Classroom Notes: The Heezen–Tharp *World Ocean Floor* Map Interactive for Education

View the Interactive: The Heezen–Tharp *World Ocean Floor Map* for Education

The outline below is meant to guide and facilitate classroom discussion while viewing the online interactive. The education version of the interactive is intended for students in grades 6-8.

Slide 1: Introduction

Ask: "This map shows something nobody could see for most of human history. Do you have any guesses what it is?"

(Pause for guesses)

"It's the bottom of the ocean. For a long time, people thought the ocean floor was mostly flat, kind of like the bottom of a bathtub. Then a scientist named Marie Tharp proved everyone wrong."

Ask: "What do you think might be down there, under all that water?"

(Pause for guesses)

"Believe it or not, beneath the surface of the oceans there are mountains bigger than Mount Everest, and canyons even deeper than the Grand Canyon."

Slide 2: Marie Tharp

“This is a photo of Marie Tharp at work on a map around 1961. She had training in geology, mathematics and drafting, but back then women weren't allowed on research ships. So, her colleague Bruce Heezen (HAY-zen) went out to sea and collected measurements, while Marie stayed on land and figured out what they meant."

Ask: "If you had a lot of scattered dots of information, and had to turn it into a picture — how would you start?"

(Pause for guesses — "connect the dots," "draw lines between them," etc.)

"The ships could only measure ocean depths along certain paths, so there were big gaps. Marie used her scientific training to fill in the blanks — almost like solving a puzzle where many of the pieces are missing."

"She didn't just write numbers, either — she drew the seafloor like a landscape, so it would be easy to understand, even for people who weren't scientists."

Slide 3: Heinrich Berann

"One more person helped make this map so cool-looking: an artist named Heinrich Berann. He painted landscapes for a living, and he used shadows, color, and perspective to make the ocean floor look just as dramatic as mountains on land."

"Fun fact — Heinrich got involved because a little girl wrote a letter to a popular magazine bragging that her dad could paint better maps than they were printing!"

Slide 4: The Mid-Atlantic Ridge

"Here's the big discovery. See this long mountain range running down the middle of the Atlantic Ocean? Marie noticed something unusual about it."

Ask: "Look right along the top of the ridge — what do you notice?"

(Pause for guesses – guide toward noticing the rift valley)

"There's a deep valley splitting it in half. At the time, most scientists thought the continents never moved. But Marie had a different idea: what if the seafloor was spreading apart right there, and new ocean floor was being made?"

"She checked it against earthquake records, and sure enough — earthquakes lined up right in that valley. That was key evidence that she was right." (Enlarge image of map with earthquakes locations plotted on it).

Ask: "Why do you think some scientists didn't believe her at first?"

(Pause for guesses— new ideas are scary, it seemed impossible, etc.)

“New ideas in science can be hard for people to accept at first — even really good ones. But that’s how science grows: by questioning things we think we know. When Heezen shared this

discovery, one scientist told him, ‘You have shaken the foundations of geology!’ In science, that’s a huge compliment.”

“Now let’s take a quick look at two important geological processes that happen on the seafloor that you can see on the map.”

Slide 5: Fracture Zones

"See this long, straight line cutting across the ocean floor? It’s called a fracture zone, and it’s where giant pieces of the Earth's top layer – called the crust – slowly slide past each other — kind of like two moving sidewalks going in opposite directions. Earthquakes happen here too."

Slide 6: Subduction

"And here — off the west coast of South America – is an ocean trench. Trenches are the deepest spots in the whole ocean. This is where one piece of Earth's crust gets pushed underneath another layer and sinks back down. This process is called subduction, and it too can cause earthquakes — and even feed volcanoes, like the ones that made the Andes mountains."

Slide 7: Plate Tectonics

"Here's where it all comes together. Earth's outer shell is broken into giant pieces called plates — kind of like a cracked eggshell – that move super slowly."

Ask: "If plates are spreading apart in one place, like we saw earlier at the Mid-Atlantic Ridge, what do you think has to happen somewhere else?"

(Pause for guesses — guide toward something has to make room, crust has to disappear somewhere else, etc.)

"That's exactly what those trenches we just saw are for — old crust gets recycled back into the Earth to make room for the new crust being born at the ridges."

“This whole idea is called plate tectonics, and it explains earthquakes, volcanoes, mountains — basically why the Earth looks the way it does. Discoveries like the rift valley on this map provided key evidence that helped convince scientists plate tectonics was real.”

Slide 8: Ocean Mapping Today

"Today we have much more sophisticated technology to map the seafloor than Marie Tharp did. But even with satellite data and robot submarines, we've only mapped about 28% of the ocean floor in detail.

Learn more: Seabed 2030

Closing Questions:

"If you got to explore part of the ocean floor that nobody's ever mapped before, what do you think you'd find?"

"If you could name one feature on the ocean floor – like a seamount or a trench – what would you call it?"

"Marie Tharp wasn't allowed on the research ships, but she still made a major scientific discovery. Have you ever found a way to do something that other people didn't think of?"