## Plate Tectonics

**Continental Drift becomes Plate Tectonics:**

* idea that Earth’s surface might be moving is not new
* in early 1500’s, explorers noted the remarkable fit of world’s continents

is like a puzzle

* first formal theory proposed by German scientist Alfred Wegener in 1912 called **“continental drift”** **which states that the continents had drifted or moved from one location to another over time**
* by the 1950’s and 1960’s scientists had further developed this theory and called it **“plate tectonics”** – **the Earth’s lithosphere is divided into plates (made up of both continents and ocean basins) that move on top of the asthenosphere**
* the plates are currently moving towards each other, moving away from each other, or sliding past each other

**Scientific historical evidence for theory:**

\*ages and similarities of rocks amongst continents

\*similar fossil records amongst continents

\*glacier tracks in rocks of southern continents indicates that they were

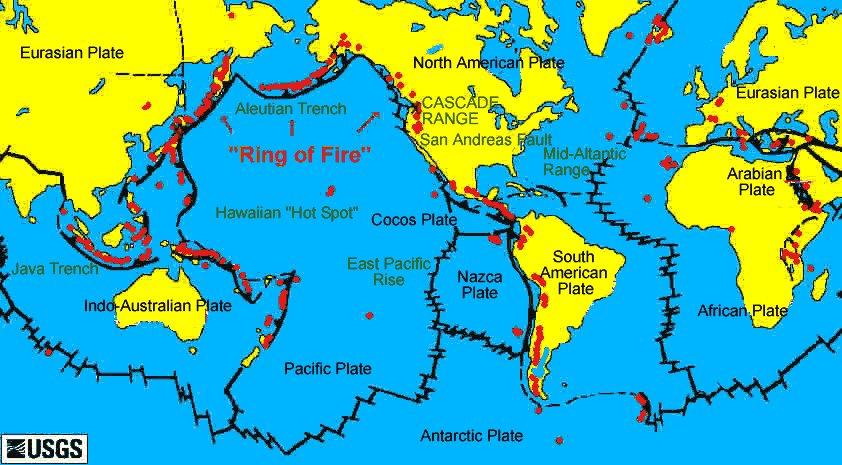
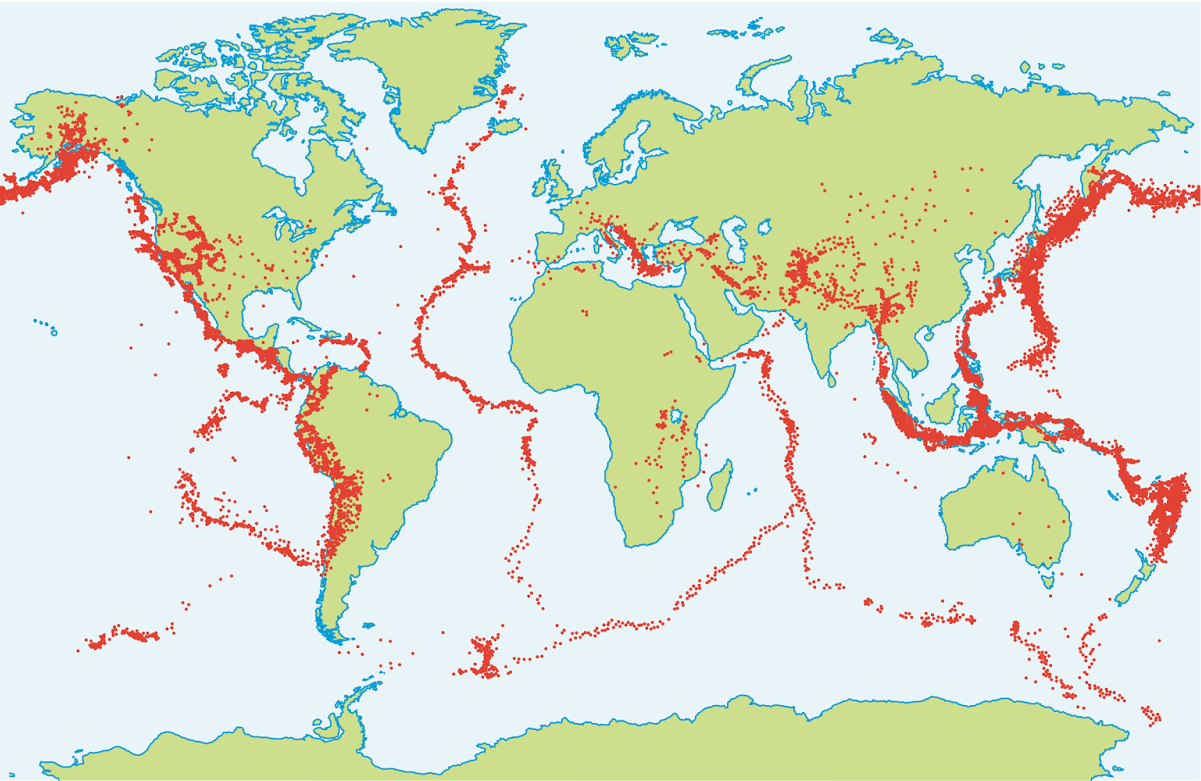
once in colder northern climates

\*zones of earthquake and volcano activity are all along where plates meet

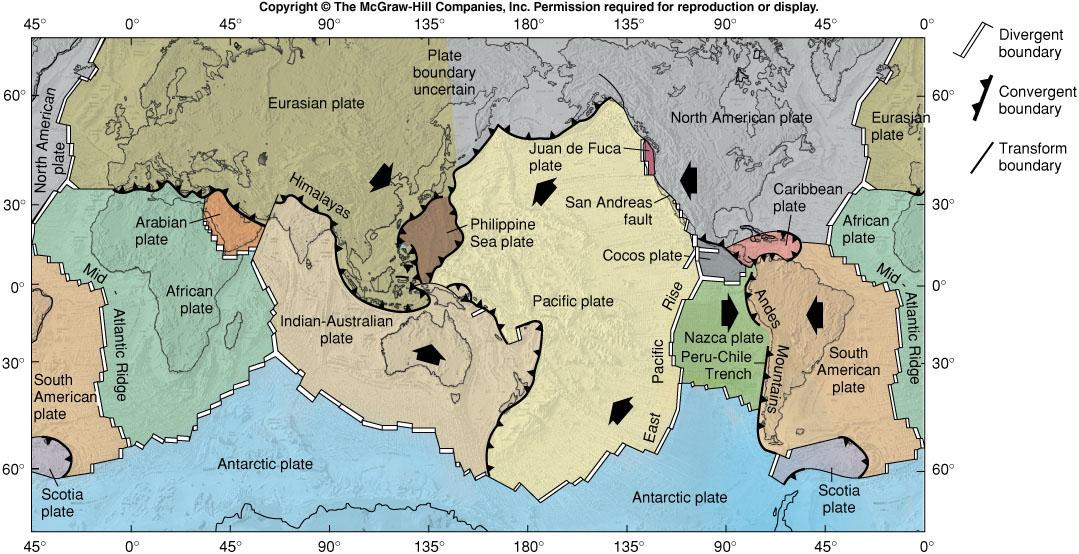
\*supercontinent Pangaea of approximately 250 million yrs ago broke apart

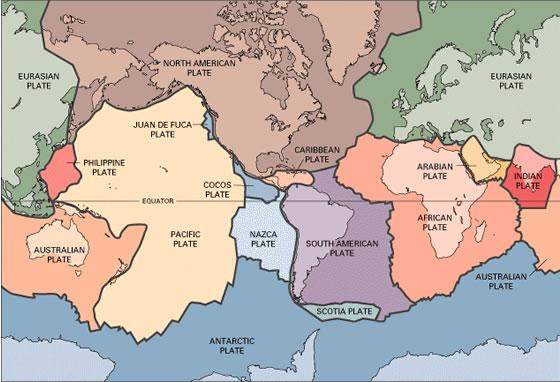
into two landmasses Gondwana and Laurasia and eventually continued to

break apart to current location of continents

**Earth’s Tectonic Plates:**

* there are 12 major plates and several other smaller ones





**Types of Plate Boundaries Determined by Movement**

**Divergent Boundaries:**

- boundary between 2 lithospheric plates that are moving apart

**Convergent Boundaries**:

- boundary between 2 lithospheric plates that are moving towards each other

* **convergent subduction boundaries**: when an oceanic plate plunges beneath another plate – it can either be two ocean plates where one goes under the other, or an ocean plate under a continental plate
* **convergent collision boundaries**: when two continental plates collide and are welded together to become one larger plate

**Transform Boundaries:**

- boundary between 2 plates that are sliding past each other

**Summary Table:**

|  |  |  |  |
| --- | --- | --- | --- |
| **Boundary Type** | **Process Involved** | **Characteristic Features** | **Current Examples** |
| **Divergent** | sea-floor spreading | \*mid-ocean ridges  \*rift valleys  \*earthquake activity at fracture zones along mid-ocean ridge  \*volcanic activity | \*Mid-Atlantic Ridge  \*East Pacific Ridge |
| **Convergent Subduction** | subduction  ocean-ocean | \*deep-sea trenches  \*volcanic island arcs  \*earthquake activity | \*Indonesian Islands |
|  | subduction  ocean-continent | \*deep-sea trench bordering continent  \*volcanoes along coast of continent  \*earthquake activity | \*western coast of  South America (Chile) |
| **Convergent Collision** | collision  continent-continent | \*high continental mountain chains  \*earthquake activity | \*Himalayas |
| **Transform** | plates sliding past each other | \*earthquake activity | \*San Andreas Fault (California) |

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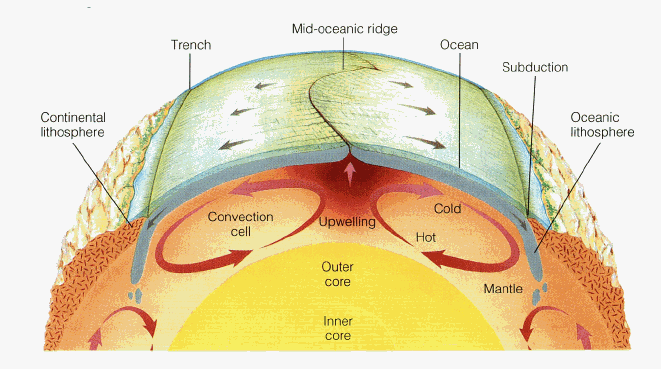
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**Causes of Plate Movement:**

* **three** hypotheses have been developed and scientists now believe all three play an equal role in moving the plates

**1) Mantle Convection:**

* heat from the inner and outer core is transferred up through the mantle which them moves the plates above it
* this happens when magma that is hotter and less dense rises upwards on one side of a convection cell and then as the convection current cools it moves away it a circular motion which then drags the lithospheric plates above it



**2) Ridge Push and 3) Slab Pull:**

* magma that rises upwards at mid-oceanic ridge is extremely hot and as it accumulates it builds up and pushes the ridge apart
* then as magma cools it slopes downwards pulling apart the lithospheric plates at the subduction boundary – this force is much stronger than the magma push
* ridge push and slab pull processes continually repeat as newer hotter magma rises and then cools

