

Rebuilding the Western Canada Deformation Array and Canadian National Seismograph Network

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Life-cycle replacement of Global Navigation Satellite System (GNSS) instruments, seismic sensors, digitizers and related infrastructure has taken place over the last five years by Natural Resources Canada (NRCan) in order to improve Canada's earthquake and deformation monitoring ability with a goal of enabling faster issuance of alerts for large local earthquakes to emergency response organizations, media and the public. Over 150 core seismic monitoring stations have received Nanometrics Trillium 120QA and/or Titan sensors along with six-channel Centaur digitizers, using sampling rates of 100sps. At over 20 southwest British Columbia GNSS stations, Septentrio PolaRx5 and GNSS optimized choke ring antennas have been installed with all-in-view constellation tracking and logging capability. Core GNSS data rates of 30 second and 1Hz have remained in place along with enabling 1Hz RTCM MSM7 real-time data to an NTRIP caster located in Sidney, BC for use in studies and applications reliant on real time data flow. New power and communications infrastructure were implemented at all stations, with remote power management capability enabling greater operational efficiency. Overall station upgrades have resulted in noticeable improvements of seismic and GNSS data retrieval latencies.

Enhancement of monitoring capabilities on the Canadian west coast has also supported partnership with Ocean Networks Canada (ONC), on behalf of Emergency Management BC, to install an Earthquake Early Warning (EEW) system, for which NRCan stations form the core network. Support via the EEW project and NRCan Programs (Public Safety Geoscience and Climate Change Geoscience) enabled the installation of six new NRCan-operated GNSS tracking stations on or around Vancouver Island, five of which were collocated with seismic installations utilizing the modern Nanometrics instrumentation. These new multi-disciplinary stations support not only EEW but also research in crustal and underthrusting fault studies as well as utilizing the geodetic technique to allow the study of sea level changes over time.

