



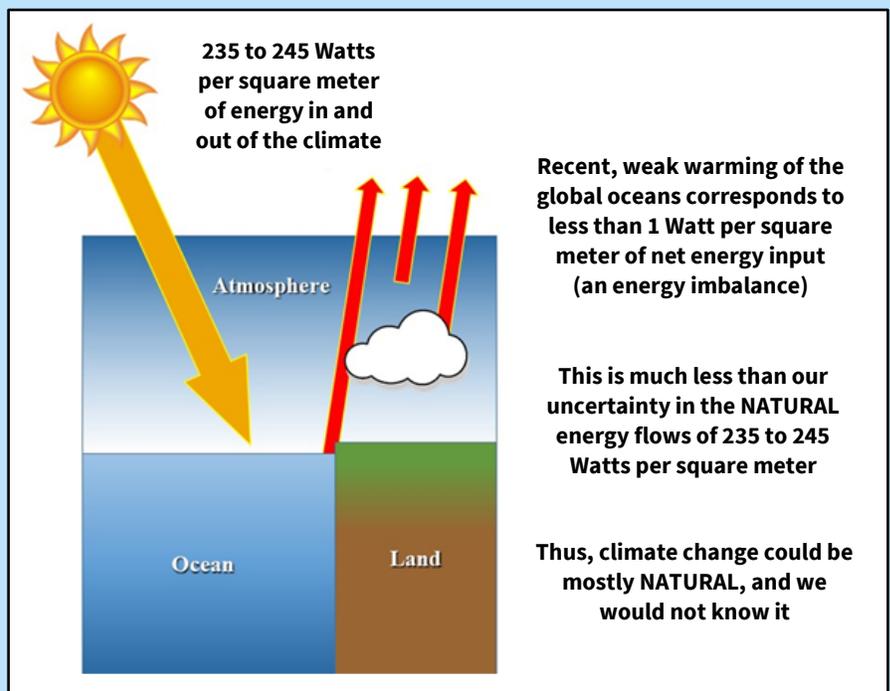
The Faith-Based Nature of Human-Caused Global Warming

Climate Warming is Due to an Energy Imbalance

Global warming – or the temperature change in anything – is the result of an imbalance in energy flowing in and out of the system. That system can be a pot of water on the stove, a car engine, a house, the human body, or the climate system.

The rate of warming of the climate system in recent decades, especially of the oceans as measured by the thousands of Argo floats scattered around the world, allows us to calculate how much energy imbalance is responsible. In the last twenty years, the deep oceans have warmed very slowly, by an average rate of $+0.04^{\circ}\text{C}$ per decade. It is easy to convert this into a heating rate, which turns out to be less than 1 Watt per square meter.

This tiny heating rate is out of approximately 240 Watts absorbed from the Sun and escaping to outer space by way of infrared (heat) radiation. But we do not really know those natural energy flows are exactly 240 Watts per square meter. They could be 235, 240, or 245, or some other number. It is simply a best estimate, which has considerable uncertainty relative to the tiny amount of energy required to warm the oceans.



Why Is this Important?

Since we do not know the natural energy flows into, and out of, the climate system to an accuracy better than about 5 to 10 Watts per square meter, and the warming in

recent decades is known (from the rate of ocean warming) to be only about 0.8 Watts per square meter (about 1% of the average flows), this means that ***recent warming of the climate system could be mostly natural and we would not even know it.***

That makes the belief in human causation of global warming, to a large extent, a matter of faith. The primary cause could be partly or mostly from increasing greenhouse gas emissions from our use of fossil fuels, but there is no way to know just how much.

There Are No Human Fingerprints of Global Warming

Many scientists claim that there are human “fingerprints” of global warming, but the features to which they point would be about the same even if the cause was natural. In other words, many fingerprints of warming exist, but not of humans as the cause of warming. Humans “could” be the cause of most of the observed warming, but as described above, so could Mother Nature.

Warming due to virtually any cause will be greater over land than ocean, it will be greatest toward the North Pole and the weakest toward the South Pole, and it will be greatest in the upper layers of the ocean and least in the deep ocean. None of these is a human fingerprint.

Sometimes stratospheric cooling is claimed as a fingerprint, but cooling is not evidence of warming. Increasing carbon dioxide causing some stratospheric cooling has more confidence because the stratosphere has no weather to complicate the diagnosis.

Thus, while an exhaustive legal examination of the evidence found sufficient reason to adjudicate legal disputes over alleged harm caused by humanity’s use of fossil fuels, this evidence still does not address the simple fact that the tiny energy imbalance causing recent warming is very small compared to the large uncertainties in the natural energy flows in the climate system. This leaves the possibility that climate change could still be mostly natural.

The Climate Warmed and Cooled Naturally in the Past

Receding glaciers in Alaska are revealing tree stumps radiocarbon dated to 1,000 to 2,000 years ago, indicating the climate system was different then. The well-documented Mendenhall glacier has been receding for about 200 years, well before humans could have been the cause.

For a mature forest to have existed where there has more recently been a glacier emptying into the ocean suggests a significant change in weather patterns, precipitation, and temperature. This should not be surprising since the atmosphere and



oceans are an example of a chaotic *nonlinear dynamical system*. All this means is that the climate system is capable of undergoing changes all by itself, without any kind of forcing from humans, the Sun, or whatever.

Considerable evidence exists that the Medieval Warm Period (~1,000 years ago) and the Roman Warm Period (~2,000 years ago) were just as warm as it is today.

Conclusion

These facts show that the hypothesis that humans have caused most, or all recent warming involves a large measure of faith.

As a result of the very large uncertainties in the energy flows in and out of the climate system, climate modelers adjust their computer models to not produce any internal “natural” climate change. This is the basis of their faith: That only humans can cause climate change.

These model adjustments are necessary anyway because a climate model cannot be constructed from first physical principles and exhibit energy balance; it must be “tuned”. The energy imbalance allegedly causing global warming is too small (0.8 Watts per sq. meter) to measure with any of our existing instrumentation, and certain aspects of the climate system (e.g. clouds, the efficiency of precipitation systems, etc.) are not understood well enough to accurately represent in models.

These uncertainties are part of the reason why, even after 30 years, climate models are unable to agree with each other to even a factor of 3 regarding just how much warming will result from adding CO₂ to the atmosphere.

Summary

- The global energy imbalance responsible for recent warming is much less than the uncertainty in our knowledge of natural energy flows.
- As a result, climate change could be mostly “natural”, and we would not know it.
- Climate models must be adjusted to not produce any “natural” climate change, which the modelers simply believe does not exist.
- Despite their belief, there is abundant evidence of past natural climate change events, the causes of which are largely unknown.

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For Further Information

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