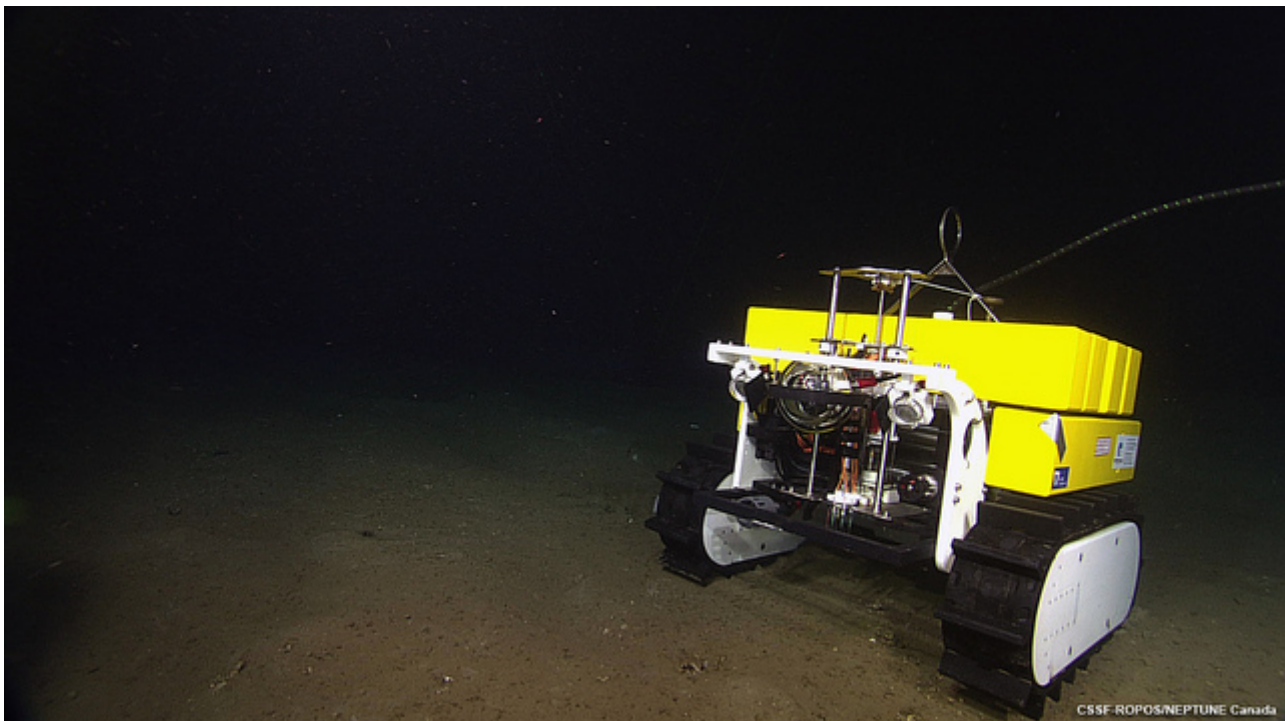


Introduction to Barkley Canyon ^[1]

Submitted by Clio Bonnett Thu, 2013-08-15 12:30



[2]

Barkley Canyon at a Glance:

- **Region:** Extending from the continental shelf edge, at a depth of 400 m, and continuing down the continental slope to the canyon axis, at a depth of 985 m, Barkley Canyon is located at the leading edge of the Cascadia subduction zone.
- **Number of Instrument Platforms:** 8
- **Depths:**
 - Barkley Canyon Axis - Pod1: 985 m
 - Barkley Benthic Pod 2: 396 m
 - Barkley Benthic Pod 3: 890 m
 - Barkley Benthic Pod 4: 894 m
 - Barkley Hydrates: 870 m
 - Barkley Upper Slope: 395 m
 - POGO Vertical Profiler: 0-396 m

- Wally: 855-870 m
- **Location:**
 - Pod 1: Lat: 48°19.0046' N, Lon: 126°03.0075' W
 - Pod 2: Lat: 48°25.6215' N, Lon: 126°10.4787' W
 - Pod 3: Lat: 48°18.9004' N, Lon: 126°03.5375' W
 - Pod 4: Lat: 48°18.8915' N, Lon: 126°03.4912' W
 - Barkley Hydrates: Lat: 48°18.7266' N, Lon: 126°03.9480' W
 - Barkley Upper Slope: Lat: 48°25.6457' N, Lon: 126°10.4799' W
 - POGO Vertical Profiler: Lat: 48°25.6424' N, 126°10.4476' W
 - Wally: Lat: 48°18.7046' N, Lon: 126°03.9227' W
- **Seafloor Composition:** Sediment covered canyon, highlighted by the presence of methane gas hydrates and hydrate mounds in some regions.
- **Principal Research:** Gas hydrates, sediment dynamics, upwelling, plankton, productivity, benthic processes, biodiversity, water column processes.

Map of Ocean Networks Canada installation in Barkley Canyon off the west coast of Vancouver Island. Click to enlarge.

Environment/Ecosystems:

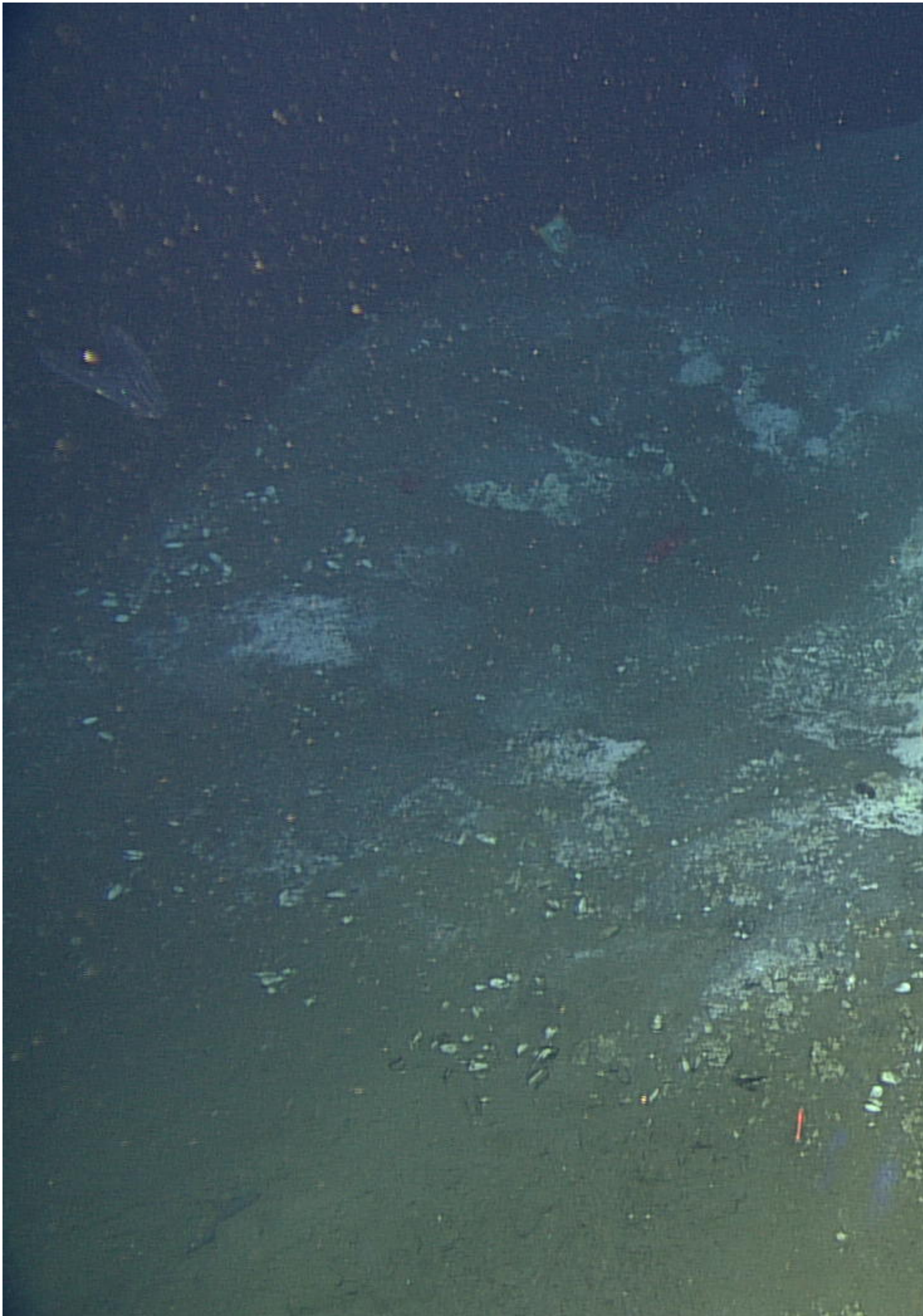
The Barkley Canyon region is influenced by a major system of currents known as the California current system which is created when the west wind drift current splits to create the Alaska and California currents, which regulate the coast's upwelling and downwelling regime.

In addition to these two currents, the Barkley Canyon itself serves as a primary conduit for the transfer of sediment from the continental slope into the deep-sea. Located at the leading edge of the Cascadia subduction zone, this site supports the study of the accretionary prism, where sediments pile along the continental slope as they are scraped off the subducting tectonic plate.

Barkley Canyon is also a location where pressure, temperature, gas saturation, and local biological chemical conditions are just right for exposed gas hydrates to be stable at the seafloor. Gas hydrates have gas molecules, typically methane in marine environments, trapped within "cages" of water molecules. This gives them a crystalline structure that resembles ice and can appear as white to yellow mounds covered by sediment on the seafloor.

Located along a canyon which descends into the deep ocean, the organisms at Barkley Canyon have evolved to deal with high pressure, an absence of light, and low nutrient availability. While species density has been suggested by video data to be greater at shallower sites, most species are also present at deeper sites, with an interesting selection of fish (such as sablefish, skates, and hagfish), molluscs (including bivalves, gastropods and cephalopods), echinoderms and arthropods.

Chemosynthetic bacterial mats are also found at the Barkley Canyon, sustained on the methane hydrates by hydrogen sulfide-producing microbes deep within the sediments.



What Makes Barkley Canyon Unique?

Barkley Canyon is a prime example for seafloor canyons at continental slopes which have one of the greatest variety of marine life, channel rich nutrition transport, transport large amounts of sediment and are prone to bioerosion or slumping.

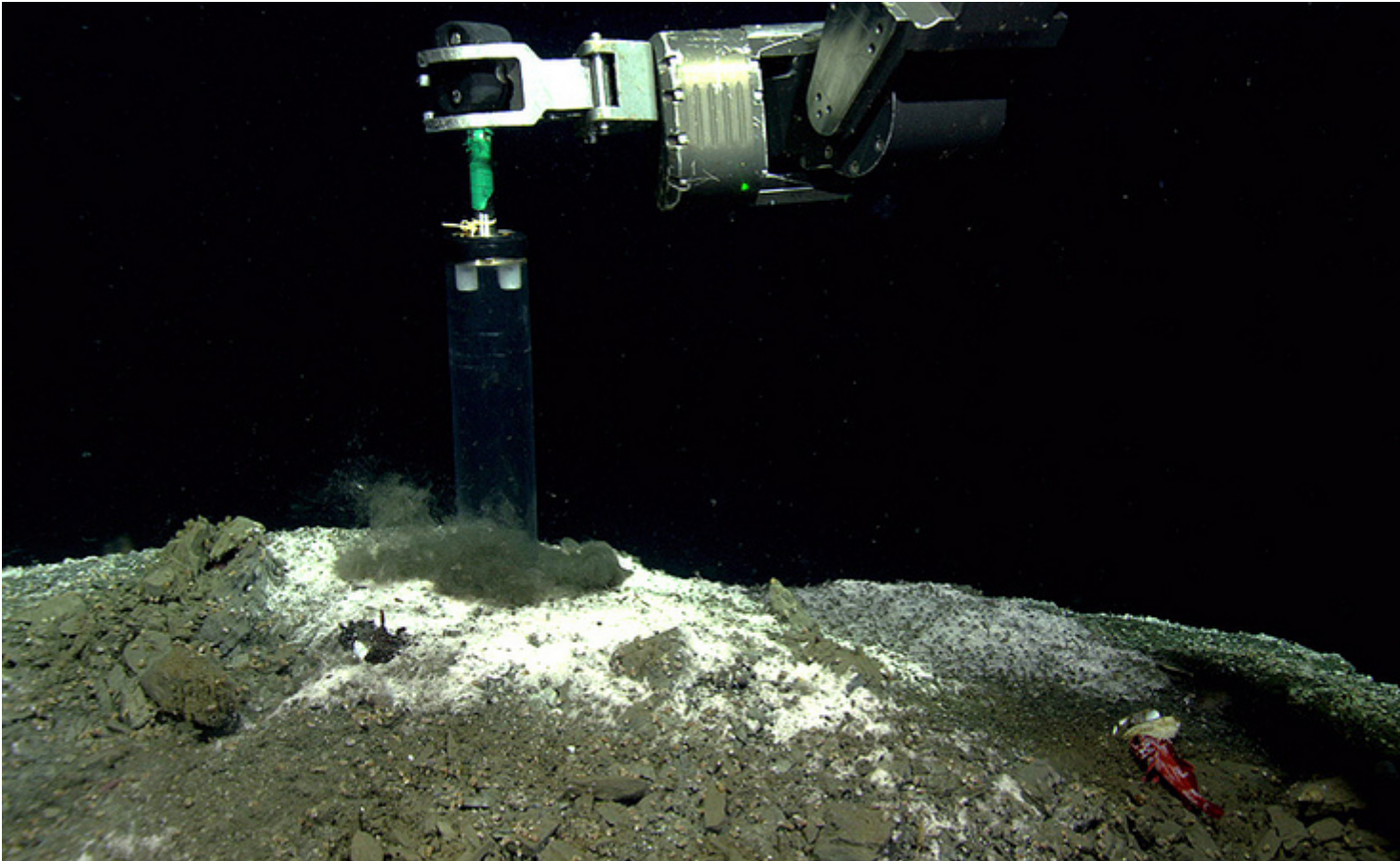
In addition to the above, Barkley Canyon's gas hydrates add to a dense focus area for ocean research. Its uniquely outcropping hydrate mounds appear to be very dynamic.

Hydrate mounds and the canyon setting provide distinct environmental settings that make Barkley Canyon truly unique in the depth and breadth of research possible here.

Barkley Canyon has a widest array of instruments, spread over the highest number (8) of instrument platforms on one node, with the only two mobile platforms on the NEPTUNE observatory: Ocean Networks Canada's Vertical Profiler POGO and the world's first Internet operated deep-sea crawler, Wally the crawler.

With the ability to study research topics as distinct as sediment dynamics, hydrate stability, benthic organisms, and the characteristics of the water column above (using POGO), the diversity of research at Barkley Canyon allows the integration of a wide array of data from different projects.

Epitomized in Wally, the submarine crawler, which is controlled remotely primarily by a team of scientists in Bremen, Germany, Barkley Canyon is generating compelling data to be used by a diverse set of researchers, fostering uniquely inter-disciplinary links between them in the process.



[4]

Principal Research:

Barkley Canyon covers a wide range of continental margin environments, where scientists can study sediment and nutrient transport, subduction zone processes, gas hydrate stability, and the influences of the canyon and related upwelling on biological, ecological, and physical processes. A selection of the ongoing research at Barkley Canyon can be found below:

- The Barkley Canyon Hydrates project, led by Ross Chapman and Laurenz Thomsen, uses Wally and its suite of instruments to study the gas hydrate benthic ecosystem and gas hydrate dynamics.
- Headed by Paul Snelgrove and Anna Metaxas, the [Barkley Benthic](#) [5] group of researchers focuses on the physical and biological forcing conditions in the benthic boundary layer and their impact on ecosystem dynamics.
- Led by Richard Thomson, the [West Coast ?Tsunami-Meter?](#) [6] is studying the generation, propagation, transformation, run-up, and dissipation of tsunamis and other long waves, to enhance our knowledge of them, and predictive capability against them.
- [The Seismograph Network](#) [6], led by Garry Rogers, uses four broadband/strong motion seismographs and four short period seismographs to study subsea earthquakes and other tectonic activity.

Blog Highlights

[Teen Spots Hagfish-Slurping Elephant Seal](#) [7]

[Barkley Canyon observatory?s Wally I Assesses Methane Flux](#) [8]

Videos

[Dr. Laurenz Thomsen and gas hydrates](#) [9]:

[Introducing Wally](#) [10]:

[LIVE video at Barkley Canyon Axis](#) [11]

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