

WOULD CO₂ EMISSION CUTS SAVE ARCTIC ICE AND REDUCE SEA-LEVEL RISE?

by

Christopher Monckton



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Yet again, rent-seeking “scientists” bidding for wealth, power, and glory at taxpayers’ expense have used computer games divorced from observed reality as the basis for making absurd, extravagant, scientifically-baseless, and now rather tired and shop-worn predictions that climatic doom will ensue unless the world shuts down two-thirds of its economic activity.

To save the planet, burn more CO₂.

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TABLE OF CONTENTS

“CO2 Emission Cuts Would Save Arctic Ice and Reduce Sea-level Rise”	4
The Claims	4
The Facts	5
Sea-level Rise	5
Arctic Sea-ice Extent.....	6
<i>Accumulating ice and snow around DEW stations.....</i>	<i>6</i>
<i>Seven years’ global cooling at 3.6 °F (2 °C) / century</i>	<i>7</i>
<i>Arctic sea-ice extent has scarcely declined in 29 years.....</i>	<i>8</i>
<i>Antarctic sea ice reached a maximum in late 2007</i>	<i>8</i>
<i>The regular, seasonal heartbeat of global sea-ice extent.....</i>	<i>9</i>
Arctic Warming.....	9
Rainfall.....	12
“Locked-in Climate Change”	13
Conclusion	14

“CO2 Emission Cuts Would Save Arctic Ice and Reduce Sea-level Rise”

The Claims:

A report by scientists from the US National Council for Atmospheric Research in mid-April 2009 concluded that what was described as the “threat of global warming” could be greatly diminished if nations cut emissions of “heat-trapping greenhouse gases” by 70 per cent this century. The report says that, while global temperatures would rise, “the most dangerous potential aspects of climate change, including massive losses of Arctic sea ice and permafrost and significant sea level rise, could be partially avoided. Warren Washington, the report’s lead author, said: “This research indicates that we can no longer avoid significant warming during this century. But if the world were to implement this level of emission cuts, we could stabilize the threat of climate change and avoid catastrophe.”

Washington and his fellow-modelers ran a series of global supercomputer studies. They assumed that greenhouse-gas levels could be held to 450 ppmv CO₂ equivalent at the year 2100. That figure comes from the U.S. Climate Change Science Program, which thinks it is an attainable target if the world quickly adopts “new green technologies” to cut emissions dramatically. In contrast, the authors imagine that emissions are now on track to reach about 750 ppmv by 2100 (actually, the figure is closer to 570 ppmv). Results showed that if greenhouse-gas emissions were held to 450 ppmv, global temperatures would increase by 0.6 Celsius degrees (about 1 Fahrenheit degree) above current readings by the end of the century. In contrast, the study showed that temperatures would rise by 2.2 C° (4 F°) above current readings, if emissions were allowed to continue on their present course.

Holding at 450 ppmv would have other impacts, according to the modelers:

- Sea level rise from thermal expansion would be 14 cm (5.5 in) instead of 22 cm (8.7 in). Either way, melting ice sheets and glaciers would also raise sea level.
- Summer Arctic ice would shrink by about 25% and stabilize by 2100, rather than shrinking 75% and perhaps disappearing altogether.
- Arctic warming would be reduced by almost half.
- Significant regional rainfall changes, including less rain in the U.S. Southwest and more in the U.S. Northeast and Canada, would be halved.
- The climate system would stabilize by 2100, instead of continuing to warm.

The authors of the paper say that sea level rise from thermal expansion of the ocean is 22 cm (8.5 in) in the business-as-usual scenario and 14 cm (5.5 in) if we reduce CO₂ emissions. Thus, about 8 cm (3 in) of the sea level rise that would occur without mitigation would be averted (or up to twice this if melting glaciers and ice-sheets were taken into account).

However, the paper’s authors conclude that by the end of the century the sea level rise would continue and would not stabilize, because of “locked-in” climate change.

The Facts:

Even if the computer model were correct (which it is not), the NCAR scientists' own figures show that shutting down close to two-thirds of the world's economy in the name of "Saving The Planet" would reduce sea-level rise by little more than 6 inches this century. Therefore, as Dr. Roger Pielke Sr. has pointed out on his influential blog, "For the 21st century sea level rise is an adaptation issue, not a mitigation issue." There is no point in destroying most of the global economy for the sake of preventing just seven inches of sea-level rise.

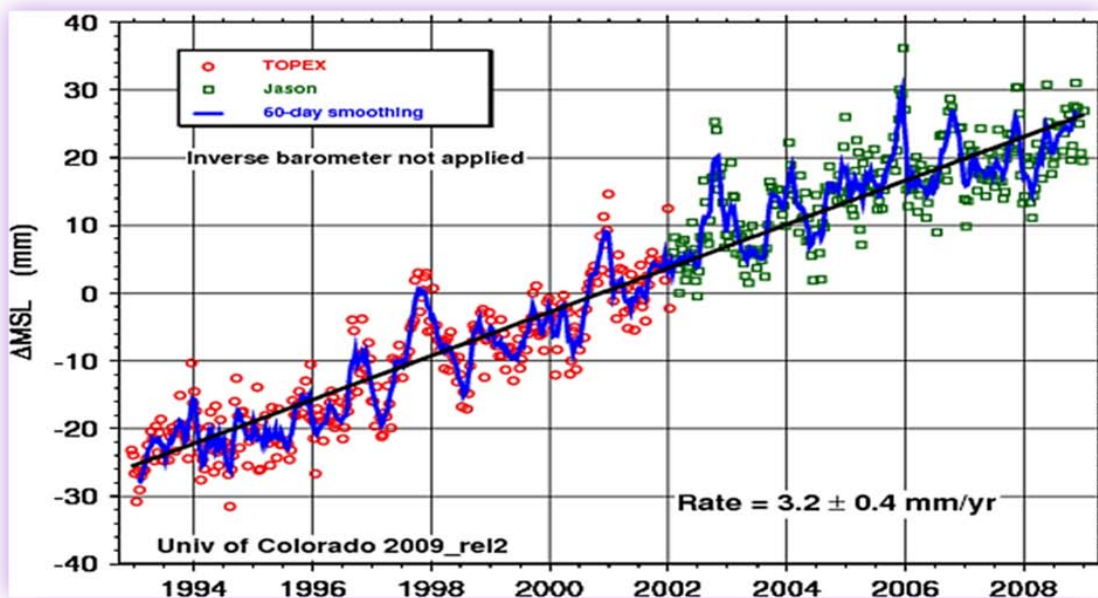
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Sea-level Rise

It cannot be repeated often enough that, as Dr. Nils-Axel Moerner has pointed out, sea-level rise caused by anthropogenic "global warming" is a non-issue.

Dr. Moerner, who has written 520 peer-reviewed papers on sea level in his 35-year career devoted solely to studying the issue, has concluded that sea level will rise in the 21st century by about 8 inches.

Since 1993, when satellites first began to measure sea-level rise, the rate of increase has been about 1 ft/century, though there has been no statistically-significant sea-level rise during the past three years.



Sea level is scarcely rising: The average rise in sea level over the past 10,000 years was 4 feet/century. During the 20th century it was 8 inches. In the past three years, sea level has scarcely risen at all. Mr. Justice Burton, in the UK High Court, bluntly commented on Al Gore's predicted 20ft sea-level rise as follows: "The Armageddon scenario that he depicts is not based on any scientific view." *A fortiori*, James Hansen's prediction of a 246ft sea-level rise is mere rodomontade. *Source:* University of Colorado.

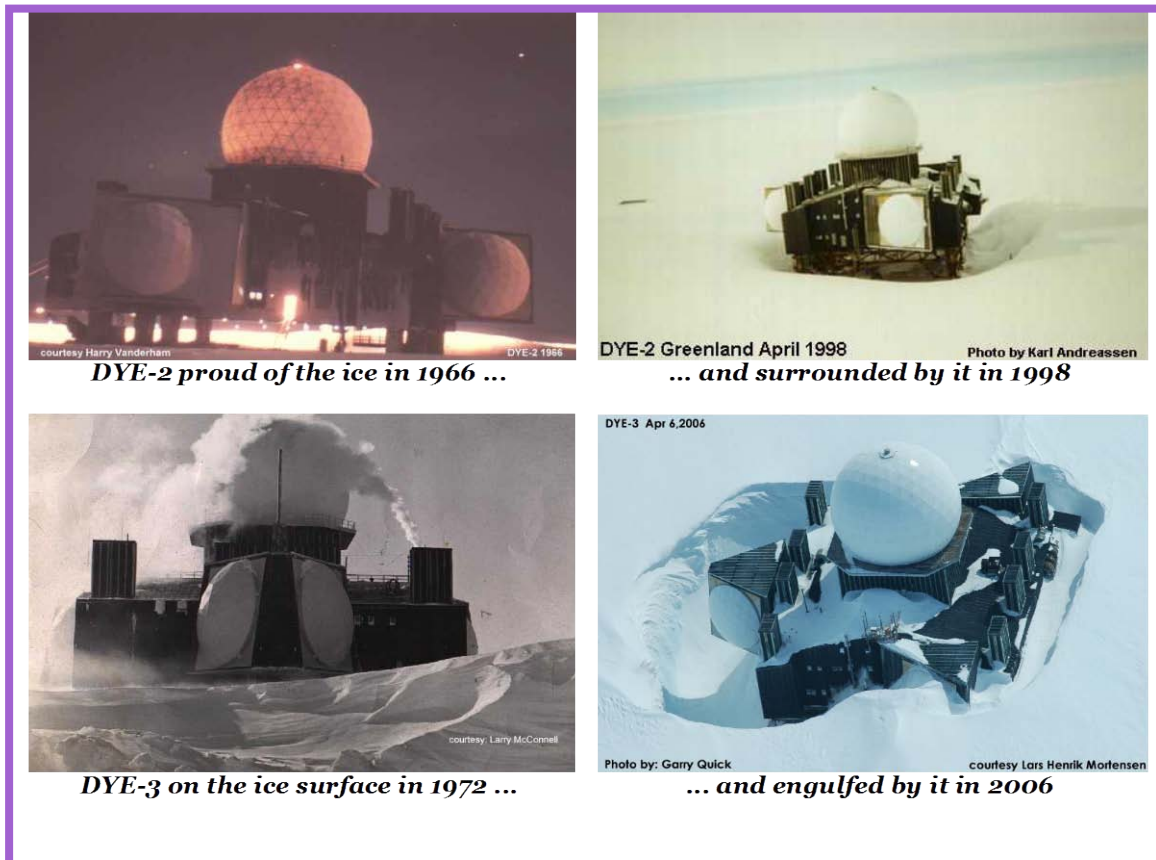
Even the 2007 report of the UN's climate panel only predicts a sea-level rise of 1 ft 5 in this century (or 2 feet at most, reduced from a maximum of 3 feet in earlier reports), compared with an observed rise of just 8 inches in the 20th century.

During the past 10,000 years, the mean centennial sea-level rise has been 4 feet/century. Therefore, on any view, even the UN's high-end estimate of sea-level rise is well within natural variability. Dr. Moerner is right to say that sea-level rise is a non-issue.

Arctic Sea-ice Extent

Sea-ice extent is another non-issue that is routinely dragged out in the media and in "scientific" papers by way of suggesting that humankind's activities are making permanent, serious, and potentially catastrophic alterations to the climate. However, as the SPPI's *Monthly CO2 Reports*¹ inexorably demonstrate, there is no scientific basis for alarm. It is known, for instance, that the Greenland ice sheet was entirely absent 850,000 years ago: therefore, even if Greenland's ice were to melt, its disappearance would be entirely within the natural variability of the climate. However, there is little sign of imminent collapse in the Greenland ice sheet. Indeed, the now-redundant DEW-line early-warning radar stations in northern Greenland are rapidly being surrounded by the rapidly-growing ice sheet.

Accumulating ice and snow around DEW stations



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

¹ http://scienceandpublicpolicy.org/monthly_report/march_co2_report.html.

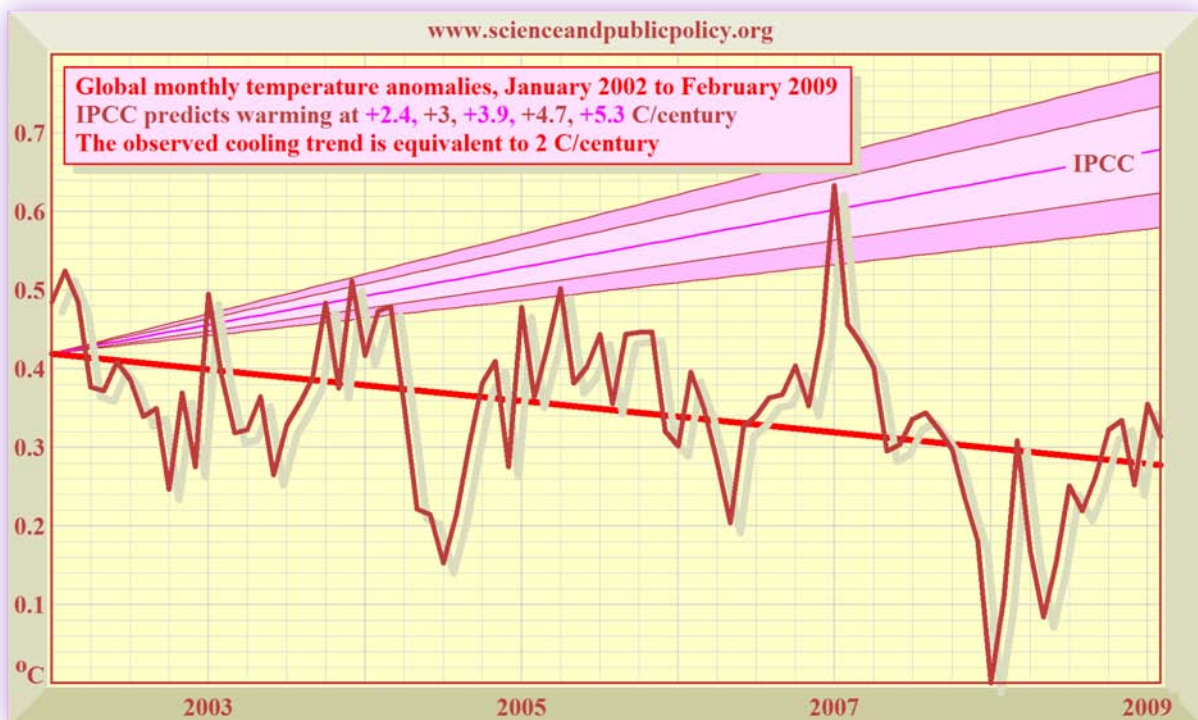
- 1959 DYE-2 station built on the surface of the Greenland ice sheet
- 1962 DYE-2 jacked up by 1.8 meters to keep it clear of the surface
- 1965 DYE-2 jacked up by 2.7 meters to keep it clear of the surface
- 1967 DYE-2 jacked up by 3.2 meters to keep it clear of the surface
- 1970 DYE-2 jacked up by 7.6 meters to keep it clear of the surface
- 1976 DYE-2 jacked up by 8.2 meters to keep it clear of the surface
- 1988 DYE-2 station closed.

At least in the region of these two stations on the DEW-line, the Greenland ice sheet has clearly been thickening, consistent with the findings of Johannessen *et al.* (2005) to the effect that the mean thickness of the entire Greenland ice sheet had *increased* by 2 inches *per year* between 1993 and 2003.

There has been much media comment about the disappearance of one-third of the usual summer sea ice at the North Pole in 2007. However, a paper by NASA in 2008 attributed this ice-melt to unusual northbound currents and winds bringing warmth up from the tropics to the Arctic, and a more recent paper says that the summertime Polar winds in 2007/8 had blown much of the sea ice southward into warmer waters, where it melted.

The temporary disappearance of the summer sea ice in the Arctic, therefore, cannot be attributed to “global warming”, not least because in the past decade there has been no warming, and in the seven years since late 2001 there has been rapid global cooling.

Seven years' global cooling at 3.6 °F (2 °C) / century



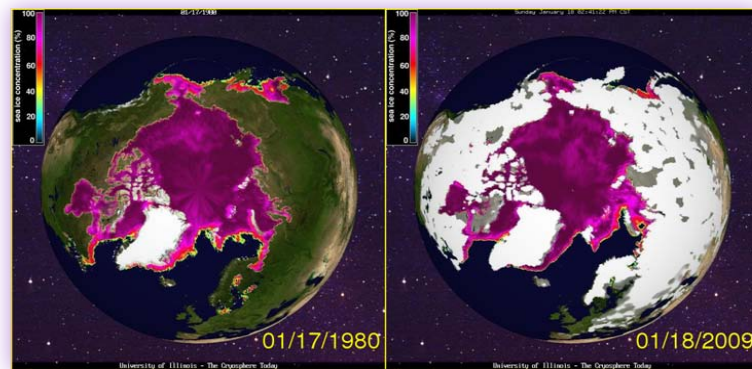
For the past seven full years, global temperatures have exhibited a pronounced downtrend. The IPCC's predicted warming path (pink region) bears no relation to the global cooling that has been observed in the 21st century to date. Source: SPPI global temperature index.

A transient and purely seasonal regional warming cannot credibly be attributed to “global warming” when what has occurred is rapid and statistically significant global cooling.

A transient and purely seasonal regional warming cannot credibly be attributed to “global warming” when what has occurred is rapid and statistically significant global cooling. We say “seasonal” because the sea ice that

disappears in the summer re-forms with great rapidity in the winter, occupying an area many times greater than the summer ice, and demonstrating that the very small anthropogenic changes to the climate are dwarfed by the changes that occur between summer and winter each year.

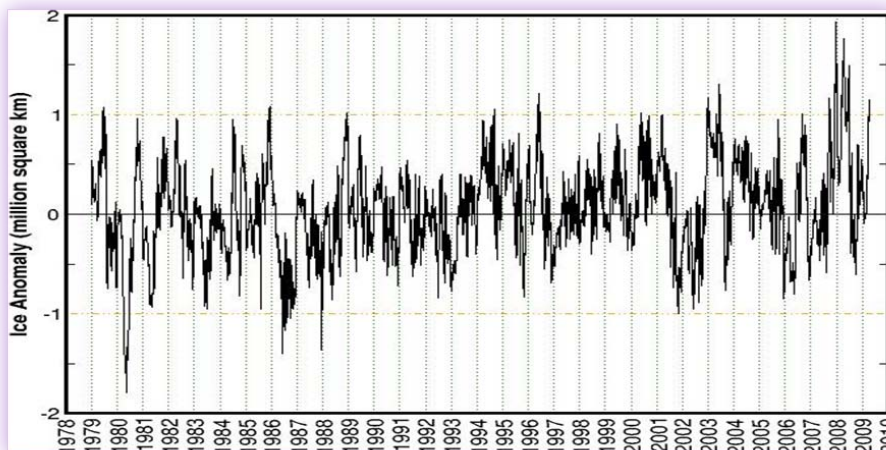
Arctic sea-ice extent has scarcely declined in 29 years



Arctic sea ice: Sea ice (shown above in purple) covered almost the same area of the Northern Hemisphere in mid-January 2009 as it had done in mid-January 1980, 29 years previously. Except in Greenland, snow cover was not shown in 1980, but is shown (white) in 2009. Summer sea ice covered its least extent in 30 years during the late summer of 2007. However, NASA has attributed that sudden decline to unusual poleward movements of heat transported by currents and winds, and, more recently, to southward drifting that moves the ice to warmer waters, where it melts.

At almost the same moment as summer sea-ice extent reached its *minimum* in the Arctic, sea-ice extent in the Antarctic reached its *maximum*, though the latter event was very much less widely reported in the media than the former.

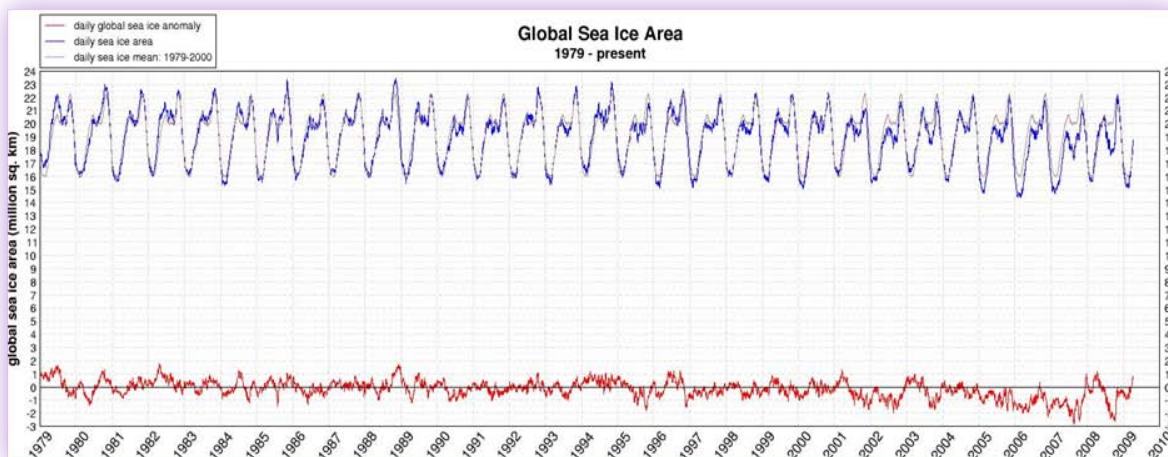
Antarctic sea ice reached a maximum in late 2007



Antarctic sea ice reached a largely-unreported 30-year maximum in late 2007, at about the same time as Arctic sea ice reached a widely-reported minimum. **Source:** University of Illinois, 2009.

Global sea-ice extent shows practically no trend in 30 years, even though there was strong “global warming” during the first 20 years of the period.

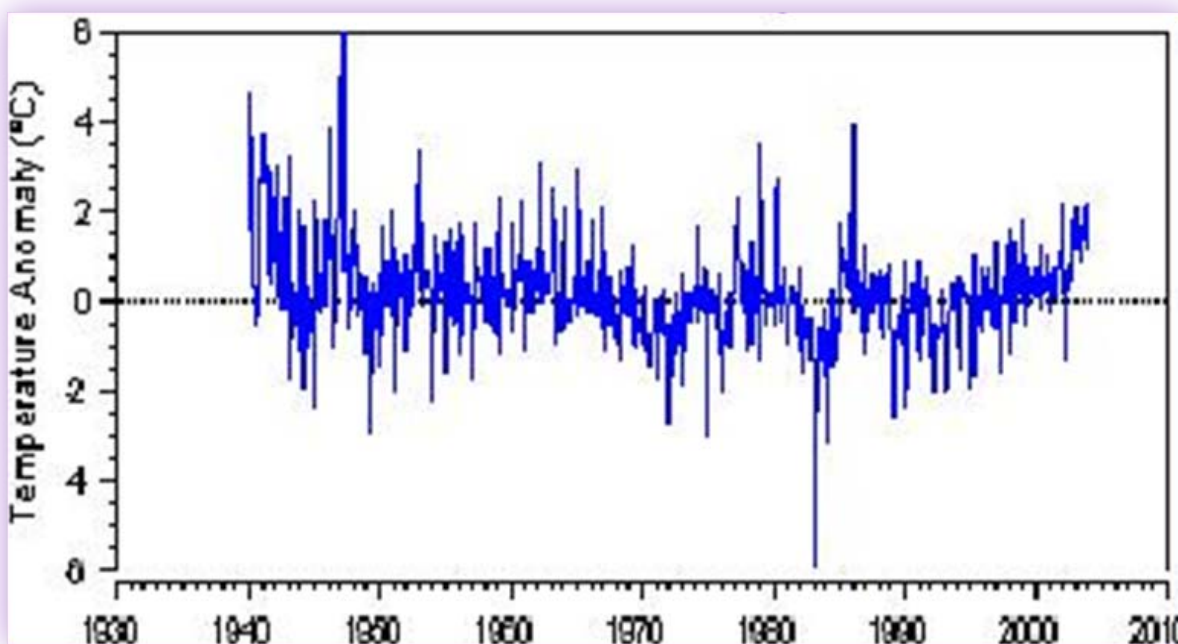
The regular, seasonal heartbeat of global sea-ice extent



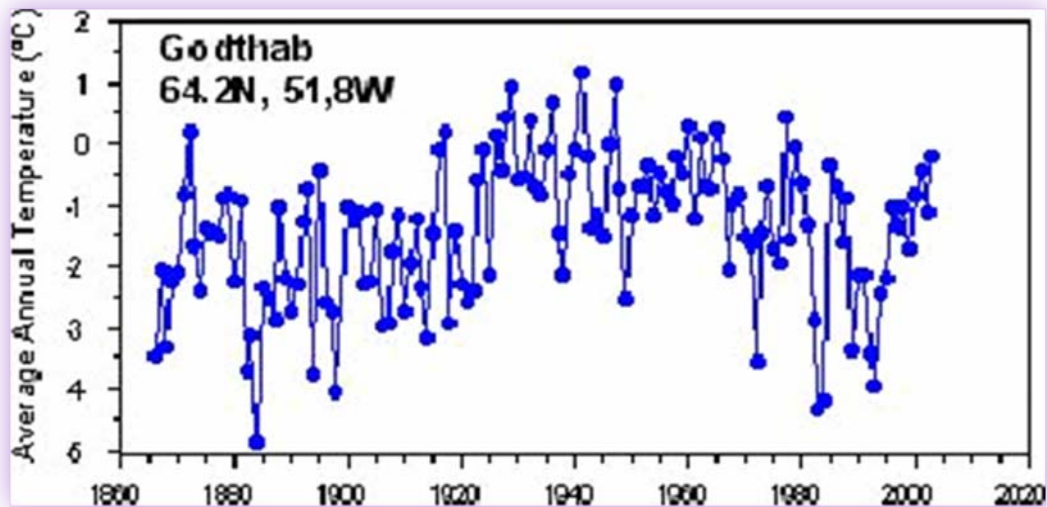
Planetary “cardiogram”: There has been a very slight decline in the trend (red) of global sea-ice extent over the decades, chiefly attributable to loss of sea ice in the Arctic during the summer, which was well below the mean in 2007, with some recovery in 2008. However, the 2008 peak sea-ice extent was exactly on the 1979-2000 mean, and current sea-ice extent is also on the 1979-2000 mean. The decline in summer sea-ice extent in the Arctic, reflected in the global sea-ice anomalies over most of the past eight years, runs counter to the pronounced global atmospheric cooling trend over the same period, suggesting that the cause of the regional sea-ice loss cannot have been “global warming.” Seabed volcanic activity recently reported in the Greenland/Iceland gap, with seabed temperatures of up to 574 °F, may have contributed to the loss of Arctic sea-ice. **Source:** University of Illinois, April 2009.

Arctic Warming

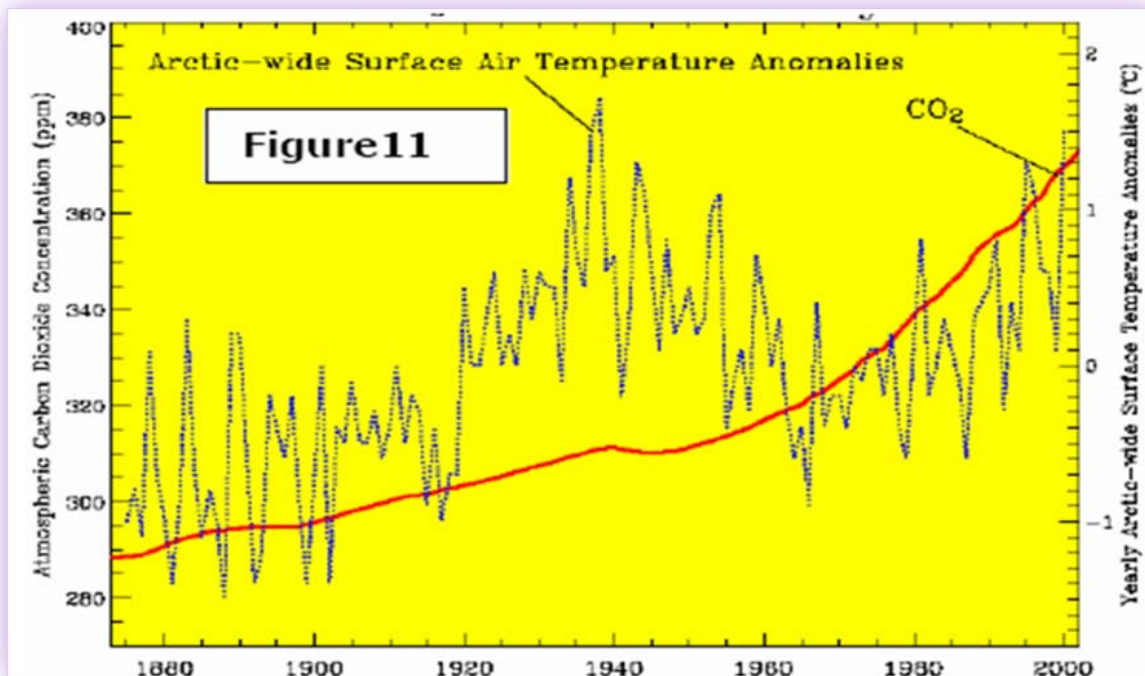
Temperatures in the Arctic and in Greenland were warmer by up to 3 Fahrenheit degrees in the late 1930s and early 1940s than they are at present –



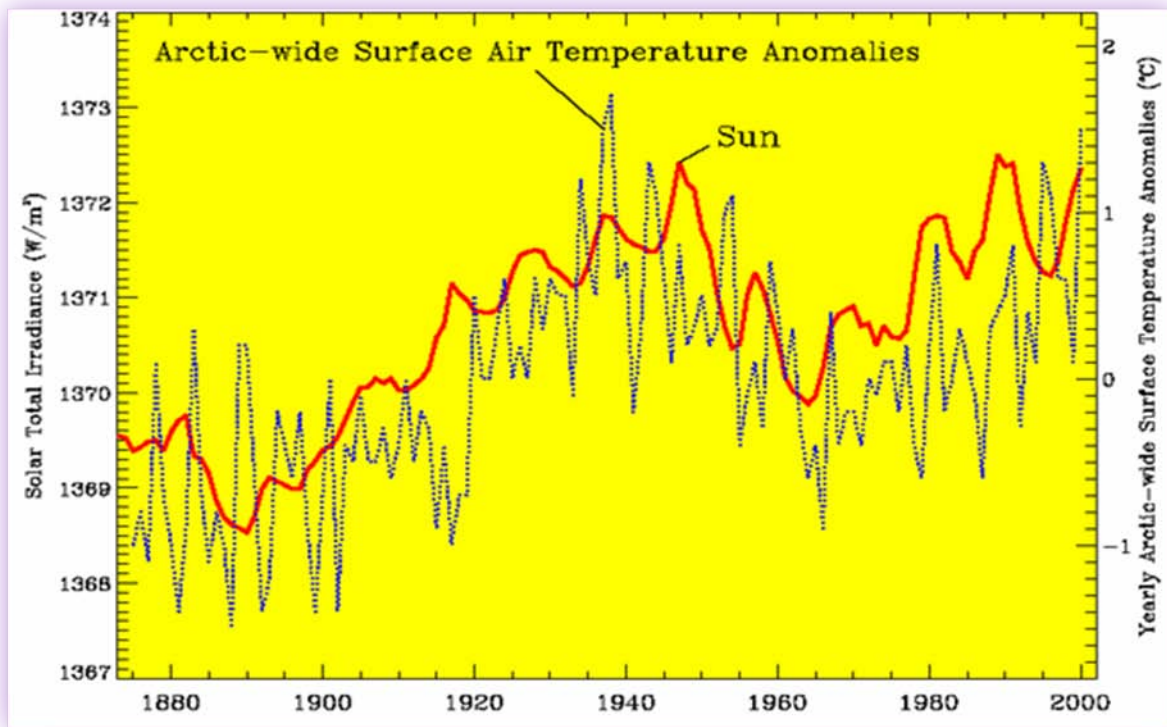
For various reasons, temperature change in the Polar regions tends to be more volatile than elsewhere on Earth, as the Godthab weather-station record shows –



Accordingly, drawing alarmist conclusions from a short-run regional increase in temperature is inappropriate, particularly given that global temperature has been falling. Whatever has caused the recent small increase in Arctic temperatures, it cannot have been “global warming,” because in the past decade there has been no warming. Correlation between changes in CO₂ concentration and Arctic temperature is very poor (Soon, 2004) –



However, correlation between solar activity and temperature change in the Arctic is considerably closer (Soon, 2004) –



The variability of the Arctic climate has been known for a long time –

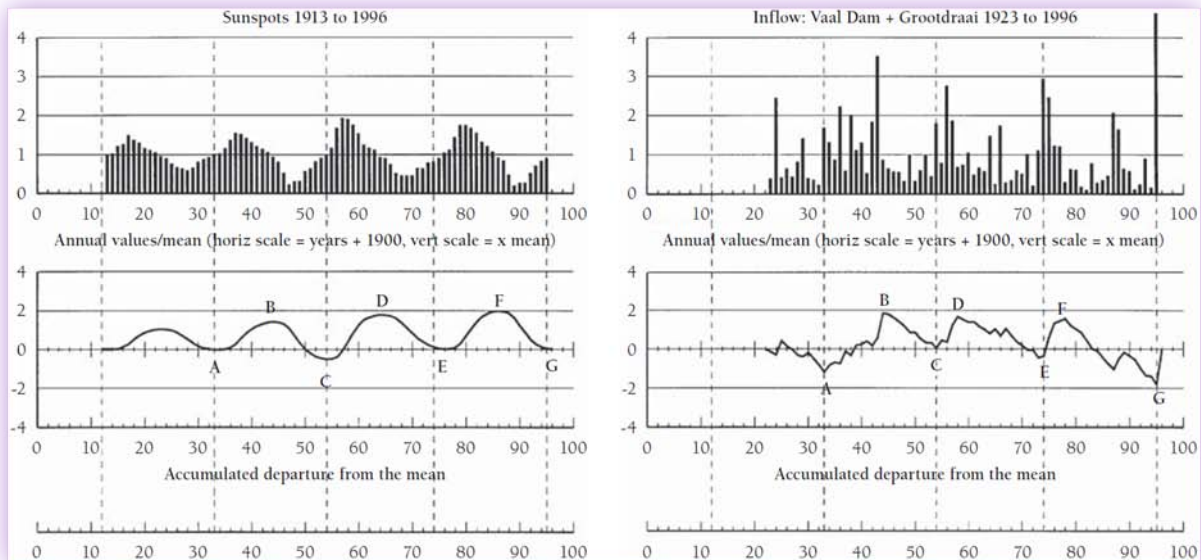


The variable Arctic: Beechey Island in September 1850 (top) and August 1858 (bottom).

Given the variability of the Arctic climate, and the stark lack of correlation between atmospheric CO₂ concentration and Arctic temperature, the apocalyptic conclusions about future Arctic warming and disappearance of sea ice that are repeatedly made are scientifically unwarranted.

Rainfall

Alexander *et al.* (2007) established definitively that solar activity, not CO₂ concentration, is the principal influence on changes in rainfall patterns over time –



Peaks and troughs in the sunspot record correspond with peaks and troughs in inflow to the Vaal Dam and Grootdraai, South Africa, over a 74-year period.

Alexander *et al.* explain:

“Vaal Dam is the major source of water for South Africa’s largest metropolitan, industrial, and mining region. This is the most analysed hydrological record in South Africa. ... The reversals in the flows in the Vaal River from drought sequences to flood sequences ... correspond closely with similar reversals in sunspot numbers. ... [The diagram] shows graphical comparisons of the properties of the double sunspot cycle with those of the Vaal River. This follows the method developed by Alexander (1978) and successfully used to predict the climate reversals from drought to flood sequences that occurred in 1995 and again in 2006.”

The number of sunspots visible on the solar surface is an indication of the radiant energy that the Sun emits. During the period of the graph, carbon dioxide concentration was rising near-monotonically, year by year. Yet there is no corresponding trend in the rainfall data, which instead conform very closely to the cycles of solar activity. It was this observation that enabled Alexander to predict the 1995 and 2006 reversals from drought to flood sequences. He now predicts that South Africa will enter a period of drought, not because of “global warming” but because of changes in solar activity. He also predicts that the drought, if it occurs, will immediately be blamed on “global warming,” as all extreme-weather events now are.

The notion that warmer weather would cause radical or permanent shifts in climatic patterns, and the notion that such shifts as may occur will necessarily be for the worse rather than for the better, are not supported by the scientific evidence.

There is remarkably little empirical evidence to support the contention that a few degrees' "global warming" – even if it were to occur – would alter patterns of rainfall and drought any more radically than the natural changes that have occurred. In the first half of the 20th century, for instance, the Great Plains of the United States suffered far worse and more persistent droughts than they have suffered since, even though global temperatures have increased since then.

In short, the notion that warmer weather would cause radical or permanent shifts in climatic patterns, and the notion that such shifts as may occur will necessarily be for the worse rather than for the better, are not supported by the scientific evidence.

“Locked-in Climate Change”

The authors of the NCAR report say that a worldwide 70% reduction in CO₂ emissions would “stabilize” the climate after 2100, whereas otherwise “global warming” would continue. However, they qualify their idea of stabilization by saying that, for instance, sea level would continue to rise after 2100 on all scenarios because of “locked-in” climate change.

*Why are the oceans cooling?
Precisely because the atmosphere is cooling.*

The NCAR’s modelers, like many of their kind, have paid too much regard to their Playstations and too little regard to observational evidence from the real world. In 2003, 3175 automated bathythermograph buoys were deployed by the Argo project throughout the world’s oceans. Though the calibration of the buoys has proven difficult, the results are becoming clear: notwithstanding the “global warming” of the past century, the oceans are now cooling, just as the atmosphere is cooling.

Why are the oceans cooling? Precisely because the atmosphere is cooling. The laws of thermodynamics require that heat-energy passes from the warmer to the cooler medium, and not the other way about. It is a one-way street.

In fact, it is easy to calculate the amount of “locked-in” temperature increase that the UN’s climate panel imagines would occur after stabilization of CO₂ concentrations in 2100. Though the calculation is simple, none of the scientists and journalists who have written so airily about “locked-in” climate change “in the pipeline” have bothered to perform it.

Here is how the calculation is done, step by step –

Step 1: In the UN’s methodology the effect of CO₂ on temperature *at equilibrium*, after all “locked-in” climate change has occurred, is a multiple of the natural logarithm of the proportionate increase in CO₂ concentration. The UN’s central estimate, using the A2 business-as-usual scenario, is that by 2100 CO₂ concentration will be 836 ppmv, against 368 ppmv in 2000. Thus the proportionate increase is 836/368, and its natural logarithm is **0.821**.

Step 2: The UN’s current central estimate of the “global warming” that might occur in response to doubling CO₂ concentration is 3.26 Celsius degrees. We note in passing that this estimate is down from 3.5 C° in 2001 and 3.8 C° in 1996, from which it is reasonable to deduce that the “consensus” does not

even agree with itself. We work out the required multiple thus: $3.26 / \ln(2) = 4.7$. In other words, the UN's current central estimate is that the warming caused by increased CO₂ concentration, in Celsius degrees, is **4.7** times the natural logarithm of the proportionate increase in CO₂ concentration.

Step 3: We multiply the natural logarithm obtained in step 1 by the coefficient obtained in step 2. Thus the UN's implicit central estimate of the *equilibrium* temperature change over the 21st century in response to its central estimate of the proportionate increase in atmospheric CO₂ concentration is $4.7 \times 0.821 = \mathbf{3.9\ C^\circ}$.

Step 4: We look up the UN's estimate of the *transient* effect of CO₂ on temperature over the 20th century. The *transient* effect is the change in temperature that occurs *before* any "locked-in" temperature change occurs. For scenario A2, the UN's central estimate (see table SPM-3 in the 2007 report) is a 21st-century warming of **3.4 C°**.

Step 5: All that remains is to subtract the *transient* warming found in step 4 from the *equilibrium* warming found in step 3. Thus, the "locked-in" climate change "in the pipeline" even if CO₂ concentrations were stabilized by 2100 would be $(3.9 - 3.4) = \mathbf{0.5\ C^\circ}$, or **less than 1 F°**.

We can thus calculate the "warming in the pipeline" with a single equation:

$$\begin{aligned} \Delta T_{pip} &= [\Delta T_{equ}] - \Delta T_{tra} \\ &= [3.26 \ln(C_{2100}/C_{2000}) / \ln 2] - 3.4 \\ &= [3.26 \ln(836/368) / \ln 2] - 3.4 \\ &= [3.9] - 3.4 \\ &= \mathbf{0.5\ C^\circ}. \end{aligned}$$

We are able to conclude definitively that the issue of "locked-in" temperature increase is indeed a non-issue. All of the excitable papers and articles, including that by the NCAR's modelers, that predict dangerous climate change "in the pipeline" as an ineluctable consequence of humankind's past self-indulgence are simply nonsense, owing everything to a politicized, quasi-religious credulity and nothing to the scientific method.

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Conclusion

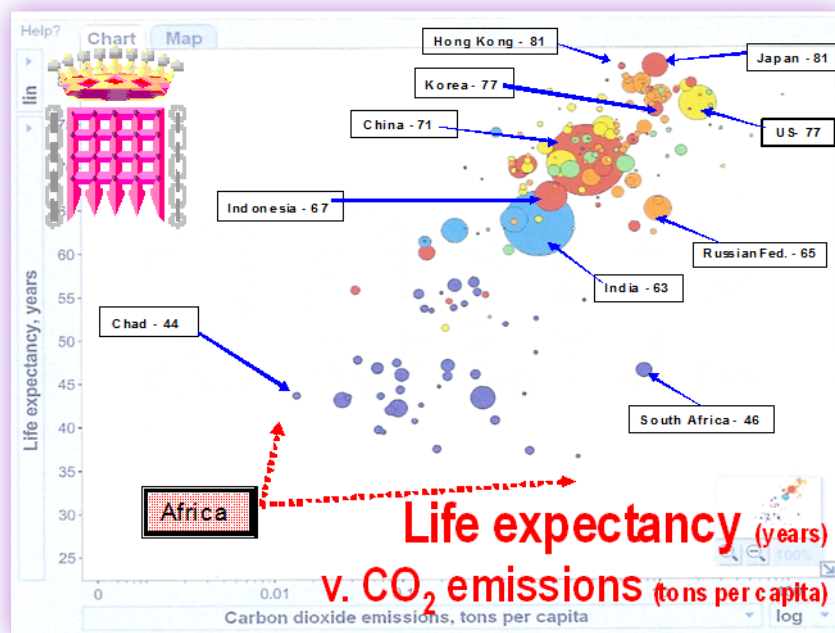
Yet again, rent-seeking "scientists" bidding for wealth, power, and glory at taxpayers' expense have used computer games divorced from observed reality as the basis for making absurd, extravagant, scientifically-baseless, and now rather tired and shop-worn predictions that climatic doom will ensue unless the world shuts down two-thirds of its economic activity.

All of the pretexts for alarm in the latest paper by self-serving climate extremists – sea-level rise, Arctic ice-melt, a warming Arctic, shifting rainfall patterns, and future "global warming" lurking in the pipeline – turn out, even on the simplest examination of the real-world facts, to be unreal and without legitimate scientific or other foundation.

Even if there were any serious likelihood that anthropogenic “global warming” (if and when it occurs) would be severe enough to go dangerously beyond natural climate variability, shutting down the greater part of the world’s industrial activity would have the perverse effect of imprisoning third-world countries such as China, India, Indonesia, Russia, and Brazil in abject poverty, which is well established in the demographic literature as the primary cause of rapid growth in human populations.

Higher population growth entails a greater total “carbon footprint.” That does not matter in reality, for the effect of carbon dioxide on temperature is largely spent. However, if the objective is to reduce the “carbon footprint” of humankind on the specious ground that it does matter, then preventing the nations of the Third World from using fossil fuels to drive their emergence from poverty will not merely defeat that objective but instead achieve precisely the opposite objective – a fine instance of the law of opposite consequences that applies universally whenever governments or supranational entities seek to interfere in the free operation of international markets.

One of the principal objectives of international policy at present should be the eradication of poverty worldwide. The liberating effect of fossil-fueled industrial activity on nations following the path from poverty to prosperity is long established and entirely clear –



There is a direct correspondence between the annual emission of CO₂ per capita and national prosperity. The greater the emissions, the greater the prosperity. The greater the prosperity, the stabler the population. The stabler the population, the smaller the environmental footprint.

To Save The Planet, burn more CO₂.