



# Seismographs in Canada

Across Canada there are more than 200 seismographs continuously recording local and global earthquake activity.



Natural Resources Canada seismologist, Alison Bird, shows off two seismometers outside the Pacific Geoscience Centre in Sidney, B.C.

## What is a Seismograph?

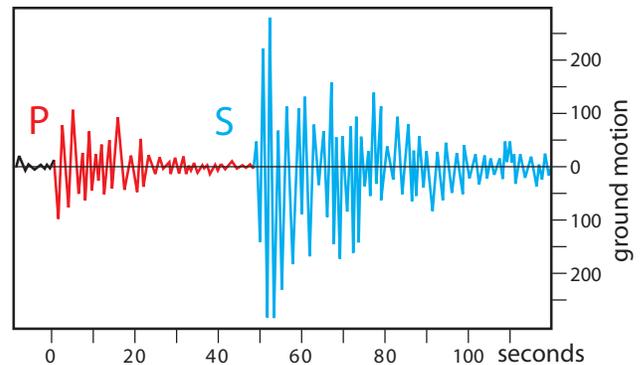
Seismographs are instruments that record ground motion. During an earthquake, vibrations created by sudden movement on a fracture in the Earth's crust (a fault) travel through the Earth. Seismographs detect and record these vibrations, also called seismic activity, which may be too small to be felt by humans.

## How Seismographs Work

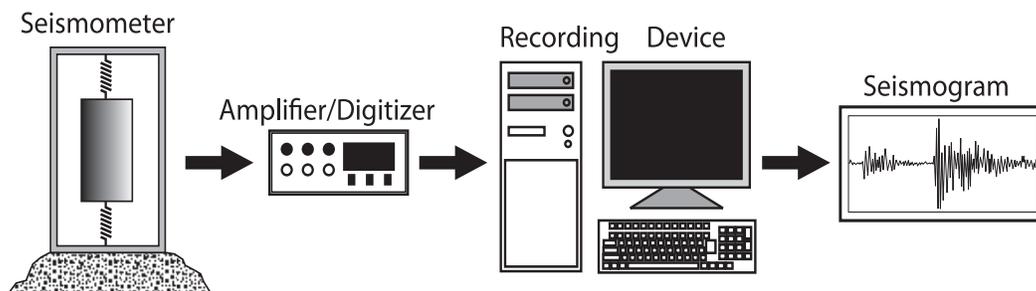
The part of the seismograph that senses ground movement is called a seismometer. Seismometers convert ground motion vibrations into an electrical signal that in turn is converted into a digital signal. This is sent to Natural Resources Canada (NRCan) processing centres in Ottawa, Ont. and Sidney, B.C. When a number of seismographs detect seismic activity, a computer automatically estimates the source of the disturbance and sends an alert out to seismologists - scientists who study earthquakes. To record clear earthquake signals, seismometers are often installed on solid rock, far away from sources of noise such as trucks, trains and pounding surf.

## Measuring Earthquakes

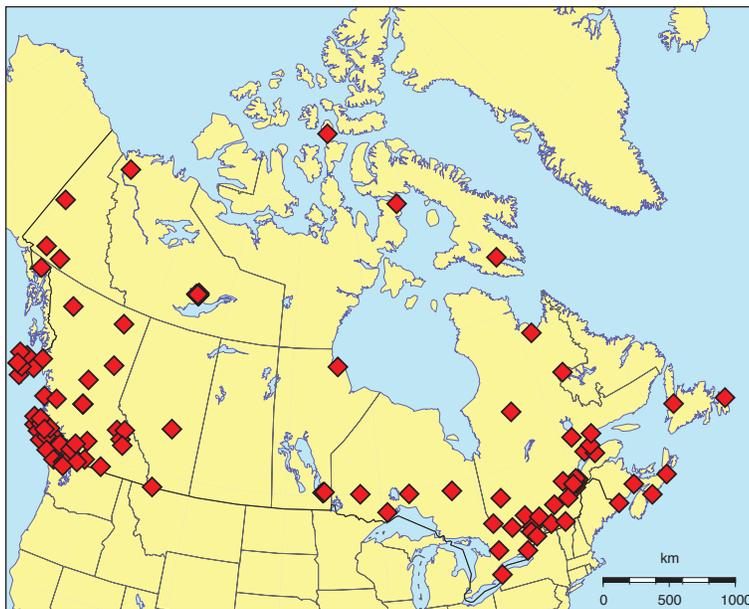
Earthquake magnitude is a measure of the amount of energy released along a fault. An earthquake produces three types of vibrations or waves. Primary, or P, waves travel most quickly through the Earth and are the first to



Seismographs create seismograms, which are graphs depicting ground motion. This seismogram is for an earthquake about 350 kilometres away (showing P and S waves).



Measuring and converting ground motion into a readable graph (seismogram).



*Seismographs operated by Natural Resources Canada*

be recorded by a seismograph. Shear, or S, waves travel more slowly, but usually produce stronger shaking. Surface waves are the third type of waves and are the last to be recorded by a seismograph. They are best observed when the earthquake is more than 1000 kilometres away.

The time interval between the arrival of the P and S waves, is used to calculate the distance between the seismometer and the earthquake. By using data from three or more seismographs, seismologists can calculate the earthquake's location and depth.

### Seismograph Installations in Canada

The first seismographs in Canada were positioned in Toronto, Ont. (1897) and Victoria, B.C. (1898). By 1920, seismographs operated at six locations across Canada. NRCan significantly expanded and modernized the network in the early 1960s and again in the 1990s.

NRCan operates about 125 stations that make up the Canadian National Seismograph Network (CNSN). Other seismographs are part of university or government research networks.

### How is Earthquake Information Used?

Data gathered by the CNSN is used to determine the location and size of earthquakes. This data, combined with the frequency of earthquakes and other geoscience information, is used to improve the earthquake resistance provisions of the National Building Code of Canada.

If there is a widely felt or damaging earthquake:

- The earthquake's size and location are rapidly posted on NRCan's "Earthquakes Canada" web site and information is sent to the news media. Updates are provided as more information is gathered.
- Emergency response agencies, media, government and other key clients, including utility companies and railways, are quickly notified.

### International Connection

The CNSN also records thousands of earthquakes that occur outside Canada each year. Data is sent to tsunami warning centres and international agencies that produce summaries of worldwide earthquake activity.

The CNSN can also detect nuclear explosions. As part of Canada's contribution to the Comprehensive Nuclear Test Ban Treaty, NRCan sends seismic and other data to an International Data Centre in Vienna, Austria.

**For further information on earthquakes, visit the Natural Resources Canada website:**

**[www.EarthquakesCanada.nrcan.gc.ca](http://www.EarthquakesCanada.nrcan.gc.ca)**

*Or contact one of these Geological Survey of Canada offices, NRCan:*

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