

Earthquake facts

What is an earthquake?

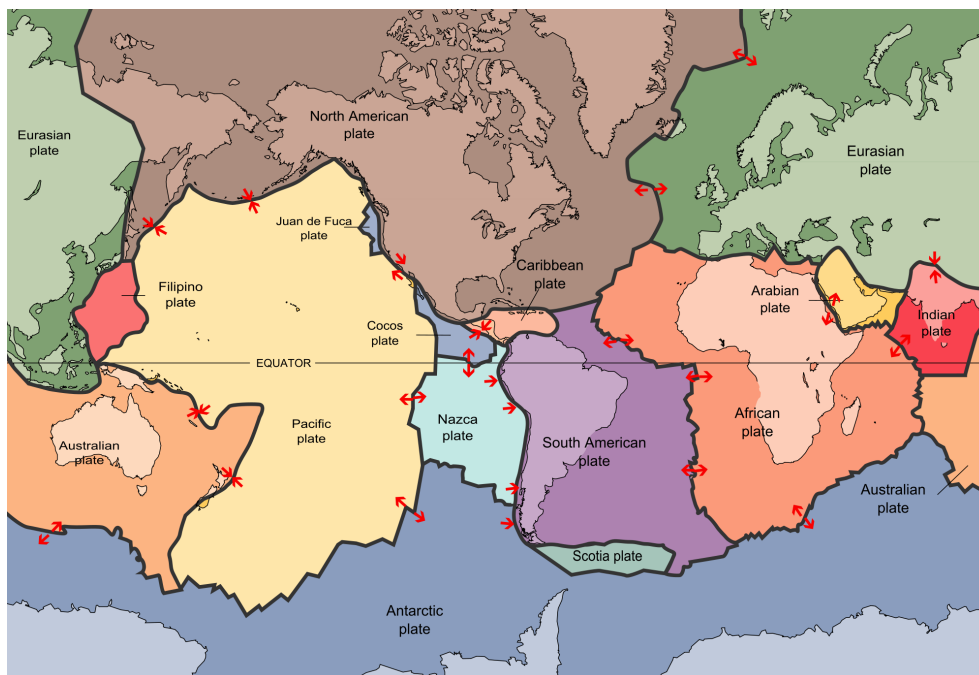
An earthquake is the shaking and vibration at the surface of the Earth caused by energy being released along a fault plane, at the edge of a tectonic plate or by volcanic activity.

What causes earthquakes?

Earthquakes are caused by the movement of Earth's outer layer (the crust and a portion of the upper mantle). The outside layer of Earth is split into **tectonic plates** which are moving slightly due to the movement of magma in the layer below. This causes plates to squeeze together, move apart and slide alongside each other.

Earthquakes are classified into two types:

- **Interplate earthquakes** – these earthquakes occur on tectonic plate boundaries where the tectonic plates are moving towards each other or sliding alongside each other. Interplate earthquakes are common for countries such as Japan, New Zealand and the west coast of the United States which are located on tectonic plate boundaries. Large earthquakes are usually interplate earthquakes.
- **Intraplate earthquakes** – these earthquakes occur in the middle of tectonic plates on fault zones where the pressure of the tectonic plate being squashed and forced to move builds up and is released through the cracks in rocks associated with fault zones, resulting in an earthquake. As Australia is located in the middle of a tectonic plate, we are less susceptible to larger earthquakes; however damaging earthquakes can still occur on fault zones.



This image shows the tectonic plate boundaries on Earth's outer layer. Earthquakes commonly occur on tectonic plate boundaries, particularly where two plates are moving towards each other such as the Australian plate and the Pacific plate.

Earthquake magnitude

The size of an earthquake is referred to as its magnitude on a scale from 1 – 10. Magnitudes as low as 1 are measured in mines due to rock bursts and the maximum magnitude possible is less than 10. For every unit increase in magnitude, there is roughly a thirty-fold increase in the energy released. For instance, a magnitude 2.0 earthquake releases about 30 times more energy than a magnitude 1.0 earthquake, while a magnitude 3.0 earthquake releases 900 times (30x30) more energy than a magnitude 1.0.

In Australia, seismologists (people who study earthquakes) prefer the use of the **moment magnitude scale**, which calculates the magnitude of an earthquake based on physical properties such as the area of movement (slip) along the fault plane.

The table below outlines expected impacts of earthquakes. Damage to buildings will depend on how they were built. For locations near the centre of the earthquake the following impacts may occur:

Magnitude (Moment Magnitude)	Description of effects
8.0 and over	◀ Magnitude 9.0 Japan 2011
	◀ Causes extensive damage, waves seen on the ground's surface, objects thrown into the air.
7.4 - 7.9	◀ Causes significant damage, most buildings collapse.
7.0 - 7.3	◀ Magnitude 7.1 Christchurch 2010
	◀ Serious damage to buildings, bridges twist, walls fracture, many buildings collapse.
6.2 - 6.9	◀ Significant building damage, houses move on their foundations, chimneys fall, furniture moves.
5.5 - 6.1	◀ Magnitude 5.6 Newcastle 1989
	◀ Some damage to buildings, plaster cracks, bricks fall, chimneys damaged.
4.9 - 5.4	◀ Magnitude 5.4 Moe 2012
	◀ Felt by everyone, dishes break and doors swing, unstable objects overturn.
4.3 - 4.8	◀ Magnitude 4.6 Korumburra 2009
	◀ Felt by many people, windows rattle, dishes disturbed, standing cars rock.
3.5 - 4.2	◀ Felt by people who are indoors and some outdoors. Hanging objects may swing.
Less than 3.4	◀ Usually felt by only a few people near the earthquake's origin. These sized Earthquakes are common in Australia and cause little to no damage.