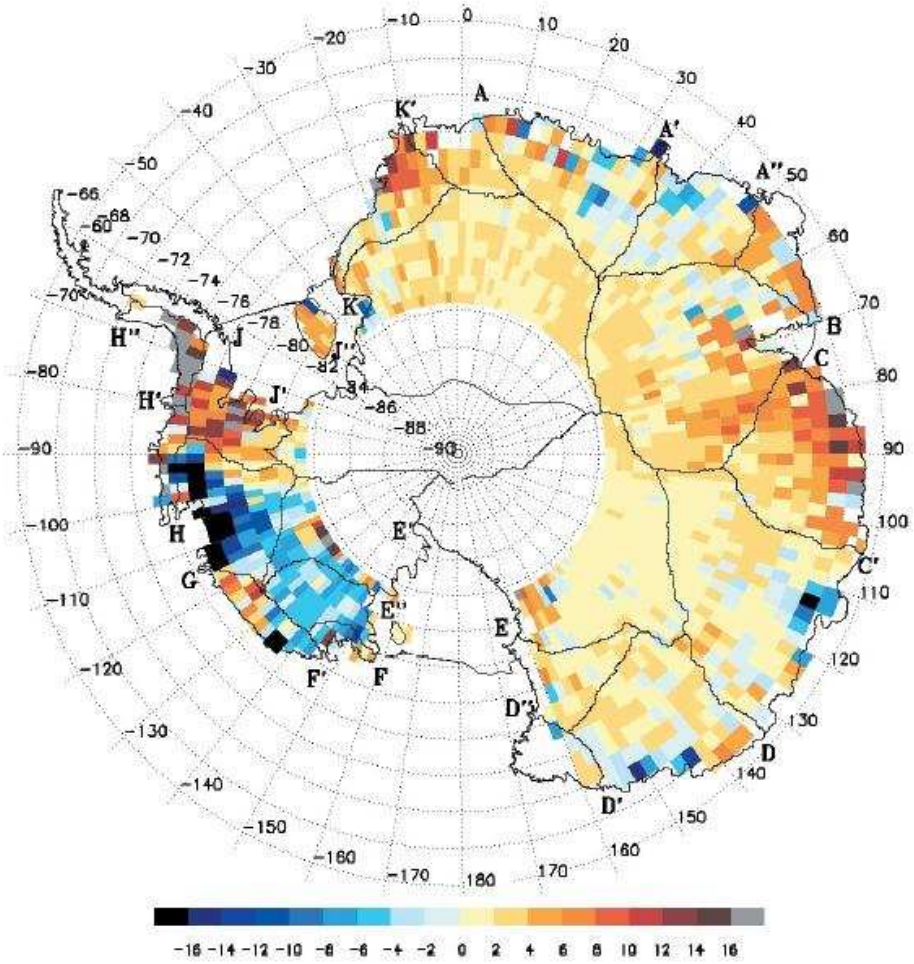
# Recent Research in Climate Change Issues:
# A compilation from World Climate Report

(With Extensive References)

**Trends in Antarctic Snow and Ice Mass**

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## Future Climate Change and Its Impacts

### Response to Joint Statement from G8 National Academies

http://www.worldclimatereport.com/index.php/2005/06/10/joint-statement-of-the-g8-national-academies-a-non-sequitur/

On June 7, 2005, a joint statement on climate change was issued by the national science academies of the G8 countries (the UK, France, Germany, Italy, Russia, Canada, Japan, and the United States) along with China, India and Brazil. The statement emphasized two primary points, 1) that climate change (as caused by human-induced alterations of the composition of the atmosphere) is real, and 2) something needs to be done about it.

As has been the case in the climate change debate for years, the second point simply does not follow from the first.

Simply stating, as the Academies do that climate change is a very real thing, and then saying that "The scientific understanding of climate change is now sufficiently clear to justify nations taking prompt action" is akin to saying that "After years of careful study we have compiled enough scientific evidence to conclude that the sky is blue. Now we must do something about it."

What is missing is the scientific assessment of the putative "threats" from climate change balanced against likely benefits. Without this type of analysis, a simple scientific finding on its own doesn't warrant any specific action, no matter how scientifically ground-breaking it might be. For instance, how are our daily lives changed because of Einstein's Theory of General Relativity—arguably one of the greatest scientific breakthroughs in our history? Virtually not at all. So unless the finding has an implication that impacts us in some way, we are not likely to change our actions.

The reason that there is no threat assessment is that there is no scientific consensus on what the threat level is—or at least one that could be agreed upon by the 11 signatories. The best that they could come up with was a smattering of climate changes that even they admit could be either beneficial or detrimental depending on their degree, timing, or location. "The projected changes in climate will have both beneficial and adverse effects at the regional level, for example on water resources, agriculture, natural ecosystems and human health. The larger and faster the changes in climate, the more likely it is that adverse effects will dominate."

And "larger and faster" is hardly likely. The joint Academies parrot the ridiculously large range given by the United Nations' Intergovernmental Panel on Climate Change "the average global surface temperatures will continue to increase to between 1.4 centigrade degrees and 5.8 centigrade degrees above 1990 levels, by 2100." The low end of this range represents a change that is likely to be more beneficial than adverse, while the upper end of this range represents a situation which may prove to be more adverse than beneficial. Without some sort of scientific guidance—guidance that is absent

from the statement of the joint academies—the finding alone, that "climate change is real" does not justify "taking prompt action."

The fact of the matter is, is that there *does* exist a growing body of scientific evidence that the climate changes in the coming decades will be modest and proceed at a rate that will lie somewhere near the low end of the IPCC projected temperature range. For instance, NASA's James Hansen—a leading climate change scientist—has analyzed trends in the emissions of greenhouse gases and concluded, in an article published in the *Proceedings of the National Academy of Sciences*, that the IPCC warming scenarios "includes CO2 growth rates that we contend are unrealistically large." Based upon current trends in greenhouse gas emissions and the rate of atmospheric composition changes, Hansen argues that the future rate of global warming "can be predicted much more accurately than generally realized." Hansen predicts that for the next 50 years, the earth will experience a warming rate of 0.15 ± 0.05ºC per decade leading to a warming of 0.75 ± 0.25ºC. This is near the low end of the IPCC's range of warming rates. A similar conclusion is reached by studying the behavior of climate models. In aggregate, climate models project that the earth warms at a linear (constant) rate when greenhouse gases are increasingly added to the atmosphere. However, the models differ on what the actual warming rate is, but here, observations adjudicate the differences. During the past 30 years or so, a constant warming rate indeed has been established , at 0.17ºC per decade. If the collection of the world's climate models are correct in form, then this established warming rate should be our best guidance as to what to expect in the future. A warming rate of 0.17ºC per decade corroborates Hansen's findings and further supports the low end of the IPCC projected warming range as the most likely course into the future.

Having established a future temperature rise near the low end of the IPCC projected range, then, according to the joint statement, there is less likelihood that the impacts will be adverse and in many regions they may prove beneficial. If this is the case, should the joint academies still push corrective actions? What if these actions reverse some the benefits? In the United States for example, the 20th century has seen an increase in precipitation of about 10 percent. In today's world where water resources are becoming more and more precious, are we willing to give back this extra water if it turns out to be related to global warming?

Obviously, the justification for action is far from clear.

That the national academies are pressing for action when the consequences of such actions are far from being well understood is a clear indication (along with the timing of the release of the statement—a month before the next meeting of the G8) that the national academies have stepped beyond the boundaries of science and into the arena of politics. This is a slippery slope, because once the national science academies have taken a policy position, they can no longer be considered an honest broker of scientific fact, but instead, simply another advocacy group (for more on this idea, see an excellent series of articles on Roger Pielke Jr.'s blog http://sciencepolicy.colorado.edu/prometheus/). And that's exactly what this joint statement represents—an advocacy piece which selectively ignores large

portions of the overall scientific understanding of climate change and its impacts in an effort to push for legislative action to limit greenhouse gas emissions. In actuality, when all the evidence is accounted for, such actions are far from justified.

**Observations not Models**
http://www.worldclimatereport.com/index.php/2004/04/14/observations-not-models/

Urging caution regarding "implausible" and "unduly pessimistic" IPCC climate scenarios, NASA's Hansen opts for observations to guide his forecasts of a 0.75ºC temperature rise by the year 2050.

NASA's James Hansen, who is widely credited as being the "father of global warming" recently wrote that the climate change scenarios put forth in the Intergovernmental Panel on Climate Change's (IPCC) 2001 *Third Assessment Report* (TAR) "may be unduly pessimistic," and that the IPCC extreme scenarios are "implausible." In fact, he argues, the observed trends in atmospheric carbon dioxide and methane concentrations for the past several years fall below all IPCC scenarios, so consequently future temperature rise will most like be about 0.75ºC during the next 50 years.

Hansen makes these claims in articles including "Defusing the Global Warming Time Bomb," which appeared in the March *Scientific American*. He bases his conclusions on simple empirical evidence that he considers more precise and reliable than model results "because it includes all the processes operating in the real world, even those we have not yet been smart enough to include in the models."

That is precisely the same justification given by another prominent global climate scientist, the University of Virginia's Patrick Michaels, thought by many to be to represent the opposing pole of scientific opinion from Dr. Hansen. Michaels, too, concludes that the IPCC scenarios in large part overestimate the potential temperature rise in the coming century. Like Hansen, Michaels relies on actual observations to gain insight into future climate behavior. In his 2002 *Climate Research* paper entitled "Revised 21st century temperature projections," Michaels writes that "[Observations] are the perfect integrators of all processes that are currently active" and thus avoid the "varying degrees of uncertainties surrounding every aspect of the models."

Using observations of the rate of the observed buildup of carbon dioxide, along with observations of the global temperature change during the past 25 years or so, Michaels determines that "our adjustments of the projected temperature trends for the 21st century all produce warming trends that cluster in the lower portion of the IPCC TAR range" and concludes that warming during the next 50 years will be somewhere near 0.75ºC—the exact same number given by Hansen years later.

That however, is where most of the agreement between these two climate researchers ends. Hansen says it is imperative that we undertake concerted and organized efforts to lower this warming rate even further to avoid what he describes as "dangerous human interference" with the climate system (echoing the words of the 1989 United Nations Framework Convention on Climate Change, a.k.a. the Rio Treaty). He declares that the "emphasis should be on mitigating the changes rather than just adapting to them."

Michaels, on the other hand, argues that the likely modest temperature rise is one that can be readily adapted to, and even used to our ultimate advantage—longer growing seasons, reduced heating costs, enhanced global vegetation, and so forth. Since the rate of climate change is manageable, he explains, artificially forced changes to the global energy structure need not be undertaken. Instead, he advocates allowing market forces to dictate change. After all, fossil fuels are a limited resource, so as mankind progresses into the future, alternative energy sources will be developed.

Michaels bases his idea upon the collection of empirical evidence—the same basis that Hansen uses in developing his estimates of the future course of climate. Yet Hansen seems to ignore that evidence when it comes to developing his estimates of the impacts of future climate changes.

For instance, Hansen expresses that his biggest concern is the potential for large sea-level rise. Yet the empirical evidence shows that the rate of sea-level rise over the course of the 20th century (during which there was about 0.75ºC of warming) was about 1.8mm per year, resulting in a total rise during the past 100 years of only about 7 inches. Doubling that rate in the future, the rate that would be implied by a continued steady temperature rise, will not, in most places, present problems that cannot be controlled or adapted to.

There are other lines of evidence that show demonstrably positive impacts. For instance, research by Ramakrishna Nemani and colleagues, who have studied variations in global vegetation patterns based upon data collected from satellites, shows a remarkable enhancement of the growth of global vegetation. They attribute this enhanced growth to changes in the climate, as well as the atmospheric enhancement of the carbon dioxide—a plant fertilizer—that has taken place over the past two decades.

The litany of dire consequences that may potentially result from global warming generally scale with the magnitude of the warming. In the IPCC *TAR*, the range of potential warming manifest by the year 2100 is given as 1.4ºC to 5.8ºC, with no indication as to which value may be more likely. Thus, many future claims of drastic consequences are made based upon the high end of the IPCC range. However, as actual evidence (rather than modeled responses) grows, more researchers such as Hansen and Michaels are pointing out that the low end of the range is much better supported by the observed behavior of the system. The impacts associated with a warming at the low end of the IPCC TAR range are far less, and infinitely more manageable, than those that would accompany high-end warming. It is about time to dispense with the notion that future warming will be catastrophic and begin focusing on the

implications of a modest warming whose benefits are likely to outweigh its costs.

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## Hurricanes

### Landsea's IPCC resignation

http://www.worldclimatereport.com/index.php/2005/01/18/2500-less-1-2/

A leading expert in the field of tropical storms and hurricanes has withdrawn from participation in the writing of the IPCC's *Fourth Assessment Report* (due out in late 2007), citing concerns that the IPCC has become too politicized, and "motivated by pre-conceived agendas."

Dr. Christopher Landsea, from the Hurricane Research Division of the National Oceanographic and Atmospheric Administration's (NOAA) Atlantic Oceanographic and Meteorological Laboratory, has withdrawn from authorship of the *Fourth Assessment Report* of the United Nations' Intergovernmental Panel on Climate Change (IPCC), a compendium due to be published in 2007. Landsea, author of over 40 refereed scientific publications over the past 12 years on hurricanes and other tropical storm systems has been a contributing author in the last two IPCC Assessments, primarily responsible for the sections describing the past, present, and future behavior of tropical cyclones. In a 'Open Letter' to his colleagues, Landsea announced and justified his decision. Landsea writes:

> Dear colleagues,
>
> After some prolonged deliberation, I have decided to withdraw from participating in the Fourth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). I am withdrawing because I have come to view the part of the IPCC to which my expertise is relevant as having become politicized. In addition, when I have raised my concerns to the IPCC leadership, their response was simply to dismiss my concerns.
>
> With this open letter to the community, I wish to explain the basis for my decision and bring awareness to what I view as a problem in the IPCC process. The IPCC is a group of climate researchers from around the world that every few years summarize how climate is changing and how it may be altered in the future due to manmade global warming. I had served both as an author for the Observations chapter and a Reviewer for the 2nd Assessment Report in 1995 and and the 3rd Assessment Report in 2001, primarily on the topic of tropical cyclones (hurricanes and typhoons). My work on hurricanes, and tropical cyclones more generally, has been widely cited by the IPCC. For the upcoming AR4, I was asked several weeks ago by the Observations chapter Lead Author - Dr. Kevin Trenberth - to provide the writeup for Atlantic hurricanes. As I had in the past, I agreed to assist the IPCC in what I thought was to be an important, and politically-neutral determination of what is happening with our climate.
>
> Shortly after Dr. Trenberth requested that I draft the Atlantic hurricane section for the AR4's Observations chapter, Dr. Trenberth participated in a press conference organized by scientists at Harvard on the topic

"Experts to warn global warming likely to continue spurring more outbreaks of intense hurricane activity" along with other media interviews on the topic. The result of this media interaction was widespread coverage that directly connected the very busy 2004 Atlantic hurricane season as being caused by anthropogenic greenhouse gas warming occurring today. Listening to and reading transcripts of this press conference and other media interviews, it is apparent the Dr. Trenberth was being accurately quoted and summarized in such statements and was not being misrepresented in the media. These media sessions have the potential to result in a widespread perception that global warming has made recent hurricane activity much more severe.

I found it a bit perplexing that the participants in the Harvard press conference had come to the conclusion that global warming was impacting hurricane activity today. To my knowledge, none of the participants in that press conference had performed any research on hurricane variability, nor were they reporting on any new work in the field. All previous and current research in the area of hurricane variability has shown no reliable, long-term trend up in the frequency or intensity of tropical cyclones, either in the Atlantic or any other basin. The IPCC assessments in 1995 and 2001 also concluded that there was no global warming signal found in the hurricane record.

Moreover, the evidence is quite strong and supported by the most recent credible studies that any impact in the future from global warming upon hurricane will likely be quite small. The latest results from the Geophysical Fluid Dynamics Laboratory (Knutson and Tuleya, Journal of Climate, 2004) suggest that by around 2080, hurricanes may have winds and rainfall about 5% more intense than today. It has been proposed that even this tiny change may be an exaggeration as to what may happen by the end of the 21st Century (Michaels, Knappenberger, and Landsea, Journal of Climate, 2005, submitted).

It is beyond me why my colleagues would utilize the media to push an unsupported agenda that recent hurricane activity has been due to global warming. Given Dr. Trenberth's role as the IPCC's Lead Author responsible for preparing the text on hurricanes, his public statements so far outside of current scientific understanding led me to concern that it would be very difficult for the IPCC process to proceed objectively with regards to the assessment on hurricane activity. My view is that when people identify themselves as being associated with the IPCC and then make pronouncements far outside current scientific understandings that this will harm the credibility of climate change science and will in the longer term diminish our role in public policy.

My concerns go beyond the actions of Dr. Trenberth and his colleagues to how he and other IPCC officials responded to my concerns. I did caution Dr. Trenberth before the media event and provided him a summary of the current understanding within the hurricane research community. I was disappointed when the IPCC leadership dismissed my concerns when I brought up the misrepresentation of climate

science while invoking the authority of the IPCC. Specifically, the IPCC leadership said that Dr. Trenberth was speaking as an individual, even though he was introduced in the press conference as an IPCC lead author; I was told that that the media was exaggerating or misrepresenting his words, even though the audio from the press conference and interview tells a different story (available on the web directly); and that Dr. Trenberth was accurately reflecting conclusions from the TAR, even though it is quite clear that the TAR stated that there was no connection between global warming and hurricane activity at this time. The IPCC leadership saw nothing to be concerned with in Dr. Trenberth's unfounded pronouncements to the media, despite his supposedly impartial important role that he must undertake as a Lead Author on the upcoming AR4.

It is certainly true that "individual scientists can do what they wish in their own rights", as one of the folks in the IPCC leadership suggested. Differing conclusions and robust debates are certainly crucial to progress in climate science. However, this case is not an honest scientific discussion conducted at a meeting of climate researchers. Instead, a scientist with an important role in the IPCC represented himself as a Lead Author for the IPCC has and used that position to promulgate to the media and general public his own opinion that the busy 2004 hurricane season was caused by global warming, which is in direct opposition to research written in the field and is counter to conclusions in the TAR. This becomes problematic when I am then asked to provide the draft about observed hurricane activity variations for the AR4 with, ironically, Dr. Trenberth as the Lead Author for this chapter. Because of Dr. Trenberth's pronouncements, the IPCC process on our assessment of these crucial extreme events in our climate system has been subverted and compromised, its neutrality lost. While no one can "tell" scientists what to say or not say (nor am I suggesting that), the IPCC did select Dr. Trenberth as a Lead Author and entrusted to him to carry out this duty in a non-biased, neutral point of view. When scientists hold press conferences and speak with the media, much care is needed not to reflect poorly upon the IPCC. It is of more than passing interest to note that Dr. Trenberth, while eager to share his views on global warming and hurricanes with the media, declined to do so at the Climate Variability and Change Conference in January where he made several presentations. Perhaps he was concerned that such speculation - though worthy in his mind of public pronouncements – would not stand up to the scrutiny of fellow climate scientists.

I personally cannot in good faith continue to contribute to a process that I view as both being motivated by pre-conceived agendas and being scientifically unsound. As the IPCC leadership has seen no wrong in Dr. Trenberth's actions and have retained him as a Lead Author for the AR4, I have decided to no longer participate in the IPCC AR4.

Sincerely,
Chris Landsea

This is yet another example of what climatologist Patrick Michaels calls the "predictable distortion" of global warming in his book Meltdown. He argues that, in general, climate scientists are not policy-neutral, and that professional advancement is best served by exaggerating threats of climate change in public discourse.

One glaring example of this was the complete omission of the word "satellite" in the Summary for Policymakers in the IPCC's *Second Assessment*, published in 1996. As a result, policymakers were not informed that orbiting temperature monitors showed no statistically significant warming at the time, a difference with the surface thermometer record that has yet to be resolved.

Ironically, in previous IPCC reports, the sections on hurricanes, in which Landsea was a major player, were quite accurate and comprehensive. In the Second Assessment Landsea contributed a graphic showing that the average maximum wind speed attained in Atlantic Ocean tropical storms and hurricanes had been declining from 1944 to 1993 (Figure 1).

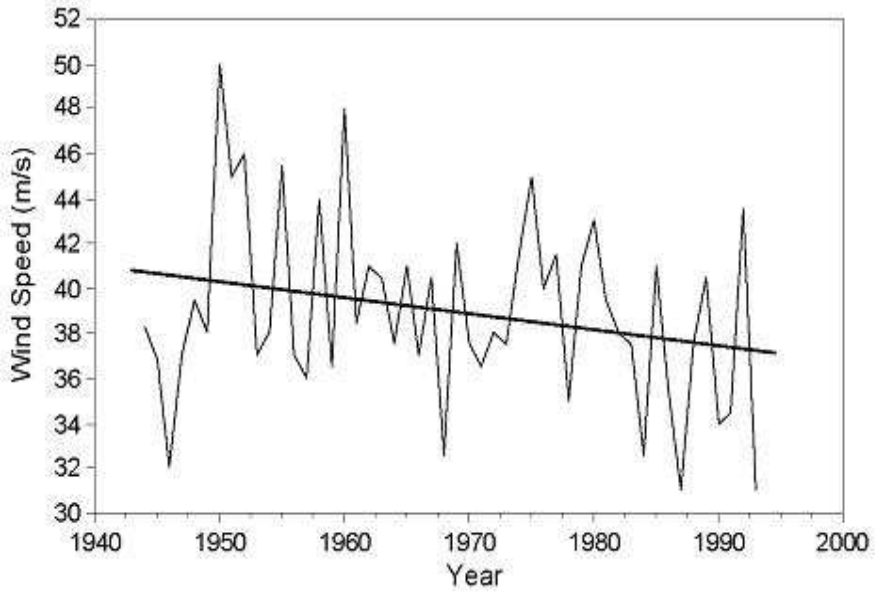


**Figure 1. Annual average maximum wind speeds recorded in Atlantic basin tropical cyclones (Landsea et al., 1996).**

An update of this data through 2004 shows that even with the upswing of hurricane activity in the past decade, there has been no long-term change in the average maximum wind speed. This observation runs counter to the proclamations that anthropogenic changes to the earth's atmosphere have been making hurricanes more severe. Landsea probably would have included this updated figure in his IPCC contribution, now, it is unlikely to appear.

As more and more scientists are finding the heavy-handed tactics of the global warming fanatics to be unsettling, the oft-made claim that the IPCC findings represent the consensus view of 2,500 scientists needs to be modified to reflect the fact that more and more, participants in the IPCC process are predictably distorting climate science, and leadership is

encouraging such activity, as shown by the recent flap over hurricanes. As a result, the IPCC can now expect to reap the whirlwind.

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**Leading research confirm little link between hurricanes and global warming**
http://sciencepolicy.colorado.edu/prometheus/archives/climate_change/000457new_paper_on_hurrica.html

We heard earlier this week that a short paper we had started on during last year's hurricane season has now been accepted for publication in the Bulletin of the American Meteorological Society after successfully completing peer review. With the paper we seek to provide a concise, largely non-technical, scientifically rigorous, globally inclusive, and interdisciplinary perspective on the state of current understandings of hurricanes and global warming that is explicitly discussed in the context of policy. As new research findings are reported in peer-reviewed journals on tropical cyclones (hurricanes) and climate change (global warming), and a corresponding public debate undoubtedly continues on this subject, we thought that it may be useful to provide a forest-level perspective on the issue to help place new research findings into a broader context.

The paper can be found here:

Pielke, Jr., R. A., C. Landsea, K. Emanuel, M. Mayfield, J. Laver and R. Pasch, in press. Hurricanes and global warming, Bulletin of the American Meteorological Society.

(http://sciencepolicy.colorado.edu/admin/publication_files/resourse-1762-hurricanes%20and_global_warming.pdf)

Here is an excerpt:

"... claims of linkages between global warming and hurricanes are misguided for three reasons. First, no connection has been established between greenhouse gas emissions and the observed behavior of hurricanes (IPCC 2001; Walsh 2004). Yet such a connection may be made in the future as metrics of tropical cyclone intensity and duration remain to be closely

examined. Second, a scientific consensus exists that any future changes in hurricane intensities will likely be small in the context of observed variability (Knutson and Tuleya 2004, Henderson-Sellers et al 1998), while the scientific problem of tropical cyclogenesis is so far from being solved that little can be said about possible changes in frequency. And third, under the assumptions of the IPCC, expected future damages to society of its projected changes in the behavior of hurricanes are dwarfed by the influence of its own projections of growing wealth and population (Pielke at al. 2000). While future research or experience may yet overturn these conclusions, the state of knowledge today is such that while there are good reasons to expect that any connection between global warming and hurricanes is not going to be significant from the perspective of event risk, but particularly so from the perspective of outcome risk as measured by economic impacts."

Here are the identities of the authors: Roger Pielke, Jr. is a Professor of Environmental Studies, University of Colorado, Chris Landsea is a Research Meteorologist at the National Oceanic and Atmospheric Administration (NOAA) Hurricane Research Division, Kerry Emanuel is a Professor in the Program in Atmospheres, Oceans and Climate at the Massachusetts Institute of Technology, Max Mayfield is Director of NOAA's National Hurricane Center (NHC), Jim Laver is the Director of NOAA's Climate Prediction Center, and Richard Pasch is a Hurricane Specialist at NOAA NHC.

## Paleotemperatures

**Hockey Stick R.I.P**.
http://www.worldclimatereport.com/index.php/2005/03/03/hockey-stick-1998-2005-rip/

The "hockey stick" representation of the temperature behavior of the past 1,000 years is broken, dead. Although already reeling from earlier analyses aimed at its midsection, the knockout punch was just delivered by *Nature* magazine. Thus the end of this palooka: that the climate of the past millennium was marked by about 900 years of nothing and then 100 years of dramatic temperature rise caused by people. The saga of the "hockey stick" will be remembered as a remarkable lesson in how fanaticism can temporarily blind a large part of the scientific community and allow unproven results to become "mainstream" thought overnight.

The "Hockey Stick" is dead. This once-feared icon of global warming purported to show annual average temperature of the Northern Hemisphere for the past 1,000 years. It was derived from the climatic information that is stored in a variety of climate-sensitive or climate "proxy" data records—things such as tree rings, coral banding records, and sediment cores. It's called the "hockey stick" because its long handle corresponds to 900 years (from 1000 to 1900) of little temperature variation, and its blade represents 100 years (1900 to 1999) of rapid temperature rise (Figure 1). The "hockey stick" made its debut in the journal Geophysical Research Letters in 1999 in a paper by Michael Mann, Raymond Bradley, and Malcolm Hughes that built upon a 1998 paper by the same authors in the journal *Nature* which detailed the methodology for creating a proxy temperature reconstruction.

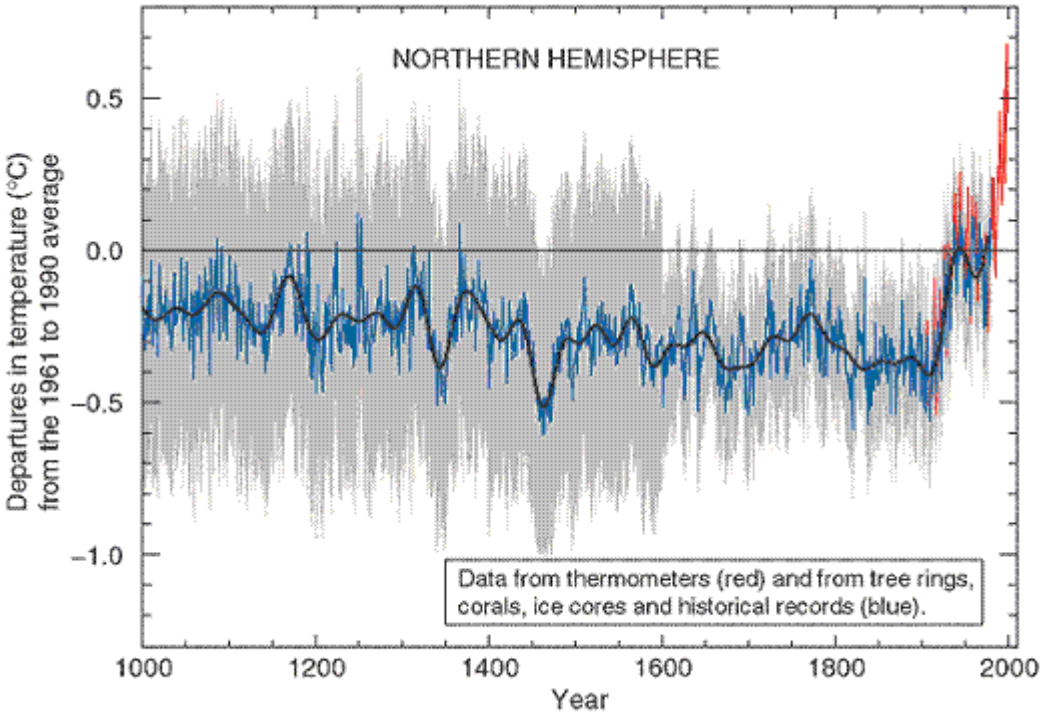


**Figure 1. Mann et al.'s "hockey stick"—the multi-proxy temperature reconstruction of the Northern Hemisphere for the past 1,000 years (blue line with gray shading depicting confidence bands). The red line is the temperature data from actual observations. (Source: Intergovernmental Panel on Climate Change 2001).**

So compelling was 1,000-yr long "hockey stick" graphic, that it quickly became the poster child for anthropogenic global warming. As such, it was prominently displayed as the first figure of the oft-read Summary for Policymakers of 2001 *Third Assessment Report* of the Intergovernmental Panel on Climate Change. The "hockey stick" graphic gives the appearance that left to its own devices, nature displays very little in the way of temperature variation, but that during the past century, humans have come along and thrown everything out of kilter. It is thus the perfect representation of the greenhouse alarmists' message—humans have caused the weather to be like never before (and this is bad).

However, the shape of the "hockey stick" looked strangely out of place against the existing knowledge of the climate of the past millennium. Where was the Little Ice Age (LIA)—a well-documented cold period lasting from about the 16th to the 19th century? And where was the Medieval Warm Period (MWP)—a relatively warmer period extending from about 11th to the 13th century? By containing little indication that these climate episodes existed, the "hockey stick" presents a completely new picture of the climate of the past 1,000 years. Natural variability is reduced to little more than annual-to-decadal scale fluctuations superimposed on longer-scale constancy. This is not the same story that is told in countless weather and climate textbooks used in classrooms around the world.

It's not that a single discovery can't change the existing scientific paradigm—in fact sudden changes are more characteristic of how science progresses than are slowly evolving ideas—it is just that rarely are new paradigms so immediately embraced and exalted as was the "hockey stick." Instead, new paradigms are typically met with skepticism and disdain as the mainstream is slow to let go of the conventional wisdom. In the case of the "hockey stick" this process was turned on its head—the "hockey stick" immediately was held up as the symbol of "mainstream" thought and anyone who did not wholly accept it was labeled as a skeptic. Additionally, the members of the mainstream often united in organized efforts to severely rebuke each any every critique of the "hockey stick," oftentimes resorting to personal attacks against the critical party.

Nevertheless, despite attempts to quell dissent, the pursuit of scientific understanding is relentless, and ideas that are unable to stand up under the weight of careful scientific scrutiny eventually collapse. Such has been the fate of the "hockey stick."

The first sign that something amiss with the "hockey stick" was published in 2003 by Harvard scientists Willie Soon and Sallie Baliunas. Soon and Baliunas performed a survey of the existing scientific literature concerning the climate of the past 1,000 years and compiled evidence for and against the existence of the MWP and the LIA. They found that overwhelmingly, within the scores of scientific articles that they reviewed, there was strong evidence to support the existence of these well-known climatic episodes that were largely absent from the "hockey stick" reconstruction. Apparently, the handle of the "hockey stick"—that part of it which represents natural variation—is too flat.

Then came the painstaking effort by Steven McIntyre and Ross McKitrick to simply attempt to reproduce the "hockey stick" using the data and procedures described by Mann and colleagues in their 1998 *Nature* publication. In their professions McIntyre (a mineral consultant) and McKitrick (an economist) had encountered numerous hockey-stick-shaped graphs that were typically used to try to sell an idea based upon some measure of performance. Their experience was that these types of graphs inevitably broke down under careful scrutiny. Familiar with accounting procedures, they decided, out of personal interest, to "audit" the "hockey stick" and see if they could recreate it starting from scratch.

The resulting trials and tribulations of McIntyre and McKitrick make for a truly eye-opening look at the supposed "openness" of the scientific process. For years they toiled tirelessly in their task, working through countless roadblocks erected by the "hockey stick's" original creators, and documenting an embarrassing number of errors in the original procedure including inaccurate data descriptions, insufficient methodological details, data compilation errors, data handling mistakes, and questionable statistical techniques. While no individual mistake was likely sufficient enough in and of itself to throw into question the "hockey stick," taken together, the list of errors indicate a certain lack of rigor and attention to detail by the "hockey stick's" creators. Their efforts are detailed in two scientific articles (McIntyre and McKitrick, 2003; 2005), in an upcoming book chapter, and in McIntyre's personal web

page. Additionally, the *Wall Street Journal* chronicled much of this activity in a front page article on February 14, 2005.

The third dissenting voice was that of Jan Esper and colleagues in 2004. Esper is an expert in climate reconstructions based upon tree-ring records (the primary type of proxy data relied upon by Mann et al. in creating the "hockey stick"). It turns out that one must be careful when using tree rings to reconstruct long-term climate variability because as the tree itself ages, the widths of the annual rings that it produces changes—even absent any climatic variations. This growth trend needs to be taken into account when trying to interpret any climate data contained in the tree-ring records. In most cases, the tree-ring records are first detrended to remove this growth trend, and then the remaining variation in the rings is used to derive a climate signal. The problem with this technique is that by detrending the tree-ring record, long-term climate trends are lost as well. Esper et al. point out that this could be one likely reason why the handle of the "hockey stick" is so flat—it lacks the centennial-scale variations that were lost in the standardization of its primary data source. Using an alternative technique that attempted to preserve as much of the information about long-term climate variations as possible from historical tree-ring records, Esper and colleagues derived their own annual Northern Hemisphere temperature reconstruction. The result (Figure 2) is a 1,000-yr temperature history in which the LIA and the MWP are much more pronounced than the "hockey stick" reconstruction—more evidence that the "hockey stick" underestimates the true level of natural climate variation.

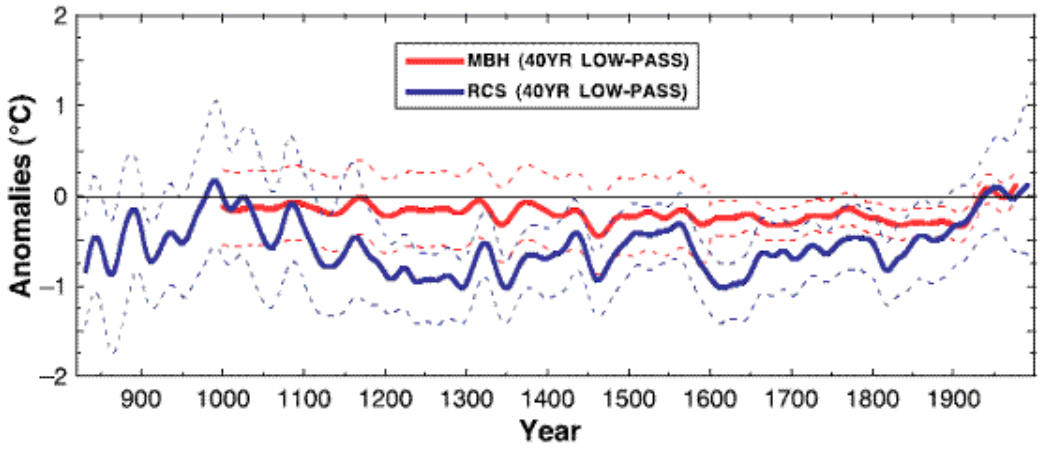


**Figure 2. A comparison of 1,000-year temperature reconstructions. The red line is the temperature history of the Northern Hemisphere as developed by Mann and colleagues, a.k.a. "the Hockey Stick." The blue line represents the Northern Hemispheric temperature history as constructed by Esper's research team (source: Esper et al., 2002).**

The chorus of dissent grew louder with the publication of a paper by Hans von Storch and colleagues in *Science* in late-2004. Von Storch was interested in how well the temperature reconstruction methodology used in producing the "hockey stick" actually worked. In order to investigate this, he used a climate

model, run with historic changes in solar output and volcanic eruptions to produce a temperature record for the past 1,000 years. For von Storch's purposes, it was not necessary to produce an accurate temperature record, just one that was reasonably representative of what may have happened. Next, he employed a methodology similar to Mann et al.'s, using "proxy" data derived from the climate model temperature record to see how well the Mann et al. methodology could reconstruct the actual data from which it was drawn. What von Storch's research team found was that the techniques used to construct the "hockey stick" vastly underestimated the true level of variability in the known (modeled) temperature record (Figure 3). It is thus reasonable to conclude that the same techniques, when applied in the real world, would similarly underestimate the true level of natural variability and thus underplay the importance of the LIA and MWP. Again, the von Storch finding adds further evidence that the handle of the "hockey stick" is too flat.

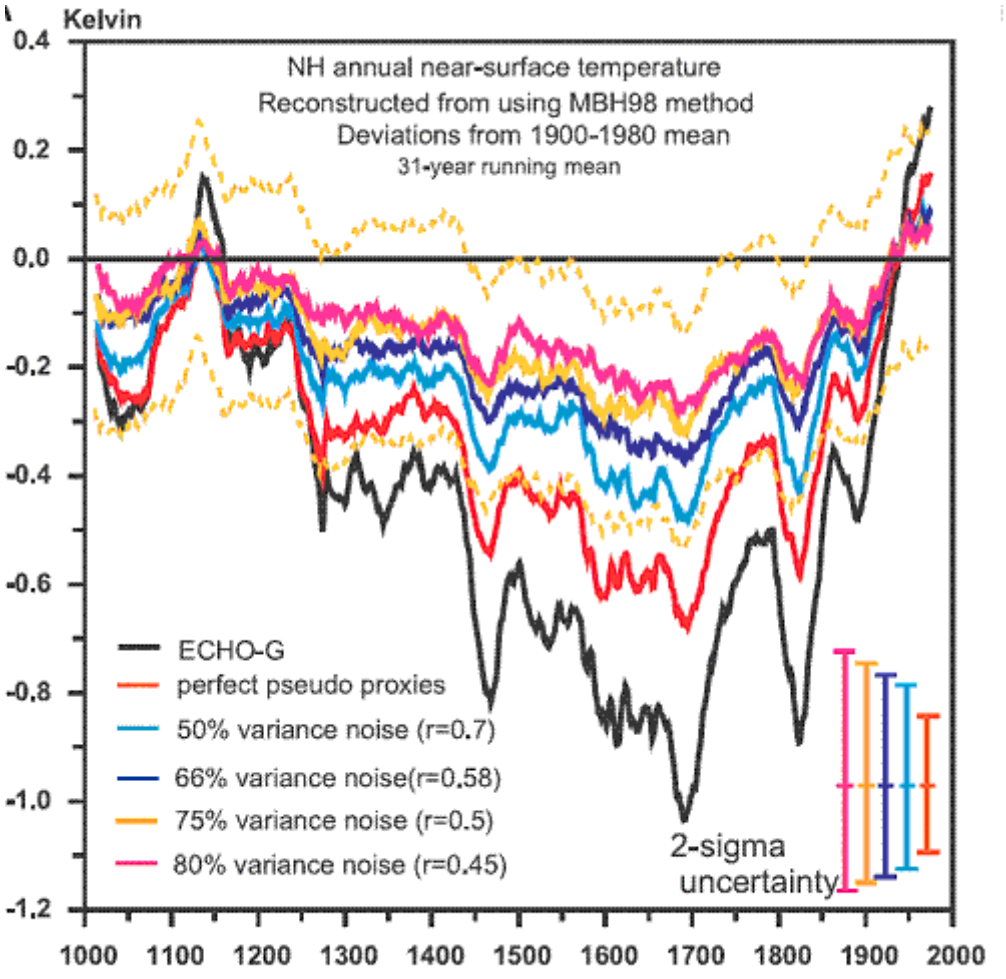


**Figure 3. Modeled temperature history for the past 1,000 years (black line) and attempts to reconstruct that history using a Mann-like multi-proxy technique when different amounts of noise are included (colored lines). The more noise, the lower the variance. (Source: von Storch et al., 2004).**

And now, with the publication of a paper in *Nature* magazine in early 2005 by Anders Moberg and colleagues, it's all over for the hockey stick. Recognizing

that different kinds of proxy temperature records may be more appropriately related to climatic variations at different time scales, Moberg applied a statistical technique called 'wavelet analysis' that allows each proxy to explain temperature variations on a timescale that it was most sensitive to. For example, as discussed above, tree-rings have difficulty in capturing long-term variations but are quite useful for investigating annual-to-decadal scale variability. Other proxies, such as lake and ocean sediments, contain climate information, but are harder to date precisely on annual or even decadal time scales. These low temporal resolution proxies are nonetheless useful for capturing long-term, multi-century climate variations. By combining high-resolution with low-resolution proxy information, Moberg et al. produced a 1,000-yr (actually a 2,000-yr) long temperature reconstruction for the Northern Hemisphere. Moberg's reconstruction (Figure 4) contains strong MWP and LIA signals. The natural variation of temperatures in the Moberg reconstruction is two to three times that of the Mann et al. "hockey stick." Again, the handle of the "hockey stick" was found to be too flat.

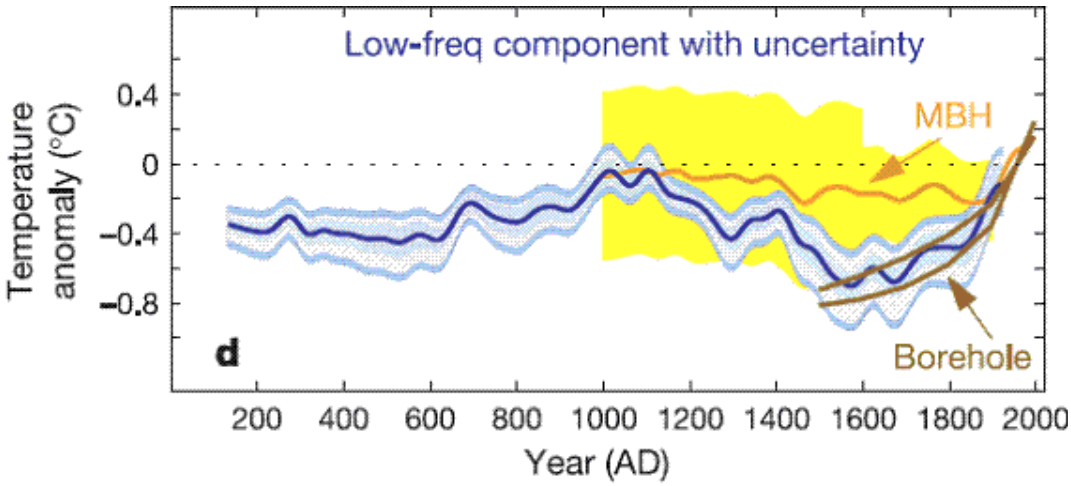


**Figure 4. The low-frequency component of climate as determined by Moberg et al. (blue curve with shaded uncertainty bands) compared with the Mann et al. record (orange curve and shaded uncertainty band). (Source: Moberg et al., 2005).**

Had the original reconstruction by Mann and colleagues looked like the latest reconstruction by Moberg et al., no one would have paid it much attention, because it would have fit nicely with the expectations given all of the prior research on the climate history of the past millennium. It would have been nothing remarkable.

But, the "hockey stick" was remarkable. And as such, it will be remembered as a remarkable lesson in how fanaticism can temporarily blind a large part of the scientific community and allow unproven results to become mainstream thought overnight. The embarrassment that it caused to many scientists working in the field of climatology will not be soon forgotten. Hopefully, new findings to come, as remarkable and enticing as they may first appear, will be

greeted with a bit more caution and thorough investigation before they are widely accepted as representing the scientific consensus.

In this way, the lead graphic in the upcoming IPCC's Fourth Assessment Report, due out in late 2007, may even survive to be included somewhere in the *Fifth Assessment Report* which will no doubt follow five or so years hence. The "hockey stick" won't be so lucky.

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Mann, M.E. R.S. Bradley, and M.K. Hughes, 1998. Global-scale temperature patterns and climate forcing over the past six centuries. *Nature*, **392**, 779-787.

Mann, M.E., R.S. Bradley, and M.K. Hughes, 1999. Northern Hemisphere temperatures during the past millennium: inferences, uncertainties, and limitations. *Geophysical Research Letters*, **26**, 759–762.

McIntyre, S., and R. McKitrick, 2003. Corrections to the Mann et. al. (1998) Proxy database and Northern Hemispheric average temperature series. *Energy & Environment*,**14**, 751-771.

McIntyre, S., and R. McKitrick, 2005. Hockey sticks, principal components, and spurious significance. *Geophysical Research Letters*, **32**, doi:10.1029/2004GL021750.

Moberg, A., et al., 2005. Highly variable Northern Hemisphere temperatures reconstructed from low- and high-resolution proxy data. *Nature*, **433**, 613-617.

Soon, W., and S. Baliunas, 2003. Proxy climatic and environmental changes of the past 1,000 years. *Climate Research*, **23**, 89–110.

Von Storch, H., et al., 2004. Reconstructing past climate from noisy data. *Science*, **306**, 679-682.

## Antarctica

**Continental-wide average temperatures are decreasing**
http://www.worldclimatereport.com/index.php/2005/04/22/the-tip-of-the-iceberg-yet-another-predictable-distortion/

This Earth Day, AP newswire leads with a real scare story: "Study Shows Antarctic Glaciers Shrinking." In doing so, the press, yet again, predictably distorted a global warming story.

By "Antarctica" they actually meant the Antarctic Peninsula, which comprises about 2% of the continent. It's warming there and has been for decades. But every scientist (or for that matter, everyone who has read Michael Crichton's *State of Fear*) knows that the temperature averaged over the entire continent has been declining for decades.

The underlying science behind the AP story was published in the April 22, 2005 issue of *Science* magazine, under the more appropriate (and accurate) title, "Retreating Glacier Fronts on the Antarctic Peninsula over the Past Half-Century." A research team led by Alison Cook of the British Antarctic Survey carefully measured the historical position of 244 glaciers as determined from a 60-year collection of images including aerial photographs and satellite pictures. By comparing the position of glacier termini over time, the researchers were able to determine the timing and speed of glacial changes.

The results presented in *Science* weren't even based on the entire Peninsula, but rather the northern portion. While a more comprehensive continent-wide investigation of coastal glacier changes is underway, only the results from the Peninsula were written up.

Figure 1 shows the temperature trends from 1966-2000 over Antarctica as reported in a study by Peter Doran and colleagues and published in *Nature* magazine in 2002. The region that encompasses all 244 of the glaciers in the *Science* study is highlighted. While it is clear the there has been warming in the localized region around where the Antarctic Peninsula glaciers are located, it is also clear that the majority of the rest of the continent has been cooling. Just how much has been cooling was also calculated by Doran (Figure 2), and shows that about 2/3rds of the continent outside of the Peninsula has been cooling over the past 35 years or so.

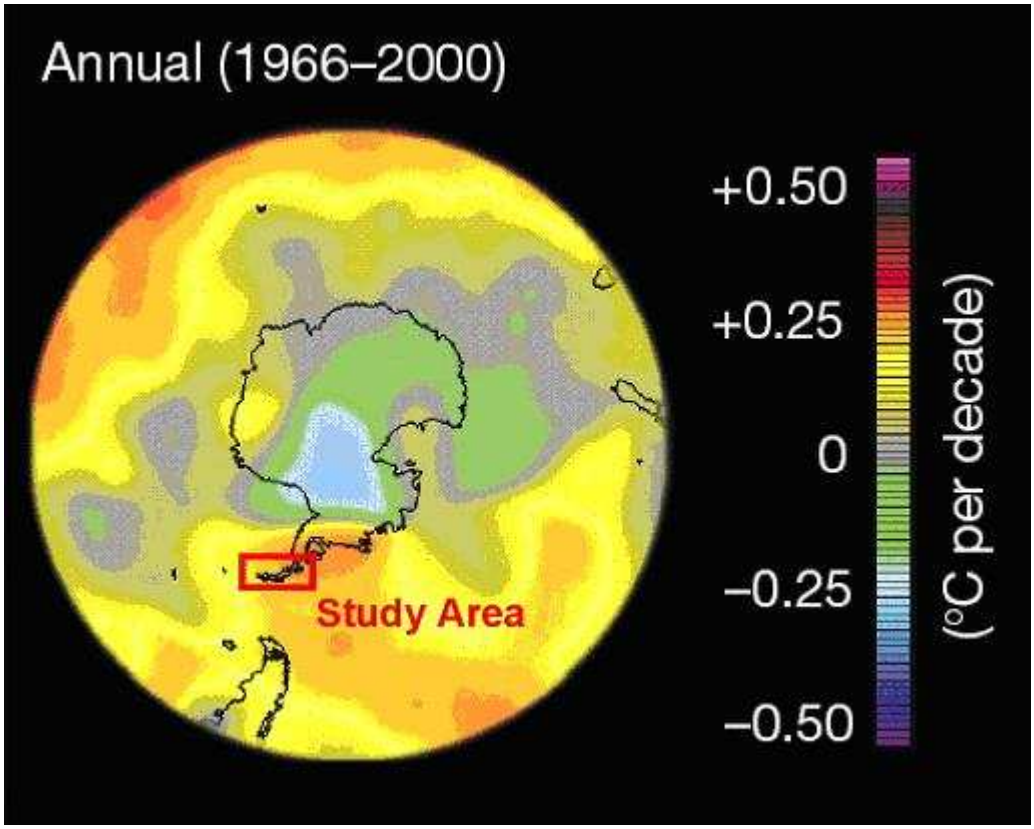


**Figure 1. Trend in annual temperatures in Antarctica with the glacier study region outlined by the red box (adapted from Doran et al., 2002).**

**Table 1 Proportions of Antarctica warming and cooling (1966–2000)**

| Period | Antarctica | Antarctica without the Antarctic Peninsula |
|---|---|---|
| Annual | +41.4%, –58.3% | +33.8%, –65.9% |
| Winter (June–Aug.) | +62.5%, –37.3%, | +56.3%, –43.4%, |
| Spring (Sept.–Nov.) | +54.1%, –45.7% | +49.4%, –50.4% |
| Summer (Dec.–Feb.) | +31.7%, –67.4% | +22.8%, –76.3% |
| Autumn (Mar.–May) | +12.6%, –87.4% | +0.3%, –99.7% |

Plus signs indicate the proportions warming; minus signs indicate the proportions cooling. The Antarctic Peninsula is defined as the area north of 80° S and east of 80° W.

**Figure 2. Proportion of Antarctica that is warming (as indicated by the + signs) and cooling (as indicated by the – signs). Annually, temperatures have been cooling in 65.9% of the region outside of the Antarctic Peninsula (from Doran et al., 2002).**

Furthermore, studies have been made investigating the overall status of sea ice around Antarctica. NASA announced the results of their study in 2002 with a press release headlined "Satellites Show Overall Increases in Antarctic Sea Ice Cover." While there are regional variations from this trend, including a decline in sea ice around the Antarctic Peninsula, the area of sea ice around

much of the remainder of the continental margin has been increasing, at least over the past 25 years. Obviously, a story proclaiming "Antarctic Sea Ice Rapidly Diminishing" and focusing on the Peninsula region would paint an incomplete and unfair picture of the actual circumstances there.

The fact that a report that glaciers are melting over one extremely small portion of Antarctica that is showing warming, while the rest of the continent is cooling, grabs not only newspaper headlines but finds its way without a regional perspective into a prestigious publication like *Science* is troubling. If objectivity, rather than scariness were the purpose, Cook et al. would certainly have referenced Doran's work for background. Or perhaps the editors at *Science* could have asked for it?

The general cooling of Antarctica is highly scientifically significant because climate models run under increasing levels of greenhouse gases predict that the Antarctic continent as a whole, not just the Peninsula, should be rapidly warming. This is clearly a model failure and no amount of going on and on about the impact of warming in the Peninsula, is going to change that fact.

There's a 2004 book that details the repetitive nature of global warming exaggeration, called *Meltdown: The Predictable Distortion of Global Warming by Scientists, Politicians, and the Media*. If it were still being written, the sad story of Earth Day, 2005, would have surely merited a chapter.

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Cook, A.J. et al., 2005. Retreating Glacier Fronts on the Antarctic Peninsula over the Past Half-Century. *Science*, **308**, 541-544.

Doran, P.T., et al., 2002. Antarctic climate cooling and terrestrial ecosystem response. *Nature*, **415**, 517-520.

Michaels, P.J., 2004. *Meltdown: The Predictable Distortion of Global Warming by Scientists, Politicians and the Media*. Cato Books, Washington DC. 272pp.

**Continental-wide snow and ice cover is growing**
http://www.worldclimatereport.com/index.php/2005/05/27/antarctic-ice-a-global-warming-snow-job/

*Antarctic Ice: A Global Warming Snow Job?*

Climate scientists have long suspected that warming the oceans around a very cold continent is likely to dramatically increase snowfall. Consider Antarctica. It's plenty chilly, dozens of degrees below freezing, and it's surrounded by water. The warmer the water, the greater the evaporation from its surface, and, obviously, the more moisture it contributes to the local atmosphere.

So, when this moisture gets swirled up by a common cyclone, do you think it's going to fall as *rain* in Antarctica?

A recent study, no shocker to real climatologists (but perhaps to climate doomsayers), demonstrates this simple physics. It appears in the latest *SciencExpress*, and it shows that the vast majority of the Antarctic landmass is rapidly gaining ice and snow cover.

Obviously this moisture comes from the sea. And, being deposited in solid form on the land-way-down-under, this lowers the earth's sea level.

Like we said, this should shock no climatologist. But consider the "profession" of environmental journalism, which ran these headlines just one teensy month ago:

"Antarctic glaciers shrink" –*The Baltimore Sun*, April 22, 2005

"Study shows Antarctic glaciers shrinking" –*Associated Press*, April 22, 2005

"Vanishing glaciers: Antarctica's big melt" –*The Australian*, April 23, 2005

"New study points to big melt in Antarctica" – *Sci-Tech Today*, April 22, 2005

"Antarctic glaciers in mass retreat" –*Nature.com*, April 21, 2005

"Antarctic glaciers at risk of global warming" – *All Headline News*, April 22, 2005

"Antarctic glaciers are getting smaller faster" –*The Times On-line*, April 22, 2005

"Shrinking glaciers confirm the worst" –*New Scientist*, April 27, 2005

Suddenly the tune has changed:

"As climate shifts, Antarctic ice sheet is growing" –*Los Angeles Times*, May 20, 2005

"Scientists link global warming to Antarctic's ice cap's growth" –*Chicago Tribune*, May 20, 2005

"Antarctica ice cap thickens" –*Pittsburgh Post Gazette*, May 20, 2005

"Warming is blamed for Antarctic's weight gain" –*New York Times*, May 20, 2005

"Ice sheet confounds climate theory" – *The Telegraph*, May 20, 2005

"Antarctica ice cap thickens, slowing rise in sea levels" – *Pioneer Press*, May 20, 2005

Recent climate changes have led to a fairly large warming trend in the region around the Antarctic Peninsula—the spit of land the stretches from the Antarctic mainland towards the southern tip of South America. In this region, comprising about 2% of the entirety of Antarctica, significant changes associated with rising temperatures are being observed—floating ice shelves are breaking up, glaciers are shrinking, seal species are moving in, grasses, tiny shrubs and mosses are thriving, etc. By most accounts, transitioning from a relatively barren, frozen landscape to a warmer, less frozen one would seem to be a positive development, as this change presents a growing opportunity for increased species richness and diversity. But, in today's world, dominated by an eagerness to demonstrate how human activities are impacting the innocent "natural" species of the world, all change is bad.

The fact is that the vast majority of global warming stories that have come out of Antarctica are based upon observations and events on and around the Peninsula. This isn't surprising as it conforms to my theory of "Predictable Distortion" recently published in my book *Meltdown*. Indeed, the number of stories about Antarctic melting is roughly in inverse proportion to the percentage of the Antarctic continent that they pertain to (and thus their global significance). For instance, most of Antarctica has actually been cooling for the past couple of decades (see here for more details). And now comes word that the snow and ice cover over large portions of Antarctica has been increasing, leading to a drawdown of global sea level.

In their *SciencExpress* article, Curt Davis (University of Missouri-Columbia) and his collaborators used satellite radar altimetry measurements from 1992 to 2003 to determine that, on average, the elevation of about 8.5 million square kilometers of the Antarctic interior has been increasing (Figure 1). The increasing elevation was then linked to increases in snowfall, which was translated into a mass gain of 45 ± 7 billion tons per year, tying up enough moisture to lower sea level by 0.12 ± 0.02 millimeters per year.

(The study region covered about 70% of the total ice sheet area–the satellites couldn't "see" all the way to the South Pole due to orbital constraints, and the altimetry doesn't work well in areas of rough terrain such as along the coastline).

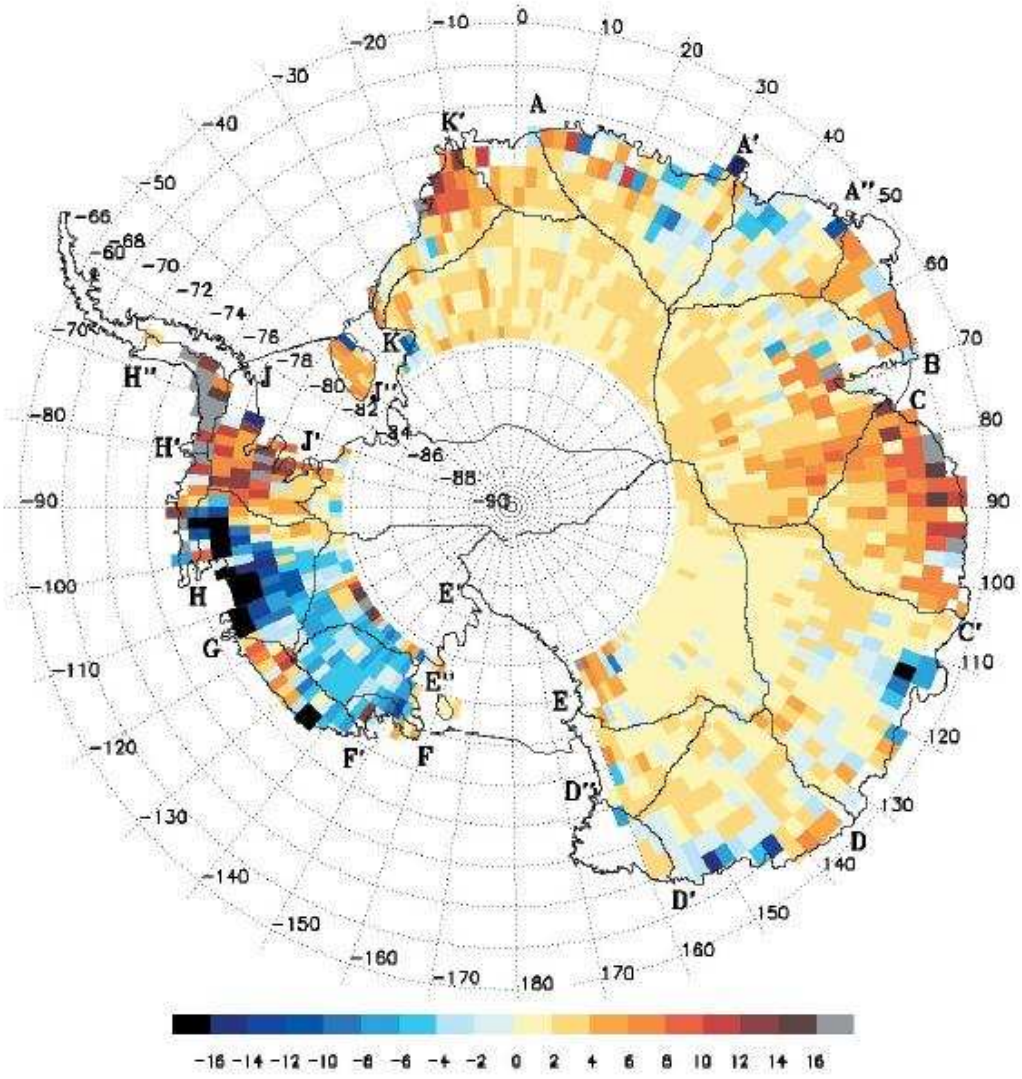


**Figure 1. Rate of elevation change (cm/yr) from 1992 to 2003 as determined by satellite altimetry measurements (from Davis et al., 2005).**

This 0.12 millimeters is a very fortuitous number. In 2000, NASA iceman William Krabill grabbed global headlines by claiming that melting in the world's other big icebox—Greenland—was raising sea level by 0.13 millimeters annually. In blackjack, this would be called a "push," and everybody would get to keep their money. (Global warming obviously isn't "21", is it?)

It seems perfectly logical that a warming of the Southern Oceans (as opposed to most of the Antarctic continent proper where temperatures have been decreasing) has led to higher levels of atmospheric moisture that eventually precipitates out over Antarctica. The authors caution though, that from their work alone, it is impossible to tell whether the observed snowfall increases are from natural climate variations or from a human-induced global warming.

Just for the hey of it, assume the increased snow cover *is* because of anthropogenic global warming. That would be more evidence it that the global climate system has more checks and balances in it than the U.S. Constitution, something as obvious as this planet's propensity to sustain life for three billion years.

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Cook, A.J. et al., 2005. Retreating Glacier Fronts on the Antarctic Peninsula over the Past Half-Century. *Science*, **308**, 541-544.

Davis, C.H., et al., 2005. Snowfall-driven growth in East Antarctic ice sheet mitigates recent sea-level rise. *SciencExpress*, May 19, 2005.

Krabill, W., et al., 2000, Greenland Ice Sheet: High Elevation Balance and Peripheral Thinning, *Science*, **289**, 428–430.

Michaels, P.J., 2004. Meltdown: The Predictable Distortion of Global Warming by Scientists, Politicians and the Media. Cato Books, Washington DC. 272pp.

## Arctic/Alaska

**Response to McCain's ACIA hearing**
http://www.worldclimatereport.com/index.php/2004/12/10/open-letter-to-senator-mccain/

*Open Letter To Senator McCain*

Open Letter to Senator John McCain concerning the misuse of Science that occurred during the November 16th, 2004 hearing held before the U.S. Senate Committee on Commerce, Science, and Transportation.

Dear Senator McCain,

During the Global Climate Change hearing that was held before your committee on Tuesday, November 16th, 2004, you wondered aloud "Who are these people?" who contend that the recently released Arctic Climate Impact Assessment (ACIA) did not tell the whole truth about past, present, and potential future conditions in the world's Arctic regions. To help answer your question, presented below is a preliminary list of scientists, who, based upon their recently published research results would have provided a more comprehensive picture of arctic climate. For the sake of Science, let's hope that their exclusion was simply a matter of oversight or scheduling conflict.

**Topic: Putting the current climate trends in historical perspective**

Over and over, you heard testimony from your panelists concerning the deteriorating state of the Arctic and its ecosystems, including its human inhabitants. Over and over you heard about how these systems got to be in their current condition—decades of warming presumably caused by worldwide reliance on fossil fuels as an energy source. No one told you that conditions in the Arctic were nearly as warm, as warm, or warmer, than they are now a mere 60 years ago. Therefore, if Arctic systems are presently struggling more so than in the past, it points to factors other than anthropogenic climate change as the root cause. Below is an international list of scientists whose published work indicates that the current Arctic warmth is of the same approximate magnitude as that of the 1930s and 1940s.

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Scientist:

Rajmund Przybylak
Department of Climatology
Nicholas Copernicus University
Torun, Poland

Paper:

Temporal and spatial variance of surface air temperature over the period of instrumental observations in the Arctic, *International Journal of Climatology*, **20**, 587-614, 2000.

Key Quote or Synopsis:

"A detailed analysis of the spatial and temporal changes in mean seasonal and annual surface air temperatures over the period of instrumental observations in the Arctic is presented…The presented analysis shows that the observed variations in air temperature in the real Arctic (defined on the basis of climate as opposed to other criteria, e.g. astronomical or botanical) are in many aspects not consistent with the projected climatic changes computed by climatic models for the enhanced greenhouse effect. The highest temperatures since the beginning of instrumental observation occurred clearly in the 1930s and can be attributed to changes in atmospheric circulation. The second phase of contemporary global warming (after 1975) is, at most, weakly marked in the Arctic. For example, the mean rate of warming for the period 1991-1995 was 2-3 times lower in the Arctic than the global average. Temperature levels observed in Greenland in the last 10-20 years are similar to those observed in the 19th century."

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Scientists:

Igor V. Polyakov
Roman V. Bekryaev
Uma S. Bhatt
Roger L. Colony
Alexander P. Maskshtas
David Walsh
International Arctic Research Center
University of Alaska Fairbanks
Fairbanks, Alaska

Genrikh V. Alekseev
Arctic and Antarctic Research Institute
St. Petersburg, Russia

Mark A. Johnson
Institute of Marine Science
University of Alaska Fairbanks
Fairbanks, Alaska

Paper:

Variability and trends of air temperature and pressure in the Maritime Arctic, 1875-2000. *Journal of Climate*, **16**, 2086-2092, 2003.

Key Quote or Synopsis:

"Arctic atmospheric variability during the industrial era (1875-2000) is assessed using spatially averaged surface air temperature (SAT) and sea level pressure (SLP) records. Air temperature and pressure display strong multidecadal variability on timescales of 50-80 yr. Associated with this variability, the Arctic SAT record shows two maxima: in the 1930s-40s and in recent decades, with two colder periods in between. In contrast to the global and hemispheric temperature, the maritime Arctic temperature was higher in the late 1930s through the early 1940s than in the 1990s."

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Scientists:

James. E. Overland
Harold O. Mofjeld
National Oceanic and Atmospheric Administration
Pacific Marine Laboratory
Seattle, Washington

Michael C. Spillane
Donald B. Percival
Muyin Wang
University of Washington
Seattle, Washington

Paper:

Seasonal and regional variation of pan-arctic surface air temperature over the instrumental record. *Journal of Climate*, **17**, 3263-3282, 2003.

Key Quote or Synopsis:

This paper presents results that show that there are seasonal and regional differences in the patterns of historical temperature in the Arctic. With the exception of spring, the authors report that the current climate in the Arctic is not unique in the in the instrumental record (which begins in the late 1800s).

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Scientists:

Vladimir A. Semenov
Lennart Bengstsson
Max Plank Institute for Meteorology
Hamburg, Germany

Paper:

Modes of the wintertime Arctic air temperature variability. *Geophysical Research Letters*, **30**, 1781-1784, 2003.

Key Quote or Synopsis:

The researchers present results which show that average Arctic temperature undergoes large variations, driven by the dominance of different internal modes. The most recent temperature rise is shown to be related to atmospheric circulation factors in the North Atlantic Ocean while an early 20th century warming of nearly equal magnitude was possibly related to long-term sea ice variations.

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**Topic: Recent climate change in Alaska**

As a U.S. Senator, you were rightly concerned about the state of the conditions in Alaska, and on repeated instances you asked for specifics about observed climate changes there. On each and every occasion, you only received a partial collection of facts about historical temperature and temperature trends that would lead an interested listener to believe that anthropogenic global warming was responsible for the large change in Alaskan temperatures observed over the past 30 to 40 years. In fact, a natural climate shift in the Pacific Ocean that occurred in 1976 is responsible for the observed climate changes in Alaska. Below is a list of researchers, many from the Alaska Climate Research Center at the University of Alaska, who could have supplied you with these facts that were missing from your hearing:

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Scientists:

Gerd Wendler, Director and Professor Emeritus
Martin Stuefer, Research Associate
Martha Shulski, Climatologist
Brian Hartmann, Assistant Climatologist
Alaska Climate Research Center
University of Alaska Fairbanks
903 Koyukuk Drive
P.O. Box 757320
Fairbanks, AK 99775-7320

Web Site:

Temperature Change in Alaska, 1949-2003,
http://climate.gi.alaska.edu/ClimTrends/Change/4903Change.html

Key Quote or Synopsis:

"The topic of climate change has attracted widespread attention in recent years and is an issue that numerous scientists study on various time and space scales. One thing for sure is that the earth's climate has and will continue to change as a result of various natural and anthropogenic forcing mechanisms.

"This page features the trends in mean annual and seasonal temperatures for Alaska's first-order observing stations since 1949 (Fig. 1), the time period for which reliable meteorological data are available. The temperature change varies from one climatic zone to another as well as for different seasons. If a linear trend is taken through mean annual temperatures, the average change over the last 5 decades is about 3.0°F. However, when analyzing the trends for the four seasons, it can be seen that most of the change has occurred in winter and spring, with less of a change in summer and even slight cooling in autumn (see Table below).

"Considering just a linear trend can mask some important variability characteristics in the time series. Figure 2 shows clearly that this trend is non-linear: a linear trend might have been expected from the fairly steady observed increase of CO2 during this time period. The figure shows the temperature departure from the long-term mean (1949-2003) for the average of all stations. It can be seen that there are large variations from year to year and the 5-year moving average demonstrates cyclical behavior. The period 1949 to 1975 was substantially colder than the period from 1977 to 2003, however since 1977 no additional warming has occurred in Alaska with the exception of Barrow and a few other locations. In 1976, a stepwise shift appears in the temperature data, which corresponds to a phase shift of the Pacific Decadal Oscillation from a negative phase to a positive phase. Synoptic conditions with the positive phase tend to consist of increased southerly flow and warm air advection into Alaska during the winter, resulting in positive temperature anomalies. Click on the table above to see temperature change after the 1976 shift, and for other time periods."

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Scientists:

Brian Hartmann
Gerd Wendler
Alaska Climate Research Center
University of Alaska
Fairbanks, Alaska

Paper:

Manifestations of the Pacific Decadal Oscillation shift of 1976 within Alaskan climatology. *Seventh Conference on Polar Meteorology and Oceanography and Joint Symposium on High-Latitude Climate Variations*. May 12-16, 2003.

Key Quote or Synopsis:

"During the year of 1976, the index of the PDO [Pacific Decadal Oscillation] underwent a shift from one of strongly negative phase to one of strongly positive phase. The general circulation and temperature differences witnessed during each of the phases is generally well known, but a fine scale study to understand specific climatological effects within Alaska, including the differing regional effects and responses to the abrupt change, has not been conducted. The present study is an effort to clearly discern the specific manner in which the regime shift was experienced throughout Alaska."

"The magnitude and sudden nature of the shift in the PDO Index is paralleled by strong local temperature increases in Alaska, suggesting that significant local changes in other meteorological variables should be seen as well….

[Atmospheric circulation patterns associated with the 1976 PDO regime shift] explain the immense warming of 10°C observed in January from one decade to the next in the Interior, a value far beyond that which can be explained by increased CO2 and other green house gases."

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Scientists:

Brian Hartmann
Gerd Wendler
Alaska Climate Research Center
Geophysical Institute
University of Alaska
Fairbanks, Alaska

Paper:
On the significance of the 1976 Pacific climate shift in the climatology of Alaska. *Journal of Climate*, under review.

Key Quote or Synopsis:

"The 1976 Pacific climate shift is examined and its manifestations and significance in Alaskan climatology during the last half-century are demonstrated. The regime shift is quantified by the Pacific Decadal Oscillation Index shift in 1976 from dominantly negative values for the 25-year time period 1951-1975 to dominantly positive values for the period 1977-2001.

Mean annual and seasonal temperatures for the positive phase were up to 3.1°C higher than for the negative phase. Likewise, mean cloudiness, wind speeds, and precipitation amounts increased while mean sea level pressure and geopotential heights decreased. The pressure decrease resulted in a deepening of the Aleutian Low in winter and spring. The intensification of the Aleutian Low increased the advection of relatively warm and moist air to Alaska and storminess over the state.

The regime shift is also examined for its effect on the long-term temperature trends throughout the state. The trends that have shown climatic warming

are strongly biased by the sudden shift from the cooler regime to a warmer regime in 1976. When analyzing the total time period from 1951 to 2001, warming is observed, however the 25-year period trend analyses before 1976 (1951-1975) and thereafter (1977-2001) both display cooling. In this paper we emphasize the importance of taking into account the sudden changes that result from abrupt climatic shifts, persistent regimes and the possibility of cyclic oscillations, such as the PDO, in the analysis of long-term climate change in Alaska."

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Scientists:

Feng Sheng Hu
University of Illinois
Urbana Illinois

Emi Ito
University of Minnesota
Minneapolis, Minnesota

Thomas A. Brown
Lawrence Livermore National Laboratory
Livermore, California

B. Brandon Curry
Illinois State Geological Survey
Champaign, Illinois

Daniel R. Engstrom
Science Museum of Minnesota
St. Croix, Minnesota

Paper:
Pronounced climatic variations in Alaska during the last two millennia.
*Proceedings of the National Academy of Sciences*, **98**, 10552-10556, 2001.

Key Quote or Synopsis:

"We conducted multiproxy geochemical analysis of a sediment core from Farewell Lake (62º 33' N, 153º 38' W, 320m altitude) in the northwestern foothills of the Alaska Range. These analysis provide the first high-resolution (multidecadal) quantitative record of Alaskan climate variations that spans the last two millennia….Our SWT [surface water temperature] reconstruction at Farewell Lake indicates that although the 20th century, represented by the uppermost three samples, was among the warmest periods of the past two millennia, two earlier intervals may have been comparably warm (A.D. 0-300 and A.D. 850-1200). These data agree with tree-ring evidence from Fennoscandia, indicating that the recent warmth is not atypical of the past 1000 years."

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**Topic: Sea Ice Declines**

During your Senate Committee hearing, you also heard testimony about the observed declines in Arctic sea ice during the past several decades and how that in some climate model prognostications, summer sea ice totally disappears from the northern oceans by the end of the 21st century. However, no one told you that a large portion of the observed sea ice declines is related to natural variability, or that in some regions it does not appear that current conditions are any more or less unusual than sea ice condition during the 19th century. Had you invited the scientists below to testify, you would have been made aware of these opinions.

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Scientists:

James E. Overland
Pacific Marine Laboratory
National Oceanic and Atmospheric Administration
Seattle, Washington

Kevin Wood
Arctic Research Office
National Oceanic and Atmospheric Administration
Silver Spring, Maryland

Paper:

Accounts from 19th-century Canadian Arctic Explorers' Logs Reflect Present Climate Conditions, *EOS Transactions of the American Geophysical Union*, **84**, October 7,2003.

Key Quote or Synopsis:

"The widely perceived failure of 19th-century expeditions to find and transit the Northwest Passage in the Canadian Arctic is often attributed to extraordinary cold climate conditions associated wit the "Little Ice Age' evident in proxy records. However, examination of 44 explorers' logs for the western Arctic from 1818 to 1910 reveals that climate indicators such as navigability, the distribution and thickness of annual sea ice, monthly surface air temperatures, and the onset of melt and freeze were within the present range of variability."

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Scientists:

Ignatius G. Rigor
John M. Wallace
University of Washington
Seattle, Washington

Roger L. Colony
University of Alaska
Fairbanks, Alaska

Paper:

Response of Sea Ice to the Arctic Oscillation. *Journal of Climate*, **15**, 2648-2663, 2002.

Key Quote or Synopsis:

"Increased advection of the ice away from the coast during winter during high-index conditions of the AO [Arctic Oscillation] enhanced the production of thin ice in the flaw leads of the East Siberian and Laptev Seas. The cyclonic SIM [sea ice motion] anomaly also enhances the production of thin ice during winter because of the increase in divergence over the eastern Arctic. Both of these processes contribute to thinning of sea ice. These changes in SIM have contributed to the observed trends in sea ice, such as the decreases in ice area and extent, and the thinning of sea ice.

The changes in SIM also appear to be at least partially responsible for the trends in SAT [surface air temperature] reported by Rigor et al. (2000); that is, the increased latent heat released during the formation of new ice in the diverging leads, and the increased heat flux through thinner ice have contributed to the pronounced warming that has been observed in the East Siberian and Laptev portions of the warm anomaly. Intuitively, one might have expected the warming trends in SAT to cause the thinning of sea ice, but the results presented in this study imply the inverse causality; that is, the thinning ice has warmed SAT by increasing the heat flux from the ocean."

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Scientists:

Greg Holloway
Tessa Sou
Institute of Ocean Sciences
Sidney, British Columbia

Paper:

Has Arctic Sea Ice Rapidly Thinned? *Journal of Climate*, **15**, 1691-1701, 2002.

Key Quote or Synopsis:

"Reports based on submarine sonar data have suggested Arctic sea ice has thinned nearly by half in recent decades. Such rapid thinning is a concern for detection of global change and for Arctic regional impacts. Including atmospheric time series, ocean currents and river runoff into an ocean-ice-snow model show that the inferred rapid thinning was unlikely. The problem stems from undersampling. Varying winds that readily redistribute Arctic ice create a recurring pattern whereby ice shifts between the central Arctic and peripheral regions, especially in the Canadian sector. Timing and tracks of the submarine surveys missed this dominant mode of variability."

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Scientist:

P. Windsor
Department of Oceanography, Earth Sciences Centre
Göteborg University
Göteborg, Sweden.

Paper:

Arctic Sea Ice Thickness Remained Constant during the 1990s. *Geophysical Research Letters*, **28**, 1039-1041, 2001.

Key Quote or Synopsis:

"The ice cover of the Arctic Ocean is considered to be a sensitive indicator of global climate change. Recent research, using submarine-based observations, suggests that the Arctic ice cover was thinner in the 1990s compared to an earlier period (1958-1979), and that it continued to decrease in thickness in the 1990s. Here I analyze subsurface ice thickness (draft) of Arctic sea ice from six submarine cruises from 1991 to 1997. This extensive data set shows that there was no trend towards a thinning ice cover during the 1990s. Data from the North Pole shows a slight increase in mean ice thickness, whereas the Beaufort Sea shows a small decrease, none of which are significant. Transects between the two areas from 76 N to 90 N also show near constant ice thicknesses, with a general spatial decrease from the Pole towards the Beaufort Sea. Combining the present results with those of an earlier study, I conclude that the mean ice thickness has remained on a near-constant level around the North Pole from 1986 to 1997."

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Scientist:

Torgny Vijne
Norwegian Polar Institute
Oslo, Norway

Paper:

Anomalies and Trends of Sea-Ice Extent and Atmospheric Circulation in the Nordic Seas during the Period 1864-1998. *Journal of Climate*, **14**, 255-254, 2001.

Key Quote or Synopsis:

Vinje constructed a 135-yr time series of sea ice extent in the Nordic Seas and found that while April sea ice extend has declined by about 33 percent during this period, more than half of the decline occurred before 1900. Vinje concluded that "the time series indicates that we are in a state of continued recovery from the cooling effects of the Little Ice Age, during which a maximum sea-ice expansion was observed around 1800, both in the Iceland Sea and the Barents Sea."

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Scientists:

Igor V. Polyakov
Mark A. Johnson
University of Alaska
Fairbanks, Alaska

Paper:

Arctic decadal and interdecadal variability. *Geophysical Research Letters*, **27**, 4097-4100, 2000.

Key Quote or Synopsis:

"The rapid reduction of arctic ice thickness in the 1990s may be one manifestation of the intense atmosphere and ice cyclonic circulation regime due to the synchronous actions of the AO [Arctic Oscillation] and LFO [low-frequency oscillation]. Our results suggest that the decadal AO and multi-decadal LFO drive large amplitude natural variability in the Arctic making a detection of possible long-term trends induced by greenhouse gas warming most difficult."

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**Topic: Greenland Melting**

Another topic one which you heard testimony was the rapid melting of Greenland ice sheets and their potential contribution to rapid global sea level rise. However, none of the panelists told you that there has been an overall decline in Greenland temperatures during the past 60s years, and that despite the warming trend in Greenland during the last decade or so, temperatures still have not reached levels as high there as they were during the 1930s and 1940s.

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Scientists:

Petr Chylek
Space and Remote Sensing Sciences
Los Alamos National Laboratory
Los Alamos, New Mexico

Jason E. Box
New Mexico State University
Las Cruces, New Mexico

Glen Lesins
Dalhousie University
Halifax, Nova Scotia

Paper:

Global Warming and the Greenland Ice Sheet. *Climatic Change*, **63**, 201-221, 2004.

Key Quote or Synopsis:

"The Greenland surface air temperature trends over the past 50 years do not show persistent warming, in contrast to global average surface air temperatures. The Greenland coastal stations temperature trends over the second half of the past century generally exhibit a cooling tendency with superimposed decadal scale oscillations related to the NAO. At the Greenland ice sheet summit, the temperature record shows a decrease in the summer average temperature at the rate of about 2.2ºC/decade, suggesting that the Greenland ice sheet at high elevations does not follow the global warming trend either.

"A significant and rapid temperature increase was observed at all Greenland stations between 1920 and 1930. The average annual temperature rose between 2 and 4ºC in less than ten years. Since the change in anthropogenic production of greenhouses gases at that time was considerably lower than today, this rapid temperature increase suggests a large natural variability of the regional climate.

"High anticorrelations ($r = -0.84$ to $-0.93$) between the NAO index and the Greenland temperature records suggest a physical link between these processes. The recent negative shift of the NAO correlates with 1990s warming in Greenland. The NAO may play a crucial role in determining local Greenland climate during the 21st century; resulting in a local climate that may defy the global climate change. This possibility should be considered in models of ice sheet melt and future sea level rise. Forecasting changes in the NAO may be a primary factor in predicting the future Greenland ice sheet mass balance."

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Scientists:

Edward Hanna
Institute of Marine Studies
University of Plymouth

John Cappelen
Danish Meteorological Institute
Copenhagen, Denmark

Paper:

Recent cooling in coastal southern Greenland and relation with the North Atlantic Oscillation. *Geophysical Research Letters*, **30**, doi:10.1029/2002GL015797, 2003.

Key Quote or Synopsis:

"Analysis of new data for eight stations in coastal southern Greenland, 1958–2001, shows a significant cooling (trend-line change -1.29°C for the 44 years), as do sea-surface temperatures in the adjacent part of the Labrador Sea, in contrast to global warming (+0.53°C over the same period). The land and sea temperature series follow similar patterns and are strongly correlated but with no obvious lead/lag either way. This cooling is significantly inversely correlated with an increased phase of the North Atlantic Oscillation (NAO) over the past few decades (r = -0.76), and will probably have significantly affected the mass balance of the Greenland Ice Sheet."

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All of the above facts and findings were known by some, if not all of your panelists, yet none of them saw it fit to tell you. This is especially shameful because panelist Robert Corell, the lead scientist of the ACIA, and a senior figure in American science concluded by telling you that the ACIA report was unique because "it was all facts, no advocacy." However, the process of carefully selecting some facts and excluding others, in an effort to tell a particular story, is advocacy, pure and simple. This is precisely the course taken in your hearing. The selective statements by your panelists and the personal and belittling attacks that you made during the course of the hearing can be construed as little more than a concerted and organized effort to quell open scientific discourse on this issue of climate change. While you, and your panelists, may defend these actions by claiming that you are doing this for the betterment of the planet and its future ability to support the human race, the fact of the matter is that in suppressing the freedoms to pursue Science and Truth, you imperil our future more than any climatic change possibly could.

**Soot responsible for Arctic ice loss?**
http://www.worldclimatereport.com/index.php/2005/04/05/is-soot-not-co2-to-blame-for-the-loss-of-arctic-ice/

*Is soot, not CO2, to blame for the loss of Arctic ice?*

There are three primary tools that global warming alarmists use in their arguments that anthropogenic enhancements to the world's naturally occurring greenhouse effect are causing the climate to behave as it never has before and this will ultimately be catastrophic. They are 1) the "hockey stick" temperature reconstruction for the past 1,000 years, which purports to show that left to its own devices, the global average temperature changes very little, yet it jumps at the slightest provocation from mankind; 2) the IPCC 21st century temperature projections which show a range of possible warming by century's end that spans 1.4 to 5.8ºC (of course, the alarmist attention is given to the high end projection); and 3) the sea ice in the Arctic Ocean has been steadily declining for the past several decades and will be entirely gone in the summertime in the next 50 years as a result of rising levels of atmospheric greenhouse gases. With the latest publication by NASA scientists Dorothy Koch and James Hansen, the final of these arguments now joins the first two in being soundly repudiated.

The first one, the "hockey stick," has been under relentless attack since it was first proposed in the late 1990s. It was ultimately killed with the publication of the work of Sweden's Anders Moberg just a month ago. Moberg and colleagues have shown that the true temperature history of the past 1,000 years was likely much more variable than the "hockey stick" reconstruction makes it out to be, with a sizable warm signal during the Medieval Warm Period about 1,000 years ago, followed by a substantial cooling (The Little Ice Age) bottoming out in the 1800s. Consequently temperature changes observed during the early and late 20th century don't look so unusual in the historic record. We documented the death of the "hockey stick" in detail in an earlier posting (see http://www.worldclimatereport.com/index.php/2005/03/03/hockey-stick-1998-2005-rip/).

The second notion, that the high-end temperature projections issued in the *Third Assessment Report* of the Intergovernmental Panel on Climate Change (IPCC) are even plausible has been dead for a while. This was killed by a collection of articles which showed that observed climate changes—changes which wholly integrate all physical processes (unlike global climate models)—indicate that the most likely future pathway taken by global temperatures will be one that lies very near the low end of the IPCC warming rate projections, or about 0.15ºC or so per decade. We detail these results also in an earlier posting (see http://www.worldclimatereport.com/index.php/2004/04/14/observations-not-models/).

And now comes a severe blow to the third argument—that anthropogenic changes to the greenhouse effect, resulting from the burning of fossil fuels, are leading to the rapid loss of Arctic ice. Instead, Koch and Hansen, writing

in the *Journal of Geophysical Research*, document that the impact of black carbon (soot) pollution on the Arctic climate is quite likely the primary driver of Artic temperature increases and sea ice declines during the past several decades. Soot is an entirely different beast than carbon dioxide, in that it is a particulate that remains only in the atmosphere for a short time, and which can be relatively easily removed from smokestack emissions. In fact, most first-world countries have programs aimed at reducing air pollution that include soot reduction measures.

Koch and Hansen suggest that soot warms the Arctic is two primary ways. When it is suspended in the atmosphere, soot absorbs incoming solar radiation and warms the atmosphere while possibly decreasing cloudiness. On the ground, it blackens the snow and ice, making it less reflective so that it absorbs more warming radiation.

Where does all of this warming soot that finds its way into the Arctic environment come from? According to Koch and Hansen, primarily from the heavy industry and biomass burning in South Asia and Russia. The current North American contribution is estimated to be only about 10-15 percent.

Since Hansen frequently claims that we take his conclusions out of context, we reproduce below the text of a March 23, 2005 NASA press release (http://www.giss.nasa.gov/research/news/20050323/) discussing the findings of Koch and Hansen:

Soot is normally something you think of at the bottom of your chimney, but it also gets into the air, and scientists have been finding it at the frozen Arctic. Soot gets into the air when fuel, vegetation and firewood are burned. When you watch the smoke and soot drift away from your chimney, you normally wouldn't think that it would drift to the North Pole and change the ice and snow there.

NASA has been exploring how black carbon or soot affects the Earth's climate, by using satellite data and computer models that recreate the climate. New findings show that soot may be contributing to changes happening at the North Pole, such as increasing melting of sea ice and snow and warming atmospheric temperatures.

Dorothy Koch of Columbia University, N.Y. and NASA's Goddard Institute for Space Studies (GISS), New York, and James Hansen of NASA GISS are co-authors of the study that appeared in a recent issue of the Journal of Geophysical Research.

"This research offers additional evidence that black carbon may have a significant warming impact on the Arctic," Koch said. Warmer temperatures in the Arctic mean melting ice and snow, among other things. These temperature and ice changes also wind up affecting climate patterns around the world.

The Arctic is especially vulnerable to pollution. In recent years the Arctic has significantly warmed, and sea-ice cover and glaciers have diminished. Likely causes for these trends include changing weather patterns and the effects of

pollution. Airborne soot also warms the air and affects weather patterns and clouds.

Black carbon has already been implicated as playing a role in melting ice and snow. Basically, when soot falls on ice, it darkens the surface and accelerates melting by absorbing more sunlight than ice would, just as wearing a black shirt in the summertime makes you feel hotter than if you wore a lighter color. Dark colors absorb heat and light, and lighter colors reflect it keeping surfaces cooler.

Koch and Hansen used a NASA computer model and information gathered by many NASA satellites to get their finding.

The research found that in the atmosphere over the Arctic, about one-third of the soot comes from South Asia, one-third from burning biomass or vegetation around the world, and the remainder from Russia, Europe and North America.

South Asia is estimated to have the largest industrial soot emissions in the world, and the meteorology in that region readily sweeps pollution into the upper atmosphere where it is easily transported to the North Pole. Meanwhile, the pollution from Europe and Russia travels closer to the surface.

During the early 1980s the main sources of Arctic pollution are believed to have been from Russia and Europe. Both of those areas have decreased their tiny particles of pollution in the last 20 years, but the pollution from South Asia has increased. Koch and Hansen suggest that Southern Asia also makes the greatest contribution to soot deposited on Greenland.

By exploring processes in the Earth's atmosphere, NASA scientists are seeking answers to how pollutants like soot are changing the climate of the world around us.

In their paper, Koch and Hansen offer up more on the impact of soot vs. an enhanced greenhouse effect. They argue that the temporal and spatial patterns of temperature changes and sea ice declines bear a greater resemblance to patterns of historical soot emissions than to carbon dioxide emissions. Here is what they have to say:

According to the 2002 AMAP [Arctic Monitoring and Assessment Program] Assessment (MacDonald et al., 2003), the past three decades show significant decreases in sea ice thickness and extent. This recent decrease is greatest in spring and fall and occurs in the western Arctic (western North America and Siberia). These observations defy recent modeling efforts, which show the largest impact of increased CO2 on the Arctic winter rather than summer (MacDonald et al., 2003). The pattern of sea ice loss is believed to be linked to the phase of the AO [Arctic Oscillation] (MacDonald et al., 2003). However it is interesting that these decades correspond to the increases in BC [black carbon, soot] from south Asia, and that this BC is transported over the Pacific and into the western Arctic, during summer as well as spring. Prior to this, sea ice also decreased during the 1930s–1940s. However this occurred during winter in the eastern part of the Arctic. Again it is interesting to note that

during this earlier period, pollution from coal burning in the United States, Europe and Russia (Novakov et al., 2003) would have been transported to the Arctic during winter-spring, and the Eurasian sources would deposit heavily in the eastern Arctic.

Clearly, Koch and Hansen believe that black carbon soot is a major contributor to the observed Arctic warming as well as to the sea ice decline there. That soot emissions are much more readily controlled than carbon dioxide emissions argues that the most effective strategies in slowing Arctic climate change is through control of black carbon. In the U.S. and in many other technologically advanced countries, air pollution measures targeting soot are already in place, and more are being proposed. According to Koch and Hansen, the culprits lie in the less technologically-developed countries.

The conclusions of Koch and Hansen stand in stark contrast to the tone of the recently released Arctic Assessment Report and of the November 16th, 2004 Senate Hearing held by Arizona Senator John McCain. Both push the idea the primary responsibility for warming in the Arctic lies with the first world emissions of greenhouse gases. During the hearing John McCain uttered words of disbelief and disgust that anyone would dare contend something other than what was written in the Arctic Assessment Report. After the hearing, we compiled a list of scientists and their publications who have characterized the recent climate events in the Arctic in a different manner than that of the Arctic Climate Report (see http://www.worldclimatereport.com/index.php/2004/12/10/open-letter-to-senator-mccain/). We'll be sure to add Dorothy Koch and James Hansen to that expanding list.

References:

Arctic Climate Assessment (ACIA), 2004. *Impacts of a warming Arctic*. Cambridge University Press, Cambridge, UK, pp139.

Koch, D., and J. Hansen 2005. Distant origins of Arctic black carbon: A Goddard Institute for Space Studies ModelE experiment. *Journal of Geophysical Research*, **110**, D04204, doi:10.1029/2004JD005296.

MacDonald, R., et al., 2003. *AMAP Assessment 2002: The influence of global change on contaminant pathways to, within, and from the Arctic*. Arctic Monitoring and Assessment Program, Oslo, 65pp.

Moberg, A., et al., 2005. Highly variable Northern Hemisphere temperatures reconstructed from low- and high-resolution proxy data. *Nature*, **433**, 613-617.

Novakov, T., et al., 2003. Large historical changes to fossil-fuel black carbon aerosols. *Geophysical Research Letters*, **30**, 1324, doi:10.1029/2002GL016345.

**Alaska's climate history shows periods in the past that have been as warm or warmer than current temperatures**
http://www.worldclimatereport.com/index.php/2005/02/28/baked-alaska/

*Baked Alaska*

The inexorable drumbeat of climate disaster stories goes on, but no one seems interested in checking the facts.

The most recent assault on common sense comes from Alaska. There, Republican senators Ted Stevens and Lisa Murkowski are now said to be favoring onerous climate change legislation sponsored by Arizona's John McCain. McCain believes he can ride global warming all the way to the 2008 presidential nomination by grabbing the horde of green-leaning California and Pacific Coast delegates who will be off-limits to his southern competition, Bill Frist (Tennessee) and George Allen (Virginia), both of whom oppose McCain's expensive, ineffective bill.

That's right. McCain's bill will do absolutely nothing measurable to curtail global warming for the foreseeable future. It's nicknamed "Kyoto Lite" in Washington, because it is an imitation of the infamous Kyoto Protocol on global warming.

But Kyoto is itself useless. Even Al Gore's scientists conceded that, over 50 years, with full participation by every nation involved, the change in global temperature Kyoto would cause would be a teeny thirteen-hundredths of a degree, an amount impossibly small to measure. Given that McCain's staff surely knows that, the hidden agenda for his presidential strategy becomes obvious.

McCain's bill went down 55-43 on Halloween 2003—a close margin. So the addition of Alaska's two conservative republicans is ominously significant, and, as we say in academic circles, counterfactual.

For their part, Alaskans Stevens and Murkowski are largely concerned that the Inuit (old timers: That means "Eskimo") culture is being damaged by warming. But Alaska has been peopled for at least 12,000 years. Within the last 12 millennia, there have been plenty of periods when it was warmer than today, and the Inuit culture flourished.

Apparently it was too much effort for the Alaska senators' staffers to consult relevant articles in the refereed scientific literature. The most important is a landmark study, "Holocene [post ice-age] thermal maximum in the western Arctic," published last year by 30 eminent scientists whose specialty is past climate. It appeared just last year in the journal *Quaternary Science Reviews*.

The article notes that Alaska averaged 3ºF warmer for 2,000 years, from 9,000 to 11,000 years ago. Concurrently, the first civilization radiated forward.

Another article on Alaskan climate history for the last 2000 years is worth a mention, this one published by Feng Sheng Hu in the *Proceedings of the*

*National Academy of Sciences*. Hu notes that there have been three similarly warm periods in Alaska, from A.D. 0 to 300, 850-1200, and 1800 to present. (Consider that humans had no influence on global temperature 200 years ago).

And what of the present? Brian Hartman and Gerd Wendler of the Alaska-taxpayer-funded Alaska Climate Research Center have written extensively on this subject. They are particularly interested in something called "The Great Pacific Climate Shift," a sudden and dramatic warming that occurred in a one-year period around 1976.

Here's what they have written:

"When analyzing the total time period from 1951-2001, warming is observed, however the 25-year trend analyses before 1976 (1951-1975) and thereafter (1977-2001) both display cooling."

That's right. The mean Alaskan temperature has been declining for the last quarter-century. All of the warming is determined by a mysterious, single-year "burp" in Pacific Ocean temperature.

Is that due to human activity? Search the scientific literature for a computer model of human influence on climate that says all our impact occurred at once, in a single year. You won't find one reference.

It is a shame that Stevens' and Murkowski's staffers didn't do this rudimentary research. Because, if they shift their votes on McCain's global warming bill, the nation will be saddled with an expensive piece of legislation that will have no effect on the problem it purports to solve. It's a double shame because the known behavior of Alaskan climate is not unusual by historical standards, and actually shows a net cooling in the last 25 years, the so-called era of human warming.

References:

Hartmann, B., Wendler, G., On the significance of the 1976 Pacific climate shift in the climatology of Alaska. *Journal of Climate*, under review.

Hu, F.S., et al., 2001. Pronounced climatic variations in Alaska during the last two millennia. *Proceedings of the National Academy of Sciences*, **98**, 10552-10556.

Kaufman, D.S., et al., 2004. Holocene thermal maximum in the western Arctic (0-180ºW). *Quaternary Science Reviews*, **23**, 529-560.