

Magnitude 6.7 Earthquake Gulf of California

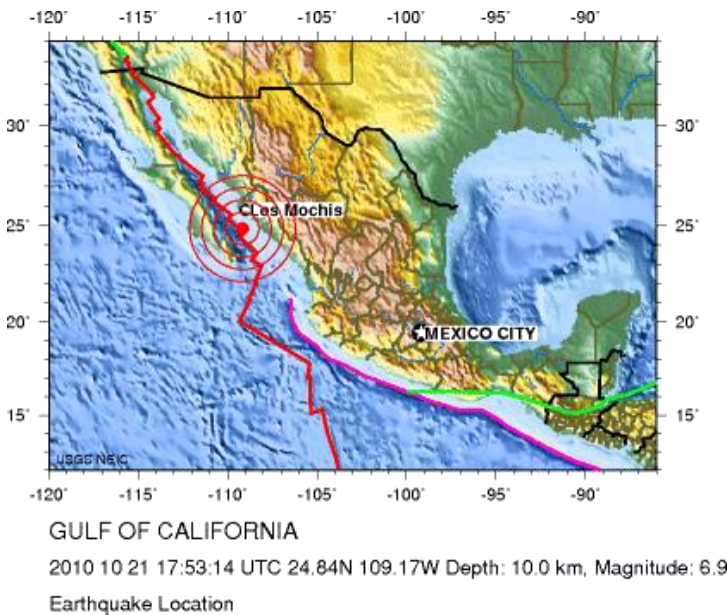
Thursday, October 21, 2010 at 17:53:14 UTC (10:53:14 AM PDT, 11:53:14 AM Local Time)

Epicenter: Latitude 24.84°N, 109.17°W. Depth: 10.0 kilometers.

As determined by the US Geological Survey National Earthquake Information Center (NEIC), a magnitude 6.7 earthquake occurred Thursday in the Gulf of California. The epicenter is indicated by the red dot on the left-side map below while the map on the right shows historic earthquake activity near the epicenter (orange star) from 1990 to present.

Earthquake Location

This earthquake occurred on the transform plate boundary between the North American and Pacific Plates. Northwest of the M 6.7 event, this transform and ridge boundary connects to the northwest – southeast oriented San Andreas Fault that is shown by the green line at the northwest corner of the location map. Essentially all of the earthquakes in this region are shallow with depths less than 30 km as expected for earthquakes on transform and ridge plate boundaries. There were no immediate reports of significant damage or injuries resulting from this earthquake.



Images courtesy of the US Geological Survey

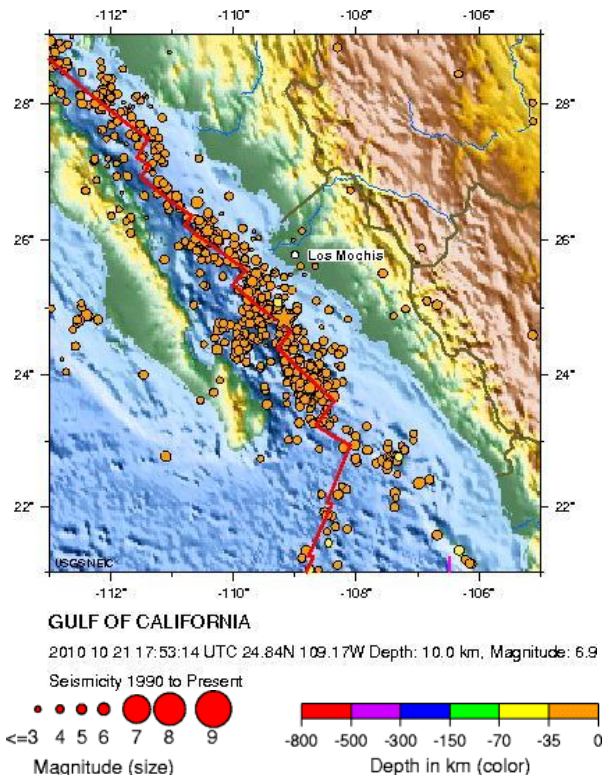
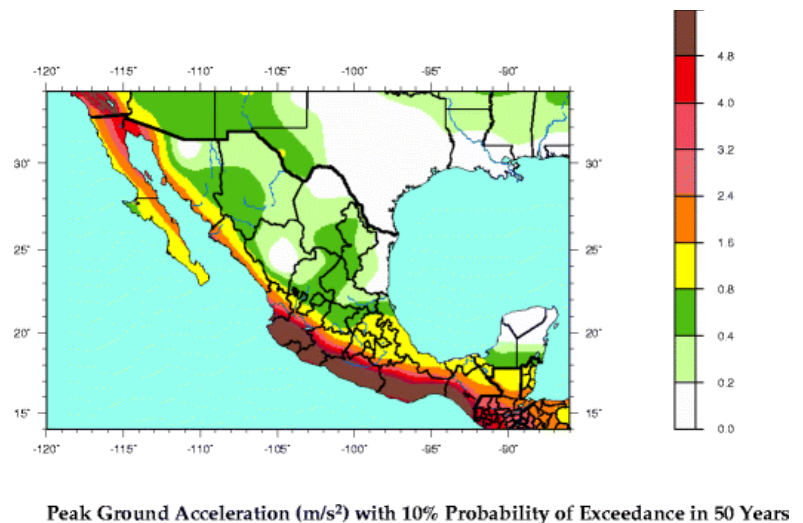


Plate Tectonic Setting

The following text is summarized from the USGS-

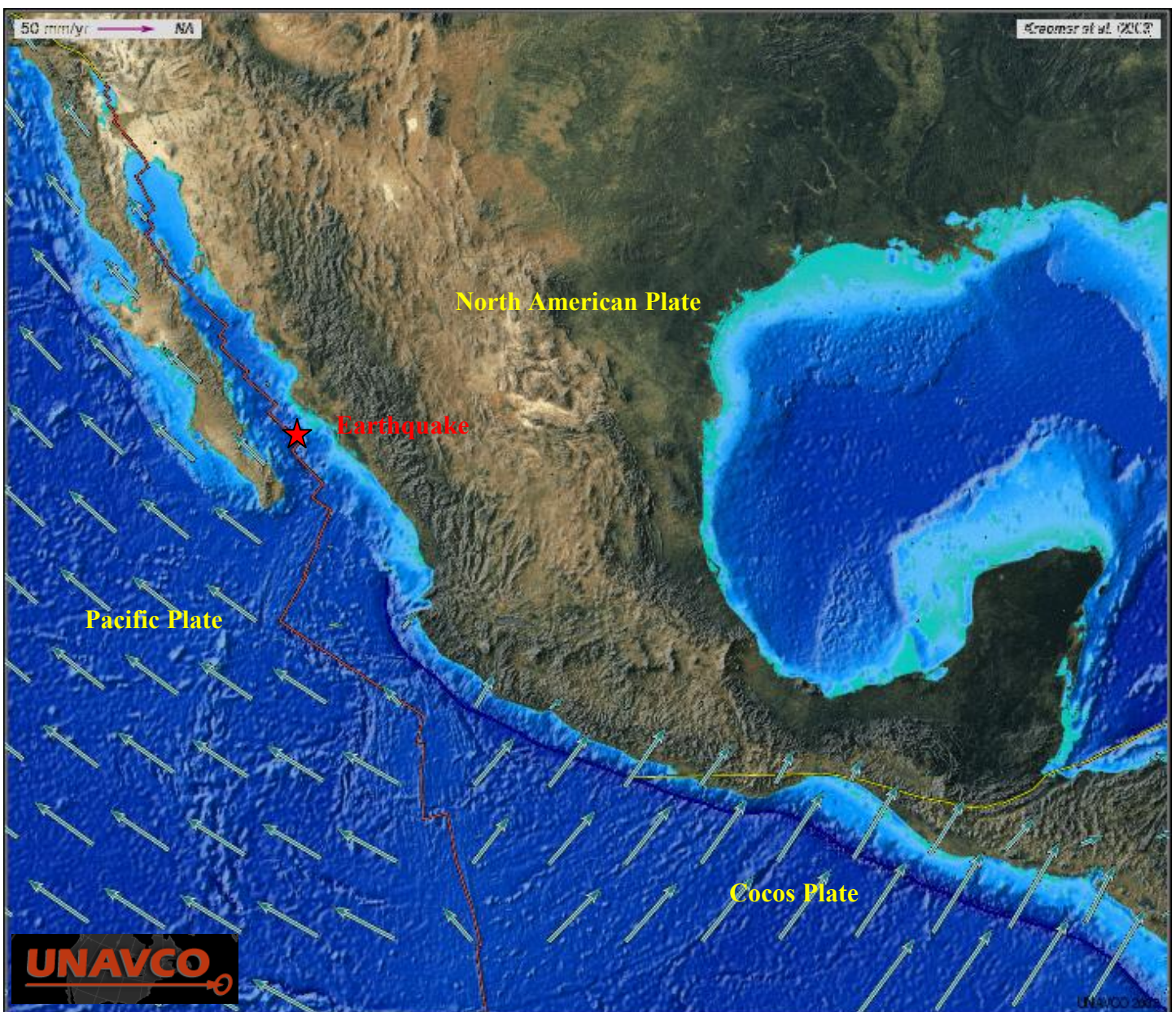
“Situating atop three of the large tectonic plates that constitute the earth’s surface, Mexico is one of the most seismologically active regions on Earth. The continual motion of tectonic plates causes earthquakes and volcanic activity.”

The image on the right is a Seismic Hazard Map of Mexico showing Peak Ground Acceleration potential in the next 50 years. Peak Ground Acceleration is a measure of how hard the ground shakes.



The arrows on the plate tectonic map below show the rates and directions of motion of the Pacific and Cocos plates with respect to the North American Plate. Most of Mexico is on the North American Plate. The Baja California Peninsula and the ocean floor southwest of Mexico are on the Pacific Plate that is moving northwest relative to the North American Plate. The Pacific Ocean floor off southern Mexico is carried northeast on the Cocos Plate that subducts beneath the North American Plate at the Middle American Trench. Volcanoes of southern Mexico and Central America are the volcanic arc produced by the Cocos – North America subduction zone.

The red star indicates epicenter of the October 21 earthquake. In the Gulf of California, the Pacific - North American plate boundary is a complex of short (sea-floor spreading) ridge segments that are linked by longer transform (strike-slip) faults. The transform and ridge boundary within the Gulf of California is slowly increasing the width of the gulf as Baja California is pulled away from mainland Mexico. At the northwest end of the Gulf of California, the ridge and transform plate boundary connects to the southeastern end of the San Andreas Fault in California. This magnitude 6.7 earthquake occurred on one of the transform fault segments within the Gulf of Mexico.



Seismogram Description

The record of this magnitude 6.7 earthquake on the University of Portland seismometer is illustrated below. This earthquake occurred 23.40 degrees (2597 km) away from the recording station UPOR in Portland, Oregon.

P-waves are compressional waves that travel a curved path through the mantle. The P-waves arrived to the seismometer in Portland, Oregon 5 minutes 9 seconds after the earthquake. Traveling the same path as the P-wave, the S-waves (shear waves) travel at a slower velocity, arriving 9 minutes 25 seconds after the earthquake. The Surface waves traveled from the earthquake to Portland around the perimeter of the Earth and arrived 10 minutes 59 seconds after the earthquake.

