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The Canadian National Seismograph Network

What is it?

More than 1 000 earthquakes are recorded in Canada every year. The Geological Survey of Canada (GSC) operates nearly 100 instruments, called seismographs, across the country to detect and locate these events. Together, these instruments make up the Canadian National Seismograph Network. The GSC is approaching the conclusion of an extensive refurbishment that will make this network one of the most modern in the world.

Each network site, or "station," consists of a small computer and a very sensitive seismograph that can record ground movement of less than one nanometre — for comparative purposes, the average thickness of human hair is thousands of nanometres. Data can be recorded locally on paper or on computer tape, or sent immediately to earthquake analysis centres located in Ottawa and in Sidney, British Columbia. Many stations use a satellite link to transmit their data.

The location of these stations is particularly important. They need to be located where bedrock is exposed at the surface and as far as possible from noise such as traffic, heavy industry and trains. Natural background noise, such as waves on nearby oceans or lakes, are also avoided and heavily wooded areas are unsuitable, because the ground moves when the wind shakes the trees. All these factors can hide, or "mask" the very small signals produced by earthquakes.

Developing a National Network

While the first seismographs in Canada were installed at the very end of the nineteenth century, a truly national network did not exist until the 1960s. This network recorded the information on photographic paper that was mailed every week to analysis centres in Ottawa and Sidney, B.C. In the 1970s, "telemetered" networks were set up in southeastern and southwestern Canada to send data immediately by radio links or telephone lines. The networks were set up in these regions because they are highly populated areas where earthquakes are frequent — and they have caused damage in the past. These networks permitted the rapid determination of the location and size (magnitude) of seismic events in these regions.

Saguenay Earthquake Sparks Network Upgrade

Following the November 1988 earthquake near Saguenay, Quebec, which caused tens of millions of dollars of damage, the GSC allocated funds to modernize the entire national network. This project includes direct communications (often by satellite) from every station (including those in the Arctic), and immediate and automated data analysis. This analysis includes the automatic detection of possible signals from earthquakes by each station. All this information is combined to provide a location and magnitude for an earthquake. While the automatic results will



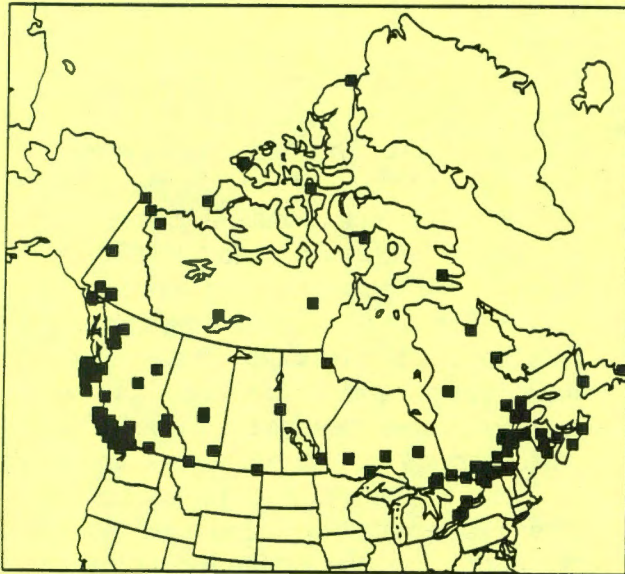
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not always be accurate, and will have to be reviewed by an experienced analyst, they will significantly reduce the time to respond to a felt and/or damaging earthquake. Emergency planning and disaster relief agencies will be more rapidly informed, and information will be provided earlier to the general public.

In the longer term, the new network's high quality digital data will be used to conduct research on the properties of earthquakes. These results will be combined with information on the distribution, size and frequency of events to improve the earthquake-resistance provisions of the National Building Code.



Seismograph stations operated by the GSC.

Partnerships

Many stations in the new network are partially- or wholly-funded by provincial utilities (Hydro-Québec, Ontario Hydro and BC Hydro) — organizations which require both immediate and long-term information on the possible effects of earthquakes on their facilities.

Atomic Energy of Canada funds the operation of some stations in areas which are being considered for long-term disposal of radioactive waste. At several sites, the satellite communications facilities are shared with other agencies such as the RCMP, Parks Canada and the Atmospheric Environment (Weather) Service of Environment Canada.

International Connection

The Canadian network also records thousands of earthquakes outside Canada each year. Data are sent to international agencies that produce bulletins of worldwide earthquake activity, and scientists in many other countries request Canadian data to study events in their own and other countries. Canada has a proud tradition and an excellent reputation in earthquake studies — and the new national network ensures that this will continue.

For further information on earthquakes contact:

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or

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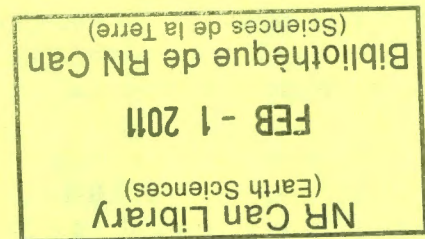
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