

Have you heard your parents or people in videos talking about climate change? Ever wondered what it is and why we care about it so much? NASA scientists have been studying Earth's climate for more than 40 years. We used what we've learned in that time to answer some of your biggest questions below!

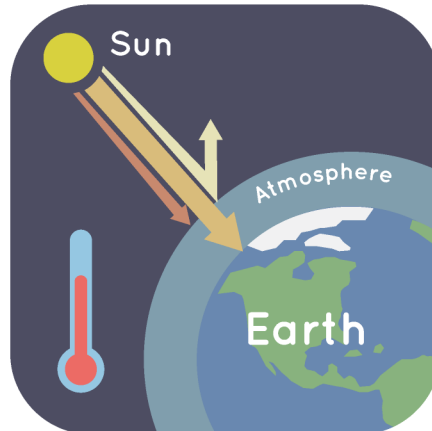
What is the difference between weather and climate?

The main difference is time. Weather is only temporary. For example, a blizzard can turn into a flood after just a few warm spring days. Climate, on the other hand, is more than just a few warm or cool days. Climate describes the typical weather conditions in an entire region for a very long time — 30 years or more.



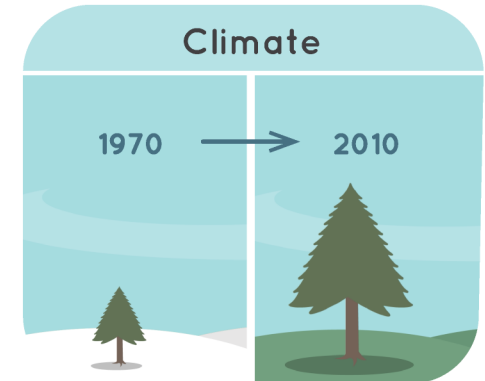
Why is Earth warming?

Some of the gases in Earth's atmosphere trap heat from the Sun — like the glass roof and walls of a greenhouse. These greenhouse gases keep Earth warm enough to live on. But human activities, such as the destruction of forests and burning fossil fuels, create extra greenhouse gases. This traps even more of the Sun's heat, leading to a warmer Earth.



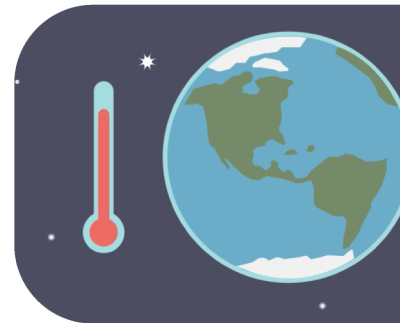
What is climate change?

Climate change describes a change in the typical weather for a region — such as high and low temperatures and amount of rainfall — over a long period of time. Scientists have observed that, overall, Earth is warming. In fact, many of the warmest years on record have happened in the past 20 years. This rise in global temperature is sometimes called global warming.



How do we know Earth's climate is getting warmer?

Scientists have been observing Earth for a long time. They use NASA satellites and other instruments to collect many types of information about Earth's land, atmosphere, ocean, and ice. This information tells us that Earth's climate is getting warmer.



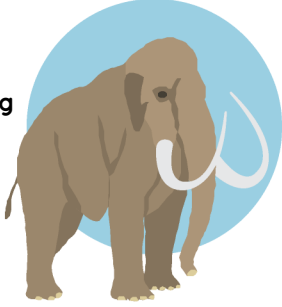
What does carbon have to do with it?

Carbon is in all living things on Earth. As plants and animals die, they get buried in the ground. After enough years, these squished underground remains can turn into fossil fuels, such as coal and oil. When we burn those fuels, the carbon that was in the ground goes into the air as a gas called carbon dioxide, or CO₂. Plants and trees can absorb some of this extra carbon dioxide. But a lot of it stays in the atmosphere as a greenhouse gas that warms up the planet.



Has the climate ever changed before?

Yes, but this time is different. Over millions of years, Earth's climate has warmed up and cooled down many times. In the past, Earth often warmed up when the Sun was very active. But nowadays, we can carefully measure the Sun's activity. We know Earth is warming now, even when the Sun is less active. Today, the planet is warming much faster than it has over human history.



How are scientists studying climate change?

Scientists study Earth's climate using lots of tools on the ground, in the air, and in space. For example, NASA satellites are orbiting Earth all the time. They measure carbon dioxide in the atmosphere. They monitor melting ice and measure rising seas and many other things, too. This information helps scientists learn more about Earth's changing climate.



It doesn't feel hotter where I live. Why does climate change matter?

The average air temperatures near Earth's surface have gone up about 2 degrees Fahrenheit in the last century. A couple of degrees over a hundred years may not seem like much. However, this change can have big impacts on the health of Earth's plants and animals.



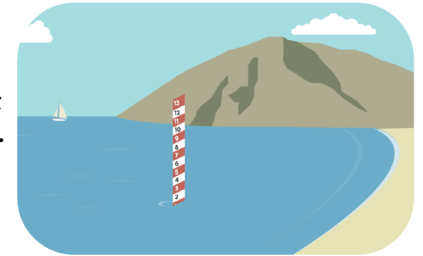
What can I do?

Climate change seems big, but it's something that we can learn about and work on together! NASA's scientists are studying and monitoring climate change — and there are a few ways you can help them learn more.



What does climate change do to the ocean?

As Earth warms, NASA has observed that sea levels are rising. This is partly due to melting ice. Glaciers and ice sheets are large masses of ice that sit on the land. As our planet warms, this ice melts and flows into the oceans. More water in the oceans makes sea level higher. Also, water expands as it gets warmer. So, warm water takes up more room in our oceans — making sea levels higher.



The properties of ocean water are also changing. One change is called ocean acidification and it can be harmful for plants and animals. Scientists have observed that the ocean is becoming more acidic as its water absorbs carbon dioxide from the atmosphere.

Learn. Have more questions about climate change? Read, play, and watch more about it on the NASA Climate Kids website: climatekids.nasa.gov

Do. Want to collect real data for climate scientists? Check out these NASA citizen science projects to see how you can contribute to what we know about our planet: science.nasa.gov/citizenscience

Some examples include:

- Globe Observer
- Community Snow Observations
- Air Quality Citizen Science