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Climate wars  
Guardian special investigation



## Climate change debate overheated after sceptic grasped 'hockey stick'

Steve McIntyre pursued graph's creator Michael Mann, but replication of his temperature spike has earned him credibility



**Fred Pearce**  
guardian.co.uk, Tuesday 9 February 2010 14.03 GMT



Michael Mann's research was flawed, but has been replicated with the same results.  
Illustration: Tom Coquill/Pennstate

*In a unique experiment, The Guardian has published online the full manuscript of its [major investigation into the climate science emails](#) stolen from the [University of East Anglia](#), which revealed apparent attempts to cover up flawed data; moves to prevent access to climate data; and to keep research from climate sceptics out of the scientific literature.*

*As well as including new information about the emails, we will allow web users to annotate the manuscript to help us in our aim of creating the definitive account of the controversy. This is an attempt at a collaborative route to getting at the truth.*

*We hope to approach that complete account by harnessing the expertise of people with a special knowledge of, or information about, the emails. We would like the protagonists on all sides of the debate to be involved, as well as people with expertise about the events and the science being described or more generally about the ethics of science. The only conditions are the comments abide by our [community guidelines](#) and add to the total knowledge or understanding of the events.*

*The annotations - and the real name of the commenter - will be added to the manuscript, initially in private. The most insightful comments will then be added to a public version of the manuscript. We hope the process will be a form of peer review. If*

*you have a contribution to make, please [email climate.emails@guardian.co.uk](mailto:climate.emails@guardian.co.uk).*

*The anonymous commenting facility under each article will also be switched on so that anyone can contribute to the debate.*

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After the publication of the IPCC report in 2001, the controversy about the hockey stick spread beyond the science community. Political opponents of climate scientists cried foul, and they have stayed on Michael Mann's trail for years.

Republican senator James Inhofe of Oklahoma, who calls global warming a "hoax", repeatedly attacked the Penn State University professor's hockey stick graph. In 2005, Congressman Joe Barton of Texas ordered Mann to provide the House Committee on Energy and Commerce, which he chaired, with extensive details of his working procedures, computer programs and past funding. "There are people who believe that if they bring down Mike Mann, they can bring down the IPCC," Ben Santer of the Lawrence Livermore Laboratory in California told me at the time.

Mann's voluble, self-confident style did not help matters. "The goddam guy is a slick talker and super-confident. He won't listen to anyone else," one of climate science's most senior figures, Wally Broecker of the Lamont-Doherty Earth Observatory at Columbia University in New York, told me. "I don't trust people like that. A lot of the data sets he uses are shitty, you know. They are just not up to what he is trying to do.... If anyone deserves to get hit it is goddam Mann."

[It should be said that Broecker has a reputation among some scientists for bad-mouthing young researchers.](#)

The temperature of the debate soared in 2003 with the intervention of Canadian sceptic Steve McIntyre and his economist co-author Ross McKittrick of the University of Guelph. In a paper published in what was becoming the house journal of the sceptics, Energy and Environment, McIntyre and McKittrick widened the attack on the hockey stick by calling into question the statistical methods employed by Mann to amalgamate his different data sets. They even suggested that the hockey stick was entirely an artefact of those methods.

Mann replied in kind. The emails reveal that he heard about the "M&M" paper for the first time the day before it was published. He was angry that the journal had not asked him to review the paper, or at least comment on it, before publication. He put his friends on attack alert. "My suggested response is to dismiss this as a stunt appearing in a 'journal' already known to have defied standard practices of peer-review. It is clear, for example, that nobody we know has been asked to 'review' this so-called paper... the claim is nonsense."

He went on: "Who knows what sleight of hand the authors have pulled. Of course the usual suspects are going to try to peddle this crap. The important thing is to deny that this has any intellectual credibility whatsoever."

In an ironic twist, he appended the anonymous note that had alerted him to the paper, apparently after being distributed among several scientists. It said that, far from being nonsense, the M&M paper reveals what "was known by most people who understand Mann's methodology [that] it can be quite sensitive to the input data in the early centuries." It went on: "There's going to be a lot of noise about this one, and knowing Mann's very thin skin, I am afraid he will react strongly, unless he has learned (as I hope he has) from the past..."

M&M's statistical complaint was that the analysis Mann pioneered, in which different proxy records are merged, involved sorting and aggregating these signals and smoothing

the result. It had the effect of flattening the hockey stick shaft. Any graph of real temperatures would have been much less smooth. That was reasonable when all the data used along the graph had been subjected to the same smoothing. But, they complained, if you then added a graph of real temperatures onto the end, to cover the final decades, it gave a misleading impression. Because there was no smoothing in this real data. Their point was that the shaft had been smoothed, but the blade had not. If a few decades of unusually warm temperature had showed up in, say, the 11th century they might have been smoothed away to nothing.

Mann didn't try to hide this in his papers. He put in error bars above and below the main line on his graph, showing how much temperature change the smoothing might have removed. He was among the first paleoclimatologists to do this. What is noticeable is that the error bars are huge. Most of the "blade" of 20th century warming would have fitted within the errors. It wasn't his fault that in future renditions, those very wide error bars sometimes disappeared.

Another criticism was that Mann analysed temperatures in terms of their divergence from the 20th-century mean. Mann agrees this would have highlighted differences from that period and accentuated any hockey stick shape. When M&M repeated Mann's analysis using different statical methods they said they found a big rise in temperatures in the middle ages.

Finally, and perhaps most troublingly, M&M raised questions about the reliability of tree rings as a measure of temperature at all. Tree ring analysts are pretty sure that from the mid-19th century, when we have useable thermometer data, through to the mid-20th century, the width of rings faithfully represents real temperatures. Some detail is lost but the overall measure is good. But since around 1960, a "divergence" problem has emerged. Most tree ring data sets do not reflect the warming seen in thermometer readings (and indeed in nature, as glaciers melt, sea ice disappears, springs come earlier and so on).

Most scientists believe this divergence is a result of some other human-caused factor, but nobody is sure what. And until that is clear, there must be a question mark over the reliability of tree ring data for eras before we have thermometers. In fact this criticism ought to make Mann's hockey stick, which uses a range of different proxies, more reliable than temperature reconstructions based solely on tree rings. And, while the emphasis has mostly been on the probity of Mann's hockey stick, most researchers I have spoken to regard the M&M study as far more deeply flawed. They say it also includes subjective decisions about choice of data sets that seem hard to explain.

There are two take-home questions from this complex saga. Was Mann wrong to do as he did? And did it make any difference to his findings? In the aftermath of the M&M attack on Mann, a number of groups of researchers scrutinised the competing claims.

Hans von Storch of the GKSS Research Centre in Geesthacht, Germany, concluded that M&M were right to say that temperatures should be analysed relative to the 1,000-year mean, not the 20th-century mean. But he also found that even when this was done, it did not have much effect on the result. This didn't stop Mann bad-mouthing von Storch's work in a succession of emails through 2005.

Meanwhile, two people closer to Mann — Caspar Ammann of the National Centre for Atmospheric Research in Boulder, Colorado and Eugene Wahl of Alfred University, New York — claimed that most of the difference between the findings of Mann and M&M had nothing to do with statistical methods. M&M had not "repeated" Mann's study as they claimed. In fact they had done a different study, leaving out some of the sets of tree-ring data that Mann included. In particular, they had excluded tree-ring studies based on

ancient bristlecone pines in the south-west of the US. "Basically, the M&M case boiled down to whether selected North American tree rings should have been included, and not that there was a mathematical flaw in Mann's analysis," Ammann told me in 2006.

Interestingly, McKittrick now says he partially agrees. In a [newspaper article in the Canadian Financial Post](#) in October 2009, while still complaining that Mann's statistical methods skewed the data, he said of the hockey stick "its shape was determined by suspect bristlecone tree ring data."

Mann has always accepted that his graph was work in progress, and most researchers in the field accept that he is honest if hot-headed. "I'm not slamming what he did overall. It was a great effort, a great step," Jacoby told me in 2005. "But he got into hot water by defending it too hard in places where he shouldn't." But there is a troublingly arbitrary nature about temperature reconstructions when the choices made about which data to include and which not seem often to be based on researchers' hunches. However honest, they are open to the charge of cherry-picking their data. That applies as much to M&M as to Mann.

What counts in science, however, is not a single study. It is whether its finding can be replicated by others. Here Mann has been on a winning streak. Upwards of a dozen studies, using different statistical techniques or different combinations of proxy records, have produced reconstructions broadly similar to the original hockey stick. These reconstructions all have a hockey stick shaft and blade. While the shaft is not always as flat as Mann's version, it is present. Almost all support the main claim in the IPCC summary: that the 1990s was then probably the warmest decade for 1000 years.

A decade on, Mann's original work emerges remarkably unscathed. Briffa's more recent reconstructions are closer to Mann's than those he had in the late 1990s. Folland says: "The Mann work still stands."

McIntyre remains unimpressed. "There is a distinct possibility that researchers have either purposefully or subconsciously selected series with the hockey stick shape," he says.

McKittrick similarly insists that there is a cabal of paleoclimatologists who have their favourite data sets that produce the required shape. In the Financial Post he singled out dodgy data from the US bristlecone pines and another set of tree rings from the remote Yamal peninsula in Siberia. He said they occurred in so many studies that they skewed the lot.

This is not so. The Yamal tree rings were not in the famous hockey sticks of the late 1990s. They were not even published then. According to Jones, of the 12 reconstructions of temperature over the past thousand years used in the last IPCC assessment, only three contained Yamal data.

In 2006, the US National Academy of Sciences published the [results of a long inquiry into Mann's findings](#), triggered by a request from Congress. It upheld most of Mann's findings, albeit with some caveats. "There is sufficient evidence... of past surface temperatures to say with a high level of confidence that the last few decades of the 20th century were warmer than any comparable period in the last 400 years. Less confidence can be placed in proxy-based reconstructions of surface temperatures for AD 900 to 1600, although the available proxy evidence does indicate that many locations were warmer during the past 25 years than during any other 25-year period since 900."

It agreed that there were statistical failings of the kind highlighted by M&M, but like von Storch it found that they had little effect on the overall result. One panel member, Kurt Cuffey of the University of California at Berkeley, reserved his criticism for the way the

graph had been used by the IPCC. "I think that sent a very misleading message about how resolved this part of the scientific research was," he said. In retrospect, Mann rather agrees. "Given its place in the IPCC summary with the uncertainties not even shown, we were a target from the beginning," he admitted to me later.


The hockey stick, a pioneering piece of work in progress, became victim of the notoriety it gained from being included in the IPCC summary. And of course its catchy title.

"The label was always a caricature and it became a stick to beat us with," Mann said later. Was it flawed research? Yes. Was it hyped by the IPCC? Yes. Has it been disproved? Despite all the efforts, no. So far, it has survived the ultimate scientific test of repeated replication.

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**AMeyer**

9 Feb 2010, 3:01PM

If you project the data over a long time-frame [800,000 years] the 'hockey-stick' looks more like a right angle bend.

If you project the data over short time-frame [40 years] ,the 'hockey-stick' looks more like a limp-wristed hand-shake with a shrimp.

If you project the data over a time-frame between that [say 250 years] the 'hockey-stick' looks more like a 'hockey-stick'.

Which just goes to show what a shower all these numberless words add up to.

'Wordistas' working for newspapers and other vested interests should take note.

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**ogram23**

9 Feb 2010, 4:07PM

Mann should have quoted more from the title of his paper about the "uncertainties and limitations" and allowed future studies to justify or otherwise. It does show how heated scientific debate can become even among "believers".

Science-wise, from the large error bars and the anomalous tree ring date from the last 50 years I would suggest little credence should be placed on this type of analysis until more is known. The recent tree ring evidence which is omitted from the graph shows there is still much to understand and who is to say that similar anomalies did not happen in the past?

Probably someone could take the same results and produce a graph showing a cooling in the last 100 years!

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**Barelysane**

9 Feb 2010, 4:58PM

Posted this on another thread, but as it's relevant here;

Fairly good summary of the goings on with the "hockey stick"

<http://bishophill.squarespace.com/blog/2008/8/11/caspar-and-the-jesus-paper.html>[Recommend?](#) (8)[Report abuse](#)[Clip](#) |[Link](#)**Woodspirit**

9 Feb 2010, 5:08PM

Mann may be right, he may be wrong (*based on his stat work it looks like maybe wrong wins*).

But - either way - he sure comes across as a nasty, self-absorbed, little weasal of a character in those emails.

[Recommend?](#) (22)[Report abuse](#)[Clip](#) |[Link](#)**smoothisland**

9 Feb 2010, 7:40PM

@ogram23

Upwards of a dozen studies, using different statistical techniques or different combinations of proxy records, have produced reconstructions broadly similar to the original hockey stick. These reconstructions all have a hockey stick shaft and blade. While the shaft is not always as flat as Mann's version, it is present. Almost all support the main claim in the IPCC summary: that the 1990s was then probably the warmest decade for 1000 years.

Was it flawed research? Yes. Was it hyped by the IPCC? Yes. Has it been disproved? Despite all the efforts, no. So far, it has survived the ultimate scientific test of repeated replication.

How much more review do you want?

The fact is that you and most of the denialists are just wilfully ignorant and it's that simple.

[Recommend?](#) (5)[Report abuse](#)[Clip](#) |[Link](#)**smoothisland**

9 Feb 2010, 7:42PM

And you denialists become *really* quiet whenever the science is rolled out don't you?You'd *much* rather stick to stories about leaked emails and the Al Gore / Big Oil / IPCC / UNICEF / Pentagon conspiracy.[Recommend?](#) (9)[Report abuse](#)

[Clip |](#)[Link](#)**PKthinks**

9 Feb 2010, 8:16PM

I think the hockey stick graph is one of the great villains in this whole story.

Remember what is is! Multiple proxies smoothed and cherry picked to obliterate the medieval warm period.(There is lots of evidence to suggest this period was as warm as the late 20th century and indeed that was the graph shown on the 1st IPCC report!)

Then for good effect the proxies are spliced to a temperature record with the obvious intention of reflecting the global CO2 record which does show a convincing peak in the late 20th century.This was assumed by by the IPCC and the media to demonstrate cause and effect which is plainly rubbish.

The only reason the proxies were abandoned for the last 50 yrs is because they did not in fact show a hockey stick shape but a downturn.I think that alone degrades the signifiacnce of the whole paper but politics took over from science around that time, in my opinion

I still can't understand how it was accepted for publication by a leading peer review journal and must further call into question that particular process

We could find many exponential curves for the late 20th century (such as global population). The fact that the population growth curve vaguely looks like the hockey stick graph does not mean exhaled CO2 is the cause of global warming.

Once and for all this graph should be renounced by the scientific community and removed from all further reports on climate change!

[Recommend? \(24\)](#)[Report abuse](#)[Clip |](#)[Link](#)**legjoints**

9 Feb 2010, 9:44PM

ogram23

Science-wise, from the large error bars and the anomalous tree ring date from the last 50 years I would suggest little credence should be placed on this type of analysis until more is known.

We know that dozens of other studies, using a variety of methodologies, have confirmed Mann's findings. How much certainty does there have to be before you people will accept that perhaps we ought to start reducing our emissions of greenhouse gases?

[Recommend? \(9\)](#)[Report abuse](#)[Clip |](#)[Link](#)**legjoints**

9 Feb 2010, 9:49PM

PKthinks

Once and for all this graph should be renounced by the scientific community and removed from all further reports on climate change!

If a scientific study is able to falsify Mann's work then his findings would be rejected by scientists, by so long as all the other peer-reviewed studies confirm Mann's results his

results will stand, with each new confirming study strengthening them.

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**DrScott**

9 Feb 2010, 10:06PM

Why do people think that scientists are pleasant? Some of the most unpleasant scientists have been the best. Go look up Newton sometime. He was a complete wanker.

The science either stands on its own or it doesn't regardless of the characters involved.

That is the point of science. Anyone has the chance to knock down any theory or strengthen it, and the real knowledge will out in the end.

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**PKthinks**

9 Feb 2010, 10:22PM

His results such as they they are do not demonstrate cause and effect.

It is not the results (which are contrived ), it is what the graph means! Mann simply said it was resonable to assume global warming due to greenhouse gases because of the shape of the graph.

It is plainly obvious if you relied on proxy data only, and depending on which you chose to incude in the analysis, the graph could be almost any shape!

It has indeed already been rejected by many scientists

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**scamuk**

9 Feb 2010, 10:26PM

@legjoints

Manns work eliminated,or severely reduced,the Medieval Warm Period and Little Ice Age apparently from publication in 2001.Were these periods of climate history supported by any proxy evidence or scientific research? Or are they largely anecdotal? The issue is confused by Manns supporters saying these existed but only in Europe and North America.So are we to believe global patterns diverged from the northern hemisphere?

You have got it the wrong way round.It is up to scientists to prove their hypotheses,not merely destroy somebody elses.The same applies to earlier scientists assertions.

You fall back on the "peer reviewed studies" argument.Unfortunately this is a completely politicised science where the adherents of one view seem to believe that by launching ferocious attacks on the opposing side they are enhancing their credibility with outsiders.They are not.Peer review will not work in this situation.Perhaps persuasion and argument supported by evidence would work more effectively.

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[Clip |](#)[Link](#)**TBombadil**

9 Feb 2010, 11:07PM

PKthinks

9 Feb 2010, 8:16PM

I think the hockey stick graph is one of the great villains in this whole story.

Remember what is is! Multiple proxies smoothed and cherry picked to obliterate the medieval warm period.(There is lots of evidence to suggest this period was as warm as the late 20th century and indeed that was the graph shown on the 1st IPCC report!)

The evidence for or against a medieval warm period is still ambiguous however even if it did occur there is an alternative, peer reviewed, theory that includes variations in temperature over the last few thousand years.

[http://stephenschneider.stanford.edu/Publications/PDF\\_Papers/Ruddiman2003.pdf](http://stephenschneider.stanford.edu/Publications/PDF_Papers/Ruddiman2003.pdf)

Ruddiman presents evidence that human influence on the climate started not 200 years ago but 8000 years ago when they started to cut down and burn the forests. They exacerbated the problem 5000 years ago when they increased atmospheric methane by growing rice in paddy fields. The warming was finally boosted further by the massive release of CO2 over the last couple of centuries.

His theory also explains a number of other fluctuations in global temperature as for example epidemics temporarily cut the world population allowing the forest to grow back.

Although peer reviewed the theory is not yet accepted because the work has not yet been replicated however if the medieval warm period should be established the theory may well be examined further.

[Recommend? \(2\)](#)[Report abuse](#)[Clip |](#)[Link](#)**richarm1**

9 Feb 2010, 11:12PM

I would have thought it was fairly obvious that there can never be complete certainty over global temperatures more than 50 years ago. All there can be are different proxies, whether it is tree ring data, ice cores, written records, where grapes are grown, glaciers or whatever. A serious scientist would assemble all this and try to produce some reasonable idea of past temperatures.

It is an interesting scientific question as to why different sources produce different results, but the idea that there is a simple shortcut with just one source of data is fanciful.

As it turns out, the whole issue has backfired, with climate science itself being trashed by the controversy.

I must say I have always been sceptical of the hockey stick graph, as it simply doesn't look like real world data, being too smooth early on and spiky later. The fact that it became so political merely added to my scepticism.

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**ogram23**

9 Feb 2010, 11:20PM

smoothisland and legjoint

I am not a deniest or whatever. I am a poor guy in the middle trying to discover the truth. All I said was Mann's work does not convince me and the other studies, done by mostly his buddies are even less convincing.

The debate has become a "them and us" and in the lead up to Copenhagen I decided to try and find out what exactly was the truth. I was so disheartened by the mud-slinging on both sides. In fact the "alarmists" seem to be the most vocal with their diatribes and that makes me wary of their need for this.

So far I have not found totally convincing arguments from any side. The Hockey stick I find is one of the least convincing.

Is there any non-biased sites where the scientific truth is spelled out? Don't say the IPCC as this is one of the most biased which is partially a result of its original charter and ongoing direction (I have found that even the scientists who write for it seem to think this).

[Recommend? \(4\)](#)[Report abuse](#)[Clip |](#)[Link](#)**PKthinks**

9 Feb 2010, 11:54PM

Some of the answers to the questions are simply not known with a high degree of confidence, and we must accept uncertainty

It is fair to say that at the time that the first IPCC report was published the consensus opinion was that the medieval warm period was well accepted (both historic and scientific) Mann's work as documented in the CRU emails was intended to change the historical view of global temperature historically

eg. 1 of many, Mann to Jones

Mann expresses concern they should all co-operate despite doubt amongst the scientists about the paleo reconstructions of the proxy historical temperature record, and encourages them to get things 'flattened out' before next IPCC report

<http://www.eastangliaemails.com/emails.php?eid=66&filename=906042912.txt>

Further discussion of hockey stick,

<http://sciencepolicy.colorado.edu/prometheus/the-hockey-stick-debate-as-a-matter-of-science-policy-4511>

Further discussions MWP

CO2 Science Medieval Warm Period Project

Was there a Medieval Warm Period? YES, according to data published by 597 individual scientists from 352 separate research institutions in 38 different countries ... and counting! This issue's Medieval Warm Period Record of the Week comes from the Northern Russian Treeline, Russia. To access the entire Medieval Warm Period Project's database, click here.

<http://www.co2science.org/data/mwp/mwpp.php>

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**SPLD**

9 Feb 2010, 11:59PM

Any thing you feed red noise into that comes out with the same shape ever time is some thing that is designed to produce that shape , and that is what was found in Manss work . The shape is not representative of the data , the process regardless of the data is made to produce the shape.

[Recommend?](#) (5)[Report abuse](#)[Clip](#) |[Link](#)**Leslie2**

10 Feb 2010, 12:18AM

I have just been reading some summaries of the ice core work. They claim that Co2 rises lag (not lead) temperature increases by 600 (plus/minus) 400 years.

So if there was a MWP & the same factors are in play then we could expect a lagging Co2 increase in the last century due to the MWP??

[Recommend?](#) (0)[Report abuse](#)[Clip](#) |[Link](#)**mikegeo**

10 Feb 2010, 2:29AM

Mr Pearce, you've missed it all once again.

You forgot to mention that the Wegman Report in front of the US hearings on this affair in 2006, not only completely trashed Mann's statistical process and calculations, but the report also, in conjunction with the NAS members, trashed the use of bristlecone and foxtail paleo proxies.

Mann and his cohorts methods, selectively mined for specific signals and both Wegman and NAS concurred it was flawed method and flawed material and bad science.

And the Yamal data was Briffa's contribution. Later on Mann selected other proxies but they always contained some material that would pop up with his programs. Its like putting a needle in a haystack and then passing a magnet over it - it pops up and leaves you believing the whole thing is magnetic when only one tiny bit is what reacts.

And finally, the issue with the upturn in the blade is that they pasted the thermometer record onto the end of the proxy records.

If the proxy records cannot coincide with the thermometer record, what use are the proxies in the period when there was no thermometers? You don't seem to realize, that if there is absolutely no way to confirm that the proxies are even reacting to temperature (because where they overlap they go in opposite directions), then you may have developed a graph that represents nothing whatsoever to do with temperature. And Wegman and NAS pointed this out too. Please read them.

The hockeystick broke long ago but like lazarus, some of the AGW scientists keep trying to ressurect it. The other ones know its broken.

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**WeeJim**

10 Feb 2010, 2:44AM

And you denialists become really quiet whenever the science is rolled out don't you? You'd much rather stick to stories about leaked emails and the Al Gore / Big Oil / IPCC / UNICEF / Pentagon conspiracy. Not really interested in responding to that remark nor do I have any reason (other than it was closest to my cursor) for choosing that particular one but I just want to say that this kind of post whether it comes from "**Them or us**" serves absolutely no purpose in the debate.

If the term "Denialist" is meant to sound insulting, by the way, it's working.

Quite hurtful, actually.

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**AntonyIndia**

10 Feb 2010, 3:21AM

This comment has been removed by a moderator. Replies may also be deleted.



**JasonP**

10 Feb 2010, 3:34AM

@Leslie2

I just [replied](#) to a similar question you posed in another thread, so you might want to check it out. There's a fun video.

A few things.

First is that we have reason to believe that we've been contributing to increases of CO<sub>2</sub> in the atmosphere as a result of industrial activity. Fossil fuels are rich in carbon - when you burn them the carbon joins with oxygen and you get CO<sub>2</sub> which floats off out the chimney/exhaust and into the sky. We burn a lot of fossil fuels.

Second is that not all carbon is the same: There are different varieties with different numbers of isotopes which you might have seen referred to as C<sub>12</sub>, C<sub>13</sub> and C<sub>14</sub>. The fossil fuels that we burn have distinct ratios of carbon types. We can measure the change of the ratio of C<sub>12</sub> to C<sub>13</sub> in the atmosphere and it tallies with the signature of the carbon from fossil fuels that we burn - so there's good reason to think the extra carbon in the atmosphere is the same extra carbon as the stuff we pump out into the atmosphere.

There might well be a bit of natural variation, but the recent increases (>30% in 150 years) in CO<sub>2</sub> look exceptionally high when considering the historical record and recent volcanic activity and so on. It's obviously a little tricky to know for sure, but the ice core records stretching back 800,000 years don't have anything that compares with current levels and the geological indicators suggest that there likely hasn't been this much atmospheric CO<sub>2</sub> in the last 20 million years or so.

In short, it's not unreasonable to suggest that we're responsible for much of the additional CO<sub>2</sub> currently in the atmosphere.

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**Drcrinum**

10 Feb 2010, 3:45AM

The account rendered in this article about the 2006 NAS Panel Report is misleading. Certainly, when the report was released, Gerald North, the Chairman of the Panel, said complimentary things about Mann which the MSM picked up. However, during the subsequent Congressional hearings, when North & his colleague on the Panel testified, they responded that Mann's methodology was shoddy and that they agreed with the more extensive report issued by Dr. Edward Wegman's Group. See:

<http://network.nationalpost.com/np/blogs/fpcomment/archive/2009/02/14/lawrence-solomon-under-oath-north-faults-mann-too.aspx>

Here are excerpts from the above:

>"CHAIRMAN BARTON Dr. North, do you dispute the conclusions or the methodology of Dr. Wegman's report?

DR. NORTH No, we don't. We don't disagree with their criticism. In fact, pretty much the same thing is said in our report.

Barton then asked North's colleague on the NAS panel, Peter Bloomfield, a similar question. Bloomfield's reply: "Our committee reviewed the methodology used by Dr. Mann and his co-workers and we felt that some of the choices they made were inappropriate. We had much the same misgivings about his work that was documented at much greater length by Dr. Wegman."

Now, completely missing from the above account by Mr. Pearce is any mention of Dr. Edward Wegman and his group's analysis of Mann's Hockey Stick. Why??? Here it is:

[http://repUBLICANS.energycommerce.house.gov/108/home/07142006\\_Wegman\\_Report.pdf](http://repUBLICANS.energycommerce.house.gov/108/home/07142006_Wegman_Report.pdf)

Dr Wegman = PhD in Mathematical Statistics.

Dr. Mann = PhD in Geology & Geophysics.

Who is the expert in statistical methods?

The Wegman report documents the erroneous data manipulation by Mann.

Have you read it?

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**LondonEye**

10 Feb 2010, 8:31AM

This comment has been removed by a moderator. Replies may also be deleted.

**Calvadoslurp**

10 Feb 2010, 9:26AM

@smoothisland 9 Feb 2010, 7:40PM

"The fact is that you and most of the denialists are just wilfully ignorant and it's that simple."

Do you believe that being rude to people is likely to bring them round to your way of thinking?

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**gubulgaria**

10 Feb 2010, 11:09AM

@Calvadoslurp

For the last two months, AGW proponents have had the entire world's media lecturing them that they should be more open and honest.

Denialists are wilfully ignorant. That's pretty much the definition of a denialist.

You wouldn't want us to lie about it in order to 'bring them round', would you?

There may still be few genuine sceptics, who aren't wilfully ignorant but genuinely sceptical, however, they are a tiny group compared to the denialists, and in grave danger of extinction.

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**gubulgaria**

10 Feb 2010, 11:23AM

Ogram23 is a great example of this. At the bottom of an article which explicitly explains that Mann's findings have been repeatedly replicated by other researchers -

"it has survived the ultimate scientific test of repeated replication."

he posts -

"I would suggest little credence should be placed on this type of analysis until more is known."

this is wilful ignorance.

If it's replicated a hundred times, Ogram23 will still want further confirmation, because he does not accept the science and never will.

this is wilful ignorance.

There's no point engaging in debate with denialists as their approach is not that of the scientist or even the reasonably rational man in the street, but that of the conspiracy theorist.

Trying to 'bring them round' is pointless. The issue is whether they influence enough of the public to in turn influence the political process. Exposing their wilful ignorance is one way of preventing this.

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**BeStill**

10 Feb 2010, 1:57PM

@DrScott:

*Why do people think that scientists are pleasant? Some of the most unpleasant scientists have been the best. Go look up Newton sometime. He was a complete wanker.*

The fact that Mann might be a wanker hardly makes him a Newton.

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**kvms**

10 Feb 2010, 2:11PM

"Upwards of a dozen studies, using different statistical techniques or different combinations of proxy records, have produced reconstructions broadly similar to the original hockey stick. These reconstructions all have a hockey stick shaft and blade. While the shaft is not always as flat as Mann's version, it is present. Almost all support the main claim in the IPCC summary: that the 1990s was then probably the warmest decade for 1000 years."

Once again we have the argument: the science was flawed but the result is right. Just which "upwards of a dozen studies" you refer to is not clear, but anyway, this defence of the hockey stick, and with it the defence of AGW, which stands and falls by the stick, fails to address the straightforward criticism of the proxies.

The sceptics have repeatedly said that the proxies like tree rings don't follow the thermometers in the 1990's. This is a testable statement, Mr Pearce. If you want to defend the stick, you have to answer it, and if you could do, at least this one reader believes you would be in a big hurry to do that.

What you are saying is, others have used proxies and come to the same result.

Yeah, they would do wouldn't they.

Just spare me the denialist labels and insults folks. Please explain why the proxies sometimes go in a different direction to the temperature measurements.

Here is the link Bluecloud gave us for the hockey stick, showing the different proxies in different colours.

[http://en.wikipedia.org/wiki/File:1000\\_Year\\_Temperature\\_Comparison.png](http://en.wikipedia.org/wiki/File:1000_Year_Temperature_Comparison.png)

I would like to believe we had a nice clean answer to this, but the fact is the red curve shows higher temperatures during the MWP than in the 20th century. It has fallen since 1930 and has not increased much since then.

Here is what it says in the paper in Nature

**According to our reconstruction, high temperatures?similar to those observed in the twentieth century before 1990?occurred around ad 1000 to 1100, and minimum temperatures that are about 0.7 K below the average of 1961?90 occurred around ad 1600**

The more I read the response, shuddup you denialist, the more I am convinced that the hockey-stick is a hoax.

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**gbulgaria**

10 Feb 2010, 3:45PM

@kvms

Just to be clear, you're quite content with temperatures in the 1990s being higher than the MWP? And that temperatures since the 1990s have been higher still?

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**TBombadil**

10 Feb 2010, 3:47PM

kvms

10 Feb 2010, 2:11PM

Here is the link Bluecloud gave us for the hockey stick, showing the different proxies in different colours.

[http://en.wikipedia.org/wiki/File:1000\\_Year\\_Temperature\\_Comparison.png](http://en.wikipedia.org/wiki/File:1000_Year_Temperature_Comparison.png)

I would like to believe we had a nice clean answer to this, but the fact is the red curve shows higher temperatures during the MWP than in the 20th century. It has fallen since 1930 and has not increased much since then.

It really doesn't matter if the medieval period was warm or not because as I pointed out above there is already an alternative theory waiting in the wings that would cover that possibility. It is a modification of the present consensus view and therefore a little more complex. It sets out to explain the medieval warm period, the little ice age, the present period of warming as well as several earlier fluctuations in temperature.

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**jon56**

10 Feb 2010, 4:17PM

M&M's main statistical complaint was in fact much more serious than that which you describe. It was the use of so called short centring PCA, which had the effect of mining the data for hockey stick shapes. M&M demonstrated this, and it was eventually confirmed by Wegman in his report. The phrase "Short centring" implies that what Mann used was a recognised technique. I think not. It was an ad hoc method. It is difficult to know whether Mann knew of its effect, or whether statistical analysis was not a member of his skills set. Either way, M&M should be congratulated on their efforts.

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**kvms**

10 Feb 2010, 4:26PM

**gubulgaria**

You are missing the point. It is not a question of whether I am contented or not, what we are discussing here is the validity of the proxies used in the hockey-stick graphs. AGW as it stands depends on the hockey-stick.

There are no temperature measurements for the MWP. That is why proxies are necessary. But the proxies don't follow temperature in the 20th century.

FWIT I guess there is a climate disaster on the way, and there is a lot we can do to prevent it.

**TBombadil** There may be a hundred new theories on the way, we are discussing the validity of the hockey-stick here. And I still say Fred Pearce is papering over the cracks and avoiding the question.

It certainly DOES matter if the MWP was warmer than now, because it was not caused by CO2 and it didn't cause a massive rise in sea-levels or tip into runaway warming. So the sceptics say that there is no basis for the predicitions being made about the warming from 1990 to the present.

There may, as you claim, be an explanation for this. Do tell us about it.



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**Leslie2**

10 Feb 2010, 4:34PM

about "JasonP @Leslie2

I just replied to a similar question you posed in another thread, so you might want to check it out. There's a fun video."

Thanks, good video

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**TBombadil**

10 Feb 2010, 4:39PM

kvms

10 Feb 2010, 4:26PM

It certainly DOES matter if the MWP was warmer than now, because it was not caused by CO2 and it didn't cause a massive rise in sea-levels or tip into runaway warming. So the sceptics say that there is no basis for the predicitions being made about the warming from 1990 to the present

Rudiman claims that the medieval warm period was caused by CO2 and methane produced by increased agriculture ie cutting down forests and increased cultivation of rice in paddy fields. ie according to him the medieval warm period was caused by human activity just as much as the recent period of warming was caused by CO2 from industrial activity.

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**scamuk**

10 Feb 2010, 5:20PM

@Tbombadil,

Are you really serious in believing this theory the Medieval Warm period was caused by humans?

When I first saw this idea posted a few days ago I thought it was a joke.

A classic example of a unprovable,untestable,counter-intuitive piece of scientific speculation.How can this stuff get "peer reviewed" in climatology?

If this is true we should be now living in temperatures not seen since the Cretaceous.My

God--somethings moving outside the window! Its huge.....

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**PKthinks**

10 Feb 2010, 7:14PM

@kvms

The reproducibility of the hockey stick curve is not a surprise, it is a particular set of data with defined mathematical adjustments. I am a priori with the data and code input. I must ask you why do you think that is significant much less proof of global warming due to greenhouse gases?

The validity of the proxies and the sensitivity (when we are dealing with fractions of a degree over a century) must be open to question. This was a rather obscure area of science for dating rather than demonstrating recording changes in the global climate until recently

As you will be aware there are many proxies and the degree of uncertainty must be significant. That is where most sceptics have a problem not being allowed to question some very esoteric science now adopted by policymakers who want to save the world (don't they all!) The problem is in the period since the warming effect was first observed the models used to make predictions look increasingly weak

[Recommend? \(2\)](#)[Report abuse](#)[Clip |](#)[Link](#)**kvms**

10 Feb 2010, 8:56PM

**pkthinks writes:** The reproducibility of the hockey stick curve is not a surprise, it is a particular set of data with defined mathematical adjustments.

Not sure that is true. Various proxies have been produced independently of one another. I am arguing the other way round: if the hockey-stick is a fudge, then AGW is not proven. My line is that the proxies can't be used as they diverge from temperature measurements, so we agree the hockey-stick tells us nothing.

But that is all beside my main point, which is that Fred P can't simply brush away the objections to the proxies in the way he has.

The debate about policy is a separate one. I argue we should base economic growth on photosynthesis to combat CO2 pollution and defend the biosphere.

[Recommend? \(2\)](#)[Report abuse](#)[Clip |](#)[Link](#)**Think4YerSelf**

10 Feb 2010, 9:07PM

@TBombadil

This notion that the MWP was caused by humans is totally beyond ridicule. What was the world's population during this period? This small population caused the warming in Greenland that allowed the Norse to farm there? To grow grapes in Newfoundland?

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**Think4YerSelf**

10 Feb 2010, 9:40PM

Fred:

"Upwards of a dozen studies, using different statistical techniques or different combinations of proxy records, have produced reconstructions broadly similar to the original hockey stick"

The problem with these "supportive" studies is that they use exactly the same proxy data that Mann used. Of course they'll get a hockey stick out of it. And they ALL ignore the MWP. This was one of Wegman's key arguments against these other studies. Not citing this fact puts this entire chapter into disrepute and shows you have more of a political goal here than a journalistic one.

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**TBombadil**

10 Feb 2010, 9:59PM

scamuk

10 Feb 2010, 5:20PM

Are you really serious in believing this theory the Medieval Warm period was caused by humans?

I didn't say I believed it, I said it was an alternative version of AGW that includes an explanation for a medieval warming period. At the present time the evidence for a medieval warming period is ambiguous, more data is needed. If sufficient evidence is found to support a global medieval warming period then Ruddiman's theory may be re-examined. What Ruddiman's theory does indicate is that a medieval warm period is not the AGW killer issue that some people think.

It is perfectly normal for several versions of a scientific theory to be proposed, there are for example several versions of Einstein's General Theory of Relativity. More evidence will eventually rule some of them out.

If this is true we should be now living in temperatures not seen since the Cretaceous.

Not if you actually read what he says.

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**SPLD**

10 Feb 2010, 10:12PM

TBombadil that's a cope out if ever I had heard one , even if there was a MWP oit was down to man anyway. So if Mann and co work turns out to be BS because they should not have deleted the MWP , it does not matter because the science still stand as this was caused by man as well as AGW seen now.

Heads you win , tails I lose , yah that's a fair contest .

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**PKthinks**

10 Feb 2010, 10:34PM

re kvms 8.56pm,

Sorry if I misunderstood your point, but re the reproducibility of the Hockey stick I do think my comment is correct, as to the significance we may agree.

The CRU emails are revealing in most of this discussion, Briffa seems very fair minded and re MWP writes in in 1999

'I believe that the recent warmth was probably matched about 1000 years ago. I do not believe that global mean annual temperatures have simply cooled progressively over thousands of years as Mike appears to and I contend that that there is strong evidence for major changes in climate over the Holocene'

<http://www.eastangliaemails.com/emails.php?eid=138&filename=.txt>

I think Fred has a series of hawk/dove articles, its hard to know what his persoanl view is

What exactly do you have in mind re photosynthesis grass or trees?

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**TBombadil**

10 Feb 2010, 11:15PM

SPLD

10 Feb 2010, 10:12PM

even if there was a MWP oit was down to man anyway. So if Mann and co work turns out to be BS because they should not have deleted the MWP , it does not matter because the science still stand as this was caused by man as well as AGW seen now.

Heads you win , tails I lose , yah that's a fair contest .

Science evolves and is refined in the light of new evidence. Scientists apply Occam's razor, they try to keep their theories as simple as possible. So they don't at present see a need for Ruddiman's theory because everything can be explained without the extra complexity that his theory would imply. However if the medieval warm period is established his theory or some other theory that explains the medieval warm period may well gain support.

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**BeStill**

11 Feb 2010, 12:16AM

@TBombadil:

*What Ruddiman's theory does indicate is that a medieval warm period is not the AGW killer issue that some people think.*

By "some people" you are referring to Mike Mann and the rest of the hockey team? And posters here like Bluecloud who declare the hockey stick to be a robust underpinning of AGW theory?

Nobody was that bothered about the MWP either way until the Team set out to abolish it..

[Recommend? \(2\)](#)[Report abuse](#)[Clip |](#)[Link](#)**TBombadil**

11 Feb 2010, 12:39AM

BeStill

11 Feb 2010, 12:16AM

The rapid rise in global temperature in the 20th century is what is predicted by AGW theory. The rise that has occurred does therefore support the theory.

Whether or not there was a medieval warm period does not demolish AGW theory as the theory can be modified to account for a MWP.

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11 Feb 2010, 1:35AM

@TBombadil:

*The rapid rise in global temperature in the 20th century is what is predicted by AGW theory. The rise that has occurred does therefore support the theory.*

*Whether or not there was a medieval warm period does not demolish AGW theory as the theory can be modified to account for a MWP.*

It is not deniers you have to make your case to on this point; it is the hockey team.

And - whilst AGW theory looks happy enough with the period 75 - 98, it looks a bit unhappy with the warming early this century, and with the cooling mid century.

Personally I reckon that warmism has invested quite a bit of "credibility capital" in the hockey stick. The team will fight to the bitter end to keep it no matter what Ruddiman might say.

[Recommend? \(2\)](#)[Report abuse](#)[Clip |](#)[Link](#)**SPLD**

11 Feb 2010, 10:03AM

BeStill your right at the root of this Mann and co needed the MWP gone , because it would have totally undermined the idea that the ONLY cause of current warming was man .

For years there was no problem with it and it was widely accepted, indeed even the IPCC accepted it , but on research thats is iffy to say the least all the historic data was wiped out to suit the new orthodoxy. Sadly its still quite possible to have the MWP and to have current warming down to man , but the once extreme positions where taken by the faithful and the "stick" became an icon of the new faith. Its was not possible to even consider is.

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**[TBombadil](#)**

11 Feb 2010, 10:12AM

BeStill

11 Feb 2010, 1:35AM

It is not deniers you have to make your case to on this point; it is the hockey team

I don't have to "make the case" to the hockey team because the evidence for a global medieval warming period has not yet been established. If it ever is the theory can be easily modified to account for it by e.g. adopting Ruddiman's ideas.

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**[ScepticMike](#)**

11 Feb 2010, 12:47PM

ogram23

So you are "sceptical " of the work of Manns "buddies" I think the use of the word shows exactly where you are coming from.

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