

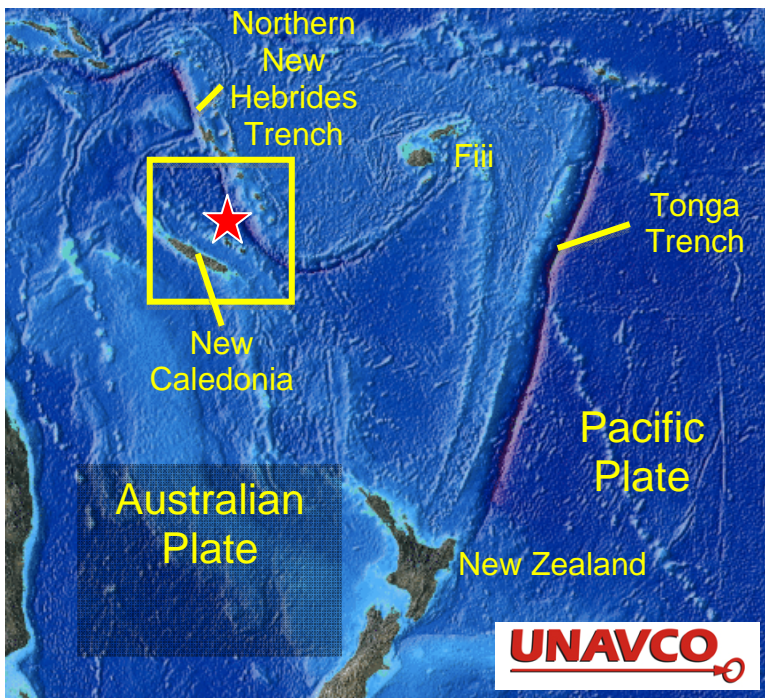
Magnitude 7.3 Earthquake in Vanuatu Region
Saturday, December 25, 2010 at 13:16:37 UTC (05:16:37 PST)
Sunday, December 26, 2010 at 12:16:37 AM at Epicenter
Epicenter: Latitude 19.775°S, Longitude 167.895°E Depth: 12 km

As determined by the US Geological Survey National Earthquake Information Center (NEIC), a magnitude 7.3 earthquake occurred early Christmas morning Portland time in the Northern New Hebrides Trench between Vanuatu and New Caledonia. At this trench, the Australian Plate subducts beneath the Pacific Plate (Map A on left). The rate of convergence between the plates in this trench is about 9 cm/yr, more than twice the rate of convergence between the Juan de Fuca and North American plates at the Cascadia subduction zone.

The 1990-to-present earthquake history within the yellow square of Map A is shown on Map B where the gold star indicates the location of the M7.3 December 25 earthquake. This major earthquake occurred about 230 km south of Port Vila, Efate, Vanuatu (Map B). Similar to the major earthquake in the Bonin Islands region of Japan on December 21, the mechanism of the December 25 earthquake was normal faulting. This suggests that the earthquake was caused by extensional forces within the upper part of the Australian Plate where it bends to descend into the Northern New Hebrides Trench.

Major earthquakes that occur at shallow depths below the seafloor are candidates for producing tsunamis. The Pacific Tsunami Warning Center issued a tsunami warning for the Vanuatu, New Caledonia, and Fiji area. A small tsunami with wave height of 15 cm (6 inches) was observed at Vanuatu about 45 minutes after the earthquake. The tsunami warning was later cancelled when no additional reports of significant tsunami arrivals were received.

Map A



Map B

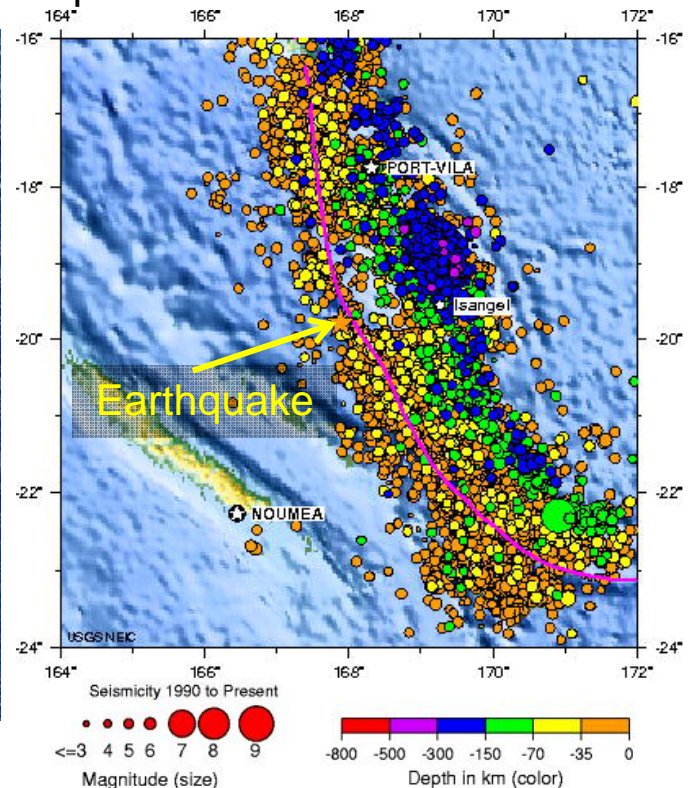
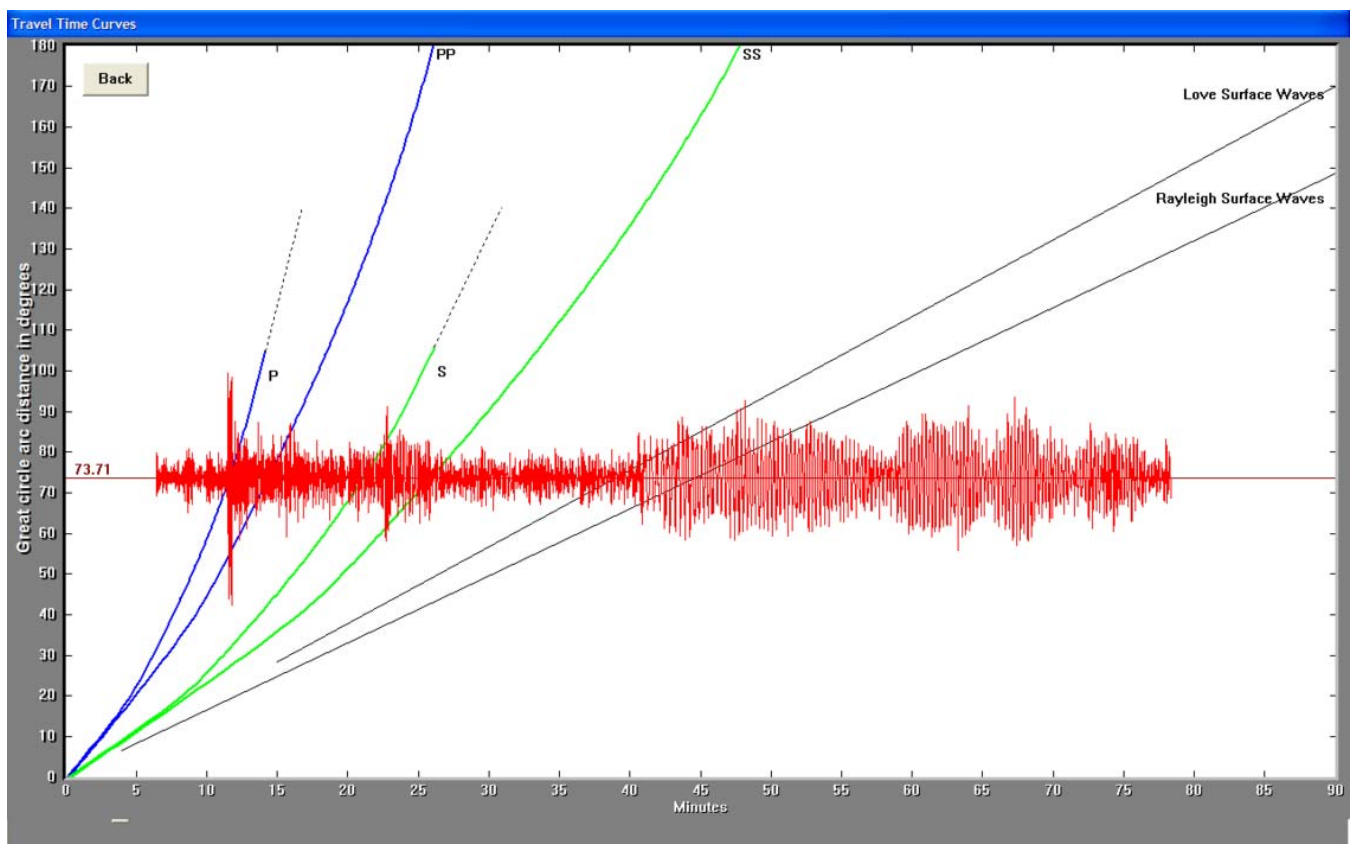


Image courtesy of the US Geological Survey

The record of the M7.3 Vanuatu earthquake on the University of Portland seismometer in Portland, Oregon is illustrated below. Portland is about 8177 km (73.67°) from the location of this earthquake. Following the earthquake, it took 11 minutes and 33 seconds for the P waves to travel from the Vanuatu earthquake to Portland, Oregon. P waves are body waves, compressional waves that travel through the Earth's mantle. 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 14 minutes and 17 seconds after the earthquake. The S waves started arriving 21 minutes 4 seconds after the earthquake occurred. S waves are also body waves, but they travel as shear waves through the Earth's mantle. 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 Vanuatu earthquake started arriving in Portland, Oregon about 31 minutes after the earthquake occurred.



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