


Plate Tectonics: Part 1

Dec. 1, 2014

1

Review from Last Week: Wegener's Theory of Continental Drift

- In 1912, Alfred Wegener, proposed his theory of continental drift, where Earth's continents were once all joined as a single supercontinent (Pangea).
- He said that the continents have separated and collided as they have moved over Earth's surface for millions of years.



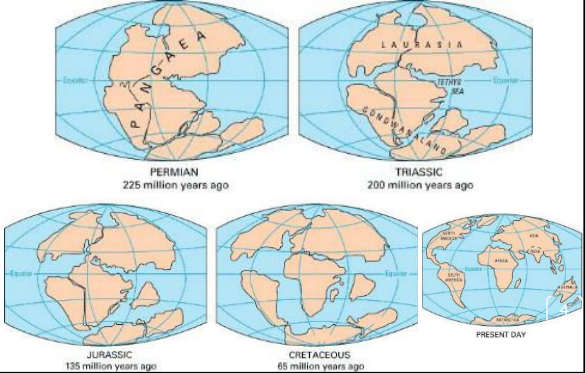
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Theory of Continental Drift

- Wegener proposed that if the land areas were brought back together, the move would line up:
 - ancient mountain ranges
 - similar continental rock formations
 - evidence of ancient glaciers
 - similar fossils
- This is what we illustrated last week with our reconstruction of **Pangaea** from fossil and rock evidence.

3

Continental Drift Timeline



The timeline consists of five world maps showing the progression of continental drift. The first map (PERMIAN, 225 million years ago) shows the supercontinent PANGAEA. The second map (TRIASSIC, 200 million years ago) shows the beginning of the separation into LAURASIA and GONDWANA. The third map (JURASSIC, 135 million years ago) shows further continental movement. The fourth map (CRETACEOUS, 65 million years ago) shows the formation of the Atlantic Ocean. The fifth map (PRESENT DAY) shows the current configuration of continents.

Wegener's hypothesis rejected

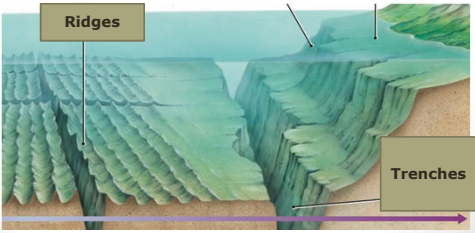
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- Why? Well there were two main reasons:
 1. He could not satisfactorily explain what was causing the continents to move
 2. He was said to be a rather dull speaker and unable to captivate and motivate his audience
- Wegener died in 1930 and his theory would not gain wide support until the late 1950s

5

Evidence from the Oceans

- In 1957 the International Geophysical Organization initiated a massive project to map the seafloor
 - Used sonar and magnetometers
 - Discovered ocean ridges, which are underwater mountains
 - Discovered ocean trenches, which are narrow, long depressions with very steep sides.



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Analyzing the Data

- Discovered “young” rock near ocean ridges and “old” rock near trenches.
- Discovered strips of reversed polarity rocks
- What could this mean?

Conclusion:

- Seafloor Spreading: New ocean crust is formed at ocean ridges and destroyed at deep-sea trenches. Describes how land masses move.

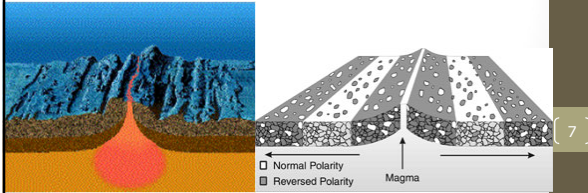
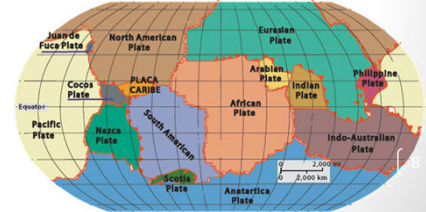
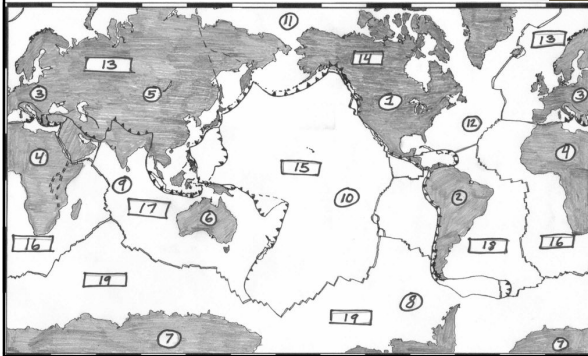


Plate Tectonics

- The surface of Earth is composed of about a dozen major rigid, moving crustal plates and several smaller plates.
- These plates contain areas of light continental rock and dense oceanic bottoms.



Continents, Oceans, & Plates!

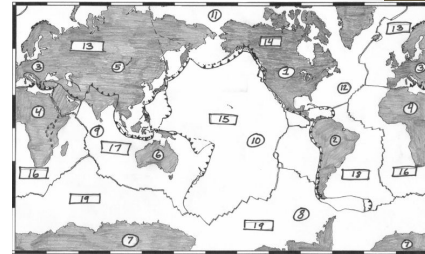


Let's label our maps!

Continents

Continents Key

1. North America
2. South America
3. Europe
4. Africa
5. Asia
6. Australia
7. Antarctica



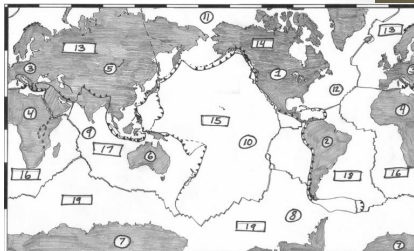
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Let's label our maps!

Oceans

Oceans Key

8. Southern Ocean
9. Indian Ocean
10. Pacific Ocean
11. Arctic Ocean
12. Atlantic Ocean



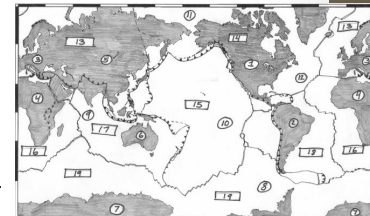
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Let's label our maps!

Major Plates

Major Plates Key

13. Eurasian Plate
14. North American Plate
15. Pacific Plate
16. African Plate
17. Indian-Australian Plate
18. South American Plate
19. Antarctic Plate



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Beneath the Plates

- The plates represent the enormous pieces of Earth's crust. Let's now dig beneath the plates...

A slice through the globe to show Earth's different layers

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The Basic Layers...

[14]

The Physical Structure of the Earth

Lithosphere: Continental and oceanic crust. Divided into tectonic plates.

Asthenosphere: Top part of mantle. Flows like soft plastic, think silly putty!

Upper & Lower Mantle: Thickest layer; most of Earth's mass. Hot softened rock.

Outer Core: Thought to be liquid iron & nickel

Inner Core: Thought to be solid iron & nickel

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Helpful Textbook Pages: [453-459](#); [Dictionary](#).

Today's Main Idea

- Theory of plate tectonics states that the crust is broken into enormous pieces called plates.

Explore Question

2. Explore today's main idea with this question:
Describe how new ocean floor is created (pages 453-454).

Vocabulary

- Rift Valley
- Subduction
- Dynamic (use dictionary)

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