

Countering the “It is the Sun” Argument

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Among the arguments used by those who deny the Earth’s ongoing change in climate, one of the most commonly cited is “It is the Sun.” The implication of this argument is that the Sun is the primary factor which decides the Earth’s global average temperature, and greenhouse gases such as carbon dioxide, have a negligible influence on global average temperature. This argument is deliberately misleading; intended to shift public opinion by instilling doubt over the validity of climate science in the United States. The objective of this action is to create controversy and debate, allowing for any regulations on greenhouse gas emissions to be delayed for as long as possible. It is vital to mankind’s future that we do not allow our own recklessness, greed, and ignorance to change the environment we have adapted to over the last several hundred thousand years. Misleading facts and arguments must be dismantled brick by brick in order to reverse the trend of skepticism concerning the science behind global climate change.

To understand why the “It is the Sun” argument is myth it is important to first understand the Sun’s effect on Earth’s climate. The Sun supplies nearly all the energy present in our climate by providing incoming solar radiation, also known as total solar irradiance (TSI). According to *Climate Change* by David Kitchen the definition of total solar irradiance is “the total amount of radiation received at the top of the [Earth’s] atmosphere from the Sun” (Kitchen, 2013). Without the energy provided from the Sun, the Earth could not maintain a climate. The

geothermal energy released from the core is simply not enough to keep the surface of Earth from freezing.

The Sun has several processes which can cause a slight variance in the amount of total solar irradiance received by Earth, the most notable of these being sunspots. These appear in a rhythmic cycle called the Schwabe cycle. Kitchen describes sunspots as “large (up to 50,000 kilometers), slightly depressed areas in the photosphere that are around 1,500K cooler than the surrounding Sun” (Kitchen, 2013). Although this area is cooler than the rest of the Sun, it is surrounded by faculae, described as “bright areas of irradiance” (Kitchen, 2013). Faculae emit energy at a higher intensity than average and actually cause an increase in total solar irradiance. The Sun also has several solar cycles. Kitchen references several different types in “Climate Change,” however; he focuses most of his attention on the 11-year solar cycle. During every new 11-year cycle the Sun’s magnetic field experiences a reversal in its north-south polarity. These cycles also cause slight variances in total solar irradiance.

Another process that must be understood to refute the “It is the Sun” argument is the Greenhouse Effect. This is a process which occurs when electromagnetic waves enter our atmosphere and warm the surface of the Earth. Greenhouse gases allow the passage of these waves through our atmosphere because these waves have a short-wave frequency. Thermal

radiation is then released from the surface and blocked from escaping the atmosphere by greenhouse gases. This occurs because thermal radiation has a long-wave frequency, and when this frequency comes into contact with a greenhouse gas it is re-radiated through the atmosphere, causing an increase of the global average temperature. Greenhouse gases in our atmosphere include, but are not limited to, carbon dioxide, methane, and nitrous oxide.

Now, armed with a basic understanding of how the Sun’s energy affects Earth and a basic understanding of the Greenhouse Effect, it is possible to dissect the argument made by those who deny climate change using the argument “It is the Sun.” The first evidence we can examine is temperature versus solar activity. According to Cook, Leahy, and Russell, “Over the last 35 years the Sun has shown a slight cooling trend. However global temperatures have been increasing. Since the Sun and climate are going in opposite directions, scientists have concluded that the Sun “cannot be the cause of recent global warming” (Cook, Leahy, & Russell, 2010). The available evidence lends credibility to the authors statement. There are several independent studies of solar activity that have shown that since 1960 the Sun has been in a slight cooling trend while the global average temperature has skyrocketed over that same time period.

An image available from Cook, Leahy, and Russell’s article which examines temperature versus solar activity, is shown below. Starting in 1880 until 1960 we can see a correlation

between rising temperature and total solar irradiance. This correlation shows how the total solar irradiance affects the Earth’s temperature; however, starting in 1960 we must look for another cause to explain the rising global average temperature. The graph clearly shows that the temperature is sharply rising while total solar irradiance has seen a gradual decline. The only other explanation we have that explains this divergence is the increased presence of greenhouse gases in our atmosphere.

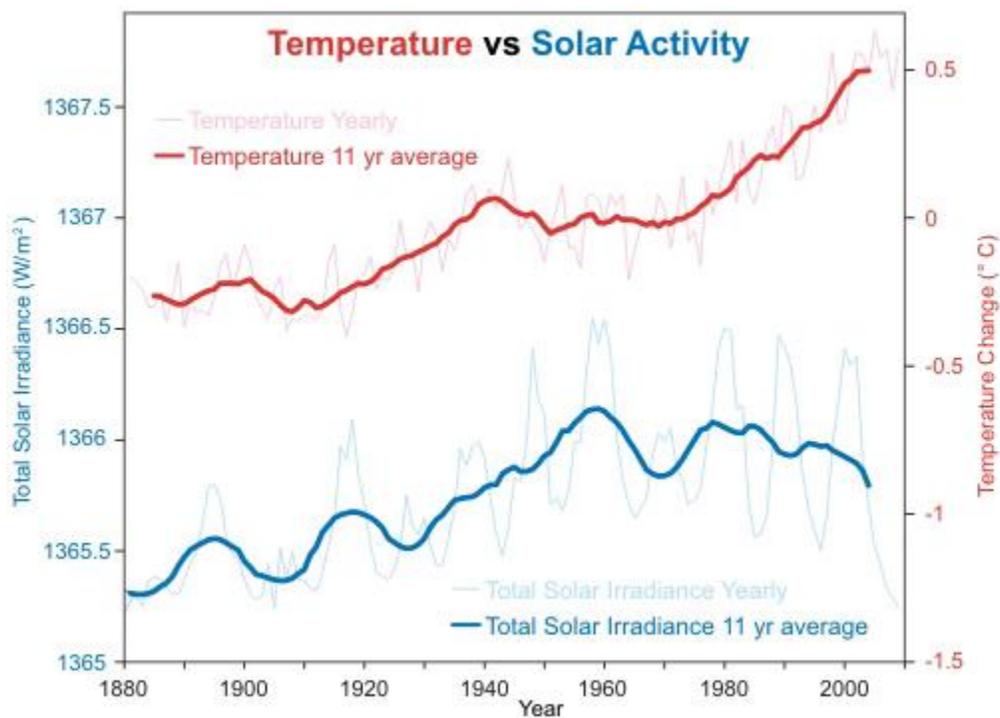


Figure A. Retrieved www.skepticalscience.com. “Global temperature (red, NASA GISS) and Total solar irradiance (blue, 1880 to 1978 from Solanki, 1979 to 2009 from PMOD).”

A study by Foster and Rahmstorf (2011) used a method called multiple linear regression

to quantify the effects of “the El Niño Southern Oscillation and solar and volcanic activity from the surface and lower troposphere temperature data” (Cook, Leahy, & Russell, 2010). Once a measured effect was determined, it was possible to remove these variables from the equation and determine the effect of solar activity on global temperature. The study found that from 1979 to 2010 the sun had a “very slight cooling effect of between -0.014 and -0.023°C per decade, depending on the data set.”

A similar study, Lean and Rind (2008), determined that solar activity can account for roughly 11% of global warming between 1889 and 2006. This data is presented by the advocates of the “It is the Sun argument,” but it is an example of cherry picking on their behalf. Although solar activity is responsible for an 11% increase during that time period, the study also states it can only account for 1.6% of the warming from 1955 to 2005. The study also states that from 1979 to 2005 solar activity had a slight cooling effect of $-.004^{\circ}\text{C}$. This means that the vast majority of warming caused by the Sun occurred before 1955, or before solar activity began a cooling trend.

Furthermore, there are a total of eighteen other studies listed in Cook, Leahy, and Russell’s article. All of these studies have been conducted and then peer-reviewed, lending support the conclusion that the Sun may have been responsible for some of the warning before

1955, but since that time it cannot be responsible for the increasing trend of the average global temperature.

In conclusion, this is a complicated subject and it can be manipulated by the proponents of the “It is the Sun” argument by cherry picking data and also by manufacturing fabrications.

The denial of climate change is deliberately perpetrated by the people who stand to gain financially from inaction. Unfortunately because of the politicization of this issue inaction has been achieved. Many people fear a change in lifestyle or increased taxes and costs as a result of combating climate change as well which can lead to internal denial of climate change. However, by examining the arguments against climate change we can debunk claims such as “It is the Sun.” Hopefully by sharing this information with family and friends we can convince them of the truth and with enough pressure from the voting booth, force our government to step in and intervene before it is too late to act.

References

Cook, J., Leahy, S., & Russell, J. (2010, November 20). *Solar activity & climate: is the sun causing global warming?*. Retrieved from <http://skepticalscience.com/solar-activity-sunspots-global-warming-basic.htm>

Kitchen, D. (2013). *Climate change: Turning knowledge into action*. Prentice Hall.