

Natural Disasters Caused by Plate Tectonics

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1. Plate Tectonics Basics

- Plate tectonics are among the most influential forces that shape Earth. The Earth's surface is not a single, solid mass but is instead made up of many plates, each one slowly sliding on top of the planet's underlying mantle. Most of the time, these plates move slowly and only create changes over the course of millions of years. Sometimes, however, two plates move abruptly with respect to each other. When that happens, the Earth's surface is subject to natural disasters. Events such as earthquakes, volcanoes and tsunamis all are the result of plate tectonics.

2. Earthquakes

- Most earthquakes occur as the result of the sudden movement along a fault line between two adjacent tectonic plates. The movement of the plates is not always smooth. The plates can "catch" on each other. Since the plates are always moving, these catches cause energy to build up along the fault line. Eventually, this catch has to give way, and all of the energy is released in an earthquake. The famous San Andreas fault in California marks the location where the North American plate and the Pacific plate slide alongside each other. The two plates move at a rate of about 6 cm per year, causing hundreds of tiny earthquakes yearly and a few major earthquakes less often. The earthquakes that hit San Francisco in 1906 and 1989 were both caused by this fault.

3. Volcanoes

- Volcanoes occur either along fault lines or over "hot spots." When a plate moves over the top of another plate, the energy and friction melt the rock and push it upwards. The increased pressure of this rock causes a swelling in the surface--a mountain. The pressure continues to build over time, and, without any other outlet for release, the mountain eventually explodes as a volcano. The type of volcanic explosion essentially depends on the underlying rock. Rock that is "sticky" when melted tends to plug the volcano's vents until the pressure of underlying gases causes an often cataclysmic eruption. This type of eruption occurred at Mt. St. Helens in

Washington in 1980. Other types of rock flow more smoothly when melted. In this case, the molten rock seeps out of the volcano in gentler and longer eruptions. The famous Hawaiian volcanoes usually erupt in this way.

4. Tsunamis

- Plate tectonics are the indirect cause of tsunamis. When a major seismic tremor occurs underneath a body of water, the energy from that tremor is released into the surrounding liquid. The energy spreads out from its original site, traveling through the water in the form of a wave. A tsunami wave poses little danger while in the open ocean. When the wave reaches shore, however, it is another story. The trough of the great wave strikes land first, seen as the pulling of water away from the shore. Then the wave peak hits, with disastrous consequences. Depending on the location of the original tremor, the configuration of the local sea floor and the distance from the tremor, the tsunami varies in size, number of waves and arrival time. The devastating tsunami of December 2004, which killed more than 300,000 people around the edges of the Indian Ocean, emanated from an extremely powerful earthquake on the ocean floor near Indonesia.

Resources

- [Plate tectonics animations](#)
 - [NASA images of recent earthquakes and volcanoes](#)
- [Interactive volcano and earthquake information](#)