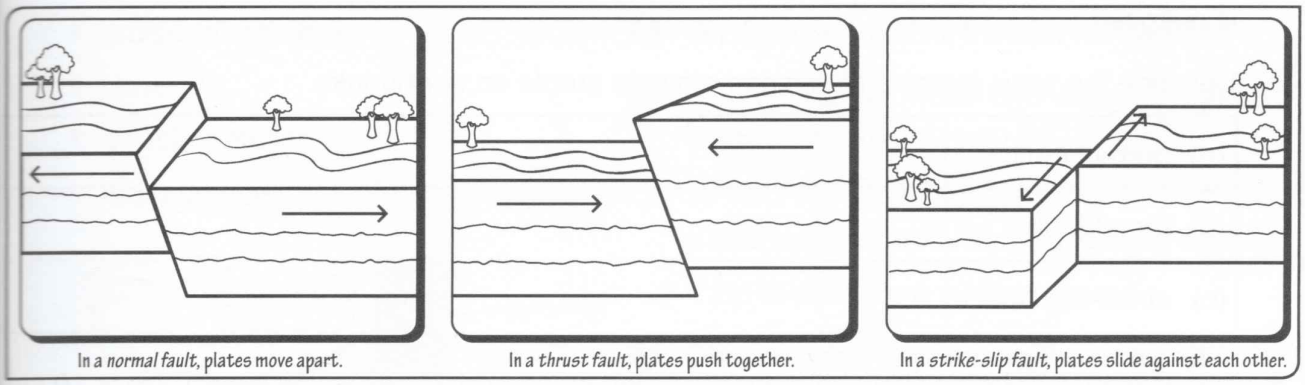
How are earthquakes and tsunamis related? – I

Earthquakes and tsunamis are both mostly naturally occurring events, both related to the stability of the Earth's crust.

The Earth's crust is not one single piece with no joins. It is made of eight large pieces and a number of smaller ones, fitting together like an irregular jigsaw. Each piece is called a *tectonic plate*. The joins between these plates, known as *fault lines*, sometimes release the pressure that has been building deep within the Earth. When this pressure is released, the plates move with massive force, causing the ground to tremble. This is what we call an earthquake.

The plates can move in one of three ways.



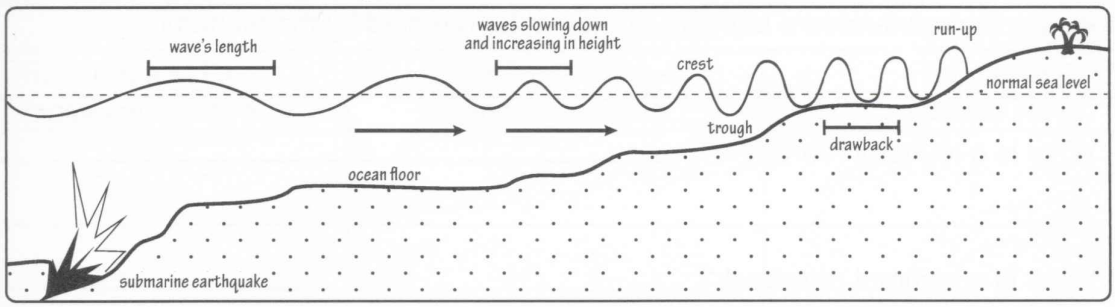
In a *normal fault*, plates move apart.

In a *thrust fault*, plates push together.

In a *strike-slip fault*, plates slide against each other.

The shock waves from the earthquake are the strongest at the *epicentre*, the land directly above the plate movement. This is where the most destructive force occurs. The waves weaken as they move away from the epicentre. For weeks after a major earthquake, *aftershocks* of less intensity may be felt. These can cause further damage to buildings and services already damaged by the original earthquake.

A tsunami can occur after an earthquake on the ocean floor. As one tectonic plate slides under another, an enormous amount of water is displaced (pushed). The force of the eruption provides energy for the water to travel quickly across the open ocean in a series of waves that remain short but wide while the water is deep. But closer to land, as the water becomes shallower, the waves slow down, are closer together and increase in height. By the time they reach the coast, the waves can be about 20 m high.



Before the tsunami waves hit the coast, one of two things can happen:

- If the first part of the wave to hit is the trough (the lowest point of the wave), then there is a sudden decrease in water level. This actually exposes a wide expanse of land. This is known as the *drawback*.
- If the crest (high point) hits first, then there is a large increase in water level, causing major flooding. This is known as the *run-up*.

If a large tsuanmi hits, there can be multiple waves which hit hours apart.

Unlike a land earthquake where the epicentre is the scene of greatest force, a submarine (underwater) earthquake is barely noticeable at sea. But the devastating effects of a tsunami can be felt thousands of kilometres away.