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Fact checking Climate Science

Four Alleged Lines of Proof for CAGW: A Critical Analysis

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Abstract

The presentation analyses the four existing lines of proof for the CAGW hypothesis and concludes that all four fail:

The first line of proof is the “proof by contradiction”: the observed temperature change can only be explained by the known climate forcings if CO₂ is responsible for all the warming.

However, the ensemble of forcings used contains only two natural forcings — a marginal influence from the sun and intermittent cooling from volcanic eruptions. This would require either that temperatures before 1850 were essentially “flatlining”, or that the ensemble is incomplete. Since temperatures before 1850 were highly dynamic, it follows that the ensemble underlying this proof lacks an unknown but significant forcing that could readily account for most of the warming observed since 1850.

Correlation alone does not constitute scientific proof in the absence of established causation; there is therefore no requirement to disprove any correlation. Nevertheless, no timescale exhibits a convincing and consistent correlation between CO₂ and temperature — neither over 120 years, 11.000 years, 400.000 years, 600 million years, nor 4.5 billion years.

The water cycle of evaporation, convection, condensation, cloud formation and precipitation is poorly represented in climate models. As a result, almost all models predict more warming than has been observed.

Radiation physics is unambiguous: a doubling of CO₂ by itself produces approximately 1 °C of global warming. The climate system, however, contains strong feedbacks, both positive and negative. Determining the net warming that would result from a doubling of CO₂ once all feedbacks are included would require a far better understanding of the climate system than we currently possess.

The presentation concludes with a perspective on the nature of climate change. It is suggested that a warming climate essentially consists of climate zones shifting poleward away from the equator and expanding in extent — thereby providing more habitat for all species and enabling greater food production for humankind.

Keywords: Proof of CAGW; greenhouse effect; climate models; climate change.

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1. Introduction

In Western Europe, most politicians and almost all mainstream media have accepted the claim that “the science is settled”, meaning that the Catastrophic Anthropogenic Global Warming (CAGW) hypothesis, promoted by most climate scientists, can no longer be disputed.

The core of this hypothesis is the central claim of the IPCC's Sixth Assessment Report: that all warming over the past century has been caused by human forcings, primarily greenhouse gas emissions. Yet the foundation of good science is that every claim advanced by scientists can and should be open to challenge. Science is, by its very nature, never settled.

One would therefore expect that when scientists (for non-scientific reasons such as ethics) nevertheless demand immunity from debate and criticism, their evidence must be exceptionally strong and their conclusions clear and robust. To determine whether this is indeed the case, this presentation analyses the four lines of evidence advanced in support of the anthropogenic global warming hypothesis.

After examining whether humans are responsible for all recent warming (AGW), it remains necessary to assess whether the projected warming would in fact be catastrophic (CAGW). Accordingly, the nature of climate change and its effects on nature and humanity are also examined from the perspective of recent history.

2. Four lines of proof for the CAGW hypothesis

The presentation analyses the four lines of proof commonly advanced for the CAGW hypothesis:

1. Proof by contradiction
2. Correlation between CO₂ concentration and temperature
3. Climate models
4. (Radiation) physics

It is noteworthy that the first of these — proof by contradiction — is accepted as rigorous proof only in mathematics. Nevertheless, it constitutes the principal argument for anthropogenic warming presented by the IPCC in its Sixth Assessment Report. The second and third lines of proof are also frequently invoked. Yet correlation without demonstrated causation, and models without experimental verification, cannot be regarded as scientific proof either. The only potentially rigorous scientific proof would be the fourth: physics. However, because the other three are so widely used and appear to persuade many people, all four are examined in this presentation.

2.1 Proof by contradiction

In the case of CO₂ being assumed as the cause of all warming over the past century, “proof by contradiction” means the following: “The observed temperature change can only be explained by the known climate forcings if CO₂ is responsible for almost all of the warming.” This constitutes the principal line of proof presented by the IPCC in its Sixth Assessment Report (AR6, 2021), specifically in FAQ 3.1, and is accompanied by the Figure 1 overleaf.

However, the ensemble of forcings employed contains only two natural components: a marginal influence from the sun and intermittent cooling spikes from volcanic eruptions. All other forcings are anthropogenic and were absent before 1850. This implies that either the black temperature line in the above figure must have been essentially flat before 1750, or the ensemble is incomplete.

Since temperatures before 1850 were in fact highly dynamic — exhibiting, for example, a roughly thousand-year cycle with 1.5–3 °C of warming in the Northern Hemisphere and approximately 0.5 °C globally — it follows that the ensemble of forcings used in the proof omits an unknown but significant forcing. Given that this is a thousand-year cycle and that the previous warming peak occurred about 1.000 years ago, the cycle may well have been responsible for most of the warming observed since 1750. We do not yet know the nature of this forcing, but we know that it exists.

This illustrates why proof by contradiction can be valid only in domains where every variable is precisely known, such as mathematics. In climate science we do not know what we do not know, and major forcings have evidently been overlooked.

It is therefore clear that the proof by contradiction fails.

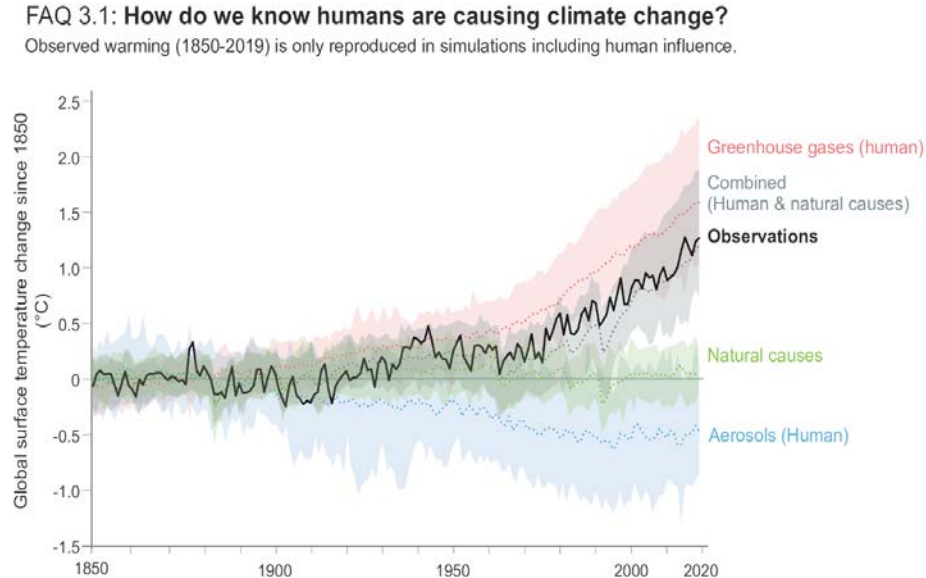


Figure 1: FAQ 3.1: proof by contradiction from AR6 - IPCC

2.2 Proof by correlation

Correlation is not regarded as scientific proof in the absence of demonstrated causation. In climate science, however, this principle is inverted: the alleged correlation is itself taken as proof of causation.

This alone is sufficient to dismiss the correlation argument. Nevertheless, because the idea appears intuitively persuasive to many people, the claimed correlation is examined here in any case.

The apparent correlation between CO₂ and temperature over the past 120 years strikes many as highly convincing. In reality, the only correlation is that both quantities have risen. The temperature record displays a distinctive “Z” shape: a similar warming trend in the first 40 years and in the last 50 years, interrupted by a cooling period between 1940 and 1970 — a pattern entirely absent in the CO₂ concentration record. Actually, when atmospheric CO₂ began its steep post-Second World War rise, global temperatures had just entered a 30-year cooling phase.

By way of illustration, the correlation between CO₂ and, for example, the number of global birthdays is far stronger — yet this does not prove that CO₂ causes birthdays worldwide, see Figure 2 overleaf.

There is no timescale on which a convincing and consistent correlation between CO₂ and temperature can be found — neither over 120 years, 11 000 years, 600 million years, nor 4.5 billion years.

The only strong correlation appears on the 400 000-year timescale of the ice-age cycles. In that case, however, the temperature change precedes the change in CO₂ concentration, so the direction of causation runs from temperature to CO₂.

It can therefore be concluded that the proof by correlation also fails.

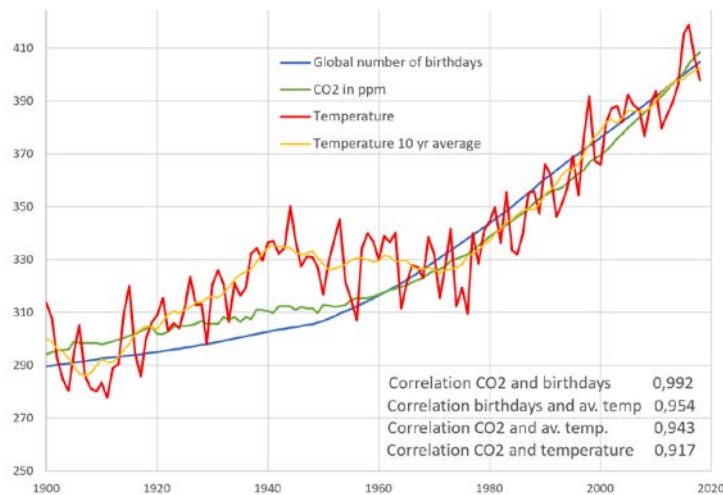


Figure 2: Correlation of birthdays, CO2 concentration, temperature and 10 yr av. temperature

2.3 Proof by climate models

The principal factor controlling atmospheric energy flow is the water cycle — evaporation, convection, condensation, cloud formation and precipitation. All five components of this cycle are poorly represented in climate models. This is demonstrated by every comparison between observations and model output, most notably by the so-called “missing tropical hot spot”, see Figure 3.

The tropical hot spot is a model-predicted amplification of the surface warming that roughly doubles the temperature increase at approximately 12 km altitude across the entire tropical region. Such a feature would constitute a major warming event over half the Earth’s surface. Yet none of the numerous radiosonde observations conducted over recent decades has ever detected this predicted but elusive hot spot.

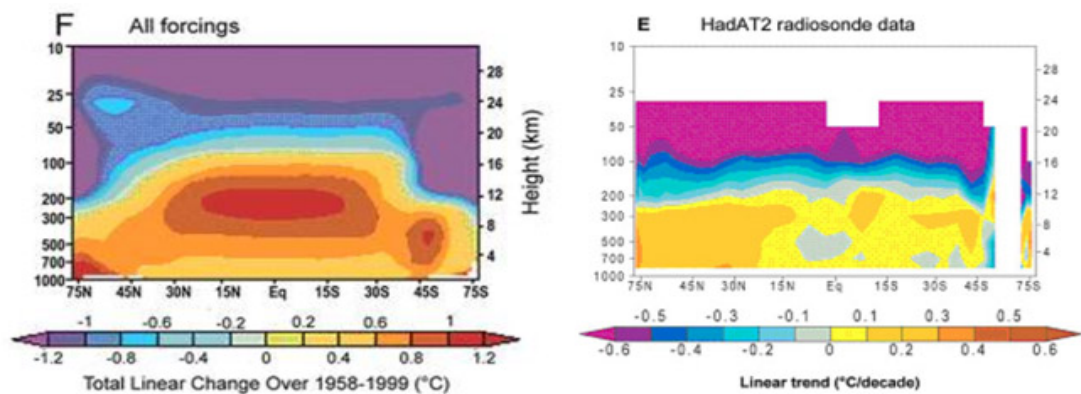


Figure 3: Hotspot predicted by the models (left) versus radiosonde observations (right)

This is one of many demonstrations that climate models are far from capable of describing atmospheric temperature and energy flows with any reliability.

The proof based on climate models therefore fails as well.

2.4 Proof by (radiation) physics

Radiation physics is unambiguous: a doubling of CO₂ by itself produces approximately 1 °C of global warming. There is no scientific debate on this point, although the IPCC revised the value

from 0.9 °C in AR4 (2007) to 1.2 °C in AR6 (2021).

The climate system, however, contains numerous positive and negative feedbacks — and possibly even a thermostat — that may strongly modify this 1 °C effect. The IPCC AR6 claims that the 1 °C warming per CO₂ doubling is amplified by the combined positive and negative feedbacks (primarily the increase in water vapour) to approximately 3 °C. This would require a feedback factor of 0.675, which lies very close to the runaway threshold: any modest change in the water-cycle feedbacks could trigger a thermal runaway. Given that no thermal runaway has occurred for millions of years, such a high feedback factor is extremely implausible.

In particular, because so many aspects of the water cycle remain poorly understood, science cannot credibly claim this critical feedback factor with any accuracy. Doing so would require a far better understanding of the climate system than we currently possess.

The only firm conclusion that physics can offer is that a doubling of CO₂ in isolation would produce roughly 1 °C of warming — a change that would raise little concern. At the present rate of CO₂ increase (approximately 3 ppm per year), the next doubling, and the associated 1 °C warming, would not be expected until around 2168.

The combined effect of all climate feedbacks, however, could produce a completely different outcome from a CO₂ doubling. Nature is full of negative feedbacks, while positive feedbacks are rare. No one knows what the resulting temperature change would actually be.

Thus physics cannot provide proof for the CAGW hypothesis either.

3. Conclusion

Analysis of the four lines of proof advanced for the CAGW hypothesis shows that none of them provides scientific proof for the hypothesis.

This does not mean that the hypothesis has been proven false; it simply means that no scientific proof for it has been established.

Such a finding should lead to a climate policy different from the present one, which rests on the assertion that “the science is settled” and treats CAGW as a political dogma. If CO₂ is not the (main) cause of the recent warming, the trillions of dollars spent on climate mitigation policies may be wasted, and the resulting damage to our prosperity — as well as to the economic advancement of developing nations — may prove to have been in vain.

The alternative is to do what humanity has always done: adapt to climate change. Even Nobel laureate and climate economist Professor William Nordhaus — for decades the leading authority on the economic costs of climate change and himself a proponent of the CAGW hypothesis — concluded in his Nobel Prize acceptance speech in Oslo that attempting to combat climate change through CO₂ reduction is far more costly than adapting to it.

In the absence of solid scientific proof for CAGW, the only prudent course is therefore to shift from a mitigation policy to an adaptation policy.

The warming climate is actually very comforting to humanity. However, the prevailing narrative of global warming treats the present or recent climate as ideal for every region and interprets all climatic changes as dramatic local threats to biodiversity, food production, disease patterns, hunger and human well-being.

In this presentation it is suggested that a warming climate essentially consists of climate zones shifting poleward away from the equator while expanding in area. With a 2 °C warming, Berlin would acquire roughly the present climate of Mannheim; New York that of Washington, D.C. Why would any species suffer or face extinction as a result? And is it an established fact that living conditions deteriorate as one moves southward? The millions of people who travel south precisely during the hottest part of the year would suggest otherwise.

Because warming is limited in the tropics and increases with latitude towards the Arctic, the effect of global warming is that climate zones shift northward and become larger. In essence this provides more space and more food for virtually all species, with the possible exception of those adapted to the tundra and steppe biomes.

This pattern is illustrated by the climatic changes that the great European plain has undergone through successive ice-age cycles. In the present interglacial the plain is occupied mainly by temperate broadleaf and mixed forest, with boreal forest in the northern part. During glacial periods, however, almost the entire plain is transformed into tundra and steppe on permafrost, driving all present-day plants and animals back into small Mediterranean coastal and Balkan refugia.

The Holocene warming of 5–10 °C expanded their habitats more than a hundred-fold. Further warming would enlarge those habitats still more. In general, therefore, warming benefits the great majority of species, with the exception of the few that can survive only in a sub-Arctic climate, such as the reindeer. Yet even these species have survived hundreds of warm interglacials, just as the species of the temperate zones have survived hundreds of ice ages.

Nature always adapts to climate change — and so should we.

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