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Two Years of Regional Cabled Seafloor Observations Across Northern Cascadia

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NEPTUNE Canada completed the installation and is now operating an 800 km, regional cabled ocean network that spans the northern Juan de Fuca tectonic plate and continental shelf/slope in the northeastern Pacific. The NEPTUNE Canada network is part of the Ocean Networks Canada Observatory. Public data flow started in 2009 and interactive instruments continue to be added to this technically advanced system which provides continuous power and high bandwidth for enabling the collection of real-time physical, chemical, geological, and biological oceanographic data at resolutions relevant for furthering our understanding of the dynamics of the earth-ocean system.

Recent results at five NEPTUNE nodes are presented. Inshore at Folger Passage and Barkley Sound experiments focus on understanding biological productivity and the effects that marine processes have on fish and marine mammals. Experiments further offshore at Barkley Canyon allow quantification of changes in benthic activity with nutrient and sediment transport. Barkley Canyon and further north along the mid-continental slope near ODP Site 889, instruments are monitoring changes in the distribution, structure, related biotas and venting of gas hydrates. A Circulation Obviation Retrofit Kit (CORK) at our mid-plate site (ODP 1027) monitors crustal temperature and pressure, particularly related to triggered events, such as earthquakes, tsunamis, hydrothermal convection. On the Juan de Fuca Ridge, the Endeavour node observes volcanic, tectonic, hydrothermal, and associated biological processes. NEPTUNE Canada provides high resolution acoustic and seismic monitoring across the entire network, important for understanding subduction earthquake processes and contributing to a near-field tsunami detection system. An array of bottom pressure recorders is used for the determination of trans-Pacific open ocean tsunami amplitude, propagation direction, and as model input to examine tsunami interaction with the complex coast.

With the installation nearing completion and the first phase of experiments now operational for over two years, NEPTUNE Canada plans to expand the network with establishment of core sensors and the addition of new sensors and experiments, developed through national and international collaborations with special focus on coordinating with the OOI Regional Scale Nodes and their cyberinfrastructure teams.