

# Climate change: Is it real?

Tony Grift

**D**isbelief in the theory of gravity is easily disproven by experiment: place the disbeliever on a ledge, push him off, and observe whether he goes up or down. In this experiment, the observation annihilates the object under test; on the other hand, another recipient has been added to the Darwin Awards, and en pass  Heisenberg’s uncertainty principle has been demonstrated once again. Now consider the following thought problem: if the universe and everything in it suddenly became ten times bigger, could you tell? Most people would use this logic: “If everything got bigger, then so would I, and therefore I would not notice.” Wrong! You would notice because all the hams would fall from the ceiling in every butcher shop on earth. The mass of an object is proportional to its volume (length cubed), but the strength of a string is proportional to its cross-sectional area (length squared), so the strings could no longer hold the massive hams.

Intuition doesn’t get you very far in engineering, nor in life in general. If we base our perceptions of truth on what are essentially feelings rather than knowledge, we are getting it cattywampus. We are using the wrong part of our noggin.

Which brings me to the flat earth community. The flat earthers have devised a system that explains everything we see around us based on a disk-shaped earth, and they claim that everyone who disagrees is part of a global (pardon me, disk-wide) conspiracy by those pesky Illuminati. A great illustration of this belief system is Orlando Ferguson’s 1893 map of a flat earth ([www.livescience.com/14754-ingenious-flat-earth-theory-revealed-map.html](http://www.livescience.com/14754-ingenious-flat-earth-theory-revealed-map.html)), which was based on “four hundred passages in the Bible that condemn the globe theory.” I find Ferguson’s square and stationary earth fascinating. Among many other impossible quirks, it implies that flying the shortest distance from Australia to South Africa would require crossing the North Pole. There would never be a sunset, let alone a solar eclipse, no seasons, and no midnight sun.

Wow. It is baffling to me how flat earthers can unabashedly spew nonsense that was refuted in antiquity. The ancient Greeks noticed that departing ships disappeared from bottom up as they passed over the horizon, with the sails still visible after the hull was out of sight. Around 240 B.C., Eratosthenes estimated the diameter of the earth to within less than a percentage point of the currently accepted value. If flat earthers travel from Europe to Australia, hoping to observe the Northern Lights, they will see a few familiar constellations turned upside down and a night sky that is largely invisible from Europe. How is their misunderstanding possible in the age of the internet, when the accumulated knowledge of humanity is accessible on smartphones?

Misinformation endures not in spite of the internet, but because of it. This is also the age of confirmation bias. Information is now so filtered to each reader’s preconceptions that ludicrous ideas persist in the face of overwhelming evidence to the contrary. Flat earthers see clouds apparently behind the sun and cite this as evidence that their holy book (in which Joshua made the sun stand still) is literally true. Did we really land on the moon? Who was the Umbrella Man? Did the government bring down the Twin Towers, and was



Montana’s Grinnell Glacier basin in 1936. Photo by W. C. Alden, courtesy of USGS Photo Library.

Barack Obama really born in the USA? Never before have conspiracy theories thrived as they do today, and this is a highly disturbing trend. To quote Stephen Hawking: “The greatest enemy of knowledge is not ignorance; it is the illusion of knowledge.” In summary, the theory of gravity is true because anyone can demonstrate it at any time. However, the flat earth delusion is easily disproven, and yet it endures.

So what about climate change? Climate change is a very slow process (it isn’t just weather change), and therefore it’s difficult to observe in daily life. Nevertheless, 97% of active climate scientists claim that climate change is happening and that it is most likely due to human activity. A recent Pew Research Center poll used three categories to assess popular belief in climate change: (1) the earth is warming because of human activity, (2) the earth is warming because of natural patterns, and (3) there is no solid evidence that the earth is warming. Overall, U.S. adults were divided 50%, 23%, and 25% across the three respective categories, whereas AAAS scientists were divided 87%, 9%, and 3%.

NASA/NOAA reported that 2014 was the hottest year on record, and the 38th consecutive year of above-average temperatures. In 2015, until September, we had record-breaking warmth every month (it was an El Niño year), and 2015 ended as the hottest year on record—but then 2016 became the hottest year on record. You get the idea. So far, 2017 is the third hottest year on record, surpassed only by 2012 and 2016. However, the current administration has rolled back 29 environmental regulations, another 24 rollbacks are in progress (including the Paris Climate Agreement and the car and truck fuel efficiency standards), and another seven climate-related regulations are in limbo. Meanwhile, Scott Pruitt, Director of the EPA and an avid climate change denier,

has to fly first class because of “unpleasant interactions with other travelers.” How unfortunate for him.

Despite all the data, many prominent people still insist that climate change is a hoax. This includes 53 out of 100 senators and 232 out of 435 representatives, the vast majority of whom are Republicans. As with the flat earth delusion, the difference is in the intellectual authority of the people who are making the conflicting claims. On the one hand, there is a small group of highly educated people who spend their careers collecting data and producing climate models. They adhere to the scientific method, which is built on a system of checks and balances. They publish in peer-reviewed journals, and their biggest thrill is proving each other wrong. Most of all, scientists follow strict rules of evidence. Karl Popper invented the concept of falsificationism, which says that any theory that cannot be disproven is not scientific. In other words, scientists can’t just come up with a crazy idea and then challenge others to disprove it. The inability to disprove is not proof. Bertrand Russell’s flying teapot put the lid on that fallacy.

On the other hand, there is a much larger group of people (and our government!) who seem to think that their uninformed opinion is just as valid as the “opinions” of scientists. It is not. If I learned one thing in my academic career, it’s to admit when I don’t understand something. But for too many people (and virtually every politician), such an admission is a sign of weakness. The underlying problem is that about half of all Americans don’t get their knowledge from fact-based sources but rather from their favorite slanted news outlets or from biased pulpits. Because climate change doesn’t fit their ideology, they reject it—no matter what the facts are.

I am not a climate scientist, but I have seen the photos of disappearing glaciers all over the world, and I have attended seminars hosted by genuine climate scientists. I have even read some of the scientific literature, and I try to be as unbiased as I can. That experience doesn’t make me a climate expert. Instead, my support for the reality of climate change is determined by its credibility: whereas science is based on evidence, peer review, logic, and falsificationism, the other camp gets its “alternative facts” from ancient myths, hearsay, self-interest, and official misinformation. I’ll stick with the science.

**ASABE member Tony Grift**, Associate Professor, Department of Agricultural Engineering, University of Illinois, Urbana, USA, [grift@illinois.edu](mailto:grift@illinois.edu).



A view of Grinnell Glacier basin in 2014 from the glacier’s eastern terminus shows extensive melting and the subsequent result: Upper Grinnell Lake. Photo by Dan Fagre, USGS.

Views expressed are solely those of the author and do not necessarily represent the views of ASABE.