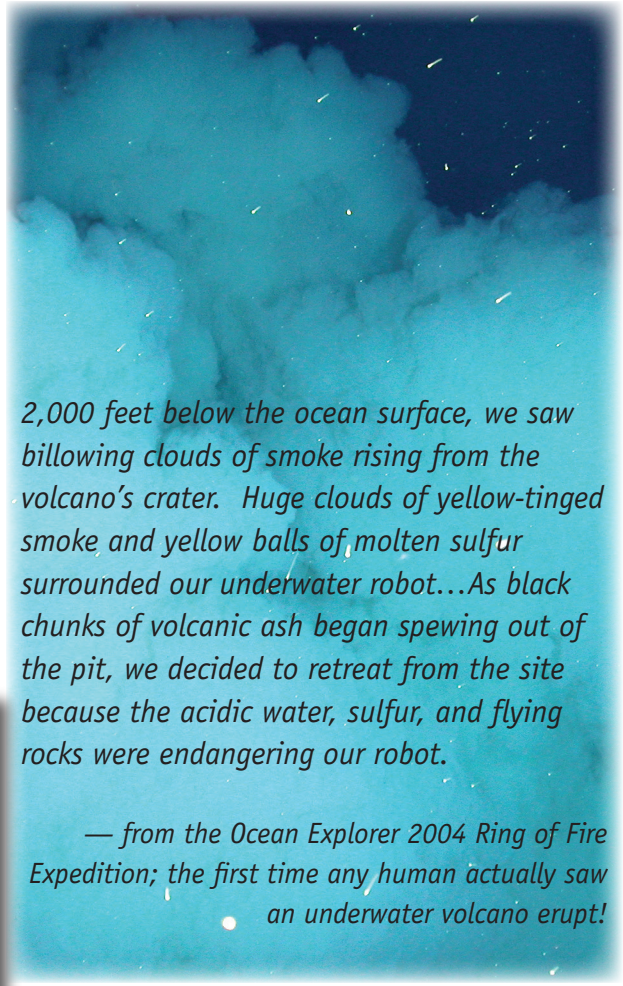
Make Your Own Volcano!



2,000 feet below the ocean surface, we saw billowing clouds of smoke rising from the volcano's crater. Huge clouds of yellow-tinged smoke and yellow balls of molten sulfur surrounded our underwater robot...As black chunks of volcanic ash began spewing out of the pit, we decided to retreat from the site because the acidic water, sulfur, and flying rocks were endangering our robot.

— from the Ocean Explorer 2004 Ring of Fire Expedition; the first time any human actually saw an underwater volcano erupt!

What You Will Do

Make a model of a volcano, complete with eruption!

What You Will Need

- ❒ Cardboard tube from a roll of paper towels
- ❒ Sheets of newspaper
- ❒ Clear plastic tape or masking tape
- ❒ Corrugated cardboard, about 12 inches square
- ❒ Aluminum foil or homemade modeling dough (see recipe below)
- ❒ Modeling dough (store-bought or home-made)
- ❒ Baking soda (enough to fill the cardboard tube at least half full)
- ❒ Vinegar, about eight ounces
- ❒ Sharp knife to cut the cardboard tube
- ❒ Optional: spray paint; spray glue; sand; food coloring

Warnings

1. Be careful with the knife! Cut on a flat cutting board, and keep your fingers away from the blade!
2. Wear protective gloves and eye shields when handling chemicals.

Recipe for Homemade Modeling Dough

1 cup flour
1/2 cup salt
1 cup water
1 tablespoon cooking oil
2 teaspoon cream of tartar
(optional) food coloring

Mix all ingredients together and heat slowly, stirring constantly, until the mixture is thick and doughy. Let the mixture cool until it can be handled. Knead the dough ball a few times, then wrap in foil to store.

How to Do It

1. Cut the cardboard tube to a length of about eight inches. Plug the bottom of the tube with a piece of modeling dough.

2. Tape the cardboard tube to the piece of corrugated cardboard with plastic tape or masking tape.

3. Crumple sheets of newspaper into balls, and tape these onto the corrugated cardboard around the cardboard tube. Make several different size balls so the surface tapers upward from the edge of the cardboard to the top of the cardboard tube, giving your volcano its shape.

4. Cover the balls of newspaper with a sheet of aluminum foil or a rolled out sheet of homemade modeling dough. Leave a hole in the covering for the end of the cardboard tube. Fold the edges of the foil under the corrugated cardboard sheet

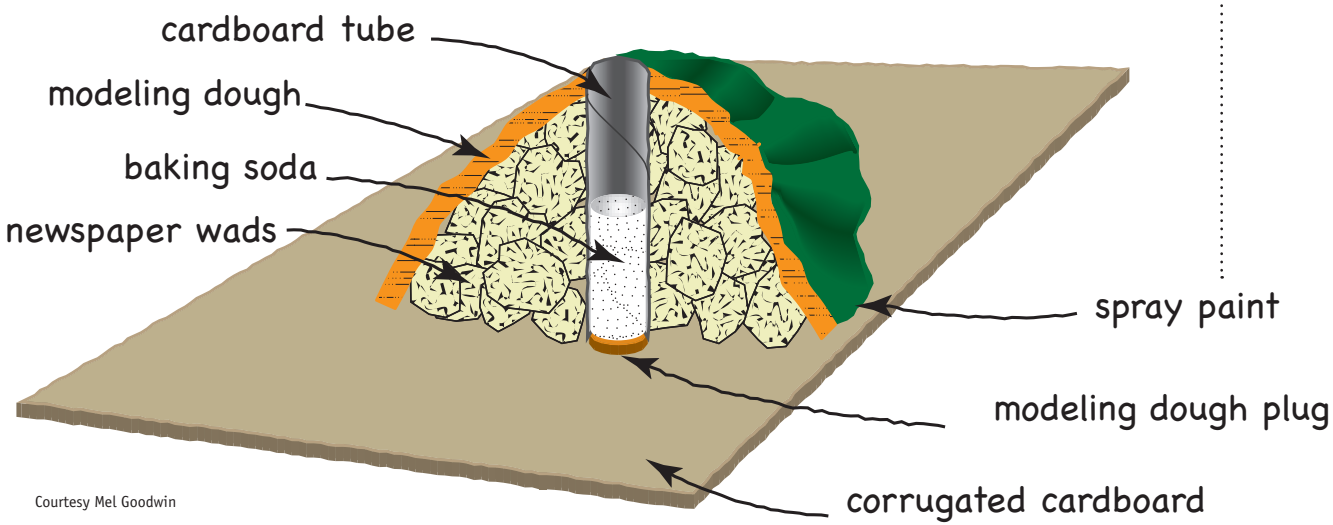
5. Optional: Decorate your model. Spray with green and brown spray paint. You may also want to spray on glue and dribble sand onto the glue before it dries.

6. Fill the cardboard tube at least half full of baking soda. If desired, mix several drops of red food coloring into the vinegar to give a molten lava appearance.

7. Take your model outside before erupting! Pour the vinegar into the tube, and stand back!

[Note: The volcano model made in this activity has the shape of a strato volcano. If you want to make a model of a shield volcano, cut the cardboard tube to a length of about three inches instead of eight inches (Step 1). Then follow the remaining instructions.]

Cutaway view of the volcano model

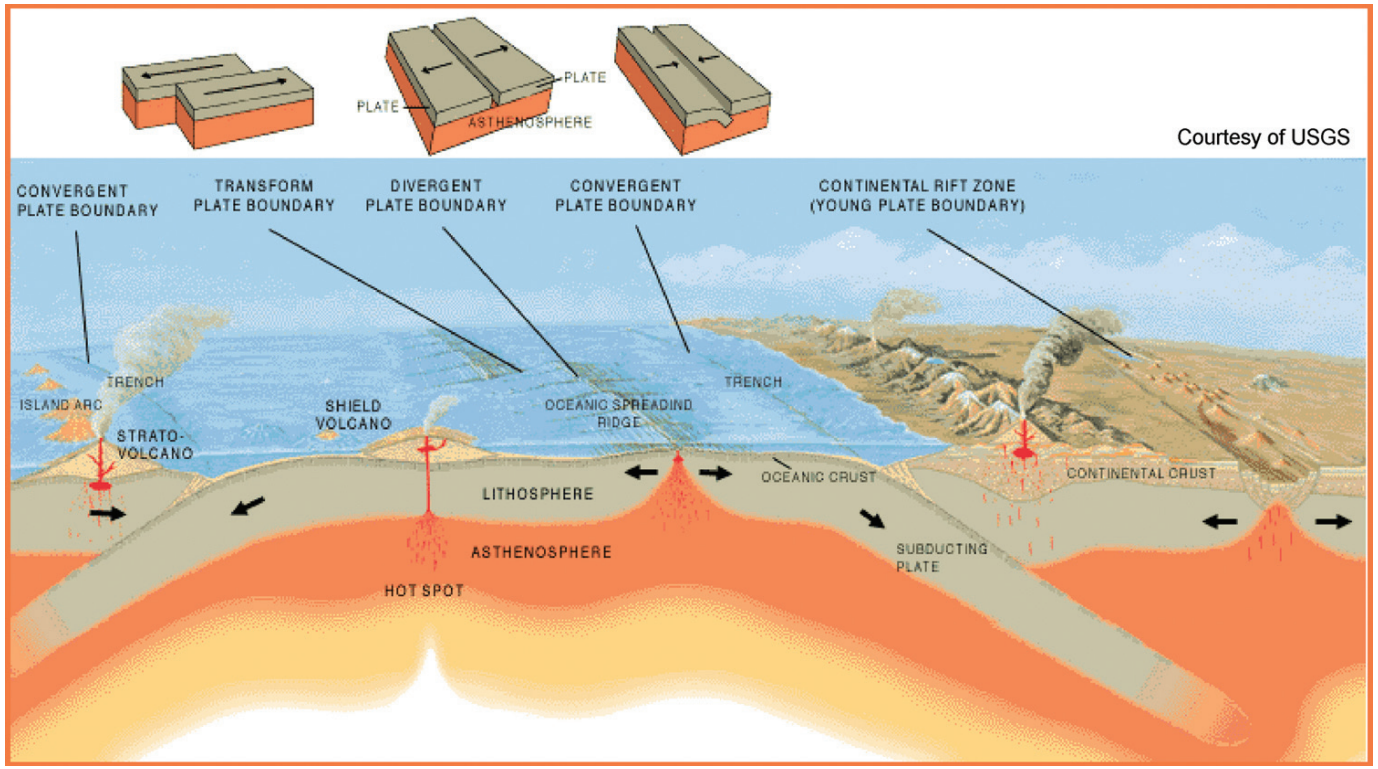


Courtesy Mel Goodwin

What's Happening

Volcanoes erupt when rocks melt below Earth's surface. Liquid rock is called magma, and tends to rise toward the surface. Magma collects beneath the surface in magma chambers, which often contain various gases as well as magma. When the magma and gases break through the Earth's crust, an eruption happens. If pressure builds up inside the magma chamber, the eruption may be very violent. Very hot magma flows easily over the Earth's surface, and produces flattened volcanoes called shield volcanoes. If the magma is cooler, it is sticky and flows more slowly, producing the familiar cone-shaped volcanoes called strato volcanoes. If the eruption is extremely explosive and violent, the top of the volcano may be blown completely away so that only the inside of the magma chamber remains. The collapsed depression is called a caldera.

See the diagram above for a summary of the different types of submarine volcanoes.



Most submarine volcanoes occur where tectonic plates are either moving apart or colliding. This image shows the many types of plate boundaries: convergent, transform, divergent, and continental rift zone. The Explorer Ridge is a divergent plate boundary at an ocean spreading ridge in the eastern Pacific, where new oceanic crust is formed. The Mariana Island Arc, on the other end of the conveyor belt in the western Pacific, was formed by the melting of the subducting Pacific Plate. *(Image courtesy of USGS Web site. Cross section by Jose F. Vigil from This Dynamic Planet.)*

Want to Do More?

1. You can see pictures from the Ocean Explorer Ring of Fire expeditions, and find out more about their discoveries at: *http://oceanexplorer.noaa.gov/explorations/03fire/welcome.html, http://oceanexplorer.noaa.gov/explorations/04fire/welcome.html,* and *http://oceanexplorer.noaa.gov/explorations/06fire/welcome.html.*

2. Some volcanoes in the United States are also part of the Ring of Fire! Find out more at *http://vulcan.wr.usgs.gov/*.

This activity is adapted from "The Volcano Factory," a lesson from the Ocean Explorer 2004 Ring of Fire Expedition (http://oceanexplorer.noaa.gov/explorations/04fire/background/edu/media/RoF.volcanism.pdf); by Mel Goodwin, The Harmony Project, Charleston, SC