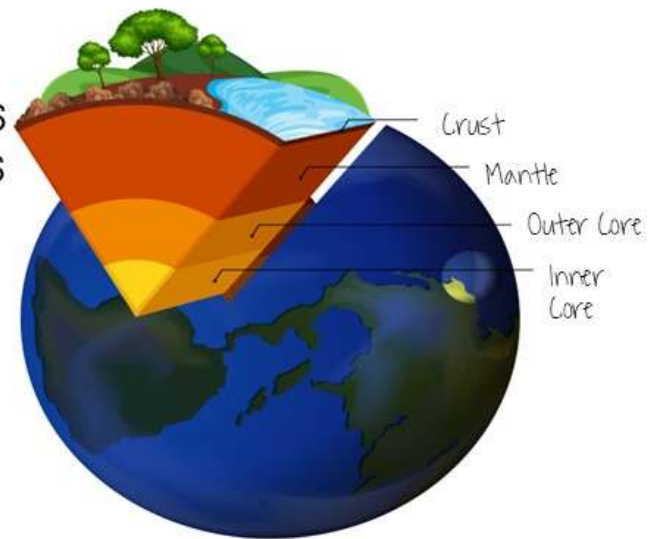


Earthquakes

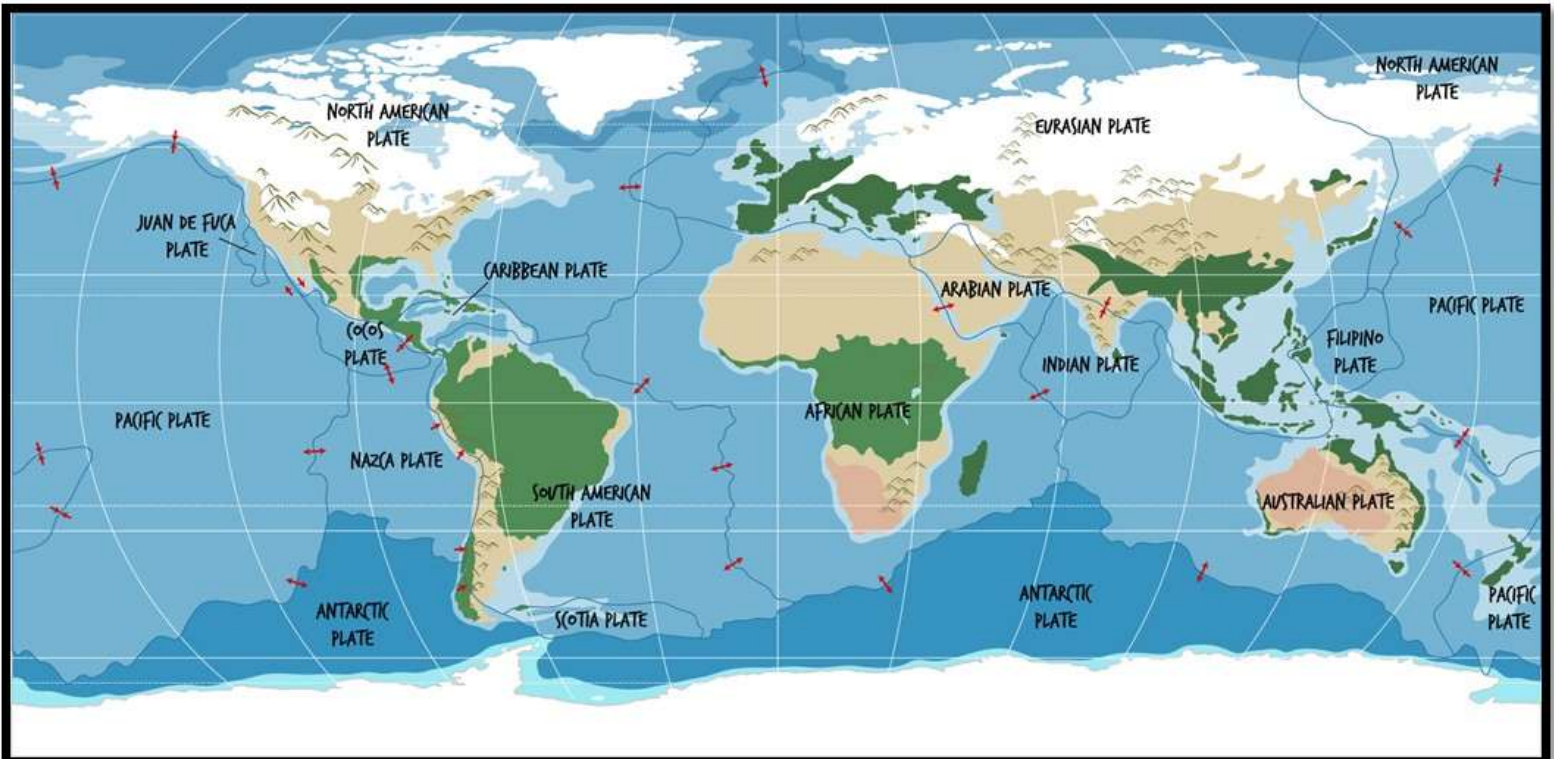
At first it starts with a gentle tremor, and then it strengthens in intensity. Soon, dishes are flying out of cabinets and the building is shaking. Roads and bridges start to bend and buckle. You are experiencing an earthquake! But what causes these earthquakes that are felt all over the world?

The Earth is made up of several different layers which include the *crust*, *mantle*, *inner core*, and *outer core*. The crust is made up of **tectonic plates**. Forces from within the Earth cause tectonic plates on the crust to slide along the mantle, sometimes towards other tectonic plates and sometimes away. As the tectonic plates move against each other, friction causes them to get stuck, causing tension to build up in the tectonic plates. An earthquake is caused when the forces of the tectonic plates pushing against each other suddenly shift, causing the ground along the edge of the tectonic plate to shake.

LAYERS OF THE EARTH



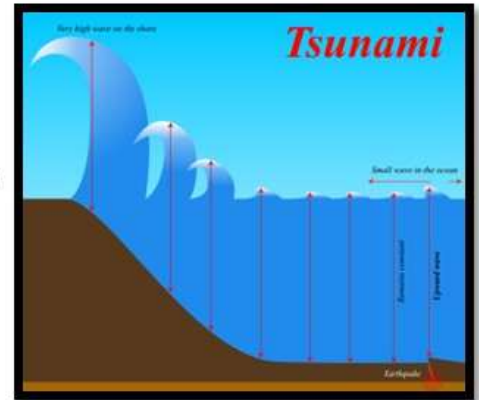
Movement of tectonic plates on the Earth's crust causes different types of earthquakes.



Tectonic plates are constantly moving, causing earthquakes where the plates push against each other.

Case Study - Alaska

An earthquake can cause untold damage to property and human lives. They strike without warning. If you think of the damage caused by earthquakes, it can be daunting, but can you imagine what an earthquake combined with multiple tsunamis can do? On March 27, 1964, at 5:36pm, a magnitude 9.2 earthquake occurred in the ocean by Alaska. The earthquake was caused by the Pacific Plate being forced underneath the North American Plate. The earthquake lasted over 4 and $\frac{1}{2}$ minutes and is the most powerful recorded earthquake in U.S. history. It is also the second largest earthquake ever recorded, following the M9.5 earthquake in Chile in 1960.



Tsunamis are caused by earthquakes on the ocean floor.



Collapse of Fourth Avenue near C Street, Anchorage, due to earthquake caused landslide. Anchorage district, Cook Inlet region, Alaska. 1964.

The largest city in Alaska, Anchorage, was heavily damaged by the earthquake and landslides that followed. Houses and buildings not designed to survive earthquakes crumbled in the massive quake. Streets buckled and train tracks folded. Landslides moved entire neighborhoods as the ground liquified and rolled. Bridges across the area collapsed as the ground shifted underneath. Some areas of Alaska were raised by over 30 feet, while some dropped as much as 8 feet, causing significant damage across the area. "*Ghost forests*" developed when trees were killed and then preserved by saltwater rushing onto the land.

Following the massive earthquake, tsunamis swept along the Pacific Coast of the United States. Walls of water nearly 27 feet high destroyed villages and towns in Alaska. People all along the coast were impacted. The tsunami even killed people in California.

Nine people died in the earthquake in Alaska, and 122 people died in the tsunamis in Alaska, Oregon and California. Property loss from the earthquake and subsequent tsunamis totaled over \$300 million dollars.

As a result of the 1964 disaster in Alaska, an earthquake-monitoring system and the Pacific Tsunami Warning Center were built. Engineers also developed earthquake-resistant buildings to prevent damage and loss of life in future quakes.