

# 6

## THE NATURAL SUSPECTS

“The day is yours, and yours also the night;  
you established the sun and moon.  
It was you who set all the boundaries of the earth;  
you made both summer and winter.”

—Psalm 74:16–17 (TNIV)

But there’s no proof that we are causing the warming! After all, we see lots of changes in *weather*: cold days and hot spells, torrential rain and droughts. And we have nothing to do with those! Heck, we can’t even predict most of these events. They’re due to natural causes—the sun, natural cycles, or even volcanoes. So why should we believe that climate is any different?

You have likely heard an argument like this before, on the radio, online, or even from your favorite television news program. But this book is not about short, slick arguments that can be presented in thirty-second sound bites. It’s about taking a long, hard look at the evidence and making up our own minds, based on what God’s other “book”—the natural world—tells us.

So the first thing we need to do is investigate those “usual suspects” and see what they’ve been up to lately. Do they have a solid alibi? Or should we simply pin the blame on them and go on with our lives as usual?

## Suspect #1: The Sun

The sun is the first place to look if we're searching for an explanation for changes in Earth's temperature.

We already know that it's the orbit of the earth around the sun that causes our seasons to change from summer to winter, and back to summer again, every year.

Astronomers also tell us that the amount of energy we receive from the sun varies over an eleven-year cycle, by about one tenth of a percent. You can see this cycle in Figure 10. The purple line shows the changes in the amount of energy we receive from the sun. At the top of the cycle, we get more energy from the sun. At the bottom, we get a bit less.

Sometimes solar activity can temporarily shut down for decades at a time. This was the situation from about 1645 to 1715. This period also coincided with the coldest part of the Little Ice Age over Europe that we talked about earlier.

And over thousands and thousands of years, Earth's orbit undergoes slow, predictable changes in shape. The pathway that the earth follows around the sun becomes first more circular, and then more oval. The earth tilts more toward the sun, and then away from it. Together, these changes affect the amount of solar energy that Earth receives, as well as the time and place that energy is received.

These long-term, cyclical changes in the energy that the earth receives from the sun are the reason for the largest natural cycles the earth experiences. So it's entirely logical, when we see unusual change in global temperature, to look first to the sun as our prime suspect. But when we dig deeper, we encounter solid evidence that doesn't support our allegations.

That's because, for the last few decades, the sun has a perfect alibi.

As we've seen, many major changes in Earth's temperature in the past have been driven by changes in the sun's output. So let's take a look at what the sun has been doing lately. Can solar activity explain the unusual warming over the last century?

Figure 10 compares energy from the sun to the observed change in Earth's temperature. For the first part of the last century—up until about the mid-seventies—both temperature and energy from the sun were increasing. So it is very likely that the sun had a positive effect on temperature during that time.

But, for the last three decades, Earth's temperature has been increasing even more rapidly than before. And this has happened at the exact same time that solar energy has been holding constant or even going down.

Yes, that's right. Solar activity has been going down since the late 1980s as global temperatures continued to rise. If our temperature were being primarily controlled by the sun right now, then over the last few decades we should actually have seen temperatures *cooling*, not warming.

So if the natural-cycles argument is going to hold up in court, we're going to have to put another prime suspect on the witness stand. Let's try the earth's oceans and the atmosphere itself, to see if they can be guilty as charged.

## Suspect #2: Natural Cycles

The most well-known natural cycle is El Niño, which means “the little boy” in Spanish. Named after the baby Jesus, El Niño was first identified as a pattern of warm ocean waters off the coast of Peru that tended to occur around Christmas.

Today, we know that El Niño extends as far west as Australia, changing wind, temperature, and rainfall patterns around the

world. An El Niño year such as 1998 tends to be warmer than usual. In contrast, a La Niña year such as 2008 (where the ocean waters are cooler than normal) tends to produce cooler-than-average global temperatures.

El Niño events bring life-giving rain to some regions and severe droughts to others. In the dry, arid plains of west Texas, for example, a wet El Niño winter means that farmers can expect a break from the continuous irrigation usually needed to water the cotton crop that supports the region's economy.

It's not all good news, though. The strongest El Niño winter in recent memory occurred during the winter of 1997–1998. Worldwide, it caused an estimated \$32–\$96 billion in damages. Southern California was slammed by violent winter storms and heavy rainfall events that triggered landslides and swept away highways and houses. At the same time, an exceptional drought triggered fires that devastated large areas of tropical rain forests.

Natural cycles like El Niño are internal to the atmosphere-ocean system. There are many other cycles, some decades in length, that can affect *regional* temperatures, rainfall patterns, and even the amount of ice in the Arctic. But all of these cycles are exactly that—cycles. They affect certain parts of the world, but not all. They redistribute heat between the atmosphere and the ocean, but they don't create more overall heat.

Furthermore, scientists can measure exactly how these natural cycles have changed over the last hundred years or more. And adding up their effects produces no net change in temperature at all, let alone a change as unusual as what has been observed in recent decades. But there are other external natural factors that may cause some years to be colder or warmer, wetter or drier than others. We'll look at the most likely factor next.

### Suspect #3: Volcanoes

Another argument you may hear is that volcanoes produce more carbon dioxide than humans. It logically follows that volcanoes have been around forever, and we obviously can't *prevent* them from erupting. Are volcanoes to blame for the current warming?

Volcanoes do produce carbon dioxide and other greenhouse gases. And these emissions *used to be* much larger than what humans produced—a very long time ago. Today, however, carbon dioxide production from volcanoes is miniscule compared to the human contribution. Rather, the main effect of volcanic eruptions is to *cool* the planet, not to warm it.

Major volcanic eruptions can shoot millions of tons of dust and ash far up into the atmosphere. These dust particles are so high that they can remain up there for several months and even years, circling the globe again and again. And the cooling effect of these dust clouds can be severe.

The eruption of Mount Tambora in Indonesia in 1815 was estimated to be the worst in the last twelve hundred years or more. The eruption was the reason why 1816 was known as the “year without a summer.” Freezing summer temperatures, frosts, and even snowstorms destroyed crops across China, Europe, and eastern North America, causing the worst famine of the 1800s. Food shortages combined with flooding led to riots, and these events are estimated to have caused at least two hundred thousand deaths during that year.

Even today, we see that volcanoes have a cooling effect on the earth. Major eruptions such as Indonesia's Mount Agung in 1963, Mexico's El Chinchón in 1982, and the Philippines' Mount Pinatubo in 1992 had major—albeit temporary—cooling effects on temperatures worldwide. But today, we know when a volcano erupts and we can track its effects around the world. And the volcanic

## 40 A CLIMATE FOR CHANGE

eruptions we've seen over the last century cannot be responsible for the sustained, global-scale warming we've been witnessing for more than a hundred years.

So if the sun, natural cycles, and volcanoes can't be blamed for what we see happening with our climate in recent decades, where should we look?