

What Is An Earthquake And How Do They Do Damage?



Lesson One

Earthquakes occur when two blocks of rock within the Earth's crust slide past each other. The contact zone between these two blocks is called a fault. Faults come in nearly all shapes and sizes. Faults can be thousands of miles long on the tectonic plate boundaries, like the San Andreas fault running most of the length of California, or smaller than a football field, and everything in between. The epicenter of an earthquake is the location on the surface of the Earth above the point where the earthquake first originated along that fault.

Earthquakes do damage in a few different ways. When an earthquake occurs, the ground can move significantly compared to the other side of the fault. Buildings and roads that are built on a fault can be torn apart during an earthquake. When an earthquake occurs, seismic waves are generated. Seismic waves are similar to sound. A good analogy is the sound you get by sliding two bricks past each other. The seismic waves generated in an earthquake travel very fast through the Earth and cause shaking or a rolling motion. If this shaking is strong enough, buildings can be damaged or collapse. The shaking or intensity lessens as the seismic waves move away from the epicenter. This is similar to the ripples when you throw a rock in a still pond. As the ripples move away from the spot where the rock hit the water, they become smaller and harder to see until they are no longer visible.

In addition, the seismic waves can cause the ground to lose its strength, especially soils that contain large amounts of water. This is called liquefaction, and can cause buildings to collapse because the soils underneath cannot support the weight of the building. Mountains can have landslides if large amounts of material on a steep-slope collapse quickly and come down the side of the mountain. A landslide occurred near Cavanal Hill in eastern Oklahoma directly after the 1952 M 5.4 El Reno earthquake. Landslides have been associated with many earthquakes around the world and can be a leading cause of casualties and damage associated with earthquakes.



Figure 1 Figure illustrates how a fault might look and how buildings and roads on the fault are damaged when a fault slips and an earthquake occurs. The black rings represent the seismic energy as it radiates away from the epicenter. As the amplitude of the wave decreases it goes to gray. Modified from the USGS.

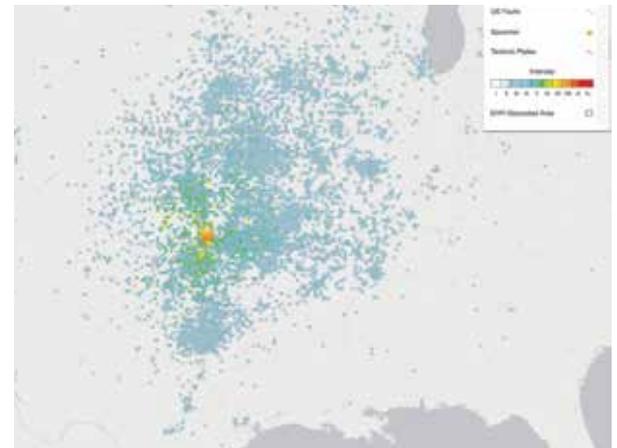


Figure 2 Map showing how the intensity of seismic waves decrease with distance from the 2016 M 5.8 Pawnee earthquake. Intense shaking was observed near the epicenter and it was slightly felt by several people as far away as Denver, Colorado; Chicago, Illinois; and Austin, Texas. These are reported as Modified Mercalli Intensities through the USGS Did You Feel It (DYFI) program, which gathers citizen reports of earthquake shaking with a simple form on the USGS website. You can help scientists understand how shaking effects are felt widely by reporting your own observations after an earthquake you feel!

Additional Materials:

<http://earthquake.usgs.gov/learn/animations/>
<http://earthquake.usgs.gov/learn/kids/>