

Ocean Floor Mapping Investigation

Use sonar depth data to reveal hidden seafloor features, infer plate motion, and build your own boundary models.

NGSS: MS-ESS2-3 - analyze seafloor structures as evidence of past plate motion; HS-ESS2-1 - develop a model showing how plate processes form ocean-floor features.

Name: _____ **Class / Period:** _____ **Date:** _____

Driving Question

How can a measured depth profile reveal ocean-floor features and provide evidence about plate motion?

Before You Begin

1. Predict what a depth profile from Papua New Guinea to Peru might look like. Name at least two features you expect to detect.

2. Why is it scientifically useful that the seafloor stays hidden until the vessel collects sonar measurements?

Scan and Build the Profile

Open Ocean Floor Mapper. Complete the scan before labeling. Use the graph and cursor/readouts to estimate the location and depth of each feature.

Feature	Approx. distance (km)	Approx. depth (km)	Evidence from profile
Continental shelf			
Continental slope			
Abyssal plain			
Seamount			
Mid-ocean ridge			
Deep-ocean trench			

Tip: Record approximate values. The goal is to use the shape of the measured profile as evidence, not to memorize exact numbers.

Use the Profile to Predict Plate Motion

Boundary	Plate 1 motion	Plate 2 motion	Boundary type	Profile evidence
Pacific-Nazca ridge				
Peru-Chile trench				

3. Which feature provides evidence that new ocean crust may form? Explain using the profile and plate-motion pattern.

4. Which feature suggests that one plate is moving beneath another? Explain using the profile and plate-motion pattern.

Develop Your Own Boundary Models

Use your measured profile as evidence. In each cross-section, draw the plates and seafloor, add arrows showing relative plate motion, label the ridge or trench, and identify where oceanic crust is created or recycled.

Boundary	Your annotated cross-section model
Pacific-Nazca ridge	
Peru-Chile trench	

5. How do your two models explain why a ridge and a trench have different shapes?

Evaluate the Model

6. The model uses one simplified Pacific transect. Identify one real-world complexity it leaves out and explain how that could change a real depth profile.

Claim - Evidence - Reasoning

Claim: What do your measured profile and boundary models show about how plate motion forms ridges and trenches?

Claim: State your answer in one clear sentence.

Evidence: Use at least three specific observations, measurements, or data values from the investigation.

Reasoning: Explain why your evidence supports the claim using the science ideas from the investigation.
