

Magnitude 7.0 HAITI

Tuesday, January 12, 2010 at 21:53:09 UTC

A powerful earthquake hit the impoverished country of Haiti on Tuesday, collapsing the presidential palace and numerous other critical government buildings and raising fears of substantial casualties in what a witness called “a major, major disaster.”

NBC News



*Image courtesy of the
U.S. Geological Survey*



Before and After Earthquake
Presidential Palace in Port-au-Prince, Haiti



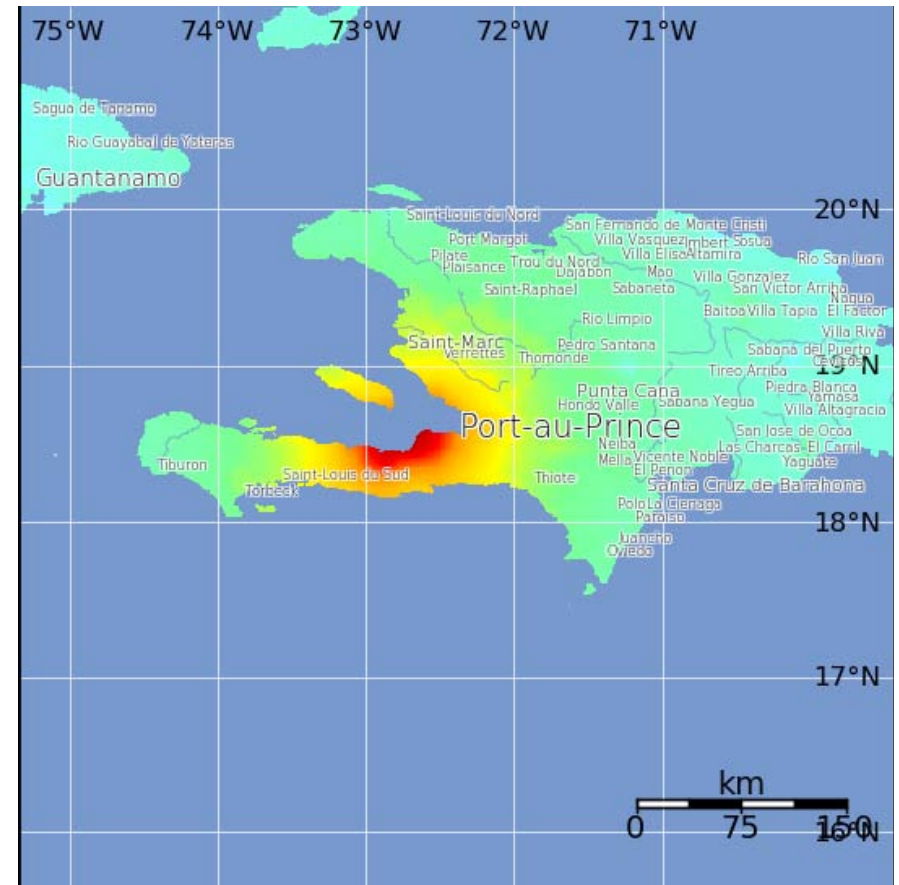
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The earthquake occurred about 10 miles west of the capital of Haiti, Port-au-Prince, and caused extreme shaking.

USGS Shaking Intensity

Mike Blanpied of the US Geological Survey said that, based on the location and size of the quake, about three million people would have been severely shaken by its impact.

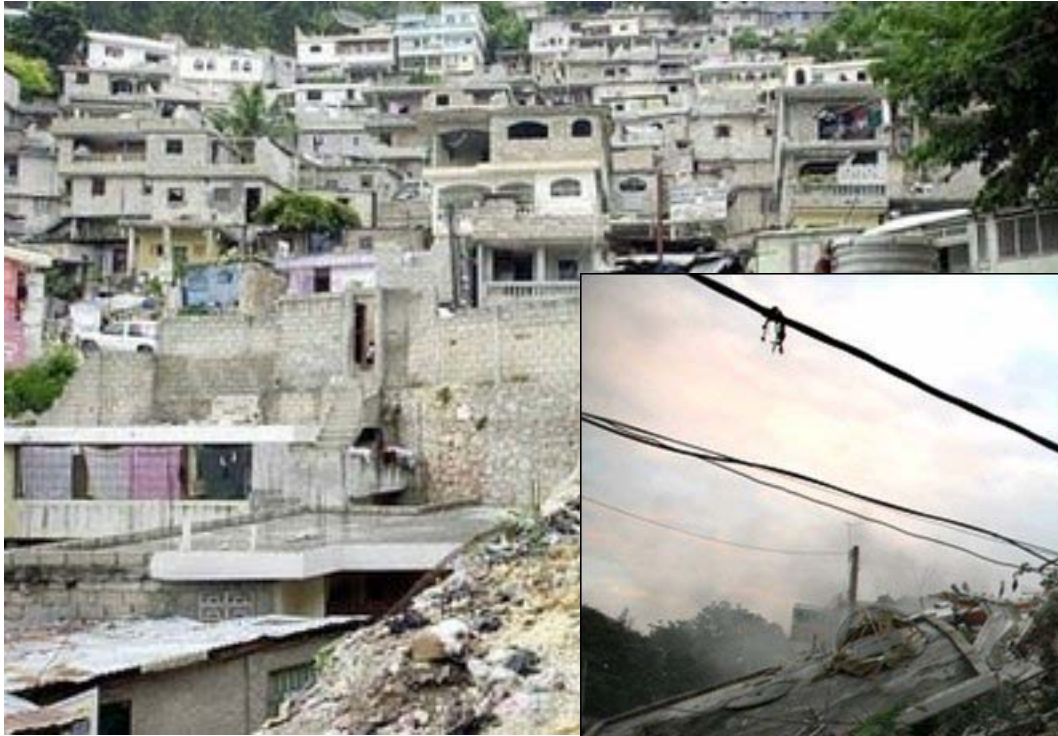


Modified Mercalli Intensity

X
IX
VIII
VII
VI
V
IV
II-III
I

Perceived Shaking
Extreme
Violent
Severe
Very Strong
Strong
Moderate
Light
Weak
Not Felt

Image courtesy of the U.S. Geological Survey



Left: Photo taken prior to the earthquake. Low income housing-unreinforced masonry.

Below: After



Further complicating the situation, many people live in structures that are vulnerable to earthquake shaking.

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Carel Pedre via Twitter



"Thousands of people were feared dead today after a powerful earthquake struck Haiti's capital, leaving tens of thousands homeless and buried beneath rubble.... Thousands of people gathered in public squares late into the night, singing hymns and weeping, with many seriously injured people sitting in the streets pleading for doctors."

The Gazette, U.K.

Eyewitness

Carel Pedre, TV and radio presenter, Port-au-Prince

I saw a lot of people crying for help, a lot of buildings collapsed, a lot of car damage, a lot of people without help, people bleeding.

I saw a movie theatre, a supermarket, a cybercafe, an apartment building which collapsed.

Now it's dark outside, there is no electricity, all the phone networks are down, so there's no way that people can get in touch with their family and friends.

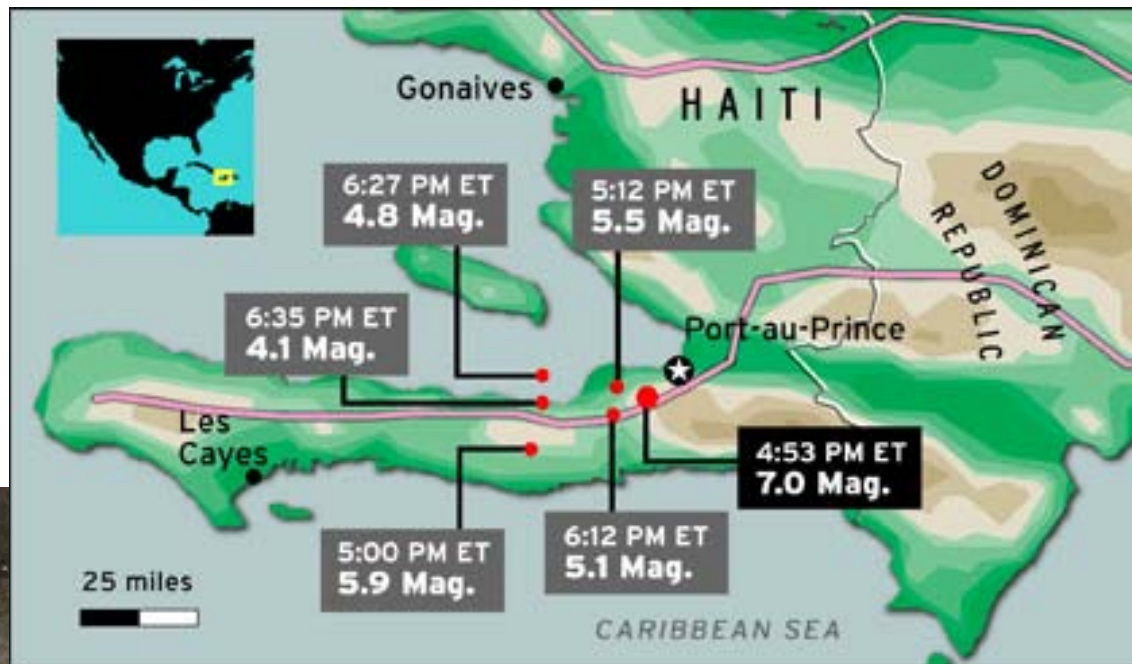
There are aftershocks every 15 to 20 minutes. They last from three to five seconds. The first shock was really strong, people were falling in the streets and buildings collapsed.

I didn't see any emergency services, the people at the neighbourhood were trying to help each other.

The streets are narrow and there is lot of traffic and everyone is trying to reach family and friends. Traffic now is really difficult. People don't know where to go or where to start.

Aftershocks

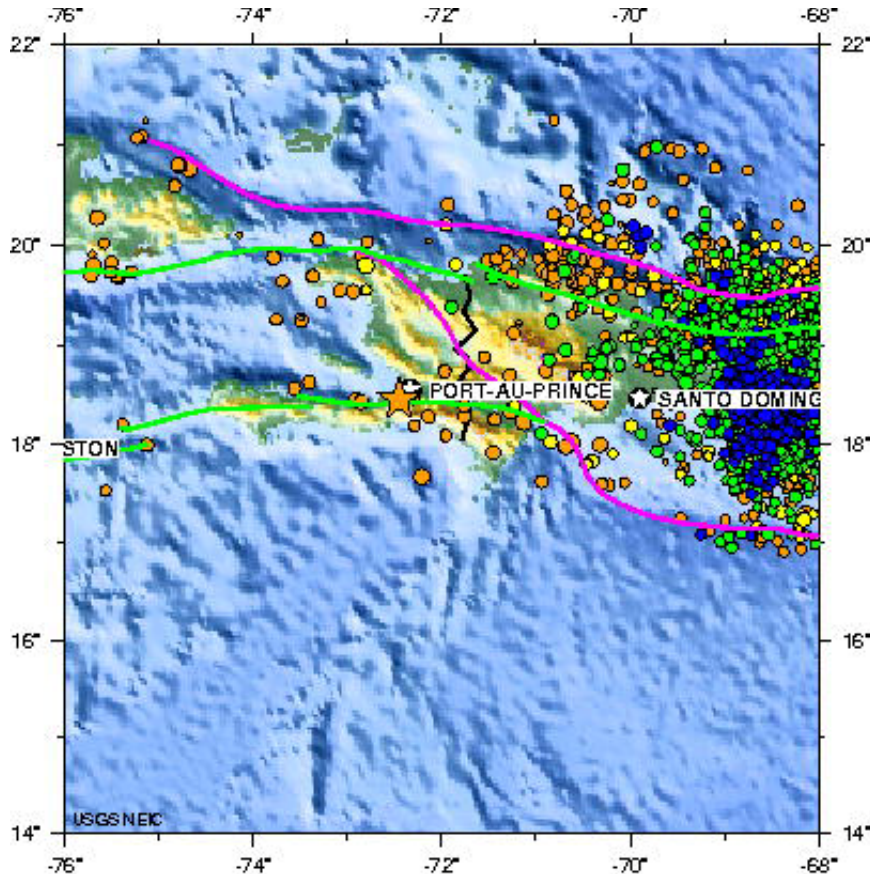
This earthquake was followed by five powerful aftershocks within the first two hours after the devastating quake.



Left: Aftershocks (yellow)

In the first eleven hours after the earthquake there have been 32 aftershocks greater than magnitude 4.

Earthquake and Historical Seismicity



HAITI REGION

2010 01 12 21:53:09 UTC 18.45N 72.45W Depth: 10.0 km, Magnitude: 7.0

Seismicity 1990 to Present

This earthquake (star), plotted with regional historical seismicity, occurred on the transform plate boundary between the Caribbean and North American plates.

As expected for an earthquake on a transform boundary, the depth of the event was quite shallow at about 10 km.

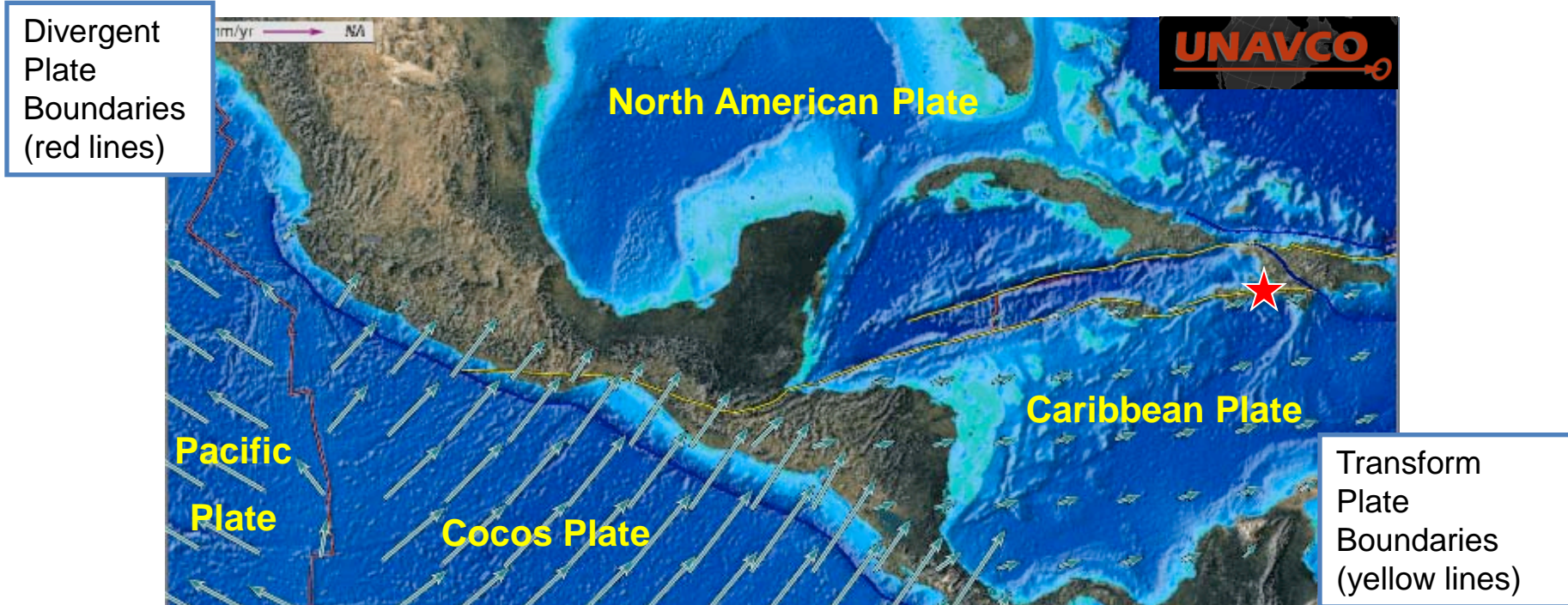
The depth and proximity to the population center contributed to the destruction.

This powerful earthquake was the largest magnitude this region has seen in two centuries.

Image courtesy of the U.S. Geological Survey

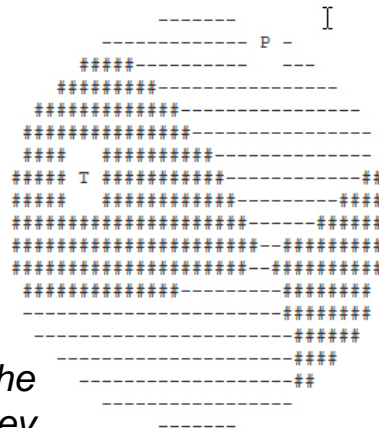
Regional Tectonics

This map shows the rates and directions of motion of the Cocos, Pacific, and Caribbean plates with respect to the North American Plate. The small arrows on the Caribbean Plate show that it moves eastward at a rate of about 20 mm/yr (2 cm/year) with respect to the North American Plate. This is a fairly slow rate of transform motion between the Caribbean and North American plates. For comparison, the rate of transform motion across the San Andreas transform fault between the North American and Pacific plates is about 50 mm/yr (5 cm/yr).



Haiti occupies the western part of the island of Hispaniola. At the longitude of the earthquake, motion between the Caribbean and North American plates is partitioned between two major east-west trending, strike-slip fault systems -- the Septentrional fault system in northern Haiti and the Enriquillo-Plantain Garden fault system in southern Haiti.

USGS Centroid
Moment Tensor



Graphic courtesy of the
U.S. Geological Survey

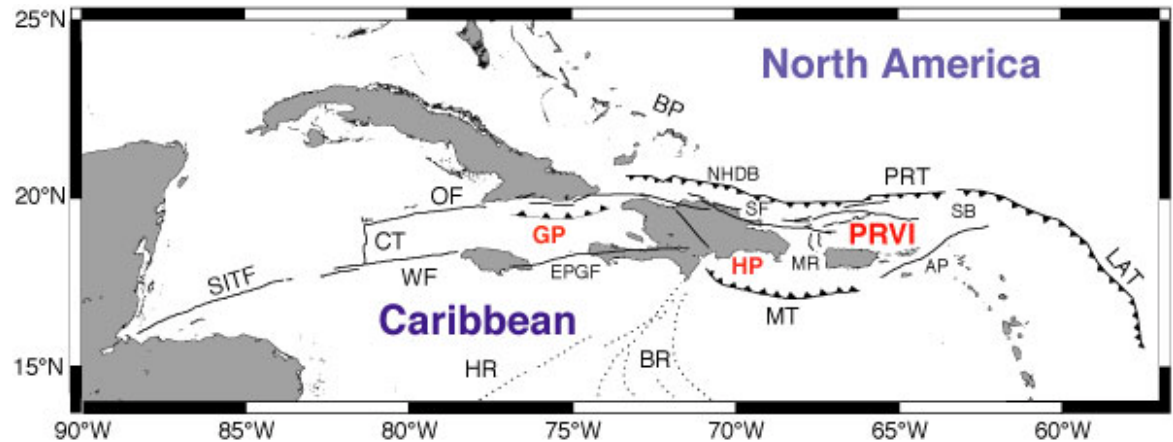


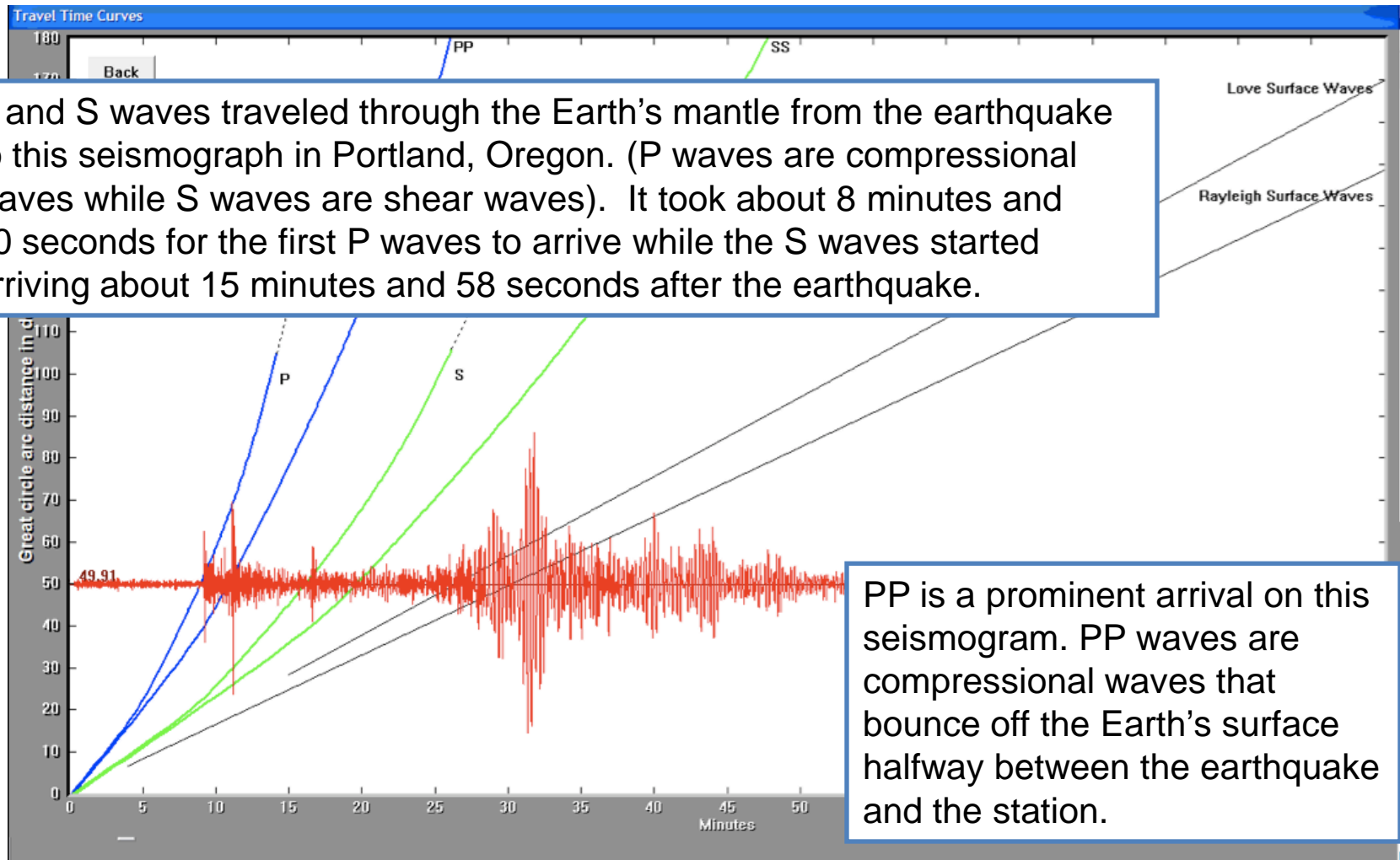
Figure 1. Map of northern Caribbean plate boundary showing microplates and structures. AP: Aneгада Passage. BP: Bahamas Platform. BR: Beata Ridge. CT: Cayman Trough Spreading Center. EPGF: Enriquillo-Plantain Garden Fault. GP: Gonvave Platelet. HP: Hispaniola Platelet. HR: Hess Rise. LAT: Lesser Antilles Trench. MR: Mona Rift. MT: Mueritos Trough. PRVI: Puerto Rico-Virgin Islands block. SB: Sombrero Basin. SITF: Swan Islands Transform Fault. SF: Septentrional Fault. WF: Walton Fault.

The location and focal mechanism of the earthquake are consistent with the event having occurred as left-lateral strike slip faulting on the Enriquillo-Plantain Garden fault system. This fault system accommodates about 7 mm/y, nearly half the overall motion between the Caribbean plate and North America plate.

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The record of the January 12, 2010 Haitian earthquake on the University of Portland seismometer is illustrated below. Portland is about 5500 km (~3400 miles) from the location of this earthquake.



P and S waves traveled through the Earth's mantle from the earthquake to this seismograph in Portland, Oregon. (P waves are compressional waves while S waves are shear waves). It took about 8 minutes and 50 seconds for the first P waves to arrive while the S waves started arriving about 15 minutes and 58 seconds after the earthquake.

PP is a prominent arrival on this seismogram. PP waves are compressional waves that bounce off the Earth's surface halfway between the earthquake and the station.

Quick Time Required


Animation of the generalized path of seismic waves traveling from the Haitian earthquake to a seismometer in Portland, Oregon

Haiti_Earthquake_100112_B

File Edit View Window Help


Magnitude 7.0 earthquake near Port-au-Prince, Haiti
6000 km (~3,730 mi) from UPOR seismic station in
Portland, OR

January 12, 2010

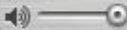







UPOR Port au Prince, Haiti

Scale and motion exaggerated to show wave patterns



00:00:00

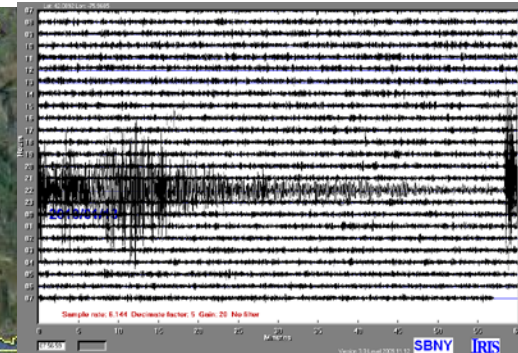
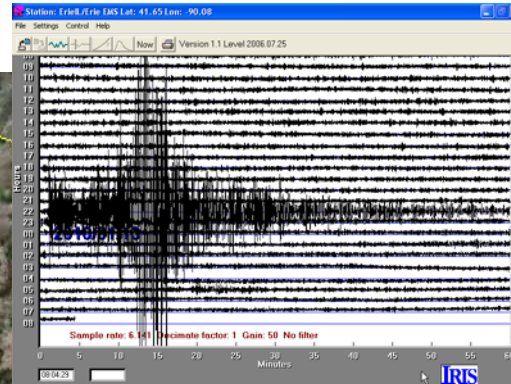
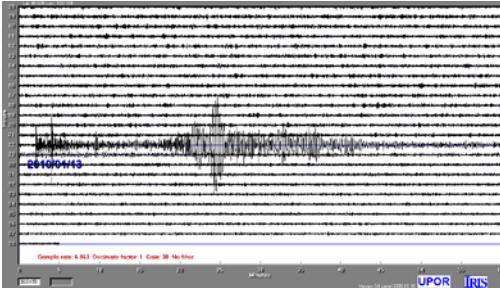
     

Seismic Waves Cross the Country

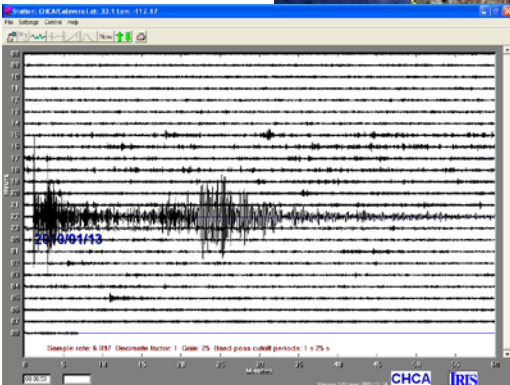
EMIL

UPOR

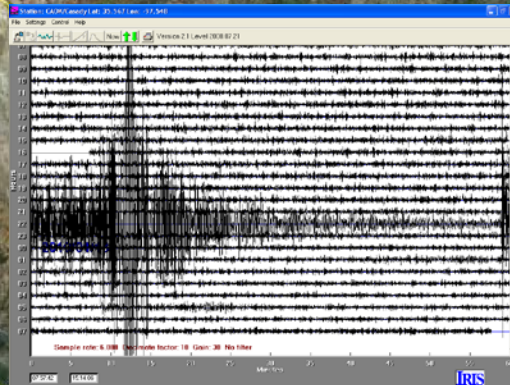
SBNY



CHCA



CAOK



NLNC

