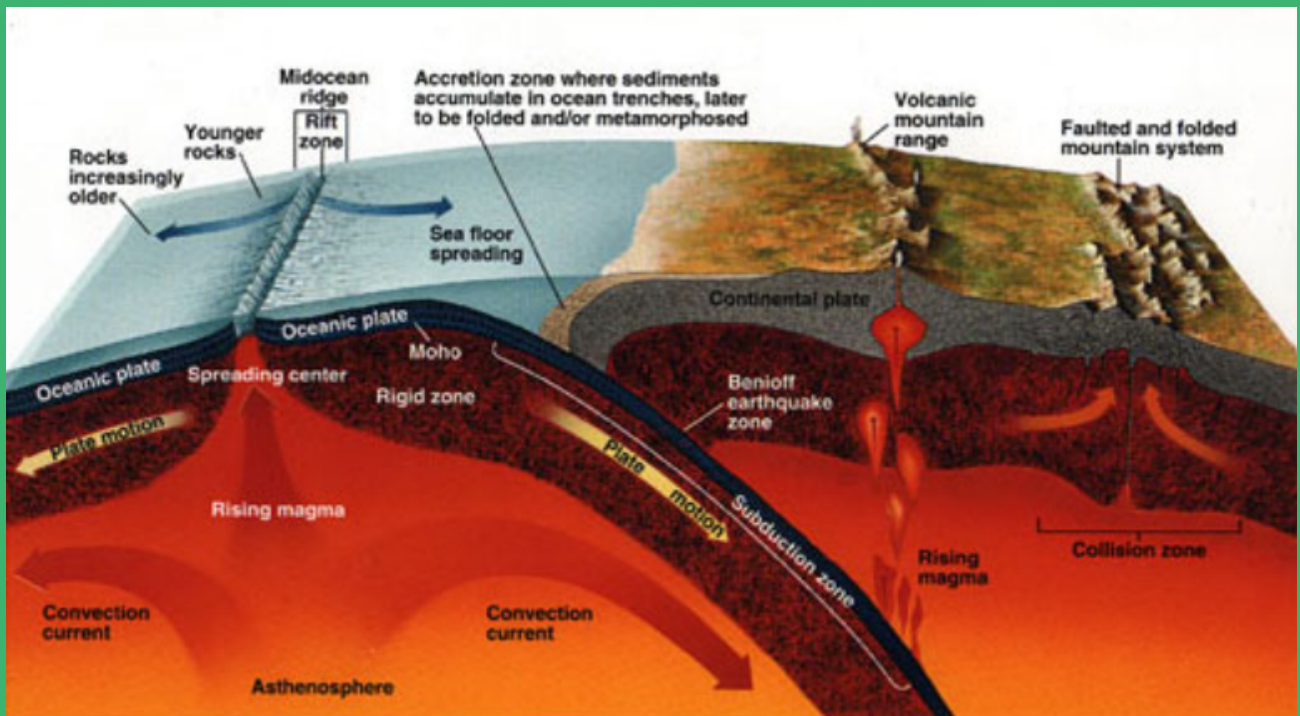


# Sea-Floor Spreading

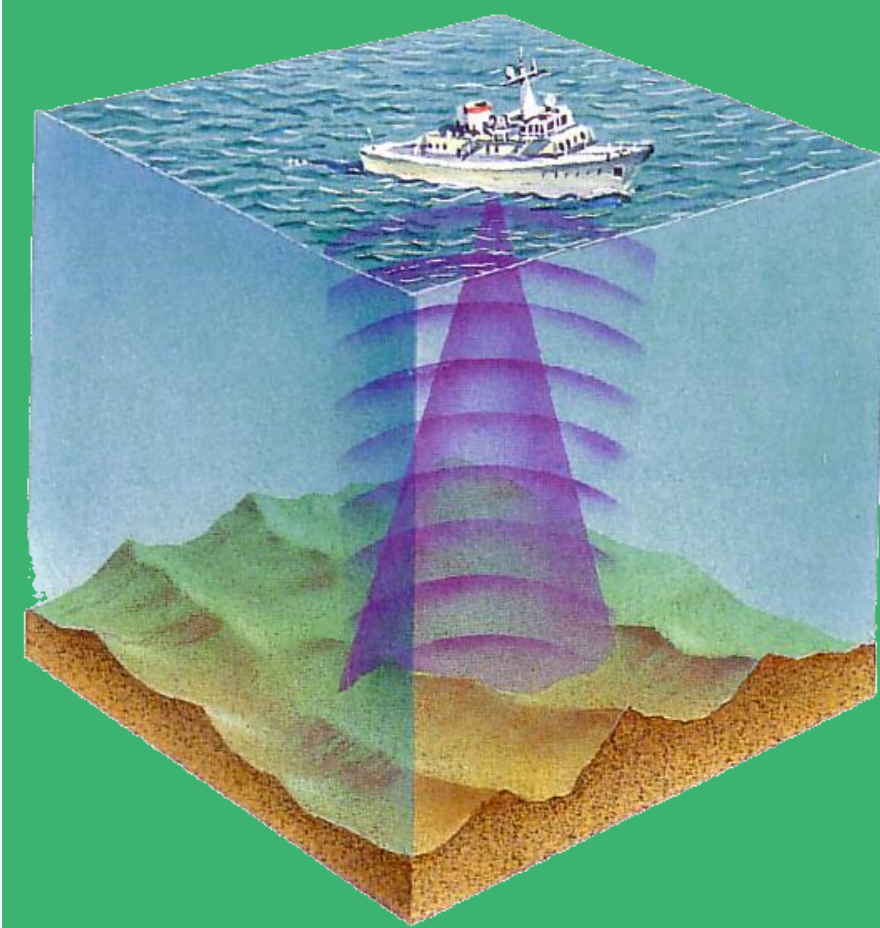


## Mapping the Mid-Ocean Ridge

**Mid-Ocean Ridge:** the longest chain of mountains in the world, located underwater.

**Sonar:** device that bounces sound waves off underwater objects and then records the echos of these sound waves.

The mid-ocean ridge curves like the seams of a **baseball** along the sea floor. It extends into all of Earth's oceans





Example of Sonar being used

Figure 18 The mid-ocean ridge is more than 50,000 kilometers long.

Earth's Ocean Floor



 Mid-Ocean Ridge  
 Deep-Ocean Trench

## Evidence for Sea-Floor Spreading

**Harry Hess**: an American geologist: suggested that the ocean floors moved like conveyor belts, carrying the continents along with them.

This movement begins at the **mid-ocean ridge**

At the mid-ocean ridge, **molten material** rises from the mantle and erupts. The molten material then spreads out, pushing older rock to both sides of the ridge.

As the molten material cools, it forms a strip of solid rock in the center of the ridge.

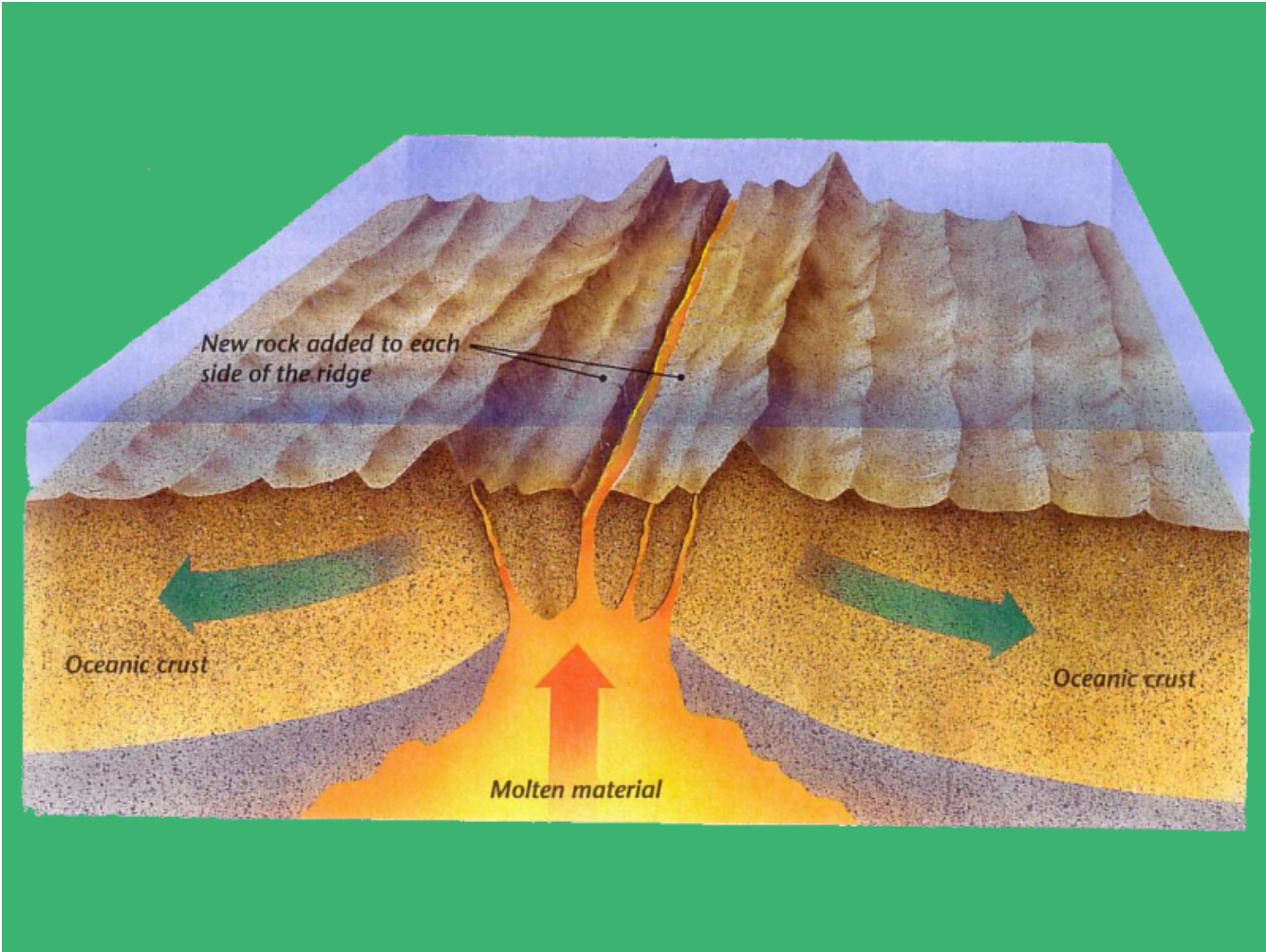
**Sea-Floor Spreading**: the process that continually adds new material to the ocean floor.

Several types of evidence from the oceans supported Hess's theory of sea-floor spreading.

1. **evidence from molten material**
2. **magnetic stripes**
3. **drilling samples**

Hess and his evidence led other scientists to look at Wegener's theory of **continental drift**.





## Evidence from Molten Material

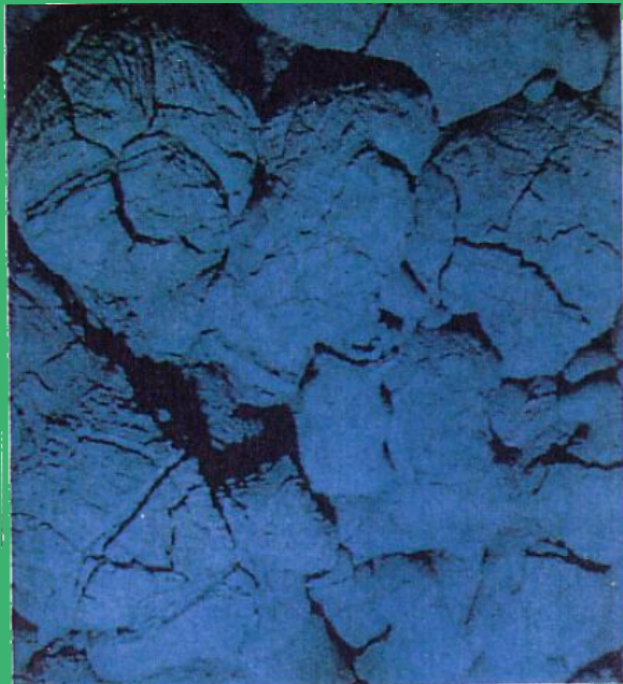
In the 1960's scientists sent a submersible to the bottom of the ocean and found strange rocks shaped like pillows or like toothpaste squeezed from a tube.

These types of rocks can only form when molten material hardens quickly after erupting under water.

The molten material erupted again and again from cracks along the central valley of the mid-ocean ridge.



Alvin  
Submersible



## Evidence from Magnetic Stripes

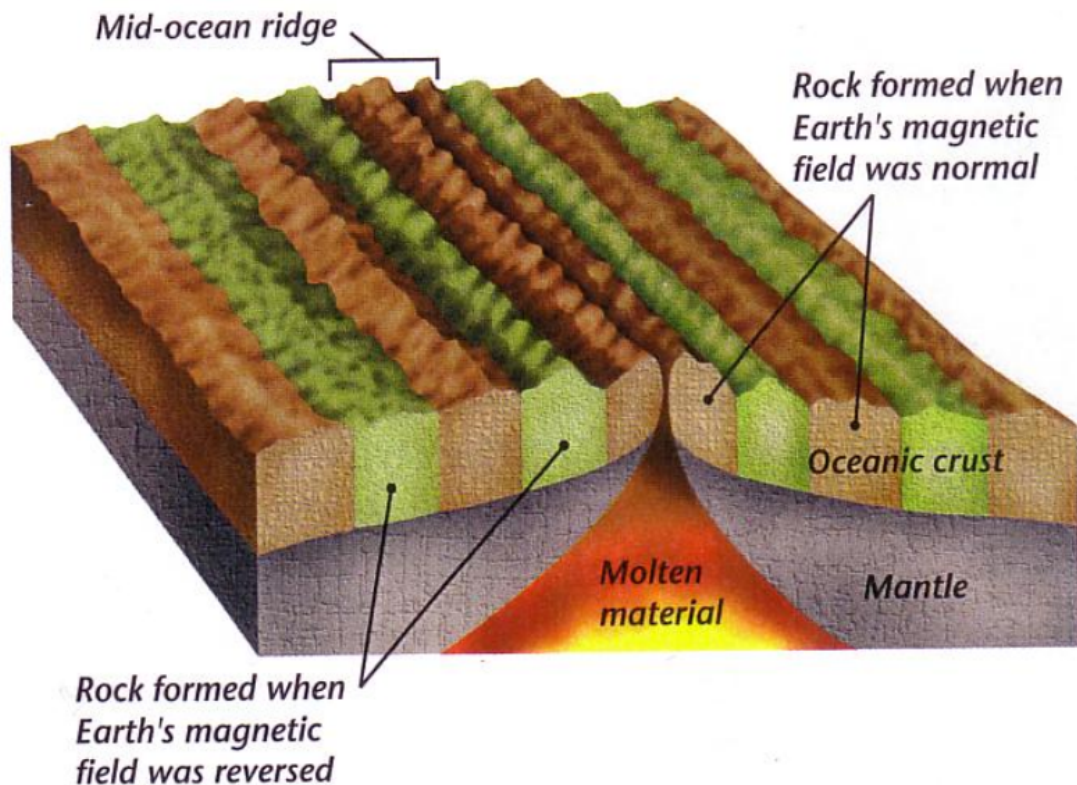
Earth is like a giant magnet with a north pole and a south pole

Evidence shows that the Earth's magnetic poles reversed themselves.

This last happened 780,000 years ago

If the magnetic poles reversed themselves today, your compasses would point to the south

Rocks that make up the ocean floor lies in patterns of magnetized stripes.



These stripes hold a record of the reversals in Earth's magnetic fields.

The rock on the ocean floor, which contains iron, began as molten material. As the molten material cooled, the iron bits inside lined up in the direction of Earth's magnetic poles. When the rock hardened completely, it locked the iron bits in place, giving the rocks a permanent magnetic memory.



## Evidence From Drilling Samples

Holes were drilled into the floor of the **ocean**

Scientists determined the age of the samples retrieved from the **samples**

The farther away from the ridge the samples were taken, **the older the rocks were.**

They found that the **youngest rocks** were always found in the center of the ridges.

## Subduction at Deep-Ocean Trenches

The ocean floor does not just keep spreading.

The ocean plunges into deep underwater canyons called deep-ocean trenches.

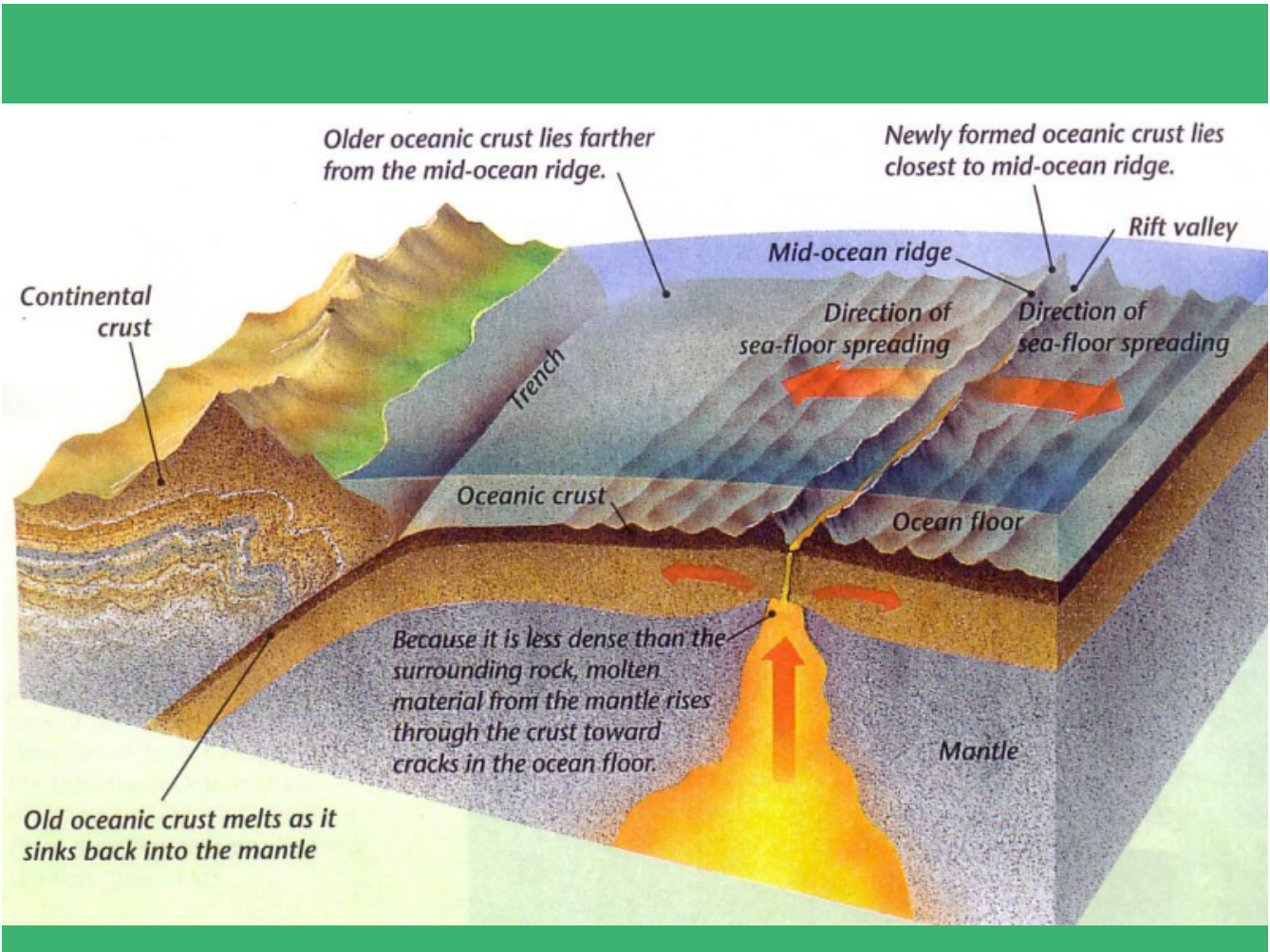
**Deep-Ocean Trenches:** forms where oceanic crust bends downward.

**Subduction:** process by which the ocean floor sinks beneath a deep-ocean trench and back into the mantle.

Convection Currents under the lithosphere push new crust that forms at the mid-ocean ridge away from the ridge and toward a **deep-ocean trench**.

As new oceanic crust moves away from the mid-ocean ridge it becomes more dense. Gravity pull the older denser oceanic crust **down beneath the crust**.

At deep-ocean trenches, subduction allows part of the ocean floor to sink back into the mantle, over **tens of millions of years**.





## Subduction at Earth's Oceans

Because of sea-floor spreading the ocean floor is renewed about every 200 million years.

that is the time it takes for new rock to form at the mid-ocean ridge, move across the ocean, and sink into a trench

Edit

Q.1

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Press edit to start creating your quiz

A

C

B

D

