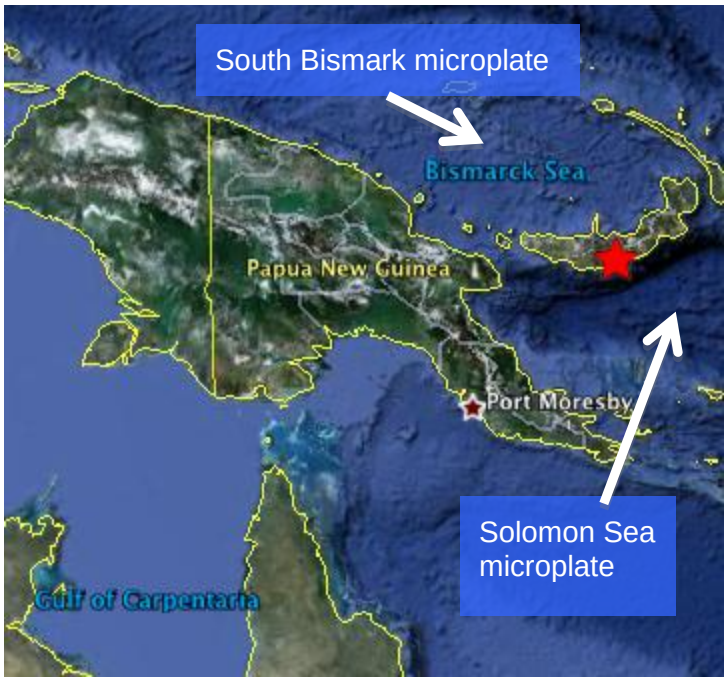
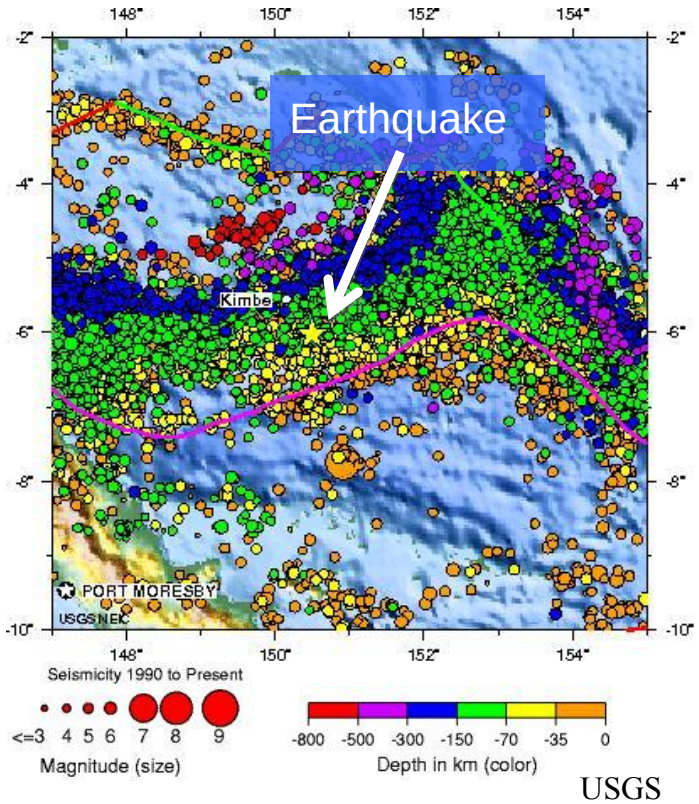
Major 7.3 Earthquake New Britain Region of Papua New Guinea
Sunday, July 18, 2010 at 13:35:02 UTC
Sunday, July 18, 2010 at 6:35:02 PM PDT
Epicenter: Latitude 6.019°S, 150.497°E. Depth: 57.6 kilometers.

As determined by the US Geological Survey National Earthquake Information Center (NEIC), a magnitude 7.3 earthquake occurred Sunday morning Portland time beneath the New Britain region of Papua New Guinea. The epicenter is indicated by the red star on the left-side map below while the map on the right shows historic earthquake activity near the epicenter (yellow star) from 1990 to present. Just 30 minutes before the M7.3 main shock, a M6.9 foreshock occurred at a shallower level within the same subduction zone. These earthquakes occurred in a region of convergence between the Pacific, Philippine, and India-Australia plates. The basic plate tectonics of the Papua region involves convergence with the Pacific Plate subducting beneath Papua – New Guinea at the northern fringe of the India-Australia Plate. In detail, there are several convergent and transform (strike-slip) boundaries between numerous microplates, as illustrated on the historic seismicity map where purple lines are convergent boundaries and green lines are transform boundaries. NEIC reported that the mechanisms for both July 18 earthquakes were thrust faulting related to the subduction of the Solomon Sea microplate in a northwesterly direction beneath the South Bismark microplate. A more complete description of the plate tectonics in the New Guinea region can be found on the NEIC web site at:
http://earthquake.usgs.gov/earthquakes/recenteqsww/Quakes/us2010ywbr.php#summary





USGS

The record of two July 18, 2010 Papua New Guinea earthquakes on the University of Portland seismometer is illustrated below. Portland is about 10,000 km (~92 degrees) from the location of these earthquakes. The first earthquake, a magnitude 6.9, was followed 31 minutes later by a magnitude 7.3 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 increase with depth in the mantle. The first arrival is the direct P wave that took 13 minutes and 4 seconds to travel from the magnitude 6.9 earthquake to the station. The wave labeled PP is a compressive body wave that traveled through Earth's mantle and bounced off the Earth's surface midway between the epicenter and Portland. It took about 16 minutes and 44 seconds for the PP waves to travel from the magnitude 6.9 earthquake to Portland. The S waves (shear body waves) traveled from the first magnitude 6.9 earthquake through the Earth's mantle to the station in approximately 24 minutes and 3 seconds. Surface waves travel 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 from the magnitude 6.9 earthquake until almost 43 minutes after the earthquake occurred beneath Papua New Guinea. However, as the surface waves from the magnitude 6.9 earthquake were arriving to the station, the direct P waves from the later magnitude 7.3 were also arriving, having traveled the 10,000 km distance in 13 minutes and 2 seconds. The PP arrival from the magnitude 7.3 earthquake is visible on this record at 16 minutes and 42 seconds from the time of that event. However this PP arrival is overprinted by the surface waves arriving from the earlier earthquake. Surface waves from the magnitude 7.3 earthquake took 43 minutes to travel from that earthquake to Portland.