Earthquake Early Warning

Submitted by Max Kasprzik Wed, 2016-07-27 15:07

The west coast of North America is at risk of a major earthquake. An early warning alert of up to 90 seconds could save lives and protect infrastructure. In February 2016 Ocean Networks Canada (ONC) received funding from Emergency Management British Columbia (EMBC) to install the technology that will deliver a system for earthquake early warning for southern British Columbia by 2019.

The potential for earthquakes in British Columbia

- British Columbia is located on the Pacific Ring of Fire, an active seismic region. Thousands of earthquakes are recorded annually by seismic sensors across the province.
- Many earthquakes occur near the Cascadia subduction zone, where the Juan de Fuca and North American tectonic plates converge. Also known as the Cascadia fault, this area is capable of producing megathrust earthquakes.
- The last megathrust earthquake in British Columbia occurred on 26 January in the year 1700. We know it will happen again, we just do not know when. Now is the time to prepare.

How does Earthquake Early Warning work??

- There is currently no known means to reliably predict earthquakes, however seismic instruments can rapidly detect an earthquake as it begins to unfold.
- Earthquakes release energy that travels through the Earth as seismic waves.
- Primary or ?P? waves travel faster than secondary or ?S? waves. The latter are the cause of severe and damaging ground shaking.
- The detection of an earthquake by many sensors can provide rapid estimates of the location and magnitude of an earthquake. This helps determine the arrival time and intensity of ground-shaking across a region.
- It is the ability to detect these first seismic ?P? waves that enables earthquake early warning systems to deliver alerts before the arrival of the ?S? waves that cause major ground shaking.
- Monitoring for earthquakes and providing alerts are critical to public safety.

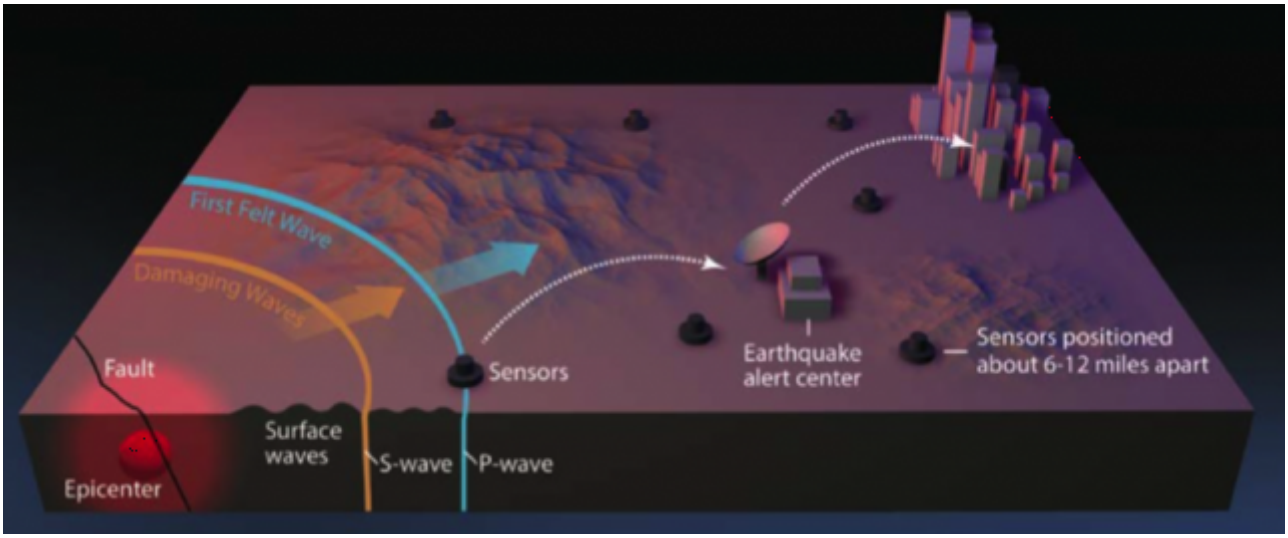


Image courtesy of United States Geological Survey.

What are the benefits of earthquake early warning?

Scientists cannot predict earthquakes but rapid alerts signalling an incoming earthquake may reduce deaths, injuries and property losses. Even a few seconds of warning may be enough time to take protective and preventative measures, such as:

- triggering trains to slow down
- stopping bridge and tunnel traffic
- bring elevators to the ground floor
- shutting off gas lines
- opening bay doors at fire and ambulance halls
- allowing surgeons to stop delicate procedures
- allowing people, including school children, to Drop, Cover and Hold On before the shaking starts.

What is the timeline?

- In February 2016, the Government of British Columbia announced an investment of $5 million to ONC for the development of an earthquake early warning system for British Columbia. BC Government News Release
- In June 2016, ONC successfully deployed and connected the first of several offshore earthquake early warning sensors at the Cascadia fault.
- With the funding from Emergency Management BC (EMBC), ONC will:
    - install more subsea seismic instruments, as well as land-based seismic and GPS sensors, which will help estimate the magnitude for large earthquake events,
    - integrate the new network of land and sea sensors with existing networks and data,
    - further develop earthquake alerting software, and
    - test the system with EMBC.
- By 2019, ONC will deliver earthquake early warning alerts to EMBC, who are responsible for providing alerts and updates to the general public.

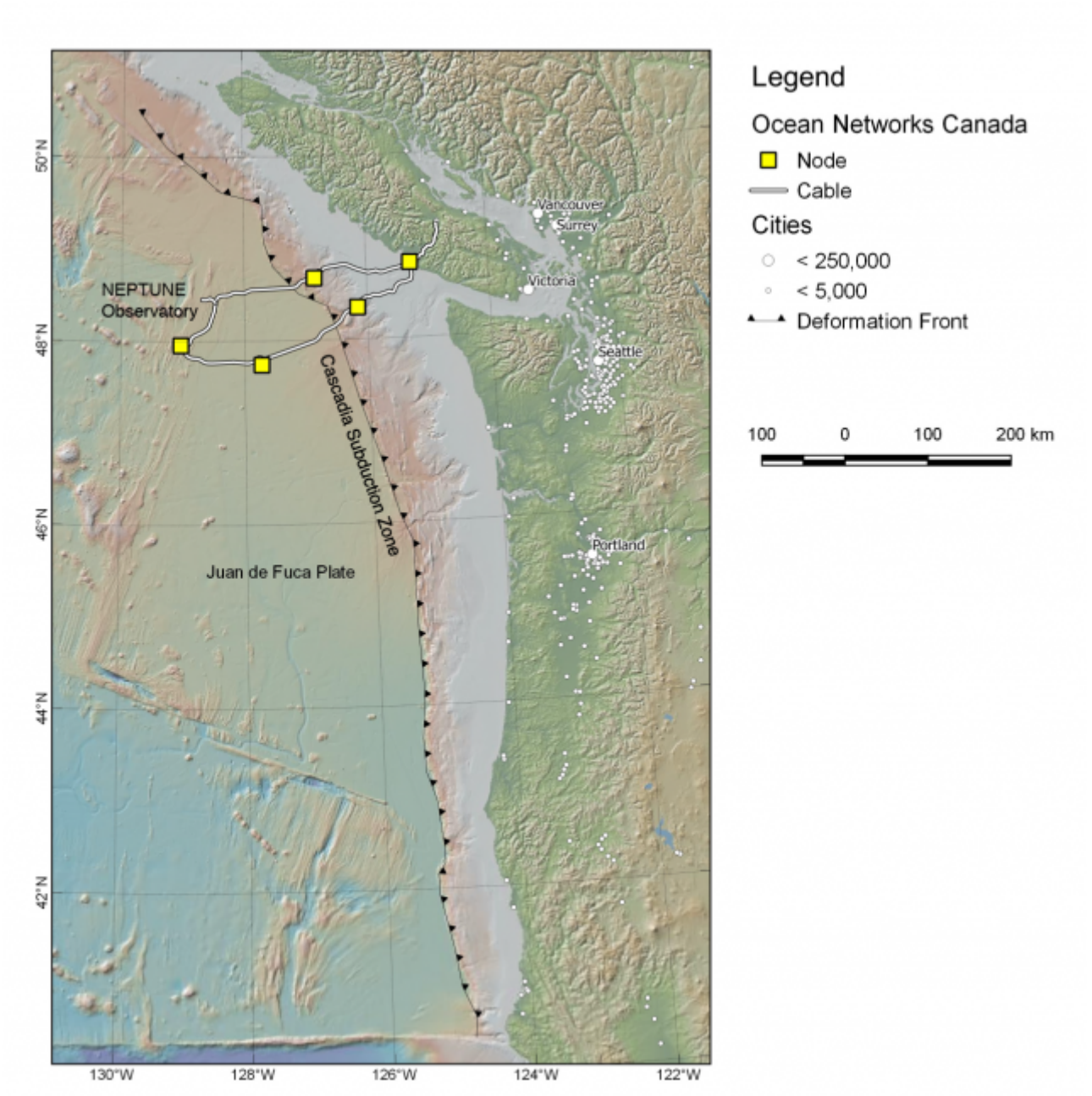
Who is involved?

- An effective earthquake early warning system is a collaboration among government, academia, industry, and communities.
- ONC is coordinating the project in partnership with EMBC, who has provided $5M to fund the project.
- Other collaborating organizations are Natural Resources Canada (NRCan), the BC Ministry of Transportation and Infrastructure (MoTI), the University of British Columbia (UBC), United States Geological Survey and the University of Washington, Pacific Northwest Seismic Network.

Why Ocean Networks Canada?

- Over the last decade, ONC has successfully deployed over 5000 ocean sensors connected via fibre optic cable, satellite, wireless, and cellular.
- ONC delivers data from ocean sensors for free and in real-time 24/7 via ONC?s world-leading data management system Oceans 2.0.
- ONC is the only organization in Canada with offshore earthquake sensors, located on?and adjacent to?the Cascadia subduction zone.

Where and what is the Cascadia subduction zone?



The Cascadia subduction zone is a boundary between tectonic plates where denser oceanic plates (mainly the Juan de Fuca Plate) are forced under the continental North America Plate. It is a region that roughly extends from the deformation front where the plates first meet on the seafloor past the volcanic arc to the east of the major coastal cities. The subduction zone stretches from northern California up to northern Vancouver Island.

About Ocean Networks Canada

- Ocean Networks Canada?s vision is to enhance life on earth by providing knowledge and leadership that deliver solutions for science, society, and industry.
- ONC manages and operates world leading ocean observatories off the coast of southern British Columbia, and monitors more than 50 seabed and shoreline sites, off Canada?s west, east, and arctic coastlines, with 400 instruments containing over 5,000 active sensors.
- ONC leverages the unique capabilities of the observatories and monitoring technology to provide real-time, free data to scientists, students, policy makers, and the public across the globe, and to inform public safety, marine safety and state-of-the art environmental monitoring.
- ONC is an initiative of the University of Victoria, British Columbia.

About Emergency Management British Columbia (EMBC)

- Emergency Management BC is the Province's lead coordinating agency for all emergency management activities, including planning, training, testing and exercising, to help strengthen provincial preparedness.
- Be Prepared: find out about EMBC?s emergency preparedness information.

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