The New York Times | https://nyti.ms/2v9dLji

CLIMATE

Should You Trust Climate Science? Maybe the Eclipse Is a Clue

Justin Gillis

BY DEGREES AUG. 18, 2017

Eclipse mania will peak on Monday, when millions of Americans will upend their lives in response to a scientific prediction.

Friends of mine in Georgia plan to drive 70 miles to find the perfect spot on a South Carolina golf course to observe the solar eclipse. Many Americans will drive farther than that, or fly, to situate themselves in the "path of totality," the strip of the country where the moon is predicted to blot out the sun entirely.

Thanks to the work of scientists, people will know exactly what time to expect the eclipse. In less entertaining but more important ways, we respond to scientific predictions all the time, even though we have no independent capacity to verify the calculations. We tend to trust scientists.

For years now, atmospheric scientists have been handing us a set of predictions about the likely consequences of our emissions of industrial gases. These forecasts are critically important, because this group of experts sees grave risks to our

civilization. And yet, when it comes to reacting to the warnings of climate science, we have done little.

If the science were brand new, that might make sense, but climate scientists have been making predictions since the end of the 19th century. This is the acid test of any scientific theory: Does it make predictions that ultimately come true?

In the early 20th century, Albert Einstein's new and controversial theory of relativity predicted that gravity would cause light to bend. It sounded crazy, but a solar eclipse in 1919 provided the opportunity to test it as starlight passed near the blotted-out sun. Einstein's theory was proved, turning him into a celebrity overnight.

When medicine delivered a wave of vaccines in the 20th century, doctors predicted that widespread use would cause childhood deaths from illnesses like whooping cough and diphtheria to fall. The public trusted the doctors, and those deaths plummeted.

So what predictions has climate science made, and have they come true?

The earliest, made by a Swede named Svante Arrhenius in 1897, was simply that the Earth would heat up in response to emissions. That has been proved: The global average temperature has risen more than 1 degree Celsius, or almost 2 degrees Fahrenheit, a substantial change for a whole planet.

By the 1960s and '70s, climate scientists were making more detailed predictions. They said that as the surface of the Earth warmed, the temperature in the highest reaches of the atmosphere would fall. That is exactly what happened.

The scientists told us that the Arctic would warm especially fast. They told us to expect heavier rainstorms. They told us heat waves would soar. They told us that the oceans would rise. All of those things have come to pass.

Considering this most basic test of a scientific theory, the test of prediction, climate science has established its validity.

That does not mean it is perfect, nor that every single prediction is correct. While climate scientists have forecast the long-term rise of global temperatures

pretty accurately, they have not been as good — yet — about predicting the short-term jitters.

In other fields, we do not demand absolute certainty from our scientists, because that is an impossible standard.

When you let doctors inject vaccines into your children, you are responding to a prediction — based on evidence, of course — about how their bodies will react. Yet the vaccines do pose some risks, and a small proportion of children suffer side effects.

When your aging mother is found to have cancer, the recommended treatment will be rooted in a statistical model of how tumors respond to the available medicines. Your family is likely to follow that advice, even though you know the drugs are imperfect and may not save her.

We trust scientific expertise on many issues; it is, after all, the best advice we can get. Yet on climate change, we have largely ignored the scientists' work. While it is true that we have started to spend money to clean up our emissions, the global response is in no way commensurate with the risks outlined by the experts. Why?

Sheer inertia is one of many reasons. The changes we need to make are hard, and they demand large-scale, collective action: to rebuild our energy system, to save our forests, to change our cars, to create radically better buildings.

But a bigger reason is that these changes threaten vested economic interests. Commodity companies benefit from exploiting forests. Fossil-fuel companies, to protect their profits, spent decades throwing up a smoke screen about the risks of climate change.

Most of them now say they have stopped funding climate denial, but they still finance the careers of politicians who say they are skeptical of climate science and who play down the risks.

In the face of such attacks, the scientists soldier on, offering us more predictions even as the old ones come true.

They tell us that we are now at risk of causing the great ice sheets in Greenland and west Antarctica to collapse, which would raise the sea level 30 feet or more over some unknown period, wiping out many of the world's great cities.

They tell us that under a worst-case scenario, it might get so hot across large parts of the world that people would be unable to work outdoors without risking death. They tell us that we stand a good chance of causing the sixth mass extinction of plants and animals in the Earth's history.

These kinds of forecasts are painful to consider. By contrast, something like a solar eclipse is just fun. But as you watch it on Monday, spare a moment to think about the role of science in society.

When the moon throws Corvallis, Ore., into near-darkness at 10:16 a.m. local time, or eclipses the sun over Kansas City, Mo., at 1:08 p.m., or Nashville at 1:27 p.m., think about the long scientific journey that allowed us to know precisely when it would happen.

Think about Galileo standing in the dock of the Inquisition, forced to recant his belief that the Earth moves around the sun. Legend has it that he whispered under his breath: "And yet it moves." Think about the centuries of patient effort that followed to work out the precise motions of the solar system, now understood so thoroughly that we can use them to predict eclipses centuries in advance.

If you respect and honor the scientists who did this work, then spare another moment to think about the scientists whose work is under attack today, and why.

Follow @NYTClimate on Twitter

A version of this article appears in print on August 20, 2017, on Page A14 of the New York edition with the headline: Should You Trust Climate Science? Maybe the Eclipse Is a Clue.