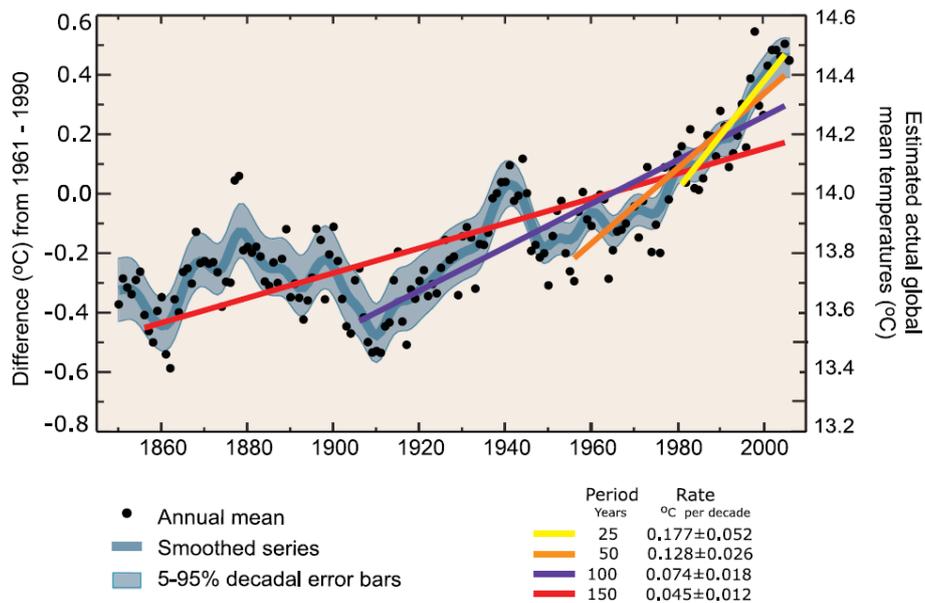


Professor Boston's fraudulent graph

Professor Jonathan Boston gave a PowerPoint presentation on climate change in 2008. The presentation is on the website of the University of Wellington. One of the graphs in the presentation appeared twice in the contribution of Working Group I to the IPCC's *Fourth Assessment Report*, published in 2007, from which Professor Boston appears to have lifted it. The graph is fraudulent. Yet the IPCC relied upon it to draw one of its principal conclusions. Professor Boston either knows the graph to be defective, in which event he furthers the fraud, or has used the graph without sufficient knowledge of elementary statistics and logic to be aware that the graph was defective, in which event he was reckless whether the graph was fraudulent. Either way, he commits a serious offence by circulating the fraudulent graph.

The fraud lies in a graph of the HadCRUt global temperature anomalies from 1850-2005, which appears twice in the *Fourth Assessment Report* and purports to show, but does not show, that the rate of global warming has been accelerating and that the accelerated global warming is anthropogenic.



The caption (in part) reads as follows:

“... Annual global mean observed temperatures from the HadCRUt3 dataset (black dots) along with simple fits to the data. The left hand axis shows anomalies relative to the 1961 to 1990 average and the right hand axis shows the estimated actual temperature (°C). Linear trend fits to the last 25 (yellow), 50 (orange), 100 (purple) and 150 years (red) are shown, and correspond to 1981-2005, 1956-2005, 1906-2005, and 1856-2005, respectively. Note that for shorter recent periods, the slope is greater, indicating accelerated warming. The blue curve is a smoothed depiction to capture the decadal variations. To give an idea of whether the fluctuations are meaningful, decadal 5% to 95% (light blue) error ranges about that line are given (accordingly, annual values do exceed those limits). Results from climate models driven by estimated radiative forcings for the 20th century (Chapter 9) suggest that there was little change prior to about 1915, and that a substantial fraction of the early 20th-century change was contributed by naturally occurring influences including solar radiation changes, volcanism and natural variability. From about 1940 to 1970 the increasing industrialisation following World War II increased pollution in the Northern Hemisphere, contributing to cooling, and increases in carbon dioxide and other greenhouse gases dominate the observed warming after the mid-1970s ...”

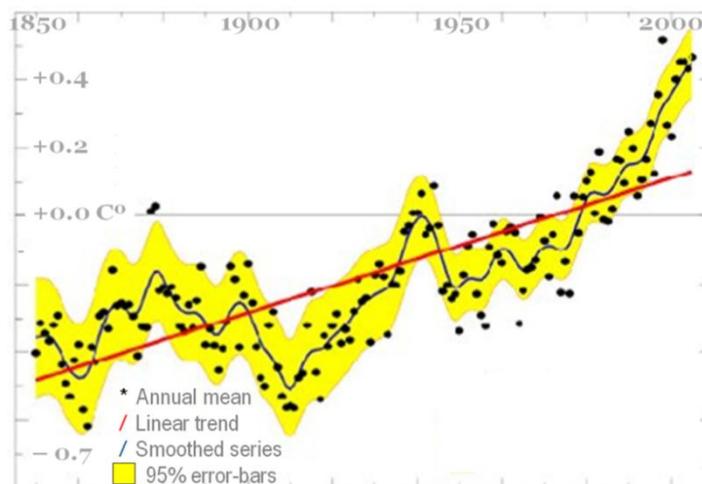
The text accompanying the defective graph says, *inter alia* –

“An increasing rate of warming has taken place over the last 25 years ...”

The graph also appears in the *Technical Summary*, where the accompanying text says, *inter alia* –

“The rate of warming averaged over the last 50 years ($0.13^{\circ}\text{C} \pm 0.03^{\circ}\text{C}$ per decade) is nearly twice that for the last 100 years.”

The graph as submitted to the IPCC Secretariat in the scientists' final draft of the *Fourth Assessment Report* is below (axial and other notations are mine). It is unobjectionable. But it was tampered with before publication.



My note of a lecture by Dr. Rajendra Pachauri, the IPCC's climate-science chairman, at the University of New South Wales in 2008 indicates that he displayed the offending graph, explained that it showed "surface temperature going back to the beginning of industrialization", and commented as follows –

"... In recent years this graph has become much steeper. If you draw a line through the last 100 years, the slope is a 0.74 C° line. But if you look at the last 50 years, [it is] almost twice as steep as the total 100-year period. So it would be appropriate to conclude that we are now at a stage where **warming is taking place much faster** ... So I'd like to emphasize the fact that we are at a stage where warming is taking place at a much faster rate, and clearly if we don't bring about some changes we'd have **much faster changes in future.**"

Dr. Pachauri's citation of and commentary upon the graph indicate that it is at the very heart of the IPCC's central message that we are to blame for "accelerated" warming. By implication, Dr. Pachauri attributes the acceleration to us when he says there will be "much faster changes in future" unless we act.

This particular message of the IPCC has been widely reproduced in the news media and, in particular, in the science journals. For instance, the December 2007 edition of *Physics Today* displays this diagram, and only this diagram, when praising Al Gore and the IPCC for winning the Nobel Peace Prize.

The defective graph has also been relied upon by agencies of government, such as the US Environmental Protection Agency, which displays it prominently in the *Technical Support Document* accompanying its December 2009 finding, carefully timed to coincide with the Copenhagen climate conference, that CO₂ and five other classes of greenhouse gas are an "endangerment" to human health.

The EPA continued to rely upon the graph even after having received the following plainly-worded warning from the South-Eastern Legal Foundation, acting on behalf of clients –

"The graph, like most others in your documentation, was lifted from a document of the IPCC – its 2007 assessment report. The graph purports to demonstrate, but does not in reality demonstrate, that the rate of "global warming" is itself increasing. No reasonable agency of government, acting responsibly and with due scientific competence and impartiality, would have unquestioningly reproduced such a graph. No competent and genuinely independent peer-reviewer would have sanctioned the use of this graph. However, not one of the 11 'Federal expert reviewers' whom you chose informed you that this graph was an instance of a well-known statistical fallacy. One of the 'expert' reviewers was the lead author of the IPCC document in which the defective graph first appeared.

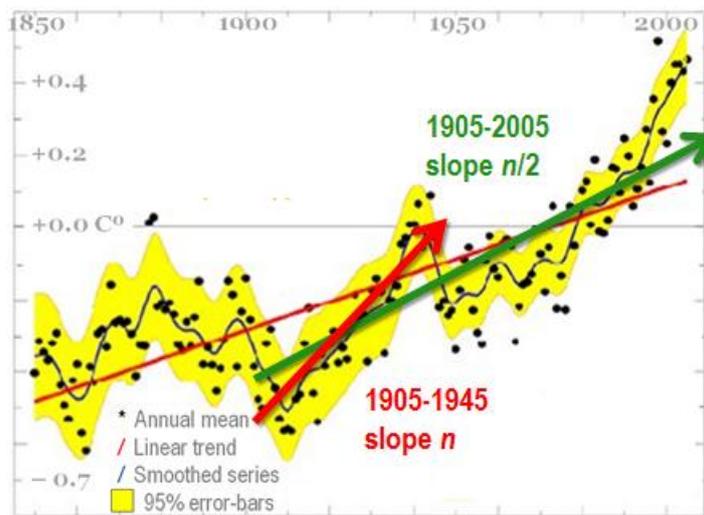
"It is instances such as this that underline the lack of wisdom of your repetition of the defective and highly-politicized analyses issued by the IPCC, and of your failure to ensure that genuinely independent scientific reviewers were invited to scrutinize your documentation to prevent you from merely repeating bad scientific errors such as that which the IPCC's bogus graph represents."

As the EPA's *Technical Support Document* itself admits (though it then ignores its own admission) –

"Trends may be sensitive to changes of start date in a time series ..."

On any curve of a time-series representing stochastic data (from the Greek *στόχος*, “a guess”, for stochastic data are inherently unpredictable), an artful choice of endpoints for a set including more than one least-squares linear-regression trend permits fabrication, at will, of a spurious apparent acceleration or deceleration in the trend.

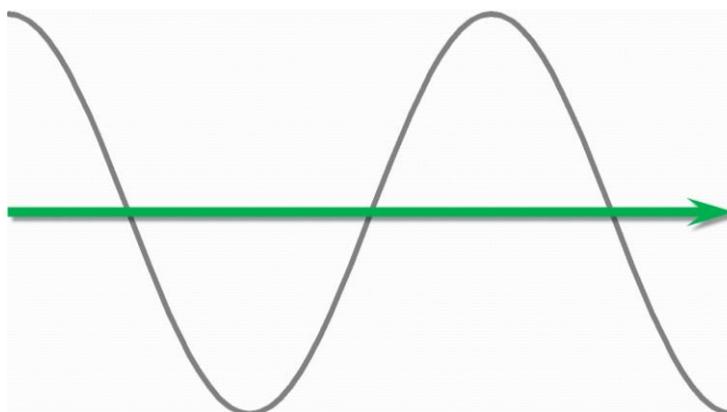
It will now be shown, using the same IPCC technique on the same data but carefully selecting different endpoints, that it is possible to generate opposite results, demonstrating the technique to be defective:



In the above diagram, the slope of the IPCC’s trend-line for 1905-2005 (here shown as an arrowed green line) is half the slope of the trend-line for 1905-1945.

It would be as inappropriate to draw from the carefully-chosen trend-lines on the above graph the conclusion that the rate of global warming has decelerated as it was for the IPCC to draw from its artfully-chosen trend-lines the opposite conclusion that the rate of global warming is accelerating. The example is given to illustrate the falsity of the IPCC’s technique.

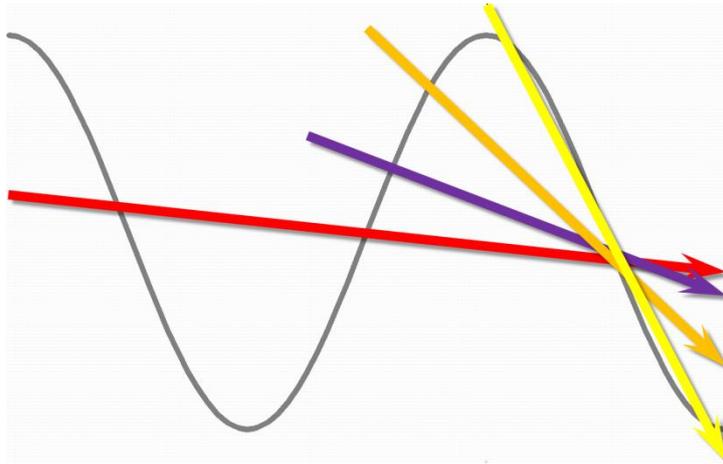
By way of a heuristic to demonstrate why the technique used by the IPCC is an abuse of statistical method, consider a sine-wave, propagated horizontally from left to right *ad infinitum*. A segment of the wave is shown here. The slope of the curve is by definition zero –



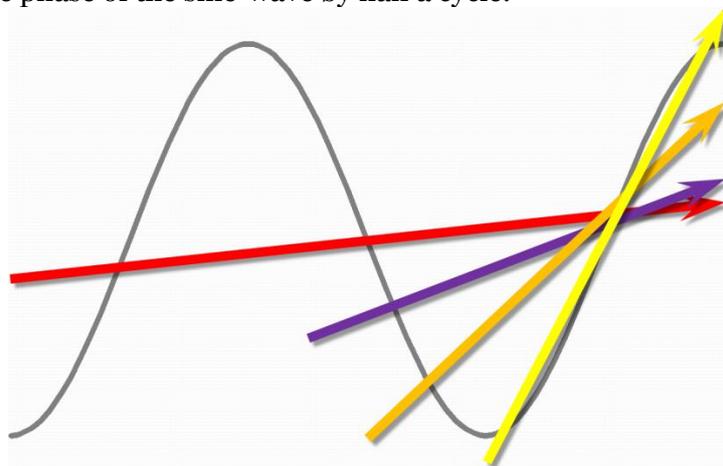
Or is it zero? We take a short segment of the sine-wave terminating at a local minimum (at right, above), and calculate four overlapping least-squares linear-regression trends on the data in that segment, each terminating at that rightward minimum.

The first trend-line in the graph below covers the whole segment that is displayed, but the starting-points of the three remaining trend-lines are carefully chosen, starting successively closer to the endpoint of the displayed segment of the curve.

Each successively-commencing trend-line – the red, the purple, the orange and the yellow – has a steeper slope than its predecessor, just as in the IPCC’s graph. On this evidence, the curve of the sine-wave seems not merely to be following a falling trend, but a falling trend that is in accelerated and ever-more-precipitate decline.



Yet it is self-evident from the very definition of the horizontally-propagated sine-wave that its true long-run trend must be zero. For this reason, the statistical technique is unquestionably false, as may be confirmed by shifting the phase of the sine-wave by half a cycle:



Suddenly, the graph appears to exhibit not merely a rising trend but an ever-more-rapidly climbing trend, the opposite of the (equally false) result obtained previously.

Where, then, lies the truth about the trend in mean global surface temperatures over the past century and a half? Remove all but one of the trend-lines from the IPCC's deceptive graph, and add trend-lines marking the periods of the most rapid warming during the period that persisted for more than a decade.

This technique is legitimate: we are asking a narrow question about which periods exhibited the fastest supra-decadal warming rate during the instrumental record.

The rate of warming in the 26 years 1975-2001 (during which, at least in theory, humankind's emissions of CO₂ might have been sufficient to exercise some small influence on the global temperature trend) is not unique.

During two previous periods – 1860-1880 and 1910-1940 – the warming rate was identical, within statistical error, to that from 1975-2001. Yet it is agreed among all parties that we cannot have had any measurable effect on temperature trends in the two earlier periods.

On 23 April, 2009, Lord Leach of Fairfield asked Her Majesty's Government –

“... whether the rate of increase in global mean surface temperatures between 1975 and 1998 [His Lordship chose that date rather than 2001] was similar to the rates of increase observed between 1860 and 1880 and between 1910 and 1940 ...”

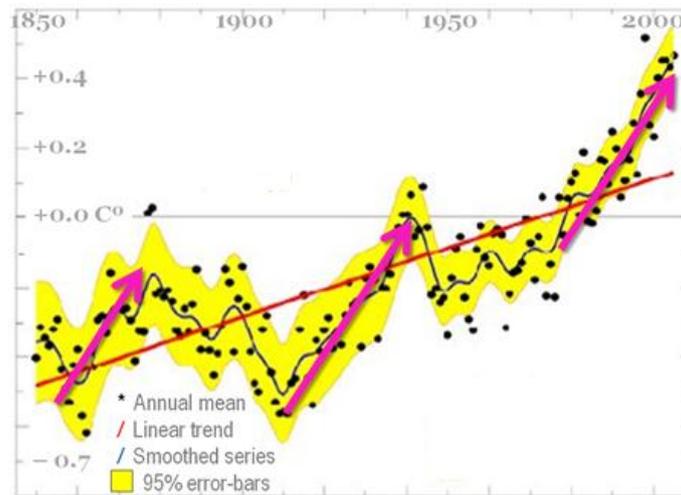
Lord Hunt of King's Heath replied –

“Observations collated at the Met Office Hadley Centre and the University of East Anglia Climate Research Unit indicate that the rate of increase in global average surface temperature between 1975

and 1998 was similar to the rates of increase observed between 1860 and 1880 and between 1910 and 1940 (approximately 0.16 C° per decade). This observation has no implications for our policy on anthropogenic warming. Little can be deduced from relatively short trends in the temperature record taken in isolation from the overall picture. ...”

Yet the IPCC, in its defective graph, had indeed sought to deduce from a “relatively short trend” in the data – namely, the last 25 years – that the magnitude of the trend was exceptional, when, as Her Majesty’s Government were compelled to admit upon questioning, the trend over that period had two previous precedents occurring at approximately 60-year intervals in the 150-year instrumental record:

Surely the correct conclusion is that – so far, at any rate – there is no discernible human influence on global temperature: merely a continuation of the recovery of global temperatures from the Little Ice Age (a recovery that began 300 years ago), overlaid by a ~60-year periodicity in global temperature:



None of these considerations rule out a gentle (though not yet plainly detectable) influence on global temperature from rising CO₂ concentrations. However, examination of the 161-year record of global mean surface temperature anomalies does appear to indicate –

- that there has been no acceleration in the warming rate, which, at its supra-decadal maximum from 1976-2001, was no greater than in 1860-1880 or 1910-1940;
- that most of the warming from 1950 to date must have been caused not by us but by natural variability in the climate, perhaps including the Pacific Decadal Oscillation, with whose warming and cooling phases its ~60-year quasi-periodicity appears to coincide; and
- that the *mean* decadal warming rate of almost 0.4 C°/decade that the IPCC predicts for the next 90 years as its central estimate on the A2 emissions scenario is two and a half times the *maximum* decadal warming rate observed over the past 161 years, which was just 0.17 C°/decade.

The last of these conclusions raises questions about the reliability of the IPCC’s central climate-sensitivity estimate, which appears excessive. Remove the apparent exaggeration and the global warming problem vanishes.

Dr. Pachauri, the science chairman of the IPCC, to whom I reported the defective IPCC graph in person and in writing in 2009, has not taken any action to have the graph corrected.

Bearing in mind the very substantial sums that Professor Boston and his university are receiving on the pretext *inter alia* of this graph and of the inappropriate conclusion from it that the rate of warming is accelerating and that we are to blame for the acceleration, and the consequent substantial losses to taxpayers, Professor Boston’s continued reliance upon this graph in its *Fourth Assessment Report* and his and his university’s continued dissemination of the graph on the university’s website constitutes fraud.