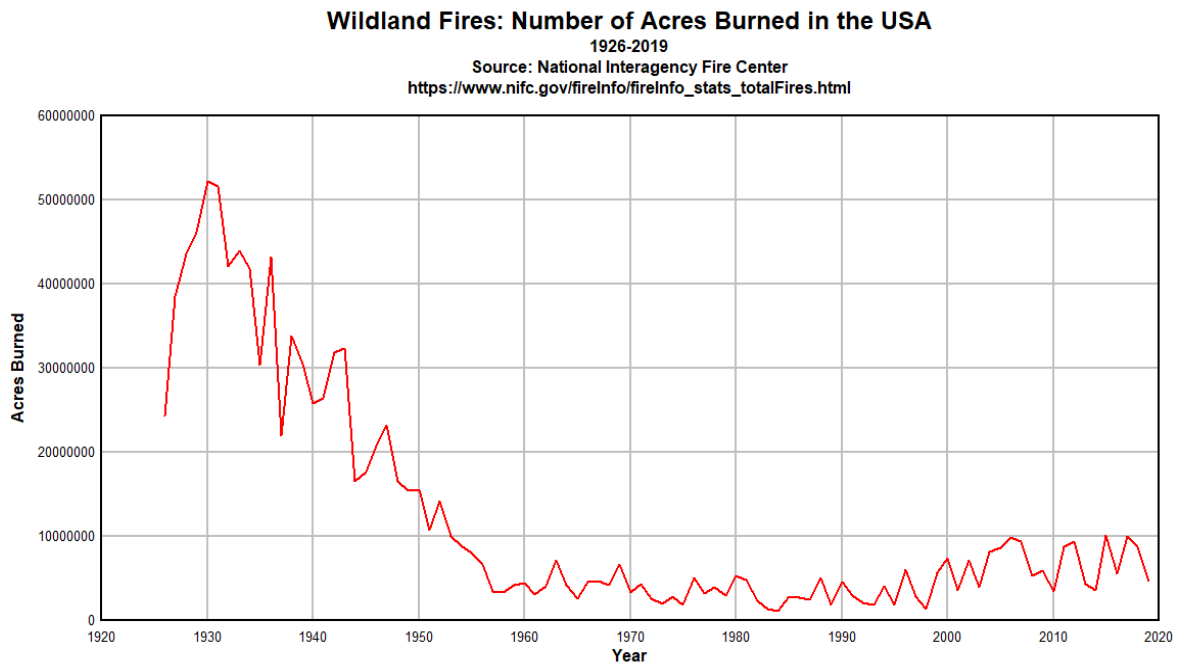
**Figure 15.** A plot of the ACE as a function of year, year by year, and a smoothed.

Notice that the average has a wavelike structure with a period of ~60 years, half with more hurricanes, half with fewer. There is no steady increase with increasing CO<sub>2</sub>, although the peak at ~2010 is a bit higher than the peak at ~1875 (roughly 140 as opposed to 120). Again, this might be partly due to the absence of airborne and spaceborne detection. However, if one reasonably thinks the damage hurricanes do is mostly related to the ACE, then clearly there is hardly any intensity increase so great as to threaten “Americans physical, social, and economic well-being” as the ACS asserted in its statement. This data certainly provides no justification for drastically changing our energy and power infrastructure. Nevertheless, there is certainly a reason to be more cautious than we are in developing oceanfront property.

Let us now look at wildfires in the United States, especially the western part where they have been a big concern recently. The National Fire Center has released a graph showing the acres burned in the United States from 1926 to 2019 [49]. It is shown in **Figure 16**.

This graph is very interesting, and information on it is not easy to find on the internet. Hence, our discussion here is necessarily a bit speculative. The first point is that there has been a gigantic decrease in acres burned from ~1930 to 1960. This decrease is hardly ever shown the media, which usually focuses on the time beginning in 1983 [50], perhaps to correlate the relatively minor (compared with 1930) increase with increasing atmospheric CO<sub>2</sub>. These more common graphs show an increase in burned acreage, as does **Figure 16**. However, this latter increase, from 1983 is hardly the entire story, as **Figure 16** shows. This author believes that the explanation for the entire graph rests mostly on forest management, and only slightly on other influences. Apparently before 1930, the forest management relied mostly on putting out a fire where one was detected.

But one cannot win this battle, fires are one of nature's ways of managing the forest, and for thousands of years, it has been successful. For instance, the gigantic sequoias and redwoods in California thrived for over a thousand years despite surviving what must have been at least 50 - 100 fires. Possibly the small increase from 1995 to 2005, followed by no further steady increase, could be due to increased CO<sub>2</sub> in the atmosphere, but this author believes it is more likely due to changes in forest management.



**Figure 16.** From the Fire National Interagency Center, a graph of the yearly acreage burned by wildfires from 1926 to 2019. Notice that there has been a tremendous decrease from 1930 to 1960, and then (on that scale) a slight increase from 1995 to 2005 [49].

This author does not see any evidence from **Figure 16**, that variations in acreage destroyed forest fires since 1920 has any relation to additional CO<sub>2</sub> in the atmosphere.

Finally, the ACS has this additional statement:

“The effects of climate change on human health are a serious threat leading to increased illness and mortality rates, ...”

If additional CO<sub>2</sub> in the atmosphere causes “increased illness and mortality rates”, one would certainly expect to see a drop in life expectancy. However, life expectancy, from 1770 to 2021, has been carefully measured in every part of the world [51], the graph is shown in **Figure 17**.

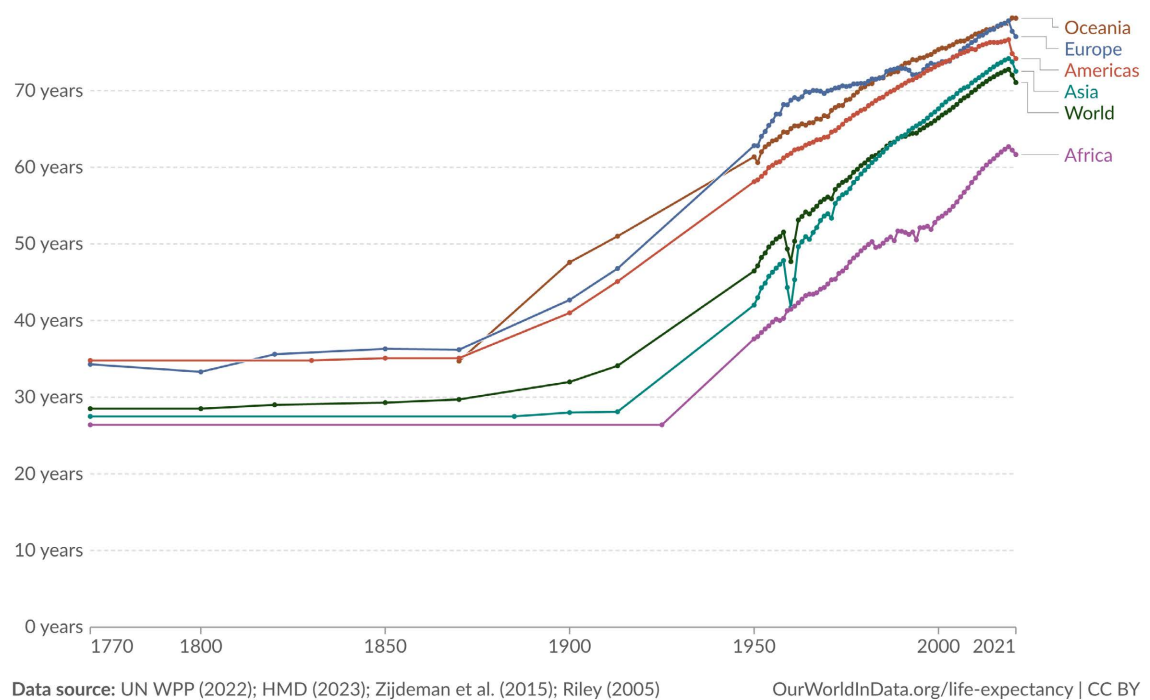
There is a steady increase in life expectancy during this period of two and a half centuries with 2 exceptions. First, there is a measured dip in Asia in the mid 1960's, which is reflected in the world measurement, since Asia has such a large population. Second, there is a significant dip from 2020 to 2021, undoubtedly

from the Covid 19 pandemic. In the United States, this took the lives of about a million people. Unlike say heart disease, or cancer, which kills mostly older people, covid took the lives of people of all ages, causing a rather large decrease in life expectancy for the number of deaths it caused. The one thing which does *not* appear in the graph is any decrease in life expectancy due to the increase in CO<sub>2</sub> in the atmosphere from ~1960 to the present.

It certainly appears to this author that the ACS should reexamine some of its current climate change statements and in doing so, more carefully consider actual data.

## Life expectancy

The period life expectancy<sup>1</sup> at birth, in a given year.



**Figure 17.** A measurement of life expectancy from 1770 to 2021.

## 7. Concerns with the Climate Statement of the American Geophysical Union

An excerpt from the AGU statement on climate change [4] reads:

The current decade is now the hottest in the history of modern civilization. Based on extensive scientific evidence, it is extremely likely that human activities, especially emissions of greenhouse gases, are the dominant cause of the observed warming since the mid-20th century. There is no alternative explanation supported by convincing evidence.

Many other changes related to heating have been documented: more frequent heat waves on land and in the ocean; reductions in Arctic sea ice, ... Greater CO<sub>2</sub> concentrations in the atmosphere are also affecting the growth and nutritional

value of land plants...

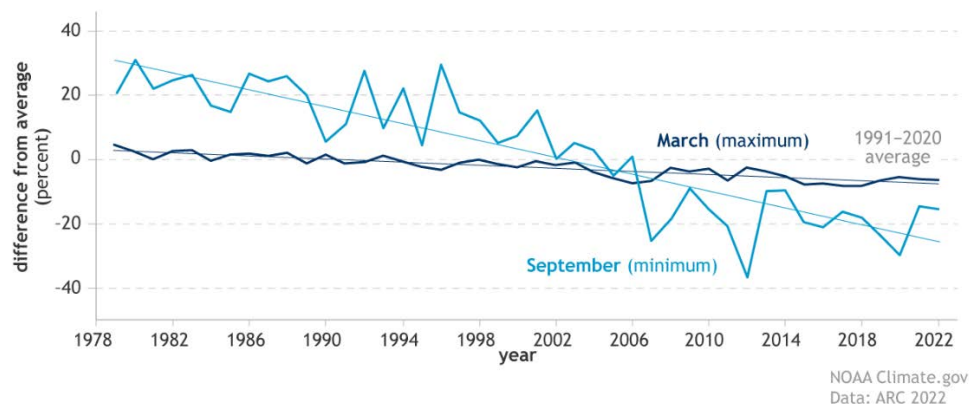
### The Predictions

Realistic and continually improving computer simulations of the global climate predict that global temperatures will continue to rise as a result of past and future greenhouse gas emissions, ...

Section 3 dealt with “greenhouse gases, are the dominant cause of the observed warming since the mid-20th century”, and Section 4 with “The current decade is now the hottest in the history of modern civilization”. If there is really “no alternative explanation” for mid 20<sup>th</sup> century warming, how come there have been numerous periods in the last 10,000 years that that were warmer than today, as was demonstrated in Section 4, by scientific, archaeological, and historical data. Is there no explanation for them? They *did* occur. Also, their statement on *affecting* growth of plants is misleading; added CO<sub>2</sub> in the atmosphere *improves* the growth of land plants, as was shown in Section 5. Their statement very briefly suggests many other terrible things (not shown above) for which it unambiguously blames fossil fuel, which it says must be eliminated. Several of these we have dealt with in earlier sections of the paper, discussing all of them would be beyond the scope of this paper.

However, we do briefly discuss their assertion that Arctic Sea Ice is melting. NOAA has documented the area of the Arctic and Antarctic Oceans that has been covered with sea ice as over the years. We regard this as an example of what may be other less than accurate assertions in the AGU statement. Generally, NOAA’s graphs plot the area at the maximum time for sea ice, namely March; and the minimum, September. Their plot for the Arctic [52] is a single plot shown in **Figure 18**.

Arctic sea ice extent, 1979-2022

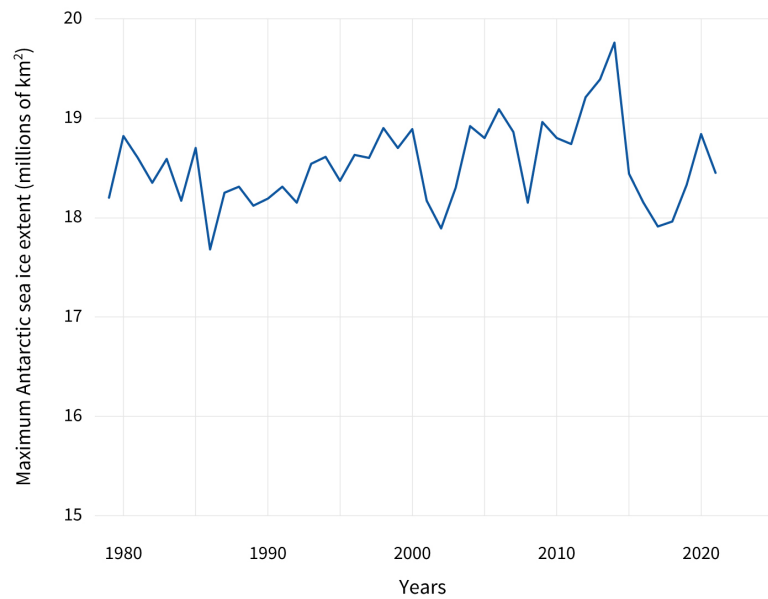


**Figure 18.** The plot of the maximum and minimum area of Arctic sea ice over a period of 44 years, as a percentage of the average for that month. While the area of ice at the minimum is decreasing, the area at the maximum is reasonably constant.

There is also the NOAA plot of variation of Antarctic sea ice [53], which has been presented in two plots. These are the area in square km of sea ice, one for

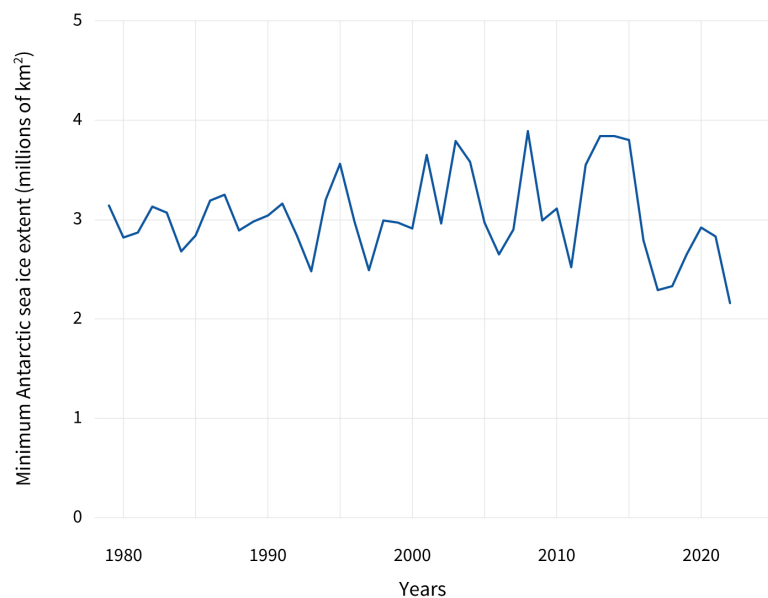
the maximum, **Figure 19**, and one for the minimum **Figure 20**.

### ANTARCTIC SEA ICE YEARLY MAXIMUM



**Figure 19.** Antarctic sea ice at the maximum extent in September. It is reasonably constant through the years. If anything, the extent of ice may even be slightly increasing.

### ANTARCTIC SEA ICE YEARLY MINIMUM

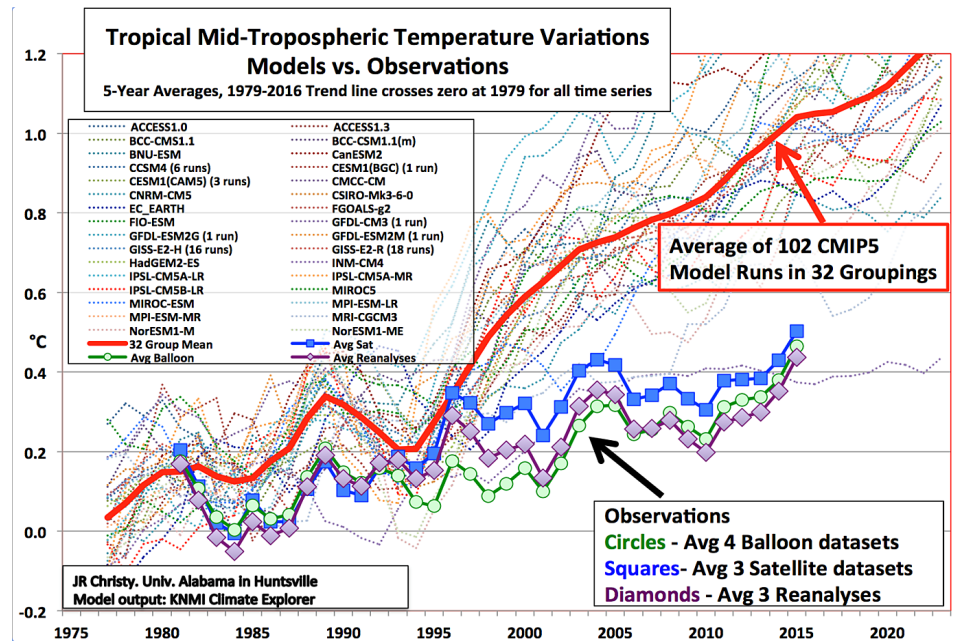


**Figure 20.** Antarctic sea ice extent at the minimum in March. It is reasonably constant also.

The AGU statement's claim that Arctic Ocean sea ice is receding, is correct for the minimum, but **Figure 18** shows that it is incorrect for the maximum. At best the AGU is half right and half wrong. Throw in the results on Antarctic Ocean sea ice, and the AGU is one for four. 250 is a fine batting average for a third

baseman, but for a scientific prediction, it means only one thing, the prediction is wrong. This author feels that the AGU’s briefly putting forward all sort of claims of the harm that CO<sub>2</sub> is doing, claims they very possibly cannot back up (like their claim about sea ice), does not rise to the level of scientific accuracy and responsibility that the AGU should and typically has demonstrated. The author believes that the AGU should carefully reconsider its statements and hopefully modify them so that they are more consistent with observed data.

Finally their claim that computer simulations are constantly improving also deserves some examination. Computer simulations of complex phenomena is a scientific area that the author has spent a good bit of his scientific career on and there is good reason, pointed out by many experts, to be very skeptical of them as applied to something as complex as the earth’s climate [17] [54] [55] [56]. Lindzen, Happer and Koonin also pointed this out in their friend of the court document [6]. **Figure 21**, from [6] is their redrawing of a plot of the results of a large number of simulations as compared to reality.



**Figure 21.** A plot of computer simulations of global temperature over the years as compared to reality. As Lindzen et al put it, “The simulations fail miserably”.

### 8. An Approach to Sustainable Nuclear Energy by Breeding

We briefly discuss a way the world might achieve sustainable energy for all mankind. First let us give estimates of the amount of energy available from various worldwide resources [57]. Reference [57] measures the energy in units of terawatt years (TWY’s). As the world now uses a power of ~14 Terawatts, it uses an energy of ~14 TWY’s in one year. The author’s goal is that the world rapidly increases energy use to 30 - 40 TW, so that the entire world can have a living standard like we do in the west. **Table 1** gives estimates of various energy resources, as noted in [57], and gives estimates of the resources currently.

**Table 1.** Left column: resource; Middle column: world wide resource in TWY's as of Reference ([57], (2002)), Right column: increase in oil and gas based on new technology since 2002 (*i.e.* fracking [58]) and the discovery of new extremely large gas fields in the United States [59]. It assumes world oil and gas resources can increase by the same factor as those in the United States. The bottom row middle element is the energy of mined fissile  $^{235}\text{U}$  [57]; the right hand column is the energy in all fertile uranium and thorium (about 4 times as much thorium as uranium) assuming it is used either in fast neutron reactors [60] [61], thermal thorium breeders [62], or is used to breed fissile fuel for thermal reactors.

Resource	2002 Energy Resource	2024 Energy Resource
Coal	4800	4800
Oil	1200	2000
Natural Gas	1200	4000
Nuclear	300	150,000

Notice two things about this table. First, at a worldwide energy use of 30 TW, nuclear can power civilization at 30 TW for about 5000 years, about as far into the future as the dawn of civilization was in the past. We consider this to be a sustainable energy source. Nobody can predict the future so well that we have to be concerned now about what is needed 6000 years from now. Second if it takes even a century, to work out the scientific and technical challenges of extracting the energy from fertile as well as fissile material, there is plenty of fossil fuel to get the world over that particular speed bump. As there is very unlikely that a climate crisis is coming any time soon, there is no particular to hurry to have the new sustainable power system in place in the next decade or two. Finally, even if there is a temperature increase of more than a degree or so, is it really worth tearing down civilization to (maybe) avoid this?

This author has spent a good bit of the last 25 years studying and advocating fusion breeding, and has written extensively on it. His first such reference appeared in 1999 [63]. The potential of fusion breeding going the tokamak (ITER) route is summarized in [22] [64]. Up until 2020, the author believed that this was the only viable route to fusion. That all changed in 2021 with the Lawrence Livermore National Laboratory's (LLNL) demonstration of an alpha burn wave in a laser fusion configuration [22] [65]. The purpose of that experiment is nuclear stockpile sustainability. This author does not believe that approach is viable for energy for the civilian sector, but does believe that using a different laser, and a different target configuration, one might achieve fusion breeding, or even pure fusion for civilian energy [22] [66].

References [22] [65] [66] have many citations of the author's work on fusion breeding over the years. One thing that Ref [66] pointed out is that it is only fusion breeding (and not fission breeding) can be used to fuel many thermal nuclear reactors once mined uranium fuel becomes scarce.

## 9. Conclusions

The assertion that the current and future excess  $\text{CO}_2$  in the atmosphere (for ~

the next half century or even century) will cause a climate crisis is shown violate at least two important physical laws. All agree that the effect of CO<sub>2</sub> on the earth's radiation balance, as calculated by both believers and skeptics, is that it is a minor effect, on the order of 1% of the total radiation absorbed by earth [7] [8] [9]. However, the Stefan Boltzman radiation law shows that a small change in the radiation, induces a considerably smaller change in temperature. Also, there is a claim that this small temperature change induces other physical effects which increase the heating. However this violates LeChatelier's principle, which states that in any dynamic equilibrium (certainly the climate system is one), any changes in the forcing (*i.e.* a small amount of extra radiation), the new system equilibrium will tend to oppose this forcing. This alone should be a bright flashing red light for the scientific societies. However, this is hardly the only concern with their climate statements. As this paper showed in numerous examples, specific claims made in their statements, are directly contradicted by data from credible, established sources like NOAA, NASA, EPA, ... as well as by archaeological and historical records.

On a personal note, the author is very much aware that the data and graphs presented here, are the results of the efforts and dedication of thousands of talented and hardworking scientists, engineers, data analysis etc., as well as their support staff. Many are undoubtedly members of one or more of the scientific societies discussed here. By taking the positions they do, these societies diminish many of their own members. Instead, the societies should be proudly presenting these results. The results shown here are the very best of what science has to offer the public, and the societies should take considerable pride in it, rather than ignore it, seemingly because it contradicts the approaching climate disaster hypothesis.

This author recommends that these societies remove their current statements and replace them with more moderate statements, statements more consistent with modern measurements and analyses, statements which are more scientifically correct, and which are more consistent with established scientific laws. Also, these societies should prominently recognize that modern civilization depends crucially on fossil fuel and there is no substitute now and will not be one for quite a few decades. While sustainable energy sources, most likely based on the use of fertile as well as fissile nuclear material, will ultimately become necessary for the long-term survival of civilization, there no need to panic. There is no reason to abandon fossil fuel in the next half century or century. One cannot simply abandon it to save the world from the potential inconvenience (or perhaps more likely the convenience) of a degree or so's possible temperature rise. As our current civilization is set up, going to "net zero" any time in the next 30 - 40 years has the real risk to destroy either western, or world civilization.

By changing their statements, to others more moderate and scientifically correct, these societies would cease being on the wrong side of history. If they do not do this, posterity will almost certainly not look kindly on them. By changing

their statements to others more moderate and scientifically correct, they will not only be aiding their own professions, but will be serving humanity as well.

## Acknowledgement

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## Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

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## Appendix

Since the ACS does not appear to have provided a simple way to assess its statement on climate change with a click or two, the first paragraph of that statement is provided here:

### CLIMATE CHANGE

The Earth's climate is changing in response to increasing concentrations of greenhouse gases (GHGs) and particulate matter in the atmosphere, largely as the result of a broad range of human activities. The American Chemical Society (ACS) acknowledges that climate change is real, presents serious risk for civil society and business, and that human activity is the primary cause. Atmospheric carbon dioxide (CO<sub>2</sub>) concentrations are increasing at a rate never observed before, primarily due to emissions from fossil fuel combustion. Extreme weather and related events, such as floods, droughts, hurricanes, heatwaves and wildfires, are increasing in frequency and intensity threatening Americans' physical, social, and economic well-being. Continued uncontrolled GHG emissions will compound the effects and risks of climate change well into the future. The world population will experience more extreme weather events which, coupled with sea level rise, will continue to cause coastal property damage and population displacement. Extreme weather and flooding events will further impact infrastructure (such as energy supply and transportation systems) leading to disruption of supply chains, business and industry productivity and military operations. Ecosystems and natural resources will continue to be stressed, affecting food and water availability burdening economies and societies. The effects of climate change on human health are a serious threat leading to increased illness and mortality rates, the spread of vector-borne diseases and epidemics and decreased efficiency of labor work forces among other impacts.