**Tectonics and Earthquakes of JAMAICA (Text from the animation)**

*(link to the animation here:* <https://www.iris.edu/hq/inclass/animation/713>)

Jamaica is the third-largest island of the Greater Antilles along the northern Caribbean Sea.

The Greater Antilles straddle the northern boundary of the Caribbean Plate, a mostly oceanic plate that moves 2 cm/yr eastward with respect to the North American Plate. In this region, the Caribbean Plate is broken into at least four microplates as the North American – Caribbean plate boundary changes from frontal subduction at the Lesser Antilles Trench — to oblique subduction at the Puerto Rico Trench — to oblique collision at the North Hispaniola Trench — and finally to strike-slip in the Cayman Trough.

The Gonave microplate stretches from the Cayman Spreading Center on the west to western Hispaniola on the east. The north and south boundaries of the Gonave microplate are dominantly left-lateral strike slip faults with rates of motion about 1 cm/yr. Most of the earthquakes occur on or near the microplate boundaries. Two recent major earthquakes emphasize how proximity to population centers controls human impact. The January 12, 2010 magnitude 7 earthquake near Port-au-Prince caused over 100,000 fatalities. Although the January 28, 2020 magnitude 7.7 earthquake on the Oriente Fault released 20 times more energy, its location far from populated islands resulted in minimal impact and no fatalities.

Notice the offset between the Enriquillo – Plantain Garden Fault in southeast Jamaica and the Walton Fault in northwest Jamaica. This is a “restraining bend” in the left-lateral strike-slip fault system along the southern edge of the Gonave microplate. As left-lateral strike-slip motion progresses, an overlap or collision between the blocks develops in the bend. This overlap becomes a zone of thrust and strike-slip faulting between the crustal blocks.

Over millions of years, displacement between the Gonave microplate and the Caribbean Plate in the restraining bend has broken the oceanic crust of Jamaica into blocks separated by strike-slip and thrust faults. Resulting uplift is responsible for Jamaica being an island and is continuing to raise the Blue Mountains. We see that active faulting and recent seismicity are concentrated on the Plantain-Garden & Blue-Mountains faults in southeast Jamaica and, to lesser extent, along the Central Jamaica Fault System.
Major destructive earthquakes occurred in 1692 and the 1907. The epicenters are not well located but occurred within or adjacent to eastern Jamaica.

Kingston, Jamaica’s largest city, like Port au Prince, is underlain in many areas by unconsolidated sands and gravels. Port Royal, the unofficial capital of Jamaica in the late 1600s, was built largely on a sand spit in Kingston Harbor. Port Royal, described as “the most important English city of the New World” and “one of the wickedest places on Earth”, was home port for many true “Pirates of the Caribbean”. By early 1692, the population of 6500 occupied the 2000 buildings. Then on June 7, 1692, an earthquake estimated at magnitude 7.5 struck. Ground shaking, liquefaction, and lateral spreading combined with submarine landslides so that 2/3 of the town sank into the sea and resulting tsunamis washed over the sunken and damaged buildings. About 2000 people were killed immediately by the earthquake and tsunami with many victims entombed in sand that liquefied during ground shaking then solidified when ground shaking stopped. An additional 3000 deaths followed from injuries and disease. Port Royal was partially rebuilt then mostly destroyed by fire in 1703 and Kingston became the major city.

By the early 1900s, Kingston had grown to a population of 60,000. Then on January 14, 1907 a magnitude 6.5 earthquake struck the city. The greatest intensity of ground shaking, liquefaction, and damage occurred in the business and harbor districts where over 80% of buildings were destroyed. In addition to destruction from effects of ground shaking, seiches, or standing waves, occurred in Kingston Harbor resulting in seawater inundating areas near the shoreline. Tsunamis, likely caused by submarine landslides that severed communications cables, reached 2 meters height on northern shores. This earthquake caused 800 to 1,000 fatalities.

In the succeeding 113 years, Kingston has grown to over 1 million people and the population of Jamaica is approaching 3 million. Rapid growth and the high poverty rate has resulted in vulnerable buildings. Since 1907, Jamaica has experienced only four moderate to strong earthquakes while over 20 deadly and damaging hurricanes have affected the island challenging. Yet Jamaica is cut by strike-slip and thrust faults that, at any time, can produce major earthquakes like the 2010 Haiti earthquake.  Jamaica's Office of Disaster Preparedness and Emergency Management's has successfully promoted awareness of earthquake hazards and personal protective actions.  The next step on the path to earthquake resilience is to improve earthquake resistance of buildings and infrastructure.