

Contrarian

Denialist

INFILTRATION

**The effect of condoning
psychologically intimidating language in a climate science
peer-reviewed journal**

A Case Study

By Michelle Stirling ©2015

This paper was contributed to Friends of Science Society.



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Abstract

Vested interests and professional positioning have led a long-term attack on dissenting views on climate change. Various psychological intimidation tactics have been employed (name-calling, bullying) to denigrate and isolate researchers whose views and research dispute the findings of the Intergovernmental Panel on Climate Change reports. In most areas of science, new perspectives are welcomed and discussed in a collegial manner. The author examines a case study of a recent peer-reviewed paper in climate science, "Seepage: Climate change denial and its effect on the scientific community" Lewandowsky, Oreskes et al (2015), in which disparaging words have infiltrated peer-reviewed works thus becoming officially condoned as an acceptable part of the scientific language. The author evaluates the claims of seepage against the norms of conduct of the National Academies of Science, the American Association for the Advancement of Science and the American Psychological Association to evaluate whether or not this infiltration constitutes a form of Type Two Scientific Misconduct (Cabbolet 2013).¹ As reported by Cabbolet, this form of scientific misconduct operates on two levels, that of the researchers and that of the peer-reviewers, and it creates a powerful, inappropriate precedent that endorses name-calling. If so, this infiltration of the terms 'climate change denial' and 'contrarian' would set a peer-review precedent that would create a psychological and socio-economic threat to dissenting researchers in a field intended to be open to inquiry.

Note: Certain sections of this paper use verbatim excerpts of a previously published Friends of Science Society report that deconstructs the alleged 'consensus' surveys, with permission of the authors. These are the opinions of the author.

¹ <http://www.bmartin.cc/dissent/documents/Cabbolet13.pdf>

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1. Introduction

According to the National Academies Press publication “On Being a Scientist: Responsible Conduct in Research”² (1995) (hereinafter NAS Code of Conduct) we are told that:

“Science has progressed through a uniquely productive marriage of human creativity and hard-nosed skepticism, of openness to new scientific contributions and persistent questioning of those contributions and the existing scientific consensus.”³

This code of conduct document was produced by the Committee on Science, Engineering, and Public Policy of the National Academy of Sciences, National Academy of Engineering and Institute of Medicine.

The American Association for the Advancement of Science (AAAS) is the largest such scientific body in the world representing 24 disciplines. Its slogan is “Advancing Science, Serving Society” and offers a code of conduct document entitled “Scientific Freedom and Responsibility” by John T. Edsall (1975)⁴ which states:

“One of the basic responsibilities of scientists is to maintain the quality and integrity of the work of the scientific community. Ideally, it is an open community—all findings should be publicly and generally available, and open to criticism, improvement, and, if necessary, rejection.”

Thus it is concerning to read a recently published, peer-reviewed paper entitled

² http://www.nap.edu/openbook.php?record_id=4917&page=1

³ http://www.nap.edu/openbook.php?record_id=4917&page=24

⁴ <http://archives.aaas.org/docs/1975-ScientificFreedomResponsibility.pdf>

“Seepage: Climate change denial and its effect on the scientific community” by Lewandowsky, Oreskes, et al (2015), published in the Elsevier Journal “Global Environmental Change,” Editor, J. Barnett⁵ that begins with the statement:

“Opponents of the scientific consensus on climate change.....have often emphasized uncertainty to forestall mitigative action.”⁶

This statement is a sweeping generalization that is the hallmark of propaganda, not science. It appears to contradict a fundamental statement of the codes of conduct of the NAS and AAAS. We use this paper, Lewandowsky et al (2015), as a case study to explore the implications of the derogatory language employed, now inherently endorsed by the scientific peer-reviewed community through the publication of this paper, and we review the corresponding impact on the scientific community.

2. Method

To establish whether or not the premise of Lewandowsky et al (2015) is sound, the author reviewed the published codes of conduct and principles of the NAS and AAAS. To evaluate whether or not there is a consensus on climate change, the referenced studies that claim a consensus were reviewed vis-à-vis the climate change principles they were said to support. The definitions of terms such as “denier” were reviewed as was the source of terminology like “hiatus” and “stagnation” which Lewandowsky et al (2015) claim have “seeped” into the peer-reviewed literature due to the influence of ‘deniers’ and ‘contrarians.’ Exclusionary social psychology tactics were reviewed in light of the expertise of a number of the authors of Lewandowsky et al (2015), as was the scientific accuracy of a science history that does not include a 1906 crucial revision by Svante Arrhenius to his earlier work, widely claimed as the foundation of the “hot-house” theory.

⁵ Jon [Barnett] is a Lead Author for the Fifth Assessment Report of the Intergovernmental Panel on Climate Change (Working Group II, Ch 12), and he is co-editor of Global Environmental Change.

<http://www.findanexpert.unimelb.edu.au/display/person8871>

⁶ <http://www.sciencedirect.com/science/article/pii/S0959378015000515>

3. Results

3.1 Hard-nosed skepticism is integral to scientific inquiry

The NAS Code states that: "... hard-nosed skepticism ... and persistent questions.... Of the "existing scientific consensus" ..." is, in fact, the way of scientific discovery. Thus the term "*opponents...of consensus*" as used by Lewandowsky et al (2015) appears to be an oxymoron. Those who dispute a theory or scientific argument do not oppose the formation of consensus – they are exercising the right and obligation of scientists to dispute findings with which they disagree.

It is concerning that those scientists who hold rational dissenting views on climate change are painted as 'opponents' to consensus when the NAS Code further states:

"Science results in knowledge that is often presented as being fixed and universal."

and goes on to explain that:

"Scientific results are inherently provisional. Scientists can never prove conclusively that they have described some aspect of the natural or physical world with complete accuracy. In that sense all scientific results must be treated as susceptible to error."

However, the case study Lewandowsky et al (2015) appears to defend only a consensus position on climate change and to denigrate those who dissent as being in "climate change denial" or "contrarians." This position is contrary to a published statement by the AAAS from 2011 which decries the personal attacks on climate scientists who may present controversial research.⁷

4. Terminology and Connotation

"Climate change denial" is the term used in the title of "Seepage."

It would be difficult to find a person who denies that climate changes, though there are thousands of qualified scientists who dispute the various natural and human factors involved in climate change, and the relative scope and impact.

⁷ http://www.aaas.org/sites/default/files/migrate/uploads/0629board_statement.pdf

Therefore, the title cannot be seen to accurately reflect the essence of the public debate on climate change, and has a pejorative connotation from the outset.

“Denial” is defined by the Merriam-Webster dictionary for these purposes as:

“refusal to admit the truth or reality (as of a statement or charge) (2) :
assertion that an allegation is false”

“a psychological defense mechanism in which confrontation with a
personal problem or with reality is avoided by denying the existence of the
problem or reality”

The term “denial” appears twelve times in the document and “denialist” appears twice. The term is linked with the oft-used epithet for dissenting climate scientists - “denier.”

“Denier” is defined by the Merriam-Webster dictionary as “one who denies <*deniers* of the truth>.”

More colloquial usage is found in Wiktionary⁸ where pejorative connotations are attached to the use of the word.

1. Person who denies something.

*Holocaust **denier*** (see Wikipedia: Holocaust denial)

*Global warming **denier*** (see Wikipedia: Global warming denial)

*AIDS **denier*** (see Wikipedia: AIDS denial)

“Denial” is also associated with a serious health mental condition defined as a defense mechanism that ‘obliterates external reality’⁹ - often exhibited temporarily when unexpected or shocking, deeply emotional events occur in a person’s life, such as a sudden death in the family wherein a person continues as if nothing happened – “He’s in denial.” More extreme cases indicate serious psychotic conditions.

“Contrarian” is defined by the Merriam-Webster dictionary as: “a person who takes a opposite or different position or attitude from other people.”

⁸ <https://en.wiktionary.org/wiki/denier>

⁹ http://isites.harvard.edu/fs/docs/icb.topic625831.files/Defense_Mechanisms_and_Emotional_Regulation.pdf¹⁰
<http://www.urbandictionary.com/define.php?term=contrarian>

The Urban Dictionary¹⁰ provides a more connotative definition of “contrarian”: “Someone who automatically tends to take the opposite point of view from the person to whom they’re speaking, or to disagree with society at large out of a sort of knee-jerk reflex.”

The word “contrarian” appears in “Seepage:...” some 31 times.

Through the choice of such pejorative terms that inaccurately ascribe either stubborn opposition for its own sake, the connotation of the despicable qualities of a Holocaust denier, or a psychotic mental condition, Lewandowsky et al (2015) imply that the arguments of dissenting scientists have no substance or scientific merit, when this is not at all the case.

Dissenting scientists are thus smeared using an age-old tactic noted by Spinoza in his 17th century “Ethics” (Cabbolet 2013): “throughout the ages this publicly discrediting someone’s work as despicable has become the number one method to set up people against someone.”

This smear must be questioned in light of the fact that three of the contributors to Lewandowsky et al (2015) are highly qualified psychological researchers who would likely be well-aware that the use of such language would lead to ostracism and social isolation of *all* dissenting scientists.

The pejorative associations of the terms ‘denialist’ and ‘contrarian’ thus become attributed to *any* scientific dissent. The phrase, now a *meme* - “climate change denial” - found in the paper’s title embodies this. Even work based on substance and valid research is henceforth simply dismissed as if entirely invalid. This is contrary to the fundamental principles of science which relies on a ‘productive marriage’ of human creativity and hard-nosed skepticism” described in the NAS Code of Conduct. Numerous sections of the American Psychological Association’s Codes of Conduct and Ethics¹⁰ have been violated in this paper, particularly the fundamental maxim of the APA “Do no harm,” thus constituting scientific misconduct on many levels.

From Cabbolet (2013):

¹⁰ <http://www.apa.org/ethics/code/> “Principle A: Beneficence and Nonmaleficence Psychologists strive to benefit those with whom they work and take care to do no harm. “

“Smear

A few tell-tale signs that make clear that smear has nothing whatsoever to do with a scientific discourse:

1. it always concerns false allegations that more often than not are peppered with strong pejoratives;
2. it always gravely discredits someone else’s research as despicable;
3. **it always involves a gross violation of the principle of carefulness, one of the principles of good scientific practice, with regard to checking the correctness of the allegations;** more often than not, the allegations are taken straight to the mass media, that is, without any prior discussion with the author(s) of the targeted work.”

At a higher level, the publication of Lewandowsky et al (2015) in a well-respected, peer-reviewed paper, thus condoning the use of such derogatory terms legitimizes this “Type Two Scientific Misconduct” [that] is other-harming and leads to falsely negative conclusions about someone else’s work.” (Cabbolet 2013) This scientific misconduct results in “three known issues are identified as specific forms of such scientific misconduct: biased quality assessment, smear, and officially condoning scientific misconduct” (Cabbolet 2013), the proof of which is in the publication of “Seepage...” It appears to be a violation of the Code of Publication Ethics¹¹ that the publisher, editors and peer-reviewers found it acceptable to condone such language.

First, let us address the factual failings of the “Seepage...” case study and see if it meets the parameters of “Smear” as described above from Cabbolet.

5. Case study’s citations do not support its claims

The Lewandowsky et al (2015) case study suggests that several studies support the notion of consensus via broad agreement on two principles: “a) the Earth is warming and (b) most of that warming has been due to human greenhouse gas emissions.”¹²

¹¹ <http://publicationethics.org/files/2008%20Code%20of%20Conduct.pdf> “champion freedom of expression”; “Editors should ensure that research material they publish conforms to internationally accepted ethical guidelines.”; “Editors have a duty to act if they suspect misconduct. This duty extends to both published and unpublished papers. Editors should not simply reject papers that raise concerns about possible misconduct. They are ethically obliged to pursue alleged cases.”

¹² Greenhouse gas emissions (CO₂, CH₄, N₂O, HFCs, PFCs, SF₆) are typically noted as a carbon dioxide ‘equivalent’ or CO₂e – having an equivalent warming effect as that ascribed to carbon dioxide (CO₂).

The principles are said to be supported by the research of three studies, Anderegg et al (2010), Doran and Zimmerman (2009) and Oreskes (2004). These three are often referred to as ‘consensus’ studies and it is often claimed that they show a “97% consensus” when they show nothing of the kind.

5.1 Lack of statistical relevance

The American Association for the Advancement of Science (AAAS) document of 1975 states: “The American scientific community, as we define it here, includes a wide range of very diverse individuals, who number at the very least several hundred thousand and possibly more than a million.”

The 2014 Congressional Research Study entitled “The US Science and Engineering Workforce”¹⁴ states that: “In 2012, there were 6.2 million scientists and engineers (as defined in this report) employed in the United States” with some 4% or 248,000 working in the physical sciences.

Based on the above figures, the three studies cited by Lewandowsky et al (2015) as showing broad support for the two principles of “the Earth is warming...due to human greenhouse gas emissions” cannot be said to have valid statistical scope as shown in the table below, nor do they show broad consensus.

	Number of Abstracts/Individuals under Review	Consensus Claimed
Oreskes (2004)	928 – ISI diverse types of scientists	“75% fell into the first three categories, either explicitly or implicitly accepting the consensus view; 25% dealt with methods or paleoclimate, taking no position on current anthropogenic climate change. Remarkably, none of the papers disagreed with the consensus position.” Thus, ~97% assumed consensus (based on a review of abstracts only with no delineation of scientists’ assessment of % of human vs. natural influence)

Doran & Zimmerman (2009)	12,000 database of Earth scientists 10,257 respondents 3,146 surveyed 79 “climate” scientists	97% (of 79 scientists)
Anderegg et al (2010)	1,372 reduced to 908 Credibility: focussed on 4 most cited papers	97-98%
	Convinced or Unconvinced by evidence: based on multi-signatory papers signed by researchers	66% (CE - convinced by evidence) 34% (UE- unconvinced by evidence)

¹⁴ <http://fas.org/sgp/crs/misc/R43061.pdf>

Indeed the 2008 US Senate Minority report cites some 650 scientists as rejecting the theory of human-caused global warming.¹³ Many of those scientists explicitly reject carbon dioxide (CO2) from human emissions as a causative factor at all.

Contrary to President Barack Obama’s infamous tweet of May 16, 2013 in which he stated: “Ninety-seven percent of scientists agree: #climate change is real, man-made and dangerous,”¹⁶ there has never been a survey of *all* scientists on this topic, nor is there a single survey of climate scientists that supports these claims.

5.2 Citations do not support the stated cause

The cited works, Anderegg et al (2010), Doran and Zimmerman (2009) and Oreskes (2004) do not address the two principles stated in Lewandowsky et al (2015) as having ‘broad agreement.’ Likewise, there are other issues with these studies that should invalidate them for use as supporting evidence of a ‘consensus.’ First, let us review the stated objectives of these studies.

¹³ <http://www.inhofe.senate.gov/download/?id=c94cb1b0-747e-4d6b-984a-f27664a23831&download=1>

¹⁶ <https://twitter.com/barackobama/status/335089477296988160>

Author(s) & Date	Title & Stated Intent
Oreskes, N. 2004	<p>The Scientific Consensus on Climate Change</p> <p><i>[Referring to IPCC & various professional scientific society statements...]</i>“The drafting of such reports and statements involves many opportunities for comment, criticism, and revision, and it is not likely that they would diverge greatly from the opinions of the societies’ members. Nevertheless, they might downplay legitimate dissenting opinions. <i>[bold emphasis added]</i> That hypothesis was tested by analyzing 928 abstracts, published in refereed scientific journals between 1993 and 2003, and listed in the ISI database with the keywords “climate change” Erratum: ” The keywords used were “global climate change,” not “climate change.” Post date 21 January 2005</p>
Doran & Zimmerman 2009	<p>Examining the Scientific Consensus on Climate Change</p> <p><i>“The objective of our study presented here is to assess the scientific consensus on climate change through an unbiased survey of a large and broad group of Earth scientists.”</i></p>
<p>Anderegg et al sent for review Dec. 22, 2009</p> <p>Contributed† by Stephen H. Schneider PNAS publication date April 9, 2010</p>	<p>Expert credibility in climate change</p> <p><i>“Here, we use an extensive dataset of 1,372 climate researchers and their publication and citation data to show that (i) 97-98% of the climate researchers most actively publishing in the field surveyed here support the tenets of ACC [Anthropogenic Climate Change] outlined by the Intergovernmental Panel on Climate change, and (ii) the relative climate expertise and scientific prominence of the researchers unconvinced of ACC are substantially below that of the convinced researchers.”</i></p>

†See “Conflict of Interest” below

5.2.1 Oreskes (2004)

5.2.1.1 Abstracts mention global climate change, but not the author's position on IPCC definitions of the % level of certainty and cause

Oreskes (2004) was not a peer-reviewed paper but rather an essay published in the AAAS Science Magazine drawn from an excerpt of a George Sarton Memorial Speech¹⁴ she had given in Feb 13, 2004 to the AAAS. The content appears to be the basis of a subsequent book chapter Oreskes wrote (published in 2007) entitled “The Scientific Consensus on Climate Change: How do we Know We’re Not Wrong?”¹⁵ ¹⁶

The essay reports a review of 928 abstracts from the Institute for Scientific Information (ISI) database, spanning diverse types of abstracts of scientific papers that mentioned “global climate change.” Oreskes’ term does not ascribe any particular cause (such as human industry) or factor (such as greenhouse gas emissions). Further description of the study is found in her subsequent Chapter 4 in which the research question is delineated as: “Global climate change is occurring, and human activities are at least part of the reason why.” This research question does not state human greenhouse gas emissions as a causative factor, but rather “human activities.” Nor does the question suggest a scope of influence of any activity or factor – and it gives only minimal weight to human activity as “at least part of the reason.”

Oreskes essay of 2004 claimed: “This analysis shows that scientists publishing in the peer-reviewed literature agree with IPCC, the National Academy of Sciences, and the public statements of their professional societies. Politicians, economists, journalists, and others may have the impression of confusion, disagreement, or discord among climate scientists, but that impression is incorrect.”

However, as Pielke (2005) rebutted, this claim of “consensus” on the principle that humans may have *some* effect on climate, does not allow for the robust and diverse views of the hundreds of scientists who dissent on the scope or ratio of influence between natural factors (like the sun, atmospheric oscillations, ocean currents) or human factors (including land disturbance like forestry, agriculture, dam construction, or

¹⁴ This essay is excerpted from the 2004 George Sarton Memorial Lecture, “Consensus in science: How do we know we're not wrong,” presented at the AAAS meeting on 13 February 2004. ... (From notes of Oreskes’ essay <http://www.sciencemag.org/content/306/5702/1686.full>)

¹⁵ <https://www.lpl.arizona.edu/sites/default/files/resources/globalwarming/oreskes-chapter-4.pdf>

¹⁶ Oreskes, Naomi 2007, “The scientific consensus on climate change: How do we know we’re not wrong?” Climate Change: What It Means for Us, Our Children, and Our Grandchildren, edited by Joseph F. C. DiMento and Pamela Doughman, MIT Press, pp. 65T99.

greenhouse gas emissions, or agriculture, etc). These dissenting views are primarily founded in complex scientific arguments; they are not knee-jerk “contrarian” or “denial” responses without substance.

Nor does Oreskes’ review of abstracts prove agreement or consensus. Peiser (2005)¹⁷ exposed this when he reran Oreskes’ study and he found that of the 1,138 abstracts he reviewed only 13 scientists explicitly agreed with the IPCC 2004 definition of Anthropogenic Global Warming (AGW). Most papers Peiser reviewed had no stated position on humans or greenhouse gas emissions, or the scope, as factors in climate change at all. The papers simply mentioned the words ‘global climate change.’

5.2.1.2 Accepted definitions of human-caused climate change include factors beyond greenhouse gases

Note that several definitions of human-caused climate change, like that of Houghton’s 1996 definition include other human activities as relevant causative factors... *“human activities, mostly fossil-fuel use, land-use change and agriculture.”* These other relevant factors are excluded from the Lewandowsky (2015) case study’s principles, skewing the study’s findings toward a singular factor of greenhouse gas emissions, one that is not supported by the citations.

5.2.1.3 Reliance on out-of-date works and statements that were subsequently and substantially revised

Lewandowsky et al (2015) are relying on Oreskes (2004) which referred to the IPCC’s 2004 report citing: “Human activities ... are modifying the concentration of atmospheric constituents ... that absorb or scatter radiant energy. ... [M]ost of the observed warming over the last 50 years is likely to have been due to the increase in greenhouse gas concentrations” [p. 21 in (4)]

By 2007 the IPCC itself had altered its definition of climate change from being solely caused by humans (as in 2004) to being caused by humans or nature or both – which is precisely the case most so-called ‘contrarians’ are trying to make.

¹⁷ <http://www.cfact.org/2005/05/04/dr-benny-peisers-letter-to-science-magazine-and-the-story-of-its-rejection/>

Consequently, even the title of the paper "**Seepage: Climate change denial and its effect on the scientific community**" uses the term "climate change" which the IPCC Redefined in 2007 as **any change in climate over time, whether due to natural variability or as a result of human activity.**

The IPCC itself agrees and confirms that climate changes and that it does so due to natural or human forces – how can Lewandowsky et al (2015) then accuse any authority or scientist of “denial?” How can they claim, as they do on page 4, that the American Geophysical Union, which “hosted 128 sessions over 5 days that contained the theme ‘uncertainty’” are doing so to simply “exaggerate their concern.” Lewandowsky et al (2015) then go on to argue against appearing to “be open to contrarian claims...inviting contrarians to conferences or public events...” when clearly the IPCC by definition recognizes climate changes for many reasons, and the evidence of its 2013 report confirms significant uncertainty over previous claims of accurate modelling.

Climate Change 2007: Synthesis Report¹⁸ ContentsSYR1

1 Observed changes in climate and their effects

1.1 Observations of climate change

Since the TAR, progress in understanding how climate is changing in space and time has been gained through improvements and extensions of numerous datasets and data analyses, broader geographical coverage, better understanding of uncertainties and a wider variety of measurements. {WGI SPM}

Definitions of climate change

Climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer. **It refers to any change in climate over time, whether due to natural variability or as a result of human activity.** [emphasis added] This usage differs from that in the United Nations Framework Convention on Climate Change (UNFCCC), where climate change refers to a change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods

Further, Oreskes states in her Chapter 4 writings: “But note that Svante Arrhenius and Guy Callendar predicted global warming before anyone ever built a global circulation model (or even had a digital computer).” However, she does not refer to Arrhenius’

¹⁸ http://www.ipcc.ch/publications_and_data/ar4/syr/en/mains1.html

subsequent 1906 work, in German, “*Die vermutliche Ursache der Klimaschwankungen*”¹⁹ (English translation)²⁰ in which he amended his earlier widely-cited view of 1896. His first calculations led Arrhenius to claim that a doubling of the concentration of CO₂ (then at approximately 300ppm) would lead to as much as a 5°C temperature rise. Arrhenius’ amended statement of 1906 shows that he decided, based on additional evidence and consideration, that warming would be no more than 1.6°C – and largely beneficial, not catastrophic, to human kind. Even so, he also cites many uncertainties, particularly about water vapour, and many of those are with us today.

Oreskes, a science historian, is either unaware of this amendment or intentionally omits reference to it, as does Lewandowsky et al (2015).

Arrhenius’ amended scientific statement supports the present observations of 18+ years of temperature stagnation, and the case of most dissenting scientists, meaning that the catastrophic climate scenario inherent in the early IPCC statements may be null and void.

5.2.2 Doran and Zimmerman (2009)

Doran and Zimmerman (2009) does not support the Lewandowsky et al (2015) alleged agreement that “the Earth is warming...due to human greenhouse gas emissions.” Doran and Zimmerman (2009) asked two opinion questions of 10,257 earth scientists, to which there were 3,146 survey respondents. Neither of the questions correspond with the Lewandowsky et al (2015) defined agreement.

Q1: “When compared with pre-1800’s levels, do you think that mean global temperatures have generally risen, fallen, or remained relatively constant?” 89.5% of survey participants thought temperatures had risen, while 0.5% thought temperatures had fallen, 5.7% thought it had remained relatively constant, and 4.2% had no opinion or were unsure.”

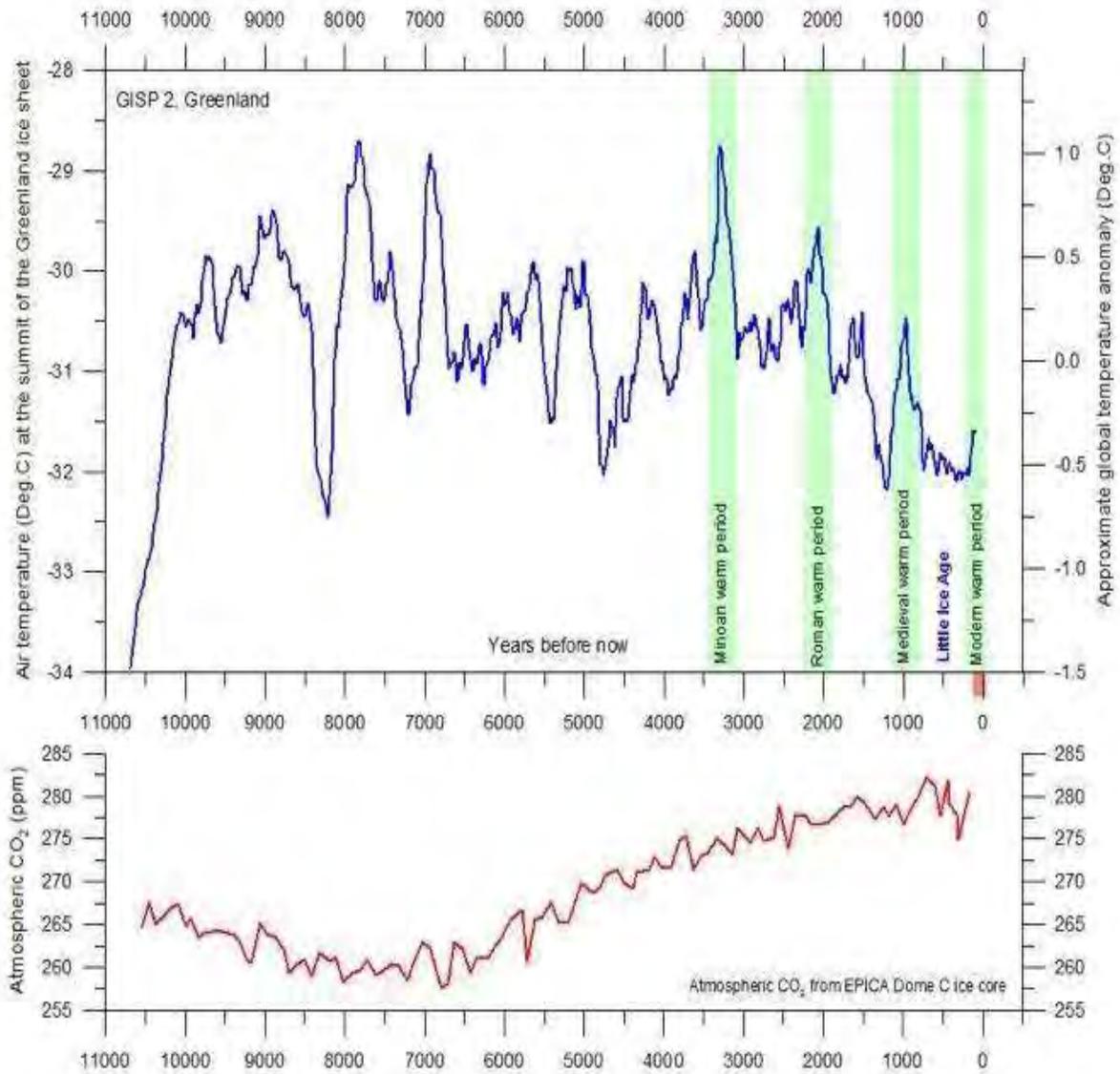
The question does not mention any human-caused reason for a rise in temperature, therefore it cannot rightly be said to show any consensus of the IPCC AGW declaration. Most geologists would agree temperatures have risen because since 1880 the earth has been warming out of the cold period known as the Little Ice Age. The cause is the subject of debate, but the warming to 1940 could not have been caused by CO₂ emissions because these emissions were too low.

¹⁹ <http://www.friendsofscience.org/assets/documents/Arrhenius1906.pdf>

²⁰ <http://www.friendsofscience.org/assets/documents/Arrhenius%201906,%20final.pdf>

Emails to Zimmerman from respondents, published in her thesis “The Consensus on the Consensus”²¹ the source material of the study, argue against the fact that her question asks for an opinion on an empirical topic, instead of a statement of evidence, and the questions have no parameters of time. Doran and Zimmerman were assessing a group of earth scientists (primarily geologists) whose view of time may stretch back eons. The main focus of AGW is from 1880 forward; geologists reviewing the Holocene period dating back 11,700 years Before Present would likely see an overall cooling temperature in earth’s climate, as shown below in the Greenland Ice Cores chart. Note that the corresponding graph in red showing carbon dioxide levels clearly disputes the claim that higher concentrations of carbon dioxide leads to warming – the evidence herein shows the exact opposite.

²¹ <http://www.lulu.com/shop/m-r-k-zimmerman/the-consensus-on-the-consensus/ebook/product-17391505.html>



Source: Ole Humlum Climate4You The upper panel²² shows the air temperature at the summit of the Greenland Ice Sheet, reconstructed by Alley (2000) from GISP2 ice core data. The lower panel²³ shows the past atmospheric CO₂ content, as found from the EPICA Dome C Ice Core in the Antarctic (Monnin et al. 2004).

²² **Top Temperature Graph**

GISP2 is the Greenland Ice Sheet Project 2, which was a project to drill an ice core on the summit of the ice sheet in Greenland. Drilling was completed on July 1, 1993 after five years of drilling, reaching an ice core depth of 3053.4 m. GISP2 ice core temperature data ends about a century ago.

The Alley (2000) paper reference is "Alley, R.B. 2000. The Younger Dryas cold interval as viewed from central Greenland. *Quaternary Science Reviews* 19, 213-226.", [here](#). The data is stored at NOAA [here](#).

²³ **Bottom CO₂ Graph**

Consequently many respondents to the survey declined to participate because the questionnaire was improperly phrased by not including time parameters, and the survey relied on opinion, not empirical evidence.

Likewise, the second question by Doran and Zimmerman (2009) does not respond to Lewandowsky et al (2015) “broad agreement” as greenhouse gases are not mentioned: Q2: "Do you think human activity is a significant contributing factor in changing mean global temperatures?"

This question does not refer to any specific percentage of influence, which the IPCC definitions use, **nor does this question specify greenhouse gas emissions as a causative factor.** Therefore Doran and Zimmerman (2009) cannot be said to support the case of Lewandowsky et al (2015).

Furthermore, a review of the original basis of the Doran and Zimmerman (2009) paper, the MA thesis of MK Zimmerman entitled “The Consensus on the Consensus”²⁴ shows startling evidence that many scientists surveyed emphatically *disagreed* that human industrial emissions of greenhouse gas are the principle cause of warming in this contemporary period. Most of those who wrote-in answers stated the major influence was the sun or other natural factors. A handful acknowledged that humans also have some nominal impact.

As shown by the comments below, there has been a gross violation of the principle of scientific carefulness as well, in that these valuable comments from qualified scientists have been ignored, while the short summary paper of Doran and Zimmerman (2009) has been widely accepted without question as demonstrating ‘consensus,’ when, as shown above, the number of 79 is a statistically insignificant sample size vis-à-vis the number of scientists in the US alone and as shown below, there are numerous dissenting views based on substance, not ‘denial’ or ‘contrarianism.’

EPICA is the European Project for Ice Coring in Antarctica. It is a multinational European project for deep ice core drilling in Antarctica. Dome C means the location at Concordia Station, which is 3233 m above sea level. Drilling was completed in December 2004, reaching a drilling depth of 3270.2 m. The EPICA ice core data ends in 1777 A.D.

²⁴ <http://www.lulu.com/shop/m-r-k-zimmerman/the-consensus-on-the-consensus/ebook/product-17391505.html>

Write-in Comments to MK Zimmerman from “The Consensus on the Consensus,” comparing the number of Earth scientists who support the Sun or natural factors as drivers of climate change versus the influence of humans on climate change

#	Supporting Sun or other natural factors as causes and geologic or solar cycles as models as evidence	Supporting CO2/Humans as causes and climate evidence
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1A.

*“The extremely rapid increase in global temperatures over the past 10 years and the ability of numerical models to simulate the increase”
(This is the only response to specifically point to human causes)*

1 *“solar activity but maybe[sic] decrease in solar flares and increasing solar[sic] cycle times”*

2 *“Much better correlation between solar energy and surface temp. than CO2 and surface temp.”*

3 *“We are in a pattern of recurring natural climate cycles that exactly predict the past 30 yrs of warming and the current 10 yrs of global cooling (yes, COOLING!) as confirmed by all major global temp measuring systems. In addition, of the past 28 warming periods, only the last one could have involved CO2. Also, the precise correlation of solar variation with climate changes is more than just coincidental. No real, physical evidence exists that CO2 is the cause of the past 30 years of warming and all of the previous warming occurred BEFORE significant manmade CO2 emissions.”*

4 *“All of the above”*

- 5 *“increased solar wind intensity”*
- 6 *“Both natural climate cycles and solar activity”*
- 7 *“The carbon dioxide theory is based on computer [sic] output. Short term changes in Global Climate cannot reasonably be connected to a rise or fall of ten or so parts per thousand of carbon dioxide.”*
- 8 *“Complex feedback systems causing advance and retreat of great ice sheets”*
- 9 *“There are likely a number of compounding natural factors including the ones you list (i.e., Milankovitch cycles, solar radiation output/cycles, etc. This does not mean that CO2 output from man-related sources do not contribute in a minor secondary manner; however, there is abundant, non-politically driven scientific studies that would indicate the primary causes of recent (last several hundred years) climate increases are the result of natural factors and not man-related activities.”*
- 10 *“the increase in temperature does not correlate with the increase in CO2. It appears more tied to some kind of natural cycle.”*
- 11 *“Your first two choices appear reasonable as possible causes of global temperature change. Also, I am aware that the Quaternary glaciations occurred and abated, with at least 4 major peaks, prior to people evolving and/or prior to the industrial revolution. In addition, the most recent warming commenced at the peak of the Little Ice Age, about 1680 but certainly between 1650 and 1700, at least 100 years prior to the start of the industrial revolution and at least 200 years prior to the major use of fossil fuels by humans.”*

- 12 *“ca 14,00 yr ago Great Basin contained many large lakes & Sierra Nevadas had many glaciers. Currently there are [sic] only a few lake remnants & the glaciers have all melted. This process began pre-industrial revolution and pre-major carbon releases by mankind”*
- 13 *“All of the answers.”* Includes some human
- 14 *“All of these combined, preferential [sic] funding and media hype”* Includes some human
- 15 *“Global climate records of the last 60 MY.”*
- 16 *“We cannot separate out, with adequate precision, the different factors.”*
- 17 *“multiple lines of data suggest humans are not the first order drivers of climate”*
- 18 *“There temperature record is not long enough to form any significant hypothesis regarding the cause of the observed temperature increase. What we are probably experiencing is random variability imprinted on long term cycles such as milankovitch, and shorter cycles such as the amount of solar insolation due to sunspot activity and forcing by other similar natural phenomenon. Compared to the natural sources of greenhouse gas input, the amount of greenhouse gas generated by humans is relatively” insignificant.*
- 19 *“Climate has been changing throughout the Holocene for uncertain natural causes. Perhaps it is solar output, but I don't think that has been ascertained with strong evidence. Nonetheless, for whatever reason the climate has constantly been changing and there is no compelling reason to believe that human activity is the current cause given that the current increase began 150 years ago, well before human activity was sufficient to create change.”*

20	<i>"I think the climate record is far too incomplete, that the impact of solar input and volcanic inputs are poorly known and that our ability to accurately model the climatic system is far too immature and untested to rely on current predictions"</i>	
22	<i>"Effects of solar radiation and solar wind on outer atmosphere layers"</i>	
23	<i>"Throughout geologic time climate and temperature have had very large variations. Right now, we are on a 400 year overall rise, and part of a general rise since the end of the last glaciation 14-18,000 years ago."</i>	
24	<i>"Current climate falls well within geologic [sic] norms and recent increases in CO2 lag behind 'correlative' rises in temperature."</i>	
25	<i>"it is human and natural environment [sic], one needs to separate cause and reaction"</i>	Human influence acknowledged
26	<i>"data sets feeding models is incomplete"[sic]</i>	
27	<i>"global temperatures changes do not mirror steady CO2 increase"</i>	
28	<i>"both 1 and 2 and current global records do not cover a significant enough length of time to make the types of projections that are being made"</i>	
29	<i>"See Jan Veizer papers" (solar influence)</i>	
30	<i>"temperature increase follow sunspot cycle length"</i>	
31	<i>Combination of A and B plus - we don't know how climate actually works"</i>	
32	<i>warming and cooling cycles have been occurring since the earth was formed"</i>	

33	<i>“There are indications that natural terrestrial processes are at work including cyclical ocean currents. In addition solar energy output needs to be studied to determine what sorts of fluctuations can take place and have taken place, and, what these fluctuations mean to Earth's climate. (Just to mention a couple.)”</i>	
34	<i>“All three choices contribute to global climate cycles”</i>	Human influence acknowledged
35	<i>“All of the above and that the time interval and random geologic process has a greater impact. Human activity only exaserbates [sic] the temperature rise. But we are at a deliquate point of balance in S.L. fluctuation and need to try to keep the surface cool.”</i>	Human influence acknowledged
36	<i>“solar ouput [sic] differences observed over the past fifty years and estimates of planetary warming on Mars”</i>	
37	<i>“I appreciate the limitations of this survey method, but I'm not sure that simplifying complex questions this way is all that helpful in understanding how science is done. Most scientists acknowledge uncertainties in hypotheses so asking black/white questions like this (you either think it is or think is isn't; you're not allowed to think that it may be). For example, I might I guess that 80% of my fellow geoscientists are at least 50% sure that human activity may be at least 50% responsible for global warming.”</i>	

Of 38 replies listed above, 37 see natural variability (solar factors, orbits, oceans, etc.) as the drivers of climate change; 5 of those responses also acknowledge some human impact and only one response claims that models show humans are the driver of climate change.

The write-in answers received by MK Zimmerman reveal significant rejection of the Anthropogenic Global Warming theory (due to greenhouse gases). However, these

earth scientists, whose knowledge base also includes climate sciences, were not deemed to be qualified respondents, as they did not self-identify as regularly publishing on the topic of climate. Note that none of the comments in the table above ‘deny’ that climate changes and none of these comments could be considered to be ‘contrarian’ – a term typically reserved for those who oppose a view for the sake of opposition alone. Many provide substantiating explanations, meaning large numbers of qualified scientists who hold dissenting views on the AGW theory are being bullied and intimidated out of the public conversation by papers like that of Lewandowsky et al (2015), and regrettably, such language against dissenting scientists is now officially condoned by a major peer-review journal and publisher.

So, how did this become a “consensus” survey when write-in comments reject the alleged consensus position? Of the group of 3,146 respondents, a self-selected sub-set of 79 individuals, credentials unknown, who claimed to be regularly publishing on climate science, became the 100% pool. When asked the two opinion questions, 77 said “risen” to question 1 and 75 said “yes” to question 2.

Zimmerman’s survey had an additional sub-set of questions. “Q3 Do you think human activity is a significant contributing factor in changing mean global temperatures?” Again, the reference is to human activity, not specifically greenhouse gas emissions, and “significant” does not state a percentage of influence as the IPCC does.

5.2.3 Anderegg et al (2010)

Anderegg et al (2010) reviewed lists of various climate declarations signed by scientists and IPCC participants and delineated those “Convinced” or “Unconvinced” by the evidence (IPCC AR4 2007 declaration).

The IPCC 2007 definition of climate change, as noted above in the section on Oreskes, was changed to include “natural variability or human activity.” This means that Anderegg et al (2010) does not support Lewandowsky et al (2015) “consensus on climate change” is the broad agreement that “the Earth is warming...due to human greenhouse gases emissions” since Anderegg used the term Anthropogenic Climate Change (ACC), but the IPCC had accepted that climate change was defined as any change in climate whether caused by natural variability or human factors.

Anderegg et al (2010) found 66% were “CE – Convinced by the Evidence” – but this does not describe to what extent or what cause convinced these scientists (i.e. perhaps some thought deforestation, dam building or agriculture had a more important role). In

part two of their survey, Anderegg et al (2010) reviewed the top 100 most published/most cited researchers. They reported that 97% are “Convinced by the Evidence” in support of the IPCC AR4 2007 declaration.

This is not surprising because papers that support the IPCC position appear to get preferential peer-review approval and research funding, according to scientists whose work challenges the IPCC mandate to explore human-causes²⁸ of climate change. This is a consequence of type Two Scientific Misconduct as noted by Cabbolet (2013). Dr. Roy Spencer, a scientist who holds dissenting views to AGW writes, “I would guess today’s research funding lopsidedness is currently running at least 100 to 1, humans versus nature.”

The “Climategate”²⁹ emails revealed that climate journals are controlled by IPCC affiliated scientists who tend to reject papers skeptical of AGW, despite having good technical quality but give only cursory review of papers supporting the IPCC position.

This is known as “confirmation bias” (Nickerson 1998) in science. Many scientists do not see warming as particularly dangerous - their views are rarely published or cited. In their study, Anderegg et al changed both the declaration (to “tenets,” which is a belief or idea, not a definition or declaration) and the term (Anthropogenic Climate Change - ACC):

“(i) 97–98% of the climate researchers most actively publishing in the field support the tenets of ACC outlined by the Intergovernmental Panel on Climate Change, and (ii) the relative climate expertise and scientific prominence of the researchers unconvinced of ACC are substantially below that of the convinced researchers”

²⁸ 1. Scope and Approach of the Assessment 1.1. Mandate of the Assessment

The Intergovernmental Panel on Climate Change (IPCC) was established by World Meteorological Organization and United Nations Environmental Programme (UNEP) in 1988 to assess scientific, technical, and socioeconomic information that is relevant in understanding human-induced climate change, its potential impacts, and options for mitigation and adaptation.

<http://www.ipcc.ch/ipccreports/tar/wg2/index.php?idp=22>

²⁹ <http://www.drroyspencer.com/2011/11/climategate-2-0-bias-in-scientific-research/>

The Anderegg et al (2010) study was published in the prestigious Proceedings of the National Academy of Sciences (PNAS), despite the fact that the authors were not members of the National Academy of Sciences (NAS). Anderegg, the lead author, was an MA student at the time. PNAS accepted this study as a “contributed” article from NAS member, the late Stephen Schneider. Any member of the NAS had, at that time, the right to submit four “contributed” articles per year of which they had to be part of the design, but did not have to have done the research themselves. These submissions were reviewed by two qualified reviewers of the contributor’s choice.

By contrast, the PNAS has a very stringent “Direct Submission”ⁱ peer-review process that a “contributed” article does not go through. However, by the very fact of its publication in the PNAS, a “contributed” article garners the same high profile and assumed level of scientific diligence for the uninformed reader, as a stringently, blind, peer-reviewed Direct Submission paper.

Anderegg et al (2010) study also published a list of scientists as to who the authors claimed were Convinced or Unconvinced by Evidence. A number of scientists who challenged the alleged “consensus” study objected saying that this was equivalent to creating a “blacklist” of scientists.

5.2.4 Unstated Conflicts of Interest

Oreskes 2004

At the time, the author had an possible unstated conflict of interest. In Oreskes’ CV it states that she was a “*Member, National Academy of Sciences/National Research Council Committee on the Use of Models in Regulatory Decision Making 2004-2007.*”

Anderegg et al (2010)

Anderegg et al (2010) - This paper was “contributed” to the PNAS by NAS member Stephen Schneider. “Contributed” articles allowed an NAS member to submit four articles a year, of which they only needed to be party to the design. The article was then reviewed by two qualified reviewers of the NAS member’s choice. (This is commonly known as “pal-review”; see contrast to “Direct Submission” process of that time.) Schneider was an early proponent in the 1980’s of reduction of greenhouse gas emissions as a means of stopping global warming. He was founder and editor of Climatic Change Journal. He was a Coordinating Lead Author in Working Group II IPCC TAR and co-anchor of the Key Vulnerabilities Cross-Cutting Theme for the Fourth Assessment Report (AR4).

6. **Attributing Intent**

The foregoing has dealt with only the first part of the first sentence of Lewandowsky et al (2015); the second part of the sentence curiously attributes intent to something the NAS Code of Conduct states is an inherent fact of scientific inquiry – “uncertainty.” Lewandowsky et al (2015) state: (Opponents to consensus)... “have often emphasized scientific uncertainty in order to **forestall mitigative action.**”

This statement is an unsupported assumption and is inappropriate in a scientific paper.

As noted in the NAS Code of Conduct:

“The fallibility of methods is a valuable reminder of the importance of skepticism in science. Scientific knowledge and scientific methods, whether old or new, must be continually scrutinized for possible errors. Such skepticism can conflict with other important features of science, such as the need for creativity and for conviction in arguing a given position. But organized and searching skepticism as well as an openness to new ideas are essential to guard against the intrusion of dogma or collective bias into scientific results.”

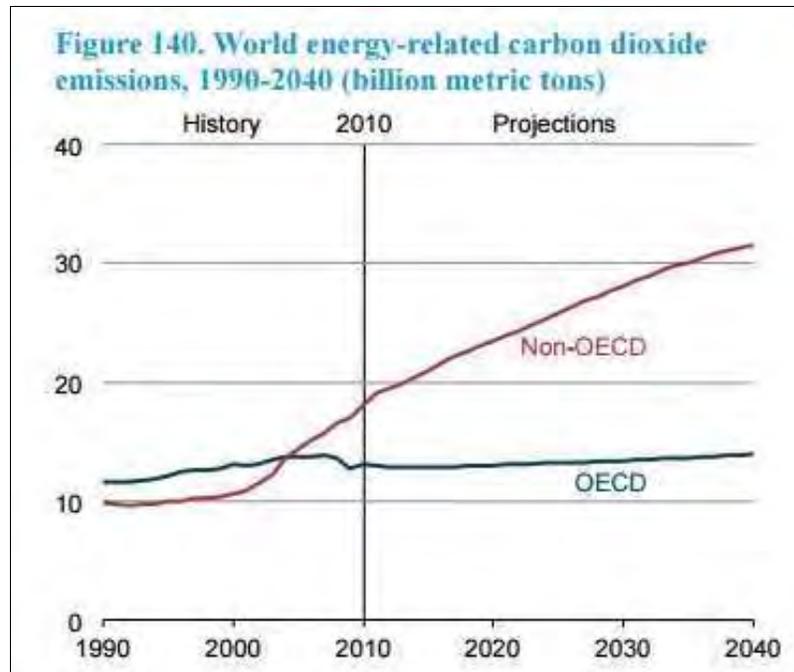
By contrast, the publication of Lewandowsky et al (2015) appears to enshrine dogma in climate science through allowing these sweeping allegations to be published in a peer-reviewed journal, suggesting that those who cite uncertainty are doing so to “forestall mitigative action” rather than to continue the process of scientific inquiry. No evidence is provided to prove that all dissenting scientists are intending only to prevent mitigation efforts and no evidence is provided to demonstrate that many or all mitigation efforts are deemed to be necessary or effective.

7. **Forestalling economic ruin is a valid argument as is seeking more beneficial application of financial resources**

Numerous studies question the effectiveness of certain proposed mitigative actions, particularly in light of other pressing human needs. For example, Bjorn Lomborg, who accepts AGW, is an outspoken advocate for spending the billions now going into climate change reduction strategies on improving conditions for people world-wide instead.²⁵

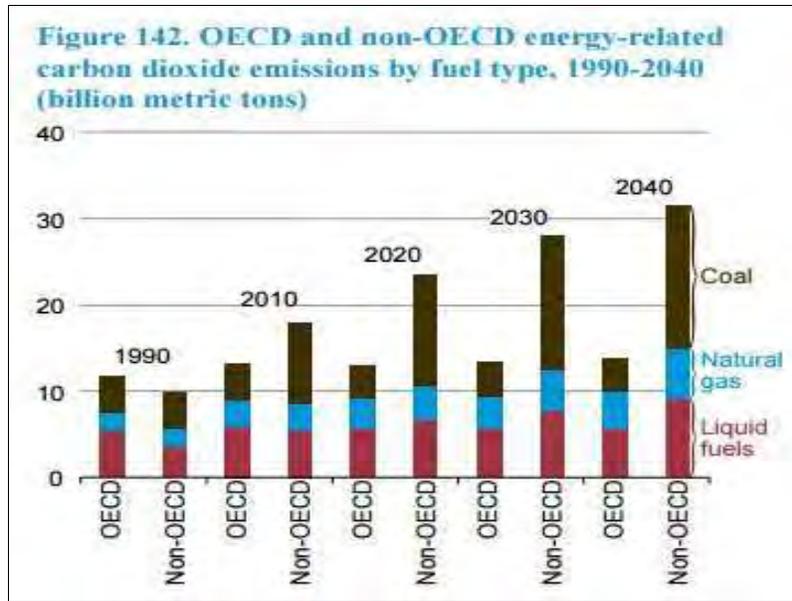
²⁵ <http://www.gatesnotes.com/Energy/Two-Videos-Illuminate-Energy-Poverty-Bjorn-Lomborg>

Studies by economists like Robert Lyman²⁶ question the value of economic destruction of industrialized societies for minimal or inconsequential environmental benefits as does Tol (2005), Tol (2009). These questions are relevant as rising fossil fuel use in non-OECD countries would wipe out any greenhouse gas reductions made by OECD signatory nations, as shown in the graphs below.³² The stated objective of protecting the environment would not be met, and millions of people in the industrialized West, where environmental management is good and constantly improving, would be forced into unemployment and heat-or-eat poverty.



²⁶ http://friendsofscience.org/assets/documents/climate_change_implications_Lyman.pdf

³² [eia.gov/forecasts/ieo/pdf/0484\(2013\).pdf](http://eia.gov/forecasts/ieo/pdf/0484(2013).pdf)



Source: US EIA Energy forecast 2013

Certainly the forecasts above should be of concern for any citizen or policy-maker of a western, industrialized, OECD nation, and economic arguments must not be dismissed out of hand as if “contrarian.” These graphs show that any restriction on industry or consumer lifestyle vis-à-vis climate change policies in the west will be entirely useless in terms of protecting the environment.

Tol et al (2005) summarized an assessment of six different scenarios in developing nations, assessing the forecast spread of disease due to climate change versus the management and reduction of disease due to improvement of adaptive capacity from development, finding that: “As climate change can only be affected in the long term but adaptive capacity can be improved in both the short and long term, this implies that development is a better response to climate-change-induced infectious disease than is greenhouse gas emission reduction.”

Richard Tol (2009) later found: “The quantity and intensity of the research effort on the economic effects of climate change seems incommensurate with the perceived size of the climate problem, the expected costs of the solution, and the size of the existing research gaps. Politicians are proposing to spend hundreds of billions of dollars on greenhouse gas emission reduction, and at present, economists cannot say with confidence whether this investment is too much or too little.”

8. **Solar physics largely ignored in IPCC assessments – but solar cycles better match and explain temperature changes**

Numerous studies demonstrate a better match between solar cycles and natural variability than carbon dioxide levels: Ziskin and Shaviv (2011); Howard, Shaviv, Svensmark (2015); Shaviv and Veizer (2003), to name a few. The on-line website Club du Soleil²⁷ maintains a growing list of recent papers exploring various solar effects on climate change dating back to 2009.

9. **New Technologies and Insights aid Atmospheric, Oceanic and Solar Research**

Recent research insights from NOAA reveal how a reduction in water vapour in the upper atmosphere is a “wild card” in global warming as it reduces the predicted warming effect of rising CO₂²⁸; the work of Mike Fromm et al (2010) of US Naval Research Laboratory on the diverse, wide-reaching climatic effects of Pyrocumulonimbus ‘fire’ clouds from wildfires²⁹; incoming information from NASA’s Solar Dynamic Observatory³⁶ (operational for 5 years) and from the ARGOs system of 3,881 ocean drones (as of July 2015) (operational since 2000, adding some 800 drones per year) are providing new information on climate all the time.³⁰

Consequently, the uncertainties are very real and the quality and sources of content are changing rapidly all the time. Responsible scientists who are questioning the “consensus” are providing a valuable service to the public by illustrating the weaknesses and errors in the presumed “science is settled” consensus claim on climate change.

²⁷ <http://chrono.qub.ac.uk/blaauw/cds.html>

²⁸ http://www.noaanews.noaa.gov/stories2010/20100128_watervapor.html

²⁹ <http://journals.ametsoc.org/doi/pdf/10.1175/2010BAMS3004.1>

³⁶ <http://sdo.gsfc.nasa.gov/>

³⁰ http://www.argo.ucsd.edu/About_Argo.html

10. **Reliance on social science papers to ‘reframe’ audience perceptions flies in the face of stagnating temperature evidence**

The Lewandowsky et al (2015) attribution of the assumed intent of so-called ‘contrarians’ is to emphasize “scientific uncertainty to forestall mitigative action” is unsupported by their citation of three papers (Kim, 2011; Freudenburg et al., 2008; Nisbet 2009), all of which were written before the release of the IPCC’s 2013 report that clearly showed a significant divergence between models and observed temperatures. These cited papers appear to express consternation that “uncertainty” is being used as a tool to stop the implementation of sweeping climate change policies and action in support of the alleged crisis of climate change, when the evidence shows that a crisis in global warming is not occurring.

In fact, the IPCC report of 2013 demonstrated just how uncertain the science really is. It was at that time that the public was officially made aware that global warming had stagnated for some 15 years - (to 2012, the IPCC publication closing date). That period is now 18 years and 6 months – and clearly there is substantial uncertainty about the AGW theory as shown by this evidence.

With this evidence, it is curious that Lewandowsky et al (2015) appear to be the ones denying this reality and making counterfactual arguments. Likewise, it is regrettable that Lewandowsky et al (2015) have condoned the contrived and derogatory acronym “SCAM – Scientific Certainty Argumentation Methods” (Freudenburg et al., 2008) throughout their work. The word ‘scam’ means of course: “...a fraudulent or deceptive act or operation” or “a dishonest way to make money by deceiving people.”³¹

Implying that legitimate scientific dissent is a “scam” when dissenting scientists have reason to question, based on evidence, is a form of scientific dishonesty or misconduct.

If anything, the publication on September 30, 2013, of the IPCC’s Working Group I (Physical Sciences) report supports the need for “contrarian” voices like that of scientist Robert Carter (2006)³² who early-on was informing the public, through media channels, that global warming had apparently stopped or stagnated. The value of Carter’s early reporting and the diverse scope of “contrarian” commentary that is not focussed solely on human industrial greenhouse gas emissions is supported by a Submission from The Netherlands³³ government that calls for an overhaul of the IPCC saying:

³¹ <http://www.merriam-webster.com/dictionary/scam>

³² <http://www.telegraph.co.uk/comment/personal-view/3624242/There-IS-a-problem-with-global-warming...-it-stopped-in-1998.html>

³³ [http://www.knmi.nl/research/ipcc/FUTURE/Submission by The Netherlands on the future of the IPCC laatste.pdf](http://www.knmi.nl/research/ipcc/FUTURE/Submission%20by%20The%20Netherlands%20on%20the%20future%20of%20the%20IPCC%20laatste.pdf)

“The IPCC needs to adjust its principles.

We believe that limiting the scope of the IPCC to human-induced climate change is undesirable, especially because natural climate change is a crucial part of the total understanding of the climate system, including human-induced climate change.”

The Netherlands submission also addresses the time lag, the need for inclusion of societal bodies affected by IPCC statements and that the reports should be web-based and regionalized – as part of an effort to be more timely and relevant.

“The Netherlands is also of the opinion that the word ‘comprehensive’ may have to be deleted, because producing comprehensive assessments becomes virtually impossible with the ever expanding body of knowledge and IPCC may be more relevant by producing more special reports on topics that are new and controversial.”

In the author’s opinion, the public and policy-makers should be asking, “Why did we have to wait another seven years to find this out from the IPCC authorities? Why wasn’t the scientific community asking these questions and giving due respect to dissenting viewpoints on the alleged consensus?”

Why was it the lone voice of a “contrarian” giving us a heads-up that warming had stagnated, seven years before it was officially reported by the IPCC?

11. Organized skepticism dismissed and not supported by references

In Section 5.1 “Stereotype threat,” Lewandowsky et al (2015) refer to the norms of science described by sociologist Merton (1942)³⁴ and claim that “empirical evidence shows that these norms continue to be broadly internalized by the scientific community,” citing Macfarlane and Cheng (2008). In fact, a review of the Methodology and Results of Macfarlane and Cheng reveals that their paper relied on six hundred and seventy-one responses from self-selected UK academics of which 44.7 per cent were from either Arts or Humanities and some 20.1 per cent were from Social Sciences. The majority were lecturers (65.1 per cent) and only 1 in 10 were full professors.

³⁴ http://sciencepolicy.colorado.edu/students/envs_5110/merton_sociology_science.pdf

This means that the views reflected mostly an UK academic community of social sciences, arts and humanities, whose work bears little relationship to the empirical demands of the physical sciences.

Furthermore, a key parameter, most relevant to the discussion at hand, is that of Merton's fourth principle – “organized skepticism.”

According to Macfarlane and Cheng's methodology:

“Organized skepticism was excluded from this analysis for two reasons. Firstly, prior analysis of the literature did not suggest that this value had necessarily shifted or been challenged in the same way as the first three: communism, universalism and disinterestedness. Secondly, difficulties were encountered in constructing value statements that adequately reflected positive and negative positions with respect to organized skepticism as a value.”

Therefore, no relevant consideration or validity was given to Merton's fourth and crucial principle which supports his notion that:

“...organized skepticism is variously interrelated with the other elements of the scientific ethos. It is both a methodological and an institutional mandate.”

Merton supports the view of scientists challenging consensus in the statement:

“Science which asks questions of fact, including potentialities, concerning every aspect of nature and society may come into conflict with other attitudes toward these same data which have been crystallized and often ritualized by other institutions.”

Here we can clearly see the conflict of any dissenting scientists colliding with the ritualistic nature of the continuous cycle of climate change conferences over the past 21 years, where the Working Group I – the Physical Scientists' voices and views – have been overwhelmed by the interventions of politicians, environmental non-governmental organizations (ENGOS), and the media seeking frenzied headlines.

Robert Stavins, a co-ordinating lead author of Chapter 13, Working Group III (Mitigation) surprised the world by publicly stating in an open letter:³⁵

“..I was surprised by the degree to which governments felt free to recommend and sometimes insist on detailed changes to the SPM [Summary for Policy Makers] text on purely political, as opposed to scientific bases.”

Dutch professor of economics, Richard Tol³⁶ left the Working Group II “Impacts, Adaptations” panel in 2014 saying:

“The panel is being governed from within the environmental policy, not from the science”

Long before this, in 2005,³⁷ scientist Chris Landsea made a public pronouncement about his resignation from the IPCC and described many curious goings-on that do not appear to have been in keeping with any aspect of the scientific method.

Merton (1942) lauds “The virtual absence of fraud...” in the annals of science and states:

“By implication, scientists are recruited from the ranks of those who exhibit an unusual degree of moral integrity.”

It is thus curious and disturbing that authors Lewandowsky et al (2015) avoid addressing the value of organized skepticism as a scholarly norm of science.

Meanwhile, unelected, unaccountable, financially powerful ENGOs are busy writing policy documents in advance of the Paris 2015 climate conference with little regard for the uncertainties stated by the Working Group I scientists in September 2013³⁸ authored by 259 from 600 contributing authors in total:

³⁵ <http://www.robertstavinsblog.org/2014/04/25/is-the-ipcc-government-approval-process-broken-2/>

³⁶ <http://www.nltimes.nl/2014/04/08/dutch-professor-leaves-un-climate-panel/>

³⁷ http://cstpr.colorado.edu/prometheus/archives/science_policy_general/000318chris_landsea_leaves.html

³⁸ <http://www.green-alliance.org.uk/resources/Paris%202015getting%20a%20global%20agreement%20on%20climate%20change.pdf>

“A total of 209 Lead Authors and 50 Review Editors from 39 countries and more than 600 Contributing Authors from 32 countries contributed to the preparation of WGI AR5.”³⁹

This compared to observers admitted to Conference of the Parties meetings:

“Over 1598 NGOs (non-governmental organizations) and 99 IGOs (intergovernmental organizations) are admitted as observers.”⁴⁰

As Merton (1942) noted in conclusion:

“Conflict becomes accentuated whenever science extends its research to new areas toward which there are institutionalized attitudes or whenever other institutions extend their control over science. In modern totalitarian society, anti-rationalism and the centralization of institutional control both serve to limit the scope provided for scientific activity.”

12. The IPCC introduced “hiatus” into the science; it did not “seep”

Box 9.2 | Climate Models and the Hiatus in Global Mean Surface Warming of the Past 15 Years

The observed global mean surface temperature (GMST) has shown a much smaller increasing linear trend over the past 15 years than over the past 30 to 60 years (Section 2.4.3, Figure 2.20, Table 2.7; Figure 9.8; Box 9.2 Figure 1a, c). Depending on the observational data set, the GMST trend over 1998–2012 is estimated to be around one-third to one-half of the trend over 1951–2012 (Section 2.4.3, Table 2.7; Box 9.2 Figure 1a, c). For example, in HadCRUT4 the trend is 0.04°C per decade over 1998–2012, compared to 0.11°C per decade over 1951–2012. The reduction in observed GMST trend is most marked in Northern Hemisphere winter (Section 2.4.3; Cohen et al., 2012). Even with this “hiatus” in GMST trend, the decade of the 2000s has been the warmest in the instrumental record of GMST (Section 2.4.3, Figure 2.19). Nevertheless, the occurrence of the hiatus in GMST trend during the past 15 years raises the two related questions of what has caused it and whether climate models are able to reproduce it.

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³⁹ <http://www.climatechange2013.org/contributors/>

⁴⁰ http://unfccc.int/parties_and_observers/items/2704.php

The above screenshot from the IPCC 2013 Working Group I report shows the source of the term “hiatus.” Curiously, authors Lewandowsky et al (2015) claim in Section 6.1 and 6.1.1 of their paper that the term “hiatus” has its roots in “contrarian” research and that it has thus “seeped” into mainstream scientific reporting.

Prior to the publication of this IPCC report, Hans von Storch of Germany, certainly not a “contrarian” by any stretch of the imagination, was interviewed by Der Spiegel⁴⁹ on June 20, 2013 on this topic. Von Storch refers to the timeframe as “taking a break” and “stagnation” – Der Spiegel refers to it as “a standstill” and “a pause.” The author has bolded some salient points:

SPIEGEL: Just since the turn of the millennium, humanity has emitted another 400 billion metric tons of CO₂ into the atmosphere, yet temperatures haven't risen in nearly 15 years. What can explain this?

Storch: So far, **no one has been able to provide a compelling answer to why climate change seems to be taking a break**. We're facing a puzzle. Recent CO₂ emissions have actually risen even more steeply than we feared. As a result, according to most climate models, we should have seen temperatures rise by around 0.25 degrees Celsius (0.45 degrees Fahrenheit) over the past 10 years. That hasn't happened. In fact, the increase over the last 15 years was just 0.06 degrees Celsius (0.11 degrees Fahrenheit) -- a value very close to zero. **This is a serious scientific problem** that the Intergovernmental Panel on Climate Change (IPCC) will have to confront when it presents its next Assessment Report late next year.

SPIEGEL: Do the computer models with which physicists simulate the future climate ever show the sort of **long standstill** in temperature change that we're observing right now?

Storch: Yes, but only extremely rarely. At my institute, we analyzed how often such a 15-year **stagnation** in global warming occurred in the simulations. The answer was: in under 2 percent of all the times we ran

⁴⁸ https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter09_FINAL.pdf

⁴⁹ <http://www.spiegel.de/international/world/interview-hans-von-storch-on-problems-with-climate-changemodels-a-906721.html>

the simulation. In other words, **over 98 percent of forecasts show CO₂ emissions as high as we have had in recent years leading to more of a temperature increase.**

SPIEGEL: How long will it still be possible to reconcile such a pause in global warming with established climate forecasts?

Storch: If things continue as they have been, **in five years, at the latest, we will need to acknowledge that something is fundamentally wrong with our climate models.** A 20-year pause in global warming does not occur in a single modeled scenario. But even today, we are finding it very difficult to reconcile actual temperature trends with our expectations. *[Note: July 2015 -we are now at 18 years and 6 months of temperature stagnation]*

SPIEGEL: What could be wrong with the models?

Storch: There are two conceivable explanations -- and neither is very pleasant for us. The first possibility is that less global warming is occurring than expected because **greenhouse gases, especially CO₂, have less of an effect than we have assumed.** This wouldn't mean that there is no man-made greenhouse effect, but simply that our effect on climate events is not as great as we have believed. The other possibility is that, in our simulations, **we have underestimated how much the climate fluctuates owing to natural causes.**

SPIEGEL: That sounds quite embarrassing for your profession, if you have to go back and adjust your models to fit with reality...

Storch: Why? That's how the process of scientific discovery works. There is no last word in research, and that includes climate research. **It's never the truth that we offer, but only our best possible approximation of reality.** But that often gets forgotten in the way the public perceives and describes our work.

SPIEGEL: But it has been climate researchers themselves who have feigned a degree of certainty even though it doesn't actually exist. For example, the IPCC announced with 95 percent certainty that humans contribute to climate change.

Storch: And there are good reasons for that statement. We could no longer explain the considerable rise in global temperatures observed between the early 1970s and the late 1990s with natural causes. My team at the Max Planck Institute for Meteorology, in Hamburg, was able to provide evidence in 1995 of humans' influence on climate events. **Of course, that evidence presupposed that we had correctly assessed the amount of natural climate fluctuation. Now that we have a new development, we may need to make adjustments.**

SPIEGEL: In which areas do you need to improve the models?

Storch: Among other things, there is evidence that the oceans have absorbed more heat than we initially calculated. Temperatures at depths greater than 700 meters (2,300 feet) appear to have increased more than ever before. The only unfortunate thing is that our simulations failed to predict this effect.

SPIEGEL: That doesn't exactly inspire confidence.

Storch: **Certainly the greatest mistake of climate researchers has been giving the impression that they are declaring the definitive truth.** The end result is foolishness along the lines of the climate protection brochures recently published by Germany's Federal Environmental Agency under the title "Sie erwärmt sich doch" ("The Earth is getting warmer"). Pamphlets like that aren't going to convince any skeptics. It's not a bad thing to make mistakes and have to correct them. **The only thing that was bad was acting beforehand as if we were infallible. By doing so, we have gambled away the most important asset we have as scientists: the public's trust.** We went through something similar with deforestation, too -- and then we didn't hear much about the topic for a long time.

Indeed, many scientists deemed to be 'contrarians' or 'deniers' have, for years, questioned the very aspects of the climate change debate highlighted in Hans von Storch's comments.

- 1) The veracity of the greenhouse effect
- 2) Whether the climate sensitivity ascribed to CO₂ was too high
- 3) Models should not take priority over observed evidence
- 4) The role of natural factors – do they supersede human-ascribed influence?

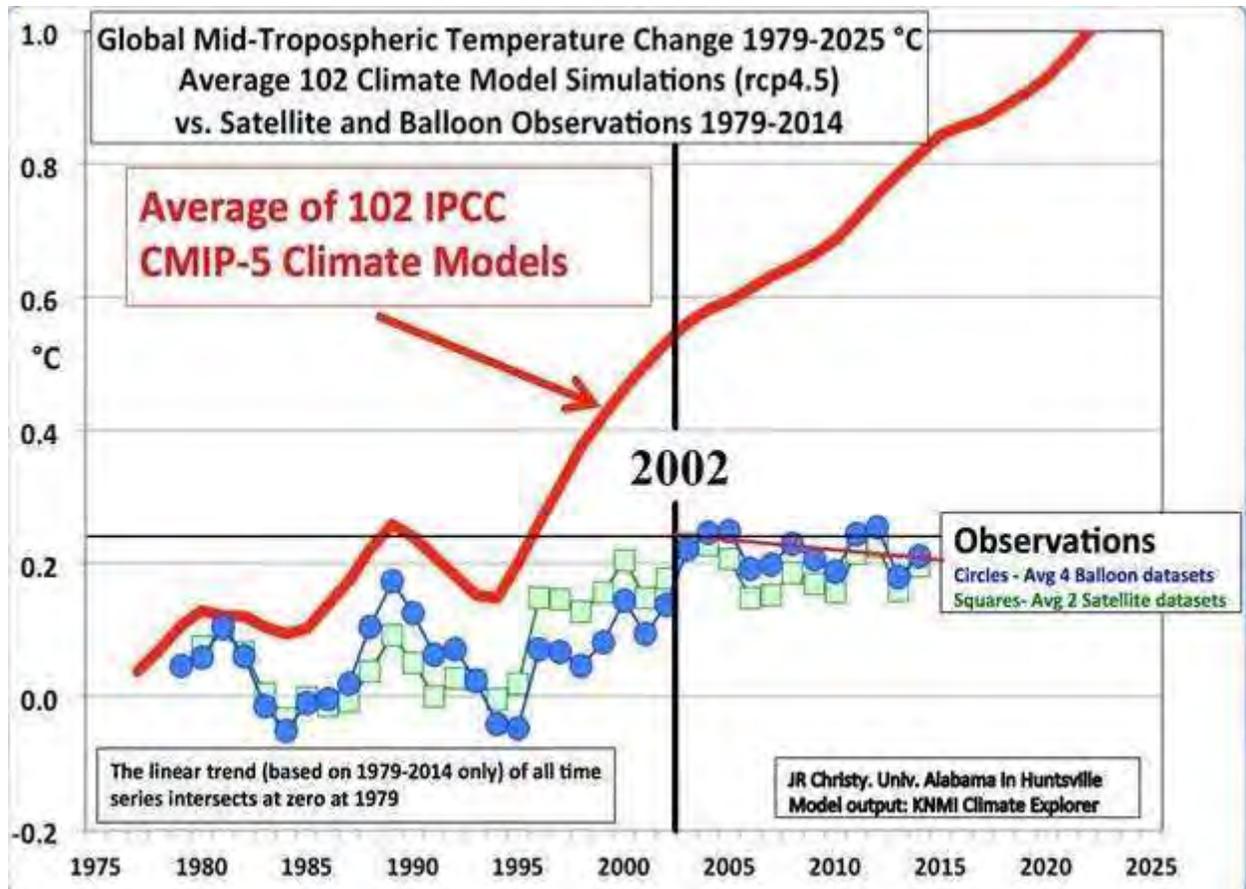
- 5) The process at the IPCC and in the public had become too politicized and highly emotional rhetorical hype on the 'certainty' of a global warming crisis had distorted the conversation away from science and evidence toward ideology

13. Evidence over Ideology

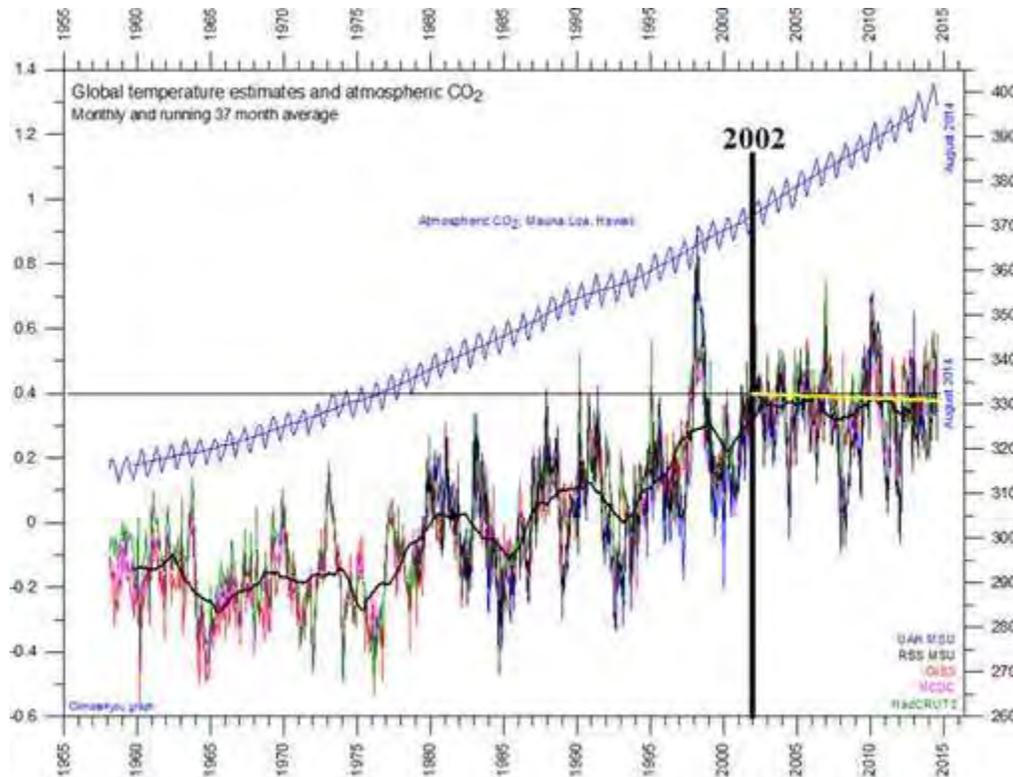
13.1 The Divergence between Model and Reality - the "Hiatus" or "Pause"

Indeed, any scientist *or citizen* reviewing the evidence below should be concerned at the disparity between the modelled projections – the rising red line (upon which governments are basing climate change policies), and the evidence of the actual temperatures shown in the blue and pale green dots and circles representing satellite and balloon temperature measurements.

In short, it is not getting hot despite a very significant rise in carbon dioxide (CO₂) – yet governments are still plowing full-speed ahead to sign greenhouse gas reduction agreements which will cost taxpayers and citizens a fortune.



Reference: Graph compiled by Dr. John Christy, University of Alabama in Huntsville. Climate models output from KNMI Climate Explorer [here](#). Satellite observation from University of Alabama in Huntsville [here](#) and Remote Sensing Systems [here](#). Balloon observations are from four weather balloon radiosonde datasets.



Source: Ole Humlum Climate4You

Yellow trend line reveals slight decline - added by Norm Kalmanovitch, P. Geoph., Friends of Science Society's resident science adviser.

This chart shows rising carbon dioxide (blue wavy line going up) while since about 2002 the temperatures from 5 different well-recognized measurements (datasets) show a basic flat line (see yellow line) if not slight cooling. If the Anthropogenic Global Warming theory were occurring as predicted, all of the five colored temperature lines would be rising up parallel to the blue line of carbon dioxide. Clearly there is something wrong with the models or the theory – or both.

As Richard Feynman explained the Scientific Method:

"In general, we look for a new law by the following process. **First, we guess it** (audience laughter), no, don't laugh, that's really true. **Then we compute the consequences of the guess**, to see what, if this is right, if this law we guess is right, to see what it would imply and **then we compare the computation results to nature, or we say compare to**

experiment or experience, compare it directly with observations to see if it works.”

“If it disagrees with experiment, it’s wrong. In that simple statement is the key to science. It doesn’t make any difference how beautiful your guess is, it doesn’t matter how smart you are who made the guess, or what his name is... If it disagrees with experiment, it’s wrong. That’s all there is to it.”

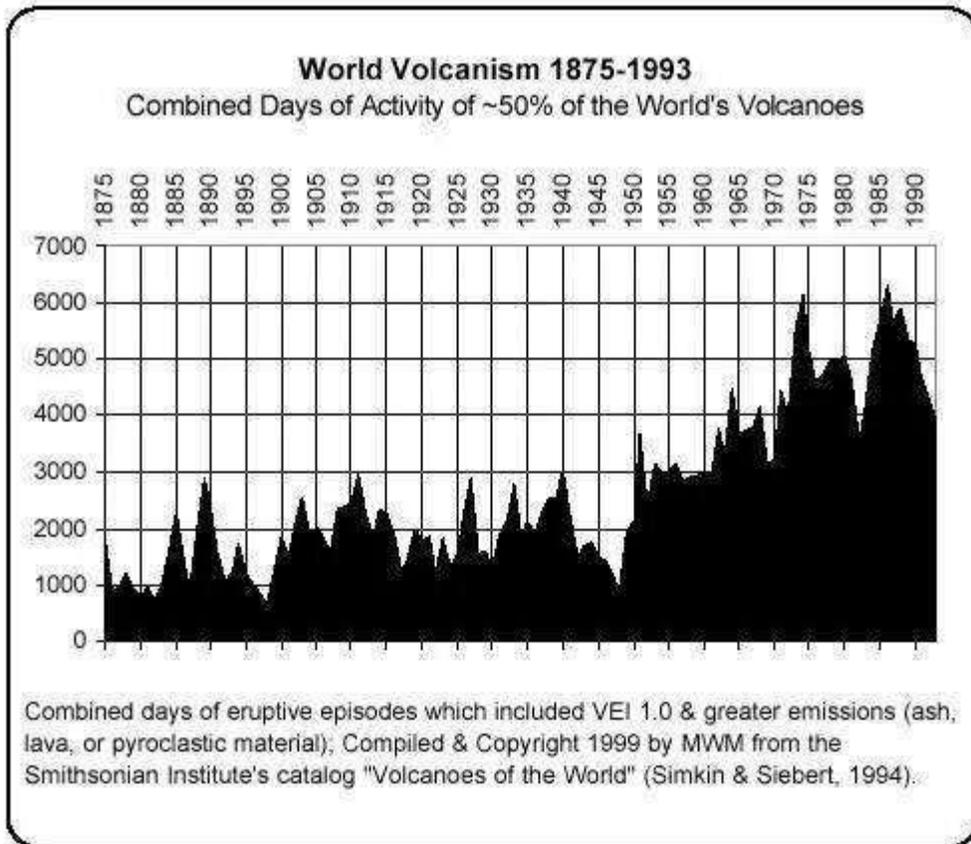
Based on the evidence, there is clearly something wrong with the theory or the models (or both) used in assessing Anthropogenic Global Warming.

Numerous dissenting scientists are trying to point out the errors or discrepancies according to their area of expertise; they are engaged in the moral duty of the scientist to seek out verifiable evidence. Yet, they are disdained, rejected and humiliated for not being part of “the consensus” in Lewandowsky et al (2015).

13.2 The Influence of low volcanic activity

Some scientists, like Ian Plimer,⁴¹ have noted that between 1912 and 1963 there was very little volcanic activity and he and some other scientists ascribe a potential 0.5 degrees C of 20th century warming to the lack of volcanic ash and aerosols in the atmosphere; meaning the possible human contribution to warming was only 0.3 degrees C during that time (though there may be other relevant natural factors – see below).

⁴¹ <http://www.amazon.ca/Heaven-Earth-Warming-Missing-Science/dp/1589794729>



This information is not addressed by Lewandowsky et al (2015) who spend substantial effort in their paper trying to prove that there is still a warming trend in the world – which there may be, in fact – but is it sufficient to indicate danger or catastrophe? Should we not be openly discussing this unexpected divergence between model forecasts – which we have been told were “right” – and the evidence that shows all the models are wrong, at least in this case of the 18 month and 6 year pause?

As noted previously, Naomi Oreskes has presented and written extensively on climate models and how she believes them to be accurate: “The Scientific Consensus on Climate Change: How do we Know We’re Not Wrong?” She was also on the NAS climate modelling committee from 2004-2007 and could be seen to have a vested interest in maintaining the view that models are accurately forecasting climate activity, despite evidence to the contrary.

13.3 The influence of solar variability

Other scientists in the field of solar physics - Nir Shaviv (Israel), Henrik Svensmark (Denmark), Willie Soon (United States), Khabibullov Abdussamatov (Russia), Silvia Duhau (Argentina), Ivanka Charvatova (Czech Rep.), Hans Jelbring (Sweden), Nils-Axel Mörner (Sweden), Nicola Scafetta (U.S.A.), Ilya Usoskin (Finland), to mention a few - in fact see the solar system as the main driver of climate change in terms of planetary orbital forces and variations in the rate and type of the sun's "solar wind".

Several of these prominent scientists are forecasting imminent drastic cooling based on study of a thousand years of observed cyclical patterns of solar activity and their effect on earth's climate.

Important aspects of solar science has also been documented by Brothers working at the Vatican Observatories, which are some of the oldest observatories on earth, and go back to the work of Scheiner and Albertus Magnus – also known as Albert the Great.⁴²

More recently, Fr. Casanovas⁴³ “founded the solar division of the newly-established observatory on La Palma, which today has developed into a primary European center of astronomical studies” and wrote papers on early astronomical sunspot observations by Scheiner.⁴⁴

The Vatican maintains the world's largest collection of meteorites which are the source of insight into non-planetary research.⁴⁵

The IPCC's assessment of solar physics is extremely limited, according to solar physicist Nir Shaviv⁴⁶, and does not fairly represent the influence of solar variability (in its many forms), on Earth's climate,⁴⁷ nor are orbital factors reviewed. The IPCC has been criticized for the limited number of solar physicists and limited scope of solar

⁴² <http://plato.stanford.edu/entries/albert-great/>

⁴³ <http://vaticanobservatory.org/about-us/emeritus-staff/75-emeritus-staff/juan-casanovas-sj/337-juan-casanovas-sj>

⁴⁴ Casanovas, Juan; *Early Observations of Sunspots: Scheiner and Galileo*, in: 1st Advances in Solar Physics Euroconference, *Advances in the Physics of Sunspots*, ASP Conference Series 118, B. Schmieder, J. C. del Toro Iniesta, M. Vásquez (Hg.) (1997), 3–20.

⁴⁵ <http://www.amazon.ca/Brother-Astronomer-Adventures-Vatican-Scientist/dp/007135428X>

⁴⁶ Video Interview with the author “What about the 97%?” <https://youtu.be/3vCxxecs4hk>
“Does the IPCC include Solar Physics in their reports?” <https://youtu.be/QO3xIN3Zml0>

⁴⁷ <http://chronon.qub.ac.uk/blaauw/cds.html>

influence involved in its review. NASA's Solar Dynamics Observatory has only been up for 5 years, consequently new information may alter the view that "Total Solar Irradiance" is not so total, but just a small portion of the solar effect on climate.

The recent IPCC AR5 report states:

"However, the few tenths of a percent bias in the absolute TSI value has minimal consequences for climate simulations because the larger uncertainties in cloud properties have a greater effect on the radiative balance." (pg. 688)⁴⁸

It would seem too soon to say that the science is settled.

14. Science versus social processes

Lewandowsky et al (2015) state that "How citizens feel about matter such as evolution or climate change should, ideally, be irrelevant to how scientists judge the evidence regarding these matters. Given this, how could scientific work be subject to seepage?" In fact, according to the NAS Code of Conduct, the opposite is true:

"The important point is that science and technology have become such integral parts of society that scientists can no longer isolate themselves from societal concerns. Nearly half of the bills that come before Congress have a significant scientific or technological component. Scientists are increasingly called upon to contribute to public policy and to the public understanding of science. They play an important role in educating non-scientists about the content and processes of science."

Likewise, science and technology move from the lab into real life. There, ordinary citizens become the victors or victims depending upon how the experiment or model plays out on the larger scale. Consequently how citizens 'feel,' or how much they have to pay for taxpayer- funded science is very important to them. And sadly, there are frequently tragic unintended consequences.

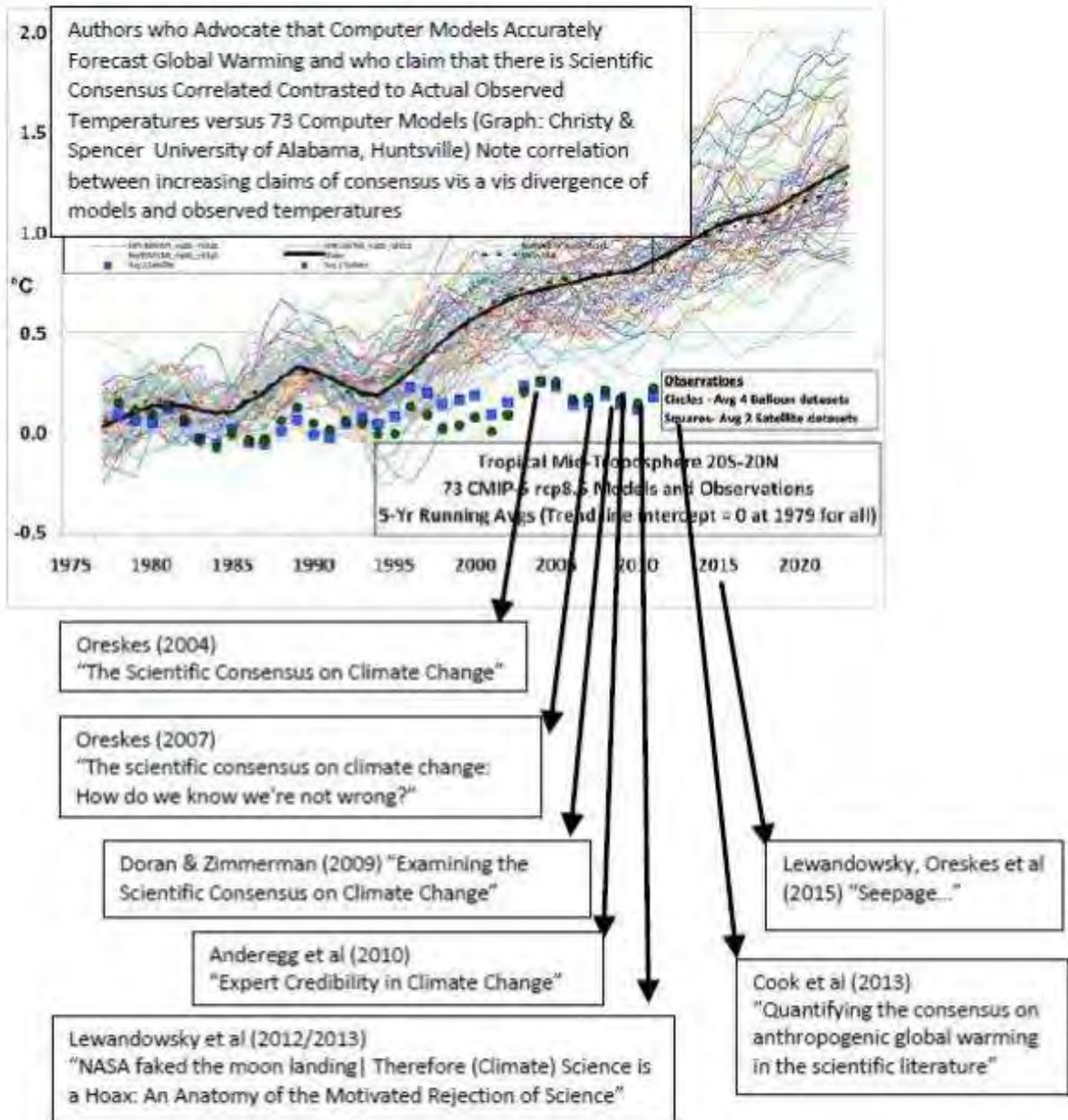
The AAAS document "Scientific Freedom and Responsibility" cites a case of unintended consequences of trying to bring water to the people in Africa, leading to a greater water crisis, as a warning note that the impact of science and technology on society is indeed quite relevant to citizens.ⁱⁱ It is thus alarming that Lewandowsky et al (2015) perceive the work of scientists to be above and beyond the concerns of the general public who:

⁴⁸ https://www.ipcc.ch/pdf/assessment-report/ar5/wg1/WG1AR5_Chapter08_FINAL.pdf

- a) Fund their work and university studies in general
- b) Will be directly affected by the implementation of policies based on climate change research

The publication in peer-reviewed literature of the Lewandowsky et al (2015) perspective, that how citizens feel on matters 'should be, ideally irrelevant' to scientific judgements, is damaging to science overall and conflicts the NAS and AAAS codes of conduct.

15. **Insistence on Consensus Grows as does the Divergence between Models and Reality**



16. Scientific uncertainty a part of IPCC reports

While Lewandowsky et al (2015) attempt to make the case that scientific uncertainty is being exaggerated for the sole end of avoiding action on climate change, the IPCC Technical Summary of September 2013 clearly states the numerous uncertainties. The pages are reproduced here for the reader's review.

TS.6 Key Uncertainties

This final section of the Technical Summary provides readers with a short overview of key uncertainties in the understanding of the climate system and the ability to project changes in response to anthropogenic influences. The overview is not comprehensive and does not describe in detail the basis for these findings. These are found in the main body of this Technical Summary and in the underlying chapters to which each bullet points in the curly brackets.

TS.6.1 Key Uncertainties in Observation of Changes in the Climate System

- There is only *medium* to *low confidence* in the rate of change of tropospheric warming and its vertical structure. Estimates of tropospheric warming rates encompass surface temperature warming rate estimates. There is *low confidence* in the rate and vertical structure of the stratospheric cooling. (2.4.4)
- *Confidence* in global precipitation change over land is *low* prior to 1951 and *medium* afterwards because of data incompleteness. (2.5.1)
- Substantial ambiguity and therefore *low confidence* remains in the observations of global-scale cloud variability and trends. (2.5.6)
- There is *low confidence* in an observed global-scale trend in drought or dryness (lack of rainfall), due to lack of direct observations, methodological uncertainties and choice and geographical inconsistencies in the trends. (2.6.2)
- There is *low confidence* that any reported long-term (centennial) changes in tropical cyclone characteristics are robust, after accounting for past changes in observing capabilities. (2.6.3)
- Robust conclusions on long-term changes in large-scale atmospheric circulation are presently not possible because of large variability on interannual to decadal time scales and remaining differences between data sets. (2.7)
- Different global estimates of sub-surface ocean temperatures have variations at different times and for different periods; suggesting that sub-decadal variability in the temperature and upper heat content (0 to to 700 m) is still poorly characterized in the historical record. (3.2)
- Below ocean depths of 700 m the sampling in space and time is too sparse to produce annual global ocean temperature and heat content estimates prior to 2005. (3.2.4)
- Observational coverage of the ocean deeper than 2000 m is still limited and hampers more robust estimates of changes in global ocean heat content and carbon content. This also limits the quantification of the contribution of deep ocean warming to sea level rise. (3.2, 3.7, 3.8; Box 3.1)

- The number of continuous observational time series measuring the strength of climate relevant ocean circulation features (e.g., the meridional overturning circulation) is limited and the existing time series are still too short to assess decadal and longer trends. (3.6)

- In Antarctica, available data are inadequate to assess the status of change of many characteristics of sea ice (e.g., thickness and volume). (4.2.3)

- On a global scale the mass loss from melting at calving fronts and iceberg calving are not yet comprehensively assessed. The largest uncertainty in estimated mass loss from glaciers comes from the Antarctic, and the observational record of ice-ocean interactions around both ice sheets remains poor. (4.3.3, 4.4)

TS.6.2 Key Uncertainties in Drivers of Climate Change

- Uncertainties in aerosol-cloud interactions and the associated radiative forcing remain large. As a result, uncertainties in aerosol forcing remain the dominant contributor to the overall uncertainty in net anthropogenic forcing, despite a better understanding of some of the relevant atmospheric processes and the availability of global satellite monitoring. (2.2, 7.3–7.5, 8.5)

- The cloud feedback is *likely* positive but its quantification remains difficult. (7.2)

- Paleoclimate reconstructions and Earth System Models indicate that there is a positive feedback between climate and the carbon cycle, but *confidence* remains *low* in the strength of this feedback, particularly for the land. (6.4)

TS.6.3 Key Uncertainties in Understanding the Climate System and Its Recent Changes

- The simulation of clouds in AOGCMs has shown modest improvement since AR4; however, it remains challenging. (7.2, 9.2.1, 9.4.1, 9.7.2)

- Observational uncertainties for climate variables other than temperature; uncertainties in forcings such as aerosols, and limits in process understanding continue to hamper attribution of changes in many aspects of the climate system. (10.1, 10.3, 10.7)

- Changes in the water cycle remain less reliably modelled in both their changes and their internal variability, limiting confidence in attribution assessments. Observational uncertainties and the large effect of internal variability on observed precipitation also precludes a more confident assessment of the causes of precipitation changes. (2.5.1, 2.5.4, 10.3.2)

- Modelling uncertainties related to model resolution and incorporation of relevant processes become more important at regional scales, and the effects of internal variability become more significant. Therefore, challenges persist in attributing observed change to external forcing at regional scales. (2.4.1, 10.3.1)

- The ability to simulate changes in frequency and intensity of extreme events is limited by the ability of models to reliably simulate mean changes in key features. (10.6.1)
- In some aspects of the climate system, including changes in drought, changes in tropical cyclone activity, Antarctic warming, Antarctic sea ice extent, and Antarctic mass balance, confidence in attribution to human influence remains *low* due to modeling uncertainties and low agreement between scientific studies. (10.3.1, 10.5.2, 10.6.1)

TS.6.4 Key Uncertainties in Projections of Global and Regional Climate Change

- Based on model results there is limited confidence in the predictability of yearly to decadal averages of temperature both for the global average and for some geographical regions. Multi-model results for precipitation indicate a generally low predictability. Short-term climate projection is also limited by the uncertainty in projections of natural forcing. (11.1, 11.2, 11.3.1, 11.3.6; Box 11.1)
- There is *medium confidence* in near-term projections of a northward shift of NH storm track and westerlies. (11.3.2)
- There is generally *low confidence* in basin-scale projections of significant trends in tropical cyclone frequency and intensity in the 21st century. (11.3.2, 14.6.1)
- Projected changes in soil moisture and surface run off are not robust in many regions. (11.3.2, 12.4.5)
- Several components or phenomena in the climate system could potentially exhibit abrupt or nonlinear changes, but for many phenomena there is *low confidence* and little consensus on the likelihood of such events over the 21st century. (12.5.5)
- There is *low confidence* on magnitude of carbon losses through CO₂ or CH₄ emissions to the atmosphere from thawing permafrost. There is *low confidence* in projected future CH₄ emissions from natural sources due to changes in wetlands and gas hydrate release from the sea floor. (6.4.3, 6.4.7)
- There is *medium confidence* in the projected contributions to sea level rise by models of ice sheet dynamics for the 21st century, and *low confidence* in their projections beyond 2100. (13.3.3)
- There is *low confidence* in semi-empirical model projections of global mean sea level rise, and no consensus in the scientific community about their reliability. (13.5.2, 13.5.3)
- There is *low confidence* in projections of many aspects of climate phenomena that influence regional climate change, including changes in amplitude and spatial pattern of modes of climate variability. (9.5.3, 14.2–14.7)

17. **Ethics of using known psychological intimidation methods in peer-review by highly qualified social psychologists**

Lewandowsky appears to have a common theme in much of his research, pursuing those he alleges to be “deniers” and some papers he has authored or co-authored have met with ethical or legal-related concerns. His work has been criticized for being what some have called unethical (“Throw Mud – It will Stick” Stirling and Gregory 2013).⁴⁹

Indeed through the Lewandowsky et al (2013) paper “NASA Faked...”⁵⁰ despite a single reference to “legitimate” skepticism within the document, in some quarters he has successfully and publicly tarred all potential climate change consensus challengers with the brush of conspiracy theorists simply through his much cited inflammatory title.

The author avoids reproducing the title of LOG (2012) paper in full here, as this would confirm the Lewandowsky et al (2012) position that attempting to correct misinformation is extremely difficult because, in the process, it is usually necessary to repeat the misinformation you want to correct,⁵¹ thus inadvertently reinforcing the slur.

Social psychology post-doc Jose Duarte⁵² found that Lewandowsky’s claims in “NASA Faked...” are not supported by his data, and that the use of such a title slanders millions of people.⁵³ Duarte poses the questions: “Why is their title based on the variable for which they have the least data, essentially no data? Why in the abstract are they linking free market views to incredibly damaging positions that again, they have no data for?” Lewandowsky’s “Recursive Fury...” paper was retracted by the Journal Frontiers in Psychology in April 2014 on questionable legal grounds.⁵⁴ The publisher stated: “Specifically, the article categorizes the behaviour of identifiable individuals within the context of psychopathological characteristics.”

It seems a curious breach of fundamental counselling principles and psychological ethics to ascribe psychopathological characteristics to individuals in the broader public when they have not been under your care and such remarks can be crippling to an individual’s career and is reminiscent of abuses of psychiatric diagnosis to silence dissidents in Soviet Union.⁵⁵

⁴⁹ https://www.academia.edu/7961060/Throw_Mud_-_It_will_Stick_-_Lewandowsky_Critique

⁵⁰ <http://pss.sagepub.com/content/early/2013/03/25/0956797612457686.abstract>

⁵¹ <http://psi.sagepub.com/content/13/3/106.abstract>

⁵² PhD candidate in Social Psychology at Arizona State University

⁵³ <http://www.joseduarte.com/blog/more-fraud>

⁵⁴ <http://journal.frontiersin.org/article/10.3389/fpsyg.2014.00293/full>

⁵⁵ <http://io9.com/5940212/how-the-soviets-used-their-own-twisted-version-of-psychiatry-to-suppress-political-dissent>

“And indeed, what better way to deal with activists and naysayers than to diagnose them as being mentally unstable. Dissenters, who were often seen as both a burden and a threat to the system, could be easily discredited and detained.

Moreover, it served as a powerful and disturbing way to convince the masses that they needed to adhere to the party line — and that any deviant thinking was surely a sign of mental instability.”

The “GULAG” that exists now in climate change discussions is simply that of the invisible walls of the ‘tyranny of public opinion’ - no facility or physical restraint required when someone has taught the masses – even the children^{56 57} - how to mock and humiliate you for challenging the “consensus.”ⁱⁱⁱ

⁵⁶ <http://www.troymedia.com/2014/04/18/earth-day-confuses-cult-indoctrination-with-education/>

⁵⁷ <http://www.troymedia.com/2012/09/27/teachers-journal-wants-questions-about-climate-change-suppressed/>

Name _____
Date _____

Pika population an 'early warning' of climate change
The pika may be the first mammal in North America to fall victim to global warming. This small furry mammal that lives on the high slopes of western mountains is not able to tolerate high temperatures. It can die in minutes from overheating if its body temperature rises just a few degrees. Scientists have found that pikas have disappeared from 30% of areas where they were once common. In the Yukon mountains, the pika populations plunged during the warm winters of 1998 to 2000.

Rising sea level will threaten millions of people around the world
As the oceans warm, seawater expands and sea level rises. In Truro, Nova Scotia, the sea level has risen 44 cm since 1869. It is predicted to rise 70cm by 2100. The low-lying Maritime provinces could be subject to more frequent and more severe flooding than ever before. In other parts of the world, many island communities could be inundated. Coastal wetlands, such as Florida's Everglades, could also be devastated by flooding. However, more research is needed to determine whether and when such flooding is likely to occur.

Mountain pine beetles attack B.C. forests
Large stretches of lodgepole pine forests are being attacked by mountain pine beetles. Scientists say that the mild winters of the last few years have not been enough to kill the insect. The larva of this beetle is able to resist cold temperatures, even down to -40°C for a few days. In past years, long cold winters did interrupt the life cycle. But with shorter winters and many trees, the beetle has thrived.

2. Your cousin doesn't believe that we should be worried about climate change. Write him/her a message explaining your position on this issue.

Following three catastrophic climate-related statements (with no empirical references) Exercise 2 inherently assumes the reader has no questions or alternative views on climate change – and affirms that that we *should be* worried.

Source: Alberta Grade 5 "Science" Curriculum

The author finds that "Seepage.." appears to have issues with unsupported statements and it seems to be a similar, more subtle effort, to delegitimize the work of scientists who hold dissenting views on climate change, and worse, to legitimize the Type Two Scientific Misconduct by the infiltration of the terms "denial" and "contrarian" into the peer-reviewed literature, in the form of a case study on "seepage."

This does not suggest any conspiracy; rather that people are compliant by nature and as noted herein, it is difficult to challenge the theory of Anthropogenic Global Warming, or whether rational dissent is acceptable, without being called a "denier."

Throughout the paper unsupported claims are made – the claim that the surveys of Oreskes (2004), Doran and Zimmerman (2010) and Anderegg et al (2010) support the AGW theory have been demonstrated herein to be false; likewise a later claim in “Seepage...” that these support a 97% consensus is also false.⁵⁸

Figure 1: Percentage agreement with IPCC AGW declaration and survey numbers

Surveys by Author Name	Actual % Explicitly Agreeing w. IPCC Declaration	From a Base Survey Number of Respondents or Papers Assessed
Oreskes/Peiser	1.2%	~1,000
Doran and Zimmerman	2.38%	3,146 respondents
Anderegg et al	66%	1,372 scientists
Cook et al	0.54%	11,944

Source: “97%? No! Global Warming Math Myths and Social Proofs”

Likewise, in Lewandowsky et al (2013) “Seepage...” it is curious that the authors insist on referring to a 15 year “pause” (section 6.1.2). The 15 years of pause was counted to 2012 at the IPCC’s publication closing date. In fact today, there have been 18 years and 8 months of global warming stagnation or “pause” – however Lewandowsky et al (2015) attempt to argue in section 6.1.2. that: “Periods of 15 years have long been regarded as too short to indicate meaningful trends. For example, Santer et al (2011) showed that periods of at least 17 years are required to identify a human influence on climate trends. “

Since their paper was received in November of 2014 and revised in February 2015, it is unclear why the length of pause was not suitably updated. At 18 years and 8 months, we are much closer to Hans von Storch’s statement of June 2013 that: “If things continue as they have been, in five years, at the latest, we will need to acknowledge that something is fundamentally wrong with our climate models. A 20-year pause in global warming does not occur in a single modeled scenario.”

⁵⁸ http://www.friendsofscience.org/assets/documents/97_Consensus_Myth.pdf

Clearly the evidence supports the view of many dissenting scientists that:

- a) Climate models are not reliable
- b) Climate sensitivity of carbon dioxide is likely set too high – or “carbon dioxide is not the “knob” of climate variability” (Judith Curry to US Senate Jan 16, 2014)⁵⁹⁶⁰
- c) Natural factors are more influential than human influences
- d) Climate science is an extremely complex field with far too many unknowns to make long-term accurate predictions
- e) Real pollution issues and human needs in developing countries are being ignored while trillions of dollars are wasted on climate change policies that have destabilized important Western economies and done nothing for the environment

Attempting to delegitimize or silence the dissenting scientists and economists who are seeking thoughtful public debate, based on the **evidence**, is disingenuous on the part of Lewandowsky and his colleagues in the “Seepage...” paper.

A final example, in section 7 of “Seepage...” Lewandowsky et al address the risk of sea level rise. There is an inherent assumption in their statement that “increasing uncertainty about the extent of future sea level rise requires increasingly greater protective measures if the risk of inundation is to be kept constant” citing Hunter (2012). In this statement the assumption is that the reduction of carbon dioxide would lead to no sea level rise. However the vast geologic evidence of the past Holocene disproves this statement – in fact the Starr Carr⁶¹ people of Northern England moved due to sea level rise 10,000 years ago when carbon dioxide was low; the Okotoks “Big Rock” glacial erratic, just south of Calgary, Alberta was revealed 10,000 years ago when the 2 miles of glacial ice above it melted; the vast glacial Lake Agassiz that occupied most of the Canadian Plains and American mid-west receded, revealing fertile agricultural land. Populations have migrated over time along with these and other natural occurrences and it is doubtful humankind could have exerted any control over these climatic conditions.

⁵⁹ http://www.epw.senate.gov/public/_cache/files/07472bb4-3eeb-42da-a49d-

⁶⁰ [/11614hearingwitness testimonycurry.pdf](http://11614hearingwitness testimonycurry.pdf)

⁶¹ http://teachinghistory100.org/objects/about_the_object/mesolithic_headdress



The Okotoks “Big Rock” – the world’s largest known glacial erratic, situated just south of Calgary, Alberta, Canada. The erratic was pushed here by a glacier from today’s Jasper region, some 400 km north and west, and lay under 2 miles of ice until about 10,000 years ago.

There are tangible artifacts to demonstrate the certainty of these and similar paleoclimatic events – these are not “SCAMs” – and far more certain than anything offered by climate models.

It is thus odd that Lewandowsky et al (2015) appear to want us to deny this reality and rely instead on something purely theoretical – or be outed and denigrated as contrarians and deniers. This may be a form of projection.

18. **Cognitive Psychology**

“Communicating the scientific consensus also increases people’s acceptance that climate change (CC) is happening”

Lewandowsky *et al* 2012

“People follow the lead of similar others.”

- Robert Cialdini “Influence” (2007)

Psychological Factors – Lewandowsky is highly qualified and very experienced in cognitive psychology and psychological communications – as are three of his coauthors. He understands both the value of affirming a consensus in terms of swaying public opinion and also the power of discrediting those who disagree.

It is ironic that consensus does not prove anything scientifically – but it is a very powerful motivator as a “social proof” (Cialdini 2007). We are reminded by Huff (1954) that it is easy to “lie with statistics” (as we saw earlier in the “consensus” surveys). Huff cautioned us, even then that:

- Misinforming people by the use of statistical material might be called statistical manipulation; in a word (though not a very good one) - “statisticulation.”
- Percentages offer a fertile field for confusion.... they can lend an aura of precision to the inexact.
- Any percentage figure based on a small number of cases is likely to be misleading.

By positioning dissenting scientists with the derogatory terms of “denier” or “contrarian” this ensures that many people will operate on the “herd mentality” principle and will reject consideration of an alternate or dissenting scientific position on climate change.

As noted in Cabbolet (2013) people can be easily swayed by manipulation and groupthink. In the manipulation example, he describes how people who are told a photo represents either a convicted criminal or, in a second experiment, a famous scientist, easily find features in the face as ‘evidence’ that support either story.

A second example he provides refers to a Solomon Asch (1951) experiment so described:

“A single test person was added to a group of about ten paid actors, where after two similar pyramids, one white and one black, were placed on a table, and the group members were asked one by one which color the pyramids

were; all paid actors, who were of course asked first, answered that both pyramids were white. In some (but not all) cases the test person would then respond by saying that both pyramids were white. Upon evaluation, these test persons said that they didn't want to fall outside the group. This footage undeniably provides experimental evidence of how people can make false statements because of group pressure, and there is no reason to assume that this excludes modern-day scientists."

It would appear that Lewandowsky et al (2015) "Seepage.." falls into the above category as there is no allowance, whatsoever, in this paper for "legitimate dissent," something he and other colleagues grudgingly acknowledged in an earlier paper, saying:

"Rejection of science must be **distinguished from true scepticism**, [emphasis added] which may prompt the revision of a scientific claim on the basis of evidence and reasoned theorizing. Skepticism is not only at the core of scientific reasoning but has also been shown to improve people's discrimination between true and false information."

Lewandowsky, Stritzke, Oberauer, & Morales (2005) (2009)

Ironically, the current evidence itself supports the case of the dissenting scientists. Lewandowsky refers to a "small set of dissenting scientists" when as previously shown, there has been no count of dissenting scientists, but there is evidence of significant numbers. Most scientists who are still working are afraid to freely voice their views precisely because of the climate of intimidation created by those people who have given currency and blessing to the public shaming of those scientists who dissent, or bullying of any citizen who questions.

There is little doubt that the infiltration of derogatory language into peer-reviewed literature through the publication of "Seepage..." in a prestigious journal like "Global Environment Change" with such excellent metrics will be devastating to open scientific inquiry. Who wants to be categorized as a "denialist" or "contrarian"?

Journal Metrics⁶²

- Source Normalized Impact per Paper (SNIP): **2.665i**
- SCImago Journal Rank (SJR): **3.006i**
- Impact Factor: **5.089i**
- 5-Year Impact Factor: **7.784i**

Indeed, at the time of this writing (July 12, 2015) “Seepage...” is one of the most downloaded articles:

Most Downloaded Articles

The most downloaded articles from Global Environmental Change in the last 90 days.

1. [Successful adaptation to climate change across scales](#)
W. Neil Adger | Nigel W. Arnell | ...
2. [Seepage: Climate change denial and its effect on the scientific community](#)
Stephan Lewandowsky | Naomi Oreskes | ...
3. [Resilience: The emergence of a perspective for social–ecological systems analyses](#) Carl Folke

Consensus = Social Proofs; Isolation and Ostracism = Social Death

Schacter (1959) experimented with social isolation, finding it had immediate, devastating impacts on individuals; his work was followed up on by Sarnoff and Zimbardo (1961) who largely replicated Schachter's results with a twist.

Their findings showed that when anxiety is aroused in a person, theoretically that person would seek isolation from others. However, when fear is aroused and if the

⁶² <http://journalinsights.elsevier.com/journals/0959-3780/impact>

person is unable to run away from the threat, that person then welcomes a chance to join with other people.

In contemplating these findings, clearly the threat of global warming, as presented by charismatic figures like Al Gore, makes ordinary people both anxious and fearful.

“Climate” is something no one can escape, but one is able to join many groups that are engaged in the “fight against global warming.” Consequently, these dual primal emotions are powerful motivators, both of which can supersede rational thought.

The language and visuals used by most of these groups in their materials and on-line websites invoke fear and anxiety and encourage individuals to join and take action.

The stubborn “consensus” resisters are thus confronted by an army of angry climate change activists, fearful of human extinction “caused” (in their minds) by those who won’t join the herd.

Williams (2007) expresses the outcome of being ostracized (i.e. the excluded 3%) - as “the kiss of social death.” Throughout the consensus papers, there are persistent pejorative references to those who challenge or dissent from the alleged consensus – the familiar terms of “contrarian,” “denier,” “denialist,” “conspiracy theorist,” “manufacturers of doubt,” etc. are dotted throughout these research papers.

As noted by Cialdini (2007), the author of “Influence:”

“We need only make a conscious decision to be alert to counterfeit social evidence. We can relax until the exploiters' evident fakery is spotted, at which time we can pounce.”

“And we should pounce with a vengeance. I am speaking of more than simply ignoring the misinformation, although this defensive tactic is certainly called for. I am speaking of aggressive counterattack. Whenever possible we ought to sting those responsible for the rigging of social evidence.”

19. Conclusion

We read in the NAS code of conduct:

“The fallibility of methods is a valuable reminder of the importance of skepticism in science. Scientific knowledge and scientific methods, whether old or new, must be continually scrutinized for possible errors. Such skepticism can conflict with other important features of science, such as the need for creativity and for conviction in arguing a given position. But organized and searching skepticism as well as an openness to new ideas are essential to guard against the intrusion of dogma or collective bias into scientific results.”

The paper goes on to discuss an important incident in science.

POLYWATER AND THE ROLE OF SKEPTICISM

The case of polywater demonstrates how the desire to believe in a new phenomenon can sometimes overpower the demand for solid, well controlled evidence. In 1966 the Soviet scientist Boris Vladimirovich Derjaguin lectured in England on a new form of water that he claimed had been discovered by another Soviet scientist, N. N. Fedyakin. Formed by heating water and letting it condense in quartz capillaries, this "anomalous water," as it was originally called, had a density higher than normal water, a viscosity 15 times that of normal water, a boiling point higher than 100 degrees Centigrade, and a freezing point lower than zero degrees.

Over the next several years, hundreds of papers appeared in the scientific literature describing the properties of what soon came to be known as polywater. Theorists developed models, supported by some experimental measurements, in which strong hydrogen bonds were causing water to polymerize. Some even warned that if polywater escaped from the laboratory, it could auto catalytically polymerize all of the world's water.

Then the case for polywater began to crumble. Because polywater could only be formed in minuscule capillaries, very little was available for analysis. When small samples were analyzed, polywater proved to be contaminated with a variety of other substances, from silicon to

phospholipids. Electron microscopy revealed that polywater actually consisted of finely divided particulate matter suspended in ordinary water.

Gradually, the scientists who had described the properties of polywater admitted that it did not exist. They had been misled by poorly controlled experiments and problems with experimental procedures. As the problems were resolved and experiments gained better controls, evidence for the existence of polywater disappeared.

While most scientists agree that humans have some effect on climate from diverse activities and emissions – and 100% of all scientists would agree that climate changes – it appears that the case for Catastrophic Anthropogenic Global Warming/Climate Change from carbon dioxide alone is losing credibility as the evidence overrides the forecasts of climate models.

Indeed, as discussed earlier, the current evidence supports Svante Arrhenius' revised 1906 view that warming due to carbon dioxide would be nominal. What would the scientific conversation look like today had Naomi Oreskes widely promoted the content of Arrhenius' 1906 paper – and not issued her essay on the alleged 'consensus' in 2004?

Unfortunately, today free scientific inquiry on the topic of climate change is impeded by name-calling, bullying and psychological intimidation tactics – all of which constitute forms of Scientific Misconduct.

In the view of the author, the Lewandowsky et al (2015) paper "Seepage..." violates the basic principles of science – by using inaccurate references and through a lack of scientific accuracy, and by using words that smear all dissenting scientists' through the use of psychologically intimidating tactics that isolate, denigrate and delegitimize non-conforming researchers, and by claiming a nonexistent and undefined "consensus," thus distorting scientific evidence.

That these tactics have been condoned by the scientific community through the acceptance of the paper "Seepage:..." in a peer-reviewed journal – tragically reinforces what John Mills called "The tyranny of prevailing opinion."

The end result is contrary to all principles of scientific inquiry. Based on the foregoing, in the opinion of the author, it is clear to this author that "Seepage..." by Lewandowsky, Oreskes, Risby, Newell and Smithson (2015) should be retracted.

Acknowledgements

Thanks for review by Albert Jacobs, Geol. Drs. and Norm Kalmanovitch, P. Geoph.
Thanks to Erno Kovacs for detail review and insight into the Merton paper.

Declaration of Conflicting Interests

The author is contract consultant as Communications Manager for the non-profit Friends of Science Society, a group of scientists whose position is that the sun is the main direct and indirect driver of climate change, and who agree that humans have an effect on climate through diverse activities and that the effect of human carbon dioxide/GHG emissions on climate change is nominal compared to overwhelming natural factors. Friends of Science Society support improved emissions management for the reduction of real pollutants, over the many billions invested in carbon reduction schemes, which has had no benefit to the environment.

This work was written independently, of the author's own volition and outside of her contract terms with Friends of Science Society.

Funding

The author received no financial support for the research, authorship, and/or publication of this article.

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ⁱ **PNAS – this information from 2011 [the PNAS website has been changed now] “Contributed” articles do not follow the conventional PNAS Direct Submission peer review route.**

Overview: Direct Submission (see section 2 below) requires three appropriate Editorial Board members, three NAS members who are expert in the paper's scientific area, and five qualified reviewers.; **Contributed articles**, by contrast, are in a category that allows 4 submissions of this kind per

year; the author must confirm they were part of the design, and only 2 qualified reviewers (of the authors choice) review it. Likewise, conflicts of interest must be declared.

From: PNAS website (2011) – re: Contributed articles

An Academy member may submit up to four of his or her own manuscripts for publication per year. To contribute an article, the member must affirm that he or she had a direct role in the design and execution of all or a significant fraction of the work and the subject matter must be within the member's own area of expertise. **Contributed** articles must report the results of original research. A special obligation applies to a Contributed paper for which the member or coauthors disclose a significant financial or other competing interest in the work. **We no longer consider such submissions using the contributed route.** Members who disclose a significant conflict of interest must submit their manuscripts using standard Direct Submission. When submitting using the contributed process, members must secure the comments of at least two qualified reviewers. Reviewers should be asked to evaluate revised manuscripts to ensure that their concerns have been adequately addressed. Members' submissions must be accompanied by the names and contact information, including e-mails, of knowledgeable experts who reviewed the paper, along with all of the reviews received and the authors' response for each round of review, and a brief statement endorsing publication in PNAS. Reviews must be on the PNAS review form. Members must select reviewers who have not collaborated with the authors in the past 24 months. See Section iii for the full conflict of interest policy. Members must verify that reviewers are free of conflicts of interest, or must disclose any conflicts and explain their choice of reviewers. The Academy member must be a corresponding author on the paper. These papers are published as "Contributed by" the responsible editor. As of July 1, 2011, members may contribute PNAS Plus articles. <http://www.pnas.org/site/misc/iforc.shtml>

PNAS conventional peer review method - Compare the 'Contributed' process above with the real peer reviewed process below:

The standard mode of transmitting manuscripts is for authors to use **Direct Submission**. Authors must recommend three appropriate Editorial Board members, three NAS members who are expert in the paper's scientific area, and five qualified reviewers. The Board may choose someone who is or is not on that list or may reject the paper without further review. A directory of PNAS member editors and their research interests is available at http://nrc88.nas.edu/pnas_search. The editor may obtain reviews of the paper from at least two qualified reviewers, each from a different institution and not from the authors' institutions. For Direct Submission papers, the PNAS Office will invite the reviewers, secure the reviews, and forward them to the editor. The PNAS Office will also secure any revisions and subsequent reviews. The name of the editor, who may remain anonymous to the author until the paper is accepted, will be published in PNAS as editor of the article. Papers submitted directly are published as "Edited by" the responsible editor and have an additional identifying footnote.

ⁱⁱ Other unanticipated complexities have arisen in programs for international development. Dams and irrigation schemes in many parts of Africa have vastly increased the incidence of bilharziasis (schistosomiasis), a disease that debilitates whole populations and for which there is as yet no effective cure (39). After the building of the first Aswan Dam in Egypt (1902) the incidence of schistosomiasis greatly increased, and with the construction of the High Dam it will probably increase further. There has been a progressive erosion of the Nile Delta, in the absence of the silt deposits that were formerly brought down by the annual flood, and which counterbalanced the forces of erosion (40). The sardine fisheries that once flourished outside the delta have been largely destroyed, although new fisheries may be established above the dam in Lake Nasser (41). It is very doubtful whether the various disturbing changes were taken seriously into account in a cost-benefit analysis before the dam was built. The recent and current catastrophic droughts in sub-Saharan Africa (the Sahel) furnish a striking example of man-made technological damage. Climatic changes may have produced the droughts of recent years, but the droughts are probably no greater than many in the past that have not done comparable damage to the people or to the ecology of the region. The current disasters appear to be due largely to overgrazing and to the disruption of much of the traditional nomadic way of life. Particularly disastrous in their effects have been the thousands of deep boreholes, drilled by engineers to tap the vast reservoirs of underground water in that region. The resulting wells encouraged a great increase in the size of the cattle herds; pasture instead of water became the limiting factor on numbers of cattle. As pasture dried up in the drought, countless thousands of dead and dying cows were found clustered around the boreholes, and the surrounding land, for miles around, was ravaged by trampling and overgrazing. Thus these wells, constructed by men of good will and technical skill to bring more water to the people and cattle of the Sahel, became a major factor in intensifying a great human and natural disaster (42, 43).

ⁱⁱⁱ

http://cmaste.ualberta.ca/en/TeacherResources/~media/cmaste/Documents/CurriculumResources/Elementary/Changing_Seasons_Part_3.pdf

pg- 161 - 2. "Your cousin doesn't believe that we should be worried about climate change. Write him/her a message explaining your position on this issue." A Grade 5 exercise in how to confront and convert a "climate change denier"

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