

**Report on the Past, Present, and Future Climate
Conditions in the Arctic as they Relate to the
Existence and Survival of Polar Bears.**

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Summary

1. Climate changes significantly all the time.
2. Current climate changes are well within natural variability.
3. The world has emerged from the last major ice sheet in the last 22,000 years.
4. Significant periods of warming and cooling have occurred since then many warmer than the most extreme warming forecast.
5. Polar Bears have survived all previous warming periods.
6. Carbon dioxide is not the cause of global warming or climate change.
7. The major causes of changes now and in the past are changes in the Sun.
8. All predictions of future climate are based on computer models.
9. The models are built on an inadequate database, lack knowledge and inclusion of major mechanisms.
10. All previous model predictions have been incorrect.
11. All previous predictions have seen a steady decrease in the amount of temperature increase forecast.
12. The models are unable to forecast important Arctic variables, especially snowfall and wind patterns.
13. Global temperatures vary with changes in sunspot activity, but these are not included in the IPCC forecasts.
14. High sunspot numbers produce warm global temperatures, low numbers create cool conditions.
15. Solar physicists predict sunspot numbers will decrease in Cycle 25.
16. A much cooler world will exist by 2030.

Introduction

It is essential to understand the intellectual context of what is happening, before any discussion of the climate record and its impact on the flora, fauna and human condition can occur. It is even more important when policy is planned.

Recently the terminology of the climate debate has changed from an emphasis on global warming to concern about climate change. The reason for the change is a conflict between hypothesis and fact. Since 1998 the global temperature has decreased while atmospheric levels of CO₂ continue to increase. Climate change allows the focus to shift to any weather event can be inferred as being the result of human activity. Different terminology simply reflects a lack of knowledge about global climate, namely that it changes all the time with much greater variability and in shorter time periods than most people understand.

Current weather and climate change are not outside long-term normal patterns. However, the public believes otherwise because of a combination of political exploitation of science, exploitation of people's fears by extreme environmentalists and how people understand nature. Western education automatically assumes a uniformitarian view of nature, which is the general concept that change is gradual over long periods of time and the corollary that sudden or extreme change is not normal. The concept essentially developed because Darwin's theory of evolution required a much older world than western religion allowed for his theory to operate.

In climate studies a brief surge of chaos theory quickly dissipated. A conference in Warsaw in 1990 essentially divided between chaos theorists and those who believed climate was composed of a multitude of cycles the net effect of which is the daily weather. Stephen Jay Gould attempted a compromise with punctuated equilibrium. This proposed a uniform advance periodically interrupted by periods of chaos.

Brief studies of any period of past weather show significant changes in short periods. Despite this we continue to teach that change is gradual over long periods or doesn't even occur. For example, most students learn and people believe that the orbit of the earth around the sun is a fixed elliptical orbit. In fact it changes every single year and the change is significant over time. We have known about this variable orbit for about 150

years yet we still tell our students it is unchanging.

Most people believe severe weather events are occurring more and with greater magnitude. This is not correct, so how has this perception evolved? It is partly to do with how we function in the world. We're selective in what we see and notice individually and collectively. Selectivity occurs when after being introduced to someone you then seem to meet them frequently. They were always there, but just not part of your 'noticing'. Collectively the media and the public have 'noticed' the weather, especially severe events, so they seem to be occurring more often. In addition, events are presented as unusual or unique. For example, a report will state, it was the highest or lowest temperature, rainfall, "ever." What they mean is in the barely 100 year old official weather record; a grossly inadequate sample in a 5 billion year old world.

Another major problem is the failure to understand how science works. Thomas Kuhn provided the outline in his important book, *The Structure of Scientific Revolutions*.¹ Scientists begin with an hypothesis, which is based on assumptions. Other scientists then challenge and test the hypothesis, mostly by questioning the assumptions. If the assumptions are shown to be incorrect, the hypothesis is rejected or significantly adjusted. If the assumptions and hypothesis hold up and more specifically are able to make accurate prediction then it becomes a fact or a law. It is reasonable to argue that the sole goal of science is accurate prediction.

All scientists are skeptics and should challenge a new hypothesis. Often this can take a long time. Newton's theory of gravity took over 200 years to become the laws of gravity. Darwin's theory of evolution is now 157 years old. Einstein's theory of relativity is 102 years old this year. It remains a hypothesis because a basic assumption that nothing can travel faster than the speed of light is not proven. If something is found traveling faster than the speed of light the entire hypothesis is in serious jeopardy.

With global warming the hypothesis assumed that,

- CO₂ is a greenhouse gas, that allows solar energy to pass through the atmosphere but slows the rate at which heat energy from the earth is emitted to space
- If the amount of CO₂ in the atmosphere increases the atmospheric temperature will rise

¹ *The Structure of Scientific Revolutions*. University of Chicago Press, 1962. ISBN 0-226-45808-3

- The amount of CO₂ will increase mainly because of human burning of fossil fuels
- As long as human production of CO₂ increases the temperature will continue to rise

What happened with this hypothesis and assumptions was it became fact almost immediately. As Richard Lindzen, Sloan Professor of Atmospheric Meteorology at MIT, said many years ago, the consensus was reached before the research had even begun. Scientists who tried to challenge or test as all reputable scientists should do, were marginalized first, inappropriately as skeptics and latterly as deniers with all the holocaust connotations. In effect the scientific method was thwarted. Despite these efforts a few people continued to challenge and test. The results of their work increasingly and almost overwhelmingly shows the hypothesis and its assumptions are wrong. CO₂ and especially the minute human portion is not the cause of global warming or climate change.

Geography and Climate of the Arctic Region

The simplest definition of the Arctic is that entire region within the Arctic Circle. Like all definitions it seems simple and all-inclusive but isn't. Even at the most basic level it is incorrect. The latitude at which the sun's rays are tangential to the earth's surface at winter solstice defines the Arctic Circle. This is shown as 66.5° N on all maps, but that assumes incorrectly the tilt of the earth is $23^{\circ} 30'$. It is actually $23^{\circ} 26' 21.44''$, which is rounded to $23^{\circ} 27'$ but this is only the tilt for the first part of the 21st century. The change in tilt varies from $21^{\circ} 30'$ to $24^{\circ} 30'$. The angle changes from one extreme to another and back over 41,000 years.

This information may seem purely academic, but it is of relevance to the problem discussed here. It means our definition of the Arctic is not only wrong but also changing all the time, which fits with the incorrect concept of uniformitarianism.

The static definition will suffice for this report as it is relatively immediate, but the changing situation will be part of the concern about planning for the future.



A better determination is provided by the position of the 10°C (50°F) summer isotherm. It is better because it is a natural depiction not an artificial geometric boundary.



The red line marks the 10°C isotherm. Over the land it is also coincident with the northern limit of trees.

The Arctic Ocean is the smallest of the world's oceans and the least known because a thin blue line represents it across the top of most world map projections. The actual ocean basin covers 14,090,000 km² but the ice cover extends over a larger area. It is the least salty of the oceans and this is important for ice formation. Maximum density of fresh water is at 4°C (39°F) and ice forms at 0°C (32°F), technically known as the fusion point. Maximum density for salt water is the same as the fusion point at -2°C (28.4°C).

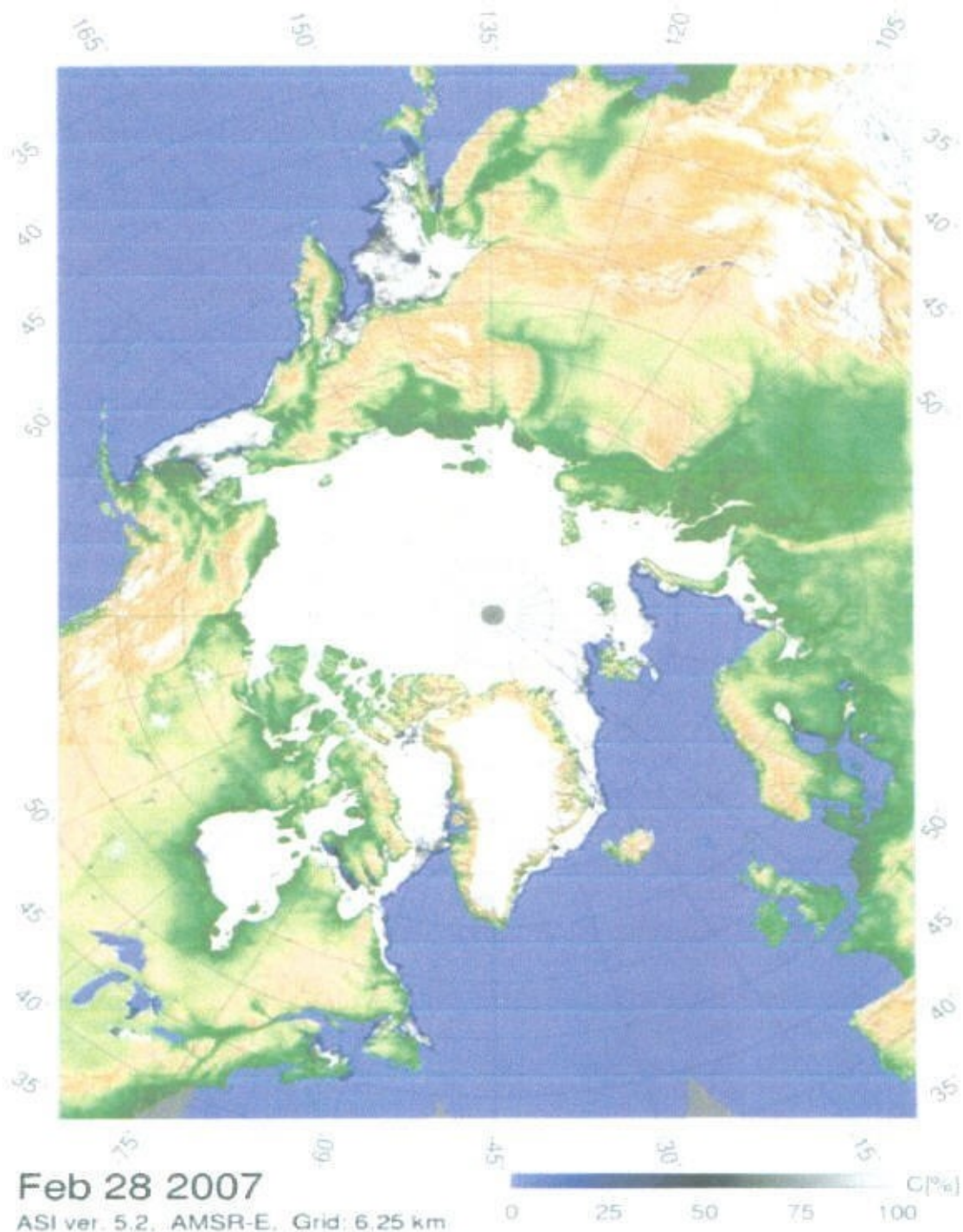
The North Pole is much warmer than the South Pole for several reasons, but likely the most important is the amount of heat coming through the ice from the relatively warm water underneath. Water temperature averages approximately 3.5°C (38°F). It is colder, down to about -1.6°C (29°F) as freezing approaches. When ever the temperature of the air drops below that amount heat is transferred through the ice to warm the air. As a result air temperatures rarely drop below -40°C (-40°F). It is usually colder in the surrounding land areas in winter and warmer in summer because land heats and cools quicker than water. This is why ice forms along shorelines first as winter begins, but also melts first in spring. This pattern of freezing and melting is important for the annual circular migration of the Hudson Bay polar bears. This is why we studied the evidence of changes in springtime temperatures.

We found that spring air temperatures around the Hudson Bay basin for the past 70 years (1932-2002) show no significant warming trend and are more likely identified with the large-amplitude, natural climatic variability that is characteristic of the Arctic. Any role of external forcing by anthropogenic greenhouse gases remains difficult to identify. We argue, therefore, that the extrapolation of polar bear disappearance is highly premature.¹

The Arctic Ocean ice is a dynamic body comprised of ice that generally varies in age up to 25 years. Prevailing winds drive the ice in slow around the pole in an east to west direction. Two forms of open ice can occur even in winter when leads open or at polynas, which are large areas of open water apparently due to upwelling warm water.

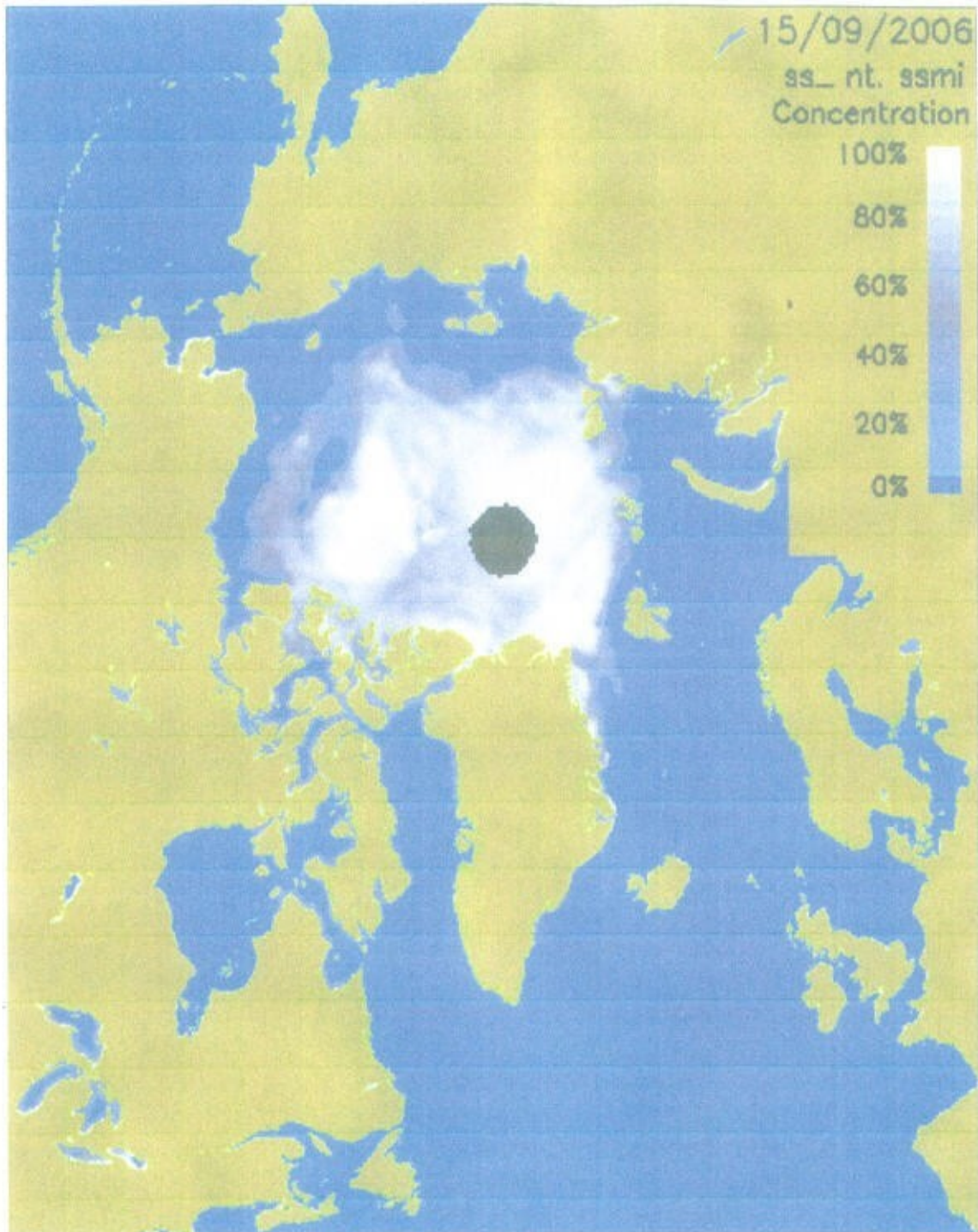
¹ Polar Bears of western Hudson Bay and climate change: Are warming spring air temperatures the "ultimate" survival control factor? *Ecological Complexity* In Press.

Every winter approximately 15 million km² of ice is formed, covering the entire Arctic Ocean and beyond. The coverage for the winter of 2006/2007 is shown below.



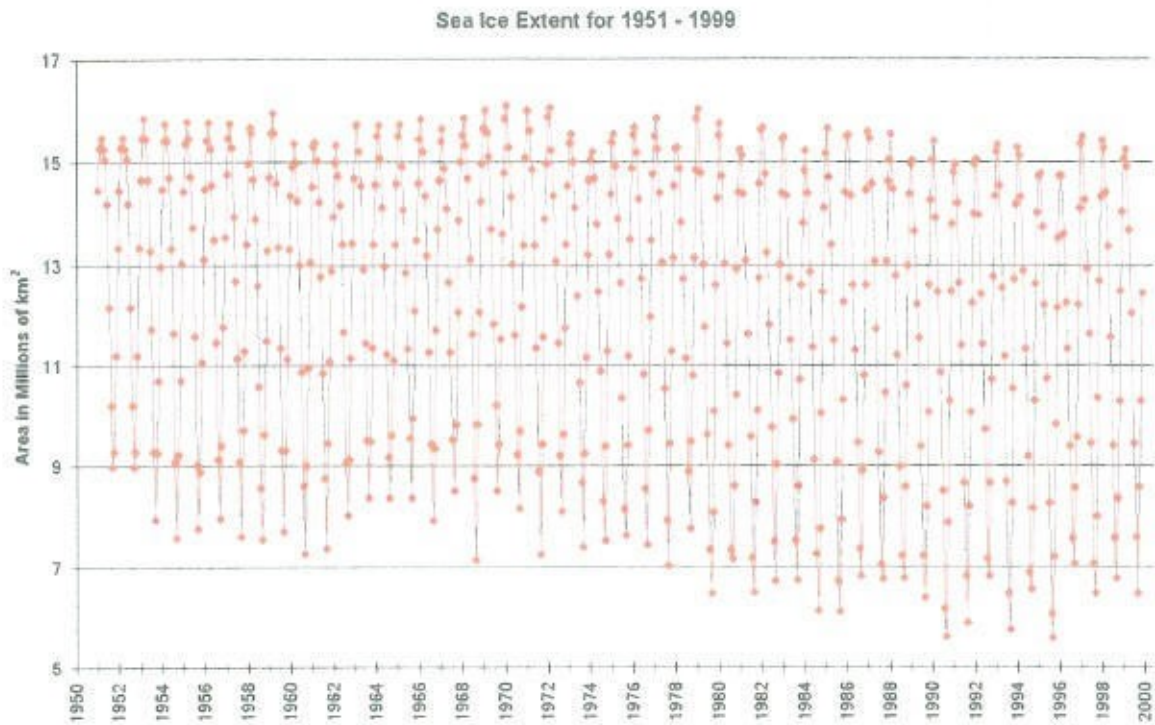
Source: <http://iup.physik.uni-bremen.de:8084/amr/amre.html>

In summer the ice melts so approximately 7 million km² remains.



This shows ice conditions on September 15 2006.

Source: SOCC at http://www.socc.ca/seaiice/seaiice_hist_e.cfm



This graph shows the variability of ice cover from 1952.

Source: SOCC at http://www.socc.ca/seaice/seaice_hist_e.cfm

The record from 1952 to 1972 was a collage of information put together by University of Alaska Professor John Walsh.² From 1972 to 1980 the data was compiled by the US National Ice Center, but the meaningful record begins in 1980 with the introduction of satellite data. A trend line from 1952 to 2000 indicates approximately a 9% decline, but this is a function of the change in measurement. A more accurate determination of what is happening is the variability of the trend of maximum and minimum ice cover.

Claims of dramatic decline are simply not warranted given the less than 30-year length of record. The summer melts, which are the period of concern for polar bears shows considerable variation even within this short record. For example, in 1996 total extent of ice cover in summer was approximately 4.5 million km². In 1997 the ice cover was approximately 7 million km², a difference of 2.5 million km² in just one year. It is important to note that in 1998, reported as the warmest year in the official record, cover was approximately 6.4 million km² still 1.9 million km² more than in

² Source: SOCC at http://www.socc.ca/seaice/seaice_hist_e.cfm

1996. These statistics explain how the following reports are used to manipulate the perception of ice cover and its impact on polar bears.

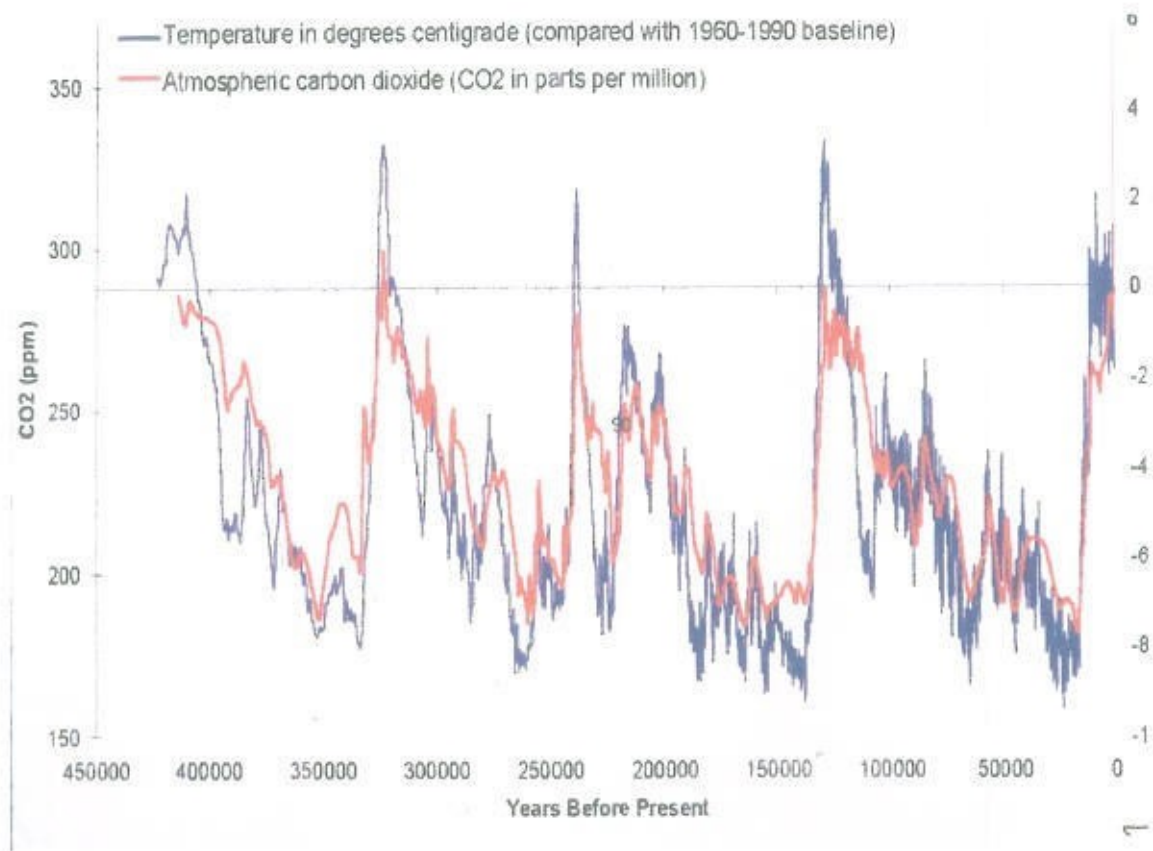
In 1977 a group called the Impact Team produced a book titled "The Weather Conspiracy" in which one piece of clear evidence of the cooling trend was provided. "The ice cover in the Northern Hemisphere increased by 12 percent in 1971 – an increase equal to the combined area of England, Italy, and France. This added ice has remained." The combined area of these countries is 983,066 km² (379,564 mi²), or approximately 10.4% of the total area of melt.

In 2005 we had a similar comparison of the 'catastrophic' amount of change in ice, but this time it was melting not freezing. The report claimed an area of ice equal to the State of Texas had melted more than the previous year. Texas is 692,404 km² (267,339 mi²) so an estimated 2.8% more than the average melt of 9.5 km² occurred.

While these examples provide dramatic headlines, they are not accurate portrayals of what is actually happening. They do become part of the public perception and misconception. It is part of the manipulation of public emotions about changing environmental conditions. The actual changes are well within natural variability, however, that variability is much greater than people understand.

History of Arctic Ice and Climate Change

It is not necessary to cover the entire history of the arctic basin, which had become enclosed almost as it is today, but smaller, approximately 50 million years ago. It is sufficient to show the pattern according to ice core plots that cover 420,000 years. The blue line represents temperature determined by the ratio of oxygen 16/18 isotopes.

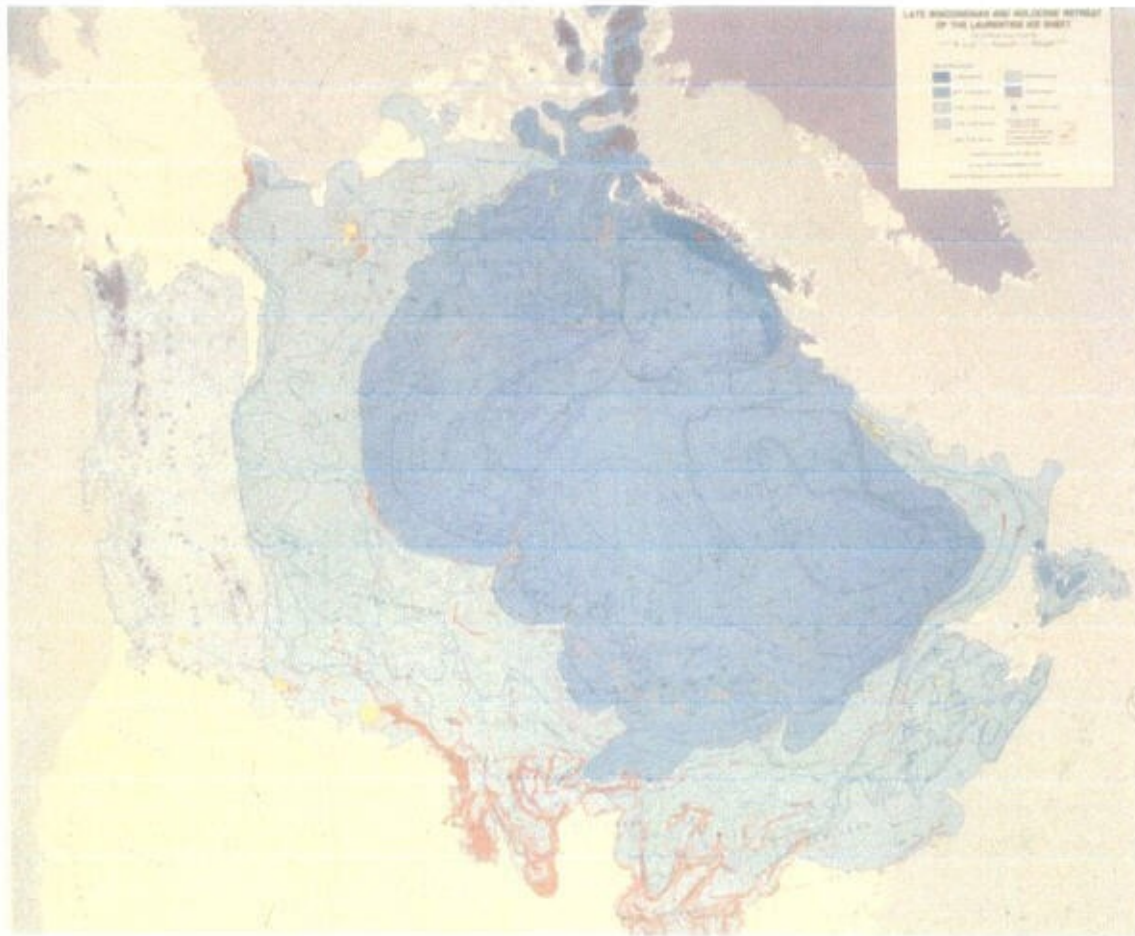


There are two important points about this chart.

1. The current temperature is shown on the right, but you can see it was warmer 120,000 and again 320,000 years ago.
2. The temperature changes before the CO₂ not as the fundamental assumption of climate change due to human CO₂ assumes.

The most recent ice age began approximately 120,000 years ago as the temperature began to decline from the previous interglacial period. Ice extent reached maximum approximately 22,000 years ago as depicted in the

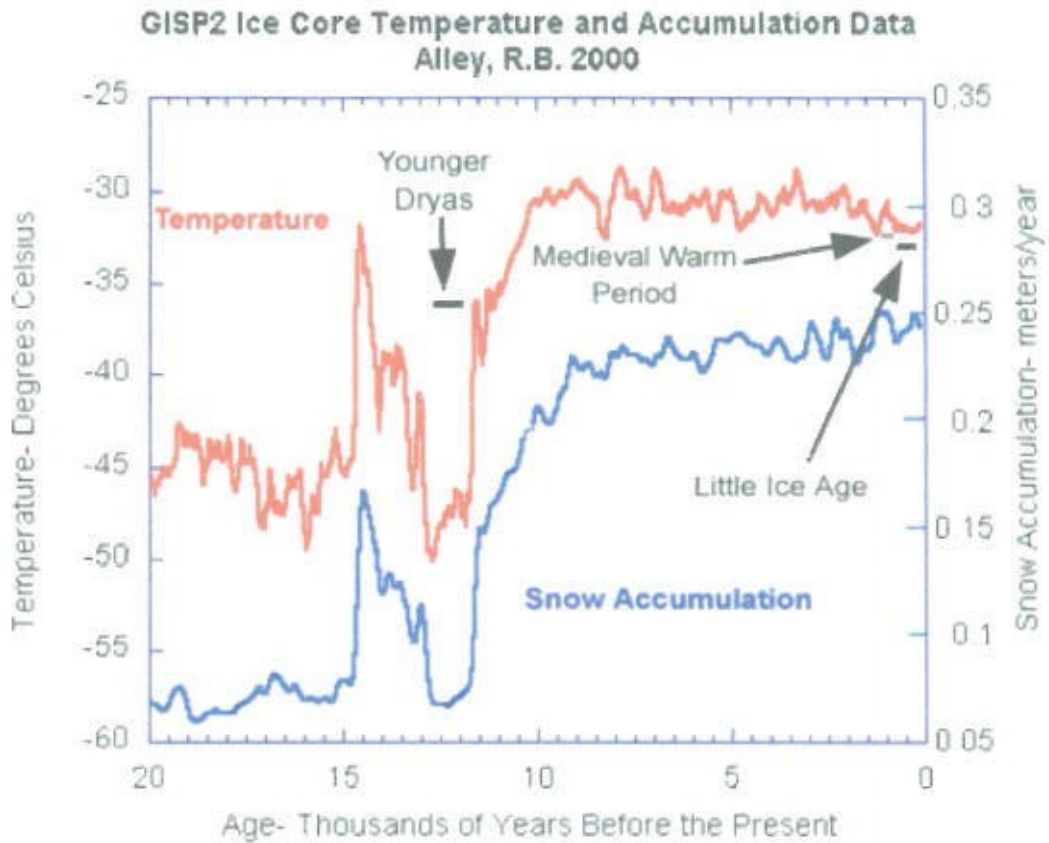
following map.



Source: Geological Survey of Canada.

Similar sheets existed in Europe and Asia. Sea level was approximately 150 m lower than today. Since then, the Earth warmed as we entered an interglacial period, but the warming in the last 15,000 years was not continuous. Except in short time periods the length of record chosen determines a trend.

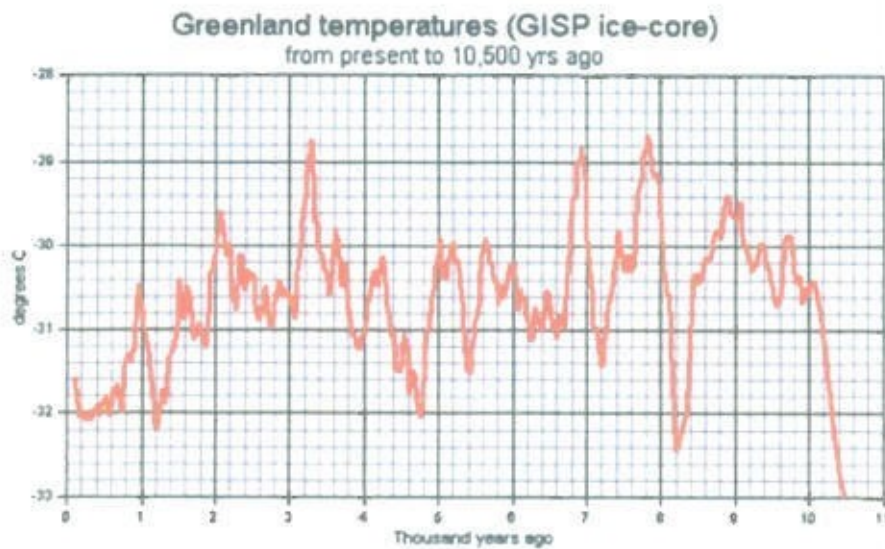
A graph of temperature reconstruction for Greenland shows this very well. Overall the trend is warming for 20,000 years but there are distinct cooling periods as well.



Source; Richard B. Alley The Younger Dryas cold interval as viewed from central Greenland, *Quaternary Science Reviews* Volume 19, Issues 1-5, 1 January 2000, Pages 213-226.

There is debate about the cause and extent about the Younger Dryas, but no question that warming continued rapidly after the nadir approximately 12,500 years ago. The temperature curve trend is fairly consistent, slightly downward but warmer than the present with considerable variability. This is more easily seen in the net graph

A more detailed view of temperature for the last 10,500 years is given in the next figure. (Note the present is on the left) It is reasonable to argue that this shows the world has cooled from the peak about 8000 years ago. It certainly has cooled from 3200 years ago to the present. These warm periods are important because they raises questions about future warming and the survivability of Polar Bears during warmer climates. Obviously they survived these periods.



The global temperature shows considerable variability at any point you care to examine. Every single change brings about adjustments by the flora and fauna to the changing conditions.

Evidence of warmer temperatures above are from isotope readings in ice cores, but the most compelling evidence is in the following photograph.



Source: Reproduced with permission of Professor Ritchie, Univ. of Toronto.

The picture shows a tree stump of a White Spruce (*Picea Glauca*) 100 km north of the current tree line in the Mackenzie Delta. It is radiocarbon dated at 4940 years \pm 140 B.P. or 2990 BC. The modern range of this species is shown in the next figure.



Source: U.S. Geological Survey, 1999, Digital representation of "Atlas of United States Trees" by Elbert L. Little, Jr.

Professor Ritchie notes the tree rings of this plant are wider than those of the present day trees. This clearly indicates a much warmer climate than today that lasted long enough for the tree to grow with more vigor than presently possible. Research of movement of the tree line by the author in northern Manitoba showed a movement due to warming from the nadir of the Little Ice Age in 1680 to its position in 1972. This suggests the average temperature was probably at least 3 to 5 degrees Celsius warmer than today.

We can speculate on Arctic ice conditions during this period and computer simulations may produce a pattern. Regardless, Polar Bears survived this period when temperatures at least equaled and likely exceeded the IPCC predictions in the latest Summary for Policymakers (SPM).

During the warmer periods, arctic ice conditions decreased, but

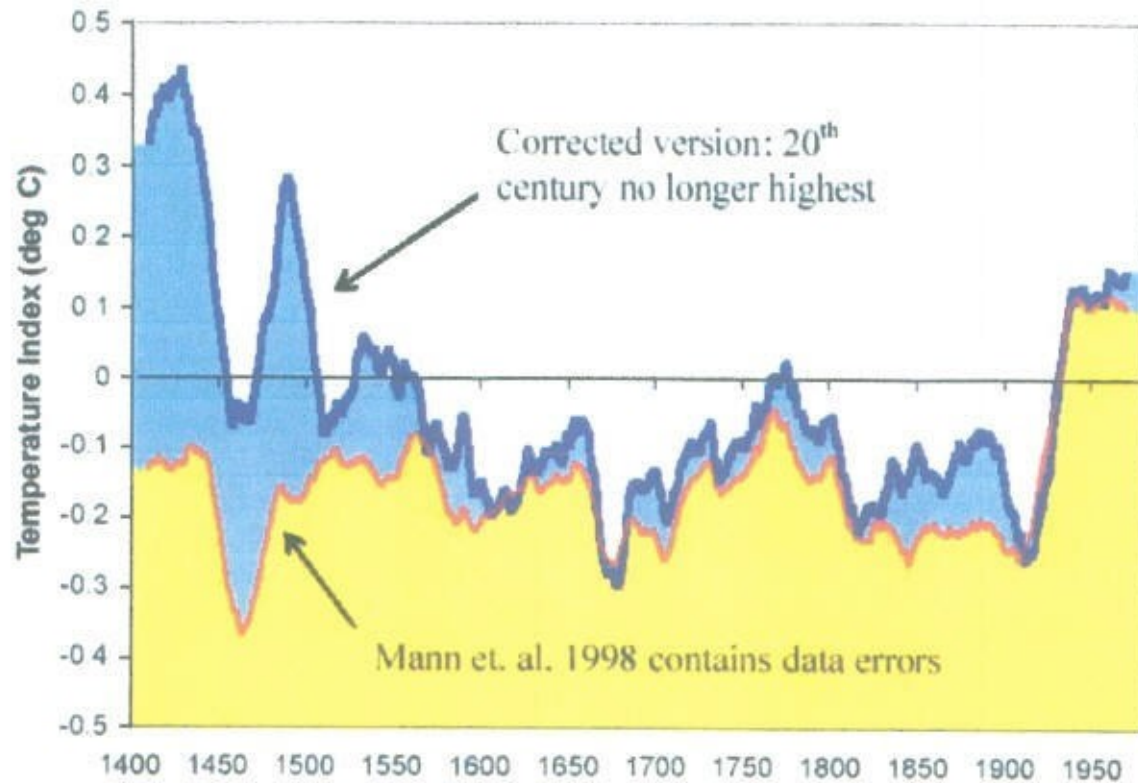
increased in colder periods. Clearly there are temperature thresholds that push some flora and fauna to the limits and beyond. The major mistake made is tied in to the assumption that change is gradual. Evidence shows there are built in adaptation strategies for these constantly changing conditions. For example, in the Medieval Warm Period (MWP) from 900 to 1200 AD the Vikings sailed in arctic waters that are now permanent pack ice, and farmed in Greenland soil that is now permafrost. Two centuries later in the period known as the Little Ice Age their descendants were dying as ice enclosed Greenland for decades at a time and the Norse colonies eventually failed.

The Medieval Warm Period is the most recent long warming period that exceeded the current temperatures. It is this period that caused trouble for those claiming the 20th century, especially the last decade, was warmer than the MWP. It posed two problems. One; it suggested modern 'global warming' was within natural variability long before any possible human impact. Second; it showed the world had survived warmer periods with no catastrophic effect as proponents were predicting. What to do?

Apparently the answer is provided by a Professor Deming in the following letter to *Science*.

*"With the publication of the article in Science [in 1995], I gained significant credibility in the community of scientists working on climate change. They thought I was one of them, someone who would pervert science in the service of social and political causes. So one of them let his guard down. A major person working in the area of climate change and global warming sent me an astonishing email that said "**We have to get rid of the Medieval Warm Period.**" (My emphasis)*

Apparently this was done by production of what became known as the "hockey stick." This was a graph produced in a 1998 article by Mann, Bradley and Hughes that is known as MBH98. Two Canadian researchers, Steve McIntyre and Ross McKittrick attempted the standard scientific technique of reproducible results. A comparison of the two results are shown in the following figure.



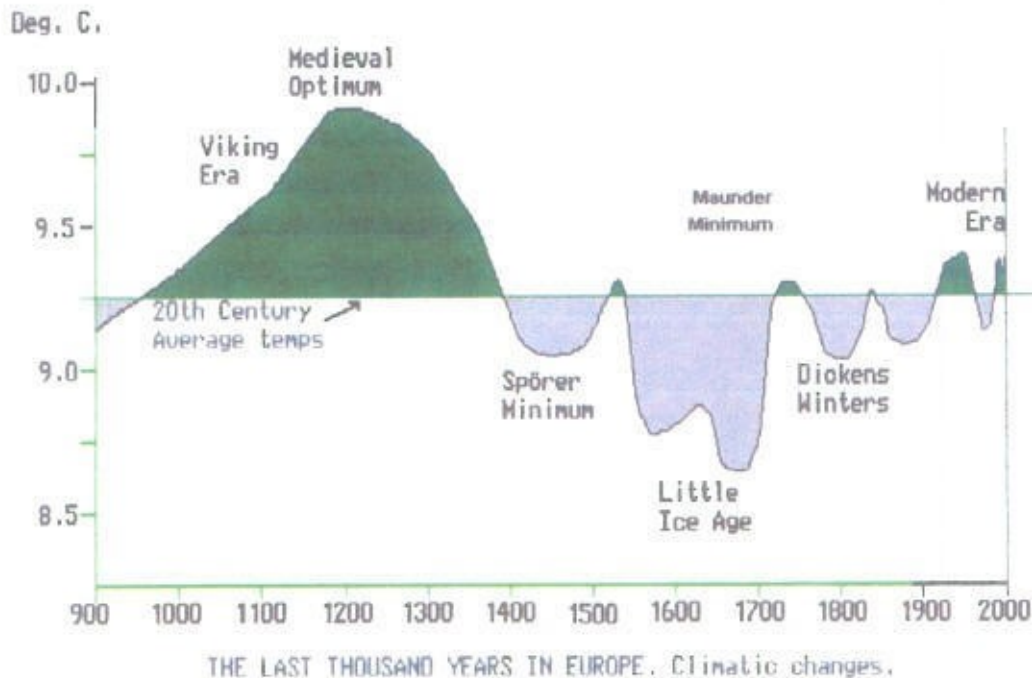
Source; Web page of Ross McKittrick.

The MWP is clearly restored in the attempted reproduction. The US National Academy of Sciences (NAS) appointed a committee chaired by Professor Wegman to investigate and arbitrate. His committee report found in favor of M&M

It is not clear that Mann and associates realized the error in their methodology at the time of publication. Because of the lack of full documentation of their data and computer code, we have not been able to reproduce their research. We did, however, successfully recapture similar results to those of MM. This recreation supports the critique of the MBH98 methods, as the offset of the mean value creates an artificially large deviation from the desired mean value of zero.¹

¹ AD HOC COMMITTEE REPORT ON THE 'HOCKEY STICK' GLOBAL CLIMATE RECONSTRUCTION. By Edward J. Wegman, George Mason University, David W. Scott, Rice University, and Yasmin H. Said, The Johns Hopkins University, 2006, National Academy of Sciences.

Extent of change of the historic record is remarkable and disturbing when accurate information is crucial to policy. The 1995 UN IPCC report provided this graph of temperatures of the last 1000 years in the Northern Hemisphere.



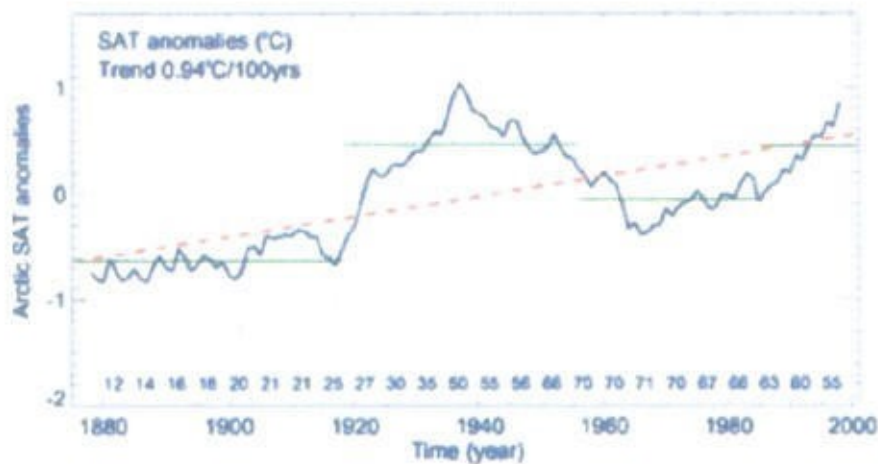
Source: UN IPCC Report, 1995 First Assessment.

Three trends are evident: the warming to approximately 1200 A.D., the cooling to 1680 A.D., and the warming to the present. This is important because there is no argument the world has warmed since 1680, the debate is about the cause. Despite these trends there are short term variations such as the cooling around 1800, which can cause concern and demands for action. Here is an example accompanying a demand for action by the British Royal Society.

An 1817 letter from the President of the Royal Society to the British Admiralty reports, *It will without doubt have come to your Lordship's knowledge that a considerable change of climate inexplicable at present to us must have taken place in the Circumpolar Regions, by which the severity of the cold that has for centuries past enclosed the seas in the high northern latitudes in an impenetrable barrier of ice has been during the last two years greatly abated... This, with information of a similar nature derived from other sources; the unusual abundance of ice islands that have during the last two summers been brought by currents from Davies Streights into the*

Atlantic. This is a far more rapid and expansive change than is currently occurring.

Recent temperature trends for the arctic show the claims of most dramatic warming in the last part of the 20th century are incorrect. The period from approximately 1910 to 1940 warmed faster and to a higher level. The polar bears survived this thirty-year event.



Source: Igor Polyakov of IARC at the University of Alaska.

Recent reports of ice shelves breaking loose are similar events presented as if they are new or outside of natural variability. The most recent involved the Ayles Ice Shelf on the northern coast of Ellesmere Island. Hysterical reports such as this March 5, 2007 story in the Canadian newspaper *The National Post* had a scientist saying, "It really is incredible," says Warwick Vincent of Laval University, one of the few people to have laid eyes on the scene. "It's like a cruise missile has come down and hit the ice shelf." The actual breaking off occurred 15 months before it was even noticed and reported so it can't have been so cataclysmic. Besides similar calving occurs all the time as the ice shelf, which is the seaward extension of the Ellesmere ice cap, is pushed out into tidal waters. Martin Jeffries reported similar events in a 1986 paper in *Arctic*.²

Dr Fred Michel, Arctic ice expert at the University of Ottawa wrote in a *National Post* article, "Since the ice shelves were first mapped in 1906, they have been gradually disappearing. In fact, research papers on this ice shelf, published in 1986 and 2001 by Dr. Martin Jeffries of the University of Alaska, show

² Martin Jeffries, "Ice Island Calvings and Shelf Changes, Milne Ice Shelf and Ayles Ice Shelf, Ellesmere Island, N.W.T." *Arctic* Vol. 39, No.1. (March 1986) p.15-19.

that by 1962 roughly 60% of the ice shelf had already disappeared. Since then, an additional 30% has broken away with a larger loss than the most recent one occurring about 30 years ago. In other words, 60% of the ice shelf was lost in the first 56 years of this period (over 1% per year) versus 30% in the last 44 years (or 0.67% per year). Is that acceleration? Before today's global warming hype, Jeffries reported that "the coincidence of tidal and seismic events in 1962 created a critical condition that caused the ice shelf calving." He concluded that further losses were to be expected.³ This simply underscores the fact that climate and environmental conditions are changing all the time.

It appears a major explanation for the survival of polar bears is not a function of temperature and ice conditions during the warmer periods but their ability to survive on land. In testimony before a State of Alaska hearing T. Cuning noted,

1. *Polar bears do not use the majority of the ice cap, but favor near shore ice.*
2. *Polar bears are adaptable to use land for hunting and to den, and data from several areas indicate that bears are already adapting.*
3. *Preferred food sources such as some ice seal populations may be declining, but data indicate that the bears are adapting to use alternative food sources, including food sources that may be expanding.*
4. *Polar bear survival may, in fact, be more dependent upon snow for denning than on the presence of sea ice.*⁴

This is important because the computer models are unable to predict precipitation patterns and especially snowfall.

³ Professor Fred Michel "*Climatic hubris: The Ellesmere Island ice shelves have been disappearing since they were first mapped in 1906.*" National Post, Tuesday, March 16, 2007.

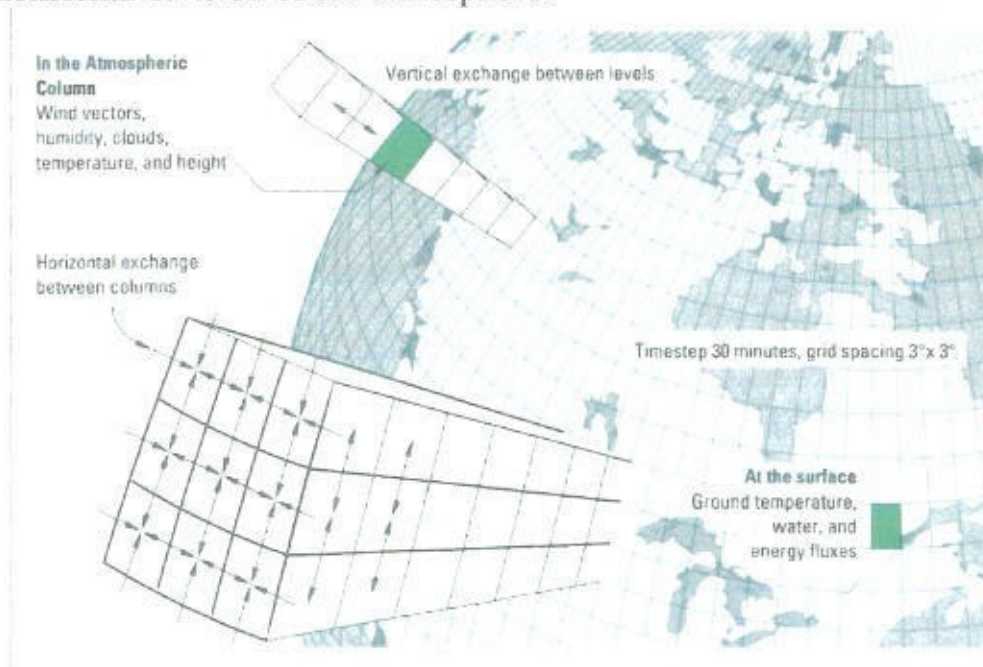
⁴ Cuning, T., Special Asst to the Commissioner, Alaska Dept of Fish and Game, Testimony to the State of Alaska hearing on polar bear as an endangered species. March 6, 2007.

Future Climate

The problem is international, national and regional policies are being made solely on the output of computer models. Scientists who work with these computer climate models, especially those working with the UN Intergovernmental Panel on Climate Change (IPCC), claim they don't make predictions, yet this is precisely how they are being used. This apparent contradiction goes to the heart of the problem faced by the public and politicians. It applies directly to consideration of listing Polar Bears as an endangered species.

Coastal geologist and emeritus professor at Duke University has published a book with his daughter geologist at Washington State questioning the entire validity of modeling Nature. They say nature is too complex, dependent on too many poorly understood processes, does not accommodate feedbacks and there is too little data to produce models.¹ These comments all apply to climate models with some additional problems. They confirm A.N. Whiteheads warning, *"There is no more common error than to assume that, because prolonged and accurate mathematical calculations have been made, the application of the result to some fact of nature is absolutely certain."*

Climate models are actually mathematical models based on a three dimensional division of the atmosphere.



Source: *Fundamentals of Physical Geography*, Briggs, et al., Copp Clark Pitman, 1993.

¹ O.H. Pilkey and L.Pilkey-Jarvis, "Useless Arithmetic: Why Environmental Scientists Can't Predict the Future." 2007, Columbia University Press.

The major problem is the almost complete lack of surface temperature and other data for most of the world. Adequate coverage in space and time exists for about 15% of the world and most of this is concentrated in eastern North America and Western Europe. Very few stations have records longer than 50 years and about 1000 stations are of 100 years in length. Measurements of the other variables such as precipitation, wind speeds, moisture levels, and cloud cover, are even less available. There is virtually no data of any sort above the surface.

The basic fact is there is insufficient data on which to build the models. Ironically, two strong advocates of the computer models and their predictions confirm this. P.D. Jones and T.R. Wigley said in 1994, "Many of the uncertainties surrounding the cause of climate change will never be resolved because the necessary historical data are lacking." It is reasonable to conclude this problem alone is sufficient to preclude use of the results as the basis of policy.

But there are other serious limitations of the models as follows.

1. The limited power of even the most recent computers. Variables re left out because they are beyond the capacity of the computer. Even with the ones include it takes hundreds of computer hours simply to change one variable and then achieve a new equilibrium Caspar Ammann told Steve McIntyre that "GCMs (General Circulation Models) took about 1 day of machine time to cover 25 years. On this basis, it is obviously impossible to model the Pliocene-Pleistocene transition (say the last 2 million years) using a GCM as this would take about 219 years of computer time." *
2. The recreation of surface features changes in topographic, biologic and atmospheric features are extremely crude with resolution skills of no better than thousands of square miles.^x
3. There is an inability to simulate important atmospheric processes. Dr. Vincent Gray, a research scientist and a 2001 reviewer with the UN's Intergovernmental Panel on Climate Change (IPCC) has noted, "*The effects of aerosols, and their uncertainties, are such as to nullify completely the reliability*

* McIntyre, Blog Climateaudit, 2005

^x "Global Climate Models Violate Scaling of the Observed Atmospheric Variability" R. B. Govindan, Dmitry Vyushin,, Armin Bunde,*, Stephen Brenner, Shlomo Havlin, I and Hans-Joachim Schellnhuber
VOLUME 89, NUMBER 2 Physical Review Letters 8 JULY 2002

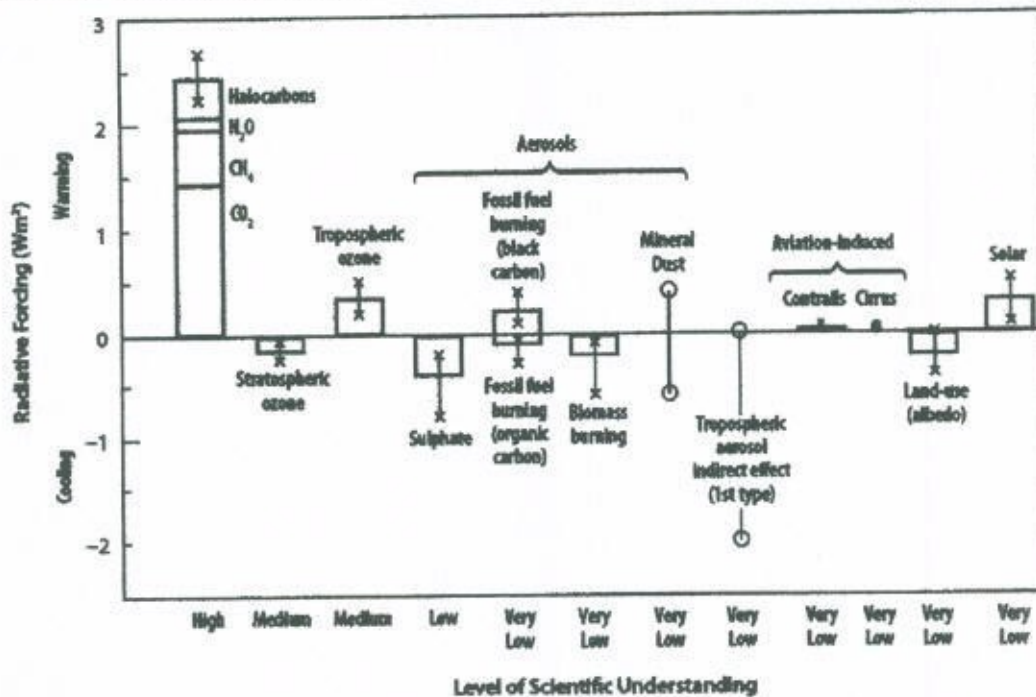
of any of the climate models."* Clouds are an equally serious limitation. The primary focus is on temperature, but from a biologic short and medium term perspective precipitation is more important. Arctic snowfall variations are as critical to plant and animal survival as temperature variations. Precipitation data is less available in space and time than even the inadequate temperature record. A recent attempt to predict droughts in Africa found two computer models produced completely opposite results. In an article on the issue the author writes, "*One obvious problem is a lack of data. Africa's network of 1152 weather watch stations, which provide real-time data and supply international climate archives, is just one-eighth the minimum density recommended by the World Meteorological Organization (WMO). Furthermore, the stations that do exist often fail to report.*"* Problems with precipitation and serious limits on accuracies of simulation impinge on almost all other climate variables. The role of water vapor in the atmosphere is a very important part of the entire dynamics and is seriously under managed in the computer models.

4. The models are mathematical constructs of some individual components of the atmosphere and ocean atmosphere interface. Outputs of these components are then interconnected mathematically with other components but not necessarily in the way they interconnect in nature. The models also overlook the fact that an error in one component introduces errors in all other related processes.
5. A basic but powerful definition of science is the ability to predict. GCMs are not weather prediction models, but climate is the pattern of weather over time or in a region. The models are based on the laws of physics and yet cannot reproduce the mechanisms that create daily weather patterns so they are unlikely to predict even very general future climate conditions. The inability of the models to predict climate change is already evident in their inability to accurately simulate current or past conditions. This is true of such significant patterns as the Little Ice Age and the Medieval Warm Period. It is also confirmed in the failures of all previous predictions. These predictions have consistently exaggerated the actual events. The 2007 IPCC model temperature predictions and of sea level rise are once again reduced from previous reports.
6. The models virtually ignore the sun as a cause of climate change, but place undue emphasis on CO₂, a secondary greenhouse gas. Interestingly, the 2001 IPCC Report illustrate the level of scientific understanding, which only serves to show why the models are completely inadequate, especially as the basis of policy. The errors in the table are remarkable and reflect the emphasis the authors want rather than the scientific reality, especially as the science evolves.

* Gray, Vincent, "The Greenhouse Delusion: A critique of "Climate Change 2001." Multi-Science Publishing, Bentwood Essex, 2002.

* Catherine Brahic, "Waiting for the Monsoon" SCIENCE VOL 313 4 August 2006. 608- 609

Figure 1: Level of confidence assigned to identified components of climate change



Source: Houghton et al., 2001: 8.

For example scientific understanding of CO₂ is much lower because the models assume it an increase causes temperature increase. We now know the temperature increases before CO₂. “Solar” is very low because the IPCC chooses to ignore major influences on climate including changes in sun/earth relationships and the correlation between, sun spots, the solar wind and global temperature.

In their book about the limitations of modeling mentioned at the beginning of this section Pilkey and Pilkey-Jarvis note that with climate modeling the experts justifiable caution about limitations and uncertainties leads them to ignore real world evidence. This occurred recently when actual ocean temperatures measurements showed cooling when the models predicted warming. We were told the data was wrong and the computer correct. A similar conclusion is reached by Lahsen.

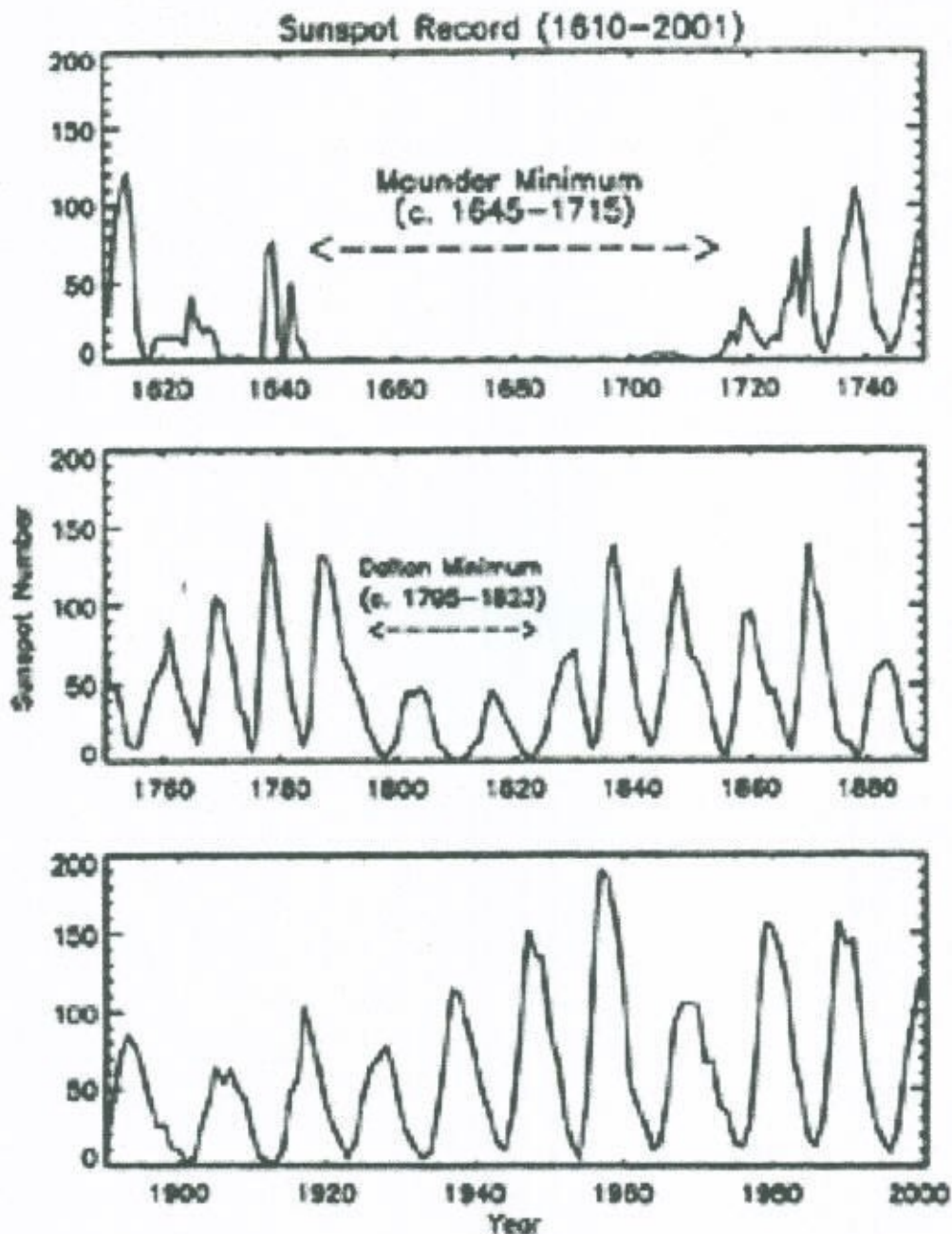
*This case study also challenges the assumption that knowledge producers always are the best judges of the accuracy of their models. Drawing on participant observation and interviews with climate modelers and the atmospheric scientists with whom they interact, the study discusses how modelers, and to some extent knowledge producers in general, are sometimes less able than some users to identify shortcomings of their models.*²

The most egregious omission the modelers ignore the high correlation between

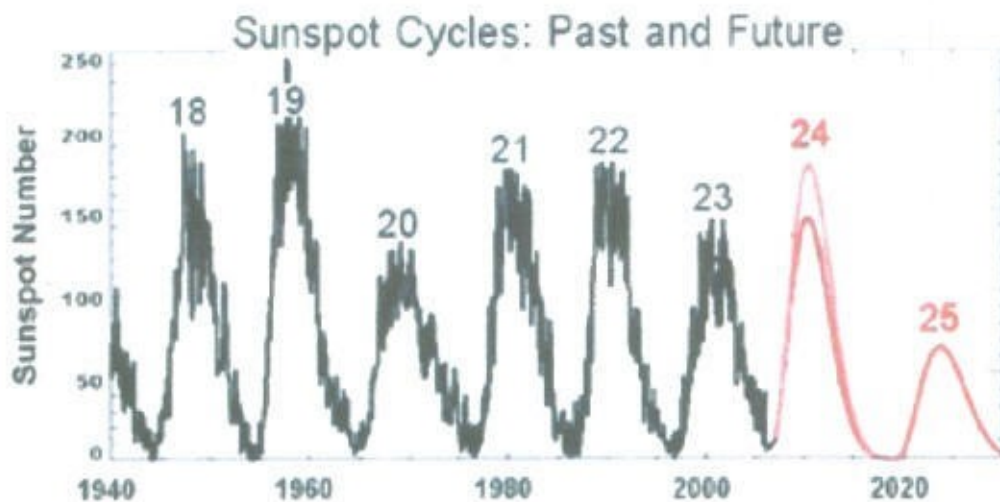
² Myanna Lahsen, “Seductive Simulations? Uncertainty distribution around climate models.” *Social Studies of Science* 35/6(December 2005) 895–922

sunspot activity and global temperatures. The reason given is that we don't fully understand the mechanism. Manifestation of the sunspot activity is provided in the Arctic by the aurora borealis. Traditionally, aboriginal people of northern Canada used the aurora to make accurate weather forecasts.

Sunspot were first observed by Galileo in 1610. Since then we have recorded the number of spots and determined their cyclical pattern. The most obvious cycle is the 11-year or Schwabe cycle. Other important cycles include the 22-year Hale and the 90 to 100-year Gleissberg cycle.



Everyone agrees the world has warmed since 1680 when the cold period known as The little Ice Age occurred. The coldest period lasted from 1640 to 1720 and is fully coincident with the Maunder Minimum. Global temperature follows this pattern up to the present. The simple relationship is when sunspot numbers are low the earth is colder and when they are high the earth is warmer. We reached a peak at the end of the 20th century. Currently we are entering cycle 24 and cycle 25 is predicted to be very low. *"The Sun's Great Conveyor Belt has slowed to a record-low crawl, according to research by NASA solar physicist David Hathaway. "It's off the bottom of the charts," he says. "This has important repercussions for future solar activity."*³ Other scientists have made similar predictions as summarized in an article by David Archibald⁴



A comparison of previous periods with similar sunspot numbers suggest global temperatures comparable with those associated with the Dalton Minimum at the beginning of the 19th century.

It appears some are preparing to explain the cooling and failure of the models by blaming soot, but this type of explanation failed when the cooling from 1940 to 1980 was attributed to human additions of sulfates to the atmosphere. So while the world prepares for warming the science indicates we are heading for cooling.

³ www.physorg.com/news66581392.html

⁴ David C. Archibald "Solar Cycles 24 and 25 and Predicted Climate Response" 2007 Summa Development Limited, Perth, WA, Australia dca@arach.net.au

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