WHEN THE EARTH SHAKES: A RELEASE OF ENERGY

When large pieces of the Earth grind and collide against each other, pressure begins. When those plates break free, the surface of the Earth shakes suddenly and without warning.

The Earth's surface is like a giant puzzle, with pieces that form its outer layers. Though we may not always feel it, these puzzle pieces, or **tectonic plates**, are constantly moving and bumping into one another. But when the jagged edges of the plates get caught on each other, energy and friction begin to build. Once these edges (known as **faults**) break free, that energy is radiated outwards, sending **seismic waves**, like ripples, across the Earth's surface, causing an **earthquake**. The location on the Earth's surface directly above the earthquake is its **epicenter**.

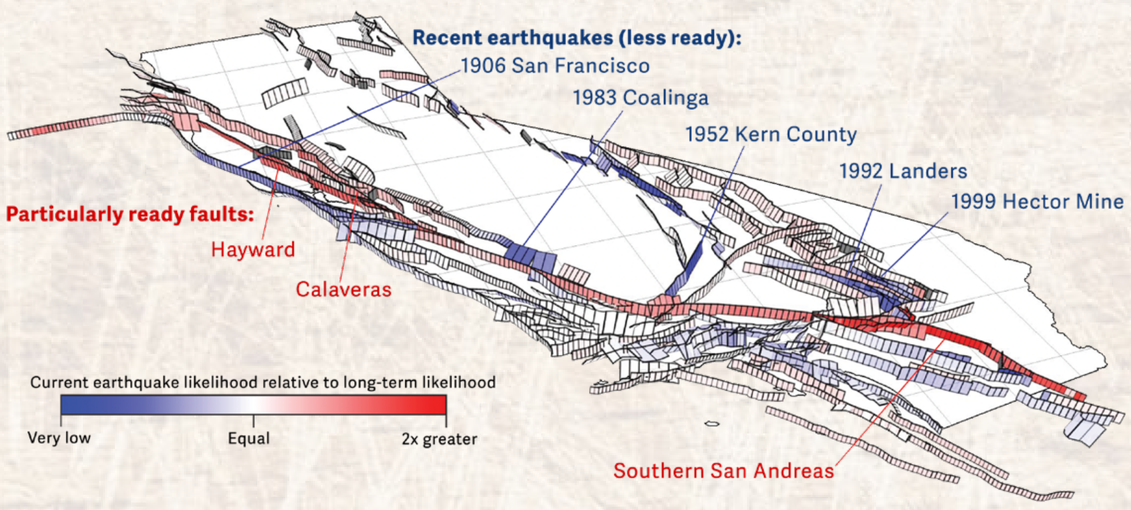
The San Andreas Fault in Carrizo Plain National Monument in the Central Valley. Photo by Doc Searls (@faultfind_48 on Flickr). Licensed under Attribution-ShareAlike 2.0 Generic (CC BY-SA 2.0).

An earthquake's **magnitude**, or size, is detected and recorded using a sensitive instrument called a **seismograph**. Scientists can compare the magnitude and intensity of earthquakes using seismograph stations all over the world. For example, the 1989 Loma Prieta earthquake had a magnitude of 6.9, the 1906 San Francisco earthquake was 7.9, and the 2011 Japan earthquake was 9.0.

While most earthquakes are small, as many as 500,000 are detected each year, though only about 100 cause damage. In the past 20 years, however, earthquakes are responsible for half of all deaths related to natural disasters. The extent of harm and damage depends heavily on population density and building designs. Worldwide, the cost of earthquakes overwhelmingly impacts lower-income populations with lower household savings.

While most earthquakes are caused by natural forces, they can also be induced by humans. According to the U.S. Geological Survey (USGS), earthquakes in the central U.S. have increased over the last decade due to fluid injections from unconventional oil and gas operations. The injected fluid loosens the fault zones, making them more likely to slip and cause earthquakes. New regulations on fluid injections have decreased the number of earthquakes in recent years.

Is it possible to predict earthquakes? Despite various attempts, it is unlikely that we will ever be able to predict them. **While we may not be able to predict when "The Big One" will occur, Californians know it's best to be prepared with an emergency plan and supply kit.**



This map from the third Uniform California Rupture Forecast, published in 2015, reflects each major fault line's long-term likelihood of an earthquake of magnitude 6.7 or greater. Fault lines with recent earthquakes are less likely to be host to another quake in the near future (seen here in blue). Conversly, where pressure from tectonic forces has built up over many years without an earthquake, an earthquakes is more likely to occur in the next several decades (seen here in red). Report compiled in cooperation between Southern California Earthquake Center, California Geological Survey, California Earthquake Authority, and U.S. Geological Survey.