



This is the print version of the [Skeptical Science](http://sks.to/falsify) article '[Greenhouse effect has been falsified](http://sks.to/falsify)', which can be found at <http://sks.to/falsify>.

Has the greenhouse effect been falsified?

What The Science Says:

The greenhouse effect is standard physics and confirmed by observations.

Climate Myth: Greenhouse effect has been falsified

"[T]he influence of so-called greenhouse gases on near-surface temperature - is not yet absolutely proven. In other words, there is as yet no incontrovertible proof either of the greenhouse effect, or its connection with alleged global warming.

This is no surprise, because in fact there is no such thing as the greenhouse effect: it is an impossibility. The statement that so-called greenhouse gases, especially CO₂, contribute to near-surface atmospheric warming is in glaring contradiction to well-known physical laws relating to gas and vapour, as well as to general caloric theory.' ([Heinz Thieme](#))

Some climate change skeptics dispute the so-called 'greenhouse effect', which keeps the surface temperature of the Earth approximately 33 degrees C warmer than it would be if there were no greenhouse gases in the atmosphere. In other words, without the greenhouse effect, the Earth would be largely uninhabitable.

How do we know for sure this effect is real? The principle is demonstrated through basic physics, because a bare rock orbiting the sun at the distance of the Earth should be far colder than the Earth actually is. The explanation for this observation was based on the work of John Tyndall, who discovered in 1859 that several gases, including carbon dioxide and water vapour, could trap heat. This was the first evidence for what we know now as greenhouse gases. Then, towards the end of the same century, a Swedish scientist named Svante Arrhenius proved the relationship between greenhouse gas concentrations and surface temperatures.

Empirical Evidence for the Greenhouse Effect

We only have to look to our moon for evidence of what the Earth might be like without an atmosphere that sustained the greenhouse effect. While the moon's surface reaches 130 degrees C in direct sunlight at the equator (266 degrees F), when the sun 'goes down' on the moon, the temperature drops almost immediately, and plunges in several hours down to minus 110 degrees C (-166F).

Since the moon is virtually the same distance from the sun as we are, it is reasonable to ask why at night the Earth doesn't get as cold as the moon. The answer is that, unlike the Earth, the moon has no water vapour or other greenhouse gases, because of course it has no atmosphere at all. Without our protective atmosphere and the greenhouse effect, the Earth would be as barren as our lifeless moon; without the heat trapped overnight in the atmosphere (and in the ground and oceans) our nights would be so cold that few plants or animals could survive even a single one.

The most conclusive evidence for the greenhouse effect - and the role CO₂ plays - can be seen in data from the surface and from satellites. By comparing the Sun's heat reaching the Earth with the heat leaving it, we can see that less long-wave radiation (heat) is leaving than

arriving (and since the 1970s, that less and less radiation is leaving the Earth, as CO2 and equivalents build up). Since all radiation is measured by its wavelength, we can also see that the frequencies being trapped in the atmosphere are the same frequencies absorbed by greenhouse gases.

Disputing that the greenhouse effect is real is to attempt to discredit centuries of science, laws of physics and direct observation. Without the greenhouse effect, we would not even be here to argue about it.

Basic rebuttal written by [GPWayne](#)

Update July 2015:

Here is a related lecture-video from [Denial101x - Making Sense of Climate Science Denial](#)



Skeptical Science explains the science of global warming and examines climate misinformation through the lens of peer-reviewed research. The website won the Australian Museum 2011 Eureka Prize for the Advancement of Climate Change Knowledge. Members of the Skeptical Science team have authored peer-reviewed papers, a [college textbook on climate change](#) and the book [Climate Change Denial: Heads in the Sand](#). Skeptical Science content has been used in university courses, textbooks, government reports on climate change, television documentaries and numerous books.



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