

Climate change science

Global warming

Did you know that the 1980s and 1990s were the warmest decades on record, and the 20th century the warmest in the past 1,000 years?

Over the past 100 years, the average temperature of Earth has warmed by 0.6°C . This amount of warming may not seem substantial; however, to put this in perspective, the average global temperature today is only 5 degrees warmer than during the last Ice Age, when ice sheets covered much of North America.

There is new and stronger evidence that most of the warming observed over the last 50 years is attributable to human activities.

United Nations Intergovernmental Panel on Climate Change, 2001

The natural greenhouse effect

If our planet had no atmosphere, the sun would reflect directly back into space and the earth would be a cold, lifeless place. But the earth does have an atmosphere. It is composed of several gases that absorb the sun's heat and slow its escape back into space. The gases that have the ability to insulate Earth are water vapour, carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O) and other trace gases called greenhouse gases. Without greenhouse gases, the average temperature on the earth would be -18°C instead of the current average of 15°C .

Graph Source: United Nations Environment Programme and GRID-Arendal. Available at Vital Climate Graphics: www.climateark.org



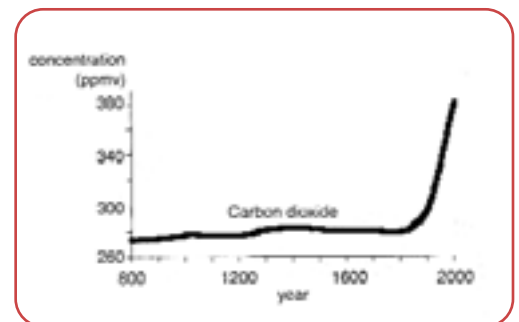
Human activities are enhancing the greenhouse effect

The Intergovernmental Panel on Climate Change concluded that human activities are contributing to climate change, and that there has been a discernible human influence on global climate. Natural changes in climate result from interactions between the atmosphere and ocean, variations in the sun's energy output, and volcanic eruptions. However, these natural causes of climate change do not account for all of the observed warming over the last century.

Human activity is increasing greenhouse gas concentrations in the atmosphere in two ways: by increasing sources of greenhouse gases and by reducing sinks. Anthropogenic sources of greenhouse

gases (resulting from or produced by humans) include burning of fossil fuels such as coal, oil, and natural gas to drive our vehicles, power our industries, heat and cool our homes, and land use change. Emissions of carbon dioxide due to changes in land use arise when forests are converted to agriculture or urban areas, which have considerably less capacity to store carbon dioxide.

Global warming theory predicts that the rapid increase in the concentration of greenhouse gases due to human activities will warm the earth at a rate faster than at any time in human history.



Atmospheric carbon dioxide concentrations since 800 AD.

Graph Source: United Nations Intergovernmental Panel on Climate Change, 1995



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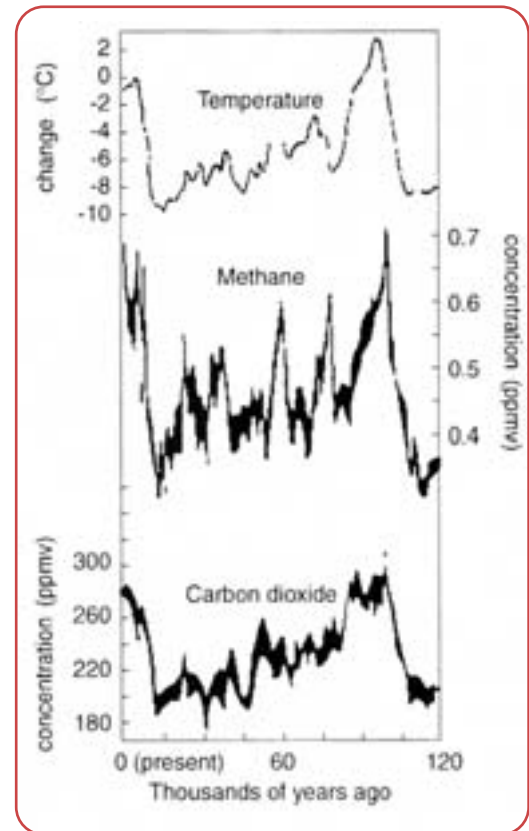
Available observational evidence indicates that regional changes in climate, particularly increases in temperature, have already affected a diverse set of physical and biological systems in many parts of the world.

United Nations Intergovernmental Panel on Climate Change, 2001

The link between global temperatures and two greenhouse gases

Since the Industrial Revolution, the concentration of carbon dioxide in the atmosphere has grown by nearly 31%, methane by 151%, and nitrous oxide by 17%. Records from ice core data, and from direct measurements of modern temperatures and atmospheric gas concentrations, show a close link between greenhouse gases and global temperatures.

The theory of global warming is based on the link between increased global temperatures and increased concentrations of greenhouse gases in the atmosphere. Over the past 400,000 years, Antarctic ice cores show that the average temperature of the Earth is strongly linked to carbon dioxide and methane concentrations in the atmosphere.



The link between global temperatures and methane and carbon dioxide concentrations.

Graph Source: United Nations Intergovernmental Panel on Climate Change, 1995

The result of global warming: climate change

Increasing global temperatures may trigger a series of changes within the overall global climate system. For example, global sea levels have risen 10 to 25 centimetres over the past 100 years. An increase in the severity and frequency of extreme weather events is also attributed to climate change.

Evidence of the impacts of climate change on our environment already exists. Examples of observed changes include:

- Shrinkage of glaciers.
- Thawing of permafrost.
- Later freezing and earlier break-up of ice on rivers and lakes.
- Lengthening of mid- to high-latitude growing seasons.
- Poleward and altitudinal shifts of plant and animal ranges.

- Declines of some plant and animal populations.
- Earlier flowering of trees, emergence of insects and egg-laying by birds.

These events could have far-reaching environmental, social, and economic consequences.

Alpine and continental glaciers have retreated extensively in response to 20th-century warming.

United Nations Intergovernmental Panel on Climate Change, 2001