# THE TRIUMPH OF DOUBLESPEAK

Ву

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### **ABSTRACT**

The Framework Convention on Climate Change (FCCC) which was signed by 41 nations, including our own, in 1992, promoted **doublespeak** with this definition of "Climate Change", from Article 1 as follows:

"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods"

They have suddenly changed the meaning of "climate change" which had previously not involved any particular cause, to one restricted only to its being "attributed" to direct or indirect human changes in atmospheric composition. This means that they do not have to prove that all changes in climate have this cause. All they need to do is to get people to use the term "climate change", and they will suddenly discover that by saying these words they support the IPCC "attribution" whether they know it or not.

There does not need to be any actual evidence. All that is needed is for somebody, such as an IPCC climate scientist, an environmental activist, a politician, or a journalist, to "attribute" it. The "attribution" does not even need to be "direct". It can be "Indirect" which can be as obscure as they choose it to be.

This device has been an outstanding success. Any "climate change" which is disapproved of, be it a heat wave, cold spell, flood, drought, or hurricane, is today routinely "attributed" to human influence on the atmosphere.

The paper will give many other examples of IPCC doublespeak.,

## THE FRAMEWORK CONVENTION ON CLIMATE CHANGE

The Framework Convention on Climate Change (FCCC) 1992 which was signed by 41 nations, including our own had this legally binding definition of "Climate Change", from Article 1 as follows:

"a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods"

"Climate Change" is a prime example of **doublespeak** the use of language to suggest one meaning in order to imply another.

Before this definition came along, "climate change" meant any change in the climate, however caused. This definition restricts the cause only to "a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods" but it does not stop anybody using he original meaning.

But when they do, the above definition can be used to suggest that they agree with the FCCA definition. So, today, our press is full of examples of climate events which are called "climate change", which is interpreted as evidence that humans are responsible for everytrhing.

The definition does not mention any need to provide evidence that human activity has caused "climate change". All that is necessary is for somebody, anybody, to "attribute" a climate event to humans, and not even "directly"; "indirectly" will do.

Then, only human activity involving changes in the atmosphere can actually cause "climate change". Natural causes can never cause "change", they are only "variable".

All organisms attempt to alter the climate around them to suit their metabolism. Humans have been very successful at doing this, as it has enabled them to populate many parts of the earth. They may alter their close climate by the use of clothes, or they may build a box with a roof which encloses a climate suitable for living. They may modify climate to suit crops or animals. They may alter climate by other activities; by building cities, and roads, by heating their buildings, or consuming fuel for power production or transport. Most of these, with the possible exception of the last, do not obviously change the composition of the atmosphere, so they are excluded from "climate change" even if they cause measurable changes to temperature or other climate properties. Unless these can be allowed for, it is impossible to "attribute" any "change" to changes in atmospheric gases.

The above definition, and, indeed, the entire Framework Convention on Climate Change, Is an open invitation to fraud, distortion, suppression and fabrication of data, so that any climate event can be "attributed", even indirectly, to human interference with the climate.

## IPCC DOUBLESPEAK

The Reports of the Intergovernmental Panel on Climate Change (IPCC) have followed the lead given by the FCCC to develop the use of *doublespeak* to conceal the fact that despite over 20 years' of effort and four major Reports, it has not succeeded in providing any evidence that increases in human-produced greenhouse gases are having a measurable effect on the climate.

Many people believe that they have done so because of the subtle use of *doublespeak*, This paper shows how they have confused and twisted the meanings of words in such a way as to create triumph out of failure.

The IPCC Reports deliberately increase confusion by refusing to endorse the FCCC definition of "climate change" and providing yet another definition of their own, as follows:

"Climate change in IPCC usage refers to any change in climate over time, whether due to natural variability or as the result of human activity"

This appears as a footnote to the first page of the "Summary for Policymakers" in Reports No 3 and 4. It appears to return to the obvious straightforward definition of "climate change" before the FCCC came along, but not quite.

First it only "refers" to a definition, so we are not sure whether that is a definition or not. Secondly, they still want to deprive "natural variability" of being capable of "change", but they are disingenuous anyway, because their own title is bound to be interpreted according to the FCCC definition, particularly by those who have not got around to reading the footnote on the first page of the "Summary for Policymakers".

Also, they do not play fair with their limited discussion of "natural variability". They always choose arguments that play down its importance, and place the actual data in such a way as to make it difficult to find., so they can claim that its influence can be ignored by comparison with the "anthropogenic" greenhouse effect.

## **GREENHOUSE GASES**

The above FCCC definition of "Climate Change" includes only "human activity that alters the composition of the atmosphere". It makes no mention of the so-called "greenhouse gases" which figure so strongly in IPCC discussions.

There are a number of trace gases in the atmosphere which possess absorption bands for infra red radiation emitted by the earth, thus reducing the total radiation emitted and causing a temperature rise. This action is quite different from what happens in a greenhouse, which traps warmed air instead of absorbing radiation.

The most important greenhouse gas is water vapour. John Tyndall, in 1870, wrote that water vapour

"acts more energetically upon the terrestrial rays than upon the solar rays; hence, its tendency is to preserve to the earth a portion of heat which would otherwise be radiated into space".

The Table of 'Properties of Greenhouse Gases" on the first page of the first IPCC Report (1990) does not include water vapour, and there is no Chapter on the subject, and hardly a single paragraph devoted to it, in any of their Reports. Their charts showing the various components of "radiative forcing" do not include water vapour.

At first glance they may be implying the human activity does not change the concentration of water vapour in the atmosphere, but this not so. They merely conceal their treatment of water vapour as a "feedback", assumed to be an additional human consequence from changes in carbon dioxide.

If they were really interested in studying human effects on atmospheric components you would think that the main initial approach must surely involve a study of changes in water vapour.

They have not done so because it is too hard. Water vapour concentration in the earth's atmosphere is extremely variable, with differences of orders of magnitude in different places. There are hardly any past records and little prospect of comprehensive study at the present time.

Instead they have decided to study the minor greenhouse gas, carbon dioxide, and to sweep the problem of water vapour to one side by calling it a "feedback" to the effects of carbon dioxide. It is a case of the tail wagging the dog.

The meaning of the decision to make water vapour a "feedback" is never made clear, but actually involves the assumption that relative humidity is a constant. Since relative humidity is known to vary almost as widely as the actual concentration, there is no observational evidence to support this assumption and significant evidence against it which they ignore

## **CLOUDS AS WELL**

Clouds are also not one of the components of "Radiative Forcing", not even at a "Low Level of Scientific Understanding". They are also treated as "feedback", so that the poor knowledge of their behaviour and effects can be concealed.

## **ANTHROPOGENIC**

This is a typical example of *doublespeak*, one of the words they have invented with the specific purpose of confusing people. It is supposed to mean "human-induced", but in practice they try to leave out human-induced climate change which does not involve changes in atmospheric components, or try to pretend that it does not exist.

## **DISCERNIBLE HUMAN INFLUENCE**

Another example of *doublespeak* is the statement from the second IPCC Report (1995):

"The balance of the evidence suggests a discernible human influence on global climate".

This statement may refer only to the effects of greenhouse gass or to all human influences on the climate, as required, but it is always interpreted as evidence for an "influence" from greenhouse gases, when it says nothing of the kind. And the "influence" is assumed to be always bad.

## **BROADLY CONSISTENT**

The First IPCC Report (1990) took advantage of this confusion when they coined the *doublespeak* "broadly consistent", in:

"The size of this warming is broadly consistent with the predictions of climate models, but is also of the same magnitude as natural climate variability"

The "warming" that was illustrated was obviously "broadly inconsistent" with the models because it was intermittent, and the actual amount was different. The conclusion should have been that the greenhouse theory did not explain climate, but "natural variability" did, but that would be too honest.

#### CORRELATION AND ATTRIBUTION

The IPCC admit that a correlation, however convincing, does not prove cause and effect. This ancient logical principle if often ignored by the general public, who are so often convinced that "links" between one phenomenon and another prove that they are related.

The IPCC decided that they could play on the lack of logical education merely by changing the word "correlation" to "attribution". They could then claim that "attribution, in contrast to "correlation" could prove cause and effect. This principle even occurs in the original definition of the FCCC, where "climate change" is caused by human activity merely by being "attributed" to it, whoever does the "attribution". So "evidence" is not needed. "Attribution" is all that is required.

## FORECASTING AND PROJECTING

The IPCC has abandoned any attempt to forecast future climate.

The first draft of the 1995 Report had a Chapter 5 "Validation of Climate Models" as in the First Report. I pointed out that it was wrong since no climate model has ever been "validated", and they did not even try to do so. They thereupon changed the word "Validation" to "Evaluation" no less that fifty times and have used it exclusively ever since.

In addition, they do not use the word "prediction". The models merely supply "projections", which are the results of accepting the assumptions made by the models and by the futures scenarios which need to be used in association with the models to obtain the "projections"

"Validation" is a term used by computer engineers to describe the rigorous testing process that is necessary before a computer-based model can be put to use. It must include successful prediction over the entire range of circumstances for which it is required, to an acceptable level of accuracy. Without this process it is impossible to find out whether the model is suitable for use or what levels of accuracy can be expected from it..

## **UNCERTAINTIES**

The IPCC has never attempted validation, and they do not even discuss ways in which it may be carried out. As a result the models are worthless, and their possible inaccuracy is completely unknown.

The IPCC has developed an elaborate procedure for covering up this deficiency which is well described in the IPCC document on "Guidance Notes for Lead Authors on Addressing "Uncertainties". .It includes attempts to "simulate" those past climate sequences where suitable adjustment of the uncertain parameters and equations in their models can be made to give an approximate "fit". This procedure failed to simulate temperature in the lower troposphere and the attempt to simulate the gobal mean surface temperature anomaly required omission of the important influences of ocean oscillations and urban heating.

Estimates of uncertainty by intercomparison of models are futile when no model has been validated.

#### CONFIDENCE AND LIKELIHOOD

Since the results of the models are never validated and there is no method available to determine their accuracy or their reliability, they are graded by a set of levels of "confidence" decided entirely from the opinions of those who have produced them.

"Very High Confidence. At least 9 out of 10 chance of being correct High Confidence. About 8 out of 10 chance Medium Confidence. About 5 out of 10 chance Low Confidence. About 2 out of 10 chance Very Low Confidence. Less than 1 out of 10 chance."

The probability levels stated are nothing more than guesswork

They try to improve their "confidence" by trying to reduce the huge differences between the different models in intercomparison exercises, which is more likely to standaardize the same errors"

#### **FUTURES SCENARIOS**

The "projections" are a combination of models with a set of "futures scenarios"

Several sets of scenarios have been prepared by a special sub-committee of Working Group III (Mitigation). No attempt is made to assess levels of probability, and no attempt is made to chexk whether any of them are successful. . In the 1994 IPCC Report the following statement was made.

"Since scenarios deal with the future they cannot be compared with observations"

#### **PROJECTIONS**

Projections are combination of unvalidated models with untested scenarios.

No attempt has ever been made to check these "projections against actual climate behaviour, except in a paper I published in 1999, which found that all of those then in use were wrong in one way or another

They are graded according to different levels of "likelihood" based on the opinions of the prejudiced "experts".

"Virtually Certain: >99% probability of occurrence

Very Likely: >90% probability Likely: > 66% probability

About as Likely as not:33 to 66% probability

Unlikely: <33% probability Very Unlikely: <10% probability

# Exceptionally Unlikely: <1% probability"

Although low levels of "likelihood" are possible, almost all of the assessments are "very likely". They seem reluctant to claim the ultimate brag of "virtually certain".

They back up these prejudiced opinions by allocating arbitrary and completely unjustified levels of "probability", which range up to over 99%, but they usually give themselves a sufficient margin of uncertainty to give them an escape if the projections turn bad..

From the Second Report "projections" were always so far ahead, typically 100 years, that they could not be verified in the lifetime of anybody living today. With increasing pressure to justify their claims, the 4<sup>th</sup> report and more recent additions are beginning to make 'projections" only a few years' ahead, so it is not going to be long before they may be called to account for their inadequacy..

They do not seem to realise that all serious forecasters automatically check against observations as they occur, and adjust the forecast accordingly. The IPCC must be the only organisation capable of believing that this procedure is impossible. It automatically ensures that all their projections are worthless.

### FORECASTS AND CHAOS

"Frequently Asked Questions" No 2 in Chapter 1 of "Climate Change 2007" has the following statement:

A common confusion between weather and climate arises when scientists are asked how they can predict climate 50 years from now when they cannot predict the weather a few weeks from now. The chaotic nature of weather makes it unpredictable beyond a few days. Projecting changes in climate (i.e., long-term average weather) due to changes in atmospheric composition or other factors is a very different and much more manageable issue".

Weather forecasters are the true climate scientists. They have been using all available scientific techniques for some 200 years, and yet their forecasts are unreliable beyond a few days.

The IPCC statement begins by failing to admit that the IPCC climate scientists do not make "forecasts" at all, only "projections". As a consequence they are likely to be even less successful than weather forecasters, who at least try to make regular checks on thi reliability of the forecasts.

All calculations involving the properties of fluids involve the use of non-linear equations and integrals that cannot be solved exactly, This provides an uncertainty referred to as "chaos" which is certainly one reason why forecasting the complex behaviour of weather or climate is unlikely to be successful very far into the future.

But the claim that climate forecasting is somehow immune from "chaos" is simply untrue.

The following statement comes from a paper by David Rind, a prominent IPCC climate scientist.

"The climate that we experience results both from ordered forcing and chaotic behaviour, the result of a system with characteristics of each. In forecasting prospective climate changes for the next century, the focus has been on the ordered system's responses to anthropogenic forcing. The chaotic component may be much harder to predict. but at this point it is not known how important it will be"

#### **TRENDS**

The whole object of the IPCC Reports is to establish "Trends". They have to establish that everything is inexorably getting worse. The "globe" is "warming" with an upwards "trend" The ice is melting with a downwards "trend". Any "trend" in the wrong direction has to be ignored as "anomalous". Indeed, any disagreement with the models is regarded as anomalous. The rate of change of methane in the atmosphere has a downwards trend, but this is ignored in favour of the upwards trend in concentration from 1984 which ended, anyway, in 2000..

Since most climate properties fluctuate or even oscillate, it is necessary to choose a beginning point and an ending point to give the necessary trend. For example the last Report makes a big thing at the "trend" of retreat of Arctic ice from 1978 to 2007. They do not want people to know that Arctic ice follows a periodic pattern, with low points in around 1940 and 2007 and the high point at 1978. 2008 looks like a turnaround.

The rather unreliable surface temperature anomaly record also begins either in 1900 or in 1978, because both are low points in a periodic record. The high points were 1940 and 1998 and the figures have fallen since then, but the "trends" before 1998 are the only ones that matter.

Often the beginning and end points of the "trend" are not mentioned at all. Thus, we are told that "the globe is "warming" without any information as to which period is referred to or how much it is warming. In this way they can ignore the fact that since 1998 the "globe" has been cooling. So perhaps we may now be told that the "long term trend" is up, without defining the meaning of "long-term".

Another periodic climate property is temperature of the ocean, and the trend is again chosen to be taken from the lowest point to the highest point, ignoring the fluctuation. The "trend" seems currently to be downwards.

The Fox and Franz Josef glaciers in New Zealand fluctuate. Some years ago they were receding. This fact was frequently used by the world press to prove the existence of a

disastrous "trend". For the past few years they are advancing, and the World press is silent because the trend is in the wrong direction.

## **UNCERTAINTY OF SURFACE TEMPERATURE ANOMALIES**

The IPCC carries out exercises to reduce the "uncertainty" not only of models but also of climate observations.

Much effort has been devoted to trying to improve the "certainty" of the surface temperature anomaly record, which is based on an unrepresentative sample, for which there is no recognised method of "correction". When a whole series of "corrections" are applied to the USA where there are many weather stations with a long record of professional monitoring, the presumed "global warming" over an extended period tends to disappear, but a recent study of the absence of quality control in US weather stations casts doubt on the entire system. In this study Anthony Watts recruited a large number of volunteers who assessed compliance with US Bureau of Meteorology standards over a third of all US weather stations and found that only 11% were capable of an accuracy below one degree Celsius and 65% had errors of at least 5°C Since the supposed increase over 100 years is less than one degree, the whole system can be considered useless..

A recent study of these temperature uncertainties admits that after they have tried their best there are remaining "unknown unknowns", referring to the well-known poem of Donald Rumsfeld

#### The Unknown

As we know,
There are known knowns.
There are things we know we know.
We also know
There are known unknowns.
That is to say
We know there are some things
We do not know.
But there are also unknown unknowns,
The ones we don't know
We don't know.

#### IMPOSITION OF DOGMA

The IPCC Reports make no attempt to consider seriously all comments made on their various drafts. They make this plain in Appendix 1 of the First Report, where they say:

"While every attempt was made by the Lead Authors to incorporate their comments, in some cases these formed a minority opinion which could not be reconciled with the larger consensus"

This "consensus" is what is collectively decided by the anonymous Government representatives who approve the entire reports and who dictate to the "Drafting Editors" of the "Summary For Policymakers" what they are permitted to write. The "consensus" is actually a dogma, foreshadowed by the FCCC concept of "climate change", that all changes in the climate are caused by human-induced changes in the minor greenhouse gases. All contributions and comments that challenge this dogma are treated as a "minority opinion" which they ruthlessly suppress. Reasons for rejecting comments were never given. The only way I could find out whether they had been considered was to read through the final Report. For the latest, Fourth Report, access to the comments on the "Science" Report was obtained through the British Official Information Act. I discovered that I had made 1,878 comments, and that most of these had been rejected out of hand and the others usually had a trivial reason such as "insufficient information" even when this information had been repeatedly supplied.

#### STATISTICS AND DAMN LIES

Before the development of statistical methods for estimating accuracy by R A Fisher and others in the 1930s there was no way of telling whether any particular observation was accurate. Several observations of the same quantity had a "range", but there was no way of preferring one or another, or knowing whether any of them is a correct figure.

Statistical techniques were developed for which an estimate of the most probable figure for any quantity could be obtained, together with an estimate of the probable level of accuracy. These methods are now applied and reported widely, but it is not often realised that they are only valid if the assumptions made by the mathematics are met. Amongst these are the use of representative samples, the insistence of identical conditions of measurement, and compliance with a very few mathematical formulae, the most importance being the Gaussian relationship which provides the statistical calculations of pocket calculators and computer- bases spreadsheets.

With the climate, few of these conditions can be met, so there are no reliable estimates of the accuracy either of the observations or of the conclusions after manipulation. The IPCC cheerfully ignores all of this necessity and claims that its figures possess confidence levels for many quantities which cannot be justified. It should be noted, however, that their basic figures of "radiative forcing" are all qualified as being dependent on various "Levels of Scientific Understanding" which are undefined. The only logical conclusion is to assume that none of them can be considered seriously even when the "Level of Scientific Understanding" is considered to be "high"

#### NATURAL VARIABILITY WINS

Three of the four major IPCC Science Reports admitted that "natural variability", involving influences that do not involve changes in greenhouse gases, are perfectly capable of explaining the behaviour of our climate.

"Climate Change 1990", after saying ""Global mean surface temperature has increased by 0.3°C to 0.6°C over the last 100 years", stated

"The size of this warming is broadly consistent with the predictions of climate models, but is also of the same magnitude as natural climate variability".

The models are presented as an alternative to "natural variability" instead of something that might be in addition to it. Indeed, throughout the Reports attempts are made to suggest that the models are capable of explaining every climate event, ignoring "natural variability" altogether, even when the influences of volcanic eruptions or ocean oscillations are obvious.

At the same time, they do their best to marginalize the influence of natural events by placing emphasis on publications which minimise their influence

The Second Report (1995) was subjected to special treatment. One of the Lead Authors (Ben Santer) was given the task of altering offending sentences in the Final Draft Report, to make it conform with the "consensus" imposed by the Government Representatives who had to give approval to the report.

Among the passages from the Final Draft that were removed was the following

"None of the studies cited above has shown clear evidence that we can attribute the observed changes to the specific cause of increases in greenhouse gases."

This was replaced by the following

"Implicit in these global mean results is a weak attribution statement—if the observed global mean changes over the last 20 to 50 years cannot be fully explained by natural climate variability, some (unknown) fraction of the changes must be due to human influences".

The following statement was also in the original final draft

"Finally we come to the most difficult question of all: 'When will the detection and unambiguous attribution of human-induced climate change occur?. In the light of the very large signal and noise uncertainties discussed in this Chapter, it is not surprising that the best answer to this question is 'We do not know'... Some scientists would have claimed, on the basis of the results presented in Section 8.4, that detection of a significant climate change has already occurred. Few if any would be willing to argue that unambiguous attribution of this change to anthropogenic effects has already occurred, or was likely to happen in the next several years."

This statement was altered as follows:

"Finally we come to the most difficult question of when the detection and attribution of human-induced climate change is likely to occur. The answer to this question must be subjective, particularly in the light of the very large signal and noise uncertainties discussed in this Chapter, Some scientists maintain that these uncertainties currently preclude any answer to the question posed above. Other scientists would and have claimed, on the basis of the statistical results presented in Section 8.4, that confident detection of a significant anthropogenic climate change has already occurred. As noted in Section 8.1, attribution involves statistical testing of alternative explanations for a detected observed change and Few would be willing to argue that completely unambiguous attribution of (all or part of) this change has already occurred, or was likely to happen in the next several years."

Even the altered versions do not seem very confident.

The 1995 Report also stated:

"The balance of the evidence suggests a discernible human influence on the global climate".

Here is a statement everyone can agree with, merely surprised that such an obvious and familiar fact should claim to be an original, fresh, discovery.

Every building, every highway, every shelter belt, every factory provides a discernible human influence on the local climate which, in aggregate, impacts globally. There is no mention here of greenhouse gases or emissions, yet it seems to have been interpreted as if it did.

The scandal that emerged from the last minute censorship of the 1995 Report led to the imposition of strict controls over what could be permitted throughout the Third (2001) and Fourth (2007) Reports. A set of "Guidelines" to ensure uniform techniques for "estimating" (in other words "guessing") uncertainties was drawn up

Much use has been made of Bayesian statistics which provides a technique for improving the reliability of guesswork, but is unlikely to work in the absence of comparison with actual observations.

Despite all these control measures the following statement was made in Chapter 1 of the Third Report, "Climate Change 2001".

"The fact that the global mean temperature has increased since the late 19<sup>th</sup> century and that other trends have been observed does not necessarily mean that an anthropogenic effect on the climate has been identified. Climate has always varied on all time-scales, so the observed change may be natural".

This whole Chapter was omitted from the Fourth Report, and those who wrote it presumably ostracized. Instead there was a pseudo history of the Greenhouse Effect which promoted the activities of the IPCC, but omitted all scientific work which did not suit them, like the voluminous measurements of carbon dioxide in the atmosphere as long ago as 1812.

The Third Report (2001), in their "Summary for Policymakers stated

"There is new and stronger evidence that most of the warming observed over the past 50 years is attributable to human influence"

The Fourth Report (2007), made a very similar statement:

"Most of the observed increase in globally averaged temperature since the mid-20<sup>th</sup> century is *very likely* due to the observed increase in anthropogenic greenhouse gas concentrations'

These statements are literally crawling with reservations which can be used to back out of their claims when the time comes.

Thus, it is only "most" of the "observed increase or warming. How much is that?

They have eliminated from consideration those "globally averaged" temperature anomaly records that are more recent that "the mid-20<sup>th</sup> Century, and therefore, more reliable. These include satellite and radiosonde records, and even the most recent amalgamated surface temperature anomaly records, which do not show effects incompatible with natural variability.

"Globally averaged temperature" is never "observed" Individual local temperatures cannot be averaged because a representative sample does not exist. They refer instead to the so-called "Mean annual global surface temperature anomaly record" which is actually based on the "anomalies" obtained from measurements in the same geographically defined area, but are not "observed" but "deduced"...

Then, the second statement is only "very likely" based on opinions of computer modelists, and the "observed" "anthropogenic" greenhouse gas concentrations, which do not include any measurements of the main greenhouse gas, water vapour, and only very restrictive measurements of all the rest, whose concentrations over land surfaces, where it matters, are almost unknown.

## CONCLUSION

Encouraged by the Framework Convention on Climate Change, the IPCC reports have useds widespread examples of **DOUBLESPEAK** to conceal the absence of evidence that "anthropogenic" increases in greenhouse gases are altering the climate.

"Natural Variability" and human interventions not involving greenhouse gases, are therefore the only proven causes of changes in the climate

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