

# Global Warming Fast Facts

Brian Handwerk

for [National Geographic News](#)

December 6, 2004

Global warming is a hot topic that shows little sign of cooling down. Earth's climate *is* changing, but just how it's happening, and our own role in the process, is less certain.

Check out these fast facts and [pictures](#) for a snapshot of Earth's evolving climate.

- There is little doubt that the planet is warming. Over the last century the average temperature has climbed about 1 degree Fahrenheit (0.6 of a degree Celsius) around the world.

The spring ice thaw in the Northern Hemisphere occurs 9 days earlier than it did 150 years ago, and the fall freeze now typically starts 10 days later.

The 1990s was the warmest decade since the mid-1800s, when record-keeping started. The hottest years recorded: 1998, 2002, 2003, 2001, and 1997.

- The multinational Arctic Climate Impact Assessment (ACIA) report recently concluded that in Alaska, western Canada, and eastern Russia, average temperatures have increased as much as 4 to 7 degrees Fahrenheit (3 to 4 degrees Celsius) in the past 50 years. The rise is nearly twice the global average. In [Barrow, Alaska](#) (the U.S.'s northernmost city) average temperatures are up over 4 degrees Fahrenheit (2.5 to 3 degrees Celsius) in 30 years.

The United Nations' Intergovernmental Panel on Climate Change (IPCC) projects that global temperatures will rise an additional 3 to 10 degrees Fahrenheit (1.6 to 5.5 degrees Celsius) by century's end.

- Over the last million years the Earth has fluctuated between colder and warmer periods. The shifts have occurred in roughly 100,000-year intervals thought to be regulated by sunlight. Earth's sunlight quota depends upon its orbit and celestial orientation.

But changes have also occurred more rapidly in the past—and scientists hope that these changes can tell us more about the current state of climate change. During the last ice age, approximately 70,000 to 11,500 years ago, ice covered much of North America and Europe—yet sudden, sometimes drastic, climate changes occurred during the period. Greenland ice cores indicate one spike in which the area's surface temperature increased by 15 degrees Fahrenheit (9 degrees Celsius) in just 10 years.

- Where do scientists find clues to past climate change? The tale is told in remnant materials like [glacial ice](#) and moraines, pollen-rich mud, stalagmites, the rings of corals and trees, and ocean sediments that yield the shells of microscopic organisms. Human history yields clues as well, through records like ancient writings and inscriptions, gardening and [vintner records](#), and the logs of historic ships.

- Rising temperatures have a dramatic impact on [Arctic ice](#), which serves as a kind of "air conditioner" at the top of the world. Since 1978 Arctic sea ice area has shrunk by some 9 percent per decade, and thinned as well.

ACIA projects that at least half of the Arctic's summer [sea ice will melt](#) by century's end, and that the Arctic region is likely to warm 7 to 13 degrees Fahrenheit (4 to 7 degrees Celsius) during the same time.

- Over the very long term, Greenland's [massive ice sheet](#) holds enough melt water to raise sea level by about 23 feet (about 7 meters). ACIA climate models project significant melting of the sheet throughout the 21st century.
- Vast quantities of fresh water are tied up in the world's many melting glaciers. When [Montana's Glacier National Park](#) was created in 1910 it held some 150 glaciers. Now fewer than 30, greatly shrunken glaciers, remain. Tropical glaciers are in even more trouble. The legendary snows of Tanzania's Mount Kilimanjaro 19,340-foot (5,895-meter) peak [have melted](#) by some 80 percent since 1912 and could be gone by 2020.
- Sea levels have risen and fallen many times over the Earth's long geological history. Average global sea level has risen by 4 to 8 inches (10 to 20cm) over the past century according to the IPCC.

The IPCC's 2001 report projects that sea level could rise between 4 and 35 inches (10 to 89cm) by century's end. Such rises could have major effects for coastal dwellers. A 1.5-foot (50-centimeter) sea level rise in flat coastal areas would cause a typical coastline retreat of 150 feet (50 meters).

Worldwide some 100 million people live within 3 feet (1 meter) of mean sea level. Rises of just 4 inches (10 centimeters) could promote flooding in many South Sea islands, while in the U.S. [Florida and Louisiana are at risk](#). The Indian Ocean nation of [Maldives](#) has a maximum elevation of only 8 feet (2.5 meters). Construction of a sea wall around the capital, Male, was driven by vulnerability to the rising tides.

- The ocean's circulation system, known as the [ocean conveyor belt](#), moderates global temperatures by moving tropical heat around the planet. Global warming could alter the balance of this system, via an influx of freshwater from melting ice caps for example, creating unforeseen and possibly fast-paced change.

Climate models suggest that global warming could cause more frequent extreme weather conditions. Intense [hurricanes](#) and storm surges could threaten coastal communities, while heat waves, fires and drought could also become more common.

- Since the 1860s, increased industrialization and shrinking forests have helped raise the atmosphere's CO<sub>2</sub> level by almost 100 parts per million—and Northern Hemisphere temperatures have followed suit. Increases in temperatures and greenhouse gasses have been even sharper since the 1950s.

Water vapor is the most important greenhouse gas. Carbon dioxide, methane and nitrous oxide also contain heat and help keep Earth's temperate climate balanced in the cold void of space. Human activities, burning fossil fuels and clearing forests, have greatly increased concentrations by producing these gases faster than plants and oceans [can soak them up](#). The gases linger in the atmosphere for years, meaning that even a complete halt in emissions would not immediately stop the warming trend they promote.

- In the Arctic the impacts of a warming climate are being felt already. Coastal [Indigenous communities](#) report shorter periods of sea ice, which fails to temper ocean storms and their

destructive coastal erosion. Increased snow and ice melt have caused higher rivers while thawing permafrost has wreaked havoc with roads and other infrastructure. Some communities have had to move from historic coastline locations.

Sea ice loss is devastating for species that have adapted to the environment, such as [polar bears](#) and ringed seals in the Arctic and Antarctic [penguins](#).

- Studies show that many European plants now flower a week earlier than they did in the 1950s and also lose their leaves 5 days later.

Biologists report that many [birds](#) and frogs are [breeding earlier](#) in the season. An analysis of 35 nonmigratory butterfly species showed that two-thirds now range 2 to 150 miles (3.5 to 240 kilometers) farther north than they did a few decades ago.

- By 2050, rising temperatures exacerbated by human-induced belches of carbon dioxide and other greenhouse gases could send more than a million of Earth's land-dwelling plants and animals down the road to extinction, according to a [recent study](#).
- [Coral reefs](#) worldwide are ["bleaching"](#), losing key algae and resident organisms, as water temperatures rise above 85 degrees Fahrenheit (29.5 degrees Celsius) through periods of calm, sunny weather. Scientists worry that rapid climate change could inhibit the ability of many species to adapt within complex and interdependent ecosystems.
- The effects of a warming globe may not be entirely negative. Heating costs could decline for those in colder climates, while vast marginal agricultural areas in northern latitudes [might become more viable](#). Arctic shipping and resource extraction operations could also benefit—summer sea ice breakup in Hudson Bay already occurs two to three weeks earlier than it did half a century ago.

But many species could be hit hard—including humans. The most vulnerable are peoples living in the far North, those perched along the world's coasts, and millions dependent on subsistence agriculture subject to the vagaries of a changing climate.