

# Ridges & Trenches--Chpt 13



D. 230 million years ago

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End of Paleozoic

# Continental Drift



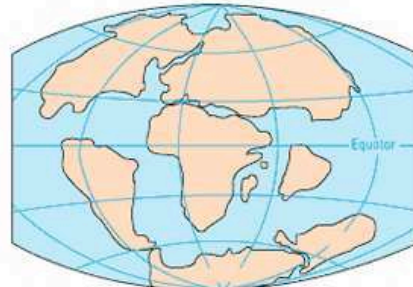
PERMIAN  
225 million years ago



TRIASSIC  
200 million years ago



JURASSIC  
135 million years ago



CRETACEOUS  
65 million years ago

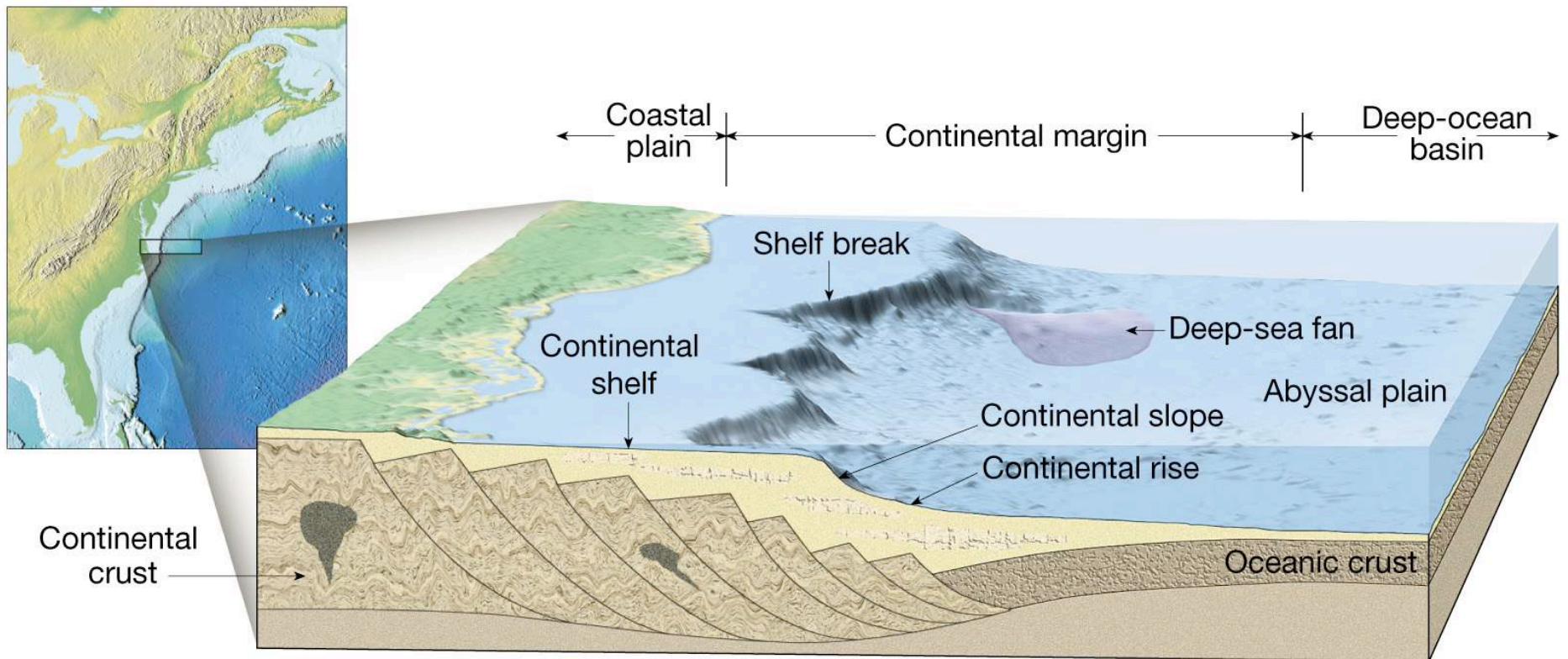


PRESENT DAY

So What's in the Oceans?

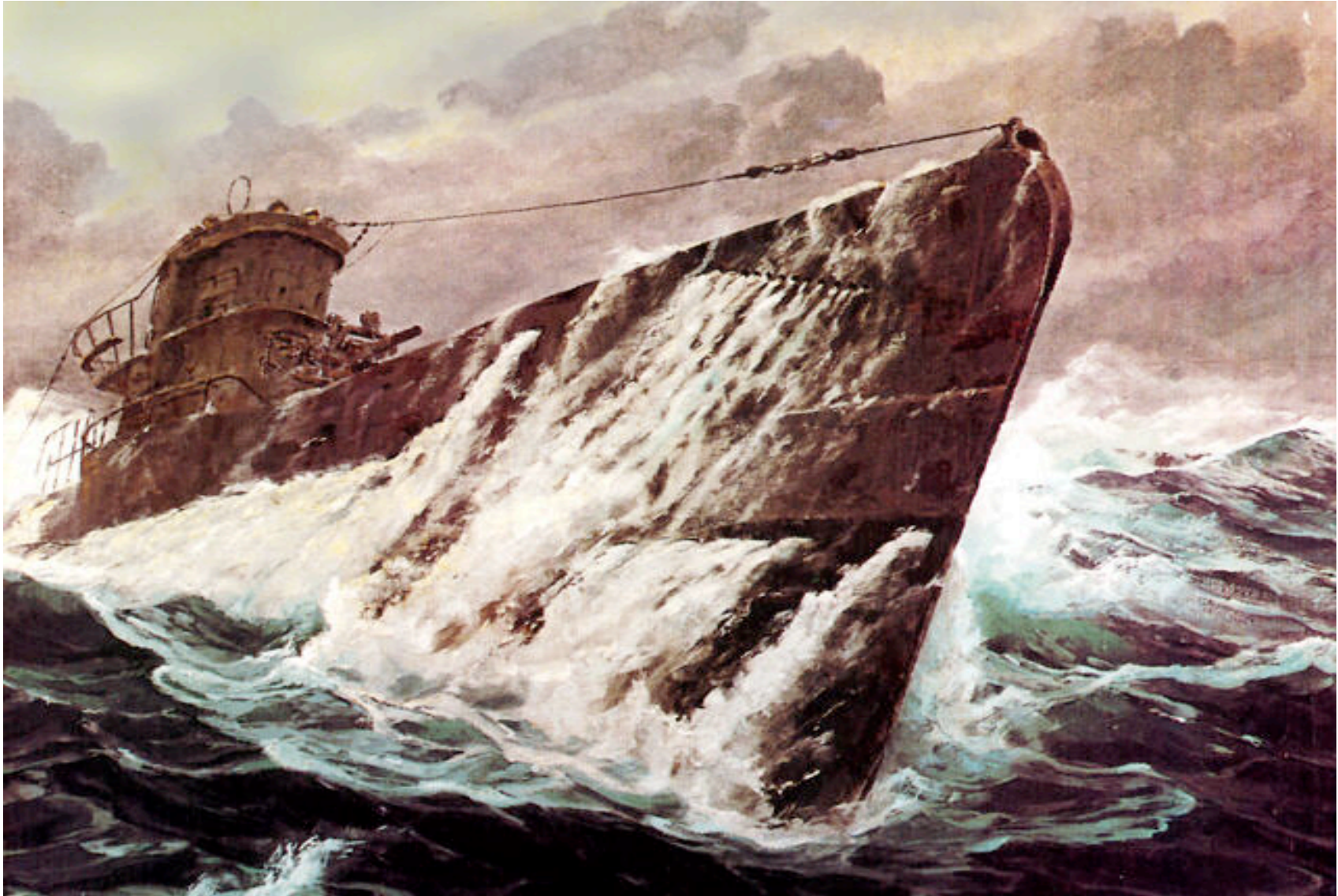


# Coastal Edge



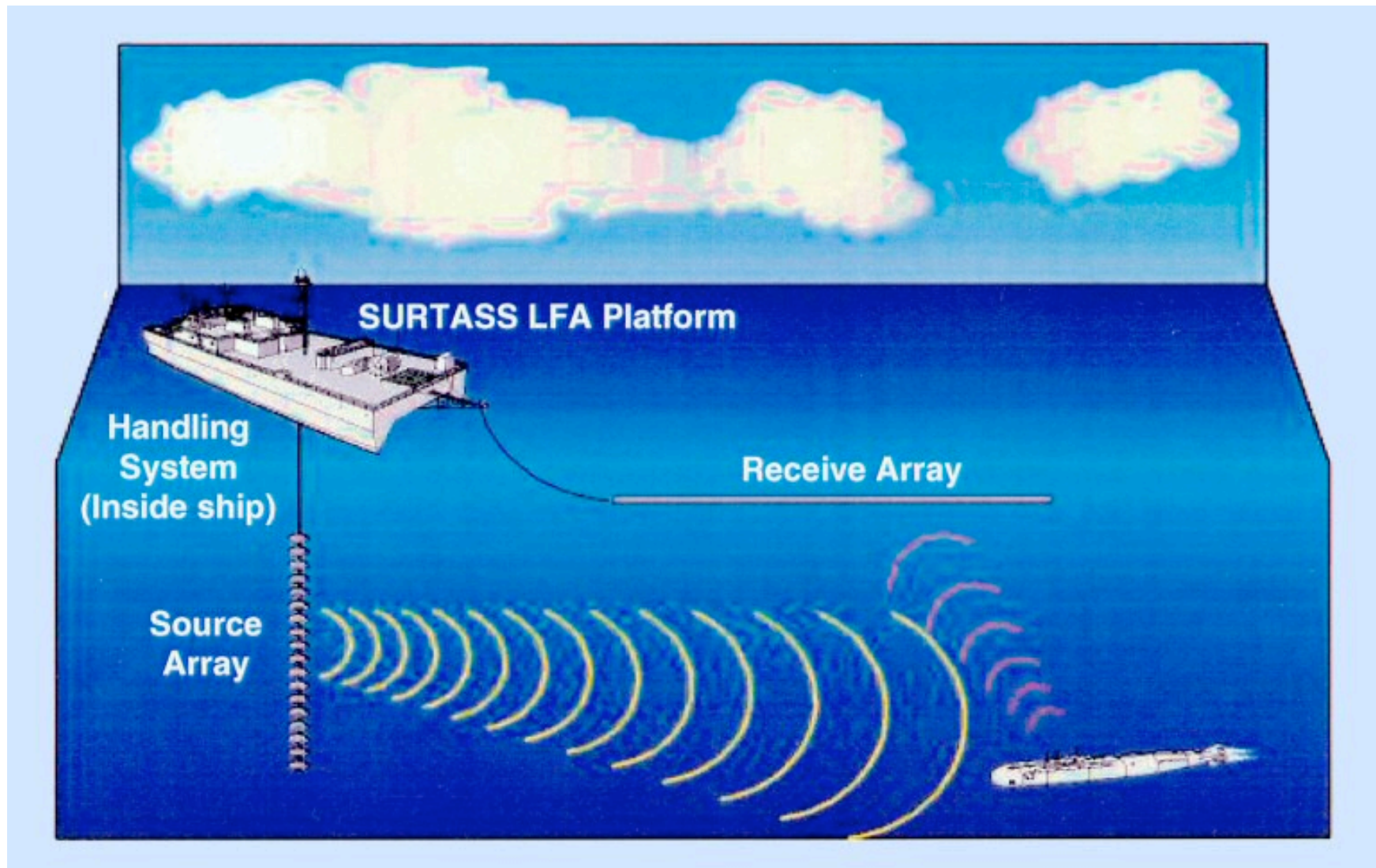
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# WWII, German U-Boats

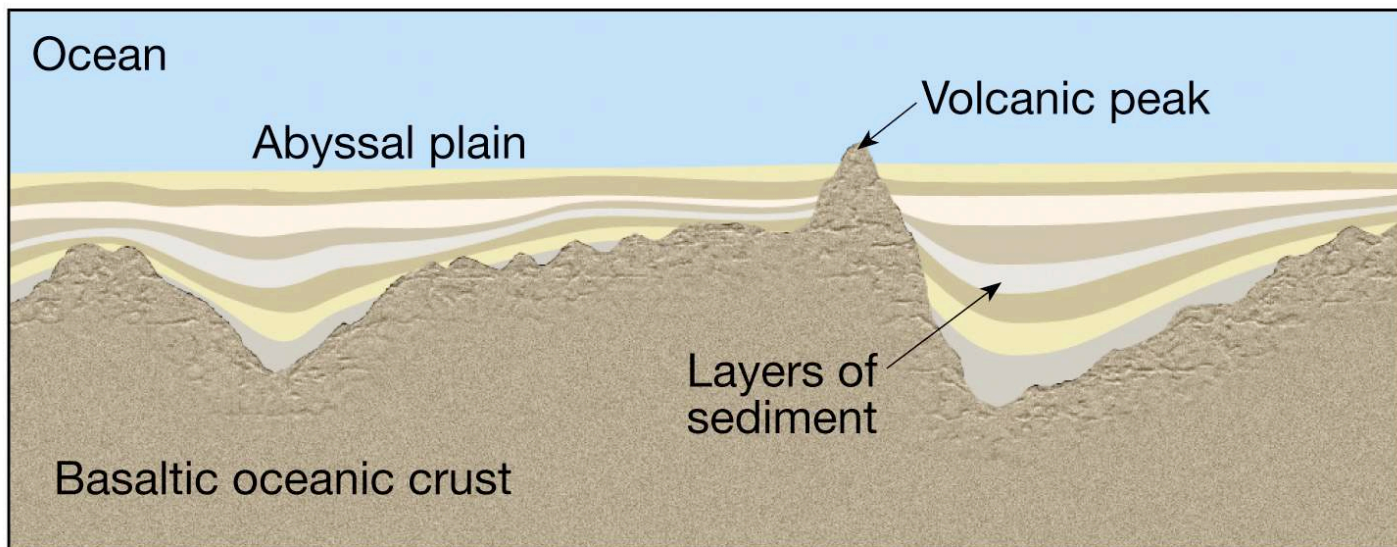
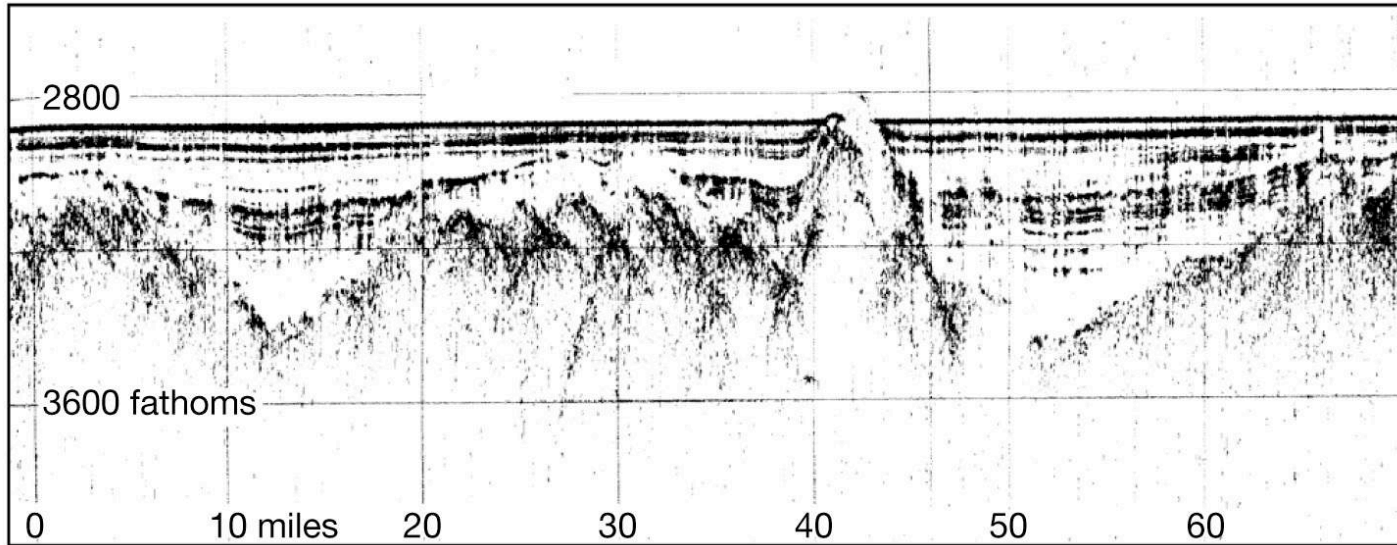




# Navy Sonar



# Atlantic Ocean Images





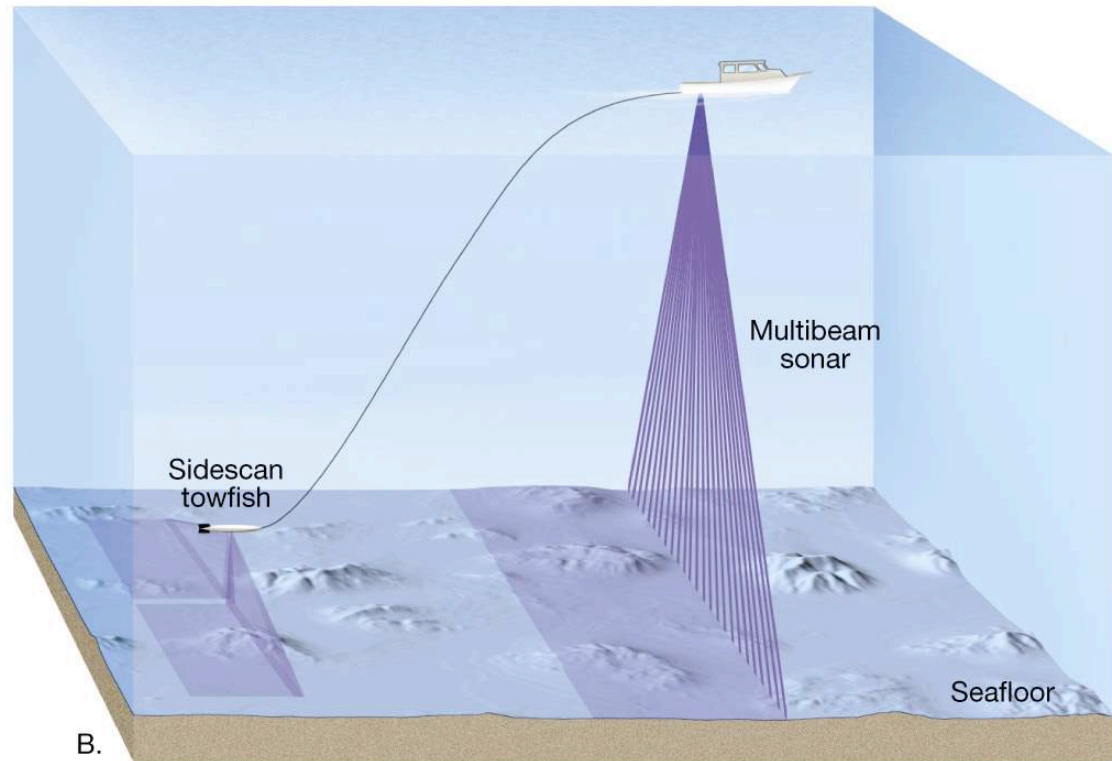
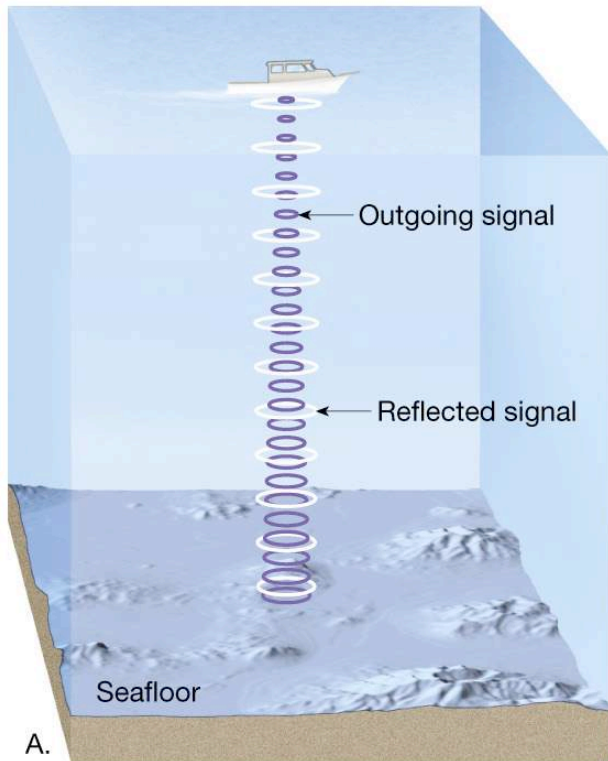
# Glomar Challenger



1970's-80's

Scientific mapping of Ocean

# Sonar

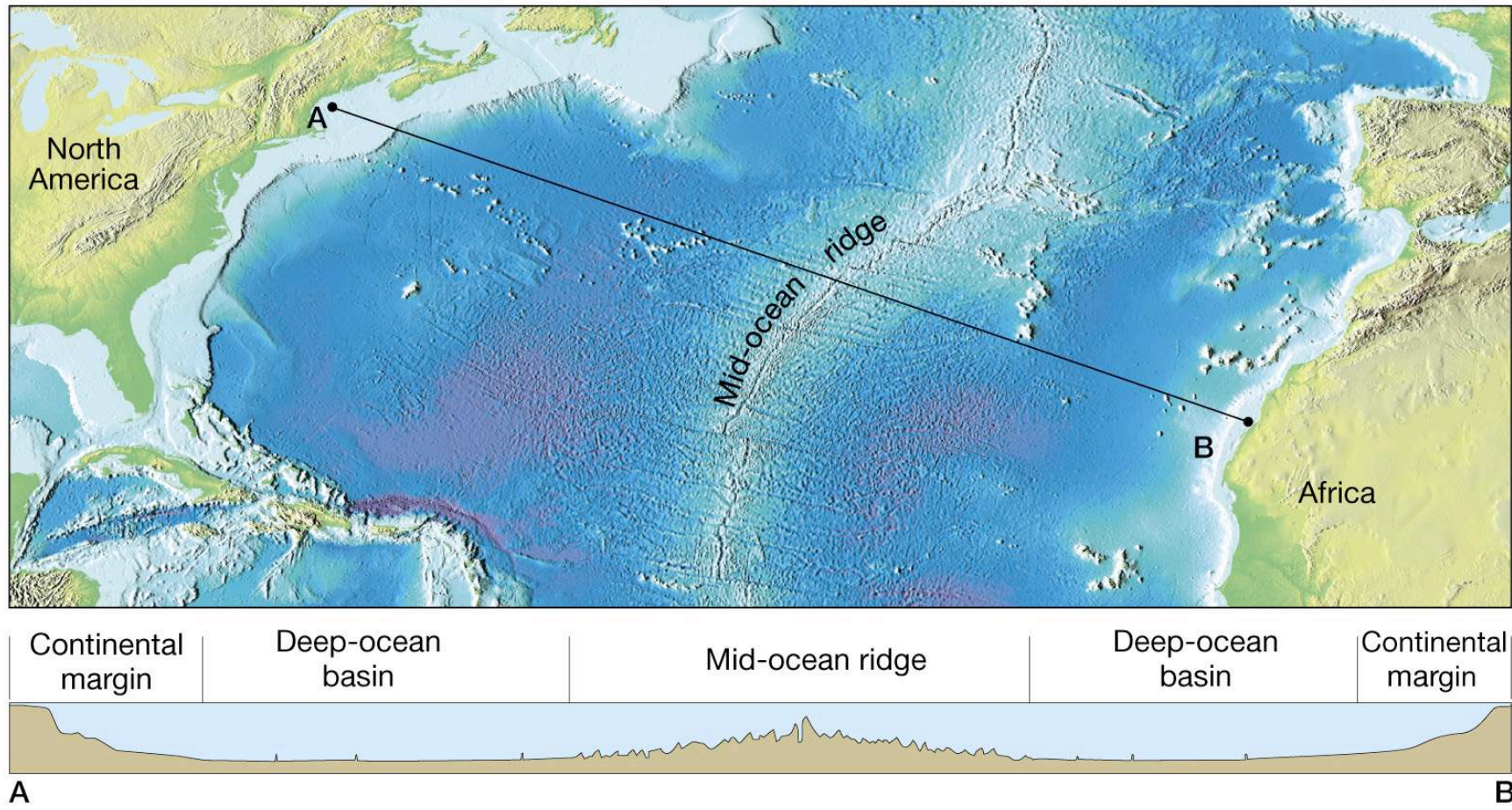


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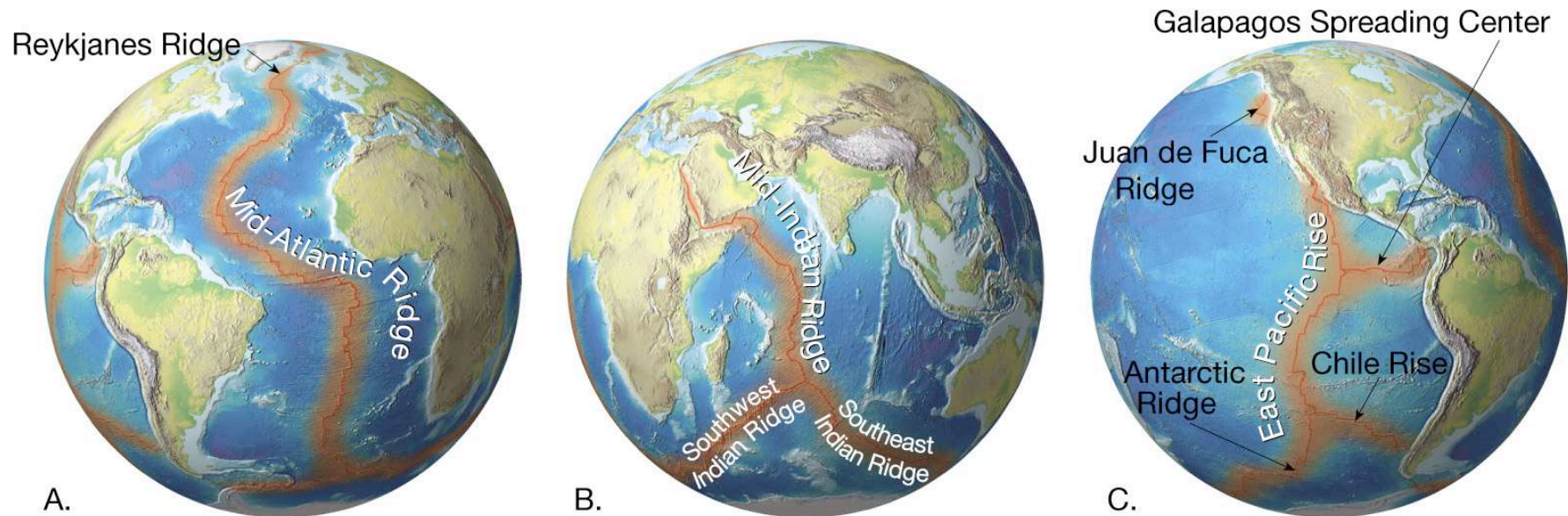
What did they find????



# Mid-Atlantic Ridge



# Ocean Ridges

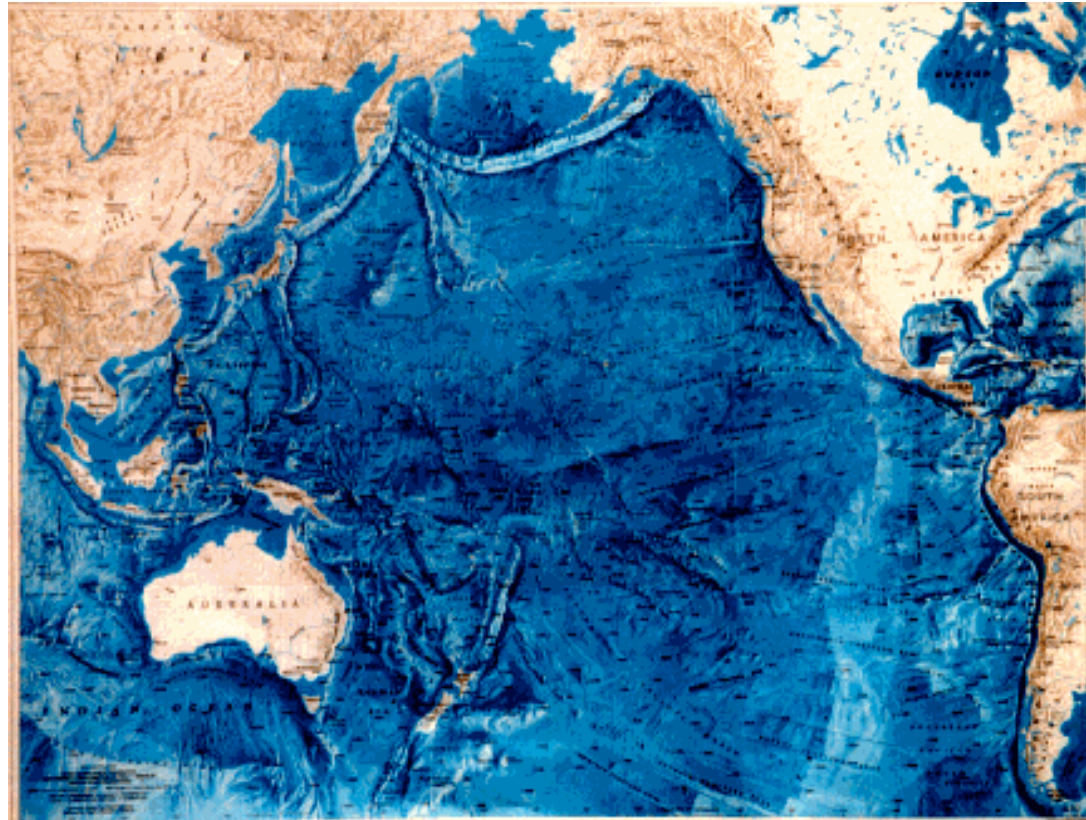


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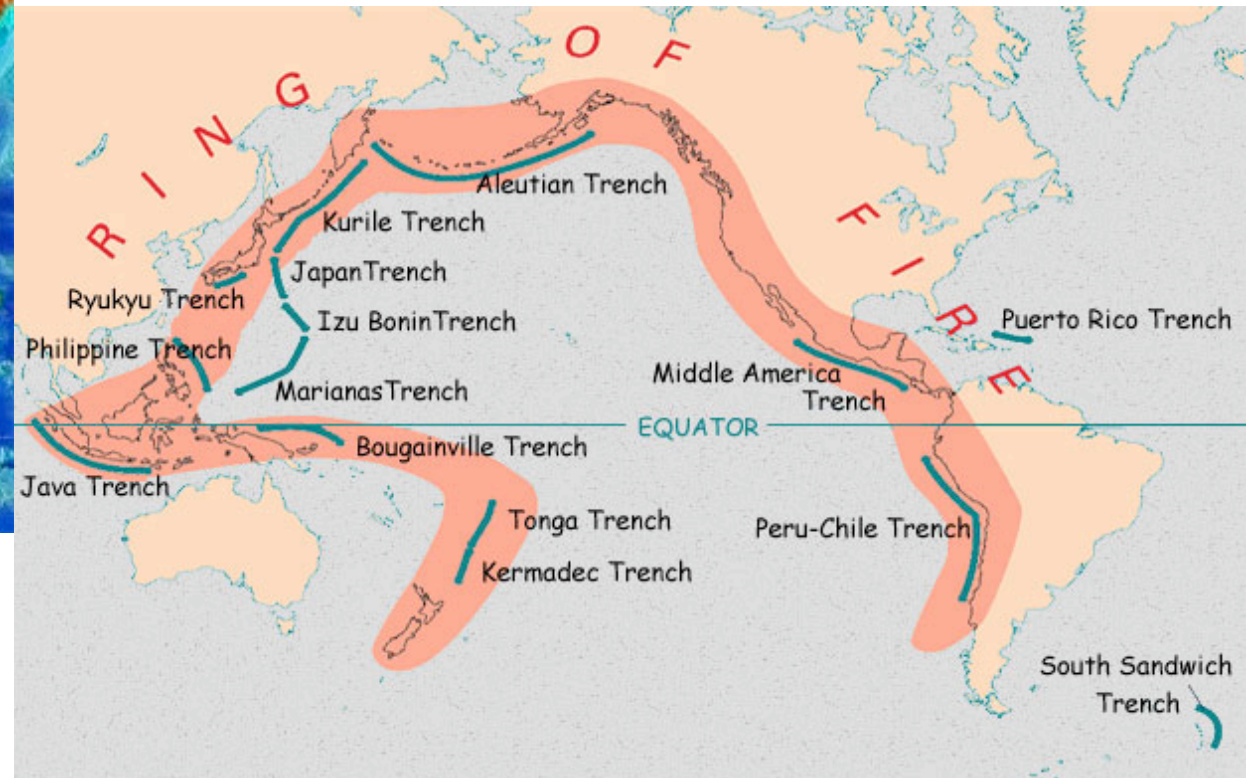
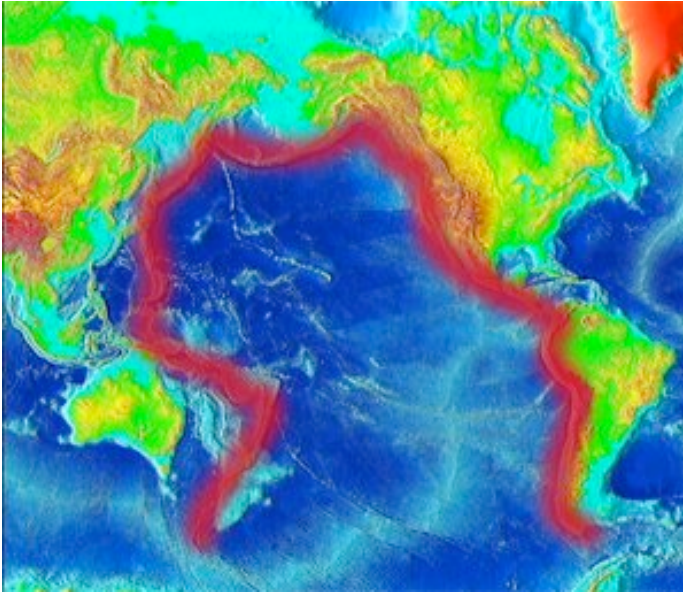
40,000 miles



# Pacific Ocean



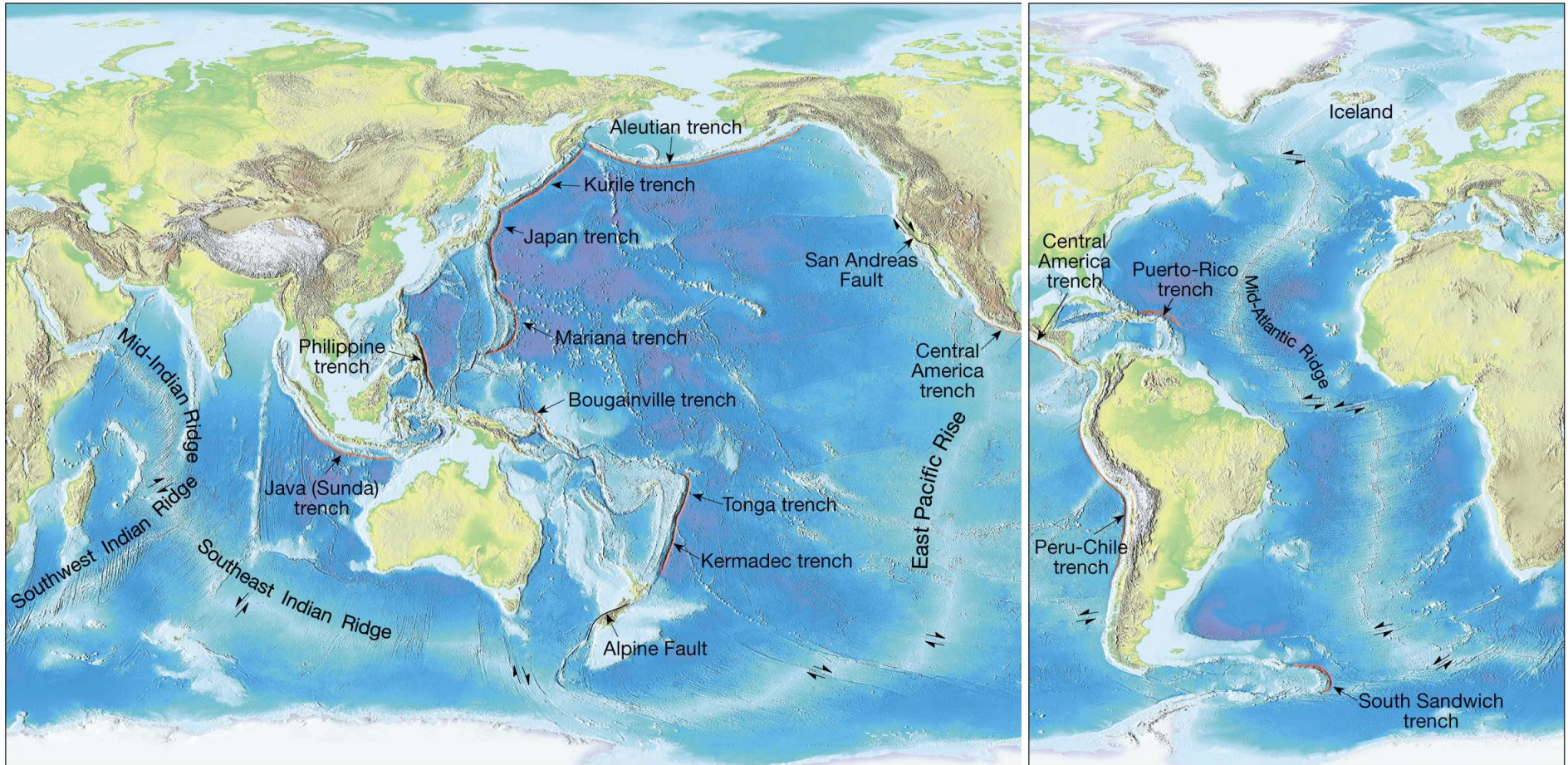
# Pacific Ocean “Ring of Fire”



Trenches



# Trenches & Ridges



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# Trench Depths

**TABLE 13.1** Dimensions of Some Deep-Ocean Trenches

Trench	Depth (kilometers)	Average Width (kilometers)	Length (kilometers)
Aleutian	7.7	50	3700
Japan	8.4	100	800
Java	7.5	80	4500
Kurile–Kamchatka	10.5	120	2200
Mariana	11.0	70	2550
Central America	6.7	40	2800
Peru–Chile	8.1	100	5900
Philippine	10.5	60	1400
Puerto Rico	8.4	120	1550
South Sandwich	8.4	90	1450
Tonga	10.8	55	1400

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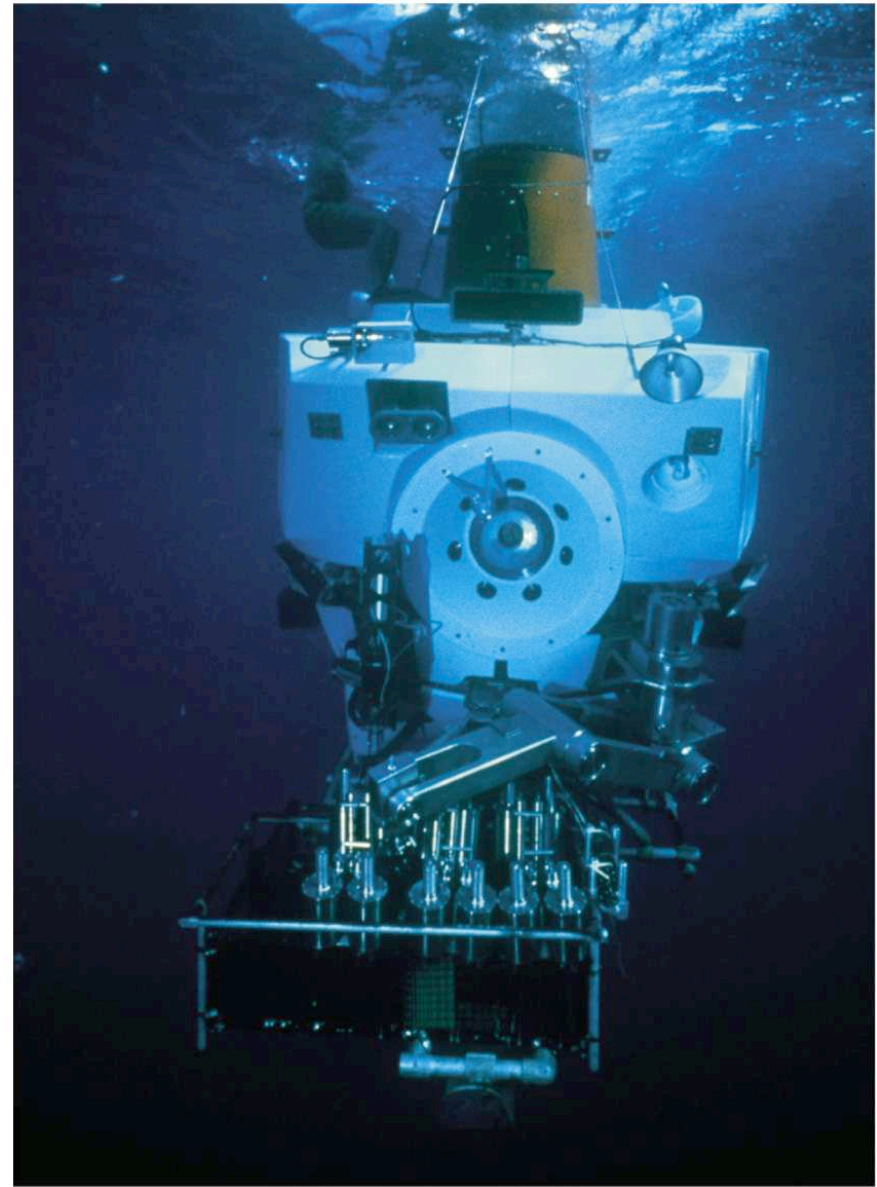


# Questions

- What are Ridges doing?
- What are Trenches for?
- What is at the Ridges and Trenches?



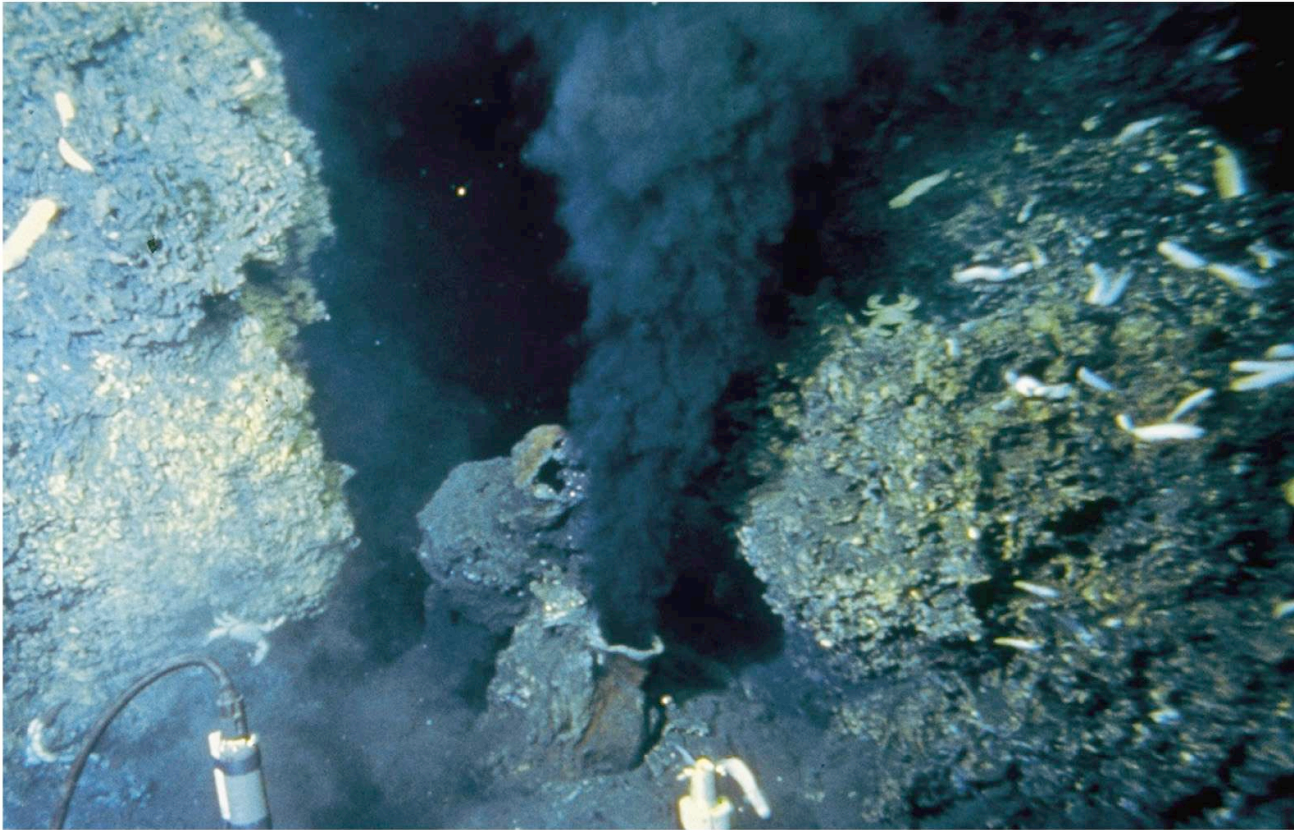
# Deep Sea Investigations



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# Smokers & Tube Worms



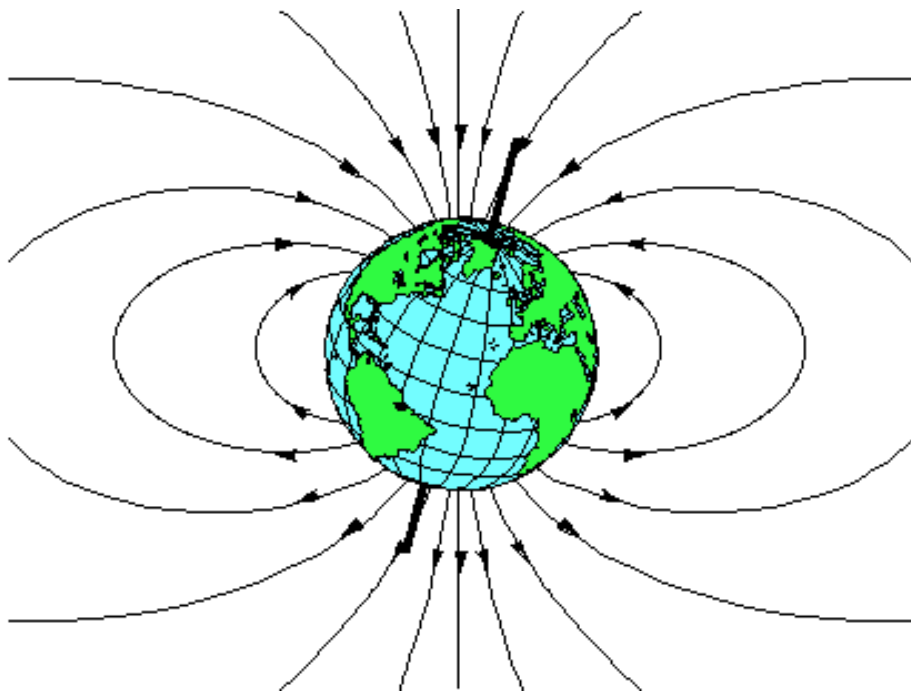
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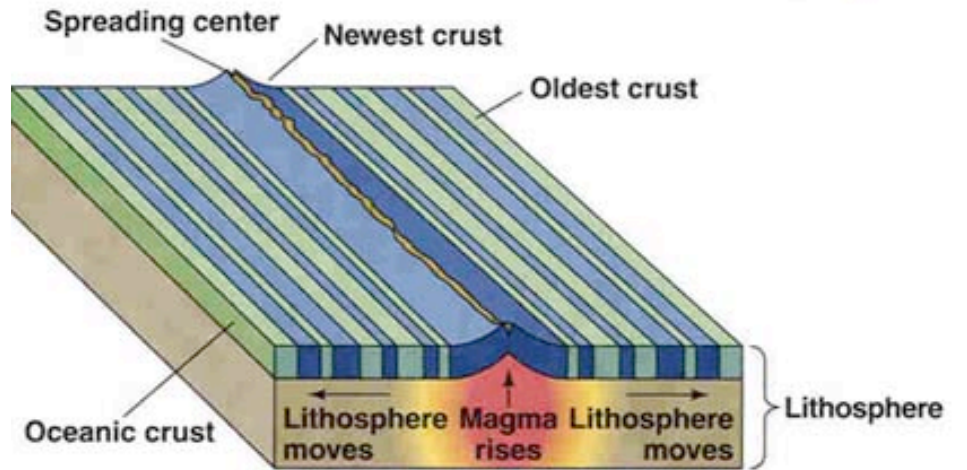
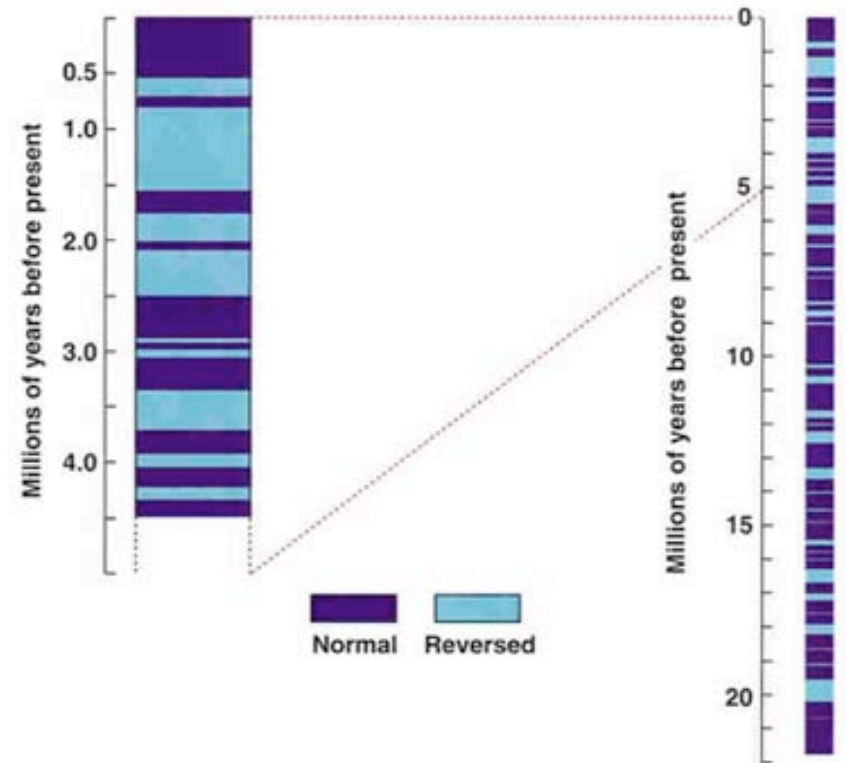
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Basalt



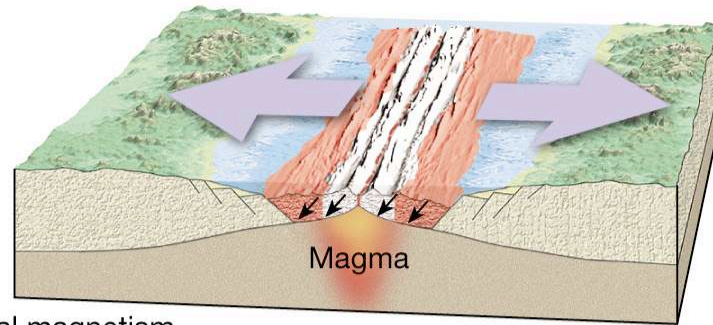
Earth's Magnetic Field



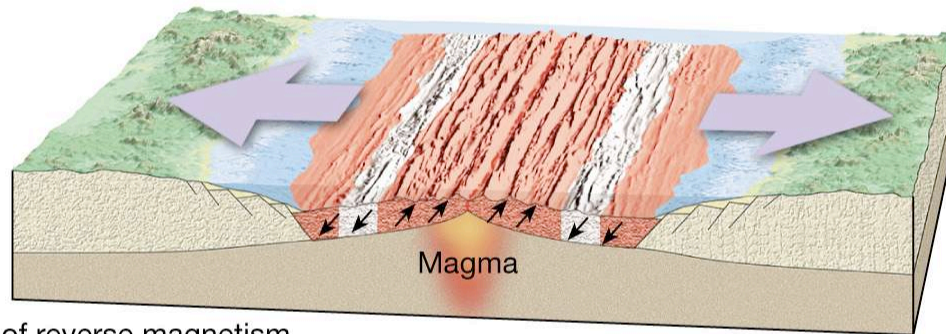
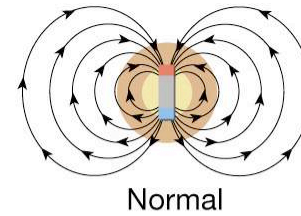
Magnetic Strips



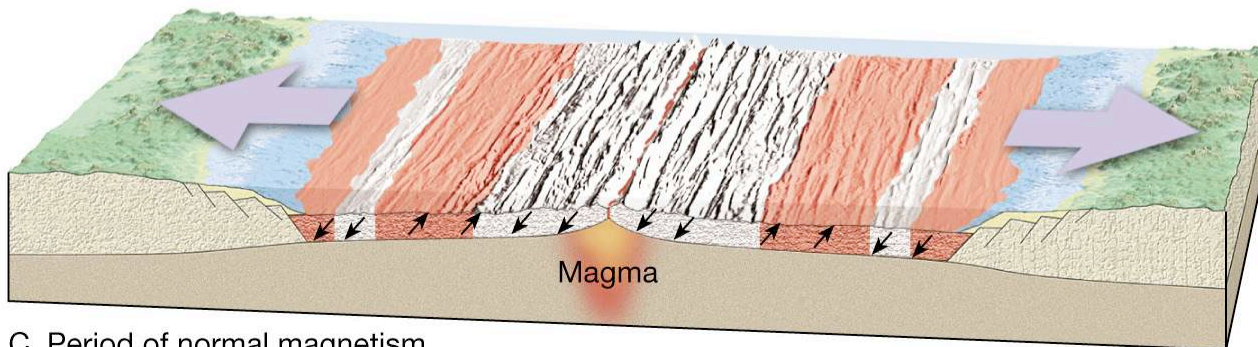
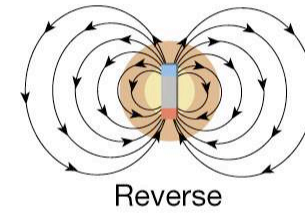
# Magnetic Reversals



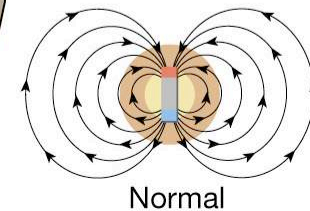
A. Period of normal magnetism



B. Period of reverse magnetism

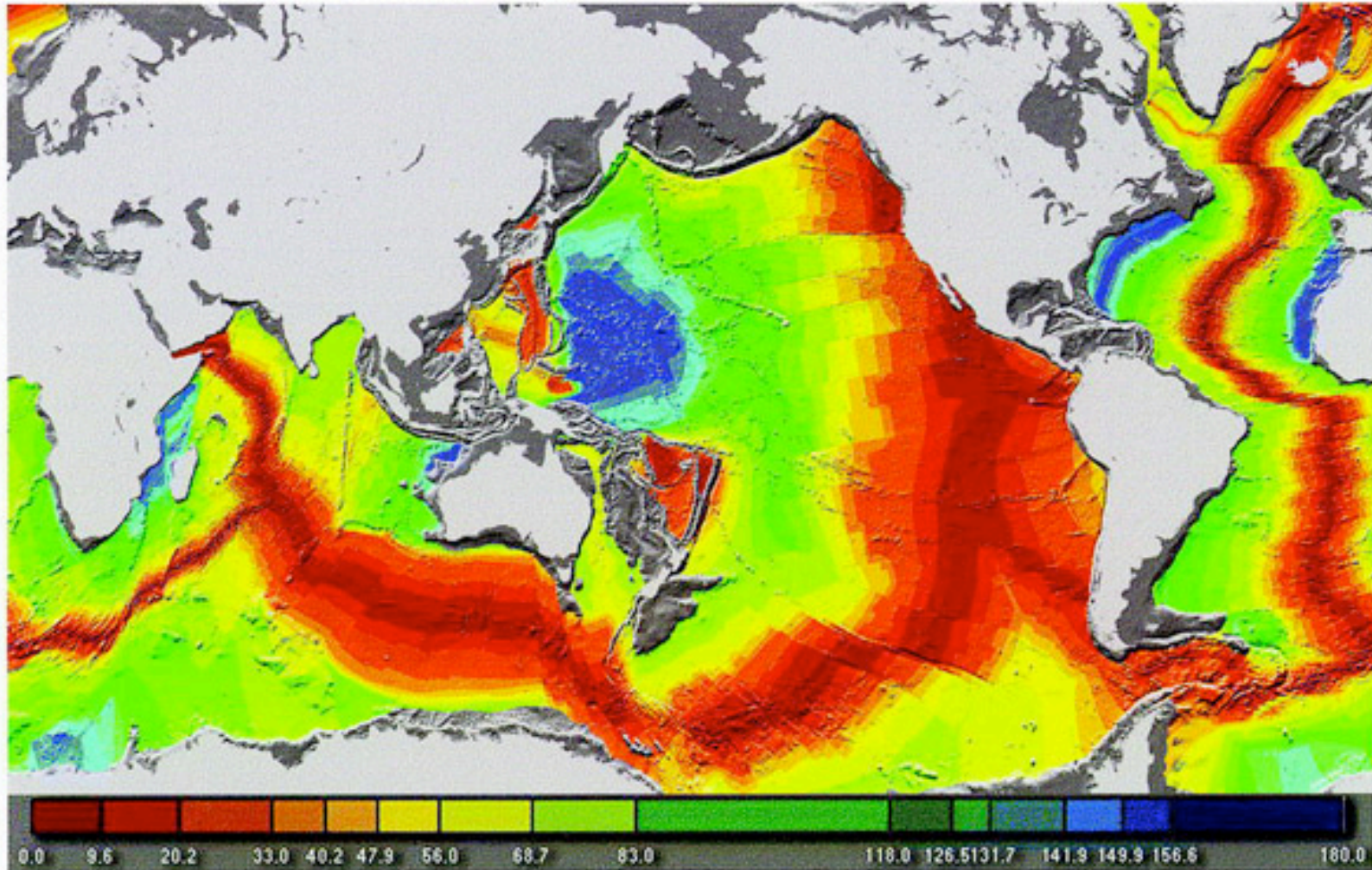


C. Period of normal magnetism





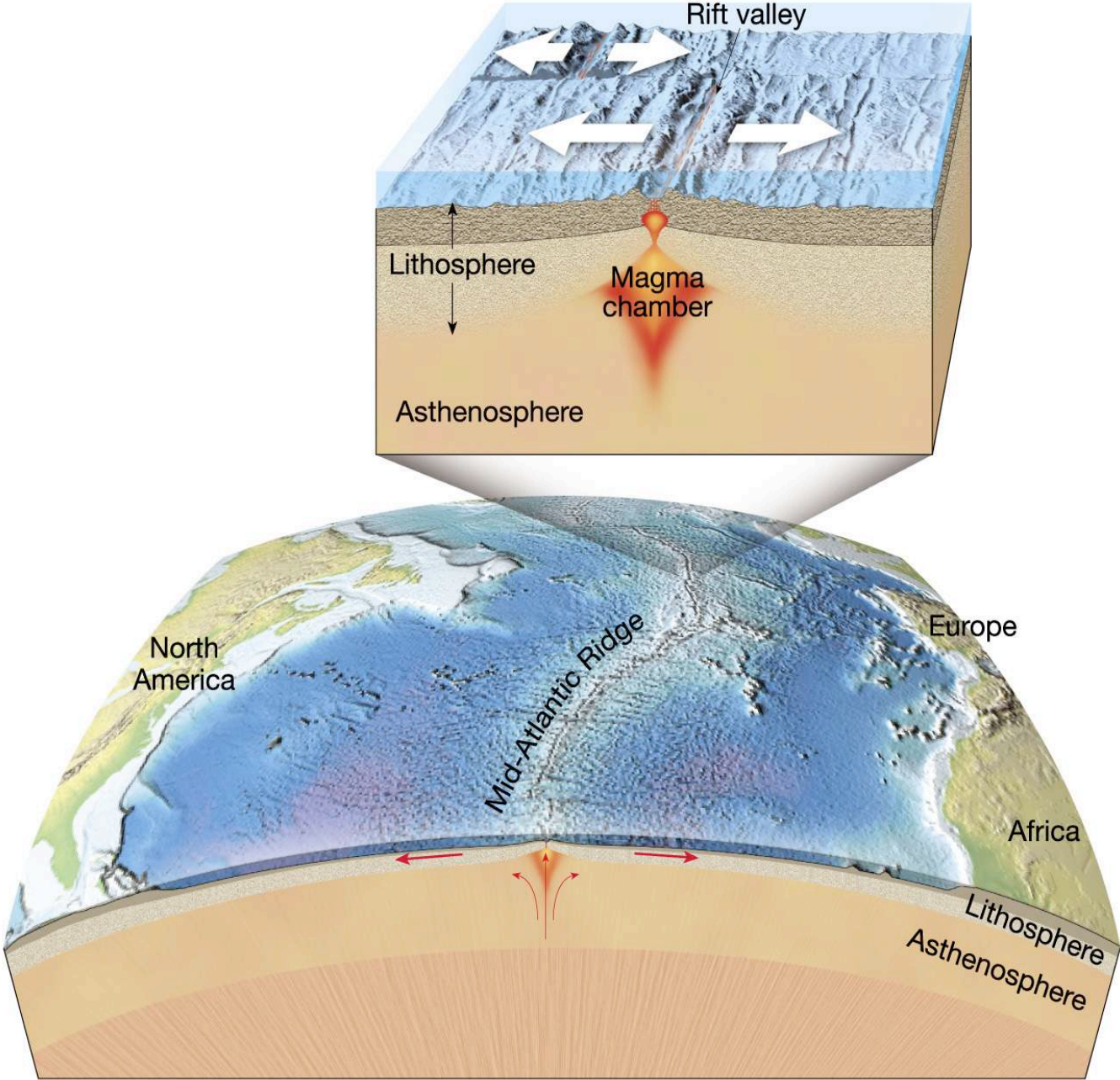
# Magnetic Patterns



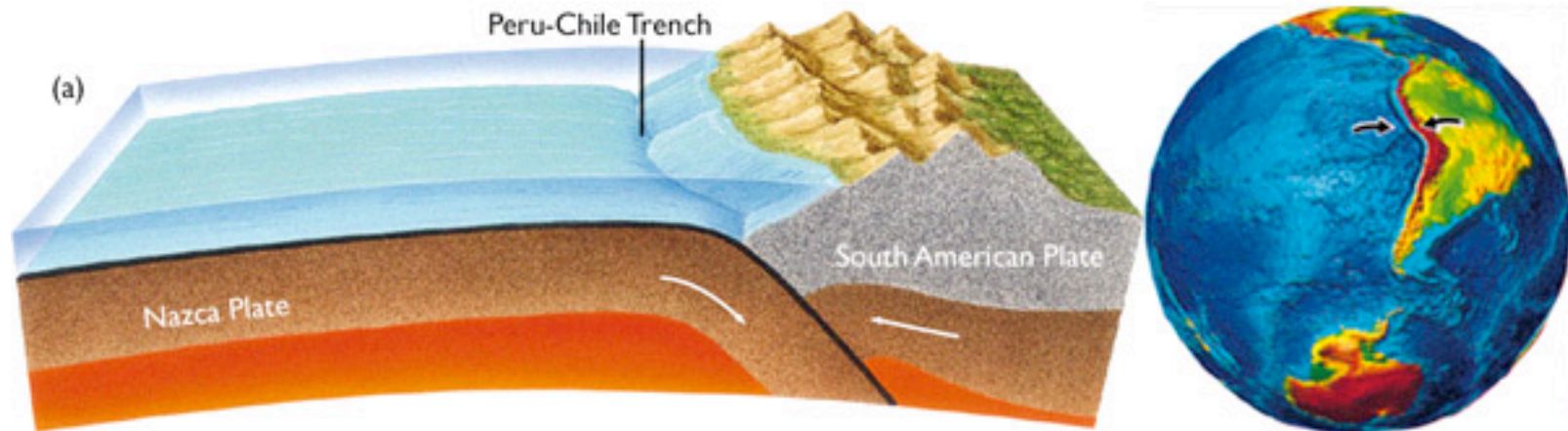
Modern ocean floors colour-coded by geological age. The crust either side of the spreading centres becomes progressively older. Note how the floor of the Pacific Ocean has been subducting eastwards under North and South America.



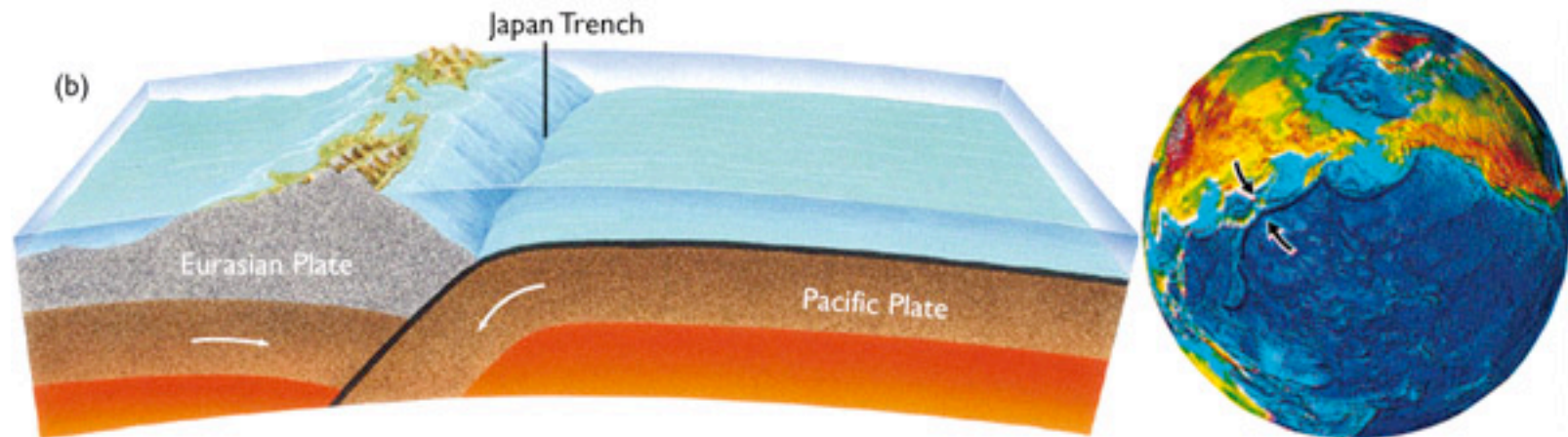
# Spreading Ridges



# Trenches-Subduction Zones



Subduction of an ocean plate beneath a continental margin forming a volcanic belt

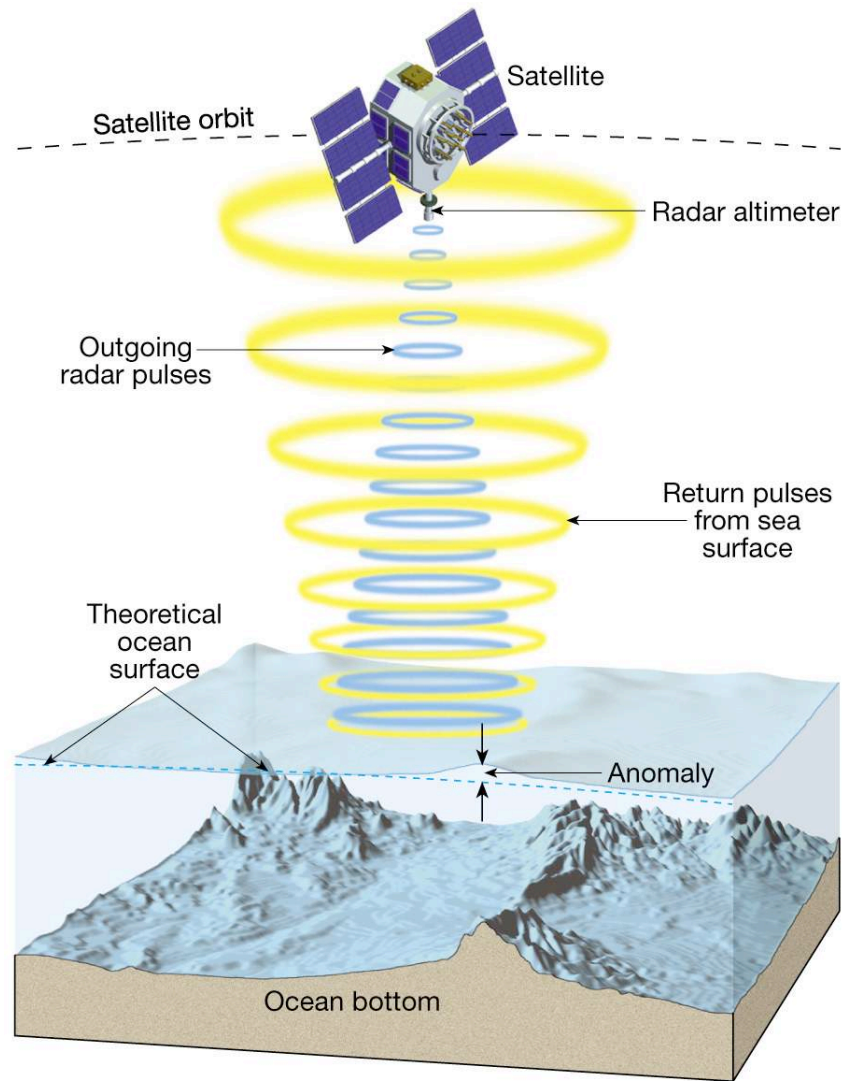


Subduction of an ocean plate beneath another ocean plate forming a volcanic arc

(Press and Siever, Understanding Earth, Freeman 1998)



# Satellites



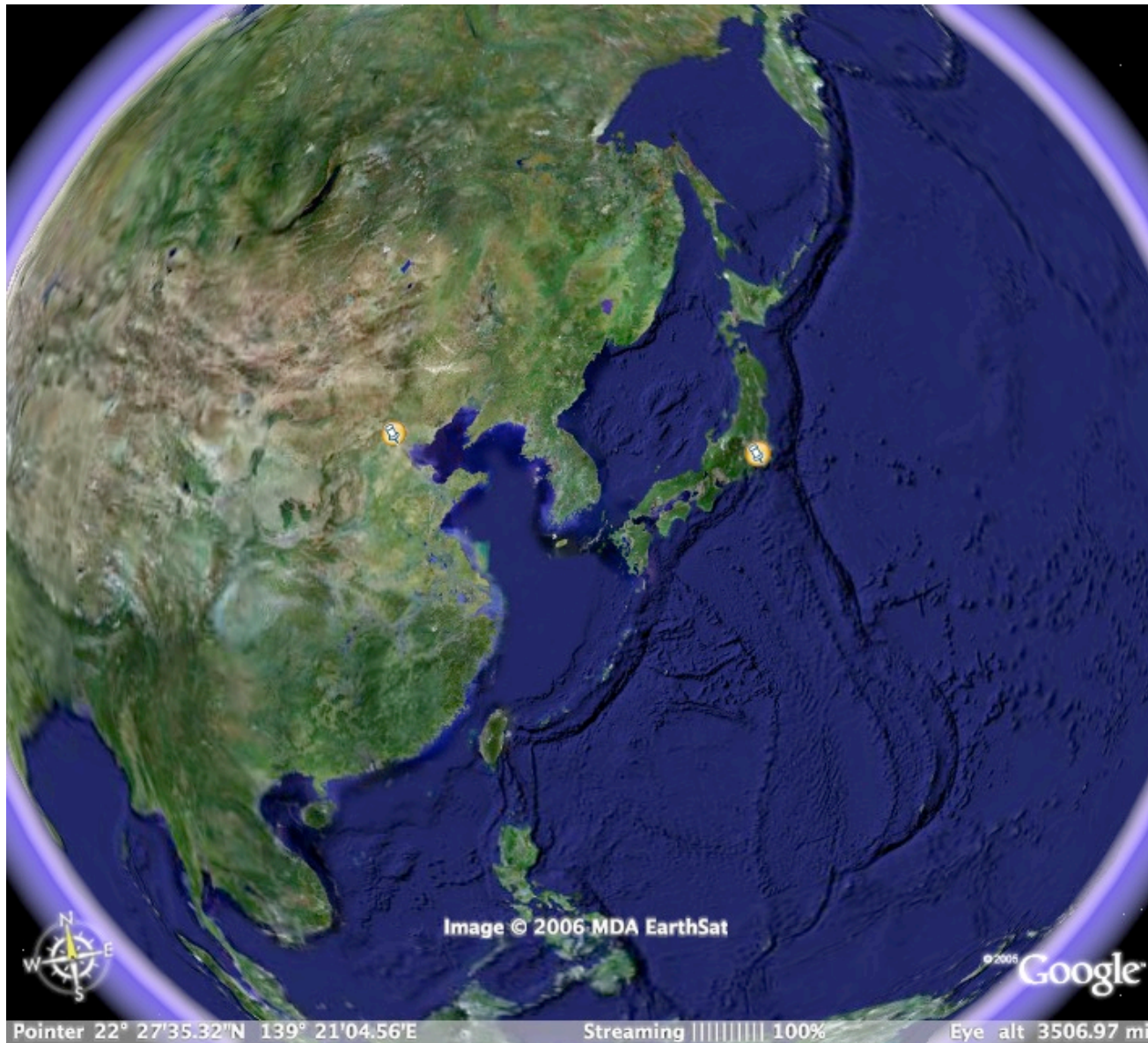
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# Mid Ridge-Google Earth





# Mariannas Trench



Pointer 22° 27'35.32"N 139° 21'04.56"E

Streaming ||||| 100%

Eye alt 3506.97 mi



# Ridges & Trenches

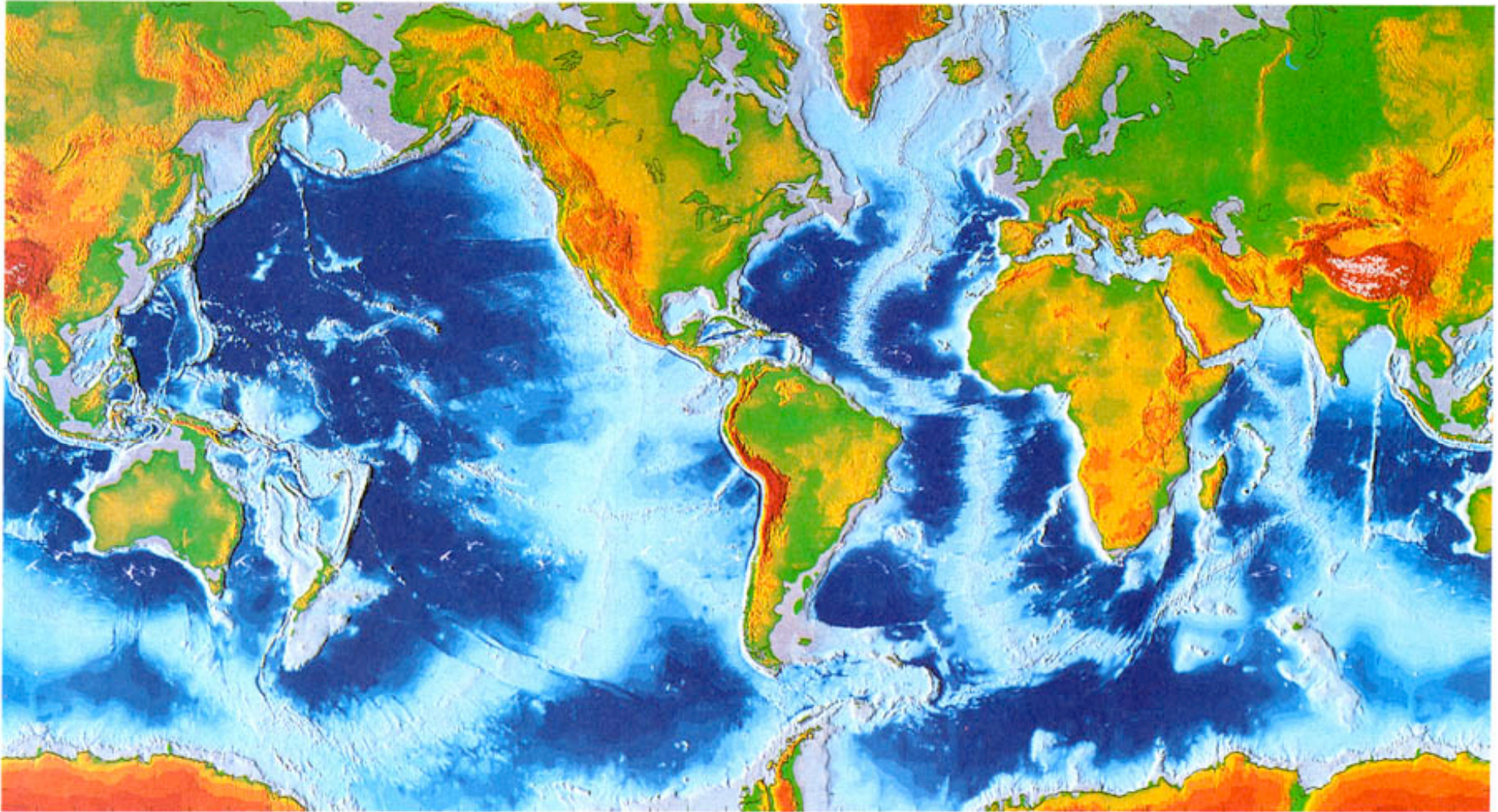
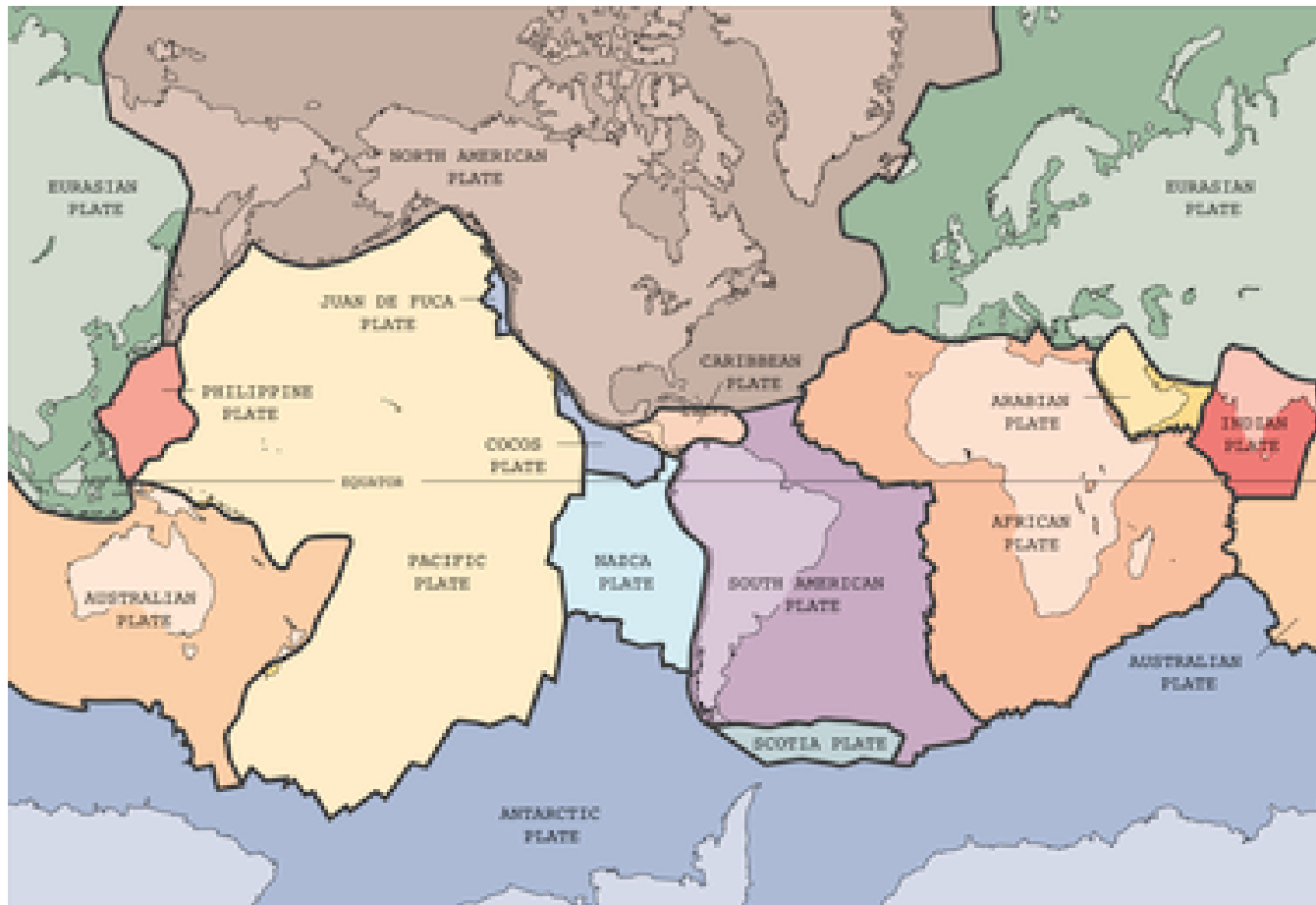


Figure 1.11 Shaded relief map of the Earth's solid surface. The Ninety-east Ridge is the linear ridge running almost north-south to the south-east of India near the right-hand edge of the map.



# Plates on the Earth



What are the Plates doing??