Table of Contents

CLIMATE CHANGE BAD 4

GW Real/Anthro 5

Warming is Real 6

Warming Bad Impacts 9

Extinction 10

Resource Wars 12

CLIMATE CHANGE GOOD 14

CO2 Fertilization 15

1NC 16

CO2 Increases Ag 18

CO2 Good-Laundry List 23

AT: Drought 27

AT: Heat Kills Plants 28

Sulfate Cooling Turn 31

1NC 32

SO2 Cools 33

Ice Age 35

1NC 36

UQ: Cooling Now 38

UQ: Current CO2 Sufficient 40

CO2 Offsets Ice 41

Impact: Timeframe 43

Moral Obligation 44

Methane Turn 45

1NC 46

Methane Worse 47

AT: Methane 48

UQ: Methane increase now 49

GW ADVANTAGE ANSWERS 50

1NC 51

Not Anthropogenic 55

AT: CO2 = WARMING 57

AT: SLR 60

AT: Superstorms 62

AT: Ice Cores 63

AT: Oceans 65

AT: Runaway Warming 67

Negative Feedback 68

IPCC Indicts 69

Heat Islands 71

Carbon Sinks 72

Alternate Causality 74

GCMs 77

Impact Mitigation 79

CLIMATE CHANGE BAD 81

# CLIMATE CHANGE BAD

## GW Real/Anthro

### Warming is Real

#### Warming is a fact

Achenbach 2012 (Joel Achenbach, writer and lecturer at Princeton and Georgetown, July 7, 2012, “Climate Change: Global Warming is a Fact,” Washington Post, http://www.washingtonpost.com/blogs/achenblog/post/climate-change-global-warming-is-a-fact/2012/07/09/gJQAAGs6XW\_blog.html)

At some point we should stop litigating the basic question of whether climate change is happening. Climate change is a fact. The spike in atmospheric CO2 is a fact. The dramatic high-latitude warming is a fact. That the trends aren’t uniform and linear, and that there are anomalies here and there, does not change the long-term pattern. The warming trend has flattened out in the last decade but probably only because of air pollution from Chinese coal-fired power plants or somesuch forcing we haven’t fully discovered (smog is hardly the long-term solution we should be seeking). The broader patterns are clear. Models show the greatest warming spike down the road still, decades hence. Thus in a sense, saying that “this is what global warming is like” whenever we have a heat wave actually understates the problem. Having spent much of my life in Florida, I can tell you, what kills you in summer is not the temperature but the duration of the season, which lasts basically forever — into November or even December in South Florida. So, yeah, 100 degrees in July gets my attention here in DC, but so will a stretch of 85-degree high temperatures in October.

#### Warming is real- Long-term trends prove

Nordhaus 2012 (William D. Nordhaus, Sterling Professor of Economics at Yale University, research for National Science Foundation, the Department of Energy, and the Glaser Foundation, March 22, 2012, “Why the Global Warming Skeptics Are Wrong,” New York Review of Books, http://www.nybooks.com/articles/archives/2012/mar/22/why-global-warming-skeptics-are-wrong/?pagination=false)

The first claim is that the planet is not warming. More precisely, “Perhaps the most inconvenient fact is the lack of global warming for well over 10 years now.” It is easy to get lost in the tiniest details here. Most people will benefit from stepping back and looking at the record of actual temperature measurements. The figure below shows data from 1880 to 2011 on global mean temperature averaged from three different sources.2 We do not need any complicated statistical analysis to see that temperatures are rising, and furthermore that they are higher in the last decade than they were in earlier decades.3 One of the reasons that drawing conclusions on temperature trends is tricky is that the historical temperature series is highly volatile, as can be seen in the figure. The presence of short-term volatility requires looking at long-term trends. A useful analogy is the stock market. Suppose an analyst says that because real stock prices have declined over the last decade (which is true), it follows that there is no upward trend. Here again, an examination of the long-term data would quickly show this to be incorrect. The last decade of temperature and stock market data is not representative of the longer-term trends. The finding that global temperatures are rising over the last century-plus is one of the most robust findings of climate science and statistics.

#### Anthropogenic warming is happening in line with projections

Nordhaus 2012 (William D. Nordhaus, Sterling Professor of Economics at Yale University, research for National Science Foundation, the Department of Energy, and the Glaser Foundation, March 22, 2012, “Why the Global Warming Skeptics Are Wrong,” New York Review of Books, http://www.nybooks.com/articles/archives/2012/mar/22/why-global-warming-skeptics-are-wrong/?pagination=false)

A second argument is that warming is smaller than predicted by the models: The lack of warming for more than a decade—indeed, the smaller-than-predicted warming over the 22 years since the UN’s Intergovernmental Panel on Climate Change (IPCC) began issuing projections—suggests that computer models have greatly exaggerated how much warming additional CO2 can cause. What is the evidence on the performance of climate models? Do they predict the historical trend accurately? Statisticians routinely address this kind of question. The standard approach is to perform an experiment in which (case 1) modelers put the changes in CO2 concentrations and other climate influences in a climate model and estimate the resulting temperature path, and then (case 2) modelers calculate what would happen in the counterfactual situation where the only changes were due to natural sources, for example, the sun and volcanoes, with no human-induced changes. They then compare the actual temperature increases of the model predictions for all sources (case 1) with the predictions for natural sources alone (case 2). This experiment has been performed many times using climate models. A good example is the analysis described in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (for the actual figure, see the accompanying online material4). Several modelers ran both cases 1 and 2 described above—one including human-induced changes and one with only natural sources. This experiment showed that the projections of climate models are consistent with recorded temperature trends over recent decades only if human impacts are included. The divergent trend is especially pronounced after 1980. By 2005, calculations using natural sources alone underpredict the actual temperature increases by about 0.7 degrees Centigrade, while the calculations including human sources track the actual temperature trend very closely. In reviewing the results, the IPCC report concluded: “No climate model using natural forcings [i.e., natural warming factors] alone has reproduced the observed global warming trend in the second half of the twentieth century.”5

#### Warming is a fact- New research solves skeptics concerns

Borenstein 2011 (Seth Borenstein, October 31, 2011, “Skeptic finds he now agrees global warming is real,” Yahoo, http://news.yahoo.com/skeptic-finds-now-agrees-global-warming-real-142616605.html)

The Muller "results unambiguously show an increase in surface temperature since 1960," Curry wrote Sunday. She said she disagreed with Muller's public relations efforts and some public comments from Muller about there no longer being a need for skepticism. Muller's study found that skeptics' concerns about poor weather station quality didn't skew the results of his analysis because temperature increases rose similarly in reliable and unreliable weather stations. He also found that while there is an urban heat island effect making cities warmer, rural areas, which are more abundant, are warming, too. Among many climate scientists, the reaction was somewhat of a yawn. "After lots of work he found exactly what was already known and accepted in the climate community," said Jerry North, a Texas A&M University atmospheric sciences professor who headed a National Academy of Sciences climate science review in 2006. "I am hoping their study will have a positive impact. But some folks will never change."

\*\*\*

#### Overwhelming scientific evidence proves—warming is real and anthropocentric

IPCC 2007 (“Combining Evidence of Anthropogenic Climate Change,” *IPCC Fourth Assessment Report: Climate Change 2007*, http://www.ipcc.ch/publications\_and\_data/ar4/wg1/en/ch9s9-7.html

The evidence from surface temperature observations is strong: The observed warming is highly significant relative to estimates of internal climate variability which, while obtained from models, are consistent with estimates obtained from both instrumental data and palaeoclimate reconstructions. It is extremely unlikely (<5%) that recent global warming is due to internal variability alone such as might arise from El Niño (Section 9.4.1). The widespread nature of the warming (Figures 3.9 and 9.6) reduces the possibility that the warming could have resulted from internal variability. No known mode of internal variability leads to such widespread, near universal warming as has been observed in the past few decades. Although modes of internal variability such as El Niño can lead to global average warming for limited periods of time, such warming is regionally variable, with some areas of cooling (Figures 3.27 and 3.28). In addition, palaeoclimatic evidence indicates that El Niño variability during the 20th century is not unusual relative to earlier periods (Section 9.3.3.2; Chapter 6). Palaeoclimatic evidence suggests that such a widespread warming has not been observed in the NH in at least the past 1.3 kyr (Osborn and Briffa, 2006), further strengthening the evidence that the recent warming is not due to natural internal variability. Moreover, the response to anthropogenic forcing is detectable on all continents individually except Antarctica, and in some sub-continental regions. Climate models only reproduce the observed 20th-century global mean surface warming when both anthropogenic and natural forcings are included (Figure 9.5). No model that has used natural forcing only has reproduced the observed global mean warming trend or the continental mean warming trends in all individual continents (except Antarctica) over the second half of the 20th century. Detection and attribution of external influences on 20th-century and palaeoclimatic reconstructions, from both natural and anthropogenic sources (Figure 9.4 and Table 9.4), further strengthens the conclusion that the observed changes are very unusual relative to internal climate variability.

The energy content change associated with the observed widespread warming of the atmosphere is small relative to the energy content change of the ocean, and also smaller than that associated with other components such as the cryosphere. In addition, the solid Earth also shows evidence for warming in boreholes (Huang et al., 2000; Beltrami et al., 2002; Pollack and Smerdon, 2004). It is theoretically feasible that the warming of the near surface could have occurred due to a reduction in the heat content of another component of the system. However, all parts of the cryosphere (glaciers, small ice caps, ice sheets and sea ice) have decreased in extent over the past half century, consistent with anthropogenic forcing (Section 9.5.5, Table 9.4), implying that the cryosphere consumed heat and thus indicating that it could not have provided heat for atmospheric warming. More importantly, the heat content of the ocean (the largest reservoir of heat in the climate system) also increased, much more substantially than that of the other components of the climate system (Figure 5.4; Hansen et al., 2005; Levitus et al., 2005). The warming of the upper ocean during the latter half of the 20th century was likely due to anthropogenic forcing (Barnett et al., 2005; Section 9.5.1.1; Table 9.4). While the statistical evidence in this research is very strong that the warming cannot be explained by ocean internal variability as estimated by two different climate models, uncertainty arises since there are discrepancies between estimates of ocean heat content variability from models and observations, although poor sampling of parts of the World Ocean may explain this discrepancy. However, the spatial pattern of ocean warming with depth is very consistent with heating of the ocean resulting from net positive radiative forcing, since the warming proceeds downwards from the upper layers of the ocean and there is deeper penetration of heat at middle to high latitudes and shallower penetration at low latitudes (Barnett et al., 2005; Hansen et al., 2005). This observed ocean warming pattern is inconsistent with a redistribution of heat between the surface and the deep ocean.

Thus, the evidence appears to be inconsistent with the ocean or land being the source of the warming at the surface. In addition, simulations forced with observed SST changes cannot fully explain the warming in the troposphere without increases in greenhouse gases (e.g., Sexton et al., 2001), further strengthening the evidence that the warming does not originate from the ocean. Further evidence for forced changes arises from widespread melting of the cryosphere (Section 9.5.5), increases in water vapour in the atmosphere (Section 9.5.4.1) and changes in top-of-the atmosphere radiation that are consistent with changes in forcing.

The simultaneous increase in energy content of all the major components of the climate system and the pattern and amplitude of warming in the different components, together with evidence that the second half of the 20th century was likely the warmest in 1.3 kyr (Chapter 6) indicate that the cause of the warming is extremely unlikely to be the result of internal processes alone. The consistency across different lines of evidence makes a strong case for a significant human influence on observed warming at the surface. The observed rates of surface temperature and ocean heat content change are consistent with the understanding of the likely range of climate sensitivity and net climate forcings. Only with a net positive forcing, consistent with observational and model estimates of the likely net forcing of the climate system (as used in Figure 9.5), is it possible to explain the large increase in heat content of the climate system that has been observed (Figure 5.4).

## Warming Bad Impacts

### Extinction

#### Continued emissions will cause runaway warming that will eradicate human life on earth.

Ahmed 2010 (Nafeez Ahmed, Executive Director of the Institute for Policy Research and Development, professor of International Relations and globalization at Brunel University and the University of Sussex, Spring/Summer 2010, “Globalizing Insecurity: The Convergence of Interdependent Ecological, Energy, and Economic Crises,” Spotlight on Security, Volume 5, Issue 2, online)

Perhaps the most notorious indicator is anthropogenic global warming. The landmark 2007 Fourth Assessment Report of the UN Intergovernmental Panel on Climate Change (IPCC) – which warned that at then-current rates of increase of fossil fuel emissions, the earth’s global average temperature would likely rise by 6°C by the end of the 21st century creating a largely uninhabitable planet – was a wake-up call to the international community.[v] Despite the pretensions of ‘climate sceptics,’ the peer-reviewed scientific literature has continued to produce evidence that the IPCC’s original scenarios were wrong – not because they were too alarmist, but on the contrary, because they were far too conservative. According to a paper in the Proceedings of the National Academy of Sciences, current CO2 emissions are worse than all six scenarios contemplated by the IPCC. This implies that the IPCC’s worst-case six-degree scenario severely underestimates the most probable climate trajectory under current rates of emissions.[vi] It is often presumed that a 2°C rise in global average temperatures under an atmospheric concentration of greenhouse gasses at 400 parts per million (ppm) constitutes a safe upper limit – beyond which further global warming could trigger rapid and abrupt climate changes that, in turn, could tip the whole earth climate system into a process of irreversible, runaway warming.[vii] Unfortunately, we are already well past this limit, with the level of greenhouse gasses as of mid-2005 constituting 445 ppm.[viii] Worse still, cutting-edge scientific data suggests that the safe upper limit is in fact far lower. James Hansen, director of the NASA Goddard Institute for Space Studies, argues that the absolute upper limit for CO2 emissions is 350 ppm: “If the present overshoot of this target CO2 is not brief, there is a possibility of seeding irreversible catastrophic effects.”[ix] A wealth of scientific studies has attempted to explore the role of positive-feedback mechanisms between different climate sub-systems, the operation of which could intensify the warming process. Emissions beyond 350 ppm over decades are likely to lead to the total loss of Arctic sea-ice in the summer triggering magnified absorption of sun radiation, accelerating warming; the melting of Arctic permafrost triggering massive methane injections into the atmosphere, accelerating warming; the loss of half the Amazon rainforest triggering the momentous release of billions of tonnes of stored carbon, accelerating warming; and increased microbial activity in the earth’s soil leading to further huge releases of stored carbon, accelerating warming; to name just a few. Each of these feedback sub-systems alone is sufficient by itself to lead to irreversible, catastrophic effects that could tip the whole earth climate system over the edge.[x] Recent studies now estimate that the continuation of business-as-usual would lead to global warming of three to four degrees Celsius before 2060 with multiple irreversible, catastrophic impacts; and six, even as high as eight, degrees by the end of the century – a situation endangering the survival of all life on earth.[xi]

#### Global warming causes extinction--reefs

Sify 2010 (Sify, Sydney newspaper citing Ove Hoegh-Guldberg, professor at University of Queensland and Director of the Global Change Institute, and John Bruno, associate professor of Marine Science at UNC (Sify News, “Could unbridled climate changes lead to human extinction?”, <http://www.sify.com/news/could-unbridled-climate-changes-lead-to-human-extinction-news-international-kgtrOhdaahc.html>)

The findings of the comprehensive report: 'The impact of climate change on the world's marine ecosystems' emerged from a synthesis of recent research on the world's oceans, carried out by two of the world's leading marine scientists. One of the authors of the report is Ove Hoegh-Guldberg, professor at The University of Queensland and the director of its Global Change Institute (GCI). 'We may see sudden, unexpected changes that have serious ramifications for the overall well-being of humans, including the capacity of the planet to support people. This is further evidence that we are well on the way to the next great extinction event,' says Hoegh-Guldberg. 'The findings have enormous implications for mankind, particularly if the trend continues. The earth's ocean, which produces half of the oxygen we breathe and absorbs 30 per cent of human-generated carbon dioxide, is equivalent to its heart and lungs. This study shows worrying signs of ill-health. It's as if the earth has been smoking two packs of cigarettes a day!,' he added. 'We are entering a period in which the ocean services upon which humanity depends are undergoing massive change and in some cases beginning to fail', he added. The 'fundamental and comprehensive' changes to marine life identified in the report include rapidly warming and acidifying oceans, changes in water circulation and expansion of dead zones within the ocean depths. These are driving major changes in marine ecosystems: less abundant coral reefs, sea grasses and mangroves (important fish nurseries); fewer, smaller fish; a breakdown in food chains; changes in the distribution of marine life; and more frequent diseases and pests among marine organisms. Study co-author John F Bruno, associate professor in marine science at The University of North Carolina, says greenhouse gas emissions are modifying many physical and geochemical aspects of the planet's oceans, in ways 'unprecedented in nearly a million years'. 'This is causing fundamental and comprehensive changes to the way marine ecosystems function,' Bruno warned, according to a GCI release. These findings were published in Science.

#### Warming causes extinction—billions will die

Tickell 2008 (Oliver Tickell, Climate Researcher, The Gaurdian, August 11, 2008, “On a planet 4C hotter, all we can prepare for is extinction”, http://www.guardian.co.uk/commentisfree/2008/aug/11/climatechange)

We need to get prepared for four degrees of global warming, Bob Watson told the Guardian last week. At first sight this looks like wise counsel from the climate science adviser to Defra. But the idea that we could adapt to a 4C rise is absurd and dangerous. Global warming on this scale would be a catastrophe that would mean, in the immortal words that Chief Seattle probably never spoke, "the end of living and the beginning of survival" for humankind. Or perhaps the beginning of our extinction. The collapse of the polar ice caps would become inevitable, bringing long-term sea level rises of 70-80 metres. All the world's coastal plains would be lost, complete with ports, cities, transport and industrial infrastructure, and much of the world's most productive farmland. The world's geography would be transformed much as it was at the end of the last ice age, when sea levels rose by about 120 metres to create the Channel, the North Sea and Cardigan Bay out of dry land. Weather would become extreme and unpredictable, with more frequent and severe droughts, floods and hurricanes. The Earth's carrying capacity would be hugely reduced. Billions would undoubtedly die.

#### Human caused CO2 emissions cause extinction

Brandenburg and Paxon 1999 (John E. Brandenburg (physicist rocket scientist, Mars expert, investigator on MET project, NASA technical advisor, former member of space transport subcommittee) Monica Rix Paxon (writer and scientific editor) Dead Mars, Dying Earth, 1999, p.46 - 47

Gradually, incrementally, we are changing Earth’s atmosphere. But are we slowly altering our atmosphere away from something that supports human life toward something deadly like the atmosphere of Mars? Such an atmosphere would have been very familiar to Joseph Black, who isolated the very first atmospheric gas. Unitarian minister Joseph Priestley would have recognized the atmosphere of Mars as well. So would coal miners from the early part of the 20th century and the canary that lay gasping at the bottom of the cage, for the atmosphere of Mars is made of fixed air. The atmosphere of Mars is made of blackdamp. The atmosphere of Mars is made of carbonic acid gas. The atmosphere of Mars is made of a substance that has over time had many names reflecting the toxic side of its nature. While today we call all of them “carbon dioxide” (which we think of as a benign product of our own bodies and the harmless bubbles in soda pop), this substance has clearly not always been viewed as a harmless gas. Nor should it be in the future, for it is time once again to inform our opinions about this substance and recognize its invisible, dark side. As long as a stylus attached to the monitoring equipment in some lonely station on the top of an inactive volcano in Hawaii continues to etch a line ratcheting upward—showing the increased amounts of carbon dioxide that, year after year, flood our atmosphere, threatening us—then we too must think of it very differently. It isn’t a matter of speculation. It is a matter of hard, cold scientific fact supported by numerous studies conducted by many respected scientists.’7~ In the overwhelming majority they agree: Earth’s atmosphere has far too much of what we now must think of as carbon die-oxide. It is warming our planet to the point where life, human life, is endangered. We are going to have to do something decisive and effective about this killer. No matter how successful or enlightened we think ourselves to be, we are not exempt from the need to act—in the same way that we are not exempt from the need to breathe.

### Resource Wars

#### It also causes huge resource wars and is a conflict multiplier

Klare 2006 (Michael Klare, professor of peace and world security studies at Hampshire College, March 10, 2006, “The Coming Resource Wars,” http://goo.gl/sPH9D)

It's official: the era of resource wars is upon us. In a major London address, British Defense Secretary John Reid warned that global climate change and dwindling natural resources are combining to increase the likelihood of violent conflict over land, water and energy. Climate change, he indicated, "will make scarce resources, clean water, viable agricultural land even scarcer" -- and this will "make the emergence of violent conflict more rather than less likely." Although not unprecedented, Reid's prediction of an upsurge in resource conflict is significant both because of his senior rank and the vehemence of his remarks. "The blunt truth is that the lack of water and agricultural land is a significant contributory factor to the tragic conflict we see unfolding in Darfur," he declared. "We should see this as a warning sign." Resource conflicts of this type are most likely to arise in the developing world, Reid indicated, but the more advanced and affluent countries are not likely to be spared the damaging and destabilizing effects of global climate change. With sea levels rising, water and energy becoming increasingly scarce and prime agricultural lands turning into deserts, internecine warfare over access to vital resources will become a global phenomenon. Reid's speech, delivered at the prestigious Chatham House in London (Britain's equivalent of the Council on Foreign Relations), is but the most recent expression of a growing trend in strategic circles to view environmental and resource effects -- rather than political orientation and ideology -- as the most potent source of armed conflict in the decades to come. With the world population rising, global consumption rates soaring, energy supplies rapidly disappearing and climate change eradicating valuable farmland, the stage is being set for persistent and worldwide struggles over vital resources. Religious and political strife will not disappear in this scenario, but rather will be channeled into contests over valuable sources of water, food and energy. Prior to Reid's address, the most significant expression of this outlook was a report prepared for the U.S. Department of Defense by a California-based consulting firm in October 2003. Entitled "An Abrupt Climate Change Scenario and Its Implications for United States National Security," the report warned that global climate change is more likely to result in sudden, cataclysmic environmental events than a gradual (and therefore manageable) rise in average temperatures. Such events could include a substantial increase in global sea levels, intense storms and hurricanes and continent-wide "dust bowl" effects. This would trigger pitched battles between the survivors of these effects for access to food, water, habitable land and energy supplies. "Violence and disruption stemming from the stresses created by abrupt changes in the climate pose a different type of threat to national security than we are accustomed to today," the 2003 report noted. "Military confrontation may be triggered by a desperate need for natural resources such as energy, food and water rather than by conflicts over ideology, religion or national honor." Until now, this mode of analysis has failed to command the attention of top American and British policymakers. For the most part, they insist that ideological and religious differences -- notably, the clash between values of tolerance and democracy on one hand and extremist forms of Islam on the other -- remain the main drivers of international conflict. But Reid's speech at Chatham House suggests that a major shift in strategic thinking may be under way. Environmental perils may soon dominate the world security agenda. This shift is due in part to the growing weight of evidence pointing to a significant human role in altering the planet's basic climate systems. Recent studies showing the rapid shrinkage of the polar ice caps, the accelerated melting of North American glaciers, the increased frequency of severe hurricanes and a number of other such effects all suggest that dramatic and potentially harmful changes to the global climate have begun to occur. More importantly, they conclude that human behavior -- most importantly, the burning of fossil fuels in factories, power plants, and motor vehicles -- is the most likely cause of these changes. This assessment may not have yet penetrated the White House and other bastions of head-in-the-sand thinking, but it is clearly gaining ground among scientists and thoughtful analysts around the world. For the most part, public discussion of global climate change has tended to describe its effects as an environmental problem -- as a threat to safe water, arable soil, temperate forests, certain species and so on. And, of course, climate change is a potent threat to the environment; in fact, the greatest threat imaginable. But viewing climate change as an environmental problem fails to do justice to the magnitude of the peril it poses. As Reid's speech and the 2003 Pentagon study make clear, the greatest danger posed by global climate change is not the degradation of ecosystems per se, but rather the disintegration of entire human societies, producing wholesale starvation, mass migrations and recurring conflict over resources. "As famine, disease, and weather-related disasters strike due to abrupt climate change," the Pentagon report notes, "many countries' needs will exceed their carrying capacity" -- that is, their ability to provide the minimum requirements for human survival. This "will create a sense of desperation, which is likely to lead to offensive aggression" against countries with a greater stock of vital resources. "Imagine eastern European countries, struggling to feed their populations with a falling supply of food, water, and energy, eyeing Russia, whose population is already in decline, for access to its grain, minerals, and energy supply." Similar scenarios will be replicated all across the planet, as those without the means to survival invade or migrate to those with greater abundance -- producing endless struggles between resource "haves" and "have-nots." It is this prospect, more than anything, that worries John Reid. In particular, he expressed concern over the inadequate capacity of poor and unstable countries to cope with the effects of climate change, and the resulting risk of state collapse, civil war and mass migration. "More than 300 million people in Africa currently lack access to safe water," he observed, and "climate change will worsen this dire situation" -- provoking more wars like Darfur. And even if these social disasters will occur primarily in the developing world, the wealthier countries will also be caught up in them, whether by participating in peacekeeping and humanitarian aid operations, by fending off unwanted migrants or by fighting for access to overseas supplies of food, oil, and minerals. When reading of these nightmarish scenarios, it is easy to conjure up images of desperate, starving people killing one another with knives, staves and clubs -- as was certainly often the case in the past, and could easily prove to be so again. But these scenarios also envision the use of more deadly weapons. "In this world of warring states," the 2003 Pentagon report predicted, "nuclear arms proliferation is inevitable." As oil and natural gas disappears, more and more countries will rely on nuclear power to meet their energy needs -- and this "will accelerate nuclear proliferation as countries develop enrichment and reprocessing capabilities to ensure their national security." Although speculative, these reports make one thing clear: when thinking about the calamitous effects of global climate change, we must emphasize its social and political consequences as much as its purely environmental effects. Drought, flooding and storms can kill us, and surely will -- but so will wars among the survivors of these catastrophes over what remains of food, water and shelter. As Reid's comments indicate, no society, however affluent, will escape involvement in these forms of conflict.

# CLIMATE CHANGE GOOD

## CO2 Fertilization

### 1NC

#### A. CO2 is key to food security—solves water crisis and starvation

Idso 8 (Craig Idso 8 December 2010 "The World's Looming Food and Water Shortage," CO2 Science Magazine, Volume 13, Number 49:8, December, http://www.co2science.org/articles/V13/N49/EDIT.php)

Every now and then, various astute observers of [hu]man's precarious position on planet earth call our attention to a developing global crisis that seems destined to wreak havoc on the human race a mere forty years from now: a lack of sufficient land and freshwater resources to produce the food that will be required to sustain our growing population. The most recent of this community of researchers to address the approaching problem are Hanjra and Qureshi (2010), who begin their treatment of the subject by quoting Benjamin Franklin's well-known homily: "when the well is dry, we know the worth of water." "Food policy," as the two Australian researchers write, "must not lose sight of surging water scarcity." Stating that "population and income growth will increase the demand for food and water," they indicate that "irrigation will be the first sector to lose water, as water competition by non-agricultural uses increases and water scarcity intensifies." And noting that "increasing water scarcity will have implications for food security, hunger, poverty, and ecosystem health and services," they report that "feeding the 2050 population will require some 12,400 km3 of water, up from 6800 km3 used today." This huge increase, in their words, "will leave a water gap of about 3300 km3 even after improving efficiency in irrigated agriculture, improving water management, and upgrading of rainfed agriculture," as per the findings of de Fraiture *et al*. (2007), Molden (2007) and Molden *et al*. (2010). This **water deficiency**, according to Hanjra and Qureshi, "**will lead to a food gap unless concerted actions are taken** today." Some of the things they propose, in this regard, are to conserve water and energy resources, develop and adopt climate-resilient crop varieties, modernize irrigation, shore up domestic food supplies, reengage in agriculture for further development, and reform the global food and trade market. And to achieve these goals, they say that "unprecedented global cooperation is required," which by the looks of today's world is an even more remote possibility than that implied by the proverbial *wishful thinking*. So, on top of everything else they suggest (a goodly portion of which will *not* be achieved), what can we do to defuse the ticking time-bomb that is the looming food and water crisis? We suggest doing *nothing*. But not just *any* "nothing." The nothing *we* suggest is to not mess with the normal, unforced evolution of civilization's means of acquiring energy. We suggest this, because on top of everything else we may try to do to conserve both land and freshwater resources, we will still fall short of what is needed to be achieved **unless the air's CO2 content rises significantly and thereby boosts the *water use efficiency* of earth's crop plants, as well as that of the plants that provide food and habitat for what could be called "wild nature," enabling *both* sets of plants to produce more biomass per unit of water used in the process.** And to ensure that this happens, **we will need all of the CO2 that will be produced by the burning of fossil fuels, until *other* forms of energy *truly* become more cost-efficient than coal, gas and oil**. In fact, **these other energy sources will have to become *much* more cost-efficient before fossil fuels are phased out; because the *positive externality* of the *CO2-induced increase in plant water use efficiency* provided by the *steady rise in the atmosphere's CO2 concentration* due to the *burning of fossil fuels* will be providing a most important service in helping us feed and sustain our *own* species without *totally decimating* what yet remains of wild nature**.

#### B. CO2 is the elixir of life—it’s the only check against food shortage, resource wars, and humyn extinction.

CO2 Science Magazine 2001 (“Anthropogenic CO2 Emissions Could Dramatically Increase Agricultural Production by Thwarting the Adverse Effects of Ozone Pollution,” 10/24/2001 www.co2science.org/edit/v4\_edit/v4n43edit.htm)

Damage to crops caused by air pollutants is one of the major scourges of present-day agriculture. How great are the production losses caused by these plant-debilitating agents? In a recent study of the effects of ozone pollution in the Punjab region of Pakistan, Wahid et al. (2001) periodically applied a powerful ozone protectant to soybean plants growing in three different locations in the general vicinity of the city of Lahore - a suburban site, a remote rural site, and a rural roadside site - throughout two different growing seasons (one immediately post-monsoon and one the following spring or pre-monsoon). The results were truly astounding. At the suburban site, application of the ozone protectant increased the weight of seeds produced per plant by 47% in the post-monsoon season and by 113% in the pre-monsoon season. At the remote rural site, the corresponding yield increases were 94% and 182%; and at the rural roadside site, they were 170% and 285%. Averaged across all three sites and both seasons of the year, the mean increase in yield caused by countering the deleterious effects of this one major air pollutant was nearly 150%. Due to their somewhat surprising finding that "the impacts of ozone on the yield of soybean are larger in the rural areas around Lahore than in suburban areas of the city," the authors concluded "there may be substantial impacts of oxidants on crop yield across large areas of the Punjab." In addition, they noted that earlier studies had revealed similar large ozone-induced losses in the productivity of local cultivars of wheat and rice. Hence, it is clear that whatever could be done to reduce these massive crop losses - or, ideally, eliminate them altogether - would be a godsend to the people of Pakistan and the inhabitants of many other areas of the globe. Fortunately, such a savior is silently working its wonders throughout the entire world. That of which we speak, of course, is the ongoing rise in the air's CO2 content, which counteracts the negative effects of ozone - and those of many other air pollutants (Allen, 1990; Idso and Idso, 1994) - by restricting the noxious molecule's entry into plant leaves via induced reduction of leaf stomatal apertures (Reid and Fiscus, 1998), and by ameliorating its adverse biochemical activities when it does penetrate vegetative tissues (Reid et al., 1998). In a number of studies of these beneficial consequences of atmospheric CO2 enrichment for the crop studied by Wahid et al., i.e., soybeans, it has been found that a nominal doubling of the air's CO2 concentration is sufficient to greatly reduce - and in some cases completely eliminate - the yield-reducing effects of ozone pollution (Heagle et al., 1998a and 1998b; Miller et al., 1998; Reid and Fiscus, 1998; Reid et al., 1998). The same conclusion follows from the results of several studies that have looked at wheat in this regard (Heagle et al., 2000; McKee et al., 2000; Pleijel et al., 2000; Tiedemann and Firsching, 2000). In fact, the work of Volin et al. (1998) suggests that these CO2-induced benefits will likely be experienced by all plants. As the researchers directly state in the title of their paper: "species respond similarly regardless of photosynthetic pathway or plant functional group." Think about the implications of these findings. A doubling of the air's CO2 content could well double agricultural production in many areas of the world by merely eliminating the adverse effects of but one air pollutant, i.e., ozone. Then, consider the fact that by the mid-point of the current century, we will likely face a food production crisis of unimaginable proportions (see our Editorials of 21 February 2001 and 13 June 2001). Finally, ask yourself what the Precautionary Principle has to say about this state of affairs (see our Editorial of 4 July 2001). We conducted such an exercise in our review of the paper of Hudak et al. (1999), concluding that perhaps our new mantra should be: Free the Biosphere! Let the air's CO2 content rise. And we still feel that way. CO2 is the elixir of life. It is one of the primary raw materials - the other being water - out of which plants construct their tissues; and it is essential to their existence and our existence. Without more of it in the air, our species - as well as most of the rest of the planet's animal life - will not survive the 21st century intact. The biosphere will continue to exist, but not as we know it; for most of its wild diversity of life will have been extinguished by mankind's mad rush to appropriate ever more land and water to grow the food required to feed itself (Tilman et al., 2001). So we say again, let the air's CO2 content rise. It's the right thing to do, both scientifically and morally.

### CO2 Increases Ag

#### Policies to restrict CO2 by switching to renewables cause a short term spike in warming—hurts ecological systems

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

From the perspective of global warming prevention, high¶ CH4 leaks and declining sulfur particulate emissions could¶ mean that policies to restrict CO2 by inducing switching from¶ coal to natural gas would cause a global risk offset by increasing¶ net global warming, at least in the short term. Although¶ the effect of decreased CO2 would likely dominate over¶ the long term (given the long residence time of CO2 in the atmosphere)'¶ the increased rate of global warming in the short¶ term could be more important to sensitive ecological systems.

#### Current plant yields prove—CO2 increases biomass

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Ofcourse, important uncertainties remain regarding the impact¶ of elevated CO2 • Like the computer-generated forecasts of¶ the effects of global warming, the predictions of enhanced CO2¶ fertilization have not yet been tested on complete ecosystems.¶ But at least in the case of CO2 fertilization there is already¶ some corroboratory evidence at the macro level: as atmospheric¶ CO2 has risen from 275 ppm in the 1800s to about 350¶ ppm today, the amplitude (annual variation) of the earth's historical¶ CO2 record has increased, implying an increase in the¶ total biomass of the world's carbon sinks (Rosenberg 1991,¶ p. 333). Still, the detailed effects on unmanaged ecosystems,¶ such as rainforests, have not yet been fully studied (see Peters¶ and Lovejoy 1992). There are also important questions about¶ the nutrient needs and nutritional value of CO2-fertilized¶ larger plants (IPCC 1990b, p. 2.6; Cline 1992, p. 90). Researchers¶ are currently studying the effect of elevated CO2 on¶ successive generations of plants, and are attempting to test¶ increased CO2without changing other variables, such as light,¶ that may have varied in previous field tests when CO2 chambers¶ were attached to plants (Oren 1994).

#### Co2 increases plant growth—offsets desertification and increases ag output by 10 percent.

Mintz 9/13 *(Zoe Mintz. Originally from Montreal, Zoë Mintz joined IBTimes in March 2013. A graduate from the S.I. Newhouse School of Public Communications at Syracuse University, her writing has appeared in magazine, newspaper and online publications that speak to a range of audiences, but the majority of her work is rooted in place. She has also pursued work across platforms and cultivated an interest in multimedia and design. July 9, 2013. “Deserts Are ‘Greening’ From Carbon Dioxide Fertilization, Satellite Imagery Saw Arid Regions Bloom”)***¶**

Carbon dioxide has turned arid deserts green, according to satellite observations released in a new study. In a process called “CO2 fertilization,” the gas boosted green foliage in the world’s driest regions.¶ Using satellites that detected leaf coverage and mathematical modeling, the study conducted by Australia’s Commonwealth Scientific and Industrial Research Organisation and Australian National University, found that in arid regions of Australia, North America, the Middle East and Africa, CO2 fertilization [increased foliage by 11 percent](http://www.csiro.au/en/Portals/Media/Deserts-greening-from-rising-CO2.aspx" \t "_blank) over nearly three decades.¶ The process occurs when elevated CO2 levels enable a leaf during photosynthesis – where green plants convert sunlight to energy -- to extract more carbon from the air or lose less water to the air, or both, [according to CSIRO](http://www.csiro.au/en/Portals/Media/Deserts-greening-from-rising-CO2.aspx" \t "_blank). If each individual leaf uses less water, then the plant will respond by increasing its leaf production, said Randall Donohue, a research scientist.¶ "Our work was able to tease-out the CO2 fertilization effect by using mathematical modeling together with satellite data adjusted to take out the observed effects of other influences such as precipitation, air temperature, the amount of light, and land-use changes," Donohue said.¶ Researchers created a computer model of a given area and predicted carbon dioxide’s “fertilization effect” as increasing plant foliage by 5-10 percent over a 30-year period. Using satellite imagery, the team compared the model with real world changes that occurred between 1982 and 2010 and found that their predictions supported their theory that the gas helped plant growth, [LiveScience reports](http://news.yahoo.com/carbon-dioxide-greening-deserts-140045897.html" \t "_blank). ¶ Scientists have speculated CO2 fertilization was taking place, but it has been difficult to prove, Donahue said. While boosting foliage in dry areas can help forestry and agriculture, it can also hurt water availability, the carbon cycle, fire regimes and biodiversity, [he added](http://www.sciencedaily.com/releases/2013/07/130708103521.htm" \t "_blank).¶ "Trees are reinvading grasslands, and this could quite possibly be related to the carbon dioxide effect," [Donohue told LiveScience](http://news.yahoo.com/carbon-dioxide-greening-deserts-140045897.html" \t "_blank). "Long-lived woody plants are deep rooted and are likely to benefit more than grasses from an increase in carbon dioxide."¶ But a boost in greenhouse gases such as carbon dioxide could also be a cause for concern. For instance, changing rainfall patterns could diminish the positive effects of higher CO2 levels, LiveScience reports.¶ "Ongoing research is required if we are to fully comprehend the potential extent and severity of such secondary effects," Donahue said.

#### Atmospheric CO2 is offset by plant fertilization—makes dry regions greener

**Khondakar 13** (Reem Khondakar, Science staff writer for the Cornell Daily Sun October 24, 2013, ‘Co2 Fertilization and Climate Change’)

Australian researchers have found that increased levels of carbon dioxide contribute to making the world’s driest regions greener. The study, conducted by the Commonwealth Scientific and Industrial Research Organisation of Australia and Australian National University, identified an 11 percent increase in foliage in arid regions between 1982 and 2010 that strongly correlated with increasing levels of CO2.¶ In what is called the fertilization effect, plants take up increasing levels of CO2 and photosynthesize more rapidly, thus decreasing atmospheric CO2 levels. According to CSIRO, the researchers predicted that foliage in dry areas would grow more, because at higher levels of CO2, arid plants use water more efficiently. The researchers then observed satellite data of arid regions in the world.¶ “Drylands would be expected to be most responsive to the carbon dioxide fertilization effect. One intriguing implication is that the observed invasion of woody plants into dry grasslands may be caused in part by this effect,” Prof. Timothy Fahey, Department of Natural Resources, said.¶ According to Dr. Randall Donohue, CSIRO, these results should not be interpreted as support for climate skeptics and do not mean that climate change is good. Rather, the study forays into a particular area of climate research that has long been difficult to observe.¶ “CO2 fertilization has been shown in greenhouse and field experiments, but this enhancement has been hard to detect in the natural environment, as reported here,” Prof. Christine Goodale, Department of Ecology and Evolutionary Biology, said. However, “the growth enhancement offsets only a tiny fraction of the CO2 emissions released to the atmosphere from fossil fuel combustion.”¶ According to Goodale, some plants are more sensitive to rises in CO2 than others, which could have an effect on interpreting foliage growth.¶ “Most global climate models use basic physiological relationships among CO2, photosynthesis and water use to project rather optimistic CO2 fertilization responses over the coming centuries,” Goodale said.

Longitudinal satellite data proves increases in CO2 cause a 30 percent increase in plant yield.

Tayler 13 *(James M. Taylor is managing editor of Environment & Climate News, a national monthly publication devoted to sound science and free-market environmentalism. He is also senior fellow for The Heartland Institute, focusing on energy and environment issues. 7/10/2013 10:49AM “Global Warming? No, Satellites Show Carbon Dioxide Is Causing ‘Global Greening’”* [*http://www.forbes.com/sites/jamestaylor/2013/07/10/global-warming-no-satellites-show-carbon-dioxide-is-causing-global-greening/*](http://www.forbes.com/sites/jamestaylor/2013/07/10/global-warming-no-satellites-show-carbon-dioxide-is-causing-global-greening/)*) ¶*

Rising atmospheric carbon dioxide levels are bolstering plant life throughout the world, environmental scientists report in a newly published peer-reviewed study. The findings, [published](http://onlinelibrary.wiley.com/doi/10.1002/grl.50563/abstract;jsessionid=DACBD1BD9E71E340FE6A63DE7F7F47F1.d03t04) in *Geophysical Research Letters*, are gleaned from satellite measurements of global plant life, and contradict assertions by activists that global warming is causing deserts to expand, along with devastating droughts.¶ A team of scientists led by environmental physicist Randall Donohue, a research scientist at the Commonwealth Scientific and Industrial Research Organization in Australia, analyzed satellite data from 1982 through 2010. The scientists documented a carbon dioxide “fertilization effect” that has caused a gradual greening of the Earth, and particularly the Earth’s arid regions, since 1982. The satellite data showed rising carbon dioxide levels caused a remarkable 11 percent increase in foliage in arid regions since 1982, versus what would be the case if atmospheric carbon dioxide levels had remained at 1982 levels.¶ “Lots of papers have shown an average increase in vegetation across the globe, and there is a lot of speculation about what’s causing that,” said Donohue [in a press release](http://www.csiro.au/en/Portals/Media/Deserts-greening-from-rising-CO2.aspx) accompanying the study. “Up until this point, they’ve linked the greening to fairly obvious climatic variables, such as a rise in temperature where it is normally cold or a rise in rainfall where it is normally dry. Lots of those papers speculated about the CO2 effect, but it has been very difficult to prove.”¶ The study noted that foliage in warm, wet regions such as tropical rainforests are near their maximum capacity. In warm, arid regions there is room for greater increases in foliage and rising carbon dioxide levels are inducing more prevalent plant growth.¶ Carbon dioxide acts as aerial fertilizer and also helps plants thrive under arid conditions. Although global precipitation has increased during the past century as the Earth has warmed, elevated carbon dioxide levels are assisting plant life in warm, dry regions independent of – and in addition to – increases in global precipitation.¶ “The effect of higher carbon dioxide levels on plant function is an important process that needs greater consideration,” said Donohue. “Even if nothing else in the climate changes as global CO2 levels rise, we will still see significant environmental changes because of the CO2 fertilization effect.”¶ Donohue focused special attention on Australia in an [additional press release](http://wattsupwiththat.com/2013/05/31/agu-says-co2-is-plant-food/). Although global drought is becoming less frequent and less severe as the Earth modestly warms, activists claim global warming is causing harmful drought in Australia.¶ “In Australia, our native vegetation is superbly adapted to surviving in arid environments and it consequently uses water every efficiently,” said Donohue. “Australian vegetation seems quite sensitive to CO2 fertilization.”¶ “On the face of it, elevated CO2 boosting the foliage in dry country is good news and could assist forestry and agriculture in such areas,” Donohue reported, while adding that scientists should still monitor secondary effects.¶ The satellite data show plant life in the United States has especially benefited from rising atmospheric carbon dioxide levels and gradually warming temperatures. Satellite data show foliage has increased in the vast majority of the United States since 1982, with the western U.S. benefiting the most. Indeed, many western regions experienced a greater than 30 percent increase in foliage since 1982.¶ Other regions showing particularly strong increases in foliage include the Sahel region of Africa, the Horn of Africa, southern Africa, the Indian subcontinent, and nearly all of Europe.¶

#### CO2 increases plant growth

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Each of the greenhouse gases has other impacts on the environment¶ besides its impact on global temperature. In addition¶ to its potential impact on the planet's heat balance, CO2 stimulates¶ the growth and water use efficiency of plants. Thus, pol¶ icies to reduce levels ofCO2 in the atmosphere may pose a risk¶ transfonuation by limiting the atmospheric carbon available¶ to plants.¶ Doubling the CO2 concentration of the atmosphere from its¶ recent level of 300 parts per million (ppm) to 600 ppm is estimated¶ in laboratory studies to boost average plant growth and¶ crop yield by about 33 percent in "C3" plants, and about 14¶ percent in "C4" plants (Rosenberg et al. 1990, p. 157). C3¶ plants, so named for the type of photosynthetic process they¶ perform, include wheat, rice, barley, legumes-in total, 80 percent¶ of the world's food supply-and virtually all trees. C4¶ plants, which include maize, sorghum, millet, and sugarcane¶ plants, employ a photosynthetic process that already uses¶ carbon efficiently, and therefore they derive less aid from increased¶ CO2 concentrations (IPCC 1990b, P 2.5).

#### CO2 Fertilization effects are even greater than lab studies report—empirical research proves

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Recent research tends to confirm the CO2 fertilization hypothesis¶ in more realistic situations. Several experiments in¶ the field have shown significant fertilization effects, in some¶ cases even larger changes in yield and growth than predicted¶ by lab studies, on the order of 25 to 50 percent increases for¶ C3 plants (Drake and Leadley 1991, pp. 858-859). A study of¶ grasses in the Chesapeake Bay exposed to 800 ppm CO2 has¶ shown increased photosynthetic carbon assimilation (a mea¶ sure of overall plant matter growth) of88 percent in C3 grasses¶ and 40 percent in C4 grasses, and no decline in this response¶ rate over the four years of the study (Drake and Leadley 1991,¶ p. 858). Because of internal positive feedback mechanisms,¶ sour orange trees turn out to respond to a doubling of the CO2¶ concentration by tripling their growth rate and total biomass¶ (Idso and Kimball 1991). Meanwhile, field studies suggest that¶ one reason for lesser response in some lab studies may be that¶ labs use potted plants whose root growth is constrained and¶ which therefore cannot respond fully to the rising availability¶ of carbon; in field trials where roots can expand, robust CO2¶ enrichment is consistently observed (Drake and Leadley 1991,¶ p.858).

#### CO2 is the elixir of life—increases ag output

Idso “Mr. President, It’s NOT “Carbon Pollution”, it’s the “Elixir of Life!” <http://www.co2science.org/articles/V17/N27/C2.php> 6/26/13

On June 25th, President Obama unveiled his plan to reduce what he refers to as "carbon pollution" -- the emission of gaseous carbon dioxide into the air that primarily results from the burning of fossil fuels. In discussing the rationale for his plan, the President claims that carbon dioxide, or CO2, "causes climate change and threatens public health" and that "cutting carbon pollution will help keep our air and water clean and protect our kids." Unfortunately, President Obama's statements could not be further from the truth. Far from being a "pollutant," carbon dioxide is the Elixir of Life.¶ Nearly a quarter of a century ago, my father and two of his co-workers grew some water lilies in sunken metal stock tanks located out-of-doors and enclosed within clear-plastic-wall open-top chambers through which air of either 350 or 650 ppm CO2 was continuously circulated (Idso et al. 1990). Over the course of the next two growing seasons, he and his colleagues measured a number of plant responses to these two environmental treatments, the former of which we will call "normal" and the latter of which -- according to the classification scheme of President Obama -- we will call "polluted."¶ What my father and his associates learned from their experiment was truly amazing. Although the dictionary defines a pollutant as "a harmful chemical or waste material discharged into the water or atmosphere" - and in my father's experiment, the offending substance went into both of these environmental reservoirs - the water lilies in the CO2-polluted enclosures seemed to grow better than the water lilies in the normal enclosures, right from the very start of the study.¶ Although the first new growth from the original rhizomes that were planted in the layers of soil at the bottoms of the tanks all reached the surface of the water at essentially the same time, the leaves that unfurled themselves in the CO2-polluted tanks were slightly larger than those in the normal tanks. The percent dry matter contents of the leaves in the CO2-polluted tanks were also greater. And these two factors combined to produce leaves in the CO2-polluted tanks that were composed of 68% more dry matter, on average, than leaves produced in the non-polluted tanks.¶ In addition to being larger and more substantial, the leaves in the CO2-polluted tanks had more company: there were 75% more of them than there were in the normal tanks over the course of the initial five-month growing season (which, incidentally, lasted two weeks longer in the CO2-polluted tanks). Each of the plants in the CO2-polluted tanks also produced twice as many flowers as the plants growing in normal air; and the flowers that blossomed in the CO2-polluted air were more substantial than those that bloomed in the air of normal CO2 concentration. They had more petals, the petals were longer, they had a greater percent dry matter content, and each flower consequently weighed about 50% more. In addition, the stems that supported the flowers were slightly longer in the CO2-polluted tanks; and the percent dry matter contents of both the flower and leaf stems were greater, so that the total dry matter in the flower and leaf stems in the CO2-polluted tanks exceeded that of the flower and leaf stems in the non-polluted tanks by approximately 60%.

#### CO2 greens the planets and offsets CO2 emissions

Moulder ’14 (Mickey, Windsor Star, Feb. 19, 2014)¶

The CO2 global warming supporters from the UN, the many universities receiving related grants from governments and global warming foundations and the biased news media have taken to shortening the CO2 Carbon Dioxide label to the misleading "carbon" moniker. ¶ By doing this, they disingenuously expand and bring into play the public's images of dirty coal and carbon monoxide when addressing CO2 based global warming concerns. Accident or by design? You decide.¶ There are many sources to CO2 forming in our atmosphere, most of which comes from natural sources not human. For example there are approximately 200 active volcanoes on the planet every day. The 1991 Mount Pinatubo eruption in the Philippines spewed out CO2 gases for a full year.¶ For 60 years, hydraulic fracking has evolved to the point now where we are able to recover a seemingly endless supply of natural gas as well as tens of billions of barrels of new oil. The resultant reduction in natural gas prices has lead to huge increases in the use of natural gas and as a consequence, CO2 emissions in the West are declining, not that it matters much according to real science.¶ As you know, CO2 is not a pollutant; far from it. It's the critical chemical compound that every plant requires to live and grow and to synthesize into oxygen for humans and all animal life.¶ And yet Spain ruined its economy 10 years ago when it went "green" by trying to control CO2 carbon dioxide emissions. It now suffers 25 per cent unemployment and is reverting to clean coal and natural gas from solar panels and wind.¶ Germany is doing the same and of course here at home, Ontario is on its way to destroying its economy with its extreme "green" agenda. Ontario has lost over 300,000 manufacturing jobs recently much of it caused by having the highest energy costs in North America.¶ In addition, carbon trading schemes are always hovering even though our planet has cooled by 0.7 C degrees in the past century.¶ And hurricanes and typhoons are down significantly both in number and size over the past several years in spite of how the media and others spin this fact.¶ Ontario's wind turbines often function less than 15 per cent of the time and much of the very expensive energy they produce is sold off at a loss or just given to Quebec and the U.S.¶ We are destroying our rural settings with these unsightly, unhealthy and bird killing wind turbines and yet we are installing more.¶ Just look at President Obama's intransigence on approving the Keystone oil pipeline in spite of five years of scientific study showing no CO2 issues.¶ Since science has proven that CO2 based global warming does not exist, its ideologue believers have turned it into a religion.¶ There are countless honest scientists that have openly condemned global warming for what it is; a giant hoax.¶ As references look up Rick Morano of Climate Matters or Frank Beckmann Global Warming for starters.¶ Let's hope that someone here in Ontario wakes up soon and gets us off the road to economic ruin brought on by so-called solutions to a non issue called global warming.¶ Mickey Moulder is a retired auto executive who lives in Tecumseh.

#### Current plant yields prove—CO2 increases biomass

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Ofcourse, important uncertainties remain regarding the impact¶ of elevated CO2 • Like the computer-generated forecasts of¶ the effects of global warming, the predictions of enhanced CO2¶ fertilization have not yet been tested on complete ecosystems.¶ But at least in the case of CO2 fertilization there is already¶ some corroboratory evidence at the macro level: as atmospheric¶ CO2 has risen from 275 ppm in the 1800s to about 350¶ ppm today, the amplitude (annual variation) of the earth's historical¶ CO2 record has increased, implying an increase in the¶ total biomass of the world's carbon sinks (Rosenberg 1991,¶ p. 333). Still, the detailed effects on unmanaged ecosystems,¶ such as rainforests, have not yet been fully studied (see Peters¶ and Lovejoy 1992). There are also important questions about¶ the nutrient needs and nutritional value of CO2-fertilized¶ larger plants (IPCC 1990b, p. 2.6; Cline 1992, p. 90). Researchers¶ are currently studying the effect of elevated CO2 on¶ successive generations of plants, and are attempting to test¶ increased CO2without changing other variables, such as light,¶ that may have varied in previous field tests when CO2 chambers¶ were attached to plants (Oren 1994).

### CO2 Good-Laundry List

#### Warming science is a joke—CO2 increases food production and offsets health problems

Delingpole 14 (James Delingpole 4 Apr 2014 Degree in English Literature, written several books including Watermelons: How the Environmentalists are Killing the Planet, Destroying the Economy and Stealing Your Children's Future. http://www.breitbart.com/Breitbart-London/2014/04/04/World-doing-just-fine-Global-Warming-is-Good-CO2-is-our-friend-say-Scientists)

The latest verdict is in on 'climate change' - and the news is good. **The planet is greening, the oceans are blooming, food production is up, animals are thriving and humans are doing better than ever: and all thanks to CO2 and global warming.**¶ So say the authors of the latest [Climate Change Reconsidered report by the NIPCC](http://nipccreport.org/reports/ccr2b/ccr2biologicalimpacts.html" \t "_blank) - that's the Non-Governmental International Panel on Climate Change, an independent research body funded by the Heartland Institute.¶ The scientific team, led by atmospheric physicist Fred Singer, geographer and agronomist Craig Idso, research physicist Sherwood B. Idso and marine geologist Bob Carter, has assessed the peer-reviewed evidence and reached a conclusion somewhat different from the scaremongering narrative which has been promoted in the last week by the IPCC and its amen corner in the mainstream media: reports of **the planet's imminent demise have been somewhat exaggerated; in fact we're doing just fine.**¶ **Biological Impacts**¶ Atmospheric CO2 is not a pollutant and is greening the planet. **Far from damaging food production it is helping to increase it**, as are rising temperatures. **Ecosystems are thriving** and rising CO2 levels **and** temperatures **pose no significant threat to aquatic life**. Global warming will have a negligible effect on human morbidity and the spread of infectious diseases but will, on balance, be beneficial because cold is a deadlier threat to the human species than warmth.¶ **CO2, Plants and Soil**¶ Numerous studies show that **CO2 is good for plants, increasing their growth-rate, reducing their reliance on water and making them less vulnerable to stress**. **Increased CO2 has resulted in reduced topsoil erosion,** has **encouraged beneficial bacteria, and improved aerial fertilization** - creating more plantlife which will help sequester the carbon apparently of so much concern to environmentalists.¶ Plant Characteristics¶ **Rising CO2** will improve plant growth, development and yield. It **enables plants to produce more - and larger - flowers, thus increasing productivity. It also helps plants grow more disease-resistant.**¶ **Earth's Vegetative Future**¶ Rising CO2 has led to a greening of the planet. **Agricultural production has increased dramatically across the globe in the last three decades**, partly **because of new technologies but** partly **also** because of **the beneficial warmth and increased CO2**.¶ **Terrestrial Animals**¶ **There is little if any evidence to support the IPCC's predictions of species extinction** which are based mainly on computer models rather than hard data**. Amphibian populations will suffer little, if any, harm.** **Bird populations may have been affected by habitat loss - but not by "climate change" to which they are more than capable of adapting. Polar bears have survived periods climatic change considerably more extreme than the ones currently being experienced. Butterflies, insects, reptiles and mammals tend on balance to proliferate rather than be harmed by "climate change."**¶ **Aquatic Life**¶ **Multiple studies from multiple oceanic regions confirm that productivity** - from phytoplankton and microalgae to corals, crustaceans and fish - **tends to increase with temperature.** Some experts predict **coral calcification will increase by about 35 per cent beyond pre-industrial levels by 2100, with no extinction of coral reefs**. Laboratory studies predicting lower PH levels - "ocean acidification" - fail to capture the complexities of the real world and often contradict observations in nature.¶ **Human Health**¶ **Warmer temperatures result in fewer deaths associated with cardiovascular disease, respiratory illness and strokes**. In the US a person who dies of cold loses on average in excess of ten years of life, whereas someone who dies from heat loses likely no more than a few days or weeks of life. **Between 3 and 7 percent of the gains in longevity** in the US **in the last three decades are the result of people moving to warmer states.** There is a large body of evidence to suggest that the spread of malaria will NOT increase as a result of global warming. **Rising CO2 is increasing the nutritional value of food with consequent health benefits for humans.**

#### Warming is a hoax—CO2 is the backbone of jobs, food, and energy

Moulder ’14 (Mickey, Windsor Star, Feb. 19, 2014)¶

The CO2 global warming supporters from the UN, the many universities receiving related grants from governments and global warming foundations and the biased news media have taken to shortening the CO2 Carbon Dioxide label to the misleading "carbon" moniker. ¶ By doing this, they disingenuously expand and bring into play the public's images of dirty coal and carbon monoxide when addressing CO2 based global warming concerns. Accident or by design? You decide.¶ There are many sources to CO2 forming in our atmosphere, most of which comes from natural sources not human. For example there are approximately 200 active volcanoes on the planet every day. The 1991 Mount Pinatubo eruption in the Philippines spewed out CO2 gases for a full year.¶ For 60 years, hydraulic fracking has evolved to the point now where we are able to recover a seemingly endless supply of natural gas as well as tens of billions of barrels of new oil. The resultant reduction in natural gas prices has lead to huge increases in the use of natural gas and as a consequence, CO2 emissions in the West are declining, not that it matters much according to real science.¶ As you know, CO2 is not a pollutant; far from it. It's the critical chemical compound that every plant requires to live and grow and to synthesize into oxygen for humans and all animal life.¶ And yet Spain ruined its economy 10 years ago when it went "green" by trying to control CO2 carbon dioxide emissions. It now suffers 25 per cent unemployment and is reverting to clean coal and natural gas from solar panels and wind.¶ Germany is doing the same and of course here at home, Ontario is on its way to destroying its economy with its extreme "green" agenda. Ontario has lost over 300,000 manufacturing jobs recently much of it caused by having the highest energy costs in North America.¶ In addition, carbon trading schemes are always hovering even though our planet has cooled by 0.7 C degrees in the past century.¶ And hurricanes and typhoons are down significantly both in number and size over the past several years in spite of how the media and others spin this fact.¶ Ontario's wind turbines often function less than 15 per cent of the time and much of the very expensive energy they produce is sold off at a loss or just given to Quebec and the U.S.¶ We are destroying our rural settings with these unsightly, unhealthy and bird killing wind turbines and yet we are installing more.¶ Just look at President Obama's intransigence on approving the Keystone oil pipeline in spite of five years of scientific study showing no CO2 issues.¶ Since science has proven that CO2 based global warming does not exist, its ideologue believers have turned it into a religion.¶ There are countless honest scientists that have openly condemned global warming for what it is; a giant hoax.¶ As references look up Rick Morano of Climate Matters or Frank Beckmann Global Warming for starters.¶ Let's hope that someone here in Ontario wakes up soon and gets us off the road to economic ruin brought on by so-called solutions to a non issue called global warming.¶ Mickey Moulder is a retired auto executive who lives in Tecumseh.

#### Captured carbon key to prolong the greening of the earth

Idso, 2014 (Craig “CO2-Enriched Plants Follow Frugal Dictum of "Waste Not, Want Not" with Respect to Valuable Captured Carbon 2014)

As the air's CO2 content continues to rise, earth's plants are becoming more and more productive, thanks to the aerial fertilization effect of atmospheric CO2 enrichment that increases their photosynthetic prowess and helps drive the great "greening of the earth" that is documented by modern satellite studies (Myneni et al., 1997; Zhou et al., 2001).  This phenomenon can readily boost plant growth rates by 30 to 50% in response to a doubling of the ambient CO2 concentration (Idso and Idso, 1994); and it enables earth's plants to remove from the atmosphere greater quantities of what to them is a most highly-prized resource (CO2), ultimately allowing them to sequester more of that trace gas's valuable carbon in their tissues and the soils in which they grow.

#### CO2 promotes coral growth

Idso “Coral Reefs: Doomed by Carbon Dioxide?” <http://www.co2science.org/education/reports/reportarch.php> 10/19/1998

While surfing last week - on the web, that is - we came across some material decrying the state of the world's coral reefs. In one report, posted on 19 October 1998 (Hocking Voice Global Warming Report 9), corals were said to be expiring in record numbers because of warmer-than-normal temperatures. "These corals are dying from heatstroke," it quoted Thomas Goreau of the Global Coral Reef Alliance as saying, noting that he and another scientist claim that "reefs will rebound only through dramatic reduction of fuel consumption. "Coincidentally, a frequent visitor to our website sent us a copy of the 19 December 1998 "Good Weekend" edition of The Sydney Morning Herald, wherein (on pages 28-33) Environment Editor Murray Hogarth suggests that anthropogenic CO2 emissions pose a serious threat to Australia's Great Barrier Reef, due to their purported central role in causing global warming. In fact, Hogarth goes so far as to describe plans to mine oil shale deposits on Queensland's reef coastline as "bizarre and perverse," as he puts it, because of the CO2 that would ultimately be released to the air when the recovered oil is burned.Citing the oft-repeated claim of Goreau that "if it keeps getting hotter due to human-induced global warming, ? then reefs are doomed," Hogarth joins him in equating the death of reefs with human enterprises that release CO2 to the atmosphere and presumably lead to escalating temperatures. There are, however, a number of problems with this line of reasoning.¶ First, it has yet to be proven that the rise in the atmosphere's CO2 concentration that began with the Industrial Revolution has anything to do with the concomitant warming of the globe. It is a well known fact, for example, that earth's near-surface air temperature oscillates on millennial time scales throughout glacial and interglacial periods alike, independent of any forcing from carbon dioxide. Furthermore, for significant periods of time during the present interglacial, when there was much less CO2 in the air than there is currently, it was actually warmer than it is now; and earth's reefs did not succumb to the dreaded bleaching that Goreau and Hogarth attribute to global warming.¶ A good case in point is illustrated by the recent work of a large research team composed of M.K. Gagan, L.K. Ayliffe, J.A. Cali, G.E. Mortimer and M.T. McCulloch of the Australian National University's Research School of Earth Sciences, as well as J. Chappell and M.J. Head of ANU's Research School of Pacific and Asian Studies and D. Hopley of James Cook University's Sir George Fisher Center. Together, these scientists studied corals from the Great Barrier Reef and determined that some 5,350 years ago the tropical ocean surface was 1.2°C warmer than it is presently. Moreover, as they noted in the report of their research published in the 13 February 1998 issue of Science, "terrestrial pollen and tree-line elevation records elsewhere in the tropical southwest Pacific indicate that the climate was generally warmer from 7,000 to 4,000 [years before present]." As for CO2, our Fact Sheet referenced above indicates that this was a period of time when the air's CO2 content was fully 100 ppm less than it is today! And, of course, the corals survived.

#### Turn: Nature’s attempts to combating global warming result in devastating consequences, CO2 solves

Idso, Sherwood “CO2 to the rescue…Again!” <http://www.co2science.org/education/reports/reportarch.php> January 1 2012

Atmospheric CO2 enrichment has long been known to help earth's plants withstand the debilitating effects of various environmental stresses, such as high temperature, excessive salinity levels and deleterious air pollution, as well as the negative consequences of certain resource limitations, such as less than optimal levels of light, water and nutrients (Idso and Idso, 1994).  Now, in an important new study, Johnson et al. (2002) present evidence indicating that elevated levels of atmospheric CO2 do the same thing for soil microbes in the face of the enhanced receipt of solar ultraviolet-B radiation that would be expected to occur in response to a 15% depletion of the earth's stratospheric ozone layer.  In addition, their study demonstrates that this phenomenon will likely have important consequences for soil carbon sequestration. Johnson et al. conducted their landmark work on experimental plots of subarctic heath located close to the Abisko Scientific Research Station in Swedish Lapland (68.35°N, 18.82°E).  The plots they studied were composed of open canopies of Betula pubescens ssp. czerepanovii and dense dwarf-shrub layers containing scattered herbs and grasses.  For a period of five years, the scientists exposed the plots to factorial combinations of UV-B radiation - ambient and that expected to result from a 15% stratospheric ozone depletion - and atmospheric CO2 concentration - ambient (around 365 ppm) and enriched (around 600 ppm) - after which they determined the amounts of microbial carbon (Cmic) and nitrogen (Nmic) in the soils of the plots.

When the plots were exposed to the enhanced UV-B radiation level expected to result from a 15% depletion of the planet's stratospheric ozone layer, the researchers found that the amount of Cmic in the soil was reduced to only 37% of what it was at the ambient UV-B level when the air's CO2 content was maintained at the ambient concentration.  When the UV-B increase was accompanied by the CO2 increase, however, not only was there not a decrease in Cmic, there was an actual increase of fully 37%.

The story with respect to Nmic was both similar and different at one and the same time.  In this case, when the plots were exposed to the enhanced level of UV-B radiation, the amount of Nmic in the soil experienced a 69% increase when the air's CO2 content was maintained at the ambient concentration.  When the UV-B increase was accompanied by the CO2 increase, however, Nmic rose even more, experiencing a whopping 138% increase.These findings, in the words of Johnson et al., "may have far-reaching implications ... because the productivity of many semi-natural ecosystems is limited by N (Ellenberg, 1988)."  Hence, the 138% increase in soil microbial N observed in this study to accompany a 15% reduction in stratospheric ozone and a concomitant 64% increase in atmospheric CO2 concentration (experienced in going from 365 ppm to 600 ppm) should do wonders in enhancing the input of plant litter to the soils of these ecosystems, which phenomenon represents the first half of the carbon sequestration process, i.e., the carbon input stage.

With respect to the second stage of keeping as much of that carbon as possible in the soil, Johnson et al. note that "the capacity for subarctic semi-natural heaths to act as major sinks for fossil fuel-derived carbon dioxide is [also] likely to be critically dependent on the supply of N."  Indeed, in a previous essay in this series, wherein we discussed the findings of the literature review of Berg and Matzner (1997), we found that such is truly the case.  With more nitrogen in the soil, the long-term storage of carbon is significantly enhanced, as more litter is chemically transformed into humic substances when nitrogen is more readily available; and these resulting more recalcitrant carbon compounds can be successfully stored in the soil for many millennia.Clearly, earth's biosphere is effectively programmed to engage in a whole host of different phenomena that may act to slow - or actually stop - the ongoing rise of the air's CO2 content, especially if there is a chance it might otherwise attain a dangerously high level in terms of its potential to induce global warming, as we have indicated in earlier essays of this series.  Furthermore, as was suggested in yet another related context well over a decade ago (Idso, 1990), lowly soil microbes may well play a major role in this biologically-mediated regulatory enterprise, as is so nicely demonstrated in the new and unique study of Johnson et al. in Swedish Lapland.

#### CO2 Enriched ecosystems are the fuel that enables population growth amongst animals and plant life

Idso 2012 (Idso, Keith "Rising CO2: A Breath of New Life for the Biosphere," <http://www.co2science.org/articles/V17/N27/C2.php> 29/01/2012)

Background  In an article published in the 1995 World Climate Report and entitled Dr. Keith E. Idso stated that "it is abundantly clear that earth's animal life will experience population responses to rising levels of atmospheric CO2 that will parallel those of the plant kingdom; for the greater the food base, the greater the super-structure of life that can be supported." What seems obvious to one person, however, may not be nearly so clear to another; and the ultimate proof of such a [postulate](http://www.co2science.org/dictionary/define_p.php#Postulate) may sometimes reside years, or even decades, in the future. It is thus immensely gratifying that a mere three years were required to provide a sound experimental demonstration of this "obvious" - but not nearly so easy to demonstrate - consequence of atmospheric CO2 enrichment. The 15 authors of this paper brought together the expertise of 10 different research institutions scattered throughout the United Kingdom, Austria and the United States to study complex [food chain](http://www.co2science.org/dictionary/define_f.php#Food%20chain) responses to atmospheric CO2 enrichment in model terrestrial [ecosystems](http://www.co2science.org/dictionary/define_e.php#Ecosystems) maintained within the sophisticated Ecotron controlled environment facility at Silkwood Park, Ascot, Berkshire, UK. Eight [microcosms](http://www.co2science.org/dictionary/define_m.php#Microcosms), each covering a ground area of 1 m², were maintained at the local ambient CO2 concentration, while eight others were maintained at a CO2 concentration approximately 53% greater for a period of nine months. Throughout this period, numerous ecological parameters were measured.What was learned  As the plants of the ecosystems went through three complete generations, the CO2-enriched plant communities typically [fixed](http://www.co2science.org/dictionary/define_f.php#Fixed) more carbon as a consequence of their enhanced rates of photosynthesis. Most of the extra production was directed below-ground, where it increased the dissolved organic carbon and nitrogen concentrations of the CO2-enriched microcosms' soil water supplies. This change, in turn, led to the development of a greater biomass of certain soil fungi in the CO2-enriched ecosystems. At the end of this food chain were several species of soil [microarthropods](http://www.co2science.org/dictionary/define_m.php#Microarthropods) that fed upon the soil fungi; and the 53% increase in the atmospheric CO2 content of the CO2-enriched microcosms led to a 52% increase in the number of these fungal grazers.

### AT: Drought

#### CO2 fertilization increases in stress conditions—IPCC reports agree

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Rather than fading under stressed growing conditions, the¶ positive effects of elevated CO2 appear to be comparatively¶ larger in the face of stresses-limited nutrients or water, salinity,¶ cool temperatures, or pollution-than in already optimal¶ conditions (IPCC 1990b, p. 2.5). Increasing CO2 concentrations¶ spurs plants to close their stomata (small openings in¶ leaf tissues) and thereby to reduce transpiration (water loss to¶ the air through the stomata) per unit of photosynthesis, increasing¶ their water use efficiency and their resistance to¶ drought by about 30 percent (Rosenberg 1990, 1991; IPCC¶ 1990b, pp. 2.4-2.5). CO2 fertilization could therefore be especially¶ valuable in arid areas and areas that might lose precipitation¶ under global warming. And doubling CO2 concentrations¶ actually raises the optimum temperature for¶ photosynthesis in C3 plants by about 4 to 6 degrees C, so¶ global warming itself is not likely to inhibit the carbon fertilization¶ effect (IPCC 1990b, pp. 2.4-2.5). As for weed competition,¶ the IPCC noted that fourteen of the world's seventeen¶ worst weeds are C4 plants amid C3 crops, so that CO2 enrichment¶ might in fact help crops outperform these weeds (IPCC¶ 1990b, p. 2.5).

### AT: Heat Kills Plants

#### Higher levels of CO2 allow plant decomposition to nourish soil rather than harm

Idso, Craig “Elevated CO2 May Slow Plant Decomposition Rates, Increasing Soil Carbon Storage” <http://www.co2science.org/articles/V17/N27/EDIT.php> 15 February 2014

In a previous essay, we indicated that contrary to the long-held assumption that global warming would increase soil respiration rates and reduce soil carbon storage, thereby adding to the growing burden of atmospheric CO2, elevated temperatures may actually enhance soil carbon storage, thereby slowing the rate-of-rise of the air's CO2 content.  We here describe a second natural phenomenon that does much the same thing.

As plants grow and develop, they shed various organs (lose their leaves or drop their fruit, for example) at different stages of their life cycles, ultimately leaving behind all of their remaining biomass upon their death.  This litter, which was constructed from CO2 acquired during photosynthesis, is then subjected to the process of decomposition, which returns some of its carbon back to the atmosphere, once again in the form of CO2.

At first glance, it might appear that the process of decomposition would have little net impact on terrestrial carbon sequestration.  However, in reviewing the published scientific literature on the topic, we find that litter from plants grown at elevated CO2 concentrations often decomposes at a slower rate, or to a lesser degree, than litter from plants grown at the air's current CO2 concentration.  This phenomenon results in greater carbon retention times within decaying litter; and it provides greater time for more of the litter's carbon to become incorporated into more stable compounds that can be sequestered for longer periods of time within soils.  And, of course, it leaves a greater amount of carbon to be thus sequestered. Nitschelm et al. (1997), for example, studied root decomposition rates in large plots of white clover, observing that a 250 ppm increase in the air's CO2 content reduced decomposition rates by 24%.  Similarly, atmospheric CO2 enrichment significantly reduced litter decomposition rates in an alpine grassland species (Hirschel et al., 1997), in seedlings of yellow poplar (Scherzel et al., 1998), and in sorghum and soybeans (Tobert et al., 1998).  In addition, in studying litter decomposition rates in Lolium perenne grasslands, Van Ginkel et al. (1996) determined that root decomposition rates were 19 and 14% slower at atmospheric CO2 concentrations of 700 ppm than they were at ambient CO2 concentrations after one and two years of treatment exposure, respectively.  Likewise, Van Ginkel and Gorissen (1998) grew this same perennial ryegrass at 700 ppm CO2 and noted a 42% increase in both root and soil microbial biomass, while root decomposition rates dropped by 13% relative to those measured at 350 ppm CO2.

#### No reductions in crop yields due to warming

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

An early effort¶ found that although warming alone would imply substantial¶ reductions in yields of several crops in the United States,¶ warming and CO2fertilization toge therwould impose only mild¶ to insignificant reductions in yields (Dudek 1987). More recent¶ studies examining the two effects in concert, using a variety of¶ general circulation models of the earth's climate (GCMs), have¶ predicted a 17 percent increase in yields in subarctic Russia¶ and Siberia (Parry et al. 1988, cited in Kane et ale 1992b,¶ p. 25), and from no change to large crop yield increases in the¶ United States (Adams 1989; Smith and Tirpak 1989, cited in¶ Kane et al. 1992b, p. 25) and in other countries (Brookes¶ 1990, citing IPCCjCoolfont report). These estimates do not¶ fully incorporate the findings described earlier about nighttime-¶ wintertime warming and farmer adaptation, which tend¶ to brighten the prospects for world agriculture further. Yet the¶ analysis of adjustments by international food markets (Kane¶ et ale 1992a), as discussed earlier, suggests that modest increases¶ in world crop output, like modest decreases, would not¶ appreciably affect world economic well-being.

#### Increased heat has no effect on plant life in ecosystems

Idso, Craig “Recent Studies show global warming may enhance soil carbon storage and thereby slow its own progression” <http://www.co2science.org/articles/V17/N27/EDIT.php> 15 February 2014

The amount of carbon stored above and beneath a unit area of land is basically a function of two biochemical processes, photosynthesis and respiration.  During photosynthesis, plants remove CO2 from the atmosphere and utilize it to construct their tissues, where it is safely retained until it is respired back to the atmosphere.  Thus, if the total amount of photosynthesis occurring over a given area of land is greater than the total amount of respiration occurring above and beneath its surface, that area of land is said to be a carbon sink.  Conversely, if the amount of photosynthesis is less than the amount of respiration, the area is said to be a carbon source.For many years, theoretical models of ecosystem dynamics suggested that global warming would reduce both the magnitude and number of terrestrial carbon sinks by increasing ecosystem respiration more than it increased ecosystem photosynthesis.  If true, this result would dash all hopes of mitigating CO2-induced global warming via biological carbon sequestration.  However, like model-based predictions of climate change, there are a number of problems with this prediction as well.

The primary problem is the simple fact that most observational evidence does not support the model predictions of reduced soil carbon storage under elevated temperatures.  Fitter et al. (1999), for example, evaluated the effect of temperature on plant decomposition and soil carbon storage, finding that upland grass ecosystem soils artificially heated by nearly 3°C increased both root production and root death by equivalent amounts.  Hence, they concluded that in these ecosystems, elevated temperatures "will have no direct effect on the soil carbon store."  Similarly, Johnson et al. (2000) warmed Arctic tundra ecosystems by nearly 6°C for eight full years and still found no significant effect of that major temperature increase on ecosystem respiration.

#### Overestimation of soil respiration have lead to a false ideology of the effect of Co2 on ecosystems and plant life

Idso, Craig “Recent Studies show global warming may enhance soil carbon storage and thereby slow its own progression” <http://www.co2science.org/articles/V17/N27/EDIT.php> 15 February 2014

Furthermore, Liski et al. (1999) showed that carbon storage in soils of both high- and low-productivity boreal forests in Finland actually increased with warmer temperatures along a natural temperature gradient.Why the big discrepancy between model predictions and reality?  According to a recent paper in the Annals of Botany, there are two potential explanations: (1) ecosystem modelers are over-estimating the temperature dependency of soil respiration, and (2) warming may increase the rate of certain physico-chemical processes that transfer organic carbon to more stable soil organic matter pools, thereby enabling the protected carbon to avoid or more strongly resist decomposition (Thornley and Cannell, 2001).That the first of these explanations is viable is demonstrated by the results of the studies just described.  The second explanation is also reasonable.  Thornley and Cannell hypothesize, for example, that the pertinent physico-chemical processes require a certain amount of activation energy to attach organic materials onto soil minerals or bring them together into aggregates that are less subject to decomposition; and they suggest that higher temperatures can provide that energy.Taking their hypothesis one step further, Thornley and Cannell developed a dynamic soil model in which they demonstrate that if their thinking is correct, "long-term soil carbon storage will appear to be insensitive to a rise in temperature, even if the respiration rates of all [soil carbon] pools respond to temperature as assumed by [most models]," which is, in fact, what experimental and real-world data clearly indicate to be the case.

The upshot of these several observations is that global warming does not cause terrestrial carbon sinks to release additional CO2 to the atmosphere and thereby exacerbate the warming, as was fervently believed up until the last few years.  In fact, it is much more likely that rising temperatures may do just the opposite, inducing a negative feedback phenomenon that enables greater amounts of carbon to be sequestered, which would tend to decrease the rate of CO2-induced warming.

Clearly, the biosphere is well adapted to responding to environmental challenges; and this one is no exception.  When the going gets hot, the earth knows how to keep its cool.

#### Global warming does not effect the plant decompostion

Idso, Craig “Elevated CO2 May Slow Plant Decomposition Rates, Increasing Soil Carbon Storage” <http://www.co2science.org/articles/V17/N27/EDIT.php> 15 February 2014

Van Ginkel et al. (1999) used their earlier experimental results to test whether or not global warming and atmospheric CO2 enrichment, acting in unison, would amplify plant residue decomposition rates in Lolium perenne grasslands and lead to a net loss of carbon from them.  Their results indicate that the addition of global warming will not increase plant residue decomposition rates enough to turn such ecosystems into carbon sources, as opposed to the sinks they are currently; for CO2-induced increases in plant growth and CO2-induced decreases in plant decomposition rates "are more than sufficient to counteract the positive feedback caused by an increase in temperature." Not all studies have indicated that atmospheric CO2 enrichment will reduce litter decomposition rates, however, as demonstrated by the experiments of Dukes and Field (2000) on native California grassland species, Hirschel et al. (1997) on plants from lowland calcareous grasslands and moist tropical forests, Scherzel et al. (1998) on eastern white pine, and Henning et al. (1996) on soybean and sorghum.  In fact, in an analysis of several dozen such studies, Norby et al. (2001) concluded that elevated CO2 had no consistent effect on leaf litter decomposition rate.  Even in the face of no net change in litter decomposition, however, more carbon will still be sequestered in soils at higher atmospheric CO2 concentrations, since the aerial fertilization effect of elevated CO2 will lead to the production of more plant biomass; and an unchanged rate of decomposition will thus still result in more carbon eventually being retained in the soil under these conditions. In summation, it is clear from experimental results described in the scientific literature that as the air's CO2 content continues to rise, earth's vegetation will likely respond with increasing photosynthetic rates and biomass production.  As a consequence of these phenomena, more plant litter will be returned to the soil where it should be retained for longer periods of time, as elevated atmospheric CO2 concentrations tend to decrease or, at the very minimum, maintain current rates of litter decomposition.  Thus, the carbon sequestering abilities of earth's natural ecosystems should increase in tandem with the CO2 content of the atmosphere; and they should do so even in the face of any global warming that might occur concurrently.

## Sulfate Cooling Turn

### 1NC

#### Sulfate aerosols reflect heat—and they’re short lived, mitigates any negatives

NASA 96 (Langley Research Center August 19 http://www.nasa.gov/centers/langley/news/factsheets/Aerosols.html What Are They, and Why Are They So Important?)

The third type of aerosol comes from human activities. While a **large fraction of human-made aerosols** come in the form of smoke from burning tropical forests, the major component **come**s **in the form of sulfate aerosols created by the burning of coal and oil**. The concentration of human-made sulfate aerosols in the atmosphere has grown rapidly since the start of the industrial revolution. At current production levels, **human-made sulfate aerosols are thought to outweigh the naturally produced sulfate aerosols**. The **concentration of aerosols is highest in the northern hemisphere where industrial activity is centered.** The **sulfate aerosols absorb no sunlight but they reflect it, thereby reducing the amount of sunlight reaching the Earth's surface. Sulfate aerosols are believed to survive in the atmosphere for about 3-5 days**.The sulfate aerosols also enter clouds where they cause the number of cloud droplets to increase but make the droplet sizes smaller. The net effect is to make the clouds reflect more sunlight than they would without the presence of the sulfate aerosols. **Pollution from the stacks of ships at sea has been seen to modify the low-lying clouds above them**. **These changes in the cloud droplets, due to the sulfate aerosols from the ships, have been seen in pictures from weather satellites as a track through a layer of clouds**. In addition to making the clouds more reflective, it is also believed that the additional aerosols cause polluted clouds to last longer and reflect more sunlight than non-polluted clouds.

### SO2 Cools

#### China proves—anthropogenic SO2 offsets warming

Santer 14 (Benjamin Santer February 24th 2014 <http://www.sciencedaily.com/releases/2014/02/140224133137.htm> Benjamin Santer contributed to this report for the Department of Energy through the Lawrence Livermore National Laboratory)

Volcanic eruptions in the early part of the 21st century have cooled the planet, according to a study led by Lawrence Livermore National Laboratory. This cooling partly offset the warming produced by greenhouse gases. Despite continuing increases in atmospheric levels of greenhouse gases, and in the total heat content of the ocean, global-mean temperatures at the surface of the planet and in the troposphere (the lowest portion of Earth's atmosphere) have shown relatively little warming since 1998. This so-called 'slow-down' or 'hiatus' has received considerable scientific, political and popular attention. The volcanic contribution to the 'slow-down' is the subject of a new paper appearing in the Feb. 23 edition of the journal Nature Geoscience. Volcanic eruptions inject sulfur dioxide gas into the atmosphere. If the eruptions are large enough to add sulfur dioxide to the stratosphere (the atmospheric layer above the troposphere), the gas forms tiny droplets of sulfuric acid, also known as "volcanic aerosols." These droplets reflect some portion of the incoming sunlight back into space, cooling Earth's surface and the lower atmosphere. "In the last decade, the amount of volcanic aerosol in the stratosphere has increased, so more sunlight is being reflected back into space," said Lawrence Livermore climate scientist Benjamin Santer, who serves as lead author of the study. "This has created a natural cooling of the planet and has partly offset the increase in surface and atmospheric temperatures due to human influence." From 2000-2012, emissions of greenhouse gases into the atmosphere have increased -- as they have done since the Industrial Revolution. This human-induced change typically causes the troposphere to warm and the stratosphere to cool. In contrast, large volcanic eruptions cool the troposphere and warm the stratosphere. The researchers report that early 21st century volcanic eruptions have contributed to this recent "warming hiatus," and that most climate models have not accurately accounted for this effect. "The recent slow-down in observed surface and tropospheric warming is a fascinating detective story," Santer said. "There is not a single culprit, as some scientists have claimed. Multiple factors are implicated. One is the temporary cooling effect of internal climate noise. Other factors are the external cooling influences of 21st century volcanic activity, an unusually low and long minimum in the last solar cycle, and an uptick in Chinese emissions of sulfur dioxide

#### Emissions cuts cause warming spikes—SO2 is needed to offset warming

New Scientist 2004 (7/24)

As well as pumping gases into the atmosphere, we are also filling it with huge volumes of microscopic particles, mostly from burning forests, crop waste and fossil fuels. Depending on their characteristics, these aerosols can scatter or absorb solar radiation and may influence the formation, colour and reflectivity of clouds. The precise nature of their involvement in global temperature has been hotly disputed for a decade. But most researchers now believe that the dominant effect of these aerosols is to suppress warming by shading the planet. “We are dealing with a coiled spring with temperatures being held back by aerosols,” says Solomon. “If you shutoff aerosols, temperatures would increase rapidly, but we don’t yet know exactly how coiled the spring is.” The best guess until recently was that this “parasol effect” was holding back a quarter of the warming so far, or about 0.2 degrees C. But critics say this calculation is little more than a guess. The first efforts at directly measuring the parasol effects suggest the spring maybe much more tightly coiled In an assessment last year, Nobel prize winning atmospheric chemist Paul Crutzen argued that aerosols could be disguising between half and three-quarters of present warming. That suggests the coiled spring is already holding back warming of anything up to 2 degrees C. “The two major pollutants have been almost cancelling each other out” says Cox. This is doubly bad news, first because it shows that cleaning up aerosols, would release a burst of warming. But secondly, it suggests that the climate system is much more sensitive to greenhouse gases than we thought. Crutzen’s estimate would put the true warming effect of doubling C02 at between 7 and 10 degrees C, which Murphy’s graph predicts, albeit at a low probability.

#### Emissions cuts saps SO2—which cools

David Sington, Writer for the BBC, 1/14/2005 “Why the Sun seems to be 'dimming'”, BBC, http://news.bbc.co.uk/2/hi/science/nature/4171591.stm

Perhaps the most alarming aspect of global dimming is that it may have led scientists to underestimate the true power of the greenhouse effect. They know how much extra energy is being trapped in the Earth's atmosphere by the extra carbon dioxide we have placed there. What has been surprising is that this extra energy has so far resulted in a temperature rise of just 0.6 degree Celsius. This has led many scientists to conclude that the present-day climate is less sensitive to the effects of carbon dioxide than it was, say, during the ice age, when a similar rise in CO2 led to a temperature rise of six degrees Celsius. But it now appears the warming from greenhouse gases has been offset by a strong cooling effect from dimming - in effect two of our pollutants have been cancelling each other out. This means that the climate may in fact be more sensitive to the greenhouse effect than previously thought. If so, then this is bad news, according to Dr. Peter Cox, one of the world's leading climate modellers. As things stand, CO2 levels are projected to rise strongly over coming decades, whereas there are encouraging signs that particle pollution is at last being brought under control. "We're going to be in a situation unless we act where the cooling pollutant is dropping off while the warming pollutant is going up. "That means we'll get reducing cooling and increased heating at the same time and that's a problem for us," says Dr Cox. Even the most pessimistic forecasts of global warming may now have to be drastically revised upwards.

#### SO2 cools in the short term

Mooney 8 (Chris Mooney, U.S. scientific and political journalist and academic, 28/06/2008 Wired magazine, “Can a million tons of Sulfur Dioxide combat climate change?” http://www.wired.com/science/planetearth/magazine/16-07/ff\_geoengineering?currentPage=all)

The heating potential of solar-energy absorbing gases such as SO2 and O3 in concentrations of tens of parts per billion is well observed in several ways:¶ 1. Ozone absorbs enough solar energy to heat and form the stratosphere.¶ 2. SO2 in the stratosphere forms aerosols that have major effects on the atmosphere by¶ reflecting sunlight, cooling the earth ~0.5oC for ~3 years, and absorbing sunlight, raising the temperature of the lower stratosphere ~3oC for more than a year.¶ Between 1979 and 2000, humans decreased SO2 emissions 18% in an effort to reduce acid rain. The rate of increase in global temperatures and concentrations of methane decreased to zero by 1998. Temperatures have been relatively constant for 12 years while concentrations of CO2 have continued to rise at a constant rate. Clearly global mean surface temperatures are not a direct function of CO2 concentrations as is assumed in most atmospheric models.

#### SO2 causes cooling – aerosol effect

USGS, National Survey Team, 1997. “volcanic plumes”, National Geological Survey, http://volcanoes.usgs.gov/hazards/gas/index.php

Measurements from recent eruptions such as Mount St. Helens, Washington, El Chichon, Mexico, and Mount Pinatubo, and the Philippines, clearly show the importance of sulfur aerosols in modifying climate, warming the stratosphere, and cooling the troposphere. Sulfur dioxide (SO2) condenses rapidly in the stratosphere to form fine sulfate aerosols. The aerosols increase the reflection of radiation from the Sun back into space and thus cool the Earth's lower atmosphere or troposphere; however, they also absorb heat radiated up from the Earth, thereby warming the stratosphere.

## Ice Age

### 1NC

#### A. Current CO2 emissions stave off an ice age

**Caseldine '12** (Chris, Professor of Quaternary Environmental Change, 06/25/12, "Conceptions of time in (paleo)climate science and some implications", http://onlinelibrary.wiley.com/doi/10.1002/wcc.178/abstract)

Thus, in order to explain to nonscientists the nature of the scientific evidence, especially evidence that utilizes past climate data, and what it means for the future there is a need to find ways in which to communicate what time, timescales and chronologies mean and how they relate to possible futures. It is also important to realize that however careful palaeoscientists are at explaining scientifically the temporal contexts and consequences of their work, when the media take up the ‘story’ any fine nuances will be lost. Thus, when *Nature Geoscience*released details of **the recent paper by Tzedakis et al.60 showing the likelihood that** **GHG emissions may be responsible for delaying a ‘natural’ onset of a move toward glacial inception,** **the Daily Telegraph reported that ‘carbon dioxide emissions will delay the arrival of next Ice Age,**  if the climate downturn was due in the next few months or years, a point immediately taken up by sceptics such as the Global Warming Foundation arguing for continued GHG emissions to prevent a ‘global disaster’. The authors attempted to preempt such an interpretation, pointing out that a natural move to cooler global conditions would be likely to occur over the next 1500 years that is not politically immediate, even if relatively near geologically, but the headlines were lost. In trying to communicate palaeoscience to a wider audience perhaps rather than concentrate on time and years it may be of value to revert to the importance of sequence in preference to more specific timelines. Sequential approaches help in that they mirror a fondness for narrative and stories, and cause and effect is a well understood concept. Uncertainty and error have proved far more intractable, as would the ideas of different sorts of years and the problems of measuring time. Once time goes beyond the personal measure of a life time, the personal time of Braudel or the human timescale of lifetimes and generations,[62](http://onlinelibrary.wiley.com/doi/10.1002/wcc.178/full#bib62) it seems likely that interest, concern and the ability to differentiate timescales diminish. It is common when asking new undergraduates about periods of past time when things may have happened, such as glaciations or landscape changes, to find a random selection of answers that fails to differentiate between hundreds, thousands, hundreds of thousands and even millions of years. This lack of ability to see beyond a very restricted time frame is perhaps one of the reasons why it is so difficult to get the public to engage with future climate change, as most significant change is still believed likely to take place at the *longue duree* scale, and be driven by the natural cycles that have operated and will continue to operate. After all ‘seasonality is the most basic scaffolding of people's sense of time,’ (Ref [63](http://onlinelibrary.wiley.com/doi/10.1002/wcc.178/full#bib63), p. 94), and defining change at seasonal levels is well beyond the scope of the majority of palaeoscience research, apart perhaps from ice core analysts and tree ring researchers.

#### B. The impact is extinction

Jaworowski 2004 [Professor Zbigniew M.D., Ph.D., D.Sc. is the chairman of the Scientific Council of the Central Laboratory for Radiological Protection in Warsaw. Winter “Solar Cycles, Not CO2, Determine Climate” 21st Century Science Tech http://www.21stcenturysciencetech.com/Articles%202004/Winter2003-4/global\_warming.pdf]

The climate is constantly changing. Alternate cycles of long cold periods and much shorter interglacial warm periods occur with some regularity. The typical length of climatic cycles in the last 2 million years was about 100,000 years, divided into 90,000 years for Ice Age periods and 10,000 years for the warm, interglacial ones. Within a given cycle, the difference in temperature between the cold and warm phases equals 3°C to 7°C. The present warm phase is probably drawing to an end—the average duration of such a phase has already been exceeded by 500 years. Transition periods between cold and warm climate phases are dramatically short: They last for only 50, 20, or even 1 to 2 years, and they appear with virtually no warning. It is difficult to predict the advent of the new Ice Age—the time when continental glaciers will start to cover Scandinavia, Central and Northern Europe, Asia, Canada, the United States, Chile, and Argentina with an ice layer hundreds and thou- sands of meters thick; when mountain glaciers in the Himalayas, Andes, and Alps, in Africa and Indonesia, once again will descend into the valleys. Some climatologists claim that this will happen in 50 to 150 years.53, 54 What fate awaits the Baltic Sea, the lakes, the forests, animals, cities, nations, and the whole infrastructure of modern civilization? They will be swept away by the advancing ice and then covered by moraine hills. This disaster will be incomparably more calamitous than all the doomsday prophecies of the proponents of the man-made global warming hypothesis. Similarly, as the study of Friis-Christensen and Lassen50 shows, observations in Russia established a very high correlation between the average power of the solar activity cycles (of 10 years to 11.5 years duration) and the surface air temperature, and “leave little room for anthropogenic impact on the Earth’s climate.”55 Bashkirtsev and Mashnich, Russian physicists from the Institute of Solar-Terrestrial Physics in Irkutsk, found that between 1882 and 2000, the temperature response of the atmospheric air lagged behind the sunspot cycles by approximately 3 years in Irkutsk, and by 2 years over the entire globe.56 They found that the lowest temperatures in the early 1900s corresponded to the lowest solar activity, and that other temperature variations, until the end of the century, followed the fluctuations of solar activity. The current sunspot cycle is weaker than the preceding cycles, and the next two cycles will be even weaker. Bashkirtsev and Mishnich expect that the minimum of the secular cycle of solar activity will occur between 2021 and 2026, which will result in the minimum global temperature of the surface air. The shift from warm to cool climate might have already started. The average annual air temperature in Irkutsk, which correlates well with the average annual global temperature of the surface air, reached its maximum of +2.3°C in 1997, and then began to drop to +1.2°C in 1998, to +0.7°C in 1999, and to +0.4°C in 2000. This prediction is in agreement with major changes observed currently in biota of Pacific Ocean, associated with an oscillating climate cycle of about 50 years’ periodicity.57 The approaching new Ice Age poses a real challenge for mankind, much greater than all the other challenges in history. Before it comes—let’s enjoy the warming, this benign gift from nature, and let’s vigorously investigate the physics of clouds. F. Hoyle and C. Wickramasinghe58 stated recently that “without some artificial means of giving positive feedback to the climate . . . an eventual drift into Ice Age conditions appears inevitable.” These conditions “would render a large fraction of the world’s major food-growing areas inoperable, and so would inevitably lead to the extinction of most of the present human population.” According to Hoyle and Wickramasinghe, “those who have engaged in uncritical scaremongering over an enhanced greenhouse effect raising the Earth’s temperature by a degree or two should be seen as both misguided and dangerous,” for the problem of the present “is of a drift back into an Ice Age, not away from an Ice Age.”

### UQ: Cooling Now

#### Ice age is coming—climate records prove

**Chapman '08** (Staff Writer for The Australian, 04/23/08, The Australian, "Sorry to ruin the fun, but an ice age cometh" http://www.theaustralian.com.au/archive/news/sorry-to-ruin-the-fun-but-an-ice-age-cometh/story-e6frg73o-111111613487)

All four agencies that track Earth's temperature (the Hadley Climate Research Unit in Britain, the NASA Goddard Institute for Space Studies in New York, the Christy group at the University of Alabama, and Remote Sensing Systems Inc in California) report that it cooled by about 0.7C in 2007. This is the fastest temperature change in the instrumental record and it puts us back where we were in 1930. If the temperature does not soon recover, we will have to conclude that global warming is over. **There is also plenty of anecdotal evidence that 2007 was exceptionally cold. It snowed in Baghdad for the first time in centuries, the winter in China was simply terrible and the extent of Antarctic sea ice in the austral winter was the greatest on record since James Cook discovered the place in 1770** The reason this matters is that there is a close correlation between variations in the sunspot cycle and Earth's climate. The previous time a cycle was delayed like this was in the Dalton Minimum, an especially cold period that lasted several decades from 1790. Northern winters became ferocious: in particular, the rout of Napoleon's Grand Army during the retreat from Moscow in 1812 was at least partly due to the lack of sunspots. That the rapid temperature decline in 2007 coincided with the failure of cycle No.24 to begin on schedule is not proof of a causal connection but it is cause for concern. It is time to put aside the global warming dogma, at least to begin contingency planning about what to do if we are moving into another little ice age, similar to the one that lasted from 1100 to 1850.There is no doubt that the next little ice age would be much worse than the previous one and much more harmful than anything warming may do. There are many more people now and we have become dependent on a few temperate agricultural areas, especially in the US and Canada. Global warming would increase agricultural output, but global cooling will decrease it. Millions will starve if we do nothing to prepare for it (such as planning changes in agriculture to compensate), and millions more will die from cold-related diseases. There is also another possibility, remote but much more serious. The Greenland and Antarctic ice cores and other evidence show that for the past several million years, severe glaciation has almost always afflicted our planet. The bleak truth is that, under normal conditions, most of North America and Europe are buried under about 1.5km of ice. This bitterly frigid climate is interrupted occasionally by brief warm interglacials, typically lasting less than 10,000 years. The interglacial we have enjoyed throughout recorded human history, called the Holocene, began 11,000 years ago, so the ice is overdue. We also know that glaciation can occur quickly: the required decline in global temperature is about 12C and it can happen in 20 years. **The next descent into an ice age is inevitable** but may not happen for another 1000 years. On the other hand, it must be noted that **the cooling in 2007 was even faster than in typical glacial transitions.** If it continued for 20 years, the temperature would be 14C cooler in 2027. By then, most of the advanced nations would have ceased to exist, vanishing under the ice, and the rest of the world would be faced with a catastrophe beyond imagining. Australia may escape total annihilation but would surely be overrun by millions of refugees. **Once the glaciation starts, it will last 1000 centuries, an incomprehensible stretch of time.** If the ice age is coming, there is a small chance that we could prevent or at least delay the transition, if we are prepared to take action soon enough and on a large enough scale. For example: We could gather all the bulldozers in the world and use them to dirty the snow in Canada and Siberia in the hope of reducing the reflectance so as to absorb more warmth from the sun. We also may be able to release enormous floods of methane (a potent greenhouse gas) from the hydrates under the Arctic permafrost and on the continental shelves, perhaps using nuclear weapons to destabilise the deposits. We cannot really know, but my guess is that the odds are at least 50-50 that we will see significant cooling rather than warming in coming decades. The probability that we are witnessing the onset of a real ice age is much less, perhaps one in 500, but not totally negligible. All those urging action to curb global warming need to take off the blinkers and give some thought to what we should do if we are facing global cooling instead. It will be difficult for people to face the truth when their reputations, careers, government grants or hopes for social change depend on global warming, but the fate of civilisation may be at stake. In the famous words of Oliver Cromwell, "I beseech you, in the bowels of Christ, think it possible you may be mistaken.

#### Climate patterns prove—an ice age is upon us

**Evans '08** (co-*founder of the Australian Lavoisier Group, November, 2008* Thank God For Carbon)

It is noteworthy that, **over the past 500,000 years, brief intervals of inter-glacial warmth such as the recent 12,000 years or so, have been followed, very quickly, by long periods of ice-age conditions, typically 85,000 years in duration. If this historical pattern is to continue (and we have no reason to think it will not do so), then the next Ice Age will be upon us some time during the next millennium, or perhaps the one after.** Our current state of knowledge does not allow us to predict when this will happen. Now does it tell is what we could do to forestall its arrival, even if we could predict when it was due to arrive.

#### Ocean temperatures prove—a cooling is upon us

**Will '06** (George, Staff Writer for The York Dispatch, 04/03/06 The York Dispatch, "Cooler or hotter? It depends who -- and when -- you ask " http://www.lexisnexis.com/hottopics/lnacademic/)

While worrying about Montana's receding glaciers, Schweitzer, who is 50, should also worry about the fact that when he was 20 he was told to be worried, very worried, about global cooling. Science magazine [Dec. 10,1976] warned of "extensive Northern Hemisphere glaciation." Science Digest [February 1973] reported that **"the world's climatologists are agreed" that we must "prepare for the next ice age."** The Christian Science Monitor ["Warning: Earth's Climate is Changing Faster than Even Experts Expect," Aug. 27, 1974] reported that glaciers "have begun to advance," "growing seasons in England and Scandinavia are getting shorter" and **"the North Atlantic is cooling down about as fast as an ocean can cool."** Newsweek agreed ["The Cooling World," April 28, 1975] that meteorologists "are almost unanimous" that catastrophic famines might result from the global cooling that The New York Times [Sept. 14,1975] said "may mark the return to another ice age." The Times [May 21,1975] also said **"a major cooling of the climate is widely considered inevitable" now that it is "well established" that the Northern Hemisphere's climate "has been getting cooler since about 1950." In fact, the earth is always experiencing either warming or cooling.** But suppose the scientists and their journalistic conduits, who today say they were so spectacularly wrong so recently, are now correct. Suppose the earth is warming and suppose the warming is caused by human activity. Are we sure there will be proportionate benefits from whatever climate change can be purchased at the cost of slowing economic growth and spending trillions? Are we sure the consequences of climate change -- remember, a thick sheet of ice once covered the Middle West -- must be bad? Or has the science-journalism complex decided that debate about these questions, too, is "over"? About the mystery that vexes ABC --Why have Americans been slow to get in lock step concerning global warming? -- perhaps the "problem" is not big oil or big coal, both of which have discovered there is big money to be made from tax breaks and other subsidies justified in the name of combating carbon. Perhaps the problem is big crusading journalism.

### UQ: Current CO2 Sufficient

#### Current humyn activity is delaying the inevitable ice age

**Revkin '09** (Andrew, senior fellow at Pace University's Pace Academy for Applied Environmental Studies. 09/04/09, The New York Times, "Global Warming Is Delaying Ice Age, Study Finds" http://www.lexisnexis.com/hottopics/lnacademic/)

The human-driven buildup of heat-trapping greenhouse gases in the atmosphere appears to have ended a slide, many millenniums in the making, toward cooler summer temperatures in the Arctic, the authors of a new study report. Scientists familiar with the work, to be published Friday in the journal Science, said it provided fresh evidence that **human activity is not only warming the globe, particularly the Arctic, but could also even fend off what had been presumed to be an inevitable descent into a new ice age over the next few dozen millenniums. The reversal of the slow cooling trend in the Arctic, recorded in samples of layered lakebed mud, glacial ice and tree rings from Alaska to Siberia, has been swift and pronounced, the team writes. Earlier studies have also shown that the Arctic, more than the planet as a whole, has seen unusual warming in recent decades. But the new analysis provides decade-by-decade detail on temperature trends going back 2,000 years -- five times further than previous work at that detailed a scale.** Several climate scientists said the new study was most significant for showing just how powerfully the Arctic climate appears to be responding to a greenhouse-gas buildup that is having more complex and subtle mix of effects elsewhere around the globe. Darrell S. Kaufman, the lead author and a climate specialist at Northern Arizona University, said the biggest surprise was the strength of the shift from cooling to warming, which started in 1900 and intensified after 1950. ''The slow cooling trend is trivial compared to the warming that's been happening and that's in the pipeline,'' Dr. Kaufman said. Several scientists who were not involved with the study concurred that the pace of the temperature reversal far exceeded the natural variability in Arctic temperatures, supporting the idea that the warm-up is human-caused and potentially disruptive. According to the study, after a slow cooling of less than half a degree Fahrenheit per millennium, driven by a cyclical change in the orientation of the North Pole and the Sun, the region warmed 2.2 degrees just since 1900, with the decade from 1998 to 2008 the warmest in 2,000 years. In theory, summer temperatures in the Arctic region would be expected to cool for at least 4,000 more years, given the growing distance between the Sun and the North Pole during the summer in the Northern Hemisphere, the study says. But Jonathan T. Overpeck, a study author and climate specialist at the University of Arizona, said the rising concentration of long-lived greenhouse gases guaranteed warming at a pace that could stress ecosystems and cause rapid melting of Greenland's great ice sheet. ''The fast rate of recent warming is the scary part,'' Dr. Overpeck said. ''It means that major impacts on Arctic ecosystems and global sea level might not be that far off unless we act fast to slowglobal warming.'' In the very long term, the ability to artificially warm the climate, particularly the Arctic, could be seen as a boon as the planet's shifting orientation to the Sun enters a phase that could initiate thenext ice age. As a result of such periodic shifts, 17 ice ages are thought to have come and gone in two million years. The last ice age ended 11,000 years ago and the next one, according to recent research, could be 20,000 or 30,000 years off discounting any influence by humans. The last ice age buried much of the Northern Hemisphere under a mile or more of ice. With humans' clear and growing ability to alter the climate, Dr. Overpeck said, ''we could easily skip the next opportunity altogether.''

### CO2 Offsets Ice

#### Warming will offset the next ice age—our evidence is longitudinal

**Flam '02** (Staff Writer for The Oklahoma Daily, 08/23/02, The Oklahoma Daily, "It's hot now, but scientists predict there's an ice age coming", http://www.oudaily.com/it-s-hot-now-but-scientists-predict-there-s-an/article\_977084fa-30a8-5842-a8fd-81a4eb9fc22e.html)

PHILADELPHIA \_ It may be hot now, but it's never too early to start thinking about the next ice age. **Based on the earth's historical cycle of warm and cold periods, we're due for a big freeze** any millennium now. **If the next cold spell is like the last one, which ended 10,000 years ago, glaciers would cover much of North America, creeping as far south as New York City.** Over the whole planet, ice ages reduce temperatures by only about 5 to 9 degrees, but the chill is more pronounced in temperate zones \_ such as most of the United States. If you were living in Philadelphia, you could have taken a day trip to see the ice sheet," said Duke University climatologist Tom Crowley. A 50-foot thick glacier covered Long Island back then. **But there's the possibility that ongoing global warming could delay the onset of the next big freeze by thousands of years**, according to Belgian researchers, writing in Friday's issue of the journal Science. "We've shown that the input of greenhouse gas could have an impact on the climate 50,000 years in the future," said Marie-France Loutre of the Universite Catholique de Louvain in Belgium. Ice ages and warmer "interglacials" alternate in cycles. In the past few cycles, the **relatively warm "interglacials" lasted about 10,000 years. Since our current interglacial started about 10,000 years ago, it's due to end any time now. The ice ages last much longer \_ 80,000 to 100,000 years.** But factoring in the higher concentration of carbon dioxide in the atmosphere, Loutre and collegaue Andre Barger found the deep freeze might not come for a few more tens of thousands of years. The increase in carbon dioxide, many scientists believe, has come primarily from the increased burning of fossil fuels, such as coal, oil and gas. Scientists don't normally connect global warming with ice ages since they happen on very different time scales \_ decades for global warming, compared to tens of thousands of years for ice ages, said Princeton climatologist Jorge Sarmiento.¶

#### CO2 emissions avert a global ice age

**Revkin '03** (Andrew, Staff Writer for The New York Times, 10/11/03, The New York Times, "When Will The Next Ice Age Begin?" http://www.nytimes.com/2003/11/11/science/when-will-the-next-ice-age-begin.html)

Others have proposed that an earlier warm era that lasted even longer -- 30,000 years -- was a better model for the Holocene. But many experts still say they are convinced that the current warmth should, under the influence of orbital cycles alone, near an end ''any millennium now,'' as Dr. Richard A. Muller, a physicist at the University of California at Berkeley, puts it. But **the planet is feeling a new influence, that of people. Humans may delay the dawn of the next ice age by a millennium or two, or even longer, many climate experts say, as Earth's long-buried stores of coal, oil and other carbon-rich fossil fuels are burned, releasing billions of tons of carbon dioxide and other heat-trapping greenhouse gases. That insulating blanket has a bigger climatic influence than the slight flux in incoming solar energy** from changes in Earth's orientation relative to the Sun, said Dr. James A. Hansen, the director of NASA's Goddard Institute for Space Studies.'**'We have taken over control of the mechanisms that determine the climate change,''** he said. Other scientists, while agreeing with this thesis for the short term, say that eventually the buffering properties of the atmosphere, ocean and Earth will restore balance, returning most of the liberated carbon to long-term storage and allowing the orbital rhythm once again to dominate.

#### Warming minimizes the risk of an ice age

**Brooks '14** (Deputy Chair of the Education Committee, Durham Law School ,2/24/14, "The Inevitability of Climate Change", http://onlinelibrary.wiley.com/doi/10.1111/1758-5899.12110/pdf)

In response to my first question: we should not be disappointed. The disappointment is mistaken because it assumes climate change requires human beings for its existence. It is easy to overlook the fact our Earth has experienced climate change, including ice ages, prior to human civilization. Human activity can make climate change occur more rapidly, but it is neither necessary nor sufficient for climate change to occur. So the fact that human emissions are responsible for the present challenges arising from climate change does not mean no climate change could occur if only our emissions were less. Our impact has an effect for sure, but it does not operate in isolation from many other factors. ¶ **We cannot stop the climate from changing, but we can and should manage how it changes far more effectively. The risk of a future ice age may be ever present, but it does not follow that there is nothing we can do to ensure that the inevitable becomes less likely,** also considering the catastrophic potential consequences are at stake. **Climate change is a challenge to be managed, to ensure that catastrophes are not hastened and their potential damages are minimized.** So if we should be disappointed with our responses to climate change, we should for a new reason: climate change is a larger problem than often thought. It is a problem unlikely to go away despite our best efforts in the most ideal circumstances.¶ In response to my second question: the inevitability of climate change need not reduce our efforts but should rather *increase* them. If climate change is not a phenomenon which we might just eradicate, like polio for instance, then we must accept there being no quick fix, and begin to sustain a concerted global campaign to respond more effectively to the challenge that confronts us. Jamieson and Di Paola would probably agree with this. This signals, perhaps, a new phase in climate change philosophy and, possibly, a new phase in antianticlimate change policy. The problem is as inevitable as it is, for humanity, unprecedented. It is a wicked problem, as the authors note, and should be thought of and treated as such. The real challenge it presents is not how it might be ‘solved’, but rather how it might be better managed. Responses that show insensitivity to this fact are misled and misleading, and will not get us far.

#### CO2 staves off the ice age—atmospheric concentrations are key

**Reuters '12** (Staff Writer for the Windsor Star, 01/10/12, "Cold comfort as ice age delayed 1,500 years ")

**High levels of carbon dioxide emissions in the atmosphere mean the next ice age is unlikely to begin for at least 1,500 years**, an article in the journal Nature Geoscience said Monday. Concentrations of the main gases blamed for global warming reached record levels in 2010 and will linger in the atmosphere for decades even if the world stopped pumping out emissions today, according to the U.N.'s weather agency. **An ice age is a period when there is a long-term reduction in the earth's surface and atmospheric temperature, which leads to the growth of ice sheets and glaciers.** There have been at least five ice ages on earth. During ice ages there are cycles of glaciation with ice sheets both advancing and retreating. Officially, the earth has been in an interglacial, or warmer period, for the last 10,000 to 15,000 years, and estimates vary on how long such periods last. **"(Analysis) suggests that the end of the current interglacial (period) would occur within the next 1,500 years, if atmospheric CO2 concentrations do not exceed (around) 240 parts per million by volume** (ppmv)," the study said. However, the current carbon dioxide concentration is of 390 ppmv, and at that level an increase in the volume of ice sheets would not be possible, it added. The study based on variations in the earth's orbit and rock samples was conducted by academics at Cambridge University, University College London, the University of Florida and Norway's University of Bergen. The causes of ice ages are not fully understood but concentrations of methane and carbon dioxide in the atmosphere, changes in the earth's orbit around the sun, and the movement of tectonic plates are all thought to contribute.

#### Carbon emissions are the only thing preventing a new ice age

**Black '12** (Environment Correspondent BBC News, 1/9/12, “Carbon emissions will defer Ice Age”, http://www.bbc.com/news/science-environment-16439807 )

**Human emissions of carbon dioxide will defer the next Ice Age, say scientists. The last Ice Age ended about 11,500 years ago**, and when the next one should begin has not been entirely clear. Researchers used data on the Earth's orbit and other things to find the historical warm interglacial period that looks most like the current one.  **In the journal *Nature Geoscience*, they write that the next Ice Age would begin within 1,500 years - but emissions have been so high that it will not.**  "At current levels of CO2, even if emissions stopped now we'd probably have a long interglacial duration determined by whatever long-term processes could kick in and bring [atmospheric] CO2 down," said Luke Skinner from Cambridge University. Dr Skinner's group - which also included scientists from University College London, the University of Florida and Norway's Bergen University - calculates that the atmospheric concentration of CO2 would have to fall below about 240 parts per million (ppm) before the glaciation could begin. The current level is around 390ppm.

### Impact: Timeframe

#### We control the timeframe—we will see an ice age in as few as 10 years. And it’s slow to reverse

**Lemley '02** (Staff Writer for Discovery Magazine, September 2002, "The Next Ice Age" http://academic.udayton.edu/SCI210L/ICE/Next\_Ice\_Age.pdf)

Such frigid settings were commonplace during a period dating roughly from 1300 to 1850 because much of North America and Europe was in the throes of a little ice age. And now there is mounting evidence that the chill could return. A growing number of scientists—including many here at Curry's base of operations, the Woods Hole Oceanographic Institution on Cape Cod in Massachusetts—believes conditions are ripe for another prolonged cooldown, or small ice age. While no one is predicting a brutal ice sheet like the one that covered the Northern Hemisphere with glaciers about 12,000 years ago, **the next cooling trend could drop average temperatures 5 degrees Fahrenheit over much of the United States and 10 degrees in the Northeast, northern Europe, and northern Asia. "It could happen in 10 years," says Terrence Joyce, who chairs the Woods Hole Physical Oceanography Department. "Once it does, it can take hundreds of years to reverse."** And he is alarmed that Americans have yet to take the threat seriously. In a letter to The New York Times last April, he wrote, "Recall the coldest winters in the Northeast, like those of 1936 and 1978, and then imagine recurring winters that are even colder, and you'll have an idea of what this would be like."

### Moral Obligation

#### We have an obligation to future generations—must try to prevent a new ice age

**Holper et. al. 2K** (Paul, CSIRO Atmospheric Researcher, 10/25/00, Sydney Morning Herald, "Hot and cold flushes in the greenhouse" http://www.lexisnexis.com/hottopics/lnacademic/)

May I add a few observations to today's lively discussion of the climatic cycle? **The cycle of ice age and warm interglacial periods has been going on, without help from humankind, for more than 2 billion years. It is not operated by clockwork, and the timing of the cycle is irregular, so that we cannot predict the next change as we predict**, say, the return of Halley's Comet. But we can say with certainty that the cycle will turn and the temperature will start to drop towards the next ice age. If the current cycle is about average, the turnaround should happen fairly soon probably within the next 10,000 years. All life forms, plant and animal, have evolved against a background of change, both physical and climatic. They adapt by both evolution and migration. As the Garden of Eden becomes the Arabian Desert, life moves northward into more temperate climes. A thousand years from now, Earth's granaries may be Siberia, Northern Europe and the Canadian tundra. We cannot control the cycle, but **we must find out more about it, try to predict it, and develop strategies for future generations to cope with it.**

## Methane Turn

### 1NC

#### Replacing GHGs with renewables will cause a net warming—sulfate aerosols from coal and carbon emissions have a net cooling effect

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Reducing CO2 by switching from coal to other fuels could¶ also pose a second risk offset, not reflected in Figure 10. 1, because¶ sulfur particulates emitted in coal combustion exert a¶ cooling influence on the earth by reflecting solar radiation¶ (IPCC 1992, pp. 20-21; Wigley 1991). Burning natural gas¶ emits a much smaller quantity of these particulates than¶ burning coal, and of course nuclear power, hydropower, and¶ solar/wind power emit no sulfur particulates. Thus, wholly¶ apart from the tradeoff between reduced CO2 and increased¶ CH4 from natural gas, switching from coal use to other fuels¶ could yield a net increase in relative warming influence in the¶ short term because of the declining emissions of reflective¶ sulfur particulates (Wigley 1991, p. 505). Indeed, recent analysis¶ under the central emissions scenario used by the IPCC¶ indicates that the sulfur effect alone is so important that replacing¶ coal with no-sulfur energy technologies would actually¶ cause a net increase in average global temperature through¶ the year 2050 (though a net decrease after 2050, when longlasting¶ CO2 begins to outweigh the more transient effects of¶ sulfur) (Edmonds et al. 1994). Of course, controlling sulfur¶ emissions can have important regional benefits in risk reduction,¶ such as reducing acid precipitation (NAPAP 1991) and¶ reducing the human health effects of particulate air pollution¶ (Dockery. et al. 1993). Thus, from the perspective of sulfur¶ emission control, important risk substitutions and transformations¶ need to be weighed.

### Methane Worse

#### Methane warms quicker than CO2

EPA 2014 (“Overview of Greenhouse Gases,” *US Environmental Protection Agency Website*, July 2, http://epa.gov/climatechange/ghgemissions/gases/ch4.html)

Methane (CH4) is the second most prevalent greenhouse gas emitted in the United States from human activities. In 2012, CH4 accounted for about 9% of all U.S. greenhouse gas emissions from human activities. Methane is emitted by natural sources such as wetlands, as well as human activities such as leakage from natural gas systems and the raising of livestock. Natural processes in soil and chemical reactions in the atmosphere help remove CH4 from the atmosphere. Methane's lifetime in the atmosphere is much shorter than carbon dioxide (CO2), but CH4 is more efficient at trapping radiation than CO2. Pound for pound, the comparative impact of CH4 on climate change is over 20 times greater than CO2 over a 100-year period.

#### Methane is far worse for the environment that Carbon Dioxide

Harris 10 (Richard Harris January 26th 2010 <http://www.npr.org/templates/story/story.php?storyId=122638800> Richard Harris is a frequent contributor to NPR, or National Public Radio. )

For example, methane in the atmosphere also creates ground-level ozone. And ozone isn't only bad for human health; it also contributes to global warming. Shindell recently totaled up all the effects of methane emissions and realized that the heating effect is more than 60 percent that of carbon dioxide's."So that tells you that methane is a pretty big player."Methane in the atmosphere leveled off in the 1990s, so it seemed that efforts to control industrial emissions were keeping this problem gas in check. But since 2007, methane levels have been on the rise again. Even so, there's relatively little effort now to control methane. Mohamed El-Ashry at the United Nations Foundation says part of the reason has been a fear by governments and advocates that attacking methane would be a dangerous distraction."People are worried about diverting attention away from carbon dioxide," he says. "But that shouldn't really be the case at all."

#### Methane is 21 times worse than CO2

Staples 8 (David Staples September 21st 2008, David Staples is a scientist with the Edmonton Journal of Science)

Other greenhouse gases are referred to as carbon dioxide equivalents (CO2e). In order to compare emissions between the various greenhouse gases, they have been assigned a global warming potential number measured in carbon dioxide equivalents (CO2e). The number reflects their influence on warming the atmosphere. For example, methane has a global warming potential of 21, meaning it has 21 times the amount of heating capacity of CO2.Total greenhouse gas emissions in Canada in 2006 were 721 megatonnes of CO2e. China is now edging ahead of the United States as the world's biggest emitter of CO2e, but the latest worldwide data, from 2004, shows that the U.S. produces 6,049 megatonnes of carbon, 22.2 per cent of the total output, while China produces 5,010 tonnes, for 18.4 per cent. Canadian emissions were 2.3 per cent of total worldwide emissions, just behind Germany, 3.1 per cent, but ahead of the United Kingdom, 2.2 per cent.Canada's 2006 emissions level is a decrease of 2.8 per cent from 2003 levels (a megatonne is one million tonnes or one billion kilograms). This slight reduction in recent emissions is due to a smaller quantity of carbon-rich coal being burned to produce electricity, more hydro and nuclear generation and a reduced demand for heating fuels because of warmer winters in 2004-06. But the long term trend is that CO2e emissions are rising. We're 22 per cent above 1990 levels of 592 megatonnes. Canada's Kyoto Protocol target was our 1990 level minus six per cent, 558.4 megatonnes in total. Almost all of Canada's increase in C02e emissions since 1990 -- 119 megatonnes out of the total 129- megatonne increase -- came from the energy and transportation industries. The biggest culprit on a percentage basis was fuel for light-duty trucks, which had their emissions go up by 116 per cent, a 24-megatonne increase; this huge increase reflects the growing popularity of Sports Utility Vehicles, reports Environment Canada.

## AT: Methane

### UQ: Methane increase now

#### Methane Emissions are on the rise

Wines 13 (Michael Wines November 25th 2013 <http://www.nytimes.com/2013/11/26/us/emissions-of-methane-in-us-exceed-estimates-study-finds.html?_r=0> Michael Wines is with the New York Times)

Emissions of the greenhouse gas methane due to human activity were roughly 1.5 times greater in the United States in the middle of the last decade than prevailing estimates, according to a new analysis by 15 climate scientists published Monday in The Proceedings of the National Academy of Sciences.The analysis also said that methane discharges in Texas and Oklahoma, where oil and gas production was concentrated at the time, were 2.7 times greater than conventional estimates. Emissions from oil and gas activity alone could be five times greater than the prevailing estimate, the report said. The study relies on nearly 12,700 measurements of atmospheric methane in 2007 and 2008 One of the study’s principal authors, Scot M. Miller of Harvard University’s department of earth and planetary sciences, said its higher estimates underscore methane’s significant contribution to rising temperatures.“These are pretty substantial numbers we’re dealing with, and an important part of greenhouse gas emissions,” he said on Monday. “Our study shows that there could be large greenhouse gas emissions in places in the country where we may not necessarily have accounted for them.”

## GW ADVANTAGE ANSWERS

### 1NC

#### 1. Climate change isn’t credible, 3 reasons: CO2 is good for plants, Climate change is regional, and Models are flawed

Lupo, 14 (Anthony. "Global Warming Is Natural, Not Man-Made." Naps Net. N.p., 7 Feb. 2010. Web. 8 July 2014. <http://www.napsnet.com/pdf_archive/34/50144.pdf> TG.)

(NAPSA)—One of the fundamental tenets of our justice system is one is innocent until proven guilty. While that doesn’t apply to scientific discovery, in the global warming debate the prevailing attitude is that human induced global warming is already a fact of life and it is up to doubters to prove otherwise. To complete the analogy, I’ll add that to date, there is no credible evidence to demonstrate that the climatological changes we’ve seen since the mid-1800’s are outside the bounds of natural variability inherent in the earth’s climate system. Thus, any impartial jury should not come back with a “guilty” verdict convicting humanity of forcing recent climatological changes. Even the most ardent supporters of global warming will not argue this point. Instead, they argue that humans are only partially responsible for the observed climate change. If one takes a hard look at the science involved, their assertions appear to be groundless. First, carbon dioxide is not a pollutant as many claim. Carbon dioxide is good for plant life and is a natural constituent of the atmosphere. During Earth’s long history there has been more and less carbon dioxide in the atmosphere than we see today. Second, they claim that climate is stable and slow to change, and we are accelerating climate change beyond natural variability. That is also not true. Climate change is generally a regional phenomenon and not a global one. Regionally, climate has been shown to change rapidly in the past and will continue to do so in the future. Life on earth will adapt as it has always done. Life on earth has been shown to thrive when planetary temperatures are warmer as opposed to colder. Third, they point to recent model projections that have shown that the earth will warm as much as 11 degrees Fahrenheit over the next century. One should be careful when looking at model projections. After all, these models are crude representations of the real atmosphere and are lacking many fundamental processes and interactions that are inherent in the real atmosphere. The 11 degrees scenario that is thrown around the media as if it were the mainstream prediction is an extreme scenario. Most models predict anywhere from a 2 to 6 degree increase over the next century, but even these are problematic given the myriad of problems associated with using models and interpreting their output. No one advocates destruction of the environment, and indeed we have an obligation to take care of our environment for future generations. At the same time, we need to make sound decisions based on scientific facts.

#### 2. Climate science is dubious—not based on real science, ignores cooling data, results from natural oscillations.

Caruba 2/15/14 (“There is no warming and will be none for decades” http://news.heartland.org/editorial/2014/02/15/there-no-global-warming-and-will-be-none-decades. Alan Caruba is a writer by profession and [host](http://heartland.org/alan-caruba) of several Web sites and blogs, including [Warning Signs](http://factsnotfantasy.blogspot.com/), [The National Anxiety Center](http://nationalanxietycenter.blogspot.com/), [Caruba Editorial Services](http://carubaeditorialservices.blogspot.com/), and [Bookviews by Alan Caruba](http://bookviewsbyalancaruba.blogspot.com/). His daily column, "[Warning Signs](http://factsnotfantasy.blogspot.com" \t "_blank)", is disseminated on many Internet news and opinion websites, as well as blogs. The National Anxiety Center is a clearinghouse for information about scare campaigns such as “global warming” designed to influence public opinion and policies.)¶

Global warming was never based on real science. It was conjured up using dubious computer models and we were supposed to believe that the Intergovernmental Panel on Climate Change could actually predict what the climate would be 20, 50, or 100 years from now.¶ Anyone familiar with my writings knows that a lot of research is involved. In my case, it dates back to the late 1980s when the global warming hoax began to be embraced by politicians like Al Gore who made millions selling worthless “carbon credits” while warning that “Earth has a fever.”¶ A small army of scientists lined their pockets with [government grants](http://news.heartland.org/editorial/2014/02/15/there-no-global-warming-and-will-be-none-decades) to produce data that supported the utterly baseless charge that carbon dioxide was causing the Earth to warm. They castigated other scientists or people like myself as “deniers” while we proffered to call ourselves skeptics. They were joined by most of the media that ignored the real science. And the curricula in our schools were likewise corrupted with the hoax.¶ Then, about 17 years ago the Earth began to cool. It had nothing to do with carbon dioxide — which the Environmental Protection Agency deems a “pollutant” despite the fact that all life on Earth would die without it — and everything to do with the sun.¶ A few days after the email arrived, [two-thirds of the contiguous U.S.A.](http://www.usatoday.com/story/weather/2014/02/13/snow-cover-usa/5454645/" \t "_blank) was covered by snow. As this is being written, Lake Superior is 92 percent frozen, setting a new record. As of February 5, the entire Great Lakes system was, according to the Great Lakes Environmental Research Laboratory, [77 percent covered with ice](http://hosted.ap.org/dynamic/stories/U/US_FROZEN_GREAT_LAKES?SITE=AP&SECTION=HOME&TEMPLATE=DEFAULT&CTIME=2014-02-14-07-28-00" \t "_blank).¶ On February 1, NOAA and NASA held a joint press conference in which they released data about 2013’s global surface temperature. They made reference to a “pause” in the temperature that began in 1997. Dr. David Whitehouse, science editor for the BBC, [noted](http://www.thegwpf.org/nasa-noaa-confirm-global-temperature-standstill-continues/" \t "_blank):¶ When asked for an explanation for the ‘pause’ by reporters, Dr. Gavin Schmidt of NASA and Dr. Thomas Karl of NOAA spoke of contributions from volcanoes, pollution, a quiet Sun, and natural variability. In other words, they don’t know.¶ Both of these government agencies, along with others like the EPA and the Department of the Interior, are staffed by people who understand that their employers are deeply committed to the global warming hoax. One should assume that almost anything they have to say about the “pause” is based entirely on politics, not science.¶ Then, too, despite the many measuring stations from which data is extracted to determine the Earth’s climate, there is a paucity of such stations in cold places like Siberia. Stations here in the U.S. are often placed in “heat islands” otherwise known as cities. If you put enough of them close to sources of heat, you get thermometer readings that produce, well, heat.¶ People in the U.S., England, Europe and other areas of the world who do not possess Ph.Ds in meteorology, climatology, geology, astronomy, and chemistry have begun to suspect that everything they have been told about global warming is false. Between 1300 and 1850 the northern hemisphere went through a mini-ice age. After that it began to warm up again. So, yes, there was global warming, but it was a natural cycle, not something caused by human beings. Nature doesn’t care what we do. It is far more powerful than most of us can comprehend.¶ This brings us back to the sun. which determines, depending on where you are on planet Earth, how warm or cold you feel. The sun, too, goes through cycles, generally about eleven years long. When it is generating a lot of heat, its surface is filled with sunspots, magnetic storms.¶ When there are few sunspots, solar radiation diminishes and we get cold. Scientists who study the sun believe it may encounter another “[Maunder minimum](http://policybot.enginez.com/results.engz?sort=publication_date+desc&uq=Maunder+minimum" \t "_blank),” named after astronomer Edward Maunder, in which the last “[Little Ice Age](http://policybot.enginez.com/results.engz?uq=little+ice+age&x=0&y=0" \t "_blank),” between 1645 and 1715, occurred. The Thames in England froze over as did the canals of Holland froze solid.¶ There is no global warming and scientists like Henrik Svensmark, the director of the Center for Sun-Climate Research at Denmark’s National Space Institute, [believes that](http://www.climatechangedispatch.com/global-warming-based-on-computer-models-not-science-environmental-critic.html" \t "_blank) “world temperatures may end up a lot cooler than now for 50 years or more.”¶ I agree

#### 3. Science isn’t in—ignores the positive effects of CO2

Idso 2010 (Idso, Keith “Show us the science” <http://www.co2science.org/education/reports/reportarch.php> 2012)

In the box office hit Jerry Maguire, Tom Cruise plays an aggressive sports agent who questions the ethics of his occupation. After printing his opinions in a company memorandum, Jerry is relieved of his position in a large management agency. When he attempts to take some of his clients with him, the agency is able to dissuade all but one from leaving. This athlete, a pro football player, tells Jerry that he will go the distance with him on one condition. "Show me the money," he says, just show me the money.¶ This simple phrase -- show me the money -- is a powerful expression that reaches far beyond the movie screen. It is the bottom line of nearly all business transactions, the place where the rubber truly meets the road. Likewise, in essentially all fields of endeavor, there typically is some overriding and all-powerful criterion upon which we base our decisions. And in this regard, concern for the environment should be no different; but instead of "show me the money," the operative phrase when dealing with the future of the biosphere should clearly be "show me the science."¶ Far too often, we see material that boldly proclaims that the rising CO2 content of earth's atmosphere is causing global warming, that it is wreaking havoc all across the earth, that we must do something to stop it, and that we must do it now, regardless of the cost. When carefully studying such materials, however, one key ingredient is often missing or greatly maligned -- something that would have a science referee throwing up a penalty flag in disgust. This ingredient is a proper regard for, and clear exposition of, the data and reasoning upon which such statements are supposedly based.¶ Consider the classic claim that "climate change is the greatest environmental challenge facing the world today." First of all, is the climate really changing? If so, by how much and on what time scale? Show me the pertinent data if you want me to even consider your position on this topic. Is warmer (as is usually implied in such proclamations) worse than cooler? Give me your reasoning based on experiments or observations that broach this question; and if your arguments are sound, I may be forced to concede your point. What other environmental challenges did you consider in deciding that climate change was the greatest threat currently facing the planet, and how did you objectively compare them? Show me the results of your analyses; and if I find them convincing, I may even join your crusade. Is CO2 (again, as is typically implied) responsible for any climate change that may be occurring? Make your best case for this supposition with whatever climate-modeling approach you feel is justified -- but be sure to back it up with real-world data -- and I may be persuaded to become your ally.What about the other side of the story? Are you ignoring any positive effects of elevated CO2? There are generally two sides to every issue; and objective seekers of truth will want to know the "whole truth." And more often than not (but not always), the whole truth cuts both ways, with positive and negative consequences at one and the same time. And when this happens, we must judiciously weigh all the pros and cons in formulating a position on the topic. Yes, show me the science, and show me all of it, if you expect to convert me to your cause. Everyone wants to do what is best for the earth (or should want to); but gut feelings, personal convictions and political philosophies just don't cut it. The peer-reviewed scientific literature is the coin of the realm on the field of scientific debate. If you think you know what is best for the planet and have a plan for its stewardship, show me the observations and analyses in the peer-reviewed scientific literature that support your view. Anything less is insufficient at best and disingenuous at worst. And if you don't have the data to support your claim, you must seriously consider the very real possibility that you may be espousing an errant hypothesis. I think about this possibility every time I pick up a new journal and begin to peruse its pages. Do you?¶ In the end, we all must be open to receiving and objectively evaluating the never-ending flow of newly-discovered scientific information. And we must be willing to alter our views as the unfolding evidence warrants. If we do not, the world will pass us by and we will become but an archaic curiosity, holding fiercely but uselessly to antiquated ideas that have long since lost their once-perceived validity.¶ Yes, show me the science, and keep showing it to me. We have not yet arrived at the end of the road that leads to complete understanding of the complex and multifaceted role of atmospheric CO2 in regulating earth's climate and biosphere. And it is crucial that we reach that understanding.

#### 4. Negative feedback checks warming

Idso 12 (Idso, Sherwood “Rising temperatures,Atlantic Hurricanes, United States Forests and Carbon Sequestration: Another Negative Feedback Phenomenon That Reduces Global warming” http://www.co2science.org/education/reports/reportarch.php 29/01/12)¶ In a recent study of hurricane impacts on carbon sequestration by United States forests, McNulty (2002) determined that a single intense hurricane can convert the equivalent of 10% of the total annual carbon sequestered by US forests into "dead and downed biomass." Hence, since intense hurricanes occur, on average, two out of every three years across the eastern part of the country, he further concluded that "hurricanes are a significant factor in reducing long-term carbon storage in US forests."The tone of this conclusion is decidedly negative, implying that efforts to promote long-term carbon sequestration by US forests may not be as effective as proponents of that approach to fighting global warming have long assumed they would be. Before such thinking is blindly accepted, however, one must determine if there are likely to be any changes in either the frequency or intensity of hurricanes making landfall along the US Atlantic Coast in a world that would need additional carbon sequestration, i.e., in a warming world. Hence, we briefly explore this important question.¶ First, we consider how hurricane characteristics may have changed as the earth emerged from the global chill of the Little Ice Age and entered into what we could call the Modern Warm Period. In a major analysis of Atlantic basin hurricane characteristics from 1944 to 1996, over which period climate alarmists claim it has substantially warmed, Landsea et al. (1999) found decreasing trends for (1) the total number of hurricanes, (2) the number of intense hurricanes, (3) the annual number of hurricane days, (4) the maximum wind speed of all hurricanes averaged over the course of a year, and (5) the highest wind speed associated with the strongest hurricane recorded in each year. In addition, they report that the total number of Atlantic hurricanes making landfall in the United States decreased over the extended 1899-1996 time period - which fact has been subsequently reaffirmed by Easterling et al. (2000) - and that normalized trends in hurricane damage in the United States between 1925 and 1996 have decreased at a rate of 728 million US dollars per decade.¶ Moving further back in time, Elsner et al. (2000) studied major hurricane occurrences in Bermuda, Jamaica and Puerto Rico over the past three centuries. Their data reveal that hurricanes at these locations occurred at far lower frequencies in the last half of the 20th century (the warmest period of the entire three hundred years) than they did in the preceding 250-year period. Between 1701 and 1850, for example, major hurricane frequency was 2.77 times greater than it was from 1951 to 1998, while from 1851 to 1950 it was 2.15 times greater. Consequently, as the earth has continued to recover from the coldness of the Little Ice Age (Esper et al., 2002), both the frequency and intensity of Atlantic basin hurricanes have continued to decline.¶ A second way of investigating this subject is to look at year-to-year fluctuations in the number of observed hurricanes in relation to the state of the El Niño-Southern Oscillation phenomenon. Wilson (1999), for example, examined Atlantic basin hurricane frequency over the period 1950 to 1998, finding that the probability of having three or more intense hurricanes during a warm El Niño year was approximately 14%, while during a cool non-El Niño year the figure jumped to 53%. Likewise, in a study of Atlantic basin hurricane intensity over the period 1925 to 1997, Pielke and Landsea (1999) reported that average hurricane wind speeds during warmer El Niño years were about 6 meters per second lower than during cooler La Niña years. In addition, they reported that hurricane damage during cooler La Niña years was twice as great as during warmer El Niño years (1.6 billion dollars per year for [La Niña](http://www.co2science.org/articles/dictionary/define_l.htm#La%20Nina) conditions compared to 800 million dollars per year for El Niño conditions). Hence, these year-to-year variations also indicate that both the frequency and intensity of Atlantic basin hurricanes tend to decrease under warmer conditions.¶ In light of these several real-world observations, one can only conclude that, in a warming world, forests along the US Atlantic seaboard would likely experience fewer and fewer hurricanes as time progressed, while those hurricanes that did occur would likely become ever weaker as the years passed. Consequently, there would be a significant long-term decline in the loss of previously sequestered carbon in eastern US forests as the world warmed, which would translate into a long-term increase in carbon sequestration that would leave less CO2 in the air to promote global warming. Hence, by encouraging the development of US forests to sequester carbon as a means of fighting rising temperatures, one gets an extra dividend, so to speak, as nature actually amplifies the consequences of this important approach to removing CO2 from the atmosphere.

#### **Environmental regulations fail to reduce risk—tradeoffs and complexity**

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

But proclaiming a global environmental goal through an international¶ agreement or a national law does not guarantee¶ success in reducing overall risk to the global environment. The¶ potential for unexpected risk tradeoffs, so evident in the preceding¶ chapters regarding specific domestic policies, is exacerbated¶ where policy must address multiple activities and effluents¶ arising in virtually every sector of human endeavor in¶ every country. The pathways through which risks may shift,¶ plentiful enough at the micro level, only proliferate at the¶ global level.

### Not Anthropogenic

#### Climate change is not anthropogenic—human contributions are minimal

Duffy 13 (Dr. Geoff Duffy Professor of Chemical Engineering DEng, PhD, BSc, ASTC Dip, FRS NZ, FIChemE, CEng, Climate Change, the real cause, <http://www.climaterealists.org.nz/node/601>)

Climate is always changing, and always will. There are seasons. There are day-night (diurnal) cycles. At any one location, heat energy from the sun varies during the day. Energy from the sun is affected by local conditions and clouds. Heat absorption depends on whether it impacts water or land, and then even the type of land (desert, forest, snow-covered land), or the layout of the land (continental masses, or islands surrounded by seas). In some areas temperatures are climbing and in some areas they are dropping. Warming is not occurring everywhere at once, and hence ‘*globa*l warming’ is a misnomer. ¶ So what are the key players in ‘Climate Change’? The major driver is the sun. Warming depends on the sun. Cooling is due to the lack of sun’s energy. Radiant energy enters the earth’s atmosphere - air (on a dry basis) which mainly consists of nitrogen 78.08% and oxygen 20.94%. Of the 0.98% remaining, 0.934% (almost all) is the inert gas argon. Carbon dioxide CO2 is a trace. It is less than 400ppm (parts per million) or 0.04%. Surprisingly, less than a fifth of that is [hu]manmade CO2 (0.008% of the total), and that is only since the beginning of the industrial era and the rapid increase in world population. ¶ What is the next major constituent of air apart from oxygen and nitrogen? Water: as a vapour, a condensed liquid, or ice crystals. The atmosphere is comprised of about 1-3% water vapour [At 200C and 100% humidity there is 0.015kg water/kg air or 1.5%: at 50% Humidity, 0.008kg water/kg air or 0.8%: and in warmer climate at say 300C, 100% humidity, 0.028kg water/kg air or 2.8%]. Water vapour condenses to form clouds and it is by far the most abundant and significant of the greenhouse gases. Water accounts for about 95% of the greenhouse effect. The main atmospheric ‘intermediary’ between the sun and earth is water, and thus it dictates the behaviour of the earth's climate. Without water vapour in particular and other greenhouse gases in the air in general, the surface air temperatures worldwide would be well below freezing. The sun clearly must be a much bigger influence on global temperatures than any of the greenhouse gases, even water and CO2. Carbon dioxide is about 1/60 of water in air!! It clearly is not the major player even though it is wise to minimise [hu]man-made emissions like particulate emissions, and CO2 and other pollutants and gases where practically possible.¶ Variable and unstable weather conditions are caused by local as well as large-scale differences in conditions (wind, rain, evaporation, topography etc). They naturally induce either warming or cooling locally, regionally, or worldwide. We all have experienced how clouds on a cloudy/sunny day strongly affect our *experience* of both heat and light (infrared energy and visible light). Clouds do several things! The atmosphere may be heated by clouds by emitting latent heat of condensation as water vapour condenses. But clouds can both heat the atmosphere by reducing the amount of radiation transmitted, or cool the atmosphere by reflecting radiation. So of *all* the affects that can cause heating and cooling in the atmosphere and on earth, clearly water is the main greenhouse ‘gas’. Other greenhouse gases (carbon dioxide CO2, methane CH4, oxides of nitrogen etc) are 1/60 to 1/30 smaller in both quantity and effect. So with all ‘greenhouse gases’ including water, human activity accounts for only minute amounts, just 0.28% of the total greenhouse gases. If we exclude the key one, water, then human activity would only account for about 5.53% of the total greenhouse effect. This is minute in the total picture whatever way we look at it.

#### Warming is natural-water vapor

Jaworowski 2004 [Professor Zbigniew M.D., Ph.D., D.Sc. is the chairman of the Scientific Council of the Central Laboratory for Radiological Protection in Warsaw. Winter “Solar Cycles, Not CO2, Determine Climate” 21st Century Science Tech http://www.21stcenturysciencetech.com/Articles%202004/Winter2003-4/global\_warming.pdf]

In fact, the recent climate developments are not something unusual; they reflect a natural course of planetary events. From time immemorial, alternate warm and cold cycles have followed each other, with a periodicity ranging from tens of millions to several years. The cycles were most probably dependent on the extraterrestrial changes occurring in the Sun and in the Sun’s neighborhood. Short term changes—those occurring in a few years—are caused by terrestrial factors such as large volcanic explosions, which inject dust into the stratosphere, and the phenomenon of El Niño, which depends on the variations in oceanic currents. Thermal energy produced by natural radionuclides that are present in the 1-kilometer-thick layer of the Earth’s crust, contributed about 117 kilojoules per year per square meter of the primitive Earth. As a result of the decay of these long-lived radionuclides, their annual contribution is now only 33.4 kilojoules per square meter.10 This nuclear heat, however, plays a minor role among the terrestrial factors, in comparison with the “greenhouse effects” caused by absorption by some atmospheric gases of the solar radiation reflected from the surface of the Earth. Without the greenhouse effect, the average near-surface air temperature would be –18°C, and not +15°C, as it is now. The most impor- tant among these “greenhouse gases” is water vapor, which is responsible for about 96 to 99 percent of the greenhouse effect. Among the other greenhouse gases (CO2 , CH4 , CFCs, N2O, and O3 ), the most important is CO2 , which contributes only 3 percent to the total greenhouse effect.11, 12 The manmade CO2 contribution to this effect may be about 0.05 to 0.25 percent.13.

#### Warming is natural

Idso, Carter and Singer 2011 [Craig D. Ph.D Chairman for the Center for the Study of Carbon Dioxide and Global Change, Robert M. Ph.D Adjunct Research Fellow James Cook University, S. Fred Ph.D President of Science and Environmental Policy Project, Climate Change Reconsidered 2011 Interim Report” Nongovernmental International Panel on Climate Change http://nipccreport.org/reports/2011/pdf/2011NIPCCinterimreport.pdf

New evidence points to a larger role for solar forcing than the IPCC has acknowledged. Likely mechanisms include perturbation of ocean currents, tropospheric zonal mean-winds, and the intensity of cosmic rays reaching the Earth.  The IPCC underestimated the warming effect of chloroflourocarbons (CFCs) prior to their gradual removal from the atmosphere following the implementation of the Montreal Protocol in 2000. This could mean CO2 concentrations played a smaller role in the warming prior to that year, and could help explain the global cooling trend since 2000.  Other forcings and feedbacks about which little is known (or acknowledged by the IPCC) include stratospheric water vapor, volcanic and seismic activity, and enhanced carbon sequestration.

#### **Climate change isn’t anthropogenic—it’s a result of natural cycles**

Betke ’13 (Art Betke, Staff Writer at The Prince George Citizen, April 16, 2013)

Thomas Cheney (letter, March 4 issue) challenged me to provide a coherent alternative theory for **global warming**. I'm happy to oblige. (Bracketed numbers refer to online citations.) In 1984 the Dansgaard-Oeschger temperature cycle (1,500-plus years) which could not be caused by any terrestrial agent was noticed. Cycle shifts were abrupt, sometimes gaining half of their change in only a decade. (1)¶ Dozens of papers confirmed this cycle (at 1470-plus years) and determined it must have a solar cause. (2, 3, 4, 5)¶ But there is no 1,470 year solar cycle. There are, however, the 87-year Gleisberg and 210-year DeVries-Suess cycles of sunspot activity. Seven of the 210 year cycles and 17 of the 87 year cycles operating together produce an erratic 1,470-year solar cycle. (6)¶ How could sunspots affect our climate? Henrik Svensmark postulated that sunspots are associated with the suns magnetic field and it, together with solar flares, modulates galactic cosmic ray input to the atmosphere which may cause variations in the nucleation of low level clouds, affecting their reflectivity. (7)¶ Incontrovertible evidence of a link between cosmic rays and terrestrial temperature variability was discovered in 2001. (8)¶ In August, 2011 CERN released results of its first study, confirming the theory. (9)¶ Evidence of the Dansgaard-Oeschger cycle has been found going back a million years and accounts for the climate variations of the past 2,000 years including the Roman Warming, the Dark Ages cooling, the Medieval Climate Optimum, the Little Ice Age, and now the modern warming.¶ Projected forward this pattern suggests we are about 160 years into the next warming phase with a few centuries to go which will be followed by several centuries of cooling.¶ In 2003, Russian scientists Klyashtorin and Lyubishin identified a recurring 60-year cycle of **warming** and cooling (most likely related to the **Pacific Decadal Oscillation)** superimposed on Dansgaard-Oeschger, subsequently confirmed by other studies. (10, 11, 12)¶ This cycle accounts for the warming and cooling pattern of the last 150 years of temperature records including cooling 1882 to 1910, warming 1910 to 1944, cooling 1944 to 1975, and warming 1975 to 2001.¶ Projected forward, this suggests we are on the cusp of a slight 30-year cooling after which the **warming** will resume.¶ The studies briefly described here account for all past as well as current climate changes either of which the anthropogenic CO2 hypothesis absolutely cannot do.

### AT: CO2 = WARMING

#### Rising Co2 emissions do not effect atmosphere

Idso 14 **(Idso,Craig “Plantetary Carbon Sequestration: Earth’s Biosphere Flexes Its Muscles” http://www.co2science.org/articles/V17/N27/EDIT.php 2 July 2014)**

Ten years ago, many people were fearful the air's CO2 content would rise in direct proportion to the magnitude of humanity's ever-increasing emissions of carbon dioxide. Idso (1991a,b), however, felt otherwise. He predicted the air's CO2 content would rise at a rate that would be a declining percentage of anthropogenic CO2 emissions, because he felt the productivity of earth's plant life would rise in response to the ongoing increase in the air's CO2 content - due to the well known aerial fertilization effect of carbon dioxide - thereby resulting in ever more CO2 being removed from the atmosphere each year.  Today, he appears to be vindicated by real-world data, as Wofsy (2001) reports in a Climate Change article in Science magazine that "emission rates of CO2 from combustion of fossil fuel have increased almost 40 percent in the past 20 years, but the amount of CO2 accumulating in the atmosphere has stayed the same or even declined slightly."

**Increase in CO2 percentages provide environment for increasing growth in organisms, study proves**

Idso, Keith "Rising CO2: A Breath of New Life for the Biosphere," <http://www.co2science.org/articles/V17/N27/C2.php> 29/01/2012

Ecosystems composed of [primary producers](http://www.co2science.org/dictionary/define_p.php#Primary%20producers), [herbivores](http://www.co2science.org/dictionary/define_h.php#Herbivores), [carnivores](http://www.co2science.org/dictionary/define_c.php#Carnivores), and [decomposers](http://www.co2science.org/dictionary/define_d.php#Decomposers) are extremely complex; and it is not always possible to predict what the end result of a change in environmental conditions will mean for such an assemblage of life forms.  In this case, standing plant biomass changed very little in response to an increase in the air's CO2 concentration.  However, the enhanced fixation of carbon in a CO2-enriched ecosystem has to show up somewhere; and in this experiment it appeared in the dissolved organic carbon content of the soil water of the ecosystems exposed to the extra CO2.  This augmented carbon supply then supported a greater soil fungal population, which in turn supported a greater soil microarthropod population, the size of which was enhanced by essentially the same percentage as the percent increase in the airspace CO2 concentration of the CO2-enriched microcosms.

#### The effect of Carbon Dioxide on Global warning is greatly overestimated.

Evans ‘11(David Evans consulted full-time for the Australian Greenhouse Office (now the Department of Climate Change) from 1999 to 2005, and part-time 2008 to 2010, modeling Australia's carbon in agricultural products with six university degrees, including a PhD from Stanford University. Anti-Carbon-Tax Rally in Perth, Australia)

The debate about global warming has reached ridiculous proportions and is full of micro-thin half-truths and misunderstandings. I am a scientist who was on the carbon gravy train, understands the evidence, was once an alarmist, but am now a skeptic. Watching this issue unfold has been amusing but, lately, worrying. This issue is tearing society apart, making fools out of our politicians.¶ Let's set a few things straight. The whole idea that carbon dioxide is the main cause of the recent global warming is based on a guess that was proved false by empirical evidence during the 1990s. But the gravy train was too big, with too many jobs, industries, trading profits, political careers, and the possibility of world government and total control riding on the outcome. So rather than admit they were wrong, the governments, and their tame climate scientists, now outrageously maintain the fiction that carbon dioxide is a dangerous pollutant.¶ Let's be perfectly clear. Carbon dioxide is a greenhouse gas, and other things being equal, the more carbon dioxide in the air, the warmer the planet. Every bit of carbon dioxide that we emit warms the planet. But the issue is not whether carbon dioxide warms the planet, but how much. ¶ Most scientists, on both sides, also agree on how much a given increase in the level of carbon dioxide raises the planet's temperature, if just the extra carbon dioxide is considered. These calculations come from laboratory experiments; the basic physics have been well known for a century.¶ The disagreement comes about what happens next.¶ The planet reacts to that extra carbon dioxide, which changes everything. Most critically, the extra warmth causes more water to evaporate from the oceans. But does the water hang around and increase the height of moist air in the atmosphere, or does it simply create more clouds and rain? Back in 1980, when the carbon dioxide theory started, no one knew. The alarmists guessed that it would increase the height of moist air around the planet, which would warm the planet even further, because the moist air is also a greenhouse gas.¶ This is the core idea of every official climate model: For each bit of **warming** due to carbon dioxide, they claim it ends up causing three bits of **warming** due to the extra moist air. The climate models amplify the carbon dioxide **warming** by a factor of three -so two-thirds of their projected **warming** is due to extra moist air (and other factors); only one-third is due to extra carbon dioxide.¶ That's the core of the issue. All the disagreements and misunderstandings spring from this. The alarmist case is based on this guess about moisture in the atmosphere, and there is simply no evidence for the amplification that is at the core of their alarmism.¶ Weather balloons had been measuring the atmosphere since the 1960s, many thousands of them every year. The climate models all predict that as the planet warms, a hot spot of moist air will develop over the tropics about 10 kilometres up, as the layer of moist air expands upwards into the cool dry air above. During the warming of the late 1970s, '80s and '90s, the weather balloons found no hot spot. None at all. Not even a small one. This evidence proves that the climate models are fundamentally flawed, that they greatly overestimate the temperature increases due to carbon dioxide.¶ This evidence first became clear around the mid-1990s.¶ At this point, official "climate science" stopped being a science. In science, empirical evidence always trumps theory, no matter how much you are in love with the theory. If theory and evidence disagree, real scientists scrap the theory. But official climate science ignored the crucial weather balloon evidence, and other subsequent evidence that backs it up, and instead clung to their carbon dioxide theory -that just happens to keep them in well-paying jobs with lavish research grants, and gives great political power to their government masters.¶ There are now several independent pieces of evidence showing that the earth responds to the warming due to extra carbon dioxide by dampening the warming. Every long-lived natural system behaves this way, counteracting any disturbance. Otherwise the system would be unstable. The climate system is no exception, and now we can prove it.¶ But the alarmists say the exact opposite, that the climate system amplifies any **warming** due to extra carbon dioxide, and is potentially unstable. It is no surprise that their predictions of planetary temperature made in 1988 to the U.S. Congress, and again in 1990, 1995, and 2001, have all proved much higher than reality.¶ They keep lowering the temperature increases they expect, from 0.30C per decade in 1990, to 0.20C per decade in 2001, and now 0.15C per decade -yet they have the gall to tell us "it's worse than expected." These people are not scientists. They overestimate the temperature increases due to carbon dioxide, selectively deny evidence, and now they conceal the truth.¶ One way they conceal is in the way they measure temperature.¶ The official thermometers are often located in the warm exhaust of air conditioning outlets, over hot tarmac at airports where they get blasts of hot air from jet engines, at waste-water plants where they get warmth from decomposing sewage, or in hot cities choked with cars and buildings. **Global warming** is measured in 10ths of a degree, so any extra heating nudge is important. In the United States, nearly 90% of official thermometers surveyed by volunteers violate official siting requirements that they not be too close to an artificial heating source.¶ **Global** temperature is also measured by satellites, which measure nearly the whole planet 24/7 without bias. The satellites say the hottest recent year was 1998, and that since 2001 the **global** temperature has levelled off. Why does official science track only the surface thermometer results and not mention the satellite results?¶ The Earth has been in a **warming** trend since the depth of the Little Ice Age around 1680. Human emissions of carbon dioxide were negligible before 1850 and have nearly all come after the Second World War, so human carbon dioxide cannot possibly have caused the trend. Within the trend, the **Pacific Decadal Oscillation** causes alternating **global warming** and cooling for 25 to 30 years at a go in each direction. We have just finished a **warming** phase, so expect mild **global** cooling for the next two decades.¶ We are now at an extraordinary juncture. Official climate science, which is funded and directed entirely by government, promotes a theory that is based on a guess about moist air that is now a known falsehood. Governments gleefully accept their advice, because the only ways to curb emissions are to impose taxes and extend government control over all energy use. And to curb emissions on a world scale might even lead to world government -how exciting for the political class!¶ Even if we stopped emitting all carbon dioxide tomorrow, completely shut up shop and went back to the Stone Age, according to the official government climate models it would be cooler in 2050 by about 0.015 degrees. But their models exaggerate 10-fold -in fact our sacrifices would make the planet in 2050 a mere 0.0015 degrees cooler!¶ Finally, to those who still believe the planet is in danger from our carbon dioxide emissions: Sorry, but you've been had. Yes, carbon dioxide is a cause of global warming, but it's so minor it's not worth doing much about.

#### Natural oscillations—not humans—cause climate change

Gunther ’11 (Lorne, “This just in — Despite UN’s best guess, Earth has not been flooded,” *National Post*, Editorials, April 20, 2011, http://fullcomment.nationalpost.com/2011/04/20/lorne-gunter-this-just-in-—-despite-uns-best-guess-earth-has-not-been-flooded/?\_\_federated=1)

Late last month, a report by two sea-level experts - James Houston, director emeritus of engineer research and development for the U.S. Army Corps of Engineers, and Robert Dean, professor emeritus of civil and coastal engineering at the University of Florida - examined historic data from tidal monitors around the United States, and determined that sea levels rose very little in the 20th century and that, to the extent they rose at all, their rate of rise has begun to fall.¶ Sea levels have not exactly begun to fall yet, but the rate at which they are rising has slowed considerably and this deceleration has likely been occurring for the past 80 years. ¶ This finding, the researchers added, is consistent with what they and others have found from checking tidal gauges worldwide, too. What little sea-level rise there was in the last century was insignificant. Moreover, the rate at which the seas are rising has decelerated appreciably in the last few decades, contrary to the predictions by computer climate models that show the sea rising quickly and catastrophically as global warming melts glaciers and polar ice caps.¶ According to Messrs. Houston and Dean, were the 20 th-century trend to continue, the world's oceans would only rise about 15 cms between now and 2100. That's about ankle depth, far from the one to three metres predicted by the UN's Intergovernmental Panel on Climate Change (IPCC), and way below the 20 to 30 metres forecast by Pope Al Gore of the Gaian Church of Environmental Harridans.¶ Why, the authors wonder in the Journal of Coastal Research, has "worldwide-temperature increase not produced acceleration of **global** sea level over the past 100 years." And "indeed why [has] **global** sea level possibly decelerated for at least the last 80 years," despite what many scientists insist have been unnatural and dangerous **global** temperature rises over the same period?¶ Good questions.¶ Another good question would be: "Why do Western politicians continue to propose economically crippling solutions to man-made climate change when there is increasing evidence that such climate change is not occurring, or at least not occurring at a threatening or alarming rate?"¶ In Canada's current federal election campaign, the Liberals have proposed a cap-andtrade regime that would add tens of billions of dollars to the cost of manufacturing, energy supply and transportation, and raise the cost of consumer goods, food and gasoline. Meanwhile, the New Democrats have promised to restrict development in the oil sands in the name of saving the planet without offering any concrete examples of how they will replace the national income, jobs or energy their moves would affect.¶ There have in the past few months been major studies projecting that hurricanes will not become more numerous or more severe, and concluding that ocean cycles -Atlantic Multidecadal Oscillation (AMO), El Nino/La Nina Southern Oscillation (ENSO), Pacific Decadal Oscillation (PDO) -best explain climate fluctuations, not [hu]man-made carbon dioxide emissions.¶ There was even a prediction last fall from William Livingston and Matthew Penn of the U.S. National Solar Observatory, that sunspots could all but disappear beginning in 2015 (their number has already been greatly reduced over the past 18 months). And since the sun has a great deal more impact on Earth's climate than do idling SUVs and oil sands mining, we might be headed for another Little Ice Age, such as the one that dominated Northern Hemisphere weather from 500 years from the 14th through the 19th centuries.¶ Even the UN was forced to make an embarrassing admission last week that it was wrong six years ago -spectacularly wrong -when it issued a dire warning that by now 50 million people would have been forced to become environmental refugees by the onset of **global warming**.¶ A great deal of wind has gone out of the climatechange sails since the revelations a year-and-a-half ago of major data manipulation by many of the world's leading climate scientists. Still the "green" desire to micro-manage individual lives and regulate whole cultures still exists, so environmentalism remains a movement that needs to be kept in check.

### AT: SLR

#### Sea Level Rise empirically denied—flawed models

Booker 09 (Christopher Booker, 6:25PM GMT 28 Mar 2009 **Christopher John Penrice Booker** (born 7 October 1937) is an English [journalist](http://en.wikipedia.org/wiki/Journalist) and author. In 1961, he was one of the founders of the magazine [*Private Eye*](http://en.wikipedia.org/wiki/Private_Eye), and has contributed to it since then. He has been a columnist for [*The Sunday Telegraph*](http://en.wikipedia.org/wiki/The_Sunday_Telegraph) since 1990.[[1]](http://en.wikipedia.org/wiki/Christopher_Booker#cite_note-1) He has taken a stance which runs counter to the scientific consensus on a number of issues, including [global warming](http://en.wikipedia.org/wiki/Global_warming), the link between [passive smoking](http://en.wikipedia.org/wiki/Passive_smoking) and cancer,[[2]](http://en.wikipedia.org/wiki/Christopher_Booker#cite_note-passivesmoking-2) and the dangers posed by [asbestos](http://en.wikipedia.org/wiki/Asbestos).[[3]](http://en.wikipedia.org/wiki/Christopher_Booker#cite_note-3) In 2009, he published [*The Real Global Warming Disaster*](http://en.wikipedia.org/wiki/The_Real_Global_Warming_Disaster). ‘Rising Sea Levels, the greatest lie ever told’)

If one thing more than any other is used to justify proposals that the world must spend tens of trillions of dollars on combating global warming, it is the belief that we face a disastrous rise in sea levels. The Antarctic and Greenland ice caps will melt, we are told, warming oceans will expand, and the result will be catastrophe. ¶ Although the UN's Intergovernmental Panel on Climate Change (IPCC) only predicts a sea level rise of 59cm (17 inches) by 2100, Al Gore in his Oscar-winning film *An Inconvenient Truth* went much further, talking of 20 feet, and showing computer graphics of cities such as Shanghai and San Francisco half under water. We all know the graphic showing central London in similar plight. As for tiny island nations such as the Maldives and Tuvalu, as Prince Charles likes to tell us and the Archbishop of Canterbury was again parroting last week, they are due to vanish. ¶ But if there is one scientist who knows more about sea levels than anyone else in the world it is the Swedish geologist and physicist Nils-Axel Mörner, formerly chairman of the INQUA International Commission on Sea Level Change. And the uncompromising verdict of Dr Mörner, who for 35 years has been using every known scientific method to study sea levels all over the globe, is that all this talk about the sea rising is nothing but a colossal scare story. ¶ Despite fluctuations down as well as up, "the sea is not rising," he says. "It hasn't risen in 50 years." If there is any rise this century it will "not be more than 10cm (four inches), with an uncertainty of plus or minus 10cm". And quite apart from examining the hard evidence, he says, the elementary laws of physics (latent heat needed to melt ice) tell us that the apocalypse conjured up by Al Gore and Co could not possibly come about. ¶ The reason why Dr Mörner, formerly a Stockholm professor, is so certain that these claims about sea level rise are 100 per cent wrong is that they are all based on computer model predictions, whereas his findings are based on "going into the field to observe what is actually happening in the real world". ¶ When running the International Commission on Sea Level Change, he launched a special project on the Maldives, whose leaders have for 20 years been calling for vast sums of international aid to stave off disaster. Six times he and his expert team visited the islands, to confirm that the sea has not risen for half a century. Before announcing his findings, he offered to show the inhabitants a film explaining why they had nothing to worry about. The government refused to let it be shown. ¶ Similarly in Tuvalu, where local leaders have been calling for the inhabitants to be evacuated for 20 years, the sea has if anything dropped in recent decades. The only evidence the scaremongers can cite is based on the fact that extracting groundwater for pineapple growing has allowed seawater to seep in to replace it. Meanwhile, Venice has been sinking rather than the Adriatic rising, says Dr Mörner. ¶ One of his most shocking discoveries was why the IPCC has been able to show sea levels rising by 2.3mm a year. Until 2003, even its own satellite-based evidence showed no upward trend. But suddenly the graph tilted upwards because the IPCC's favoured experts had drawn on the finding of a single tide-gauge in Hong Kong harbour showing a 2.3mm rise. The entire global sea-level projection was then adjusted upwards by a "corrective factor" of 2.3mm, because, as the IPCC scientists admitted, they "needed to show a trend". ¶ When I spoke to Dr Mörner last week, he expressed his continuing dismay at how the IPCC has fed the scare on this crucial issue. When asked to act as an "expert reviewer" on the IPCC's last two reports, he was "astonished to find that not one of their 22 contributing authors on sea levels was a sea level specialist: not one". Yet the results of all this "deliberate ignorance" and reliance on rigged computer models have become the most powerful single driver of the entire warmist hysteria. ¶

#### Climate feedback checks against a sea level rise

Idso 11 (**Idso**, Sherwood “Another silver lining in a global warming storm cloud” <http://www.co2science.org/education/reports/reportarch.php> 2011)

One of the most hyped of the catastrophic consequences climate alarmists claim will result from predicted CO2-induced global warming is the rise in sea level we are told will result from the melting of glacial ice and the thermal expansion of ocean water. Thanks to the contribution of a newly-recognized negative feedback factor, however, this tale of gloom and doom may not play out quite the way we have been led to believe it will.¶ Surmising the existence of this heretofore unheralded phenomenon, Choi et al. (2001) descended upon the coastal marshes of the St. Marks National Wildlife Refuge in Wakulla County, Florida, USA. There they took numerous plant and soil samples along a transect stretching from low marsh to middle marsh to high marsh, which finally grades into upland forest. Back in the laboratory, they measured the carbon contents of these samples along with their stable carbon isotope ratios.¶ In the low marsh, which is the oldest part of the wetland, the total organic carbon content in the upper 86 cm of soil averaged 29 ± 3.6 kg/m2. In the middle marsh, the carbon content of the same depth of soil averaged 15 ± 3.6 kg/m2; and in the high marsh, the soil carbon content averaged 13 ± 6.0 kg/m2. In comparison, the soils of the adjacent forests contained only 5 to 10 kg/m2 organic carbon. Relative to the mean of the upland forest, therefore, the high marsh contained 73% more soil organic carbon, the middle marsh 100% more, and the low marsh 287% more.From the results of the stable carbon isotope ratios obtained at different depths within the soil profiles of the several sites, the scientists determined there had been a shift in the local vegetation over the past hundred years characteristic of what would be expected by rising sea levels and consequent inundation of the land. That is, what was once high marsh had become middle marsh and then low marsh; and throughout this transformation of the landscape, soil carbon contents had grown ever larger as the sea invaded the land.¶ But how does it happen? "The increased accumulation of soil organic carbon," in the words of Choi et al., "is the result of reduced decomposition and increased primary production," two phenomena that are also promoted by atmospheric CO2 enrichment, as we have noted in earlier installments of this series of reports. In the specific wetland studied by the scientists, for example, productivity increased from 243 g/m2/year in the high marsh to 595 g/m2/year in the middle marsh to 949 g/m2/year in the low marsh. In addition, other studies of marshes in the same general area have indicated they are four to five times more productive than the adjacent upland forests (Krucznski et al., 1978; Hsieh, 1996) and that their soils store fully ten times more organic carbon than do those of the forests (Coultas, 1996).Earth's enormously complex climate system is chock full of negative feedback mechanisms that operate in such a way as to continuously maintain the planet's temperature within the narrow range required for the continued existence of life. Furthermore, life itself plays a major role in this enterprise, one avenue of which is enhancing biological carbon sequestration in the face of both rising temperatures and sea levels.

#### Rising Seas Trigger Carbon Sequestration in Tidal Marshes

Idso 11 (Idso, Craig “Rising seas trigger carbon sequestration in tidal marshes” <http://www.co2science.org/education/reports/reportarch.php> 2014)

Tidal marshes typically exhibit high rates of productivity.  In the southern coastal region of North America, for example, the net primary production of these ecosystems averages approximately 8000 g m-2 yr-1 (Mitsch and Gosselink, 1993).  Tidal marshes also exhibit low rates of organic matter decomposition, because the anaerobic decomposers of these oxygen-depleted environments operate at slower rates than do their aerobic counterparts of terrestrial environments (Humphrey and Pluth, 1996; Amador and Jones, 1997).  Thus, it can readily be appreciated that as seas rise and encroach upon the land, rates of carbon sequestration in coastal marsh soils rise right along with them.

How significant is this phenomenon?  In an earlier contribution to this series ([6 March 2002](http://www.co2science.org/articles/V5/N5/COM.php)), we highlighted the work of Choi et al. (2001), who studied coastal marshes of the St. Marks National Wildlife Refuge in Wakulla County, Florida, USA, where they discovered that high-marsh soils contain 73% more organic carbon than nearby upland forest soils, that older middle-marsh soils contain 100% more carbon, and that still-older low-marsh soils contain 287% more, indicative of the fact that as seawater encroaches upon the land, carbon sequestration at any submerged location grows ever larger.  Now, additional evidence for this trend is provided by Hussein and Rabenhorst (2002) in a study of submerged upland tidal-marsh soils on the eastern seaboard of the United States in the lower eastern portion of the Chesapeake Bay area of Dorchester County, Maryland.

At each of two representative marshes in this area - Hell Hook and Cedar Creek - a transect was established that led from the upland area across the marsh to the main stream that feeds each marsh.  Along these transects, soil cores were extracted and brought back to the laboratory for numerous analyses, including age dating and carbon (C) and nitrogen (N) content determinations.  Among other things, these measurements demonstrated that the accumulation of organic C and total N were "significantly related (alpha = 0.01 with r2 of 0.94)," with an essentially constant C/N ratio of 20:1.

The authors also learned that over the 2000-year period they studied, the deposition of organic matter in the marshes generally kept pace with the sea-level rise, i.e., the top of the marsh-soil's organic matter horizon typically rose just as fast as sea level, which led them to conclude that "the sequestration of total N (g m-2 over the entire thickness of the organic horizon) will increase with time, and that sea-level rise is the primary driving force."  In addition, we note that the tight coupling of the marsh-soil's organic C and total N contents implies essentially the same thing about soil carbon sequestration: it is driven by sea-level rise and will increase with time ... but only, of course, if sea level continues to rise.

With respect to the past, the authors determined the mean rate of total N sequestration at the Hell Hook and Cedar Creek tidal marshes was 1.47 ± 0.3 g m-2 yr-1 over the past two millennia, while over the last century and a half it was 4.2 ± 1.15 g m-2 yr-1, or nearly three times greater.  Even more impressive were their projections for the coming century.  Based on predicted rates of sea level rise, they calculated a mean total N sequestration rate of 20.0 ± 7.9 g m-2 yr-1, which is nearly five times greater than the past century's rate and more than thirteen times greater than the mean rate of the prior two thousand years.  And, again, the tight coupling the scientists observed between the organic C and total N contents of the marsh soils implies a similar amplification of marsh-soil carbon storage rate in the next century.

### **AT: Superstorms**

#### **No evidence of Global Warming resulting in super cylclones**

Idso “Coral Reefs: Doomed by Carbon Dioxide?” <http://www.co2science.org/education/reports/reportarch.php> 10/19/1998

Second, Hogarth's recitation of global warming's "growing list of perils for reefs" lacks rigorous scientific backing.  There is, for example, simply no empirical evidence that the global warming of the recent past has resulted in "more powerful cyclones to pound them [i.e., the reefs]."  Neither is there any evidence that such storms are becoming more frequent.  In fact, intense tropical cyclone activity has actually decreased in the North Atlantic over the last few decades; and hurricane financial damage in the United States, when adjusted for inflation, wealth statistics and population trends, has also dropped over the last half century.

### AT: Ice Cores

#### Ice cores prove that humans play a small role in climate change—temp changes lag behind by 800 years

Martino 13 (Joe. "420,000 Years of Data Suggests Global Warming is Not Man-Made." *Collective Evolution*. N.p., 8 Feb. 20. Web. 8 July 2014. <http://www.collective-evolution.com/2013/02/08/420000-years-of-data-suggestss-global-warming-is-not-man-made/>.)

The global warming debate is one of the biggest topics of the last few years. It makes it’s way into the political, financial, environmental, entertainment and social arena. While it appears as though the verdict is in and we are in fact responsible for the recent warming, we must take the time to really look at all the possibilities here. What will be presented in this article is an in depth look at data from research done at the Vostok station in the Antarctic. Hardly new data, it still remains more of a quiet topic as it without a doubt diminishes the importance we put on man being responsible for global warming. The research was done over many years by a group of Russian and French scientists. Why it is important to know who did this research is because we can better remove the potential bias due to financial or political gain. Before we jump into the data, I want to make it clear that this is not false data, made up or hypothetical, it is very real. One final note, when it comes to the treatment of our environment I will be the first to say that I do not agree with the use of harsh chemicals, fossil fuels, clear cutting, dumping, toxic waste disposal, etc. I know that what we are doing to our environment is a serious issue, but is very overlooked due to the attention and distraction global warming creates. We need to change our ways, but global warming is not the biggest issue. **Vostok Data** The Vostok ice core sample was obtained by drilling down into the ice above Lake Vostok to a depth of 3623m. The graph built from the Vostok ice core data shows us the relationship between CO2 in the atmosphere and global temperature. Contrary to current belief today, the Vostok data shows us that CO2 increases lag behind temperature increases by about 800 years. This means that CO2 is not the cause of the increased temperatures, although it might potentially play a small role. This cannot be confirmed at this time however. The Vostok graph also shows us the cyclical pattern that occurs with warming and cooling as well as the increase in CO2 levels. The graph below indicates the approximate 110,000 year cycles that took place over the past 420,000 years, in which there is a clear relationship between higher temperatures and increased CO2. From this data we may question why the fall of CO2 after that fall in temperature? The reason is that cold water is capable of retaining more CO2 than warm water. We see this if we were to leave fizzy beverages out in warm weather, it would lose its carbonation quickly. In nature terms, when the temperatures are cooler, the ocean water is able to hold much more CO2. As the temperature warms, CO2 is released into the atmosphere, hence the increase in CO2 levels during warmer periods in time. What is very important to take from this data is that the rise and fall of global temperatures and the rise and fall of CO2 emissions is a completely natural cycle that the planet has gone through on many occasions. We can see that all increases and decreases correlate directly with the Ice Age minimus and maximus as shown in the graphs. This process has been happening for the past 420,000 years according to the data collected at Vostok. Also note the fact that the temperatures of today and the CO2 emissions of today are relative to previous peaks that occurred in the past. It is fair to say that 150 years ago we did not have the same level of industry and CO2 emissions as we do today, never mind 100,000 or 200,000 years ago. This tells us that regardless of the CO2 emissions we have sent into the atmosphere, it is not adding a great deal nor is it causing the warming. It is believed that there is about 800 billion tonnes of CO2 in the atmosphere and human activities release about another 27 billion tonnes per year, or 3% of the total. What is important to note is that CO2 in the air dissolves into the oceans and there is a lot more in the oceans than there is in the atmosphere. CO2 in the oceans is slowly gathered by limestone, chalk and other rocks. More than 100 times the amount of CO2 in the atmosphere is locked up in these stones (The White Cliffs of Dover are largely responsible for sequestering CO2). How much CO2 that goes to the ocean versus into the atmosphere is not understood at this point. So regardless of the 3% of total emissions that humanity creates, it is very likely that a large portion of it doesn’t even make it to the atmosphere. Even if one were to assume that man is contributing large amounts of CO2 to the atmosphere, it will dissolve in the sea and then turn to limestone without any help from us. CO2 contributes 9% of the greenhouse effect. Industry currently pumps 3% more CO2 into the atmosphere each year, which is only responsible for a total of .27% of the greenhouse effect. The reality this creates is that if we were to cease all transport and industry right now, it is very unrealistic to assume that it would have any impact on global warming. Since this cannot be stated as fact, we can leave this point open to possibility. However it is important to note that the claims made by major pushers of global warming greatly rely on the assumption that humanity’s small addition to the CO2 levels is what is going to push warming beyond a point of return. As you can see from the previous data, this assumption is not backed nor sound. The graph below shows the sources of CO2 emissions into the atmosphere. If we look to roughly 325,000 years ago, based on the Vostok data above, we see that Earth was at the peak of a warm interglacial period. At that time, global temperature and CO2 levels were higher than they are today. Currently, we are again at the peak and near end of a warm interglacial. Based on the cycle, it would suggest that we are heading into another Ice Age period of cooling where global temperatures will drop and ice will again form heavily at the poles. The fact of the matter is, while the world is focused on anthropogenic global warming, warming induced by humans, what could potentially be a more serious and real matter is that of the coming ice age as the cycle suggests. 420,000 years of data has proven to us that we are not going to see a constant warming of the planet and that we are near the very end of a warming cycle -yet we seem stuck in the idea that we are about to cease our existence due to global warming. At this point, the data should speak for itself and completely nullify any belief that global warming is induced by humans, and that CO2 is the cause. We see very clearly that CO2 lags the temperature increases and has done so many times.

### AT: Oceans

#### CO2 doesn’t affect ocean acidification

Taylor 12 (James M. Taylor, J.D. January 27, 2012 senior fellow of The Heartland Institute and managing editor of Environment & Climate News., “Ocean Acidification Scare Pushed at Copenhagen)

With global temperatures continuing their decade-long decline and United Nations-sponsored global warming talks falling apart in Copenhagen, **alarmists at the U.N. talks spent considerable time claiming carbon dioxide emissions will cause catastrophic ocean acidification**, regardless of whether temperatures rise. The **latest** scientific **data,** **however,** **show no such catastrophe is likely to occur**. The United Kingdom’s environment secretary, Hilary Benn, initiated the Copenhagen ocean scare with a high-profile speech and numerous media interviews claiming ocean acidification threatens the world’s food supply. “The fact is our seas absorb CO2. They absorb about a quarter of the total that we produce, but it is making our seas more acidic,” said Benn in his speech. “If this continues as a problem, then it can affect the one billion people who depend on fish as their principle source of protein, and we have to feed another 2½ to 3 billion people over the next 40 to 50 years.” Benn’s claim of oceans becoming “more acidic” is misleading, however. Water with a pH of 7.0 is considered neutral. pH values lower than 7.0 are considered acidic, while those higher than 7.0 are considered alkaline. The world’s oceans have a pH of 8.1, making them alkaline, not acidic. **Increasing carbon dioxide concentrations would make the oceans less alkaline but not acidic.** Since human industrial activity first began emitting carbon dioxide into the atmosphere a little more than 200 years ago, the pH of the oceans has fallen merely 0.1, from 8.2 to 8.1. Following Benn’s December 14 speech and public relations efforts, most of the world’s major media outlets produced stories claiming ocean acidification is threatening the world’s marine life. An Associated Press headline, for example, went so far as to call ocean acidification the “evil twin” of climate change. **Numerous recent scientific studies show higher carbon dioxide levels in the world’s oceans have the same beneficial effect on marine life as higher levels of atmospheric carbon dioxide have on terrestrial plant life.** In a 2005 study published in the *Journal of Geophysical Research*, scientists examined trends in chlorophyll concentrations, critical building blocks in the oceanic food chain. The French and American scientists reported “an overall increase of the world ocean average chlorophyll concentration by about 22 percent” during the prior two decades of increasing carbon dioxide concentrations. In a 2006 study published in *Global Change Biology*, scientists observed higher CO2 levels are correlated with better growth conditions for oceanic life. **The highest CO2 concentrations produced “higher growth rates and biomass yields” than the lower CO2 conditions.** Higher CO2 levels may well fuel “subsequent primary production, phytoplankton blooms, and sustaining oceanic food-webs,” the study concluded. In a 2008 study published in *Biogeosciences*, scientists subjected marine organisms to varying concentrations of CO2, including abrupt changes of CO2 concentration. The ecosystems were “surprisingly resilient” to changes in atmospheric CO2, and “the ecosystem composition, bacterial and phytoplankton abundances and productivity, grazing rates and total grazer abundance and reproduction were not significantly affected by CO2-induced effects.” In a 2009 study published in *Proceedings of the National Academy of Sciences*, scientists reported, “Sea star growth and feeding rates increased with water temperature from 5ºC to 21ºC. A doubling of current [CO2] also increased growth rates both with and without a concurrent temperature increase from 12ºC to 15ºC.” “Far too many predictions of CO2-induced catastrophes are treated by alarmists as sure to occur, when real-world observations show these doomsday scenarios to be highly unlikely or even virtual impossibilities,” said Craig Idso, Ph.D., author of the 2009 book *CO2, Global Warming and Coral Reefs*. “The phenomenon of CO2-induced ocean acidification appears to be no different.“**What we observe in nature is** not **supported by** theoretical projections, because **numerous studies** have shown that the net impact of **twentieth century increases in atmospheric CO2 and temperature has not been anywhere near as catastrophically disruptive to Earth’s marine organisms as climate alarmists suggest it should have been.** And every month more and more **research confirms that marine life will likely successfully adapt to, or even benefit from, the modest increase in atmospheric CO2 and temperature projected to occur in the future**,” Idso explained.“As for why this is the way marine organisms respond, no one knows for certain, but it is probably because calcification is a biologically driven process that can overcome physical-chemical limitations which in the absence of life would appear to be insurmountable,” Idso said. “**We have got to realize that rising atmospheric CO2 concentrations are** not the bane of the biosphere but **an invaluable boon to the planet’s many life forms, marine life included**.”

#### Ocean acidification isn’t a threat—adaptation, empirics prove

Idso 13(Idso “Mr. President, It’s NOT “Carbon Pollution”, it’s the “Elixir of Life!” http://www.co2science.org/articles/V17/N27/C2.php 6/26/13)

The results we have depicted in the figures above suggest something very different from the doomsday predictions of the climate alarmists who claim we are in "the last decades of coral reefs on this planet for at least the next ... million plus years, unless we do something very soon to reduce CO2 emissions," or who declare that "reefs are starting to crumble and disappear," that "we may lose those ecosystems within 20 or 30 years," and that "we've got the last decade in which we can do something about this problem." Clearly, the promoting of such scenarios is not supported by the vast bulk of pertinent experimental data.Two other important phenomena that give us reason to believe the predicted decline in oceanic pH will have little to no lasting negative effects on marine life are the abilities of essentially all forms of life to adapt and evolve. Of those experiments in our database that report the length of time the organisms were subjected to reduced pH levels, for example, the median value was only four days. And many of the experiments were conducted over periods of only a few hours, which is much too short a time for organisms to adapt (or evolve) to successfully cope with new environmental conditions (see, for example, the many pertinent Journal Reviews we have archived under the general heading of [Evolution](http://www.co2science.org/subject/e/subject_e.php) in our Subject Index). And when one allows for such phenomena, the possibility of marine life experiencing a negative response to ocean acidification becomes even less likely.¶ In conclusion, claims of impending marine species extinctions driven by increases in the atmosphere's CO2 concentration do not appear to be founded in empirical reality, based on the experimental findings we have analyzed above.

### AT: Runaway Warming

#### Marsh growth is a carbon sink—proves negative feedback prevents runaway warming

Idso,Craig Idso, Craig “Rising seas trigger carbon sequestration in tidal marshes” <http://www.co2science.org/education/reports/reportarch.php> 2014

These observations illustrate one of the many important ways in which earth's biosphere tends to counter increases in the planet's temperature.  The negative feedback effect is initiated by the photosynthetic removal of CO2 from the atmosphere by tidal-marsh vegetation and magnified by the enhanced sequestration of the biologically-captured carbon in submerged organic soils, which process is driven by rising sea levels that are sustained by the rising temperature.  This interim effect either lowers the air's CO2 content, stabilizes it, or slows its rate of rise, which leads to a reduction in the atmospheric greenhouse effect that either reverses, stops or slows the rate of temperature rise.

Interestingly, when the air's CO2 content is in a rising mode, the power of this negative feedback phenomenon is even greater; for the meticulous and voluminous work of Dr. B.G. Drake and a host of collaborators on the very same Chesapeake Bay wetlands has abundantly demonstrated that elevated atmospheric CO2 concentrations significantly stimulate the productivity of the marsh plants that grow there (Drake et al., 1989; Curtis et al., 1990; Arp et al., 1991; Long and Drake, 1991; Drake, 1992; Jacob et al., 1995; Drake et al., 1996; Dakora and Drake, 2000).  Hence, we can take comfort in the fact that earth's biosphere is functioning in such a way as to significantly limit the amount of warming that might possibly occur as a consequence of the ongoing rise in the air's CO2 content.

### Negative Feedback

#### Negative feedback solves runaway warming—increased CO2 Enables Plants to Sequester Carbon at Higher Temperatures than Squo

Idso, Craig “Enricing the air with CO2 enables plants to sequester carbon at higher temperatures than they do currently”

<http://www.co2science.org/education/reports/reportarch.php> 2014

Photosynthesis, which is the physiological process by which plants remove CO2 from the atmosphere and incorporate it into their tissues, is the first step in a sequence of events that ultimately leads to the sequestration of carbon in soils.  Without it, nothing else matters.  Hence, anything that either enhances photosynthesis or enables it to proceed under conditions that would normally inhibit it, will ultimately lead to the removal of more CO2 from the atmosphere and a slowing of the rate of rise of the air's CO2 content.It is instructive to consider the effects of daily temperature changes on this process.  As a plant warms from an initial state of early-morning coolness, its rate of net photosynthesis - the difference between gross photosynthesis (CO2 uptake) and respiration (CO2 release) - generally rises, until it reaches a maximum at what is called the optimum temperature for that plant, i.e., the temperature at which the plant exhibits peak performance in terms of growth or net CO2 uptake.  Then, if the air temperature rises higher still, the plant's rate of net photosynthesis decreases; and if the temperature rises high enough, the plant's rate of net CO2 uptake will drop all the way to zero at what is generally referred to as the plant's upper limiting temperature, above which thermal death can occur there if is no relief from the high-temperature stress.And if one is concerned about carbon sequestration, it doesn't take much gray matter to realize that dead plants have done all they'll ever do in the way of removing CO2 from the atmosphere.  One of the important keys to greater carbon storage, therefore, is to keep plants both living and growing as long as possible; and in this regard, elevated levels of atmospheric CO2 seem to be just what the plant doctor ordered.

### IPCC Indicts

#### Climate models are flawed—guts IPCC credibility

Hollingsworth 13 (Barbara Hollingsworth, CNS News, September 30th 2013 <http://www.cnsnews.com/news/article/barbara-hollingsworth/climate-scientist-73-un-climate-models-wrong-no-global-warming-17> )

Global temperatures collected in five official databases confirm that there has been no statistically significant global warming for the past 17 years, according to Dr. John Christy, professor of atmospheric science and director of the Earth System Science Center at the University of Alabama Huntsville (UAH).Christy's findings are contrary to predictions made by 73 computer models cited in the United Nation’s latest Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (5AR).Christy told CNSNews that he analyzed all 73 models used in the 5AR and not one accurately predicted that the Earth’s temperature would remain flat since Oct. 1, 1996. (See Temperatures v Predictions 1976-2013.pdf)“I compared the models with observations in the key area – the tropics – where the climate models showed a real impact of greenhouse gases,” Christy explained. “I wanted to compare the real world temperatures with the models in a place where the impact would be very clear.” (See Tropical Mid-Troposphere Graph.pdf)Using datasets of actual temperatures recorded by the NASA Goddard Institute for Space Studies (NASA GISS), the United Kingdom’s Hadley Centre for Climate Prediction and Research at the University of East Anglia (Hadley-CRU), the National Oceanic and Atmospheric Administration (NOAA), satellites measuring atmospheric and deep oceanic temperatures, and a remote sensor system in California, Christy found that “all show a lack of warming over the past 17 years.” “All 73 models’ predictions were on average three to four times what occurred in the real world,” Christy pointed out. “The closest was a Russian model that predicted a one-degree increase.

#### IPCC admits—climate models aren’t predictive

Rose 13 (David Rose, September 19th 2013 <http://www.dailymail.co.uk/news/article-2420783/Worlds-climate-scientists-confess-Global-warming-just-QUARTER-thought--computers-got-effects-greenhouse-gases-wrong.html> David Rose is a frequent contributor to the Daily Mail)

The Mail on Sunday has obtained the final draft of a report to be published later this month by the UN Intergovernmental Panel on Climate Change (IPCC), the ultimate watchdog whose massive, six-yearly ‘assessments’ are accepted by environmentalists, politicians and experts as the gospel of climate science. They are cited worldwide to justify swingeing fossil fuel taxes and subsidies for ‘renewable’ energy.Yet the leaked report makes the extraordinary concession that over the past 15 years, recorded world temperatures have increased at only a quarter of the rate of IPCC claimed when it published its last assessment in 2007. Back then, it said observed warming over the 15 years from 1990-2005 had taken place at a rate of 0.2C per decade, and it predicted this would continue for the following 20 years, on the basis of forecasts made by computer climate models. But the new report says the observed warming over the more recent 15 years to 2012 was just 0.05C per decade - below almost all computer predictions. The 31-page ‘summary for policymakers’ is based on a more technical 2,000-page analysis which will be issued at the same time. It also surprisingly reveals: IPCC scientists accept their forecast computers may have exaggerated the effect of increased carbon emissions on world temperatures – and not taken enough notice of natural variability. They recognise the global warming ‘pause’ first reported by The Mail on Sunday last year is real – and concede that their computer models did not predict it. But they cannot explain why world average temperatures have not shown any statistically significant increase since 1997. They admit large parts of the world were as warm as they are now for decades at a time between 950 and 1250 AD – centuries before the Industrial Revolution, and when the population and CO2 levels were both much lower. lThe IPCC admits that while computer models forecast a decline in Antarctic sea ice, it has actually grown to a new record high. Again, the IPCC cannot say why. A forecast in the 2007 report that hurricanes would become more intense has simply been dropped, without mention. This year has been one of the quietest hurricane seasons in history and the US is currently enjoying its longest-ever period – almost eight years – without a single hurricane of Category 3 or above making landfall.

#### IPCC models flawed—don’t account for cooling from sea spray

**McShane 8** (Owen McShane April 07, 2008 chairman of the policy panel of the New Zealand Climate Science Coalition and director of the Center for Resource Management Studies http://www.nbr.co.nz/article/climate-change-confirmed-global-warming-cancelled)

In December last year, at the UN conference in Bali, I heard Viscount Monckton present a paper prepared by himself, the Australian Dr David Evans and our own Dr Vincent Gray (who were at Bali, too) that showed **while the IPCC models predict that greenhouse gases would produce an extensive "hot spot**" in the upper troposphere over the tropics, **the satellite measurements show no such hotspots have appeared.** Monckton and Evans found a large part of this discrepancy is the result of some basic errors in the IPCC's assessment of the Stefan-Boltzmann equation. When they applied their revised factor to the effect of greenhouse gases, the temperature rise was about a third of that predicted by the IPCC. So by late last year we not only knew IPCC forecasts of atmospheric global warming were wrong; we were beginning to understand why they are wrong. The key issue in this debate is whether anthropogenic greenhouse gases or natural solar activities are the prime drivers of climate change. A closely related argument is whether the climate is highly sensitive to carbon dioxide concentrations in the atmosphere. Put together, **these** uncertainties **raise doubts as to whether the IPCC models can accurately forecast the climate over the long term.** If they cannot, then we have to wonder how much damage we should risk doing to the world's economies in attempts to manage the possibly adverse effects of these "predictions." The findings that the predicted "tropical hot spots" do not exist are important because the IPCC models assume these hot spots will be formed by increased evaporation from warmer oceans leading to the accumulations of higher concentrations of water vapour in the upper atmosphere, and thereby generating a positive feedback reinforcing the small amount of warming that can be caused by CO2 alone. **Atmospheric scientists generally agree that** as carbon dioxide levels increase there is a law of "diminishing returns" - or more properly "diminishing effects" - and that ongoing **increases in CO2 concentration do not generate proportional increases in temperature.** The common analogy is painting over window glass. The first layers of paint cut out lots of light but subsequent layers have diminishing impact. So, you might be asking, why the panic? Why does Al Gore talk about temperatures spiraling out of control, causing mass extinctions and catastrophic rises in sea-level, and all his other disastrous outcomes when there is no evidence to support it? The alarmists argue that increased CO2 leads to more water vapour - the main greenhouse gas - and this provides positive feedback and hence makes the overall climate highly sensitive to small increases in the concentration of CO2. Consequently, the IPCC argues that while carbon dioxide may well "run out of puff" the consequent evaporation of water vapour provides the positive feedback loop that will make anthropogenic global warming reach dangerous levels. **This assumption that water vapour provides positive feedback lies behind the famous "tipping point,"** which nourishes Al Gore's dreams of destruction and indeed all those calls for action now - "before it is too late!" **But no climate models predict such a tipping point.** However, while the absence of hot spots has refuted one important aspect of the IPCC models we lack a mechanism that fully explains these supposed outcomes. Hence the IPCC, and its supporters, have been able to ignore this "refutation." So by the end of last year, we were in a similar situation to the 19th century astronomers, who had figured out that the sun could not be "burning" its fuel - or it would have turned to ashes long ago - but could not explain where the energy was coming from. Then along came Einstein and E=mc2. Similarly, the climate sceptics have had to explain why the hotspots are not where they should be - not just challenge the theory with their observations. This is why I felt so lucky to be in the right place at the right time when I heard Roy Spencer speak at the New York conference on climate change in March. At first I thought this was just another paper setting out observations against the forecasts, further confirming Evans' earlier work. But as the argument unfolded I realised Spencer was drawing on observations and measurements from the new Aqua satellites to explain the mechanism behind this anomaly between model forecasts and observation. You may have heard that **the IPCC models cannot predict clouds and rain with any accuracy.** Their models assume water vapour goes up to the troposphere and hangs around to cook us all in a greenhouse future. However, there is a mechanism at work that "washes out" the water vapour and returns it to the oceans along with the extra CO2 and thus turns the added water vapour into a NEGATIVE feedback mechanism. The newly discovered mechanism is a combination of clouds and rain (Spencer's mechanism adds to the mechanism earlier identified by Professor Richard Lindzen called the Iris effect). The IPCC models assumed water vapour formed clouds at high altitudes that lead to further warming. **The Aqua satellite observations** and Spencer's analysis **show water vapour actually forms clouds at low altitudes that lead to cooling.** Furthermore, Spencer shows **the extra rain that falls from these clouds cools the underlying oceans,** providing a second negative feedback to negate the CO2 warming. This has struck the alarmists like a thunderbolt, especially as the lead author of the IPCC chapter on feedback has written to Spencer agreeing that he is right! There goes the alarmist neighbourhood! The climate is not highly sensitive to CO2 warming **because water vapour is a damper against the warming effect of CO2.**

### Heat Islands

#### Cities act as urban heat islands—distorts climate research

Lemonick 12

Michael D. Lemonick August 15th 2012, Huffington Post <http://www.huffingtonpost.com/2012/08/15/urban-heat-island-effect-climate-change_n_1778949.html>

For scientists who worry about climate change, cities are just plain annoying. The acres of asphalt that cover roads and parking lots and roofs absorb enormous amounts of heat. In the summer, whirring air conditioners channel even more heat out of buildings and into the air. Climate scientists have to subtract this so-called urban heat island effect from their calculations if they want to get a true picture of how greenhouse gas emissions are warming the planet. The danger is especially great when nighttime temperatures remain high, which keeps the body from recovering after a scorching day. Unfortunately, the urban heat island effect affects nighttime temperatures the most: that’s when all the heat absorbed by the roads and buildings is re-released.

### Carbon Sinks

#### Trees function as carbon sinks—offset warming

Idso, Craig “trees spend more time sequestering carbon with more CO2 in the air” http://www.co2science.org/articles/V17/N27/EDIT.php 15 February 2014

One of the current hot topics in the global climate change debate is whether the planting of trees is a viable mechanism for offsetting anthropogenic carbon dioxide emissions.  Many politically-active environmental groups, claim this approach won't work.  Indeed, they say that using trees to sequester carbon in lieu of reducing CO2 emissions is immoral and akin to committing criminal acts against the earth.

What's wrong with this picture?  If you can recall what you learned in high school biology, you will remember that plants remove CO2 from the air and convert it into sugars that are used to produce substances needed to sustain their growth and development.  Many of these CO2-derived products, particularly lignin and cellulose, are present in large quantities within the woody tissues of trees and shrubs.  Hence, as long as these plants are alive and growing, they actively remove carbon from the air around them.  Moreover, even after their biological activities cease, trees continue to retain the carbon they sequestered during their lifetimes within their woody tissues; and the products that mankind develops from them retain this carbon over their lifetimes as well.  Thus, trees and other woody plants, aided by human ingenuity, possess an enormous potential to sequester vast amounts of carbon for very long periods of time.  For many species, in fact, this time may amount to hundreds of years; and for several others it may even exceed a millennium (Chambers et al., 1998).An important point hardly ever mentioned by opponents of carbon sequestration by trees is the fact that their ability to remove CO2 from the air will only grow stronger with each passing year, as the air's CO2 content continues to rise, due to the well-known aerial fertilization effect of atmospheric CO2 enrichment.  In a recent analysis of the results of 176 separate studies of this phenomenon in all types of tree seedlings, for example, Idso (1999) found that a 300 ppm increase in the air's CO2 concentration increased seedling biomass production by fully 50%; while Saxe et al. (1998) put the biomass increase for such a CO2 increase at 130% for conifers. These biomass increases are very large; and many people have wondered how they could possibly be sustained by virtue of the aerial fertilization effect alone.  Now comes a study that helps to answer that question by illuminating a closely-related way in which elevated levels of atmospheric CO2 increase the carbon sequestering power of trees.

In this experiment, Marek et al. (2001) constructed open-top chambers around 30-year-old mature oak (Quercus ilex) trees growing in perennial evergreen stands in central Italy, through which they forced continual flows of air having CO2 concentrations of either 350 or 700 ppm for five full years. Trees clearly possess a number of mechanisms - of which we here discuss but two - that allow them to sequester great quantities of carbon and significantly offset anthropogenic CO2 emissions.  Planting them for this purpose is a reasonable and prudent action that could be used successfully to measurably reduce the rate of rise of the air's CO2 concentration.

#### Elevated CO2 Increases Leaf Longevity, Giving Plants Extra Time to Deposit More Carbon in Earth's Soil Bank System

Idso 2011 (Craig “Elevated CO2 Increases Leaf Longevity, Giving Plants Extra Time to Deposit More Carbon in Earth's Soil Bank System” 2 July 2011)

There are a number of different ways in which the ongoing rise in the air's CO2 content enables plants to sequester more carbon than they would do under conditions of static or declining atmospheric CO2 concentration. Most notable of these stimulatory phenomena is the fundamental aerial fertilization effect of atmospheric CO2 enrichment, which increases the photosynthetic rates of plant leaves. Another important way in which CO2-enriched leaves may remove greater amounts of carbon dioxide from the air is by simply living longer than they do at the current or ambient atmospheric CO2 concentration.One of the first studies to probe the connection between atmospheric CO2 concentration and leaf longevity was that of Idso et al. (1990), who grew water lilies out-of-doors in sunken metal stock tanks located within clear-plastic-wall open-top chambers maintained at either the ambient atmospheric CO2 concentration or ambient plus 300 ppm CO2. Over the five-month growing season of their experiment, the water lily leaves exposed to the extra CO2 extended their lifespan by 17.5%.**¶** More recently, Craine and Reich (2001) described an experiment in which they grew monocultures of ten different grassland species and used Free-Air CO2 Enrichment (FACE) technology to increase the CO2 concentration of the air surrounding half of their plants by 200 ppm. Over the four-month period of their experiment, they observed that leaves of C3 grasses lived 3.3% longer in the CO2-enriched air of the FACE treatments, while C3 forbs exposed to the extra CO2 increased the lifespan of their leaves by 11.7%. For a 300 ppm increase in atmospheric CO2 concentration such as Idso et al. employed in their study, these results correspond to leaf longevity increases on the order of 5% and 17.5%, respectively.¶ Another study of CO2 effects on leaf longevity was conducted by Knapp et al. (1999), who used open-top chambers in a Kansas grassland to determine the response of the dominant C4 grass to a doubling of the ambient CO2 concentration (a daytime increase of 335 ppm). In this experiment, leaf lifespan was extended by 20%, which for a 300 ppm increase in atmospheric CO2 concentration would correspond to an increase of 18%.

### Alternate Causality

#### CFCs—not CO2—drive warming trends. Science proves

Qing-Bin Lu 2013 (May 30, Cosmic-Ray-Driven Reaction and Greenhouse Effect of Halogenated Molecules: Culprits for Atmospheric Ozone Depletion and Global Climate Change, Qing-Bin Lu, University of Waterloo, Published on May 30 in International Journal of Modern Physics B Vol. 27 (2013) 1350073 (38 pages) http://phys.org/news/2013-05-global-chlorofluorocarbons-carbon-dioxide.html#jCp

**CFCs are already known to deplete ozone,** **but** in-depth statistical analysis **now shows that CFCs are also the key driver in global climate change**, rather than [carbon dioxide](http://phys.org/tags/carbon+dioxide/) (CO2) emissions.¶ "**Conventional thinking says** that the emission of human-made non-CFC gases such as **carbon dioxide has mainly contributed to global warming.** But we have observed data going back to the Industrial Revolution that convincingly shows that **conventional understanding is wrong**," said Qing-Bin Lu, a professor of physics and astronomy, biology and chemistry in Waterloo's Faculty of Science. "In fact, **the data shows that CFCs conspiring with cosmic rays caused both the polar** [**ozone hole**](http://phys.org/tags/ozone+hole/) **and global warming**."¶ "Most conventional theories expect that [global temperatures](http://phys.org/tags/global+temperatures/) will continue to increase as CO2 levels continue to rise, as they have done since 1850. What's striking is that **since 2002, global temperatures have actually declined – matching a decline in CFCs in the atmosphere**," Professor Lu said. "My calculations of CFC [greenhouse effect](http://phys.org/tags/greenhouse+effect/) show that there was global warming by about 0.6 °C from 1950 to 2002, but the earth has actually cooled since 2002. The cooling trend is set to continue for the next 50-70 years as the amount of CFCs in the atmosphere continues to decline."¶ The findings are based on in-depth [statistical analyses](http://phys.org/tags/statistical+analyses/) of observed data from 1850 up to the present time, Professor Lu's cosmic-ray-driven electron-reaction (CRE) theory of [ozone depletion](http://phys.org/tags/ozone+depletion/) and his previous research into Antarctic ozone depletion and global surface temperatures.¶ "It was generally accepted for more than two decades that the Earth's [ozone layer](http://phys.org/tags/ozone+layer/) was depleted by the sun's ultraviolet light-induced destruction of CFCs in the atmosphere," he said. "But in contrast, **CRE theory says cosmic rays – energy particles originating in space – play the dominant role in breaking down ozone-depleting molecules and then ozone."** ¶ Lu's theory has been confirmed by ongoing observations of cosmic ray, CFC, ozone and stratospheric temperature data over several 11-year solar cycles. "**CRE is the only theory that provides us with an excellent reproduction of 11-year cyclic variations of both polar ozone loss and stratospheric cooling,**" said Professor Lu. "After removing the natural cosmic-ray effect, my new paper shows a pronounced recovery by ~20% of the Antarctic ozone hole, consistent with the decline of CFCs in the polar stratosphere."¶ By proving the link between CFCs, ozone depletion and temperature changes in the Antarctic, Professor Lu was able to draw almost perfect correlation between rising [global surface temperatures](http://phys.org/tags/global+surface+temperatures/) and CFCs in the atmosphere.¶ "The climate in the Antarctic stratosphere has been completely controlled by CFCs and [cosmic rays](http://phys.org/tags/cosmic+rays/), with no CO2 impact. **The change in global surface temperature after the removal of the solar effect has shown zero correlation with CO2 but a nearly perfect linear correlation with CFCs - a correlation coefficient as high as 0.97."**¶ Data recorded **from 1850 to 1970**, before any significant CFC emissions, show that [**CO2 levels**](http://phys.org/tags/co2+levels/) **increased significantly as a result of the Industrial Revolution, but the global temperature,** excluding the solar effect**, kept nearly constant**. The conventional warming model of CO2, suggests the temperatures should have risen by 0.6°C over the same period, similar to the period of 1970-2002.¶ The analyses indicate the dominance of Lu's CRE theory and the success of the Montreal Protocol on Substances that Deplete the Ozone Layer.¶ "**We've known for some time that CFCs have a really damaging effect on our atmosphere and we've taken measures to reduce their emissions**," Professor Lu said. "We now know that international efforts such as the Montreal Protocol have also had a profound effect on [global warming](http://phys.org/tags/global+warming/) but they must be placed on firmer scientific ground."¶ "This study underlines the importance of understanding the basic science underlying ozone depletion and global climate change," said Terry McMahon, dean of the faculty of science. "This research is of particular importance not only to the research community, but to policy makers and the public alike as we look to the future of our climate."¶ Professor Lu's paper, Cosmic-Ray-Driven Reaction and Greenhouse Effect of Halogenated Molecules: Culprits for Atmospheric Ozone Depletion and Global Climate Change, also predicts that the global sea level will continue to rise for some years as the hole in the ozone recovers increasing ice melting in the polar regions.¶ "Only when the effect of the global temperature recovery dominates over that of the polar ozone hole recovery, will both temperature and polar ice melting drop concurrently," says Lu.

#### Beef Production is an Alt Cause to Global Warming due to its Methane

Gossard and York 2003 (Marcia Hill Gossard works at Department of Sociology at Washington State University and Richard York works at the Department of Sociology at University of Oregon. Human Ecology Review, Vol. 10, No. 1, 2003. <http://www.humanecologyreview.org/pastissues/her101/101gossardyork.pdf>)s

The environmental literature identifies industrial meat¶ production as a leading cause of many ecological problems¶ (Durning and Brough 1991; Ehrlich, Ehrlich and Daily 1995;¶ Goodland 1997; Pimentel and Pimentel 1996; Rifkin 1992;¶ Subak 1999). Modern, intensive meat production places a¶ burden on ecosystems since it requires the use of large quantities¶ of natural resources — particularly land, energy, and¶ water used to produce feed grain (Durning and Brough 1991;¶ Dutilh and Kramer 2000; Fiddes 1991). Relative to the production¶ of grain and other vegetable matter for human consumption,¶ meat production is extremely resource inefficient¶ — several times more people can subsist on a vegetarian diet¶ than can on a meat centered diet (Durning and Brough 1991;¶ Dutilh and Kramer 2000; Ehrlich, Ehrlich and Daily 1995;¶ Lappé 1991; Rifkin 1992).¶ Beef production is particularly resource intensive, having¶ an even greater impact on the environment than is suggested¶ by the amount of grain — and the resources that go¶ into producing grain — that it requires (Subak 1999).¶ Livestock grazing contributes to many environmental problems¶ including soil erosion, desertification, water pollution,¶ and loss of biological diversity (Durning and Brough 1991;¶ Ehrlich, Ehrlich and Daily 1995; Pimentel and Pimentel¶ 1996; Rifkin 1992). For example, millions of acres of tropical¶ forest in Latin America have been cleared for cattle grazing¶ (Durning and Brough 1991; Harrison and Pearce 2000;¶ Myers 1981). Additionally, due to their digestive physiology,¶ cattle also emit a large quantity of methane, a greenhouse¶ gas, and their manure expels gaseous ammonia into the air,¶ contributing to acid rain (Durning and Brough 1991;¶ Harrison and Pearce 2000; Subak 1999).

#### Vehicle emissions are dwarfed by nitrous oxide from cows—and it has a coefficient of warming 300 times CO2

Walsh 8 (Bryan Walsh Wednesday, Sept. 10, 2008 <http://content.time.com/time/health/article/0,8599,1839995,00.html> Bryan Walsh is a writer for Time Magazine)

By the numbers, Pachauri is absolutely right. In a 2006 report, the U.N. Food and Agriculture Organization (FAO) concluded that worldwide livestock farming generates 18% of the planet's greenhouse gas emissions — by comparison, all the world's cars, trains, planes and boats account for a combined 13% of greenhouse gas emissions. Much of livestock's contribution to global warming come from deforestation, as the growing demand for meat results in trees being cut down to make space for pasture or farmland to grow animal feed. Livestock takes up a lot of space — nearly one-third of the earth's entire landmass. In Latin America, the FAO estimates that some 70% of former forest cover has been converted for grazing. Lost forest cover heats the planet, because trees absorb CO2 while they're alive — and when they're burned or cut down, the greenhouse gas is released back into the atmosphere. Then there's manure — all that animal waste generates nitrous oxide, a greenhouse gas that has 296 times the warming effect of CO2. And of course, there is cow flatulence: as cattle digest grass or grain, they produce methane gas, of which they expel up to 200 L a day. Given that there are 100 million cattle in the U.S. alone, and that methane has 23 times the warming impact of CO2, the gas adds up.The worrisome news is that as the world economy grows, so does global meat consumption. The average person in the industrialized world eats more than 176 lb. of meat annually, compared with around 66 lb. consumed by the average resident of the developing world. As developing nations get richer, one of the first things citizens spend their extra income on is a more meat-rich diet. Whereas pork would once have been a rare luxury in China, today even the relatively poor in the country's cities can afford a little meat at almost every meal — so much so that pork imports to China rose more than 900% through the first four months of the year. In 2008, global meat production is expected to top 280 million tons, and that figure could nearly double by 2050.

#### Alternative Theory to Global Warning

Betke ’13 (Art Betke, Reporter at The Prince George Citizen, April 16, 2013)

Thomas Cheney (letter, March 4 issue) challenged me to provide a coherent alternative theory for **global warming**. I'm happy to oblige. (Bracketed numbers refer to online citations.)

In 1984 the Dansgaard-Oeschger temperature cycle (1,500-plus years) which could not be caused by any terrestrial agent was noticed. Cycle shifts were abrupt, sometimes gaining half of their change in only a decade. (1)¶ Dozens of papers confirmed this cycle (at 1470-plus years) and determined it must have a solar cause. (2, 3, 4, 5)¶ But there is no 1,470 year solar cycle. There are, however, the 87-year Gleisberg and 210-year DeVries-Suess cycles of sunspot activity. Seven of the 210 year cycles and 17 of the 87 year cycles operating together produce an erratic 1,470-year solar cycle. (6)¶ How could sunspots affect our climate? Henrik Svensmark postulated that sunspots are associated with the suns magnetic field and it, together with solar flares, modulates galactic cosmic ray input to the atmosphere which may cause variations in the nucleation of low level clouds, affecting their reflectivity. (7)¶ Incontrovertible evidence of a link between cosmic rays and terrestrial temperature variability was discovered in 2001. (8)¶ In August, 2011 CERN released results of its first study, confirming the theory. (9)¶ Evidence of the Dansgaard-Oeschger cycle has been found going back a million years and accounts for the climate variations of the past 2,000 years including the Roman Warming, the Dark Ages cooling, the Medieval Climate Optimum, the Little Ice Age, and now the modern warming.¶ Projected forward this pattern suggests we are about 160 years into the next warming phase with a few centuries to go which will be followed by several centuries of cooling.¶ In 2003, Russian scientists Klyashtorin and Lyubishin identified a recurring 60-year cycle of **warming** and cooling (most likely related to the **Pacific Decadal Oscillation)** superimposed on Dansgaard-Oeschger, subsequently confirmed by other studies. (10, 11, 12)¶ This cycle accounts for the warming and cooling pattern of the last 150 years of temperature records including cooling 1882 to 1910, warming 1910 to 1944, cooling 1944 to 1975, and warming 1975 to 2001.¶ Projected forward, this suggests we are on the cusp of a slight 30-year cooling after which the **warming** will resume.¶ The studies briefly described here account for all past as well as current climate changes either of which the anthropogenic CO2 hypothesis absolutely cannot do.

### GCMs

#### Climate models are bunk—complexity of sea spray proves

Ogburn 13 (Stephanie Page Ogburn April 26th, 2013 http://www.eenews.net/climatewire/stories/1059980161)

For climate models, understanding how clouds form over the ocean, which covers 71 percent of the Earth's surface, and which droplets reflect radiation back out to space is important, because clouds have an overall cooling effect on the planet. Right now, said Vicki Grassian, chemistry professor at the University of Iowa and another author on the study, models represent the influence of sea spray on cloud formation incredibly poorly, because they treat it as just one thing: sodium chloride -- salt. "It's pretty clear that sea spray aerosol is not just sodium chloride and there is actually a different range of different chemical compositions in sea spray aerosol and in different particle types," she said. So while a lot of sodium chloride does come off the ocean, there are also a number of other particles that might behave exactly opposite of salt particles in terms of how they form clouds or reflect light, she said. Grassian likened the simplicity of this approach, in the climate models, to modeling the human body, which is made up primarily of water, as a shapeless blob of H2O. "There's so much you would miss!" she exclaimed. As for climate modelers, whose simplified system she is breaking apart, she says their response to the nuance she and others are finding in how sea spray behaves has been positive. "They love it." Stephen Schwartz, a senior scientist at Brookhaven National Laboratory and an expert on sea spray aerosols who was not involved with the research, called the new laboratory approach "a great way to go," especially because guest researchers can come and use the setup to do more work on sea spray aerosols.

#### Climate models are inaccurate

Weiner 1997 (JONATHAN BAERT WIENER, William R. and Thomas L. Perkins Professor of Law

Professor of Environmental Policy at Duke University School of Law, “Protecting the Global Environment,” in John D. Graham and Jonathan Baert Wiener, *Risk vs. Risk: Tradeoffs in Protecting Health and the Environment*. Cambridge, MA: Harvard U P, 1997: pp. 193-225)

Enormous computer models constructed to forecast the effect¶ of increasing levels of greenhouse gases such as carbon dioxide¶ (C02) on the earth's climate predict that if the amount of¶ CO2 in the atmosphere doubled from its preindustrial level¶ (about 275 parts per million (ppm]), global temperature would¶ rise about 1.5 to 4.5 degrees centigrade-a larger change than¶ recorded in the last 10,000 years (Schneider 1989). However,¶ numerous uncertainties and gaps in the computer models¶ have made these forecasts subject to challenge and periodic¶ recalculation, and debate has raged over the likelihood that¶ global warming will occur (for example, see Balling 1992).

#### Climate models are biased—overstate the impacts of warming.

McNider and Christy 14 (Richard McNider and John Christy February 19th 2014 The Wall Street Journal http://online.wsj.com/news/articles/SB10001424052702303945704579391611041331266 Messrs. McNider and Christy are professors of atmospheric science at the University of Alabama in Huntsville and fellows of the American Meteorological Society. Mr. Christy was a member of the Intergovernmental Panel on Climate Change that shared the 2007 Nobel Peace Prize with former Vice President Al Gore. Mr. Christy was a member of the Intergovernmental Panel on Climate Change that shared the 2007 Nobel Peace Prize with Vice President Al Gore)

Most of us who are skeptical about the dangers of climate change actually embrace many of the facts that people like Bill Nye, the ubiquitous TV "science guy," say we ignore. The two fundamental facts are that carbon-dioxide levels in the atmosphere have increased due to the burning of fossil fuels, and carbon dioxide in the atmosphere is a greenhouse gas, trapping heat before it can escape into space.What is not a known fact is by how much the Earth's atmosphere will warm in response to this added carbon dioxide. The warming numbers most commonly advanced are created by climate computer models built almost entirely by scientists who believe in catastrophic global warming. The rate of warming forecast by these models depends on many assumptions and engineering to replicate a complex world in tractable terms, such as how water vapor and clouds will react to the direct heat added by carbon dioxide or the rate of heat uptake, or absorption, by the oceans. We might forgive these modelers if their forecasts had not been so consistently and spectacularly wrong. From the beginning of climate modeling in the 1980s, these forecasts have, on average, always overstated the degree to which the Earth is warming compared with what we see in the real climate. For instance, in 1994 we published an article in the journal Nature showing that the actual global temperature trend was "one-quarter of the magnitude of climate model results." As the nearby graph shows, the disparity between the predicted temperature increases and real-world evidence has only grown in the past 20 years. When the failure of its predictions become clear, the modeling industry always comes back with new models that soften their previous warming forecasts, claiming, for instance, that an unexpected increase in the human use of aerosols had skewed the results. After these changes, the models tended to agree better with the actual numbers that came in—but the forecasts for future temperatures have continued to be too warm.

#### Computer models exaggerate warming—ignores benefits of CO2

**Wall Street Journal**, **12** (January 27, 20Claude Allegre, former director of the Institute for the Study of the Earth, University of Paris; J. Scott Armstrong, cofounder of the Journal of Forecasting and the International Journal of Forecasting; Jan Breslow, head of the Laboratory of Biochemical Genetics and Metabolism, Rockefeller University; Roger Cohen, fellow, American Physical Society; Edward David, member, National Academy of Engineering and National Academy of Sciences; William Happer, professor of physics, Princeton; Michael Kelly, professor of technology, University of Cambridge, U.K.; William Kininmonth, former head of climate research at the Australian Bureau of Meteorology; Richard Lindzen, professor of atmospheric sciences, MIT; James McGrath, professor of chemistry, Virginia Technical University; Rodney Nichols, former president and CEO of the New York Academy of Sciences; Burt Rutan, aerospace engineer, designer of Voyager and SpaceShipOne; Harrison H. Schmitt, Apollo 17 astronaut and former U.S. senator; Nir Shaviv, professor of astrophysics, Hebrew University, Jerusalem; Henk Tennekes, former director, Royal Dutch Meteorological Service; Antonio Zichichi, president of the World Federation of Scientists, Geneva)

**The lack of warming for more than a decade**—indeed, the smaller-than-predicted warming over the 22 years since the U.N.'s Intergovernmental Panel on Climate Change (IPCC) began issuing projections—**suggests that computer models have greatly exaggerated how much warming additional CO2 can cause**. Faced with this embarrassment, those promoting alarm have shifted their drumbeat from warming to weather extremes, to enable anything unusual that happens in our chaotic climate to be ascribed to CO2. The fact is that **CO2 is not a pollutant.** **CO2 is a** colorless and odorless gas, exhaled at high concentrations by each of us, and a **key component of the biosphere's life cycle**. Plants do so much better with more CO2 that **greenhouse operators often increase the CO2 concentrations by factors of three or four to get better growth**. This is no surprise since plants and animals evolved when CO2 concentrations were about 10 times larger than they are today**. Better plant varieties, chemical fertilizers and agricultural management contributed to the great increase in agricultural yields of the past century, but part of the increase almost certainly came from additional CO2 in the atmosphere.** Although the number of publicly dissenting scientists is growing, many young scientists furtively say that while they also have serious doubts about the global-warming message, they are afraid to speak up for fear of not being promoted—or worse. They have good reason to worry. In 2003, Dr. Chris de Freitas, the editor of the journal Climate Research, dared to publish a peer-reviewed article with the politically incorrect (but factually correct) conclusion that the recent warming is not unusual in the context of climate changes over the past thousand years. The international warming establishment quickly mounted a determined campaign to have Dr. de Freitas removed from his editorial job and fired from his university position. Fortunately, Dr. de Freitas was able to keep his university job. This is not the way science is supposed to work, but we have seen it before—for example, in the frightening period when Trofim Lysenko hijacked biology in the Soviet Union. Soviet biologists who revealed that they believed in genes, which Lysenko maintained were a bourgeois fiction, were fired from their jobs. Many were sent to the gulag and some were condemned to death. Why is there so much passion about global warming, and why has the issue become so vexing that the American Physical Society, from which Dr. Giaever resigned a few months ago, refused the seemingly reasonable request by many of its members to remove the word "incontrovertible" from its description of a scientific issue? There are several reasons, but a good place to start is the old question "cui bono?" Or the modern update, "Follow the money."

### Impact Mitigation

#### No Impact to Warming – Studies and History Prove

Jaworowski, ‘08 Z Chairman of the Scientific Council of the Central Laboratory for Radiological Protection in Warsaw and former chair of the United Nations Scientific Committee on the Effects of Atomic Radiation “Fear Propaganda, ”http://www.ourcivilisation.com/aginatur/cycles/chap3.htm”

The strongest fears of the population concern the melting of mountain glaciers and parts of the Greenland and Antarctic continental glaciers, which supposedly would lead to a rise in the oceanic level by 29 centimeters in 2030, and by 71 cm in 2070. Some forecasts predict that this increase of ocean levels could reach even 367 cm. In this view, islands, coastal regions, and large metropolitan cities would be flooded, and whole nations would be forced to migrate. On October 10, 1991, *The New York Times* announced that as soon as 2000, the rising ocean level would compel the emigration of a few million people. ¶ Doomsayers preaching the horrors of warming are not troubled by the fact that in **the Middle Ages, when for a few hundred years it was warmer than it is now, neither the Maldive atolls nor the Pacific archipelagos were flooded.** **Global oceanic levels** [**have been rising**](http://www.ourcivilisation.com/aginatur/sealevel.htm) **for some hundreds or thousands of years** (the causes of this phenomenon are not clear). In the last 100 years, this increase amounted to 10 cm to 20 cm, but it does not seem to be accelerated by the 20th Century warming. It turns out that in warmer climates, there is more water that evaporates from the ocean (and subsequently falls as snow on the Greenland and Antarctic ice caps) than there is water that flows to the seas from melting glaciers. **Since the 1970s, the glaciers of the Arctic, Greenland, and the Antarctic have ceased to retreat, and have started to grow.** On January 18, 2002, the journal *Science* published the results of satellite-borne radar and ice core studies performed by scientists from CalTech's Jet Propulsion Laboratory and the University of California at Santa Cruz. These results indicate that **the Antarctic ice flow has been slowed,** and sometimes even stopped, **and** that this **has resulted in the thickening of the continental glacier at a rate of 26.8 billion tons a year.** In 1999, a Polish Academy of Sciences paper was prepared as a source material for a report titled "*Forecast of the Defense Conditions for the Republic of Poland in 2001-2020*." The paper implied that the increase of atmospheric precipitation by 23% in Poland, which was presumed to be caused by global warming, would be detrimental. (Imagine stating this in a country where 38% of the area suffers from permanent surface water deficit!) The same paper also deemed an extension of the vegetation period by 60 to 120 days as a disaster. Truly, a possibility of doubling the crop rotation, or even prolonging by four months the harvest of radishes, makes for a horrific vision in the minds of the authors of this paper. Newspapers continuously write about the increasing frequency and power of the storms. The facts, however, speak otherwise. I cite here only some few data from Poland, but there are plenty of data from all over the world. In Cracow, in 1896-1995, the number of storms with hail and precipitation exceeding 20 millimeters has decreased continuously, and after 1930, the number of all storms decreased. In 1813 to 1994, the frequency and magnitude of floods of Vistula River in Cracow not only did not increase but, since 1940, have significantly decreased. Also, measurements in the Kolobrzeg Baltic Sea harbor indicate that the number of gales has not increased between 1901 and 1990. Similar observations apply to the 20th Century hurricanes over the Atlantic Ocean (See [*Mean Annual Maximum Wind Speed In Atlantic Hurricanes*](http://www.ourcivilisation.com/aginatur/cycles/fig4.htm),) and worldwide.

#### **Biosphere resilient, china proves**

Idso,Craig “Plantetary Carbon Sequestration: Earth’s Biosphere Flexes Its Muscles” http://www.co2science.org/articles/V17/N27/EDIT.php 2 July 2014

What is responsible for this largely unanticipated turn of events?  In a word, the biosphere.  Much like Rodney Dangerfield, "it don't get no respect."  For years environmentalists have warned us about how fragile earth's biosphere is; and in many cases dealing with specific species or ecosystems, they have been correct.  In its totality, however, the biosphere is much more resilient than most people give it credit for being.  As atmospheric CO2 - the lifeblood of the planet - has gradually risen over the course of the Industrial Revolution, for example, the biosphere has begun to reveal its true strength, with the plants of the planet growing ever more robustly and profusely, as they expand their ranges over the face of the earth and extract ever greater quantities of CO2 from the air and sequester its carbon in their tissues and the soil into which they sink their roots (Idso, 1995).

A good case in point is the vegetation of the coterminous United States.  Pacala et al. (2001) report in a recent article in Science that estimates of the country's 48-state carbon sequestering power have grown significantly over the past several years, from a range of 0.08-0.35 x 1015 grams of carbon per year (Pg C yr-1) in the 1980s to a range of 0.37-0.71 Pg C yr-1 today, with some evidence suggesting values as high as 0.81-0.84 Pg C yr-1 (Fan et al., 1998).  Likewise, we read in another report in the same issue of Science that carbon sequestration in China is growing like gangbusters as well (Fang et al., 2001).  With a little help from the government via several "ecological restoration projects" aimed primarily at afforestation and reforestation, the world's most populous country has turned around what had been a losing proposition with respect to carbon capture by forests to where it has now been increasing its forest carbon sequestration rate by an average of 0.021 Pg C yr-1 for about the last two decades.

Yes, we are by no means headed for a runaway atmospheric CO2 greenhouse effect, or even a runaway atmospheric CO2 concentration.

# CLIMATE CHANGE BAD

#### Warming is real and it’s anthropogenic—it’s almost certain

Bastasch 13 (Michael Bastasch September 27th 2013 <http://dailycaller.com/2013/09/27/u-n-climate-report-glosses-over-15-years-without-global-warming/> Michael Bastasch is a scientist that often contributes to the Daily Caller)

A U.N. bureaucracy’s newly released assessment on global warming does little to address the break in warming that has now lasted 15 years, saying that the time period is too short to reflect any long-term climate trends. Nevertheless, because the science is settled, the United Nations Intergovernmental Panel on Climate Change announces in the report that it is 95 percent certain [hu]mankind is the main driver behind rising temperatures. The report states: “Due to natural variability, trends based on short records are very sensitive to the beginning and end dates and do not in general reflect long-term climate trends,” reads the report. As one example, the rate of warming over the past 15 years (1998–2012; 0.05 [–0.05 to +0.15] °C per decade), which begins with a strong El Niño, is smaller than the rate calculated since 1951 (1951–2012; 0.12 [0.08 to 0.14] °C per decade).” “An old rule says that climate-relevant trends should not be calculated for periods less than around 30 years,” said Dr. Thomas Stocker of the University of Bern, co-chair of the I.P.C.C.’s working group that wrote the report.