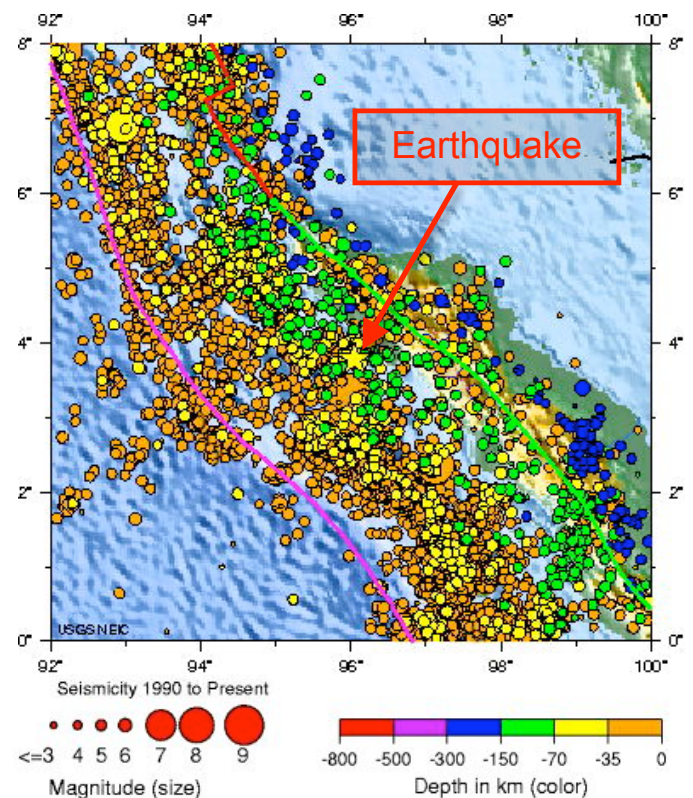
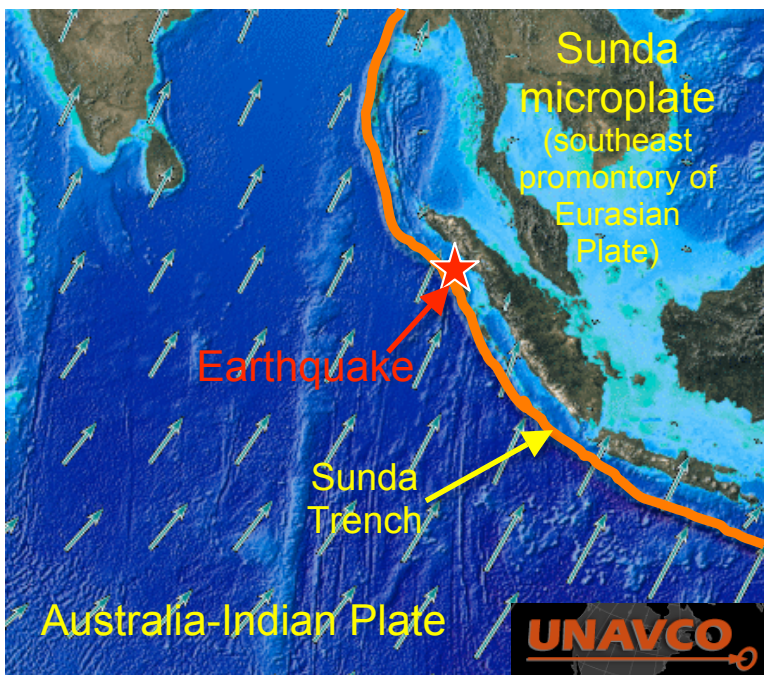


Major 7.2 Earthquake off the West Coast of Northern Sumatra
Sunday, May 9, 2010 at 05:59:42 UTC
Saturday May 8, 10:59:42 PM Pacific Daylight Time
Epicenter: Latitude 3.775°N, 96.055°E. Depth: 45 kilometers.

As determined by the US Geological Survey National Earthquake Information Center (NEIC), a major earthquake occurred Saturday night Pacific Daylight Time 215 km (130 miles) south-southeast of Banda Aceh, Sumatra, Indonesia. The epicenter of the earthquake is indicated by the red star on plate-tectonic map below on the left. The orange line on that map shows the boundary between the Australia – Indian Plate and the Sunda microplate (= southeast promontory of Eurasian Plate). Historic earthquake activity near the epicenter (yellow star) from 1990 to present is shown on the map on the right below. This earthquake was felt over a wide area of Indonesia as well as in Laos, Malaysia, Myanmar, Singapore and Thailand. According to the Pacific Tsunami Warning Center, no tsunami warning, watch, or advisory was issued for this event. An earthquake of magnitude 7.2 at 45 km depth is both too deep and too small to generate a tsunami.

The US Geological Survey Tectonic Summary for this event states: "The northern Sumatra earthquake of May 9, 2010 occurred as a result of thrust faulting on or near the subduction interface plate boundary between the Australia-India and Sunda plates. At the location of this earthquake, the Australia and India Plates move north-northeast with respect to the Sunda plate at a velocity of approximately 60-65 mm/yr. On the basis of the currently available fault mechanism information and earthquake depth, it is likely that this earthquake occurred along the plate interface. The subduction zone surrounding the immediate region of this event slipped during the devastating M 9.1 earthquake of December 2004, and today's event appears to have occurred within the rupture zone of that earthquake. Today's earthquake is the latest in a sequence of large ruptures along the Sunda megathrust, including a M 7.8 in April of this year, approximately 200 km to the south of today's event; two M 7.4 earthquakes beneath Simeulue approximately 100 km to the south in 2002 and 2008; a M 8.6 210 km to the south in 2005; a M 7.5 650 km to the south near Padang in 2009; and two events of M 8.5 and M 7.9 approximately 1000 km to the south in 2007."



The record of the Sumatra earthquake on the University of Portland seismometer is illustrated below. Portland is about 13,319 km (~8276 miles, 119.99 degrees) from the location of this earthquake. Body waves travel through Earth's mantle from the earthquake to a distant station along paths that curve upwards because the velocity of seismic waves generally increases with depth in the mantle. However, direct P and S waves cannot travel to stations more than epicentral distance $\Delta > 103^\circ$ because of the large decrease in wave velocities across the boundary between the mantle and the liquid outer core. (Epicentral distance, Δ , is the angle formed by the intersection of the line from the earthquake to Earth's center with the line from the observing point to the Earth's center.) There is a "shadow zone" for direct P waves in the range $103^\circ < \Delta < 143^\circ$. The S-wave shadow zone exists for $\Delta > 103^\circ$ because the liquid outer core blocks S waves that cannot travel through liquids. While a diffracted P wave is the first wave to arrive to Portland, the first clear arrival aligned with the PP arrival is a compressive wave that traveled through Earth's mantle and bounced midway between the epicenter and Portland; SS is a shear wave that also bounced midway between the epicenter and Portland. It took about 20 minutes 10 seconds for the PP waves and 34 minutes 42 seconds for the SS waves to travel from the earthquake to Portland. The (Love and Rayleigh) surface waves traveled from the earthquake to Portland 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, surface waves did not arrive in Portland until 50 minutes 45 seconds after the earthquake occurred.

