

CO2 Transmitters

CO2, Temperature, Humidity Output: 4-20mA 0-10V Ethernet
DS485 Co to nmatofordam mm



My Global Warming Skepticism, for Dummies

I receive many e-mails, and a recurring complaint is that many of my posts are too technical to understand. This morning's installment arrived with the subject line, "Please Talk to Us", and suggested I provide short, concise, easily understood summaries and explanations "for dummies".

So, here's a list of basic climate change questions, and brief answers based upon what I know today. I might update them as I receive suggestions and comments. I will also be adding links to other sources, and some visual aids, as appropriate.

Deja vu tells me I might have done this once before, but I'm too lazy to go back and see. So, I'll start over from scratch. (Insert smiley)

It is important to understand at the outset that those of us who are skeptical of mankind's influence on climate have a wide variety of views on the subject, and we can't all be right. In fact, in this business, it is really easy to be wrong. It seems like everyone has a theory of what causes climate change. But it only takes one of us to be right for the IPCC's anthropogenic global warming (AGW) house of cards to collapse.

As I like to say, taking measurements of the climate system is much easier than figuring out what those measurements mean in terms of cause and effect. Generally speaking, it's not the warming that is in dispute...it's the cause of the warming.

If you disagree with my views on something, please don't flame me. Chances are, I've already heard your point of view; very seldom am I provided with new evidence I haven't already taken into account.

1) Are Global Temperatures Rising Now? There is no way to know, because natural year-to-year variability in global temperature is so large, with warming and cooling occurring all the time. What we can say is that surface and lower atmospheric temperature have risen in the last 30 to 50 years, with most of that warming in the Northern Hemisphere. Also, the magnitude of recent warming is somewhat uncertain, due to problems in making long-term temperature measurements with thermometers without those measurements being corrupted by a variety of non-climate effects. But there is no way to know if temperatures are continuing to rise now...we only see warming (or cooling) in the rearview mirror, when we look back in time.

2) Why Do Some Scientists Say It's Cooling, while Others Say the Warming

is Even Accelerating? Since there is so much year-to-year (and even decade-to-decade) variability in global average temperatures, whether it has warmed or cooled depends upon how far back you look in time. For instance, over the last 100 years, there was an overall warming which was stronger toward the end of the 20th Century. This is why some say “warming is accelerating”. But if we look at a shorter, more recent period of time, say since the record warm year of 1998, one could say that it has cooled in the last 10-12 years. But, as I mentioned above, neither of these can tell us anything about whether warming is happening “now”, or will happen in the future.

3) Haven't Global Temperatures Risen Before? Yes. In the longer term, say hundreds to thousands of years, there is considerable indirect, proxy evidence (not from thermometers) of both warming and cooling. Since humankind can't be responsible for these early events is evidence that nature can cause warming and cooling. If that is the case, it then opens up the possibility that some (or most) of the warming in the last 50 years has been natural, too. While many geologists like to point to much larger temperature changes are believed to have occurred over millions of years, I am unconvinced that this tells us anything of use for understanding how humans might influence climate on time scales of 10 to 100 years.

4) But Didn't the “Hockey Stick” Show Recent Warming to be Unprecedented? The “hockey Stick” reconstructions of temperature variations over the last 1 to 2 thousand years have been a huge source of controversy. The hockey stick was previously used by the IPCC as a veritable poster child for anthropogenic warming, since it seemed to indicate there have been no substantial temperature changes over the last 1,000 to 2,000 years until humans got involved in the 20th Century. The various versions of the hockey stick were based upon limited amounts of temperature proxy evidence — primarily tree rings — and involved questionable statistical methods. In contrast, I think the bulk of the proxy evidence supports the view that it was at least as warm during the Medieval Warm Period, around 1000 AD. The very fact that recent tree ring data erroneously suggests cooling in the last 50 years, when in fact there has been warming, should be a warning flag about using tree ring data for figuring out how warm it was 1,000 years ago. But without actual thermometer data, we will never know for sure.

5) Isn't the Melting of Arctic Sea Ice Evidence of Warming? Warming, yes...manmade warming, no. Arctic sea ice naturally melts back every summer, but that meltback was observed to reach a peak in 2007. But we have relatively accurate, satellite-based measurements of Arctic (and Antarctic) sea ice only since 1979. It is entirely possible that late summer Arctic Sea ice cover was just as low in the 1920s or 1930s, a period when Arctic thermometer data suggests it was just as warm. Unfortunately, there is no way to know, because we did not have satellites back then. Interestingly, Antarctic sea ice has been growing nearly as fast as Arctic ice has been melting over the last 30+ years.

6) What about rising sea levels? I must confess, I don't pay much attention to the sea level issue. I will say that, to the extent that warming occurs, sea levels can be expected to also rise to some extent. The rise is partly due to thermal expansion of the water, and partly due to melting or shedding of land-locked ice (the Greenland and Antarctic ice sheets, and glaciers). But this says nothing about whether or not humans are the cause of that warming. Since there is evidence that glacier retreat and sea level rise started well before humans can be blamed, causation is — once again — a major source of uncertainty.

7) Is Increasing CO2 Even Capable of Causing Warming? There are some very intelligent people out there who claim that adding more carbon dioxide to the atmosphere can't cause warming anyway. They claim things like, "the atmospheric CO2 absorption bands are already saturated", or something else very technical. [And for those more technically-minded persons, yes, I agree that the effective radiating temperature of the Earth in the infrared is determined by how much sunlight is absorbed by the Earth. But that doesn't mean the lower atmosphere cannot warm from adding more greenhouse gases, because at the same time they also cool the upper atmosphere]. While it is true that most of the CO2-caused warming in the atmosphere was there before humans ever started burning coal and driving SUVs, this is all taken into account by computerized climate models that predict global warming. Adding more "should" cause warming, with the magnitude of that warming being the real question. But I'm still open to the possibility that a major error has been made on this fundamental point. Stranger things have happened in science before.

8) Is Atmospheric CO2 Increasing? Yes, and most strongly in the last 50 years...which is why "most" climate researchers think the CO2 rise is the cause of the warming. Our site measurements of CO2 increase from around the world are possibly the most accurate long-term, climate-related, measurements in existence.

9) Are Humans Responsible for the CO2 Rise? While there are short-term (year-to-year) fluctuations in the atmospheric CO2 concentration due to natural causes, especially El Nino and La Nina, I currently believe that most of the long-term increase is probably due to our use of fossil fuels. But from what I can tell, the supposed "proof" of humans being the source of increasing CO2 — a change in the atmospheric concentration of the carbon isotope C13 — would also be consistent with a natural, biological source. The current atmospheric CO2 level is about 390 parts per million by volume, up from a pre-industrial level estimated to be around 270 ppm...maybe less. CO2 levels can be much higher in cities, and in buildings with people in them.

10) But Aren't Natural CO2 Emissions About 20 Times the Human Emissions? Yes, but nature is believed to absorb CO2 at about the same rate it is produced. You can think of the reservoir of atmospheric CO2 as being like a giant container of water, with nature pumping in a steady stream into the bottom of the container (atmosphere) in some places, sucking out about the same amount in

other places, and then humans causing a steady drip-drip-drip into the container. Significantly, about 50% of what we produce is sucked out of the atmosphere by nature, mostly through photosynthesis. Nature loves the stuff. CO₂ is the elixir of life on Earth. Imagine the howls of protest there would be if we were destroying atmospheric CO₂, rather than creating more of it.

11) Is Rising CO₂ the Cause of Recent Warming? While this is theoretically possible, I think it is more likely that the warming is mostly natural. At the very least, we have no way of determining what proportion is natural versus human-caused.

12) Why Do Most Scientists Believe CO₂ is Responsible for the Warming? Because (as they have told me) they can't think of anything else that might have caused it. Significantly, it's not that there is evidence nature can't be the cause, but a lack of sufficiently accurate measurements to determine if nature is the cause. This is a hugely important distinction, and one the public and policymakers have been misled on by the IPCC.

13) If Not Humans, What could Have Caused Recent Warming? This is one of my areas of research. I believe that natural changes in the amount of sunlight being absorbed by the Earth — due to natural changes in cloud cover — are responsible for most of the warming. Whether that is the specific mechanism or not, I advance the minority view that the climate system can change all by itself. Climate change does not require an “external” source of forcing, such as a change in the sun.

14) So, What Could Cause Natural Cloud Changes? I think small, long-term changes in atmospheric and oceanic flow patterns can cause ~1% changes in how much sunlight is let in by clouds to warm the Earth. This is all that is required to cause global warming or cooling. Unfortunately, we do not have sufficiently accurate cloud measurements to determine whether this is the primary cause of warming in the last 30 to 50 years.

15) How Significant is the Climategate Release of E-Mails? While Climategate does not, by itself, invalidate the IPCC's case that global warming has happened, or that humans are the primary cause of that warming, it DOES illustrate something I emphasized in my first book, “Climate Confusion”: climate researchers are human, and prone to bias.

16) Why Would Bias in Climate Research be Important? I thought Scientists Just Follow the Data Where It Leads Them When researchers approach a problem, their pre-conceived notions often guide them. It's not that the IPCC's claim that humans cause global warming is somehow untenable or impossible, it's that political and financial pressures have resulted in the IPCC almost totally ignoring alternative explanations for that warming.

17) How Important Is “Scientific Consensus” in Climate Research? In the case of global warming, it is nearly worthless. The climate system is so complex

that the vast majority of climate scientists — usually experts in variety of specialized fields — assume there are more knowledgeable scientists, and they are just supporting the opinions of their colleagues. And among that small group of most knowledgeable experts, there is a considerable element of groupthink, herd mentality, peer pressure, political pressure, support of certain energy policies, and desire to Save the Earth — whether it needs to be saved or not.

18) How Important are Computerized Climate Models? I consider climate models as being our best way of exploring cause and effect in the climate system. It is really easy to be wrong in this business, and unless you can demonstrate causation with numbers in equations, you are stuck with scientists trying to persuade one another by waving their hands. Unfortunately, there is no guarantee that climate models will ever produce a useful prediction of the future. Nevertheless, we must use them, and we learn a lot from them. My biggest concern is that models have been used almost exclusively for supporting the claim that humans cause global warming, rather than for exploring alternative hypotheses — e.g. natural climate variations — as possible causes of that warming.

19) What Do I Predict for Global Temperature Changes in the Future? I tend to shy away from long-term predictions, because there are still so many uncertainties. When pressed, though, I tend to say that I think cooling in our future is just as real a possibility as warming. Of course, a third possibility is relatively steady temperatures, without significant long-term warming or cooling. Keep in mind that, while you will find out tomorrow whether your favorite weather forecaster is right or wrong, no one will remember 50 years from now a scientist today wrongly predicting we will all die from heat stroke by 2060.

Concluding Remarks

Climate researchers do not know nearly as much about the causes of climate change as they profess. We have a pretty good understanding of how the climate system works on average...but the reasons for small, long-term changes in climate system are still extremely uncertain.

The total amount of CO₂ humans have added to the atmosphere in the last 100 years has upset the radiative energy budget of the Earth by only 1%. How the climate system responds to that small “poke” is very uncertain. The IPCC says there will be strong warming, with cloud changes making the warming worse. I claim there will be weak warming, with cloud changes acting to reduce the influence of that 1% change. The difference between these two outcomes is whether cloud feedbacks are positive (the IPCC view), or negative (the view I and a minority of others have).

So far, neither side has been able to prove their case. That uncertainty even exists on this core issue is not appreciated by many scientists!

Again I will emphasize, some very smart people who consider themselves skeptics

will disagree with some of my views stated above, particularly when it involves explanations for what has caused warming, and what has caused atmospheric CO₂ to increase.

Unlike the global marching army of climate researchers the IPCC has enlisted, we do not walk in lockstep. We are willing to admit, “we don’t really know”, rather than mislead people with phrases like, “the warming we see is consistent with an increase in CO₂”, and then have the public think that means, “we have determined, through our extensive research into all the possibilities, that the warming cannot be due to anything but CO₂”.

Skeptics advancing alternative explanations (hypotheses) for climate variability represent the way the researcher community used to operate, before politics, policy outcomes, and billions of dollars got involved.