

Mix Up a Model Rock Core

Preview

After scientists examine the cores in Antarctica, they ship them to a special core storage facility in Tallahassee, Florida in the United States. Scientists from around the world can request small samples from the cores for further study. The cores are too valuable to ship around for public viewing. In order to have a model of a rock core to display at your Flexhibit, follow these three sedimentary-rock recipes to mix up a model rock core.

Prepare

Layer 1: Sediments Under an Ice Sheet

The bottom surface of an ice sheet isn't nearly as white as its top: as layers of snow pile up on the surface, rocks are frozen into its base. Over time, rocks of all sizes and shapes are embedded in the bottom of the ice. As the ice moves downhill, rocks in its base scratch the ground.

When the ice melts, the rocks it was carrying form a layer of sediments with all sizes and shapes of rocks mixed together. If these sediments are later buried by other rock layers and turn into solid rock, the rock is known as **diamictite**. Wherever geologists find diamictite, they know that an ice sheet once existed in that place.

Mix a batch of icy sediments

1. Put about $\frac{3}{4}$ cup each of stones, gravel, sand, and fine silt into a large mixing bowl. Mix in about 5 cups of crushed ice or snow.
2. Discuss how your mixture is the same and how it's different from the bottom of a glacier.
3. Put one of the PVC slip caps on the bottom of the plastic tube.
4. Using your hands, fill the plastic tube all the way to the top with this mixture. Put the PVC slip cap on and set the tube where it won't be disturbed while the ice melts. Melting may take several hours.



Time

- ⌚ Layer 1: 20 minutes, followed by at least one hour of melting
- ⌚ Layers 2 & 3: 30 minutes

Tools & Materials

- Large mixing bowl
- Large spoon
- 2 cups each of:
 - Stones (larger than $\frac{1}{2}$ " diameter)
 - Gravel (about $\frac{1}{4}$ " diameter)
 - Sand
 - Fine silt or dirt
- Clear plastic protective tube for fluorescent light bulb (24")
- $\frac{1}{4}$ " PVC slip caps (2)
- Clean plastic jars with water-tight lids (3)
- Adhesive labels for jars (3)
- Green sand (2 cups)
- White sand (2 cups)
- String (4 feet)
- + Crushed ice or snow (5 cups)
- + Water
- + Freezer
- + Optional: Plastic containers (8) for holding sediments
- + Optional: Laundry bleach

📖 Items found in this book

- Items included in the Flexhibit Kit, available from <http://www.andrill.org/flexhibit>.
- + Additional items



- Put the rest of the mixture into a jar and seal it. Make a label for it that reads **Sediments in the bottom of an ice sheet**. Store it in a freezer.
- After the ice has melted in the tube, examine and discuss the layer of sediments. Leave the water in the tube.
- Optional: Have an adult carefully add a few drops of bleach to the tube. This will discourage algae from growing in your sediments.

Layer 2: Sediments Under an Ice Shelf

When an ice sheet enters the ocean, it becomes a floating ice shelf. Where the ice enters the water, rocks that were frozen into it drop out and pile up on the seafloor. When the pile of sediments grows too steep, underwater landslides occur. These landslides carry smaller sediments long distances from the coast, out under the ice shelf. As the sediments move through the water, the larger rocks drop to the seafloor first and smaller particles settle out later, after the water calms down. The result of each landslide is a layer of sediments that has slightly larger grains at the bottom and smaller grains at the top. Occasionally these layers have a larger rock dropped on top of them. This happens when rocks that were still embedded in the bottom of the ice shelf melt out and fall to the seafloor.

Deposit some under-an-ice-shelf sediments

- Mix together 1/4 cup of gravel plus 1 cup of sand and 1 cup of silt.
- One at a time, pour large spoonfuls of this mixture through the standing water in the plastic tube, on top of Layer 1. Let each spoonful settle for a minute or two before you add the next one.
- Once every 2 or 3 spoonfuls, drop a single stone into the tube. These represent "dropstones" from the ice shelf.
- Discuss how your layers are similar to and different from sedimentary processes under an ice shelf.
- Fill a jar about 3/4 full of water. Put 1/4 cup each of gravel, sand, and silt into the jar and close the lid tightly.
- Label the jar: **Shake to simulate an underwater landslide**.
- Shake the jar vigorously. This simulates the high-energy environment of an underwater landslide.
- Set the jar down and let the sediments settle out. Examine how the sediments are arranged: look for a pattern of smaller grains on top of larger ones.



Layer 3: Sediments in Open Ocean

Microscopic algae called **diatoms** are abundant in water. Wherever water receives sunlight, these single-celled organisms flourish. Diatoms use the sun's energy for **photosynthesis**. While they are alive, diatoms float near the surface, where they can get sunlight. When they die, their skeletons sink to the seafloor. Zillions of diatom skeletons pile up into thick layers on the seafloor. Occasionally, an iceberg might float across the area and drop stones that are still melting out of the base of the ice onto the accumulating diatoms.

If layers of diatom skeletons get buried by more sediments and turn to solid rock, the result is known as **diatomite**. When geologists find diatomite, they can tell that an open marine environment once existed in that place.

Deposit some dead diatoms

1. In a plastic container, mix $\frac{1}{2}$ cup of green sand with $\frac{1}{2}$ cup of white sand.
2. Randomly alternate pouring spoonfuls of pure green sand, pure white sand, and mixed green and white sand through the water into the tube. The different colors represent slightly different types of diatoms.
3. Within the bottom third of Layer 3, add a few rocks to the tube to represent stones that may have dropped out of icebergs.
4. Fill a jar about $\frac{3}{4}$ full of water. Add two spoonfuls of green sand and close the lid tightly.
5. Label the jar: **Shake to simulate live floating diatoms.**
6. Set the jar where it won't be disturbed to let the sediments settle.
7. Put the PVC slip cap on top of the tube. Store your model rock core upright, in a cool, dark place.



The Finished Core



Ponder. . .

Sketch and label a diagram of the three main layers of your model rock core.

Consider the environments that all three of the sedimentary rock layers you made represent, from the oldest to the youngest. What kind of climate change does the sequence of layers represent?

Which layer do you think is the best model for the rock type it represents?

Practice

Got the Big Idea?

The model rock core made with three different rock “recipes” provides examples of sediments produced in three different environments. The sequence of rock types tells the story of a warming climate. The environment changed from a cold climate (ice sheet) to a more moderate climate (ice shelf) to a warmer climate (open ocean) while the rocks were forming.

Get ready to present

Come up with a statement to tell visitors about the three rock recipes and your model rock core. Show your prepared jars and the sediments that match the environment represented by each jar. If possible, plan to set this station up near the *Reading Antarctica's Rock Cores* banner so you can point out the similarities between rock layers in your core and the ones on the banner.

Present

Encourage visitors to examine the sediment layers and compare them to the rocks on the *Reading Antarctica's Rock Cores* banner. Consider the environment represented by each layer and the climate story told by the overall sequence of the three layers.

