

CLASSROOM ACTIVITY

Shrinking Glaciers: A Chronology of Climate Change

Analysis of Earth's geologic record can reveal how the climate has changed over time. Scientists in New Zealand are examining samples from the rocky landscape once dominated by glaciers. They are employing a new technique called surface exposure dating, which uses chemical analysis to determine how long minerals within rocks have been exposed to the air since the glaciers around them melted. Comparisons of this data with other climate records have revealed a link between glacial retreat and rising levels of carbon dioxide in the air, findings that are informing scientists' understanding of global climate change today.

CLASS DISCUSSION

Establish Prior Knowledge

Call on students to explain what they know about glaciers (*A glacier is a large body of thick ice that forms over many years. Glaciers flow slowly, transporting rock and earth from the underlying land.*). Tell students that in the video they are about to see a team of scientists study the rocks carried by glaciers to determine how the climate has changed over time.

Exploration

Have students watch the video. Use the following questions to guide a class discussion.

- Scientists have been able to map out the path of ice age glaciers for some time, but what information were they unable to glean from glaciers, until now?
(*Answer: They were unable to date the remnants of past glaciers. So they couldn't tell how fast or how slow the glacier moved.*)
- What technique are scientists using to date the remnants left by the glacier?
(*Answer: They are using Surface Exposure Dating*)
- How does Surface Exposure Dating work?
(*Answer: The rock deposited by the glacier is exposed to incoming cosmic radiation from outer space. The cosmic ray particles bombard the quartz atoms in the rock. The rays blast apart silicon and oxygen to create Beryllium 10. Beryllium 10 builds up in the surface of the rock over time. By measuring Beryllium atoms, they can determine when the rock was deposited.*)
- What did the scientists determine from the data they collected?
(*Answer: They reconstructed a local glacier record that shows a chronology of the glacier's movement.*)
- How did the scientists put the data they collected into a climate context? What were their findings?
(*Answer: They compared their data with data from an Antarctic ice core. Their findings showed that when CO₂ in the atmosphere rises, glaciers retreat.*)

Wrap-Up

Point out that in the video the scientist says that the relationship between retreating glaciers and CO₂ presents very bad news and that we have a very big problem. Discuss with students the possible problems humans would face if glaciers continued to retreat at the current rate

Extend

For those students who want to learn more about glaciers, direct them to two other Science Bulletins features:

Melting Ice, Rising Seas

Archived in Ice: Rescuing the Climate Record