
CO2 ON TRIAL

GUILTY OR NOT GUILTY: THE EVIDENCE IS INSUFFICIENT

No denying that the earth is warmer – in the aggregate – than, say, in 1917. The conventional wisdom is that carbon dioxide, the gas that plants ‘inhale’ and that we animals exhale, is guilty. What if the conventional wisdom is wrong or misleading? **If CO2 is not the culprit, what is?**

Not everyone has read the recent **Economist** article acknowledging the decade-long disconnect between rising CO2 and essentially flat world temperatures over the same period, because the conventional wisdom media is very, very slow to publish anything that ‘denies’ the global warming ‘consensus’. The current **10 year long** period of stable world aggregate temperatures is being described as a “**warming “pause”**” - but not a pause for reflection about the underlying assumptions.

THE ECONOMIST March 30, 2013

“OVER the past 15 years air temperatures at the Earth’s surface have been flat while greenhouse-gas emissions have continued to soar. The world added roughly 100 billion tonnes of carbon to the atmosphere between 2000 and 2010. That is about a quarter of all the CO₂ put there by humanity since 1750. And yet, as James Hansen, the head of NASA’s Goddard Institute for Space Studies, observes, “the five-year mean global temperature has been flat for a decade.”

LINK - <http://www.economist.com/news/science-and-technology/21574461-climate-may-be-heating-up-less-response-greenhouse-gas-emissions>

Contrary to conventional wisdom, CO2 - allegedly the guilty-as-charged greenhouse gas, has gone on strike, no longer “forcing” world-wide heat increases. What’s up?

As the physicist Wm. Happer of Princeton wrote in the journal **First Things** --

“Other things being equal, more CO2 will cause more warming. The question is how much warming, and whether the increased CO2 and the warming it causes will be good or bad for the planet.

“The argument starts something like this. CO2 levels have increased from about 280 ppm to 390 ppm over the past 150 years or so, and the earth has warmed by about 0.8 degree Celsius during that time. Therefore the warming is due to CO2. But correlation is not causation. Roosters crow every morning at sunrise, but that does not mean the rooster caused the sun to rise. The sun will still rise on Monday if you decide to have the rooster for Sunday dinner.”

LINK - <http://www.firstthings.com/article/2011/05/the-truth-about-greenhouse-gases>

And as Dr. Happer observed in the **Wall Street Journal** last year-

“It is easy to be confused about climate, because we are constantly being warned about the horrible things that will happen or are already happening as a result of mankind's use of fossil fuels. But these ominous predictions are based on computer models. It is important to distinguish between what the climate is actually doing and what computer models predict. The observed response of the climate to more CO₂ is not in good agreement with model predictions.”

LINK - <http://online.wsj.com/article/SB10001424052702304636404577291352882984274.html>

Anthropogenic (human caused) climate forcing may well be operating. But do we have a handle on the mechanism? Are we (like those clueless medieval physicians) merely bleeding the patient? Is the patient really sick? Or are we warding off the onset of a new cooling period? If we humans collectively are powerful enough to warm the entire planet earth, just how are we doing it?

I recall the arguments of the environmental scientist, **Dr. William F. Ruddiman, who** first advanced a provocative thesis in 2005. His proposal was never really addressed thereafter. **LINK** - <http://www.scientificamerican.com/article.cfm?id=how-did-humans-first-alte>

Dr. Ruddiman advanced two important points: (1) Human land use and agricultural activities over the last eight millennia have done as much to alter the climate as the more recent wave of industrialization; (2) This warming effect is not bad; according to Ruddiman's calculations we otherwise would be in the midst of an ice age.

“New evidence suggests that concentrations of CO₂ started rising about 8,000 years ago, even though natural trends indicate they should have been dropping. Some 3,000 years later the same thing happened to methane, another heat-trapping gas. The consequences of these surprising rises have been profound. Without them, current temperatures in northern parts of North America and Europe would be cooler by three to four degrees Celsius--enough to make agriculture difficult. In addition, an incipient ice age--marked by the appearance of small ice caps--would probably have begun several thousand years ago in parts of northeastern Canada. Instead the earth's climate has remained relatively warm and stable in recent millennia.”

“...about 8,000 years ago the [greenhouse] gas trends stopped following the trend that would have been predicted from their past long-term behavior, which had been marked by regular cycles... [H]uman activities ... - primarily agricultural deforestation and crop irrigation – must have added the extra CO₂ and methane to the atmosphere. These activities explained both the reversals in gas trends and the ongoing increases right up to the start of the industrial era.”

Dr. Ruddiman's hypothesis was partly based on the discovery of changes in the earth's orbit around the sun (known since the 1970's to affect climate). Long term heating and cooling patterns are linked to “regular changes in the amount of sunlight reaching the earth's surface”. In effect, the ice ages and the shorter, warmer interglacial periods are driven by the interplay of three orbital cycles “which operate over 100,000, 41,000 and 22,000 years” and sometimes reinforce each other. The rise of human civilization within the last 6,000 years coincided with the retreat of the huge glaciers that “had blanketed Europe and North America for the previous 100,000 years”.

An ice core taken from Vostok Station in the Antarctic in the 1990's preserves a record of trapped ancient air bubbles going back 400,000 years. “...for example, methane concentrations fluctuate mainly at the 22,000-year tempo of an orbital cycle called precession.”

Skipping most of the technical details of Dr. Ruddiman's argument, I gleaned that methane, CO2 and temperature levels went off-pattern in the last several thousand years and that this change tracked the development of human agriculture. For example, rice paddies generate excess methane, a more potent greenhouse gas than CO2. There was a substantial warming effect that "escaped detection" because "it was masked by natural climate changes in the opposite direction".

Ruddiman and two colleagues, Steven J. Vavrus and John E. Kutzbach, have calculated that human activities, agriculture and industrial combined, have prevented a substantial cooling. "In effect, current temperatures would be well on the way toward typical glacial temperatures had it not been for the greenhouse contributions from early farming practices and later industrialization."

Until the outlines of the current warming trend were understood, scientists in the 1970's were predicting that another ice age was only a "few hundred years" away. Ruddiman now asserts that - "If anything, such forecasts of an 'impending' ice age were actually understated: new ice sheets should have begun to grow several millennia ago because human-induced global warming actually began far earlier..."

In a publisher's description of Ruddiman's 2005 book (Princeton University Press 2005), *Plows, Plagues, and Petroleum: How Humans Took Control of Climate*, we were told that "The 'Ruddiman Hypothesis' will spark intense debate."

I'm still waiting for that debate. Shouldn't it make policy makers the least bit uncomfortable that the climate arguments resemble theological ones in an atmosphere (pun intended) that is hyper sensitive to heresy?

Climate scientists acknowledge the existence of several possible drivers of the observed global warming patterns over the last 80 years, some more plausible than others. Among them are these:

- a) Solar forcing, due to changes in the net heat energy transmitted by the sun to the earth's atmosphere that vary due to a variety of factors, including variations in the earth's orbit and solar radiation output changes;
- b) ocean surface heat variations;
- c) greenhouse gas forcing, noting that the single most potent greenhouse gas is water vapor, then methane and CO2;
- d) land use and atmosphere changes (some due to human activity) that alter surface heat reflectivity;
- e) changes (so far unexplained) in ocean current circulation patterns;
- f) miscellaneous other "suspect" factors such as subsurface ocean volcanic activity and even cosmic ray surges that may affect water vapor formation have limited support as candidates.

We must ask, why was so much emphasis placed on CO2 emissions? Three reasons leap out:

1. CO2 emissions increases roughly coincided with the modern industrial period; and were approximately correlated with the modern warming period (noting that we really only have reliable modern records of world temperatures);
2. The methane sources were poorly documented as they were mostly agricultural; and water vapor was dismissed as the driving cause as "just weather", i.e., as something that was assumed, *a priori*, to be an effect of warming, not a causative agent;

3. Tests of those pre-ancient Antarctic ice cores revealed a strong correlation (over much longer time spans than the modern period) between temperature rises and CO2. But there was an undisclosed CAVEAT: The embarrassing problem that the CO2 increases lagged the temperature increases by about 800 years was a fact not disclosed in Al Gore's movie, Inconvenient Truths. This has been "explained" by asserting that the original heating was caused by greenhouse gasses (really a conjecture), and that the outgassing of water-trapped CO2 in the oceans has accelerated the warming.

We know from tests under ideal and artificial conditions that CO2 has a heat trapping effect. But how does that work under the large scale, dynamic conditions of the real world? Computer models have been developed mostly by extrapolation, not by rigorous testing.

Greenhouse gasses work by absorbing incoming visible light and UV radiation and emitting heat-transmitting infrared radiation (that is trapped on earth as heat) by absorbing the former and emitting the latter.¹

To date, no country, corporation or agency has attempted the following experiment:

In the real world, the greenhouse warming effect takes place in columns of moist or dry air many miles tall, from surface to the troposphere. Thousands of floating smart sensors, aloft for several hours can track local temperatures, incoming solar radiation, scattering radiation -including the infrared band, and the presence of CO2, water vapor and methane. Data would be captured by monitoring aircraft or balloons. This data harvest would be fed to a computer farm. This experimental model can be repeated in hundreds of locations around the globe. Because, so far, the computer models have been embarrassingly off the mark, we can be confident that the resulting **data set** will refute or modify some of the key greenhouse gas assumptions. To date, suppositions and guesses (disguised as climate algorithms) have driven policy. Why not actual empirical findings?

Are such experiments doable? Of course they are. Will they be expensive? Yes, but compared to what? We are spending hundreds of billions of dollars in CO2 remediation without a realistic clue whether that investment will pay off at all.

The climate arguments for drastic CO2 curbs resemble theological ones in a heresy-sensitive atmosphere. The current "warming pause" needs to be a pause for review. Why not use it to utilize real science to generate real data?

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¹ In order of abundance, the greenhouse (heat-trapping) gasses are: water vapor, CO2, methane, nitrous oxide and ozone (a modified form of oxygen). Potency varies. For example, on a pound for pound basis, the heat trapping effects of methane are said to be 72 times stronger than CO2. Moreover, methane gas has large indirect warming effects that have not yet been studied. Water vapor, though highly variable, accounts for **most** of the greenhouse effect, while CO2 accounts for about 20%
LINK - <http://www.realclimate.org/index.php?p=142>