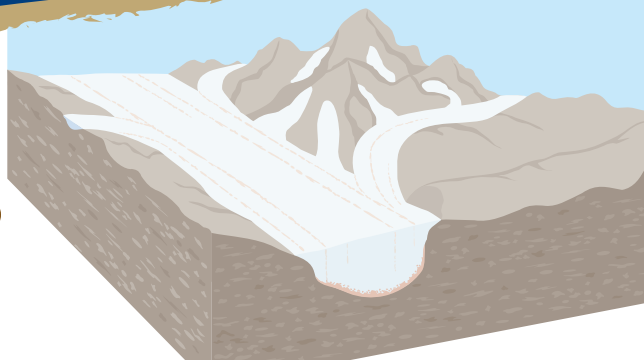


What is a glacier?

Glaciers aren't just big pieces of ice that froze overnight. They are far more complex than that. They are actually slow moving rivers of ice. It takes a long time to make a glacier. You need layers of snow to pile up in a place where the snow won't all melt in the summer. That snow then gets pushed down as more snow falls on top of it each year. Eventually the snow turns into ice from all the pressure of the snow on top of it. The pressure, weight, and repeated melting and freezing all impact the movement of the glacier.

Glaciers can be tens of thousands of years old and have shaped much of the land around us. Glaciers of the past carved out mountains, valleys, and lakes and often left behind clues that they were there, such as large boulders and scratch marks in rocks. Glaciers can also impact weather patterns, climate, and sea levels.



There are glaciers on mountains and in valleys but the largest are ice sheets or continental glaciers. They are huge and so deep (they can be more than a mile deep) that they can hide the features of the land below them. The only two continental glaciers that exist today are on Greenland and Antarctica. If the entire Greenland Ice Sheet melted, the world's oceans would rise more than 23 feet!

One third of the people on Earth get their water from rivers that come from glaciers. Many glaciers around the world are disappearing due to climate change including the ones in Montana's Glacier National Park. Check out the photo on this page. For more photos like this one visit <http://nrmsc.usgs.gov/repeatphoto>.

Boulder Glacier Glacier National Park, MT



1932

T. J. Hileman photo
Courtesy of GNP archives



1988

Jerry DeSanto photo



USGS Repeat Photography Project
<http://nrmsc.usgs.gov/repeatphoto/>



Try this!

MAKE YOUR OWN GLACIER

Supplies needed: play dough, ice cube tray, ice cubes with dirt and rocks frozen in them, and a pan.

Take a mixture of dirt and rocks of different sizes. Add approximately one tablespoon of the mixture per ice cube that you want to make. Fill the ice cube tray with water and then freeze it. Take your model glacier ice cube and leave it out at room temperature until it begins to melt a bit and the rocks at the bottom become exposed and loose. Take a handful of play dough and smooth it out like a pancake.

- Grab your ice cube and drag it (rough end down) slowly, one way across the play dough while pushing down with medium pressure. What kind of marks does it make in the play dough? Does it leave anything behind (dirt, rocks)? Look closely at your model glacier. Are there interesting features on the surface like crevasses? How is the dirt and gravel distributed throughout (randomly)? How was the play dough "landscape" affected by the sediment in the "glacier" (scratches, grooves, large boulders picked up and then deposited by glaciers)? **Glaciers form on top of rocks and dirt but also pick up more as they move;** these can be rock fragments from valley walls or new rocks from the ground that freeze into the ice. These rocks produce glacial grooves and scratches in bedrock that show patterns of glacial movement.
- Now, put your model glacier into a pan and observe it melting. This is more similar to a continental glacier, while the scraping activity represented a valley glacier. What do you notice about how the rocks and dirt are distributed by the melting ice (sediment is unsorted, piles are of mixed sizes)?
- Can you think of areas you have visited that show evidence of glaciers? Describe the areas and the clues the glaciers left behind.

(lesson modified from pbs.org)