



This is the print version of the [Skeptical Science](http://sks.to/cloud) article 'Clouds provide negative feedback', which can be found at <http://sks.to/cloud>.

## What is the net feedback from clouds?

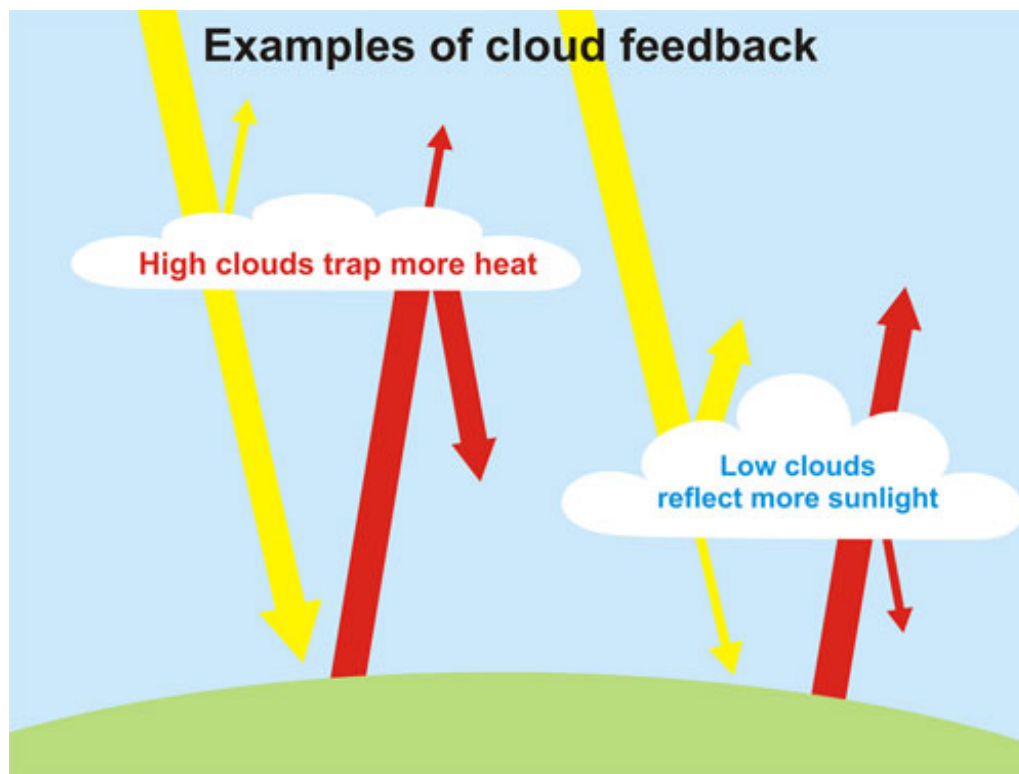
### What The Science Says:

Evidence is building that net cloud feedback is likely positive and unlikely to be strongly negative.

### Climate Myth: Clouds provide negative feedback

"Climate models used by the International Panel on Climate Change (IPCC) assume that clouds provide a large positive feedback, greatly amplifying the small warming effect of increasing CO<sub>2</sub> content in air. Clouds have made fools of climate modelers. A detailed analysis of cloud behavior from satellite data by Dr. Roy Spencer of the University of Alabama in Huntsville shows that clouds actually provide a strong negative feedback, the opposite of that assumed by the climate modelers. The modelers confused cause and effect, thereby getting the feedback in the wrong direction." ([Ken Gregory](#))

The effect of clouds in a warming world is complicated. One challenge is that clouds cause both warming and cooling. Low-level clouds tend to cool by reflecting sunlight. High-level clouds tend to warm [by trapping heat](#).



As the planet warms, clouds have a cooling effect if there are more low-level clouds or less high-level clouds. Clouds would cause more warming if the opposite is true. To work out the overall effect, scientists need to know which types of clouds are increasing or decreasing.

Some climate scientists, such as Richard Lindzen and Roy Spencer, are skeptical that greenhouse gas emissions will cause dangerous warming. Their skepticism is based mainly on uncertainty related to clouds. They believe that when it warms, low-level cloud cover increases. This would mean the Earth's overall

reflectiveness would increase. This causes cooling, which would cancel out some of the warming from an increased greenhouse effect.

However, recent evidence indicates this is not the case. Two [separate studies](#) have looked at cloud changes [in the tropics and subtropics](#) using a combination of ship-based cloud observations, satellite observations and climate models. Both found that cloud feedback in this region appears to be positive, meaning more warming.

[Another study](#) used satellite measurements of cloud cover over the entire planet to measure cloud feedback. Although a very small negative feedback (cooling) could not be ruled out, the overall short-term global cloud feedback was probably positive (warming). It is very unlikely that the cloud feedback will cause enough cooling to offset much of human-caused global warming.

Other studies have found that the climate models that best simulate cloud changes are the ones that find it to be a positive feedback, and thus have higher climate sensitivities. Steven Sherwood explains one such study:

While clouds remain an uncertainty, the evidence is building that clouds will probably cause the planet to warm even further, and are very unlikely to cancel out much of human-caused global warming. It's also important to remember that there many other feedbacks besides clouds. There is a large amount of [evidence that the net feedback is positive](#) and will amplify global warming.

Basic rebuttal written by dana1981

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**Update July 2015:**

Here is the relevant 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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