# Warming Core

## \*\*\*\*\*Warming Bad Core\*\*\*\*\*

## \*\*\*Warming Bad— Mechanics

### Yes Warming – Real, Human Induced, Cuts Key

#### Warming is real and human induced – drastic emissions reductions are key to avoid dangerous climate disruptions

-now is key

-AR4 = IPCC

Somerville 11 – Professor of Oceanography @ UCSD

Richard Somerville, Distinguished Professor Emeritus and Research Professor at Scripps Institution of Oceanography at the University of California, San Diego, Coordinating Lead Author in Working Group I for the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

1n early 2007, at the time of the publication of WG1 of AR4, the mainstream global community of climate scientists already understood from the most recent research that the latest observations of climate change were disquieting. In the words of a research paper published at the same time as the release of AR4 WG1, a paper for which I am a co-author, "observational data underscore the concerns about global climate change. Previous projections, as summarized by IPCC, have **not exaggerated** but may in some respects even have **underestimated the change**" (Rahmstorf et al. 2007). Now, in 2011, more recent research and newer observations have demonstrated that climate change continues to occur, and in several aspects the magnitude and rapidity of observed changes frequently **exceed the estimates of earlier projections**, including those of AR4. In addition, the case for attributing much observed recent climate change to human activities is **even stronger now** than at the time of AR4. Several recent examples, drawn from many aspects of climate science, but especially emphasizing atmospheric phenomena, support this conclusion. These include temperature, atmospheric moisture content, precipitation, and other aspects of the hydrological cycle. Motivated by the rapid progress in research, a recent scientific synthesis, The Copenhagen Diagnosis (Allison et al. 2009), has assessed recent climate research findings, including: -- Measurements show that the Greenland and Antarctic ice-sheets are losing mass and contributing to sea level rise. -- Arctic sea-ice has melted far beyond the expectations of climate models. -- Global sea level rise may attain or exceed 1 meter by 2100, with a rise of up to 2 meters considered possible. -- In 2008, global carbon dioxide emissions from fossil fuels were about 40% higher than those in 1990. -- At today's global emissions rates, if these rates were to be sustained unchanged, after only about 20 more years, the world will no **longer have a reasonable chance** of **limiting warming** to less than 2 degrees Celsius, or 3.6 degrees Fahrenheit, above 19th-century pre-industrial temperature levels, This is a much- discussed goal for a maximum allowable degree of climate change, and this aspirational target has now been formally adopted by the European Union and is supported by many other countries, as expressed, for example, in statements by both the G-8 and G-20 groups of nations. The Copenhagen Diagnosis also cites research supporting the position that, in order to have a reasonable likelihood of avoiding the risk of **dangerous climate disruption**, defined by this 2 degree Celsius (or 3.6 degree Fahrenheit) limit, global emissions of greenhouse gases such as carbon dioxide must peak and then start to **decline rapidly** within the next five to ten years, reaching near zero well within this century.

### Yes Warming – Human Induced

#### Warming is real and human induced – consensus is on our side – numerous studies prove

Rahmstorf 8 – Professor of Physics of the Oceans

Richard, of Physics of the Oceans at Potsdam University, Global Warming: Looking Beyond Kyoto, Edited by Ernesto Zedillo, “Anthropogenic Climate Change?,” pg. 42-4

It is time to turn to statement B: human activities are altering the climate. This can be broken into two parts. The first is as follows: global climate is warming. This is by now a generally undisputed point (except by novelist Michael Crichton), so we deal with it only briefly. The two leading compilations of data measured with thermometers are shown in figure 3-3, that of the National Aeronautics and Space Administration (NASA) and that of the British Hadley Centre for Climate Change. Although they differ in the details, due to the inclusion of different data sets and use of different spatial averaging and quality control procedures, they both show a consistent picture, with a global mean warming of 0.8°C since the late nineteenth century. Temperatures over the past ten years clearly were the warmest since measured records have been available. The year 1998 sticks out well above the longterm trend due to the occurrence of a major El Nino event that year (the last El Nino so far and one of the strongest on record). These events are examples of the largest natural climate variations on multiyear time scales and, by releasing heat from the ocean, generally cause positive anomalies in global mean temperature. It is remarkable that the year 2005 rivaled the heat of 1998 even though no El Nino event occurred that year. (A bizarre curiosity, perhaps worth mentioning, is that several prominent "climate skeptics" recently used the extreme year 1998 to claim in the media that global warming had ended. In Lindzen's words, "Indeed, the absence of any record breakers during the past seven years is statistical evidence that temperatures are not increasing.")33 In addition to the surface measurements, the more recent portion of the global warming trend (since 1979) is also documented by satellite data. It is not straightforward to derive a reliable surface temperature trend from satellites, as they measure radiation coming from throughout the atmosphere (not just near the surface), including the stratosphere, which has strongly cooled, and the records are not homogeneous' due to the short life span of individual satellites, the problem of orbital decay, observations at different times of day, and drifts in instrument calibration.' Current analyses of these satellite data show trends that are fully consistent with surface measurements and model simulations." If no reliable temperature measurements existed, could we be sure that the climate is warming? The "canaries in the coal mine" of climate change (as glaciologist Lonnie Thompson puts it) ~are mountain glaciers. We know, both from old photographs and from the position of the terminal moraines heaped up by the flowing ice, that mountain glaciers have been in retreat all over the world during the past century. There are precious few exceptions, and they are associated with a strong increase in precipitation or local cooling.36 I have inspected examples of shrinking glaciers myself in field trips to Switzerland, Norway, and New Zealand. As glaciers respond sensitively to temperature changes, data on the extent of glaciers have been used to reconstruct a history of Northern Hemisphere temperature over the past four centuries (see figure 3-4). Cores drilled in tropical glaciers show signs of recent melting that is unprecedented at least throughout the Holocene-the past 10,000 years. Another powerful sign of warming, visible clearly from satellites, is the shrinking Arctic sea ice cover (figure 3-5), which has declined 20 percent since satellite observations began in 1979. While climate clearly became warmer in the twentieth century, much discussion particularly in the popular media has focused on the question of how "unusual" this warming is in a longer-term context. While this is an interesting question, it has often been mixed incorrectly with the question of causation. Scientifically, how unusual recent warming is-say, compared to the past millennium-in itself contains little information about its cause. Even a highly unusual warming could have a natural cause (for example, an exceptional increase in solar activity). And even a warming within the bounds of past natural variations could have a predominantly anthropogenic cause. I come to the question of causation shortly, after briefly visiting the evidence for past natural climate variations. Records from the time before systematic temperature measurements were collected are based on "proxy data," coming from tree rings, ice cores, corals, and other sources. These proxy data are generally linked to local temperatures in some way, but they may be influenced by other parameters as well (for example, precipitation), they may have a seasonal bias (for example, the growth season for tree rings), and high-quality long records are difficult to obtain and therefore few in number and geographic coverage. Therefore, there is still substantial uncertainty in the evolution of past global or hemispheric temperatures. (Comparing only local or regional temperature; as in Europe, is of limited value for our purposes,' as regional variations can be much larger than global ones and can have many regional causes, unrelated to global-scale forcing and climate change.) The first quantitative reconstruction for the Northern Hemisphere temperature of the past millennium, including an error estimation, was presented by Mann, Bradley, and Hughes and rightly highlighted in the 2001 IPCC report as one of the major new findings since its 1995 report; it is shown in figure 3\_6.39 The analysis suggests that, despite the large error bars, twentieth-century warming is indeed highly unusual and probably was unprecedented during the past millennium. This result, presumably because of its symbolic power, has attracted much criticism, to some extent in scientific journals, but even more so in the popular media. The hockey stick-shaped curve became a symbol for the IPCC, .and criticizing this particular data analysis became an avenue for some to question the credibility of the IPCC. Three important things have been overlooked in much of the media coverage. First, even if the scientific critics had been right, this would not have called into question the very cautious conclusion drawn by the IPCC from the reconstruction by Mann, Bradley, and Hughes: "New analyses of proxy data for the Northern Hemisphere indicate that the increase in temperature in the twentieth century is likely to have been the largest of any century during the past 1,000 years." This conclusion has since been supported further by every single one of close to a dozen new reconstructions (two of which are shown in figure 3-6).Second, by far the most serious scientific criticism raised against Mann, Hughes, and Bradley was simply based on a mistake. 40 The prominent paper of von Storch and others, which claimed (based on a model test) that the method of Mann, Bradley, and Hughes systematically underestimated variability, "was [itself] based on incorrect implementation of the reconstruction procedure."41 With correct implementation, climate field reconstruction procedures such as the one used by Mann, Bradley, and Hughes have been shown to perform well in similar model tests. Third, whether their reconstruction is accurate or not has no bearing on policy. If their analysis underestimated past natural climate variability, this would certainly not argue for a smaller climate sensitivity and thus a lesser concern about the consequences of our emissions. Some have argued that, in contrast, it would point to a larger climate sensitivity. While this is a valid point in principle, it does not apply in practice to the climate sensitivity estimates discussed herein or to the range given by IPCC, since these did not use the reconstruction of Mann, Hughes, and Bradley or any other proxy records of the past millennium. Media claims that "a pillar of the Kyoto Protocol" had been called into question were therefore misinformed. As an aside, the protocol was agreed in 1997, before the reconstruction in question even existed. The overheated public debate on this topic has, at least, helped to attract more researchers and funding to this area of paleoclimatology; its methodology has advanced significantly, and a number of new reconstructions have been presented in recent years. While the science has moved forward, the first seminal reconstruction by Mann, Hughes, and Bradley has held up remarkably well, with its main features reproduced by more recent work. Further progress probably will require substantial amounts of new proxy data, rather than further refinement of the statistical techniques pioneered by Mann, Hughes, and Bradley. Developing these data sets will require time and substantial effort. It is time to address the final statement: most of the observed warming over the past fifty years is anthropogenic. A large number of studies exist that have taken different approaches to analyze this issue, which is generally called the "attribution problem." I do not discuss the exact share of the anthropogenic contribution (although this is an interesting question). By "most" I imply mean "more than 50 percent.”The first and crucial piece of evidence is, of course, that the magnitude of the warming is what is expected from the anthropogenic perturbation of the radiation balance, so anthropogenic forcing is able to explain all of the temperature rise. As discussed here, the rise in greenhouse gases alone corresponds to 2.6 W/tn2 of forcing. This by itself, after subtraction of the observed 0'.6 W/m2 of ocean heat uptake, would Cause 1.6°C of warming since preindustrial times for medium climate sensitivity (3"C). With a current "best guess'; aerosol forcing of 1 W/m2, the expected warming is O.8°c. The point here is not that it is possible to obtain the 'exact observed number-this is fortuitous because the amount of aerosol' forcing is still very' uncertain-but that the expected magnitude is roughly right. There can be little doubt that the anthropogenic forcing is large enough to explain most of the warming. Depending on aerosol forcing and climate sensitivity, it could explain a large fraction of the warming, or all of it, or even more warming than has been observed (leaving room for natural processes to counteract some of the warming). The second important piece of evidence is clear: there is no viable alternative explanation. In the scientific literature, no serious alternative hypothesis has been proposed to explain the observed global warming. Other possible causes, such as solar activity, volcanic activity, cosmic rays, or orbital cycles, are well observed, but they do not show trends capable of explaining the observed warming. Since 1978, solar irradiance has been measured directly from satellites and shows the well-known eleven-year solar cycle, but no trend. There are various estimates of solar variability before this time, based on sunspot numbers, solar cycle length, the geomagnetic AA index, neutron monitor data, and, carbon-14 data. These indicate that solar activity probably increased somewhat up to 1940. While there is disagreement about the variation in previous centuries, different authors agree that solar activity did not significantly increase during the last sixty-five years. Therefore, this cannot explain the warming, and neither can any of the other factors mentioned. Models driven by natural factors only, leaving the anthropogenic forcing aside, show a cooling in the second half of the twentieth century (for an example, See figure 2-2, panel a, in chapter 2 of this volume). The trend in the sum of natural forcings is downward.The only way out would be either some as yet undiscovered unknown forcing or a warming trend that arises by chance from an unforced internal variability in the climate system. The latter cannot be completely ruled out, but has to be considered highly unlikely. No evidence in the observed record, proxy data, or current models suggest that such internal variability could cause a sustained trend of global warming of the observed magnitude. As discussed, twentieth century warming is unprecedented over the past 1,000 years (or even 2,000 years, as the few longer reconstructions available now suggest), which does not 'support the idea of large internal fluctuations. Also, those past variations correlate well with past forcing (solar variability, volcanic activity) and thus appear to be largely forced rather than due to unforced internal variability." And indeed, it would be difficult for a large and sustained unforced variability to satisfy the fundamental physical law of energy conservation. Natural internal variability generally shifts heat around different parts of the climate system-for example, the large El Nino event of 1998, which warmed, the atmosphere by releasing heat stored in the ocean. This mechanism implies that the ocean heat content drops as the atmosphere warms. For past decades, as discussed, we observed the atmosphere warming and the ocean heat content increasing, which rules out heat release from the ocean as a cause of surface warming. The heat content of the whole climate system is increasing, and there is no plausible source of this heat other than the heat trapped by greenhouse gases. ' A completely different approach to attribution is to analyze the spatial patterns of climate change. This is done in so-called fingerprint studies, which associate particular patterns or "fingerprints" with different forcings. It is plausible that the pattern of a solar-forced climate change differs from the pattern of a change caused by greenhouse gases. For example, a characteristic of greenhouse gases is that heat is trapped closer to the Earth's surface and that, unlike solar variability, greenhouse gases tend to warm more in winter, and at night. Such studies have used different data sets and have been performed by different groups of researchers with different statistical methods. They consistently conclude that the observed spatial pattern of warming can only be explained by greenhouse gases.49 Overall, it has to be considered, highly likely' that the observed warming is indeed predominantly due to the human-caused increase in greenhouse gases. ' This paper discussed the evidence for the anthropogenic increase in atmospheric CO2 concentration and the effect of CO2 on climate, finding that this anthropogenic increase is proven beyond reasonable doubt and that a mass of evidence points to a CO2 effect on climate of 3C ± 1.59C global-warming for a doubling of concentration. (This is, the classic IPCC range; my personal assessment is that, in-the light of new studies since the IPCC Third Assessment Report, the uncertainty range can now be narrowed somewhat to 3°C ± 1.0C) This is based on consistent results from theory, models, and data analysis, and, even in the absence-of any computer models, the same result would still hold based on physics and on data from climate history alone. Considering the plethora of consistent evidence, the chance that these conclusions are wrong has to be considered minute. If the preceding is accepted, then it follows logically and incontrovertibly that a further increase in CO2 concentration will lead to further warming. The magnitude of our emissions depends on human behavior, but the climatic response to various emissions scenarios can be computed from the information presented here. The result is the famous range of future global temperature scenarios shown in figure 3\_6.50 Two additional steps are involved in these computations: the consideration of anthropogenic forcings other than CO2 (for example, other greenhouse gases and aerosols) and the computation of concentrations from the emissions. Other gases are not discussed here, although they are important to get quantitatively accurate results. CO2 is the largest and most important forcing. Concerning concentrations, the scenarios shown basically assume that ocean and biosphere take up a similar share of our emitted CO2 as in the past. This could turn out to be an optimistic assumption; some models indicate the possibility of a positive feedback, with the biosphere turning into a carbon source rather than a sink under growing climatic stress. It is clear that even in the more optimistic of the shown (non-mitigation) scenarios, global temperature would rise by 2-3°C above its preindustrial level by the end of this century. Even for a paleoclimatologist like myself, this is an extraordinarily high temperature, which is very likely unprecedented in at least the past 100,000 years. As far as the data show, we would have to go back about 3 million years, to the Pliocene, for comparable temperatures. The rate of this warming (which is important for the ability of ecosystems to cope) is also highly unusual and unprecedented probably for an even longer time. The last major global warming trend occurred when the last great Ice Age ended between 15,000 and 10,000 years ago: this was a warming of about 5°C over 5,000 years, that is, a rate of only 0.1 °C per century. 52 The expected magnitude and rate of planetary warming is highly likely to come with major risk and impacts in terms of sea level rise (Pliocene sea level was 25-35 meters higher than now due to smaller Greenland and Antarctic ice sheets), extreme events (for example, hurricane activity is expected to increase in a warmer climate), and ecosystem loss. The second part of this paper examined the evidence for the current warming of the planet and discussed what is known about its causes. This part showed that global warming is already a measured and-well-established fact, not a theory. Many different lines of evidence consistently show that most of the observed warming of the past fifty years was caused by human activity. Above all, this warming is exactly what would be expected given the anthropogenic rise in greenhouse gases, and no viable alternative explanation for this warming has been proposed in the scientific literature. Taken together., the very strong evidence accumulated from thousands of independent studies, has over the past decades convinced virtually every climatologist around the world (many of whom were initially quite skeptical, including myself) that anthropogenic global warming is a reality with which we need to deal.

#### Warming is anthropogenic – new ocean study overwhelms doubt

**Johnson 12—earth science professor**

 Scott K. “Yet another study confirms global warming is human-caused,” [<http://arstechnica.com/science/2012/06/yet-another-study-confirms-global-warming-is-human-caused/>] June 18

One of the ways in which climate scientists evaluate the role of anthropogenic greenhouse emissions in the recent warming of Earth’s climate is to run climate models both with and without human activities. By comparing the results of each to the observed temperature trend, these “fingerprinting” studies can show how much of the temperature record can be explained by natural factors (such as solar activity and volcanic eruptions). This has commonly been applied to trends in atmospheric temperatures ([as shown](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/figure-9-5.html) in the 2007 IPCC report), where it’s clear that the observed warming wouldn’t have happened without rising greenhouse gases. Increasingly reliable records of ocean temperatures have now allowed some of these same researchers to confidently apply the technique to Earth’s seas. This is important because some 90 percent of all the energy trapped by human greenhouse emissions has ended up in the ocean, not the atmosphere. The trend with ocean heat content is clear—[it’s rising](http://www.agu.org/pubs/crossref/2012/2012GL051106.shtml). The question is whether that rise could be caused by natural variations. Researchers averaged the results from a number of climate models, and compared that to global temperature records for the upper 700 meters of the ocean from 1960 to 1999. The temperature record is less complete for the deep ocean, and its massive volume and separation from the surface subdues its response to climatic changes. In addition to the global average, they also analyzed each of the major ocean basins (North and South Atlantic, North and South Pacific, North and South Indian) separately. They found that the anthropogenic “fingerprint” was apparent in the observed temperature record at the 99 percent confidence level. That means the observed warming is beyond the variability seen in model simulations where greenhouse gases are kept constant, but is exactly what the models predict for a world in which humans change the composition of the atmosphere. That result should hardly be a surprise at this point (though it is important). Perhaps it's more interesting to look at the differences between ocean basins. The Atlantic Ocean is warming considerably faster than the others—especially the North Atlantic, which is warming at about double the global average rate. This behavior, too, was simulated by the models. This actually isn’t the first study to find an anthropogenic ”fingerprint” in ocean temperatures. However, previous work was limited to individual ocean basins and comparisons with just a couple of climate models. By utilizing multiple global data sets of ocean temperature (in which researchers have carefully accounted for the various measurement methods that have been used) and a larger number of the models that were used for the last IPCC report, this study has generated the strongest analysis to date.

### Yes Warming – Consensus

#### Vast scientific consensus warming exists, and is human induced

Monbiot 7 – Professor @ Oxford

George, Professor @ Oxford Brookes University, Heat: How to Stop the Planet from Burning, pg. 5

But the link has also been established directly. A study of ocean warming over the past forty years, for example, published in the journal Science in 2005, records a precise match between the distribution of heat and the intensity of manmade carbon dioxide emissions. Its lead author described his findings thus: The evidence is so strong that it should put an end to any debate about whether humanity is causing global warming." This sounds like a strong statement, but he is not alone. In 2004, another article in Science reported the results of a survey of scientific papers containing the words 'global climate change." The author found 928 of them on the database she searched, **'None of the papers**, she discovered, **disagreed with the consensus position…**Politicians, economists, journalists and others may have the impression of confusion, disagreement, or discord among climate scientists, but **that impression is incorrect**. In 2001 the Royal Society, the United Kingdom's pre-eminent scientific institution, published the following statement: Despite increasing consensus on the science underpinning predictions of global climate change, doubts have been expressed recently about the need to mitigate the risks posed by global climate change. We do not consider such doubts justified. It was also signed by the equivalent organisations in fifteen other countries."' Similar statements have been published by the US National Academy of Sciences, the American Meteorological Society, the American Geophysical Union" and the American Association for the Advancement of Science."

### Yes Warming – AT: Cooling Now

#### Short-term years of cooling don’t disprove the warming trend

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The 2007 IPCC Fourth Assessment Report (AR4) described "an unambiguous picture of the ongoing warming of the climate system." This trend is continuing. Small year-to-year differences in global average temperatures are unimportant in evaluating long-term trends. During a warming trend, a given year is not always warmer than all the previous years, because the ongoing warming is sometimes temporarily masked by internal climate variability, a normal and natural phenomenon. For example, 2008 was slightly cooler globally than 2007, in part because a La Nina occurred in 2008 (NASA Goddard Institute for Space Studies, 2009). Such natural events can lead to slight temporary cooling. Solar output was also at its lowest level of the satellite era, another temporary cooling influence. Quantitatively, the global average near-surface atmospheric temperature in 2008 was only about 0.1 deg C less than in the years immediately preceding it. Such a small difference over such a short time is not statistically significant in evaluating trends. It is noteworthy that 2008, while at the time it may have been the coolest year since 2000, was one of the ten warmest years since instrumental records began in mid-19th century, and the most recent ten-year period is still warmer than the previous ten-year period. The **long-term trend is clearly still a warming trend** (NASA Goddard Institute for Space Studies, 2009). Its magnitude is about 0.2 degrees Celsius per decade, consistent with IPCC AR4 projections. This is equivalent to about one third of a degree Fahrenheit per decade.

### Yes Warming – Prefer Our Evidence

#### Climate consensus is real – climate skeptics hyperbolize difference

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It is a standard tactic of many climate "skeptics" or "contrarians" (terms commonly used to denote those who reject central findings of mainstream climate change science) to try to frame this issue in terms of the whole edifice of modern climate science hanging from some slender thread. Thus, if a given scientist uses intemperate language, or a particular measurement is missing from an archive, or a published paper has a minor mistake in it, the **whole unstable scientific structure comes tumbling down**, or so the skeptics would have people believe. In fact, climate change science is **not at all fragile or vulnerable**, and there are multiple lines of evidence in support of every one of its main conclusions. That is what the 2007 IPCC AR4 report says. It remains definitive. Historians of science tell us that the overwhelming degree of scientific agreement on climate change is rare for such a complex issue. A Galileo does come along every few hundred years to reveal fundamental errors in the prevailing understanding and thus to revolutionize a branch of science. However, almost all the people who think they are a Galileo are simply wrong. Facts matter.

### Yes Warming – AT: Climategate

#### Climategate doesn’t disprove consensus – media cherry-picking and letters are taken out of context

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In late November 2009, at about the same time that The Copenhagen Diagnosis was released, a crime was committed in which thousands of emails of prominent climate scientists were illegally obtained from a server at the University of East Anglia in the United Kingdom. These emails, which appear to be authentic, were published online and extensively discussed in the press and the blogosphere. Extremely serious questions were immediately raised. Is the science of global warming indeed valid, or has it been proven fundamentally incorrect by this episode of emails stolen from a climate research center in England? The short answer is that the hacked emails **do not undermine** the science in any way. There is no doubt that the emails have embarrassed several climate scientists. Writing what they thought were private messages to their close colleagues, they expressed themselves in intemperate language. Angered by what they regarded as intolerable harassment by repeated and unreasonable demands from some of their critics, they lashed out and expressed extreme frustration in these private emails to one another. Edited excerpts from the emails do read poorly, especially out of context, and they might lead some people to conclude that climate research must involve biased, power-hungry, and unprincipled scientists. Following the release of the emails, many in the blogosphere and media, and some politicians, immediately appointed themselves prosecutor, judge and jury. There was little chance to mount a defense in this rush to judgment. Time has now passed. During the year following the release of the emails, several independent investigations were carried out, and we now have the results of these inquiries. The outcome of **all of these investigations** has been to exonerate the scientists from accusations of fraud, incompetence, and dishonesty. Many of the specific charges made against the scientists have been shown to be entirely false. For example, cherry-picked words like "trick" turn out to be innocent jargon. In science, a "trick" is not an underhanded tactic to conceal the truth. It is simply a clever way to solve a technical problem, like finding solutions to certain equations. "Trick" here is a jargon term, a word that means one thing to scientists, something else to bridge players, and something altogether different to dog trainers. Context matters.

### Yes Warming – AT: “We Have Peer Reviewed Evidence”

#### A single peer-reviewed study doesn’t disprove overall consensus

Mann and Schmidt 5 – Both professors @ Major Research institutions

Michael, Professor of Climatology @ Penn State University, Gavin, Professor of Research Science @ Columbia, 1-2005, “Peer Review: A Necessary But Not Sufficient Condition,” http://www.realclimate.org/index.php/archives/2005/01/peer-review-a-necessary-but-not-sufficient-condition/

The current thinking of scientists on climate change is based on thousands of studies (Google Scholar gives 19,000 scientific articles for the full search phrase “global climate change”). Any new study will be **one small grain of evidence** that adds to this big pile, and it will shift the thinking of scientists slightly. Science proceeds like this in a slow, incremental way. It is extremely unlikely that any new study will immediately overthrow all the past knowledge. So even if the conclusions of the Shaviv and Veizer (2003) study discussed earlier, for instance, had been correct, this would be one small piece of evidence pitted against hundreds of others which contradict it. Scientists would find the apparent contradiction interesting and worthy of further investigation, and would devote further study to isolating the source of the contradiction. They would not suddenly throw out all previous results. Yet, one often gets the impression that scientific progress consists of a series of revolutions where scientists discard all their past thinking each time a new result gets published. This is often because only a small handful of high-profile studies in a given field are known by the wider public and media, and thus unrealistic weight is attached to those studies. New results are often over-emphasised (sometimes by the authors, sometimes by lobby groups) to make them sound important enough to have news value. Thus “bombshells” usually end up being duds.

### Yes Positive Feedbacks

#### Warming creates positive feedbacks – exponentially increases the impact – on the brink

Hansen 8 – Professor of Earth and Environmental Science

James E. Hanson, head of the NASA Goddard Institute for Space Studies in New York City and adjunct professor in the Department of Earth and Environmental Science at Columbia University, Al Gore’s science advisor, “Briefing before the Select Committee on Energy Independence and Global Warming,” US House of Representatives, 6-23-2008, “Twenty years later: tipping points near on global warming,” <http://www.columbia.edu/~jeh1/2008/TwentyYearsLater_20080623.pdf>

Fast feedbacks—changes that occur quickly in response to temperature change—amplify the initial temperature change, begetting additional warming. As the planet warms, fast feedbacks include more water vapor, which traps additional heat, and less snow and sea ice, which exposes dark surfaces that absorb more sunlight. Slower feedbacks also exist. Due to warming, forests and shrubs are moving poleward into tundra regions. Expanding vegetation, darker than tundra, absorbs sunlight and warms the environment. Another slow feedback is increasing wetness (i.e., darkness) of the Greenland and West Antarctica ice sheets in the warm season. Finally, as tundra melts, methane, a powerful greenhouse gas, is bubbling out. Paleoclimatic records confirm that the long-lived greenhouse gases— methane, carbon dioxide, and nitrous oxide—all increase with the warming of oceans and land. These positive feedbacks amplify climate change over decades, centuries, and longer. The predominance of positive feedbacks explains why Earth’s climate has historically undergone large swings: feedbacks work in both directions, amplifying cooling, as well as warming, forcings. In the past, feedbacks have caused Earth to be whipsawed between colder and warmer climates, even in response to weak forcings, such as slight changes in the tilt of Earth’s axis.2 The second fundamental property of Earth’s climate system, partnering with feedbacks, is the great inertia of oceans and ice sheets. Given the oceans’ capacity to absorb heat, when a climate forcing (such as increased greenhouse gases) impacts global temperature, even after two or three decades, only about half of the eventual surface warming has occurred. Ice sheets also change slowly, although accumulating evidence shows that they can disintegrate within centuries or perhaps even decades. The upshot of the combination of inertia and feedbacks is that additional climate change is already “in the pipeline”: even if we stop increasing greenhouse gases today, more warming will occur. This is sobering when one considers the present status of Earth’s climate. Human civilization developed during the Holocene (the past 12,000 years). It has been warm enough to keep ice sheets off North America and Europe, but cool enough for ice sheets to remain on Greenland and Antarctica. With rapid warming of 0.6°C in the past 30 years, global temperature is at its warmest level in the Holocene.3 The warming that has already occurred, the positive feedbacks that have been set in motion, and the additional warming in the pipeline together have brought us to the **precipice of a planetary tipping point**. We are at the tipping point because the climate state includes large, ready positive feedbacks provided by the Arctic sea ice, the West Antarctic ice sheet, and much of Greenland’s ice. **Little additional forcing is needed** to trigger these feedbacks and magnify global warming. If we go over the edge, we will transition to an environment far outside the range that has been experienced by humanity, and there will be no return within any foreseeable future generation. Casualties would include more than the loss of indigenous ways of life in the Arctic and swamping of coastal cities. An intensified hydrologic cycle will produce both greater floods and greater droughts. In the US, the semiarid states from central Texas through Oklahoma and both Dakotas would become more drought-prone and ill suited for agriculture, people, and current wildlife. Africa would see a great expansion of dry areas, particularly southern Africa. Large populations in Asia and South America would lose their primary dry season freshwater source as glaciers disappear. A major casualty in all this will be wildlife.

#### Positive feedbacks magnify the impact to warming

Stern 7 – Professor of Economics and Government

Nicholas Stern, Head of the British Government Economic Service, Former Head Economist for the World Bank, I.G. Patel Chair at the London School of Economics and Political Science, “The Economics of Climate Change: The Stern Review”, The report of a team commissioned by the British Government to study the economics of climate change led by Siobhan Peters, Head of G8 and International Climate Change Policy Unit, Cambridge University Press, pg. 3

In the future, climate change itself could trigger additional increases in greenhouse gases in the atmosphere, further amplifying warming. These potentially powerful feedbacks are less well understood and only beginning to be quantified. Climate change projections must also take into account the strong possibility that climate change itself may accelerate future warming by reducing natural absorption and releasing stores of carbon dioxide and methane. These feedbacks are not incorporated into most climate models to date because their effects are only just beginning to be understood and quantified. Rising temperatures and changes in rainfall patterns are expected to weaken the ability of the Earth’s natural sinks to absorb carbon dioxide (Box 1.3), causing a larger fraction of human emissions to accumulate in the atmosphere. While this finding is not new, until recently the effect was not quantified. New models, which explicitly include interactions between carbon sinks and climate, suggest that by 2100, greenhouse gas concentrations will be 20 – 200 ppm higher than they would have otherwise been, amplifying warming by 0.1 – 1.5°C.21 Some models predict future reductions in tropical rainforests, particularly the Amazon, also releasing more carbon into the atmosphere22. Chapter 8 discusses the implications of weakened carbon sinks for stabilising greenhouse gas concentrations. Widespread thawing of permafrost regions is likely to add to the extra warming caused by weakening of carbon sinks. Large quantities of methane (and carbon dioxide) could be released from the thawing of permafrost and frozen peat bogs. One estimate, for example, suggests that if all the carbon accumulated in peat alone since the last ice age were released into the atmosphere, this would raise greenhouse gas levels by 200 ppm CO2e.23 Additional emissions may be seen from warming tropical wetlands, but this is more uncertain. Together, wetlands and frozen lands store more carbon than has been released already by human activities since industrialisation began. Substantial thawing of permafrost has already begun in some areas; methane emissions have increased by 60% in northern Siberia since the mid-1970s24. Studies of the overall scale and timing of future releases are scarce, but initial estimates suggest that methane emissions (currently 15% of all emissions in terms of CO2 equivalent25) may increase by around 50% by 2100 (Box 1.3). Preliminary estimates suggest that these “positive feedbacks” could lead to an addition rise in temperatures of 1 - 2°C by 2100. Recent studies have used information from past ice ages to estimate how much extra warming would be produced by such feedbacks. Warming following previous ice ages triggered the release of carbon dioxide and methane from the land and oceans, raising temperatures by more than that expected from solar effects alone. If present day climate change triggered feedbacks of a similar size, temperatures in 2100 would be 1 - 2°C higher than expected from the direct warming caused by greenhouse gases.26 There are still many unanswered questions about these positive feedbacks between the atmosphere, land and ocean. The combined effect of high climate sensitivity and carbon cycle feedbacks is only beginning to be explored, but first indications are that this could lead to far higher temperature increases than are currently anticipated (discussed in chapter 6). It remains unclear whether warming could initiate a self- perpetuating effect that would lead to a much larger temperature rise or even runaway warming, or if some unknown feedback could reduce the sensitivity substantially27. Further research is urgently required to quantify the combined effects of these types of feedbacks.

### Must Act Now

#### Must act now – solves risky and expensive solutions in crisis

Carnesale 11 – Professor of Engineering @ UCLA

Albert, PhD in Nuclear Engineering, UCLA Chancellor Emeritus, Professor of Public Policy and Mechanical and Aerospace Engineering, 3-2011, “America’s Climate Choices,” http://americasclimatechoices.org/ACC\_Final\_Report\_Brief04.pdf

In the judgment of this report’s authoring committee, the environmental, economic, and humanitarian risks posed by climate change indicate a pressing need for substantial action to limit the magnitude of climate change and to prepare for adapting to its impacts. There are many reasons why it is imprudent to delay such actions, for instance: • The sooner that serious efforts to reduce greenhouse gas emissions proceed, the lower the risks posed by climate change, and the less pressure there will be to make larger, more rapid, and potentially more expensive reductions later. • Some climate change impacts, once manifested, will persist for hundreds or even thousands of years, and will be difficult or impossible to “undo.” In contrast, many actions taken to respond to climate change could be reversed or scaled back, if they some how prove to be more stringent than actually needed.

#### Only action now solves future catastrophe

Antholis and Talbott 10 – Director and President @ Brookings

William Antholis, managing director of the Brookings Institution and a senior fellow in Governance Studies, former director of studies at the German Marshall Fund of the United States, and Strobe Talbott, president of the Brookings Institution, deputy Sec. of State under Clinton, “The Global Warming Tipping Point,” The Globalist, http://www.theglobalist.com/storyid.aspx?StoryId=8523

Moreover, we need to start reductions now in order to slow temperature rise later. Even if we could flip a switch and shut down all emissions, gases that are already in the atmosphere will continue to trap heat for some time to come. Once emitted into the atmosphere, a molecule of carbon dioxide, or CO2, lingers for decades. So gases emitted today are added to ones that have been around for 50 years or more. The current concentration of CO2 in the atmosphere is about 385 parts per million (ppm) and growing by two ppm each year. If we continue with current warming trends, the globe could keep warming for millennia. Even if the human species is biologically resilient enough to survive for centuries, the human enterprise may well be hard to maintain in anything like its current form. Today, humanity is cumulatively emitting, on a yearly basis, around 30 gigatons of CO2. A gigaton is a billion tons. Thirty gigatons is about the weight of 8,000 Empire State Buildings, which, if stacked one on top of another, would reach almost 2,000 miles into space. Of those 30 gigatons of CO2 that will be emitted this year, just under six gigatons are from the United States. To keep CO2 concentrations below 400 ppm and thereby keep temperature rise below 3.6°F, we should use the next four decades to cut the current output of 30 gigatons a year approximately in half. Thirty gigatons is about the weight of 8,000 Empire State Buildings, which, if stacked one on top of another, would reach almost 2,000 miles into space. So that is another target for mitigation: a staged process that would bring the global annual output down to 15 gigatons a year by 2050. To reach that goal, we have to build a new worldwide system for generating and using energy. We have to begin quickly in order to achieve the bulk of the necessary cuts between 2020 and 2035 so that there is some hope that, by 2050, emissions will have come down to 15 gigatons, concentrations will have stabilized below the 400 ppm level — and temperature rise will have flattened out before hitting the 3.6°F mark. At the heart of this mammoth undertaking is a transition from a high-carbon to a low-carbon global economy — that is, one that is powered as much as possible by forms of energy that do not burn fossil fuels and therefore do not pump CO2 into the atmosphere.

#### Acting now is key to avoiding tipping points

Strom 7 – Professor of Planetary Science @ U of Arizona

Robert Strom, studied climate change for 15 years, the former Director of the Space Imagery Center, Professor of planetary sciences @ U of Arizona, "Hot House", SpringerLink, p. 123

 We do not have time to spare. We must act now. Delaying action will require a much greater effort later to achieve the same temperature target. Even a 5-year delay is significant, given the current increase in C02 emissions. If action is delayed 20 years, rates of emission reduction will need to be 3 to 7 times greater to meet the same temperature target (Schellnhuber et al., 2006). In the absence of urgent and strenuous reduction in greenhouse gas emissions, the world will be committed to at least a 0.5 to 2 °C rise by 2050, and it could be considerably more because of the factors mentioned earlier. None of the greenhouse gas or temperature projections take into account the possibility of crossing a threshold that leads to an abrupt climate warming by the catastrophic release of natural greenhouse gases or some other cause. Although this is considered unlikely, we do not know in detail how these abrupt changes are triggered. Could the rise of atmospheric greenhouse gases and the complex interactions of other warming conditions set one of these events into motion? We do not know, but if it happened we would be in the **worst trouble imaginable**.

### Brink of Runaway Warming

#### Tipping points now – on the brink of runaway warming

Speth 8 – Dean of Yale school of Forestry

James, dean of the Yale School of Forestry and Environmental Studies at Yale University, New Haven, Connecticut. Currently he serves the school as the Carl W. Knobloch, Jr. Dean and Sara Shallenberger Brown Professor in the Practice of Environmental Policy, The Bridge @ the Edge of the World, pg. 26

The possibility of abrupt climate change is linked to what may be the most problematic possibility of all—"positive" feedback effects where the initial warming has effects that generate more warming. Several of these feedbacks are possible. First, the land's ability to store carbon could weaken. Soils and forests can dry out or burn and release carbon; less plant growth can occur, thus reducing nature's ability to remove carbon from the air. Second, carbon sinks in the oceans could also be reduced due to ocean warming and other factors. Third, the potent greenhouse gas methane could be released from peat bogs, wetlands, and thawing permafrost, and even from the methane hydrates in the oceans, as the planet warms and changes. Finally, the earth's albedo, the reflectivity of the earth's surface, is slated to be reduced as large areas now covered by ice and snow diminish or are covered by meltwater. All these effects would tend to **make warming self-reinforcing**, possibly leading to a greatly amplified greenhouse effect. The real possibility of these amplifying feedbacks has alarmed some of our top scientists. James Hansen, the courageous NASA climate scientist, is becoming increasingly outspoken as his investigations lead him to more and more disturbing conclusions. He offered the following assessment in 2007: "Our home planet is now **dangerously near a 'tipping point**.' Human-made greenhouse gases are near a level such that important climate changes may proceed mostly under the climate system's own momentum. Impacts would include **extermination of a large fraction of species on the planet**, shifting of climatic zones due to an intensified hydrologic cycle with effects on freshwater availability and human health, and repeated worldwide coastal tragedies associated with storms and a continuously rising sea level. .. . "Civilization developed during the Holocene, a period of relatively tranquil climate now almost 12,000 years in duration. The planet has been warm enough to keep ice sheets off North America and Europe, but cool enough for ice sheets on Greenland and Antarctica to be stable. Now, with rapid warming of o.6°C in the past 30 years, global temperature is at its warmest level in the Holocene. "This warming has brought us to the precipice of a great 'tipping point” If we go over the edge, it will be a transition to 'a different planet,' an environment far outside the range that has been experienced by humanity. There **will be no return** within the lifetime of any generation that can be imagined, and the trip will **exterminate a large fraction of species on the planet.**

## \*\*\*Warming Bad— Impacts

### Human Extinction

#### Warming leads to extinction

Burkett 8 – Professor of Law

Maxine Burkett, Associate Professor, University of Colorado Law School, 2008, “Just Solutions to Climate Change: A Climate Justice Proposal for a Domestic Clean Development Mechanism,” 56 Buffalo L. Rev. 169, Lexis

The unparalleled scale of impact the climate crisis has had, and will continue to have, on the globe has been forecasted for almost a century. 3 Most recently, the Intergovernmental Panel on Climate Change (IPCC) has concluded that the warming of the climate system is "unequivocal." 4 With this warming comes the threat of more [\*174] extreme weather, including more intense and longer droughts than have already been observed, 5 heavy precipitation including increased intensity of tropical cyclones, 6 and hot extremes and heat waves. 7 While these changes sound merely inconvenient and perhaps costly, they have been described by the IPCC Chairman, without hyperbole, as dangers that risk "**the ability of the human race to survive**." 8 In the short term, these extremes will risk the survival of communities that are ill-equipped to adapt to warming as they struggle to moderate and cope with its consequences.

#### Tipping points coming soon – risk extinction

Hamilton 10 – Professor of Public Ethics @ ANU

Clive Hamilton, Professor of Public Ethics in Australia, 2010, “Requiem for a Species: Why We Resist the Truth About Climate Change,” pg. 1-2

One of the most striking features of the global warming debate has been how, with each advance in climate science, the news keeps getting worse. Although temporarily slowed by the effects of the 2008 global financial crisis, the world's greenhouse gas emissions have been growing much faster than predicted in the 1990s. In addition, since 2005 a number of scientific papers have described the likelihood of the climate system passing significant 'tipping points' beyond which the warming process is reinforced by positive feedback mechanisms—small perturbations that cause large changes.1 This new understanding has upset the comforting idea of a 'dose—response' relationship between the amount of greenhouse gases we put into the atmosphere and the amount of global warming that follows. That idea has allowed us to believe that, although we may be slow to respond, once we decide to act we will be able to rescue the situation. In truth, it is likely that in the next decade or so, beginning with the melting of the Arctic's summer sea-ice, the Earth's climate will shift onto a new trajectory driven by 'natural' processes that will **take millenniums** to work themselves out. The paleoclimate record shows the Earth's climate often changing abruptly, flipping from one state to another, sometimes **within a few years**.2 It now seems almost certain that, if it has not occurred already, within the next several years enough warming will be locked in to the system to set in train feedback processes that will **overwhelm any attempts** we make to cut back on our carbon emissions. We will be powerless to stop the jump to a new climate on Earth, one much less sympathetic to life. The kind of climate that has allowed civilisation to flourish will be gone and humans will enter a **long struggle just to survive**.

#### Warming is an existential threat

Mazo 10 – PhD in Paleoclimatology from UCLA

Jeffrey Mazo, Managing Editor, Survival and Research Fellow for Environmental Security and Science Policy at the International Institute for Strategic Studies in London, 3-2010, “Climate Conflict: How global warming threatens security and what to do about it,” pg. 122

The best estimates for global warming to the end of the century range from 2.5-4.~C above pre-industrial levels, depending on the scenario. Even in the best-case scenario, the low end of the likely range is 1.goC, and in the worst 'business as usual' projections, which actual emissions have been matching, the range of likely warming runs from 3.1--7.1°C. Even keeping emissions at constant 2000 levels (which have already been exceeded), global temperature would still be expected to reach 1.2°C (O'9""1.5°C)above pre-industrial levels by the end of the century." Without early and severe reductions in emissions, the effects of climate change in the second half of the twenty-first century are **likely to be catastrophic** for the stability and security of countries in the developing world - not to mention the associated human tragedy. Climate change could even undermine the strength and stability of emerging and advanced economies, beyond the knock-on effects on security of widespread state failure and collapse in developing countries.' And although they have been condemned as melodramatic and alarmist, many informed observers believe that unmitigated climate change beyond the end of the century could pose an **existential threat** to civilisation." What is certain is that there is no precedent in human experience for such rapid change or such climatic conditions, and even in the best case adaptation to these extremes would mean profound social, cultural and political changes.

### Agriculture

#### Warming collapses agriculture

-this is comparative with the benefits from co2-induced yield increases

Field 11 – PhD in Biology from Stanford, Director, Department of Global Ecology Carnegie Institution for Science

Christopher, PhD in Biology from Stanford, Director, Department of Global Ecology Carnegie Institution for Science, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

Globally and in the US, advancements in agriculture are among the crowning accomplishments of human ingenuity. Especially over the last century, yields have increased dramatically ( Lobell et al. 2009 ), more than keeping pace with the growth of human population. One recent analysis concludes that agricultural intensification since 1961 has increased yields so much that the area in crops has not needed to change, even as demand has soared ( Burney et al. 2010 ). As a consequence, intensification of agriculture has prevented deforestation that otherwise would have emitted 161 billion tons of carbon to the atmosphere. Over recent decades, yields of most major crops have increased at 1-2% per year ( Lobell and Field 2007 ), but an increasing body of evidence indicates that obtaining these yield increases is becoming more and more difficult, as climate change acts to resist or reverse yield increases from improvements in management and breeding. Using global records of yield trends in the world's six major food crops since 1961, my colleague David Lobell and I ( Lobell and Field 2007 ) concluded that, at the global scale, effects of warming are already visible, with global yields of wheat, corn, and barley reduced since 1981 by **40 million tons per year** below the levels that would occur without the warming. As of 2002 (the last year analyzed in the study), this represents an economic loss of approximately $5 billion per year. In the United States, the observed temperature sensitivity of three major crops is even more striking. Based on a careful county-by county analysis of patterns of climate and yields of corn, soybeans, and cotton, Schlenker and Roberts ( Schlenker and Roberts 2009 ) concluded that observed **yields** from all farms and farmers are relatively insensitive to temperature up to a threshold but **fall rapidly** as temperatures rise above the threshold. For farms in the United States, the temperature threshold is 84F for corn, 86F for soybeans, and 90F for cotton. For corn, a single day at 104F instead of 84F reduces observed yields by about 7%. These temperature sensitivities are based on observed responses, including data from all of the US counties that grow cotton and all of the Eastern counties that grow corn or soybeans. These are not simulated responses. They are observed in the aggregate yields of thousands of farms in thousands of locations. The temperature sensitivity observed by Schlenker and Roberts ( Schlenker and Roberts 2009 ) suggests a challenging future for US agriculture. Unless we can develop varieties with improved heat tolerance, modest warming (based on the IPCC B1 scenario) by the end of the 21st century will reduce yields by 30-46%. With a high estimate of climate change (based on the IPCC A1FI scenario), the loss of yield is 63-82%. These three major crops, in some ways the core of US agriculture, are exquisitely sensitive to warming. This result is very clear. We may be able to breed warming tolerant varieties, and it is possible that some of the yield losses due to warming will be compensated by positive responses to elevated atmospheric CO2 ( Long et al. 2006 ), but we will be trying to improve yields in a setting where **warming is like an anchor pulling us back**.

#### Warming collapses agriculture – places billions at risk of food insecurity

Monbiot 7 – Professor of Economics @ Oxford

George, Professor @ Oxford Brookes University, Heat: How to Stop the Planet from Burning, pg. 6-7

But even a much smaller rise is likely to cause great harm to some human populations. Professor Martin Parry of the UK's Meteorological Office estimates that a rise of just 2.1° will expose **between 2.3 and 3 billion people** to the risk of water shortages. The disappearance of glaciers in the Andes and the Himalayas will imperil the people who depend on their meltwater, particularly in Pakistan, western China, Central Asia, Peru, Ecuador and Bolivia. As rainfall decreases, there arc likely to be longer and more frequent droughts in southern Africa, Australia and the countries surrounding the Mediterranean. In northern Europe, summer droughts and winter floods will both become more frequent. Very wet winters, for example, which until now have troubled us every forty years or so, could recur one year in every eight.'11 The UN Food and Agriculture Organisation warns that in some forty poor, developing countries, with a combined population of two billion . .. [crop] production losses due to climate change may drastically increase the number of undernourished people, severely hindering progress in combating poverty and food insecurity. The reason is that, in many parts of the tropics, crop plants are already close to their physiological limits. If, for example, temperatures stay above 35° for one hour while rice is flowering, the heat will sterilize the pollen." The International Rice Research Institute has found that rice yields fall by 15 per cent **with every degree of warming**.

### Economy

#### Warming collapses the economy

Burkett 8 – Professor of Law

Maxine Burkett, Associate Professor, University of Colorado Law School, 2008, “Just Solutions to Climate Change: A Climate Justice Proposal for a Domestic Clean Development Mechanism,” 56 Buffalo L. Rev. 169, Lexis

The EJ communities will also, of course, be subject to the more general and commonly cited negative effects of climate change; and, further aggravating these outcomes, the dire economic forecasts for the globe will be felt acutely by EJ communities. The environmental risks these communities disproportionately suffer, mentioned just above, acquire a more dangerous hue when income is taken into account. A report by noted economist Sir Nicholas Stern warns that unless urgent action is taken, the planet faces an economic calamity on the scale of the Great Depression and the world wars. 34 Using formal economic models, Stern [\*180] suggests that climate change will produce "market failure on the **greatest scale the world has seen**," 35 which should lead the world to grave concern. 36 This is particularly relevant to EJ communities, as the first and most severe effects of economic downturn are borne by the poor. 37 Less obvious climate change risks include increases in the costs of energy and food, employment restructuring within and across industries, and impacts on the uninsured. With respect to costs of basic goods, increases will come with clear, attendant disadvantages, as these costs already represent a large proportion of the budgets for the poor and of-color. 38 Employment restructuring, including layoffs and hiring freezes, with the "last hired, first fired" phenomenon, will certainly worsen the economic damage of global warming caused to individuals, families, and communities. 39 [\*181] Finally, warming will hit the uninsured hardest. At present, of the tens of millions of Americans who are without health insurance, for example, the rate for people of color is twice that for whites. 40 Natural disasters in EJ communities are particularly fierce, as many of the communities' residents are often renters, without renter's insurance, and lack savings to recover from disasters. 41 Additionally, low-income earners typically are without the resources to compensate for the lack of insurance. 42 These factors, according to the Intergovernmental Panel on Climate Change, will be critically important as education, health care, prevention initiatives, and infrastructure and economic development directly shape the health of populations. 43 Existing conditions suggest troubling, substantial impacts on domestic populations.

#### Warming collapses the economy and free trade

Dyer 9 – PhD in ME History

Gwynne, MA in Military History and PhD in Middle Eastern History former @ [Senior Lecturer](file://localhost/wiki/Senior_Lecturer) in War Studies at the [Royal Military Academy Sandhurst](file://localhost/wiki/Royal_Military_Academy_Sandhurst), Climate Wars

Among the non-linear political events Fuerth foresees in the event of severe climate change are class warfare "as the wealthiest members of every society pull away from the rest of the population;" an **end to globalization and the onset of rapid economic decline** owing to the collapse of financial and pro- . duction systems that depend on integrated worldwide systems; and the collapse of alliance systems and multilateral institu­tions, including the United Nations. He suggests that massive social upheavals will be accompanied by intense religious and ideological turmoil, in which the principal winners will be authoritarian ideologies and brands of religion that reject scien­tific rationalism. Even more disturbing (and persuasive) is his observation that "governments with resources will be forced to engage in long, nightmarish episodes of triage: deciding what and who can be salvaged from engulfment by a disordered envi­ronment. The choices will need to be made primarily among the poorest, not just abroad but at home. We have already pre­viewed the images, in the course of the organizational and spir­itual unravelling that was Hurricane Katrina. At progressively more extreme levels, the decisions will be increasingly harsh: morally agonizing to those who must make and execute them­but in the end, morally deadening."

### Biodiversity

#### Warming collapses biodiversity – outweighs all alternate causes

Hansen 8 – Professor of Earth Sciences @ Columbia

James E, Head of the NASA Goddard Institute for Space Studies in New York City and adjunct professor in the Department of Earth and Environmental Science at Columbia University. Al Gore’s science advisor. Introductory chapter for the book State of the Wild. “Tipping point: Perspective of a Scientist.” April. http://www.columbia.edu/~jeh1/2008/StateOfWild\_20080428.pdf

Climate change is emerging while the wild is stressed by other pressures— habitat loss, overhunting, pollution, and invasive species—and it will magnify these stresses. Species will respond to warming at differing paces, affecting many others through the web of ecological interactions. Phenological events, which are timed events in the life cycle that are usually tied to seasons, may be disrupted. Examples of phenological events include when leaves and flowers emerge and when animals depart for migration, breed, or hibernate. If species depend on each other during those times—for pollination or food— the pace at which they respond to warmer weather or precipitation changes may cause unraveling, cascading effects within ecosystems. Animals and plants respond to climate changes by expanding, contracting, or shifting their ranges. Isotherms, lines of a specific average temperature, are moving poleward by approximately thirty-five miles (56 km) per decade, meaning many species ranges may in turn shift at that pace.4 Some already are: the red fox is moving into Arctic fox territory, and ecologists have observed that 943 species across all taxa and ecosystems have exhibited measurable changes in their phenologies and/or distribution over the past several decades.5 However, their potential routes and habitat will be limited by geographic or human-made obstacles, and other species’ territories. Continued business-as-usual greenhouse gas emissions threaten many ecosystems, which together form the fabric of life on Earth and provide a wide range of services to humanity. Some species face extinction. The following examples represent a handful. Of particular concern are polar species, because they are being pushed off the planet. In Antarctica, Adelie and emperor penguins are in decline, as shrinking sea ice has reduced the abundance of krill, their food source.6 Arctic polar bears already contend with melting sea ice, from which they hunt seals in colder months. As sea ice recedes earlier each year, populations of polar bears in Canada have declined by about 20 percent, with the weight of females and the number of surviving cubs decreasing a similar amount. As of this writing, the US Fish and Wildlife Service is still considering protecting polar bears, but only after it was taken to court for failure to act on the mounting evidence that polar bears will suffer greatly due to global warming. 7 Life in many biologically diverse alpine regions is similarly in danger of being pushed off the planet. When a given temperature range moves up a mountain, the area with those climatic conditions becomes smaller and rockier, and the air thinner, resulting in a struggle for survival for some alpine species. In the Southwest US, the endemic Mount Graham red squirrel survives on a single Arizona mountain, an “island in the sky,” an isolated green spot in the desert. The squirrels, protected as an endangered species, had rebounded to a population of over 500, but their numbers have since declined to between 100 and 200 animals.8 Loss of the red squirrel will alter the forest because its middens are a source of food and habitat for chipmunks, voles, and mice. A new stress on Graham red squirrels is climatic: increased heat, drought, and fires. Heat-stressed forests are vulnerable to prolonged beetle infestation and catastrophic fires. Rainfall still occurs, but it is erratic and heavy, and dry periods are more intense. The resulting forest fires burn hotter, and the lower reaches of the forest cannot recover. In the marine world, loggerhead turtles are also suffering. These great creatures return to beaches every two to three years to bury a clutch of eggs. Hatchlings emerge after two months and head precariously to the sea to face a myriad of predators. Years of conservation efforts to protect loggerhead turtles on their largest nesting area in the US, stretching over 20 miles of Florida coastline, seemed to be stabilizing the South Florida subpopulation. 9 Now climate change places a new stress on these turtles. Florida beaches are increasingly lined with sea walls to protect against rising seas and storms. Sandy beaches seaward of the walls are limited and may be lost if the sea level rises substantially. Some creatures seem more adaptable to climate change. The armadillo, a prehistoric critter that has been around for over 50 million years, is likely to extend its range northward in the US. But the underlying cause of the climatic threat to the Graham red squirrel and other species—from grizzlies, whose springtime food sources may shift, to the isolated snow vole in the mountains of southern Spain—is “business-as-usual” use of fossil fuels. Predicted warming of several degrees Celsius would surely cause mass extinctions. Prior major warmings in Earth’s history, the most recent occurring 55 million years ago with the release of large amounts of Arctic methane hydrates,10 resulted in the extinction of half or more of the species then on the planet. Might the Graham red squirrel and snow vole be “saved” if we transplant them to higher mountains? They would have to compete for new niches— and there is a tangled web of interactions that has evolved among species and ecosystems. What is the prospect that we could understand, let alone reproduce, these complex interactions that create ecological stability? “Assisted migration” is thus an uncertain prospect. 11 The **best chance** for all species is a conscious choice by humans to pursue an **alternative energy scenario to** **stabilize the climate**.

#### Collapses half of all species

Stern 7 – Professor of Economics and Government

Nicholas- Head of the British Government Economic Service, Former Head Economist for the World Bank, I.G. Patel Chair at the London School of Economics and Political Science, “The Economics of Climate Change: The Stern Review”, The report of a team commissioned by the British Government to study the economics of climate change led by Siobhan Peters, Head of G8 and International Climate Change Policy Unit, Cambridge University Press, p. 79-81

Climate change is likely to occur too rapidly for many species to adapt. One study estimates that around 15 – 40% of species face extinction with 2°C of warming. Strong drying over the Amazon, as predicted by some climate models, would result in dieback of forest with the highest biodiversity on the planet. The warming of the 20th century has already directly affected ecosystems. Over the past 40 years, species have been moving polewards by 6 Km on average per decade, and seasonal events, such as flowering or egg-laying, have been occurring several days earlier each decade.72 Coral bleaching has become increasingly prevalent since the 1980s. Arctic and mountain ecosystems are acutely vulnerable – polar bears, caribou and white spruce have all experienced recent declines.73 Climate change has already contributed to the extinction of over 1 % of the world’s amphibian species from tropical mountains.74 Ecosystems will be highly sensitive to climate change (Table 3.4). For many species, the rate of warming will be too rapid to withstand. Many species will have to migrate across fragmented landscapes to stay within their “climate envelope” (at rates that many will not be able to achieve). Migration becomes more difficult with faster rates of warming. In some cases, the “climate envelope” of a species may move beyond reach, for example moving above the tops of mountains or beyond coastlines. Conservation reserves may find their local climates becoming less amenable to the native species. Other pressures from human activities, including land-use change, harvesting/hunting, pollution and transport of alien species around the world, have already had a dramatic effect on species and will make it even harder for species to cope with further warming. Since 1500, 245 extinctions have been recorded across most major species groups, including mammals, birds, reptiles, amphibians, and trees. A further 800 known species in these groups are threatened with extinction.7 A warming world will accelerate species extinctions and has the potential to lead to the irreversible loss of many species around the world, with most kinds of animals and plants affected (see below). Rising levels of carbon dioxide have some direct impacts on ecosystems and biodiversity,76 but increases in temperature and changes in rainfall will have even more profound effects. Vulnerable ecosystems are likely to disappear almost completely at even quite moderate levels of warming.77 The Arctic will be particularly hard hit, since many of its species, including polar bears and seals, will be very sensitive to the rapid warming predicted and substantial loss of sea ice (more detail in Chapter 5).78 1°C warming. At least 10% of land species could be facing extinction, according to one stud y.79 Coral reef bleaching will become much more frequent, with slow recovery, particularly in the southern Indian Ocean, Great Barrier Reef and the Caribbean.80 Tropical mountain habitats are very species rich and are likely to lose many species as suitable habitat disappears. 2°C warming. Around 15 – 40% of land species could be facing extinction, with most major species groups affected, including 25 – 60% of mammals in South Africa and 15 – 25% of butterflies in Australia. Coral reefs are expected to bleach annually in many areas, with most never recovering, affecting tens of millions of people that rely on coral reefs for their livelihood or food supply.81 This level of warming is expected to lead to the loss of vast areas of tundra and forest – almost half the low tundra and about one-quarter of the cool conifer forest according to one study. 82 3°C warming. Around 20 – 50% of land species could be facing extinction. Thousands of species may be lost in biodiversity hotspots around the world, e.g. over 40% of endemic species in some biodiversity hotspots such as African national parks and Queensland rain forest. 83 Large areas of coastal wetlands will be permanently lost because of sea level rise (up to one-quarter according to some estimates), with acute risks in the Mediterranean, the USA and South East Asia. Mangroves and coral reefs are at particular risk from rapid sea level rise (more than 5 mm per year) and their loss would remove natural coastal defences in many regions. Strong drying over the Amazon, according to some climate models, would result in dieback of forest with the highest biodiversity on the planet. 84 Temperatures could rise by more than 4 or 5°C if emissions continue unabated, but the full range of consequences at this level of warming have not been clearly articulated to date. Nevertheless, a basic understanding of ecological processes leads quickly to the conclusion that many of the ecosystem effects will become compounded with increased levels of warming, particularly since small shifts in the composition of ecosystems or the timing of biological events will have knock-on effects through the food- chain (e.g. loss of pollinators or food supply).85

### Disease

#### Warming leads to disease spread

Stern 7 – Professor of Economics and Government

Nicholas Stern, Head of the British Government Economic Service, Former Head Economist for the World Bank, I.G. Patel Chair at the London School of Economics and Political Science, “The Economics of Climate Change: The Stern Review”, The report of a team commissioned by the British Government to study the economics of climate change led by Siobhan Peters, Head of G8 and International Climate Change Policy Unit, Cambridge University Press, pg. 74-76

Climate change will increase worldwide deaths from malnutrition and heat stress. Vector-borne diseases such as malaria and dengue fever could become more widespread if effective control measures are not in place. In higher latitudes, cold-related deaths will decrease. Climate-sensitive aspects of human health make up a significant proportion of the global disease burden and may grow in importance.46 The health of the world’s population has improved remarkably over the past 50 years, although striking disparities remain .47 Slum populations in urban areas are particularly exposed to disease, suffering from poor air quality and heat stress, and with limited access to clean water. In some tropical areas, temperatures may already be at the limit of human tolerance. Peak temperatures in the Indo-Gangetic Plain often already exceed 45°C before the arrival of the monsoon .48 In contrast, in northern latitudes (Europe, Russia, Canada, United States), global warming may imply fewer deaths overall, because more people are saved from cold-related death in the winter than succumb to heat- related death in the summer (Figure 3.7; more detail in Chapter 5).49 In cities heatwaves will become increasingly dangerous, as regional warming together with the urban heat island effect (where cities concentrate and retain heat) leads to extreme temperatures and more dangerous air pollution incidents (see Box 6.4 in Chapter 5). Climate change will amplify health disparities between rich and poor parts of the world. The World Health Organisation (WHO) estimates that climate change since the 1970s is already responsible for over 150,000 deaths each year through increasing incidence of diarrhoea, malaria and malnutrition, predominantly in Africa and other developing regions (Figure 3.8).50 Just a 1 °C increase in global temperature above pre-industrial could double annual deaths from climate change to at least 300,000 according to the WHO.51 These figures do not account for any reductions in cold-related deaths, which could be substantial .52 At higher temperatures, death rates will increase sharply, for example millions more people dying from malnutrition each year. 53 Climate change will also affect health via other diseases not included in the WHO modelling.54 The distribution and abundance of disease vectors are closely linked to temperature and rainfall patterns, and will therefore be very sensitive to changes in regional climate in a warmer world. Changes to mosquito distributions and abundance will have profound impacts on malaria prevalence in affected areas. This will be particularly significant in Africa, where 450 million people are exposed to malaria today, of whom around 1 million die each year. According to one study, a 2°C rise in temperature may lead to 40 – 60 million more people exposed to malaria in Africa (9 – 14% increase on present-day), increasing to 70 – 80 million (16 – 19%) at higher temperatures, assuming no change to malaria control efforts.55 Much of the increase will occur in Sub-Saharan Africa, including East Africa. Some studies suggest that malaria will decrease in parts of West Africa, e.g. taking 25 – 50 million people out of an exposed region, because of reductions in rainfall. 56 Changes in future exposure depend on the success of national and international malaria programmes. Such adaptations are not taken into account in the estimates presented, but the effectiveness of such programmes remains variable. 57 Climate change will also increase the global population exposed to dengue fever, predominantly in the developing world, e.g. 5 – 6 billion people exposed with a 4°C temperature rise compared with 3.5 billion people exposed with no climate change. 8 Health will be further affected by changes in the water cycle. Droughts and floods are harbingers of disease, as well as causing death from dehydration or drowning.59 Prolonged droughts will fuel forest fires that release respiratory pollutants, while floods foster growth of infectious fungal spores, create new breeding sites for disease vectors such as mosquitoes, and trigger outbreaks of water-borne diseases like cholera. In the aftermath of Hurricane Mitch in 1998, Honduras recorded an additional 30,000 cases of malaria and 1,000 cases of dengue fever. The toxic moulds left in New Orleans in the wake of Hurricane Katrina continue to create health problems for its population, for example the so-called “Katrina cough”.

### Hegemony

#### Warming leads to constant US intervention – collapses hegemony

Matthew 8 – Professor of Political Science

Richard Matthew, Professor of Political Science @ Irvine, 2008, ‘A Threat Assessment,’ GLOBAL CLIMATE CHANGE, May, Accessed via KU Library, http://www.strategicstudiesinstitute.army.mil/pdffiles/PUB862.pdf

Against this background, climate change and security can be linked in a number of ways. Where climate changes abruptly, security problems will be immediate and extensive and perhaps even existential. We can easily envision threats on this scale in Bangladesh or other poor low-lying countries, but even here a significant number of Americans would be affected by a sudden barrage of massive flooding, Katrina-sized hurricanes, and tropical disease epidemics—perhaps enough to make climate change a national security issue. Another possible threat that we should take seriously is that of the gradual **erosion of American power** as endless demands are placed on it due to abrupt changes elsewhere. These are likely to arise as we face humanitarian disasters, as drought intensifies throughout Africa, and as South Asia collapses into conflict over things like fresh water. The greater our sense of interdependence, the greater our sense that national security depends on the welfare of things beyond our borders, and the more likely it is that the climate change will be a real security threat. This poses a big problem today. To what extent should we intervene to assist abroad? When should we use our resources and when should we show restraint? It is going to be difficult to make these decisions. We are playing with a lot of uncertainty. We do not know how other actors in the world will behave.

### Ocean Biodiversity

#### Warming collapses ocean biodiversity – cuts are key to limit nonlinear transformation

Hoegh-Guldberg and Bruno 10 – Both Professors in Relevant Fields

Ove, Professor of Oceanic Biology and John, Professor of Marine Sciences, 6-2010, “The Impact of Climate Change on the World’s Marine Ecosystems,” Science Mag, Science

Earth, with its life-filled ocean, is unusual among planets (1). Covering 71% of Earth’s surface, the ocean nurtured life on our planet and continues to play a dominating role in regulating its climate. Change has been the norm as Earth has swung through a variety of states in which life has prospered, dwindled, or experienced calamitous declines. In the latter case, intrinsic events (e.g., volcanic activity) or extrinsic events (e.g., large meteorite strikes) have sometimes resulted in hostile conditions that have increased extinction rates and driven ecosystem collapse. There is now overwhelming evidence that human activities are driving rapid changes on a scale similar to these past events (2). Many of these changes are already occurring within the world’s oceans (Figs. 1 and 2), with serious consequences likely over the coming decades. Our understanding of how climate change is affecting marine ecosystems has lagged behind that of terrestrial ecosystems. This is partly due to the size and complexity of the ocean, but also to the relative difficulty of taking measurements in marine environments. Long-term studies of climate change in the oceans are rare by comparison to those on land (3). Here, we review the impacts of anthropogenic climate change on marine ecosystems, revealing that the majority are changing rapidly with an increased risk of **sudden nonlinear transformations**. Given the **overwhelming importance** of the ocean to life on our planet, these changes underscore the urgency with which the international community must act to limit further growth of atmospheric **greenhouse gases** and thereby reduce the serious risks involved.

#### Oceanic tipping points coming soon – cuts are key

Hoegh-Guldberg and Bruno 10 – Both Professors in Relevant Fields

Ove, Professor of Oceanic Biology and John, Professor of Marine Sciences, 6-2010, “The Impact of Climate Change on the World’s Marine Ecosystems,” Science Mag, Science

Recent evidence suggests that there is now a growing risk that several thresholds will soon be exceeded (51). For example, increasing ocean temperatures and acidities associated with atmospheric CO2 concentrations of 450 parts per million (ppm) represent a serious threat to ecosystems such as coral reefs. In the latter case, temperatures that exceed 2°C above pre-industrial temperatures are very likely to drive an unsustainable frequency of mass coral bleaching and mortality, whereas ocean acidification associated with atmospheric CO2 above 450 ppm will push coral reefs into a negative carbonate balance (23). Similar thresholds (400 to 450 ppm or a +2°C increase in average global temperature above pre-industrial values) have been identified for key ocean components such as aragonite undersaturation of the Southern Ocean (52), loss of polar sea ice (24), and the melting of the Greenland (53) and Western Antarctic (54) ice sheets. Specific thresholds (or **tipping points**) are predicted to have large-scale consequences for coastal and oceanic ecosystems, as outlined above. These drivers add to the complex behavior of ecological systems, increasing the chance of triggering amplifying feedback loops and **domino effects**. Given the growing evidence that relatively small increases in the concentration of atmospheric carbon dioxide will **trigger a wide array** of irreversible changes to critically important marine ecosystems, avoiding any further increases and aiming to reduce the atmospheric concentration of CO 2 below 350 ppm in the long term **must be an** international **imperative** (55, 56). The rapid ecological shifts that are occurring in the world’s oceans present major challenges for managers and policy makers. Understanding and reducing risk exposure will become increasingly important as conditions change and the likelihood of major ecological shifts increases. These changes will decrease the relevance of current models and practices for managing ecological resources and fisheries stocks, leading the management of many marine resources into “uncharted waters.” Nonetheless, “no regret” management strategies that reduce the impact of local stresses while maintaining ecological resilience will play an increasingly important role as the climate changes. Actions that reduce the flow of nutrients and sediments from coastal catchments, for example, as well as those that reduce activities such as the deforestation of mangroves and the overfishing of key ecological species (e.g., herbivores), will become increasingly important as the impacts of climate change mount. Natural resource management must also remain flexible in order to absorb the sudden and nonlinear changes that are likely to characterize the behavior of most ecosystems into the future. Overall, however, reducing greenhouse gas emissions **remains the priority**, not only because it will reduce the huge costs of adaptation but also because it will reduce the growing risk of pushing our planet into an **unknown and highly dangerous** **state**.

### Ocean Biodiversity – Coral Reefs

#### Warming kills corals

Archer 7 – Professor of Geophysical Sciences

David Archer, Professor of Geophysical Sciences at the University of Chicago, “Global Warming: Understanding the Forecast.” p. 162-163

In addition to all of these struggles, corals are vulnerable to increases in tempera­ture (Fig. 12.12). When corals are stressed, they respond by expelling their symbiotic algae. This is called coral bleaching because of their loss of color. Bleaching may be a mechanism for the coral to try to find new symbiotic algae that are more suited to the conditions they find themselves in, but it is a measure of desperation. Bleaching is often followed by the death of the coral. Figure 12.12 shows a record of temperatures in Tahiti, with arrows indicating times of coral bleaching events. The correlation between heat spikes and bleaching is very clear. Sediment cores in Caribbean reefs indicate that the degradation of reef communities is more widespread than has been seen in centuries. The projected warming, in the future looks like it will have catastrophic effect on corals.

#### Alt causes have put coral reefs on the brink

Lynas 7 – Associate @ Oxford’s School of the environment

Mark, advisor on climate change to the President of the Maldives, Educational focus on Politics and History, Six Degrees, pg. 50

In any case, very few of the world's reefs are in any state to take on the **challenges of climate change**. Direct human interference—from sewage, overfishing, and agricultural runoff—has already reduced coral reefs across the globe to shadows of their former pristine selves. In total 70 percent of the world's reefs are now either dead or dying. This is a disaster of an almost **unimaginable** scale for global biodiversity: Second only to rain forests in terms of the vibrancy and diversity of life they nurture, coral reefs worldwide shelter and feed a third of all life in the oceans, including 4,000 types of fish.

### Ocean Biodiversity – Plankton

#### Warming collapses plankton

Hoegh-Guldberg and Bruno 10 – Both Professors in Relevant Fields

Ove, Professor of Oceanic Biology and John, Professor of Marine Sciences, 6-2010, “The Impact of Climate Change on the World’s Marine Ecosystems,” Science Mag, Science

**Warming hurts phytoplankton** Variation in temperature can also have impacts on key biological processes. For example, the dis- tribution and abundance of phytoplankton com- munities throughout the world, as well as their phenology and productivity, are changing in re- sponse to warming, acidifying, and stratifying oceans (7, 13). The annual primary production of the world’s oceans has decreased by at least 6% since the early 1980s, with nearly 70% of this decline occurring at higher latitudes (29) and with large relative decreases occurring within Pacific and Indian ocean gyres (13). Climate variability strongly influences ocean productivity, such as seen in the anomalous conditions of 1998, which that left a clear fingerprint on global ocean phytoplankton pro- ductivity and chlorophyll stand- ing stocks (30). Overall, these changes in the primary produc- tion of the oceans have profound implications for the marine bio- sphere, carbon sinks, and bio- geochemistry of Earth (31).

### Ocean Acidification

#### Ocean acidification now – the impact is long-term – ocean can’t self-correct

Kerr 10 - PhD in chemical oceanography

Richard Kerr, 6-2010, “Ocean Acidification Unprecedented, Unsettling,” Science, Science Magazine

Humans are caught up in a grand planetary experiment of lowering the ocean's pH, with a potentially devastating toll on marine life. Aside from the dinosaur-killing asteroid impact, the world has probably never seen the likes of what's brewing in today's oceans. By spewing carbon dioxide from smokestacks and tailpipes at a gigatons-per-year pace, humans are conducting a grand geophysical experiment, not just on climate but on the oceans as well. Over the past 4 years, there's been a crescendo of concern that the ocean experiment may be scarier than its climate counter part (http://news.sciencemag.org/sciencenow/2006/07/05-01.html). Now the geochemists are weighing in, and they are not mincing words: The physics and chemistry of adding an acid to the ocean are so well understood, so inexorable, that there cannot be an iota of doubt—gigatons of acid are lowering the pH of the world ocean, humans are totally responsible, and the more carbon dioxide we emit, the worse it's going to get. Unconstrained emissions growth is likely to leave the current era of human planetary dominance “as **one of the most** notable, if not **cataclysmic**, events in the history of our planet,” geochemist Lee Kump of Pennsylvania State University, University Park, and colleagues wrote last December in a special issue of Oceanography. The geochemical disruption will reverberate for tens of thousands of years. It's less clear how marine life will fare. “We can detect these changes [in ocean acidity], but we still don't have a good idea of how ecosystems would change,” says marine biologist Victoria Fabry of California State University, San Marcos. With nothing in the geologic record as severe as the ongoing plunge in ocean pH, paleontologists can't say for sure how organisms that build carbonate shells or skeletons will react. In the laboratory, corals always do poorly. The lab responses of other organisms are mixed (http://news.sciencemag.org/sciencenow/2009/12/01-01.html). In the field, researchers see signs that coral growth does slow, oyster larvae suffer, and plankton with calcareous skeletons lose mass. There are enough alarming signs that global oceanic acidification “is an experiment we would not choose to do,” says Fabry. Strictly speaking, the ocean, now at a pH of 8.1, will not turn into an acid, as its pH will not drop below 7.0. But on dissolving into the ocean, carbon dioxide instantly forms bicarbonate ions (HCO3−) and hydrogen ions—the H+ of pH. The “acidification” resulting from the current carbon dioxide emissions is massive and rapid, a combination that is “almost certainly unprecedented in Earth history,” says earth systems modeler Andrew Ridgwell of the University of Bristol, United Kingdom. The closest analog in the geologic record to the present acidification appears to be the Paleocene-Eocene Thermal Maximum (PETM) 55.8 million years ago. At its start, anywhere from 2000 to 7000 gigatons of carbon were released as methane and carbon dioxide, the methane quickly oxidizing to carbon dioxide. Where it all came from—volcanoes, icy sea-floor methane hydrates, marshy peat, or a combination—no one is sure, but almost all of it would eventually have gone into the ocean. PETM's carbon gush was on a par with what burning the 2180 gigatons of carbon in the world's fossil fuel reserves would produce, notes Kump and his colleagues. The difference this time around is speed. Today, “you could argue the rate of release is 10 times faster [than at the PETM], if not faster,” says paleoceanographer James Zachos of the University of California, Santa Cruz. Whereas nature took a few thousand years to spout out thousands of gigatons of carbon, he notes, humans could be doing it in a few centuries. And **speed makes a big difference**. It takes the ocean about 1000 years to flush carbon dioxide added to surface waters into the deep sea where sediments can eventually neutralize the added acid. The PETM release appears to have been slow enough that no biological catastrophe struck in the upper ocean, only an extinction among tiny shell-forming organisms living on the deep sea floor. But today's emissions are so rapid that they are piling up in surface waters.

#### Acidic oceans collapse biodiversity

Walker and King 8 – Both PhDs in Chemistry

Gabrielle, PhD in Chemistry, Sir David, Director of the Smith School of Enterprise and the Environment at the University of Oxford, and a senior scientific adviser to UBS, The Hot Topic, pg. 38-39

Increasing carbon dioxide has another side effect that will also be bad news for corals. To date, the oceans have soaked up around half of the carbon dioxide emissions from burning fossil fuels, making cement, and land-use changes. That's just as well; otherwise there would be even more carbon dioxide in the air and hence even more warming than we have seen so far. But the benefit has come at a price: All that additional carbon dioxide is gradually acidifying the ocean. This seems hard to believe and, indeed, many scientists initially discounted the possibility. The oceans, after all, are vast and are also expert at neutralizing any material that threatens to acidify their waters. However, the carbon dioxide is arriving too fast. It's overwhelming the ocean's natural capacity to compensate. A report produced by Britain's Royal Society in 2005 estimated that the world's oceans had already increased their acidity by 0.1 units, which translates to an increase in the ions that cause acidity of some 30 percent.11 And one study calculated that unfettered carbon dioxide increases over the next few centuries could make the oceans more acid than they have been for three hundred million years.12 Nobody yet knows whether this is having an impact on the world's sea creatures, mainly because it is hard to measure. But most agree that the effects will be felt soon, if, indeed, they are not already with us. According to the Royal Society report, animals with a high metabolism, such as squid, are likely to suffer in more acidic waters. But the real danger is to any animal that makes itself a shell, or skeleton, out of the calcium carbonate (the same stuff as common chalk) dissolved in seawater. The more acidic the seawater, the harder it is to make this shell, and in the extreme the shells already made will begin to dissolve. This danger applies to creatures that span a **wide part** of the food chain—from tiny plankton and pteropods, which feed cod, salmon, and whales, to mussels, conch, and sea urchins. It applies particularly to corals. Sixty-five million years ago a meteor the size of New York slammed into Earth. The environmental chaos that ensued is widely believed to have led to the extinction of the dinosaurs. But it also had a less well-known effect. According to Ken Cal-deira at the Carnegie Institution of Washington in California, the meteor also threw up vast amounts of sulfur, which then rained down on the ocean as sulfuric acid. The upper ocean became acidified for a brief moment, perhaps only one or two years. But that was enough. More or less every sea creature that built shells or skeletons out of calcium carbonate became either rare or extinct. A handful of corals must have survived, or we would not still have them on Earth today. But they were nonetheless too scarce to leave their imprint; they did not reappear in the fossil record for a full two million years.

### War

#### Global warming leads to mass and unending international conflict

Klare 6 – Professor of Peace and World Security Studies

Michael, professor of peace and world security studies at Hampshire College, The Coming Resource Wars, 3-10-2006, http://www.alternet.org/environment/33243

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.

#### Global warming leads to nuclear war

Dyer 9 – PhD in ME History

Gwynne, MA in Military History and PhD in Middle Eastern History former @ [Senior Lecturer](file://localhost/wiki/Senior_Lecturer) in War Studies at the [Royal Military Academy Sandhurst](file://localhost/wiki/Royal_Military_Academy_Sandhurst), Climate Wars

THIS BOOK IS AN ATTEMPT, peering through a glass darkly, to understand the politics and the strategies of the potentially apocalyptic crisis that looks set to occupy most of the twenty­first century. There are now many books available that deal with the science of climate change and some that suggest pos­sible approaches to getting the problem under control, but there are few that venture very far into the grim detail of how real countries experiencing very different and, in some cases, overwhelming pressures as global warming proceeds, are likely to respond to the changes. Yet we all know that it's mostly politics, national and international, that will decide the outcomes. Two things in particular persuaded me that it was time to write this book. One was the realization that the first and most important impact of climate change on human civiliza­tion will bean acute and permanent crisis of food supply. Eating regularly is a non-negotiable activity, and countries that cannot feed their people are unlikely to be "reasonable" about it. Not all of them will be in what we used to call the "Third World" -the developing countries of Asia, Africa and Latin America. The other thing that finally got the donkey's attention was a dawning awareness that, in a number of the great pow­ers, climate change scenarios are already playing a large and increasing role in the military planning process. Rationally, you would expect this to be the case, because each country pays its professional military establishment to identify and counter "threats" to its security, but the implications of their scenarios are still alarming. There is a probability of wars, including even **nuclear wars**, if temperatures rise two to three degrees Celsius. Once that happens, all hope of international cooperation to curb emissions and stop the warming goes out the window.

#### Climate change makes all causes of war more likely

Mazo 10 – PhD in Paleoclimatology from UCLA

Jeffrey Mazo, Managing Editor, Survival and Research Fellow for Environmental Security and Science Policy at the International Institute for Strategic Studies in London, 3-2010, “Climate Conflict: How global warming threatens security and what to do about it,” pg. 142

The security dimension of climate change will come increasingly to the fore as countries face falls in available resources, economic vitality, increased stress on military capabilities, greater instability in regions of strategic import, and a widening gap between rich and poor. Over the next few decades, unavoidable global warming will lead to a world where a changing climate multiplies and intensifies current security concerns and creates new ones. Food, water and energy security are central to national and international security, and **climate change will magnify them all**. Instability, conflict and humanitarian disasters, both chronic and acute, are not the inevitable result of climate change, nor are they dependent on it. But over the course of history, climate change has affected the stability of societies, nations and civilisations and the unprecedented change that has already begun raises the spectre of increasing and accelerating social, geopolitical and economic disruption. **Climate change will have to be taken into account in policy debates** on issues involving anything but the shortest timescales.

### War – Arctic Conflict

#### Leads to Arctic conflict

Borgerson 8 – Fellow @ CFR

Scott, International Affairs Fellow at the Council on Foreign Relations and former Lieutenant Commander in U.S. Coast Guard. “Arctic Meltdown” Foreign Affairs; Mar/Apr2008, Vol. 87 Issue 2, p63-77, Ebsco

DESPITE THE melting icecap's potential to transform global shipping and energy markets, Arctic issues are largely ignored at senior levels in the U.S. State Department and the U.S. National Security Council. The most recent executive statement on the Arctic dates to 1994 and does not mention the retreating ice. But the Arctic's strategic location and immense resource wealth make it an important national interest. Although the melting Arctic holds great promise, it also poses grave dangers. The combination of new shipping routes, trillions of dollars in possible oil and gas resources, and a poorly defined picture of state ownership makes for a toxic brew. The situation is especially dangerous because there are currently no overarching political or legal structures that can provide for the orderly development of the region or mediate political disagreements over Arctic resources or sea-lanes. The Arctic has always been frozen; as ice turns to water, it is not clear which rules should apply. The rapid melt is also rekindling numerous interstate rivalries and attracting energy-hungry newcomers, such as China, to the region. The Arctic powers are fast approaching diplomatic gridlock, and that could eventually lead to the sort of armed brinkmanship that plagues other territories, such as the desolate but resource-rich Spratly Islands, where multiple states claim sovereignty but no clear picture of ownership exists.

### Warming Outweighs War

#### Climate change outweighs conflict

Lee 9 – Professor of environment, conflict, and trade @ American

James, PhD, runs American University's Inventory of Conflict and Environment project, Climate Change and Armed Conflict

The path from climate change to conflict will not be a direct one. For that matter, most roads to conflict are indirect and lie in structural and behavioral patterns that make the path easier to travel. There are three structural pathways from climate change to armed conflict: sustained trends, intervening variables, and the need for conflict triggers. First, conflict only emerges after a sustained period of divergent climate pat­terns. People can survive aberrant, short-term climate change through exploita­tion of saved resources, but this strategy has temporal limits. The issue is not one of surviving a particularly fierce rain or a harsh winter, but the accumulation of many rain events and many harsh winters. Human society is capable of enduring events and seasons, but as these events and seasons accumulate over many years or even decades, accumulated wealth begins to draw down and eventually dissi­pates. Without renewal of society's wealth, human health and well-being decline, and over time the society itself may collapse. Societies with few savings will be more vulnerable to adverse impacts from climate change. Societies that already heavily exploit their environment will be closer to possible conflict than those that do not. Brian Fagan offers a context for climate-induced conflict in places where people already live on the edge of survival: In a telling analysis on nineteenth century droughts, the historian Mike Davis has estimated, conservatively, that at least 20 to 30 million people, and probably many more, most of them tropical farmers, perished from the consequences of harsh droughts caused by EI Ninos and monsoon failures during the nineteenth century, more **people than in virtually all the wars of the century**. (Fagan 2008: 235)

### Water Scarcity

#### Warming leads to water scarcity – threatens billions

Stern 7 – Professor of Economics and Government

Nicholas Stern, Head of the British Government Economic Service, Former Head Economist for the World Bank, I.G. Patel Chair at the London School of Economics and Political Science, “The Economics of Climate Change: The Stern Review”, The report of a team commissioned by the British Government to study the economics of climate change led by Siobhan Peters, Head of G8 and International Climate Change Policy Unit, Cambridge University Press, pg. 62-63

People will feel the impact of climate change most strongly through changes in the distribution of water around the world and its seasonal and annual variability. Water is an essential resource for all life and a requirement for good health and sanitation. It is a critical input for almost all production and essential for sustainable growth and poverty reduction. 12 The location of water around the world is a critical determinant of livelihoods. Globally, around 70% of all freshwater supply is used for irrigating crops and providing food. 22% is used for manufacturing and energy (cooling power stations and producing hydro-electric power), while only 8% is used directly by households and businesses for drinking, sanitation, and recreation. 13 Climate change will alter patterns of water availability by intensifying the water cycle. 14 Droughts and floods will become more severe in many areas. There will be more rain at high latitudes, less rain in the dry subtropics, and uncertain but probably substantial changes in tropical areas.15 Hotter land surface temperatures induce more powerful evaporation and hence more intense rainfall, with increased risk of flash flooding. Differences in water availability between regions will become increasingly pronounced. Areas that are already relatively dry, such as the Mediterranean basin and parts of Southern Africa and South America, are likely to experience further decreases in water availability, for example several (but not all) climate models predict up to 30% decrease in annual runoff in these regions for a 2°C global temperature rise (Figure 3.2) and 40 – 50% for 4°C. 16 In contrast, South Asia and parts of Northern Europe and Russia are likely to experience increases in water availability (runoff), for example a 10 – 20% increase for a 2°C temperature rise and slightly greater increases for 4°C, according to several climate models. These changes in the annual volume of water each region receives mask another critical element of climate change – its impact on year-to-year and seasonal variability. An increase in annual river flows is not necessarily beneficial, particularly in highly seasonal climates, because: (1) there may not be sufficient storage to hold the extra water for use during the dry season, 17 and (2) rivers may flood more frequently.18 In dry regions, where runoff one-year-in-ten can be less than 20% of the average annual amount, understanding the impacts of climate change on variability of water supplies is perhaps even more crucial. One recent study from the Hadley Centre predicts that the proportion of land area experiencing severe droughts at any one time will increase from around 10% today to 40% for a warming of 3 to 4°C, and the proportion of land area experiencing extreme droughts will increase from 3% to 30%.19 In Southern Europe, serious droughts may occur every 10 years with a 3°C rise in global temperatures instead of every 100 years if today’s climate persisted .20 As the water cycle intensifies, billions of people will lose or gain water. Some risk becoming newly or further water stressed, while others see increases in water availability. Seasonal and annual variability in water supply will determine the consequences for people through floods or droughts. Around one-third of today’s global population live in countries experiencing moderate to high water stress, and 1.1 billion people lack access to safe water (Box 3.3 for an explanation of water stress). Water stress is a useful indicator of water availability but does not necessarily reflect access to safe water. Even without climate change, population growth by itself may result in several billion more people living in areas of more limited water availability. The effects of rising temperatures against a background of a growing population are likely to cause changes in the water status of billions of people. According to one study, temperature rises of 2°C will result in 1 – 4 billion people experiencing growing water shortages, predominantly in Africa, the Middle East, Southern Europe, and parts of South and Central America (Figure 3.3).21 In these regions, water management is already crucial for their growth and development. Considerably more effort and expense will be required on top of existing practices to meet people’s demand for water. At the same time, 1 – 5 billion people, mostly in South and East Asia, may receive more water. 22 However, much of the extra water will come during the wet season and will only be useful for alleviating shortages in the dry season if storage could be created (at a cost). The additional water could also give rise to more serious flooding during the wet season.

## \*\*\*Warming Bad— Indicts

### Avery and Singer

#### Singer and Avery are selective – warming leads to extinction

Rattle No Date

Robert, conducts research projects on sustainable consumption and provides services as a sustainable development consultant for governmental organizations, Singer and Avery's book claims global warming not our fault, http://www.saultthisweek.com/ArticleDisplayGenContent.aspx?e=7478

Reading Unstoppable Global Warming by Singer and Avery produced a similarly nauseating effect without the fun. Somewhat like driving along Wellington Street, this book offered a roller coaster ride of bumps, pointless deviations, and abrupt leaps of faith. Like driving Wellington Street, it's only a matter of time until the fantasies, misleading statements and twisted distortions in this book crumble. I'm glad to see Wellington Street being repaired. Singer and Avery often discuss weather conditions, while repeatedly asserting climate change is global warming (just look at the book's title). The authors frequently claim average global temperature is declining, not rising, despite their argument that solar activity, and only solar activity, is warming the planet (thus global warming). For instance, they draw on the micro-climate surrounding Mt. Kilimanjaro, suggesting local temperatures have been falling (recall their basic argument is that solar activity is warming the planet!) in concert with a decline in the mountains ice caps. They argue other factors, such as local declines in precipitation, have been responsible for the decline in the ice caps mass, not temperature. Despite their argument that the planet is warming, they are attempting to argue there is no temperature rise to prove ice cap melt is not a result of global warming. First, **local temperature is not global mean temperature**. Second, global climate change is about so much more than simply an average rising mean temperature. Third, one of the major impacts apparent in many studies on climate change, including the Sudbury study on climate change, is that water and precipitation will be a defining feature of climate change -- more where and when we don't want it and less where and when we will need it. Less precipitation on Mt. Kilimanjaro where it is needed to maintain glacier integrity and essential melt water for local peoples, consistent across that section of the world, is also suggestive of global climate change. But for some inane reason, Singer and Avery suggest the exact opposite -- that reduced ice caps, simply because the ambient temperature has declined in that region in recent years, disproves climate change or, in their term, global warming. Oh, and by the way, there's less precipitation, which is why the ice caps have receded. Well, duh! Why has there been such a dramatic shift in precipitation patterns in the region? Perhaps a changing climate? By excessively drawing upon remarkably **selective historical circumstances**, and assuming this means all will be fine in the future, Singer and Avery also make another fundamental error: that climate is a continuous predictable beast. It's not. The planet's complex mechanisms, such as climate, interact and respond unpredictably. It's like a light switch: if you push a little, nothing [happens...push](http://www.happens...push/) a little more and still nothing. This continues until suddenly, the lights go out.

### Ball

#### Not qualified

Littlemore 9 - delegate to the Canadian government's Kyoto Implementation Process

Richard, delegate to the Canadian government's Kyoto Implementation Process, 2009, “The decline of Tim Ball: Denier champion reduced to railing at real scientists,” http://www.desmogblog.com/decline-tim-ball-denier-champion-reduced-railing-real-scientists

Despite having a short (eight years as a professor) and undistinguished (five peer-reviewed publications in his lifetime) career as a geography professor at the University of Winnipeg, Dr. Ball was able in the last 10 years to elevate himself to the level of self-appointed climate change expert. By working with energy industry lobby firms, he was able to insinuate himself as a would-be advisor to committees of the Canadian House of Commons and the the U.S. Senate. At one point, he presumed to send a letter directly to Canadian Prime Minister Paul Martin, introducing himself as "one of the first climatology PhDs in the world," - a claim so far from accurate as to be laughable. By his activism, his constant and so-often ill-informed criticism of scientists who were actually working in the field of climate change, Ball had, by 2006, established himself as Canada's pre-eminent global warming denier. The Globe and Mail called him "Mr. Cool," although the accompanying feature was anything but complimentary. Still, at least he was getting attention. When someone (University of Lethbridge Professor Dan Johnson) finally called Ball on his trumped up resume, the uber-denier launched a suit of defamation. Big mistake. The statements of defence included more devastating slander than Ball had ever previously endured. Lawyers for the Calgary Herald, for example, dismissed him as someone "viewed as a paid promoter of the agenda of the oil and gas industry, rather than as a practicing scientist." Ball abandoned his suit and went back to spreading disinformation in small prairie town service clubs. This blow to his credibility was such that he is no longer even a candidate for inclusion in the periodic lists that the climate denial industry creates to try to give the impression that there is still a legitimate scientific debate about climate change. For example, in a full page that the Cato Institute placed in five major American newspapers last week, Ball's name was left off the list, in favour of "climate experts" like Dr. Susan Crockford, an archeoanthropologist who's actual expertise in the evolutionary theory of the domestic dog. The folks at Cato might even be applauded for trransparency. Instead of using Ball, who has tried on many occasions to deny that his income derives directly or indirectly from oil and gas revenues, Cato included on his petition A Neil Hutton, the past president of the Canadian Society of Petroleum Geologists. There is clearly no question who's interests the American Petroleum Industry-sponsored Cato is trying to defend - and without the help of a damaged ally like Tim Ball. So now Dr. Ball is left with a dwindling audience, writing his weekly column in the little-known libertarian website Canada Free Press. There, recently, he set upon doctors James Hansen and Andrew Weaver, two of the most respected climate scientists on the continent. Both of these men have published more peer-reviewed research in a single season than Ball wrote in his entire career. Both have gained the respect and admiration of their professional colleagues and both are prominent contributors to the Nobel quality work of the Intergovernmental Panel on Climate Change. Both are also seriously (and justifiably) concerned about government inaction in the face of a slimate change threat that grows more daunting by the day. Ball is fond of dismissing concern as "alarmism" - as if alerting your neighbors to danger is somehow a bad thing. It's true that pulling the fire alarm in a theatre is an act of mischief - WHEN THERE IS NO FIRE. But when providing an early warning could save lives, it is an act of heroism. That may be especially the case when standing up to raise the alarm can subject you to the kind of ill-informed character assassination that Ball directs at Hansen and Weaver. The question, for Dr. Ball - an expert with no credentials and, increasingly, an advocate with no audience - is this: If he would have us criticize Hansen and Weaver for alarmism - for "frightening people" in a theatre that is about to be engulfed in flames - what accusation would he hurl at the usher who blocks the door and recommends people return to their seats and ignore the smoke already curling around their head.

#### Ball’s studies are based on politics, not science, and he receives funding from oil companies

Montgomery 6 – Cited in the CMOS

Charles Montgomery, Winner of a citation from the Canadian Meteorological and Oceanograpic Society for this article, 12-8-2006, Globe and Mail, Lexis

Few in the audience have any idea that Prof. Ball hasn't published on climate science in any peer-reviewed scientific journal in more than 14 years. They do not know that he has been paid to speak to federal MPs by a public-relations company that works for energy firms. Nor are they aware that his travel expenses are covered by a group supported by donors from the Alberta oil patch. Most Canadians recognize, of course, that fossil-fuel businesses could lose large sums if the federal government moves to curtail greenhouse-gas emissions. But they may not realize that by quietly backing the movement behind maverick figures such as Prof. Ball, the fuel industry - with its close ties to the party that brought Prime Minister Stephen Harper to power - is succeeding, bit by bit, in influencing both public opinion and Canadian policy on global warming, including the international Kyoto Accord. An Ipsos Reid poll released in May found that, despite increasing scientific evidence to the contrary, four of every 10 Canadians surveyed still agreed with Prof. Ball's assertion that climate change is due to natural warming and cooling patterns. "He is a very entertaining performer, very slick," says Neil Brown, the Conservative MLA for Calgary-Nose Hill, who attended a presentation Prof. Ball made to a caucus of provincial Tories in Calgary. "When someone shows up and tells me that the earth is actually cooling, then it gets my attention." The scientific mainstream is unequivocal that global warming is real, happening at a rate unprecedented in human history, and most likely caused mainly by human greenhouse-gas emissions. Last year, the national academies of science of all the G8 nations, representing most scientists in the developed world, sent a joint message to their leaders urging prompt action. In February, the UN and the World Meteorological Society's Intergovernmental Panel on Climate Change (IPCC), which brings together more than 2,000 scientists to review tens of thousands of peer-reviewed papers on climate science, will release its fourth report. The authors say it will contain a warning that human-caused global warming could drive the Earth's temperature to levels far higher than previously predicted. Andrew Weaver is the Canada Research Chair in Climate Modelling and Analysis at the University of Victoria, and a lead author of a chapter in the upcoming IPCC report. He gives a frustrated sigh at the mention of Tim Ball's cross-country tour. "He says stuff that is just plain wrong. But when you are talking to crowds, when you are talking on TV, there is no challenge, there is no peer review," Prof. Weaver says. Like other senior scientists, he charges that Prof. Ball's arguments are a grab bag of irrelevancies and falsehoods: "Ball says that our climate models do not [account for the warming effects of] water vapour. That's absurd. They all do." Likewise, he says, Prof. Ball's claims that climate change could be explained by variations in the earth's orbit or by sunspots are discounted by widely available data. Many of Prof. Ball's other arguments don't stand up to scrutiny. Consider the hockey-stick graph: He was right that the U.S. Academies of Science had delivered a review of climate science to Congress. But their report concluded that temperatures in the last 25 years really have been the highest in 400 years. Moreover, the panelists assured reporters that there was no evidence at all that the Mann team cherry-picked its data - completely contradicting what Prof. Ball told his audience in Comox. "What Ball is doing is not about science," says Prof. Weaver. "It is about politics."

### Balling

#### Bought off

De Granados 7

Oriana Zill, productions director of the Center for Investigative Reporting, <http://www.pbs.org/wgbh/pages/frontline/hotpolitics/reports/skeptics.html>

Affiliations & Funding: Journalist Ross Gelbspan reported in 1995 that Balling had received "more than $200,000 from coal and oil interests in Great Britain, Germany, and elsewhere." Dr. Balling has also received funding since 1989 from the Kuwaiti government, which paid for a version of Balling's A Heated Debate to be released in the Middle East. According to Greenpeace's Exxonsecrets.org, Dr. Balling conducted an ExxonMobil-funded study in 2002 entitled "The 2000 United States Historical Climate Network Update: What Changed?"

### Bellamy / Singer

#### Bellamy based his research on incomplete data sets and miscalculations, and Singer invented a fake source to base his studies one.

Monbiot 5 – Professor @ Oxford

George, visiting professor of planning at Oxford Brookes University, 5-10-2005, The Guardian, <http://www.guardian.co.uk/environment/2005/may/10/environment.columnists>

So last week I telephoned the World Glacier Monitoring Service and read out Bellamy's letter. I don't think the response would have been published in Nature, but it had the scientific virtue of clarity: "This is complete bullshit." A few hours later, they sent me an email: "Despite [Bellamy’s] his scientific reputation, he makes all the mistakes that are possible." He had cited data that was simply false, he had failed to provide references, he had completely misunderstood the scientific context and neglected current scientific literature. The latest studies show unequivocally that most of the world's glaciers are retreating.But I still couldn't put the question out of my mind. The figures that Bellamy cited must have come from somewhere. I emailed him to ask for his source. After several requests, he replied to me at the end of last week. The data, he said, came from a website called www.iceagenow.com. Ice age now was constructed by a man called Robert W Felix to promote his self-published book about "the coming ice age". It claims that sea levels are falling, not rising; that the Asian tsunami was caused by the "ice age cycle"; and that "underwater volcanic activity - not human activity - is heating the seas".Is Felix a climatologist, a volcanologist or an oceanographer? Er, none of the above. His biography describes him as a "former architect". His website is so bonkers that I thought at first it was a spoof. Sadly, he appears to believe what he says. But there, indeed, was all the material that Bellamy cited in his letter, including the figures - or something resembling the figures - he quoted. "Since 1980, there has been an advance of more than 55% of the 625 mountain glaciers under observation by the World Glacier Monitoring group in Zurich." The source, which Bellamy also cited in his email to me, was given as "the latest issue of 21st Century Science and Technology".21st Century Science and Technology? It sounds impressive, until you discover that it is published by Lyndon LaRouche. Lyndon LaRouche is the American demagogue who in 1989 received a 15-year sentence for conspiracy, mail fraud and tax-code violations. He has claimed that the British royal family is running an international drugs syndicate, that Henry Kissinger is a communist agent, that the British government is controlled by Jewish bankers, and that modern science is a conspiracy against human potential.It wasn't hard to find out that this is one of his vehicles: LaRouche is named on the front page of the magazine's website, and the edition Bellamy cites contains an article beginning: "We in LaRouche's Youth Movement find ourselves in combat with an old enemy that destroys human beings ... it is empiricism."Oh well, at least there is a source for Bellamy's figures. But where did 21st Century Science and Technology get them from? It doesn't say. But I think we can make an informed guess, for the same data can be found all over the internet. They were first published online by Professor Fred Singer, one of the very few climate change deniers who has a vaguely relevant qualification (he is, or was, an environmental scientist). He posted them on his website, www.sepp.org, and they were then reproduced by the appropriately named junkscience.com, by the Cooler Heads Coalition, the US National Centre for Public Policy Research and countless others. They have even found their way into the Washington Post.They are constantly quoted as evidence that man-made climate change is not happening. But where did they come from? Singer cites half a source: "A paper published in Science in 1989." Well, the paper might be 16 years old, but at least, and at last, there is one. Surely?I went through every edition of Science published in 1989, both manually and electronically. Not only did it contain nothing resembling those figures, throughout that year there was no paper published in this journal about glacial advance or retreat.So it wasn't looking too good for Bellamy, or Singer, or any of the deniers who have cited these figures. But there was still one mystery to clear up. While Bellamy's source claimed that 55% of 625 glaciers are advancing, Bellamy claimed that 555 of them - or 89% - are advancing. This figure appears to exist nowhere else. But on the standard English keyboard, 5 and % occupy the same key. If you try to hit %, but fail to press shift, you get 555, instead of 55%. This is the only explanation I can produce for his figure. When I challenged him, he admitted that there had been "a glitch of the electronics".So, in Bellamy's poor typing, we have the basis for a whole new front in the war against climate science. The 555 figure is now being cited as definitive evidence that global warming is a "fraud", a "scam", a "lie". I phoned New Scientist to ask if Bellamy had requested a correction. He had not.

### Carlin

#### Should be disregarded

Broder 9

John, 9-2009, “Behind the Furor Over a Climate Change Skeptic,” NYT, Factiva

But the newly obtained documents show that Dr. Carlin’s highly skeptical views on global warming, which have been known for more than a decade within the small unit where he works, have been repeatedly challenged by scientists inside and outside the E.P.A.; that he holds a doctorate in economics, not in atmospheric science or climatology; that he has never been assigned to work on climate change; and that his comments on the endangerment finding were a product of rushed and at times shoddy scholarship, **as he acknowledged** Thursday in an interview.

#### Inconclusive, cites blogs, contradictory and is based in economic (not climate) theory

Schmidt 9 – PhD in Applied Mathematics

Gavin, climate modeler at the NASA Goddard Institute for Space Studies in New York and is interested in modeling past, present and future climate, o-chair of the CLIVAR/PAGES Intersection Panel and is an Associate Editor for the Journal of Climate, cited by Scientific American as one of the 50 Research Leaders of 2004, 2009, “Bubkes,” Real Climate, http://www.realclimate.org/index.php/archives/2009/06/bubkes/

Some parts of the blogosphere, headed up by CEI (“CO2: They call it pollution, we call it life!“), are all a-twitter over an apparently “suppressed” document that supposedly undermines the EPA Endangerment finding about human emissions of carbon dioxide and a basket of other greenhouse gases. Well a draft of this “suppressed” document has been released and we can now all read this allegedly devastating critique of the EPA science. Let’s take a look… First off the authors of the submission; Alan Carlin is an economist and John Davidson is an ex-member of the Carter administration Council of Environmental Quality. Neither are climate scientists. That’s not necessarily a problem – perhaps they have mastered multiple fields? – but it is likely an indication that the analysis is not going to be very technical (and so it will prove). Curiously, while the authors work for the NCEE (National Center for Environmental Economics), part of the EPA, they appear to have rather closely collaborated with one Ken Gregory (his inline comments appear at multiple points in the draft). Ken Gregory if you don’t know is a leading light of the Friends of Science – a astroturf anti-climate science lobbying group based in Alberta. Indeed, parts of the Carlin and Davidson report appear to be lifted directly from Ken’s rambling magnum opus on the FoS site. However, despite this odd pedigree, the scientific points could still be valid. Their main points are nicely summarised thus: a) the science is so rapidly evolving that IPCC (2007) and CCSP (2009) reports are already out of date, b) the globe is cooling!, c) the consensus on hurricane/global warming connections has moved from uncertain to ambiguous, d) Greenland is not losing mass, no sirree…, e) the recession will save us!, f) water vapour feedback is negative!, and g) Scafetta and West’s statistical fit of temperature to an obsolete solar forcing curve means that all other detection and attribution work is wrong. From this “evidence”, they then claim that all variations in climate are internal variability, except for the warming trend which is caused by the sun, oh and by the way the globe is cooling. Devastating eh? One can see a number of basic flaws here; the complete lack of appreciation of the importance of natural variability on short time scales, the common but erroneous belief that any attribution of past climate change to solar or other forcing means that CO2 has no radiative effect, and a **hopeless lack of familiarity** of the basic science of detection and attribution. But it gets worse, what solid peer reviewed science do they cite for support? A heavily-criticised blog posting showing that there are bi-decadal periods in climate data and that this proves it was the sun wot done it. The work of an award-winning astrologer (one Theodor Landscheidt, who also thought that the rise of Hitler and Stalin were due to cosmic cycles), a classic Courtillot paper we’ve discussed before, the aforementioned FoS web page, another web page run by Doug Hoyt, a paper by Garth Paltridge reporting on artifacts in the NCEP reanalysis of water vapour that are in contradiction to every other reanalysis, direct observations and satellite data, a complete reprint of another un-peer reviewed paper by William Gray, a nonsense paper by Miskolczi etc. etc. I’m not quite sure how this is supposed to compete with the four rounds of international scientific and governmental review of the IPCC or the rounds of review of the CCSP reports…. They don’t even notice the contradictions in their own cites. For instance, they show a figure that demonstrates that galactic cosmic ray and solar trends are non-existent from 1957 on, and yet cheerfully quote Scafetta and West who claim that almost all of the recent trend is solar driven! They claim that climate sensitivity is very small while failing to realise that this implies that solar variability can’t have any effect either. They claim that GCM simulations produced trends over the twentieth century of 1.6 to 3.74ºC – which is simply (and bizarrely) wrong (though with all due respect, that one seems to come directly from Mr. Gregory). Even more curious, Carlin appears to be a big fan of geo-engineering, but how this squares with his apparent belief that we know nothing about what drives climate, is puzzling. A sine qua non of geo-engineering is that we need models to be able to predict what is likely to happen, and if you think they are all wrong, how could you have any faith that you could effectively manage a geo-engineering approach? Finally, they end up with the oddest claim in the submission: That because human welfare has increased over the twentieth century at a time when CO2 was increasing, this somehow implies that no amount of CO2 increases can ever cause a danger to human society. This is just boneheadly stupid. So in summary, what we have is a ragbag collection of un-peer reviewed web pages, an unhealthy dose of sunstroke, a dash of astrology and more cherries than you can poke a cocktail stick at. Seriously, if that’s the best they can do, the EPA’s ruling is on pretty safe ground.

### Idsos

#### The Idsos receive funding from major coal and oil companies, and have been on the Western Fuels payroll.

UCS 7 – Union of Concerned Scientists

“Responding to Global Warming Skeptics—Prominent Skeptics Organizations,” http://www.ucsusa.org/global\_warming/science/skeptic-organizations.html

Greening Earth Society  The Greening Earth Society (GES) was founded on Earth Day 1998 by the Western Fuels Association to promote the view that increasing levels of atmospheric CO2 are good for humanity. GES and Western Fuels are essentially the same organization. Both used to be located at the same office suite in Arlington, VA. Until December 2000, Fred Palmer chaired both institutions. The GES is now chaired by Bob Norrgard, another long-term Western Fuels associate. The Western Fuels Assocation (WFA) is a cooperative of coal-dependent utilities in the western states that works in part to discredit climate change science and to prevent regulations that might damage coal-related industries.  Spin: CO2 emissions are good for the planet; coal is the best energy source we have.  Affiliated Individuals: Patrick Michaels, Robert Balling, David Wojick, Sallie Baliunas, Sylvan Wittwer, John Daley, Sherwood Idso Funding: The Greening Earth Society receives its funding from the Western Fuels Association, which in turn receives its funding from its coal and utility company members.  Center for the Study of Carbon Dioxide & Global Change  The Center claims to "disseminate factual reports and sound commentary on new developments in the world-wide scientific quest to determine the climactic and biological consequences of the ongoing rise in the air's CO2 content." The Center is led by two brothers, Craig and Keith Idso. Their father, Sherwood Idso, is affiliated with the Greening Earth Society; the Center also shares a board member (Sylvan Wittwer) with GES. Both Idso brothers have been on the Western Fuels payroll at one time or another.  Spin: Increased levels of CO2 will help plants, and that's good.  Funding: The Center is extremely secretive of its funding sources, stating that it is their policy not to divulge it funders. There is evidence for a strong connection to the Greening Earth Society (ergo Western Fuels Association).  Affiliated Individuals: Craig Idso, Keith Idso, Sylvan Wittwer

#### The Idsos don’t have peer review, and fill their work with meaningless jargon

UCS 7 – Union of Concerned Scientists

“Responding to Global Warming Skeptics—Prominent Skeptics Organizations,” http://www.ucsusa.org/global\_warming/science/skeptic-organizations.html

In an attempt to bank on the credibility science generally enjoys and to fight off accusations of making unscientific, biased claims, skeptics also pursue the idea "if you can't beat them, join them"—if only in appearance. EXAMPLE: The Center for the Study of Carbon Dioxide and Global Change. This pseudo-scientific research center located in Tempe, AZ, who are also involved with the Greening Earth Society. In a position paper on global warming [13], the two authors (the only listed staff of the Center) state, "There is little doubt the air's CO2 concentration has risen significantly since the inception of the Industrial Revolution; and there are few who do not attribute the CO2 increase to the increase in humanity's use of fossil fuels. There is also little doubt that the earth has warmed slightly over the same period; but there is no compelling reason to believe that the rise in temperature was caused by the rise in CO2. Furthermore it is highly unlikely that future increases in the air's CO2 content will produce any global warming; for there are numerous problems with the popular hypothesis that links the two phenomena." The authors then go on to flesh out these "problems" with scientific jargon, criticizing unscientific interpretations, and debunking claims never made by serious climate scientists. The "scientific" positions held by Center staff are **not subjected to peer-review**, and the Center's Scientific Advisors are mostly retired scientists **without past or current research** in climate-related sciences. It is not clear whether the CO2 Center is actually a separate entity from the Greening Earth Society.

### Lindzen

#### Lindzen lies about his funding—he is paid off by the coal and oil industries

De Granados 7

Oriana Zill, productions director of the Center for Investigative Reporting, <http://www.pbs.org/wgbh/pages/frontline/hotpolitics/reports/skeptics.html>

Dr. Lindzen has claimed in Newsweek and elsewhere that his funding comes exclusively from government sources, but he does not seem to include speaking fees and other personal compensation in this statement. Ross Gelbspan, who did some of the first reporting on climate skeptics' links to industry, wrote in Harper's Magazine in 1995: "[Lindzen] charges oil and coal interests $2,500 a day for his consulting services; his 1991 trip to testify before a Senate committee was paid for by Western Fuels, and a speech he wrote, entitled 'Global Warming: the Origin and Nature of Alleged Scientific Consensus,' was underwritten by OPEC."

#### Uses argument from authority, too ideological and no scientist views it as legitimate

Bowen 7 – PhD in Physics from MIT

Mark, PhD in Physics from MIT, Censoring Science, pg. 235

But the game had begun. Richard Lindzen of MIT, a man who leans heavily upon his various credentials, which include election to the National Academy at a young age for his work in atmospheric circulation, coauthored a letter to President Mush supporting the paper with the Marshall Institute—and simultaneously took aim at the GCMs by proposing a second preposterous notion regarding water vapor. It is often difficult for the ordinary mortal to follow Dr Lindzen's complex logic and locution, but he was basically saying that changes in water vapor would lead to a negative feedback the upper troposphere would dry as the atmosphere wanned; this would counteract the effect of the manmade greenhouse gases and act to stabilize temperatures. I once attempted to interview Dr. Lindzen, but he fended me off. Journalist Ross Gelbspan had better luck, managing to meet with him for two hours in 1995. "In contrast to his often tortured scientific pronouncements." Gelbspan wrote, 'I found his social and political expressions to be lucid, succinct, and unambiguous Indeed, I found him to be one of the most ideologically extreme individuals I have ever interviewed " Lindzen has compared the rise of the environmental movement to the rise of the Nazi party in Weimer Germany. A cigarette smoker, he has also been known to deny that there is a connection between smoking and cancer. He is still **kicking the dead horse** of his water vapor theory, although virtually **no legitimate scientists** found it conceivable in 1989, and fewer believe it today. A test of his notion would arise naturally in mid-1991. Jim never wasted much time on it. He casually pointed out that the planet performs an experiment that disproves it even year. As anyone whose skin has gotten sticky in summer would suspect, and as Arrhenius deduced more than a century ago. every layer of the troposphere takes on water vapor in summer and dries in winter. **This is a positive feedback**; it's as simple as that.

#### Lindzen admits he has no data to back up his claims

Bowen 7 – PhD in Physics from MIT

Mark, PhD in Physics from MIT, Censoring Science, pg. 235-236

When Lindzen first brought his convoluted theory public, many took note of the seemingly spiritual aspect of his belief. He admitted that he had **no data to back it up**, and he spoke of water in quasi-religious terms. In a draft of his first journal article on the subject, he wrote. "The most likely area to search for severe problems [with the CJCMsj is in the interaction of climate with water (in all its phases) The remarkable thermodynamic properties of water almost certainly lead to its acting as nature's thermostat" He also observed that if this particular alchemical substance did not meet his magical needs, something else must Seven years later he would appeal to a belief in a benign, or even divine, principle of balance in testimony before the Senate Committee on Environment and Public Works: "In some ways, we arc driven to a philosophical consideration: namely, do we think that a long-lived natural system, like the earth, acts to amplify any perturbations, or is it more likely that it will act to counteract such perturbations? It appears that we are currently committed to the former rather vindictive view of nature **With generous help** from the fossil fuel industry, the Marshall Institute orchestrated probably the single most effective disinformation campaign that has been aimed at global warming. Between 1998 and 2005, according to a 2007 report by the Union of Concerned Scientists, the institute received $630,000 from ExxonMobil. In 2004, the oil giant's funding represented about 21 percent of the institute's total expenses. Lindzen has sat on Marshall's science advisory board. The institute has published his diatribes as well as books by Pat Michaels, whose distortion of Jim's 1988 testimony would prove useful to Michael Crichton. Sallie Bahunas. author of the backdoor journal article questioning a primary' conclusion of the 2001 IPCC assessment, of which Philip Cooney would become so enamored that he would brag about it to Dick Cheney s office, would join Marshall's board of directors: and she and her coauthor. W'illie Soon, would publish copious similar balderdash disguised as "sound science' under the institute's auspices.

#### He ignores contradictory science

Glebspan 97 – Professor @ Columbia

Ross Gelbspan, editor and reporter at The Boston Globe and The Washington Post and professor at the Columbia University School of Journalism , The Heat is On, 1997, p. 49

Of all the skeptics, the most infuriating to his adversaries—and the most unassailable because of his prestigious credentials—is MIT’S Richard Lindzen. Lindzen arrived at his belief that global warming is basically a nonevent based partially on his own studies of atmospheric water vapor. Water vapor, which traps heat in the earth’s atmosphere, is by far the largest gaseous contributor to planetary warming. Some years ago Lindzen theorized that atmospheric convection currents would transport water vapor through certain cloud formations into the upper atmosphere. There it would be dried out—in effect, imposing an upper limit on the vapor buildup that would otherwise have fueled atmospheric warming. Fears of a runaway greenhouse reac­tion, he concluded, were unfounded. But Lindzen’s theory has been contradicted by satellite and balloon observations that show that lower-level warming results in increases—not, as Lindzen predicted, decreases—in water vapor concentrations at higher altitudes. In a 1995 paper published in the Journal of Climate, B. J. Soden and R. Fu, researchers at Princeton University, found that according to satellite readings, areas of higher tropical convection are associated with increased stratospheric water vapor and higher greenhouse trapping, which also contradicts Lind­zen’s theory. Lindzen has an excruciatingly argumentative style that at times seems relentlessly obscurantist and self-contradictory. Testifying be­fore a Senate committee in 1991, he jousted at length with then­ Senator Al Gore over his theory that the drying of upper-level water vapor would produce a cooling effect and counteract atmospheric warming.

### Lomborg

#### Not qualified and ignores impact of photosynthesis

Kysar 3 – Professor of Law @ Cornell

Douglas A. Kysar, Assistant Professor of Law, Cornell Law School, Ecology Law Quarterly, 2003, Lexis

To his credit, Lomborg candidly discloses in the preface to The Skeptical Environmentalist, "I am not myself an expert as regards environmental problems."n38 The author later proves as much when he argues that plant photosynthesis is not instrumentally significant to humans, n39 apparently forgetting that the very evolution of animal life was made possible by plants increasing the oxygen content of the atmosphere over a period of millions of years. n40 Admittedly, the eradication of all plant life from the face of the Earth, discussed as a rather blase hypothetical by Lomborg, n41 would not have an immediate impact on humans due to the immense amount of oxygen presently stored in the atmosphere. However, elimination of all photosynthesizing life forms from the Earth eventually would result in a decline of atmospheric oxygen content, a fact that perhaps reveals more about Lomborg's level of concern for future generations than it does his scientific expertise.

#### Lomborg exagerates flawed evidence supporting his argument to the exclusion of contradictory, respected science

Kysar 3 – Professor of Law @ Cornell

Douglas A. Kysar, Assistant Professor of Law, Cornell Law School, Ecology Law Quarterly, 2003, Lexis

Unfortunately, such confusions plague The Skeptical Environmentalist.n43 A typical example is Lomborg's treatment of acid rain. In four short pages, Lomborg argues that acid rain has no effect on forests, dismissing the well-known claim to the contrary as a "myth." n44 Yet Lomborg's analysis of the issue borders on inept. He begins by opining that "big-city pollution has nothing to do with acid rain," n45 despite the fact that traffic emissions have been shown to be a major contributor of nitrogen compounds that cause acid rain. n46 He then reproduces a single graph from an early and much-criticized n47 National Acid Precipitation Assessment Program (NAPAP) report showing inconsequential differences in growth rates among seedlings from three species of trees that were exposed to varying concentrations of acid rain over a short period of time. n48 From this and a sprinkling of other data, Lomborg concludes that the widely held perception that acid rain contributes to forest death is "not borne out by the evidence." n49 As with many other claims in the book, Lomborg's conclusion appears to be driven by his exclusion of evidence that contradicts his chipper assessment. Numerous peer-reviewed scientific studies demonstrate that acidic deposition adversely impacts forest ecosystems, whether by causing observable mortality and decline in tree species, as in the case of the sugar maplen50 and the red spruce, n51 or by causing more long-term and widespread declines in forest quality due to the gradual erosion of base cation nutrient levels in soil. n52 One may be tempted to excuse Lomborg for his oversight because, after all, he is not himself "an expert as regards environmental problems." But Lomborg **did not need to delve** deeply into the primary scientific literature to discern these facts. Indeed, he simply could have examined NAPAP's more recent 1998  [\*233]  report to Congress, the executive summary of which states unequivocally, "Sulfur and nitrogen deposition have caused adverse impacts on certain highly sensitive forest ecosystems in the United States ... . If deposition levels are not reduced in areas where they are presently high, adverse effects may develop in more forests due to chronic, multiple decade exposure."n53 Such cursory and lopsided analysis occurs throughout The Skeptical Environmentalist, as numerous respondents to Lomborg have taken pains to demonstrate.n54 Rather than rehearse such point-by-point rebuttals, this Section instead will review briefly the statistician's treatment of three key indicators of environmental sustainability: biodiversity, renewable resources, and nonrenewable resources. As will be seen, Lomborg's analysis of each of these subjects fits into a pattern of oversimplification.

#### Lomborg is widely accepted as incorrect in his warming predictions

Hamilton 10 – Professor of Public Ethics @ ANU

Clive Hamilton, Professor of Public Ethics in Australia, 2010, “Requiem for a Species: Why We Resist the Truth About Climate Change,” pg 7

Lomborg made this confident declaration just at the time it was becoming apparent that growth in global emissions had risen so high that the world had shifted onto a path that is worse than the worst-case scenario imagined by the IPCC. In its worst case the IPCC anticipated growth in CO, emissions of 2.5 per cent per annum through to 2030, yet we have seen that from around 2000 global emissions began growing at 3 per cent a year.2' This worse-than-the-worst-case scenario should now be regarded as the most likely one in the absence of determined intervention." It is not often in the history of public debate that a commentator has been proven as **emphatically wrong** **as Bjorn Lomborg has been**.

#### Lomborg’s wrong about the rate of species loss

Friel 10 – Editor of Aletheia Press

Howard Friel, founder and president of Differentiated Information, an information-services company, “The Lomborg Deception,” 2010, pg. 8

Wilson responded a bit more pointedly "My greatest regret about the Lomborg scam is the extraordinary amount of scientific talent that has to be expended to combat it in the media." Wilson described Lomborg's book as "characterized by willful ignorance, selective quo- rations, disregard for communication with genuine experts, and destructive campaigning to attract the attention of the media rather than scientists." Referring specifically to Lomborg's claim that environmentalists have exaggerated rates of species extinction, Wilson wrote that "Lomborg's estimate of extinction rates is at odds with the vast majority of respected scholarship on extinction," and, "at current levels of habitat destruction, extinction rates are destined to rise, and - I believe **every researcher would agree** – **dramatically so**.”

#### \*\*\*This evidence cites Edward Wilson – Professor of Biology @ Harvard

#### Lomborg’s book isn’t close to science

Friel 10 – Editor of Aletheia Press

Howard Friel, founder and president of Differentiated Information, an information-services company, “The Lomborg Deception,” 2010, pg. 10

UCS answered that the separately contributed reviews to its forum "unequivocally demonstrate that on closer inspection, Lomborg's book is seriously flawed and fails to meet basic standards of credible scientific analysis," and that "Lomborg consistently misuses, misrepresents or misinterprets data to greatly underestimate rates of species extinction, ignore evidence that billions of people lack access to clean water and sanitation, and minimize the extent and impacts of global warming due to the burning of fossil fuels and other human- caused emissions of heat-trapping gases.”

#### Lomborg misrepresents science to fuel denialist claims

Friel 10 – Editor of Aletheia Press

Howard Friel, founder and president of Differentiated Information, an information-services company, “The Lomborg Deception,” 2010, pg. 204

One can convincingly maintain that Lomborgs books are an assault on science, as Scientific American did when it convened its forum of distinguished scientists to write an important early rebuttal — "Science Defends Itself Against The Skeptical Environmentalist" — to Lomborg. One might also argue that the success of Lomborg's books in a cultural sense was one manifestation of a broader "assault on reason," an apt coinage of our current overall predicament that Al Gore chose as the title of his recent book, which describes a systemic breakdown of rational consideration of the major challenges facing the United States and the world. That the twenty-year assessment of climate science by the IPCC's scientists would be compared unfavorably with Lomborgs The Skeptical Environmentalist and Cool It in so many influential circles in the United States — given the evident problems with Lomborgs scholarship — is at least one inescapable affirmation of Gore's thesis. Beyond these final comments, it is difficult to label Cool It and the larger Lomborg phenomenon. At this point we can but issue an appeal to Lomborgs prospective book publishers to **check — before publication — whether** his sources support his assertions or not. Doing so could save the world. Or at least the one we now face.

### Singer

#### Bought off

De Granados 7

Oriana Zill, productions director of the Center for Investigative Reporting, <http://www.pbs.org/wgbh/pages/frontline/hotpolitics/reports/skeptics.html>

Affiliations & Funding: Dr. Singer publicly denies receiving funding from energy industry sources, but he has acknowledged previously being a paid consultant for several oil companies. In addition, his organization -- the Science and Environmental Policy Project (SEPP) -- has received multiple grants from ExxonMobil, according to a review of Exxon's own financial documents and Greenpeace's Exxonsecrets.org. That site also shows that many of the other organizations with which Singer works -- Frontiers of Freedom, the Cato Institute, National Center for Policy Analysis -- have received large grants from Exxon as well.

#### Singer is Exxon funded

Gelbspan 11

Ross, retired editor and reporter with The Philadelphia Bulletin, The Washington Post and The Boston Globe, “ExxonMobil: The Skeptics' New Patron EXXONMOBIL EMERGES AS MAJOR FUNDER OF "GREENHOUSE SKEPTICS", http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3645&method=full

S. Fred Singer: On Feb 12, 2001, Singer wrote [a letter to](http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3647&method=full) The Washington Post in which he denied receiving any oil company money in the previous 20 years when he had consulted for the oil industry. According to ExxonMobil documents, the company gave a 1998 grant of $10,000 to Singer's institute, the Science and Environmental Policy Project (SEPP). It gave another $65,000 to the Atlas Economic Research Foundation, Fairfax, Virginia which promotes Singer's work. In its web page, "Atlas [invites](http://www.atlasusa.org/highlight_archive/1995/H1995-02-Environment.html) other institutes to take advantage of the opportunities provided by the proximity of SEPP. The organization's founding president, Dr. S. Fred Singer, is a well-known physical scientist who has been an active contributor in the battle against the 'politicization' of science. Singer, along with a handful of other prominent scientists, have dared to challenge claims of environmental apocalypse from global warming…Fortunately for those who believe that public policy should be based on sound science, Dr. Singer offers a wealth of information, credibility, and encouragement." In his letter to The Washington Post, Singer wrote: "My connection to oil during the past decade is as a Wesson Fellow at the Hoover Institution; the Wesson money derives from salad oil." In 1998, ExxonMobil gave $135,000 to the Hoover Institution -- the same year Singer published an [article](http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3650&method=full) in the institution's publication, The Hoover Digest. Singer's falsehood about industry funding in The Washington Post is the latest in a series of fabrications and untruths. In 1997, Singer told the press that former IPCC Chairman [Dr. Bert Bolin](http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3649&method=full) has changed his mind about climate change. According to Singer, Bolin had dismissed the connection between atmospheric warming and extreme weather events – and was distressed that the Clinton Administration was taking measures to reduce emissions. Bolin subsequently [denied making the statements](http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3641&method=full). Bolin said it was "scientifically accurate" to note that extreme weather effects "are consistent with the predicted effects of climate change. Referring to Singer's attribution of bogus statements to Bolin, the Swedish physicist dismissed them as "inaccurate and misleading." Singer followed that misrepresentation with an attack on the integrity of the entire IPCC process in an interview last January in The New American, the [magazine](http://thenewamerican.com/tna/2000/01-31-2000/vo16no03_environment.htm) of the ultra-conservative John Birch Society. Singer is also on the staff of the ultra-conservative Frontiers of Freedom [institute](http://www.ff.org/about/staff.html). According to its mission statement, Frontiers of Freedom "is the antithesis to the Sierra Club and Vice President Al Gore's Earth in the Balance. Frontiers works to advance States' rights, protect property rights, privatize Social Security, defend first amendment civil liberties, and among other efforts to reform the federal tax code, the Endangered Species Act, and the Food and Drug Administration." Frontiers of Freedom is [funded by](http://www.heatisonline.org/contentserver/objecthandlers/index.cfm?id=3735&method=full) ExxonMobil among others, according to the Wall Street Journal. While Singer loudly touts himself as an accomplished scientist, he has been **unable to publish** his work in any peer- reviewed scientific journal **for at least 15 years**, except for one technical comment.

### Soon / Balunias / Idso

#### Bought off

Newsmith 3

Jeff, “Foes of global warming theory have energy ties,” Seattle Pi, Lexis

The energy industry provides significant funding for groups that employ some of the authors or promote their new study. Soon's co-authors were Sallie Baliunas, also from the Harvard-Smithsonian Center; Sherwood Idso and his son, Craig Idso of Tempe, Ariz., who are the former president and the current president of the Center for the Study of Carbon Dioxide and Global Change; and David Legates, a climate researcher at the University of Delaware.  The Idsos, who have been linked to Western coal interests, do not reveal financial sources. But IRS records filed by ExxonMobil Foundation show that it provided a grant of $15,000 to the center in 2000.  These records and others show that ExxonMobil Foundation and ExxonMobil Corp. also have contributed $160,000 to the George T. Marshall Institute in the past three years and more than $900,000 to the Competitive Enterprise Institute.  Soon declined to say how much he is paid to serve as a "senior scientist" with the Marshall Institute. Both he and Baliunas have that title.  Other board members include techno-suspense novelist Thomas Clancy Jr., newspaper columnist Charles Krauthammer, Dr. Bernadine Healy, former director of the National Institutes of Health, and Frederick Seitz of Rockefeller University.  Ross Gelbspan, a former Boston Globe reporter and editor whose 1997 book, "The Heat is On," details industry efforts to discredit climate change science, said conclusions that greenhouse gases are causing the planet to heat up are the result of the "most rigorously peer-reviewed scientific collaboration in history.  "The contradictory statements of a tiny handful of discredited scientists, funded by big coal and big oil, represent a deliberate -- and extremely reckless -- campaign of deception and disinformation.

## \*\*\*Warming Bad—Answers To

### AT: Warming Inevitable – Too Much Co2

#### Not inevitable – cuts solve

Somerville 11 – Professor of Oceanography @ UCSD

Richard Somerville, Distinguished Professor Emeritus and Research Professor at Scripps Institution of Oceanography at the University of California, San Diego, Coordinating Lead Author in Working Group I for the 2007 Fourth Assessment Report of the Intergovernmental Panel on Climate Change, 3-8-2011, “CLIMATE SCIENCE AND EPA'S GREENHOUSE GAS REGULATIONS,” CQ Congressional Testimony, Lexis

Thus, atmospheric CO2 concentrations are already at levels predicted to lead to global warming of between 2.0 and 2.4C. The conclusion from both the IPCC and subsequent analyses is blunt and stark - **immediate and dramatic emission reductions** of all greenhouse gases are urgently needed if the 2 deg C (or 3.6 deg F) limit is to be respected. This scientific conclusion illustrates a key point, which is that it will be governments that will decide, by actions or inactions, what level of climate change they regard as tolerable. This choice by governments may be affected by risk tolerance, priorities, economics, and other considerations, but in the end it is a choice that humanity as a whole, acting through national governments, will make. Science and scientists will not and should not make that choice. After governments have set a tolerable limit of climate change, however, climate science can then provide valuable information about what steps will be required to keep climate change within that limit.

### AT: Adaptation – Can’t Adapt

#### Non-linear impacts prevent adaptation

Mazo 10 – PhD in Paleoclimatology from UCLA

Jeffrey Mazo, Managing Editor, Survival and Research Fellow for Environmental Security and Science Policy at the International Institute for Strategic Studies in London, 3-2010, “Climate Conflict: How global warming threatens security and what to do about it,” pg. 29

This latter aspect, the rate of change, is a critical factor in terms of adapting to climate change. Although some states and societies will be better able to adapt to change than others, regardless of how resilient a given society is there will always be some point at which its efforts would be **overwhelmed** by the **pace of change**. Changes in climate - long-term wind and rainfall patterns, daily and seasonal temperature variations, and so on - will produce physical effects such as droughts, floods and increasing severity of typhoons and hurricanes, and ecological effects such as changes in the geographical range of species (including disease-causing organisms, domesticated crops and crop pests). These physical changes in turn may lead to effects such as disruption of water resources, declining crop yields and food stocks, wildfires, severe disease outbreaks, and an increase in numbers of refugees and internally displaced persons.4

### AT: Adaptation – Biodiversity DA

#### Species can’t adapt

Lynas 7 – Associate @ Oxford’s School of the environment

Mark, advisor on climate change to the President of the Maldives, Educational focus on Politics and History, Six Degrees, pg. 116

Species have evolved to fill particular ecological niches, which may disappear as other species die out or migrate. Ecosystems also tend to be highly adapted to their geographical habitat. Chalk grasslands, for example, will not have much success moving north if the soils in cooler climes are all underlain by clay or granite. Habitat fragmentation is another problem: Cities, agricultural monocrop "deserts," and major roads **all present insurmountable barriers** to species migration. In southern England, the timid dormouse will not cross open fields, let alone scurry through the busy streets of Birmingham on its supposed journey north. As a result, climate change calls into question the very basis of site-based nature conservation: There is no point in declaring somewhere a nature reserve if all the species within it have to flee north within a few decades in order to avoid going extinct.

### AT: China / Developing Countries Outweigh

#### Their argument doesn’t justify inaction – US is responsible and modeled

Hansen 8 – Professor of Earth and Environmental Science

James E. Hanson, head of the NASA Goddard Institute for Space Studies in New York City and adjunct professor in the Department of Earth and Environmental Science at Columbia University, Al Gore’s science advisor, “Briefing before the Select Committee on Energy Independence and Global Warming,” US House of Representatives, 6-23-2008, “Twenty years later: tipping points near on global warming,” <http://www.columbia.edu/~jeh1/2008/TwentyYearsLater_20080623.pdf>

The fossil industry maintains its strangle-hold on Washington **via demagoguery**, using China and other developing nations as **scapegoats to rationalise inaction**. In fact, we produced most of the excess carbon in the air today, and it is to our advantage as a nation to move smartly in developing ways to reduce emissions. As with the ozone problem, developing countries can be allowed limited extra time to reduce emissions. They will cooperate: they have much to lose from climate change and much to gain from clean air and reduced dependence on fossil fuels. We must establish fair agreements with other countries. However, our own tax and dividend should start immediately. We have much to gain from it as a nation, and other countries will copy our success. If necessary, import duties on products from uncooperative countries can level the playing field, with the import tax added to the dividend pool.

### AT: IPCC Flawed

#### IPCC is sound objective science

Pachauri 8 – Professor of Business @ HEC Paris

Rajendra K. Pachauri, Director-General of TERI, Global Warming: Looking Beyond Kyoto, “The IPCC: Establishing the Evidence” Page 13-14

The Intergovernmental Panel on Climate Change (IPCC) was established in 1988 by the World Meteorological Organization and the United Nations Environment Program. Reexamination of the evidence on climate change is the basic purpose of the IPCC. The thorough, consensual, and objective manner in which these assessments are carried out provides solid credibility for the findings. One example: the IPCC nominated close to 2,000 experts to compile the Fourth Assessment Report. From this group it appointed about 600. The first draft was prepared and reviewed by other experts. On the basis of this review, the authors prepared the second draft, which went the rounds of expert and government reviews. Following this second review, the authors prepared the final draft along with a synthesis of the report for policymakers. These two sets of documents were approved by the working group that oversaw the preparation of the report and by the IPCC as a whole. The IPCC has followed a similarly elaborate process for every report. The Fourth Assessment Report, currently in hand, closes some gaps and provides fresh knowledge on the science of climate change. The three reports of working groups 1, 2, and 3, which form part of the Fourth Assessment Report, were completed and released in early in 2007 (February, April, and May, respectively). The synthesis report of the Fourth Assessment Report is due to be completed and released in November 2007. Although the first three assessment reports strengthened previous basic findings, the fourth provides even stronger scientific evidence and a stronger basis for actions necessary to move forward during the second commitment period of the Kyoto Protocol. It is in the context of this report that this chapter addresses not only the geophysical aspects of climate change but also the socioeconomic aspects, including equity implications.

#### It only cites peer-reviewed evidence and is well supported by other comprehensive studies

Pachauri 8 – Professor of Business @ HEC Paris

Rajendra K. Pachauri, Director-General of TERI, Global Warming: Looking Beyond Kyoto, “The IPCC: Establishing the Evidence” Page 14

Some criticize the IPCC for using market exchange rates in its scenarios. In actual fact, scenarios assessed by the IPCC also use purchasing power parity. Again, in keeping with IPCC procedures, the assessment of these scenarios is based entirely on material available in peer-reviewed literature. Another criticism is that projections for developing regions are implausibly high, that in arriving at economic projections the IPCC did not use an adequate level of expertise in the field of statisticis, and that it did not use the insights available in the economic ministries of the various governments.These criticisms are addressed herin by authors associated with the IPCC. The emissions scenarios, as well as the methodologies adopted, are consistent with work carried out by organizations such as the World Bank, the International Energy Agency, and the United States Department of Energy. Material assessed is drawn from publications produced by a very active research community working in this area. Table 1-1 shows historical growth rates for the United Kingdom, the United States, Canada, and Japan: it can be seen that the data used in the IPCC scenarios are consistent with historically established rates achieved in the developed world.

### AT: So2 Screw

#### Dimming particulates decreasing now

Westerly Sun 10

Earth Talk, 12-2010, “Global dimming a result of pollution,” http://www.thewesterlysun.com/news/article\_f919852a-039e-11e0-8702-001cc4c03286.html

Columbia University climatologist Beate Liepert notes a reduction by some 4 percent of the amount of solar radiation reaching the Earth's surface between 1961 and 1990, a time when particulate emissions began to skyrocket around the world. But a 2007 study by the National Aeronautics and Space Administration found an **overall reversal of global dimming** since 1990, probably due to stricter pollution standards adopted by the U.S. and Europe around that time.

#### Warming outweighs dimming

Reynolds 10 – PhD in Atmospheric Sciences

Michael, PhD in Atmospheric Sciences, “Report from the On-board Scientist: Aerosols, Volcanoes and Global Dimming,” http://www.aroundtheamericas.org/log/report-from-the-on-board-scientist-aerosols-volcanoes-and-global-dimming/

On the other hand, aerosols can add heat to the atmosphere which partially offsets the cooling effect. As the Earth heats up from the sun, it radiates heat back to space. Aerosols absorb some of the heat radiation and reduce the amount of heat radiation escaping out to space. This is the same heat-blocking effect attributed to greenhouse gasses, and in this way aerosols can have a heating effect on global climate. Nevertheless, the net effect of aerosols is to reduce the rate of global warming from greenhouse gasses. Does this mean we should all go build fires and drive our cars? No, because the offset that aerosols make on all of all these activities is **smaller than the impact those activities make on global warming**. Models and data now show that aerosols reduce the increase in global temperature by a factor of approximately 50% (there is uncertainty in the actual amount). So, they slow down the process but do not stop it. And they create pollution and effect health at the same time.

#### Even absent warming, dimming pollutants kill billions

Shah 5

Anup, Global Dimming, http://www.globalissues.org/EnvIssues/GlobalWarming/globaldimming.asp

Global warming results from the greenhouse effect caused by, amongst other things, excessive amounts of greenhouse gases in the earth’s atmosphere from fossil fuel burning. It would seem then, that the other by-products which cause global dimming may be an ironic savior. A deeper look at this, however, shows that unfortunately this is not the case.  Health and environmental effects The pollutants that lead to global dimming also lead to various human and environmental problems, such as smog, respiratory problems, and acid rain. The impacts of global dimming itself, however, **can be devastating**. Millions from Famines in the Sahel in the 70s and 80s The death toll that global dimming may have already caused is thought to be massive. Climatologists studying this phenomenon believe that the reflection of heat have made waters in the northern hemisphere cooler. As a result, less rain has formed in key areas and crucial rainfall has failed to arrive over the Sahel in Northern Africa. In the 1970s and 1980s, massive famines were caused by failed rains which climatologists had never quite understood why they had failed. The answers that global dimming models seemed to provide, the documentary noted, has led to a chilling conclusion: “what came out of our exhaust pipes and power stations [from Europe and North America] contributed to the deaths of a million people in Africa, and afflicted 50 million more” with hunger and starvation. Scientists said that **the impact of global dimming might not be in the millions, but billions**. The Asian monsoons bring rainfall to half the world’s population. If this air pollution and global dimming has a detrimental impact on the Asian monsoons some 3 billion people could be affected.

#### Dimming still causes global climate spikes

Westerly Sun 10

Earth Talk, 12-2010, “Global dimming a result of pollution,” http://www.thewesterlysun.com/news/article\_f919852a-039e-11e0-8702-001cc4c03286.html

Particulate pollution also changes the properties of clouds. The resulting "brown clouds" are more reflective and produce less rainfall than their more pristine counterparts. The reduction in heat reaching the Earth's surface as a result of both of these processes is what researchers have dubbed global dimming. "At first, it sounds like an ironic savior to climate change problems," reports Anup Shah of the Global Issues website. "However, it is believed that global dimming caused the droughts in Ethiopia in the 1970s and 1980s where **millions died**, because the northern hemisphere oceans were not warm enough to allow rain formation."

### AT: Co2 Ag – Doesn’t Solve

#### Co2 doesn’t boost yields – any evidence of growth is short-term and hypothetical

Jackson 9 – Research molecular biologist @ USDA

Eric, 2009, “The international food system and the climate crisis,” The Panama News, Lexis

A major weakness in the forecasts of the IPCC and others when it comes to agriculture is that their predictions accept a theory of “carbon fertilization,” which argues that higher levels CO2 in the atmosphere will enhance photosynthesis in many key crops, and boost their yields. Recent studies show **that this is a mirage.** Not only does any initial acceleration in growth slow down significantly after a few days or weeks, but the increase in CO2 reduces nitrogen and protein in the leaves by more than 12 percent. This means that, with climate change, there will be less protein for humans in major cereals such as wheat and rice. There will also be less nitrogen in the leaves for bugs, which means that bugs will eat more leaf, leading to important reductions in yield.

#### Warming leads to weather disasters – this is comparatively worse for agriculture than the benefits of co2 fertilization

-top ag experts agree

Gillis 11

Justin Gillis, Editor @ NYT, 6-11-2011, “A Warming Planet Struggles to Feed Itself,” Factiva

Now, the latest scientific research suggests that a previously discounted factor is helping to destabilize the food system: climate change. Many of the failed harvests of the past decade were a consequence of weather disasters, like floods in the United States, drought in Australia and blistering heat waves in Europe and Russia. Scientists believe some, though not all, of those events were caused or worsened by human-induced global warming. Temperatures are rising rapidly during the growing season in some of the most important agricultural countries, and a paper published several weeks ago found that this had shaved **several percentage points off potential yields**, adding to the price gyrations. For nearly two decades, scientists had predicted that climate change would be relatively manageable for agriculture, suggesting that even under worst-case assumptions, it would probably take until 2080 for food prices to double. In part, they were counting on a counterintuitive ace in the hole: that rising carbon dioxide levels, the primary contributor to global warming, would act as a powerful plant fertilizer and offset many of the ill effects of climate change. Until a few years ago, these assumptions went largely unchallenged. But lately, the destabilization of the food system and the soaring prices have **rattled many leading scientists**. “The success of agriculture has been astounding,” said Cynthia Rosenzweig, a researcher at NASA who helped pioneer the study of climate change and agriculture. “But I think there’s starting to be premonitions that it may not continue forever.” A scramble is on to figure out whether climate science has been too sanguine about the risks. Some researchers, analyzing computer forecasts that are used to advise governments on future crop prospects, are pointing out what they consider to be gaping holes. These include a failure to consider the effects of extreme weather, like the floods and the heat waves that are increasing as the earth warms. A rising unease about the future of the world’s food supply came through during interviews this year with more than 50 agricultural experts working in nine countries.

### AT: Co2 Ag – No Yield Increase

#### Turn – pollution leads to ozone – tanks ag – outweighs any benefit from CO2

Monbiot 7 – Professor @ Oxford

George, Professor @ Oxford Brookes University, Heat: How to Stop the Planet from Burning, pg. 7

But now, I am sorry to say, it seems that I might have been right, though for the wrong reasons. In late 2005, a study published in the Philosophical Transactions of the Royal Society alleged that the yield predictions for temperate countries were 'over optimistic'. The authors had blown carbon dioxide and ozone, in concentrations roughly equivalent to those expected later this century, over crops in the open air. They discovered that the plants didn't respond as they were supposed to: the extra carbon dioxide did not fertilize them as much as the researchers predicted, and the **ozone reduced their yields** by 20 per cent." Ozone levels are rising in the rich nations by between 1 and 2 per cent a year, as a result of sunlight interacting with pollution from cars, planes and power stations. The levels happen to be highest in the places where crop yields were expected to rise: western Europe, the midwest and eastern US and eastern China. The expected ozone increase in China will cause maize, rice and soybean production to fall by over 30 per cent by 2020, These reductions in yield, if real, arc enough to **cancel out the effects** of both higher temperatures and higher carbon dioxide concentrations.

#### Turn – weeds – Co2 leads to weeds – tanks agriculture

Ziska 7 – PhD in Agriculture

Lewis Ziska, PhD, Principal investigator at United States Department of Agriculture
Agricultural Research Service Alternate Crop and Systems Lab. “Climate change impact on weeds” http://www.climateandfarming.org/pdfs/FactSheets/III.1Weeds.pdf

Weeds have a greater genetic diversity than crops. Consequently, if a resource (light, water, nutrients or carbon dioxide) changes within the environment, it is more likely that weeds will show a greater growth and reproductive response. It can be argued that many weed species have the C4 photosynthetic pathway and therefore will show a smaller response to atmospheric CO2 relative to C3 crops. However, this argument does not consider the range of available C3 and C4 weeds present in any agronomic environment. That is, at present, the U.S. has a total of 46 major crops; but, over 410 “troublesome” weed species (both C3 and C4) associated with those crops (Bridges 1992). Hence, if a C4 weed species does not respond, it is likely that a C3 weed species will. In addition, many growers recognize that the worst weeds for a given crop are similar in growth habit or photosynthetic pathway; indeed, they are often the same uncultivated or “wild” species, e.g. oat and wild oat, sorghum and shattercane, rice and red rice. To date, for all weed/crop competition studies where the photosynthetic pathway is the same, weed growth is favored as CO2 is increased (Table 1, Ziska and Runion, In Press). In addition to agronomic weeds, there is an additional category of plants that are considered “noxious” or “invasive” weeds. These are plants, usually non-native whose introduction results in wide-spread economic or environmental consequences (e.g. kudzu). Many of these weeds reproduce by vegetative means (roots, stolons, etc.) and recent evidence indicates that as a group, these weeds may show a strong response to recent increases in atmospheric CO2 (Ziska and George 2004). How rising CO2 would contribute to the success of these weeds in situ however, is still unclear. Overall, the data that are available on the response of weeds and changes in weed ecology are limited. Additional details, particularly with respect to interactions with other environmental variables (e.g. nutrient availability, precipitation and temperature) are also needed.

### AT: Co2 Ag – No Yield Increase – Lab Conditions

#### Co2 fertilization is a myth – prefer our evidence – newest and assumes real world conditions

Gillis 11

Justin Gillis, Editor @ NYT, 6-11-2011, “A Warming Planet Struggles to Feed Itself,” Factiva

For decades, scientists believed that the human dependence on fossil fuels, for all the problems it was expected to cause, would offer one enormous benefit. Carbon dioxide, the main gas released by combustion, is also the primary fuel for the growth of plants. They draw it out of the air and, using the energy from sunlight, convert the carbon into energy-dense compounds like glucose. All human and animal life runs on these compounds. Humans have already raised the level of carbon dioxide in the atmosphere by 40 percent since the Industrial Revolution, and are on course to double or triple it over the coming century. Studies have long suggested that the extra gas would supercharge the world’s food crops, and might be especially helpful in years when the weather is difficult. But many of those studies were **done in artificial conditions**, like greenhouses or special growth chambers. For the past decade, scientists at the University of Illinois have been putting the “CO2 fertilization effect” to a real-world test in the two most important crops grown in the United States. They started by planting soybeans in a field, then sprayed extra carbon dioxide from a giant tank. Based on the earlier research, they hoped the gas might bump yields as much as 30 percent under optimal growing conditions. But when they harvested their soybeans, they got a rude surprise: the bump was only half as large. “When we measured the yields, it was like, wait a minute — this is not what we expected,” said Elizabeth A. Ainsworth, a Department of Agriculture researcher who played a leading role in the work. When they grew the soybeans in the sort of conditions expected to prevail in a future climate, with high temperatures or low water, the extra carbon dioxide **could not** fully **offset the yield decline** caused by those factors. They also ran tests using corn, America’s single most valuable crop and the basis for its meat production and its biofuel industry. While that crop was already known to be less responsive to carbon dioxide, a yield bump was still expected — especially during droughts. The Illinois **researchers got no bump.** Their work has contributed to a broader body of research suggesting that extra carbon dioxide does act as plant fertilizer, but that the benefits are less than previously believed — and probably **less than needed to avert food shortages**. “One of the things that we’re starting to believe is that the positives of CO2 are **unlikely to outweigh the negatives of the other factors**,” said Andrew D. B. Leakey, another of the Illinois researchers.

### AT: Co2 Ag – Warming Outweighs

#### Warming tanks ag – outweighs fertilization effect

Stern 6 – Professor of Economics

 Sir Nicholas Stern, Head of the Government Economic Service and Adviser to the Government on the economics of climate change and development, 10/30/06. "Stern Review on the economics of climate change, [http://www](http://www/%22%20%5Ct%20%22_blank).

treasury.gov.uk/independent\_reviews/stern\_review\_economics\_climate\_change/stern\_review\_report.cfm

Carbon dioxide is a basic building block for crop growth. Rising concentrations in the atmosphere will have benefits on agriculture – both by stimulating photosynthesis and decreasing water requirements (by adjusting the size of the pores in the leaves). But the extent to which crops respond depends on their physiology and other prevailing conditions (water availability, nutrient availability, pests and diseases). Until recently, research suggested that the positive benefits of increasing carbon dioxide concentrations might compensate for the negative effects of rising mean temperatures (namely shorter growing season and reduced yields). Most crop models have been based on hundreds of experiments in greenhouses and field-chambers dating back decades, which suggest that crop yields will increase by 20 – 30% at 550 ppm carbon dioxide. Even maize, which uses a different system for photosynthesis and does not respond to the direct effects of carbon dioxide, shows increases of 18 – 25% in greenhouse conditions due to improved efficiency of water use. But new analysis by Long et al. (2006) showed that the high-end estimates were largely based on studies of crops grown in greenhouses or field chambers, whereas analysis of studies of crops grown in near-field conditions suggest that the benefits of carbon dioxide may be significantly less – an 8 – 15% increase in yield for a doubling of carbon dioxide for responsive species (wheat, rice, soybean) and no significant increase for non-responsive species (maize, sorghum). These new findings may have very significant consequences for current predictions about impacts of climate change on agriculture. Parry et al. (2004) examined the impacts of increasing global temperatures on cereal production and found that **significant global declines** in productivity could occur if the carbon fertilisation is small (figures below). Regardless of the strength of the carbon fertilisation effect, higher temperatures are likely to become increasingly damaging to crops, as droughts intensify and **critical temperature thresholds** **for crop production** are reached **more often.**

#### Warming outweighs

Lynas 7 – Associate @ Oxford’s School of the environment

Mark, advisor on climate change to the President of the Maldives, Educational focus on Politics and History, Six Degrees, pg. 197

It is plausible that new areas of production in subpolar regions of Canada and Russia will be able to cover some of the shortage, though warmer temperatures across thawed tundra do not equate to higher rainfall or decent soils. It is also likely that new technological developments, with more drought-resistant crop strains, could help to stave off disaster for a while, as could the fertilization effect of higher CO2 levels in the air. But **none of this can** **make up for the loss** of most of the planet's key agricultural areas, and it is difficult to avoid the conclusion that mass starvation will be a permanent danger for much of the human race in the four-degree world—and possibly, as suggested previously, much earlier. With major global breadbaskets dusty and abandoned, rising demand will be chasing rapidly diminishing supply. How this food crisis might play out in different areas is impossible to predict. History, however, is littered with the ruins of societies that collapsed once their environments became overstretched and their food supplies endangered. The case of the Mayans is one of the better known, but in China, too, early civilizations rose and fell in response to fluctuations in rainfall and drought. In modern-day Pakistan, the ancient Harappan civilization of the Indus River Valley was likely extinguished by a particularly severe drought 4,200 years ago.

### AT: CoT Ag – No Fertilization

#### Warming tanks pollination – prevents any benefit

Brown 8 – Professor @ CAS

Lester E. Brown, Director and Founder of the global institute of Environment in the U.S., “Plan B 3.0: Mobilizing to Save Civilization,” Factiva

Agriculture as it exists today has been shaped by a climate system that has changed little over farming’s 11,000-year history. Crops were developed to maximize yields in this long-standing climatic regime. As the temperature rises, agriculture will be increasingly out of sync with its natural environment. Nowhere is this more evident than in the relationship between temperature and crop yields. Since crops in many countries are grown at or near their thermal optimum, even a relatively minor increase during the growing season of 1 or 2 degrees Celsius can shrink the grain harvest in major food-producing regions, such as the North China Plain, the Gangetic Plain of India, and the U.S. CornBelt. Higher temperatures can reduce or even halt photosynthesis, prevent pollination, and lead to crop dehydration. Although the elevated concentrations of atmospheric CO2 that raise temperature can also raise crop yields, the detrimental effect of higher temperatures on yields overrides the CO2 fertilization effect for the major crops. In a study of local ecosystem sustainability, Mohan Wali and his colleagues at Ohio State University noted that as temperature rises, photosynthetic activity in plants increases until the temperature reaches 20 degrees Celsius (68 degrees Fahrenheit).The rate of photosynthesis then plateaus until the temperature hits 35 degrees Celsius (95 degrees Fahrenheit), whereupon it begins to decline, until at 40 degrees Celsius (104 degrees Fahrenheit), photosynthesis ceases entirely.17The most vulnerable part of a plant’s life cycle is the pollination period. Of the world’s three food staples—rice, wheat, and corn—corn is particularly vulnerable. In order for corn to reproduce, pollen must fall from the tassel to the strands of silk that emerge from the end of each ear of corn. Each of these silk strands is attached to a kernel site on the cob. If the kernel is to develop, a grain of pollen must fall on the silk strand and then journey to the kernel site. When temperatures are uncommonly high, the silk strands quickly dry out and turn brown, unable to play their role in the fertilization process. The effects of temperature on rice pollination have been studied in detail in the Philippines. Scientists there report that the pollination of rice falls from 100 percent at 34 degrees Celsius to near zero at 40 degrees Celsius, leading to crop failure.

### AT: Ice Age – Comparative Answer

#### Global warming is faster and comparatively worse

-an ice age won’t start mass ice production for hundreds of thousands of years

Chameides 8 – Professor of Environment @ Duke

Bill Chameides, PhD, Yale University, “Pulse of the Planet: A New Ice Age IS Coming ... but Don't Hold Your Breath,” 11-17-2008, http://www.nicholas.duke.edu/thegreengrok/iceage-nature

Skeptics have been arguing that we should forget about global warming -- a new ice age is imminent. Maybe, some say, it's already started. In fact, a new study does predict the coming of an ice age, one promising to be more permanent than others. Is it imminent? Depends on how you characterize 10,000 years. It may surprise you to know that in our current climate, ice ages are more the norm than not. Over the past three million years, covering the end of the Pliocene and the present Pleistocene epoch, the Earth’s climate has oscillated between cold times (called ice ages or glaciations) and warmer times, interglaciations. In the recent past (the last one million years or so) the ice ages have lasted for about 100,000 years, and the warmer periods tens of thousands of years. The last ice age ended about 12,000 years ago. The questions most relevant to us are: when will the next ice age occur and should we be concerned about a global cold wave or the current global warming? The answers lie in the mechanism behind the climate swings. The oscillations between ice ages and warm periods can be qualitatively explained by the Milankovitch theory (for more details see here). The theory's basic tenet is that the ice age–interglacial swings are triggered by changes in the Earth’s orbit about the sun (eccentricity), rotational changes of the Earth on its axis (precession), and changes in the tilt of the axis (obliquity, which is what causes the seasons). The orbital changes affect how much sunlight reaches the Earth at different latitudes. These changes in solar radiation are then amplified by feedbacks involving carbon dioxide and other greenhouse gases, the ice albedo, and the large temperature swings inferred between ice ages and interglacials. One of the major puzzles in the Milankovitch theory is the so-called Mid-Pleistocene transition. Before about one million years ago, the glacial periods lasted about 40,000 years (which corresponds to the frequency of obliquity changes). Then the glaciations transitioned to a 100,000-ye

ar cycle (which corresponds to the frequency of changes in eccentricity). Why this transition? Scientists continue to discuss the cause. Now Tom Crowley of the University of Edinburgh (previously at Duke University) and William Hyde of the University of Toronto have added a new wrinkle to the debate in a paper just published in Nature. Using a simplified, coupled climate-ice sheet model, they conclude that the shift in the ice age cycling kicked off a slow transition to a new climate regime, one that will be characterized by a permanent ice sheet in the northern mid-latitudes. They argue that this transition is being driven by snow-ice albedo effects. A permanent ice sheet in the mid-latitudes of the North Hemisphere sounds like bad news. But panic is a little premature. Tom Crowley states that "our model predicts a rapid transition [to an ice age] beginning in the **10,000-100,000 years**. But the timing of this transition is surely model dependent -- it could easily be a quarter of million years or so -- still short from the context of geology but **almost infinite** from the viewpoint of society. Our results **in no way** can be interpreted as justification for continued use of fossil fuels, as that problem is **near term and very significant**."

### AT: Ice Age – Link Turn – Volcanoes

#### Warming increases volcanic activity

Thompson 7 - MA from GA Tech

Andrea Thompson, Graduate from Georgia Tech with a B.S. in Earth and Atmospheric Sciences in 2004 and a Master's in the same subject in 2006. 2007, http://www.livescience.com/environment/070830\_gw\_quakes.html

Earthquakes, volcanic eruptions, tsunamis and landslides are some of the additional catastrophes that climate change and its rising sea levels and melting glaciers could bring, a geologist says. The impact of human-induced global warming on Earth's ice and oceans is [already noticeable](http://www.livescience.com/php/multimedia/imagegallery/igviewer.php?imgid=626&gid=42&index=0): Greenland's glaciers are melting at an increasing rate, and sea level rose by a little more than half a foot (0.17 meters) globally in the 20th century**,** according to the Intergovernmental Panel on Climate Change. With these trends in ice cover and sea level only expected to continue and likely worsen if atmospheric carbon dioxide levels continue to rise, they could alter the stresses and forces fighting for balance in the ground under our feet—changes that are well-documented in studies of past climate change, but which are just beginning to be studied as possible consequences of the current state of global warming. "Although they've described it in the past, nobody's thought about it in terms of future effects of climate change," said Bill McGuire of the University College London's Hazard Research Center. McGuire's speculations of increased geological activity have not yet been published in a journal, but he has written an article about them published in the Guardian Unlimited. Rebounding crust One particular feature that can change the balance of forces in Earth's crust is ice, in the form of glaciers and ice sheets that cover much of the area around Earth's poles plus mountains at all latitudes. The weight of ice depresses the crust on which it sits. As the ice melts, the crust below no longer has anything sitting on top of it, and so can rebound fairly rapidly (by geological standards). (This rebounding is actually occurring now as a result of the end of the last Ice Age: The retreat of massive ice sheets from the northern United States and Canada has allowed the crust in these areas to bounce back.) Areas of rebounding crust could change the stresses acting on [earthquake faults](http://www.livescience.com/php/trivia/?quiz=quake) and volcanoes in the crust. "In places like Iceland, for example, where you have the Eyjafjallajökull ice sheet, which wouldn't survive [global warming], and you've got lots of volcanoes under that, the unloading effect can trigger eruptions," McGuire said.

Causes an ice age

NASA 98

[http://www.gsfc.nasa.gov/gsfc/service/gallery/fact\_sheets/earthsci/eos/volcanoes.pdf] Volcanoes and Global Climate Change, Earth Science Enterprise Series/ May

The eruption of a super volcano "sooner or later" will chill the planet and threaten human civilization, British scientists warned Tuesday. And now the bad news: There's not much anyone can do about it.Several volcanoes around the world are capable of gigantic eruptions unlike anything witnessed in recorded history, based on geologic evidence of past events, the scientists said. Such eruptions would dwarf those of Mount St. Helens, Krakatoa, Pinatubo and anything else going back dozens of millennia. "Super eruptions are up to hundreds of times larger than these," said Stephen Self of Britain's Open University. "An area the size of North America can be devastated, and pronounced deterioration of global climate would be expected for a few years following the eruption," Self said. "They could result in the devastation of world agriculture, severe disruption of food supplies, and mass starvation. These effects could be sufficiently severe to threaten the fabric of civilization." Self and his colleagues at the Geological Society of London presented their report to the British government's Natural Hazard Working Group. "Although very rare, these events are inevitable, and at some point in the future humans will be faced with dealing with and surviving a super eruption," Stephen Sparks of the University of Bristol told LiveScience in advance of Tuesday's announcement. Supporting evidence The warning is not new. Geologists in the United States detailed a similar scenario in 2001, when they found evidence suggesting volcanic activity in Yellowstone National Park will eventually lead to a colossal eruption. Half the United States will be covered in ash up to 3 feet (1 meter) deep, according to a study published in the journal Earth and Planetary Science Letters. Explosions of this magnitude "happen about every 600,000 years at Yellowstone," says Chuck Wicks of the U.S. Geological Survey, who has studied the possibilities in separate work. "And it's been about 620,000 years since the last super explosive eruption there." Past volcanic catastrophes at Yellowstone and elsewhere remain evident as giant collapsed basins called calderas. A super eruption is a scaled up version of a typical volcanic outburst, Sparks explained. Each is caused by a rising and growing chamber of hot molten rock known as magma. "In super eruptions the magma chamber is huge," Sparks said. The eruption is rapid, occurring in a matter of days. "When the magma erupts the overlying rocks collapse into the chamber, which has reduced its pressure due to the eruption. The collapse forms the huge crater." The eruption pumps dust and chemicals into the atmosphere for years, screening the Sun and cooling the planet some models predict, causing many plant and animal species to disappear forever. "The whole of a continent might be covered by ash, which might take many years — possibly decades — to erode away and for vegetation to recover," Sparks said. Yellowstone may be winding down geologically, experts say. But they believe it harbors at least one final punch. Globally, there are still plenty of possibilities for super volcano eruptions, even as Earth quiets down over the long haul of its 4.5-billion-year existence. "The earth is of course losing energy, but at a very slow rate, and the effects are only really noticeable over billions rather than millions of years," Sparks said.

### AT: Ice Age – Link Turn – Warming Leads to Cooling

#### Link turn – warming leads to ice age

Calvin 98 – theoretical neurophysicist @ U of W

William H. Calvin, Theoretical Neurophysicist at the University of Washington in Seattle, "The great climate flip-flop," The Atlantic Monthly 281:47-64

There are a few obvious precursors to flushing failure. One is diminished wind chill, when winds aren't as strong as usual, or as cold, or as dry — as is the case in the Labrador Sea during the North Atlantic Oscillation. This El Niño-like shift in the atmospheric-circulation pattern over the North Atlantic, from the Azores to Greenland, often lasts a decade. At the same time that the Labrador Sea gets a lessening of the strong winds that aid salt sinking, Europe gets particularly cold winters. It's happening right now: a North Atlantic Oscillation started in 1996. Another precursor is more floating ice than usual, which reduces the amount of ocean surface exposed to the winds, in turn reducing evaporation. Retained heat eventually melts the ice, in a cycle that recurs about every five years. Yet another precursor, as Henry Stommel suggested in 1961, would be the addition of fresh water to the ocean surface, diluting the salt-heavy surface waters before they became unstable enough to start sinking. More rain falling in the northern oceans — exactly what is predicted as a result of global warming — could stop salt flushing. So could ice carried south out of the Arctic Ocean. There is also a great deal of unsalted water in Greenland's glaciers, just uphill from the major salt sinks. The last time an abrupt cooling occurred was in the midst of global warming. Many ice sheets had already half melted, dumping a lot of fresh water into the ocean. A brief, large flood of fresh water might nudge us toward an abrupt cooling even if the dilution were insignificant when averaged over time. The fjords of Greenland offer some dramatic examples of the possibilities for freshwater floods. Fjords are long, narrow canyons, little arms of the sea reaching many miles inland; they were carved by great glaciers when the sea level was lower. Greenland's east coast has a profusion of fjords between 70°N and 80°N, including one that is the world's biggest. If blocked by ice dams, fjords make perfect reservoirs for meltwater. Glaciers pushing out into the ocean usually break off in chunks. Whole sections of a glacier, lifted up by the tides, may snap off at the "hinge" and become icebergs. But sometimes a glacial surge will act like an avalanche that blocks a road, as happened when Alaska's Hubbard glacier surged into the Russell fjord in May of 1986. Its snout ran into the opposite side, blocking the fjord with an ice dam. Any meltwater coming in behind the dam stayed there. A lake formed, rising higher and higher — up to the height of an eight-story building. Eventually such ice dams break, with spectacular results. Once the dam is breached, the rushing waters erode an ever wider and deeper path. Thus the entire lake can empty quickly. Five months after the ice dam at the Russell fjord formed, it broke, dumping a cubic mile of fresh water in only twenty-four hours. The Great Salinity Anomaly, a pool of semi-salty water derived from about 500 times as much unsalted water as that released by Russell Lake, was tracked from 1968 to 1982 as it moved south from Greenland's east coast. In 1970 it arrived in the Labrador Sea, where it prevented the usual salt sinking. By 1971-1972 the semi-salty blob was off Newfoundland. It then crossed the Atlantic and passed near the Shetland Islands around 1976. From there it was carried northward by the warm Norwegian Current, whereupon some of it swung west again to arrive off Greenland's east coast — where it had started its inch-per-second journey. So freshwater blobs drift, sometimes causing major trouble, and Greenland floods thus have the potential to stop the enormous heat transfer that keeps the North Atlantic Current going strong.

## \*\*\*\*\*Warming Good Core\*\*\*\*\*

## \*\*\*Warming Good—Mechanics

### Warming Inevitable/Can’t Solve

#### Can’t solve warming

Hamilton 10 – Professor of Public Ethics @ ANU

Clive Hamilton, Professor of Public Ethics in Australia, 2010, “Requiem for a Species: Why We Resist the Truth About Climate Change,” pg 27-28

The conclusion that, **even if we act promptly and resolutely**, the world is on a path to reach 650 ppm is almost too frightening to accept. That level of greenhouse gases in the atmosphere will be associated with warming of about 4°C by the end of the century, well above the temperature associated with tipping points that would trigger further warming.58 So it seems that even with the most optimistic set of assumptions—the ending of deforestation, a halving of emissions associated with food production, global emissions peaking in 2020 and then falling by 3 per cent a year for a few decades—**we have no chance** of preventing emissions rising well above a number of critical tipping points that will spark uncontrollable climate change. The Earth's climate would enter a chaotic era lasting thousands of years before natural processes eventually establish some sort of equilibrium. Whether human beings would still be a force on the planet, or even survive, is a moot point. One thing seems certain: there will be far fewer of us. These conclusions arc alarming, co say the least, but they are not alarmist. Rather than choosing or interpreting numbers to make the situation appear worse than it could be, following Kevin Anderson and Alice Bows 1 have chosen numbers that err on the conservative side, which is to say numbers that reflect a more buoyant assessment of the possibilities. A more neutral assessment of how the global community is likely to respond would give an even bleaker assessment of our future. For example, the analysis excludes non-CO2, emissions from aviation and shipping. Including them makes the task significantly harder, particularly as aviation emissions have been growing rapidly and are expected to continue to do so as there is no foreseeable alternative to severely restricting the number of flights.v' And any realistic assessment of the prospects for international agreement would have global emissions peaking closer to 2030 rather than 2020. The **last chance to reverse the trajectory of global emissions** by 2020 **was forfeited** at the Copenhagen climate conference in December 2009. As a consequence, a global response proportionate to the problem was deferred for several years.

### No Warming

#### No warming—we’ve entered a 30 year period of cooling—proved by PDOs

\*\* PACIFIC DECADAL OSCILLATION

Easterbrook 10—geology professor specializing in climate effects

(Don, g[eology](http://en.wikipedia.org/wiki/Geology) professor emeritus at [Western Washington University](http://en.wikipedia.org/wiki/Western_Washington_University) [http://myweb.wwu.edu/dbunny/research/global/easterbrook\_climate-cycle-evidence.pdf] EVIDENCE OF THE CAUSE OF GLOBAL WARMING AND COOLING: RECURRING GLOBAL, DECADAL, CLIMATE CYCLES RECORDED BY GLACIAL FLUCTUATIONS, ICE CORES, OCEAN TEMPERATURES, HISTORIC MEASUREMENTS AND SOLAR VARIATIONS)

‘Global warming’ (the term used for warming from 1977 to 1998) is over. No warming above the level temperatures in 1998 has occurred and global cooling has deepened since 2005 (Fig. 24). Switching of the PDO back and forth from warm to cool modes has been documented by NASA’s satellite imagery (Figs. 25, 26). The satellite image from 1989 is typical of the warm mode (1945-1977) with most of the eastern Pacific adjacent to North America showing shades of yellow to red, indicating warm water. The satellite image from 1999 (Fig. 27) shows a strong contrast to the 1997 image, with deep cooling of the eastern Pacific and a shift from the PDO warm to the PDO cool mode. This effectively marked the end of ‘global warming’ (i.e., the 1977 to 1998 warm cycle). Figures 27–30 show that the switch of the PDO from its warm cycle to the present cool cycle has become firmly established. Each time this has occurred in the past century, global temperatures have remained cool for about 30 years (Fig. 31). Thus, the current sea surface temperatures not only explain why we have had global cooling for the past 10 years, but also assure that cool temperatures will continue for several more decades.

#### Cooling is coming now – it’s fast and outweighs the effects of warming

Carlin 11 – PhD in Economics from MIT

Alan Carlin, PhD in Economics, former Director @ EPA and fellow @ RAND, 3-2011, “ A Multidisciplinary, Science-Based Approach to the Economics of Climate Change,” International Journal of Environmental Research and Public Health, Vol. 8

On the contrary, the evidence is that during interglacial periods over the last 3 million years the risks are on the temperature downside, not the upside. As we approach the point where the Holocene has reached the historical age when a new ice age has repeatedly started in past glacial cycles, this appears likely to be the only CAGW effect that mankind should currently reasonably be concerned about. Earth is currently in an interglacial period quite similar to others before and after each of the glacial periods that Earth has experienced over the last 3 million years. During these interglacial periods there is currently no known case where global temperatures suddenly and dramatically warmed above interglacial temperatures, such as we are now experiencing, to very much warmer temperatures. There have, of course, been interglacial periods that have experienced slightly higher temperatures, but none that we know of that after 10,000 years experienced a sudden catastrophic further increase in global temperatures. The point here is that there does not appear to be instability towards much warmer temperatures during interglacial periods. There is rather instability towards much colder temperatures, particularly during the later stages of interglacial periods. In fact, Earth has repeatedly entered new ice ages about every 100,000 years during recent cycles, and interglacial periods have lasted about 10,000 years. We are currently very close to the 10,000 year mark for the current interglacial period. So if history is any guide, **the main worry** should be that of entering a new ice age, with its growing ice sheets, that would **probably wipe out civilization** in the temperate regions of the Northern Hemisphere—not global warming. The economic damages from a new ice age would indeed be large, and almost certainly catastrophic. Unfortunately, it is **very likely** to occur sooner or later.

### No Warming—Solar Variations

#### Solar variations outweigh – they are exclude by the IPCC

-cooling coming

Morner 11 – PhD in Paleogeophysics

Nils-Axel Mörne, former head of the Paleogeophysics and Geodynamics department at Stockholm University, “ARCTIC ENVIRONMENT BY THE MIDDLE OF THIS CENTURY,” Energy & Environment, Vol 22, No. 3

Later, I use the Solar Irradiance curve of Bard et al. (2000), noting that this curve, in fact, rather should be labelled “a Solar Wind Curve” as it is constructed from the variations in cosmogenic nuclides controlled by the variations in shielding capacity of the Earth’s geomagnetic field as given in Figure 4 (cf. Mörner, 2010). Along this curve (Figure 6) I have marked the changes recorded between Gulf Stream stages 2 (above) and 4 (below) situations as given in Figure 2 (cf. Mörner, 2010). In the middle of this century (at about 2040-2050), we should, by cycle extrapolation, have a Future Solar Minimum when the past Gulf Stream situation should repeat; i.e. we would have a new stage 4 situation with “Little Ice Age” conditions in Europe and in the Arctic (Figure 7). This is in sharp contrast to the scenarios of IPCC (2001) and ACIA (2004), which predict a unidirectional continued warming leading to the opening of the Arctic basin within this century. Their prediction is based on **modelling excluding the effects of the Sun, however**. Personally, I am convinced that we need to have “the Sun in the centre” (Mörner, 2006a, 2006b), and doing so, we are indeed facing a new Solar Minimum in the middle of this century. Whether this minimum will be as the past three once were (Figure 6), or it will be affected by anthropogenic factors, is another question. The date of the New Solar Minimum has been assigned at around 2040 by Mörner et al. (2003), at 2030-2040 by Harrara (2010), at 2042 ±11 by Abdassamatov (2010) and at 2030-2040 by Scafetta (2010), implying a fairly congruent picture despite somewhat different ways of transferring past signals into future predictions. The onset of the associated cooling has been given at 2010 by Easterbrook (2010) and Herrara (2010), and at “approximately 2014” by Abdassamatov (2010). Easterbrook (2010) backs up his claim that the cooling has already commenced by geological observations facts. At any rate, from a Solar-Terrestrial point of view, we will, by the middle of this century, be in a New Solar Minimum and in a New Little Ice Age (Figure 7). This conclusion is completely opposite to the scenarios presented by IPCC (2001, 2007) as illustrated in Figure 3. With “the Sun in the centre”, no other conclusion can be drawn, however.

### No Warming—AT: “Skeptics”

#### Warming is not real – tons of qualified scientists agree, there names are blemished but there science is correct

Ball 7—climatology professor

Tim, Chairman of the Natural Resources Stewardship Project, Climatology Professor, http://www.iceagenow.com/Global\_Warming\_the\_Greatest\_Deception.htm

Global Warming, as we think we know it, doesn't exist. And I am not the only one trying to make people open up their eyes and see the truth. But few listen, despite the fact that I was the first Canadian Ph.D. in Climatology and I have an extensive background in climatology, especially the reconstruction of past climates and the impact of climate change on human history and the human condition. Few listen, even though I have a Ph.D, (Doctor of Science) from the University of London, England and that for 32 years I was a Professor of Climatology at the University of Winnipeg. For some reason (actually for many), the World is not listening. Here is why. Global Warming is not due to human contribution of Carbon Dioxide (CO2). This in fact is the greatest deception in the history of science. We are wasting time, energy and trillions of dollars while creating unnecessary fear and consternation over an issue with no scientific justification. No sensible person seeks conflict, especially with governments, but if we don't pursue the truth, we are lost as individuals and as a society. That is why I insist on saying that there is no evidence that we are, or could ever cause global climate change. And, recently, Yuri A. Izrael, Vice President of the United Nations sponsored Intergovernmental Panel on Climate Change (IPCC) confirmed this statement. So how has the world come to believe that something is wrong? Let me stress I am not denying the (global warming) phenomenon has occurred. The world has warmed since 1680, the nadir of a cool period called the Little Ice Age (LIA) that has generally continued to the present. These climate changes are well within natural variability and explained quite easily by changes in the sun. But there is nothing unusual going on. Since I obtained my doctorate in climatology from the University of London, Queen Mary College, England my career has spanned two climate cycles. Temperatures declined from 1940 to 1980 and in the early 1970's global cooling became the consensus. This proves that consensus is **not a scientific fact**. By the 1990's temperatures appeared to have reversed and Global Warming became the consensus. It appears I'll witness another cycle before retiring, as the major mechanisms and the global temperature trends now indicate a cooling. No doubt passive acceptance yields less stress, fewer personal attacks and makes career progress easier. What I have experienced in my personal life during the last years makes me understand why most people choose not to speak out; job security and fear of reprisals. Even in University, where free speech and challenge to prevailing wisdoms are supposedly encouraged, academics remain silent. In another instance, I was accused by Canadian environmentalist David Suzuki of being paid by oil companies. That is a lie. Apparently he thinks if the fossil fuel companies pay you have an agenda. So if Greenpeace, Sierra Club or governments pay there is no agenda and only truth and enlightenment? I am not alone in this journey against the prevalent myth. Several well-known names have also raised their voices. Michael Crichton, the scientist, writer and filmmaker is one of them. In his latest book, "State of Fear" he takes time to explain, often in surprising detail, the flawed science behind Global Warming and other imagined environmental crises. Another cry in the wilderness is Richard Lindzen's. He is an atmospheric physicist and a professor of meteorology at MIT, renowned for his research in dynamic meteorology - especially atmospheric waves. He is also a member of the National Academy of Sciences and has held positions at the University of Chicago, Harvard University and MIT. Linzen frequently speaks out against the notion that significant Global Warming is caused by humans. Yet nobody seems to listen.

### No Warming—AT: Consensus

#### Claims of scientific consensus are false—opposing views don’t get published because the peer review process is flawed and politically motivated

Spencer 10—former head climate scientist @ NASA

(Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg XVI)

The primary goal of climate research is no longer the advancement of knowledge; it is instead the protection and dissemination of the IPCC party line. The peer review process for getting research proposals funded and scientific papers published is no longer objective, but is instead short-circuited by zealots adhering to their faith that humans now control the fate of Earth's climate. Scientific papers that claim all kinds of supposedly dire consequences of anthropogenic climate change are uncritically accepted and rushed to publication, while any papers that cast doubt on the premise of a human-controlled climate system are rejected. The global warming issue has accumulated so much political and financial baggage that it will now be extremely difficult to budge the "scientific consensus" away from what a handful of bureaucrats and politically savvy scientists have decided the scientific consensus should be. As I described in my first book Climate Confusion, scientists are just as prone to bias as anyone else, and when it comes to global warming it seems that everyone has biases and vested interests.

#### Dissent should be taken into consideration—it doesn’t mean they’re wrong and its key to good science and testing their epistemology

Taylor 9—science analyst and policy advisor\*\*

\*\*Science analyst and policy advisor with over 30 years’ experience as a consultant to environmental NGOs, (particularly Greenpeace) government departments and agencies, intergovernmental bodies, the European Commission, the European Parliament and the UN.

(Peter“Chill—A reassessment of global warming theory” pgs 8-9)

It was a further shock to read, in the proceedings of the IPCC, a panel set up to review climate science and underpin the UN’s Framework Convention on Climate Change (and alter the Kyoto agreement to limit global emissions), that from the very first scientific meetings at lease on senior climatologist had argued that this assumption with regard to carbon dioxide and water vapour was unsound. This scientist argued that the feedbacks were unproven and could readily operate in the other direction and compensate for any warming. There was thus never a consensus within the IPCC, rather, a majority that overruled this dissenting voice. This lack of real consensus continued on many other key issues within the IPCC but has not been reflected in the pronouncements of the Panel’s public representatives, nor in their Summary for Policymakers document. This immediately flagged up previous histories of the treatment of dissenting voices within the UN policy process. It is an issue central to the evolution of science and sound policy—in that dissent needs to be acknowledged, respected and given its voice not just at the level of scientific working groups, but at the policy level in the treatment of uncertainty. If dissent is marginalized, science travels down a slippery slope directed by the needs of policy makers for simple single-cause answers and targets, and in this, ultimately the truth suffers.

### No Warming—AT: Computer Models

### No Human Warming

#### Warming is not anthropogenic—comparative climate models prove a) the climate is not as sensitive as previously though and b) Co2 concentrations can’t explain past warming

Spencer 8 –former head climate scientist @ NASA

(Roy, principal research scientist at the University of Alabama, former senior scientist for climate studied at NASA and now leads the U.S. science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua satellite. [http://www.drroyspencer.com/research-articles/global-warming-as-a-natural-response/] “Global Warming as a Natural Response to Cloud Changes Associated with the Pacific Decadal Oscillation (PDO)”/December 29)

A simple climate model forced by satellite-observed changes in the Earth’s radiative budget associated with the Pacific Decadal Oscillation is shown to mimic the major features of global average temperature change during the 20th Century – including three-quarters of the warming trend. A mostly-natural source of global warming is also consistent with mounting observational evidence that the climate system is much less sensitive to carbon dioxide emissions than the IPCC’s climate models simulate. 1. INTRODUCTION The main arguments for global warming being manmade go something like this: “What else COULD it be? After all, we know that increasing carbon dioxide concentrations are sufficient to explain recent warming, so what’s the point of looking for any other cause?” But for those who have followed my writings and publications in the last 18 months (e.g. [Spencer et al., 2007](http://www.drroyspencer.com/Spencer_07GRL.pdf); [Spencer, 2008](http://www.drroyspencer.com/article-satellite-and-model-evidence-against-manmade-global-warming.php)), you know that we are finding satellite evidence that the climate system is much less sensitive to greenhouse gas emissions than the U.N.’s Intergovernmental Panel on Climate Change (IPCC, 2007) climate models suggest that it is. And if that is true, then mankind’s CO2 emissions are not strong enough to have caused the global warming we’ve seen over the last 100 years. To show that we are not the only researchers who have documented evidence contradicting the IPCC models on the subject of climate sensitivity, I made the following figure (Fig. 1) to contrast the IPCC-projected warming from a doubling of atmospheric carbon dioxide with the warming that would result if the climate sensitivity is as low as implied by various kinds of observational evidence.The dashed line in Fig. 1 comes from our recent apples-to-apples comparison between satellite-based feedback estimates and IPCC model-diagnosed feedbacks, all computed from 5-year periods (see Fig. 2). In that comparison, there were NO five year periods from ANY of the IPCC model simulations which produced a feedback parameter with as low a climate sensitivity as that found in the satellite data.The discrepancy between the models and observations seen in Figs. 1 and 2 is stark. If the sensitivity of the climate system is as low as some of these observational results suggest, then the IPCC models are grossly in error, and we have little to fear from manmade global warming. [I am told that the 1.1 deg. C sensitivity of Schwartz (2007) has more recently been revised upward to 1.9 deg. C.] But it also means that the radiative forcing caused by increasing atmospheric concentrations of CO2 is not sufficient to cause PAST warming, either. So, this then leaves a critical unanswered question: What has caused the warming seen over the last 100 years or so? Here I present new evidence that most of the warming could be the result of a natural cycle in cloud cover forced by a well-known mode of natural climate variability: the Pacific Decadal Oscillation (PDO). While the PDO is primarily a geographic rearrangement in atmospheric and oceanic circulation patterns in the North Pacific, it is well known that such regional changes can also influence weather patterns over much larger areas, for instance North America or the entire Northern Hemisphere (which is, by the way, the region over which the vast majority of global warming has occurred). The IPCC has simply ASSUMED that these natural fluctuations in weather patterns do not cause climate change. But all it would take is a small change in global average (or Northern Hemispheric average) cloudiness to cause global warming. Unfortunately, our global observations of cloudiness have not been complete or accurate enough to document such a change…until recently.

### No Human Warming—Co2 =/= Warming

#### Warming isn’t human induced—empirical evidence that Co2 doesn’t correlate with global temperatures

Easterbrook 10—geology professor @ Western Washington

(Don, g[eology](http://en.wikipedia.org/wiki/Geology) professor emeritus at [Western Washington University](http://en.wikipedia.org/wiki/Western_Washington_University) [http://myweb.wwu.edu/dbunny/research/global/easterbrook\_climate-cycle-evidence.pdf] EVIDENCE OF THE CAUSE OF GLOBAL WARMING AND COOLING: RECURRING GLOBAL, DECADAL, CLIMATE CYCLES RECORDED BY GLACIAL FLUCTUATIONS, ICE CORES, OCEAN TEMPERATURES, HISTORIC MEASUREMENTS AND SOLAR VARIATIONS)

1945 to 1977 cool period with soaring CO2 emissions. Global temperatures began to cool in the mid–1940’s at the point when CO2 emissions began to soar (Fig. 4). Global temperatures in the Northern Hemisphere dropped about 0.5° C (0.9° F) from the mid-1940s until 1977 and temperatures globally cooled about 0.2° C (0.4° F) (Fig. 1). Many of the world’s glaciers advanced during this time and recovered a good deal of the ice lost during the 1915–1945 warm period. However, cooling during this period was not as deep as in the preceding cool period (1880 to 1915). Many examples of glacial recession during the past century cited in the news media show contrasting terminal positions beginning with the maximum extent at the end of a ~30 year cool period (1915 or 1977) and ending with the minimum extent of the recent 20 year warm period (1998). A much better gauge of the effect of climate on glaciers would be to compare glacier terminal positions between the ends of successive cool periods or the ends of successive warm periods. Figure 4 shows CO2 that even though emissions from 1945 to 1977 soared, global temperature dropped during that 30–year period. If CO2 causes global warming, temperature should have risen, rather than declined, strongly suggesting that rising CO2.did not cause significant global warming.

#### There is NO peer confirmed study that establishes a correlation between Co2 and climate change

Harris 11—top 10 climatologist

(Cliff, “Anthropogenic global warming is a huge costly fraud!” [http://www.cdapress.com/columns/cliff\_harris/article\_c98c9ffd-2389-5a0a-89b3-a092bcc0d40b.html] June 6)

 There is no peer-confirmed scientific research that establishes a cause-and-effect relationship between increased atmospheric carbon dioxide and higher (or lower) global temperatures. This is a clever deception put forth by those attempting to impose a centralized, worldwide socialistic form of government headed by an empowered United Nations. This far-reaching global warming industry, already making huge profits at taxpayer expense, has been given credence by most governments, the news media, political interests, fear-gripped citizens of the planet and much of the scientific community. Some of the key scientists in the AGW movement have falsified historical data to make it conform to their agenda, which is decidedly anti-American (Western), anti-democracy and anti-capitalism. Their methodology is to completely ignore the climatological facts that, since 1998, we've been in a pronounced cooling trend on a global scale that has completely wiped-out the warming that occurred from 1981 through 1997 that followed directly on the chilly heels of a prolonged colder period that began during World War II. Remember all the talk of a NEW ICE AGE at the doorsteps in the mid to late 1970s? Needless to say, it didn't happen either.

#### Past climate trends prove no correlation

Spencer 10 —former head climate scientist @ NASA

 (Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg 29)

A truth that was conveniently left out of Mr. Gore's presentation is related to an issue that I will emphasize throughout this book: cause versus effect. Mr. Gore, whether he knew it or not, was assuming that the hundreds of thousands of years of C02 variations were causing the temperature variations-and not the other way around. But as the climate researchers who produce the Vostok dataset well know, there is an average 8oo-year lag between these two variables, with the temperature changes preceding the C02 changes. At face value, this would suggest that the temperature changes caused the C02 changes. I will discuss temperature causing atmospheric C02 changes more in Chapter 7.

#### Even if Co2 does contribute to warming—human contribution to climate change is minimal

Easterbrook 10—geology professor @ Western Washington

 (Don, g[eology](http://en.wikipedia.org/wiki/Geology) professor emeritus at [Western Washington University](http://en.wikipedia.org/wiki/Western_Washington_University) [http://myweb.wwu.edu/dbunny/research/global/easterbrook\_climate-cycle-evidence.pdf] EVIDENCE OF THE CAUSE OF GLOBAL WARMING AND COOLING: RECURRING GLOBAL, DECADAL, CLIMATE CYCLES RECORDED BY GLACIAL FLUCTUATIONS, ICE CORES, OCEAN TEMPERATURES, HISTORIC MEASUREMENTS AND SOLAR VARIATIONS)

No tangible, physical evidence exists for a cause–and–effect relationship between changing atmospheric CO2 and global temperature changes over the last 150 years. The fact that CO2 is a greenhouse gas and that CO2 has increased doesn’t prove that CO2 has caused the warming phases observed from 1915 to 1945 and 1977 to 1998. As shown by isotope measurements from ice cores in Greenland and Antarctica and by measurements of atmospheric CO2 during El Nino warming, oceans emit more CO2 into the atmosphere during climatic warming. The ice core records indicate that after the last Ice Age, temperatures rose for about 600–800 years before atmospheric CO2 rose, showing that climatic warming caused CO2 to rise, not vice versa. The present high level of atmospheric CO2 may be the result of human input, but the contribution that it makes to global warming is very small. Global warming of ~0.4° C occurred from about 1910 to 1940 without any significant increase in atmospheric CO2. Global cooling occurred from the mid 1940s to 1977 despite soaring CO2 in the atmosphere (Fig. 12A,B). Global temperatures and CO2 both increased from 1977 to 1998 but that doesn’t prove that the warming was caused by increased CO2. Although CO2 has risen from 1998 to 2008 no global warming has occurred. In fact, the climate has cooled. Thus, global warming bears almost no correlation with rising atmospheric CO2.

### No Runaway Warming

#### No runaway warming—satellite data proves the climate system isn’t sensitive to human causes and would cause less than 1 degree of warming

Spencer 10—former head climate scientist @ NASA

(Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg 100-102)

Don’t be discouraged if you don’t understand these plots of data and my interpretation of them. All this has just been a quantitative way of demonstrating that climate researchers have not accounted for clouds causing temperature changes (forcing) when trying to estimate how much temperature change causes clouds to change (feedback). In simple terms, they have mixed up cause and effect when analyzing cloud and temperature variations. As a result of this mix-up, the illusion of a sensitive climate system (positive feedbacks) emerges from their analysis. Thinking that the climate system is very sensitive, the climate modelers then built overly sensitive models that produce too much global warming. Or, to illustrate the issue another way, let's return to the question I had when I got involved in this line of research. When researchers have observed clouds decreasing with warming, they have claimed that this is evidence of positive feedback - a sensitive climate system. They have explained that the warming causes the clouds to decrease, which then amplifies the warming. But how did the researchers know that the warmer temperatures caused the clouds to decrease, rather than the reverse? In other words, how did they know they weren't mixing up cause and effect? It turns out they didn't know. We now have peer- reviewed and published evidence of decreases in cloud cover causing warmer temperatures, yet it has gone virtually unnoticed. I believe that this misinterpretation of how clouds really behave in the climate system helps explain why the scientific consensus is so sure that mankind is causing global warming. By confusing natural variability in clouds with positive feedback, researchers have been led to believe that the climate system is very sensitive. This, in turn, has led them to conclude that the small amount of forcing from humanity's greenhouse gas emissions is being amplified enough to explain most of the global warming that we have seen in the last fifty years or more. They claim that no natural explanation is needed for warming-that humanity's pollution is sufficient. By ignoring natural variations, they have concluded that they can ignore natural variations. The circular nature of their reasoning has not occurred to them. Furthermore, natural variability in clouds probably also explains why climate sensitivity estimates have been so variable when previous researchers have diagnosed feedbacks from satellite data. Depending on how much natural cloud variability was occurring when the satellites made their observations, a wide variety of feedback (climate sensitivity) estimates would result-- some bordering on a catastrophically sensitive climate system. And as long as the IPCC can claim that feedbacks in the real climate system are very uncertain, they can perpetuate their warnings that disastrous global warming cannot be ruled out. They tell us that the sensitivity of the climate system is high, but just how high isn't really known for sure. Therefore, we must prepare for catastrophic warming, just in case. One detail that 1 did not discuss in this chapter is how the infrared and solar parts of feedback behaved during the period for which we have satellite data. It turns out that the negative feedback seen by the satellites was entirely in the reflected solar component, which is most likely due to low clouds. The infrared portion of the feedback supported positive water vapor feedback, which is consistent with feedback estimates from other researchers. But it is the total feedback-solar plus infrared-that determines climate sensitivity. If negative feedbacks outweigh positive feedbacks, then the net feedback is still negative. Even the IPCC recognized the uncertainty associated with reflected solar feedback from low clouds in their 2007 report when they concluded: "Cloud feedbacks are the primary source of inter-model differences in equilibrium climate sensitivity, with low cloud being the largest contributor." Taken together, all this evidence indicates that the climate models are too sensitive, which is why they predict so much global warming for the future. In contrast, the satellite evidence indicates that the climate system is quite insensitive, which means that it doesn't really care how big your carbon footprint is. Rather than 1·5 to 6 deg. C (or more) of warming as predicted by the IPCC, a careful examination of the satellite data suggests that manmade warming due to a doubling of atmospheric carbon dioxide could be less than 1 deg. C (1.8 deg. F)-possibly much less.

### No Runaway Warming—AT: Positive Feedbacks

#### Positive feedbacks don’t exist—current models don’t account for natural cloud fluctuations

Spencer 10 —former head climate scientist @ NASA

(Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg XXIV-XXV)

The research community’s confusion of forcing and feedback-cause and effect-is a major them of this book. In particular, the role of causation in cloud behavior is at the core of what I believe to be the greatest scientific faux pas in history. The mistake that researchers have made can best be introduced in the form of a question: When the Earth is observed to warm, and cloud cover decreases with that warming, did the warming cause the clouds to decrease, or did the decrease in clouds cause the warming? In the big picture of climate change, cloud changes causing temperature changes would be called forcing, while temperature changes causing cloud changes would be called feedback. Both occur in nature all the time. Yet when researchers have estimated feedbacks by analyzing natural climate variations, they have assumed causation in only one direction. Because researchers have not accounted for natural cloud fluctuations forcing temperature variations, the illusion of a climate system dominated by positive feedback has emerged. 1had always suspected that researchers were mixing up cause and effect even before I got into this line of research, but until recently I was not able to prove it.

#### No way to determine positive feedbacks—natural forcings

Spencer 10 —former head climate scientist @ NASA

(Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg 68-69)

There are actually quite a few ways in which feedbacks have been estimated from observational data, both during the modern instrumental period over the last century or so, and from proxy estimates over thousands to millions of years. But there is a fundamental problem common to all: our estimates of past temperature are better than our estimates of the forcings that caused them. And measuring a temperature change without knowing what forced it is the perfect recipe for mistakenly diagnosing positive feedback. You see, a temperature change can be caused either by a weak forcing that is being amplified by positive feedback, or by a strong forcing that is being reduced by negative feedback. Therefore, as one approaches a zero forcing, you need to have very strong positive feedback to cause an observed temperature change. Because of this issue, most methods of diagnosing feedbacks are prone to giving the illusion of a sensitive climate system. This is because we see evidence of a temperature change, but often do not know what caused it. This is just one step away from assuming that it must have been caused by some tiny forcing being amplified by positive feedback. And just like some ancient tribe of people who made sacrifices to the gods of natures to war of severe weather, our lack of understanding of the natural forcings that caused temperature changes of the past leads us to blame our sinful use of fossil fuels instead.

### Alt Cause—China

#### Chinese emissions prevents gains from US cuts

Lynas 7

Mark, Environmental Activist, Educational focus on Politics and History, Six Degrees, pg. 194

Because of its sheer size and population, China is on a collision course with the planet. The country’s oil use has doubled in the last ten years, and if the Chinese by 2030 use oil at the same rate as Americans do now, China will need 100 million barrels of oil a day. However, current world production is only around 80 million barrels per day, and is unlikely to rise much further before the “peak oil” point is reached. There simply isn’t enough oil in the ground to bring Chinese consumption up to Western levels—the global resource buffer is already being hit. Similarly for food: As the Chinese diet becomes increasingly rich in meat and dairy products, more grain is needed. By 2030, if Chinese consumers are to become as voracious as Americans, they will use the equivalent of two-thirds of today’s entire global harvest. If Chinese car ownership were to reach current U.S. levels of three cars for every four people, China’s automobile fleet would number more than one billion by 2030, substantially more than the entire current world fleet of 800 million. In almost every sector of resource use, China’s ascension to Western consumption standards will clearly demand far more than the Earth can provide. Indeed, if every Chinese were to live like an American, it would double the human environmental impact on the planet, an impact that has already moved far beyond sustainable levels. Even forgetting about climate change, China’s get rich quick dream would quickly become a global nightmare.

### Alt Cause—Defo

#### Defo makes warming inevitable

Walker and King 8-- Director of the School of Environment @Oxford

Gabrielle, PhD in Chemistry, Sir David, Director of the Smith School of Enterprise and the Environment at the University of Oxford, and a senior scientific adviser to UBS, The Hot Topic, pg. 106

Chopping down and burning tress contributes some eight billion tons of carbon dioxide to the atmosphere each year. That’s a huge amount, more than 16 percent of total human greenhouse gas emissions—more than comes from either agriculture or transportation. And yet it’s largely uncessary. Destroying forests is one of the maddest form of interefering with the climate that humans have yet devised. Most of the carbon dioxide from deforestation comes from the burning of tropical forests, especially with the Amazon rain forest. Reasons for cutting it down range from logging of individual hardwood trees to shlash-and-burn for subsistence agriculture, to clearing land for large-scale agricultural plantions of palm oil. Even logging of individual trees often creates mass destruction. Bulldozers blast through the remaining trees to get to their prize: felling on individual trees often brings down their neighbors as they are bound together with woody lianas; the holes thus created in the leaf canapoy let in the hot tropical sunlight, whid dries out the forest and allows for the outbreak of accidental fire; and loggers usually build roads, which encourage the influx of subsistence slash-and-burn farmers.

### Indicts—IPCC

#### IPCC isn’t relevant for climate predictions

Armstong 11 – Professor @ U Wharton School

J. Scott Armstrong, Professor of Marketing specializing in forecasting technology, 3-31-2011, “Climate Change Policy Issues,” CQ Congressional Testimony, Lexis

We then conducted an audit of the forecasting procedures using Forecasting Audit Software, which is freely available on forprin.com. Kesten Green and I independently coded the IPCC procedures against the 140 forecasting principles, and then we discussed differences in order to reach agreement. We also invited comments and suggestions from the authors of the IPCC report that we were able to contact in the hope of filling in missing information. None of them replied with suggestions and one threatened to lodge a complaint if he received any further correspondence. We described the coding procedures we used for our audit in Green and Armstrong (2007). We concluded from our audit that invalid procedures were used for forecasting global mean temperatures. Our findings, described in Green and Armstrong (2007), are summarized in Exhibit 1. Based on the available information, 81% of the 89 relevant principles were violated. There were an additional 38 relevant principles, but the IPCC chapter provided insufficient information for coding and the IPCC authors did not supply the information that we requested. Much of the problem revolves around the use of computer modelers' scenarios as a forecasting method. As stated correctly by Trenberth (2007), a leading spokesperson for the IPCC researchers, the IPCC provides scenarios, not forecasts. Scenarios are not a valid forecasting method (Gregory & Duran 2001), but simply descriptions of their authors' speculations about what might happen in the future.

#### IPCC is politically motivated—they cherry pick evidence and ignore contradictory evidence

Spencer 10—former head climate scientist @ NASA

(Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg XIV-XV)

The IPCC process for reviewing the science of global warming and climate change has been a peculiar perversion of the usual practice of scientific investigation. Science normally involves the testing of alternative hypotheses, not picking the first one that comes along and then religiously sticking to it. But that is exactly what the IPCC has done. As I wrote this book, I found myself increasingly criticizing the IPCC's leadership and the way it has politicized my scientific discipline, atmospheric science, in order to promote specific policies. The truth is that the IPCC doesn't actually do scientific research. It is primarily a political advocacy group that cloaks itself in the aura of scientific respectability while it cherry-picks the science that best supports its desired policy outcomes, and marginalizes or ignores science that might contradict the party line. It claims to be policy-neutral, yet it will not entertain any science that might indicate there is no need for policy change on greenhouse gas emissions. Contrary to what the public has been led to believe, the IPCC's relatively brief Summary for Policy Makers-the only part of their voluminous report that a policymaker will ever read -is not written by hundreds of scientists, but by about fifty handpicked true believers who spin the science of climate change to support specific policy goals. And those goals have not changed in the twenty years of the IPCCs existence.

### Prodicts—Spencer

#### Spencer is peer reviewed and his results are replicable

Spencer 10

(Roy, principal research scientist at the University of Alabama and former senior scientist for climate studies at NASA. He now leads the US science team for the Advanced Microwave Scanning Radiometer for EOS on NASA’s Aqua Satellite “The Great Global Warming Blunder: How Mother Nature Fooled the World’s Top Climate Scientists,” pg XXIV-XXV)

What I am claiming is more than just an untested hypothesis; my colleagues and I have published papers in the peer-reviewed scientific literature that have been laying out the evidence step by step. But chances are you haven't heard about our work. This is because the mainstream media are not interested in covering any news stories about climate that do not support AI Gore's apocalyptic vision of a global warming Armageddon. Other scientists have had similar experiences with their published research. As a friend from a newspaper family once told me, "bad news is good news, and good news is no news."

## \*\*\*Warming Good—Impact Defense

### Extinction

#### And, consensus of experts agree no impact to warming

Hsu ‘10

Jeremy, Live Science Staff, July 19, pg. http://www.livescience.com/culture/can-humans-survive-extinction-doomsday-100719.html

His views deviate sharply from those of most experts, who don't view climate change as the end for humans. Even the worst-case scenarios discussed by the Intergovernmental Panel on Climate Change don't foresee human extinction. "The scenarios that the mainstream climate community are advancing are not end-of-humanity, catastrophic scenarios," said Roger Pielke Jr., a climate policy analyst at the University of Colorado at Boulder. Humans have the technological tools to begin tackling climate change, if not quite enough yet to solve the problem, Pielke said. He added that doom-mongering did little to encourage people to take action. "My view of politics is that the long-term, high-risk scenarios are really difficult to use to motivate short-term, incremental action," Pielke explained. "The rhetoric of fear and alarm that some people tend toward is counterproductive." Searching for solutions One technological solution to climate change already exists through carbon capture and storage, according to Wallace Broecker, a geochemist and renowned climate scientist at Columbia University's Lamont-Doherty Earth Observatory in New York City. But Broecker remained skeptical that governments or industry would commit the resources needed to slow the rise of carbon dioxide (CO2) levels, and predicted that more drastic geoengineering might become necessary to stabilize the planet. "The rise in CO2 isn't going to kill many people, and it's not going to kill humanity," Broecker said. "But it's going to change the entire wild ecology of the planet, melt a lot of ice, acidify the ocean, change the availability of water and change crop yields, so we're essentially doing an experiment whose result remains uncertain."

#### Warming doesn’t lead to extinction

Barrett 6 – Professor of International Policy @ Johns Hopkins

Scott, Professor and Director of International Policy, School of Advanced International Studies, Johns Hopkins University, 2006, “CATASTROPHE: The Problem of Averting Global Catastrophe,” Chicago Journal of International Law, Lexis

Less dramatic changes are more likely. Abrupt transformations in climate would probably cause few deaths. Many scientists have remarked that climate change would increase the spread of disease, 74 and seasonal weather changes are associated with outbreaks of many diseases, including meningococcal meningitis in sub-Saharan Africa and rotavirus in the US. Moreover, stronger El Nino events have been linked to the prevalence of cholera in Bangladesh, the spread of Rift Valley fever in East Africa, and malaria incidences on the Indian subcontinent. However, while the spread of disease is influenced by the weather, the connection between global climate change and the spread of disease has not yet been established. 75 One point is clear: as Rees notes, "**Not even the most drastic conceivable climate shifts** could directly destroy all humanity." 76

#### Not an existential threat

Curry 10 – Professor of Earth Sciences

Judith Curry, Professor of Earth Sciences @ Georgia Institute of Technology, Committee on House Science and Technology Subcommittee on Energy and Environment, CQ Congressional Testimony, Lexis

Climate scientists have made a forceful argument for a looming future threat from anthropogenic climate change. Based upon the background knowledge that we have, the threat **does not seem to be an existential one** on the time scale of the 21st century, **even in its most alarming incarnation**. It is now up to the political process (international, national, and local) to decide how to contend with the climate problem. It seems more important that robust responses be formulated than to respond urgently with a policy that may fail to address the problem and whose unintended consequences have not been adequately explored.

### AT Tickell

#### Tickell is wrong and uses bad science—warming won’t lead to extinction

Lomborg 8-- [adjunct professor](http://en.wikipedia.org/wiki/Adjunct_professor) at the [Copenhagen Business School](http://en.wikipedia.org/wiki/Copenhagen_Business_School)

Bjorn, Warming warnings get overheated, 8/15/08, http://www.guardian.co.uk/commentisfree/2008/aug/15/carbonemissions.climatechange

Much of the global warming debate is perhaps best described as a constant outbidding by frantic campaigners, producing a barrage of ever-more scary scenarios in an attempt to get the public to accept their civilisation-changing proposals. Unfortunately, the general public – while concerned about the environment – is distinctly unwilling to support questionable solutions with costs running into tens of trillions of pounds. Predictably, this makes the campaigners reach for even more outlandish scares. These alarmist predictions are becoming quite bizarre, and could be dismissed as sociological oddities, if it weren't for the fact that they get such big play in the media. Oliver Tickell, for instance, writes that a global warming causing a 4C temperature increase by the end of the century would be a "catastrophe" and the beginning of the "extinction" of the human race. This is simply silly. His evidence? That 4C would mean that all the ice on the planet would melt, bringing the long-term sea level rise to 70-80m, flooding everything we hold dear, seeing billions of people die. Clearly, Tickell has maxed out the campaigners' scare potential (because there is no more ice to melt, this is the scariest he could ever conjure). But he is wrong. Let us just remember that the UN climate panel, the IPCC, expects a temperature rise by the end of the century between 1.8 and 6.0C. Within this range, the IPCC predicts that, by the end of the century, sea levels will rise 18-59 centimetres – Tickell is simply exaggerating by a factor of up to 400. Tickell will undoubtedly claim that he was talking about what could happen many, many millennia from now. But this is disingenuous. First, the 4C temperature rise is predicted on a century scale – this is what we talk about and can plan for. Second, although sea-level rise will continue for many centuries to come, the models unanimously show that Greenland's ice shelf will be reduced, but Antarctic ice will increase even more (because of increased precipitation in Antarctica) for the next three centuries. What will happen beyond that clearly depends much more on emissions in future centuries. Given that CO2 stays in the atmosphere about a century, what happens with the temperature, say, six centuries from now mainly depends on emissions five centuries from now (where it seems unlikely non-carbon emitting technology such as solar panels will not have become economically competitive). Third, Tickell tells us how the 80m sea-level rise would wipe out all the world's coastal infrastructure and much of the world's farmland – "undoubtedly" causing billions to die. But to cause billions to die, it would require the surge to occur within a single human lifespan. This sort of scare tactic is insidiously wrong and misleading, mimicking a firebrand preacher who claims the earth is coming to an end and we need to repent. While it is probably true that the sun will burn up the earth in 4-5bn years' time, it does give a slightly different perspective on the need for immediate repenting. Tickell's claim that 4C will be the beginning of our extinction is again many times beyond wrong and misleading, and, of course, made with no data to back it up. Let us just take a look at the realistic impact of such a 4C temperature rise. For the Copenhagen Consensus, one of the lead economists of the IPCC, Professor Gary Yohe, did a survey of all the problems and all the benefits accruing from a temperature rise over this century of about approximately 4C. And yes, there will, of course, also be benefits: as temperatures rise, more people will die from heat, but fewer from cold; agricultural yields will decline in the tropics, but increase in the temperate zones, etc. The model evaluates the impacts on agriculture, forestry, energy, water, unmanaged ecosystems, coastal zones, heat and cold deaths and disease. The bottom line is that benefits from global warming right now outweigh the costs (the benefit is about 0.25% of global GDP). Global warming will continue to be a net benefit until about 2070, when the damages will begin to outweigh the benefits, reaching a total damage cost equivalent to about 3.5% of GDP by 2300. This is simply not the end of humanity. If anything, global warming is a net benefit now; and even in three centuries, it will not be a challenge to our civilisation. Further, the IPCC expects the average person on earth to be 1,700% richer by the end of this century.

### Biodiversity

#### Abrupt changes in climate don’t cause mass biodiversity loss—history proves

Singer and Avery 7—distinguished research and environmental science professors @ George Mason and Virginia

Fred, Distinguished Research Professor at George Mason University and Professor Emeritus of environmental science at the University of Virginia, Dennis, director of the Center for Global Food Issues at the Hudson Institute, Unstoppable Global Warming: Every 1,500 years, pg. 16

We know that species can adapt to abrupt global warming because the climate shifts in the 1500-year cycle have often been abrupt. Moreover, the world’s species have already survived at least six hundred such warmings and coolings in the past million years. The major effect of global warming will be more biodiversity in our forests, as more trees, plants, birds, and animals extend their ranges. This is already happening. Some biologists claim that a further warming of 0.8 degrees Celsius will destroy thousands of species. However, the Earth warmed much more than that during the Holocene Climate Optimum, which occurred 8,000 to 5,000 years ago, and no known species were driven extinct by the temperature increase.

Impossible to establish causation between climate change and biodiversity—too many alt causes

Parmesan 11—population biologist @ UT Austin

(Camille “Biodiversity's ills not all down to climate change” [http://www.nature.com/news/2011/110320/full/news.2011.170.html] March 20)

Climate change is affecting the world in many ways. But attempts to directly link local changes in species distribution and biodiversity to climate warming hold little promise, ecologists warn in Nature Climate Change[1](http://www.nature.com/news/2011/110320/full/news.2011.170.html#B1). First author Camille Parmesan, a population biologist at the University of Texas in Austin, explains why. **You argue that attempts to attribute the degree of local changes, for example declines in individual plant and animal species, specifically caused greenhouse warming are misguided. Why?** It is important to look at all the different things that could cause a decline, including climate change. But when it comes to managing and conserving species and ecosystems, trying to figure out exactly how much of any one particular decline is due to greenhouse gases is not necessarily helpful, and may actually not be possible. You can, of course, attribute various individual biological changes to climate events, and even climate change, provided you have long-term studies. But linking observed changes to the man-made component of climate change requires a different scale. That level of attribution is best done for large areas — the size of northern Europe or the western United States. The more local a scale you look at, the harder it is to link single events to greenhouse-gas-driven global climate change. Take the endangered Quino checkerspot butterfly [Euphydryas editha quino] of Southern California. We do know that climate change is important: if you dry and warm the butterfly's habitat it will cause increased starvation and extinction. But many populations are also affected by an invasive geranium from the Mediterranean which is out-competing the butterfly's host plant. This is further aided by air pollution from Los Angeles and San Diego, as nitrogen fertilization helps the exotic geranium take over. It just doesn't make any sense to ask what percentage of the decline is due to anthropogenic climate change — from a scientific standpoint it doesn't have much value. What you would be better off doing instead is manage for invasive geranium, lower the nitrogen pollution and set up new reserves that anticipate climate change — that is, placed in areas the butterflies can colonize as climate shifts. **So how is climate change affecting Earth's flora and fauna?** Climate change is impacting biodiversity worldwide. Spring comes, on average, two weeks earlier. Almost two-thirds of species, including many birds, frogs, butterflies, trees and grassland flowers, breed or bloom earlier. More than 50% are changing where they live. There is a consistency in the global pattern of more than 1,700 species we are studying which tells us that the changes are linked to some common global force and are consistent with what you would expect from a warming world. **So we can say with confidence that, for example, the date of flowering in northern Europe has advanced by two weeks. But we cannot be sure that global warming is the reason a local butterfly or wild flower species is becoming extinct or expanding northwards?** Yes. Phenology signals are clearer than changes in species distribution. Plants and animals often respond to rising winter temperatures — whether due to climate change or to increased urbanization, which also causes warming. In a local area — a given park or reserve — conservation managers need to know what they can do to manage for a complex set of changes that may include habitat fragmentation, pollution, presence or absence of certain predators, and so on. It does partly depend on how climate sensitive a species is. But we shouldn't focus too much on how a species is impacted by climate change on its own, that's much too narrow a focus. Other factors are often far more important and the ultimate impact of climate change on any given population is going to be dependent upon how stressed that population is by these other problems. **Scientists have previously linked the extinction of Costa Rica's iconic mountaintop golden toad [Bufo periglenes] to climate change. Was that premature?** No — I believe that was a correct assessment. The golden toad was endemic to Costa Rica's Monte Verde preserve. It went through three major population declines — each preceded by an extremely dry and hot year[2](http://www.nature.com/news/2011/110320/full/news.2011.170.html#B2). The third such event was followed by toad extinction. What has happened looks like a clear case of extinction driven by three extreme years. So yes, climate did cause the extinction, but we have only 17 years of data. To say whether the extreme dryness was caused by rising greenhouse gases requires looking at the region as a whole and asking whether — or by how much — such events are more likely under a greenhouse-gas-driven global climate. This may appear a subtle distinction, but it is this distinction that we are trying to express. **Species distributions are also shifting. The long-spined sea urchin [Centrostephanus rodgersii], for example, has moved from the warming seas off mainland Australia and has invaded more temperate waters off Tasmania. Likewise, many terrestrial plants and insects are moving or expanding pole-wards. Are these not clear fingerprints of climate change?** Sure, the sea urchin is probably shifting due to warming waters. As it shifts, it's been devastating local ecosystems. But it may not have become invasive if humans had not already over-fished the rock lobster off Tasmania — we'll never know. So there's an interaction between climate change and overfishing. Same with coral reefs: the fact that many are dying after high ocean temperature events may have something to do with humans stressing them with pollution, dynamite fishing, recreational activities and coastal development. Death rates may not have been so dire if the reefs were not overstressed by other things humans are doing — again, we'll never know. Some people want to deconstruct any observed biological change into separate causes and put percentage figures on them. In my opinion that's not worth spending the time on. Because in real systems, all these things interact, we just can't know exactly how much of a local change is due to greenhouse warming. If you have data over a large area — like our butterfly study of all of Europe[3](http://www.nature.com/news/2011/110320/full/news.2011.170.html#B3) — then you can definitely say the northward shifts of two-thirds of European butterflies in the UK, France, Sweden, Finland and Estonia are linked to long-term climate warming in Europe. But if you go to one population in the UK and see that, at a single site, there have been new populations formed further north, you will have a harder time making the greenhouse-gas link and you probably just shouldn't try. **The Intergovernmental Panel on Climate Change (IPCC) supports an ever-more-detailed approach to biological attribution — not least to inform conservation efforts. Do you think there is a better way to approach conservation?** The IPCC exists to distil science to answer policy makers' questions. But it is perhaps too often influenced by policy makers' black-and-white view of the world. We need to train policy makers to think of probabilities and likelihoods and interactions. They don't like it — but this is the accurate way to describe the science. There are times when it is appropriate to tell people that these are not the right questions — this is one of those times. **Does your critique include physical attribution studies — attempts, that is, to pin down how greenhouse warming affects the likelihood of specific weather-related events, such as heatwaves, heavy rain and floods?** No, we have very different approaches. If climate scientists can get to where they feel comfortable in terms of assigning attribution on very local scales, fine. We would even benefit from it. But biology and ecology are fundamentally different from — and I argue more complex than — climate science — humans are doing much more harm to wild species than just adding carbon dioxide to the atmosphere. How much wildlife is harmed by global warming depends on how stressed the system is by all the other things humans are doing locally.

### Disease

#### Warming doesn’t cause diseases – scientists admit

Donnelly 7

(John, 12-5, Staff, http://www.boston.com/news/science/articles/2007/12/05/a\_tussle\_over\_link\_of\_warming\_disease/)

Donald S. Burke, dean of Pittsburgh's Graduate School of Public Health, noted that the 2001 study found that weather fluctuation and seasonal variability may influence the spread of infectious disease. But he also noted that such conclusions should be interpreted with caution. "There are no apocalyptic pronouncements," Burke said. "There's an awful lot we don't know." Burke said he is not convinced that climate change can be proven to cause the spread of many diseases, specifically naming dengue fever, influenza, and West Nile virus.

#### Not enough evidence to support their claims – studies are flawed

Kovats et al 1—studies disease @ London School of Tropical Health

(R.S., A.J. McMichael, Dept. of Epidemiology @ London School of Tropical Health, D.H. Campbell-Lendrum, J. St H. Cox, Dept of Infectious and Tropical Diseases, A. Woodward, Wellington School of Medicine, http://rstb.royalsocietypublishing.org/content/356/1411/1057.full.pdf)

A very limited number of studies present evidence for effects of observed climate change on vector-borne disease. In our judgment, the literature to date does not include strong evidence of an impact of climate change on vector-borne diseases. This must be seen as 'absence of evidence', rather than 'evidence of absence' of an effect. There is a lack of long-term (more than 10 years') quality data on disease and vector distributions in areas where climate change has been observed and where a response is most likely to have occurred. While several studies are highly suggestive, alternative explanations such as 'back- ground' socio-economic, demographic and environmental effects remain plausible enough to cast some doubt on the role of climate change. New approaches need to be developed in order to assess the pattern and plausibility of these diverse studies of health impacts. There has been a tendency to oversimplify the mechanisms by which climate change may affect disease trans- mission. For example, discussions of highland malaria have relied on assumptions of shifts in mean temperatures and a simple threshold effect or 'altitude limit'. Many studies have clearly demonstrated the importance of precipitation (and humidity) in limiting malaria trans- mission in highland and desert fringe areas. Decreases in precipitation are a feature of climate change and these may have beneficial effects malaria transmission. However, changes in precipitation patterns are complex to describe and project under climate change.

### Sea Level Rise

#### Predictions of sea level rise are inaccurate

Taylor 11 – senior fellow for environmental policy @ the Heartland Institute

(James, “SINKING UNDER THEIR FALSE SEA-LEVEL PREDICTIONS, ALARMISTS CHANGE THE DATA’ [http://sppiblog.org/news/sinking-under-their-false-sea-level-predictions-alarmists-change-the-data] May 17)

Faced with the embarrassing fact that sea level is not rising nearly as much as alarmist computer models predict, the University of Colorado’s NASA-funded Sea Level Research Group has announced it will begin adding a scientifically unjustified 0.3 millimeters per year to its Global Mean Sea Level Time Series. Human civilization readily adapted to the seven inches of sea-level rise that occurred during the twentieth century. Alarmists, however, claim global warming will cause sea level to rise much more rapidly during the coming century. The United Nations Intergovernmental Panel on Climate Change (IPCC) gives a mean estimate of 15 inches of sea-level rise during the twenty-first century. High-profile alarmists often predict three feet. Some even predict 20 feet. Satellite measurements show global sea level has risen merely 0.83 inches during the first decade of the twenty-first century (a pace of eight inches for the century) and has barely risen at all since 2006. This puts alarmists in the embarrassing position of defending predictions that are not coming true in the real world.

#### No scientific consensus for sea level rise

Singer and Avery 7—distinguished research and environmental science professors @ George Mason and Virginia

Fred, Distinguished Research Professor at George Mason University and Professor Emeritus of environmental science at the University of Virginia, Dennis, director of the Center for Global Food Issues at the Hudson Institute, Unstoppable Global Warming: Every 1,500 years, pg. 46

The United Nations’ Intergovernmental Panel on Climate Change in 1990 predicted that man-made warming would produce a sea level rise of thirty to one hundred centimeters by 2100. By 2001, the IPCC’s Third Assessment Report had lowered its predicted sea level increase slightly to nine to eighty-88 centimeters. That’s still a potentially massive sea level rise. However, it reveals an even more massive uncertainty: a ten-fold range of doubt. The IPCC has in fact been harshly criticized for its handling of sea level issues by the International Union for Quaternary Research. INQUA is a seventy-five-year-old organization dedicated to researching global environmental and climatic changes over the past 2 million years. INQUA’s Commission on Sea Level Changes and Coastal Evolution says that the IPCC has ignored the scientists who produced most of the data and observations in sea level science, substituting unverified model results instead. Nils Axel Morner, the Swedish geologist who was president of the Sea Level Commission, says, “This is nothing but falsification of scientific observational facts.” Morner says sea level shows no trend at all over the past three hundred years, and satellite telemetry shows virtually no change in the past decade. This is contrary to the model predictions of the IPCC. “This implies that there is no fear of any massive future flooding as claimed in most global warming scenarios,” says Morner.

### Ocean Acidification

#### No impact to ocean acidification and its not caused by anthropogenic warming

Eschenbach 10

**\*\* cites Robert Byrne**, Ph.D from University of Rhode Island, Professor of Seawater Physical Chemistry at the University of South Florida

Willis “The Electric Oceanic Acid Test” [<http://wattsupwiththat.com/2010/06/19/the-electric-oceanic-acid-test/#more-20792> SJE] June 19

There is a recent and interesting study in GRL by Byrne et al., entitled “Direct observations of basin-wide acidification of the North Pacific Ocean“. This study reports on the change in ocean alkalinity over a 15 year period (1991-2006) along a transect of the North Pacific from Hawaii to Alaska. (A “transect” is a path along which one measures some variable or variables.) Here is the path of the transect: I love researching climate, because there’s always so much to learn. Here’s what I learned from the Byrne et al. paper.The first thing that I learned is that when you go from the tropics (Hawaii) to the North Pacific (Alaska), the water becomes less and less alkaline. Who knew? So even without any CO2, if you want to experience “acidification” of the ocean water, just go from Hawaii to Alaska … you didn’t notice the change from the “acidification”? You didn’t have your toenails dissolved by the increased acidity? Well, the sea creatures didn’t notice either. They flourish in both the more alkaline Hawaiian waters and the less alkaline Alaskan waters. So let’s take a look at how large the change is along the transect. Changes in alkalinity/acidity are measured in units called “pH”. A neutral solution has a pH of 7.0. Above a pH of 7.0, the solution is alkaline. A solution with a pH less than 7.0 is acidic. pH is a logarithmic scale, so a solution with a pH of 9.0 is ten times as alkaline as a solution with a pH of 8.0. Figure 2 shows the measured pH along the transect. The full size graphic is here. The second thing I learned from the study is that the pH of the ocean is very different in different locations. As one goes from Hawaii to Alaska the pH slowly decreases along the transect, dropping from 8.05 all the way down to 7.65. This is a change in pH of almost half a unit. And everywhere along the transect, the water at depth is much less alkaline, with a minimum value of about 7.25. The third thing I learned from the study is how little humans have changed the pH of the ocean. Figure 3 shows their graph of the anthropogenic pH changes along the transect. The full-sized graphic is here: The area of the greatest anthropogenic change over the fifteen years of the study, as one might imagine, is at the surface. The maximum anthropogenic change over the entire transect was -0.03 pH in fifteen years. The average anthropogenic change over the top 150 metre depth was -0.023. From there down to 800 metres the average anthropogenic change was -0.011 in fifteen years. This means that for the top 800 metres of the ocean, where the majority of the oceanic life exists, the human induced change in pH was -0.013 over 15 years. This was also about the amount of pH change in the waters around Hawaii. Now, remember that the difference in pH between the surface water in Hawaii and Alaskan is 0.50 pH units. That means that at the current rate of change, the surface water in Hawaii will be as alkaline as the current Alaskan surface water in … well … um … lessee, divide by eleventeen, carry the quadratic residual … I get a figure of 566 years. But of course, that is assuming that there would not be any mixing of the water during that half-millennium. The ocean is a huge place, containing a vast amount of carbon. The atmosphere contains about 750 gigatonnes of carbon in the form of CO2. The ocean contains about fifty times that amount. It is slowly mixed by wind, wave, and currents. As a result, the human carbon contribution will not stay in the upper layers as shown in the graphs above. It will be mixed into the deeper layers. Some will go into the sediments. Some will precipitate out of solution. So even in 500 years, Hawaiian waters are very unlikely to have the alkalinity of Alaskan waters. The final thing I learned from this study is that creatures in the ocean live happily in a wide range of alkalinities, from a high of over 8.0 down to almost neutral. As a result, the idea that a slight change in alkalinity will somehow knock the ocean dead **doesn’t make any sense.** By geological standards, the CO2 concentration in the atmosphere is currently quite low. It has been several times higher in the past, with the inevitable changes in the oceanic pH … and despite that, the life in the ocean continued to flourish. My conclusion? To mis-quote Mark Twain, “The **reports of the ocean’s death have been greatly exaggerated.**”

### War

Warming doesn’t lead to war—no correlation and historically the opposite is true

Tertrais 11—Senior Research Fellow specializing in conflict study @ Fondation pour la recherche stratégique in Paris

(Bruno, “The Climate Wars Myth” Summer)

Since the dawn of civilization, warmer eras have meant fewer wars. The reason is simple: all things being equal, a colder climate meant reduced crops, more famine and instability.4 Research by climate historians shows a clear correlation between increased warfare and cold periods.5 They are particularly clear in Asia and Europe, as well as in Africa.6 Interestingly, the correlation has been diminishing since the beginning of the Industrial Revolution: as societies modernize, they become less dependent on local agricultural output.7 Moreover, if there was any significant link between warfare and warming, the number of conflicts should have been rising in the past two decades. It has not, quite the contrary. Since the end of the Cold War, the total number of wars, after having steadily increased since 1945, has diminished. Statistics published by the Stockholm International Peace Research Institute (SIPRI), which come from work done at the Uppsala University, clearly show such a decrease. Today, there are half as many wars as two decades ago (17 in 2009 versus 35 in 1989).8 This result is mainly due to the rapid decrease in the number of internal conflicts.9 As with the number of interstate conflicts, civil wars began to decline from the end of the 1970s onwards. Classic international war has, statistically speaking, disappeared from the modern world. According to the SIPRI/Uppsala University data, in 2009, for the sixth year in a row, there was no ongoing interstate war. (Iraq and Afghanistan do not belong to that category.) Such conflicts represented, in the 2000s, three out of a total of 30 wars, thus 10 percent of the total\_in a world where the number of states has tripled since the end of the Second World War. There is even a reverse correlation. The average global temperature diminished between 1940 and 1975: during that period, the total number of conflicts was on the rise. Correlation is not causation. (It may be tempting to argue that the modernization of societies leads to two separate, parallel outcomes: global warming and global peace.) But the existence of these data points should contribute to extreme caution about the hypothetical equation according to which a warmer world would be a war-prone world. In 2007, the Nobel Peace Prize was attributed jointly to the Intergovernmental Panel on Climate Change (IPCC) and to former U.S. Vice President Al Gore. Rarely was the attribution of a Nobel Peace Prize so blatantly out of sync with geopolitical realities.

## \*\*\*Warming Good—MPX Turns

### Ice Age 1NC

#### Ice Age is coming now and leads to extinction—Science is better than Aff Ev—comparatively outweighs global warming—continued CO2 burning is key

Deming 9—geophysicist

David Deming is a geophysicist and associate professor of Arts and Sciences at the University of Oklahoma. The Coming Ice Age, 5/13/09, http://www.americanthinker.com/2009/05/the\_coming\_ice\_age.html

In northern Europe, the Little Ice Age kicked off with the Great Famine of 1315. Crops failed due to cold temperatures and incessant rain. Desperate and starving, parents ate their children, and people dug up corpses from graves for food. In jails, inmates instantly set upon new prisoners and ate them alive. The Great Famine was followed by the Black Death, the greatest disaster ever to hit the human race. One-third of the human race died; terror and anarchy prevailed. Human civilization as we know it is only possible in a warm interglacial climate. Short of a catastrophic asteroid impact, the greatest threat to the human race is the onset of another ice age. The oscillation between ice ages and interglacial periods is the dominant feature of Earth's climate for the last million years. But the computer models that predict significant global warming from carbon dioxide cannot reproduce these temperature changes. This failure to reproduce the most significant aspect of terrestrial climate reveals an incomplete understanding of the climate system, if not a nearly complete ignorance. Global warming predictions by meteorologists are based on speculative, untested, and poorly constrained computer models. But our knowledge of ice ages is based on a wide variety of reliable data, including cores from the Greenland and Antarctic ice sheets. In this case, it would be perspicacious to listen to the geologists, not the meteorologists. By reducing our production of carbon dioxide, we risk hastening the advent of the next ice age. Even more foolhardy and dangerous is the Obama administration's announcement that they may try to cool the planet through geoengineering. Such a move in the middle of a cooling trend could provoke the irreversible onset of an ice age. It is not hyperbole to state that such a climatic change would mean the end of human civilization as we know it. Earth's climate is controlled by the Sun. In comparison, every other factor is trivial. The coldest part of the Little Ice Age during the latter half of the seventeenth century was marked by the nearly complete absence of sunspots. And the Sun now appears to be entering a new period of quiescence. August of 2008 was the first month since the year 1913 that no sunspots were observed. As I write, the sun remains quiet. We are in a cooling trend. The areal extent of global sea ice is above the twenty-year mean. We have heard much of the dangers of global warming due to carbon dioxide. But the potential danger of any potential anthropogenic warming is trivial compared to the risk of entering a new ice age. Public policy decisions should be based on a realistic appraisal that takes both climate scenarios into consideration.

### Ice Age UQ—Coming Now

#### Cooling is coming now – it’s fast and outweighs the effects of warming

Carlin 11 – PhD in Economics from MIT

Alan Carlin, PhD in Economics, former Director @ EPA and fellow @ RAND, 3-2011, “ A Multidisciplinary, Science-Based Approach to the Economics of Climate Change,” International Journal of Environmental Research and Public Health, Vol. 8

On the contrary, the evidence is that during interglacial periods over the last 3 million years the risks are on the temperature downside, not the upside. As we approach the point where the Holocene has reached the historical age when a new ice age has repeatedly started in past glacial cycles, this appears likely to be the only CAGW effect that mankind should currently reasonably be concerned about. Earth is currently in an interglacial period quite similar to others before and after each of the glacial periods that Earth has experienced over the last 3 million years. During these interglacial periods there is currently no known case where global temperatures suddenly and dramatically warmed above interglacial temperatures, such as we are now experiencing, to very much warmer temperatures. There have, of course, been interglacial periods that have experienced slightly higher temperatures, but none that we know of that after 10,000 years experienced a sudden catastrophic further increase in global temperatures. The point here is that there does not appear to be instability towards much warmer temperatures during interglacial periods. There is rather instability towards much colder temperatures, particularly during the later stages of interglacial periods. In fact, Earth has repeatedly entered new ice ages about every 100,000 years during recent cycles, and interglacial periods have lasted about 10,000 years. We are currently very close to the 10,000 year mark for the current interglacial period. So if history is any guide, **the main worry** should be that of entering a new ice age, with its growing ice sheets, that would **probably wipe out civilization** in the temperate regions of the Northern Hemisphere—not global warming. The economic damages from a new ice age would indeed be large, and almost certainly catastrophic. Unfortunately, it is **very likely** to occur sooner or later.

#### We must act now to survive; solar studies indicate that an ice age is approaching.

Hecht 11

(Laurence, Editor of 21st Century Science & Technology “Studies Show Weakening

Sun, Possible New Ice Age” [http://www.21stcenturyscience tech.com/Articles\_2011/WeakSun.pdf] June 24)

Three independent U.S. studies of solar activity arrive at the same conclusions put forth earlier by the Pulkovo Observatory in St. Petersburg, Russia: • solar activity is declining; • the current solar cycle, 24, which began in December 2009, is likely to be a weak one; and • the following cycle, beginning around 2018 to 2020, may be so weak as to bring on a new Little Ice Age. In the worst case, the developments could signal the beginning of a new period of reduced solar activity and extremely cold climate, like that in the period known to solar scientists as the Maunder Minimum, also known as the Little Ice Age, which lasted from approximately 1645 to 1715. Such has been the expectation of the Russian group led by Habibullo Abdussamatov of the Pulkovo Observatory, a possibility that is now being openly mooted by some of his American counterparts. To meet such an eventuality, a rapid mobilization of high technology capabilities, especially the energydense technologies of nuclear fission and fusion, is imperative for the survival of civilization.

### Ice Age Link—Co2 K/T Solve

#### Continued co2 use prevents the onset of an ice age – historically true

Thompson 7

September, Citing a researcher @ University of Southampton, Global Warming May Cancel Next Ice Age, Online

The effects of burning fossil fuels today will extend long beyond the next couple of hundred years, possibly delaying the onset of Earth's next ice age, more properly called a glacial period, says researcher Toby Tyrrell of the University of Southampton in the United Kingdom. For the past 3 million years, glacial periods have advanced and retreated about every 100,000 years or so as the pattern of Earth's orbit changes with time — called a Milankovitch cycle — and alters the way the sun strikes the planet's surface. When less solar energy hits a given area of the surface, temperatures become cooler. This is what causes the difference in temperatures between summer and winter. Long-term changes in Earth's orbit that cause less sunlight to hit the surface can cool down summer temperatures so that less ice melts at the poles. If ice sheets and glaciers don't melt a bit in the summer, the ice accumulates and starts to advance. In the most recent glacial period, sheets of ice covered all of Canada and most of the northern United States, as well as all of Scandinavia and most of Britain and Russia. The level of carbon dioxide in the atmosphere may also be an important factor in triggering glacial periods. In the past, lower carbon dioxide levels, caused by natural processes, helped cool the Earth and again allowed ice to advance. Rising carbon dioxide levels, as is the case with global warming, can have the opposite effect.

#### Massive co2 emissions key to prevent coming ice age

Walker 8

Bruce, Global Cooling is a Serious Problem, Senior Columnist, <http://canadafreepress.com/index.php/article/2071>

Scientist who study climate change have now come up with a new prognosis for the future of our planet: 2007 saw the greatest single drop in temperature in recorded history. The ice age which had been receding for the last few centuries seems to be returning. Global Cooling is a serious problem. The last time our planet suffered from global cooling, there was also a troubling increase in crop failures, disease and the decline of habitable areas (Greenland and Iceland, for example, had much more vegetation and warmth.) It is difficult to say if mankind can stop global cooling, but it is not difficult to say what the reaction of policymakers around the world should be to this newest and real natural threat. Governments should encourage the mining of coal, the drilling for oil, increasing industrial activity, more vehicles on the highways and the introduction of heat-retaining chemical compounds in our atmosphere.

### Ice Age MPX—Extinction

#### The impact is extinction

Caruba 5

Alan, “An Icy End for Mankind?” http://www.sepp.org/Archive/NewSEPP/Ice%20Age-Caruba.htm

It is well known that, in the course of billions of years, the earth has gone through warming and cooling cycles. From 1850 to 1940, the Earth gained about one degree Fahrenheit in warmth. It has been warmer in the past -- such as during the millions of years that dinosaurs existed. The earth, however, is not showing signs of significant warming. The Ice Shelf in Greenland and Antarctic is actually getting thicker. This is not something to be ignored because the earth has been in an interglacial period between ice ages that lasts about 11,000 years, and we are due another ice age any day now. Just as there is nothing mankind can do to prevent a bogus global warming, there is likely nothing we can do to avoid the very real prospect of the next ice age. When it comes, it will be extinction time for people, plants and animals in the far North. That's the way it was the last time. Indeed, in the course of its five billion years, the earth has experienced such extinctions on a regular basis. While the environmentalists have flooded the classrooms and media of America with endless nonsense about global warming, the fact is that the schedules, i.e. the movement of the earth around the sun, galactic timetables, and ways in which the earth and our solar system function, are well known to scientists who study these things and, frankly, none if it bodes well for the human race and other critters. At least, that is the conclusion of Robert W. Felix, the author of "Not by Fire, But by Ice: The Next Ice Age Now" ($15.95, Sugarhouse Publishing, Bellevue, WA). Piling scientific fact upon fact, Felix notes that, "We're beginning to realize that earth is a violent and dangerous place to live. We're beginning to realize that mass extinctions have been the rule, rather than the exception for the 3.5 billion years that life has existed on earth."

### Ice Age AT: Warming 🡺 Ice Age—NAO

#### Warming won’t collapse the north atlantic current – even if it does, warming will outweigh

O’Hare, Johnson, and Pope 5

O'Hare, Greg, Andy Johnson, and Richard Pope. "Current shifts in abrupt climate change: the stability of the North Atlantic conveyor and its influence on future climate." Geography 90.3 (Autumn 2005): 250(17). Expanded Academic ASAP. Gale. University of Kansas Libraries. 14 Mar. 2008 <http://find.galegroup.com.www2.lib.ku.edu:2048/itx/start.do?prodId=EAIM>

By currently releasing massive quantities of fresh water into the North Atlantic through ice melt, global warming today is seen as a powerful mechanism able to switch the present 'on' state of the Northern Conveyor to the 'half-on' and even the 'off' mode condition. Global warming paradoxically has the potential to plunge the northern Atlantic region into new glacial conditions. Because some scientists and others in the media believe in the return or near return of an ice age, this possibility is addressed in our article. Using modern high quality palaeoclimatic data (ice cores and deep sea sediments) a comparison of the last four interglacials, including MIS 11 (430,000 years ago), shows us that natural factors alone are unlikely to cause a quick return to ice age conditions. In addition, theoretical and empirical findings together with modelling studies of the Northern Conveyor reveal that although there is likely to be a significant weakening in the Gulf Stream/North Atlantic Drift by the end of the present century, a total collapse of the system is not expected. In terms of our future climate, therefore, we should expect continued warming as a result of anthropogenic release of greenhouse gases rather than cooling over the next 50-80 years. One favourite climate scenario suggests that cooling by a shut-down of the Gulf Stream at the end of the present century is more than likely to be balanced by global warming. In the final analysis, however, there are too many uncertainties in the science of climate change for us to be confident of what the climate will be like in the future. What we do know with a better level of authority is that abrupt climate change was a feature of the past, and it could well be one of the future.

#### Even IPCC agrees – NAO can’t totally shut-down from Greenland melting

Lomborg 7

Bjorn, Adjunct Professor at the [Copenhagen Business School](http://en.wikipedia.org/wiki/Copenhagen_Business_School) and a former director of the [Environmental Assessment Institute](http://en.wikipedia.org/wiki/Environmental_Assessment_Institute) in Copenhagen, Cool It, pg. 88

Yet the relevance of such a story crucially depends on the Greenland melt being on the same order of magnitude as the ancient freshwater pool—and its not. Over the coming century, the IPCC expects Greenland to melt almost one thousand times less than what happened 8,200 years ago. A team of modelers looked at what would happen if Greenland melted at triple the rate expected by the IPCC\_- or, as they put it, at the “upper limit of possible melting rates.” Although they see a reduction in the Gulf Stream, they find “its overall characteristic is not change” and that “abrupt climate change initiated by Greenland ice sheet melting is not a realistic scenior for the 21st century.”

### Ag Food Prices 1NC

#### Food prices are rising – the only solution is increased production

The Press Association 8

UN warns of rising food prices, 6/25/08, http://ukpress.google.com/article/ALeqM5gw3QAJkWm\_FVBknySwRjlxsD\_Z4g

The head of the UN's food agency has warned that food prices will remain high and called for a boost in production. Food and Agriculture Organisation director general Jacques Diouf said prices are expected to remain high due to climate change, continued demand for bioenergy, low food stocks and greater demand in emerging countries such as China, India, Indonesia and Brazil. Mr Diouf said the problem will not be solved without increasing food production, and he called on world leaders meeting in Japan next month to address this issue.

#### Co2 key to increased ag production

Steward 9—geologist

(H Leighton, “Plants need more CO2, not less” [http://plantsneedco2.org/default.aspx/act/newsletter.aspx/category/In+The+News/menuitemid/312/MenuGroup/NewsAndMedia/NewsLetterID/26/startrow/4.htm ] December 4)

Congress and federal regulators are poised to make a misguided and reckless decision that will stifle our economy recovery and spur long- term damage to plant and animal life on earth. In the coming months, the Environmental Protection Agency will hold hearings to justify the movement to brand carbon dioxide (CO2) as a pollutant. Congress will also consider cap-and-trade legislation that, if enacted, could also regulate CO2 as pollution. Why is it such a catastrophic decision? Because there is not a single piece of evidence that CO2 is a pollutant. In fact, lower levels of carbon dioxide actually inhibit plant growth and food production. What we see happening in Washington right now is the replacement of politics for science in conversations about CO2. For plants, CO2 is the greatest, naturally occurring air-borne fertilizer that exists. Even schoolchildren learn in elementary science class that plants need carbon dioxide to grow. During photosynthesis, plants use this CO2 fertilizer as their food and they "breathe out" oxygen into the air so humans can inhale it, and in turn exhale CO2. This mutually beneficial and reinforcing cycle is one of the most basic elements of life on earth. An article appeared recently in the Environment and Energy Daily that claimed a "modeled" nitrogen deficiency will occur as CO2 rises. Well, CO2 has already risen over 37%, 105 parts per million, and where is the real world nitrogen deficiency?Why are Earth's forests lush if the added growth that has already occurred, due to big bursts of CO2, has depleted the nitrogen supply? The nitrogen supply of pristine ecosystems has been resupplied through natural processes for eons. Computer models, manipulated to produce desired results, can generate catastrophic, front page, forecasts. We encourage our government's scientists to step back from their models and observe what is and what has happened in the real world, as well as in actual plant experiments. Doesn't anyone recognize the good news that is staring them in the face? It simply defies imagination, let alone science, that the United Nations has now backed an arbitrary limit on atmospheric carbon dioxide levels. The chairman of the politically charged Intergovernmental Panel on Climate Change (IPCC) said he supports efforts to reduce carbon dioxide to 10% below current levels. In the context of today's political conversations, this recommendation may sound like an acceptable position to save the environment. But the scientific reality of such a step is quite the opposite. Lowering carbon dioxide in our atmosphere will have catastrophic affects on our food supply. Higher concentrations of carbon dioxide support plant life and helps plants thrive. If our food supply is reduced, the hunger crisis in many parts of the world will worsen. Not only would lowering CO2 levels be wrong, one can make the argument that even higher levels would be desirable. Greenhouse operators routinely increase CO2 to about three times the current level in earth's atmosphere in order to encourage plant growth. We know CO2 is vital for plants, but what about the argument that it is a dominant contributor to the greenhouse effect? Again, science does not support this argument. CO2 is not even close to being the most important of the greenhouse gases. Most of the greenhouse effect is due to water vapor, which is more than 30 times as abundant in the atmosphere as CO2. As further evidence, we find that as the post-war industrial boom began to put significant volumes of CO2 into the atmosphere, global temperatures did not rise. Since 1945, there have been about 40 years of cooling trend and only 20-plus years of warming. While the warming is significant, it followed an unusually high period of solar activity. Temperature did rise steeply in the 1920's and in the 1930's in the U.S. and 1934 was the warmest year of the 20th century. The rate of warming then was also higher than in the 1980's and 1990's, even though CO2 levels were lower. Many in the scientific community reject reducing atmospheric CO2 to 350 parts per million, as Dr. Pachauri of the U.N. wishes. Thousands of peer-reviewed experiments have demonstrated CO2' s ability to "green" the earth dramatically. Nonetheless, Dr. Pachauri and those who prefer to debate science with politics are sticking to their old story and clinging to their inadequate climate models and their headline-grabbing catastrophic forces. Do Americans want to see their government spend trillions of dollars removing CO2 that will not lower the Earth's temperature but absolutely will risk harming ecologies, economies and mankind itself?

#### High food prices threaten global economic collapse

Fickler 8

MARTIN FACKLER June 15, 2008 http://www.nytimes.com/2008/06/15/business/worldbusiness/15ministers.html “Surging Oil and Food Prices Threaten the World Economy, Finance Ministers Warn”

The global economy faces a one-two punch from slowing growth and soaring fuel and food prices, finance ministers from the world’s richest nations warned Saturday, though they stopped short of offering concrete solutions. Finance ministers from the Group of 8 industrialized nations wrapped up a two-day meeting in Japan that was dominated by talk of rising petroleum prices, which have set off street protests across the world. In a statement, the ministers said higher prices of oil and other commodities threatened the world economy at a time when it was still reeling from the collapse of the housing market in the United States.

#### Economic decline risks nuclear war

Mead 92

[Walter Russel Mead, Senior Fellow in American FoPo @ the Council on Foreign Relations, World Policy Institute, 1992]

Hundreds of millions, billions, of people have pinned their hopes on the international market . They and their leaders have embraced market principles and drawn closer to the west because they believe the system can work for them? But what if it can’t? What if the global economy stagnates or even shrinks? In that case, we will face a new period of international conflict: North against South, rich against poor. Russia, China India, these countries with their billions of people and their nuclear weapons will pose a much greater danger to the world than Germany and Japan did in the 30s.

### Ag CO2 Key to Ag

#### CO2 in the last century has helped increase agricultural productivity

Spencer 11—former senior scientist @ NASA

Roy Spencer, Ph.D. Meteorology, Former Senior Scientist for Climate Studies, NASA, 1/4/11, Popular Science, http://www.climatechangedispatch.com/temperate-facts/co2-and-gw-primers/co2-is-not-pollution?start=1

"Many chemicals are absolutely necessary for humans to live, for instance oxygen. Just as necessary, human metabolism produces by-products that are exhaled, like carbon dioxide and water vapor. So, the production of carbon dioxide is necessary, on the most basic level, for humans to survive. The carbon dioxide that is emitted as part of a wide variety of natural processes is, in turn, necessary for vegetation to live. It turns out that most vegetation is somewhat 'starved' for carbon dioxide, as experiments have shown that a wide variety of plants grow faster, and are more drought tolerant, in the presence of doubled carbon dioxide concentrations. Fertilization of the global atmosphere with the extra CO2 that mankind's activities have emitted in the last century is believed to have helped increase agricultural productivity. In short, carbon dioxide is a natural part of our environment, necessary for life, both as 'food' and as a by-product."

#### Global warming allows for more fertile and nutrient-rich soil

Rosenzweig and Hillel 95

Cynthia, Research Agronomist at NASA/Goddard Institute for Space Studies in New York City, and Dr. Daniel, Professor Emeritus of Plant and Soil Sciences at the University of Massachusetts in Amherst, “Potential Impacts of Climate Change on Agriculture and Food Supply” Consequences Vol. 1, No. 2, Summer 1995http://www.gcrio.org/CONSEQUENCES/summer95/agriculture.html

Higher air temperatures will also be felt in the soil, where warmer conditions are likely to speed the natural decomposition of organic matter and to increase the rates of other soil processes that affect fertility. Additional application of fertilizer may be needed to counteract these processes and to take advantage of the potential for enhanced crop growth that can result from increased atmospheric CO2. This can come at the cost of environmental risk, for additional use of chemicals may impact water and air quality. The continual cycling of plant nutrients--carbon, nitrogen, phosphorus, potassium, and sulfur--in the soil-plant-atmosphere system is also likely to accelerate in warmer conditions, enhancing CO2 and N2O greenhouse gas emissions. Nitrogen is made available to plants in a biologically usable form through the action of bacteria in the soil. This process of nitrogen fixation, associated with greater root development, is also predicted to increase in warmer conditions and with higher CO2, if soil moisture is not limiting. Where they occur, drier soil conditions will suppress both root growth and decomposition of organic matter, and will increase vulnerability to wind erosion, especially if winds intensify. An expected increase in convective rainfall--caused by stronger gradients of temperature and pressure and more atmospheric moisture--may result in heavier rainfall when and where it does occur. Such "extreme precipitation events" can cause increased soil erosion.

#### Increased co2 will boost agricultural output by 33 percent – hundred of studies prove

Idso 84

Sherwood B., prof at Arizona State, “CO2, Climate and Consensus Science,” Nov 1984

But is the situation really that bad? Decidedly not, if one can believe the results of literally hundreds of sound agronomic experiments which have established beyond all doubt that atmospheric CO2 enrichment acts as a stimulus to plant growth and development. Indeed, in a recent review of the plant science literature relative to this subject (Agron. J., 75: 779), B. A. Kimball concludes that crop yields the world over 'probably will increase by 33 per cent with a doubling of atmospheric CO2 concentration'. What is more, atmospheric CO2 enrichment also induces partial stomatal closure, so that plants lose less water by transpiration; and in a recent review of this effect (Agric. Water Management, 7: 55) it is concluded that 'a doubling of CO2 concentration could reduce transpiration by 34 per cent.' Thus, it can be readily appreciated that plant water use efficiency, or the yield produced per unit of water used, will actually double with a doubling of the atmospheric CO2 content.

### Ag CO2 Key to Ag – A2: Pests

#### Co2 boosts plant growth and resistance to pests

Balgord, 1

William D., Global warming not necessarily fault of humans, Milwaukee Journal Sentinel, August 11, 2001

Kyoto proponents seldom mention the obvious: CO2 enrichment of the atmosphere can provide enormous benefits to agriculture and forestry. Controlled tests show doubling CO2 stimulates faster growth and hardiness in most plants, provides resistance to drought, pollutants and pests, and enhances the ability of plants to withstand temperature extremes. Higher field crop and forest yields would ultimately benefit a growing world population.

### Ag Food Prices Bad – Hunger

#### Higher food prices kill billions

Tampa Tribune 96

(January 20, LN)

"Even if they are merely blips, higher international prices can hurt poor countries that import a significant portion of their food," he said. "Rising prices can also quickly put food out of reach of the 1.1 billion people in the developing world who live on a dollar a day or less." He also said many people in low-income countries already spend more than half of their income on food.

#### This outweighs all – we must stop hunger, even if it leads to extinction

LaFollette 2K3

(Hugh, http://www.stpt.usf.edu/hhl/papers/World.Hunger.htm)

Those who claim the relatively affluent have this strong obligation must, among other things, show why Hardin's projections are either morally irrelevant or mistaken. A hearty few take the former tack: they claim we have a strong obligation to aid the starving even if we would eventually become malnourished. On this view, to survive on lifeboat earth, knowing that others were tossed overboard into the sea of starvation, would signify an indignity and callousness worse than extinction (Watson 1977). It would be morally preferable to die struggling to create a decent life for all than to continue to live at the expense of the starving.

### Ag AT: Warming Collapses Ag

#### Lower temperatures crush agriculture – history proves

Dunn 7

J.R., “Resisting Global Warming Panic,” 1/31/2k7, American Thinker, http://www.americanthinker.com/2007/01/resisting\_global\_warming\_panic.html

The climate closed down. Rains ruined crops and washed away entire seacoast towns. Far to the north, the great colonies of Iceland and Greenland faltered and began to fade away. Famine returned to Europe, and with it the plague, in one of the greatest mass deaths ever witnessed by humanity. The bright centuries were replaced by the dance of death and a dank and morbid religiosity. The focus of culture shifted to the warm Mediterranean. It remained cold, within certain broad limits, for six hundred years. The chill only lifted in the 1850s, when our current warming actually began.

We look back to a world that was a far more pleasant place at the turn of the last millennium, with a milder climate, plentiful food, a healthy populace. A picture, needless to say, at some variance with the Greens' prediction of coming universal disaster. It also undermines one of one of the basic environmentalist tenets - that nature is in delicate balance that can destroyed by a hard look from any given capitalist, and that any such change leads inevitably to catastrophe. The LCO suggests that a warmer world may well be more desirable than the one we have now. To go a step further, my research implied that the planet is in fact meant to be somewhat warmer than it is today, that the life-forms we see around us are in fact adapted to a warmer climate. The earth is, after all, stuck within a three-million-year glacial epoch whose origin and cause remain a mystery. (We're now in a brief "interglacial" - a warming period! - that began only 12,000 years ago and could end tomorrow.)

### So2 Screw 1NC

So2 decreases warming

Walker and King 8

Gabrielle, PhD in Chemistry, Sir David, Director of the Smith School of Enterprise and the Environment at the University of Oxford, and a senior scientific adviser to UBS, The Hot Topic, pg. 26

In fact, the models generally do a good job of explaining all the changes that have taken place in the twentieth century, including the fact that temperatures apparently dropped a little during the middle part of it—something of which climate change skeptics like to make great play. It turns out that the cooling came from something we’ve already discussed in this chapter: aerosols. They did in fact have a marked effect on the temperature of the twentieth century. It was anything but natural, however. Burning dirty coal produces plenty of sulfur containing aerosols, and researchers now think that these were responsible for the slight cooling that took place between about 1940 and the late 1960s.

#### Removal makes warming worse

Bolch and Lyons 93—prof of economics and chemistry @ Rhodes College

(Ben and Harold, “Apocalypse Not” pg 79)

A major reason that we do not agree with the National Academy of Sciences’ report is that as the greenhouse models mature, the warming predicted tends to lessen. T. M. L. Wigley, reporting in Nature, has uncovered a somewhat unexpected relationship between sulfur dioxide and the greenhouse effect. Sulfur dioxide, one of the prime targets of the lobby against acid rain, tends to oxidize into sulfate in the atmosphere and thus promote condensation clouds. Those additional droplets in clouds help reflect heat upward and therefore have a cooling effect on the earth. Since a large percentage of sulfur dioxide comes from burning high-sulfur coal, success in eliminating sulfur dioxide emissions may mean an exacerbation of any greenhouse effect.

### So2 Screw—Link

#### The aff would increase warming\*

\*don’t endorse gendered language

Schmoltner 1

(National Science Foundation [www.nsf.gov/2001/pr0132.txt] April 19)

Climate researchers are warning that efforts to reduce air pollution could, if not well designed, make global warming worse. Limiting emissions of man-made nitrogen oxides, a strategy to control ozone in the lower atmosphere, would result in increased methane abundance and lead to additional greenhouse warming, they say. Nitrogen oxides, commonly abbreviated N0x, are shorthand for the combination of nitric oxide and nitrogen dioxide (NO plus NO2) that are produced by aircraft and automobile emissions, in biomass burning, and by some industrial processes, as well as by such natural events as lightning. “Traditionally, atmospheric chemistry research has focused on processes in the natural and polluted atmosphere, while climate modeling has investigated the impact of greenhouse gasses,” says Anne-Marie Schmoltner, director of the National Science Foundation (NSF)’s atmospheric chemistry program, which funded the research along with NASA. “However, it is important to recognize the interplay between the chemistry and the distribution of greenhouse gases. Increasingly complex models such as the one employed in this study are now able to look at these interactions.” The research was conducted by Oliver Wild and Hajime Akimoto of the Frontier Research System for Global Change in Yokohama, Japan, and Michael J. Prather of the University of California, Irvine. It will appear in the May 1 issue of the journal, Geophysical Research Letters, published by the American Geophysical Union. The reason not to concentrate only on reducing nitrogen oxide emissions, they say, is that there is a marked difference in the short- and long-term effects of doing so. Increased nitrogen oxide emissions do indeed, as is commonly expected, to short-term warming from increased short-lived ozone in the troposphere, the lower part of Earth’s atmosphere. Over the following decade, however, these nitrogen oxide emissions lead to reductions in methane and even ozone, and thus to a net cooling. Overall, the net impact is a slight cooling for a wide range of locations of nitrogen oxide emissions, and thus reductions in these emissions, such as from pollution control measures, will eventually add to global warming.

### So2 Solves Warming

#### SO2 net cools – purely anthropogenic

Sofen et al 2011 - Department of Atmospheric Sciences, University of Washington

(April 15, E. D. Sofen -Department of Atmospheric Sciences, University of Washington, B. Alexander - Department of Atmospheric Sciences, University of Washington, and S. A. Kunasek - Department of Earth and Space Sciences, University of Washington) <http://www.atmos-chem-phys.net/11/3565/2011/acp-11-3565-2011.pdf>, Date accessed: 6-26-12

Atmospheric sulfate (SO 2− 4 ) aerosols impact numerous aspects of the Earth system and have been signiﬁcantly altered by human activity. Sulfate aerosols have a direct radiative cooling effect and contribute to indirect radiative effects through modiﬁcation of cloud properties. However, the extent of the cooling effect remains highly uncertain (Solomon et al., 2007). Sulfate is also a major source of acidity in aerosols and cloud water, impacting pH-dependent atmospheric chemistry and the pH of precipitation. Sulfur emissions, mainly in the form of sulfur dioxide gas (SO2), have increased dramatically due to anthropogenic activity (Langner et al., 1992; Smith et al., 2011).

#### SO2 causes cooling – empirically proven

Kaufmann et al 2011 – Professor, Geography and Environment and Center for Energy and Environmental Studies PhD, University of Pennsylvania

June 2, Robert K. Kaufmanna,1, Heikki Kauppib, Michael L. Manna, and James H. Stockc, “Reconciling anthropogenic climate change with observed temperature 1998–2008”, http://www.pnas.org/content/108/29/11790.full

Increasing emissions and concentrations of carbon dioxide receive considerable attention, but our analyses identify an important change in another pathway for anthropogenic climate change—a rapid rise in anthropogenic sulfur emissions driven by large increases in coal consumption in Asia in general, and China in particular. Chinese coal consumption more than doubles in the 4 y from 2003 to 2007 (the previous doubling takes 22 y, 1980–2002). In this four year period, Chinese coal consumption accounts for 77% of the 26% rise in global coal consumption (8). These increases are large relative to previous growth rates. For example, global coal consumption increases only 27% in the twenty two years between 1980 and 2002 (8). Because of the resultant increase in anthropogenic sulfur emissions, there is a 0.06 W/m2 (absolute) increase in their cooling effect since 2002 (Fig. 1). This increase partly reverses a period of declining sulfur emissions that had a warming effect of 0.19 W/m2 between 1990 and 2002.2 The increase in sulfur emissions slows the increase in radiative forcing due to rising greenhouse gas concentrations (Fig. 1). Net anthropogenic forcing rises 0.13 W/m2 between 2002 and 2007, which is smaller than the 0.24 W/m2 rise between 1997 and 2002. The smaller net increase in anthropogenic forcing is accompanied by a 0.18 W/m2 decline in solar insolation caused by the declining phase of the eleven year solar cycle, such that the sum of modeled forcings increases little after 1998 and declines after 2002 (Fig. 1). This cooling effect is amplified by a net increase in the Southern Oscillation Index (SOI) (9).