

Chapter 9 Earth's Undersea World

THE BIG QUESTION How does the movement of tectonic plates shape and change the seafloor?

Imagine going deep, deep, deep into the Atlantic Ocean. The water outside the ship gets darker and darker. Soon, the light goes away completely. Outside, it's as dark as night. Finally, the ship's lights show shapes below as the bottom of the ocean comes into view. You see bumpy hills and big rocks. Welcome to the Mid-Atlantic Ridge. This ridge shows where big pieces of the Earth's outer shell meet. Some of these pieces make the bottom of the Atlantic Ocean.

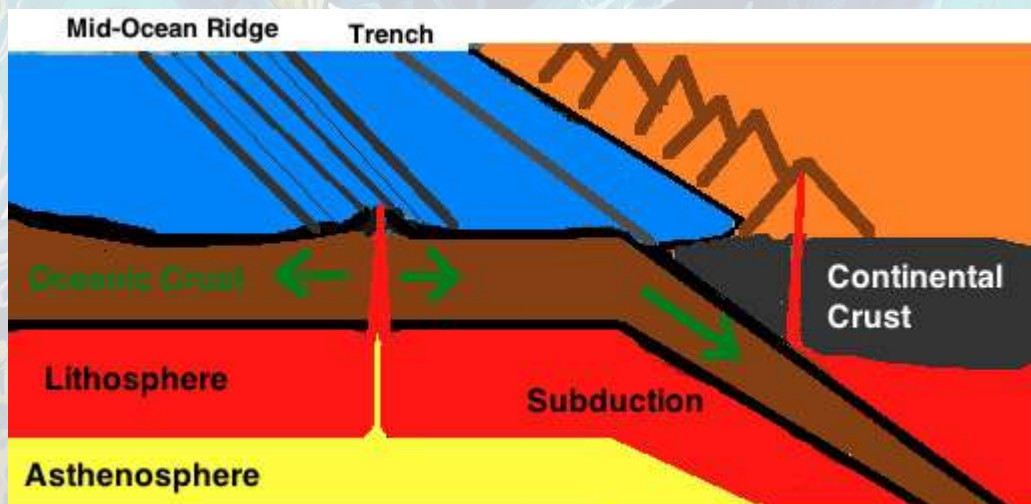
Mountains and Moving Plates

In Chapter 8, you learned about how the Earth's big plates make mountains. The plates move very slowly. Lots of mountains have been made by these moving plates over many years. The plates don't just make mountains on land, they also make mountains under the water. There are even more mountains under the water than on all of the land on Earth, like continents and islands.

The Mid-Atlantic Ridge is a long, rough underwater mountain range. It is in the middle of the Atlantic Ocean. It is very, very long and runs for a long, long way.

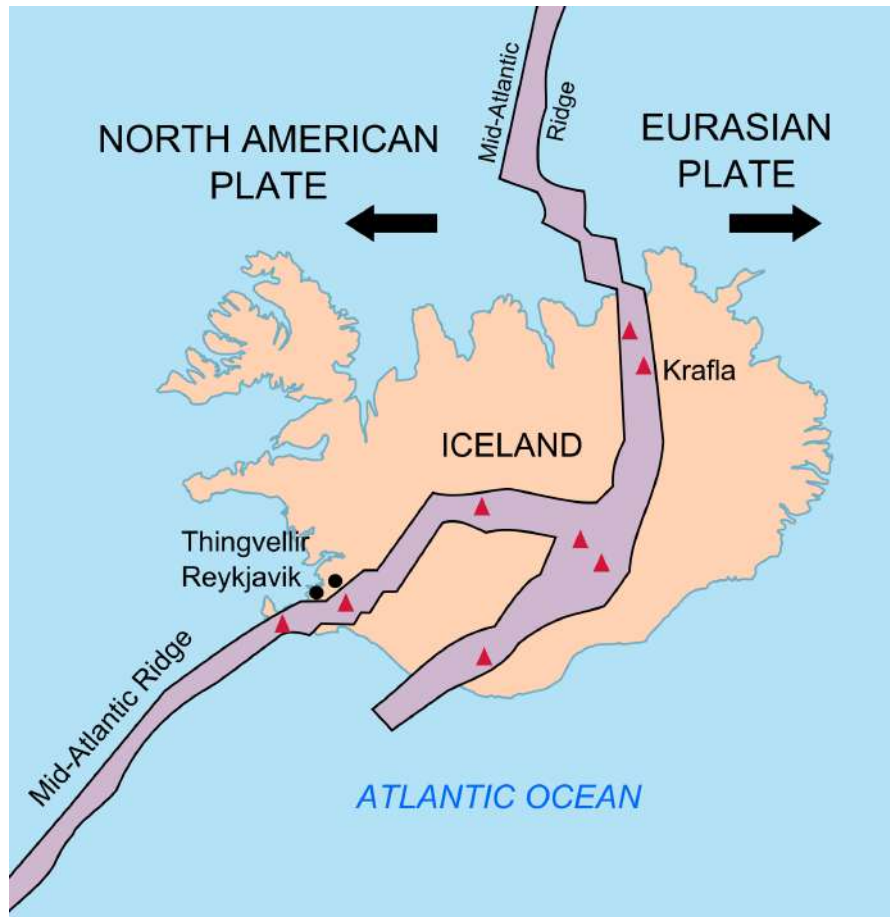
Alfred Wegener had a special idea a long time ago. He thought that the big pieces of land on Earth moved around. Back then, people didn't know how this could happen. Little by little, scientists found some hints about this mystery.

The study of the Mid-Atlantic Ridge made scientists think that the seafloor can spread out. They found out that when the seafloor spreads, the continents on both sides of the Atlantic move farther away from each other.



Scientists found out that the Mid-Atlantic Ridge is one of many ridges in the world's oceans. These ridges are like a long chain of mountains that go around the earth. They are found where big pieces of the earth's crust are moving apart. The chain of mid-ocean ridges is super long, at 40,389 miles. It is also the most active with volcanoes.

The Mid-Atlantic Ridge is just a part of this gigantic underwater mountain chain. Erupting lava has built up high walls of basalt on either side of the rift. The rift itself is nearly as deep as the Grand Canyon! If you travel along the ridge, you'll soon see more than just high walls of dark rock.



Hydrothermal Vents

At first look, it seems like a fire. Black smoke is puffing up from a place in the hill. But it's not smoke. It's very hot, dark water flowing out of holes in the rock. It's a hydrothermal vent.

Deep-sea geysers are like geysers in Yellowstone National Park, but even hotter! These geysers form when ocean water goes down through cracks in the ocean floor. As it gets close to the hot rock below, the water gets very, very hot. It can get as hot as a super amazing 750°F! The very hot water melts minerals from the rocky floor. The minerals mix with the hot liquid, just like when salt mixes into a glass of water.

At a special place in the ocean called a hydrothermal vent, very hot water with lots of minerals comes back up through the cracks in the ground. It comes out of the rocks with a lot of force, like water shooting out of a fire hose. When the hot water meets the cold ocean water, the minerals become solid again and form very tiny pieces. These pieces make the hot vent water look like dark smoke.



Hydrothermal vents are special places in the deep sea. They are home to many incredible animals. There are big tube worms with red tops. Some can be as tall as a person! There are also white crabs, big clams, and blind shrimp. These animals make the vents their home.

Scientists think there are lots of hydrothermal vents in the ocean. They have only seen a few of them. Finding a new one is always fun. Sometimes, scientists find new kinds of animals too.

Hunting for Hydrothermal Vents

Scientists look for hydrothermal vents from ships at sea. The hot and mineral-rich vent water moves slowly away from the vents, creating a cloud of mineral particles. If the scientists find this cloud, they send a robot vehicle down to locate the vent. The robot then sends pictures back to the scientists.

Seamounts and Subduction Zones

Seamounts are like underwater mountains. They come in lots of different shapes and sizes. Some are a few hundred feet high, while others are thousands of feet high. Even though they are really tall, their tops are still deep under the ocean. If a seamount grows tall enough to stick out of the ocean, it becomes an island.

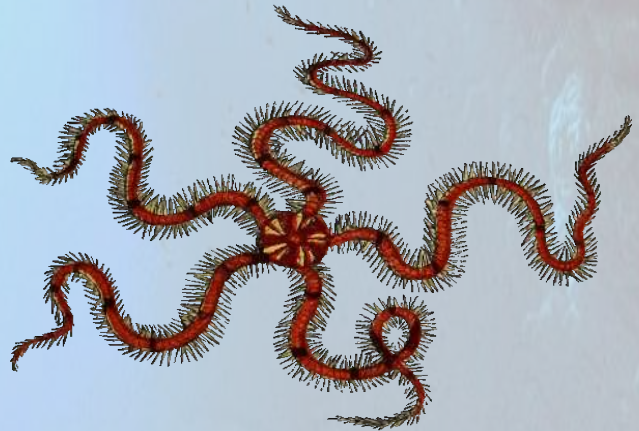
Seamounts can form wherever magma is erupting through the oceanic crust. Many seamounts form alongside mid-ocean ridges or along subduction zones.

Finally, underwater mountains can also form far away from where the ground moves. The islands in Hawaii started as underwater mountains, as you read earlier. Each island formed on top of a spot with a lot of heat under the middle of the Pacific Plate. Because of many volcanic explosions, each island started as a small underwater mountain and then got bigger over time. Eventually, the top part of the mountain reached above the water, making it an island.



Scientists think there are over 100,000 big mountains under the sea. They are called seamounts. They are hard to study because they are deep under the water. Some scientists use special machines to go down and look at them.

Seamounts are underwater mountains. They are different from each other. Many have lots of life, even those that are very deep. Water around these mountains brings up food from the ocean bottom. This food helps tiny creatures grow in the water. Then, bigger creatures eat the tiny ones. Seamounts are home to corals, sponges, stars, crabs, and anemones. Loads of fish live around seamounts too.



Into the Trenches

Under the sea, there are deep valleys called ocean trenches. These valleys form where the seafloor dips down due to one plate moving under another. Ocean trenches are the deepest parts of the ocean.

The Mariana Trench is in the Pacific Ocean. It is very deep. It is near the Mariana Islands. It is a long trench but not very wide. It is like a cut in the ocean floor. The deepest part is called the Challenger Deep. It is 36,070 feet below the ocean. That's almost 7 miles down. The average depth of the ocean is about 14,000 feet.

What's it like in the deepest part of the ocean? It's very dark and very cold. The water there is extremely heavy, like having three big SUVs pressing on every inch of your body!

Only three people have traveled to the bottom of the Mariana Trench. (More people have landed on the moon!) Several robot vehicles have also made the trip. These visits have provided only brief glimpses of this remote and extreme environment.

The Lucky Three

In 2014, people went to the deep part of the ocean called the Mariana Trench only twice. The first time was in 1960. The people who went were U.S. Navy Lieutenant Don Walsh and Swiss scientist Jacques Piccard. They used a vehicle called Trieste. Trieste took almost five hours to go from the surface of the ocean to the bottom of Challenger Deep. Walsh and Piccard looked out a small window and saw a part of the planet that people had never seen before.

In 2012, a filmmaker and explorer named James Cameron went underwater in a special vehicle called Deepsea Challenger. It only fit one person. James Cameron went down to the ocean floor, which is very deep, and he did something no one else did. He used a camera to film what he saw at 35,756 feet below the surface.



Sources:

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