Earthquakes

Since 1900, earthquakes in the United States have resulted in over 1300 deaths and direct damages totaling more than $51 billion. While the West Coast and Alaska have the highest risk, history shows that major earthquakes can also affect the Central and Eastern United States.

Basics

Most earthquakes are caused by the sudden release of built-up stress along faults, fractures in the Earth’s crust where large blocks of crustal rock move against one another. An earthquake’s size can be measured by the amount of energy released by that movement. While scientists can't predict earthquakes, they are developing earthquake early warning systems that can provide seconds to minutes of warning when an earthquake occurs. Scientists can also estimate the likelihood of future quakes and use that information to design safer buildings and roads.

Frequently Asked Questions

Why and where do earthquakes happen?
American Geosciences Institute
Can earthquakes be predicted?
U.S. Geological Survey
What is the probability that an earthquake is a foreshock to a larger earthquake?
U.S. Geological Survey
Does hydraulic fracturing cause earthquakes?
U.S. Geological Survey
Hazards
Natural hazards such as earthquakes, landslides, hurricanes, floods, and wildfires endanger public health and safety, threaten critical infrastructure, and cost our economy billions of dollars each year. Geoscientists study these hazards to provide information and warnings to populations at risk.

Landslides
Landslides affect all 50 states and U.S. territories, where they cause 25 to 50 deaths and more than $1 billion in damages each year. Geoscientists study and monitor landslides to identify at-risk areas, prepare populations, and improve our understanding of why, when, and where landslides happen.

Sinkholes
Sinkholes have both natural and artificial causes. They tend to occur most often in places where water can dissolve the bedrock (especially limestone) below the surface, causing overlying rocks to collapse. Florida, Texas, Alabama, Missouri, Kentucky, Tennessee, and Pennsylvania are most sinkhole-prone.

Tsunamis
Tsunamis are destructive waves caused by sudden displacement of ocean water. Tsunamis most often appear on shore as a rapidly receding tide or rapidly rising flood. In the United States, the Pacific coastal states – Oregon, Washington, California, Alaska, and Hawaii – are at greatest risk for destructive tsunamis.

Volcanoes
Volcanoes pose many hazards to their surroundings, from ashfall, mudflows, lava flows, landslides, and associated earthquakes. At least 54 of the United States' 169 active volcanoes pose major threats to public health and safety and to major industries such as agriculture, aviation, and transportation.

**Maps & Visualizations**

Interactive map of California earthquake hazard zones
California Geological Survey

The California Geological Survey’s Earthquake Hazards Zone Application (EQ Zapp) is an interactive map that details the risk of earthquakes and related hazards for different areas of the state. The map is searchable by address, and it maps three main hazard zones: Fault zones Landslide zones...

**Case Studies & Factsheets**

Geologic map guides earthquake damage prediction in New Jersey

Geologic mapping provides the data foundation that makes soil mapping and earthquake simulations possible. This approach also can be used to predict damage in areas where the historical record indicates a risk of potential earthquakes. Defining the Problem The density and value of its buildings...

**Webinars & Forums**

Improving Earthquake Resiliency Through the Use of Post-Earthquake Clearinghouses

This webinar provides an overview of earthquake risk in the U.S. and explores the importance of coordinated post-earthquake response and the effectiveness of post-earthquake technical clearinghouses in improving earthquake resiliency.

**GOLI Online Courses**
Communicating Cascadia's Earthquake Risk
Course Type: GOLI Online Course

View course

Geoscience research is at the forefront of characterizing the earthquake risks associated with the Cascadia subduction zone in the Pacific Northwest. This course covers the science and its implications for policy decisions and resiliency efforts.

Search all GOLI courses