Chapter 4: Earth's Fiery Volcanoes

THE BIG QUESTION: How do scientists determine where volcanoes might develop?

On the big island of Hawaii, there is a special volcano called Kilauea. Since 1983, it has been spewing out hot lava. Sometimes, the lava shoots out of the top, and other times, it oozes from the sides. When the lava flows down, it cools and becomes hard rock, adding new land to the island. This makes the island a little bit larger each time.

Volcanoes are powerful events in nature. They can make new land and islands. But they can also be dangerous. Volcanoes can knock down forests and make the air unsafe to breathe. They can also release hot, choking ash and rivers of hot rock. Volcanoes can even make earthquakes, big waves, and big landslides. They can also change the weather everywhere.

The Year without a Summer



In 1815, a big volcano in Indonesia called Tambora erupted. This was the biggest volcanic eruption ever. Lots of ash went high in the sky. The wind spread the ash all over the world. The tiny ash bits in the air stopped some of the sunlight from reaching the Earth. Less sunlight made it less warm. The weather in 1816 was much colder than usual. It frosted hard all summer in New England. In June, a foot of snow fell in eastern Canada. Many crops in Europe died because of weeks of cold rain. People said 1816 was "the year without a summer."

What is a Volcano?

A volcano is a big hill that forms over a crack in the ground. This crack goes down to a space filled with hot rock. The hot rock is called magma and it comes from deep inside the Earth. When there is a lot of pressure and heat, the magma moves up through the crack. If there is a lot of pressure, the magma comes out on the ground as lava.

Some volcanoes are calm and quiet, but others are very sudden and loud. When lava comes out, it makes a new layer of rock, and the volcano gets bigger. Many volcanoes become tall, cone-shaped mountains over time. Mount Vesuvius in Italy and Mount Fuji in Japan are examples of this kind of volcano.

Vesuvius and Fuji are both active volcanoes. When a volcano is active, it means it has erupted in the past 10,000 years and might erupt again. If an active volcano hasn't erupted in a long time, it's called a dormant volcano. Volcanoes that have not erupted for at least 10,000 years are called extinct volcanoes.

Action at the Edge

If you want to see a lot of volcanoes, you can find them where the ground has some cracks and weak spots. These cracks and weak spots happen where the Earth's outer layer has some breaks. Most of the time, you'll see volcanoes where the ground is moving in different directions. Sometimes, you can find them where the ground is crashing into itself.

The Pacific Plate is a very big piece of the Earth's surface. It's under the Pacific Ocean. This plate moves under some other plates. Scientists call the places where this happens "subduction zones." Lots of deep ocean trenches and volcanoes have formed along these zones. This happens because the edge of the moving plate melts as it goes down into the Earth's hot middle. Magma moves up through cracks in the hard outer layer and forms volcanoes above the subduction zone.

More than 450 hot, bubbling mountains lie around the edges of the Pacific Plate. Many more are hidden under the ocean's surface. Altogether, they make a circle called the Ring of Fire. It is a very fiery area around much of the Pacific Ocean.

Volcano	Location	Height	Last Eruption
	Lampung, Indonesia	2,667 feet	February 3, 2022
	100 kilometers southwest of Tokyo, Japan	12,388 feet	1707-1708
	Uruapan, Mexico	9,186 feet	1952
	Mauna Loa	13,679 feet	November 27, 2022

World's Tallest Mountain

The biggest active volcano is Mauna Loa. It is on the island of Hawaii. Mauna Loa had a very big explosion in 1984. The very top of the volcano is 13,796 feet above the sea. But its bottom is in the sea. This huge volcano measures more than 33,000 feet from top to bottom. Mount Everest is the world's highest mountain at 29,029 feet above the sea, even though Mauna Loa is taller. This is because nearly 20,000 feet of Mauna Loa are underwater.

Hotspots

Some volcanoes form in places called hotspots. A hotspot is a very hot area deep in the Earth. A big magma chamber is under the Earth's surface at a hotspot. Magma sometimes comes out of the chamber through cracks in the ground.

Geologists have found many hotspots around the world. Some hotspots are under the ground, and others are under the ocean. The ones under the ocean have made lots of islands. It all starts when hot melted rock comes out from a hotspot and makes a mountain under the water. The mountain keeps growing taller with more and more melted rock. One day, the very top of the mountain can come up above the water and make an island.



Over a very long time, hotspots in the ocean can make

chains of islands. Hotspots stay in the same place while big pieces of land under the water move slowly. The Hawaiian Islands, for example, were made by a hotspot under the middle of the Pacific Plate. The island of Kauai was made about 5 million years ago. It started as a volcano under the sea that got tall enough to come up above the water. As the Pacific Plate moved a little bit northwest, Kauai moved with it. At one point, the island was not right on top of the hotspot anymore. A new volcano under the water started to form on the seafloor. This volcano got bigger and became the island of Oahu. After that came the island of Molokai, then Maui, and lastly the island of Hawaii. Hawaii is on top of the hotspot now, which is why it has lots of active volcanoes. Eventually, Hawaii will move away from the hotspot and a new island will start to form.

A Garden of Geysers



Have you been to Yellowstone National Park? It's a really big park with a huge volcano underneath. The volcano is so big that it's called a supervolcano.Deep under Yellowstone National Park, there is very hot rock called magma. This hot rock warms up the water in the park and makes the hot springs and geysers. Geysers are like hot springs that sometimes shoot hot water into the air, like a volcano but with water. Geysers happen when water goes down into tiny holes in the ground over the hot rock. The heat from the rock makes the water very, very hot. The super hot water goes back up through the holes and some of it becomes steam. This makes the pressure go up and pushes the mix of steam and hot water to rush and bubble up. When it comes out of the ground, it shoots up as a fountain of hot water and steam. The most famous geyser at Yellowstone is called Old Faithful. It got its name because it shoots water reliably more than twelve times every day.

Magma, a very hot liquid inside the Earth, hasn't come out of the Yellowstone hotspot for hundreds of years. Some scientists think the Yellowstone supervolcano could erupt again, but most don't think it will happen soon. Sources: https://images.app.goo.gl/GMJwUieN8hR2bBLv6 https://images.app.goo.gl/w4hAJrb1ZyK3HGNw9 https://images.app.goo.gl/HHu7j1TuSsE1mJd87