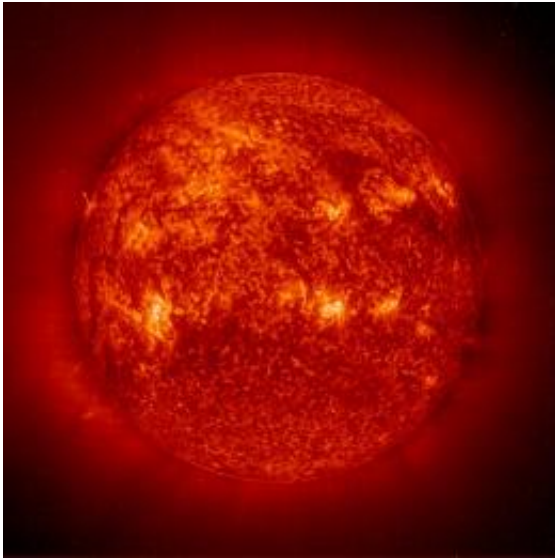


# The public debate on climate change

October 17 2011, by Anuradha K. Herath

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Scientists are studying how the Sun affects Earth's climate. Credit: NASA

Even after years of scientific research that points to how human activity is causing climate change, pundits, policymakers and the general public are still debating the issue.

For scientists, there is very little debate about the main cause of our current climate change. Ninety-seven percent of scientists who study the issue say it is the result of fossil-fuel burning and other man-made alterations to the environment.

However, much of the public discussion on climate change doesn't reflect the scientific reality. Influencing the discussion are groups such

as The Heartland Institute, a political organization whose goal is to promote free market policies. When it comes to climate change, the group's objective is to "dispute the claim that global warming is a crisis." Its president, Joseph Bast, talking to the journal Nature recently, claimed that they had swayed public and political opinions toward their view. But he expressed frustration that they had not been able to convince scientists.

However, scientists are more likely to be convinced by data than by opinions. And climate scientists are frustrated that such political organizations -- and the larger public -- downplay the data that show climate change is occurring because of the actions of man.

Gavin Schmidt, climate scientist at NASA's Goddard Institute for Space Studies, says the public debate about climate change gives a mistaken impression of what scientists are actually debating. Scientists are questioning the degree of the change, and at what rate climate changes will occur in the future. But they aren't debating the primary causes of it.

"There aren't 'two sides' to the science," Schmidt said. "[The public debate] implies that the whole thing is just a matter of an opinion – it is not."

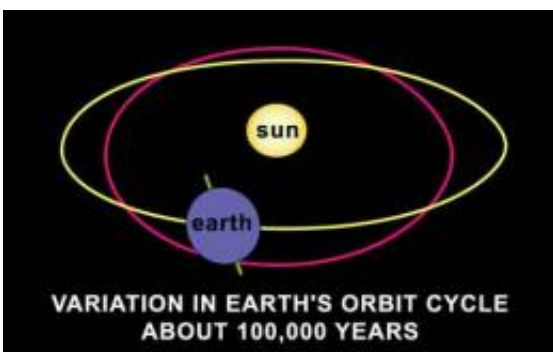
For many years the discussion in the mainstream media asked whether climate change was occurring at all. Now this public debate has shifted, with many politicians and media pundits acknowledging that climate change is a fact but questioning the cause of it. Is the trend toward global warming the result of man-made activities, or through the uncontrollable variations of Nature such as the Sun's total output or the Earth's shift in orbit? As it turns out, scientists have already taken a close look at these questions.

## **The Sun's Energy**

Scientists and astronomers have studied the impact of the Sun on the Earth's climate as far back as the early 1800s. Historians have traced the earliest such studies to the research of Sir William Herschel, who tried to link the frequency of sunspots to the price of wheat. His belief was that the number of sunspots would be indicative of the amount of the Sun's energy that is received by the Earth. That energy would affect the amount of wheat produced, which would affect the price.

Herschel's study didn't make a big impact at the time because he did not have access to historical temperature records to make any useful comparisons. However, there has been a significant amount of research conducted since then to show that variations in the Sun's energy output have an impact on changes in Earth's climate.

One such study, published earlier this year in the *Journal of Atmospheric and Solar-Terrestrial Physics*, provides more evidence of this link between the Sun and the Earth. Through their analysis of historic temperature deviations, geomagnetic activity and the frequency of sunspots, the authors concluded that “the Sun has a significant role to play in the long-term and short-term climate change.”



Alterations in Earth's orbit around the Sun over time. Image Credit: [oceanworld.tamu.edu](http://oceanworld.tamu.edu)

“With more and more data available, it may provoke some thought to further explore the solar influence on Earth's climate with geomagnetic activity acting as a possible link,” said lead author Mufti Sabi ud din, scientist of the Astrophysical Sciences Division at the Bhabha Atomic Research Center in India's Department of Atomic Energy. “It may evoke some response so as to bring to the fore the substantial role of the natural forcing at work on the observed climate variability.”

Mufti, however, noted that the evidence does not indicate the Sun and other natural forces are the main drivers behind current climate change.

“We do not rule out the natural forcings at work,” he said, “but there isn't enough quantitative evidence to say that natural forcings are the dominant cause of current climate change. We have made it amply clear that the anthropogenic origins cannot also be ruled out.”

According to Schmidt, while the Sun does have some impact, it is definitively not the reason for current patterns of climate change. Among the many studies that looked closely at the variations in solar output over time to see if they can be linked to changes in climate, the consensus has been that while the Sun affects Earth's climate, the changes in the Sun have been relatively minor, and they cannot account for the more radical changes in climate we are experiencing today.

“There is an effect,” Schmidt said, “but it is hard to detect in surface records, and is certainly not responsible for recent trends.”

## **Orbital Change**

Another natural occurrence that has caused major changes in the Earth's climate in the past is shifts in the Earth's orbit. Consider the Sahara desert, for example. There is a wide acceptance among scientists that the Sahara transformed from a fertile grassland to a desert because of a

change to the Earth's orbit. This shift in how the Earth circled the Sun affected the amount of sunlight that region of Africa received.



A shift in the Earth's orbit is said to have transformed the Sahara from a grassland into a desert. Credit: Map by Robert Simmon and Reto Stöckli

The Earth's orbital tilt is said to vary between 22 and 25 degrees roughly every 41,000 years. While a natural event such as this could bring about major changes to the climate, some scientists are warning that there is a possibility for reverse feedback. In other words, instead of an orbital tilt causing climate change, such as the one that took place in the African continent, current changes in climate could end up causing changes in the Earth's axial tilt.

In an article published late last year, *Astrobiology Magazine* [reported](#) on such a prediction: “Scientists from NASA's Jet Propulsion Laboratory say that the current melting of ice in Greenland is already causing the tilt to change at a rate of approximately 2.6 centimeters each year. They

predict that his change could increase in the years ahead.”

While fascinating, 2.6 centimeters is an infinitesimally small fraction of a single degree, and scientists say this is far too small of a change in Earth’s tilt to have a noticeable impact on climate.

## **The Politics of Climate**

Hundreds of scientists around the world have conducted research that show human activities contribute the most to today’s climate change. We are changing the Earth’s atmosphere by emitting huge amounts of greenhouse gases such as carbon dioxide, most of which comes from the burning of [fossil fuels](#). Other human activities include agriculture and changes in land-use patterns. They all work to tip the Earth’s energy balance by trapping more heat.

Most scientists note that while natural changes will cause temperature fluctuations on Earth, the impact caused by man at present is far greater.

Perhaps the most well-known spokesperson on climate change, former U.S. Vice President Al Gore, recently attracted a lot of media attention for an emotional speech regarding climate skeptics. When he spoke at the Aspen Institution in Boulder, Colorado in early August, he compared climate skeptics to those who argued that smoking was not harmful to human health in the 1960s.

"There are about 10 other memes that are out there, and when you go and talk to any audience about climate, you hear them washing back at you the same crap, over and over and over again,” Gore said. “There is no longer shared reality on an issue like climate, even though the very existence of our civilization is threatened."

Although the climate scientists who say that the climate is changing

(about 97 percent by some estimates) far outnumber those who don't, Gore's comments indicate the strength of feeling and potential influence of those who argue against climate change.

The Brookings Institute released a report in April on the public opinion on climate change in the United States and Canada. In a survey of 2,130 people, the report found that there is a progressive decrease in the number of people who think there is “solid evidence of global warming” and an increase in the number who think there is no solid evidence. In the fall of 2008, 17 percent of people did not believe in global warming. In the fall of 2010, that number had increased to 26 percent. Even though the number of climate change believers has decreased, the majority of people still believed that the Earth is undergoing global warming and most of them (61 percent of Americans and 57 percent of Canadians) felt it was a “very serious” problem.

## **Moving On**

Despite knowing the difference between weather and climate, both climate-change supporters and opponents in politics and in the media often can't refrain from using short-term weather patterns to bolster their respective arguments. Harsh winters are used as evidence of no global warming while scorching summers are used to support the viewpoint of human-caused warming of the Earth. Individual seasonal weather events such as a “snowmageddon” or heat waves cannot be directly attributed to either argument of the climate change debate because such events alone are temporary. Climate change, on the other hand, is a long-term problem. However, an increasing frequency of such extreme weather events can be another indication that climate change is in fact a reality.

In this complex and highly politicized debate, there is now an increasing number of scientists and other observers who say [policymakers](#) need to move on, to respond to the Earth's reactions to [global warming](#) instead of

still debating the issue.

Climate change affects nearly every other sector of society. Take, for example, public health. Some of the diseases that impact global populations the most, such as malaria and diarrhea that kill millions each year, are highly sensitive to climatic conditions. Then there is the inequity of these risks. China is now the world's top emitter of greenhouse gases, but developed countries, primarily the United States, are still mainly responsible for causing climate change after having emitted the most pollution for the longest time. But the populations that suffer the most from climatic changes will be those in developing countries – countries that have contributed the least to climate change and populations who have the least access to resources that could help them deal with the consequences.

There are numerous other reports which show the impact of climate change on various other sectors such as agriculture, energy, insurance and even national security. Schmidt expressed the urgency of addressing climate change now.

“The consequences of [climate change](#) increase, and they increase quite rapidly as the temperatures rise,” Schmidt said. “The faster we act, the less bad the peak warming will be. It will take a long time to turn this around.”

But Schmidt rejects the idea that there is a point of no return.

“This idea that there's just one point, I think that makes people complacent now and then it would make people fatalistic afterwards,” Schmidt said. “Whatever the situation is, there will be choices that we can make as a society that will make it better in the future or worse. The longer we let it go without doing anything, the worse the consequences will be before it comes back down and we get it back under control, but



there's never a point at which there's nothing that can be done. There is an urgency to acting but it's not because there's a point of no return.”

**More information:** *Leslie Mullen contributed to this report.*

Source: Astrobio.net

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