



WARN

Natural disaster mitigation

Natural hazards can cause a massive loss of property and life and have negative long-term social, economic, and environmental consequences. Although we can't prevent earthquakes and tsunamis from occurring, we can certainly mitigate their secondary impacts with early-warning detection systems.

In Canada, we have the Web-enabled Awareness Research Network (WARN), a geohazard-detection Research Software Platform that coordinates information from dozens of sensors to notify emergency personnel and automatic safeguard systems of potentially disastrous events.

Early detection and characterization

How does it work? WARN relies on land sensors and underwater sensors off Canada's Pacific coast to detect the arrival of seismic or tsunami waves. The sensors, including radar, accelerometers and pressure sensors, collect data that is received and analyzed by WARN to detect and report on natural events that could lead to disasters. As an advanced geohazard-detection system, WARN also calculates important parameters, such as the epicentre and magnitude of earthquakes, and the speed, amplitude and direction of tsunamis, to help determine their potential impact.

Automatic notifications in real time

Once an event is detected and confirmed, WARN provides near real-time notifications about the event (e.g. ground shaking) to emergency personnel who can then alert the public. The Platform's real power, however, lies in its ability save precious seconds by interfacing with digital infrastructure systems maintained by other institutions and private companies.

Whereas the effectiveness of human reaction and intervention can vary depending on a host of reasons, any internet-enabled device can be preprogrammed to receive emergency notifications and react very quickly based on a set of pre-determined rules. Preventative measures can be taken and executed within seconds regardless of location – pipeline

valves shut down, trains slowed, bridge traffic stopped, elevators paused, and so on.

The need for an early-warning system

A large portion of Canada's west coast population lives in an area that is part of the Pacific Ring of Fire, a range where 90 per cent of the world's earthquakes occur. Other governments in this area - such as those of California and Japan - have had early warning systems in place for some time. A catastrophic quake is rare but possible and coastal BC residents are at significant risk without an automated early warning system.

Advanced ocean monitoring

WARN is a project of Ocean Networks Canada (ONC), a not-for-profit organization created by the University of Victoria. ONC has also put together the Smart Ocean BC program, an initiative that aims to provide individuals and organizations with ubiquitous internet access to year-round observations on ocean events and processes along the coast of British Columbia.

WARN builds on earlier CANARIE-supported programs such as Oceans 2.0, for its data management system and has contributed the Event Notification Service to the CANARIE Software Registry. It is available to anyone who wants to program their equipment to receive emergency notifications from WARN.

The WARN Platform coordinates information from dozens of land and underwater sensors to notify emergency personnel and automatic safeguard systems of potentially disastrous events.

As an advanced geohazard-detection system, WARN also calculates important parameters, such as the epicentre and magnitude of earthquakes, and the speed, amplitude and direction of tsunamis, to help determine their potential impact.

Technical Details

Platform: Web-enabled Awareness Research Network (WARN)

Description	Provides subscribers with early notifications of tsunamis and earthquakes as part of Ocean Networks Canada's Smart Oceans BC initiative.
Creator(s)	Ocean Networks Canada
Collaborator(s)	Canada Foundation for Innovation, Transport Canada, Department of Fisheries and Oceans, Natural Resources Canada
Research Subject	Oceanography
Managed Version ⁱ	Yes - Requires an Ocean Networks Canada website account and permission from Ocean Networks Canada
Self-hosted Version ⁱⁱ	No
Cloud Support	N/A
Host OS	N/A
Licence	No licensing is required to become a subscriber of WARN events.
Details	canarie.ca/software/warn-en

Contributed Services:

	Sensor Observation Service (SOS)
Description	Provides an API for managing deployed sensors and retrieving sensor observation data.
Category	Sensor Management/Data Acquisition
Research Subject	Oceanography
Managed Version ⁱ	Yes - Requires an Ocean Networks Canada website account.
Self-deployed Version ⁱⁱ	No
Cloud Support	N/A
Host OS	N/A
Licence	No licensing is required
Details	canarie.ca/software/sos

ⁱ Managed version: Creators host a live instance of the software on their infrastructure, available for use by others

ⁱⁱ Self-deployed version: Users host a private instance of the software on their own infrastructure