

35.3 The Theory of Global Warming

In the past, Earth's climate has had both warm and cool periods. Changes from one period to another were caused by natural events. The last cool period ended about 12,500 years ago. Since then, Earth has been in a warm period. During the past 200 years, however, temperatures seem to have risen faster than usual. The theory of global warming tries to explain why the climate is heating up.

Three Key Ideas About Global Warming The theory of global warming is based on three key ideas. The first is that Earth's climate is getting warmer. The second is that this trend, or change over time, is mainly caused by human activity, not natural causes. The third key idea is that global warming is harmful to people and many biomes. Because of this, many people believe it should be slowed or even stopped.

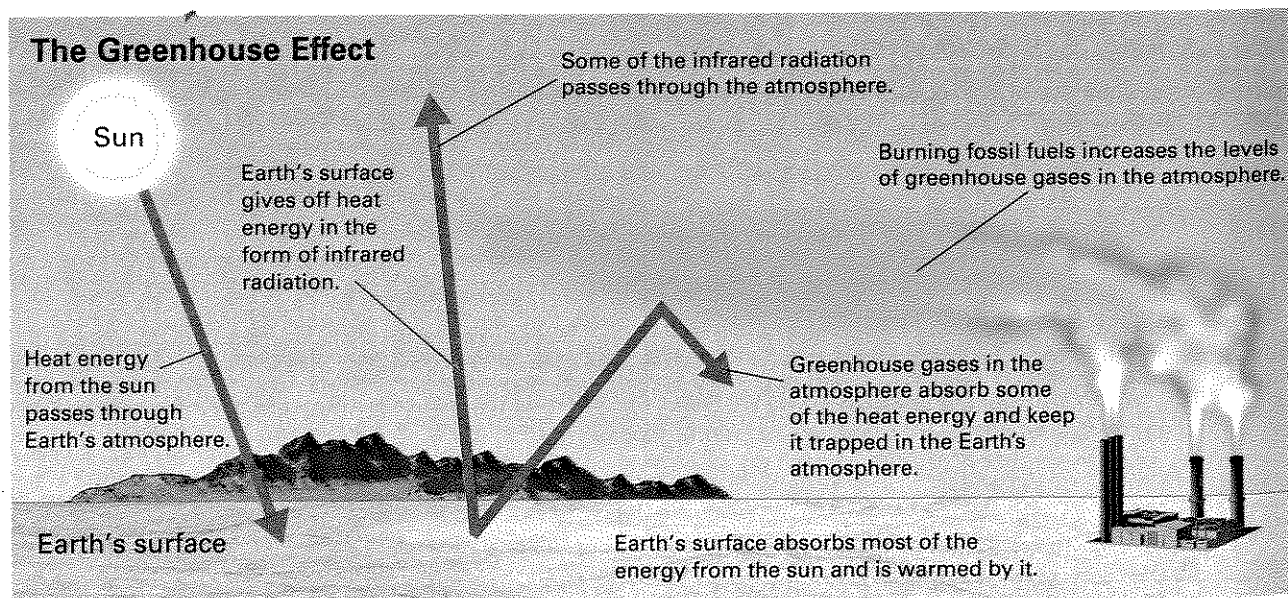
The Greenhouse Effect Keeps Earth Warm Earth is kept warm by a natural process called the *greenhouse effect*. This process traps energy from the sun in our atmosphere. The atmosphere then acts like a giant greenhouse surrounding Earth. This "greenhouse" keeps Earth's average surface temperature at a warm 59°F. Without it, the temperature could drop to 0°F, or well below freezing.

The greenhouse effect works because of gases in the atmosphere. The most common greenhouse gases are carbon dioxide, methane, and water vapor. They trap heat from the sun in the atmosphere. Otherwise, this heat would escape into space.

Since around 1800, levels of greenhouse gases in the atmosphere have been rising. This increase is due mainly to people burning **fossil fuels** such as coal, oil, and natural gas. When these fuels are burned, they give off carbon dioxide. Many scientists believe that the increase in carbon dioxide and other greenhouse gases is causing Earth to warm. Others are not so sure.

Energy from the Sun

This diagram shows what happens to energy from the sun once it enters Earth's atmosphere. Some energy is absorbed by Earth's surface. Some is reflected back into space. Some is trapped in a layer of gases that surround Earth. This trapped heat may be causing global warming.



35.4 Support for the Global Warming Theory

Scientists who support the theory of global warming point to three kinds of evidence. The first is climate records. These records show rising surface temperatures in many places. The second is glacier records. They show that glaciers around the world are melting as temperatures rise. The third type of evidence is rising levels of greenhouse gases in the atmosphere. Studies of air bubbles trapped in polar ice show that greenhouse gas levels are the highest they've been in 420,000 years.

Supporters of the global warming theory trace these changes back to the start of the **Industrial Revolution**. During this time, many new machines were invented. Many were powered by the burning of fossil fuels. Today we use coal, oil, and natural gas to heat our homes, run our cars, and power our factories. As a result of this activity, we add more than 4 billion tons of carbon dioxide to the air every year. This gas will stay in our atmosphere for at least the next 100 years.

The results of global warming, these scientists warn, could have terrible consequences. Some biomes may lose plants and animals that are unable to adapt to warmer conditions. Crop failures may become common, leading to widespread hunger. Ocean levels may rise as polar ice melts. Higher seas may flood low-lying islands and coastal cities. The best way to prevent these disasters, these scientists say, is to reduce activities that create greenhouse gases. This could mean difficult changes in the way many people today live.

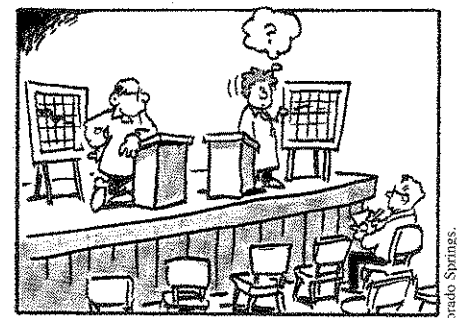
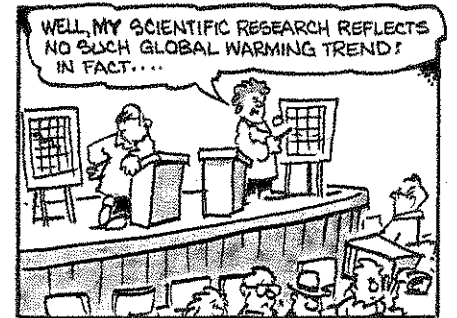
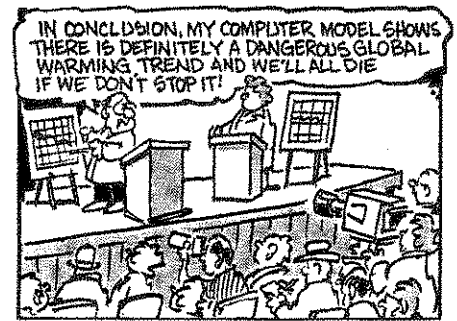
35.5 Doubts About the Global Warming Theory

Not all scientists agree with the global warming theory. Some doubt that Earth's temperature is, in fact, rising at all.

Like supporters, the doubters support their views with evidence. They point out that temperature records of the upper atmosphere show little sign of warming. Most surface temperature records, they argue, come from urban areas. City buildings and pavement absorb more heat from the sun than green spaces. As a result, urban areas get warmer as they grow. What looks like global warming may just be city warming. The doubters also note that not all glaciers are shrinking. Some are growing.

Some doubters accept evidence that Earth is warming. But they believe this is due to natural causes. Changes in the sun's energy or in ocean currents are far more likely to cause climate change, they believe, than human activity.

Finally, some doubters question whether rising temperatures will be so disastrous. People living in cold climates, they point out, might welcome warmer winters. Areas that are now too cold for crops might become productive farmland. Also, more carbon dioxide in the air may boost plant growth. The result could be faster growing crops and forests. This might be good, not bad, for many biomes.



The Global Warming Debate

Some people believe that global warming will have disastrous effects. They argue for reduced use of fossil fuels to slow climate change. Others don't believe that global warming is a major problem. Some even suggest that warmer weather could benefit people living in cold climate zones.

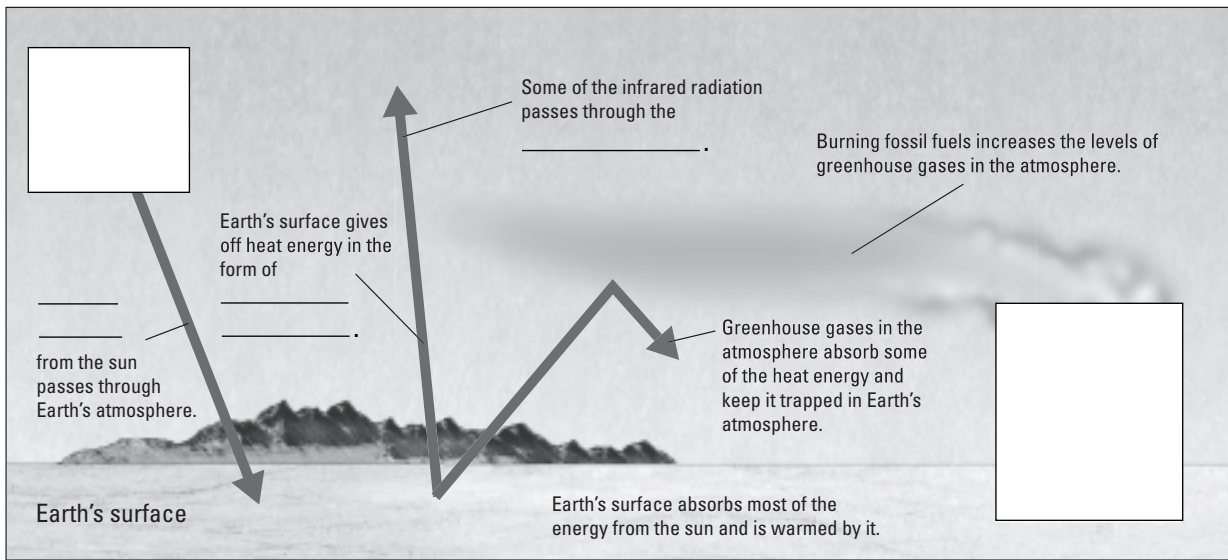
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35.3 The Theory of Global Warming

What three key ideas is the theory of global warming based on?

- 1.
- 2.
- 3.

Fill in the five missing pieces on the diagram of the greenhouse effect.



In the first column of the table, list a reason to support each of the three key ideas of the global warming theory. In the second column, list a reason to doubt each key idea.



35.4 Support for the Global Warming Theory



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