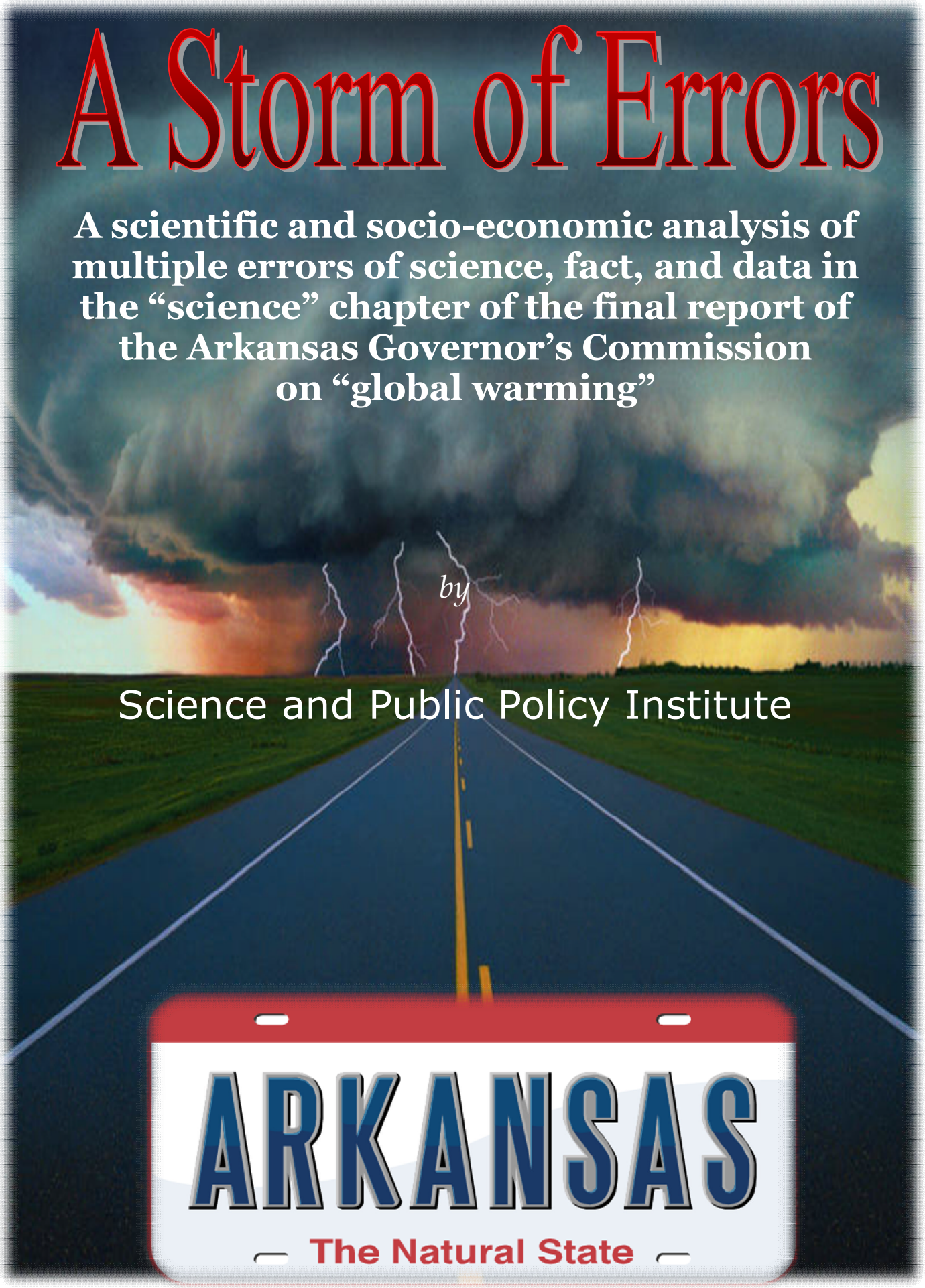
A Storm of Errors

A scientific and socio-economic analysis of multiple errors of science, fact, and data in the "science" chapter of the final report of the Arkansas Governor's Commission on "global warming"

by

Science and Public Policy Institute



"*We cannot give up science.* It is in the breath of our nostrils. Even if Joshua were to appear and forbid it we would not obey him. For we have a warranty which outweighs them all, that is to say Maimonides, who recommended it and impressed it upon us. We are ready to set our goods, our children and our lives at stake for it."

- *Rabbi "Penini" (Jedaiah ben Abraham Bedersi 1270 – 1340)*

"Nonscientists generally do not want to bother with understanding the science. Claims of consensus relieve policy types, environmental advocates and politicians of any need to do so. Such claims also serve to intimidate the public and even scientists...there is a clear attempt to establish truth not by scientific methods but by perpetual repetition."

- *Dr. Richard Lindzen, MIT, (6-26-06)*

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Governor Mike Beebe,
Room 250, Arkansas State Capitol,
Little Rock, Arkansas 72201.

23 January 2009

Dear Governor Beebe,

In October of 2008, the Arkansas Governor's Commission on Global Warming issued its final report to you and the Arkansas General Assembly. That report contained 54 recommendations for actions the state of Arkansas could take to mitigate the potential impacts that global warming might have at a projected cost of $3.7 billion spread over 17 years.

Although the legislation that created this commission directed it to study the science of global warming and consider the economic impact, unfortunately the commission did neither. In fact, in a 490 page report only four and one-half pages citing scarcely a dozen documents, none of which were peer-reviewed papers appearing in scientific journals, were presented as evidence of anthropogenic global warming. Rather than study the science a basic assumption was made by the consultant -- and commissioners were presumed to agree with the premise -- that activities of man contribute significantly to dangerous climate change.

The economic projections of the costs associated with the commission's recommendations fall far short of reality as well. For these reasons the Science and Public Policy Institute of Washington, D.C. has prepared a detailed scientific and socio-economic analysis of the "science" chapter of the report only and we present it to you as a public service. While some of the recommendations involving energy efficiency make perfect sense regardless of climate, too many recommendations contained in this report would result in Arkansans paying high costs for questionable or non-existent benefits.

We hope that you and the Arkansas General Assembly will benefit from our analysis throughout your deliberations during the 2009 legislative session and beyond.

Respectfully,

Robert Ferguson

President
Science and Public Policy Institute
Washington, DC.

Summary for Policymakers

The commission was suggested, appointed, and conducted at the instigation and under the control of an out-of-state body that prevented dissenting evidence from being fairly presented. The commission's report is a cookie-cutter copy of similar reports in many other states in which that out-of-state body has been profitably active.

Less than 1% of the commission's 490-page report is devoted to the science that is said to justify the expenditure of many billions on attempting to mitigate manmade "climate change". Yet the "science" chapter is full of errors and provides no basis for spending even one cent on climate mitigation.

Chapter 1: The false "consensus" argument

The commission bases its entire case on a logical fallacy – the *argumentum ad verecundiam,* or "argument from reputation": the false argument that, just because a scientific "consensus" (for which the commission provides no evidence) or a "consensus" of Government bodies and science institutions say a thing is so then it must be so. Yet science is not settled by "consensus", but by theoretical demonstration and empirical verification. The present report, unlike that of the commission, adopts a scientific approach rooted in the published, peer-reviewed literature and in the scientific data.

The commission fails to offer even a single scientific argument, or to cite even a single peer-reviewed scientific paper, in support of any part of its "science" chapter. Instead, the commission incorrectly says the peer-reviewed literature is unanimous in supporting the central claims of the UN's climate panel, the IPCC, misquoting a non-peer-reviewed essay by a historian. However, a subsequent peer-reviewed paper by a scientist found strong and growing dissent from the official position in the learned journals, and not one of 539 learned papers on "global climate change" published since January 2004 provided any evidence that "global warming" would prove catastrophic.

The documents of the UN's climate panel, the IPCC, are not peer-reviewed in the accepted sense. On numerous occasions, for political reasons, the IPCC's bureaucracy has rewritten conclusions made by the scientists in their final draft reports so as to say the opposite of what the scientists had concluded. In 1995, for instance, the scientists said in at least five places that there was no discernible human influence on climate. The IPCC's political wing removed all such conclusions and replaced them with a conclusion of its own to the effect that humans were having a definite influence on global temperatures, and that – regardless of the scientific evidence to the contrary – has been the official position ever since.

The commission states or implies that all major scientific bodies agree with the "consensus" that urgent action is required to prevent climate catastrophe. Several such bodies disagree. The Russian Academy of Sciences produced a major report dismissing the "global warming" theory as exaggerated, but changed its stance at the then President Putin's orders when Putin discovered that, provided that Russia signed the Kyoto Protocol, she could earn billions at the expense of the US via the Clean Development Mechanism. The International Astronomical Union is one of many bodies that have published conclusions contrary to the official "consensus": it holds that the Sun is chiefly responsible for the "global warming" that ended in 1998. The American Association of State Climatologists also disagrees with the "consensus", and has courageously held fast to its dissenting position even though many of its members have been dismissed by politicians who wished a different scientific conclusion to be reached. The Tyndall Centre for Climate Change Research in the UK has also been outspoken in its opposition to the extremist presentation that is reflected in the commission's report.

Chapter 2: Eight years' global cooling

For eight years, since the first day of the new millennium, both the Earth's atmosphere and the oceans have exhibited a cooling trend. This cooling has gone largely unreported in the news media, who have instead reported numerous recent climate events as having been caused by a "global warming" that was not occurring at the time and had not been occurring for some years.

The datasets that measure global temperature have tended to exaggerate global temperature increases, perhaps by as much as double, because insufficient allowance is made for increasing urbanization and consequent contamination of the temperature readings; because more than two-thirds of all temperature stations – mostly in rural areas – have been closed; and because there is evidence of direct manipulation of the raw data to turn real temperature decline into apparent but false temperature increase – manipulation on a scale sufficient to affect global temperature results.

Even if the warming rates over the past 30 years as reported by the global datasets are believed, since the beginning of 2001 there has been a clear, eight-year cooling trend in all of the major global-temperature datasets.

The average global warming rate over the 29 years since the first reliable satellite measurements of temperature in 1980, equivalent to 1.5 °C/century, is less than the warming rate observed in the 1930s, at a time when humankind cannot have had any influence on climate. Therefore there is no anthropogenic signal in the global temperature record, and very little reason to suppose that global temperatures in the 21st century will rise any faster than the 0.74 °C/century observed in the 20th century.

The warming rate of the 20th century is barely one-ninth of the warming rate observed in Central England in the first 35 years of the 18th century. Temperatures today are appreciably lower than they were in the medieval and Roman warm periods. Almost throughout the past 10,000 years, temperatures have been warmer than today.

Each of the last four interglacial periods was considerably warmer than the present. Most of the past half-billion years were 7 °C warmer than the present. Current temperatures are well within the natural variability of the climate.

Temperatures have been rising for 300 years, chiefly because the Sun was less active than for 10,000 years during the 70-year Maunder Minimum between 1645 and 1715, and because the Sun was more active than for 11,400 years during the 70-year solar Grand Maximum that ended in 1998, and scientists now attribute almost 70% of the warming over the past half-century to the increase in solar activity.

The Sun is now comparatively inactive again: the 266 days without sunspots observed in 2008 made it the second-least-active year since 1900. Global cooling, predicted in 1994 by the International Astronomical Union, may well continue until at least 2015 and, on one analysis, until 2035.

Chapter 3: Changes in CO2 concentration

The present report finds that the commission's conclusion that CO2 emitted by us remains in the atmosphere "for centuries" is false: the literature dating back to the 1950s establishes a mean residence time of 7 years, and half of the CO2 that we emit leaves the atmosphere after less than one year. There is evidence from the chemical methods of evaluating CO2 concentration that in 1934, the warmest year of the 20th century in the US, CO2 concentration was close to 800 parts per million by volume, more than double its present level.

The IPCC's central projection that CO2 concentration by 2100 will reach 835 ppmv is now known to be a prodigious exaggeration: for the past decade, CO2 concentration has been increasing in a straight line at little more than 200 ppmv/century, implying a concentration of just 570 ppmv by 2100. This consideration, on its own, dictates that the IPCC's central estimate that anthropogenic influence will increase global temperatures by 3.6 °C between now and 2100 must be halved to just 1.8 °C. It is generally agreed that a rise of less than 2 °C by the end of the century will be harmless. For this reason alone, the commission's proposal that Arkansas should spend billions on climate mitigation is misconceived, for it is unnecessary.

Both on the geological timescale of the distant paleoclimate and on the shorter timescale of the past century, there is no correlation between changes in CO2 concentration and changes in temperature. In mathematical logic, the absence of correlation necessarily implies absence of causation: the near-monotonic change in CO2 concentration that has occurred in the past 30 years cannot be the primary cause of the sharply-fluctuating global temperature over the same period.

Chapter 4: Climate sensitivity to changing CO2 concentration

The central question in the climate debate is this: by how much will the foreseeable increase in CO2 concentration over the coming century cause global temperatures to rise? This is called the "climate sensitivity" question. Yet, though this question is central, and a definitive answer to it would bring all debate to an end, the IPCC does not devote a full chapter to it either in its 2001 or its 2007 report.

The peer-reviewed literature now generally finds climate sensitivity to be considerably below the IPCC's estimate of 3.26 °C for a doubling of CO2 concentration. Values of <1 °C per doubling, well below one-third of the IPCC's central estimate and considerably below even its low-end estimate, are now frequently reported.

The official central estimates of climate sensitivity to a CO2 doubling have been repeatedly reduced. In 1984, the estimate was 4 °C; in 1990, 3.8 °C; in 2001, 3.5 °C; in 2007, 3.26 °C. However, Arrhenius (1906) found just 1.5 °C, echoed by scientists in the mid-1970s.

A crucial failure in the climate models is the absence in half a century's real-world observations of the predicted tripling of the surface warming rate in the tropical upper troposphere. Scientists have now determined that this absence of the tropical upper-troposphere "hot-spot" requires the current official estimate of climate sensitivity to be divided by at least three. It is also demonstrable that the IPCC has overestimated the net-positive sum of all climate-relevant temperature feedbacks by perhaps as much as double, and has overestimated the value of the climate sensitivity parameter in the absence of feedbacks by at least one-tenth. The effects of all of these well-established exaggerations and overestimates, combined with the overestimate of the rate of growth in CO2 concentration, imply that the true warming by the end of the current century cannot be more than half of the IPCC's central estimate and could well be little more than one-tenth of that central estimate – perhaps as little as one-quarter of a degree Celsius.

Chapter 5: We cannot predict "tipping-points"

The commission's report imagines that the increase over the past quarter of a millennium of just one part in ten thousand in the proportion of the atmosphere occupied by a harmless trace gas that is essential to all life on the planet has brought the Earth dangerously close to what it calls a "tipping-point".

The notion that so small a perturbation in the climate could trigger such a "tipping-point" is not possible, because the climate is chaotic and any perturbation, as well as the absence of a perturbation, can trigger what mathematicians call a "bifurcation" or a "phase transition". However, as long ago as 1963 it was scientifically established that unless we know the initial state of the climate to a precision that is in practice forever unattainable it is impossible to determine whether or when any phase transition will occur. It is also impossible to determine whether we should be wiser to leave the climate in its present state or encourage warming to continue: either outcome may, or may not, cause a "tipping-point". It is settled science, and has long been so, that we cannot predict the outcome either way.

Accordingly, there is no scientific basis whatsoever for the commission's contention that we are approaching a "tipping-point" that is in some way likely to be triggered by the minuscule change in CO2 concentration that we are causing. Prediction of the causes, incidence, duration, magnitude, or even sign of any phase transition is, in the words of the celebrated paper that founded chaos theory with a study of an idealized climate object, "impossible by any method".

Since all of the potential climate catastrophes imagined by the commission depend upon rising temperature, the present report studies the prediction of temperature increase that initiated the current climate panic, and demonstrate that the prediction was prodigiously exaggerated. The prediction was made before Congress 20 years ago, on a date carefully chosen by Al Gore because it was a very hot day. Yet the month of June 2008, exactly 20 years after the prediction of a galloping rise in temperature panicked Congress, was actually cooler than the month in which the prediction was made.

There is currently no scientific basis for any alarm that our industrial activities are about to cause any such "tipping-point" as a sudden increase in temperature. That assumption, and accordingly every conclusion drawn from it, is questionable. In particular, there is no basis for the conclusion that the taxpayers of the State of Arkansas should be mulcted to the tune of billions of dollars in the hope of preventing an imagined and almost certainly imaginary adverse climate event that cannot be predicted "by any method".

Chapter 6: The imagined consequences of "global warming"

The commission's "science" chapter lists various climate catastrophes imagined by the out-of-state body that heavily influenced the creation of the commission, the selection of the commissioners, the evidence they were and were not allowed to see, the conclusions they were and were not encouraged to draw, and the drafting of their final report, including the "science" chapter itself.

Sea level, which the commission says may rise by up to 8 meters (27 feet) in the coming century, is currently rising at just 1 ft/century, or one-quarter of the mean centennial rate of sea-level rise in the past 10,000 years. Even the excitable IPCC, in its 2007 report, chooses a central estimate of 1 ft 5 in/century, and has cut its high-end estimate by more than one-third, from 3 ft/century to less than 2 ft/century. The world's ranking expert on sea level says it is unlikely to rise by much more than the 8 inches thought to have been observed in the 20th century, during which measurements were unreliable because they depended chiefly on tide-gages, making adjustment for tectonic subduction, isostatic rebound, sedimentation, and other alterations in the altitude of the sea-bed near-impossible. Bearing in mind this limitation, there appears to have been no significant change in the rate of sea-level rise for at least 150 years.

Water vapor, the most important of the greenhouse gases, is likely to increase its concentration in the atmosphere if and when "global warming" resumes. Since it is the most important of the greenhouse gases, the temperature feedback that results from any significant increase in its atmospheric concentration is strongly net-positive. However, the commission has failed to mention any of the powerful compensating mechanisms that maintain climate homeostasis, including the increase in the tropical cloud albedo that accompanies any increase in water vapor concentration and largely compensates for the water vapor feedback.

Arctic sea ice extent has shown a very small decline over the 30 years of the satellite record: however, the Arctic was warmer in the 1930s and early 1940s than it is today. In the summer of 2007 there was a substantial loss of Arctic sea ice, but scientists have determined that this was caused not by "global warming" but by exceptional southerly currents and winds carrying warmth poleward from the tropics. The loss of ice was largely reversed this summer, and the winter ice extent shows very little change in 30 years.

Antarctic sea ice extent has recently been at a record high level. Antarctica as a whole has cooled over the past half-century. The cooling has been so severe that environmental damage has been done in some Antarctic glens.

Global sea ice extent shows no trend in the entire 30-year period of the satellite record. Reports of declining sea ice are, accordingly, inconsistent with the data.

Mountain glaciers have been receding since 1880, long before humankind can have had any appreciable influence over climate. Half of the "snows of Kilimanjaro" had already disappeared by 1936, when Hemingway wrote the book of that title. The summit glacier is not melting (summit temperatures have never risen above freezing in 30 years of continuous satellite monitoring, and are usually at –7 °C), but is ablating into the dry atmosphere caused by 30 years of regional cooling.

Most of the world's 160,000+ glaciers are in Antarctica and Greenland, where there has been very little recession of the ice.

Greenland's ice sheet has thickened by almost two feet in the past decade, more than compensating for a loss of 0.03% in the land area covered by ice. One of the DEW-line radar stations had to be jacked up by 27 feet in 20 years to keep it above the rapid accumulation of snow and ice on the surface of the ice-sheet.

Northern-hemisphere winter snow cover, on which many populations depend for their water supply, has shown no trend in 30 years: but, in the past two years, record winter snow cover has been recorded.

Droughts and floods show no adverse trends over the past century. There is less drought in the US today than there was in the 1930s, when John Steinbeck set *The Grapes of Wrath* in the drought of the Great Plains.

The Sahara Desert has shrunk by 300,000 square kilometers as vegetation has spread, allowing nomadic tribes to settle in regions where no one has lived for hundreds of years.

Tropical diseases are not spread by warmer weather but rather by inadequate public-health measures. No increase in the incidence or prevalence of any tropical disease can be realistically expected as a result of "global warming" – if and when "global warming" resumes.

Relocation of species in response to climate change has occurred throughout history. So small have the changes in temperature been over the past 30 years that very little adaptation has been required. Typically, all that is necessary, in regions that have warmed, is for species to move a few miles poleward to find the temperature that they regard as ideal. 90% of the world's species live in the tropics; fewer than 1% at the Poles. Warmer weather will not eradicate species: it will facilitate the evolution of more new species.

Climatic changes such as those mentioned by the commission, insofar as they are occurring at all, are well within natural variability, or have run in a direction opposite from that suggested by the commission.

Chapter 7: Arkansas and "global warming"

The commission imagines a series of climate disasters that might affect Arkansas. None of the imagined disasters has even begun to occur, and none is at all likely to occur.

Hurricanes do not reach Arkansas, except as welcome rainstorms during the dry summer season. In any event, there has been no trend in landfalling Atlantic hurricanes for a century.

Floodplains, which the commission says will probably increase their extent, will remain unaffected, because there is no reason to expect any more flooding than already occurs naturally.

Ground-level ozone pollution would occur if and when warmer weather resumed, but tropospheric ozone is not regarded as a particularly serious problem, and it is currently declining in response to the cooler weather of the past few years.

Tropical and insect-borne diseases, the commission says, will move northward. They will do no such thing. Insect vectors of diseases that are called "tropical" do not primarily choose their habitat by reference to its temperature. Not one of the 16 diseases mentioned by Al Gore in his much celebrated movie will be affected in any way by "global warming". In particular, the malaria mosquito can survive in temperatures up to –25 °C, and the largest outbreak in recent history was in Siberia, not noted for its tropical climate, with 30,000 deaths in Arkhangelsk on the Arctic Circle.

Heat-related mortality will not increase significantly, even if "global warming" resumes. A detailed study of heat-related deaths shows that they have been declining sharply in all parts of the US as air-conditioning and targeted public-health responses take effect. It is cold that is the real killer: warmer weather – if it occurs again – will lead to fewer, not more, weather-related deaths.

Winter sports are not big in Arkansas, but, given the record snowfalls throughout much of the US in recent years, the commission's concern that winter sports will be adversely affected by "global warming" is ill founded, particularly because in the past decade there has not been any "global warming".

Snowpack will decrease, the commission says: but the northern-hemisphere record is clear: there has been no decline in snow cover in the northern hemisphere for 30 years.

Water supplies will not be adversely affected, even in warmer weather. Water stress, mentioned by the commission as a problem, is not caused primarily by climatic change but rather by growth in the populations that require water supplies.

Droughts and floods in Arkansas are no more and no less likely to occur than previously. There has been no trend in either for 100 years.

Crop yields, which the commission says will suffer, have in fact grown throughout the warming of the past half-century, in response to improved seed-stocks and better agricultural practices. There is no reason to suppose that crop yields will not continue their rising trend, notwithstanding any warmer weather that may occur.

Sea level rise will be little more than 1 ft/century. Arkansas has no coastline. It will certainly not give rise to a national security threat, as fancifully imagined by the commission.

Cold-water fisheries, which the commission says will "decline", will hardly do so for as long as the current eight-year cooling trend continues. If warming of the oceans replaces the cooling that has been observed in recent years, cold-water species will simply move a few miles northward, as they have always done.

Coral reefs will not be affected by "global warming" at all. A major review of the literature, now available at www.scienceandpublicpolicy.org, provides definitive evidence drawn from the scientific literature. Corals first evolved 175 million years ago, when CO2 concentration was 10 times today's, and have survived without difficulty since. There are no coral reefs in Arkansas, which has no coastline.

The distribution of vegetation, says the commission, will change in response to "global warming". This and many other "disasters" on the commission's list would not, even if they occurred, justify the expenditure of billions to try to stop the change occurring. Most species on Earth are well accustomed to adapt themselves to shifting climatic conditions.

Temperature trends in Arkansas have shown no change for 100 years. Arkansas is no warmer now than before. Arkansas is not, at present, a victim of "global warming".

Precipitation trends, notwithstanding the commission's suggestion of future change, have remained firmly at zero throughout the past century. There is neither more nor less rainfall than there has been.

None of the major climate indicators in Arkansas shows a trend over the past century that would justify any action whatsoever, still less the expenditure of billions. Adaptation is vastly cheaper than mitigation: it would, therefore, be responsible to wait until it becomes clear that there is a problem before attempting to solve it. Otherwise, money that could have been spent on dealing with real environmental problems and social needs – such as education – will merely be wasted.

Chapter 8: Economic considerations

The Kyoto Protocol, which the US Senate unanimously voted not to ratify, would – if all of its signatories complied with their obligations (and few will do so) – reduce global temperatures by 0.07 °C by 2050, and by 0.15 °C by 2100. Such change is negligible, and well within natural variability, and the hundreds of billions that have been spent on Kyoto have accordingly been wasted.

A fortiori, the same goes for the Arkansas climate plan. If Arkansas were to fling itself back into the Stone Age and without even the ability to light a fire – and that seems to be the commission's intention – then the effect of closing down every business, hospital, school, road, airport, and industry of every kind would be to reduce global temperature by two *thousandths* of a degree Celsius by 2100. It might also reduce global sea level by one *hundredth* of an inch by 2100.

In short, the commission's planned expenditure is extravagantly pointless.

Federal legislation to limit greenhouse gases would also have an adverse economic impact on Arkansas, reducing the average annual household income by $5000 and increasing the cost of gasoline to more than $5 a gallon.

Chapter 9: The "precautionary principle" kills

The commission, like so many others who demand action on the climate but have no scientific basis for their demands, falls back on a device known, misleadingly, as the "precautionary principle". This "principle" is not a principle at all. It is a method of avoiding the need for rigorous scientific justification before acting.

If the "precautionary principle" really were a principle, then the commission's proposals for spending billions of dollars without the slightest climatic benefit would also be subjected to analysis in accordance with the "precautionary principle", and everyone would rapidly conclude that the loss of jobs, industries, goods, services, and economic well-being that would follow from the commission's proposals must be avoided at all costs, because the risk that any such economic damage might be done cannot be countenanced.

However, the "precautionary principle" is asymmetric: only one side of the argument is allowed to use it. When the proponents of a ban on DDT prayed the "precautionary principle" in aid, they failed to consider the consequences for the victims of malaria. No one spoke up for them. Result, 40 million deaths, mostly of children, an avoidable holocaust. Now, after a third of a century, the World Health Organization has ended the ban on DDT and now once again recommends it as the first line of defence against the malaria mosquito.

If there is one fact that Arkansas legislators should bear in mind when considering the commission's report, it is this. The very same environmental organization that promoted the ban on DDT, and now has the blood of 40 million children on its hands is now just as enthusiastically promoting the "global warming" scare. As a direct result, millions are already dying of starvation because nobody applied the "precautionary principle" to the victims of the biofuel program that took one-third of America's agricultural land out of production within just two years, doubling the world price of food and putting even the most basic foodstuffs beyond the reach of the poor.

With the DDT ban that originated in the United States, we cruelly mistreated the world's poor, and tens of millions of them needlessly died. The moral imperative, therefore, is not to be careless when taking precautions, for the precautions can – and, with the global warming scare will – do far more harm than good.

Arkansas legislators should dismiss the commission and its report.

CHAPTER 1

THE FALSE "CONSENSUS" ARGUMENT

- In the present analysis, the Science and Public Policy Institute examines in turn and in detail each of the numerous errors and omissions of science, of fact, and of data in chapter 8, *Review of Current Scientific Literature on Causes and Impacts of "Global Warming",* of the final report of the Arkansas Governor's commission on "global warming", published in October 2008. Quotations from the commission's report are given in red.

- The Appendix gives details of an apparent conflict of interest on the part of the out-of-state body that heavily influenced the establishment, appointment, and conduct of the commission, preventing dissenting views from being fairly heard or taken into account by the commission, and demonstrates that the commission's report is a cookie-cutter copy of other such reports in many other states in which the out-of-state body in question has been profitably active.

- The greater part of this analysis applies to most US states.

Supreme Court judges are not scientists

The commission's "science" chapter is not, as it purports to be, a review of the scientific literature on climate change. Instead, it is a recitation of a list of documents from various official sources some of which are, on any view, not to be regarded as authoritative on climatological questions. In essence, the "science" chapter is little more than an extended *argumentum ad verecundiam,* an instance of the informal fallacy of logic known as the "argument from reputation". It is said that the science that is said to support the need for urgent and very costly action is said to be true because those who are said to say it is true are said to have a reputation.

The commission argues that there is a unanimous scientific "consensus", not only among leading scientific bodies but also in the peer-reviewed literature, in support of the catastrophist notion of climate change that is embodied in the principal conclusions of the "science" chapter. This *argumentum ad verecundiam* will be examined in some detail in the present chapter, because it is as central to the commission's case as it is fallacious in logic and false in fact.

The commission's "science" chapter opens with a quotation not from any scientific institution or learned paper but, strangely, from the US Supreme Court –

> "'A well-documented rise in global temperatures has coincided with a significant increase in the concentration of carbon dioxide in the atmosphere. Respected scientists believe the two trends are related. For when carbon dioxide is released into the atmosphere, it acts like the ceiling of a greenhouse, trapping solar energy and retarding the escape

> of reflected heat. It is therefore a species—the most important species—of a "greenhouse gas".' *Mass. v. EPA, 127 S.Ct. 1438 (2007).*"

The Bench that handed down the cited judgement contained not one climatologist, physicist, or mathematician. If even one of the judges had been a suitably-qualified scientist, the Court would have known that the rise in global temperatures mentioned in the Court's unsatisfactory *ratio decidendi* began 300 years ago, continued until 1998, and then ceased. During all but the last 30 years of this 300-year period, humankind could not possibly have caused the rise in temperatures.

A scientifically-literate judge would have been able to explain to his brother justices that the greatest recorded increase in temperatures occurred not at the end of the 300-year period, when we could theoretically have had some modest influence, but at the beginning, when we could not have had any influence at all. From 1700-1735, the Central England Temperature Record showed an increase of 2.2 °C, a rate equivalent to 6.3 °C/century, which (albeit that it was regional rather than global, and measured by early instruments) was eight or nine times more rapid than the 0.74 °C/century rate of increase observed during the 20th century.

The Supreme Court then talks of a "significant" increase in the concentration of carbon dioxide. As we shall see in the chapter on carbon dioxide, the increase in atmospheric carbon dioxide concentration has proven to be a great deal less significant than official sources had predicted. The consequences for future temperature change are obvious – there will be a great deal less than predicted.

The Supreme Court also says that "respected scientists" believe that the trend of increasing global temperature (which began two and a half centuries before the trend in carbon dioxide concentration began to increase) is "related" to the increase in carbon dioxide concentration. As we shall see, the two trends are not in fact related in any statistically significant sense.

The Supreme Court goes on to say that carbon dioxide is "the most important" greenhouse gas. As we shall see in the chapter on carbon dioxide, this, too, is false.

Finally, global temperatures have only been "well documented" (to use the Supreme Court's optimistic term) since 1980, when satellite monitoring of the lower troposphere by an ingenious adaptation of microwave sounding units on satellites had been developed and calibrated, lending support to the terrestrial datasets that had, until that time, been more than somewhat unreliable. Over large areas of the planet – such as Russia and China during their revolutionary periods, or most of post-colonial Africa, or almost all of the oceans – systematic, accurate temperature records were not kept at all necessary locations, were not kept regularly, and were not kept accurately. Furthermore, as we shall see in the chapter on global temperature change, even the recent temperature record is more error-prone and less reliable than it should be.

Science is not settled by consensus

Science is not a democracy (though the UN's seldom-scientific climate panel, the IPCC, is prone to take scientific decisions by show of hands: for instance, that is how

the magnitude of certain radiative forcings was decided upon). No scientific question can ever be settled by consensus. Nor, indeed, does the "science" chapter offer any evidence – for there is none – that the international scientific community has a settled view about the future evolution of the climate.

There are two, and only two, rational methods for determining a scientific question. The rarer, but more rigorous, is theoretical demonstration by formal, mathematical proof. The commoner, but less definitive, is the scientific method – repeated, sceptical scrutiny of scientific hypotheses, which are empirically tested again and again, and either gain credibility with each successful test, or fail if a single test definitively disproves them. Unless a theoretical demonstration becomes available, in which case the hypothesis becomes a theorem, no hypothesis can be proved. It can only be *dis*proved, in which case it fails, or *im*proved by repeated testing that does not disprove it. Yet the "science" chapter of your commission's report bases its entire case upon the notion, for which it offers no evidence, that there is what it calls "a broad scientific consensus" –

> "Consistent with the findings of the Supreme Court, there is a broad scientific consensus that, over the last two centuries, there is a 90%–95% probability that human activities have increased amounts of important greenhouse gases (GHGs, primarily carbon dioxide, methane, nitrous oxide, and fluorocarbons) in the atmosphere to levels not seen in all of prior human experience, and likely not seen for 3 million years."

The commission then says that the "broad scientific consensus" is reflected in documents of the UN's intergovernmental panel on climate change; of the US National Research Council; and of the Environmental Protection Agency (the last document cited being a mere proposal for new regulations). The commission's bare recitation of the names of these bodies, without any critical examination of the arguments they advance or of the conclusions they draw, is a further, classic instance of the *argumentum ad verecundiam*.

We conclude that relying upon the Supreme Court or other public bodies for science is an instance of the *argumentum ad verecundiam,* or "argument from reputation", a logical fallacy that provides no sound basis for policymaking.

There is no "broad scientific consensus"

The "science" chapter briefly discusses the degree to which the scientific community concurs with the opinions expressed by the UN's climate panel and the US National Academy of Sciences, making the remarkable claim that the peer-reviewed literature "has unanimously endorsed the views in the IPCC and NAS/NRC reports" –

> "Several individuals have pointed to publications and speeches by 'climate sceptics' that appear to present contrary views. However, these publications have not been peer reviewed. Peer-reviewed scientific literature has unanimously endorsed the views in the IPCC and NAC/NRC reports described above (Naomi Oreskes, *Beyond the Ivory*

> *Tower: The Scientific Consensus on Climate Change*, Science, December 3, 2004; 306 (5702): 1686."

This statement is false in almost every particular. The cited essay by Naomi Oreskes was not itself peer-reviewed; it did not address the question whether the peer-reviewed literature "unanimously endorsed the views in the IPCC and NAS/NRC reports"; it concerned itself solely with the single finding of the IPCC that most of the warming of the past half-century is likely to have been anthropogenic; it examined only a small subset of papers up to the end of 2003 that happened to contain the arbitrarily-chosen search phrase "global climate change"; and very nearly all of the papers examined did not in fact address the single finding in question.

The origin of the claim of "consensus"

David Miliband, the Environment Minister of the United Kingdom, was greeted by cries of "Rubbish!" when he told a conference on climate change at the Holy See in the spring of 2007 that the science of climate and carbon dioxide was simple and settled.

Yet Miliband was merely reciting a mantra that has been widely circulated by politicians and the media. The claim of "consensus" rests almost entirely on an inaccurate and now-outdated single-page comment in the journal *Science* entitled *The Scientific Consensus on Climate Change* (Oreskes, 2004). In this less than impressive "head-count" essay, Naomi Oreskes, a historian of science with no qualifications in climatology, defined the "consensus" in a very limited sense, quoting as follows from IPCC (2001) –

> "Human activities ... are modifying the concentration of atmospheric constituents ... that absorb or scatter radiant energy. ... most of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations."

The limited definition of "consensus"

Oreskes' definition of "consensus" falls into two parts. First, she states that humankind is altering the composition of the atmosphere. This statement is uncontroversial: for measurement has established that the concentration of carbon dioxide in the atmosphere has risen over the past 250 years to such an extent that CO2 now constitutes almost 0.01 per cent more of the atmosphere than in the pre-industrial era.

However, on the question whether that alteration has any detrimental climatic significance, there is no consensus, and Oreskes does not state that there is.

The second part of Oreskes' definition of the "consensus" is likewise limited in its scope. Since global temperatures have risen by about 0.4C in the past 50 years, humankind – according to Oreskes' definition of "consensus" – may have accounted for more than 0.2 °C.

Applying that rate of increase over the present century, and raising it by half to allow for the impact of fast-polluting developing countries such as China, temperature may rise by 0.6 °C in the present century, much as it did in the past century, always provided that the unprecedented (and now-declining) solar activity of the past 70 years ceases to decline and instead resumes at its recent record level.

There is indeed a consensus that humankind is putting large quantities of greenhouse gases into the atmosphere; that some warming has resulted; and that some further warming can be expected. However, there is less of a consensus about whether most of the past half-century's warming is anthropogenic, which is why, rightly, Oreskes is cautious enough to circumscribe her definition of the "consensus" about the anthropogenic contribution to warming over the past half-century with the qualifying adjective "likely".

There is no scientific consensus on how much the world has warmed or will warm; how much of the warming is natural; how much impact greenhouse gases have had or will have on temperature; how sea level, storms, droughts, floods, flora, and fauna will respond to warmer temperature; what mitigative steps – if any – we should take; whether (if at all) such steps would have sufficient (or any) climatic effect; or even whether we should take any steps at all.

Campaigners for climate alarm state or imply that there is a scientific consensus on all of these things, when in fact there is none. They imply that Oreskes' essay proves the consensus on all of these things. Al Gore, for instance, devoted a long segment of his film *An Inconvenient Truth* to predicting the imminent meltdown of the Greenland and West Antarctic ice-sheets, with a consequent global increase of 20 feet (6 m) in sea level that would flood Manhattan, Shanghai, Bangladesh, and other coastal settlements. He quoted Oreskes' essay as proving that all credible climate scientists were agreed on the supposed threat from climate change. He did not point out, however, that Oreskes' definition of the "consensus" on climate change did not encompass, still less justify, these notions.

Let us take just one example. The IPCC's latest report on climate change, which is claimed as representing and summarizing the state of the scientific "consensus" insofar as there is one, says that the total contribution of ice-melt from Greenland and Antarctica to the rise in sea level over the whole of the coming century will not be the 20 feet luridly illustrated by Al Gore in his movie, but just 2 inches.

Gore's film does not represent the "consensus" at all. Indeed, he exaggerates the supposed effects of ice-melt by some 12,000 per cent. The UN, on the other hand, estimates the probability that humankind has had *any* influence on sea level at little better than 50:50.

What Oreskes said

Oreskes (2004) said she had analyzed –

> "928 abstracts, published in refereed scientific journals between 1993 and 2003, and listed in the ISI database with the keywords 'climate change'."

She concluded that 75% of the papers either explicitly or implicitly accepted the "consensus" view; 25% took no position, being concerned with paleoclimate rather than today's climate; and –

> "Remarkably, none of the papers disagreed with the consensus position. ... This analysis shows that scientists publishing in the peer-reviewed literature agree with IPCC, the National Academy of Sciences, and the public statements of their professional societies. Politicians, economists, journalists, and others may have the impression of confusion, disagreement, or discord among climate scientists, but that impression is incorrect. ... Our grandchildren will surely blame us if they find that we understood the reality of anthropogenic climate change and failed to do anything about it. ... There is a consensus on the reality of anthropogenic climate change."

It is not clear whether Oreskes' analysis was peer-reviewed, since it was presented as an essay and not as a scientific paper. However, there were numerous serious errors, effectively negating her conclusion. In fact, the essay was not reviewed at all.

What Oreskes got wrong

Dr. Benny Peiser, of Liverpool John Moores University in the UK, conducted a search of the peer-reviewed literature on the ISI Web of Science database between 1993 and 2003. He found not 928 but more than 12,000 papers mentioning the phrase "climate change". When he pointed this out, the editors of *Science* were compelled to publish an erratum to the effect that the search term which Oreskes had used was not, as stated in her essay, "climate change" but rather "global climate change". Accordingly, Oreskes' essay had covered not the entire corpus of scientific papers on climate change over the stated decade but fewer than one paper in 13.

Dr. Peiser used "global climate change" as a search term and found 1,117 documents using this term, of which 929 were articles and only 905 also had abstracts. Therefore it is not clear which were the 928 "abstracts" mentioned by Oreskes, and *Science* did not, as it would have done with a peer-reviewed scientific paper, list the references to each of the "abstracts".

Significantly, Oreskes' essay does not state how many of the 928 papers explicitly endorsed her very limited definition of "consensus". Dr. Peiser found that only 13 of the 1,117 documents – a mere 1% – explicitly endorse the consensus, even in her limited definition.

Dr. Peiser's research demonstrated that several of the abstracts confounded Oreskes' assertion of unanimity by explicitly rejecting or casting doubt upon the notion that human activities are the main drivers of the observed warming over the last 50 years.

Thus, in Oreskes' sample, more than twice as many appeared to have explicitly rejected or doubted the "consensus" as had explicitly endorsed it.

According to Dr. Peiser, fewer than one-third of the papers analyzed by Oreskes either explicitly or implicitly endorsed the "consensus", contrary to Oreskes' assertion that the figure was 75%. In addition, 44 abstracts focused on the natural as opposed to anthropogenic causes of climate change, and did not include any direct or indirect link or reference to human actitivies, carbon dioxide or other greenhouse gas emissions, let alone anthropogenic forcing of recent climate change. More than half of the abstracts did not mention anthropogenic climate change at all and could not, therefore, reasonably be held to have commented either way upon the "consensus" as defined by Oreskes.

Dr. Peiser wrote to *Science* to point out these and other anomalies in Oreskes' essay. The editors of *Science* at first asked him to shorten his letter: then, after he had sent in his shortened version, they changed their minds and refused to publish it –

> "After realizing that the basic points of your letter have already been widely dispersed over the internet, we have reluctantly decided that we cannot publish your letter. We appreciate your taking the time to revise it."

In fact, Dr. Peiser had been careful to ensure that none of his material had appeared in any public forum, whether on the Internet or otherwise. In any event, it is reprehensible that a learned journal should publish defective material and should then, in effect, expect its readers to surf the Internet to find the truth.

The editors of *Science* also refused to publish any of the numerous other letters that they had received pointing out the deficiencies in Oreskes' analysis.

At the time, the editors of *Science* had received (and rejected) a research paper giving the results of a survey of some 500 international climate researchers conducted by Professors Dennis Bray and Hans von Storch of the German Institute for Coastal Research. The survey had found that –

> "a quarter of respondents still question whether human activity is responsible for the most recent climate changes."

Dr. Peiser has commented:

> "The decision to publish Oreskes' claim of general agreement (just days before an important UN conference on global warming, the Tenth Conference of the Parties to the UN Convention on Climate Change), was apparently made while the editors of Science were sitting on a paper that showed quite clearly the opposite.
>
> "It would appear that the editors of *Science* knowingly misled the public and the world's media.
>
> "In my view, such unethical behaviour constitutes a grave contravention, if not a corruption of scientific procedure. This form of unacceptable misconduct is much worse than the editors' refusal to publish the numerous letters and rebuttals regarding Oreskes' flawed study."

What of the countless research papers that show global temperatures were similar or even higher than today's during the Holocene Climate Optimum and the Medieval Warm Period, when atmospheric CO2 levels were much lower than at present?

What of the papers showing that solar variability is a key driver of recent climate change, and that in the past 70 years the Sun has been more active, for longer, than at almost any comparable period in the past 11,400 years?

What of the papers echoing Lorenz (1963), who, in the paper that founded chaos theory, stated and demonstrated his famous theorem that the climate is a mathematically-chaotic object that is by its nature unpredictable unless one fully understands not only all the relevant evolutionary processes but also the initial state of the global climate to a precision that is in practice altogether unattainable?

There are hundreds of learned papers, many of them written by the world's leading experts in climatology and related fields, that have raised serious reservations about the notion of a "consensus" as to the alarmist presentation of climate change. Many of these papers explicitly reject the "consensus", even in the limited sense used by Oreskes.

There is no such thing as a "scientific consensus", except in a very limited sense. This may be readily demonstrated by quotations from papers casting doubt on the "consensus".

Some examples of papers which fell within Oreskes' search criteron and within her chosen timeframe but which she regarded as supportive of her imagined "unanimous" consensus:

Ammann *et al.* (2003) detected evidence for close ties between solar variations and surface climate.

Reid (1997) found that "the importance of solar variability as a factor in climate change over the last few decades may have been underestimated in recent studies".

Kondratyev and Varotsos (1996) criticize "the undoubtedly overemphasized contribution of the greenhouse effect to the global climate change".

Two abstracts reviewed by Oreskes directly and bluntly rejected the "consensus" as she had defined it, but she counted them as "consensual" nevertheless:

Gerhard and Hanson (2000):

> "The American Association of Petroleum Geologists' Ad Hoc Committee on Global Climate Issues has studied the supposition of human-induced climate change since the committee's inception in January 1998. This paper details the progress and findings of the committee through June 1999, At that time there had been essentially no geologic input into the global climate change debate. The following statements reflect the current state of climate knowledge from the geologic perspective as interpreted by the majority of the committee

> membership. The committee recognizes that new data could change its conclusions. The earth's climate is constantly changing owing to natural variability in earth processes. Natural climate variability over recent geological time is greater than reasonable estimates of potential human-induced greenhouse gas changes. Because no tool is available to test the supposition of human-induced climate change and the range of natural variability is so great, there is no discernible human influence on global climate at this time."

Fernau *et al.* (1993):

> "This article examines the status of the scientific uncertainties in predicting and verifying global climate change that hinder aggressive policy making. More and better measurements and statistical techniques are needed to detect and confirm the existence of greenhouse-gas-induced climate change, which currently cannot be distinguished from natural climate variability in the historical record. Uncertainties about the amount and rate of change of greenhouse gas emissions also make prediction of the magnitude and timing of climate change difficult. Because of inadequacies in the knowledge and depiction of physical processes and limited computer technology, predictions from existing computer models vary widely, particularly on a regional basis, and are not accurate enough yet for use in policy decisions. The extent of all these uncertainties is such that moving beyond no-regrets measures such as conservation will take political courage and may be delayed until scientific uncertainties are reduced."

Though Oreskes has challenged Dr. Peiser's analysis by pointing out that the paper by Gerhard and Hansen was not peer-reviewed, her essay was not peer-reviewed either. It may even be the case that the authors of most or even all of the cited abstracts personally believe that humankind is responsible for more than half of the 0.4 °C observed warming of the past half century. Dr. Peiser accepts, as does the author of the present paper, that most climate scientists published in the journals probably believe that humankind has contributed more than 0.2C of the 0.4C observed warming over the past half century. But the published papers we have quoted, nevertheless, raise sufficient doubts about important aspects of the imagined "consensus" to demonstrate the falsity of Oreskes' claim that not one of the abstracts was counter-consensual.

Nor is the explicit and implicit rejection of the "consensus" confined to individual research papers such as those mentioned above. Distinguished scientific organizations such as the Russian Academy of Science, the International Astronomical Union, and the U.S. Association of State Climatologists have also stated that they are skeptical of the imagined "consensus".

Dr. Peiser concludes:

> "The stifling of dissent and the curtailing of scientific skepticism is bringing climate research into disrepute. Science is supposed to work by critical evaluation, open-mindedness and self-correction. There is a fear among climate alarmists that the very existence of scientific

> scepticism and doubts about their gloomy predictions will be used by politicians to delay action. But if political considerations dictate what gets published, it's all over for science."

At least 138 Arkansas scientists have petitioned the US government that the UN's anthropogenic "global warming" hypothesis is "without scientific validity and that government action on the basis of this hypothesis would unnecessarily and counterproductively damage both human prosperity and the natural environment of the Earth." They are joined by over **31,072** Americans with university degrees in science – including **9,021** PhDs. The petition and entire list of US signers can be found here: http://www.petitionproject.org/index.html.

We conclude –

- that Oreskes' essay provides no sound basis for the assertion that a unanimous scientific "consensus" exists on climate change, for, though most climate scientists probably believe that humankind has caused 0.2C of the past half-century's 0.4C warming, there is no unanimity;
- that even in the limited sense defined by Oreskes, there were more scientific papers explicitly doubting or even rejecting the "consensus" than explicitly supporting it;
- that less than half of the papers which Oreskes said had implicitly endorsed the "consensus" had in fact done so;
- that more than half of the papers which Oreskes considered had not mentioned anthropogenic climate change at all;
- that the definition of "consensus" in Oreskes' essay is so limited, and her findings as published so greatly at variance with the content of the papers she reviewed, that the essay provides no justification for her frankly-political contention that –

  > "our grandchildren will surely blame us they find that we understood the reality of anthropogenic climate change and failed to do anything about it"; and

- that *Science,* having been given evidence of Oreskes' errors before publication, in the form of a direct survey of more than 500 climate scientists, and after it, in the form of several letters pointing out the material errors some of which we have reported here, refused to allow the survey, the letters, or any other correction to appear in print, save only the correction of the database search term which Oreskes had used.

Bringing the analysis of "consensus" up to date

Oreskes' essay is now outdated. Since it was published, more than 8,000 further papers on climate change have been published in the learned journals. In these papers, there is a discernible and accelerating trend away from unanimity even on her limited definition of "consensus".

Schulte (2008) has brought Oreskes' essay up to date by examining the 539 abstracts found using her search phrase "global climate change" between 2004 (her search had ended in 2003) and mid-February 2007. Even if Oreskes' commentary in *Science*

were true, the "consensus" has moved very considerably away from the unanimity she says she found.

Schulte's results show that about 1.5% of the papers (just 9 out of 539) explicitly endorse the "consensus", even in the limited sense defined by Oreskes. Though Oreskes found that 75% of the papers she reviewed explicitly or implicitly endorsed the "consensus", Dr. Schulte's review of subsequent papers shows that fewer than half now give some degree of endorsement to the "consensus". The abstract of his paper is worth quoting in full:

> "Fear of anthropogenic 'global warming' can adversely affect patients' well-being. Accordingly, the state of the scientific consensus about climate change was studied by a review of the 539 papers on "global climate change" found on the Web of Science database from January 2004 to mid-February 2007, updating research by Oreskes (2004), who had reported that between 1993 and 2003 none of 928 scientific papers on "global climate change" had rejected the consensus that more than half of the warming of the past 50 years was likely to have been anthropogenic. In the present review, 32 papers (6% of the sample) explicitly or implicitly reject the consensus. Though Oreskes said that 75% of the papers in her sample endorsed the consensus, fewer than half now endorse it. Only 7% do so explicitly. Only one paper refers to "catastrophic" climate change, but without offering evidence. There appears to be little evidence in the learned journals to justify the climate-change alarm that now harms patients."

Schulte's table of results (Table A) is also worthy of reproduction –

Table A

The "consensus" is far from unanimous

Abstracts on ISI *Web of Science*	Oreskes	Schulte	
Period under review	1993-2004	2004-2007	
Quantity of documents reviewed	928 documents	539 papers	
Mean annual publication rate	83.4/year	254.6/year	+201%
Explicit endorsement of "consensus"	Not stated	7%	38 papers
Explicit or implicit endorsement	75%	45%	244 papers
Explicit rejection of "consensus"	0%	1.3%	7 papers
Explicit or implicit rejection	0%	6%	32 papers
New data or observations	Not stated	24%	127 papers
New research on "consensus" question	Not stated	2%	13 papers
Quantitative evidence for "consensus"	Not stated	0%	No papers
Mention of "catastrophic" climate change	Not stated	0%	1 paper

Is there a scientific "consensus" beyond Oreskes'?

Computer models are the chief reason offered by some for claiming a "consensus" that goes so far as to predict the eradication of more than half of the world's species: (State of the Wild: http://www.giss.nasa.gov/~jhansen/preprints/Wild.070410.pdf).

However, this broader and more avowedly alarmist definition of "consensus" has even less warrant in the peer-reviewed literature than the "consensus" to the effect that humankind has caused most of the slight warming of the past half-century. On this wider definition of "consensus", we are led to believe that all serious scientists are agreed on the imminence of catastrophe and on the urgent need for, and the likely effectiveness of, costly and extreme mitigative or remedial measures.

It is crucial to appreciate that Oreskes' paper does not lend any scientific credibility to this extreme definition of the "consensus" about climate change. She was careful to constrain the scope of her definition so that at least it bore some relation to the peer-reviewed literature that she had analyzed.

"2,500 scientists can't be wrong"

The IPCC's latest report on climate change (IPCC, 2007) is said to have been written by 2,500 scientists. In fact, however, the scientific chapters were contributed by a far smaller number than this – perhaps 600, not all of whom were scientists: several were environmental campaigners with little or no track-record in the peer-reviewed learned journals.

Furthermore, it is now demonstrable that the IPCC cannot have obtained the approval of as many as 2,500 scientists to the text before it was published. The first table (Table B) of figures that occurs in the UN's *Summary for Policymakers* as first published, Table SPM-0, sets out and quantifies four sources of sea-level change:

Table B

The IPCC's incorrectly-summed table

Meters per century	1961-2003	1991-2003
1. Thermosteric expansion	0.042	0.160
2. Glaciers and ice caps	0.050	0.077
3. Greenland ice sheet	0.050	0.210
4. Antarctic ice sheets	0.140	0.210
5. Sum of individual climate contributions to sea-level rise	0.110	0.280

Officials inserted this curious table after the scientists had finalized the draft of the 2007 report. It had not been in the final draft of the IPCC's 2007 report as approved by the hundreds of scientists who had had a hand in the drafting. UN officials had inserted it after the scientists had submitted their final draft, but before publication.

The reason for this furtive last-minute insertion behind the backs of the "2,500 scientists" may have been the revelation by the Science Correspondent of theLondon *Sunday Telegraph,* some weeks before publication of the report, that the UN had drastically reduced its high-end projection of the rise in sea level to 2100, from 3 feet to less than 2 feet.

The fifth row of the table, entitled *Sum of individual climate contributions to sea-level rise,* is the result of an extravagantly incorrect addition. How did so

incompetent an error arise? Inferentially, the error occurred because the UN, in the version of the 2007 report of its scientific working group which was presented to journalists at its extravagantly-publicized launch, had perpetrated a tenfold exaggeration of the projected contributions from the Greenland and Antarctic ice-sheets (rows 2 and 3, shown in red), by the ingenious expedient of putting the decimal points in the wrong place, four times.

After protests from the lead author of the present report, the UN quietly corrected Table SPM-0, relabeled it as Table SPM-1, changed the units from meters per century to millimetres per year, relocated it, and posted the new version on its website.

By then, of course, the intended damage had been deftly done. Thousands of journalists worldwide had written excitable articles about the impending (though in reality nonexistent) acceleration in the rate at which the Greenland and Antarctic ice-caps would melt.

Why did the IPCC's "2,500 scientists" fail to spot so serious an error? The reason is that the table had not appeared at all in the final draft of the *Summary for Policymakers* that the scientists had worked on.

This episode demonstrates with great clarity that it is incorrect to assume that all of the 2,500 scientists said to have participated in the IPCC's working groups have even seen, let alone accepted, the final text that has been published in their names.

The IPCC's brief but, in public-relations terms, ingeniously effective 900% exaggeration of the projected contributions of the Antarctic and Greenland ice-caps to future increases in global sea level is an echo of Al Gore's 12,000% exaggeration of precisely the same topic. The IPCC and Gore would later share the Nobel peace prize for 2007.

Nor is this the first time that the IPCC's bureaucracy has inserted material into one of its major assessment reports after the scientists had thought they had finalized it and signed it off. In 1995 the scientists had concluded that there was no evidence of a human influence on global temperature, and had said so several times in their final draft. The IPCC's bureaucracy arranged for all such references to be removed and replaced by a substitute conclusion to the effect that an unmistakable human influence on global temperature had been found.

"All leading scientific bodies are in agreement"

The commission's "science" chapter suggests that all leading scientific bodies worldwide are in agreement that urgent action is necessary to prevent "climate catastrophe" arising from "global warming". Yet one of the scientific bodies repeatedly cited with approval by the commission is the U.S. National Research Council, an advisory and public policy arm of the National Academy of Sciences). It was the NRC, as recorded in *Newsweek* for April 28, 1975, that had previously produced a report alerting the nation to the imagined consequences of global *cooling*. That report said –

> "A major climatic change would force economic and social adjustments on a worldwide scale, because the global patterns of food production

and population that have evolved are implicitly dependent on the climate of the present century."

The National Academy of Sciences has changed its opinion with the weather. Between 1940 and 1975, the year of the NRC's report, global temperature had fallen, notwithstanding a continuous and monotonic increase in atmospheric concentrations of carbon dioxide and other greenhouse gases, and notwithstanding an increase in solar activity, suggesting a larger role for the Sun and the oceans than the IPCC at present admits.

In response to the supposed threat of "global cooling", the National Academy of Sciences published its report, which, though cautiously expressed as was then the custom, was certainly exciting enough to attract widespread media attention. The nation was told, then as now, that global cooling represented the unanimous scientific "consensus".

Since 1975, global temperature has risen. Accordingly, the NRC, seamlessly transiting from cryo-alarmism to thermo-alarmism, has produced another report, this time expressed in alarmist terms and going very far beyond the "consensus" as defined by Oreskes (2004).

"Consensus?" What "consensus"?

If either Oreskes or Schulte had focused their search on the very small minority of scientific papers in climatology and related fields that actually address the question of climate sensitivity and the attribution of climate change as between natural and anthropogenic influences, they would have found numerous papers calling into question every aspect of the official findings, including the finding that most of the past half-century's warming was anthropogenic.

To cite just one of many examples, Lindzen (1997) concludes that climate sensitivity – the amount by which temperature will rise in response to a doubling of atmospheric CO2 concentration – is not the 3.3 °C currently imagined by the IPCC but just ~0.4 °C, implying a final-climate-sensitivity coefficient of 0.4 / ln(2) ≈ 0.6. Then the increase in global temperature attributable to the increase from 315 to 385 parts per million by volume in CO2 concentration in the past half-century would be –

$$\Delta T_s \approx 0.6 \ln(385/315) \approx 0.1\ ^\circ\mathrm{C}.$$

However, global temperatures have in fact risen not by 0.1 °C but by 0.5 °C in the past half-century: four-fifths of the observed temperature increase must have been natural.

To cite another example, Scafetta & West (2008) state explicitly that 69% of the warming of the past half-century is of solar origin. If so, then less than one-third is of anthropogenic origin.

The symposium of the International Astronomical Union in 2004 came to a similar conclusion, saying that the unprecedented increase in solar activity over the past 300 years had caused nearly all of the warming over the period; that the peak of solar

activity was now past; that the Sun was now likely to decline; and that global cooling would result. Since the symposium, the Sun's activity has indeed sharply declined: in 2008 there were 266 days without sunspots. And, since 2004, global temperature has fallen at a rate equivalent to >3 °C/century.

In this and in numerous other respects, the peer-reviewed literature and the leading scientific bodies are far from unanimous in their agreement with the IPCC. Indeed, as we shall see in the chapter on climate sensitivity, insofar as there is a consensus in today's peer-reviewed literature it is to the effect that the temperature response to a given proportionate increase in carbon dioxide concentration is substantially less than that which the IPCC imagines.

Indeed, as we have already demonstrated, the IPCC does not even agree with itself on this question: it has successively presented three different – and diminishing – central estimates of climate sensitivity.

Let the last word on "consensus" go to Mike Hulme, Director of the Tyndall Centre for Climate Change Research in the UK, who, shortly before publication of the IPCC's 2007 climate assessment, wrote:

> "The IPCC is not going to talk about tipping points; it's not going to talk about five-meter rises in sea level; it's not going to talk about the next ice age because the Gulf Stream collapses; and it's going to have none of the economics of the Stern Review. It's almost as if a credibility gap has emerged between what the British public thinks and what the international science community think. …
>
> "Over the last few years a new environmental phenomenon has been constructed … – the phenomenon of 'catastrophic' climate change. It seems that mere 'climate change' was not going to be bad enough, and so now it must be 'catastrophic' to be worthy of attention. The increasing use of this pejorative term - and its bedfellow qualifiers 'chaotic', 'irreversible', 'rapid' - has altered the public discourse around climate change.
>
> "This discourse is now characterised by phrases such as 'climate change is worse than we thought', that we are approaching 'irreversible tipping in the Earth's climate', and that we are 'at the point of no return'. I have found myself increasingly chastised by climate change campaigners when my public statements and lectures on climate change have not satisfied their thirst for environmental drama and exaggerated rhetoric. It seems that it is we, the professional climate scientists, who are now the (catastrophe) sceptics. How the wheel turns!"

Finally, it is necessary to comment on the unduly pejorative reference to "climate sceptics" in the "science" chapter. Skepticism is a necessary and integral component of the scientific method. As T.H. Huxley said, it is the duty of true scientists not merely to echo the current political orthodoxy, but to test hypotheses rigorously, and to reject those that are false, however popular, convenient, or politically attractive they may be –

> "The improver of natural knowledge absolutely refuses to acknowledge authority, as such. For him, skepticism is the highest of duties; blind faith the one unpardonable sin."

We conclude that there is no unanimous scientific "consensus" about climate change; that the commission's statement that there is a "consensus" is inaccurate; that in any event science is not settled by consensus but by theoretical proof and empirical verification; and that the argument that there is a "consensus", even if it were true, is an instance of the logical fallacy of *argumentum ad verecundiam*.

CHAPTER 2

EIGHT YEARS' GLOBAL COOLING

The major temperature datasets are unreliable

The "science" chapter says that the reports of various public bodies reflect the "broad scientific consensus" view that –

> "'It is likely or very likely that human-induced increases in these greenhouse gases are already causing global climate to warm. Human activities [is] likely [to have] caused most of the approximately 0.6 °C (1.1 °F) rise over the 20th century' (NAS/NRC, *Climate Change Science,* p. 1)."

Since this assertion is central to all that follows in the "science" chapter, we shall examine this central assertion first by considering changes in global temperature; then by considering changes in global carbon dioxide concentration; and finally by considering what is known to climatology as "climate sensitivity" – namely, by how much will global temperature be likely to increase in response to a given increase in atmospheric carbon dioxide concentration? That is the crucial question in the debate about the climate; and, as we shall see, there are very good scientific reasons why there is not and cannot be a "broad consensus" to the effect that temperatures will rise anything like as rapidly as the official bodies cited with approval in the commission's "science" chapter would have us believe.

To draw any conclusions at all about temperature change, one must first be confident that temperatures worldwide are being accurately and consistently recorded. However, there are considerable doubts about the reliability of the temperature record. For instance, McKitrick (2007) finds that, over land, global land temperature has risen only half as much since 1980 as the datasets suggest, because the "heat-island" effects of urbanization have been insufficiently filtered out by the algorithms that process the raw data, leaving behind a readily-detectable and statistically-significant correlation between regional rates of economic development over time and regional rates of temperature change over time.

That correlation could not exist if the effects of increasing urbanization on the readings both from surface stations and from satellites monitoring the temperature of the lower troposphere had been fully removed – as they should have been – from the processed data from which the temperature anomalies and trends are compiled.

There have also been numerous corrections to the terrestrial datasets caused by often elementary errors in processing the data.

In October 2008 the NASA global-temperature dataset, compiled at the Goddard Institute for Space Studies under the direction not of a climatologist or meteorologist but of an astrophysicist, had transferred the September temperature anomalies for several stations in Russia into the October anomalies, leading to a false but later-corrected statement – still cited in its erroneous original form in many quarters – to

the effect that October 2008 had been the warmest October since global temperature records had first been compiled in 1880.

Also, the NASA GISS dataset is processed so as to overstate the magnitude of recent temperature changes, particularly in the United States, while altering in a downward sense and consequently understating the magnitude of temperature changes early in the 20th century. The effect of this error, in the United States, has been to imply that 1998 was warmer than 1934, when in fact 1934 had been the warmer year in the US. This conclusion, too, has now been corrected.

However, defects in the NASA GISS dataset (by no means the only dataset to have suffered problems) persist to this day. For instance, the surface temperature station for Santa Rosa, the headquarters of the National Oceanographic and Atmospheric Administration, was once in a semi-rural location but is now in a built-up area close to buildings and paved surfaces that artificially increase the temperature readings over time.

Therefore, the correct adjustment to allow for the progressive urbanization surrounding this many temperature stations in the industrially-developed world is to leave the readings from earlier periods alone and somewhat to reduce the readings from the present day, to allow for the urban "heat-island" effect.

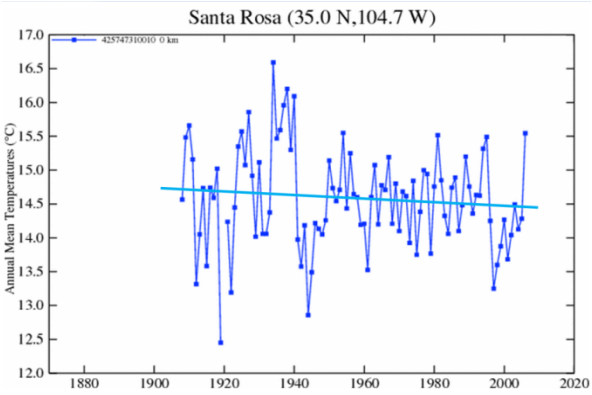
However, a recent investigation by Dr. Anthony Watts has demonstrated that the processing of the data from the Santa Rosa temperature monitoring station for the NASA GISS dataset has *reduced* the recorded temperature values from the early part of the 20th century, when Santa Rosa was less urban than it is today, and has *increased* the recorded values for the present day, when they should have been reduced to allow for the urban "heat-island" effect.

Figure 1 shows the data-curve and least-squares regression trend line of the unprocessed data from the Santa Rosa station, compared with the adjusted data-curve and trend line for the data from the same station after processing at the Goddard Institute for Space Studies –

Figure 1

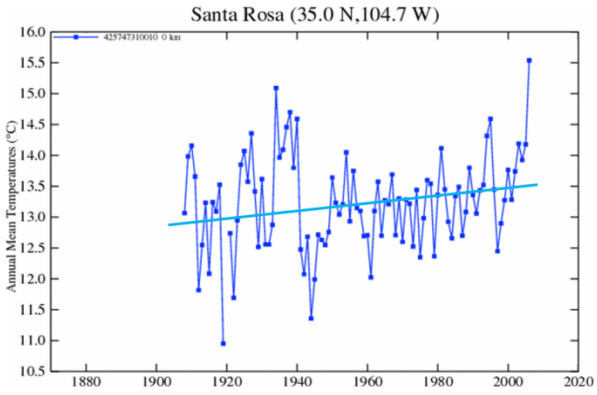
Effects of processing temperature data

BEFORE



Raw temperature data before processing

AFTER



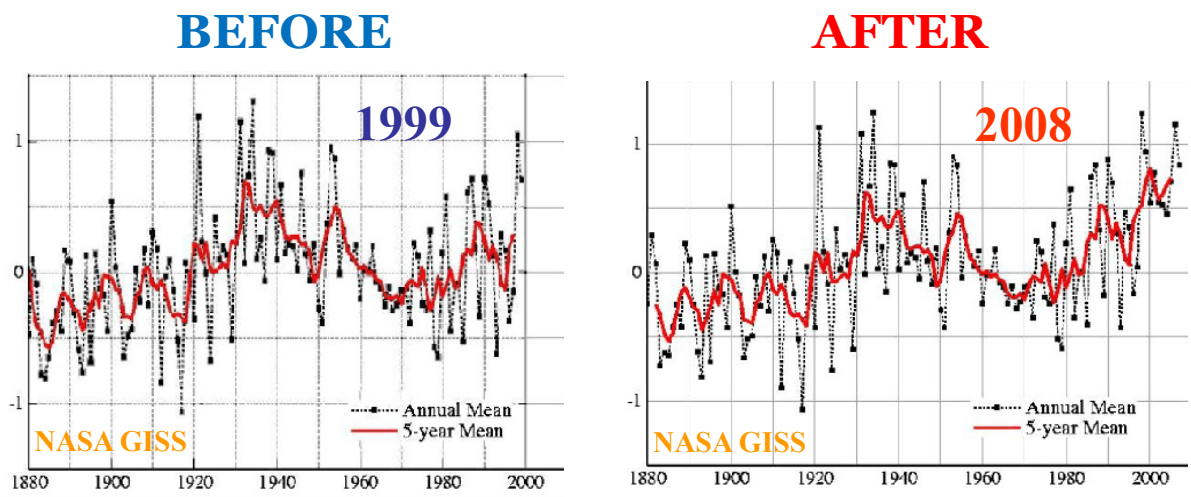
Same temperature data after processing

Figure 1 shows that 1930s temperature values have been cut by 1.5 °C, while today's values are unaltered. Accordingly, the 1910-2009 downtrend in temperatures in Santa Rosa has been transformed into an uptrend. If the two graphs are mounted as successive PowerPoint slides and the arrow-keys are used to switch rapidly and repeatedly from one to the other and back again, the distortion becomes very clear.

The question arises whether this illustrative amendment of the data from a single monitoring station is an isolated instance or whether the entire NASA GISS dataset is contaminated. Dr. Watts examined the NASA GISS global anomaly curve as it stood in 1999 and as it stands today. Figure 2 shows the results of his comparison –

Figure 2

Distortion of an entire dataset



As it was in 1999 ... ***... and after processing in 2008***

Unreal temperature change: *Note the relationship between the early-1930s temperature peak and the late-1980s temperature peak in the two graphs. In the later graph, data for earlier years has been manipulated, with the effect of erroneously increasing the apparent warming rate.*

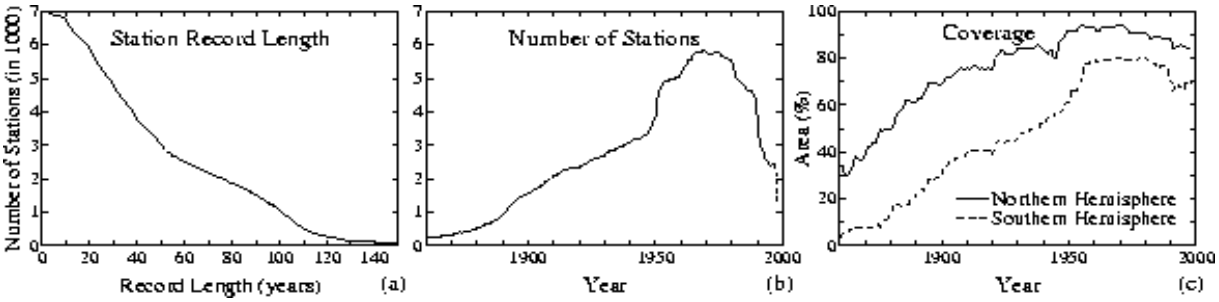
A close examination of Figure 2 shows that in the 2008 version of the GISS dataset the temperatures in the 1930s have been reduced compared with the 1999 version, while the temperatures from 1980-1999 have been increased. The effect is artificially to steepen the rising trend in temperatures since the record began in 1880.

Fewer and fewer stations monitor temperatures

Almost none of today's temperature stations have been monitoring temperatures since 1880. Also, there has been a very steep decline in the number of functioning temperature stations in the 40 years since the late 1960s, with a precipitous decline in the late 1980s to early 1990s (Figure 3). This decline in the number of stations reporting temperature data has serious consequences for the reliability and continuity of the temperature record.

Figure 3

More conclusions from less data

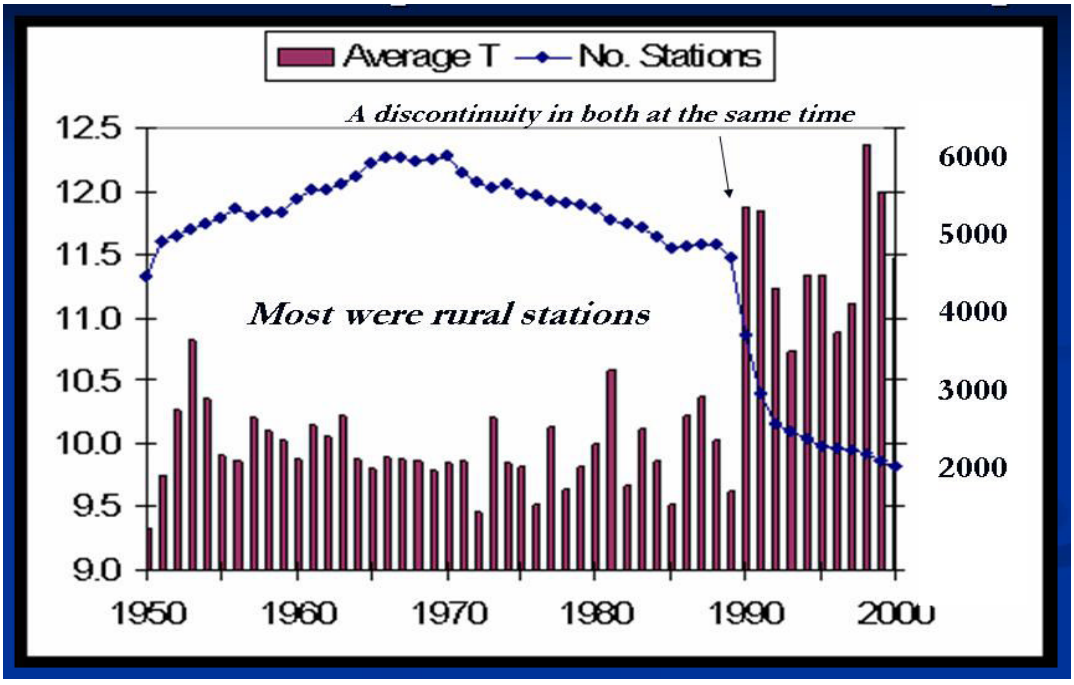


Source: *NASA Goddard Institute of Space Studies*

The decline in the number of operating temperature stations has been particularly severe in rural areas. This disproportionate closure of rural stations can be shown to be statistically significant. It leads to an overstatement of the rate of increase in global temperatures as the proportion of urban stations whose readings are exaggerated by the "heat-island effect" increases. Figure 4 demonstrates this overstatement compellingly by revealing an apparently sharp increase in global temperatures in 1990, coincident with a similarly sharp decline in the number of temperature stations reporting data, consequent upon the sudden collapse of the former Soviet Union –

Figure 4

Rural stations down, temperatures up

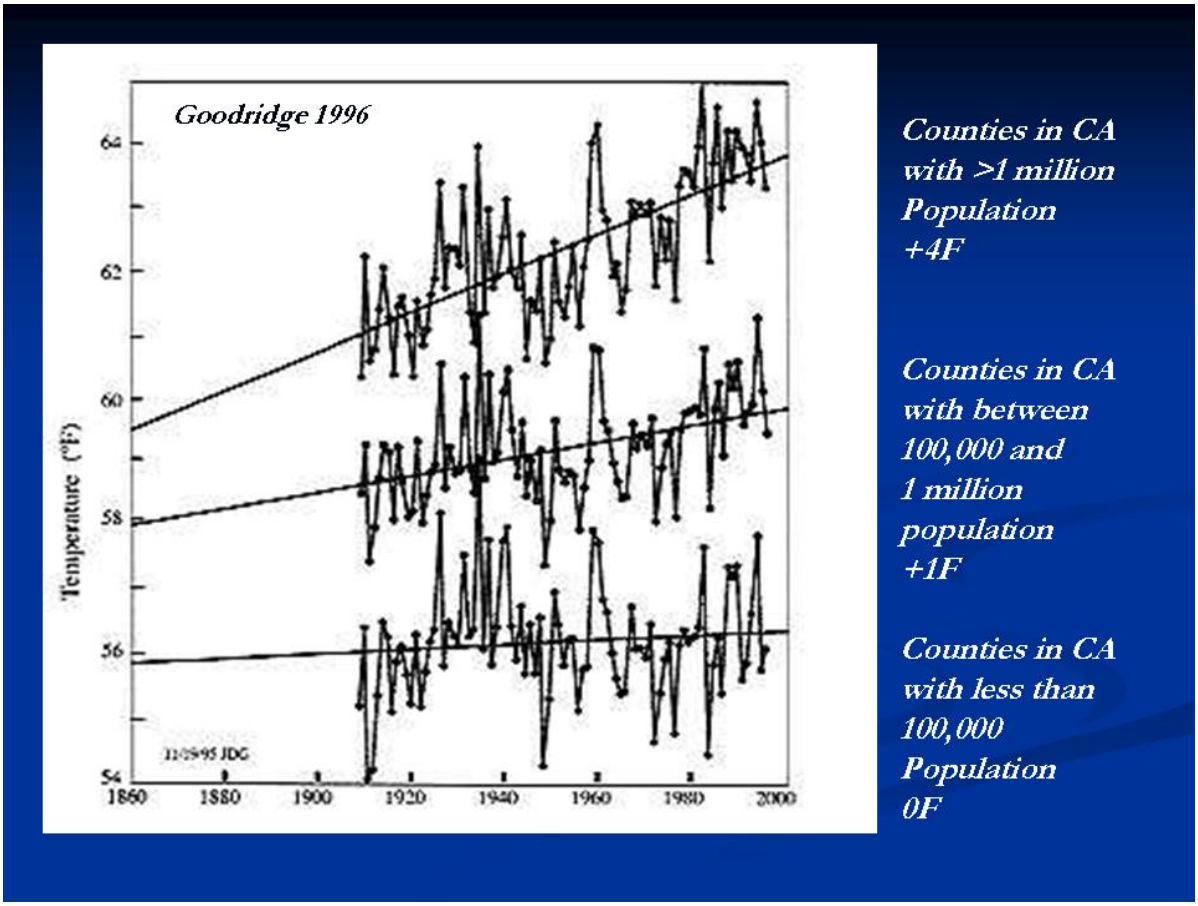


The collapse of Soviet Communism *suddenly and dramatically cut the number of rural temperature stations reporting data worldwide. At the same time, global temperatures appeared to increase just as suddenly and dramatically.* ***Source:*** *Joe d'Aleo.*

The urban "heat-island" effect is dramatic. As Figure 5 shows, in California the counties with fewer than 100,000 in the population have shown a negligible increase in temperature since 1910, while counties with up to 1 million population have shown an increase of 1 °F in the same period, and counties with more than 1 million have shown an increase four times greater, at 4 °F –

Figure 5

The urban "heat-island" effect in CA



Source: *Joe d'Aleo*

These results provide powerful, independent confirmation of the statistical research in McKitrick (2007) that demonstrated a strong urban heat-island contamination in the temperature record.

The question arises: have global temperatures risen anything like as fast as the official record shows?

Though all of the temperature graphs that we present in this report are taken directly from the official datasets without any correction for the McKitrick effect, we shall show that the often-cited evidence for higher temperatures from the effects of "global warming" is by no means as strong as the commission's "science" chapter suggests.
We conclude that, though temperatures have been rising for 300 years, the rate of increase seen since humans might in theory have had an influence – i.e. from 1980 onwards – may have been considerably exaggerated not only by failure to make full

allowance for increasing urbanization (McKitrick, 2008) but also by data manipulation that has had the effect of considerably exaggerating the warming trend (Figures 1, 2).

Trends in global temperature are not dangerous

Global mean surface temperature is not rising as fast as official sources have predicted. The maximum rate of temperature increase during the period of the global instrumental record – equivalent to ~1.8 °C/century – occurred in the 1920s-30s, when humankind's influence over the climate must perforce have been negligible.

Since 1980, the rate of increase in global temperature has been equivalent to ~1.5 °C per century - twice the 0.74 °C/century that was observed from 1900-2000.

However, if McKitrick (2008) is right, the true rate of increase in global temperatures since 1980 is considerably less than the published rate, and is merely a continuation of the 300-year rising trend, probably caused by a significant increase in solar activity.

The commission's science chapter says –

> "We know of no measures of climate on the global scale that indicate cooling. It is virtually certain that what has been observed so far is only the beginning, and that continued GHG emissions along current trajectories will cause additional warming of the Earth system as a whole."

The commission should perhaps to be introduced to the following global-temperature datasets: Hadley/Climate Research Unit, University of East Anglia; US National Climatic Data Center; RSS Microwave Sounding Unit satellite dataset; and the University of Alabama at Huntsville's MSU satellite dataset.

Each of these four datasets shows that for the past eight years (or 11 years, commencing with the great el Nino of 1998) global temperatures have been falling at a rate equivalent to more than 1 °C/century.

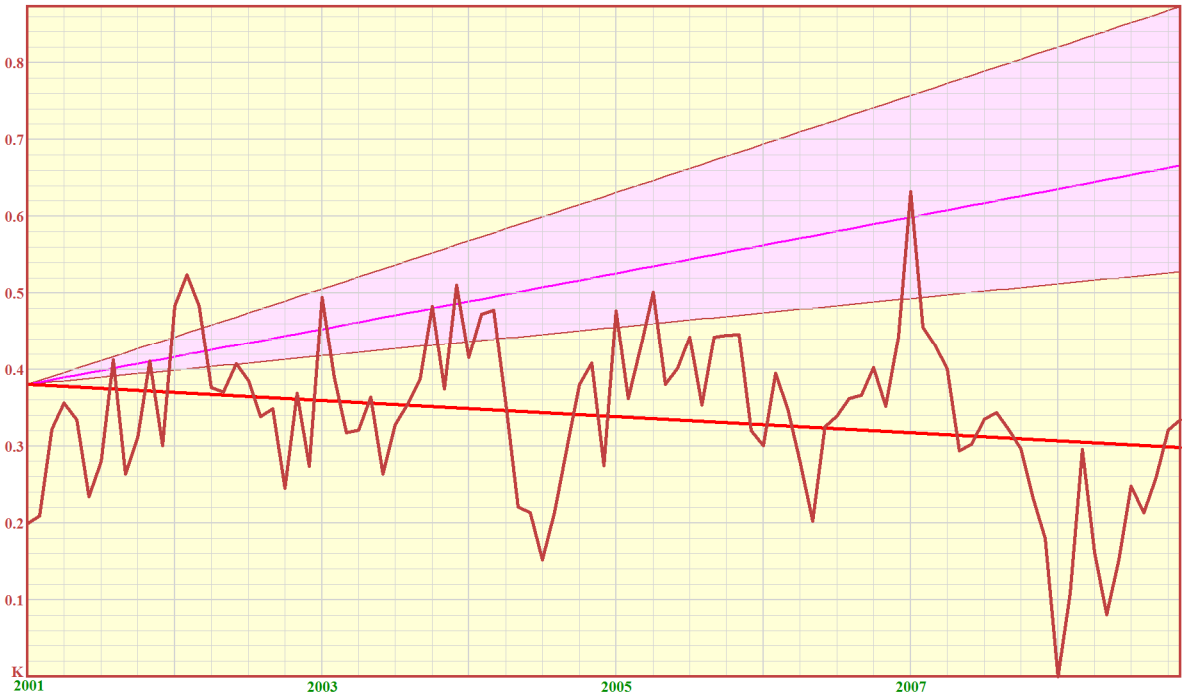
A composite of the monthly global-temperature anomalies from all of these four datasets was used to generate Figure 6, which shows the actual data-curve and the linear-regression trend set against the IPCC's predictions.

We have consulted Professor Richard Lindzen, the Alfred P. Sloan Professor of Meteorology at the Massachusetts Institute of Technology. He has confirmed that, in his professional opinion, global surface temperatures in 2050 compared with 2000 are as likely to be lower as higher.

The Professor, who knows more about the atmosphere than anyone alive, considers that climate sensitivity to increased carbon dioxide concentration is very small.

Figure 6

A little-reported global cooling trend



Eight straight years' global temperature downtrend: *The SPPI composite index of global mean surface temperature anomalies, the mean of two surface and two satellite datasets, shows a pronounced downtrend for eight full years. Not one of the climate models relied upon by the IPCC had predicted this downturn. The pink region shows the projected rates of temperature increase issued by the UN's climate panel, the IPCC. The thick red straight line shows the least-squares linear regression on the temperature anomalies, demonstrating the eight-year downward trend.*

Even on this unadjusted official record, with no allowance having been made for the McKitrick effect, for the past eight full years global mean surface temperatures have been *falling* steeply, though this eight-year fall has not been at all widely reported in the news media, which seem to be the chief source of the commission's information about climate change.

Of course, a few years' downtrend should not be naively extrapolated. However, the 30-year uptrend since 1980 (even before any adjustment to eradicate urban "heat-island" effects) was at a rate somewhat below the uptrend observed in the 1920s and 1930s, when humankind's influence on global temperatures was negligible.

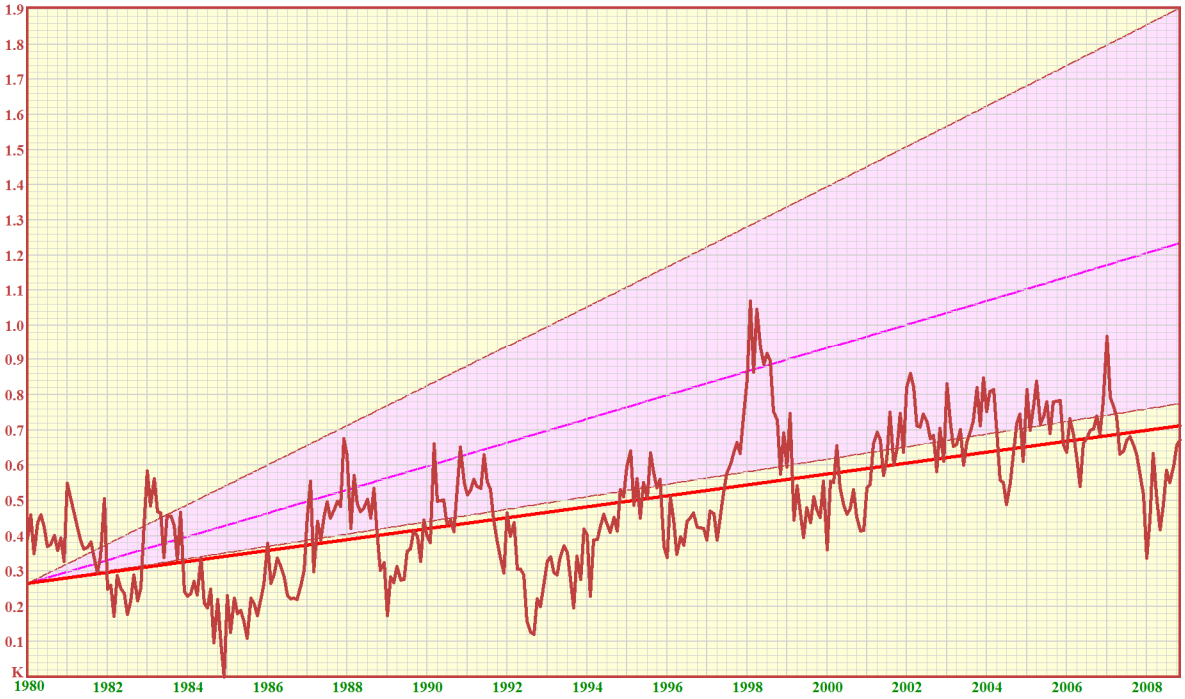
We conclude that there is no discernible anthropogenic signal in the global temperature record. In this light, the current downtrend in global temperatures, which has occurred notwithstanding the continuing increase in atmospheric CO2 concentration, indicates a growing likelihood that CO2 cannot be influencing surface temperatures to the extent imagined by official sources.

At present, therefore, there is remarkably little reason to suppose that global temperatures will rise in the 21st century at a rate any greater than the 0.74 °C/century observed in the 20th. The probability that temperatures will rise throughout the 21st century at a rate much above the 1.5 °C/century apparently

observed (before the McKitrick correction) since 1980 (see Figure 7) is vanishingly small.

Figure 7

Temperature defies official predictions



Behind the curve: *The SPPI's composite index of global temperature anomalies demonstrates that for 29 years temperatures have not risen as the IPCC had predicted. The pink region indicates the IPCC's predicted path for global temperatures, which are, however, not following the predicted path but remain well below it. If temperature continues to increase no faster than it has since 1980, it will have risen just 1.4 °C by 2100, well below half of the IPCC's central estimate of 3.6 °C.*

Recent global temperature change in the perspective of geological time

It is often said in official circles that the rate of increase in global mean surface temperature over the past 30 years is unprecedented, supposedly implying a clear anthropogenic signal.

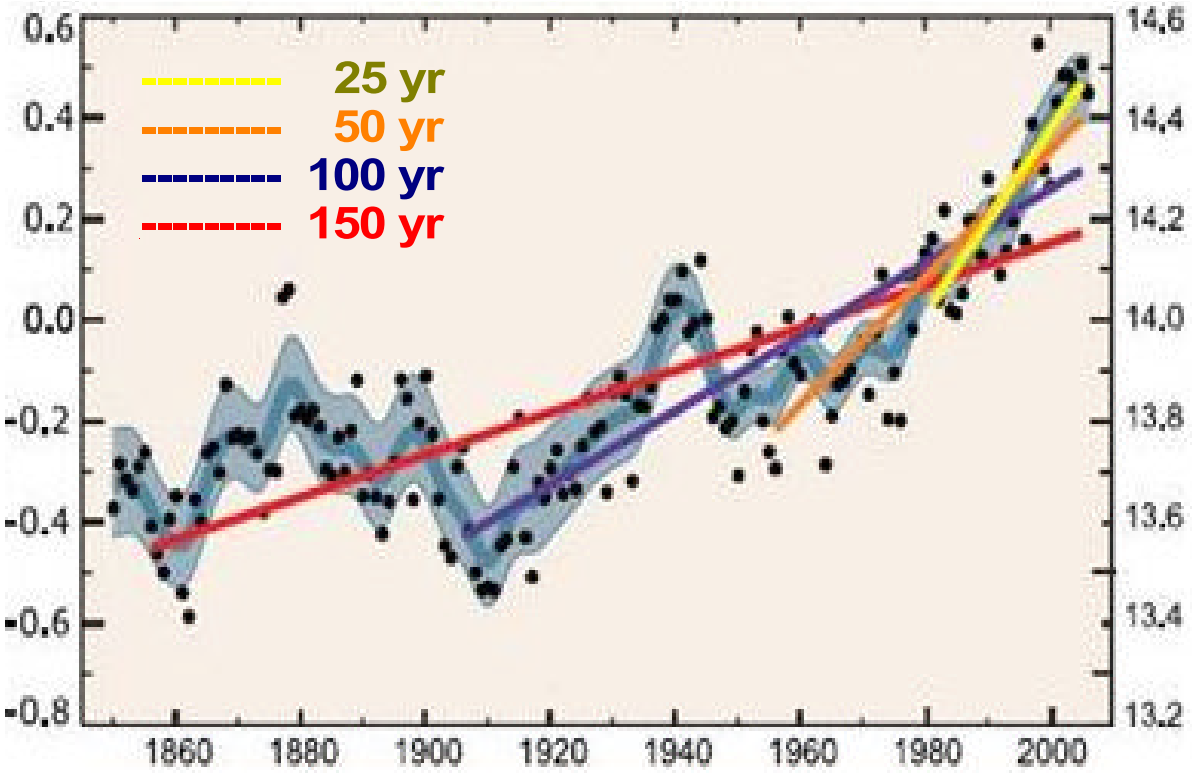
Figure 8, an IPCC graph relied upon by the chairman of the IPCC's science working group in his lectures, purports to show that there has been an inexorable increase in the global warming-rate over the past 150 years. However, the deception only succeeds because a careful and artificial selection of endpoints for the four trend-lines has been made. This is a well-known type of statistical prestidigitation, which has no place in any debate about the climate.

Dr. Pachauri, who uses the defective IPCC graph in his presentations, is not a climatologist, nor even a statistician. He is a railway engineer. It may be, therefore, that he does not realize that the graph given to him by his officials for use in his lectures is not an acceptable use of statistical methods.

It is easy to demonstrate why such deceptions ought not to be deployed. All that is necessary is to examine the global mean surface temperature trend a little more carefully than Dr. Pachauri's graph allows.

Figure 8

Official use of the endpoint fallacy



The endpoint fallacy: *Dr. Rajendra Pachauri, the railway engineer who chairs the IPCC's science working group, often uses the above IPCC graph to demonstrate his contention that global temperatures are rising at an ever-increasing rate. The deception relies upon the careful selection of endpoints for each successive linear trend.*

Why is this technique unsuitable? The reason is that the careful selection of different sets of endpoints allows the manipulator of the data to create the impression of either a rising trend (as Dr. Pachauri has done) or a falling trend, or no trend at all.

It is this sort of statistical prestidigitation that has given the IPCC a deservedly bad name, and has fatally undermined its credibility as an international expert organization, leading Lord Lawson of Blaby, a former British Chancellor of the Exchequer, to call publicly for its immediate and outright abolition.

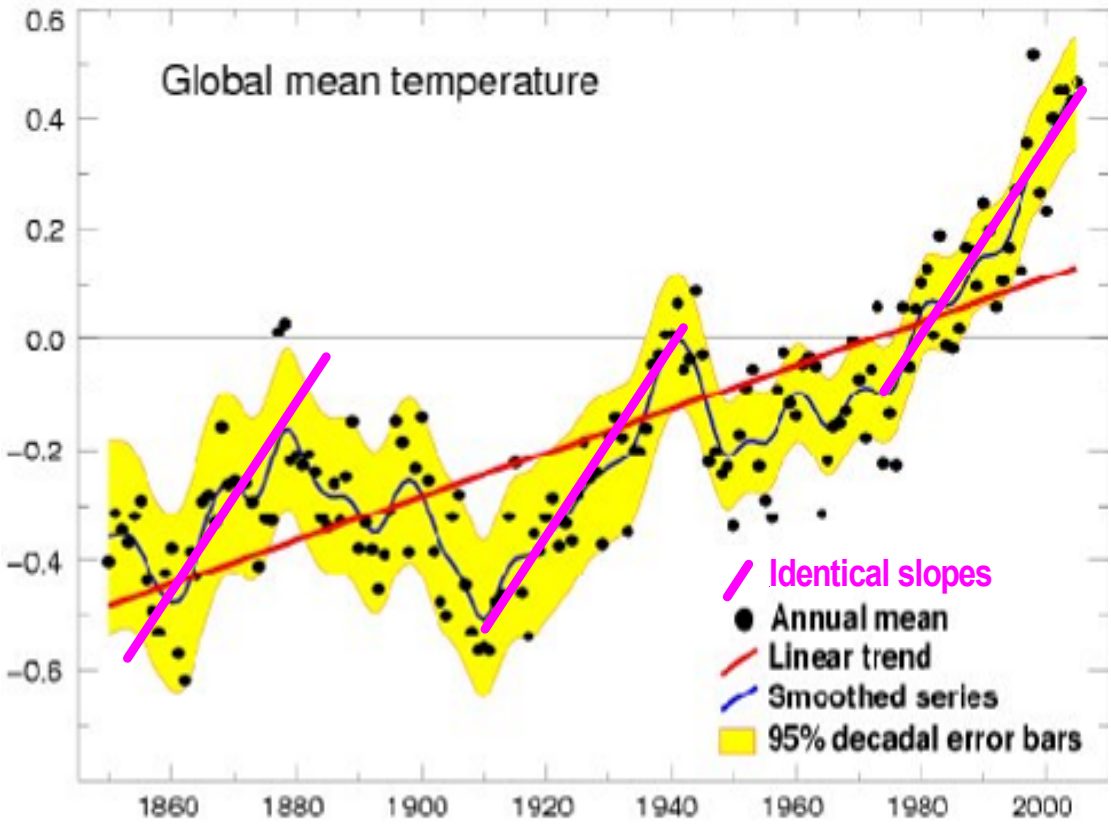
Figure 9 reproduces the IPCC's defective graph a little more clearly, but with the less-than-honest Pachauri trend-lines removed.

Three exactly parallel magenta trend-lines have been added to the graph, demonstrating that the warming-rate between 1975 and 1998, far from being unprecedented, had been observed during two previous periods in the global instrumental era, both periods having preceded the period during which humankind can have had any influence on temperature.

This form of analysis is fair: it demonstrates that the recent rising trend that appears on Pachauri's analysis to be exceptional is not without precedent and is accordingly within natural climate variability –

Figure 9

Two precedents for recent warming



Pre-anthropogenic precedents: *From 1850-1880 and from 1910-1940, the warming rate was identical to that from 1975-1998. The two earlier periods occurred before humankind could have had a significant influence. Note how the IPCC graph is truncated to conceal the post-1998 downtrend.*

Further to illustrate the unwisdom of official reliance upon the endpoint fallacy, we shall choose our own arbitrary endpoints and show the global mean surface temperature trends since 25 years ago, 20 years ago, 15 years ago, 10 years ago and 5 years ago, displaying the results in Table C –

Table C

Same fallacy: opposite result

Period length	Endpoints	Global trend
25 years	1984-2009	+1.92 °C/century
20 years	1989-2009	+1.87 °C/century
15 years	1994-2009	+1.42 °C/century
10 years	1999-2009	+ 1.15 °C/Century
5 years	2004-2009	−3.09 °C/century

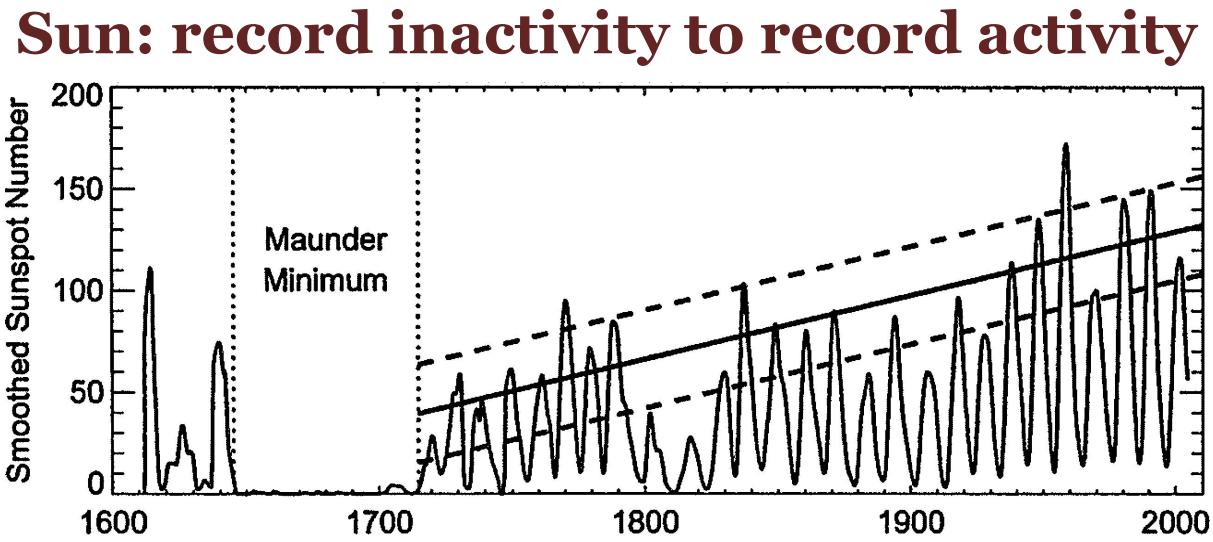
The successive trends in Table C show an accelerating decline, so that in the past five years global temperatures have been falling at a rate equivalent to >3 °C/century.

The table illustrates the extreme sensitivity of the temperature trend to the choice of endpoints, and, since it produces a result opposite to that of Dr. Pachauri with a different choice of endpoints, it neatly illustrates the unreliability of the endpoint fallacy.

Plainly, a far longer perspective is needed to avoid manipulations of the choice of endpoints such as that which the IPCC has relied upon. Akasofu (2008) finds that for 300 years, between the end of the 70-year Maunder Minimum in 1700 and the end of the 70-year solar Grand Maximum in 2000, global temperatures rose at 0.5-0.7 °C/century.

For 275 years of this 300-year period, humankind cannot have had any significant influence over the trend. In the past 25 years there has been no anthropogenic acceleration of this long-running trend. The increase in temperatures over the past 300 years parallels, and, as Figure 10 suggests, was probably chiefly caused by, a very rapid increase in solar activity, as measured by sunspot numbers:

Figure 10



Solar activity, *as measured by sunspot numbers, increased sharply between the end of the sunspot-free Maunder Minimum in 1700 and the peak of the 70-year Solar Grand Maximum in the early 1960s. During the Grand Maximum, solar activity was greater, and for longer, than during almost any similar previous period in the 11,400 years since the end of the last Ice Age.* ***Source:*** *Hathaway et al., 2004.*

Traveling still further back, temperatures throughout the world were warmer during the medieval warm period a millennium ago than they are at present. The IPCC's 1990 report showed the warm period clearly in a graph, but by the 2001 report a new graph had been substituted, in which the medieval warm period had been made to disappear.

This deception was achieved by the use of defective bristlecone-pine temperature proxies, which the IPCC had earlier recommended should not be used for pre-instrumental temperature reconstructions because the breadth of the tree-rings is sensitive not so much to changes in temperature as to changes in carbon dioxide concentration and in rainfall. Though other proxies were also used in the calculation of the IPCC's 2001 graph, those proxies that did not show the medieval warm period showed the clearest apparent increase in temperature in the late 20th century were

given almost 400 times as much weighting as those that revealed the presence of the medieval warm period.

Furthermore, the authors of the graph removed all of the proxy data for the medieval warm period itself, while writing that they had included it, and substituted some "estimates" of their own without admitting that that was what they had done. The effect of the "estimates" was to erase the medieval warm period.

The true data were then hidden on the computer of the graph's compilers in a file labeled "CENSORED_DATA". Two Canadian researchers later found it there.

If the "estimates" were replaced by the CENSORED_DATA, the medieval warm period promptly reappeared. If the defective bristlecone-pine proxies were removed and the remaining proxies used on their own, the medieval warm period also reappeared.

Furthermore, the researchers found that the algorithm that generated the defective graph nearly always eradicated the medieval warm period and artificially showed unprecedented warming at the end of the 20th century even when random red noise was fed into it rather than genuine proxy temperature data.

McIntyre & McKitrick (2005) exposed some of these defects in a paper published in *Geophysical Research Letters*. Thereupon an investigation was mounted by the US National Academy of Sciences, which found, and stated twice in its report, that the graph had "a validation skill not significantly different from zero".

However, this conclusion – to the effect that the graph was worthless – did not appear in the press release issued by the NAS, which instead stated the opposite conclusion that the graph's finding was "plausible". The NAS, like the IPCC, has a direct financial vested interest in peddling any scare that might increase funding for scientists to make the imagined problem go away.

Though those who disagree with the avowedly alarmist position that the commission has chosen to adopt in its report are often accused of taking the shilling of the fossil-fuel industry, it should also be remembered that scientists and "scientific" organizations such as the IPCC and the NAS also have a financial incentive – and it is a stronger one than that of the sceptics, because the taxpayer is a great deal more generous with his funding (whether he likes it or not) than the commercial entity which has to make a profit even while paying for spokesmen to defend it against the attacks of the State.

An investigation into the false abolition of the medieval warm period was also conducted by three statisticians acting for the US House of Representatives. This investigation, too, found the IPCC's graph valueless, and also noted that a suspiciously large number of papers apparently supporting the graph's conclusions, that had appeared in the journals following McIntyre & McKitrick's paper, had been written by former co-authors of those who had fabricated the defective graph.

Recently, the graph's inventors have published a further paper purporting to provide evidence that their original graph was correct. Once again, however, if the bristlecone-pine tree-rings declared unsuitable by the IPCC itself are removed, the remaining proxies continue to reveal that the medieval warm period was real, was global, and was warmer than the present.

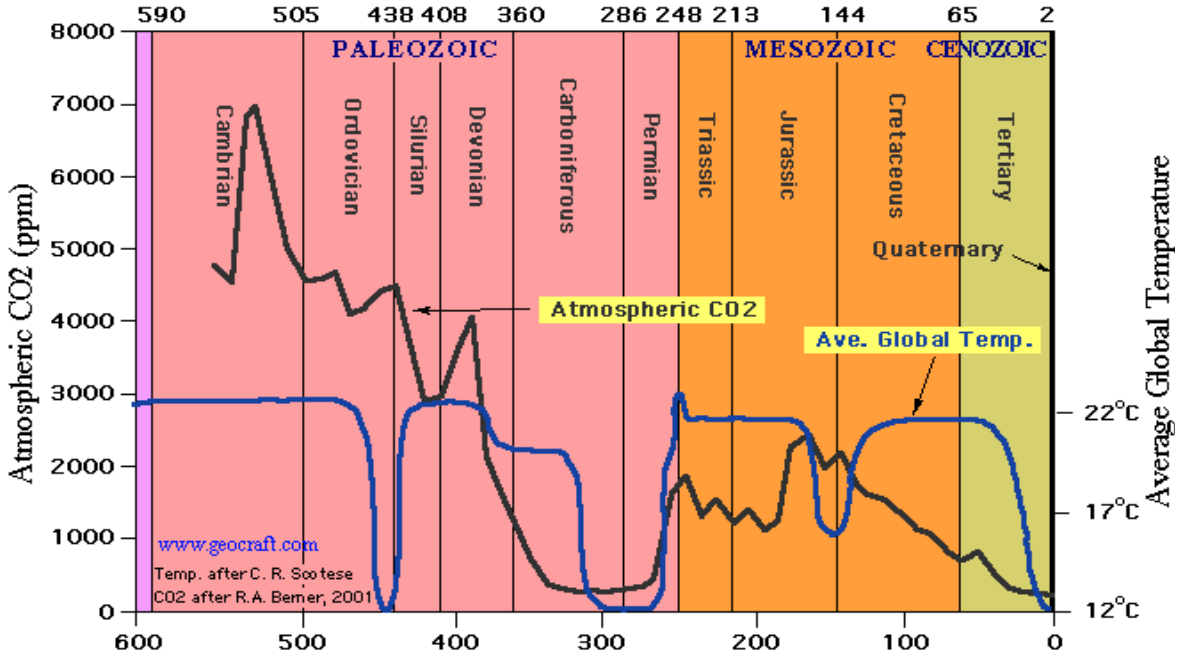
Notwithstanding the defects in the IPCC's graph, which has been more completely exposed as false than almost any scientific result over the past century, the IPCC continues to rely upon it, and to deny the existence of the medieval warm period.

A paleoclimate perspective

In the paleoclimate, there was no correlation between carbon dioxide concentration and temperature. For most of the past half billion years, global temperature was ~7 °C warmer than the present, but CO2 concentrations fluctuated considerably (Figure 11).

Figure 11

CO2 not linked to paleotemperature



*600 million years of **CO₂ concentration** vs. **surface temperature.***

The concentration on the past one or two thousand years that has arisen from the controversy over the defective graph purporting to abolish the medieval warm period has concealed a fact that swiftly re-establishes the correct perspective.

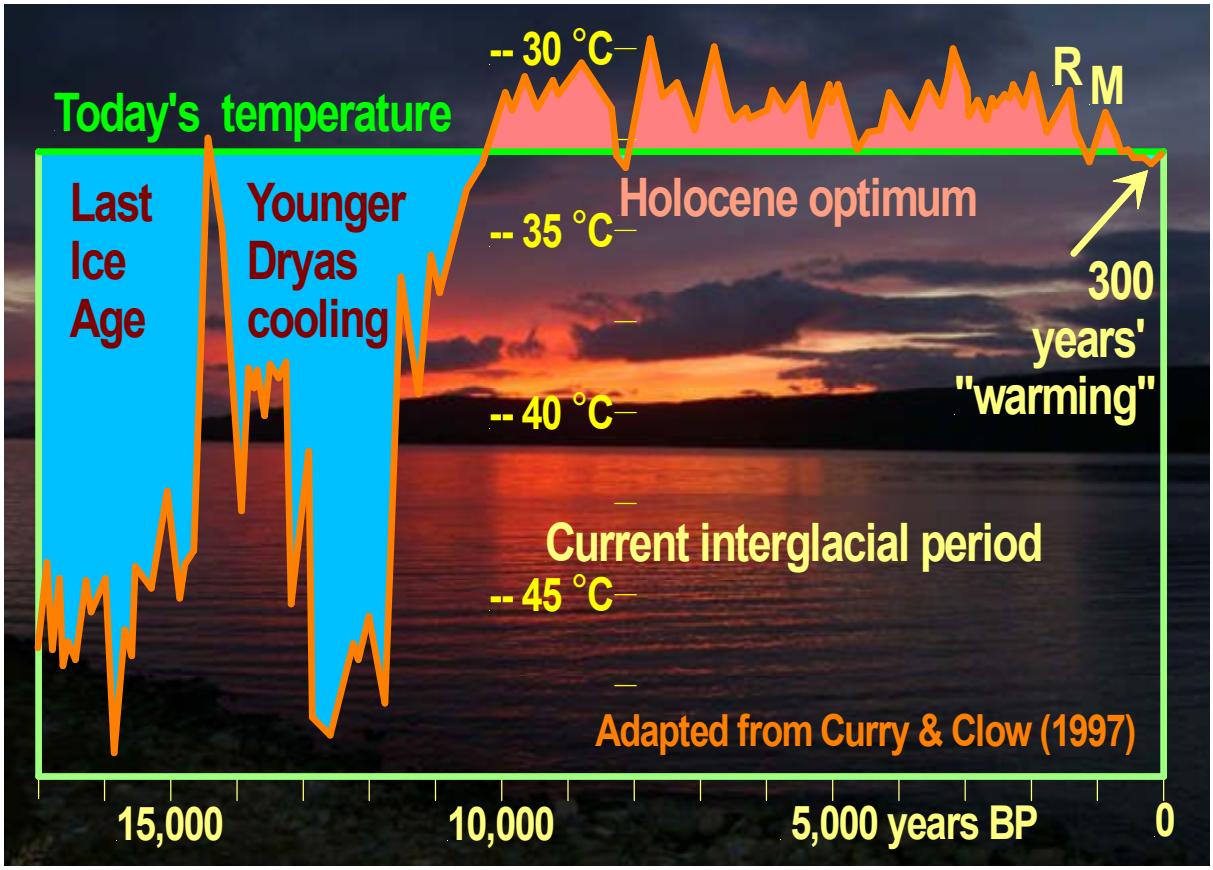
An examination of the entire Holocene period since the end of the last Ice Age 11,400 years ago reveals that global temperatures have been considerably warmer than the present almost throughout.

One of the most successful devices used by those trying to fabricate the climate scare has been the careful selection of time periods to allow them to demonstrate whatever result they desire. The only way to circumvent this stratagem is to take a far wider view across time.

See, for instance, the graph of Curry & Clow, 1997, which we have adapted in Figure 12:

Figure 12

"Warming" in geological perspective



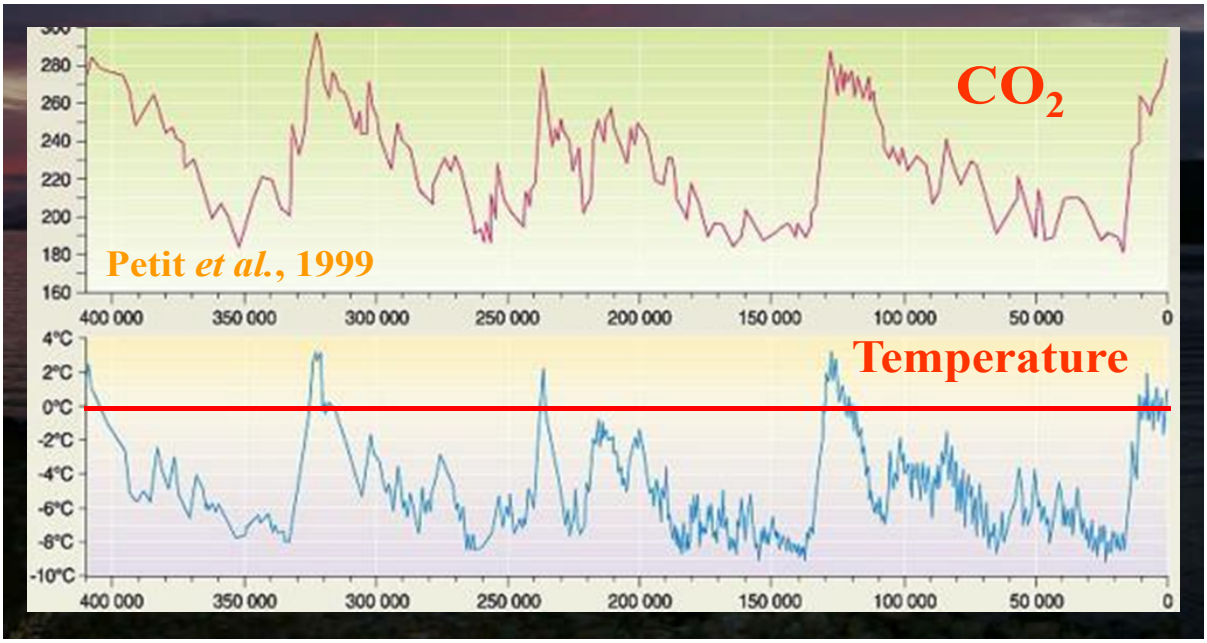
Warmer than today: *Analysis of ice-core temperatures shows that most of the period since the end of the last Ice Age has been warmer than the present, sometimes by at least 2.5 °C. The Roman (R) and Medieval (M) Warm Periods are shown at top right. The short tail of the graph to the right of the arrow's point represents the warming of the past 300 years, putting it into perspective.*

Seen in the geological perspective of the last 17,000 years, the 300 years of recent warming, nearly all of which must have been natural, are manifestly insignificant. F for we could not have had any significant influence except in the past half century, and the first half of that period of our potential influence was a period of global cooling not dissimilar to today's.

It is interesting to observe how careful the IPCC is not to present graphs such as that of Curry & Clow: for such graphs would at once demonstrate that today's temperatures are entirely within the natural variability that has been observed or inferred during the Holocene interglacial period of the past 10,000 years. Anyone who realizes that this is the case will no longer see any reason to be concerned at the comparatively minuscule increase in temperatures that occurred – very largely for natural reasons – over the past 300 years.

Interglacial periods have occurred with apparent regularity approximately every 125,000 years. The record, from Petit *et al.* (1999), is in Figure 13. It shows that each of the previous four interglacial periods was warmer than the present by several degrees Celsius –

Figure 13
Four warmer interglacial periods



Today's temperatures are unexceptional: *it was warmer in each of the past four interglacial periods than it is today. Note the close correlation between CO2 concentration and temperature: but it was temperature that changed first, though this graph misled one film-maker into falsely claiming that whenever CO2 concentration rose the paleoclimate warmed.*

We conclude that in the recent palaeoclimate it was temperatures that changed first and CO2 concentration that followed; that in the distant palaeoclimate there was no correlation between CO2 concentration and temperature; that nearly all of the warming of the past 300 years was natural, caused by the growing activity of the Sun; that the Sun is now likely to become less active; that eight years' largely-unreported but nonetheless definite global cooling have resulted; and that the oceans have cooled as well as the atmosphere.

CHAPTER 3
CHANGES IN CO2 CONCENTRATION

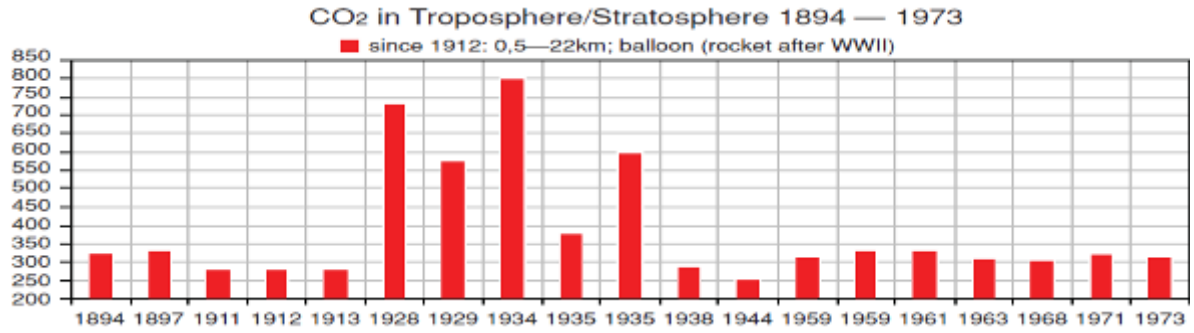
How long does CO2 remain in the atmosphere?

The commission's "science" chapter says –

> "The average time for removal from the atmosphere of added carbon dioxide is measured in centuries. It is very likely that such perturbation would cause the rate of surface warming and sea level rise in the 21st century to be substantially larger and faster than that experienced in the 20th century, without precedent in the past 10,000 years."

The commission's estimate of the mean residence time of carbon dioxide in the atmosphere is, on any view, a considerable exaggeration. Even the IPCC puts the residence time at "50-200 years", rather than "measured in centuries". However, the IPCC only gets away with so long a residence time by using a curious definition for which it has been widely criticized in the peer-reviewed literature, where dozens of papers from the 1950s to the present establish that the mean residence-time of carbon dioxide is approximately seven years.

CO_2 now occupies less than one-twenty-fifth of one per cent of the atmosphere. Research by Ernst-Georg Beck (2008) demonstrates that concentrations of up to 800 parts per million, or about twice today's, were reliably measured in the 19th and early 20th centuries. And even the UN's climate panel [IPCC, 2001] admits that the concentration of CO_2 in the atmosphere half a billion years ago was up to 25 times today's concentration. For most of the past half billion years, the concentration of CO_2 has been far greater than it has been in the past million years: yet life throve, for otherwise we should not be here.



Mean CO2 concentration (ppmv), 1894-1973. Today's value is <390 ppmv. ***Source:*** *Beck (2008).*

Nowhere is the IPCC more adrift than in its attempt to balance the atmospheric CO2 budget. It calculates that humankind's emissions of carbon dioxide are contributing more than 4 parts per million by volume of CO2 to the atmosphere each year: yet the NOAA global CO2 concentration index shows that the atmospheric concentration is increasing at a near-linear 2 ppmv.

The conclusion is obvious: that more than half of all the CO2 molecules emitted to the atmosphere by human activities reside in the atmosphere for less than a year. It

is difficult, therefore, to find any rational, scientific basis for the commission's conclusion that the residence time is "measured in centuries".

The commission goes on to say that its imagined long residence time of CO2 in the atmosphere constitutes a "perturbation" such as to cause far faster warming and sea-level rise than in the 20th century, "without precedent in the past 10,000 years".

Even if the residence time of CO2 were indeed "measured in centuries", which it is not, there would be no scientific basis whatsoever for the commission's assertion that changes in temperature and in sea level would be "without precedent in the past 10,000 years".
As we have seen, temperatures almost throughout the past 10,000 years have been considerably warmer than the present (indeed, nearly all of the past billion years were warmer than today); and, as we shall see in the chapter on climate sensitivity, the likelihood of a warming more rapid than anything seen in the past 10,000 years is remote in the extreme.

As to sea level, which will also be considered in a later chapter, it is necessary only to mention that the mean rate of sea-level rise throughout the past 10,000 years has been 4 feet per century.

The IPCC, regarded for some reason by the commission as authoritative, has estimated that the likely rate of sea-level rise in the coming century will be 1 ft 5 in (little more than one-third of the mean centennial rate of rise during the Holocene), and the maximum rate of sea-level rise will be 2 ft (less than half of the mean centennial rate of rise).

The commission does not provide any evidence on the basis of which it has decided to substitute its own judgment for that of the IPCC. As we shall see, the peer-reviewed literature establishes that even the IPCC's central estimate of sea-level rise over the coming century is probably an exaggeration. It appears, then, that the commission's choice of a sea-level rise of up to 8 feet in this century is political rather than scientific.

CO2 concentration is rising well below prediction

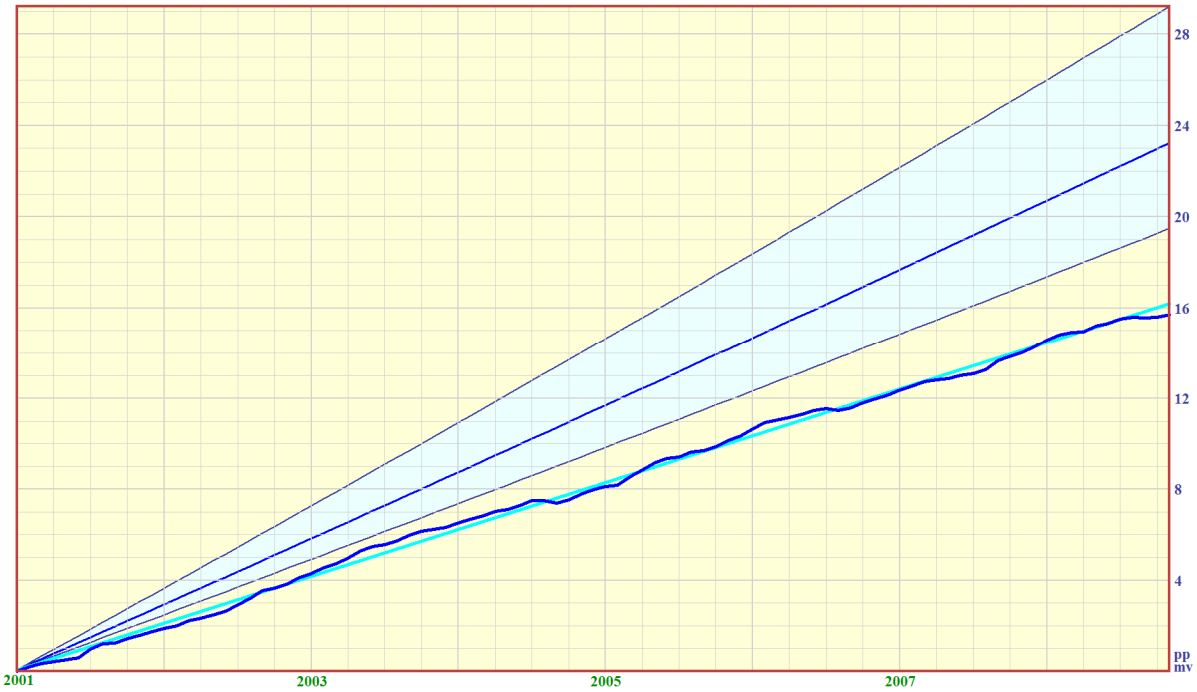
To establish the magnitude of any imagined anthropogenic temperature increase by the end of the current century, it is of course necessary to know what the projected CO2 concentration will be in the year 2100.

However, the *Summary for Policymakers* in IPCC (2007) does not provide policymakers with any information about the rate at which it expects CO2 concentration to rise.

One reason why the IPCC is coy about what is, on any view, a vital element in the calculation of future temperature increases is that, as Figure 14 shows, in the eight years since January 2001 global atmospheric CO_2 concentration has increased at a near-linear 200 ppmv/century, implying that by 2100 it will have reached ~570 ppmv:

Figure 14

Unexpectedly slow CO2 increase



CO2 is rising, but slowly: *The blue region shows the IPCC's currently-projected range of increases in CO2 concentration; the blue curve beneath this region is the deseasonalized global trend; the cyan line is the least-squares linear regression on that trend over the past eight years, equivalent to ~200 ppmv/century.* ***Data source:*** *NOAA global CO2-concentration dataset.*

The IPCC imagines CO2 concentration will fall on its projected interval [730, 1040] ppmv by 2100. The IPCC's current central projection, taken from the Bern climate model, is 834 ppmv. One has to read as far as chapter 10 of the IPCC's 2007 report to discover this key information.

However, the observed, real-world trend is entirely below the IPCC's predicted path, which, as so often with the IPCC's projections, is a considerable exaggeration.

Furthermore, the residuals of the NOAA's CO2-concentration trend are so close to the fit that the trend may itself have stabilized so as to become linear. If so, even if humankind takes no action at all to curb CO2 emissions, the concentration by 2100 will be little more than 570 ppmv, compared with today's 385 ppmv.

The implications of this shortfall are considerable. Confining the analysis to central estimates and projections, as we shall normally do throughout this report, we may evaluate the effect of the shortfall on the IPCC's central projection for temperature change by 2100, as follows.

The IPCC imagines that a doubling of CO2 concentration would increase global mean surface temperatures by 3.26 °C (IPCC, 2007). From this, we may derive the implicit final-climate-sensitivity coefficient $c = 3.26 / \ln(2) \approx 4.7$.

If the IPCC's central projection of 834 ppmv CO2 by 2100 compared with today's 385 ppmv were correct, its central projection of surface-temperature increase by 2100 would be as follows –

$$\Delta T_s = c \ln(C/C_0) \approx 4.7 \ln(834/385) \approx 3.6\ ^\circ C.$$

However, if CO2 concentration follows the current linear trend and reaches only 570 ppmv by 2100, the corresponding increase in mean global surface temperature compared with today will be half the IPCC's current central projection –

$$\Delta T_s = c \ln(C/C_0) \approx 4.7 \ln(570/385) \approx 1.8\ ^\circ C.$$

We have, therefore, halved the IPCC's central estimate of the anthropogenic increase in temperature to be expected by 2100, merely by checking its projections against the real-world data and making the appropriate arithmetical adjustment. That is the skeptical approach that is the hallmark of true science.

Anyone who had read only the *Summary for Policymakers* of the IPCC's 2007 assessment report would have been unable to carry out the verification we have carried out above, because the IPCC's estimates of CO2 concentration by 2100 had been withheld from that *Summary,* even though without them no projection of anthropogenic temperature increase to 2100 can be made or verified.

No correlation between CO2 and temperature data

In formal, mathematical logic, a correlation between one dataset and another does not necessarily imply a causative link between the two datasets. However, the absence of any correlation between the two datasets necessarily implies a lack of causation.

If we plot the CO2 and temperature data for the eight years since the previous IPCC climate assessment, it is at once apparent that there is no correlation between the two datasets. Once again, rather than accepting the word of various public bodies, however apparently eminent, we are verifying their results for ourselves by examining their imaginary projections against unfolding events in the real world.

The lack of correlation between the CO2 and temperature datasets over the past eight years is indeed startling in several respects.

First, the CO2 concentration has been increasing in what is very close to a straight line: the data-curve is very nearly coincident with its linear-regression trend-line.

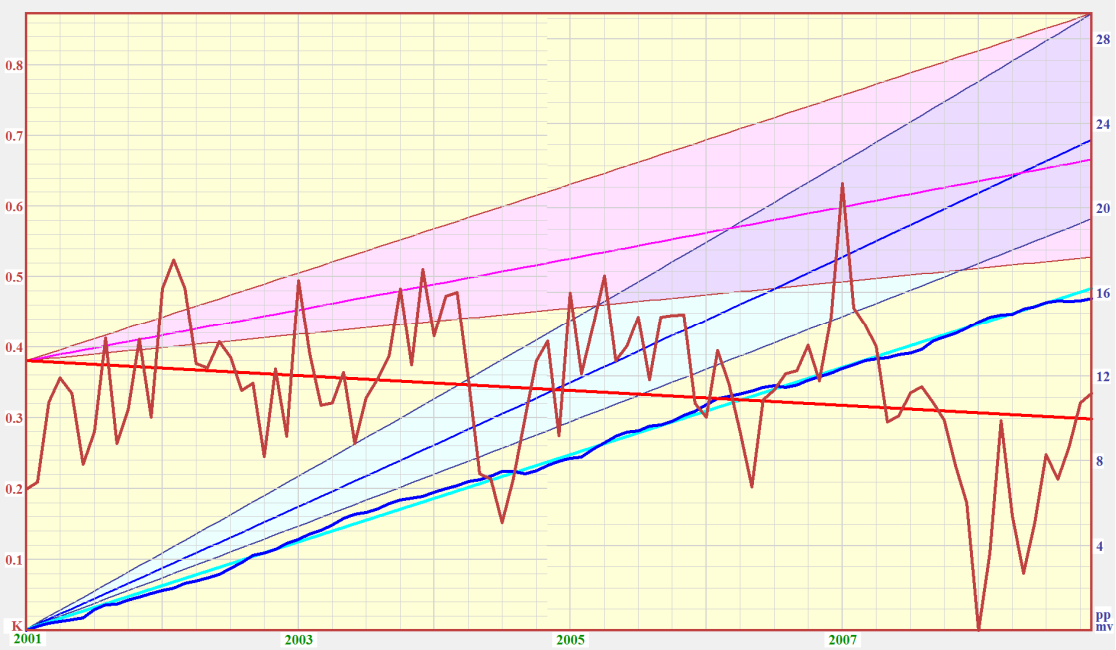
Yet the temperature data curve shows substantial fluctuations above and below its own trend-line. Plainly, the short-term to medium-term influences that drive temperature up and down have nothing to do with the monotonically-rising CO2 curve.

This is no surprise: the short-term to medium-term temperature fluctuations shown in the data-curve are chiefly caused by variability in the great ocean oscillations, with occasional interventions from volcanoes, and have nothing to do with anthropogenic increases in the atmospheric concentration of CO2.

In the short to medium term, therefore, there is no correlation and no causation. Worse, even over as long a period as eight years, the CO2 trend is a rising trend while the temperature trend is a falling trend (Figure 15) –

Figure 15

No correlation, so no causation



CO2 up, temperature down: *Neither the global-temperature trend (red line) nor the global-CO2 trend (cyan line) falls within the pink and blue regions respectively that encompass the IPCC's projected intervals. Furthermore, there is a startling absence of correlation between the CO2-concentration data and the temperature data, necessarily implying that – at least in the short to medium term – there is little or no causative link between the two.*

We conclude that CO2 concentration is rising far more slowly than the IPCC had predicted; that the residence time of CO2 in the atmosphere is seven years, not the "centuries" imagined by the commission; that more than half of all CO2 emitted to the atmosphere by humankind leaves the atmosphere within a year; that the failure of CO2 concentration to rise as predicted by the IPCC, on its own, requires a halving of the IPCC's central projection of anthropogenic temperature increase between now and 2100 from 3.6 °C to 1.8 °C, and that the lack of correlation between the CO2 and temperature datasets necessarily implies that changes in CO2 are not responsible for changes in global temperature, at least in the short to medium term.

CHAPTER 4

CLIMATE SENSITIVITY

By how much will our activities increase temperature?

The central question in the debate about the climate is this: by how much will our activities, and the emissions of carbon dioxide they release into the atmosphere, increase global temperatures?

This is what is known as the "climate sensitivity" question. Without a definitive answer to it, there cannot be any "climate crisis", nor any requirement for any executive or legislative action of any kind to mitigate the imagined future consequences of present industrial activity.

Remarkably, however, neither of the most recent IPCC quinquennial assessments (IPCC, 2001 & 2007) bothers even to devote a complete chapter to the central question of how to evaluate the magnitude of the imagined effect of changes in CO2 concentration on temperature.

Disjointed and often mutually-contradictory particles of information are scattered through the IPCC's documents. For instance, the "climate sensitivity parameter" is the coefficient by which the radiative forcing from a given proportionate increase in CO2 is multiplied to yield the increase in temperature. The IPCC's 2001 report says a typical value of the final-climate-sensitivity parameter is $\lambda = 0.5$, yet the central estimate $\lambda \approx 0.88$ implicit in the 2007 report is very much above this value, and there is no discussion of the discrepancy.

The peer-reviewed literature is full of papers questioning the IPCC's estimates of climate sensitivity to changes in CO2 concentration. Schwartz (2007), Wentz *et al.* (2007); Chylek *et al.* (2004, 2007); Lindzen (2008); Khilyuk & Chilingar (2007); Schwartz (2007); and Monckton (2008) all find final climate sensitivity to be <1 °C at CO2 doubling, for different reasons. Indeed, low, harmless, beneficial climate sensitivity is almost becoming a consensus in the scientific literature.

The likelihood of an anthropogenic temperature increase >2 °C by the year 2100 is vanishingly small, since so high an increase would require not only an exponential rate of increase in CO2 concentration very considerably in excess of the slow and recently-linear increase that is observed in the real world, but also an effect of CO2 on temperature for whose overstated magnitude no theoretical demonstration or empirical verification is provided anywhere in the climate assessments of the IPCC.

The IPCC itself has already realized that its climate sensitivity projections, like its projections of the rate of increase in atmospheric CO2 concentration, are substantial exaggerations. The official, central estimate of the effect of a given change in carbon dioxide concentration on global temperature has been revised sharply downwards three times in the past quarter of a century: it was fully 25% greater in 1984 than now.

James Hansen of NASA's Goddard Institute for Space Studies, in the lengthy paper of 1984 that is the *fons et origo* of the methodology for evaluating climate sensitivity

used by the IPCC, estimated that climate sensitivity to a doubling of CO2 concentration was –

$$\Delta T_s = 5.8 \ln(2) = 4 \text{ °C}.$$

The IPCC's current central estimate of CO2 concentration in 2100 is 834 parts per million by volume, compared with today's 385 ppmv. Accordingly, we may apply Hansen's implicit coefficient of 5.8 times the natural logarithm of the proportionate increase in CO2 concentration between today and 2100: thus Hansen would expect that, by 2100, global temperature will have risen as follows –

Step 1: $\Delta T_s = 5.8 \ln(834/385) = \mathbf{4.5 \text{ °C}}.$

However, the IPCC, though adhering closely to Hansen's methodology, reduced its central climate-sensitivity estimate in three steps. In **Step 2** (1990), the IPCC estimated that a doubling of CO2 concentration would raise global temperatures not by Hansen's 4 °C but by **3.8 °C.** By 2001, in **Step 3,** the IPCC's estimate of climate sensitivity had fallen to **3.5 °C** at CO2 doubling, and by 2007, in **Step 4,** it had fallen to just **3.26 °C** at CO2 doubling, a fall of almost one-fifth since Hansen's paper.

The steady fall in the official, central estimates of climate sensitivity, and consequently of global temperatures in 2100, is shown in Table D –

Table D

Official estimates of climate response to CO2

Temperature change 2009-2100	λ	CO2 coeffic.	Final coeffic.	ln(C/C₀)	ΔT_s
Hansen (1984)	0.84	6.9	5.8	ln(834/385)	4.5 °C
Central estimate in IPCC (1990)	0.86	6.4	5.5	ln(834/385)	4.3 °C
Central estimate in IPCC (2001)	0.93	5.35	5.0	ln(834/385)	3.9 °C
Central estimate in IPCC (2007)	0.88	5.35	4.7	ln(834/385)	3.6 °C

Going down: *The climate-sensitivity parameter λ is multiplied by the CO2 forcing coefficient to yield the final climate-sensitivity coefficient, which is in turn multiplied by the natural logarithm of the proportionate increase in CO2 concentration to give the temperature change in response to that proportionate increase. Current CO2 concentration is ~385 ppmv: the IPCC's central estimate is that by 2100 it will be 834 ppmv. Accordingly the projected proportionate increase is ~2.2 times today's concentration. Applying the successively smaller final climate sensitivity coefficients in official documents fro 1984 to 2007 yields* ***Steps 1-4,*** *the successively smaller changes in surface temperature by 2100 projected by official sources.*

However, as we have shown, the CO2 concentration has not been rising in accordance with the IPCC's projections. Accordingly, temperatures globally cannot rise by no more than half of the IPCC's projected central estimate of 3.6 °C: i.e., just 1.8 °C –

Step 5: $\Delta T_s = 4.7 \ln(570/385) = \mathbf{1.8 \text{ °C}}.$

It is generally accepted that an increase of <2 °C over the coming century will not be harmful.

However, further downward adjustments must be made to the official central estimate of climate sensitivity to bring it into line with real-world observation. To begin with, Hansen (2006) finds that the value of the climate sensitivity parameter λ, implicitly ~0.9 in the IPCC's documents, is in fact only ~0.75 (a result he describes as definitive in a current slide presentation), reducing the final coefficient in the climate-sensitivity equation to 4.0 –

Step 6: $\Delta T_s = 4.0 \ln(570/385) =$ **1.6 °C.**

Since 1980, when global temperature records began to be reliable with the addition of the satellite lower-troposphere datasets, global temperature has been rising at ~1.55 °C/century. If this 29-year trend were to continue for the rest of the century, temperature by 2100 would be as follows:

Step 7: $\Delta T_s = 1.55$ °C x $91/100 =$ **1.4 °C.**

However, a rate of temperature increase of as much as 1.55 °C/century for the 21st century seems high, since it is more than double the 0.74 °C/century observed in the 20th century.

The only value for the climate sensitivity parameter λ cited in IPCC (2001) is 0.5 K W^{-1} m^2, though other values are said to be possible. Taking this value, the final coefficient in the climate-sensitivity equation falls to 2.7 –

Step 8: $\Delta T_s = 2.7 \ln(570/385) =$ **1.1 °C.**

This value is close to that found by Arrhenius (1906), who calculated a warming of 1.6 °C at CO2 doubling, implying a final coefficient of 2.3 –

Step 9: $\Delta T_s = 2.3 \ln(570/385) =$ **0.9 °C.**

Usually, those who say "the science has been settled for more than a century" cite a far greater estimate by Arrhenius (1896), written in English and accordingly available to the English-speakers who have dominated the climate-change debate.

However, at the time when Arrhenius performed the 10,000 manual calculations that led to his 1896 result, he did not have available to him the Stefan-Boltzmann radiative-transfer equation, which allows a single calculation to be performed. Once he came across the equation, he wrote a paper in German for the second edition of the *Journal of the Royal Nobel Institute,* in which he concluded as follows –

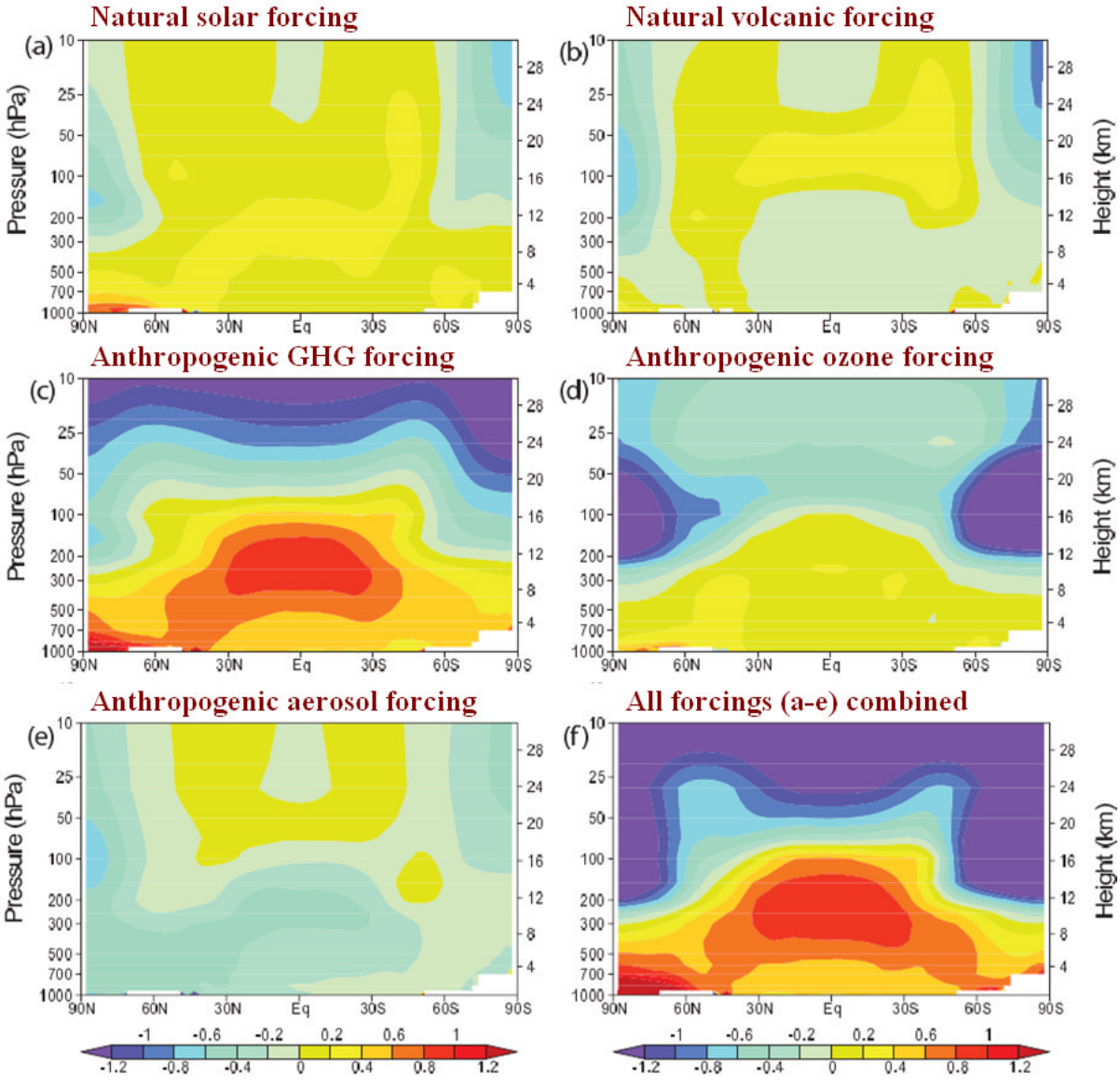
> *"In ähnlicher Weise berechne ich, dass eine Verminderung des Kohlensäuregehalts zur Hälfte oder eine Zunahme desselben auf den doppelten betrag Temperaturänderungen von –1.5 °C beziehungsweise +1.6 °C entsprechen würde."*
>
> "Likewise, I calculate that a diminution of the CO_2 concentration by half or an increase amounting to a doubling would be equivalent to temperature changes of –1.5 °C or +1.6 °C respectively."

Still further reductions in climate sensitivity are necessary to take account of real-world observations that have been reported in the scientific literature. One of the most important of these observations is that, though all of the general-circulation

climate models relied upon by the IPCC predict that anthropogenic greenhouse-gas forcing of the climate requires temperatures in the tropical upper troposphere to rise at ~3 times the surface warming rate, this tropical tropospheric "hot-spot" is demonstrated to be absent in 50 years of radiosonde temperature measurements and 30 years of satellite measurements. Figure 16 shows the computer-predicted pattern of warming from two natural and three anthropogenic forcings, and from all five forcings combined. The distinctive "hot-spot" in the tropical upper troposphere – a predicted warming rate up to three times higher at altitude than at the surface – is clearly visible in the altitude-vs-latitude plot for anthropogenic greenhouse-gas forcing –

Figure 16

The predicted anthropogenic "hot spot"

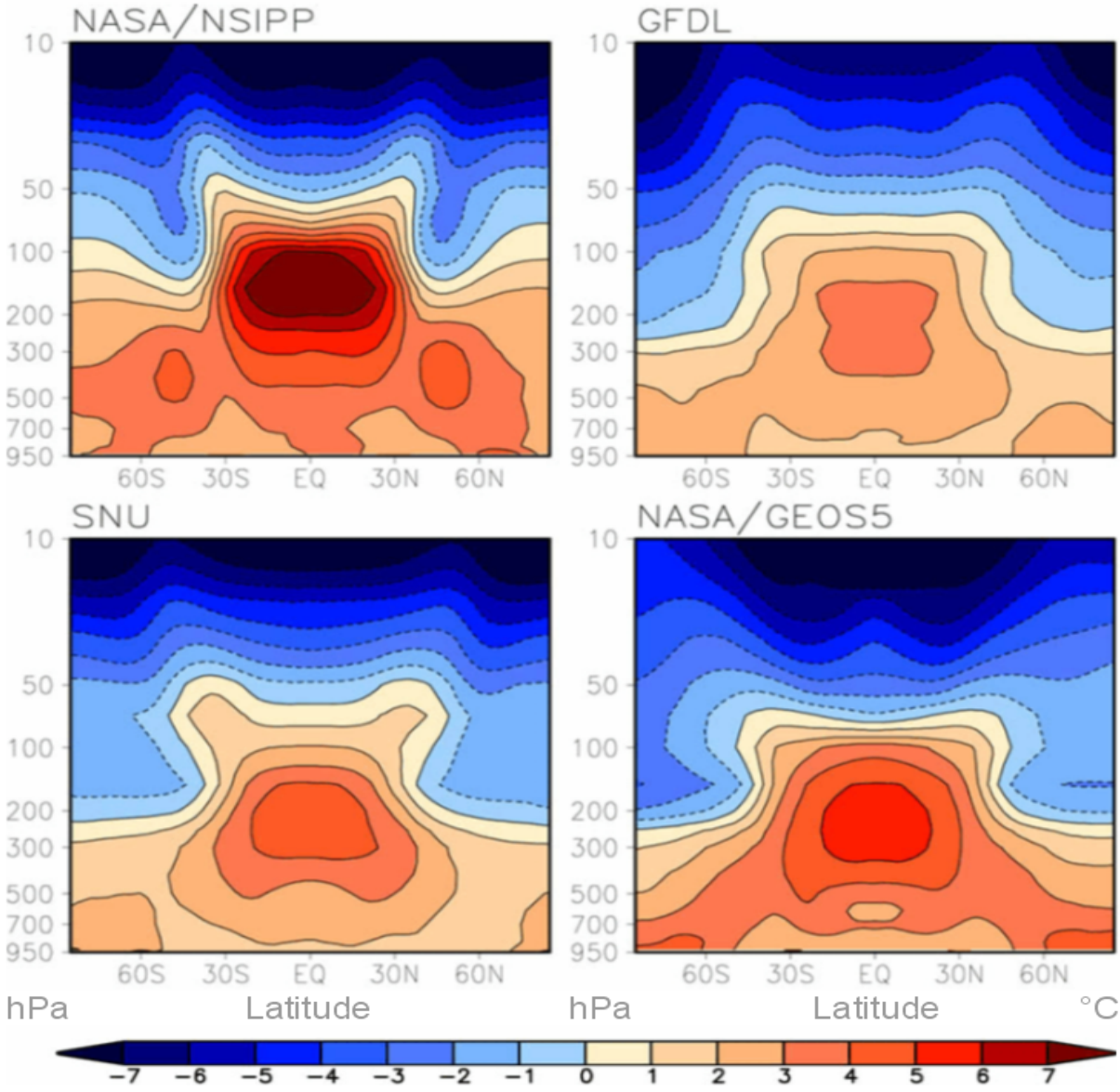


Modeled zonal mean atmospheric temperature change (°C per century, 1890-1999) in response to five distinct forcings (a-e), and to all five forcings combined (f). Altitude is in hPa (left scale) and km (right scale) vs. latitude (abscissa). ***Source:*** *IPCC (2007).*

The fingerprint of anthropogenic greenhouse-gas forcing is a distinctive "hot-spot" in the tropical mid-troposphere. Figure 17 shows altitude-vs.-latitude plots from four of the IPCC's models –

Figure 17

The fingerprint of "global warming"



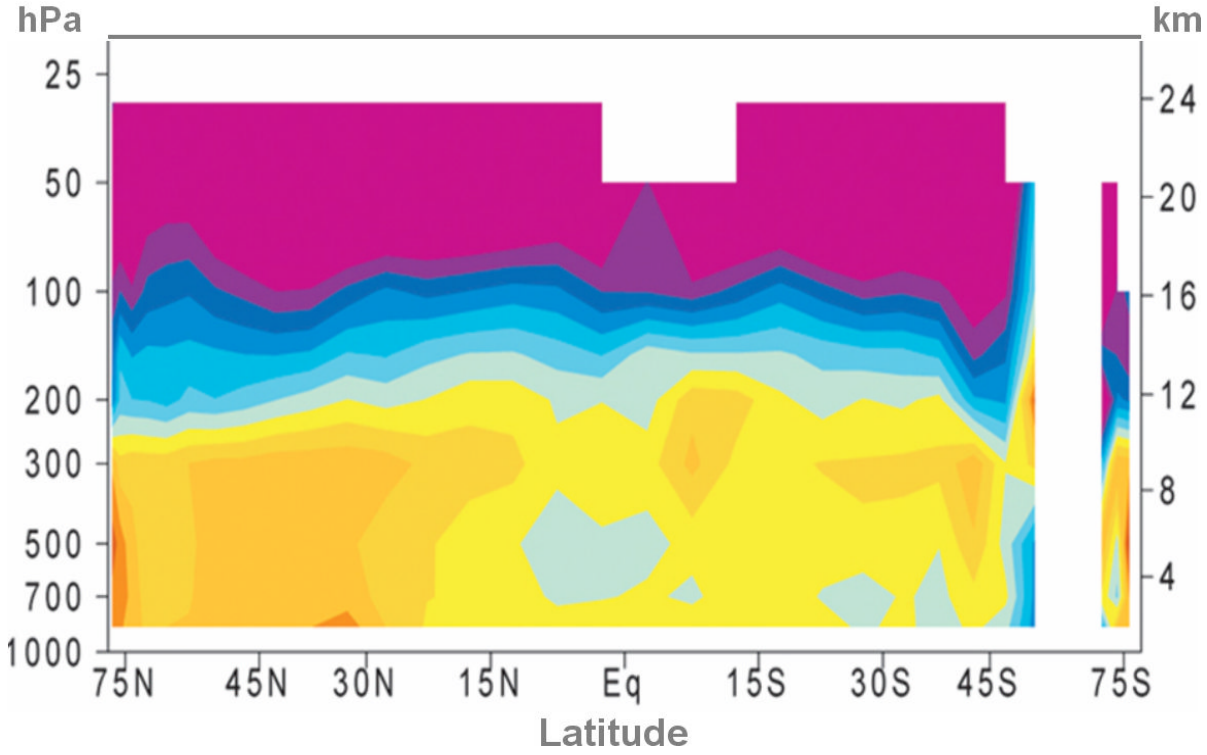
Zonal mean equilibrium temperature change (°C) at CO_2 doubling (2x CO_2 – control), as a function of latitude and pressure (hPa) for 4 general-circulation models. All show the projected fingerprint of anthropogenic greenhouse-gas warming: the tropical mid-troposphere "hot-spot" is projected to warm at twice or even thrice the surface rate. ***Source:*** *Lee et al. (2007).*

However, as Douglass *et al.* (2004, 2007) have demonstrated, the projected fingerprint of anthropogenic greenhouse-gas warming in the tropical mid-troposphere is not observed in reality. Figure 18 is a plot of observed tropospheric rates of temperature change from the Hadley Center for Forecasting. In the tropical mid-troposphere, at approximately 300 hPa pressure, the model-projected

fingerprint of anthropogenic greenhouse warming is absent from this and all other observed records of temperature changes in the satellite and radiosonde eras:

Figure 18

The predicted "hot spot" is absent



Altitude-vs.-latitude plot of observed relative warming rates in the satellite era. The greater rate of warming in the tropical mid-troposphere that is projected by general-circulation models is absent in this and all other observational datasets, whether satellite or radiosonde. Altitude units are hPa (left) and km (right). ***Source:*** *Hadley Centre for Forecasting (HadAT, 2006).*

None of the temperature datasets for the tropical surface and mid-troposphere shows the strong differential warming rate predicted by the IPCC's models. Thorne *et al.* (2007) suggested that the absence of the mid-tropospheric warming might be attributable to uncertainties in the observed record: however, Douglass *et al.* (2007) responded with a detailed statistical analysis demonstrating that the absence of the projected degree of warming is significant in all observational datasets.

Allen *et al.* (2008) used upper-atmosphere wind speeds as a proxy for temperature and concluded that the projected greater rate of warming at altitude in the tropics is occurring in reality. However, satellite records, such as the RSS temperature trends at varying altitudes, agree with the radiosondes that the warming differential is not occurring: they show that not only absolute temperatures but also warming rates decline with altitude.

There are two principal reasons why the models appear to be misrepresenting the tropical atmosphere so starkly. First, the concentration of water vapor in the tropical lower troposphere is already so great that there is little scope for additional greenhouse-gas forcing. Secondly, though the models assume that the concentration

of water vapor will increase in the tropical mid-troposphere as the space occupied by the atmosphere warms, advection transports much of the additional water vapor poleward from the tropics at that altitude.

Since the great majority of the incoming solar radiation incident upon the Earth strikes the tropics, any reduction in tropical radiative forcing has a disproportionate effect on mean global forcings.

In the lecture-notes that formed the basis for Lindzen (2008), the Professor, who kindly communicated them to the lead author of the present report, writes –

> "We see that the trend in the troposphere is no greater and generally smaller than the trend near the surface. ... the greenhouse contribution to surface warming is somewhere between zero and 0.05 degrees Celsius/decade. In brief, no more than about a third of the observed trend at the surface is likely to be due to greenhouse warming. This is about as close as one ever gets to proof in climate physics.
>
> "Using basic theory, modeling results and observations, we can reasonably bound the anthropogenic contributions to surface warming since 1979 to a third of the observed warming, leading to a climate sensitivity too small to offer any significant measure of alarm – assuming current observed surface and tropospheric trends and model depictions of greenhouse warming are correct."

Global temperature has risen 0.45 °C since 1979. Not more than one-third of this increase, or 0.15 °C, says Lindzen, may be attributable to anthropogenic "global warming". In 1979, mean CO2 concentration was ~336 ppmv; in 2008, ~385 ppmv. From this we may derive the final coefficient in the climate-sensitivity equation –

$$c = 0.15 / \ln(385/336) = 1.1$$

We can then calculate the temperature increase between the present and 2100 implicit in Lindzen's evaluation of the implications of the absence of the tropical tropospheric "hot-spot" (a result broadly confirmed in an elegant paper by Douglass and Christy, 2008) thus –

Step 10: $\Delta T_s = 1.1 \ln(570/385) =$ **0.4 °C.**

We note that this reduction in climate sensitivity applies only to the CO2 radiative forcing: it does not affect either the "no-feedbacks" climate sensitivity parameter or the feedback multiplier. Lindzen's result implies, therefore, that the CO2 forcing coefficient must be divided by 3 –

$$c_{\Delta F} = 5.35 / 3 = 1.78.$$

An additional reduction is also appropriate because the IPCC appears to have exaggerated the values of the two parameters whose product is the climate sensitivity

parameter λ. In the IPCC's methodology, λ is the product of the "no-feedbacks" climate sensitivity parameter κ and the feedback multiplier f.

The IPCC's value $\kappa = 0.31$ K W^{-1} m^2 is the highest in the mainstream literature. Any value $\kappa > 0.305$ K W^{-1} m^2 constitutes a repeal of the first and second laws of thermodynamics (a demonstration is beyond the scope of the present paper).

Calculations by Dr. David Evans have established that even the value $\kappa = 0.3$ K W^{-1} m^2 must be reduced by approximately one-tenth to allow for diurnal, seasonal and latitudinal variations of which the IPCC's methodology for quantifying κ takes no account. Therefore –

$$\kappa = 0.3 \times 0.9 = 0.27 \text{ K W}^{-1} \text{ m}^2$$

This value is equivalent to the first derivative of the Stefan-Boltzmann equation with respect to temperature at the characteristic-emission level. For further verification, we may compare this value with the value $\kappa = 0.24$ K W^{-1} m^2 implicit in the statement in IPCC (2001) that $\lambda = 0.5$ K W^{-1} m^2 is a typical value.

The IPCC's value $f = 3.1$ (near-identical to $f = 3$ in Hansen, 1984) is a function of κ and of the sum b of all individual positive and negative unamplified temperature feedbacks, thus –

$$f = (1 - b\kappa)^{-1}.$$

However, there are several grounds for concern when we examine the IPCC's list of individual temperature feedbacks. For the first time, IPCC (2007) quantifies the key feedbacks summing to b:

> "In AOGCMs, the water vapor feedback constitutes by far the strongest feedback, with a multi-model mean and standard deviation ... of 1.80 ± 0.18 W m^{-2} K^{-1}, followed by the negative lapse-rate feedback (–0.84 ± 0.26 W m^{-2} K^{-1}) and the surface albedo feedback (0.26 ± 0.08 W m^{-2} K^{-1}). The cloud feedback mean is 0.69 W m^{-2} K^{-1} with a very large inter-model spread of ±0.38 W m^{-2} K^{-1}." (Soden & Held, 2006).

To these feedbacks we add the CO2 feedback, not listed by Soden and Held, but equivalent to 0.25 W m^{-2} K^{-1}. Thus the feedback-sum is –

$$b = 2.16 \text{ W m}^{-2} \text{ K}^{-1}.$$

Note that only a single paper is cited as authority for the values of the principal climate-relevant temperature feedbacks; that the error-bars in all of the feedbacks, especially the water-vapor feedback, are suspiciously small; and that the sum of the maxima of the listed feedbacks is 3.2 °C, which is precisely the point of instability in the Bode feedback equation, upon which the IPCC relies for its mutual amplification of temperature feedbacks.

Since a runaway greenhouse effect is not evident on Earth, we may take it that the maximal values of the individual feedbacks are excessive. The implication, since the

error-bars are uncomfortably small, is that the central estimates of the values of the feedbacks are also excessive. The values of the maxima are given in Table E: -

Table E

IPCC feedback maxima

Temperature feedback	Maximum value
Water vapor feedback	1.80 W m^{-2} K^{-1}
Lapse rate feedback	–0.58 W m^{-2} K^{-1}
Surface albedo feedback	0.34 W m^{-2} K^{-1}
Cloud albedo feedback	1.07 W m^{-2} K^{-1}
CO_2 feedback	0.57 W m^{-2} K^{-1}
Total feedbacks *b*	3.20 W m^{-2} K^{-1}

Since the equation $[f = (1 - b\kappa)^{-1}] \rightarrow \infty$ as $b \rightarrow [\kappa^{-1} = 3.2$ W m^{-2} $K^{-1}]$, the feedback-sum b cannot approach 3.2 W m^{-2} K^{-1} without inducing a runaway greenhouse effect.

Furthermore, Bode (1945) made it explicit that his equation was not applicable to objects [such as the climate] whose initial state is non-linear: nevertheless, the IPCC applies his equation to the climate object, which is not merely non-linear but chaotic.

It is very likely, therefore, that the IPCC's feedback-sum is too strongly net-positive. Indeed, Spencer (2007) and Wentz *et al.* (2007) are among many in the literature who question the value of feedbacks. Spencer finds the cloud albedo feedback slightly net-negative rather than strongly positive; and Wentz points out that two-thirds of the cooling effects of evaporation at the surface are not allowed for in the IPCC's method of evaluating the water-vapor feedback.

Bearing in mind all these defects in the IPCC's methodology, and recalling that not one of the temperature feedbacks can be either demonstrated theoretically or verified empirically, it seems appropriate, at the very least, to reduce the water vapour feedback to 1.5 and the cloud albedo feedback to zero. Then –

$$b = 1.17 \text{ W m}^{-2} \text{ K}^{-1}.$$

With the two suggested adjustments, this value is sufficiently low to give comfort that the point of instability in the Bode equation will not be breached. The feedback-sum is still net-positive, but is less unreasonable than that of the IPCC.

We may now calculate the feedback factor f from the values of $\kappa = 0.27$ and $b = 1.17$ that we have established –

$$f = (1 - b\kappa)^{-1} = 1 / (1 - 1.17 \text{ x } 0.27) = 1.46$$

Then –

$$\lambda = \kappa f = 0.27 \text{ x } 1.46 = 0.39.$$

This value for the climate-sensitivity parameter is rather below the 0.5-0.9 imagined by Hansen and the IPCC. We are now in a position to reach the final step in our calculation of the likely temperature increase between 2009 and 2100 –

Step 11: $\Delta T_s = 0.7 \ln(570/385) =$ **0.27 °C.**

It is, therefore, very likely that global temperature will rise by less than 2 °C between 2009 and 2100 as a result of anthropogenic influences on the climate, and our contribution to "global warming" may perhaps be as little as a quarter of a degree Celsius over the next 91 years.

Steps 5-11 in our calculation are summarized in Table F –

Table F

Real-world estimates of climate response to CO2

Temperature change 2009-2100	λ	CO2 coeffic.	Final coeffic.	ln(C/C₀)	ΔT_s
IPCC + real-world CO2 growth	0.88	5.35	4.7	ln(570/385)	1.8 °C
IPCC + Hansen + real-world CO2	0.75	5.35	4.0	ln(570/385)	1.6 °C
cf. temperature trend since 1980					1.4 °C
IPCC(2001) sensitivity+real CO2	0.50	5.35	2.7	ln(570/385)	1.1 °C
Arrhenius (1906)			2.3	ln(570/385)	0.9 °C
No tropical troposphere hotspot	0.62	1.78	1.1	ln(570/385)	0.4 °C
Reduction of λ	0.39	1.78	0.7	ln(570/385)	0.3 °C

Note that each of these steps in the calculation has been justified by reference to the peer-reviewed literature and the data, and each equation has been clearly set forth so that it may be verified. It is not necessary to accept every step in the calculation to realize that the likely effect of increased carbon dioxide concentration on global mean surface temperatures by 2100 is very likely to be a long way below the 3.6 °C imagined by the IPCC and other official sources.

It should also be emphasized that only a very small minority of the scientists who contributed to the IPCC's 2007 climate assessment have any experience in the evaluation of climate sensitivity. These scientists number a few dozen at most. All other scientists who contributed to the IPCC's 2007 report were compelled to rely on the climate sensitivity values put forward by these few. If climate sensitivity is indeed as low as we have calculated it to be, then the adverse effects of "global warming" on the climate will be negligible.

We conclude that the true temperature response to increased atmospheric CO2 concentration is very likely to be well below half of the IPCC's imagined temperature response, and that, therefore, global temperature will not have increased sufficiently by 2100 to cause any climatic damage.

CHAPTER 5
WE CANNOT PREDICT "TIPPING POINTS"

Throughout the commission's "science" chapter there runs a thread of impending doom, encapsulated in the following passage –

> "There is also a danger of severe and sudden impacts whose likelihood cannot be assessed, as reflected in the NAS/NRC report *Abrupt Climate Change: Inevitable Surprises* (2002). The glaciers in the Antarctic and Greenland provide a 100,000-year history that show that climate was far more variable before the beginning of human civilization. This history raises the concern that there may be more extreme results as a result of increasing atmospheric GHG levels. Over the last 5,000 years, climate has been very stable, but the norm is rapid and wild fluctuation. If a forcing element, such as levels of GHGs in the atmosphere, changes considerably, it is possible that we could pass a threshold and flip a switch that would cause the climate to undergo rapid change that could include dramatically warmer or colder temperatures or rapid changes in sea level. We cannot predict when continental glaciers will collapse and how fast this will occur. The fossil record shows that there have been 5-meter rises in sea level in the shortest interval that can be read (10 years). A recent study has found that melting of continental glaciers could cause a rise of as much as 3–6 feet by 2100, in addition to the 1–2-foot rise predicted as a result of thermal expansion. In light of recent evidence, James Hansen has expressed the following concern:
>
> Crystallizing scientific data and analysis reveal that the Earth is close to dangerous climate change, to tipping points of the system with the potential for irreversible deleterious effects (James E. Hansen."Dangerous Human-Made Interference with Climate." Testimony to Select Committee on Energy Independence and Global Warming, United States House of Representatives, April 26, 2007: http://www.columbia.edu/~jeh1/2007/Testimony_20070426.pdf)."

However, climate cannot be accurately predicted more than a few weeks ahead with any respectable degree of reliability. The unpredictability even of a simple mathematical object whose initial state is not known in sufficiently fine detail has long been proven. Climate is a complex, non-linear, chaotic object (IPCC, 2001) and is, therefore, *a fortiori,* impossible to predict long-term.

Climate prediction: impossible "by any method"

Precisely because it has been proven that long-run climate prediction is not possible, it is inappropriate to attempt to state or imply that there is a "consensus" that "global warming" caused by increased greenhouse-gas concentrations will be dangerous if it continues.

Scientific dissent on the question of climate is and will always be legitimate, because it is settled, proven science that long-run prediction of the behavior of mathematical objects such as climate is not possible unless the initial climatic state at any chosen moment is known to a fineness of detail that is in practice impossible to attain, and unless the processes for the subsequent evolution of the object are also known in detail, which they are not.

It is the proven characteristic of mathematically-chaotic objects such as climate that neither the magnitude nor the timing of their phase-transitions (in the commission's environmentalist jargon, "tipping points") can be predicted (Lorenz, 1963; IPCC, 2001), because there is simply too little information about the state of the climate in the present to allow us to look as far as 100 years into the future and say with any degree of confidence how little or how much the world will warm.

As Lorenz (1963) put it in the landmark paper with which he founded chaos theory –

> "When our results concerning the instability of non-periodic flow are applied to the atmosphere, which is ostensibly non-periodic, they indicate that prediction of the sufficiently distant future is impossible by any method, unless the present conditions are known exactly. In view of the inevitable inaccuracy and incompleteness of weather observations, precise, very-long-range weather forecasting would seem to be non-existent."

And climate, of course, is very-long-range weather. Recently another scientist has considered the limitations upon climatic prediction with some care. Giorgi (2005) defines two types of prediction:

> "In the late 1960s and mid 1970s the chaotic nature of the climate system was first recognized. Lorenz defined two types of predictability problems:
>
> 1) "Predictability of the first kind, which is essentially the prediction of the evolution of the atmosphere, or more generally the climate system, given some knowledge of its initial state. Predictability of the first kind is therefore primarily an **initial-value** problem, and numerical weather prediction is a typical example of it.
>
> 2) "Predictability of the second kind, in which the objective is to predict the evolution of the statistical properties of the climate system in response to changes in external forcings. Predictability of the second kind is thus essentially a **boundary-value** problem."

Giorgi explains:

> "… Because of the long time scales involved in ocean, cryosphere and biosphere processes a first-kind predictability component also arises. The slower components of the climate system (e.g. the ocean and biosphere) affect the statistics of climate variables (e.g. precipitation) and since they may feel the influence of their initial state at multi-

> decadal time scales, it is possible that climate changes also depend on the initial state of the climate system ...
>
> "For example, the evolution of the thermohaline circulation in response to greenhouse-gas forcing can depend on the initial state of the thermohaline circulation, and this evolution will in general affect the full climate system. As a result, the climate change prediction problem has components of both first and second kind which are deeply intertwined. ...
>
> "The relevance of the first-kind predictability aspect of climate change is that we do not know what the initial conditions of the climate system were at the beginning of the 'industrialization experiment' and this adds an element of uncertainty to the climate prediction."

Giorgi also points out that the predictability of a mathematical object such as climate is adversely affected by non-linearity:

> "A system that responds linearly to forcings is highly predictable, i.e. doubling of the forcing results in a doubling of the response. Non-linear behaviors are much less predictable and several factors increase the non-linearity of the climate system as a whole, thereby decreasing its predictability."

Climatic prediction is, as Lorenz said it was, an initial-state problem. It is also a boundary-value problem, whose degrees of freedom – the quantity of independent variables that define it – are approximately equal to the molecular density of air at room temperature, an intractably large number. It is also a non-linearity problem. It is also a problem whose evolutionary processes are insufficiently understood.

When studying the climate we are in the same predicament as Christopher Columbus. When he set out for the Americas, he did not know where he was going; on the way there, he did not know what route he was following; when he got there he did not know where he was; when he returned he did not know where he had been; and, like very nearly every climate scientist worldwide, he did the whole thing on taxpayers' money.

A thought-experiment

To illustrate the difficulty further, let us conduct a thought-experiment, examining the proven mathematical impossibility of predicting the future state of a complex, non-linear object.

For our little experiment we shall use the Mandelbrot fractal, which is defined using the simple, iterative function $f(z) = z^2 + c$. Compare the extreme simplicity of this function with the complications inherent in the million-variable computer models upon which the UN so heavily relies in attempting to predict the future evolution of the climate.

In the function that generates the Mandelbrot fractal, the real part a of the complex number $c = a + bi$ lies on the x axis of the Argand plane; the imaginary part b lies on the y axis. Let $z = 0$. Compare this certainty and clarity with the uncertainty and confusion of the climate object, where, as Lorenz proved, accurate long-term projection into the future cannot be made unless an exceptionally precise knowledge of the initial state of every one of the million-plus variables at any chosen starting point is known to a very great degree of precision.

The UN presumes to make predictions a millennium into the future. This, as our thought-experiment will compellingly demonstrate, it cannot possibly do.

With the Mandelbrot fractal, then, there is no initial-state problem, for we can specify the initial state to any chosen level of precision. However, with the climate object, there is a formidable and in practice unsolvable initial-state problem. Likewise, we know the process by which the Mandelbrot fractal will evolve, namely the simple iterative function $f(z) = z^2 + c$.

However, our understanding of evolutionary processes of the climate object, though growing, is insufficient, and the computer models which try to project future climatic states continue to be caught by surprise as events unfold. The computers did not predict the severity of the El Nino event in 1998; they did not predict the cooling of the oceans from 2003 onwards; and the operators of one of the UN's leading computer models have recently admitted that the model makes errors that are orders of magnitude greater than the rather small phenomena which they are trying to predict.

In the Mandelbrot fractal, therefore, we have consciously chosen for our thought experiment an object which is like the climate in that it is chaotic and non-linear, but which is unlike the climate in that it has initial conditions which we can specify precisely, and processes for future evolution that are entirely prescribed.

So to the experiment itself. The game is to take a region of the Argand plane within the field of the Mandelbrot object, and to try to predict – at least in rough outline – the picture that will appear as the specified region of the object is generated. We shall choose values of c, to 16 significant figures, as follows:

Top left: $c = 0.2500739507702906 + 0.0000010137903618\,i$;
Bottom right: $c = 0.2500739507703702 + 0.0000010137903127\,i$.

We shall set the color of each point in our picture by counting the iterations before $|z|$ reaches infinity (or here, for convenience, 1 000). Up to 250 000 iterations will be performed to calculate each individual point.

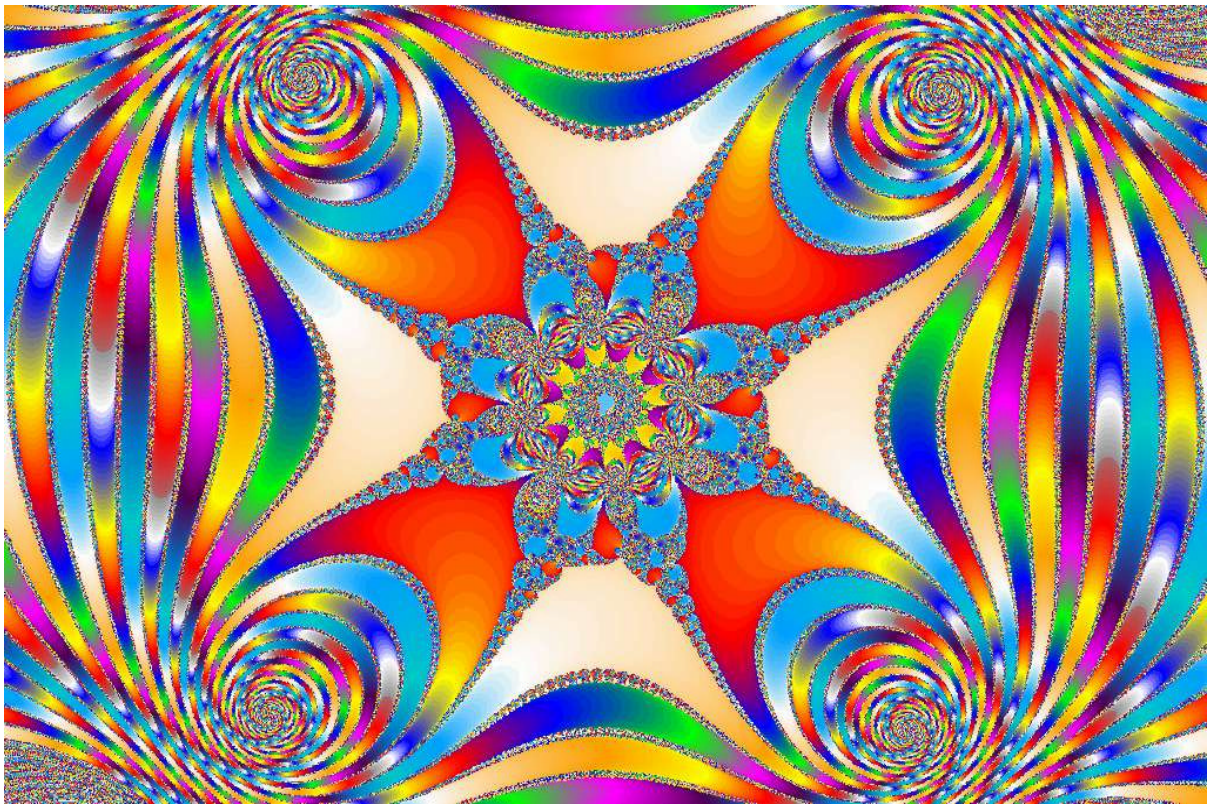
You have been told the initial state of z, and the range of initial values for c. You have been told the processes for proceeding up to a defined future point. Now, before looking at Figure 19 overleaf, make your prediction. What will the picture of our chosen part of the Mandelbrot fractal look like? In trying to draw the picture, you are in a far better position than the IPCC is in trying to predict future states of the climate. But can you do it? Do you have any idea what the picture might look like?

When you have sketched your predicted picture on a piece of paper, compare your prediction with what the specified portion of the Mandelbrot fractal actually looks like (see Figure 19 below). If your picture looked anything like the picture overleaf, apply at once to the IPCC – they need you. If you were unable to predict what the picture would look like, even though our thought-experiment has been made as easy for you as possible, in that the fundamental initial-state and subsequent-process problems that prevent the IPCC or anyone from predicting the climate accurately have been carefully engineered out of our thought experiment, you will begin to appreciate why Lorenz was right to state that long-term prediction of climate is impossible.

Lorenz's paper – one of the most elegant in the history of mathematics – also used a thought-experiment: an artificial climate object with just five variables. He demonstrated that a near-vanishingly small alteration in the initial state of just one of the variables could produce major phase-transitions (or "tipping-points") at a later state of the model. This is often called the "butterfly effect" – a butterfly flaps its wings in the Himalayas and a consequent hurricane devastates Florida.

Figure 19

Complex output of a simple equation



The mathematician's Maltese Cross: *The beribboned Cross of Malta is the unexpectedly complex and colourful output of the deceptively simple, two-variable equation that defines the chaotic object that is the Mandelbrot fractal. The climate object, also chaotic, has millions of initial variables in its definition. Therefore, as Lorenz (1963) wrote, it is impossible "by any method" to predict the cause, incidence, nature, magnitude, duration, or even sign of any future phase transition (in enviro-speak, "tipping-point") in the climate.*

Of course, the computer – on being given the precise co-ordinates we have specified to a precision of 16 decimal places – can model the Mandelbrot object to that precision.

However, even a very small variation in the initial state of the object, as defined by the co-ordinates expressing the range of values of the complex variable *c,* leads to an entirely different picture – or even to no picture at all. This is an appropriate illustration of the reason why, even with the aid of the world's most sophisticated computers, climate cannot be predicted for the long term: we do not know the initial state of the millions of relevant variables at any chosen moment with sufficient precision to make reliable projections of the long-term future state of the climate.

This simple mathematical heuristic is a way of demonstrating that anyone who says, "The Debate Is Over," or "The Science Is Certain," or "Now We Must Act," must be wrong. Climate science cannot, by its very nature, be certain.

We conclude that long-run prediction of future climatic states is not possible, and that accordingly any output from the climate models – however large the models – should be treated with appropriate caution rather than naïve credulity. Given the proven unpredictability of the climate, anyone who says, "The Debate Is Over" is merely displaying scientific ignorance of a long-established result in elementary chaos theory as applied to the climate.

The commission and "tipping-points"

With this mathematical background, we are able to examine the commission's statement that "there is a danger of severe and sudden impacts whose likelihood cannot be assessed".

Note the logical fallacy: if the likelihood of a "tipping-point" cannot be assessed, then the danger that it will occur cannot be assessed either. Since the climate is a chaotic object, sudden bifurcations or phase-transitions following periods of steady-state behavior will occur from time to time.

However, precisely because the climate is chaotic, we cannot know what events are the triggers of such phase-transitions.

Therefore the implication in the commission's "science" chapter that an increase of one part in 10,000 in the proportion of the atmosphere occupied by a mere trace gas over a quarter of a millennium must constitute the cause of a "tipping-point" is, in mathematical terms, baseless.

The commission asserts, as usual without offering evidence, that, though "over the last 5000 years climate has been very stable, the norm is rapid and wild fluctuation".

In fact, the climate has been stable for approximately 11,400 years, since the phase-transition in the Antarctic proxy-temperature record that brought the Younger Dryas cooling event to an abrupt end. However, it is not known what caused the very sudden and very dramatic increase in temperature at the end of the Younger Dryas.

For several sound reasons in elementary climatological physics, however, it is extremely unlikely that an increase in atmospheric carbon dioxide concentration could have triggered the sudden phase transition that ushered in the interglacial period – warmer than today almost throughout – that allowed the sudden development of human civilization throughout the world.

In the paleoclimate it was always the temperature that changed first, and the carbon dioxide concentration that lagged the temperature change by between 800 and 2,800 years.

Temperature in the paleoclimate is inferred by careful measurement of the ratio of two isotopes of oxygen, $_{16}O$ and $_{18}O$, in samples of air trapped in deep layers of Antarctic or Greenland ice.

Carbon dioxide concentration is measured directly in the same samples, subject to considerable uncertainty as to the ability of the ice layers to prevent migration of the carbon dioxide.

Nevertheless, the sequence of events in the paleoclimate is clear: carbon dioxide did not drive temperature, though it might have contributed in a small degree to the magnitude of temperature change once that change had been externally initiated.

Furthermore, the effect of increasing carbon dioxide concentration on temperature is approximately logarithmic. Each additional molecule has less influence on temperature than its predecessor.

It is, therefore, highly unlikely that carbon dioxide concentration might have suddenly reached a "tipping-point" sufficient to trigger the end of the Younger Dryas; and, even if so, it is still more unlikely that it might suddenly trigger another "tipping-point" at a higher temperature.

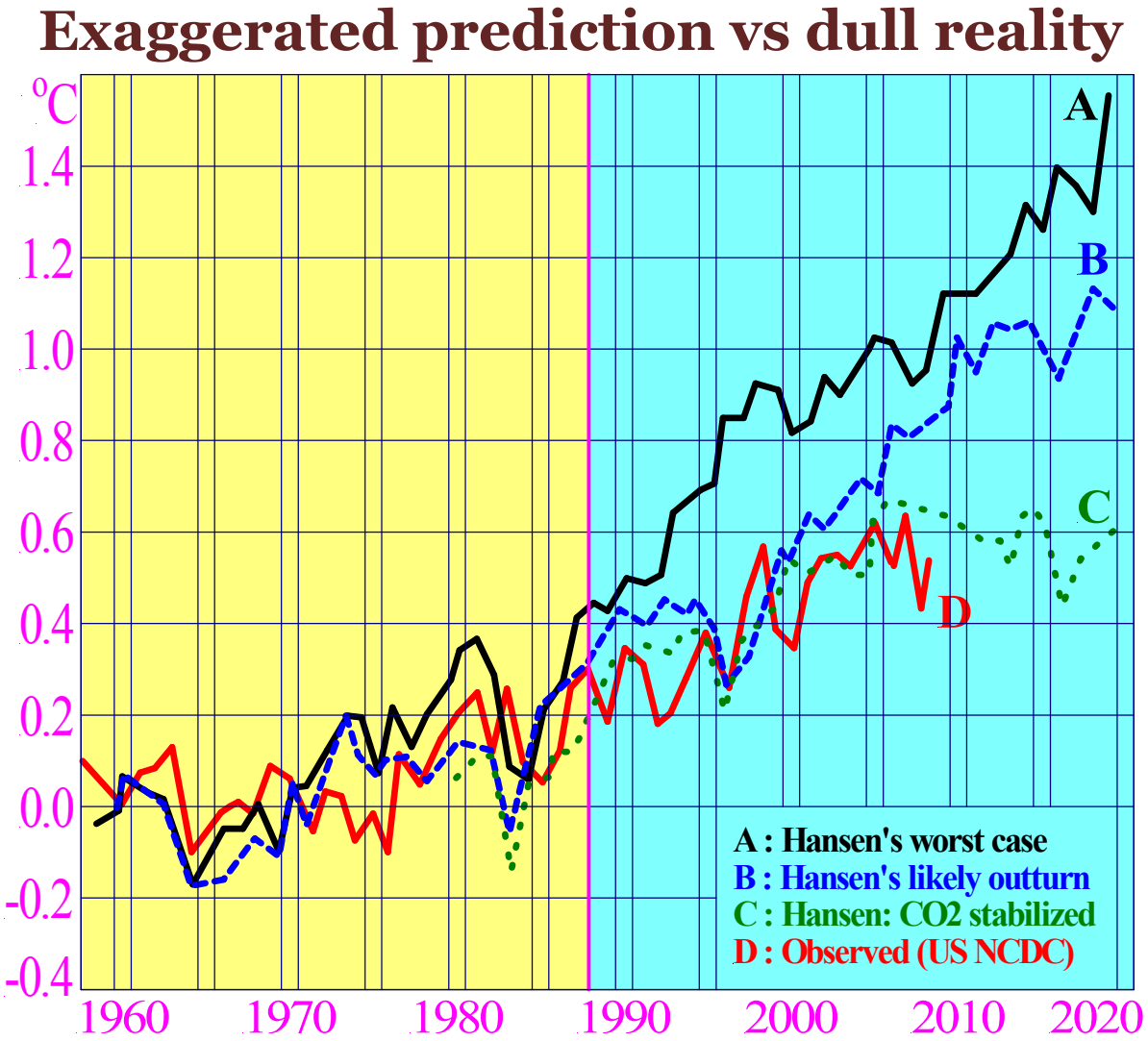
There is no evidence for any such proposition: it is merely baseless guesswork. And the long-suffering taxpayers of Arkansas ought not to be compelled to find billions of additional tax dollars to fund a trivial and futile reduction in this state's emissions of carbon dioxide solely on the basis of guesswork.

The "science" chapter quotes James Hansen as saying that "the Earth is close to dangerous climate change, to tipping points of the system". Does he say this in a peer-reviewed paper? No.

Note Hansen's unscientific use of the politically-charged term "tipping points". Is he, then, a climate scientist? After all, he once said that on questions of climate Dr. Willie Soon of Harvard ought not to be allowed to publish or say anything because he is an astrophysicist.

Hansen is not a climatologist. He is an astrophysicist. It was Hansen's predictions of imminent and severe global temperature increases (Figure 20), delivered before Congress in June 1988, on a day chosen by his political and financial ally Al Gore because it was particularly hot, that triggered the senseless, worldwide climate panic that is now at last subsiding in the face of the facts and the data.

Figure 20



***Real global temperature** (red curve) has failed to rise as James Hansen had predicted before Congress in June 1988. On one measure, global temperature in June 2008, exactly 20 years after Hansen made his prediction, was actually cooler than in the month of the prediction itself.*

Hansen had based his graphs on the assumption that a doubling of atmospheric CO2 concentration would raise global temperature by 4 °C. The current IPCC central estimate is 3.26 °C. Hansen's estimate was 22.5% in excess of the IPCC's value. His predictions, therefore, are very much on the high side (the red curve shows the true position). And his mention of "dangerous climate change" is, therefore, ambitious political rhetoric rather than serious science.

The commission also refers to "a recent study" to the effect that melting glaciers could cause sea level to rise 3-6 feet by 2100, but, as usual, it does not cite the "study", nor does it say whether it was peer-reviewed. It is likely, however, that the study was based on the assumption that the climate would warm as fast as the IPCC assumes it will warm in the current century in response to increased CO2 concentration. As we have seen, that assumption, and accordingly every conclusion drawn from it, is questionable.

CHAPTER 6
CONSEQUENCES OF GLOBAL WARMING

We have established that the likelihood of very high temperatures in response to currently-foreseeable increases in atmospheric carbon dioxide concentration in the current century is vanishingly small, and that the anthropogenic increase in global temperature by 2100 could be as little as one-quarter of a degree Celsius.

Nevertheless, the commission's "science" chapter lists a long series of imagined consequences of "global warming", which it advances as justification for the need to take urgent action to mitigate "global warming" in the hope of preventing the supposed catastrophes. First among these catastrophes is sea-level rise.

Sea level will rise by only 8-17 inches this century

The commission's "science" chapter says -

> "The mean ocean temperature has risen by 0.05 °C (0.09 °F), global average sea level has risen by 0.1–0.2 meters (4-8 inches) over the 20th century, and snow cover and Arctic ice have decreased by about 10% and 10%–15%, respectively, since the late 1960s (when data first became available for this measurement) (NAS/NRC, *op. cit.*, p. 16). ...
>
> - "Ocean temperature has increased to depths of at least 3,000 meters.
>
> - "Global sea levels rose by 1.7 millimeters per year (mm/yr) during the 20th century and by 3.1 mm/yr during 1993–2003. There is high scientific confidence that the rate of rise increased during the 20th century."

It is not clear what the commission means by "the main ocean temperature". There is no such thing. Perhaps it meant "the mean ocean temperature", a meaningless concept, since the changes in temperature globally have not been uniform.

For instance, as expected there has been very little change in sea temperature in the tropics, but there has been considerable warming of the Arctic Ocean and of the Antarctic Peninsula, while most of the Southern Ocean has cooled, along with the great majority of the Antarctic continent.

However, it is clear that the rise of 0.05 °C in ocean temperatures over 100 years mentioned by the commission is so minuscule as to fall well with the measurement error, so that we cannot be sure there has been any rise in ocean temperature at all. It is certainly not so alarming an increase as to presage catastrophe.

A similar consideration applies to the commission's statement that "ocean temperature has increased to depths of at least 3000 meters [10,000 ft]". Temperature measurements at such depths are so infrequent and so sparse geographically that no reliable conclusion can be drawn about the trend in benthic temperatures.

Next, the commission suggests that sea level rose by "0.1-0.2 meters", or, rather, by "1.7 millimeters per year" [equal to 0.17 meters/century] during the 20th century, but that sea level rose by "3.1 millimeters per year during 1993-2003", so that "there is high scientific confidence that the rate of rise increased during the 20th century".

Again, no such conclusion can be respectably drawn. What the commission somehow fails to point out is that in 1993 there was a highly significant change in the method of measuring changes in sea level. The Jason (and now Topex) satellite began measuring sea level changes by altimetry against an idealized spheroid of reference known as the geoid.

Before 1993, sea level rise was chiefly measured by tide gages. The gages had to be corrected by a complex system of allowances for changes in subsea plate tectonics (such as the rapid subduction that led to the disappearance of an island in the mouth of the Hooghly river some years ago, making some 10,000 people homeless), in sedimentation rates (such as that which has added 70,000 km² to the land area of Bangladesh in the past 30 years), and in isostatic recovery rates (such as that which is causing the west coast of northern Britain to rise, driving the east coast beneath the waves).

In short, sea level measurements before those of the past decade were not particularly reliable.

It may be that sea level rose by about 7 in/century in the 20th century, much as the commission suggests: however, the pre-satellite system of measurement was insufficiently exact to measure sea-level rise even to the nearest six inches. This problem of mensuration occurs again and again in the climate debate: very strong conclusions are being drawn on the basis of very weak evidence.

For this reason, one cannot draw any particular conclusions from the fact that the new method of measurement – satellites – shows a rather greater rate of increase in sea level than the old.

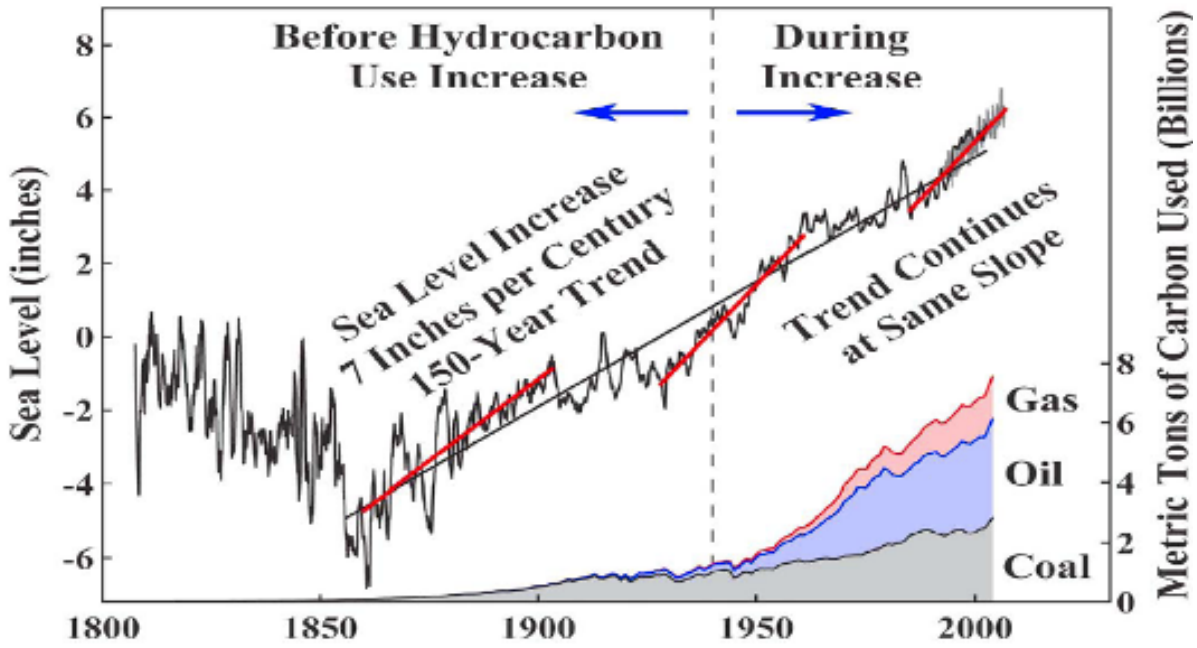
However, geological research has established a point carefully omitted by the commission – that the mean rate of sea-level rise throughout the present interglacial period, dating back some 10,000 years, has been 4 feet per century, compared with a current rate of increase of little more than 1 ft/century.

As with temperature change and carbon dioxide concentration change, so with sea-level change, a geological perspective demonstrates that currently-observed change is well within long-established natural variability.

No conclusion can be drawn to the effect that the rate of global sea-level rise as measured by the Jason and Topex satellites over the past decade has any connection with anthropogenic "global warming", or is in any sense threatening to coastal communities. Regional problems of coastal erosion, such as those in eastern Britain, are caused not by global sea-level rise but by purely local factors that have nothing to do with "global warming" whether natural or anthropogenic.

Figure 21

Little change in the rate of sea-level rise



Sea level has been rising at 7 in / century for 150 years. ***Source:*** *Robinson, Robinson & Soon, 2007.*

Robinson, Robinson & Soon (2007: Figure 21) have shown that sea level has been rising at that rate for about 150 years, and exhibits a recent acceleration that has two precedents within that timescale. There is no scientific basis, therefore, for saying that any anthropogenic warming that may have occurred over the past 50 years has had any appreciable effect on sea level.

Nor is there any reason why a little warming – or even a great deal of warming – should cause a dangerously rapid rise in sea level. Why? Because most of the land-based ice that once covered much of the northern hemisphere had melted 9000 years ago, when the last glaciers vanished from Scotland. There is not enough of it left to cause any major rise in sea level, and what is left – almost all of it in Greenland and Antarctica – is at latitudes and altitudes far too high for any significant melting to occur in the near future.

True, the UN imagines that most sea-level rise will come not from the melting glaciers about which the media so frequently fantasize, but from thermosteric expansion – sea water swelling as it warms. However, thermosteric expansion can only occur if the body of water in question is getting warmer. Contrary to what the commission suggests, the oceans are not currently getting warmer (except in certain regions, such as the Antarctic Peninsula, where there is evidence of undersea volcanic activity).

Lyman *et al.* (2006) reported that the oceans of the world had been cooling since 2003. They published a correction the following year, to the effect that the oceans had not been cooling, but had not been warming either. Now a definitive study based on readings from 6000 bathythermographs, including the 3000 Argo buoys deployed in 2003, shows that the oceans have indeed been cooling since at least 2003, in line

with the atmospheric cooling noted in the observed temperature record, and discussed in earlier chapters of the present report.

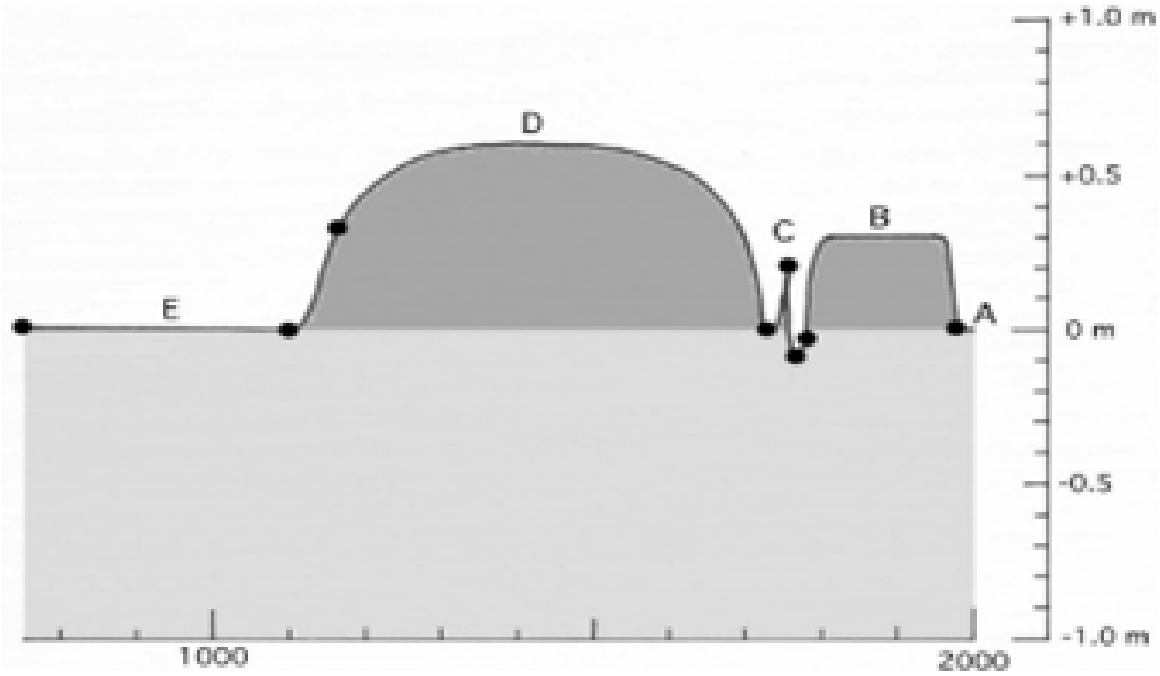
It is no surprise, then, that the UN's climate panel (IPCC, 2007) has been compelled to cut by one-third its previous high-end estimate (IPCC, 2001) that sea level would rise 3 feet by 2100. Its new high-end estimate is less than 2 feet, with a best estimate of no more than 1 ft 5 in.

The world's foremost expert on sea level is Professor Niklas Moerner, who has been studying nothing but sea level for a third of a century. In a recent paper (Moerner, 2004), he condemns the IPCC for its baseless exaggeration of future sea-level rise, and says there is no reason to suppose that sea level will rise any faster in the 21st century than it did in the 20th – i.e., by 7 or 8 inches. This paper had a profound effect on the IPCC, which duly moderated its previously-excessive projections.

Moerner also concluded in 2004 that mean sea level in the Maldives was no higher today than it had been 1,250 years ago (Figure 22) –

Figure 22

No sea-level rise in the Maldives



No change: *Sea level in the Maldives has seldom been lower in 1250 years.* ***Source:*** *Moerner, 2004.*

There is not and has never been any scientific basis for the exaggerated projections by a certain politician that sea level might imminently rise by as much as 20 feet. That politician, in the year in which he circulated a movie containing that projection, bought a $4 million condominium just feet from the ocean at Fisherman's Wharf, San Francisco. It seems, therefore, that he did not believe his own prediction.

In a recent case in the High Court in London, intended to prevent the transmission of alarmist pseudo-science to children, the judge said of this politician's sea-level prediction that –

> "The Armageddon scenario that he predicts is not based on any scientific view."

And the difference between the judge in the London High Court and the justices of the US Supreme Court, cited earlier, is that in London the scientists who had been trying to tell the court that the movie was "broadly accurate" were eventually persuaded to concede that, in this and eight other major respects, the movie was seriously and serially inaccurate.

Water vapor is the most important greenhouse gas

Contrary to the opinion of the Supreme Court, carbon dioxide is by no means the most important of the greenhouse gases. That accolade belongs to water vapor. The commission's "science" chapter says –

> "Water vapor is a greenhouse gas and is an important amplifier of climate change because its atmospheric concentrations tend to increase when the atmosphere and surface waters warm up. Anthropogenic emissions of water vapor to the atmosphere by automobiles and other combustion sources do not significantly affect global atmospheric concentrations of water vapor relative to the natural evaporation and condensation processes."

The commission cannot quite bring itself to admit that water vapor is the most important of the greenhouse gases, because that would appear to diminish the role of CO2. However, water vapor does indeed tend to amplify warming, because the Clausius-Clapeyron relation establishes that, as the atmosphere warms, the space that it occupies is capable of carrying near-exponentially more water vapour.

However, there are several compensating mechanisms that the commission somehow omits to mention. Perhaps the most important of these, considered in Spencer (2008), is the increase in the albedo of the tropical cloud-belt as atmospheric water vapor content increases with warming. More albedo means that more solar irradiance is reflected from the tropics back into space, exercising a strong negative effect on temperature.

Also, both relative and absolute humidity are highly variable throughout the atmosphere, considerably reducing the capacity of water vapour to cause increases in global temperature.

Small, natural climate change in the cryosphere

The news media have said much about the imagined loss of ice and snow cover at the poles and elsewhere. Reflecting the media coverage rather than the science and the data, the commission's "science" chapter says –

"The evidence that anthropogenic emissions of GHGs have already affected the climate includes the following observations:

- "The average Arctic temperature has increased at twice the global average.
- "Summer Arctic sea ice has shrunk at 7.4% per decade since 1978.
- "Mountain glaciers have declined in both hemispheres.
- "There is a trend toward less snow at low altitudes."

The first of the commission's four points about the cryosphere is meaningless unless the period of measurement is mentioned (which it is not). However, the Arctic was up to 2 °C warmer in the 1930s and early 1940s than it is at present.

The North-West Passage, which has become briefly ice-free in recent summers, was previously ice-free in the 1940s; and in 1903, when Amundsen sailed through it in an unpowered vessel; and at various times in the 17th, 18th, and 19th centuries. Extreme variability has long been a feature of the Arctic climate: but present conditions are by no means untypical.

However, it is in general true that any warming – whether natural or anthropogenic – will normally have a disproportionately large effect at the Poles. Curiously, however, most of the Antarctic has cooled in the past half-century, and the Arctic, as noted above, is also cooler than it was between the wars.

The second of the commission's four points is misleading, in that it presupposes an inexorable, steady decline in summer sea-ice in the Arctic.

In fact, the cited decadal percentage decline can only be arrived at by including the exceptional summer sea-ice melt of 2007, which, according to a NASA report, was caused not so much by "global warming" as by exceptional poleward movements of ocean currents powered by southerly winds.

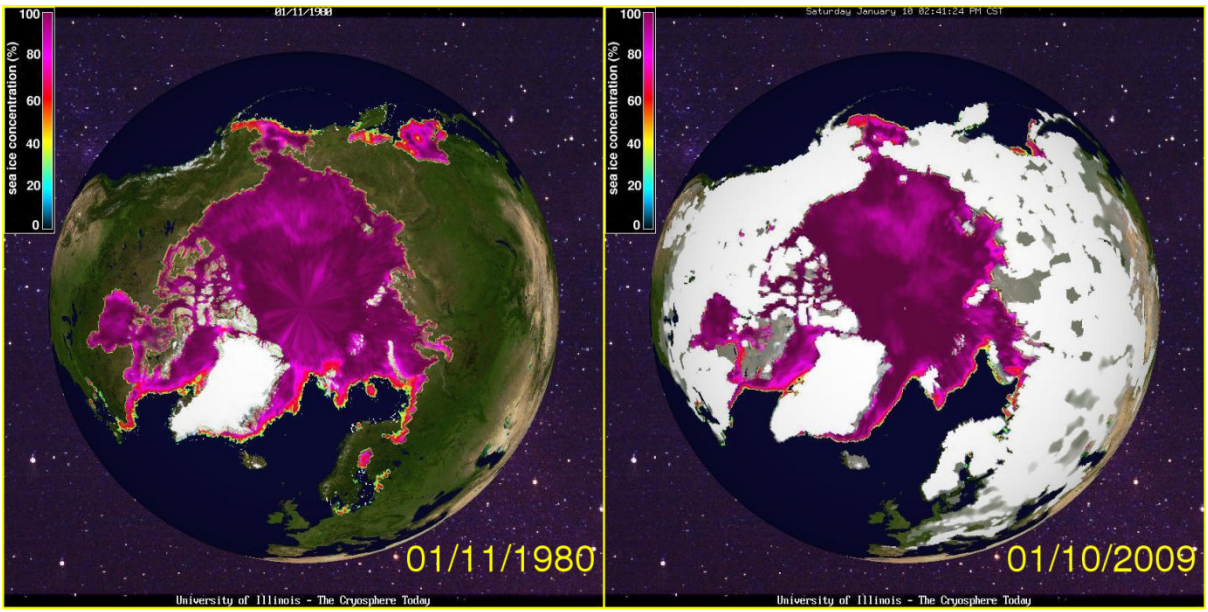
Even if the sea ice were to disappear altogether in the summer, as it probably did during the medieval, Roman and Bronze Age warm periods and certainly did 850,000 years ago, not a hundredth of an inch would be added to sea level by the melting ice, for it is already floating.

Ice has proven to be an emotive ally of the alarmist political faction that has sought to perpetrate and perpetuate the climate scare. Who has not seen the footage, over and over again, of ice crashing into what appears to be the sea? That footage is in fact of a glacier in South America that runs across a freshwater lake and dams it. Every few years the lake waters build up to the point where they breach the glacier. The film-clip, therefore, is of an entirely natural event that owes nothing to "global warming", whether natural or anthropogenic.

Likewise, one of the early sequences in Al Gore's *An Inconvenient Truth* shows what appears to be part of an ice-sheet. In fact it is a purely computer-generated image. Very little in the climate debate is truly real.

Figure 23

Little loss of Arctic sea ice over 29 years

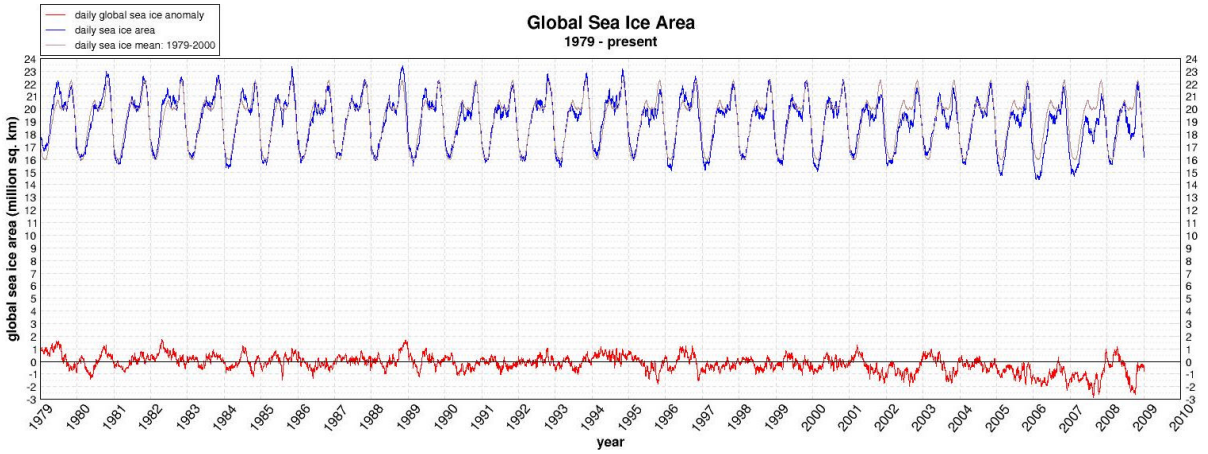


Arctic ice remains extensive: *These two satellite images, measuring the (purple) sea-ice extent in the Arctic and separated by 29 years, show a very small decline in sea-ice extent over the period. The earlier image does not also show snow-cover.* ***Source:*** *University of Illinois.*

The commission says that no effects have been observed on Antarctic sea ice. The truth, which the "science" chapter somehow fails to mention, is that the extent of Antarctic sea ice has been growing, and has recently reached record levels – certainly enough to make up for the very slight decline in Arctic sea ice. The University of Illinois' index of global sea-ice extent (Figure 24) shows no trend for 30 years –

Figure 24

Global sea ice extent holding steady

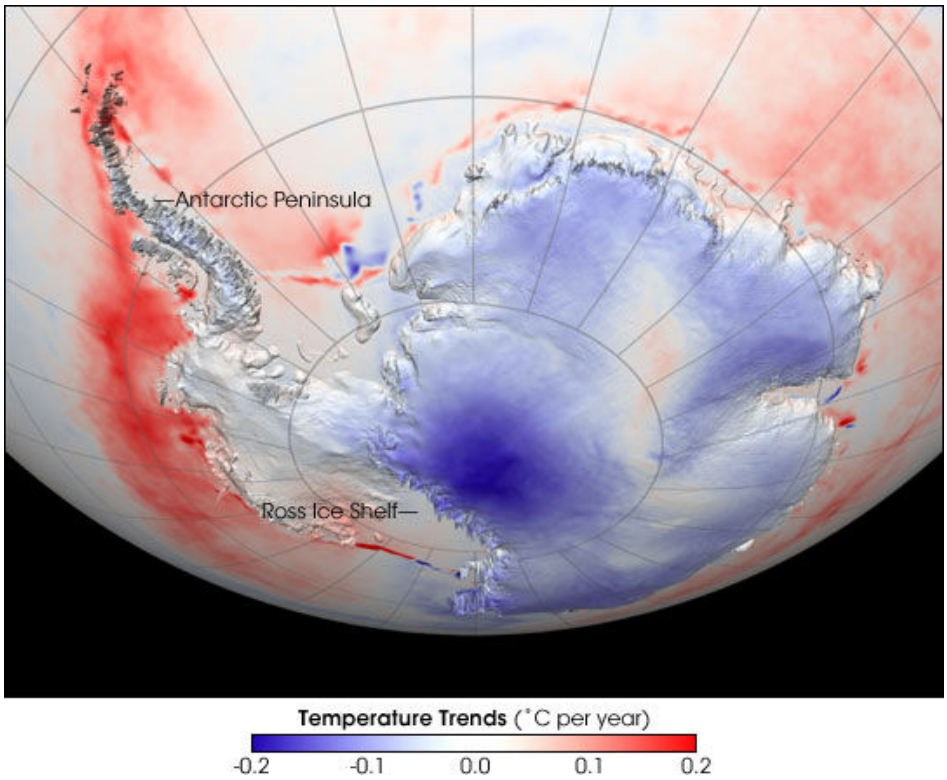


The reason why the extent of global sea ice has remained so constant throughout the period of the satellite record is that the warming of the Arctic region has been more

than compensated by the cooling of Antarctica, though the latter has received far less media attention than the former.

Figure 25

Cool Antarctica



Antarctic cooling: *Temperature trends in the Antarctic, 1979-2007 (after Doran et al., 2002). The warming of the surrounding Southern Ocean has not prevented the formation of record sea-ice around the Antarctic land-mass, which has been cooling rapidly, especially at the South Pole itself.*

The third of the commission's four points about the cryosphere is that mountain glaciers have been in decline in both hemispheres. So they have, but these glacial recessions, insofar as they indicate warmer weather, tell us nothing about whether the warming has been caused by us or by the Sun: for simultaneous planetary warming and (where applicable) glacial recession have been seen elsewhere in the solar system – on the surface of Mars, on Jupiter, on Neptune's largest moon, and even on distant Pluto.

Glacial recession seldom indicates unprecedented "global warming". For instance, the Furtwängler glacier at the summit of Mount Kilimanjaro, which, like many mountain glaciers, has been receding since 1880, long before any possible human influence on the climate, has not been melting but ablating. In 30 years of satellite monitoring, the temperature at the summit has never exceeded –1.6 °C, and has averaged –7 °C throughout the period of continuous monitoring. The ablation of the glacier, which had removed half of the ice at the summit before Hemingway wrote *The Snows of Kilimanjaro* in 1936, has been caused not by "global warming" but by regional cooling and consequent desiccation of the atmosphere in the region, compounded by imprudent post-colonial deforestation in neighbouring countries.

In the Alps, the recent recession of mountain glaciers has revealed mountain passes and roads, forests, and even an entire silver-mine that had been buried under ice after the end of the medieval warm period, establishing that the glaciers had receded before.

In the Himalayas, Professor M.I. Bhat of the Indian Geological Survey has said there have been no unusual trends in the rates of advance and recession of the 9,575 glaciers that debouch into India since the surveyors of the Raj first kept records 200 years ago.

In south America, Polissar *et al.* (2006) established that in the Cordillera de Merida, in the tropical Andes, all but the high peaks had been generally ice-free throughout the 10,000 years of the Holocene era, but glaciers are now widespread.

In north America, many glaciers that had been receding are now showing signs of advancing, after several cold winters.

However, what the commission carefully does not say is that nearly all of the world's glaciers are not mountain glaciers: they are part of the vast ice sheets of Antarctica and Greenland, which between them account for some 95% of the world's ice, and almost all of the world's 160,000+ glaciers (IPCC, 2001). In Greenland, several glaciers have recently begun advancing. And it is known, for instance, that what is now called "warming island" was an island until the mid-1950s, when advancing ice turned it into a peninsula. Most of Antarctica has cooled over the past half-century. Its glaciers are, therefore, showing few signs of recession.

The vast Greenland ice sheet last melted 850,000 years ago, when conifers grew even at some of the highest altitudes. Humankind's industrial activities are not thought to have been responsible: we were not there. Therefore, even if Greenland's ice sheet were to melt away entirely, it would not be possible to say that the melting was unprecedented and therefore definitely attributable to anthropogenic influences on the climate.

According to satellite observations, the area of Greenland that is covered in ice has decreased by 0.03% in the past 30 years. This relatively trivial diminution in the *area* is, however, more than compensated for by a very considerable increase in the *thickness*. According to Johannesen *et al.* (2005), the ice sheet grew in thickness by 5.4 cm (more than 2 inches) *per year* in the 11 years 1993-2003. Johannesen *et al.* used satellite altimetry, a well-tried technique, to estimate the change in thickness over the period of observation. However, more recent experiments, using the GRACE satellites, have attempted to measure changes in the thickness of the Greenland ice sheet by the more indirect method of studying variations in gravitational anomaly. Calibration of such measurements poses formidable problems because of changes in the location and altitude of the tectonic plates that make up the Earth's surface, compounded by isostatic alterations in the altitude of the underlying rock caused by changes in the weight of Greenland's ice as it melts or accumulates.

So, which is right – satellite altimetry or gravitational anomaly, Johannesen or GRACE? Sometimes in science a sensitive and intelligent device known as the Mark 1 Eyeball can come in handy. The US used to maintain a chain of Distant Early Warning (DEW-line) radar stations across Greenland, watching for incoming Soviet

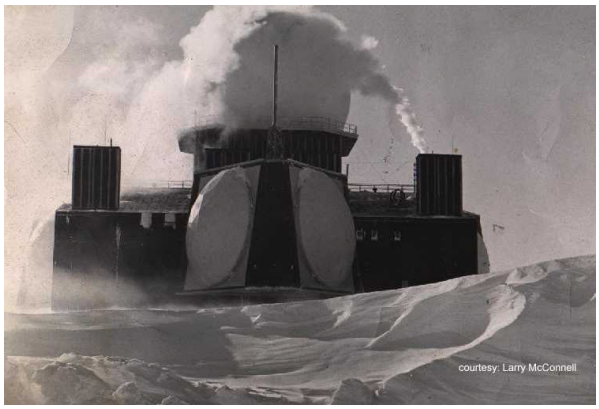
or Chinese intercontinental ballistic missiles. We shall present photographs of two of these now-abandoned stations, DYE-2 and DYE-3 (Figure 26):

Figure 26

Little loss of Arctic sea ice over 29 years

DYE-2 proud of the ice in 1966 ...

... and surrounded by it in 1998



DYE-3 on the ice surface in 1972 ...

... and engulfed by it in 2006

The history of the attempts by the US military to keep the DYE-2 station above the accumulating ice and snow is revealing. It was essential that all of the radars should remain above the surface of the ice sheet at all times so that they would be able to work efficiently at long range. Table G demonstrates what occurred –

Table G

Rapid accumulation of Greenland ice

Year	Event
1959	DYE-2 station built on the surface of the Greenland ice sheet
1962	DYE-2 jacked up by 1.8 meters (6 feet) above original datum
1965	DYE-2 jacked up by 2.7 meters (9 feet) above original datum
1967	DYE-2 jacked up by 3.2 meters (10 feet) above original datum
1970	DYE-2 jacked up by 7.6 meters (25 feet) above original datum
1976	DYE-2 jacked up by 8.2 meters (27 feet) above original datum
1988	DYE-2 station closed as the Cold War came to an end

At least in the region of these two stations on the DEW-line, the Greenland ice sheet has clearly been thickening, consistent with the findings of Johannesen *et al.* (2005). DYE-2 had to be jacked up by 27 feet in a couple of decades to keep it clear of the ice.

The IPCC's 2007 report stated clearly that there would be no significant melting of Greenland for several millennia, and only then if global temperatures remained at least 2 °C above today's temperatures throughout those millennia.

In Antarctica, the only significant loss of ice has been on the Antarctic Peninsula, which occupies ~2% of the land area of the continent.

Seven ice shelves, accounting for an area <2% that of Texas, have disappeared in the past decade. However, Larsen B, one of these shelves, was not present during the medieval warm period (Pudsey *et al.,* 2006), so the disappearance of the shelves is not only insignificant but not unprecedented.

The Larsen B disappearance is yet another example of an event that is well within the natural variability of the climate, but that has been exploited by a political faction in an attempt to make out a case that the climate is now changing in unprecedented, alarming, and dangerous ways.

In fact, the vast majority of the continent of Antarctica has cooled considerably over the past half-century, with corresponding accumulation of snow and ice, and there has also been environmental damage arising from intense cold in some Antarctic glens (Doran *et al.,* 2002).

A proxy for summertime temperatures at the poles is the extent of summer sea ice. In Antarctica, the summer of 2008 saw a record high sea-ice extent. This event attracted none of the publicity that the opposite event – an unusual reduction in the extent of summer sea-ice in the Arctic – had attracted the previous year.

There is little reason to suppose that the West Antarctic Ice Sheet is about to disintegrate. Even if it were to do so, the event would not be unprecedented, and could not be safely attributed chiefly to anthropogenic influences on the climate. Whaling records establish that vast icebergs broken off from the West Antarctic Ice Sheet have been seen before – some of them hundreds of miles long. Yet the Ice Sheet has survived.

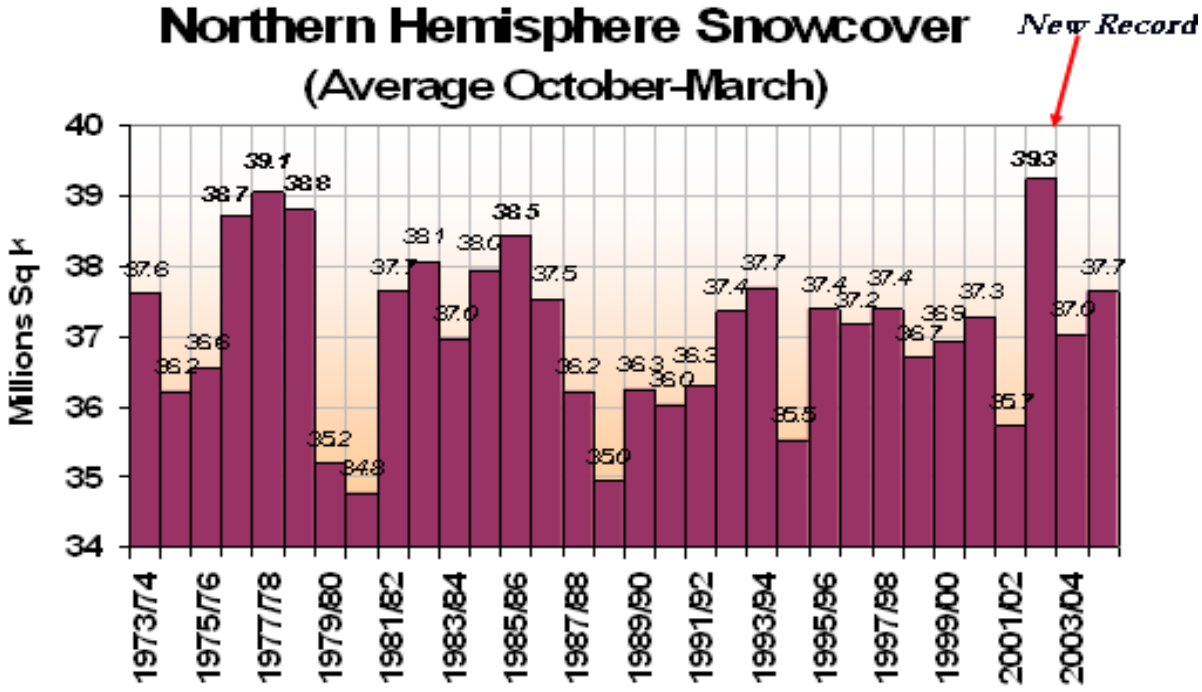
The last of the commission's four points about the cryosphere is its mention of "a trend towards less snow at low altitudes", as though this (even if it were occurring) were somehow significant. However, the key statistic for snow cover is its extent at all altitudes in the Northern Hemisphere during the winter.

Records both from NASA (Figure 27) and from the Rutgers University Snow and Ice Lab demonstrate that, in the 30-year period of the satellite record, the greatest northern-hemisphere snow extent was in 2007/8, though 2008/9 may well surpass that record, and that in the 30 years the extent of northern-hemisphere winter snow cover has shown no trend, either overall or in any of the individual winter months.

Snow cover remains normal. There is no scientific basis for suggesting otherwise.

Figure 27

No trend in the extent of snow cover



Source: *NASA*

We conclude that the cryosphere has shown none of the signs of dangerous change implicit in the commission's "science" chapter. Such changes as have occurred are well within natural variability as evidenced by events in both the past and the present climate. The changes have been fewer than the commission suggestions, lesser in extent, and often of opposite sign.

Rainfall and floods, heatwaves and droughts

It has been a feature of much ill-informed commentary on the climate in the news media that flatly-contradictory suggestions of simultaneous danger from both floods and droughts are made and eagerly attributed to anthropogenic "global warming". The commission's "science" chapter is no exception to this regrettable tendency. It writes, without irony –

> "The evidence that anthropogenic emissions of greenhouse gases have already affected the climate includes the following observations:
>
> - "There has been an increase in precipitation over many large regions (the Northern Hemisphere, in general, and eastern North America).
> - "There have been more intense, longer droughts in many regions.
> - "There has been less rainfall in African Sahel, southern Africa, and southern Asia.
> - "The frequency of heavy rainfall events has increased over most land areas.

- "There have been widespread increases in hot days and nights, and heat waves."

As before, we shall consider the commission's points *seriatim,* having first commented that, even if the mutually-contradictory climate events mentioned by the commission had actually occurred in a manner that transgressed natural variability in the climate, which they have not, the occurrence of these events might just as respectably have been attributed to natural warming of solar or oceanic origin as to anthropogenic warming. It cannot be too often pointed out that the *fact* of warming, even if it had been occurring on a global scale, which in the past eight years it has not, tells us nothing of the *cause* of the warming. The commission's assumption that the warming that it imagines has taken place can automatically and definitively be attributed to anthropogenic causes is an instance of the formal logical fallacy known as the *argumentum ad petitionem principii,* the "begging-the-question" or circular argument, in which the conclusion – often artfully disguised – is also one of the premises.

Let us tabulate the premises and the conclusion implicit in the commission's cited passage, so that its fallacious argument may be clearly seen for what it is –

Table H

Commission commits *petitio principii*

Argumentative step	Assertion
Premise 1	**Warmer weather causes more droughts and floods**
Premise 2	**The weather is getting warmer**
Premise 3	**Anthropogenic CO2 emissions cause warming**
Premise 4	**Anthropogenic CO2 concentrations are increasing**
Conclusion	**Humans are causing more droughts and floods**

Logic does not concern itself with the *truth* of an argument: merely with its *validity,* i.e. whether the premises properly entail the conclusion. We shall, therefore, demonstrate why the above superficially-plausible argument is logically invalid.

The argument (see Table H) fails because, in effect, the commission is assuming the conclusion as an undisclosed additional premise. The argument might have become valid if the commission had made some attempt to establish that the *only* cause of warmer weather, and hence of the droughts and floods that the commission imagines are the ineluctable consequences of warmer weather, was anthropogenic emissions of CO2 and other greenhouse gases. Instead, the commission has merely assumed that this is the case. In effect, it has taken the conclusion of the argument as one of the premises.

As if the commission's fallacy of *petitio principii* were not bad enough, its argument also fails the test of truth. The conclusion of an argument can only be proven true if all of the premises that are necessary to entail that conclusion are necessarily true. However, it is not necessarily true, for instance, that warmer weather causes more droughts and floods.

Warmer weather is not likely to cause droughts because, as the atmosphere warms, the space it occupies becomes capable of carrying near-exponentially more water vapour. For this reason, during the warming of the 20th century, many regions of the world, including the United States, experienced more droughts in the first half of the century than in the second half.

By the same token, warmer weather is not likely to cause floods, because flooding usually results from strong storm systems. However, it is settled science that, outside the tropics (and arguably in the tropics too), the reduction in temperature differentials as the Polar regions warm faster than the tropics causes a reduction in the number of strong storm systems, and hence reduces flooding. Severe flooding in the United States was a far greater problem early in the 20th century than it is today.

In fact, all of the points made by the commission about droughts and heatwaves, floods and rainfall are untrue. It is no surprise, therefore, that the commission offers no evidence in support of the declarations that it makes.

"Increase in precipitation over the Northern Hemisphere and eastern North America": Since water stress is a growing problem as humankind's activities use more and more water, the very slight increase in precipitation that has occurred is to be welcomed, not feared. In any event, it is well within natural variability and poses no actual or potential threat.

"There have been more intense, longer droughts in many regions": Since the climate is chaotic, the naturally-occurring patterns of drought and flood will vary from place to place and from time to time. It has always been true, therefore, that in some region or another there will be "more intense, longer droughts": the shifting patterns of drought and flood are well within natural climate variability. The commission's report is supposed to be directed at Arkansas and the wider United States. Yet somehow the "science" chapter fails to point out that there are far fewer and less serious droughts now in the US than there were in the 1930s, when John Steinbeck wrote his great novel *The Grapes of Wrath* about the severe droughts that were common in the Great Plains in the first half of the 20th century but have become comparatively rare since.

"There has been less rainfall in African Sahel, southern Africa, and southern Asia": All three of these statements are simply false. In the Sahel, along the southern edge of the Sahara Desert, there has been so much extra rainfall that the Sahara desert has lost some 300,000 km² of its area to vegetation in the past 30 years, and nomadic tribesmen have been able to return to regions that have not been settled by humankind in living memory. In southern Africa, studies by the hydrologist Will Alexander have established definitively that patterns of drought are governed not by anthropogenic "global warming" but by the 22-year Hale Cycle of the Sun. There has been plenty of rainfall in southern Africa recently (indeed, in Mozambique there has on occasion been too much): however, Dr. Alexander now predicts major drought in the region because the Sun has reached the appropriate point in its 22-year cycle of activity. In southern Asia, there has been no trend in monsoon rainfall throughout the past half-century.

"The frequency of heavy rainfall events has increased over most land areas": Insufficient reliable data exist to establish any such conclusion. The reliable

measurement and quantification of heavy rainfall events is still an inexact science, even with the recent assistance of satellites, so there is no credible basis for this assertion. In the early part of the 20th century, far more severe flooding was seen than anything that has occurred in recent times, and with far more catastrophic consequences.

In April 2007, the UK Meteorological Office confidently and publicly forecast that the summer would be the hottest, driest, most drought-prone since records began. Six weeks later the coolest, wettest, most flood-prone summer since records began commenced (Figure 28).

Figure 28

Drought was forecast

Chaotic climate, June 2007: *The Met Office had predicted drought just six weeks earlier.*

"There have been widespread increases in hot days and nights, and heatwaves": Since there has been a cooling trend for eight years, there is no basis for the commission's assertion that there have been "widespread increases" in hot days and nights, or in heatwaves. On the contrary, there have been isolated instances, such as the notorious heatwave in Europe in 2003, which is known to have been caused not by "global warming" but by an unusually prolonged blocking high-pressure system. The number of deaths from heat has plummeted in the US, because the nation has the necessary systems to cope. In any event, it is cold that is the biggest killer, not heat. Warmer weather will, in general, lead to a substantial overall reduction in weather-related deaths.

Ecological changes have been insignificant

The commission says –

> "The evidence that anthropogenic emissions of greenhouse gases have already affected the climate includes the following observations:
>
> - "Various ecological changes have been observed, including impacts on nesting behavior, insect and disease outbreaks, and species distribution."

Ecological changes occur quite naturally in response to natural climate variability. Since the past eight years have exhibited a cooling trend globally, there is no basis for the commission's implication that "global warming" is causing any undue "ecological changes". The planet has in fact been warming for 300 years. During the first 270 years, humankind could not have been responsible. During the remaining 30 years, global temperatures have increased by less than half a degree Celsius – an increase that is well within natural variability and that is in itself wholly insufficient to have caused "ecological changes" or "species distributions" of the magnitude implied by the commission.

Serious outbreaks of most forms of infectious disease are more likely to occur in cold, wet weather than in hot, dry weather: that is why colds, influenza and related diseases caused by the *rhinoviridae* occur far more frequently in the winter than in the summer. Most "tropical" diseases are in fact better described as "vector-borne": they depend for their transmission upon carriers (usually insects), nearly all of which are as well able to survive even in the Arctic as in the tropics.

For instance, much has been written about the likelihood that warmer weather will spread malaria more widely in the world. However, malaria was not and is not a tropical disease: it is a disease of poor countries with inadequate health care. The largest outbreak of malaria in modern times was in Siberia in the 1920s. Some 13 million people were infected and 600,000 died, 30,000 of them in the Arctic port of Arkhangelsk. The only climate limitation on the *anopheles* mosquito that causes malaria is a requirement that the ambient temperature should be at least 15 °C (<60 °F) during the short breeding season. Most regions, including the Arctic, are accordingly capable of suffering malaria epidemics. Malaria was once rife throughout the United States: however, despite the generally rising temperatures of the 20th century it was eradicated by 1949 through competent public-health measures.

We conclude that most of the climatic changes mentioned by the commission have either not occurred, or are within natural climate variability, or have run in a direction opposite from that suggested by the commission. None of the changes can be definitively attributed to anthropogenic "global warming", and most of them cannot be attributed to any warming, whether natural or anthropogenic: they are merely instances of natural variability within the unpredictable, mathematically-chaotic object that is the climate. The commission's list of imagined disasters bears so little relation to reality that it forms no reliable basis for the formation of policy.

CHAPTER 7

ARKANSAS AND "GLOBAL WARMING"

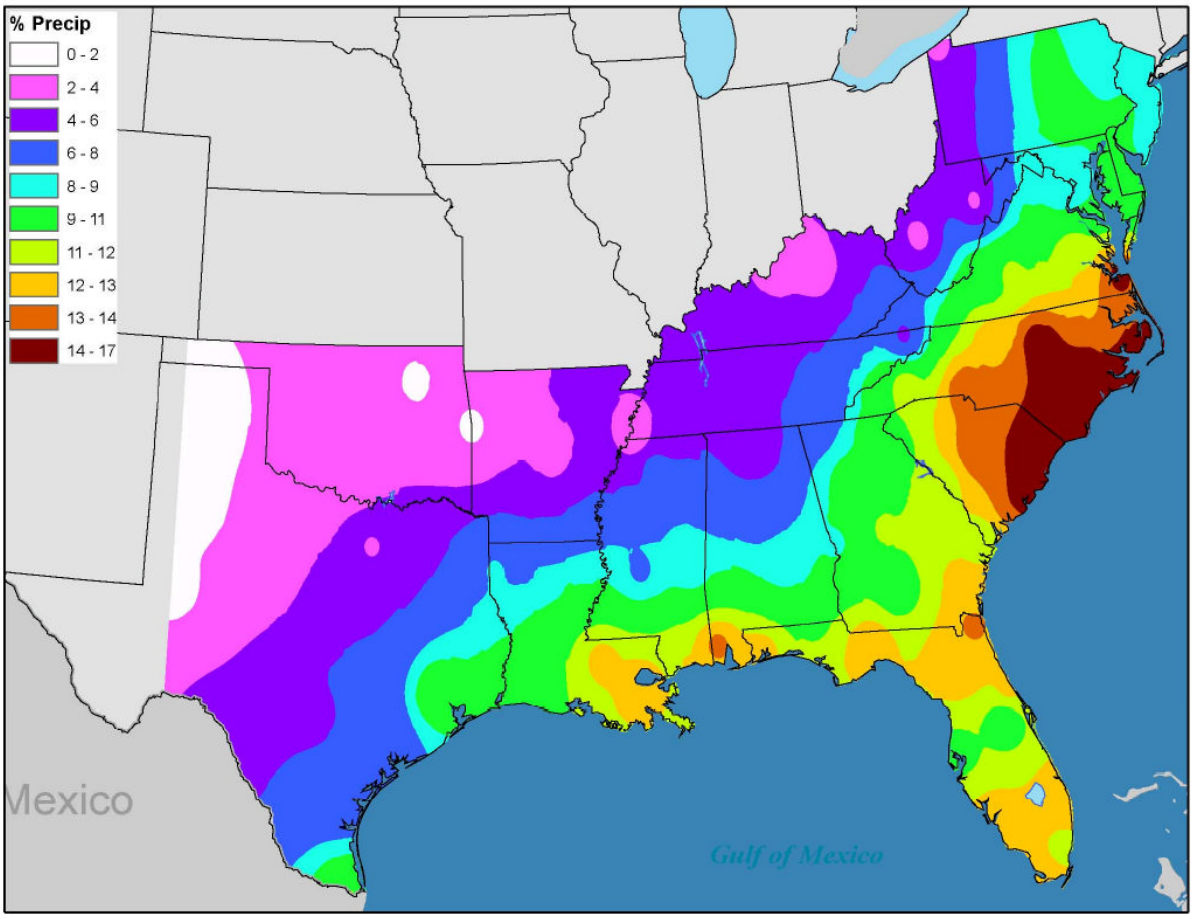
The Commission's "science" chapter presents a long list of "impacts" that, it imagines, "will affect Arkansas and the southeastern United States, particularly if emissions of greenhouse gases are not limited". With the fact-based, data-derived, scientific analysis that we have presented, it becomes possible to dispose of each of these imagined "impacts" of anthropogenic "global warming" swiftly and definitively.

- There will be increased storminess, with increases in floods, windstorms, and, in some places, ice storms.

Outside the tropics, warmer weather (if it were to occur) would be likely to reduce inter-latitudinal temperature differences, correspondingly reducing the frequency and intensity of storms and the floods they bring. However, warmer weather has not been occurring globally for eight years.

Figure 29

The benefit of tropical cyclone rainfall



It's an ill wind: *Percentage of June through November precipitation that comes from tropical systems.* ***Source:*** *Knight et al., 2007.*

Hurricanes play a significant, but beneficial, role in Arkansas climate. The remnants of tropical cyclones that pass near Arkansas have usually lost the ferocity of their winds and deliver copious moisture during the late summer, when it is often most needed. Arkansas, on average, receives about 10% percent of its normal September precipitation, and about 5% of its total June through November total precipitation from passing tropical systems (Figure 29).

- Floodplains will likely increase in extent as larger floods increase in frequency.

Since there is good scientific reason to suppose that extra-tropical storms that cause flooding will in general become less frequent and less intense with warmer weather, there is no appreciable likelihood that the extent of floodplains will increase.

- Ground-level ozone pollution will be exacerbated.

Tropospheric ozone would increase with warmer weather. But, as we have demonstrated, the weather will not become sufficiently warm to induce a serious threat from this or any other direction.

- Tropical and insect-borne diseases will move north.

Since most "tropical" diseases are vector-borne, and since nearly all of the vectors do not choose their habitat primarily (or at all) by reference to its ambient temperature, there is no basis for the commission's assertion.

Malaria, for instance, was common in most of the United States prior to the 1950s (Reiter, 1996). In fact, in the late 1800s, a period when it was demonstrably colder in the United States than it is today, malaria was endemic in most of the United States east of the Rocky Mountains—a region including Arkansas that stretched from the Gulf Coast all the way up into Northern Minnesota. In 1878, about 100,000 Americans were infected with malaria; about one-quarter of them died.

Malaria was eradicated from the United States in the 1950s not because of climate change (it was warmer in the 1950s than the 1880s), but because of technological advances. Air-conditioning, the use of screen doors and windows, and the elimination of urban overpopulation brought about by the development of suburbs and automobile commuting were largely responsible for the decline in malaria (Reiter, 1996).

The effect of technology is also clear from statistics on dengue fever outbreaks, another mosquito-borne disease. In 1995, a dengue pandemic hit the Caribbean and Mexico. More than 2,000 cases were reported in the Mexican border town of Reynosa. But in the town of Hidalgo, Texas, located just across the river, there were only seven reported cases (Reiter, 1996). This is just not an isolated example, for data collected over the past decade has shown a similarly large disparity between the high incidence of dengue in northern Mexico and the low incidence in the southwestern United States. There is virtually no difference in climate between these two locations, but a world of difference in infrastructure, wealth, and technology.

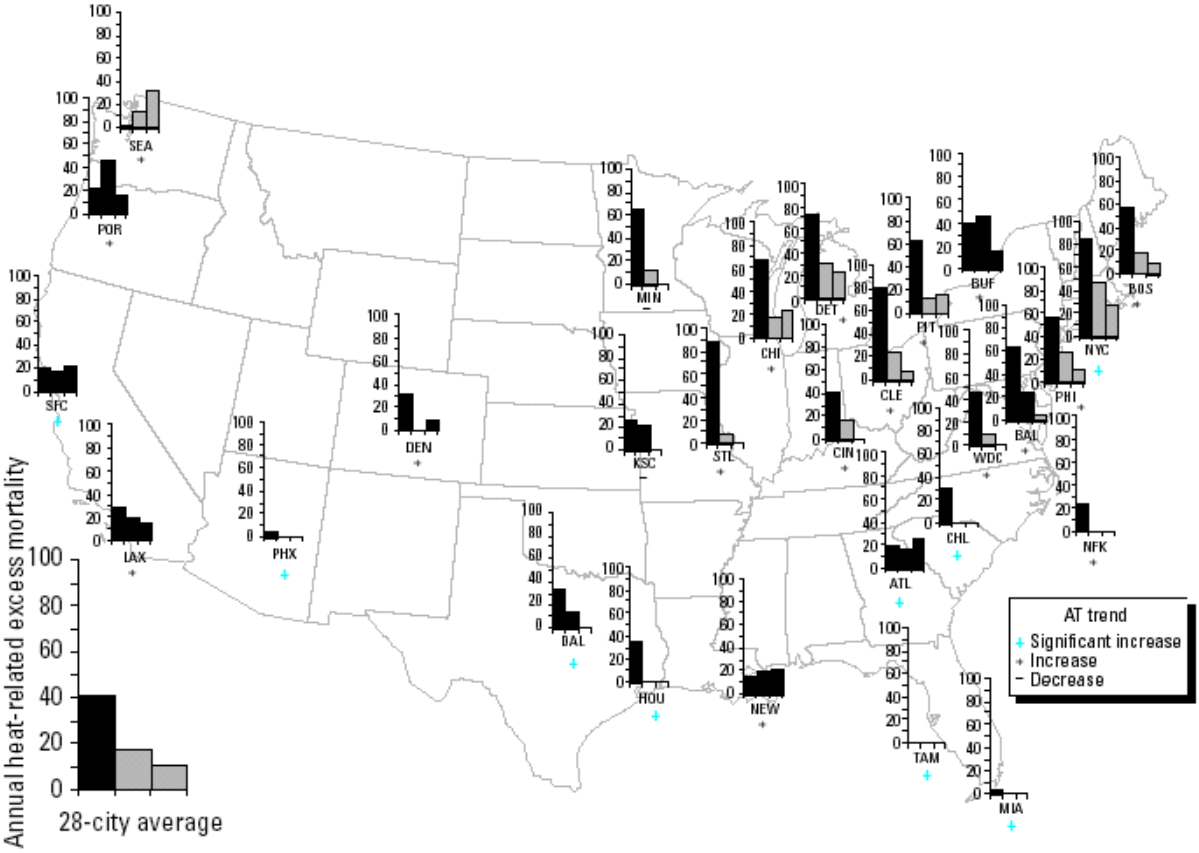
- There will be increased heat-related deaths and decreased cold-related deaths.

Even if "global warming" were still occurring, rather than the current cooling trend, cold-related deaths are many times more numerous than heat-related deaths, particularly in developed countries such as the United States, where measures to minimize adverse effects from heat have long been proven effective. Even in developed countries, preventing diseases and death arising from winter cold has proven to be a much more refractory problem. "Global warming", therefore, can be expected, in net terms, to reduce the number of weather-related deaths, and an impartial commission would have said so explicitly.

The population of Arkansas is likely to have become less sensitive to the impacts of excessive heat events over the course of the past 30-40 years. This is true in most major cities across the United States—a result of the increased availability and use of air-conditioning and the implementation of social programs aimed at caring for high-risk individuals—despite rising urban temperatures. See Figure 30.

Figure 30

Heat-related mortality across the US



Falling heat-related mortality: *Annual heat-related mortality rates (excess deaths per standard million population). Each histogram bar indicates a different decade (from left to right, 1970s, 1980s, 1990s).* ***Source:*** *Davis et al., 2003.*

A number of studies (e.g. Davis *et al*., 2003a,b) have shown that during the several decades, the population in major U.S. cities has grown better adapted, and thus less sensitive, to the effects of excessive heat events. Each bar in Figure 30 represents the annual number of heat-related deaths in 28 major cities across the United States.

There should be three bars for each city, representing, from left to right, the decades of the 1970s, 1980s and 1990. For nearly all cities, the number of heat-related deaths is declining (the bars are shorter). Though no cities from Arkansas were included in the studies, in most cities close to Arkansas there is no mortality bar at all in the 1990s: there are no statistically distinguishable heat-related deaths during that decade, since the population of those cities has adapted to heatwaves, throug improvements in medical technology, air-conditioned homes, cars, and offices, increased public awareness of potentially dangerous weather, and proactive municipal responses to extreme weather.

The distribution of heat-related mortality shows that in locations where extremely high temperatures are more commonplace, such as the southern-tier states, the prevalence of heat-related mortality is much lower than in the regions where extremely high temperatures are somewhat rarer, such as the north-eastern U.S. If temperatures warm in the future and heatwaves become more common, the population will be well able to adapt.

- Although less likely to impact Arkansas directly, there will be adverse impacts on winter sports that will reduce the snow season in resorts.

Since northern-hemisphere snow cover has recently been at a record high, and since many ski resorts in the past two winters have enjoyed longer-than-usual seasons with plentiful snow, it is not appropriate to list adverse effects on winter sports. If the present global cooling continues, there will be adverse effects on summer sports. But that is scarcely a credible argument for destroying hundreds of thousands of jobs in Arkansas in the name of mitigating a "global warming" that is not even occurring and that, even if it did occur, would have far less adverse effect than the commission imagines.

- There will be strains on water supplies, particularly in western states, which will witness a decreased snowpack.

Once again, there is no basis for talk about "strains on water supplies" from "decreased snowpack" at a time of record snowpack.

- There will be increased drought stress, because there will be less precipitation during summer months and more during winter months, putting further stress on water supplies.

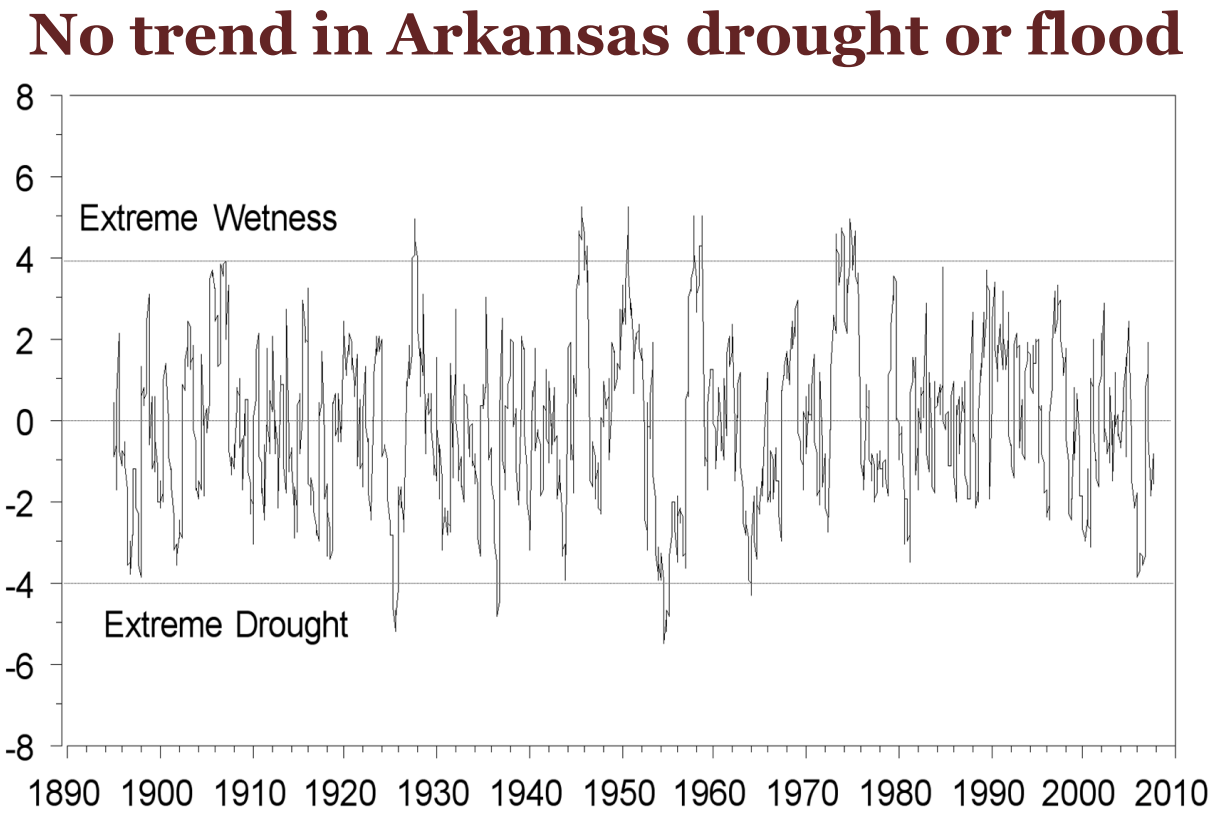
Since the climate is so chaotic that the climate models have been unable even to forecast the eight-year cooling trend that has occurred, there is certainly no credible basis on which the commission can forecast that warmer weather will lead to less rainfall in the summer and more in winter. This is mere guesswork.

Since 1895 there has been no discernible statewide trend towards either droughts or floods, as Figure 31 shows. According to records compiled by the National Climatic

Data Center since 1895, the statewide monthly average Palmer Drought Severity Index values—a standard measure of moisture conditions that takes into account both inputs from precipitation and losses from evaporation—show no long-term trend during the past 112 years. The period of record is dominated by short-term variations, although some longer-term signals are present, such as the extended period of drought in the mid-1950s and period of extreme wetness in much of the mid-1970s.

Compared with the middle part of the 20th century, when conditions varied frequently between extreme moisture excess and extreme dryness, the conditions during more recent decades have been more stable.

Figure 31



Palmer Drought Severity Index for Arkansas, 1895-2007, *shows no trend towards either droughts or floods. Monthly statewide average values are shown.* ***Data source:*** *National Climatic Data Center, www.ncdc.noaa.gov.*

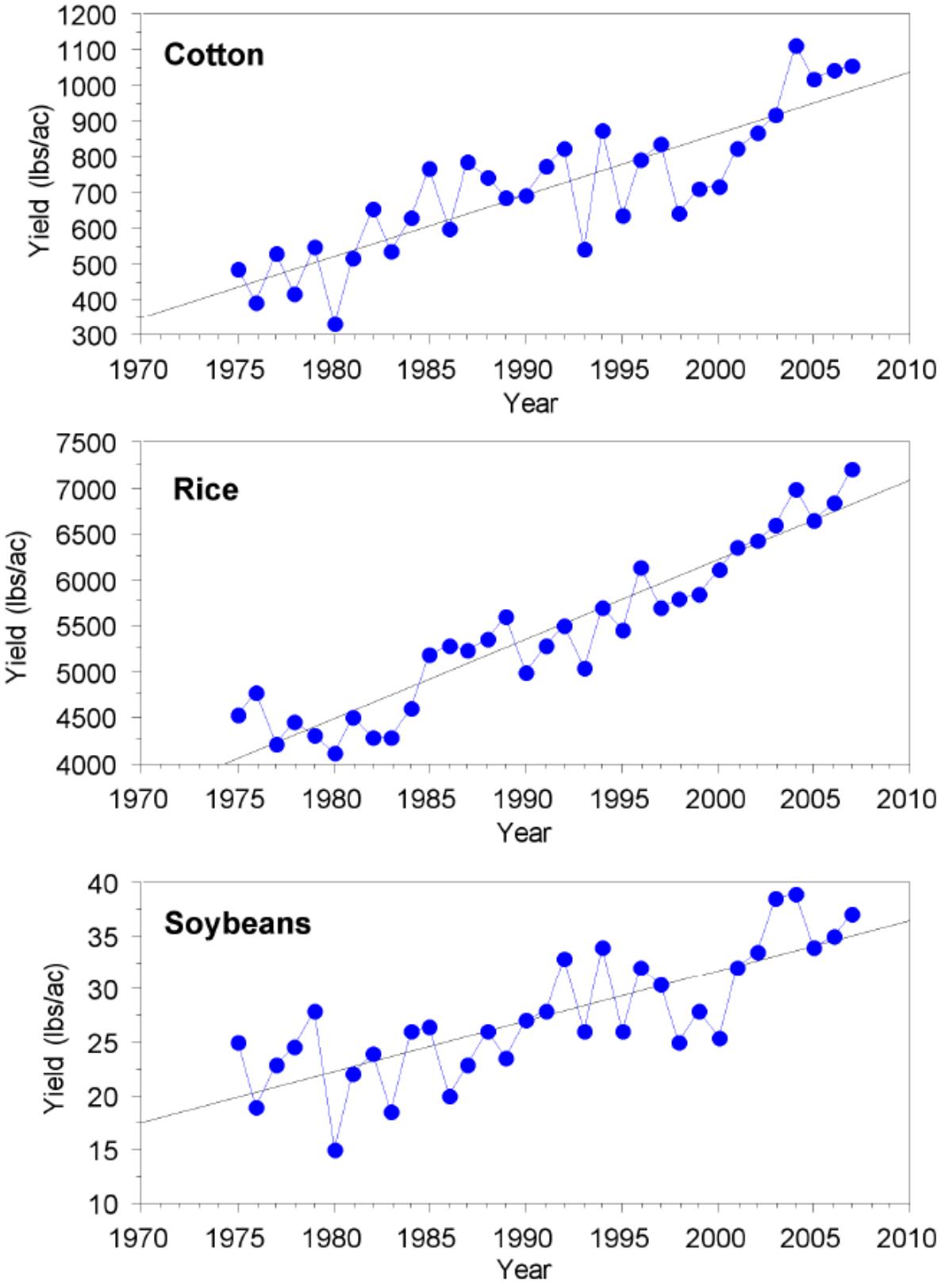
- The increases in drought stress and storminess are likely to have an adverse impact upon agriculture and forestry.

There is no basis in the current climate record for any expectation that "drought stress" is increasing, or is likely to increase merely because – for whatever reason, natural or anthropogenic – the weather becomes generally warmer.

If the weather becomes warmer, in general a reduction in storminess is to be expected: therefore the effects on agriculture and forestry would be beneficial. The effect of CO_2 fertilization has greatly increased rates of growth of timber throughout the United States, according to the US Forest Service.

Figure 32

Strong uptrend in Arkansas crop yields



Be fruitful and multiply: *Annual statewide average yields of major crops in Arkansas.* ***Source:*** *National Agricultural Statistics Service, http://www.nass.usda.gov/.*

Crop yields (Figure 32) increase primarily as a result of technology—better fertilizer, widespread irrigation, more resistant crop varieties, improved tilling practices, modern equipment, and so on. The concentration of atmospheric carbon dioxide, one of the essential ingredients in photosynthesis, has increased as well. The relative influence of weather is minimal compared with those advances. The fluctuations of temperature and precipitation from one year to the next and are responsible for some of the year-to-year variation in crops yields but are responsible for little of the long-term upward trend. Through the use of technology, farmers are adapting to the climate conditions that traditionally dictate what they do and how they do it and producing more output than ever before. There is no reason to think that such adaptations and advances will not continue into the future.

- Sea levels will rise, putting stress on coastal areas and causing salt-water intrusion into coastal aquifers. Sea levels are expected to rise by 1–2 feet by 2100 due to thermal expansion, alone. However, the sea level rise could be much greater due to melting of the Greenland or Antarctic glaciers.

Sea level has been rising for 10,000 years, but is now rising at only one-quarter of the mean centennial rate during the Holocene. The UN's central estimate, which Moerner (2004) finds to be an exaggeration, is that sea level will rise by about 1 ft 5 in during the present century. At present it is rising at just 1 ft/century. Sea-level rise is a non-issue; and, if global cooling continues, as it may given the recent sharp and now somewhat prolonged decline in solar activity combined with the reassertion this year of the cooling phase of the Pacific Decadal oscillation, there is a possibility that sea level may even fall somewhat.

- Rising sea levels, increased drought stress, and impacts on agriculture will also become "a [national security] threat multiplier for instability in some of the most volatile regions of the world" (CNA. *National Security and the Threat of Climate Change*, available at http://securityandclimate.cna.org). This insecurity may affect Arkansas.

Yet again, the commission fails to cite any peer-reviewed, scientific paper. This time, its *argumentum ad verecundiam* favors the Center for Naval Analysis. Not one of the 19 areas of expertise that the CNA claims for itself includes climatology or any related field. On any view, a worldwide sea-level rise of just 1 foot over 100 years can scarcely be held to constitute a "threat multiplier for instability". This is political language, not science. Even the IPCC's maximum official projection of a sea-level rise of <2 ft/century would fall well within both natural climate variability and humankind would have the capacity to deal with the consequences easily, and certainly without resorting to war.

- Cold-water fisheries will decline.

And warm-water fisheries will increase. But only if the current cooling of the oceans (Lyman *et al.,* 2006; Argo bathythermograph dataset, 2008) is reversed.

- Coral reefs and related fisheries will be adversely affected by ocean acidification caused by increased carbon dioxide levels.

It is puzzling that the commission includes coral reefs under the impacts of "global warming" on Arkansas, which has no coral reefs for the good and sufficient reason that it is landlocked and has no coastline. For the record, however, corals first formed by algal symbiosis in the Triassic era, ~175 million years ago, at which time the carbon dioxide concentration was 10 times today's. For well-understood reasons, homoeostatic processes have prevented acidification of the oceans, even when carbon dioxide concentration was many times today's: all that may happen, if carbon dioxide concentration in the atmosphere increases, is a moderate and harmless reduction in the oceans' alkalinity.

- Climatic hardiness zones will move north and the distribution of vegetation and wildlife will change. This will likely put stress upon vulnerable species.

Life has existed on Earth for billions of years. Some 99% of all the species that have ever existed became extinct before humankind ever appeared. We do not know how many species are coming into being or passing out of existence at any one time. We do not even know how many species there are, even to within one or two orders of magnitude. What we do know is that most of the Earth's species live in the tropics, the warmest region of the planet, and that less than 1% of the Earth's species live at the Poles. The elementary conclusion is that far more species are vulnerable to cold than to warmth and that, if the world becomes warmer, fewer species will be vulnerable to cold and the richness and diversity of life on Earth will increase.

Annual temperature trends in Arkansas

The historical time series of statewide annual temperatures in Arkansas begin in 1895. Over the entire record (Figure 33, overleaf), there is no statistically significant trend. Instead, the record is dominated by annual and decadal-scale variability.

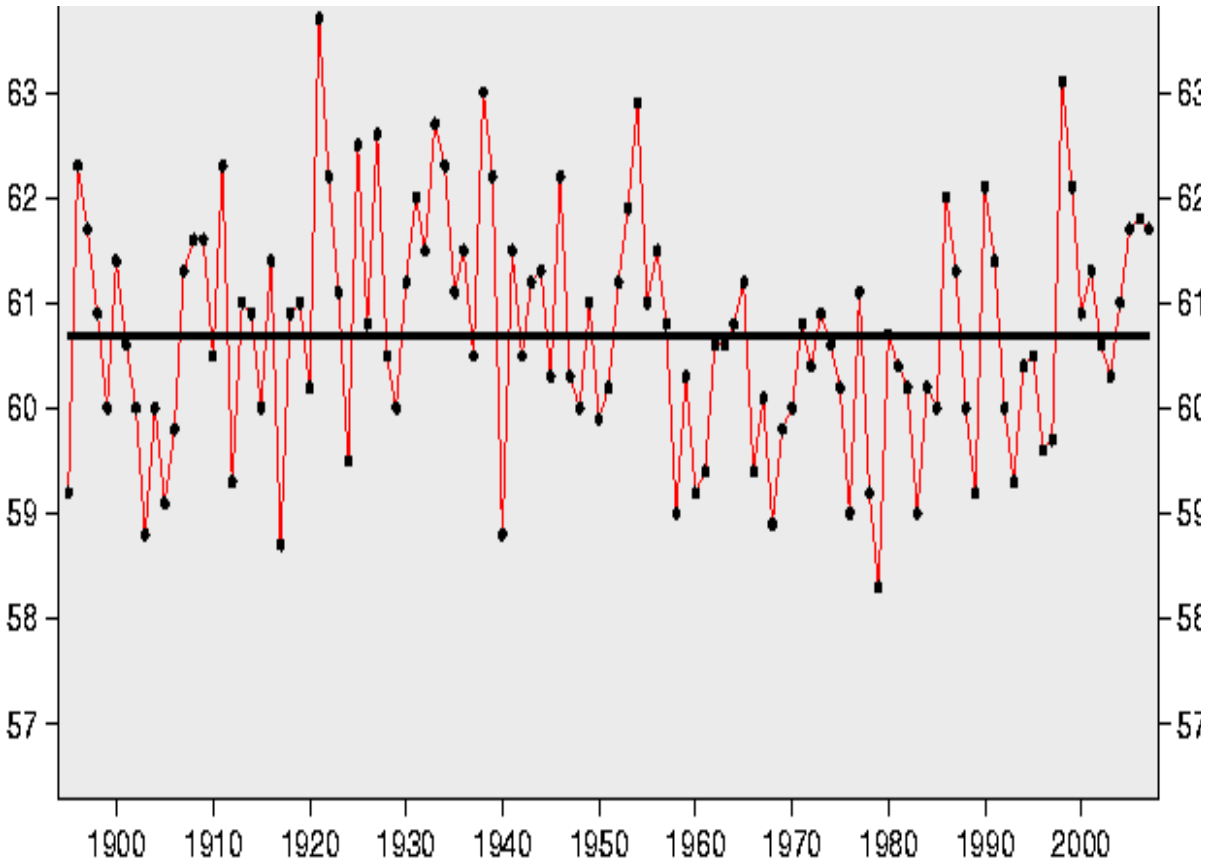
This variability is natural, and occurs all over the world. There is nothing in the temperature record of Arkansas over the past century to indicate that the very slight increase in the atmospheric concentration of carbon dioxide in the second half of the 20th century could possibly have had any influence over temperature trends in Arkansas.

Temperatures during the past decade or so have been very similar to those experienced in the 1920s and 1930s. They follow a multi-decadal period extending from the late-1950s through the mid-1990s, when statewide average temperatures were generally cooler than the long-term average.

During the middle of that cooler period, in 1975, the National Academy of Sciences produced a report stating that billions would need to be spent on mitigating the global cooling that had been observed, and that was reflected in the temperatures prevalent in Arkansas at the time. The report, and many others like it, made headlines in the more excitable news media, and made the cover of both *Time* and *Newsweek*.

Figure 33

No trend in Arkansas temperature



Zero trend: *Arkansas annual mean temperatures, 1895-2007 (degrees F), (available from the National Climatic Data Center, http://www.ncdc.noaa.gov/oa/climate/research/cag3/ar.html). The temperature history is better characterized by annual-to-decadal decadal variations than by a long-term trend.*

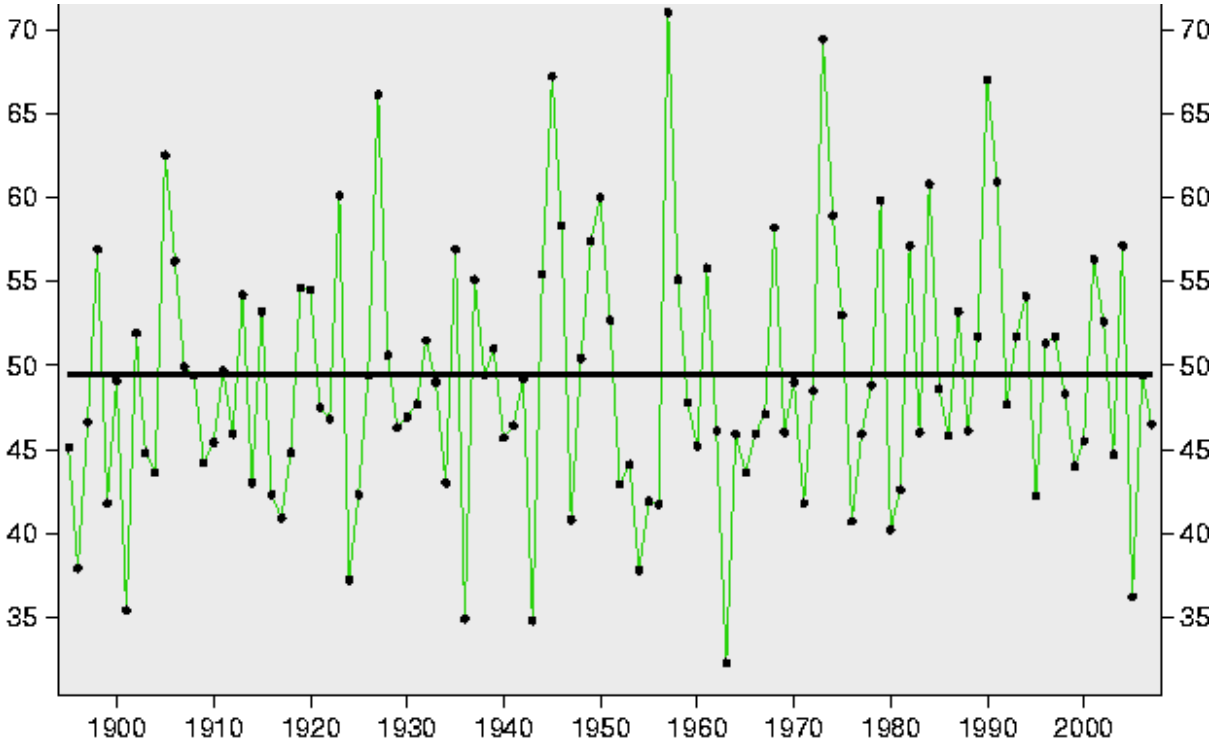
Annual precipitation trends in Arkansas

As with temperature, there is no statistically significant overall trend in total annual precipitation averaged across Arkansas (Figure 34, overleaf). Instead the record is dominated by large interannual variations—ranging from more than 71 inches of precipitation in 1957 to a little less 33 inches in 1963. Recent years are not unusual when viewed against the long-term history.

Regular, reliable rainfall is perhaps the most important desideratum in agriculture: yet, as the Arkansas record shows, very wide variations are evident between peak and trough years. Farmers, of course, must adapt to these wide variations, and they have long learned how to do so. This capacity to adapt demonstrates an important economic consideration: that it is orders of magnitude cheaper to adapt to any long-term climatic change that might occur than it is to try to predict the timing, magnitude and direction of some future change and then to take elaborate, costly steps to try to prevent that change – steps that are almost certain to make practically no real difference.

Figure 34

No trend in Arkansas precipitation



And the rain it raineth every day: *Total annual statewide precipitation history for the State of Arkansas, 1895-2007 (inches:* ***source:*** *United States National Climatic Data Center, http://www.ncdc.noaa.gov/oa/climate/research/cag3/ar.html). The precipitation history is better characterized by large interannual variations than by any long-term trend.*

We conclude that Arkansas exhibits very little sign of being affected by the "global warming" of the past century. Its temperature, precipitation, pattern of droughts and floods, species distribution, tornado record, all are normal and show no adverse change – and, in most instances, no change at all. There is certainly nothing whatsoever in the climatic record of Arkansas that can possibly justify the massive expenditures on mitigation that the commission recommends, for there is nothing to mitigate. Even if there were a change in the climate, whether for warmer or for cooler, adaptation as *and if* necessary would be orders of magnitude cheaper than mitigation. In the absence of any appreciable climate change in Arkansas, and in the absence of any credible scientific evidence that major change of any kind is to be expected anytime soon, the correct policy for Arkansas is to have the courage to do nothing.

CHAPTER 8
ECONOMIC CONSIDERATIONS

Globally, in 2003, humankind emitted 25,780 million metric tons of carbon dioxide (mmtCO_2: EIA, 2007a), of which Arkansas accounted for 62.4 mmtCO_2, or only 0.24% (EIA, 2007b).

The proportion of manmade CO_2 emissions from Arkansas will decrease over the 21st century as the rapid demand for power in developing countries such as China and India outpaces the growth of Arkansas' CO_2 emissions (EIA, 2007b).

During the past 5 years, global emissions of CO_2 from human activity have increased at an average rate of 3.5%/yr (EIA, 2007a), meaning that the annual *increase* of anthropogenic global CO_2 emissions is more than 10 times greater than Arkansas' *total* emissions.

Even a complete cessation of all CO_2 emissions in Arkansas would be entirely subsumed by rising global emissions in less than one month's time. *A fortiori,* regulations prescribing a *reduction*, rather than a complete cessation, of Arkansas's CO_2 emissions will have no effect on global climate.

Wigley (1998) examined the climate impact of adherence to the emissions controls agreed under the Kyoto Protocol by participating nations, and found that, if all developed countries meet their commitments in 2010 and maintain them through 2100, with a midrange sensitivity of surface temperature to changes in CO_2, the amount of warming "saved" by the Kyoto Protocol would be 0.07°C by 2050 and 0.15°C by 2100. These values are trivial, and they well demonstrate the growing discrepancy between the rhetoric of those who conclude international climate treaties and the foreseeably negligible results when the treaties come into force. It is as though our entire international political class has suddenly lost all perspective and common sense.

The global sea level rise "saved" would be 2.6 cm, or one inch. A complete cessation of CO_2 emissions in Arkansas is only a tiny fraction of the worldwide reductions assumed in Dr. Wigley's global analysis, so its impact on future trends in global temperature and sea level will be only a minuscule fraction of the negligible effects calculated by Dr. Wigley.

We now apply Dr. Wigley's results to CO_2 emissions in Arkansas, assuming that the ratio of U.S. CO_2 emissions to those of the developed countries which have agreed to limits under the Kyoto Protocol remains constant at 39% (25% of global emissions) throughout the 21st century. We also assume that developing countries such as China and India continue to emit at an increasing rate. Consequently, the annual proportion of global CO_2 emissions from human activity that is contributed by human activity in the United States will decline.

Finally, we assume that the *proportion* of total U.S. CO_2 emissions in Arkansas – now 1.1% – remains constant throughout the 21st century. With these assumptions, we

generate Table I, derived from the mid-range emissions scenario in Wigley (1998), which itself is based upon the IPCC's scenario "IS92a":

Table I

Projected annual CO2 emissions

(millions of tonnes of CO2)

Year	Global emissions	Developed countries	United States (39% of devel.)	ARKANSAS (1.1% of US)
2000	26,609	14,934	5,795	64
2025	41,276	18,308	7,103	78
2050	50,809	18,308	7,103	78
2100	75,376	21,534	8,355	92

Note: *Developed countries' emissions, according to Wigley's assumptions, do not change between 2025 and 2050: neither does total U.S or Arkansas emissions.*

In Table J, we compare the total CO_2 emissions saving that would result if Arkansas' CO_2 emissions were completely halted by 2025 with the emissions savings assumed by Wigley (1998) if all nations met their Kyoto commitments by 2010, and then held their emissions constant throughout the rest of the century. This scenario is "*Kyoto constant*"

Table J

Est'd. annual CO2 emissions savings

(millions of tonnes of CO2)

Year	ARKANSAS	Kyoto constant
2000	0	0
2025	78	4,697
2050	78	4,697
2100	92	7,924

Table K shows the proportion of the total emissions reductions in Wigley's (1998) case that would be contributed by a complete halt of all Arkansas' CO_2 emissions (calculated as column 2 in Table J divided by column 3 in Table J).

Table K

AR's percentage of emissions savings

Year	ARKANSAS
2000	0.0%
2025	1.7%
2050	1.7%
2100	1.2%

Using the percentages in Table K, and assuming that temperature change scales in proportion to CO_2 emissions, we calculate the global temperature savings (Table L) that will result from the complete cessation of anthropogenic CO_2 emissions in Arkansas:

Table L

Global temperature savings

Year	Kyoto constant	ARKANSAS
2000	0.0000 °C	0.0000 °C
2025	0.0300 °C	0.0005 °C
2050	0.0700 °C	0.0010 °C
2100	0.1500 °C	0.0020 °C

Accordingly, a cessation of all of Arkansas' CO_2 emissions would result in a climatically irrelevant global temperature reduction by the year 2100 of no more than two *thousandths* of a degree Celsius.

Results for sea-level rise (Table M) are also negligible:

Table M

Global temperature savings

Year	Kyoto constant	ARKANSAS
2000	0.000 in	0.000 in
2025	0.080 in	0.001 in
2050	0.354 in	0.008 in
2100	1.024 in	0.011 in

A complete cessation of all anthropogenic emissions from Arkansas will result in a global sea-level rise savings by the year 2100 of an estimated 0.03 cm, or one *hundredth* of an inch. Again, this value is climatically irrelevant.

Even if the entire Western world were to close down its economies completely and revert to the Stone Age, without even the ability to light fires, the *growth* in emissions from China and India would replace our *entire* emissions in little more than a decade. In this context, any cuts in emissions from Arkansas would be extravagantly pointless.

Costs of federal legislation

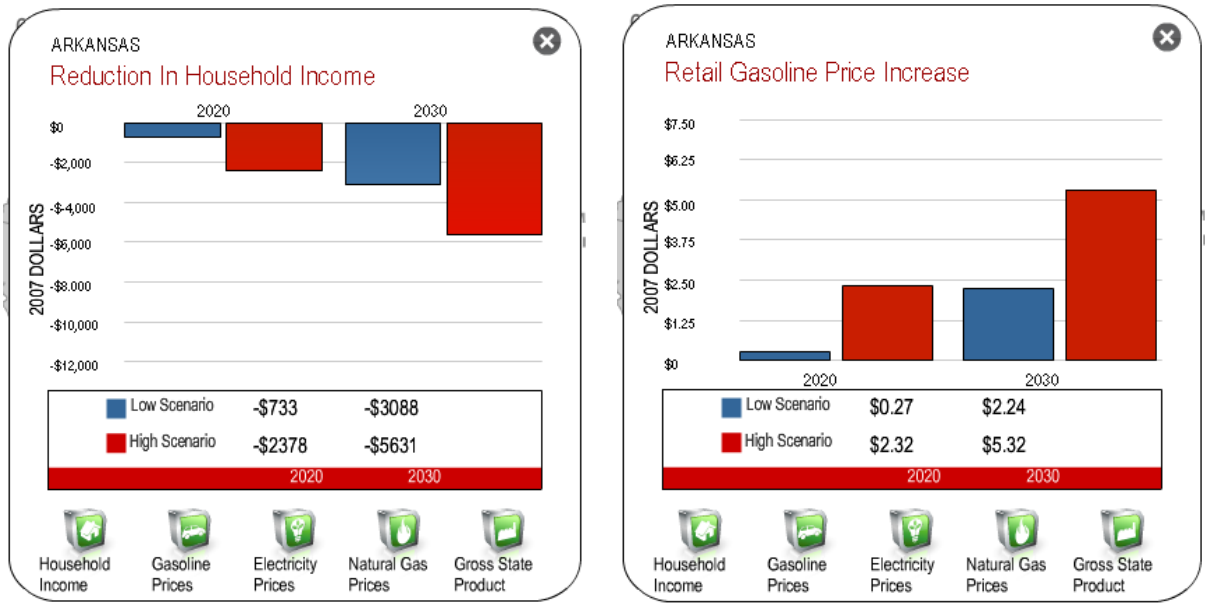
What would be the potential costs to Arkansas of legislative actions designed to cap greenhouse gas emissions? An analysis was recently completed by the Science Applications International Corporation (SAIC), under contract from the American Council for Capital Formation and the National Association of Manufacturers (ACCF and NAM), using the National Energy Modeling System (NEMS); the same model employed by the US Energy Information Agency to examine the economic impacts.

For a complete description of their findings please visit their website at this address: http://www.instituteforenergyresearch.org/cost-of-climate-change-policies/.

To summarize, SAIC found that by the year 2020, average annual household income in Arkansas would decline by $733 to $2378 and by the year 2030 the decline would increase to between $3088 and $5631. The state would stand to lose between 11,000 and 17,000 jobs by 2020 and between 30,000 and 40,000 jobs by 2030. At the same time gas prices could increase by nearly $5 a gallon (Figure 35) by the year 2030 and the states' Gross Domestic Product could decline at that time by as much as $4.7 billion/yr. All of this economic hardship would come with absolutely no detectable impact on the course of future climate. This is the epitome of a scenario of all pain and no gain.

Figure 35

Economic impacts of federal law in AR



The heavy cost of heavy-handed laws *to limit greenhouse-gas emissions at federal level would cut household incomes sharply and hike gas prices just as sharply.* ***Source:*** *Science Applications International Corporation, 2008:* http://www.accf.org/pdf/NAM/fullstudy031208.pdf.

It should not be thought that Arkansas is alone in having a political class that wishes to appear fashionable, and to win favor with younger and more idealistic voters, by bringing forward expensive legislation nominally intended to mitigate imagined future climate change. Numerous other states have brought forward similar plans, many of them authored by the same out-of-state lobby group that so heavily and regrettably influenced the Arkansas commission and its report.

We conclude that, as Table N overleaf demonstrates, state climate-mitigation programs are futile. We first assume that each state in the Union will close down its entire economy altogether. It is evident from the results in the table that even the total destruction of the US economy would make practically no difference to the global climate. Seen in that context, there is remarkably little point in implementing any of the measures proposed in the Arkansas commission's report.

Table N

Futility of state CO2 mitigation plans

State	2004 Emissions (million metric tons CO2)	Percentage of Global Total	Time until Total Emissions Cessation Subsumed by Foreign Growth (days)		Temperature "Savings" (ºC)		Sea Level "Savings" (cm)	
			Global Growth	China Growth	2050	2100	2050	2100
AK	47.0	0.17	18	28	0.0008	0.0013	0.0108	0.0217
AL	140.3	0.52	53	84	0.0025	0.0037	0.0321	0.0647
AR	63.7	0.23	24	38	0.0011	0.0017	0.0146	0.0294
AZ	96.9	0.36	37	58	0.0017	0.0026	0.0222	0.0447
CA	398.9	1.47	152	239	0.0071	0.0106	0.0914	0.1840
CO	93.1	0.34	35	56	0.0017	0.0025	0.0213	0.0430
CT	45.5	0.17	17	27	0.0008	0.0012	0.0104	0.0210
DC	4.0	0.01	2	2	0.0001	0.0001	0.0009	0.0018
DE	16.9	0.06	6	10	0.0003	0.0004	0.0039	0.0078
FL	258.0	0.95	98	155	0.0046	0.0069	0.0591	0.1190
GA	175.7	0.65	67	105	0.0031	0.0047	0.0402	0.0810
HI	22.7	0.08	9	14	0.0004	0.0006	0.0052	0.0105
IA	81.8	0.30	31	49	0.0015	0.0022	0.0187	0.0377
ID	15.6	0.06	6	9	0.0003	0.0004	0.0036	0.0072
IL	244.5	0.90	93	146	0.0044	0.0065	0.0560	0.1128
IN	239.9	0.88	91	144	0.0043	0.0064	0.0549	0.1107
KS	77.8	0.29	30	47	0.0014	0.0021	0.0178	0.0359
KY	151.5	0.56	58	91	0.0027	0.0040	0.0347	0.0699
LA	180.5	0.66	69	108	0.0032	0.0048	0.0413	0.0833
MA	83.6	0.31	32	50	0.0015	0.0022	0.0192	0.0386
MD	80.6	0.30	31	48	0.0014	0.0021	0.0185	0.0372
ME	23.3	0.09	9	14	0.0004	0.0006	0.0053	0.0107
MI	189.9	0.70	72	114	0.0034	0.0051	0.0435	0.0876
MN	102.8	0.38	39	62	0.0018	0.0027	0.0235	0.0474
MO	139.8	0.51	53	84	0.0025	0.0037	0.0320	0.0645
MS	65.1	0.24	25	39	0.0012	0.0017	0.0149	0.0300
MT	35.1	0.13	13	21	0.0006	0.0009	0.0080	0.0162
NC	152.3	0.56	58	91	0.0027	0.0041	0.0349	0.0703
ND	49.9	0.18	19	30	0.0009	0.0013	0.0114	0.0230
NE	43.6	0.16	17	26	0.0008	0.0012	0.0100	0.0201
NH	22.0	0.08	8	13	0.0004	0.0006	0.0050	0.0101
NJ	128.6	0.47	49	77	0.0023	0.0034	0.0295	0.0594
NM	59.0	0.22	22	35	0.0011	0.0016	0.0135	0.0272
NV	47.9	0.18	18	29	0.0009	0.0013	0.0110	0.0221
NY	216.7	0.80	82	130	0.0039	0.0058	0.0496	0.1000
OH	263.6	0.97	100	158	0.0047	0.0070	0.0604	0.1216
OK	100.4	0.37	38	60	0.0018	0.0027	0.0230	0.0463
OR	42.5	0.16	16	25	0.0008	0.0011	0.0097	0.0196
PA	282.5	1.04	107	169	0.0050	0.0075	0.0647	0.1304
RI	11.0	0.04	4	7	0.0002	0.0003	0.0025	0.0051
SC	87.5	0.32	33	52	0.0016	0.0023	0.0200	0.0404
SD	14.0	0.05	5	8	0.0002	0.0004	0.0032	0.0064
TN	123.6	0.45	47	74	0.0022	0.0033	0.0283	0.0570
TX	652.5	2.40	248	391	0.0116	0.0174	0.1495	0.3010
UT	65.7	0.24	25	39	0.0012	0.0017	0.0150	0.0303
VA	129.0	0.47	49	77	0.0023	0.0034	0.0295	0.0595
VT	7.0	0.03	3	4	0.0001	0.0002	0.0016	0.0032
WA	82.9	0.30	32	50	0.0015	0.0022	0.0190	0.0382
WI	108.8	0.40	41	65	0.0019	0.0029	0.0249	0.0502
WV	113.0	0.42	43	68	0.0020	0.0030	0.0259	0.0521
WY	63.9	0.24	24	38	0.0011	0.0017	0.0146	0.0295
U.S. Total	**5,942.2**	**21.86**	**2261**	**3558**				

CHAPTER 9

THE 'PRECAUTIONARY PRINCIPLE' KILLS

There is no sound, scientific analysis in the commission's "science" chapter supporting what is in essence its political contention that a multi-billion-dollar boondoggle be funded at Arkansas taxpayers' expense.

In the absence of justification in science and data, the commission falls back – as many do, in this debate – on what is called the "precautionary principle". It suggests – a suggestion that we hope we have by now dispelled – that those who question the "consensus" are "not disagreeing about the science", and adds that the questioners disagree with taking precautions just in case there might be a problem, describing the "precautionary principle" as "the default position" dictated by the UN climate convention and by the Supreme Court.

However, the "precautionary principle" is not a principle at all. Instead, it is a pretext for taking whatever policy action is desired in the absence of any scientific justification. It allows anyone to advance any notion, however implausible, and then to demand, in the name of the precautionary principle, that billions be spent just in case the implausible notion might be true.

The "precautionary principle" fails, logically speaking, because the precautionary actions to be taken ought to be, but for political reasons usually are not, themselves subjected to the "precautionary principle". A horrifying example will illustrate this point.

A third of a century ago, a well-meaning lady called Rachel Carson, on the basis of a couple of innocent scientific mistakes, concluded that DDT – the only effective agent against the *anopheles* mosquito that causes malaria – might be carcinogenic (it is not), and might weaken the eggshells of certain large birds by thinning them (it cannot do this, provided that DDT is confined to interior spraying of habitations).

Jackie Kennedy read Rachel Carson's emotive but scientifically-defective book, *The Silent Spring,* and told her husband to do something about DDT. He appointed an environmentalist friend to become head of the EPA, and DDT was duly banned, "just in case", in accordance with the "precautionary principle", first in the US and then in cookie-cutter fashion throughout the world. In the malarial poor countries where DDT was most needed, governments were brought into line by western governments threatening to withhold financial assistance unless DDT were banned and replaced by parathion, which – in a ghastly mirror-image of DDT – is more or less entirely harmless to the mosquito but is highly toxic to humans.

No one had bothered to check or think what the risk to victims of malaria might be once DDT had been banned. The "precautionary principle" was applied asymmetrically against DDT, and never mind what happened to the malaria victims. The direct, near-immediate result of the DDT ban – aside from enriching the makers of parathion – was to increase worldwide deaths from malaria from 50,000 a year to more than 1 million a year.

This disastrous and entirely avoidable holocaust, which by now has killed some 40 million people, most of them children, who would not otherwise have died, was caused by the "precautionary principle".

On 16 September 2006, under pressure from – among others – the lead author of the present report, the World Health Organization announced that it was ending the DDT ban and was once again recommending DDT as the first line of defence against the mosquito. Dr. Arata Kochi, of the World Health Organization, announcing the end of the DDT ban, said that in this field politics usually came first, but that it was now time to take a stand on the science and the data.

The "precautionary principle", as the commission wishes to apply it, would mandate action against further increases in CO2 concentration. But the commission has certainly failed to carry out any analysis of the jobs and even lives that would be destroyed by the supposedly "precautionary" measures in mitigation of CO2 emissions that it proposes.

Just as with DDT, so with CO2, the commission is failing to ensure that the "precautionary principle" is applied symmetrically, so that the (very large) risks of carrying out the "precautions" are weighed up just as carefully as the (negligible) risks of *not* carrying out the "precautions", and *not* worrying about CO2.

It is by the commission's failure to apply the "precautionary" principle not only to the imagined (but actually very small) environmental problem posed by CO2 enrichment but also to the piously-intended (but actually very dangerous) "precautions" which the commission proposes that the greatest damage will be done to the citizens of the State of Arkansas if the legislature acts upon the commission's recommendations.

One consequence of the largely emotional belief that CO2 enrichment may be dangerous has been the dash for biofuels, which – in just two years – has taken more than one-third of the agricultural surface area of the United States out of food production. Similar well-meaning but disastrous curtailments of food-producing agricultural capacity have occurred throughout the world, with the inevitable result dictated by the law of supply and demand. The price of food has doubled in just two years, and, according to a report by the World Bank, at least three-quarters of this doubling of world food prices is directly attributable to the biofuel program, which is in turn directly attributable to the largely-incorrect belief that carbon dioxide is a dangerous pollutant rather than a harmless trace gas essential to all life on Earth.

The inevitable result of the doubling of world food prices has been the starvation of millions of poor people in a dozen regions of the world. In each of those dozen regions, in the past year, there have been food riots as desperate people suddenly found themselves unable to buy the food they had bought before, because the "global warming" scare and its deadly spinoff, the biofuel program, had doubled its price. So they starved, and millions are dying.

In Haiti, the poor now live on mud pies. They take some soil, add water to make paste, add a minute knob of butter and a pinch of salt, pummel this sad mixture, shape it into pies, and put it out in the sun to bake. Some hours later, when the mud pies are ready, the Haitians feed them to their starving children, or sell them for 3 US cents each to their neighbours too weak to make the mud pies for themselves. Or at

least they did. But the lead author of the present report, in an address in Madrid recently, told the story of the Haitian mud pies – which, like the starvation and the food riots, has gone almost entirely unreported in the Western media, for they are too busy reporting the last dribble of every icicle that falls in Greenland. A member of the audience, in tears, said she lived in Haiti, and now the poor could not even afford three cents for a mud pie. So they were crawling away to die. She had tears in her eyes. She was absurdly grateful that someone in the West even knew about what was happening: the sudden, stunning, shocking price rises, the immediate starvation, the misery, the deaths.

We conclude that the commission, whether through ineptitude, laziness, or full knowledge, full deliberation, and full consent, has failed not only the poor people of the wider world but the poor people of Arkansas. It is they – the workers whose jobs will go, the pensioners whose groceries will become unaffordable, who will suffer, and immediately, if the extravagant and pointless absurdities recommended by the commission are passed into law and carried out. There is no scientific basis for taking any action at all to mitigate "global warming". Nor is there any economic basis, for, even if every terrifying but baseless word of the IPCC's climate assessements were the gospel that the commission believes it to be, adaptation to climate change as, *and if,* necessary would be orders of magnitude cheaper than the commission's gold-plated proposals for mitigation.

The commission's "science" chapter concludes with the words,

> "No sceptic says there is a reasonable scientific certainty that there will not be adverse impacts from rising greenhouse-gas levels."

That sentence is typical of the careless, muddled, illogical thinking that pervades the commission's report. Scientists do not talk of "certainties" but of "probabilities". The probability that there will be any adverse impacts from the increase of one part in ten thousand in the atmospheric concentration of a harmless trace gas over a quarter of a millennium is very close to zero. It is so close to zero that no action of any kind is required to try to push it any closer to zero than it already is. There is no "climate crisis". The billions that the commission would waste on its entirely unnecessary program would be better spent on the real environmental problems that Arkansas faces. Warmer weather is not one of them.

APPENDIX

WHO IS BEHIND THE COMMISSION?

- We reproduce, without comment, the following article which reveals that the final report of the Arkansas Governor's Commission on "Global Warming" is a cookie-cutter copy of reports produced by similar commissions in other states at the instigation of an out-of-state entity that appears to be profiting by the exploitation of the climate scare.

By David J. Sanders, a twice-weekly columnist for the Arkansas News Bureau, and host of "Unconventional Wisdom", a program of the Arkansas Education Television Network.

AS Arkansas lawmakers prepare to take care of the people's business, there are substantive questions to be asked related to the Governor's Commission on Global Warming, its work, and its symbiotic relationship with the Center for Climate Strategies.

What should be the response of lawmakers, who soon will be asked to consider the commission's final report, which effectively comes to them mired in controversy?

It's likely that a majority of lawmakers will be daunted by the task of taking on a nebulous and complex issue like global warming. After all, aren't there more pressing issues competing for their attention? It might be easy for them to take a pass. Why not? At least from some of his public statements, Gov. Mike Beebe appears to be backing away from some of his global warming commission's more extreme policy recommendations.

But none of those are good reasons for lawmakers to leave it to others to wrangle with the Center for Climate Strategies and the Commission. In fact, there are good reasons why lawmakers should train their attention on both groups and ask some tough questions.

It is neither advisable, ethical, fair-minded, nor democratic that the group, the Center for Climate Strategies, that helped push for the establishment of the Commission was hired to advise and direct the Commission. That's especially true when it comes to limiting the terms of the debate by preventing the science of climate change or directive of the Act from being debated by the commission. That gives it a clear path to push its policy recommendations, many of which were controversial and costly, so those recommendations can be adopted by the commission and recommended to lawmakers.

It is both detrimental to the public policy process, and sets a horrible precedent related to the work of future government-mandated policy commissions that the funding required for the Commission to hire the Center for Climate Strategies was arranged by the Center for Climate Strategies. Making matters worse, the Center for Climate Strategies relied on funding from out-of-state foundations that not only are aligned to the left both politically and ideologically, but are agenda-driven on the issue of global warming.

Lawmakers will have to determine whether the Commission complied with Act 696, which establishes the Commission with the force of law. Hiring the Center for Climate Strategies as

the consultant and then turning over the Commission's agenda and process to them made the task of complying with the law virtually impossible.

Both internal documents from the Center for Climate Strategies to the governor's office, as well as testimony of commission members, clearly demonstrate that by limiting terms of the debate, first on the very issue of climate change and then directive of the Act establishing the Commission, the Center for Climate Strategies intended to quash dissenting voices on the Commission to push its agenda.

According to the law, under sections labeled "Purpose and Duties" and "Emergency Clause," the Commission was charged to "conduct an in-depth examination and evaluation of the issues related to global warming and the potential impacts of global warming on the state, its citizens, its natural resources, and its economy."

The law states that it is "imperative that Arkansas study the scientific data, literature, and research on global warming to determine whether global warming is an immediate threat to the citizens in the State of Arkansas."

What was mandated by law didn't happen and, frankly, couldn't have happened under the structure the Center for Climate Strategies set up for the commission.

So, what did the state receive? If lawmakers review the Arkansas report and those from other states in which the Center for Climate Strategies has worked, then they will find that apart from subtle changes in artwork and the state names, the reports are nearly identical.

All of this begs the question: Does Arkansas' Global Warming Commission exist for the benefit of the state or the Center for Climate Strategies?

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