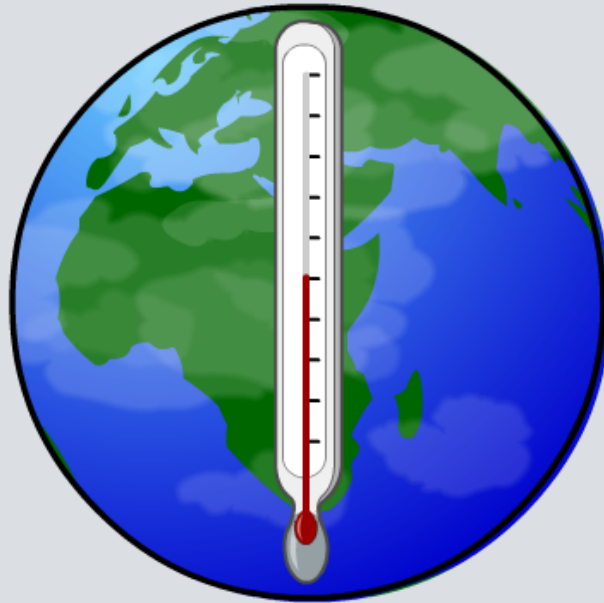


Greenhouse Gases



Global warming: true or false?

Are these statements about global warming true or false?

1.	Carbon dioxide is a greenhouse gas.	<input type="text" value="?"/>
2.	Acid rain contributes to global warming.	<input type="text" value="?"/>
3.	Global warming is thought to be accelerating due to human activity.	<input type="text" value="?"/>
4.	Nitrogen is a greenhouse gas.	<input type="text" value="?"/>
5.	Methane is a greenhouse gas.	<input type="text" value="?"/>
6.	The average temperature of the Earth is higher now than it was 200 years ago.	<input type="text" value="?"/>

true

false

S



What are greenhouse gases?

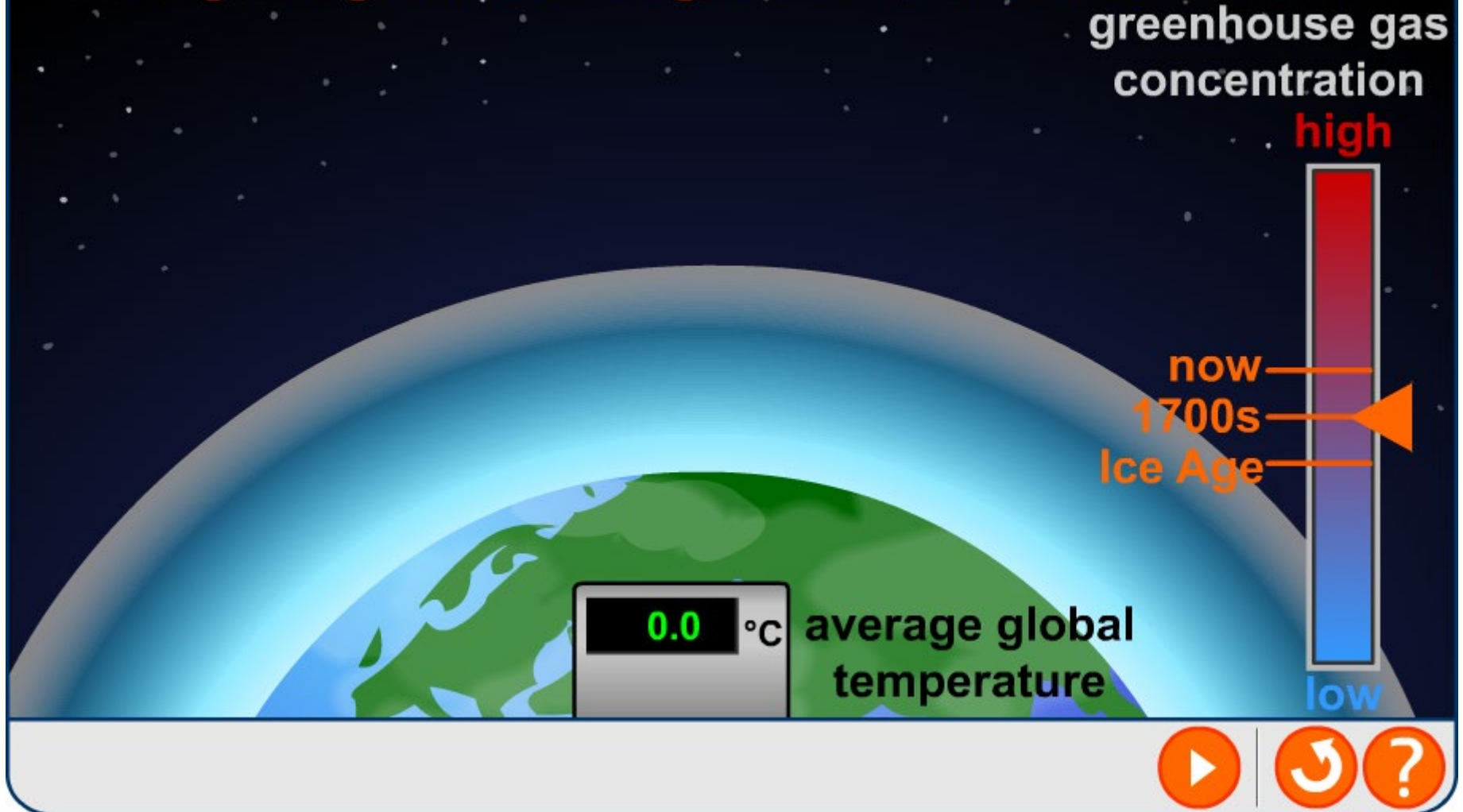
What is the greenhouse effect?

Certain gases in the Earth's atmosphere are **greenhouse gases**.

Click "**play**" to find out why they are called this.



Change in greenhouse gas concentration over time



Not all greenhouse gases contribute to global warming to the same degree.

The **global warming potential** (GWP) is a measure of how much a given gas can contribute to global warming over a given time period. It is measured relative to **carbon dioxide**, which is given a global warming potential of 1.

The GWP of a gas is calculated using the following factors:

- molar mass of the gas
- lifetime of the gas in the atmosphere
- ability of the gas to absorb infrared radiation.



Greenhouse gases compared

The contribution of a greenhouse gas to global warming depends on its global warming potential (GWP) and the amount of that gas present in the atmosphere.

Greenhouse gas	Average % of atmosphere	GWP	
		After 20 years	After 100 years
water vapor	1–4	–	–
carbon dioxide	0.038	1	1
methane	0.0002	72	25
nitrogen monoxide	0.00003	289	298



What are the possible effects of global warming?

increase in average global temperatures

rising sea level

shrinking ice caps

extreme local weather conditions

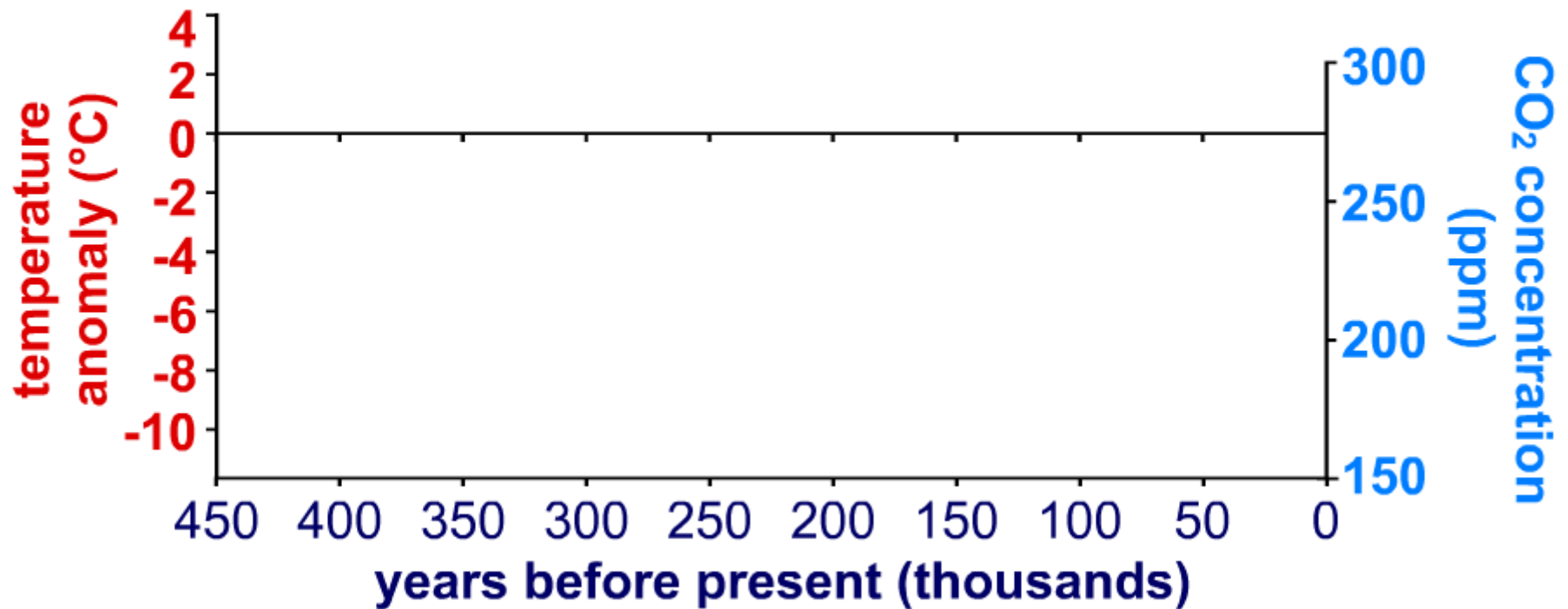
Click an effect of global warming to find out more about it.



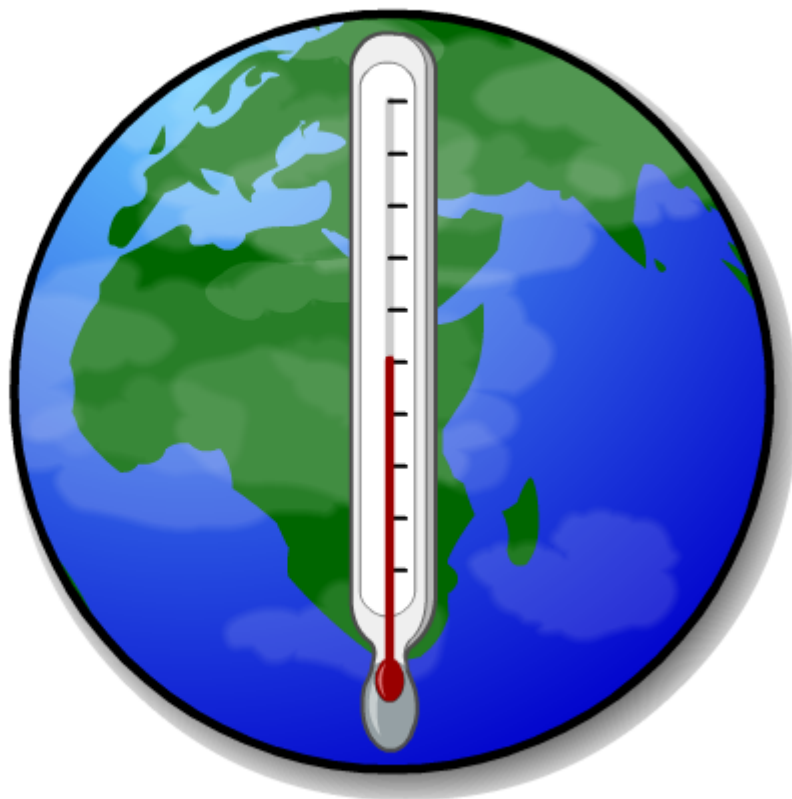
Causes of climate change


Natural or anthropomorphic climate change?


Scientists have studied Antarctic ice cores to find out historical information about the climate and carbon dioxide concentration.




Does the evidence support the theory that recent global warming is caused by human activity?



0  **yes**

0  **no**

0  **unsure**



It is now widely accepted that human activity is causing an increase in the concentration of carbon dioxide in the atmosphere, and that this is leading to global warming.

What is the role of scientists in combating global warming?

- Analyzing the available evidence to find out the current extent of the problem and predict its future extent.
- Investigating the viability of controversial solutions, such as **carbon capture and storage (CCS)**.



The role of cooperation



Because climate change is a global problem, cooperation is needed to achieve a solution.

It is not just scientists who are responsible for judging the effect of climate change. In 2006, the U.S. Climate Change Technology Program released its Strategic Plan, organizing the use of \$3 billion on climate-change technology research. Because climate change will have a massive economic cost, government investment in low-emission technologies will be economically beneficial.

International cooperation is also important. For example, many countries signed the **Kyoto Protocol**, which requires countries to reduce their greenhouse gas emissions by a certain amount in a certain time. Although the U.S. signed the Protocol, it was never ratified by the Senate.



What do you think?

What is your view of these opinions about global warming?

Zak (Student)

"There's no proof that climate change is caused by people. The climate varies anyway, like during the Ice Age."

