
LAB 15

Sea Floor Spreading

Purpose

The purpose of this lab is to have you utilize the age and positions of rock formations associated with the Mid Atlantic Ridge to support the hypothesis of sea floor spreading. The sea floor spreading hypothesis presents the idea that new crust is continually being formed at the center of mid-ocean ridges, which is causing the sea floor to spread apart from the ridge centers. This is believed to be the mechanism that causes the Earth's tectonic plates to move.

Materials

metric ruler

colored pencils

Procedure

Complete the following steps.

1. Using the map in Figure 15–1, color in the various rock formations associated with both the Mid Atlantic and East Pacific ridge systems. Create a color key that shows the color associated with each specific rock age.
2. After you have created a map showing the relationship between the age of rock and location to the ridge system center, calculate an average spreading rate associated with each ridge. To calculate the average spreading rate for the Mid Atlantic Ridge, use the following procedure. Show all work.
 - a. Measure the distance in centimeters from the Mid Atlantic Ridge to the interface between rock sequences 4 and 5 in three different places on your map. Record your answers below.

Measurement 1 =

Measurement 2 =

Measurement 3 =

- b. Determine the average distance of the three measurements to the nearest tenth of a centimeter. Show your work and record your average distance to the nearest tenth of a centimeter.

Average distance (cm) =

- c. Convert your average measurement in centimeters to kilometers by using the map scale of 1 centimeter = 500 kilometers. This is done by multiplying the average distance in centimeters by 500 kilometers. Record your answer to the nearest tenth of a kilometer.

Average distance (km) =

- d. Knowing that the age of the interface between rock sequences 4 and 5 are approximately 118 million years old, calculate how far the rocks have moved in kilometers per year. This is done by dividing your average distance in kilometers by 118 million years. Record your answer.

Distance rock moved (km per year) =

- e. Now, determine the distance the rock moved from the ridge center in centimeters by multiplying the distance the rock moved in kilometers per year by 100,000 (100,000 centimeters per kilometer). Record your answer.

Distance rock moved (cm per year) =

- f. Determine the rate of sea floor spreading associated with the Mid Atlantic Ridge by multiplying the distance the rock moved in centimeters per year by 2. This determines the rate of sea floor spreading because new rock is created on both sides of the ridge and is pushed outward. Record your answer.

Rate of sea floor spreading for the Mid Atlantic Ridge (cm per year) =

- g. Finally, convert the above spreading rate into inches per year by dividing it by 2.5 (2.5 cm = 1 inch). Record your answer.

Rate of sea floor spreading for the Mid Atlantic Ridge (inches per year) =

3. To calculate the average spreading rate for the East Pacific Ridge, use the following procedure. Show all work.
- a. Measure the distance in centimeters from the East Pacific Ridge to the interface between rock sequences 3 and 4 in three different places on your map. Record your answers.

Measurement 1 =

Measurement 2 =

Measurement 3 =

- b. Determine the average distance of the three measurements to the nearest tenth of a centimeter. Show your work and record your average distance to the nearest tenth of a centimeter.

Average distance (cm) =

- c. Convert your average measurement in centimeters to kilometers by using the map scale of 1 centimeter = 500 kilometers. This is done by multiplying the average distance in centimeters by 500 kilometers. Record your answer to the nearest tenth of a kilometer.

Average distance (km) =

- d. Knowing that the age of the interface between rock sequences 3 and 4 are approximately 56 million years old, calculate how far the rocks have moved in kilometers per year. This is done by dividing your average distance in kilometers by 56 million years. Record your answer.

Distance rock moved (km per year) =

- e. Now, determine the distance the rock moved from the ridge center in centimeters by multiplying the distance the rock moved in kilometers per year by 100,000 (100,000 centimeters per kilometer). Record your answer.

Distance rock moved (cm per year) =

- f. Determine the rate of sea floor spreading associated with the East Pacific Ridge by multiplying the distance the rock moved in centimeters per year by 2. This determines the rate of sea floor spreading because new rock is created on both sides of the ridge and is pushed outward. Record your answer.

Rate of sea floor spreading for the East Pacific Ridge (cm per year) =

- g. Finally, convert the above spreading rate into inches per year by dividing it by 2.5 (2.5 cm = 1 inch). Record your answer.

Rate of sea floor spreading for the East Pacific Ridge (inches per year) =

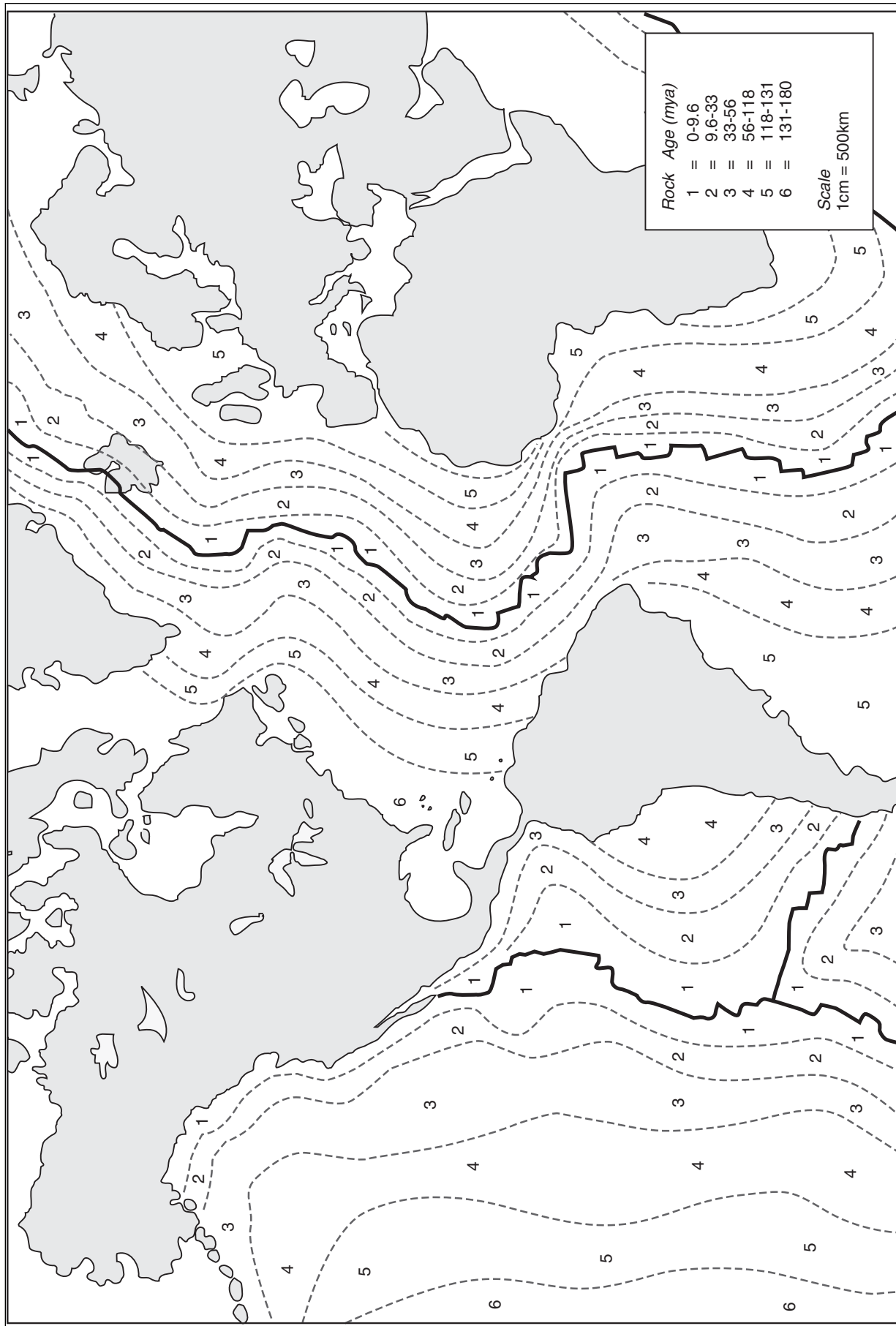


FIGURE 15-1 Sea Floor Spreading

Conclusions

1. Describe how the mapping of rock ages on the ocean floor helps to support the theory of continental drift and sea floor spreading.
2. Briefly explain how the rate of sea floor spreading can be determined in both the Atlantic and Pacific Oceans.
3. Are the average rates of sea floor spreading the same in both the Atlantic and Pacific Oceans, and if not, how do they compare?
4. Explain how the discovery of sea floor spreading has helped the theory of continental drift.