The narrative of an impending man-made climate change catastrophe is based on an assertion that the Earth’s climate is extremely sensitive to increases in CO₂ emissions and that CO₂ ranks among the most important factors determining climate across many timescales. When you hear about rising human CO₂ emissions causing everything from devastating droughts to worsening storms, from sea level rise to mass extinctions, realize that these are all based on computer models built on the assertion that changes in CO₂ will have a strong effect on global climate. However, there is one minor problem with their arguments: reality does not support that assertion.

The climate is always changing, with many factors involved (as discussed in the accompanying article, “What Causes Climate Change? The Sun, the Solar System, and the Galaxy”), and the historical and geological evidence tells us that CO₂ is a relatively minor factor (if much of a factor at all).

**Case 1: 20th Century**

Start by comparing CO₂ levels and temperature over the past century. From 1900 to the present, a relationship existed between human emissions of what are called “greenhouse gases” and the yearly average global temperature is far from self-evident. **Figure 1** compares global average temperature with increases in greenhouse gas and CO₂ emissions (expressed as an increase above the pre-industrial baseline of 300 parts per million).

The data reveal a global temperature increase from 1910 to 1945, during a period when human greenhouse emissions were relatively low. As the rate of CO₂ increase began to accelerate over the following 30 years, global temperatures did not increase along with them; the temperatures went flat from 1945 to 1975. The only period where these processes correspond is the recent warming phase, from 1975 to 1998. However, since 1998 global temperatures have again gone flat, breaking from the upward trend in CO₂ emissions.

Before going on, it should be emphasized that this disagreement is evident in the most recent historical data.
provided by NOAA and other government agencies. As will be discussed in the accompanying article, “The ‘Methods’ of Climate Alarmists,” we have strong reasons to question the accuracy of the historical data provided by government agencies with a vested interest in the man-made climate change catastrophe narrative, as they have repeatedly cherry-picked the data that supports their assertions, and even “adjusted” historical data to fit their claims. That stated, even with these biases in the data selection and adjustment processes, we still see this disagreement between CO₂ and temperature.

**Case 2: The Pause**

Focusing on this more recent period (1998 to the present), two different assessments of global temperature based on satellite measurements both show that global temperatures have shown no increasing trend since 1998 – despite the relatively large increase in CO₂ levels. These satellite measurements represent an important, independent temperature record, free from the manipulations of surface temperature records discussed in the accompanying article, “The ‘Methods’ of Climate Alarmists.”

This recent flat-line in global temperature has been popularized as a global warming “pause” or “hiatus.” Even with CO₂ and other greenhouse emissions continuing to accelerate over the past two decades, *the Earth hasn’t warmed in response*. There are literally dozens of purported explanations for why this leveling off does not bring into question the narrative that the climate is extremely sensitive to CO₂ levels and continued human CO₂ emissions will cause catastrophic climate change. But these explanations are all post hoc excuses. *None of the climate models predicted this pause before it occurred, yet we are now told to trust those same climate models for future predictions of how CO₂ increases will devastate the Earth’s climate.*

The spectacular failure of computer models to accurately predict how the Earth’s climate will respond to changes in CO₂ levels can be further illustrated by comparing the predictions made by dozens of computer models with the actual results that occurred. As can be seen in **Figure 3**, actual temperature has remained below the vast majority of all climate model predictions, and well below the average of all predictions.

These results indicate that the Earth’s climate is not responding to CO₂ emissions as claimed by those sup-

**Figure 2**

*Satellite Data Shows No Global Temperature Rise for 18 Years*

- **Global Lower Troposphere Temperature Anomalies from UAH (University of Alabama in Huntsville) Analysis of Satellite Data**
  - (Version 6.0 beta; January 1997 to March 2015; Reference 1981-2010)

- **Global Lower Troposphere Temperature Anomalies from RSS (Remote Sensing Systems) Analysis of Satellite Data**
  - (December 1996 to March 2015; Reference 1979-1998)
The global temperature predicted by an average of 44 climate models compared against actual global temperatures measured by satellites. Image adapted from Dr. Roy Spencer, “95% of Climate Models Agree: The Observations Must be Wrong,” February 7th, 2014, http://www.drroyspencer.com/

Case 3: CO₂ Lags Behind Temperature

One of the more infamous illustrations of this comes from the evidence popularized by Al Gore in his science fiction film, An Inconvenient Truth. Gore presented a close correlation between CO₂ levels and temperature records going back a half million years (recorded in ice core samples from Antarctica). This was presented as conclusive evidence that CO₂ changes drive changes in global temperature, with Gore stating “there is one relationship that is far more powerful than all the others, and it is this: when there is more carbon dioxide the temperature gets warmer, because it traps more heat from the Sun inside.” There’s a good reason Gore provided no explanation of what would have caused these past changes in CO₂.

What he didn’t mention was that the changes in CO₂ levels came after changes in temperature, indicating that CO₂ was not causing the climate to change, but rather responding to temperature change. This is no surprise. The oceans absorb, store, and release large amounts of CO₂, and the temperature of the ocean water determines how much CO₂ it can hold. Consequently, changes in climate (and ocean temperature) can increase or decrease the CO₂ in the
atmosphere. For example, warming causes more CO₂ to be released into the atmosphere, so a CO₂ increase would be expected to come after (lag behind) a temperature rise.¹

Records of CO₂ changes following temperatures have repeatedly been shown in multiple studies. A 1999 study showed that CO₂ changes followed behind temperature changes by 600 years during the last three transitions from ice ages to interglacial periods.² A 2000 study found that CO₂ lagged temperature changes by 1,200 years in Antarctic ice cores between 60,000 and 20,000 years ago (see Figure 4).³ A 2001 study demonstrated an 800 year CO₂ lag in the beginning of the most recent interglacial. And a 2005 study showed CO₂ lagging temperature changes in temperature by 1,900 years in Antarctic data.

Case 4: The Phanerozoic

The lack of climate sensitivity to CO₂ is further supported when we look at longer timescales, covering hundreds of millions of years. For records covering the entire time of advanced animal life on Earth (the Phanerozoic Eon, from 540 million years ago to the present) we see no evidence that varying CO₂ levels drive global climate, or are even correlated with climate changes. We see periods where CO₂ levels were much higher than today, with lower global temperatures (as in the Ordovician and Jurassic periods). And we see long-term trends of CO₂ increase associated with temperature decrease, followed by CO₂ decrease being associated with temperature increase (from the late Permian, through the Triassic, Jurassic, and Cretaceous). Again, this shows the absurdity of the assertion that the Earth’s climate is highly responsive to atmospheric CO₂ levels, and the criminality of the alarmists’ demands that human CO₂ emissions be drastically cut back.

Whether we look at the recent changes of the Earth’s climate over the past decades and centuries, or longer-term records covering the past hundreds of thousands or hundreds of millions of years, we see clear evidence that CO₂ is not a major factor determining the Earth’s climate. As discussed in the accompanying article, “What Causes Climate Change? The Sun, the Solar System, and the Galaxy,” the Earth’s climate is always changing, but not because of CO₂.

Bottom line: is CO₂ a greenhouse gas? Yes. Could an increase in CO₂ levels affect the climate? Sure, that is possible, but the evidence indicates it wouldn’t be much of an effect (if any). Is there any reason to believe that human CO₂ emissions are going to bring the world climate system to the verge of some catastrophic change, requiring concerted, costly, and drastic efforts to slash emissions? Absolutely not.

¹ Many supporters of the man-made climate change crisis narrative don’t dispute that CO₂ changes follow behind temperature changes, but they argue that different causes (other than CO₂) initiate the temperature change, which then releases more CO₂, and then the CO₂ acts to amplify these temperature changes. However, this is just reasserting their thesis, and providing no proof. According to this scenario these geological records don’t provide any evidence to support the claim that the climate is highly sensitive to CO₂ change (as Gore claimed).