

Sea Floor Spreading

Lesson 2



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What are mid-ocean ridges?



What is sea floor-spreading?



What happens at deep-ocean trenches?



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What are mid-ocean ridge

Marie Tharp and Bruce Heezen

Geologists

1952

Their job was to map the ocean floor using data from ships
data/map showed the height of the ocean floor varied
maps published in 1957 helped confirm theory of
continental drift

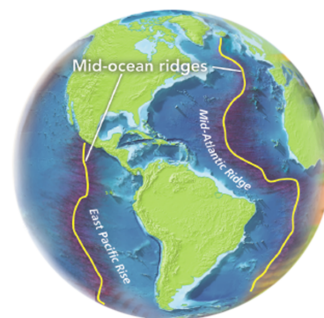
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Scientists found mountain ranges that ran along the middle of the ocean floor

like seams on a baseball

called ranges- mid-ocean ridges

mid-ocean ridges rise up from the ocean floor



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In the mid 1900's, scientists mapped ocean floor using sonar

device that uses sound waves to measure distance

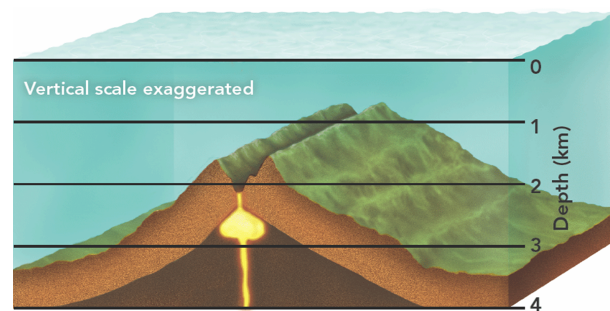
scientists found mid-ocean ridges extend to all oceans

lie thousands of meters down

also discovered steep-sided valleys

split the tops of the mid-ocean ridges

longest mountain chains on Earth



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What is Sea Floor Spreading

By the 1960's, geologists had learned more about mid ocean ridges

continually add new material to the ocean floor

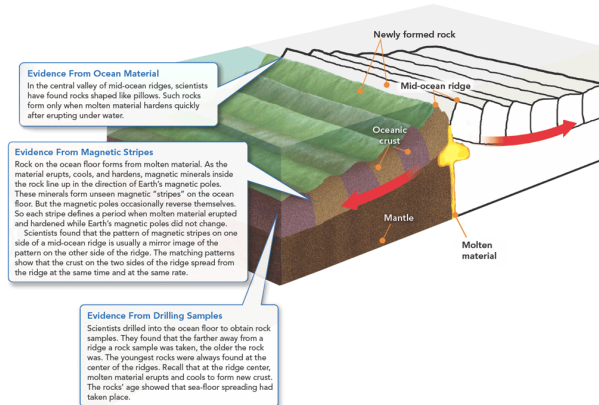
the process is called sea floor spreading begins at mid ocean ridges

new molten material rises up, erupts, cools and hardens to form new rock

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Sea floor spreading adds more crust to the ocean floor

Older strips move outward from either side of the ridge



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Evidence of Sea Floor Spreading

Ocean Floor Material

- pillow lava (rocks shaped like pillows)
- form when molten material hardens quickly after erupting



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Magnetic strips

rock forms from molten material

magnetic materials inside the rock line up in

the direction of the magnetic poles

unseen magnetic strips are on the ocean floor

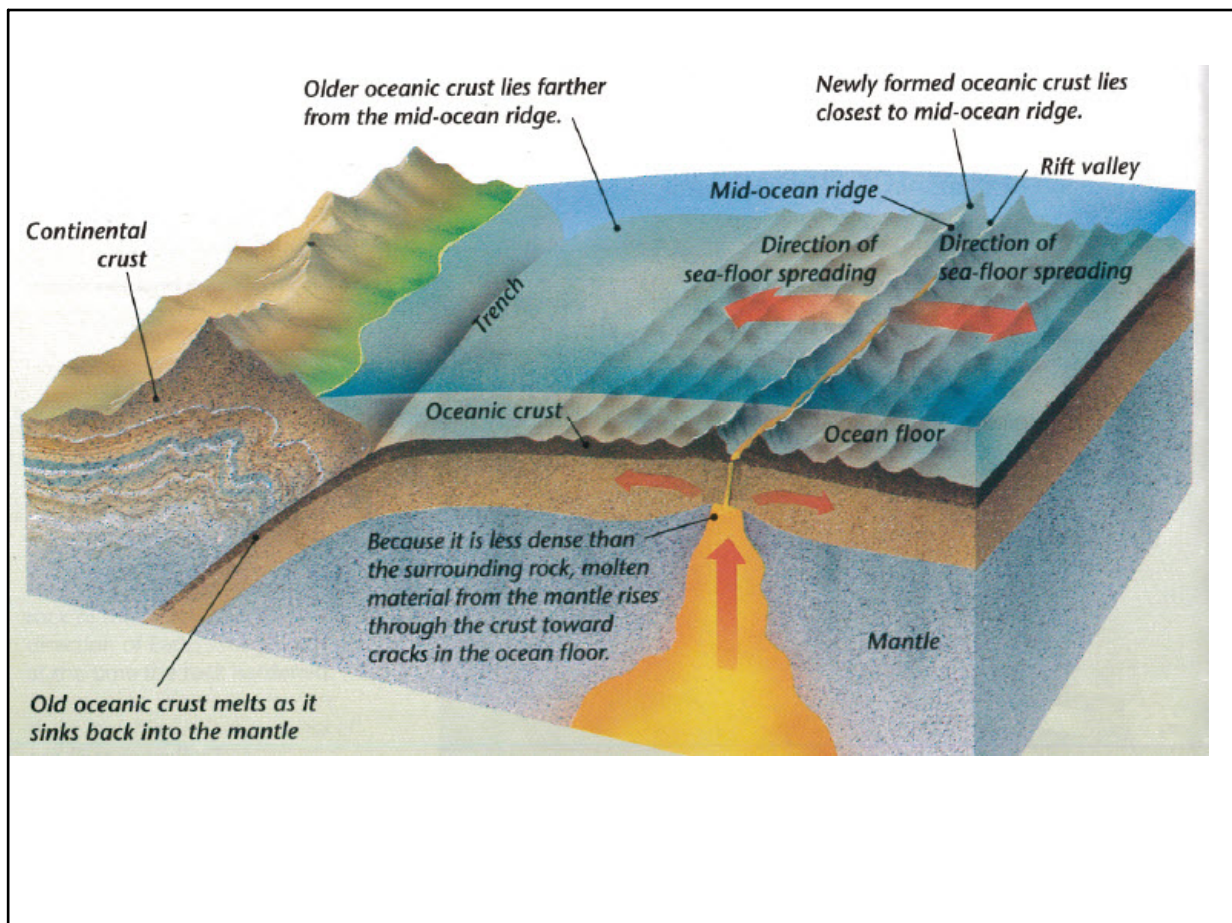
occasionally, the magnetic poles reverse

so direction the magnetic material pieces flips

strips define periods of time

Scientists found patterns are mirror images on either side of the ridge

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Drilling Samples

Scientists drilled into the ocean floor to obtain rock samples

rocks farther from the ridge = older

closer to ridge = younger

difference in age show sea floor spreading

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What happens at deep ocean trenches

The ocean floor plunges into deep underwater canyons

Deep-ocean trenches

oceanic crust bends downward

process takes 10 million of years

part of the ocean sinks back into the mantle

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Process of Subduction

changes in density affect the oceanic floor

new crust is hot, as it moves away it cools

becoming more dense

as it moves, older denser crust can collide with the
edge of a continent

gravity pulls older denser crust down beneath the
trench and back into the mantle

subduction is the process by which the ocean floor
sinks beneath a deep- ocean trench and back into
the mantle

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crust closer to the mid-ocean ridge moves
away from the ridges toward the trench

sea floor spreading and subduction work
together- like a conveyor belt

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Subduction and the Earth's Oceans

Process of subduction and sea floor spreading can change the size and shape of the oceans

Ocean floor is renewed about 200 million years
the time it takes for rock to go from the ridge
to the trench

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Size of the oceans are determined by how fast new crust is being created at the mid ocean ridge and how fast the crust is being swallowed at the trenches

many trenches = shrinking

few trenches = growing

ex. Atlantic Ocean is getting bigger

Has only a few short trenches so sea floor has no where to go.

Crust is attached to continents and pushes them along

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Location A
Crust is (newly formed/older).
Crust is (colder/hotter).
Crust is (less/more) dense.

Location B
Crust is (newly formed/older).
Crust is (colder/hotter).
Crust is (less/more) dense.

Subduction
Oceanic crust created along a mid-ocean ridge is destroyed at a deep-ocean trench. During the process of subduction, oceanic crust sinks down beneath the trench into the mantle.

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Lesson 2 - Sea-Floor Spreading

Mid-ocean ridges form long chains of volcanoes that erupt from the ocean floor

Sea floor spreading adds more oceanic crust to the ocean floor. At the same time, pieces of rock move away from either side of the ridge

In a process taking millions of years, part of the oceanic crust sinks back into the mantle at deep-ocean trenches

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Attachments



sea floor spreading



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