

## SOME SIGNIFICANT EARTHQUAKES THAT HAVE AFFECTED TRINIDAD AND TOBAGO

- 2009**  
4.8 occurred on land and felt in Sangre Grande and Penal, no reported injuries.
- 2008**  
5.8 located on the East Coast and felt mainly in Galeota, no reported injuries.
- 2007**  
7.3 felt throughout the Eastern Caribbean from Puerto Rico to Guyana; damage reported in Martinique, St. Lucia, St. Vincent and Barbados. This is the fifth earthquake in the magnitude 7 range to occur near Martinique since 1727.
- 2006**  
5.8 felt throughout Trinidad with 3 reported injuries in Point Lisas.
- 1997**  
6.1 magnitude which caused US \$25 million in damages to Tobago, 2 were injured and 15 were left homeless.
- 1996**  
5.2 North of Trinidad occurred New Year's Day. No reported injuries.
- 1968**  
6.3 occurred off east Coast Trinidad. No injuries reported.
- 1962**  
5.2 largest earthquake near Tobago up to that time.
- 1968**  
7.0 significant damage in Venezuela with some damages to Port of Spain, Trinidad.
- 1964**  
6.5 one person was killed and many were injured.
- 1888**  
7.5 Damage occurring from Trinidad to St. Vincent.
- 1766**  
7.9 Destroyed Trinidad's then capital San Jose.



## SEISMIC DATA FOR TRINIDAD AND TOBAGO

### HISTORICAL DATA

Trinidad and Tobago lies at the south-eastern corner of the Caribbean plate, close to the second most seismically active zone in the Eastern Caribbean. Tectonically it is a complex area because to the north there is subduction of Atlantic Ocean lithosphere beneath the eastern boundary of the Caribbean plate and to the west, there is a strike-slip motion between the southern Caribbean plate boundary and the South American plate. The transition between the two (2) types of motion gives rise to different seismogenic zones with distinct characteristics. Generally background seismicity in the vicinity of Tobago is relatively low when compared with other zones in the Eastern Caribbean.

There are six (6) seismogenic zones that can be identified near Trinidad. These include:

- ◆ **North of Paria Peninsula Seismogenic Zone** - the second most seismically active area in the Eastern Caribbean.
- ◆ **Gulf of Paria and Paria Peninsula Seismogenic Zone** - approximately 40 events of magnitude 2.1 and above are located in this area annually.
- ◆ **North of Trinidad Seismogenic Zone** - the largest known earthquake in this area was of magnitude 6.6 and occurred on December 4, 1964.
- ◆ **East of Trinidad Seismogenic Zone** - From 1952, when the Seismic Research Unit began its monitoring work in the eastern Caribbean, until the end of 1987 the area east of Trinidad manifested a low level of seismicity, less than ten events annually, both in terms of numbers of events and their magnitudes.
- ◆ **On land Trinidad Seismogenic Zone** - Since 1980 and prior to 2004, there have been approximately, 13 events annually, in general of magnitude less than 4.1.
- ◆ **South of Trinidad Seismogenic Zone** - During the instrumental period since 1962, there has been negligible seismicity generated in the zone closest to Trinidad.

Source:  
University of the West Indies, Seismic Research Centre ([uwisismic.com](http://uwisismic.com))

### The agency responsible for seismic monitoring:-



Established in 1952, the Seismic Research Centre of the University of the West Indies (UWI) is the agency responsible for monitoring earthquakes, volcanoes and tsunamis for the English-speaking countries of the Eastern Caribbean.

This Unit is based at the UWI Campus in St. Augustine, Trinidad and is funded by nine contributing governments from the region.

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A Division of the Ministry of National Security

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being prepared is key...  
so let's PLAN and PREPARE  
in order to safeguard our families,  
our community and country.*



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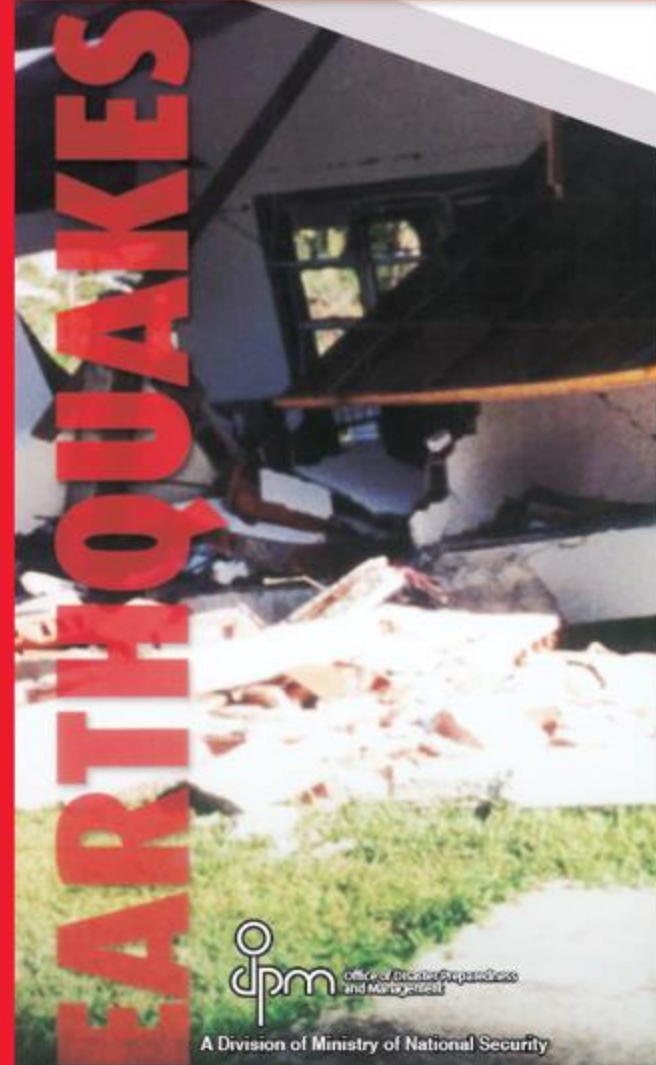
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# Everything you need to know about EARTHQUAKES



A Division of Ministry of National Security



# EARTHQUAKES

## WHAT IS AN EARTHQUAKE?

An earthquake is a natural hazard which occurs when the ground shakes or rocks violently.

## WHAT CAUSES THE EARTH TO MOVE SO VIOLENTLY?

The earth is made up of four major layers: the inner core, outer core, mantle and crust. The crust is the outermost and thinnest layer of the earth and is made out of rock. This layer of rock is not one smooth continuous layer. It is broken into several large pieces that can fit together like a jigsaw puzzle. These pieces are known as tectonic plates (Figure 1).

These tectonic plates are able to move around and interact with one another; sliding and bumping into each other. However, when two or more of these plates meet, they can lock or stick together, causing energy to build up below the plates.

When the plates are able to break free from each other, the built up energy is released moving through the earth resulting in the shaking of the ground or what we call an earthquake.

Figure 1: The different Tectonic Plates.



## What are the effects of Earthquakes?

- ◆ **DAMAGE TO BUILDINGS AND INFRASTRUCTURE:**  
Shaking and ground rupture are the main effects associated with earthquakes. These may result in general property damage, collapse of buildings or destabilization of the base of buildings and road and bridge damage.
- ◆ **LANDSLIDES:**  
Earthquakes can cause landslides in hilly and mountainous areas.
- ◆ **FIRES:**  
These can be generated by broken electrical, power or gas lines. Additionally, ruptured water mains, resulting in low water pressure can exacerbate the hazard by making it difficult to contain the spread of any fires that can occur.
- ◆ **TSUNAMIS:**  
The best example of this would be the 2004 Indian Ocean Tsunami. This earthquake which occurred off the coast of Sumatra, measured 9.1 on the Richter Scale and was responsible for the destructive Tsunami that killed 300,000 people.  
  
However, the largest recorded earthquake took place off the coast of Chile in 1960 and measured 9.5 on the Richter scale. The result of that earthquake was a Tsunami that affected Hawaii, Japan, the Philippines, New Zealand and Australia. An earthquake of magnitude 8.8 also occurred in Chile in February 2010 that caused a local tsunami.
- ◆ **LIQUEFACTION:**  
Earthquake liquefaction occurs when ground shaking reduces the strength of the soil which then becomes saturated by a rise in the water table. Reclaimed land is also susceptible to the effects of liquefaction.

## How are Earthquakes measured?

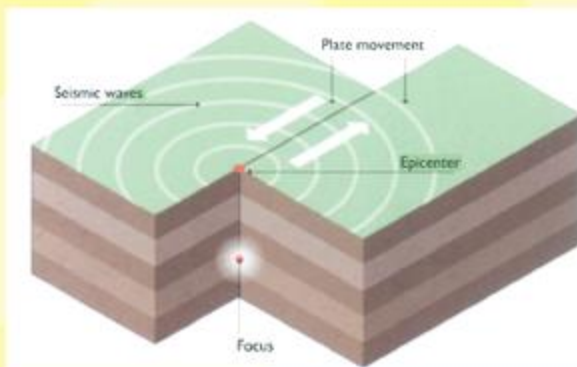
Seismometers are used to record the seismic waves generated by an earthquake. Seismologists are then able to use these recordings to determine where the earthquake was located and how strong it was.

Magnitude is used to measure an earthquake's size and is related to the amount of energy generated by the earthquake.

The Mercalli Intensity Scale is used to categorize the levels of shaking observed during an earthquake.

## Important Earthquake Terms:

- A **SEISMIC WAVE** travels through the Earth, most often as the result of an earthquake, sometimes from an explosion. Seismic waves are also continually excited by the pounding of ocean waves and the wind.
- INTENSITY** describes the level of shaking during an earthquake.
- MAGNITUDE** is a measure of the strength of an earthquake and is related to the amount of energy released.
- THE HYPOCENTRE/FOCUS** is the area within the crust where rocks rupture and release their stored energy in an earthquake.
- THE EPICENTRE** is the point on the earth's surface that is directly above the hypocenter or focus. The epicenter is usually the location of greatest damage.



## SAFETY TIPS

- ◆ Build your home in accordance with the recommended building codes.
- ◆ Bolt heavy furniture, water tanks, water heaters, gas cylinders and storage units to walls or floor.
- ◆ Place the largest and heaviest items on lower shelves.
- ◆ Emergency items and equipment such as canned food, water, medication, flashlights, battery-operated radios, fire extinguishers and a First Aid Kit should be available and functioning.
- ◆ All family members should know how to turn off electricity, gas and water using safety valves and main switches.
- ◆ All family members should know what to do during an earthquake and should practice these safety tips through regular drills.

## DURING AN EARTHQUAKE

- ◆ Stay calm, do not panic.
- ◆ If inside, do not run outside of the building.
- ◆ Get under a sturdy desk, table or bed, protect head and eyes and hold on to the desk/table.
- ◆ Stay away from glass, mirrors, windows, picture frames and objects that may shatter.
- ◆ Stand in a strong doorway and be careful of swinging doors.
- ◆ Do not use elevators or staircases.
- ◆ If on the street, move into an open area, away from buildings.
- ◆ If driving, bring your car safely to a stop at the side of the road, away from electricity poles, lines, bridges and trees. Remain in the vehicle and be vigilant.

## AFTER AN EARTHQUAKE

- ◆ Check for fires.
- ◆ Check for injuries and administer first aid (if necessary).
- ◆ Check utilities and shut off (if necessary).
- ◆ Listen to your radio for emergency bulletins.
- ◆ Check your house for any damage. Evacuate if there is any threat.
- ◆ Report damage to the Fire Services or the relevant authorities.
- ◆ Stay away from landslide prone areas.
- ◆ Secure your property and stay away from buildings that may have been weakened by the earthquake.
- ◆ Assess your situation and take action to improve preparedness in the future.

## TRIANGLE OF LIFE:

- ◆ The recommendation known as the "Triangle of Life" is widely circulated after major earthquakes and it suggests that during an earthquake it is safer to curl up next to a desk or bed rather than to go under it. This practice is not recommended for the following reasons:
  - ◆ The "Triangle of Life" is not scientifically proven and tested.
  - ◆ It is unknown if during the earthquake these "triangles of life" (triangular spaces next to desks, beds etc.) are impacted in any way which may make them unsafe areas
  - ◆ In the Eastern Caribbean, "pancaking" or crumbling of buildings which would crush occupants as described in the "Triangle of Life", is not expected.