

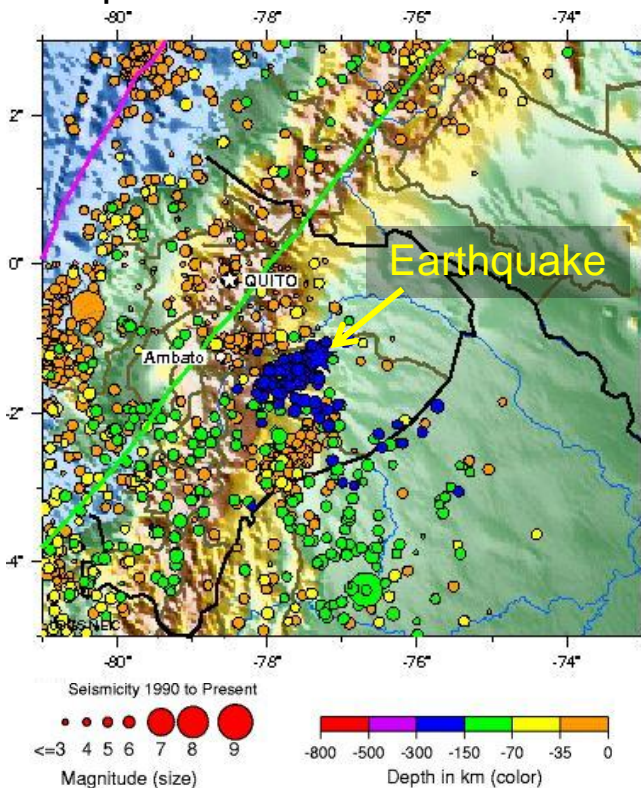
Magnitude 7.1 Earthquake Beneath Ecuador Thursday, August 12, 2010 at 11:54:16 UTC Thursday, August 12, 2010 at 4:54:16 PDT

Epicenter: Latitude 1.260°S, 77.312°W

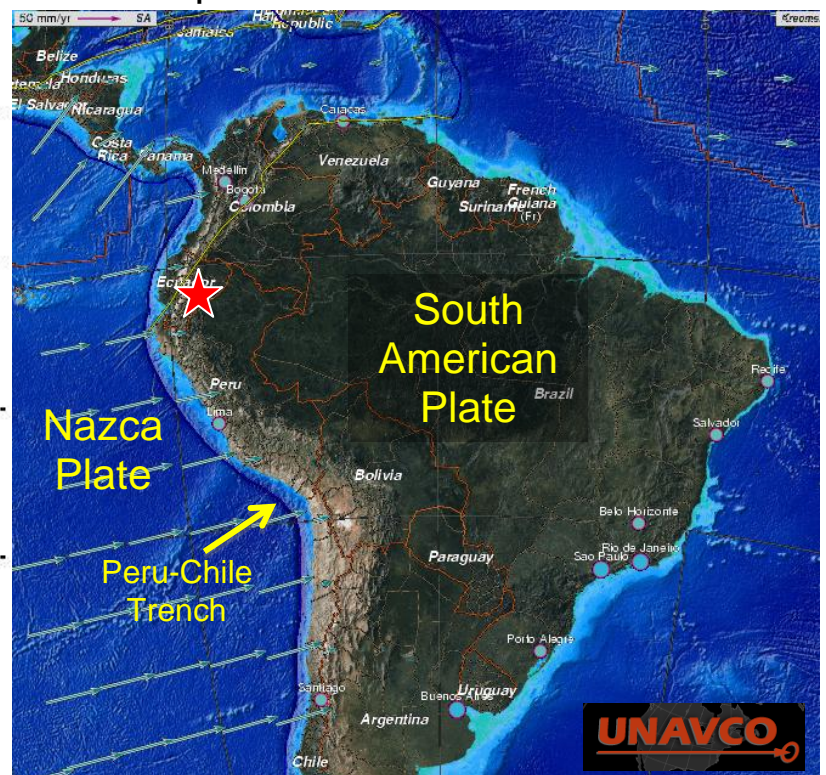
Depth: 211 kilometers

A major earthquake of magnitude 7.1 occurred beneath Ecuador on Thursday August 12. As determined by the US Geological Survey National Earthquake Information Center (NEIC), this earthquake occurred at a depth of 211 km. Although the epicenter was only 175 km from Quito, ground shaking there was light because of the depth of the earthquake. Map A on the left below illustrates the 1990-to-present earthquake history where the blue star indicates the location of the M7.1 August 12 earthquake. As shown on Map B below, the Nazca Plate subducts beneath the South American Plate at the Peru – Chile Trench. The rate of plate convergence along the coast of Ecuador is about 70 mm/yr (7.0 cm/yr). Earthquakes on the subduction zone boundary are shallow near the trench and become deeper toward the west-northwest as the Nazca Plate descends beneath Ecuador on the northwest corner of the over-riding South American Plate.

Map A



Map B



Images courtesy of the US Geological Survey

The record of the M7.1 Ecuador earthquake on the University of Portland seismometer in Portland, Oregon is illustrated below. Portland is about 6830 km (61.48°) from the location of this earthquake. Following the earthquake, it took 9 minutes and 54 seconds for the P waves to travel from the Ecuador earthquake to Portland, Oregon. P waves are body waves, compressional waves that travel through the Earth's mantle. The second labeled arrival is pP, a depth phase unique to deep earthquakes. This wave leaves the earthquake traveling towards the Earth's surface where it is reflected back into the mantle to travel approximately the same path as the P waves to the seismic station. The pP arrives to Portland 10 minutes 42 seconds after the earthquake, and the time difference between these two arrivals provides information about the depth of the earthquake. PP waves are P waves that bounce once off the Earth's surface between the epicenter and the recording seismometer. PP waves are expected to arrive 12 minutes 12 seconds after the earthquake. The S waves start arriving 17 minutes 59 seconds after the earthquake occurred. S waves are also body waves, but they travel as shear waves through the Earth's mantle. Following the S wave arrival, a sS arrives as well as a SS wave and can be seen on the record. The surface waves traveled from the earthquake to Portland, Oregon around the perimeter of the Earth. Because the distance around the perimeter is longer than the distance through Earth's mantle and the speed of surface waves is slower than body waves, it takes surface waves much longer than body waves to travel from an earthquake to a distant seismic station. In this case, the first surface waves from the Ecuador earthquake started arriving at the in Portland, Oregon about 28 minutes after the earthquake occurred.

