

# What's the difference between weather and climate?

By National Geographic Society on 01.29.20

Word Count **1,073**

Level **MAX**



Weather events, like this hailstorm in Marion, Kansas, are not the same as the climate of a region. Image by Roger Hill/Science Source  
Image by Roger Hill/Science Source

Contrary to popular opinion, science is not divided on the issue of climate change. The overwhelming majority (97 percent) of scientists agree that global warming is real, and that it is largely caused by human activity. And yet we seem to be experiencing record-breaking cold winters; in January 2019, a polar vortex plunged parts of North America into Arctic conditions. It may seem counterintuitive, but cold weather events like these do not disprove global warming, because weather and climate are two different things.



## Understanding Weather

Weather refers to the short-term conditions of the lower atmosphere, such as precipitation, temperature, humidity, wind direction, wind speed, and atmospheric pressure. It could be sunny,

cloudy, rainy, foggy, cold, hot, windy, stormy, snowing – the list goes on.

The sun drives different types of weather by heating air in the lower atmosphere at varying rates. Warm air rises and cold air rushes in to fill its place, causing wind. These winds, along with water vapor in the air, influence the formation and movement of clouds, precipitation and storms.

The atmospheric conditions that influence weather are always fluctuating, which is why the weather is always changing. Meteorologists analyze data from satellites, weather stations, and buoys to predict weather conditions over the upcoming days or weeks. These forecasts are important because weather influences many aspects of human activity. Sailors and pilots, for example, need to know when there might be a big storm coming, and farmers need to plan around the weather to plant and harvest crops. Firefighters also keep track of daily weather in order to be prepared for the likelihood of forest fires. Weather forecasts are also useful for military mission planning, for features of trade, and for warning people of potentially dangerous weather conditions.

### **Understanding Climate**

While weather refers to short-term changes in the atmosphere, climate refers to atmospheric changes over longer periods of time, usually 30 years or more. This is why it is possible to have an especially cold spell even though, on average, global temperatures are rising. The former is a weather event that takes place over the course of days, while the latter indicates an overall change in climate, which occurs over decades. In other words, the cold winter is a relatively small atmospheric perturbation within a much larger, long-term trend of warming.

Despite their differences, weather and climate are interlinked. As with weather, climate takes into account precipitation, wind speed and direction, humidity, and temperature. In fact, climate can be thought of as an average of weather conditions over time. More importantly, a change in climate can lead to changes in weather patterns.

Climate conditions vary between different regions of the world and influence the types of plants and animals that live there. For example, the Antarctic has a polar climate with sub-zero temperatures, violent winds, and some of the driest conditions on Earth. The organisms that live there are highly adapted to survive the extreme environment. The Antarctic is known for a weather phenomenon called the Aurora Australis, a spectacular natural light show caused by charged particles interacting with gases in the atmosphere near Earth's magnetic poles.

By contrast, the Amazon rainforest enjoys a tropical climate. Temperatures are consistently warm with high humidity, plenty of rainfall, and a lack of clearly defined seasons. These stable conditions support a very high diversity of plant and animal species, many of which are found nowhere else in the world.

### **Our Climate Is Changing**

The global climate has always been in a state of flux. However, it is changing much faster now than it has in the past, and this time human activities are to blame. One of the leading factors contributing to climate change is the burning of fossil fuels such as coal, gas and oil, which we use for transport, energy production and industry.

Burning fossil fuels releases large amounts of carbon dioxide (CO<sub>2</sub>) into the atmosphere; CO<sub>2</sub> is one of a group of chemicals known as greenhouse gases. They are named as such because they allow heat from the sun to enter the atmosphere but stop it from escaping, much like the glass of a greenhouse. The overall effect is that the global temperature rises, leading to a phenomenon known as global warming.

Global warming is a type of climate change, and it is already having a measurable effect on the planet in the form of melting Arctic sea ice, retreating glaciers, rising sea levels, increased frequency and intensity of extreme weather events, and a change in animal and plant ranges. The planet has already heated by about 0.8 degrees Celsius (1.4 degrees Fahrenheit) in the last century, and temperatures have continued to rise.

Scientists cannot directly attribute any extreme weather events to climate change, but they are certain that climate change makes extreme weather more likely. In 2018, at least 5,000 people were killed and 28.9 million more required aid as a result of extreme weather events. The Indian state of Kerala was devastated by flooding; California was ravaged by a series of wildfires; and the strongest storm of the year, super-typhoon Mangkhut, crashed into the Philippines. It is likely that more frequent and more severe weather events are on the horizon.

Climate change is not a new concept, and yet little seems to have been done about it on a global scale. The greenhouse effect was first discovered in the 1800s, but it was not until 1988 that the global community galvanized to form the Intergovernmental Panel on Climate Change. Since then, leaders from around the world have committed to a series of goals to combat climate change, the latest of which is the Paris Agreement in which 185 countries have pledged to stop global temperatures from rising by more than 2 degrees Celsius (3.6 degrees Fahrenheit) above preindustrial levels. In 2015, all United Nations member states agreed to the 17 Sustainable Development Goals (SDGs) designed to "provide a shared blueprint for peace and prosperity for people and the planet, now and into the future." SDG 13 in particular commands member states to "take urgent action to combat climate change and its impacts."

Part of the reason the global community has been so slow to act on climate change could be the confusion surrounding distinctions between weather and climate. People are reluctant to believe that the climate is changing when they can look outside their window and see for themselves that the weather appears typical.

## Quiz

1 Read the following sentence from the first paragraph of the article.

*It may seem counterintuitive, but cold weather events like these do not disprove global warming, because weather and climate are two different things.*

Which sentence from the article BEST supports this idea?

- (A) Weather refers to the short-term conditions of the lower atmosphere, such as precipitation, temperature, humidity, wind direction, wind speed, and atmospheric pressure.
- (B) The atmospheric conditions that influence weather are always fluctuating, which is why the weather is always changing.
- (C) While weather refers to short-term changes in the atmosphere, climate refers to atmospheric changes over longer periods of time, usually 30 years or more.
- (D) Climate conditions vary between different regions of the world and influence the types of plants and animals that live there.

2 Which of the following claims does the author support the LEAST?

- (A) Climate conditions vary between different regions of the world.
- (B) Humans' burning of fossil fuels is a leading factor in climate change.
- (C) The global climate has always been in a state of flux.
- (D) Forecasts are important and useful for many reasons.

3 Which sentence BEST summarizes how the changing climate has affected weather?

- (A) The changing climate has contributed to conditions that have made extreme weather events more intense and more frequent.
- (B) The changing climate has increased the overall temperatures and amounts of rain locations around the globe are experiencing.
- (C) The changing climate has created violent winds and dry conditions leading to the weather phenomenon called the Aurora Australis.
- (D) The changing climate has allowed the weather in most locations to remain consistent and steady over the past 100 years.

4 What role does confusion over weather and climate play in the effort to address global warming?

- (A) Because people sometimes confuse weather with climate, they try to make small changes to greenhouse gas emissions that have little effect on global warming.
- (B) Because people sometimes confuse weather with climate, there has been little urgency to address global warming when the weather feels normal in the short term.
- (C) Because people sometimes confuse weather with climate, efforts to fight global warming have only been embraced by a handful of countries directly affected by it.
- (D) Because people sometimes confuse weather with climate, participation in panels on global warming and the Paris Agreement increases when the weather is hot.