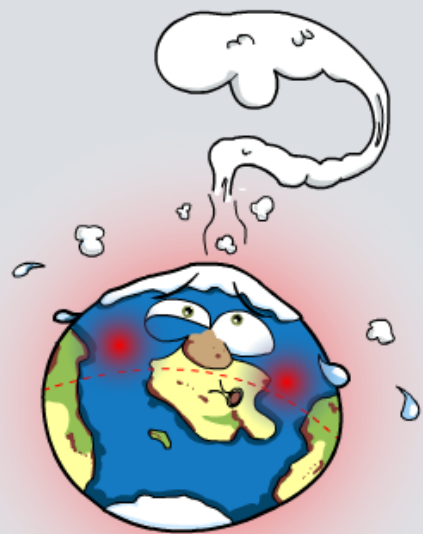




Evidence for Climate Change



What is the evidence for climate change?

Data collected by climate scientists can be used to answer two key questions:

- Is the climate really changing **rapidly**?
- Is **human activity** causing this climate change?

These scientists are setting up an Automatic Weather Station on the Djankuat glacier in Russia.



Monitoring glaciers has produced startling evidence about the rate at which some glaciers are melting.



How are carbon dioxide levels measured?

Atmospheric carbon dioxide levels are measured around the world to detect global trends in this greenhouse gas.

The standard measurement used is parts per million (ppm). In 2005, levels were around 370 ppm. This means for every million parts of air, 370 parts were carbon dioxide.

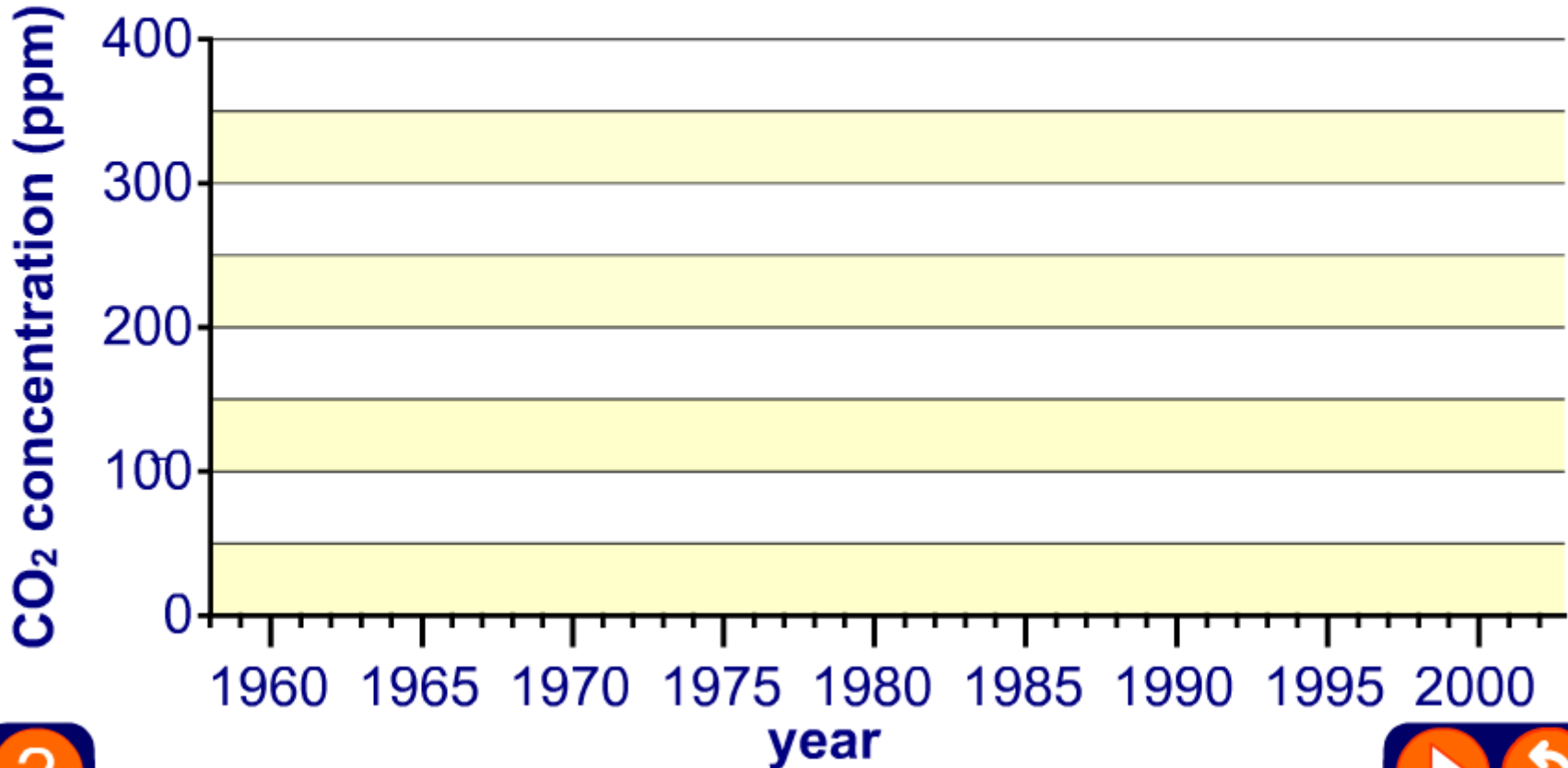
Research stations for monitoring atmospheric gases are usually sited in remote places.

The Mauna Loa Observatory in Hawaii, is located at an altitude of 4,170 meters.





What is the trend in atmospheric levels of carbon dioxide?



What are ice cores?

Ice cores are long columns of ice that are drilled out of glaciers.

Ice cores are studied to increase understanding of the history of climate as they provide data about the distant past.



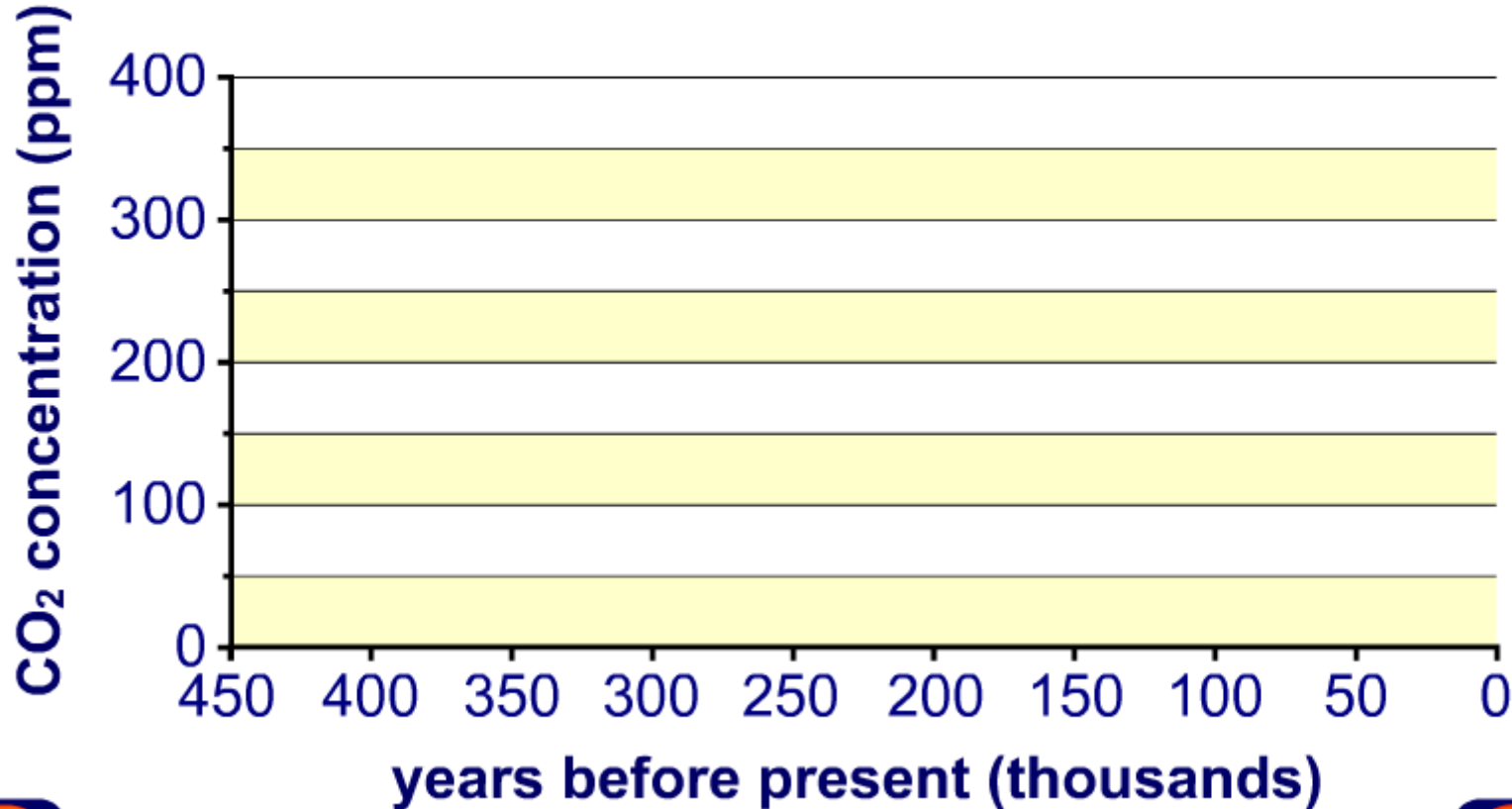
Air bubbles trapped in the ice are used to estimate carbon dioxide levels thousands of years ago.

This is called a **proxy record**. These are indirect climate measures of the climate that have not been recorded using instruments. Tree rings are another type of proxy record.

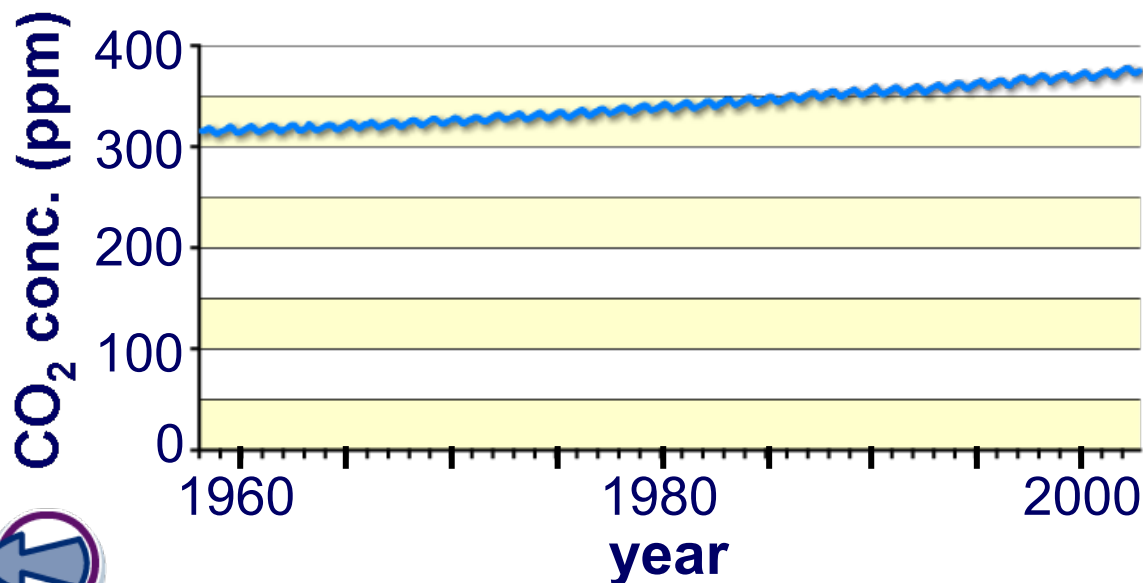
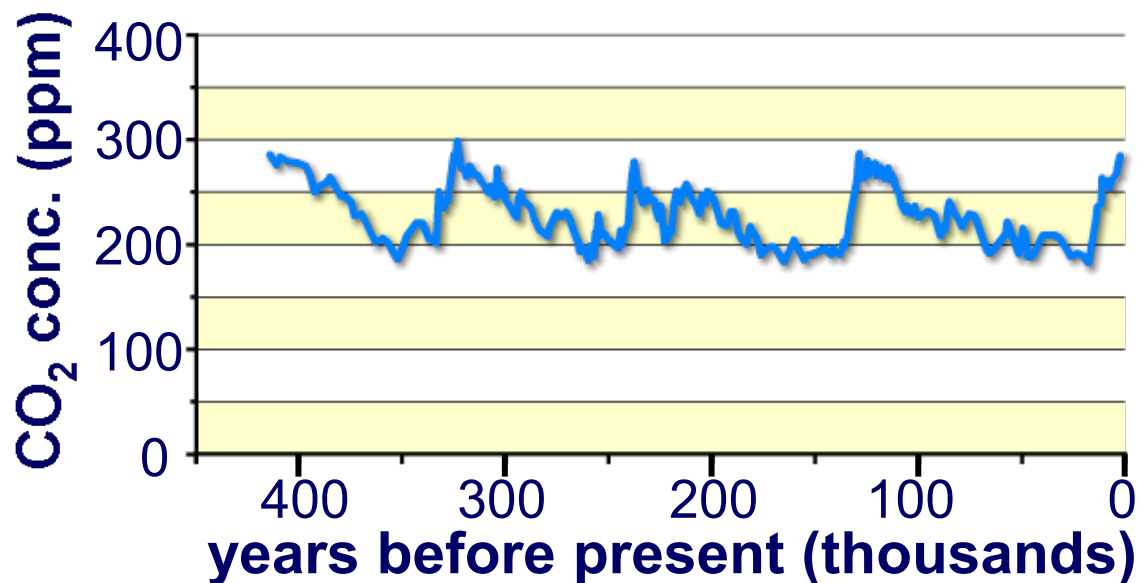




How have carbon dioxide levels changed over thousands of years?



How have CO₂ levels changed?



These graphs show how carbon dioxide concentrations have changed over time.

Around 200 years ago, CO₂ levels were about 280 ppm and are now about 380 ppm.

According to records, this is about 27% more than at any time in the last 400,000 years.

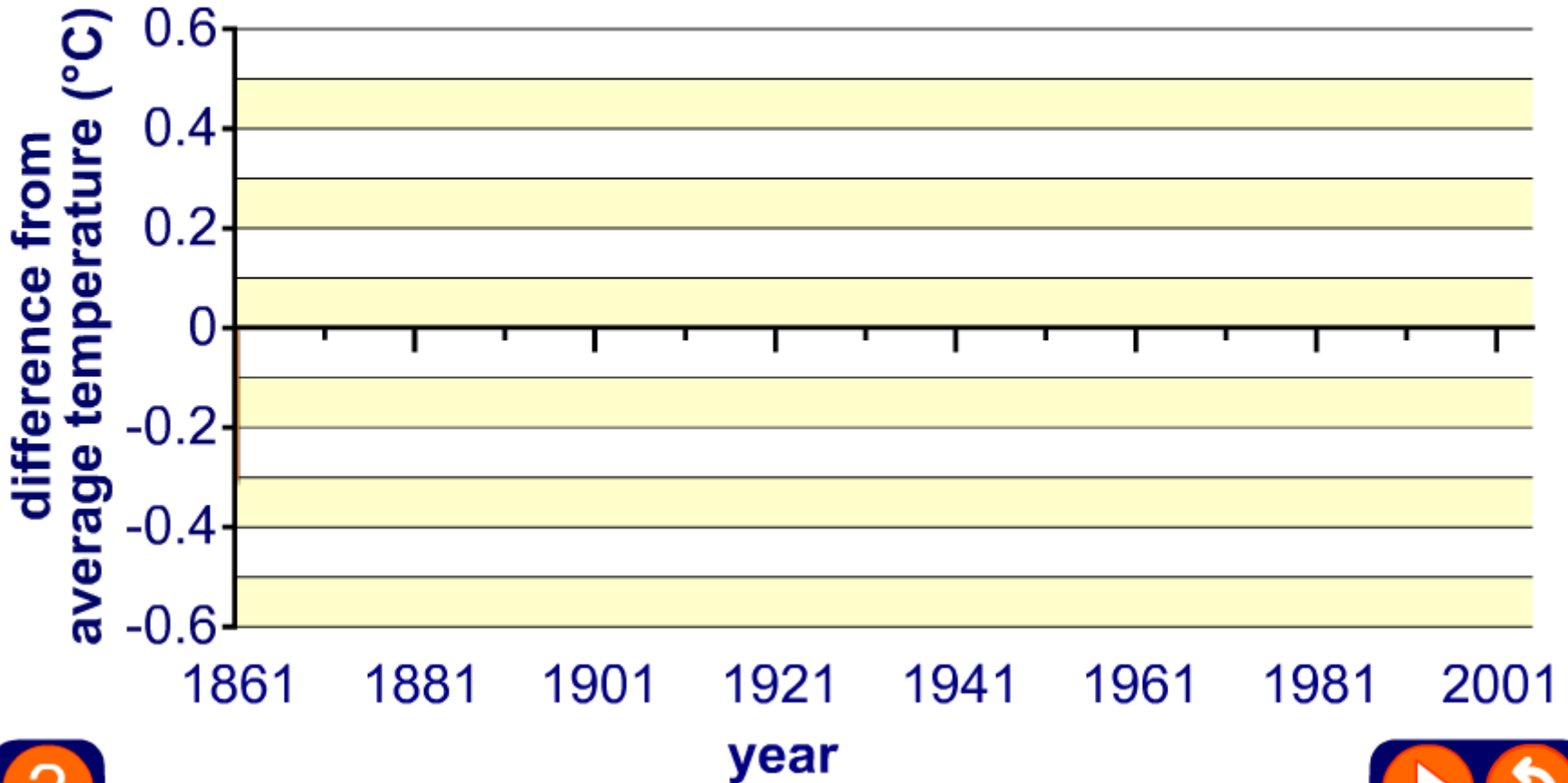
How might this affect the climate?



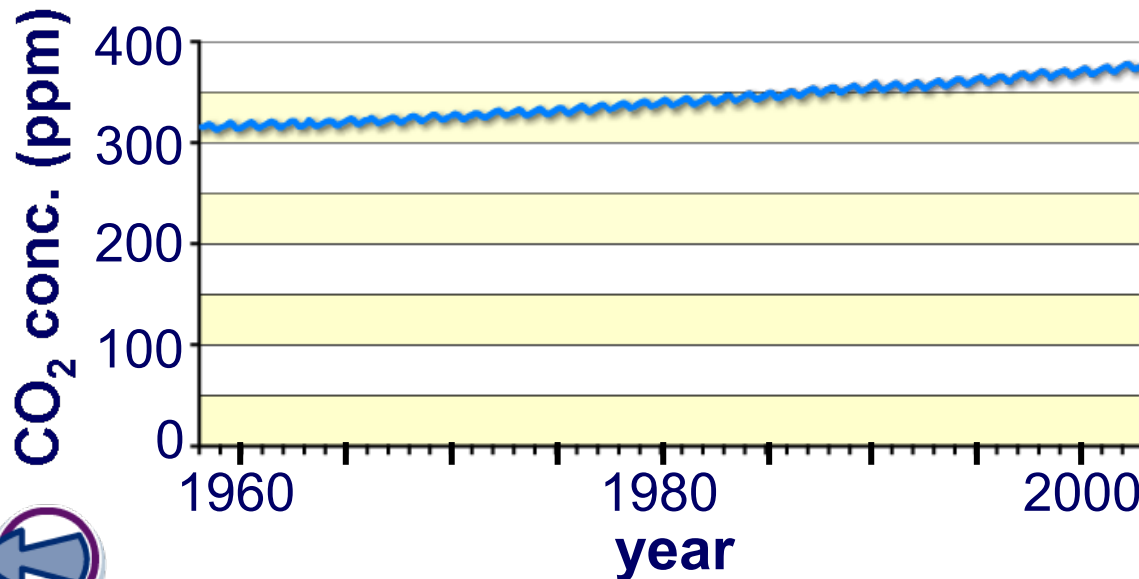
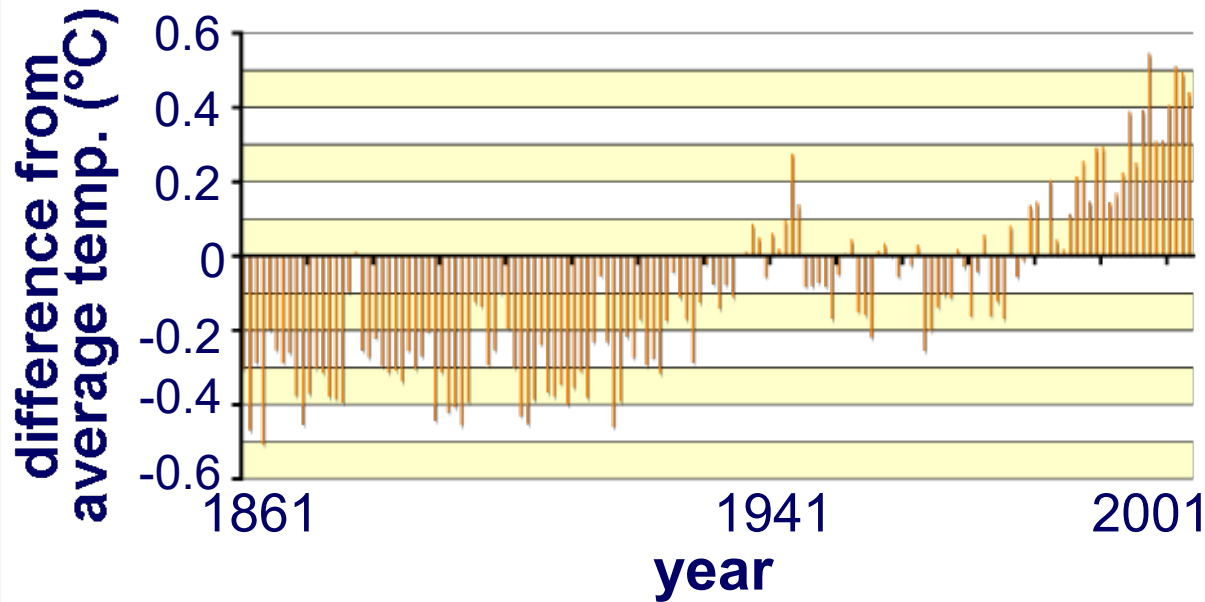
Temperature change



How has temperature changed compared to the 1961-1990 average?



Are temperature and carbon dioxide related?



The global average temperature has increased at the same time as the levels of carbon dioxide have risen.

However, it is not correct to say that carbon dioxide levels have caused this temperature change, because there are other factors involved.

How should the data be discussed?



How should I talk about the climate data?



It is important to be very careful about the words used to discuss scientific data.

Collected data shows that temperature and carbon dioxide levels in the atmosphere have increased at the same time. It might seem to make sense to say that the rise in **carbon dioxide** is causing the **temperature** rise but this is incorrect.

- How do you know that it is not the **temperature** increase that is causing **carbon dioxide levels** to rise?
- Can you say for certain that carbon dioxide is the only factor in the change of temperature?

It is more correct to say that there appears to be a **positive relationship** between carbon dioxide levels and temperature.

