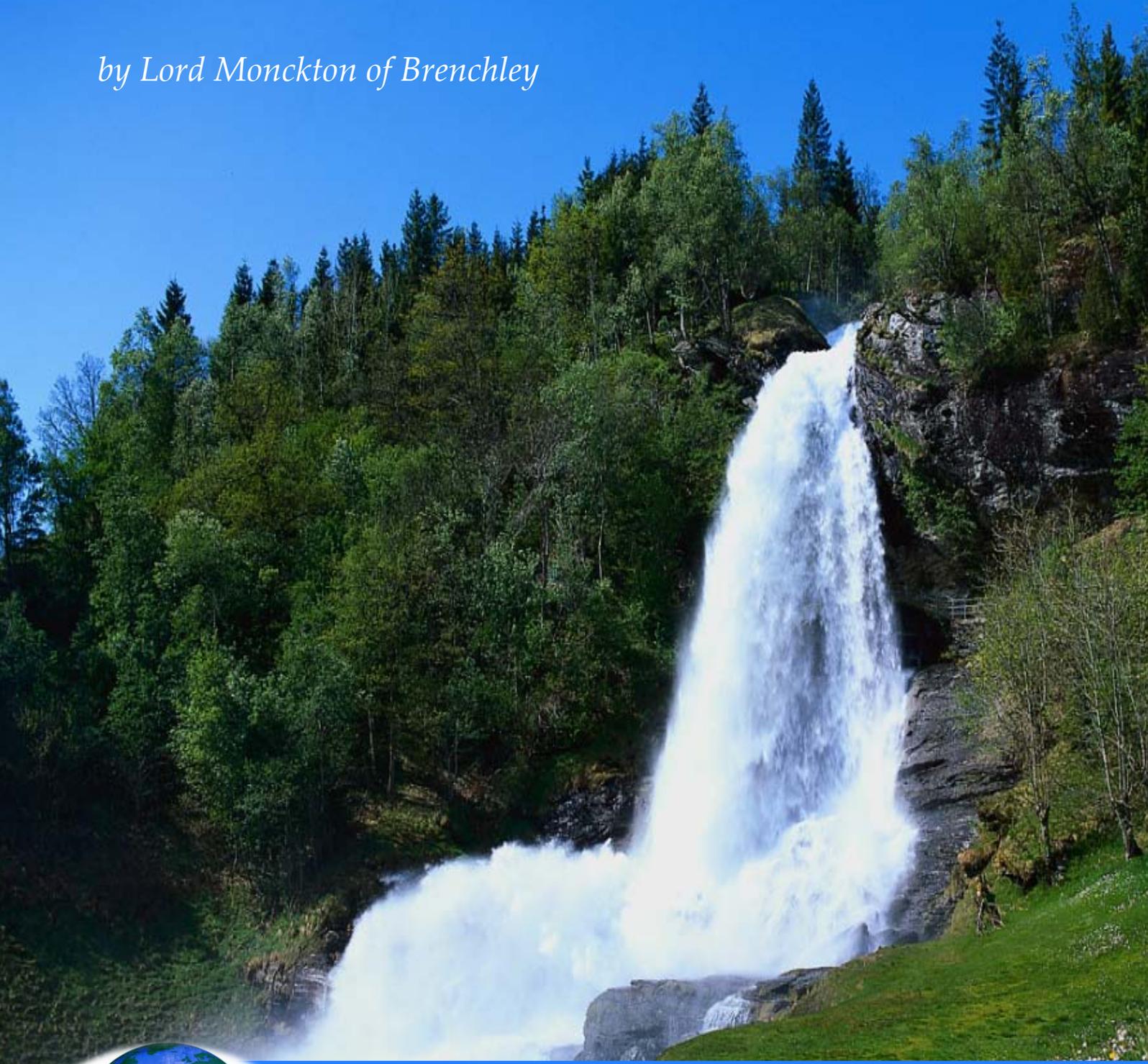


ON THE CENTRAL QUESTION OF CLIMATE SENSITIVITY

by Lord Monckton of Brenchley



SPPI ORIGINAL PAPER ◆ May 17, 2009

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The Honorable Joe Barton and the Honorable Fred Upton
17 May 2009

Gentlemen,

Following my recent testimony before the Energy and Commerce Committee of the House, you kindly directed a question to me via the Committee Clerks –

“Is there any dispute that, as you say, “How much warming will a given proportionate increase of CO2 concentration cause?” is the central question of the climate debate?”

- a) **“If so, what is it?”**
- b) **“If not, why hasn’t the scientific community participating in the IPCC caught the matter?”**

I apologise that my reply is a little late. I have taken some time consulting scientific experts. No discourtesy either to you personally or to the Committee was intended.

The answer to your principal question is that there is no dispute at all about whether the question “How much warming will a given proportionate increase of CO2 concentration cause?” is the central question of the climate debate. The “climate sensitivity” question, as it is called, is indeed the central question, on which all else depends. If climate sensitivity is high, as the IPCC maintains it is, then much “global warming” can be expected, whereupon the questions that fall to be answered are how much damage (if any) the warming predicted by the IPCC may cause, and whether or to what extent it lies within our power to mitigate or adapt to the predicted warming and any consequent damage, and whether the costs of mitigation might outweigh the costs of the damage the warming may cause, and whether or to what extent it would be cheaper to adapt to any “global warming” that might occur, as *and if necessary*.

The “climate sensitivity” question, as it is called, is indeed the central question, on which all else depends.

The IPCC’s answer to the climate sensitivity question keeps changing, and in a downward direction.

The IPCC’s answer to the climate sensitivity question keeps changing, and in a downward direction. Its 1995 report provided a central estimate that a

doubling of CO₂ concentration – i.e. a proportionate increase of 2.0, which is taken as the standard metric for evaluating climate sensitivity – would cause **3.8 K** (6.8 F°) of atmospheric warming. The IPCC's 2001 assessment report revised that estimate downward to **3.5 K** (6.3 F°). The IPCC's 2007 report cut the central estimate again, this time to **3.26 K** (5.9 F°). The additional precision of the second decimal digit should not be taken as a convergence of the IPCC's estimates upon an increasingly precise and agreed value for climate sensitivity: instead, it is an artefact of the IPCC's methodology, by which equilibrium climate sensitivity, in Kelvin degrees, is (4.7 ± 1) times the natural logarithm of the proportionate increase in atmospheric CO₂ concentration.

James Hansen, the director of the NASA Goddard Institute for Space Studies, has recently suggested that the value of the “final-climate-sensitivity parameter” λ (by which a given radiative forcing ΔF is multiplied to yield the consequent equilibrium increase in global mean surface temperature $\Delta T_s = \lambda \Delta F$) is ≈ 0.75 , rather than the substantially higher central estimate ≈ 0.97 implicit in the IPCC's 2007 climate assessment. Dr. Hansen's revised value for λ would require a further reduction in the central estimate of climate sensitivity

Making appropriate adjustments for these apparent exaggerations by the IPCC, I calculate that true climate sensitivity may well be as little as 1.1 K at CO₂ doubling.

to **2.6 K** (4.6 F°). The only stated value for λ in IPCC (2001) was ≈ 0.5 , implying a further reduction in the climate sensitivity estimate to **1.73 K** (3.1 F°) of “global warming” at equilibrium in response to a doubling of atmospheric CO₂ concentration.

Svante Arrhenius, the Swedish theoretical chemist and Nobel laureate, provided the first respectable quantification of climate sensitivity to a CO₂ doubling in a paper of 1906, published in Vol. 1 No. 2 of the *Journal of the Royal Nobel Institute*, of which the relevant conclusion is reproduced in facsimile and in translation below –

In ähnlicher Weise berechne ich, dass eine Verminderung des Kohlensäuregehalts zur Hälfte oder eine Zunahme desselben auf den doppelten Betrag Temperaturänderungen von $-1,5^{\circ}$ C. bzw. $+1,6^{\circ}$ C. entsprechen würde.

“Likewise, I calculate that a halving or doubling of the CO₂ concentration would be equivalent to changes of temperature of -1.5 K or $+1.6$ K respectively.”

Arrhenius, like many more recent commentators on the IPCC's calculations, does not accord the same very high values to temperature feedbacks as does the IPCC itself. Also, the IPCC has chosen the highest value for the Planck parameter that occurs in the mainstream literature, and there are good theoretical reasons for the conclusion that its chosen value is excessive.

Making appropriate adjustments for these apparent exaggerations by the IPCC, I calculate that true climate sensitivity may well be as little as **1.1 K** at CO₂ doubling.

Furthermore, one must make allowance for the fact that atmospheric CO₂ concentration is rising at only half the rate predicted by the IPCC, even though CO₂ emissions are rising at the higher end of the IPCC's expectations. This is because, as the IPCC's 2001 report admits, the IPCC is unable to add up the Earth/troposphere "carbon budget" to within a factor of two of the right answer. The hydrosphere and biosphere – perhaps through increased rates of photosynthesis – are taking CO₂ out of the atmosphere and "fixing" it faster than the IPCC had expected. Figure 1 illustrates the discrepancy –

CO₂ concentration is rising, but well below IPCC predictions

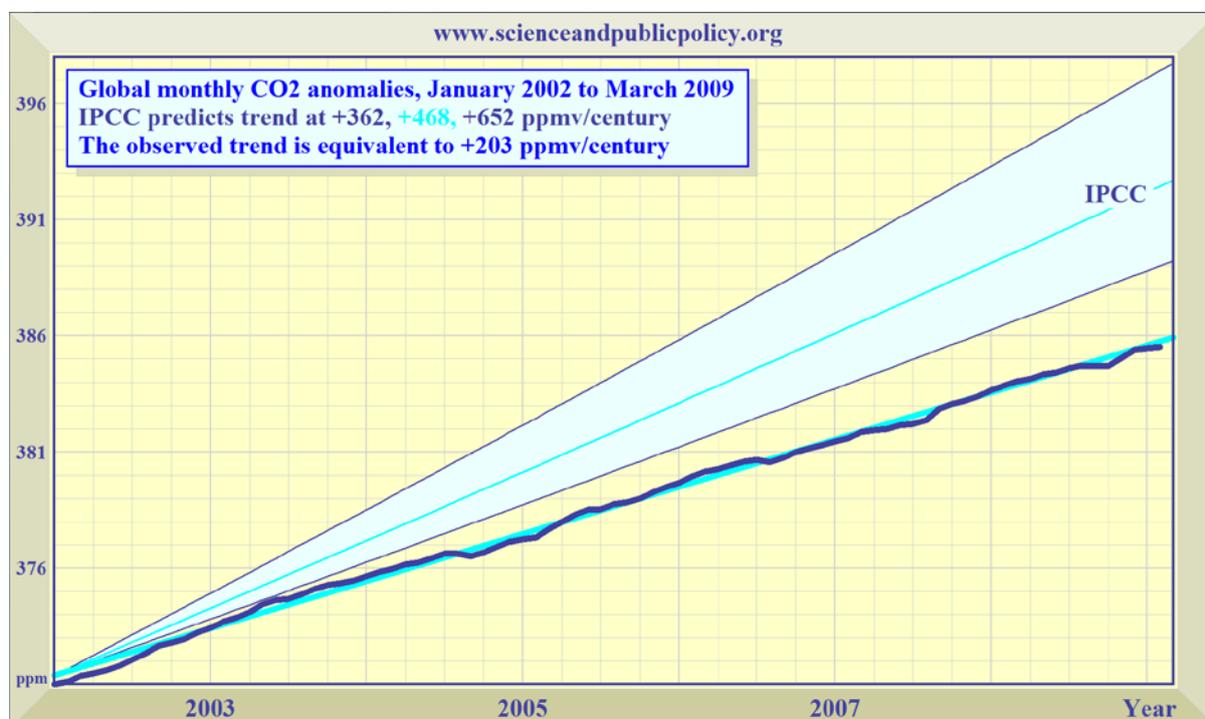


Figure 1: Deseasonalized NOAA observations are the thick, **dark-blue** line overlaid on the least-squares linear-regression trend. CO₂ is rising linearly, well below the IPCC's projected range (**pale blue region**). There is no exponential growth.

This discrepancy between prediction and observed reality is in fact larger than it appears, because the IPCC predicts that CO₂ concentration will increase exponentially, while in fact it is increasing only linearly, as Figure 2 shows –

IPCC predicts rapid, exponential CO₂ growth that is not occurring

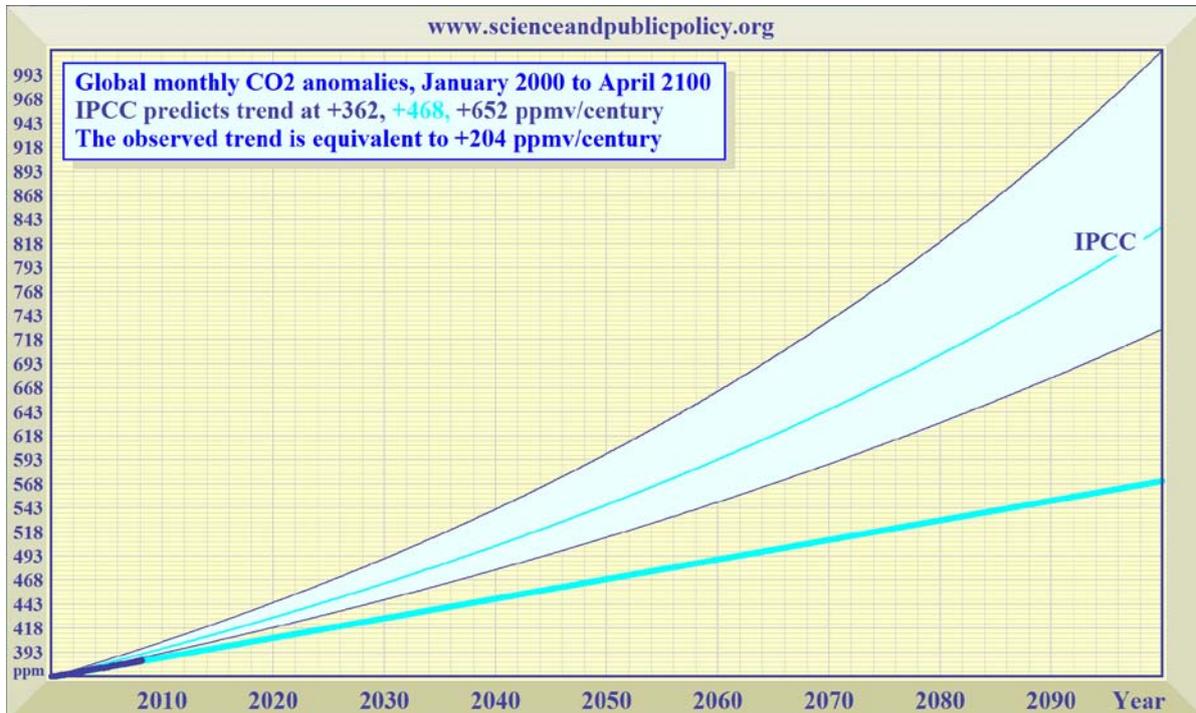


Figure 2: Observed CO₂ growth is linear, and is also well below the exponential-growth curves (bounding the pale blue region) predicted by the IPCC in its 2007 report.

On its own, the failure of CO₂ concentration to increase at even half the predicted rate requires all of the IPCC's projections for anthropogenic "global warming" over the 21st century to be halved.

It will be seen that the anthropogenic contribution to "global warming" over the whole of the 20th century could be as little as 0.6 K (1.1 F°). If so, no action either in mitigation or in adaptation would be needed.

The various changes in climate sensitivity estimates that I have discussed are summarized in Table 1, where successive changes in the parameters whose product is final temperature change are shown in green.

The rightmost column shows predicted temperature change to 2100; the penultimate column shows predicted temperature change in response to a doubling of CO₂ concentration –

Table 1: Changing climate-sensitivity estimates

2009-2100	C ppmv (2100)	n $\Delta F/\ln 2$ Forcing	κ No fdbks	b Feed- backs	g $0.92n\kappa$ $\cdot(1-\kappa b)^{-1}$	$\Delta T_{S, 2X}$ $g \ln 2$ Clim.sensi	$\Delta T_{S, 2100}$ $g \ln(C/385)$ cf. 2009
Hansen 1984-8	834	6.93	.290	2.35	6.1	4.20 °C	+4.7 °C
IPCC 1990	834	6.40	.300	2.27	5.5	3.80 °C	+4.3 °C
IPCC 2001	834	5.35	.305	2.30	5.0	3.50 °C	+3.9 °C
IPCC 2007	834	5.35	.313	2.16	4.7	3.26 °C	+3.6 °C
Hansen 0.75	834	5.35	.290	2.12	3.7	2.56 °C	+2.9 °C
ΔT_S since '80							+1.4 °C
+ real CO2	570	5.35	.290	2.12	3.7	2.56 °C	+1.4 °C
IPCC '01: .24	570	5.35	.240	2.08	2.4	1.73 °C	+0.9 °C
Arrhenius '06					2.2	1.55 °C	+0.9 °C
Correct b	570	5.35	.240	1.17	1.6	1.14 °C	+0.6 °C

It will be seen that the anthropogenic contribution to “global warming” over the whole of the 20th century could be as little as **0.6 K** (1.1 F°). If so, no action either in mitigation or in adaptation would be needed.

As I mentioned in my previous letter to the Committee, there is considerable empirical verification of this theoretically-evaluated result, which has considerable backing in the literature. For instance, direct satellite measurements show that outgoing long-wave radiation has not diminished anything like as fast as the IPCC’s climate-sensitivity estimates would require: in fact, as shown in numerous papers, it has diminished at one-seventh to one-tenth of the rate required by the IPCC’s climate-sensitivity predictions, implying that climate sensitivity is one-seventh to one-tenth of the IPCC’s value.

Further empirical verification is to be found in the now well-established failure of the world’s oceans to warm as predicted by the models on which the IPCC relies. Since 2003, some 3300 automated bathythermograph buoys have been deployed throughout the world’s oceans in the ARGO program. These buoys have shown no oceanic warming in the five years since they were deployed, contrary to model predictions that pronounced warming would occur. This result is highly significant, because it is the oceans, far more than the atmosphere, that are the real bell-wether of climatic change. The oceans, some 1100 times denser than the atmosphere, would be expected to take up at least 80% of the excess heat generated by anthropogenic greenhouse-gas emissions: yet, despite continuing rapid increases in emissions, the oceans are not warming at all, and may even be cooling a

These buoys have shown no oceanic warming in the five years since they were deployed, contrary to model predictions.

little. As with the long-wave radiation discrepancy, the discrepancy between prediction and observed reality in the failure of the oceans to warm would imply a substantial reduction of some sixfold to eightfold in the climate sensitivity estimates of the IPCC. This observed result, like the result for outgoing long-wave radiation, is in line with our calculations.

A fourth empirical verification appears in the self-evident failure of the global mean surface temperature record to show any anthropogenic signal whatsoever at any point.

As mentioned in my earlier letter to the Committee, yet a third empirical verification is available in the absence of the model-predicted threefold differential between the warming rate of the tropical upper troposphere and that of the tropical surface. According to Professor Richard Lindzen, the

repeatedly-observed absence of the higher warming rate in the upper troposphere requires that the IPCC's climate sensitivity calculations be divided by at least 3 – and that is before taking account the IPCC's exaggeration of the Planck parameter and of many temperature feedbacks.

A fourth empirical verification appears in the self-evident failure of the global mean surface temperature record to show any anthropogenic signal whatsoever at any point. The most rapid rate of warming in the 20th century occurred between 1975 and 1978, during which time it is at least theoretically possible that humankind might have had some influence on temperature. However, as I have recently confirmed by arranging for a Parliamentary Question to be put down in the House of Lords, two previous periods – 1860-1880 and 1910-1940 – exhibited precisely the same warming rate, even though the IPCC's own methodology establishes that during those two earlier periods the influence of humankind on temperature was comparatively negligible –

No anthropogenic signal in the global temperature record

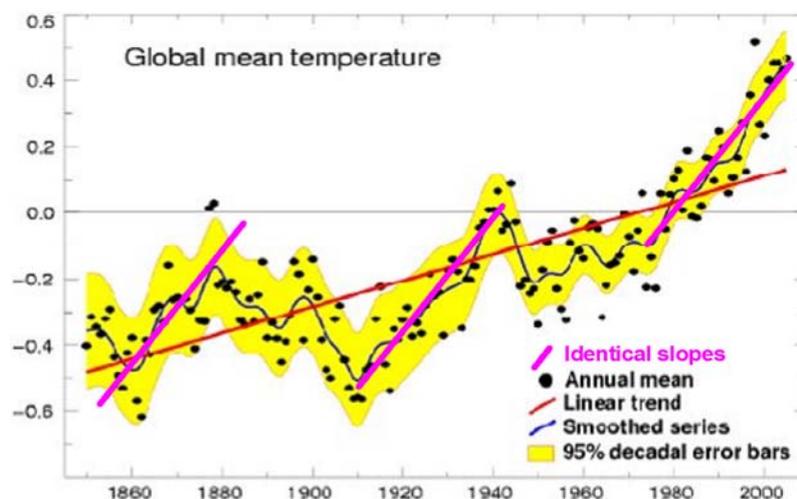


Figure 3: The three magenta lines on the global-temperature graph are strictly parallel, showing that there has been no discernible anthropogenic influence on surface temperature, notwithstanding continuing increases in atmospheric CO₂ concentration.

In addition, as Figure 4 shows, since the beginning of the new millennium on 1 January 2001 there has been an eight-and-a-half-year downtrend in global mean surface temperatures, at an equivalent centennial rate rather greater than the uptrend over the 20th century:

Since the beginning of the new millennium on 1 January 2001 there has been an eight-and-a-half-year downtrend in global mean surface temperatures, at an equivalent centennial rate rather greater than the uptrend over the 20th century.

A long, unreported downtrend: 8+ years' global cooling at 1 K/century

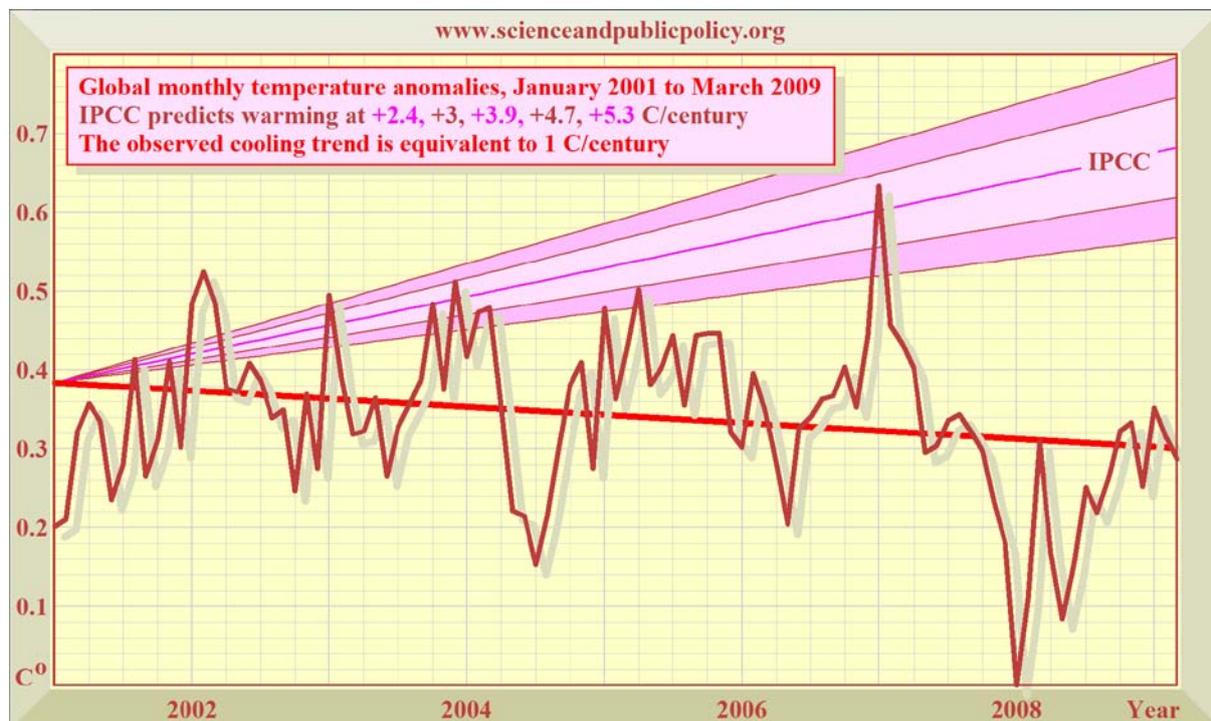


Figure 4: For eight and a half years, global temperatures have exhibited a pronounced downtrend. The IPCC's predicted equilibrium warming path (pink region) bears no relation to the global cooling that has been observed in the 21st century to date. **Source:** SPPI global temperature index, compiled from HadCRU, NCDC, RSS, and UAH temperature datasets.

There are now sound theoretical reasons, repeatedly confirmed by empirical observations, for suspecting that the IPCC has exaggerated climate sensitivity by up to tenfold, and that it has also exaggerated the rate of accumulation of CO₂ in the atmosphere by twofold.

To summarize, there are now sound theoretical reasons, repeatedly confirmed by empirical observations, for suspecting that the IPCC has exaggerated climate sensitivity by up to tenfold, and that it has also exaggerated the rate of accumulation of CO₂ in the atmosphere by twofold.

The answer to your subsidiary question b), “Why hasn’t the scientific community participating in the IPCC caught the matter?”, is simple. Nowhere does the IPCC clearly explain the methodology that it uses in the calculation of climate sensitivity. It leaves scientists to take its climate-sensitivity values upon trust – a trust that, as we have demonstrated, is very likely to be misplaced.

There is plenty of evidence that the majority of the scientists participating in the IPCC’s process were not involved in the climate sensitivity calculations: they took those calculations as Gospel and drew conclusions from them – conclusions that in many instances would have been excessive even if the IPCC’s climate-sensitivity estimates had not been exaggerated.

Precisely because the IPCC’s methodology is unclear, most scientists do not have the means or opportunity to pick through its lengthy documents in detail and to follow the trail of references in the peer-reviewed literature in order to evaluate for themselves the reliability or unreliability of the IPCC’s estimates.

There is plenty of evidence that the majority of the scientists participating in the IPCC’s process were not involved in the climate sensitivity calculations: they took those calculations as Gospel and drew conclusions from them – conclusions that in many instances would have been excessive even if the IPCC’s climate-sensitivity estimates had not been exaggerated.

The IPCC does not anywhere explain clearly that it calculates greenhouse-enrichment-induced temperature change over time as the product of four parameters, the –

- **Radiative forcing**, which is the extra energy at the top of the atmosphere caused by atmospheric enrichment with a greenhouse gas such as CO₂;
- **Planck parameter**, which converts the tropopausal radiative forcing to surface temperature change in the absence of temperature feedbacks;
- **Temperature-feedback multiplier**, which amplifies the initial warming in response to net-positive temperature feedbacks; and
- **Natural logarithm of the proportionate increase in CO₂ concentration.**

The relation is logarithmic because each additional CO₂ molecule has less effect on temperature than its predecessors.

It is at once apparent that even a very small exaggeration in the value of each of the four key parameters will cause a very large exaggeration when the four parameters are multiplied together to give the UN's projection of anthropogenic temperature change over time. For instance, even if each of the four parameters is exaggerated, on average, by as little as one-third, once the four parameters are multiplied together the projected temperature change will appear to be $(4/3)^4 = 3.16$, or more than thrice what it should be.

It is at once apparent that even a very small exaggeration in the value of each of the four key parameters will cause a very large exaggeration when the four parameters are multiplied together to give the UN's projection of anthropogenic temperature change over time.

However, as I have indicated, the UN has, on average, approximately *doubled* the value of each of the four parameters. That is, when they are multiplied together, the UN's projection of temperature increase to 2100 becomes approximately $2^4 = 16$ times too great. It is this central exaggeration on which all of the UN's overstated conclusions about the impacts of anthropogenic "global warming" absolutely depend.

Yet the vast majority of the scientists who wrote and reviewed the UN's climate reports are unaware of these exaggerations, and most are unaware even that it is the multiplication together of four separate exaggerations that causes the very large overestimates of anthropogenic temperature change over the present century which repeated satellite measurements of changes in outgoing long-wave radiation and bathythermograph measurements of changes in ocean temperature have demonstrated, and without which the UN's entire case for alarm about our effect on the climate falls away.

Most scientists are unaware of the magnitude of the UN's exaggeration, because the UN's treatment of the central question of climate sensitivity is obscurantist in the extreme. Consideration of the four key parameters is scattered untidily through several separate chapters of each report: yet the chapters are written and reviewed by different groups of scientists. At no point are the four parameters and the relationships between them drawn explicitly and clearly together.

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Some of the crucial parameters are not even explicitly quantified. The question of climate sensitivity ought to be the first question dealt with in each major, quinquennial UN climate assessment: however, the topic is neither explicitly nor completely dealt with either in the 2001 or in the 2007 report.

Often, the values selected by the UN exceed those in the very small number of papers that it cites as justification for the particular values it has chosen. Many papers are cited, but few – if any – provide real justification for the UN’s chosen values.

Correcting for the UN’s exaggerations of each of the four key parameters reduces climate sensitivity from 3.26 C to a small fraction of this value at CO2 doubling, and to a still smaller fraction by 2100.

These are some of the reasons why few scientists have noticed the large – and perhaps accidental – exaggeration that has demonstrably resulted from the UN’s methodology.

As we have already seen, the UN’s projection of the rate at which CO₂ accumulates in the atmosphere leads – on its own – to an unwarrantable near-doubling of its estimate of temperature increase over the present century.

The three other parameters I have mentioned – radiative forcing, the Planck parameter and the feedback factor, which together constitute climate sensitivity – are similarly exaggerated by approximately a factor of two in each instance, as I outlined in my previous letter to the Committee.

Correcting for the UN’s exaggerations of each of the four key parameters reduces climate sensitivity from 3.26 C to a small fraction of this value at CO₂ doubling, and to a still smaller fraction by 2100.

Whether or not “global warming” will eventually resume, and whether or not it will eventually reach the IPCC’s predicted rate (which is at least double any rate that has been observed or inferred since the beginning of the Industrial Revolution, though it would be well below of the rate measured in Central England for the period 1695-1745, before the Industrial Revolution even began, and before humankind could have had even the smallest influence over global temperature), there is one further question which the Committee should of course consider most carefully when marking up the Waxman/Markey Bill.

The cost of each 1 K of “global warming” prevented by the Waxman/Markey Bill, even if it were fully implemented, would thus be \$60-\$600 trillion. It is highly questionable whether the economic costs of simply allowing “global warming” to take its course, even if that “global warming” were to occur on the exaggerated scale imagined by the IPCC, could possibly exceed the monstrous and crippling cost of fully implementing the Waxman/Markey Bill. This cost would fall disproportionately upon the poorest.

That question is the cost-effectiveness question. By how much, and at what cost, must anthropogenic CO₂ emissions be reduced in order to prevent each 1K (1.8 F°) of imagined future anthropogenic “global warming”?

The answer, as the attached draft paper for *World Economics* explains in detail, is that CO2 emissions must be cut by 2 teratonnes (i.e. 2 million million

The Bill, even in its much-watered-down form, will still be costly, requiring the creation and maintenance of a series of monstrous, supererogatory and purposeless bureaucracies, which will achieve precisely no reduction in global mean surface temperature but will cost a great deal to run.

metric tons) to prevent just 1K of warming, even if the IPCC's climate-sensitivity estimates are correct. If, however, they are exaggerated by approximately an order of magnitude, as the empirical evidence that I have mentioned powerfully suggests, then it would be necessary to reduce CO2 emissions by a staggering 20 teratonnes in order to prevent 1K of anthropogenic warming.

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I hope that it is clearly understood that I am not making any partisan point here. It is abundantly clear from the attached draft paper that, on any view, the Waxman/Markey Bill is economically and scientifically senseless. Exactly as I had warned the Committee during my testimony, if the Bill were to make any significant impact on global temperature it would be outlandishly and disproportionately expensive, and if the Bill were made inexpensive it could not make any significant impact on global temperature.

The latest draft of the Bill shows that the Majority on the Committee, confronted (by me among others) with the catastrophic consequences for

working and low-income families, has decided to opt for a series of pork-barrel opt-outs in an attempt to make the Bill comparatively inexpensive. However, the Bill, even in its much-watered-down form, will still be costly, requiring the creation and maintenance of a series of monstrous, supererogatory and

The central difficulty is illustrated by perhaps the most startling statistic in the paper: that even if we were to shut down the entire global economy and fling humankind back into the Stone Age, without even the right to light fires in our caves, "global warming" prevented would amount to 0.0035-0.035 K/year (0.006-o.06 F/year).

purposeless bureaucracies, which will achieve precisely no reduction in global mean surface temperature but will cost a great deal to run.

The calculations in the attached paper are robust. They have already been verified by experts, and they demonstrate the extreme futility of any measure such as the Waxman-Markey Bill. I say “any measure” because my strictures

From the climatic point of view, the Bill in any form is simply irrelevant.

are not directed only at the Waxman-Markey Bill. Any Bill would face the same impossible hurdles as Waxman-Markey. The central difficulty is illustrated by perhaps the most startling statistic in the paper: that even if we were to shut down the entire global economy and fling humankind back into the Stone Age, without even the right to light fires in our caves, “global warming” prevented would amount to **0.0035-0.035 K/year** (0.006-o.06 F/year).

If even so complete a shutdown would make no discernible difference to global temperature, then *a fortiori* the much-diluted measures in the Waxman/Markey Bill, however piously intended, will have no effect whatsoever. From the climatic point of view, the Bill in any form is simply irrelevant, just as any such Bill would be irrelevant, even if it had not been serially attenuated to meet the clamour of various vested-interest groups.

For these reasons, I recommend that, as a matter of urgency, the Committee should now establish a panel of scientists and specialists representing all opinions in the climate debate, so that that panel can examine and report to the Committee upon the objections that I have raised in this and my previous letter to the actions which the Majority now proposes to take.

It has been all too painfully evident, in the Committee debates that I have attended, that the Majority on the Committee have perhaps too little interest in the true science of climate, and are too ready to believe those who are profiting mightily by unreasonably amplifying the supposed threat posed by “global warming”, while overlooking the very large cost and certain ineffectiveness of counter-measures in mitigation.

It has been all too painfully evident, in the Committee debates that I have attended, that the Majority on the Committee have perhaps too little interest in the true science of climate, and are too ready to believe those who are profiting mightily by unreasonably amplifying the supposed threat posed by “global warming”, while overlooking the very large cost and certain ineffectiveness of counter-measures in mitigation.

Let me refer to just one incident. I was asked by Acting Chairman Inslee to give an opinion on ocean acidification, which he and several others among the Majority said they thought was a serious and likely consequence of anthropogenic greenhouse-gas enrichment. I pointed out to the Committee that no global acidification of the oceans has yet been measured, and that corals and other fragile sea-creatures that would certainly disintegrate were

pH to fall below 7 had survived atmospheric concentrations of CO₂ that were up to 20 times today's levels.

But the central objection to the “ocean-acidification” scare is this. By an elementary physical law of gases – Henry's Law – if the oceans become

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warmer as a result of the “global warming” imagined by the IPCC then they *outgas* CO₂, *reducing* the oceanic concentration of CO₂ and consequently *increasing* the alkalinity of the oceans (albeit by a minuscule fraction).

The IPCC's own documents make it explicit that the official theory predicts this outgassing, which is described as the

“CO₂ feedback”. One cannot at the same time argue that “global warming” will make the oceans warmer and that it will increase their acidity (or, rather, reduce their pronounced alkalinity). If many members of the Majority are ill-instructed on fundamental points of this kind, they may find themselves taking decisions that will have catastrophic consequences not only for the families with the lowest incomes but for the US economy as a whole.

I shall be happy to serve on the expert panel that I have recommended, and to bring in experts in relevant fields who will represent the viewpoint which – on the evidence now before me – is very much closer to the truth than that which is represented in the official documents of the IPCC and of the numerous US Government agencies – such as the NRC and the EPA – that are profiting financially and politically by reciting its findings as though they were their own, and that are too readily believed by the Majority, for whatever reason.

I conclude that it would be most unwise – and would achieve no useful climatic objective – to proceed any further with the Waxman/Markey Bill. Long before the Bill really starts to bite, it will have become evident to all but a handful of irredentist zealots that the IPCC has indeed prodigiously exaggerated both the effect

Long before the Bill really starts to bite, it will have become evident to all but a handful of irredentist zealots that the IPCC has indeed prodigiously exaggerated both the effect of CO₂ on global temperature and the rate at which CO₂ is accumulating in the atmosphere; that there was not, is not, and will not be any “climate crisis”.

of CO₂ on global temperature and the rate at which CO₂ is accumulating in the atmosphere; that there was not, is not, and will not be any “climate crisis”; and that, even if there were, it would be simpler and cheaper – by orders of magnitude – to have the courage either to do nothing or to adapt as *and if* necessary than to attempt to mitigate the anthropogenic “global warming” that is imagined by the IPCC but that is not occurring and will not occur.

Even if global mean surface temperature had risen above natural variability, the recent solar Grand Maximum – or merely the natural, internal variability of the climate – may have been chiefly responsible.

Even if the sun were not chiefly to blame for the past half-century's warming, the IPCC has not demonstrated that, since CO₂ occupies only one-ten-thousandth part more of the atmosphere than it did in 1750, it has contributed more than a small fraction of the warming.

Even if per impossibile the models could ever become reliable, the empirical evidence of outgoing long-wave radiation and of ocean temperature trends confirms theoretical evaluations demonstrating that it is not at all likely that the world will warm as much as the IPCC imagines.

Even if carbon dioxide were chiefly responsible for the warming that ceased in 1998 and may not resume until 2015, the distinctive, projected fingerprint of anthropogenic “greenhouse-gas” warming is entirely absent from the observed record.

Even if the fingerprint were present, computer models are long proven to be inherently incapable of providing

projections of the future state of the climate that are sound enough for policymaking, because the initial state of the millions of variables that define the climate cannot be measured with sufficient precision reliably to predict future phase-transitions in the chaotic object that is the climate.

Even if *per impossibile* the models could ever become reliable, the empirical evidence of outgoing long-wave radiation and of ocean temperature trends confirms theoretical evaluations demonstrating that it is not at all likely that the world will warm as much as the IPCC imagines.

Even if the world were to warm that much, the overwhelming majority of the scientific, peer-reviewed literature does not predict that catastrophe would ensue.

Even if catastrophe might ensue, even the most drastic proposals to mitigate future climate change by reducing emissions of carbon dioxide would make very little difference to the climate, and would do so at a flagrantly disproportionate cost that, on any scenario, would comfortably exceed the cost of merely allowing events to unfold.

Even if mitigation were likely to be effective, it would do more harm than good.

Even if mitigation were likely to be effective, it would do more harm than good: already millions face starvation as the dash for biofuels has taken one-third of US agricultural land out of essential food production in just two years: a warning that taking precautions, “just in case”, can do untold harm unless there is a sound, scientific basis for them.

Finally, even if mitigation might do more good than harm, adaptation as (*and if*) necessary would be far more cost-effective than mitigation, and less likely to be harmful.

Yours truly,

VISCOUNT MONCKTON OF BRENCHLEY

