

Global Warming

What is it all about?

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The issue of global warming has three distinct components:

Global Warming Itself

Catastrophic Climate Alarmism

Climate Mitigation Policy

Each of these components is complex and uncertain.

The connections between the components are weak to the point of non-existence. Treating them as a single issue is a clear sign that one is trying to befuddle the public.

Muddling these aspects leads to often superficial complexity and real incoherence.

Only by separating these aspects can one logically assess the issue.

Typically, complexity is used to argue for authority, but authority cannot be the basis for illogic.

In this talk, I will begin with a discussion of global warming itself, though as we will see, this is normally not the focus of discussion.

Instead, the emphasis is on truly implausible catastrophic scenarios. I will try to explain why the catastrophes projected leave rational science far behind.

Proposed policies are even more peculiar in that they bear little relation to the first two aspects.

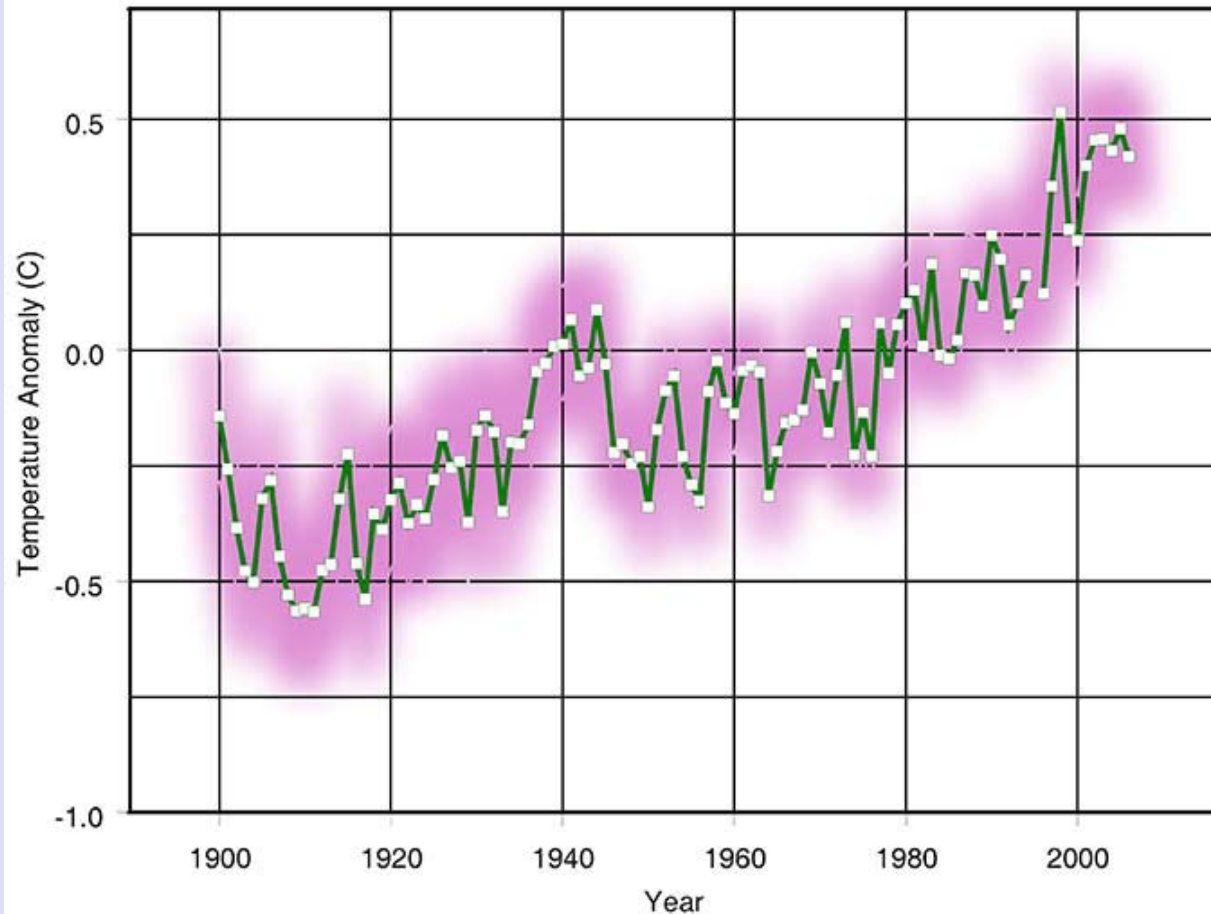
I will finally discuss how this whole issue has been corrupted by the elevation of global warming to a fundamental role in the unhealthy world of political correctness.

What is Global Warming?

The line represents the actual measurements; the purple fuzz represents the stated uncertainty. Note the small (order 0.6C) overall but irregular warming since 1900.

Global Mean Temperature Anomaly (UK Met. Office)
1900-2006

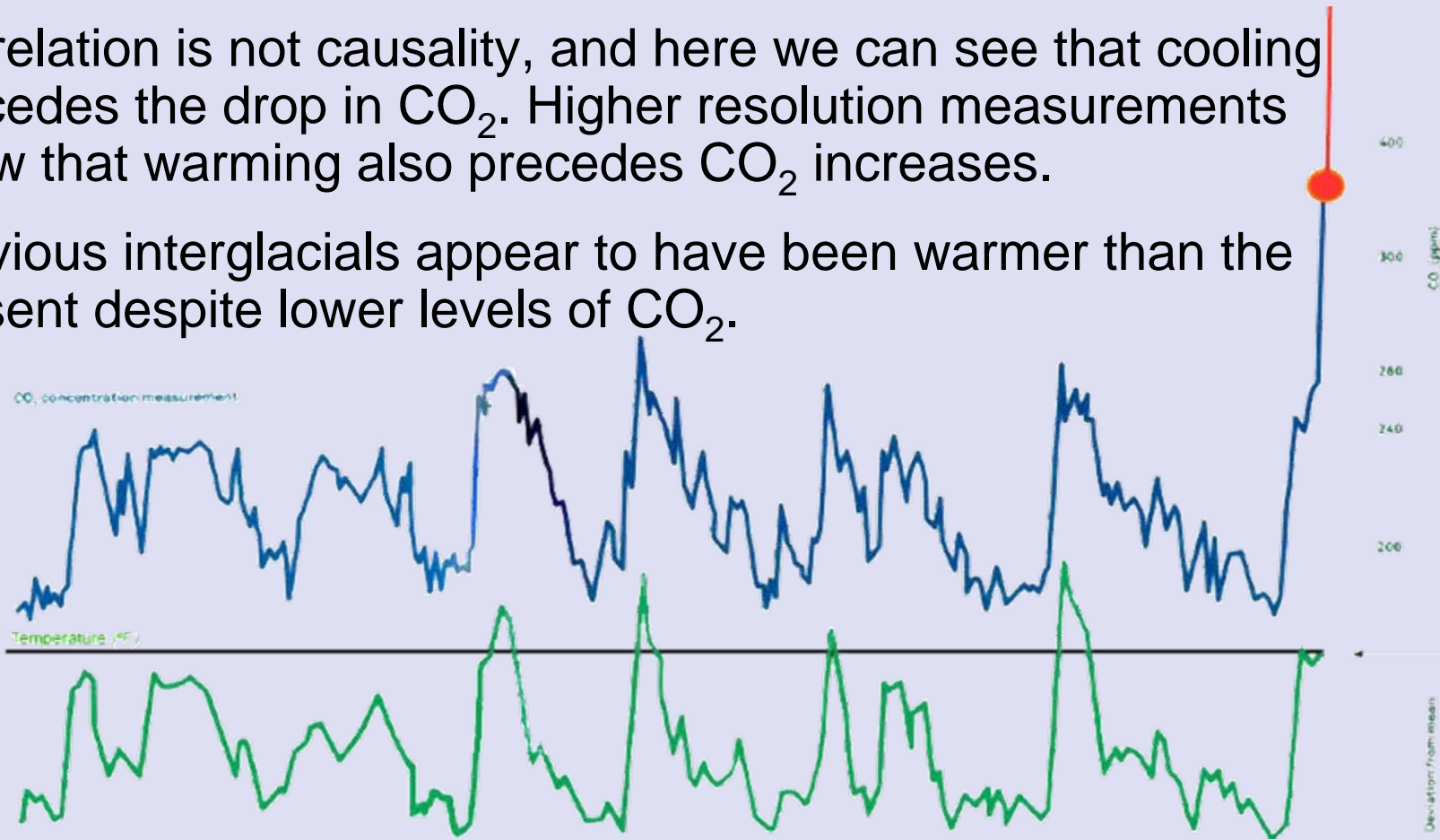
Uncertainty bounds estimated by UK Met. Office shown in purple



Is this about Global Warming?

CO₂ and temperature records over the past 650K years as inferred from ice cores in Antarctica are often cited as evidence for the role of CO₂ in global climate, but the example is faulty on several grounds:

1. Correlation is not causality, and here we can see that cooling precedes the drop in CO₂. Higher resolution measurements show that warming also precedes CO₂ increases.
2. Previous interglacials appear to have been warmer than the present despite lower levels of CO₂.

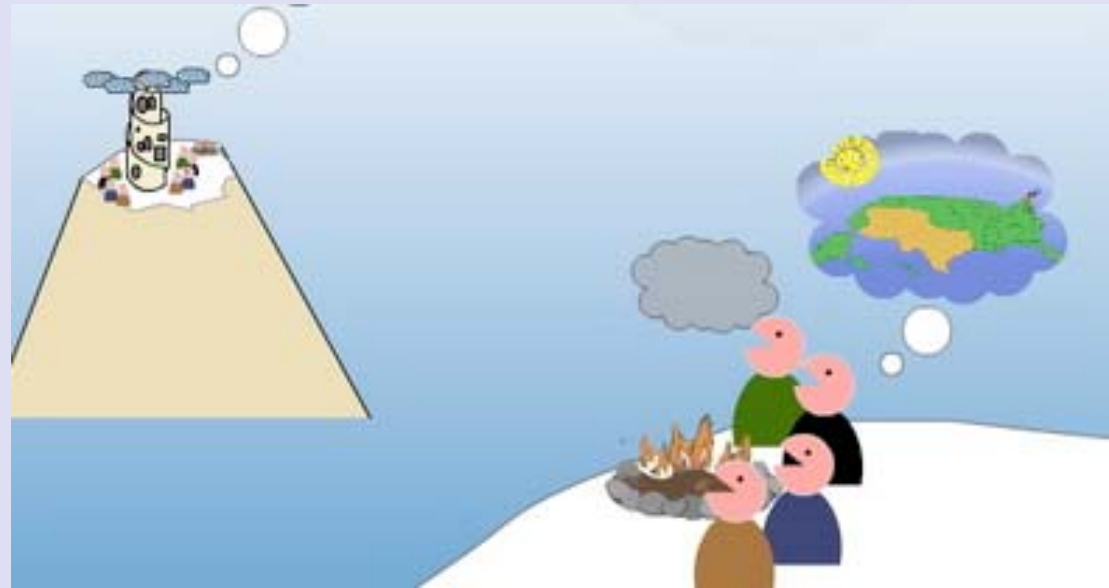


Is this what the public discourse is about?

In part – but only in relatively small part.

In fact, as I have already mentioned, there are three crucial aspects of the public discourse, and they are largely **disconnected**.

Understanding the nature of these disconnects is more important, I suspect, than understanding the science. However, we need to deal with the components first.

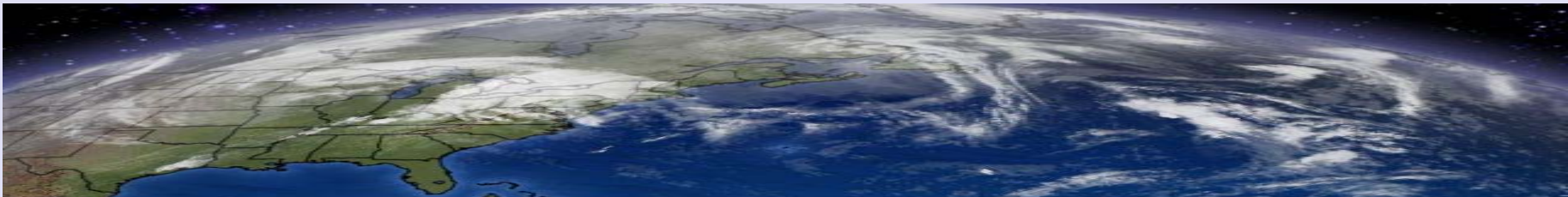


Aspect 1: Global warming itself

Global Warming is, itself, the product of many factors, and its relevance to anything else depends on its **magnitude**. Emissions of minor greenhouse gases is a factor, but only one factor (and probably not the most important) among several.

What are other factors?

The sun is commonly mentioned, but the fact of the matter is that ***the climate system does not need any external forcing to fluctuate on the scale that has been observed.*** The ocean, by constantly but irregularly exchanging heat between deeper and shallower regions is always out of equilibrium with the surface, thus serving as a large source or sink of energy for the atmosphere. In the literature, this variability goes by names like El Niño, the Pacific Decadal Oscillation, and the Atlantic Multi-Decadal Oscillation – all indicative of time scales on the order being considered.



Don't forget that climate is always changing – and on virtually all time scales.

Here is a recent paleoreconstruction for the past 2000 years.

Most presentations focus on the last 100 years or so (and show the modest warming that we are talking about), but in the context of the past 2000 years, the last 100 years do not appear exceptional.

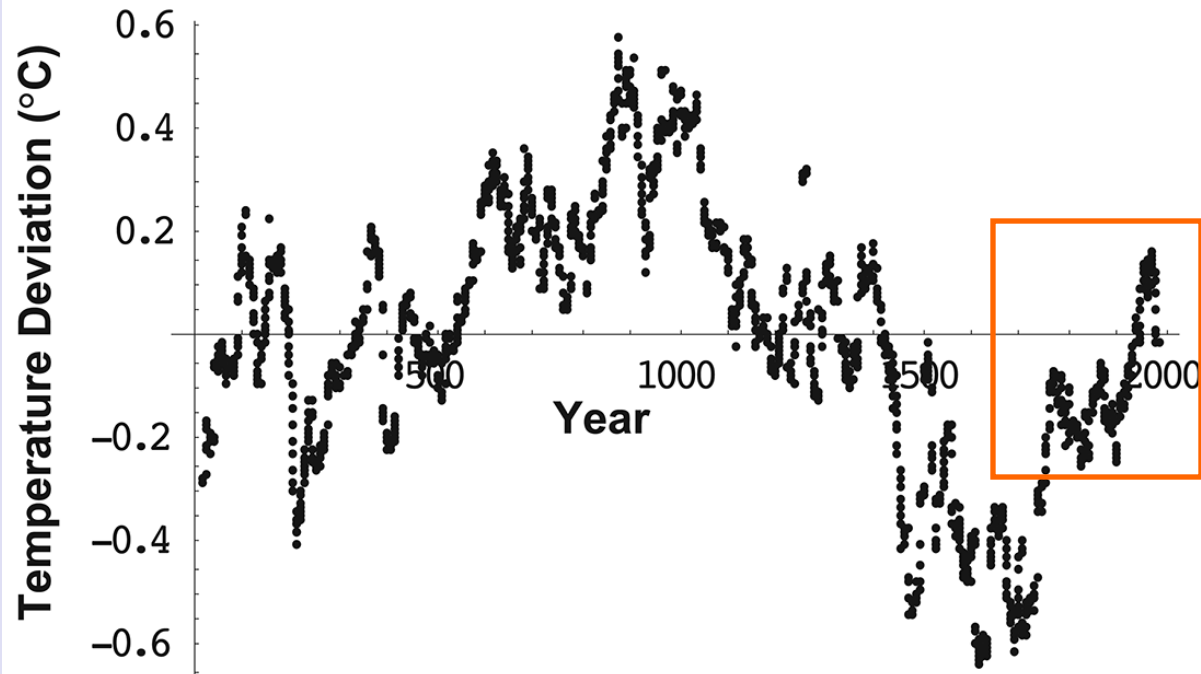
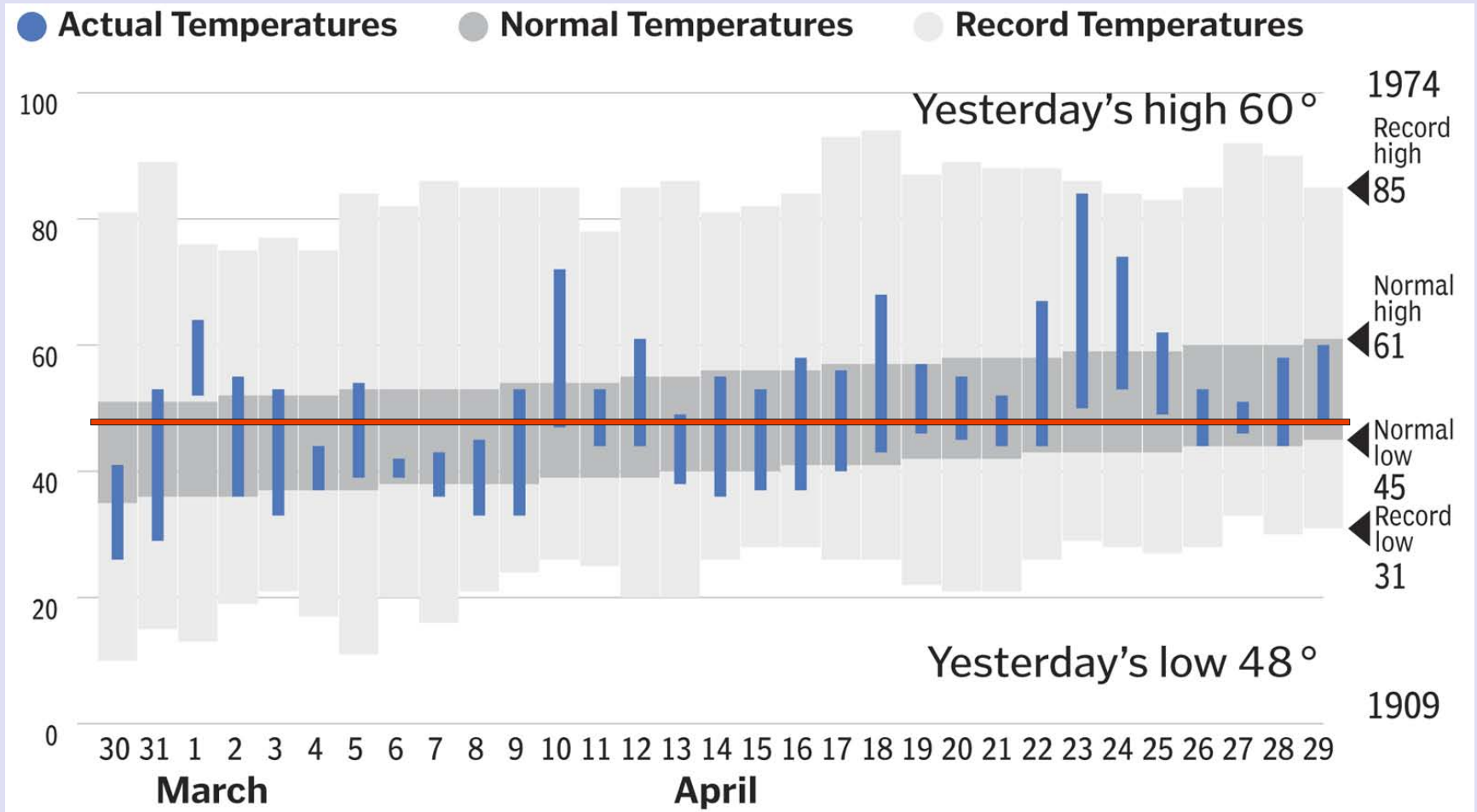


Figure 1. Mean of temperature data for 18 series.
Data archived at <http://www.ncasi.org/programs/areas/climate/LoehleE&E2007.csv>

Note that we are still talking about small changes: much smaller than the normal change in Boston from the beginning to the end of April, for example.

April 30, 2008



What is actually emphasized.

While Global Warming is sometimes what we hear about, what is usually stressed are 'catastrophic' or emotionally affecting alleged consequences of warming.

Geneva (Reuters) – Obesity contributes to global warming, too. May 15, 2008

ScienceDaily – Global Warming may lead to increase in kidney stones disease. May 15, 2008

AP- Earthquakes stronger due to global warming. June 18, 2008

NIA- Global warming could lead to increased terrorism. June 26, 2008.



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Explore, enjoy and protect the planet

We need your immediate help to save the endangered Polar Bear.

Dear Friend,

Naysayers declare that global warming is not real. And the big oil companies want you to believe that drilling in ecologically sensitive areas will not affect the wildlife that lives there.





PHOTO BY ERIKA LESLIE

LOSING LEMMINGS — Norway's lemming population is declining and it's not because the rodents are making a mad rush off a cliff. Climate change is the suspected cause, according to a study published online last week in *Nature*. Researchers presented evidence that unseasonable increases in temperature and humidity are altering snow conditions — reducing the insulated zone underneath the snow layer that provides small rodents with the essentials of survival: warmth, access to food plants, and protection from predators. Without that refuge, it is difficult for young lemmings to survive.

Aspect 2: Catastrophes

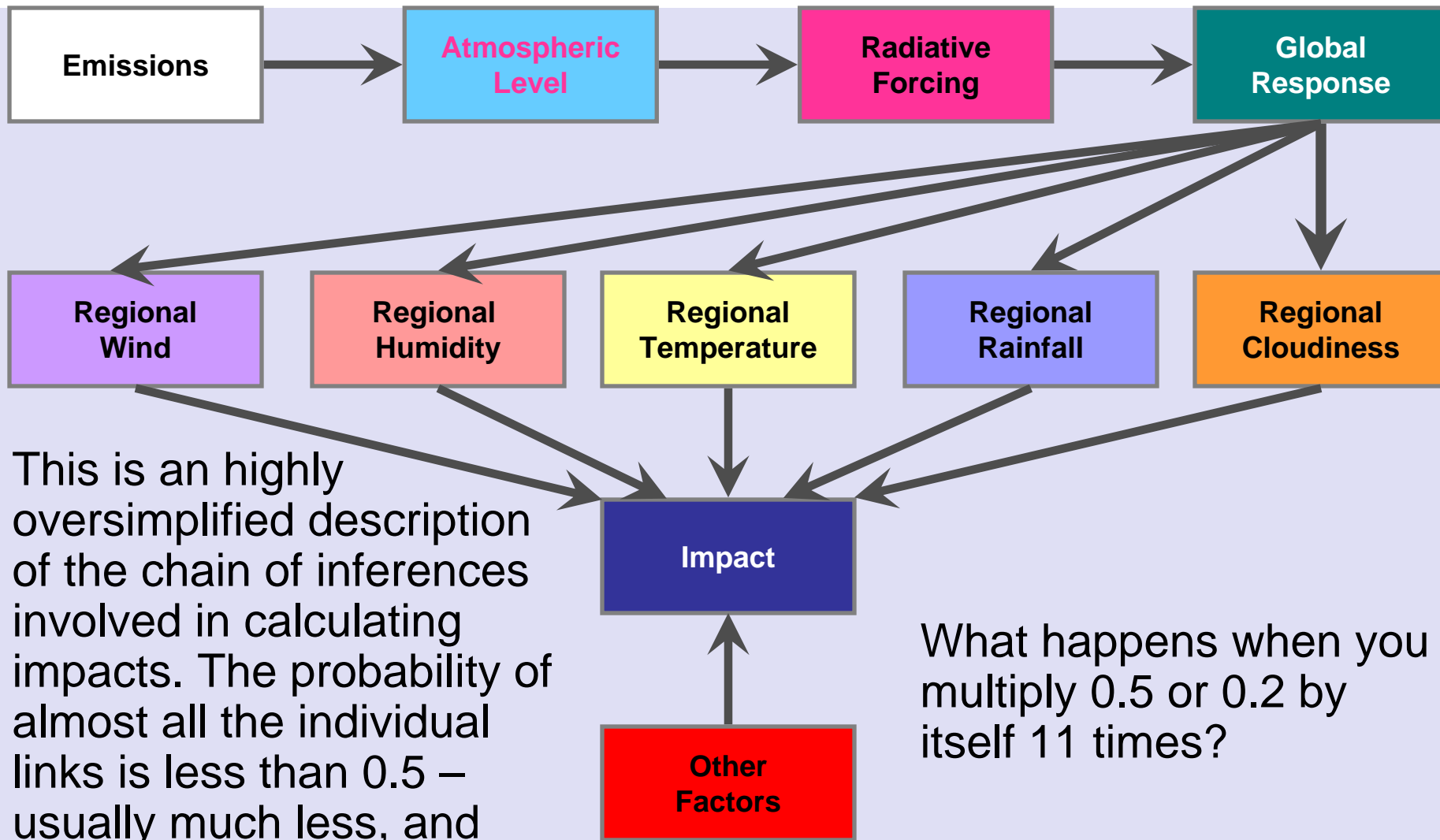
Putative catastrophes associated with global warming never result from global warming alone, but depend on the confluence of many factors almost all of which are essentially unpredictable.

The catastrophes emphasized in the environmental literature are selected on the basis of marketing research and focus groups – not climate science. Catastrophic forecasts are essentially always wrong (viz predictions of resource depletion, mass starvation, global cooling, Y2K, etc.).

Why is this so?



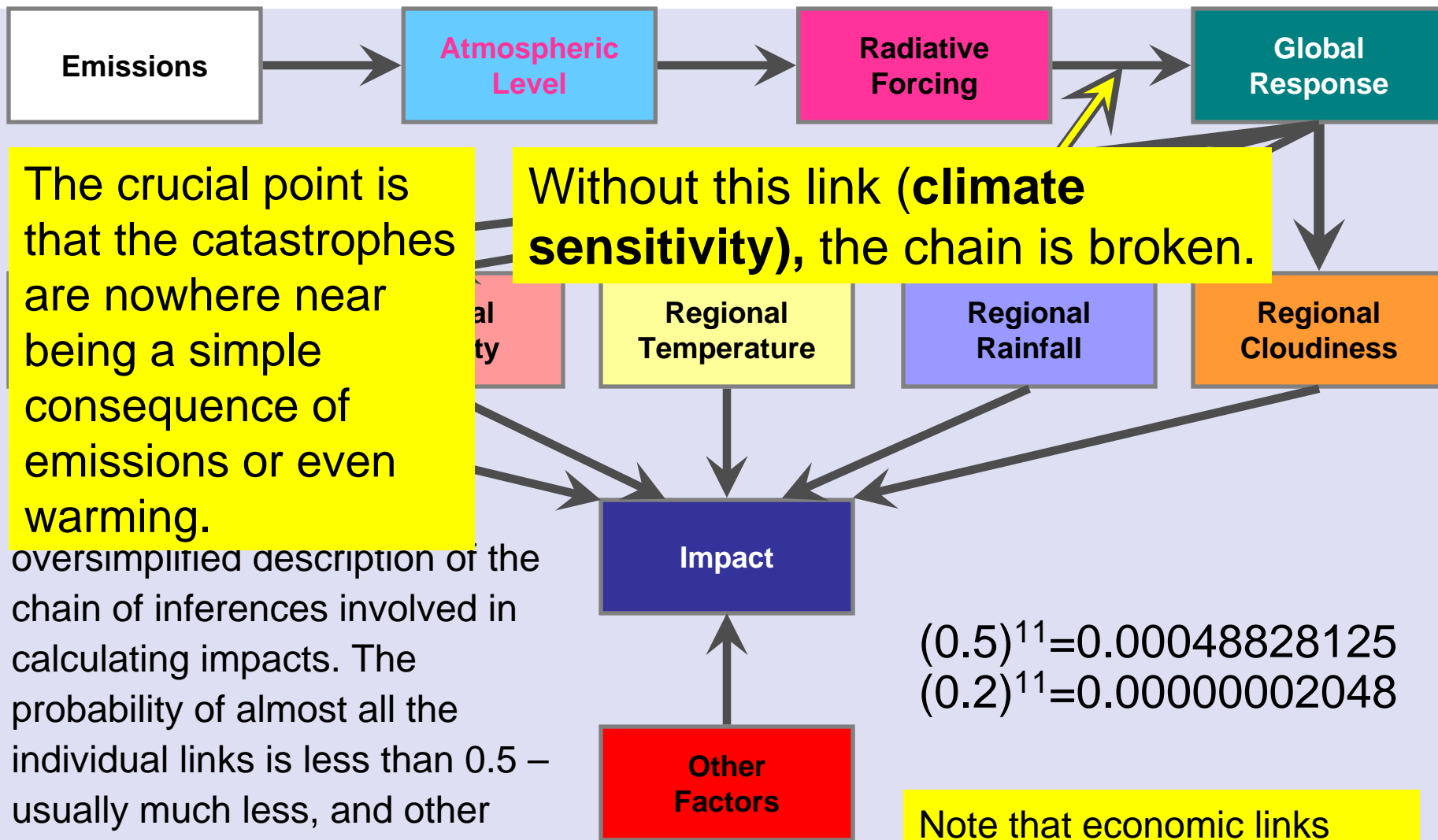
Impacts as a Chain of Inferences



This is an highly oversimplified description of the chain of inferences involved in calculating impacts. The probability of almost all the individual links is less than 0.5 – usually much less, and other factors can interfere with and confuse results.

What happens when you multiply 0.5 or 0.2 by itself 11 times?

Impacts as a Chain of Inferences



The crucial point is that the catastrophes are nowhere near being a simple consequence of emissions or even warming.

Without this link (**climate sensitivity**), the chain is broken.

oversimplified description of the chain of inferences involved in calculating impacts. The probability of almost all the individual links is less than 0.5 – usually much less, and other factors can interfere with and confuse results.

$$(0.5)^{11} = 0.00048828125$$

$$(0.2)^{11} = 0.00000002048$$

Note that economic links have not been included.

Model uncertainty does allow some model to predict anything.

Tim Palmer, a prominent atmospheric scientist at the European Centre for Medium Range Weather Forecasting, is quoted by Fred Pearce (Pearce, 2008) in the *New Scientist* as follows: "Politicians seem to think that the science is a done deal," says Tim Palmer. "I don't want to undermine the IPCC, but the forecasts, especially for regional climate change, are immensely uncertain." Pearce, however, continues "Palmer .. does not doubt that the Intergovernmental Panel on Climate Change (IPCC) has done a good job alerting the world to the problem of global climate change. But **he and his fellow climate scientists are acutely aware that the IPCC's predictions of how the global change will affect local climates are little more than guesswork.** They fear that if the IPCC's predictions turn out to be wrong, it will provoke a crisis in confidence that undermines the whole climate change debate. On top of this, some climate scientists believe that even the IPCC's global forecasts leave much to be desired. ..."

Catastrophic claims *never* involve a consensus among scientists.

Most scientists working on climate physics agree that storminess will decrease in a warmer world. Most scientists working on hurricanes agree that Katrina cannot be attributed to global warming.

Epidemiologists have noted that more lives will be saved from reduced cold than will be lost to increased warmth. Insect borne disease specialists note that diseases like malaria were once endemic to Siberia. Alpine glaciologists largely agree that the diminution of Kilimanjaro's glacier is not due to warming.

Indeed, even the environmental literature switches from claims of '**consensus**' to claims that '**scientists say**'. The difference is important but largely missed by most outsiders. In fact the scientists who say such things amount to no more than a handful, and even they usually qualify their statements.

Aspect 3: Mitigation Policies

Almost all suggested ‘mitigation’ policies are essentially irrelevant to climate or practically and morally impossible.

Kyoto – even if perfectly adhered to – delays whatever warming might be expected by 2100, by a year or two.

No currently known energy source can replace fossil fuels. The only approach to reductions of emissions by 80% would be reduction of energy use world wide to pre-industrial levels. Nuclear provides a partial out as might currently unknown approaches.

Current approaches like biofuels, cap and trade, and carbon offsets may already be leading to hunger, societal instability, and corruption – without reducing emissions at all.



Night time satellite image of the Korean Peninsula



South Korea has about the same per capita emissions as the UK; North Korea's are about 80% less. Is this what we want?

Climate change 'mitigation' and the developing world

It has long been recognized that reducing carbon dioxide would ultimately prevent the developing world from achieving its legitimate goals.

To avoid this in the first instance, developing countries were excused from the Kyoto constraints.

Nevertheless, the developing world remains sensitive to the dangers of western climate policy, and cynical of its real purposes.

Thus, Rajendra Pachauri simultaneously endorsed a climate report for the Government of India that argues that climate change will not be a problem for India, while, as head of the IPCC, he preaches that climate change will bring doom and disaster to the rest of the world, and urges the west to become vegetarian. Somehow, the cynicism seems remarkably clear to many – even if the Nobel Peace Prize Committee fails to notice it.

Combining these three independently complex and uncertain aspects – aspects in large measure unrelated to each other – into a single Climate Question – and claiming the agreement of all scientists on the matter, is clearly absurd. Equally absurd is the claim that this science is settled.

Whether claims that are so obviously absurd can be considered to be dishonest is a matter of judgment that I leave to you. It is not always an easy call.



Misuse of language is central to the public discourse

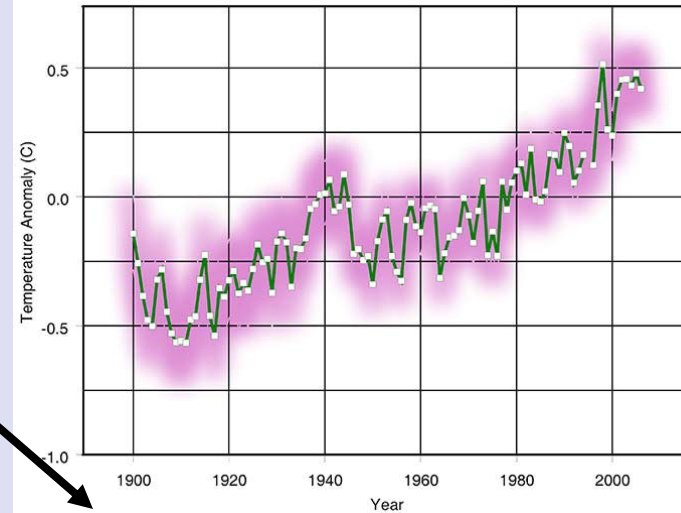
For example, we are currently in a warm period, but there has been no warming trend for over **ten years**. Normal year to year fluctuations in temperature do cause some of the years to be among the warmest in the record, but this has nothing to do with trends.

Keep this in mind the next time you hear someone respond to the fact that there has been no trend over the past ten years with the assertion that x of the last y warmest years occurred since 1996.

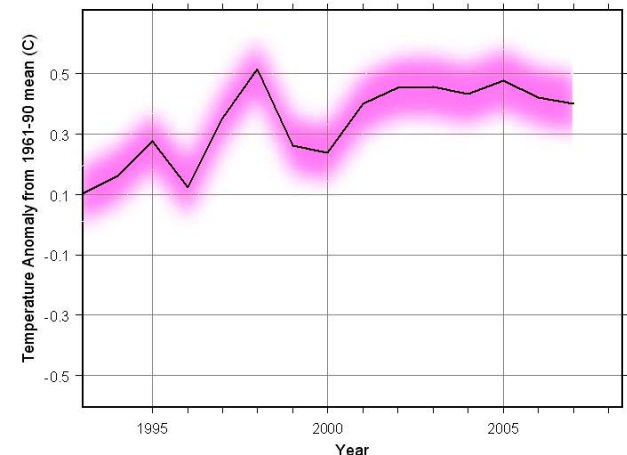
I suspect that this cessation of warming may also be responsible for the tsunami of hysterical climate propaganda of the past 3 years. The issue has been prominent for almost a generation, during which time many agendas have developed. There may be a fear that these agendas must be achieved now or never.

Global Mean Temperature Anomaly (UK Met. Office)
1900-2006

Uncertainty bounds estimated by UK Met. Office shown in purple



Annual Global Mean Surface Temperature Anomalies

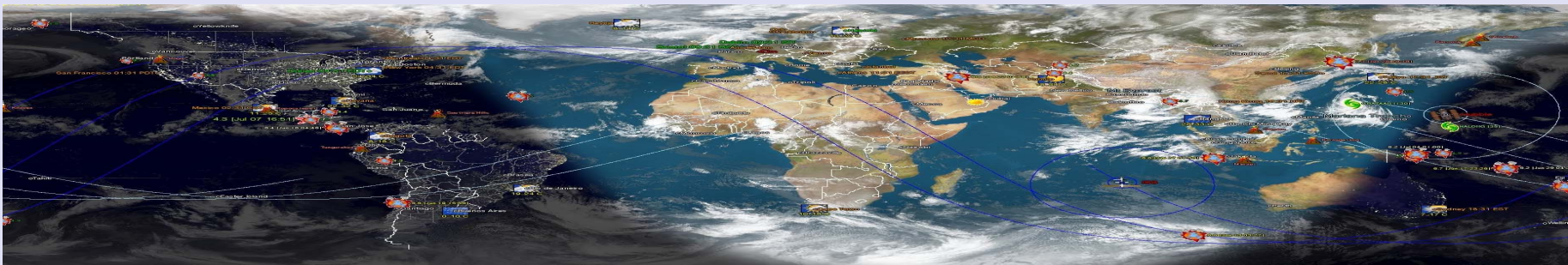


Another example of semantic confusion.

Similarly, it is often claimed that we are now warmer than we have been for the past thousand years. Though the claim is almost certainly false, even if it were true, it would not alter the fact that current warming is small (indeed much smaller than the models that are used to project alarm say it should be).

Important points to note:

1. It is not the amount of CO₂ that is important, but the contribution of all anthropogenic greenhouse gases to greenhouse forcing. We are already at about 80% of the forcing that would be produced by a doubling of CO₂.
2. There is a pronounced diminishing return for added CO₂. Each addition produces less forcing than its predecessor.
3. There is no physical evidence for a threshold in such a system.



Deconstructing the scientific consensus.

In support of the assertion of consensus, it is claimed that almost all scientists agree that the earth is warming and that man's activity causes warming.

If these two items are carefully separated, they do describe what is agreed on:

1. There has probably been warming on the order of 0.5-0.8C over the past century.
2. CO₂ is a minor greenhouse gas, whose increase should lead to some warming.

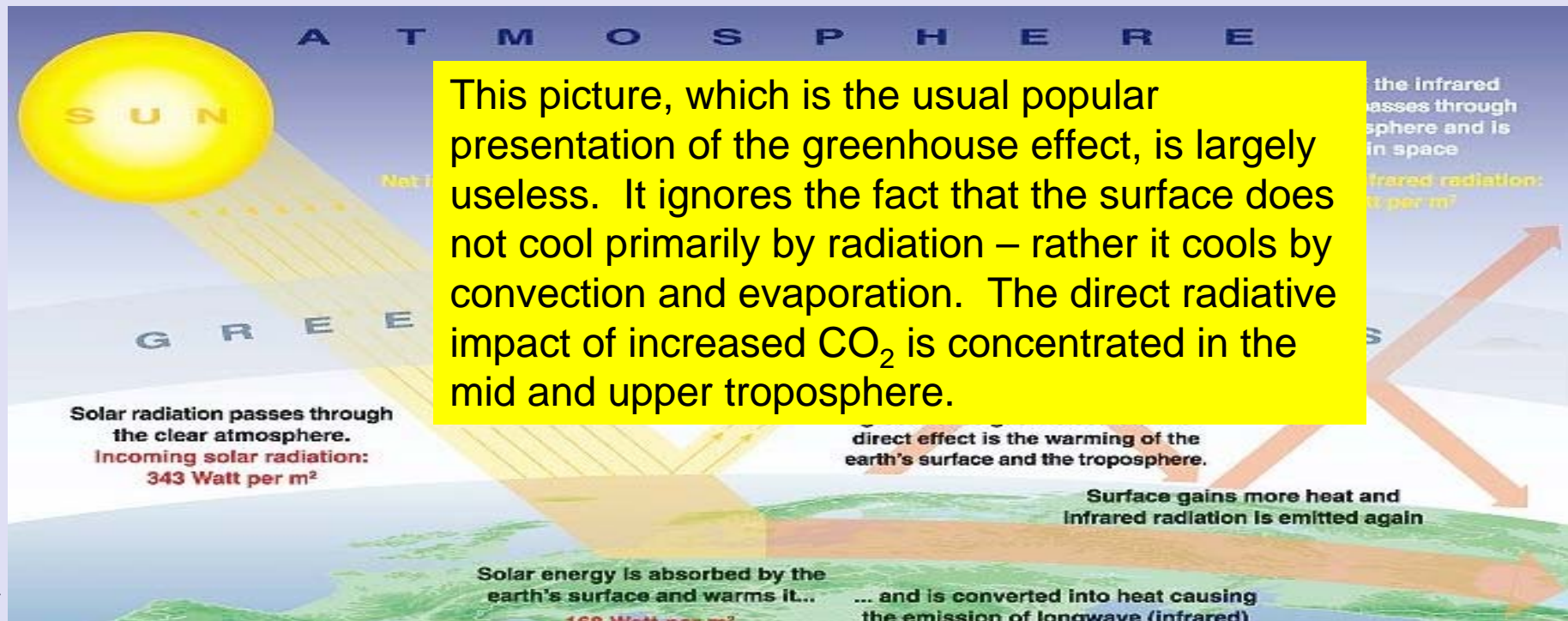
This agreement says nothing about

1. Whether items 1 and 2 are significantly related,
2. Whether the points of agreement have any relation to catastrophic expectations.

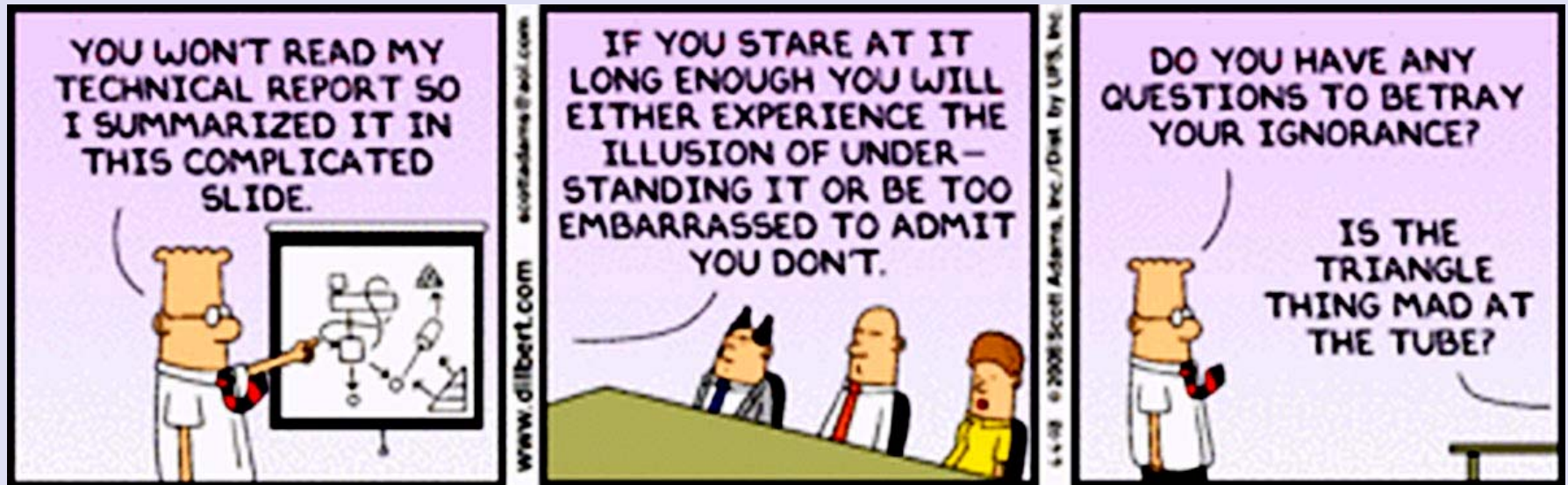
Some science.

For those of you interested in the science, here is an attempt to actually determine **the contribution of greenhouse warming** to the temperature record.

One begins with the model expectation for the pattern of warming, and then compares this with observations.



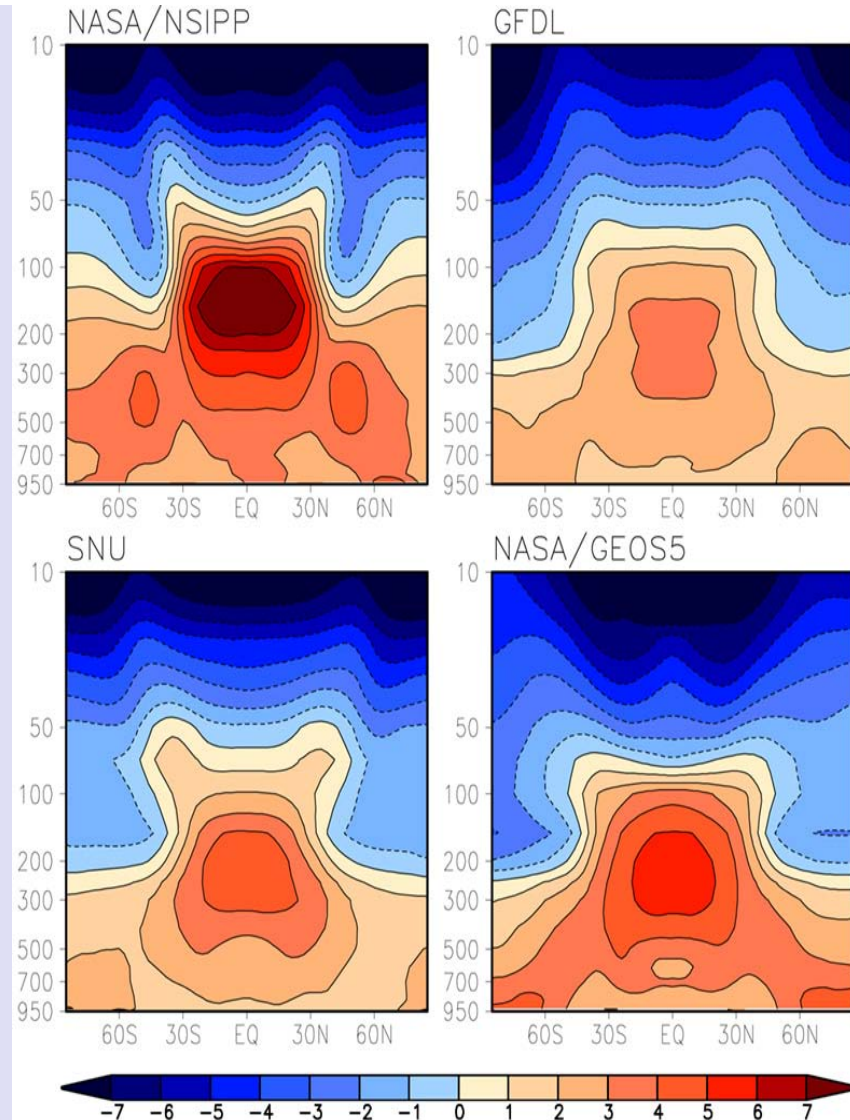
Possible purpose of previous diagram.



What models show.

Here are very recent results for four state of the art models subject to a doubling of CO_2 (Lee et al 2007). Despite differences between the models, all show that warming is strongly concentrated in the tropical troposphere rather than at the surface. This is, in fact, **the real fingerprint of greenhouse warming**.

Although each model has a different sensitivity, **they all show about 2.5 times as much warming at the characteristic emission level than at the surface.** This is far more robust than the oft claimed polar magnification.



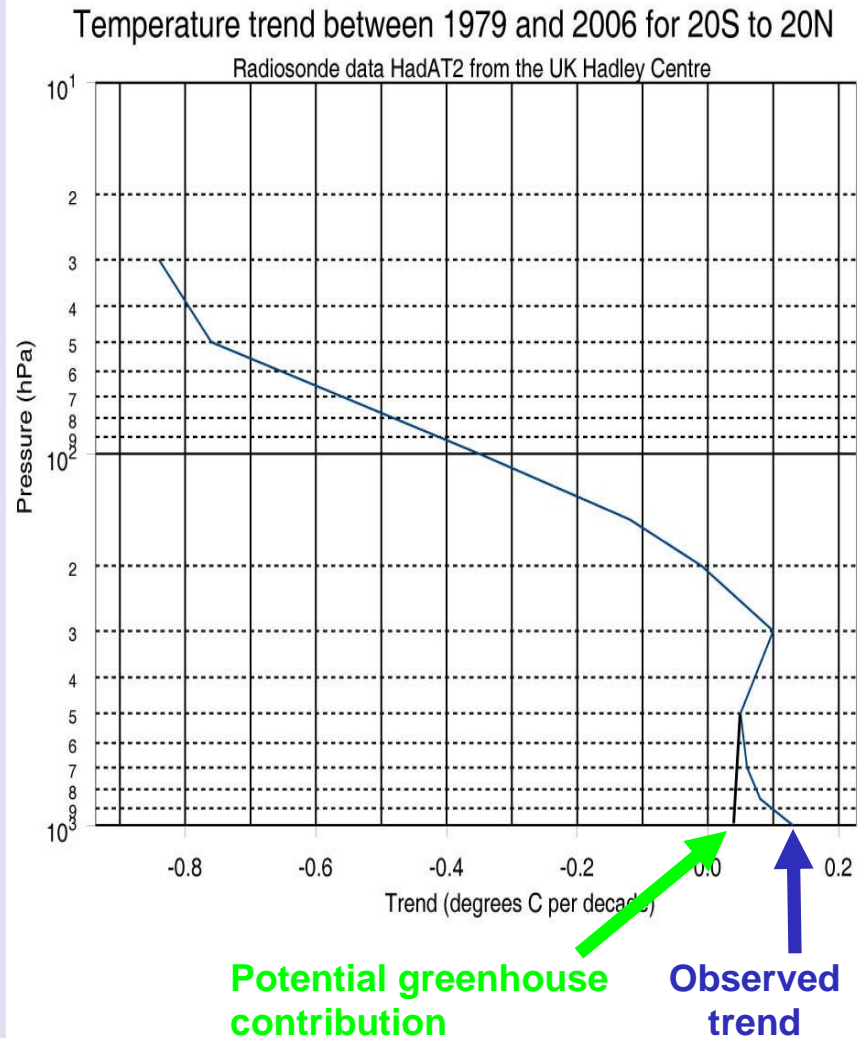
Zonal mean distributions of temperature change ($2\times\text{CO}_2$ -Control). Units are Kelvin.

What does the data show?

Here are the measured trends from balloon data analyzed by the Hadley Centre in the U.K. We do see a local maximum near the characteristic emission level (of about 0.1C/decade, but the trend at the surface is larger (about 0.13C/decade) rather than smaller.

The correct theory tells us that no more than about a third of the surface warming can be greenhouse warming.

Note that this provides a bound for climate sensitivity: namely, about 0.4C for a doubling of CO₂. This is much below the bottom of the IPCC guesstimates.



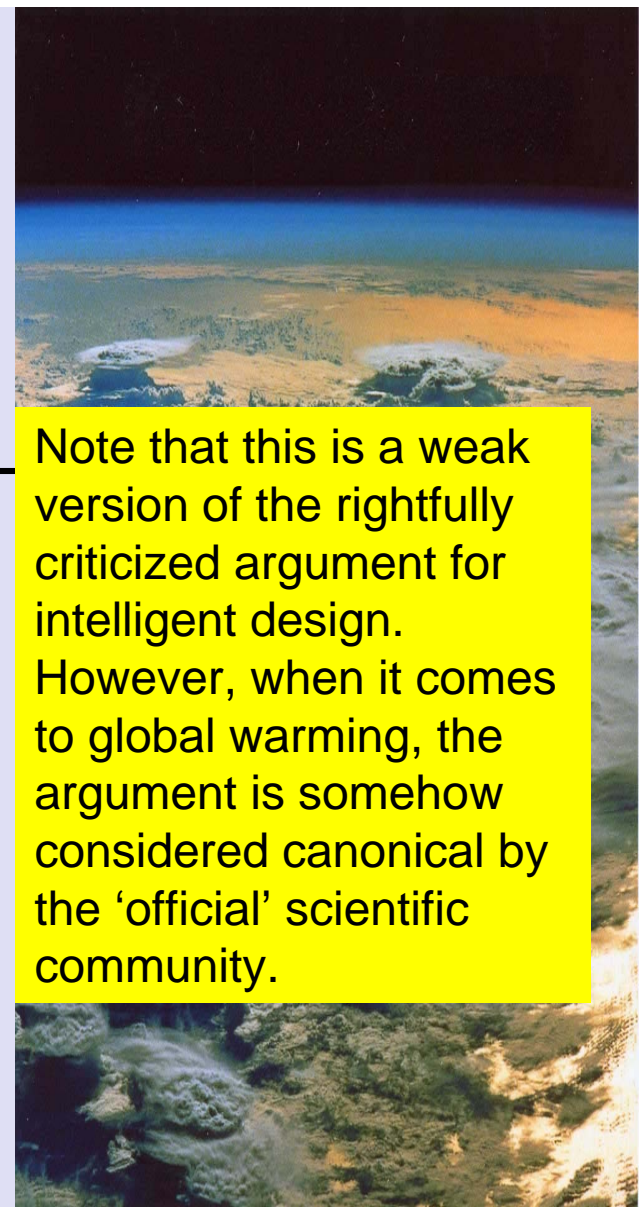
How did the IPCC justify its contrasting claims?

The IPCC claim that man is responsible for most (ie more than 50%) of recent warming is not so different from our finding of about 30%, but the IPCC justification is logically far more questionable.

The basis for the claim is, ultimately, that modelers cannot think of any other cause for the surface temperature rise of the past 50 years. ←

Moreover, the IPCC WG1 report acknowledges this – though the press release does not. Further, the change has been small, and the IPCC claims that it is merely probable that most (51%) is due to man.

To put it simply, consensus is invoked because arguments are unavailable.



Note that this is a weak version of the rightfully criticized argument for intelligent design.

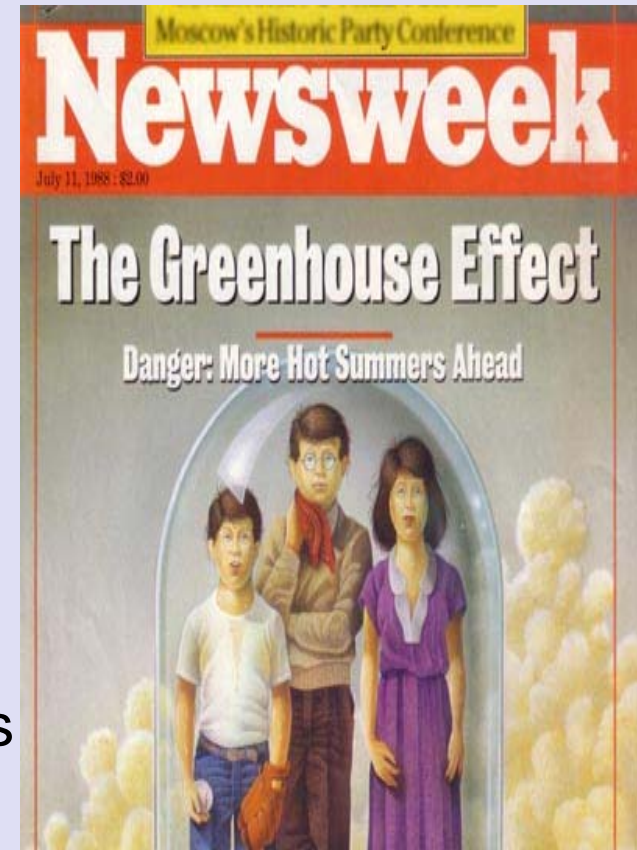
However, when it comes to global warming, the argument is somehow considered canonical by the 'official' scientific community.

Societal observations (I)

Consensus in climate always refers to the agreement over relatively simple items that are completely consistent with the absence of any alarm.

However, claims of consensus are powerful tools for propaganda:

First, laymen who have neither the background nor the time to probe deeply into the issue, are comforted by the thought that all scientists agree so that there is no need for them to try to understand the issue themselves. For example, in 1988, *Newsweek* already reported that all scientists agreed that catastrophic climate change due to man was coming soon.



Moreover, the commonly claimed consensus is NOT the IPCC claim!

What is usually claimed by the media, politicians, etc. is

It is warming, the warming is due to man's emissions, the consequences will be catastrophic, and the science is settled.

Once consensus is accepted as a criterion, consensus is claimed for anything and everything.

Societal observations (II)

Second, the instinctive drive to conform encourages people to believe what they believe others believe.

Schopenhauer: ***There is no opinion, however absurd, which men will not readily embrace as soon as they can be brought to the conviction that it is generally adopted.***

Einstein: ***Few people are capable of expressing with equanimity opinions that differ from the prejudices of their social environment. Most people are even incapable of forming such opinions.***



Societal observations (III)

The use of climate to frighten people is hardly new: The Bible does so, and the *New York Times* has issued such warmings at least a half dozen times over the past century.

However, it is crucial to understand that there is no consensus for such alarm, and indeed the science often points in the opposite direction. Current climate hysteria simply represents the scientific illiteracy of much of the educated public (interestingly, most polls in the US and UK show that working people remain largely unconcerned), the susceptibility of the public to the substitution of repetition for truth, and the exploitation of these weaknesses by politicians, environmental promoters, and, after 20 years of media exploitation, many others as well. **The dangers of some of their agendas are likely to be far greater than the dangers of man-made climate change.**



Remember the following sage observation:

Politics is the art of looking for trouble, finding it whether it exists or not, diagnosing it incorrectly, and applying the wrong remedy.

--Sir Ernest John Pickstone Benn

We appear to be well on our way to providing Sir Ernest with another example.

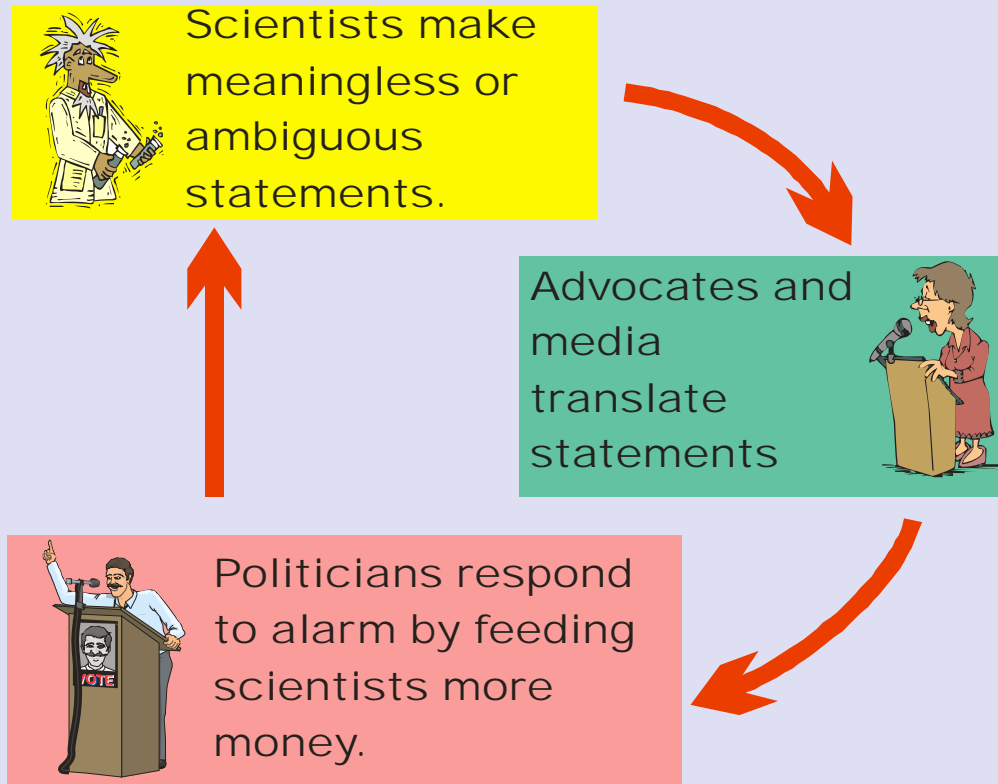
Industry, for its part, takes a simpler view:



"All we want is to be loved while making obscene profits."

And what about science?

The benign view is given by the following cartoon:



The situation depicted demands no conspiracy (and is particularly appropriate to a world where fear forms a primary basis for support of science).

Unfortunately, however, there has been an organized campaign that borders on conspiracy.

The environmental movement has essentially taken over a large number of scientific professional societies and major laboratories.

National Center for Atmospheric Research in Boulder, Colorado: John Firor, long time administrative director, was chairman of the board of Environmental Defense

UK Met Office: Chairman, Robert Napier, was also Chief Executive of WWF-UK.

Potsdam Institute: Bill Hare, Campaign Director of Greenpeace speaks as a scientist for the main German climate center.

National Academy of Sciences: For about 20 years there was a 'Temporary Nominating Group for the Global Environment to provide a back door for the election of environmental activists; the current president of the NAS, Ralph Cicerone, was elected through this channel.

John Holdren, President Obama's choice for Science Advisor, whose primary affiliation is with the Woods Hole Research Center (an environmental advocacy group as opposed to the Woods Hole Oceanographic Institution), has also served as President of the American Association for the Advancement of Science, a board member of the MacArthur Foundation, Professor in Harvard's Kennedy School of Government and in many other positions as well.

Etc., etc.

Data is now called upon to endorse models with little or no predictive skill.

Original observations for the Eocene (about 50 million years ago) showed cooler tropics and much warmer poles. Attempted greenhouse simulations produced warmer tropics and high latitudes. 'Observed' tropical temperatures have been steadily raised.

Original observations for the Last Glacial Maximum (18,000 years ago) showed tropics at about today's temperature with much colder high latitudes. Model simulations based on reduced greenhouse gases showed both tropics and high latitudes as being colder. Data was reinterpreted to show colder tropics (though the more extreme reinterpretations seem to have been rejected).

Models fail to replicate Medieval Warm Period. New 'analysis' approach gets rid of Medieval Warm Period (and produces infamous hockey stick temperature record).

Revised estimates of aerosols spoil model simulations of mid-twentieth century cooling. Data 'revised' to get rid of mid-century cooling.

Incidentally, the midcentury cooling was taken quite seriously at the time.



More 'corrections'

We previously noted that upper tropospheric warming in the tropics was too small for greenhouse attribution of surface warming. New analyses have 'corrected' the temperature to show upper tropospheric warming.

A long term problem in climate science is the Early Faint Sun Paradox: namely, according to the well established standard model of the sun, solar radiation was about 30% less 2.5 billion years ago, but geological evidence shows that oceans were unfrozen. There has been a 30 year effort to find a greenhouse solution to this paradox. The effort has proven unsuccessful. Now attempts are being made to get rid of the standard model for the sun so as to get rid of the paradox.

A very recent example, featured in *Nature*, involves matching incompatible data in order to 'show' that the west antarctic ice sheet is rapidly warming.

Etc. etc.

Geophysical data are uncertain, and corrections inevitably occur, but that all errors are such that their correction brings them closer to otherwise unsuccessful model results is statistically almost impossible.

Results contrary to models can be published with difficulty, but only if the criticism is muted.

Gerard Roe showed that the earth's orbital variations beautifully accounted for the ice age cycles, but he included an irrelevant caveat that his work did not rule out a role for greenhouse forcing.

Choi and Ho found that the radiative properties of upper level cirrus clouds were those called for in the Iris Effect (a proposed negative feedback), but were required to leave out a crucial part of their analysis, and were required to omit reference to the Iris Effect.

Horvath and Soden found that cirrus clouds responded to surface temperature in the manner required by the Iris Effect, but included an irrelevant caveat that claims existed that the Iris Effect was wrong.

Su et al found corroborating support for the Iris Effect in recent satellite data, but omitted this in the final version of the paper.

American Scientist (the monthly periodical of Sigma Xi), refused to publish the analysis of the upper level tropical warming shown earlier unless the paper included a claim that the analysis was probably wrong.

Etc. etc.

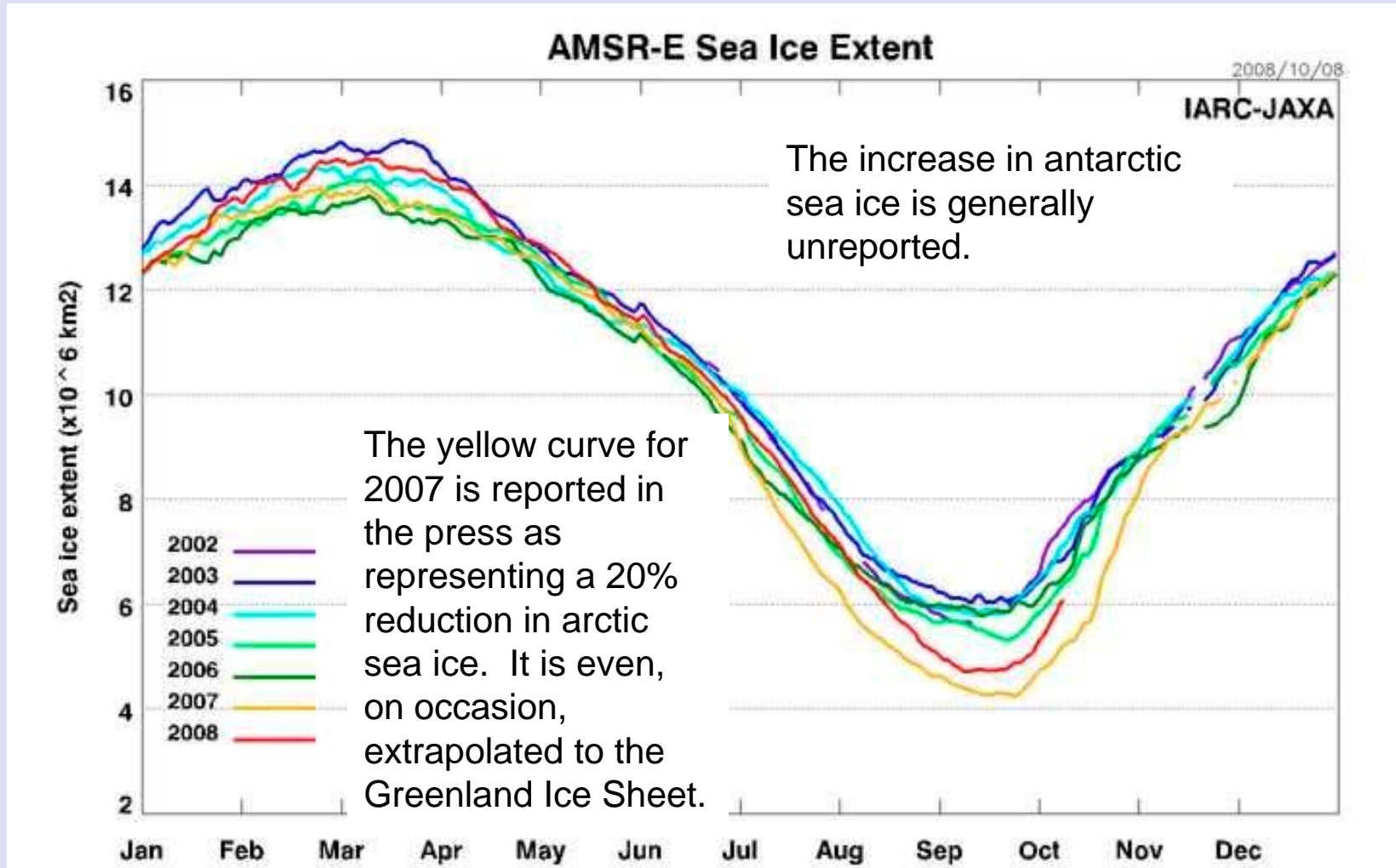
Obvious fantasy is treated with apparent seriousness

Examples:

1. Thriving polar bears, whose population is about 4 times greater than it was 50 years ago, are declared to be endangered because some climate models suggest that they will be stressed in the future.
2. Global mean temperatures are claimed to be rising at an unprecedented rate, despite the fact that they have not changed in over a decade, because climate models say that they should have been rising.
3. A recent paper claims that the discovery of a fossil of a large snake in a Columbian coal mine proves that tropical temperatures could have risen without constraint during the Eocene – ignoring the existence of hot spots in present climate.

There appears to be a total divorce from reality.

Normal variability is treated as evidence of disaster.



What is to be done? (with apologies to Lenin)

Science has been compromised if not corrupted. For the moment, institutional science is part of the problem rather than part of the solution.

Science, itself, however, remains crucial.

Serious 'stakeholders' must devote effort to independently understand the science or at least recognize the frequent departure from logic (which shouldn't be a matter of opinion). This will make it clear that institutional science cannot, at present, provide any basis for policy decisions. Such stakeholders are, in my opinion, the ultimate defense against the current hysteria that is leading to irrational and detrimental policies.

Be especially sensitive to the common tactic of responding to questions about science and/or logic with assertions of authority.

Maimonides understood this long ago.

“If anybody tells you in order to support his opinion that he is in possession of proof and evidence and that he saw the thing with his own eyes, you have to doubt him, even if he is an authority accepted by great men, even if he is himself honest and virtuous. Inquire well into what he wants to prove to you. Do not allow your senses to be confused by his research and innovations. Think well, search, examine, and try to understand the ways of nature which he claims to know. Do not allow yourself to be influenced by the sayings that something is obvious, whether a single man is saying so or whether it is a common opinion, for the desire of power leads men to shameful things, particularly in the case of divided opinions.”

--Moses Maimonides (1135 - 1204), *Medical Aphorisms*

It is hard to be optimistic on this count, but quite a lot depends on it.