8 years of continuous monitoring of NE Pacific cold-seeps and hydrothermal vents using the NEPTUNE cabled observatory

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With the advent of cabled observatories scientists are now able to have a permanent presence on the deep seafloor, enabling the discovery of previously unseen faunal behaviour and the tracking of long-term changes in biodiversity and ecosystem function. Ocean Networks Canada operates large seafloor cabled observatory networks in the NE Pacific and in the Arctic. The 850+ km network of seafloor backbone cables connect over 50 instrumented sites (>400 oceanographic instruments, >5,000 sensors), in habitats ranging from coastal fjords and rocky reefs to deep-sea canyons, cold seeps, abyssal plains and hydrothermal vents. Here we will provide an overview of how this infrastructure has been helping the scientific community better understand deep-sea chemosynthetic environments, particularly cold-seeps in the Cascadia subduction zone, and hydrothermal vents at the Endeavour segment of the Juan the Fuca Ridge. Past and ongoing research projects have focused on: 1) the influence of ocean circulation, fluid temperatures, flow and geochemistry on vent fauna distribution and behaviour; 2) understanding how non-seep endemic species, such as the tanner crab Chionoecetes tanneri disperses seep-derived energy to background soft-sediment margin habitats; 3) investigating at very fine temporal resolution the colonization and succession patterns by benthic fauna on implanted organic substrates (wood and whalebones), in an submarine canyon strongly affected by an oxygen minimum zone.