Energy, Mines and Resources Canada | Énergie, Mines et Ressources Canada

Geofacts

EARTHQUAKES IN SOUTHWEST BRITISH COLUMBIA

British Columbia's southwest corner is the most active earthquake region in Canada. More than 200 earthquakes are recorded each year on the Lower Mainland and Vancouver Island. Although most are too small to be felt, an earthquake capable of structural damage can be expected to occur somewhere in the region about once every ten years.

Causes of Earthquakes

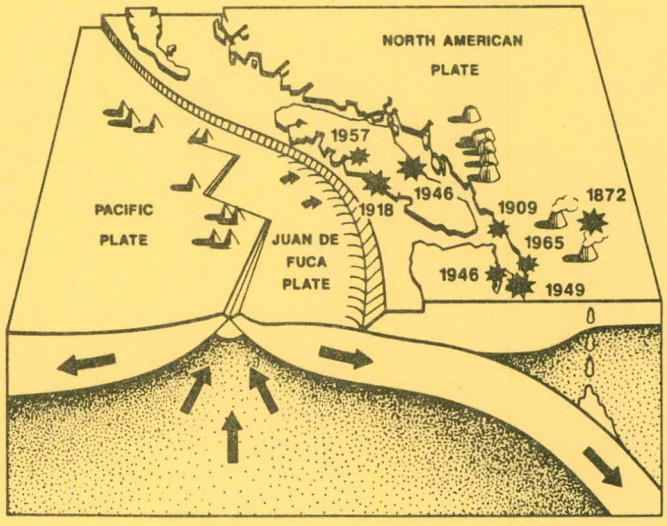
The surface of the earth is always moving. Large segments of the earth's crust — which geologists call plates — are continually shifting against each other. These movements cause stress to build up within the crust. When the strain becomes too great, the stressed rock breaks suddenly, causing an earthquake.

Earthquakes occur most frequently where plates interact. Southwest British Columbia overlies a 'subduction zone', where one crustal plate slides beneath another.

Earthquakes in the Juan de Fuca Subduction Zone

The Juan de Fuca subduction zone stretches from a point off the coast of northern Vancouver Island south to California. Along this stretch of coast the American and Pacific plates are separated by the much smaller Juan de Fuca Plate, a fragment of ocean floor that is sliding down under the continental margin. Beneath southwest British Columbia, the Juan de Fuca Plate subducts at a rate of about 4 cm per year. The stresses built up by this subduction process cause frequent earthquakes in the Vancouver Island — Lower Mainland region.

Earthquakes occur within both the descending Juan de Fuca Plate and the overriding continental plate. Most of these earthquakes originate tens of kilometres below the surface. Consequently no physical manifestations, such as fault scarps, can be seen on the ground.



Although earthquakes are frequent within both plates in the Juan de Fuca subduction zone, no significant earthquake activity is known to have occurred along the actual interface where the Juan de Fuca Plate descends. The reasons for this are uncertain. The plates could be sliding over each other smoothly, but it is also possible that the subducting Juan de Fuca Plate is 'stuck' and will snap loose some time in the form of a great earthquake. Most areas of the world where similar conditions exist can experience a very large earthquake, however rarely. Before the Mexico City earthquake of 1985, for example, that part of the North Cocos subduction zone had not had a major earthquake for more than 200 years.

Canada

Past Earthquakes in Southwest British Columbia

Three or four earthquakes are felt in southwest British Columbia each year. Since the turn of the century, seven earthquakes large enough to cause damage – events of magnitude 6 or greater on the Richter scale – have occurred in the Vancouver Island and Lower Mainland region or in the immediately adjacent areas of Washington.

The largest and most recent major earthquake in southwest British Columbia happened in 1946, when a magnitude 7.3 event rocked central Vancouver Island. Were this earthquake to occur today in the vicinity of Vancouver or Victoria, damage would likely be in the hundreds of millions of dollars.

In 1965 a magnitude 6.5 earthquake centred south of the border beneath the city of Seattle caused damage in the city and surrounding area. This event is a good example of what can be expected the next time a major earthquake occurs in an urban area of southwest British Columbia. Although no buildings collapsed, in most of the city windows broke, chimneys fell and walls cracked. Bridges, roads, and water and utility installations were also damaged. Seven people died as a result of the earthquake and hundreds more were injured.

Safety and Survival in an Earthquake

Most wood-frame residential buildings are highly resistant to earthquakes. During an earthquake the primary dangers are from falling objects and debris, such as collapsing chimneys, masonry facing, shattered glass, light fixtures, plaster ceilings and heavy furniture. A few simple steps can greatly reduce the risk of personal injury during an earthquake.

When an earthquake occurs,

– turn away from windows and other glass. Glass shards can fly considerable distances when windows break under earthquake forces;

– take cover under a sturdy desk, table or bed to prevent injury from falling debris;

– keep calm and stay where you are until the shaking stops. Do not run into the street: risk from falling debris is greatest just outside a building;

– if you are outside, try to keep to open areas well clear of buildings and power lines;

– if you are driving, pull over and stop your vehicle, preferably in an open area.

After an earthquake, follow emergency radio broadcasts carefully, and restrict your telephone calls to genuine emergencies.

For further earthquake information, please contact:

Geological Survey of Canada
Pacific Geoscience Centre
P.O. Box 6000,
Sidney, B.C.
V8L 4B2
(604) 356-6500

Geological Survey of Canada
Geophysics Division
1 Observatory Crescent
Ottawa, Ontario
K1A 0Y3
(613) 995-5548