

West Coast Earthquakes and Plate Motion

<https://earthquakescanada.nrcan.gc.ca/index-en.php>

<https://www.usgs.gov/natural-hazards/earthquake-hazards/earthquakes>

Recurrence Time of an Earthquake

The North American Plate and the Pacific plate are moving past each other at about 5 cm/yr, but this slip is distributed along many separate faults. The best estimate of the slip rate for this section of the San Andreas around San Francisco is 14 mm/yr.

1) Use the typical slips in the table to the right to estimate the approximate recurrence intervals.

Magnitude	Average slip per event	Average recurrence time?
9	(estimate)	
8	4 m	
7	1.4 m	
6	40 cm	
5	10 cm	

2) Would it be better to live on a part of the fault with frequent or infrequent earthquakes?

Pacific Northwest (Seattle, Portland, Victoria, Vancouver)

In this setting, the small Juan de Fuca plate is subducting under the North American plate.

<https://pnsn.org/outreach/earthquakesources/csz>

<https://youtu.be/2MqH4MGdmdU>

https://youtu.be/K_sJ0QJ31fc

3) What is the GPS plate motion for coastal GPS stations west of Seattle, the stations around Seattle itself, and those east of the Cascade Mountains?

4) Japan has a similar tectonic setting to that of the Pacific northwest coast of the United States. However, whereas Japan experiences daily small earthquakes, seismic events in the Pacific northwest are quite rare. What is the significance of this difference?

5) What does the expression “locked and loading” mean in the context of plate tectonics?

6) Given the plate motion speed for the “Pacific Beach” station, what would be the recurrence time for a magnitude 8 and magnitude 9 earthquake?

7) a) When was the last major earthquake in this part of North America?
b) How do we know this?

