



## Is It Happening?

Yes. Earth is already showing many signs of worldwide climate change.

- Average temperatures have climbed 1.4 degrees Fahrenheit (0.8 degree Celsius) around the world since 1880, much of this in recent decades, according to NASA's Goddard Institute for Space Studies.
- The rate of warming is increasing. The 20th century's last two decades were the hottest in 400 years and possibly the warmest for several millennia, according to a number of climate studies. And the United Nations' Intergovernmental Panel on Climate Change (IPCC) reports that 11 of the past 12 years are among the dozen warmest since 1850.
- The Arctic is feeling the effects the most. Average temperatures in Alaska, western Canada, and eastern Russia have risen at twice the global average, according to the multinational Arctic Climate Impact Assessment report compiled between 2000 and 2004.
- Arctic ice is rapidly disappearing, and the region may have its first completely [ice-free summer by 2040](#) or earlier. [Polar bears and indigenous cultures](#) are already suffering from the sea-ice loss.
- Glaciers and mountain snows are rapidly melting—for example, [Montana's Glacier National Park](#) now has only 27 glaciers, versus 150 in 1910. In the Northern Hemisphere, thaws also come a week earlier in spring and freezes begin a week later.
- Coral reefs, which are highly sensitive to small changes in water temperature, suffered the [worst bleaching—or die-off in response to stress—ever recorded in 1998](#), with some areas seeing bleach rates of 70 percent. Experts expect these sorts of events to increase in frequency and intensity in the next 50 years as sea temperatures rise.
- An upsurge in the amount of extreme weather events, such as [wildfires](#), [heat waves](#), and [strong tropical storms](#), is also attributed in part to climate change by some experts.

## Are Humans Causing It?

"Very likely," the IPCC said in a [February 2007 report](#).



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The report, based on the work of some 2,500 scientists in more than 130 countries, concluded that humans have caused all or most of the current planetary warming. Human-caused global warming is often called anthropogenic climate change.

#### RELATED

- [Global Warming: How Hot? How Soon?](#)
- [Global Warming Can Be Stopped, World Climate Experts Say](#)
- [Global Warming Interactive: Learn About Its Causes and Effects](#)
- Industrialization, deforestation, and pollution have greatly increased atmospheric concentrations of water vapor, carbon dioxide, methane, and nitrous oxide, all greenhouse gases that help trap heat near Earth's surface. (See an interactive feature on [how global warming works](#).)
- Humans are pouring carbon dioxide into the atmosphere much faster than [plants and oceans can absorb it](#).
- These gases persist in the atmosphere for years, meaning that even if such emissions were eliminated today, it would [not immediately stop global warming](#).
- Some experts point out that natural cycles in Earth's orbit can alter the planet's exposure to sunlight, which may explain the current trend. Earth has indeed experienced warming and cooling cycles roughly every hundred thousand years due to these orbital shifts, but such changes have occurred over the span of several centuries. Today's changes have taken place over the past hundred years or less.
- Other recent research has suggested that the effects of [variations in the sun's output](#) are "negligible" as a factor in warming, but other, more complicated solar mechanisms could possibly play a role.

#### **What's Going to Happen?**

A follow-up [report by the IPCC released in April 2007](#) warned that global warming could lead to large-scale food and water shortages and have catastrophic effects on wildlife.

- Sea level could rise between 7 and 23 inches (18 to 59 centimeters) by century's end, the IPCC's February 2007 report projects. Rises of just 4 inches (10 centimeters) could flood many South Seas islands and swamp large parts of Southeast Asia.



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- Some hundred million people live within 3 feet (1 meter) of mean sea level, and much of the world's population is concentrated in vulnerable coastal cities. In the U.S., [Louisiana and Florida are especially at risk](#).
- Glaciers around the world could melt, causing sea levels to rise while creating water shortages in regions dependent on runoff for fresh water.
- Strong hurricanes, droughts, heat waves, wildfires, and other natural disasters may become commonplace in many parts of the world. The growth of deserts may also cause food shortages in many places.
- [More than a million species face extinction](#) from disappearing habitat, changing ecosystems, and acidifying oceans.
- The ocean's circulation system, known as the ocean conveyor belt, could be permanently altered, causing [a mini-ice age in Western Europe](#) and other rapid changes.
- At some point in the future, warming could become uncontrollable by creating a so-called [positive feedback effect](#). Rising temperatures could release additional greenhouse gases by unlocking methane in permafrost and undersea deposits, freeing carbon trapped in sea ice, and causing increased evaporation of water.

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