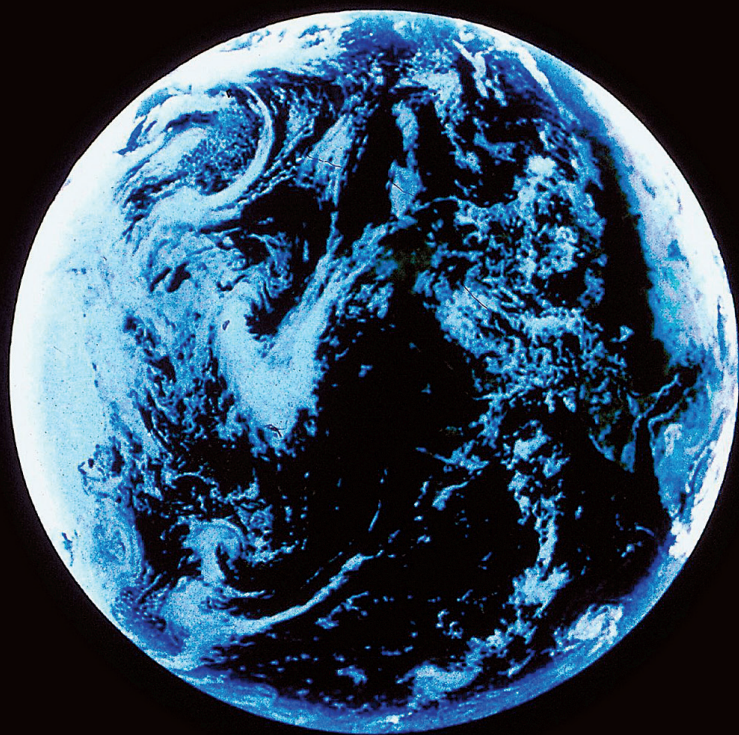


GLOBAL WARMING FACTS VERSUS FAITH

ONE ASTRONAUT'S VIEWS



BY WALTER CUNNINGHAM

APOLLO 7 ASTRONAUT

Global Warming: Facts versus Faith

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About the Author



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Walter Cunningham has enjoyed careers in the United States Marine Corps, National Aeronautics and Space Administration, and private industry, including 12 years as a venture capitalist.

Mr. Cunningham is best known as the pilot of Apollo 7, the first manned test flight of the Apollo Program to land a man on the Moon. He was given the assignment after serving on the backup crew for Apollo 1, when the prime crew was killed in a fire on the pad. Following the Apollo 7 mission in 1968, he became chief of the Skylab Astronauts, where he was responsible for the design, development, and integration of systems for the largest spacecraft, manned or unmanned, ever placed in orbit at that time.

He is a retired Marine Corps fighter pilot with the rank of colonel and 4,500 hours pilot time. He has graduate degrees from UCLA in physics and the Harvard Graduate School of Business.

Mr. Cunningham is a successful businessman, entrepreneur, venture capitalist, lecturer, author (*The All-American Boys*), and host of a radio talk show. He is a member of the Astronaut Hall of Fame.

His writings and involvement with energy and the environment date back to 1970, when he was one of three founders of The Earth Awareness Foundation, an environmental concern organization. From 2000 to 2005, Mr. Cunningham was a member of the Advisory Board for the National Renewable Energy Laboratory.

Facts versus Faith

There is a war going on between those who believe that human activities are responsible for global warming and those who don't. Contrary to the way the debate is often framed by the media, those who believe in anthropogenic global warming (AGW) do not hold the high ground, scientifically. Their critics do.

Scientists have known for centuries that the Sun, cloud cover, oceans, etc. are the principal drivers of temperature change, even without fully understanding the mechanisms or interactions. This hypothesis has been evolving for centuries, but such hypotheses, especially those elements that are the least understood, are always subject to challenge.

A competing hypothesis must be confirmed by considerable evidence and endure all attempts to disprove it before it can be considered a legitimate competitor to the status quo. The hypothesis advocating that human-generated carbon dioxide (CO₂) is responsible for heating and cooling the atmosphere has not satisfied either of these criteria. In spite of this, alarmists have succeeded in labeling us “deniers,” as if we are denying a pre-existing truth. The application of the scientific process has been bypassed in the new social/political culture with little opposition from lifelong scientists—until relatively recently.

The current debate is not unlike Galileo's historic disagreement with the Catholic Church, or the battle over evolution versus creationism. In all three cases, facts are pitted against faith and science against religion. The conflict over global warming has deteriorated into a religious war between true believers in AGW and non-believers, the so-called “skeptics.”

Like Galileo and Darwin, skeptics refuse to accept an article of popular belief simply on faith in authority. And like the Catholic Church and Darwin's critics, no evidence can convince the true believers in human-caused global warming that their faith is wrong.

AGW true believers are past the point of considering evidence. They cannot be reasoned out of their position, because it wasn't reason that got them there, it was emotion and politics. Advocacy has replaced objective evaluation of data, and scientific data—regardless of the authority of its source or importance in the debate—are ignored and suppressed, or the messengers are attacked.

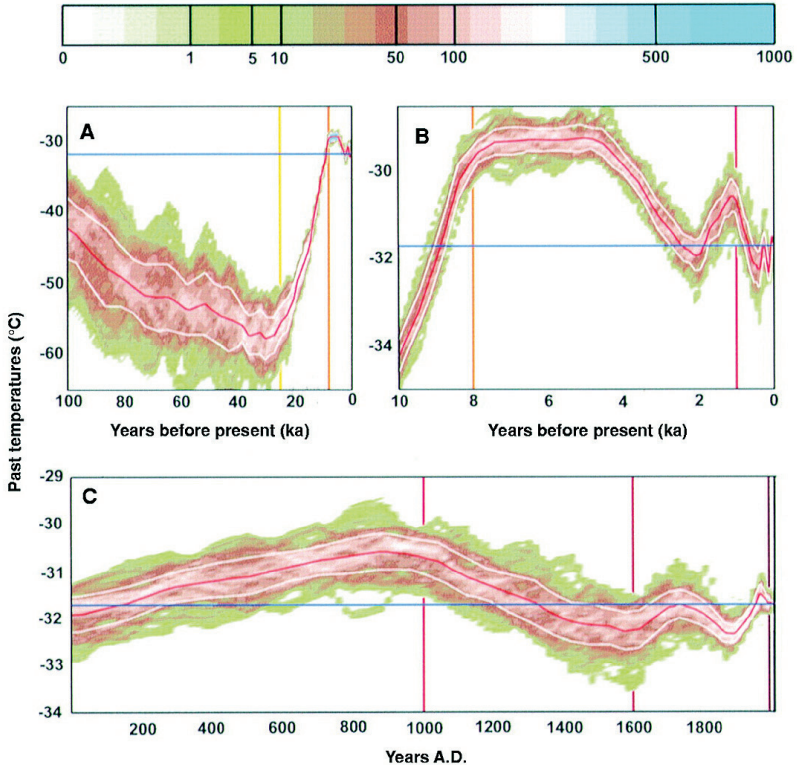
Global climate change is a scientific question, demanding scientific data for understanding, but until very recently, it looked like subjective opinion was winning. Thankfully, some scientists have been willing to risk their careers by speaking out against AGW dogma. Disclosures of scientific fraud by the leading advocates of AGW, along with new scientific discoveries and cooling global temperatures, have all helped bring the world back from the brink of adopting some utterly unnecessary and truly harmful limitations on human progress.

In the end, science will win—as it always does—but not without some painfully rude awakenings by Al Gore, President Barack Obama, and millions of others who can't handle the truth.

What Scientists Know

Public debate should be focused on what scientists know about the causes of global temperature changes and whether we can do anything to control or influence the temperature of our planet. Is global warming a natural inevitability, or is it anthropogenic—human caused?

One reason for belief in AGW is the sad state of scientific literacy in America today. A 2006 National Science Foundation survey found 24 percent of Americans did not know the Earth revolves around the Sun.¹ Such widespread ignorance leaves our society vulnerable to the emotional appeal of AGW.



Source: D. Dahl-Jensen, et al., Science, Vol. 282 (October 9, 1998).

FIGURE 1. Proxy data show past temperatures were sometimes higher and sometimes lower than today's temperatures.

Determining the temperature of the Earth, past or present, is a matter of collecting data, analyzing them, and coming up with the best explanation to account for the data. Scientists have used proxy data to estimate the temperature of the Earth going back for millennia. (See Figure 1.) To say the Earth has been warming is to state the obvious. Since the end of the last Ice Age, Earth's temperature has increased approximately 4 degrees Celsius. That is certain and measurable evidence of warming, but since the warming started before a human presence made an impact, it is evidence of natural variability, not proof of AGW.

Scientists have been unable to find a relationship between industrial activity or energy consumption and global temperatures. Carbon dioxide emissions have risen steadily since the start of the industrial revolution, but temperatures have risen, fallen, risen again, and more recently begun to fall again. (See Figure 2.) Correlation doesn't prove causation, but a persistent lack of correlation (as between human emissions of carbon dioxide and temperatures) can disprove a hypothesis. In contrast to their inability to find evidence in support of AGW, scientists have found an excellent correlation between fluctuations of solar activity and the Earth's temperature. (See Figure 3.)

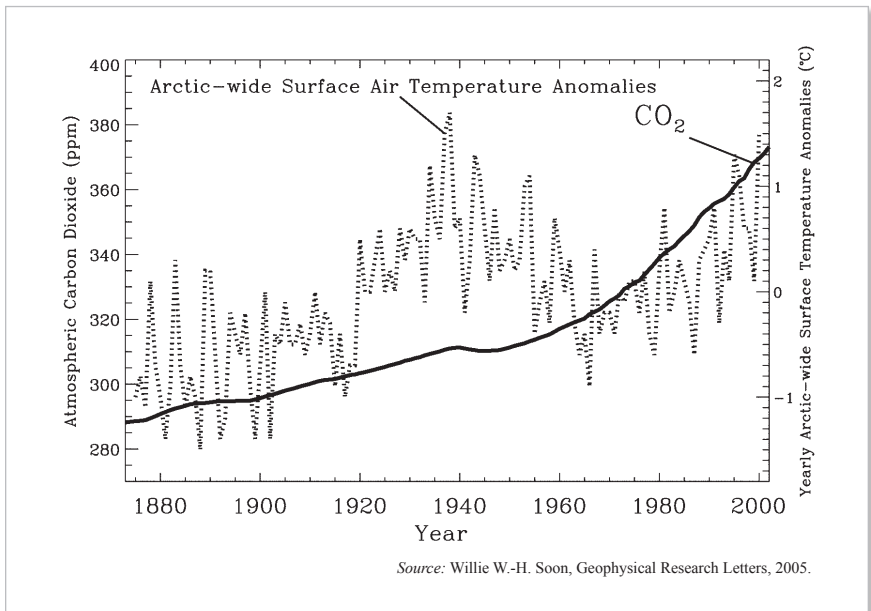


FIGURE 2. While carbon dioxide concentrations have risen steadily, temperatures have risen, fallen, risen, and fallen again.

Science tells us the Earth has been warming and cooling for the past 4.6 billion years. Most recently, it has been warming—ever so slightly—but there is nothing unusual about it. Changes in the Earth's temperature have occurred many times in our climatic history, even just since the industrial revolution.

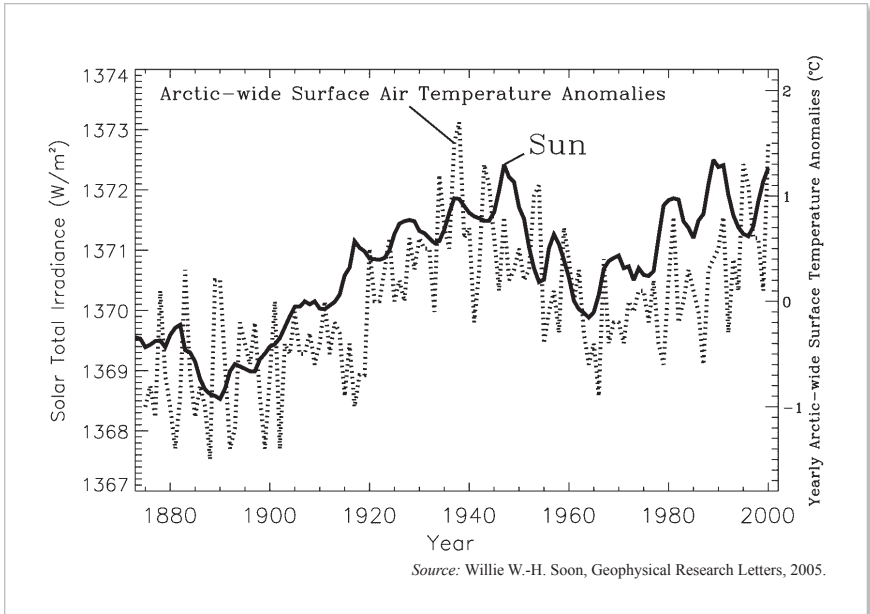


FIGURE 3. Global temperatures closely track changes in total solar irradiance, suggesting the sun causes warming and cooling trends.

Advocates of AGW have been working overtime to obfuscate the issue. When the best available temperature data (from satellites) began showing a leveling off of temperatures and then a slight cooling trend beginning in the late 1990s, the alarmists began dropping “global warming” from their vocabularies in favor of “global climate change.” Who can argue that the climate isn’t changing? It’s *always* changing!

Sure, climate change is occurring, but this is not evidence that humans are influencing the temperature of our planet to any measurable degree. In fact, any human contribution to global temperature change is probably lost in the noise of natural terrestrial and cosmic factors.

The Missing Consensus

Claims that there is a “scientific consensus” on the causes, extent, or consequences of climate change are simply false. While climate

scientists may agree that the Earth's temperature is always changing, there is tremendous disagreement and debate over whether humans are responsible for those changes. Climatology is a new science and there is great uncertainty about fundamental scientific questions, preventing scientists from knowing for certain what is causing current climate trends and accurately predicting future climate conditions.

A U.S. Senate Environment and Public Works Committee report identifies 700 prominent scientists who have publicly repudiated the alarmist position on global warming expressed by Al Gore and James Hansen.² Their ranks include experts in climatology, geology, oceanography, biology, glaciology, biogeography, meteorology, economics, chemistry, mathematics, environmental sciences, engineering, physics, and paleoclimatology. They have signed a letter pointing out that climate change is a well-known natural phenomenon, and when changes are gradual, man has an almost infinite ability to adapt and evolve.

More than 31,000 scientists in the United States have signed a petition saying "there is no convincing scientific evidence that human release of carbon dioxide, methane, or other greenhouse gases is causing or will, in the foreseeable future, cause catastrophic heating of the Earth's atmosphere and disruption of the Earth's climate."³

Debating Carbon Dioxide

The advocates of AGW say the United States must impose a devastating tax scheme to force industry to emit less carbon dioxide, thereby reversing the warming trend. This policy prescription is based on three assumptions: (1) that CO₂ is the cause of changes in the Earth's temperature; (2) that a warmer Earth would be bad for the planet's flora and fauna, including humans; and (3) that humans are capable of controlling the temperature of the Earth.

In reality, water vapor has more than twice the impact on temperature as atmospheric CO₂, aided and abetted by other greenhouse gases, like methane (CH₄) and nitrous oxide (N₂O). With CO₂ representing just 3.6 percent of greenhouse gases, by volume, and human activity responsible for only 3.2 percent of that, we can influence only a tiny portion of the total greenhouse gases. Some studies have found CO₂ levels are largely irrelevant to global warming.

The true believers in AGW base their case on a broad and weak correlation between CO₂ and global temperature in the last half of the twentieth century. They cannot be sure which is cause and which is effect. Looking at much longer periods of the Earth's history, it becomes clear that temperature increases have *preceded* high CO₂ levels by anywhere from 100 to 800 years, suggesting that higher temperatures cause CO₂ levels to rise, rather than vice versa.

The only other time in history that temperature and CO₂ levels were this low, together, was 300 million years ago.

There have been periods when atmospheric CO₂ levels were as much as 16 times higher than they are now—periods characterized *not* by warming but by glaciations. (See Figure 4.)

You might have to go back half-a-million years to match our current level of atmospheric CO₂, but you have to go back only to the Medieval Warm Period, from the tenth to the fourteenth century, to find an intense global warming episode, followed immediately by the drastic cooling of the Little Ice Age. Neither of those events can be attributed to variations in CO₂ levels.

Since CO₂ is a relatively minor constituent of “greenhouse gases,” and human activity contributes only a tiny portion of atmospheric CO₂, why have alarmists made it the whipping boy for global warming? Probably because they know how fruitless it would be to propose controlling other atmospheric drivers of climate—water, methane, and nitrous oxide—not

Global Temperature and Atmospheric CO₂ Over Geologic Time

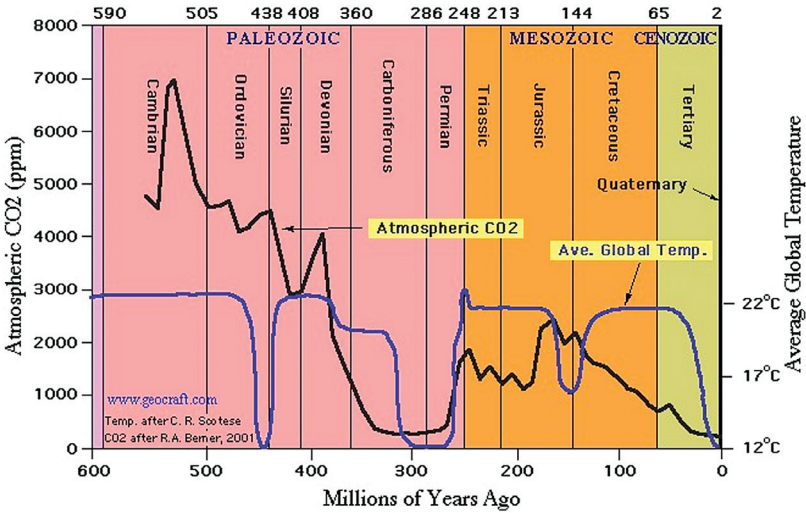


FIGURE 4. Carbon dioxide concentrations in the atmosphere in the past coincided with periods of glaciation.

to mention volcanic eruptions, or ocean temperature, or solar activity, etc. So they wage war on man-made CO₂, no matter how ridiculous it makes them appear.

Without the greenhouse effect to keep our world warm, the planet would have an average temperature of -18 degrees Celsius. Because we do have it, the temperature is a comfortable +15 degrees Celsius.

Other inconvenient facts ignored by the activists: Carbon dioxide is a non-polluting gas that is essential for plant photosynthesis. Higher concentrations of CO₂ in the atmosphere produce bigger crop harvests and larger and healthier forests—results environmentalists used to like.

There are legitimate reasons to restrict emissions of pollutants into the atmosphere. Recycling makes sense and protecting the environment is good for everyone. But we should not fool ourselves into thinking we can change the temperature of the Earth by doing these things.

The Missing Effects of Global Warming

For the past decade, according to highly accurate measurements taken from satellites, there has been no global warming. (See Figure 5.) Even though atmospheric CO₂ has continued to accumulate—up about 4 percent in the past 10 years—the global mean temperature was flat, then fell, and most recently rose again. That should raise obvious questions about CO₂ being the cause of climate change.

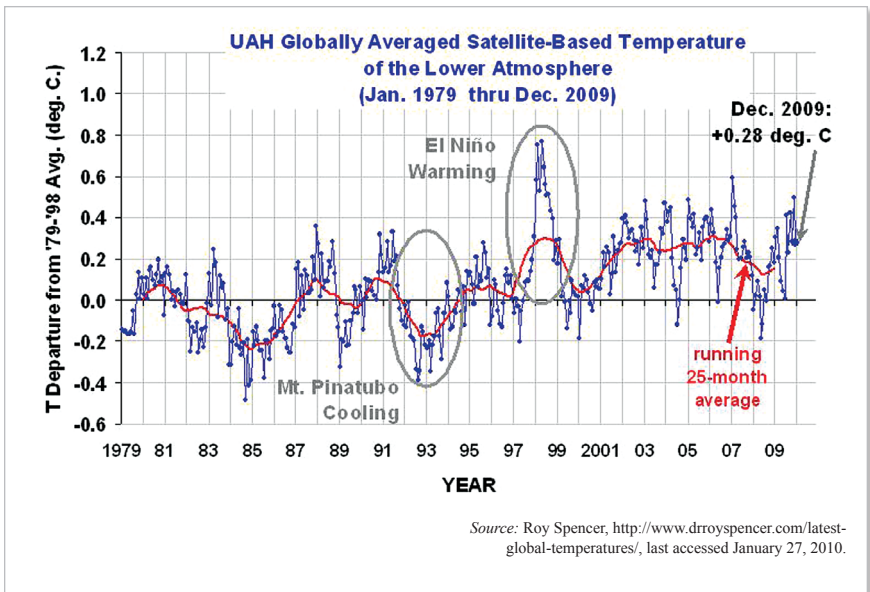


FIGURE 5. Highly accurate satellite measurements of global temperature show very little warming.

According to the greenhouse theory used by those who believe in anthropogenic global warming, warming in the upper atmosphere should occur before any surface warming effect. But NASA's data show that has

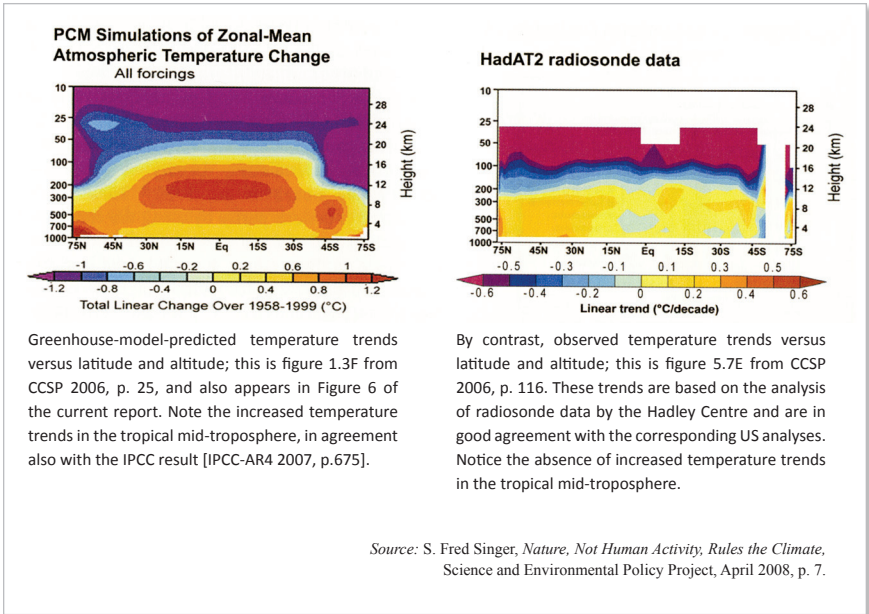


FIGURE 6. The “fingerprint” of global warming in the upper atmosphere predicted by computer models is absent from observed temperatures.

not been happening. Interestingly, satellites and weather balloons actually have shown a slight decrease in average temperatures in this part of the atmosphere. The images shown in Figure 6 reveal that the expected “fingerprint” of warming in the upper atmosphere is missing.

In spite of warnings of severe consequences from rising seas, droughts, severe weather, species extinction, and other disasters, the record shows little if any evidence of such effects. With scientific evidence being ignored, emotional arguments and anecdotal data are ruling the day. The media subjects us to one frightening image of environmental nightmares after another, linking each to global warming. Journalists and activist scientists use hurricanes, wildfires, and starving polar bears to appeal to our emotions, not our reason. They are far more concerned with anecdotal observations of such things as melting sea ice inside the Arctic Circle than they are with understanding why it is happening and how frequently it has occurred in the past.

A report by a team of 40 scientists from a dozen countries, released in June 2009,⁴ found the following:

- “The average temperature history of Antarctica provides no evidence of twentieth century warming.”
- “The results of several research studies argue strongly against claims that CO₂-induced global warming would cause catastrophic disintegration of the Greenland and Antarctic Ice Sheets.”
- “The mean rate of global sea level rise has not accelerated over the recent past. The determinants of sea level are poorly understood due to considerable uncertainty associated with a number of basic parameters that are related to the water balance of the world’s oceans and the meltwater contribution of Greenland and Antarctica.”
- “[D]espite the supposedly ‘unprecedented’ warming of the twentieth century, there has been no increase in the intensity or frequency of tropical cyclones globally or in any of the specific oceans.”

After warnings that 2007 would be the hottest year on record and a record year for hurricanes, we experienced, in 2008, the coolest year since 2001 and, by some measures, the most benign hurricane season in the Northern Hemisphere in three decades.

Even though recent changes in our atmosphere are all within the bounds of the Earth’s natural variability, a growing number of people seem willing to throw away trillions of dollars on fruitless solutions. It’s ridiculous to allow emotional appeals and anecdotal data to shape our conclusions and influence our expenditures when real science and technology are at our fingertips.

Based on the seasonal and geographic distribution of any projected warming, a good case can be made that today’s temperature is not as beneficial for humans as a warmer world temperature would be.

Political Science

Comprehensive data about our biosphere are essential to understanding our climate and informing politicians to make the critical decisions required. We have two agencies to sense, measure, collect, analyze, reduce, and produce scientific findings on the biosphere: the National Aeronautics and Space Administration (NASA) and the National Oceanic and Atmospheric Administration (NOAA).

Scientists are using data recently generated by NASA to understand the Gulf Stream warming mechanism and its effect on European weather. This will allow us to improve our models and produce better seasonal forecasts.

NASA's Aqua satellite is confirming that the dominant greenhouse gas, water vapor, works to counteract carbon dioxide in the atmosphere, information that is ignored by global warming alarmists because it contradicts an assumption used in all of their warming models. This is but one of many examples of "selective ignorance" displayed by the alarmists.

Policy efforts and the monitoring of international environmental agreements are doomed to failure without an adequate satellite system to furnish the data. But interagency wrangling and budgetary issues are crippling our satellite monitoring capability. As much as a third of our Earth-monitoring satellites will need replacing in the next couple of years.

NASA and NOAA are uniquely positioned to debunk the current hysteria over AGW but, unfortunately, they too appear to be caught up in the politics of global warming. Allowing their science to be politicized could destroy their credibility. One of the early alarmists about AGW was a NASA scientist, James Hansen. Hansen is a true believer who has been preaching AGW for 20 years, ever since he quit working on a model to prove global cooling. While giving hundreds of speeches and interviews, Hansen nevertheless insisted that the Bush administration was trying to "censor" him.

No one in the mainstream media seems to care that Hansen is a long-time political activist who preaches AGW even when NASA's own data contradict him. Ideologues like Hansen are hailed as heroes and prophets by biased media, while those who dispute the latest popular wisdom are either ignored or ridiculed.

In today's politically correct environment, many are reluctant to dispute the popular wisdom. When NASA Administrator Michael Griffin, Hansen's boss and a distinguished scientist in his own right, attempted to draw a distinction between Hansen's personal and political views and the science conducted by the agency, he was quickly forced to back off.

It is the true believers who, in the absence of supporting facts, try to silence their critics. When former NASA mathematician Ferenc Miskolczi wrote a paper pointing out that "greenhouse warming" may be a self-limiting process, he was not allowed to publish his work. Miskolczi had dared to question the simplifying mathematical assumption in the warming models that the atmosphere was infinitely thick. He pointed out that when you use the correct thickness—about 65 miles—the greenhouse effect might become moot. Miskolczi resigned in disgust and published his proof in the peer-reviewed Hungarian journal *Weather*.

Political Agendas

No matter what the latest science or temperature readings tell us about the true causes and consequences of global warming, AGW enthusiasts are embracing more regulation, greater government spending, and higher taxes in a futile attempt to control what is beyond our control: the Earth's temperature. One of their political objectives, unstated of course, is to transfer wealth from rich nations to poor nations or, as the social engineers put it, from the North to the South.

At the Bali Conference on Climate Change in December 2007, the poor nations insisted that the cost to their countries of technology to limit

emissions and adapt to the effects of climate change ought to be paid for by rich nations. Most anticipated a windfall of money flowing into their countries to develop technology or purchase carbon credits. In that scenario, selling allotments for CO₂ emissions would provide a temporary boost to their cash flow, while severely limiting the economic development of countries purchasing the carbon credits.

The December 2009 Copenhagen Conference was an attempt to formalize just such a transfer of wealth, one that would be an economic disaster for the developed nations of the world. The real economic costs of this income redistribution in the United States would be huge. Various studies have forecast that the U.S. would lose between 3 and 4 million jobs, and the average U.S. family would lose \$4,000 to \$7,000 a year in income.⁵

Without the science to back up their wild forecasts and claims, and overwhelming evidence for natural temperature variation, proponents of AGW resort to the precautionary argument: “We must do something just in case we are responsible, because the consequences are too terrible if we *are* to blame and do nothing.” They hope to stampede government entities into committing huge amounts of taxpayers’ money before their fraud is completely exposed—before science and truth save the day.

Too many politicians are going along, some because they have deluded themselves into thinking they can eventually reverse global warming by stabilizing CO₂ emissions, others more cynically to curry favor with the media or their political contributors.

There is certainly no scientific justification for a self-imposed and cockamamie scheme of cap-and-trade that would raise energy costs, reward middlemen, and result in massive fraud. For a tiny fraction of the trillions of dollars such a system would eventually cost the United States, we could pay for development of clean coal, oil-shale recovery systems, and nuclear power, and have enough left over to maintain and upgrade our essential system of temperature-monitoring satellites.

Conclusion

Understanding global warming and what, if anything, humans can do to affect it are scientific questions that can be answered only by science and scientific data. Yet global warming alarmists invariably try to make their case by resorting to rhetoric, dogma, opinion, and emotion. The closest thing to scientific data in their articles is the occasional chart claiming a poorly understood correlation between atmospheric CO₂ and the Earth's temperature.

Correlation is not causation. For five years, Michael J. Economides, a professor of chemical and biomolecular engineering at the University of Houston, has had a standing offer of \$10,000 for a single peer-reviewed paper showing causality between CO₂ and increased temperature.⁶ None exists! On the other hand, scientists who understand the Earth's temperature—as much as it can be understood—rebut the alarmists with papers replete with facts, science, charts, and data tables.

With so many uninformed and misguided politicians ignoring the available science, our country's priorities will drift away from hard science and tend toward decadence. The politicization of science is tantamount to killing it. It is our collective responsibility to champion the use of responsible science to inform politicians.

There are hopeful signs that some true believers are beginning to harbor doubts about anthropogenic global warming. We can only hope the focus of the discussion returns to scientific evidence before we have perpetrated an economic disaster on ourselves and generations to come.

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"People wishing to be informed about the facts of the constantly changing climate on Earth and in our solar system will be enlightened by this booklet by Apollo 7 Astronaut Walter Cunningham. Mr. Cunningham presents solid, vital, and understandable evidence we must consider when analyzing proposed laws or regulations that would wreak havoc on American jobs, competitiveness, and our quality of life."

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