

*Continuous long-term observation of
vent ecosystems and biogeochemical
interactions using*

North

East

Pacific

Time-series

Undersea

Networked

Experiments

CANADA



Mairi Best, Associate Director - Science

NEPTUNE Canada

A plate-scale, seafloor network of remote, interactive, natural laboratories for real-time, 4-D experiments designed to quantify linkages among oceanographic and plate-related processes

Funding

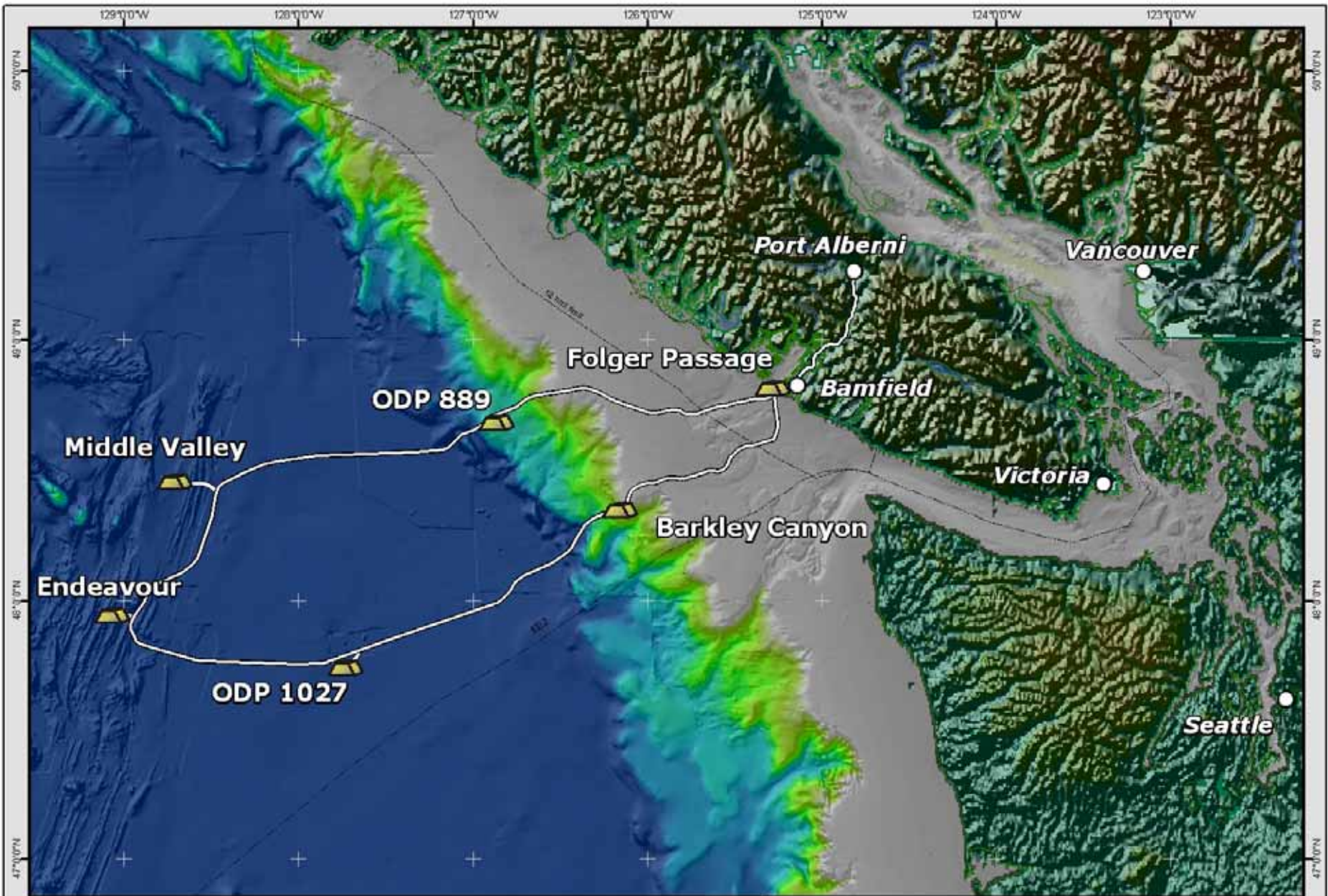
- Approximately \$80 million for 5 years
- Half from the Canada Foundation for Innovation
- Half from the BC Knowledge Development Fund
- As well, there have been contributions to specific developments (e.g., underwater High Definition Television) from CANARIE

NEPTUNE Development



- Workshops:
 - Victoria May 3-5, 2004
 - Victoria September 27-29, 2004
 - Halifax November 22-23, 2004
- Proposals Due: January 18, 2005
- External Review Committee; Executive Committee review relative to facility scope
- \$11 million available for observing systems
- Decisions – July 2005
- 17 group proposals received; 5 successful

Science Research Themes

- Plate tectonic processes and earthquake dynamics
- Dynamic processes of fluid fluxes and gas hydrates in the sea bed
- Regional oceanic/climate dynamics and effects on the marine biota
- Deep-sea ecosystem dynamics
- Engineering and computational research



Legend

-  Science Node
-  Cable Route PSR12

Basemaps:
 USGS Open File No. 99-369
 Projection: Mercator, LTS 48°



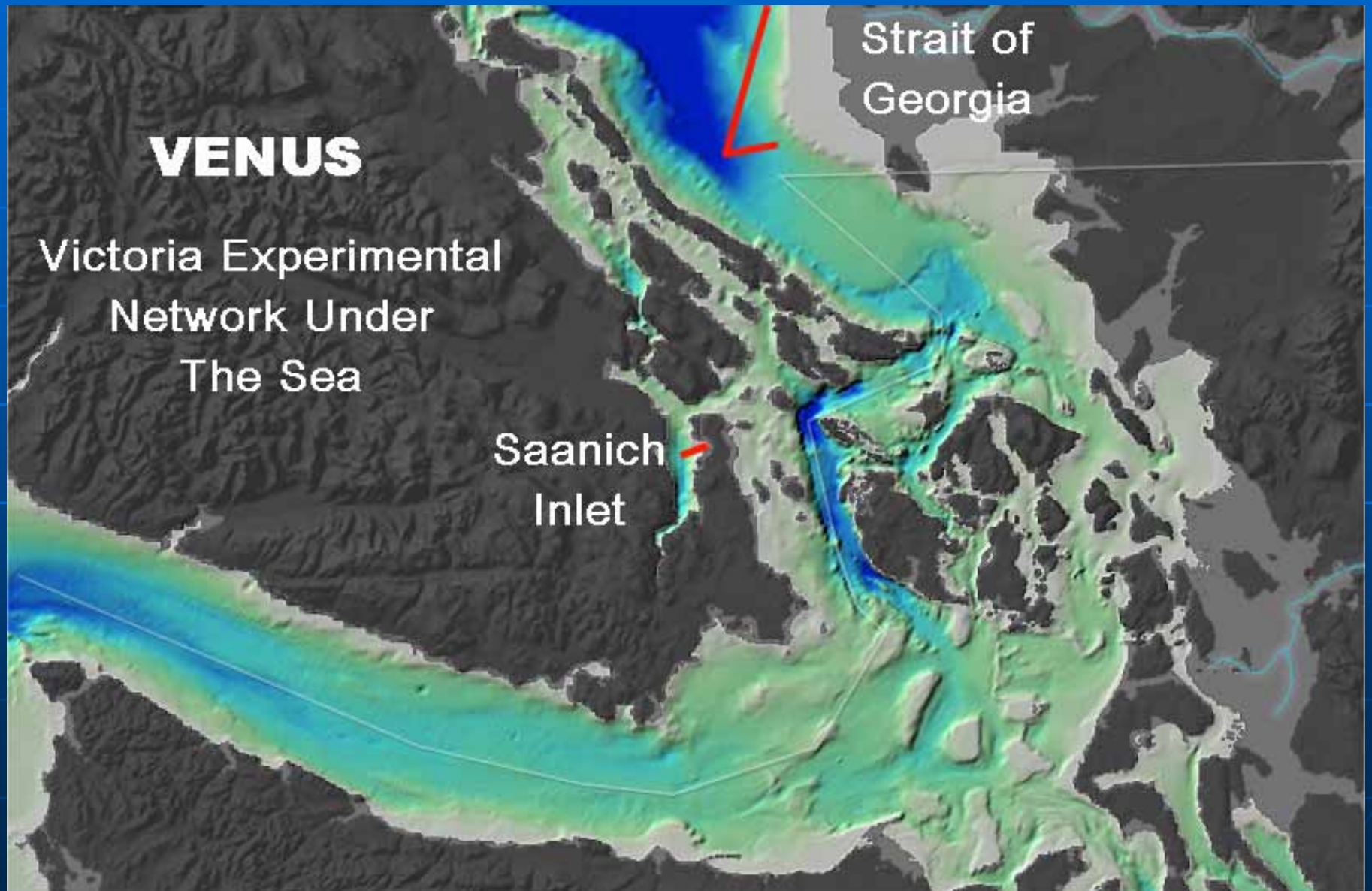
University of Victoria

NEPTUNE Canada Observatory
 Proposed System Layout

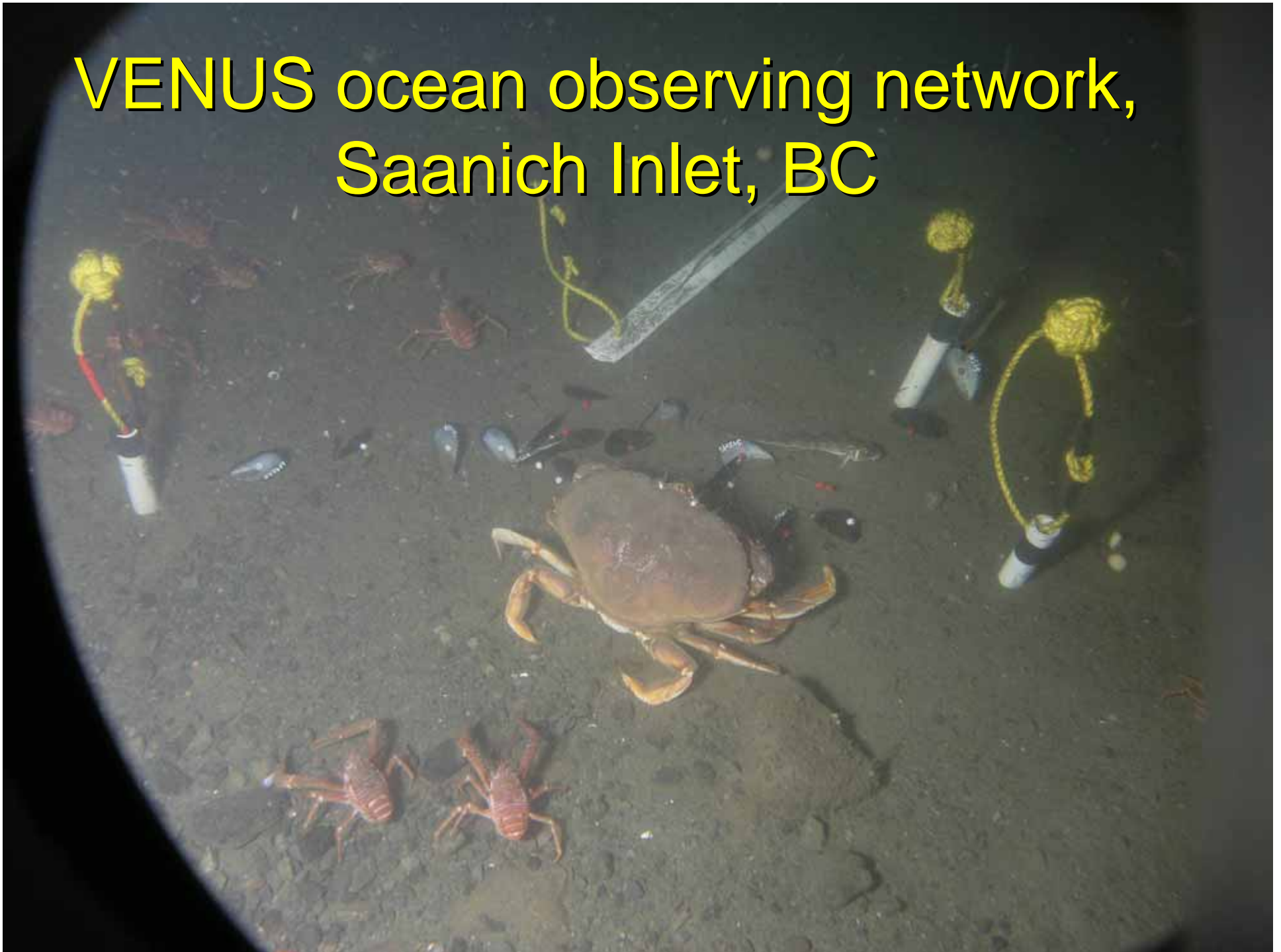


2007/05/14

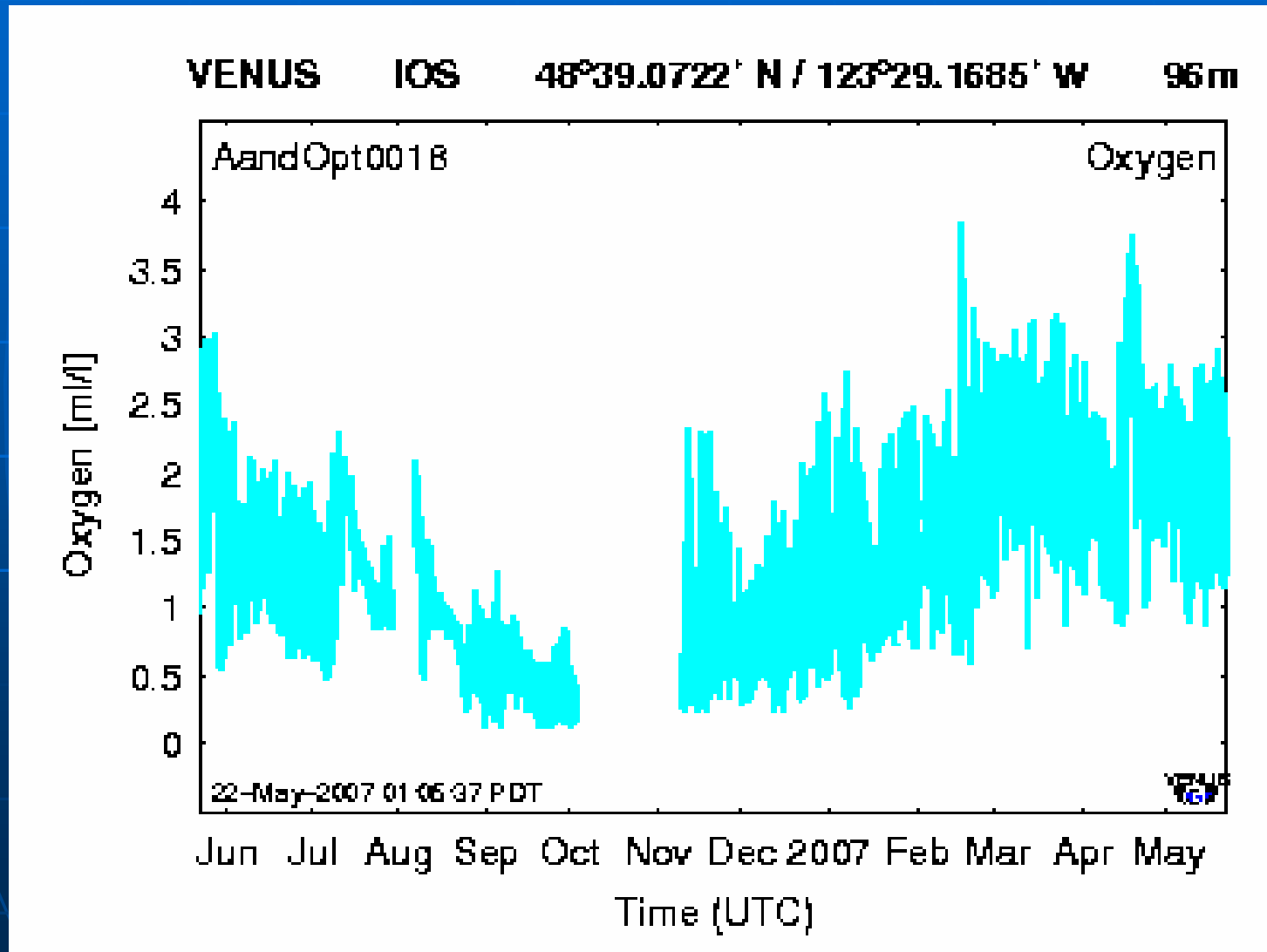
VENUS Coastal Observatory Operational Feb. 2006-present

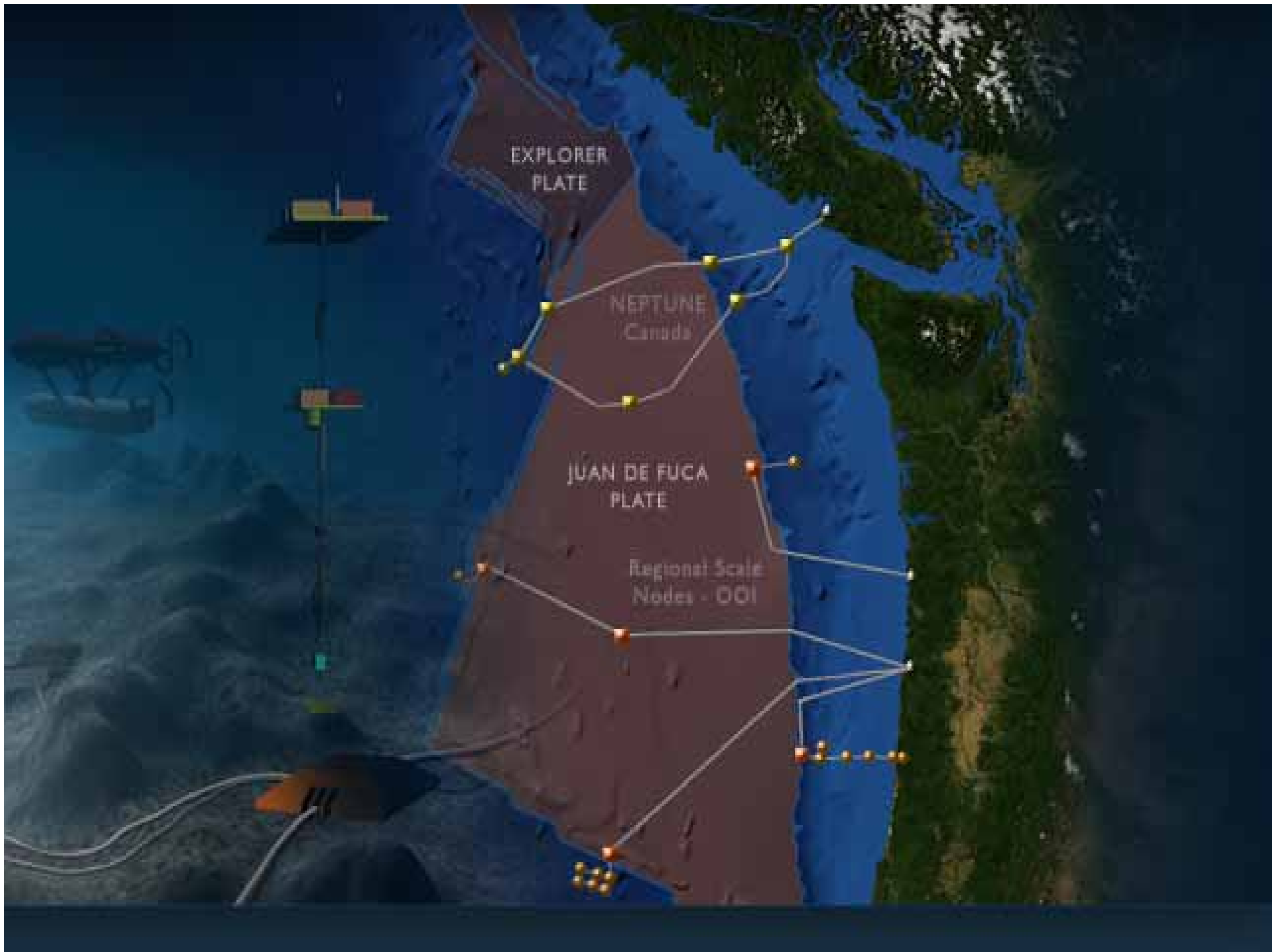


VENUS ocean observing network, Saanich Inlet, BC



Oxygen Data from VENUS-Saanich

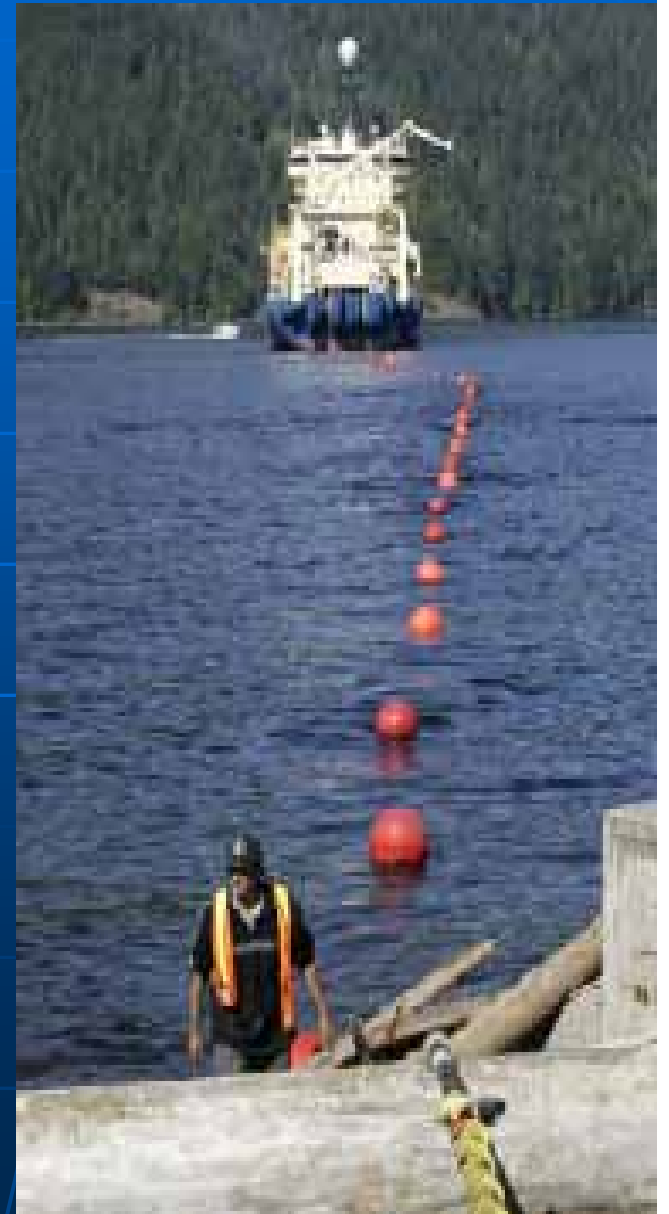




NEPTUNE Canada Cable Lay 2007



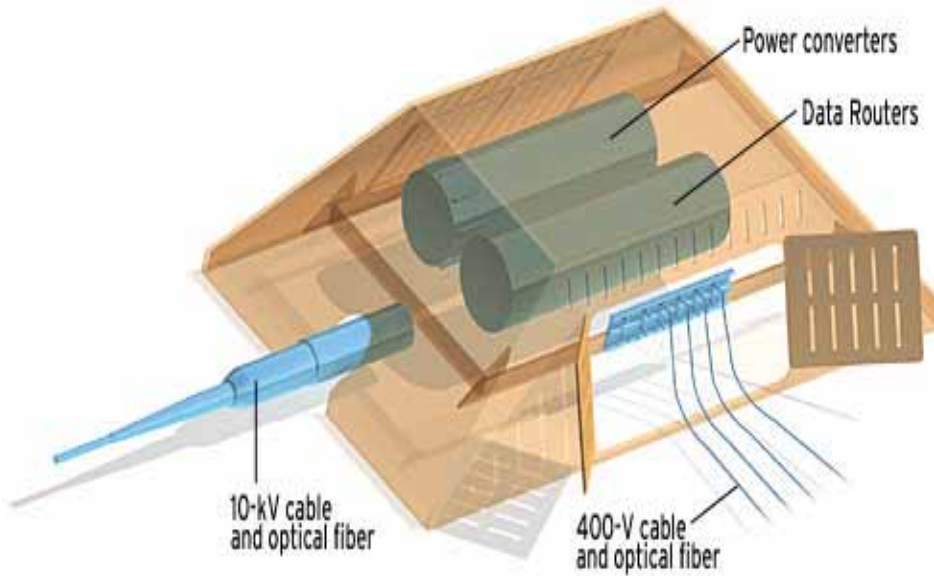
Cable Lay 2007



Sea Cable Storage



Nodes





2180 Malory Drive

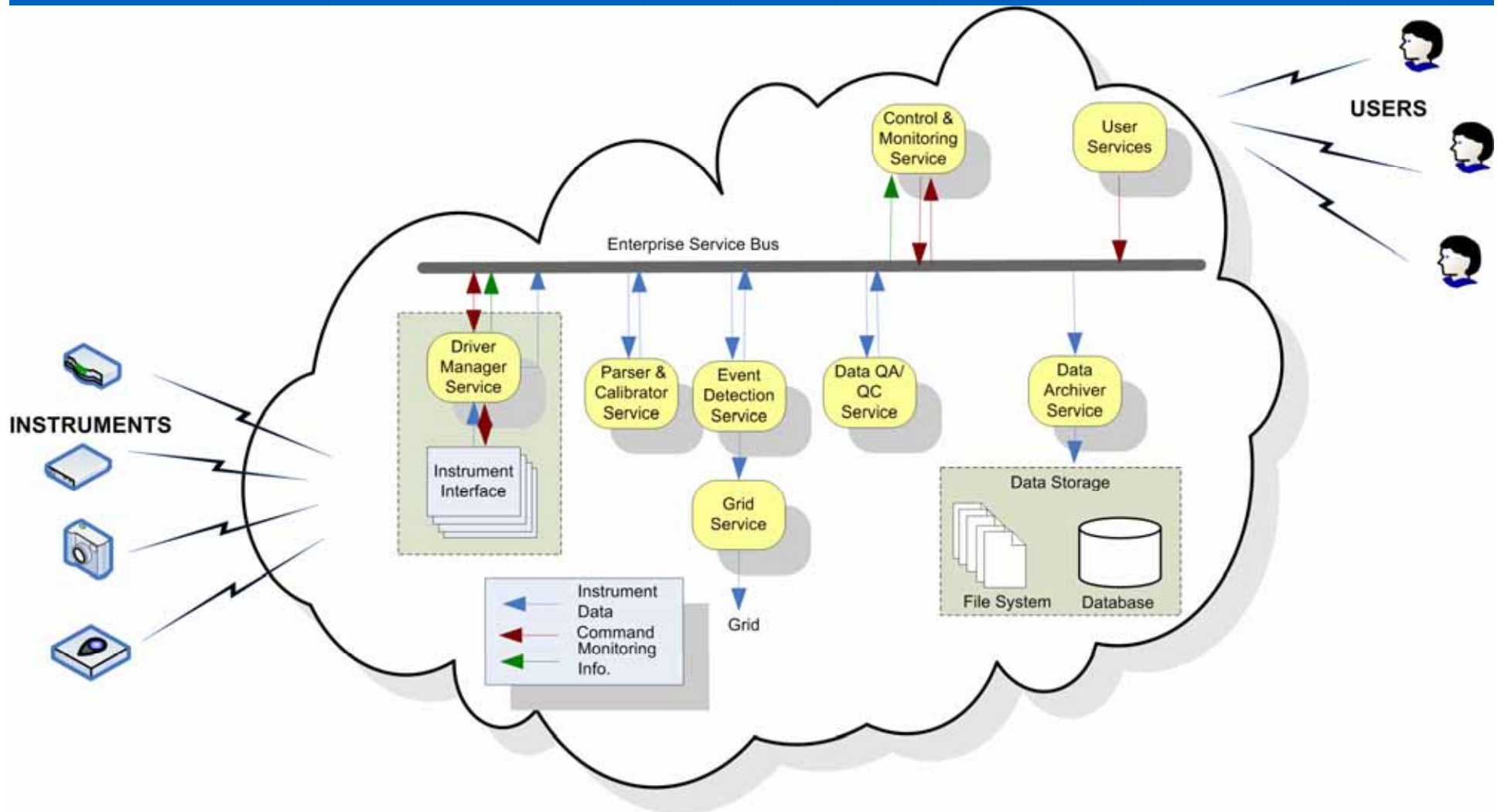


NEPTUNE Canada
Ocean Observatory Shore Station
www.neptuneinada.ca



University
of Victoria

Data Management and Archive System (DMAS)



NEPTUNE Canada

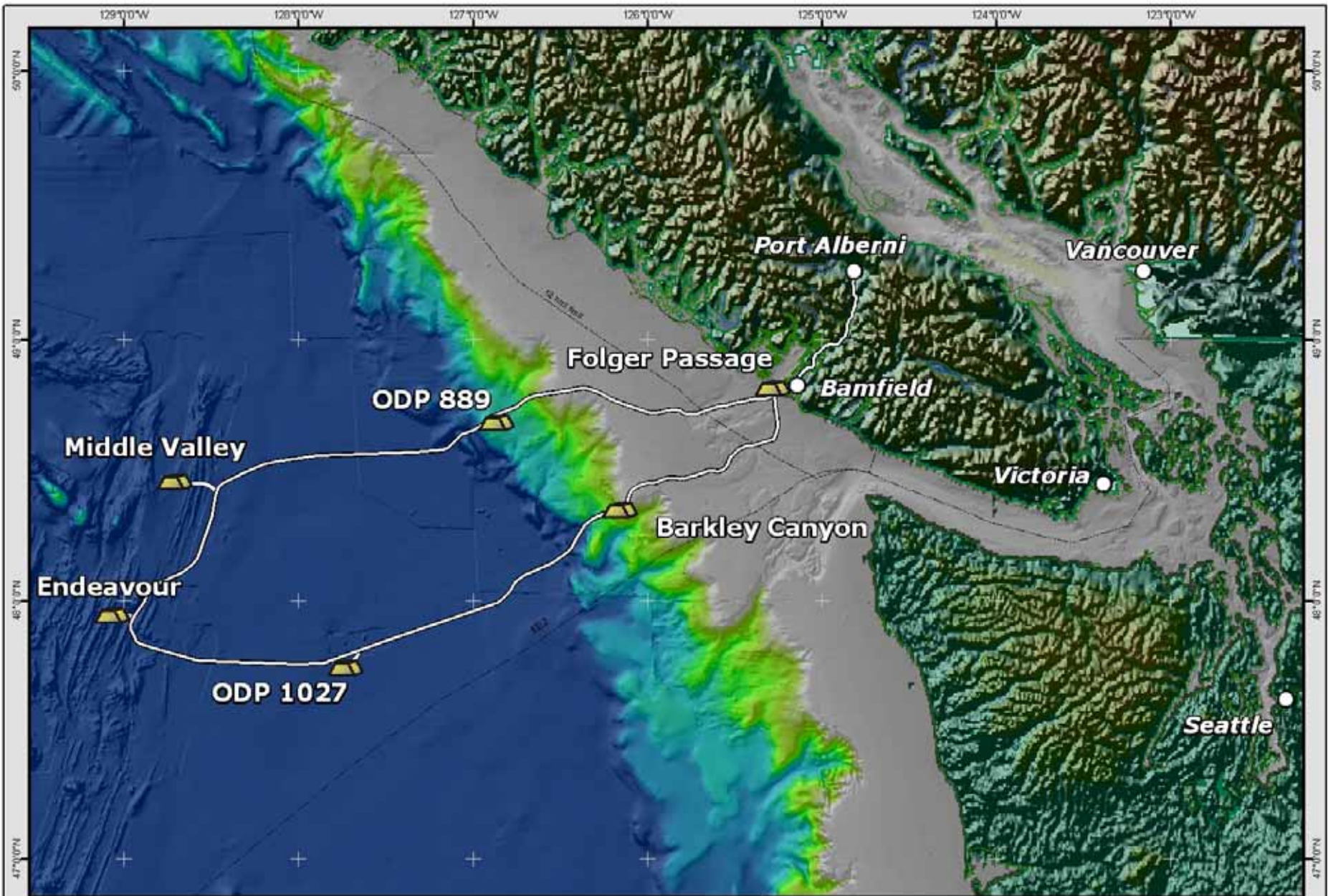
- capable of supporting ten primary nodes, with each primary node equipped to support two 10kV secondary nodes
- each primary node is currently configured with 4 Gb/sec connectivity to shore, but is upgradeable to 16 Gb/sec. Each secondary node has two 1 Gb/sec connections to its primary node.
- each node, whether primary or secondary, can provide up to 9kW to instruments, limited by the overall network power consumption of 60kW

Science Budget



- “Science” budget (everything past the nodes) is 17% of total budget
- Actual instruments are only 4% of total budget, installation 3%, connectivity 10%

NEPTUNE Canada - Status

- Secured a further \$20M in fall 2006 (total 80M)
- Scope of observatory expanded from 2 to 5 node
- Increased the instruments and data flow by 250%
- Observatory will now initially host 113 instruments
- All instruments are in the process of being procured or built, with the first instruments arriving in our testing facility
- Cable, repeaters and branching units are being laid now, then nodes next summer, followed by instruments
- NSERC and CECR being approached for operating funds
 - current estimate is ~10M



Legend

-  Science Node
-  Cable Route PSR12

Basemaps:
 USGS Open File No. 99-369
 Projection: Mercator, LTS 48°



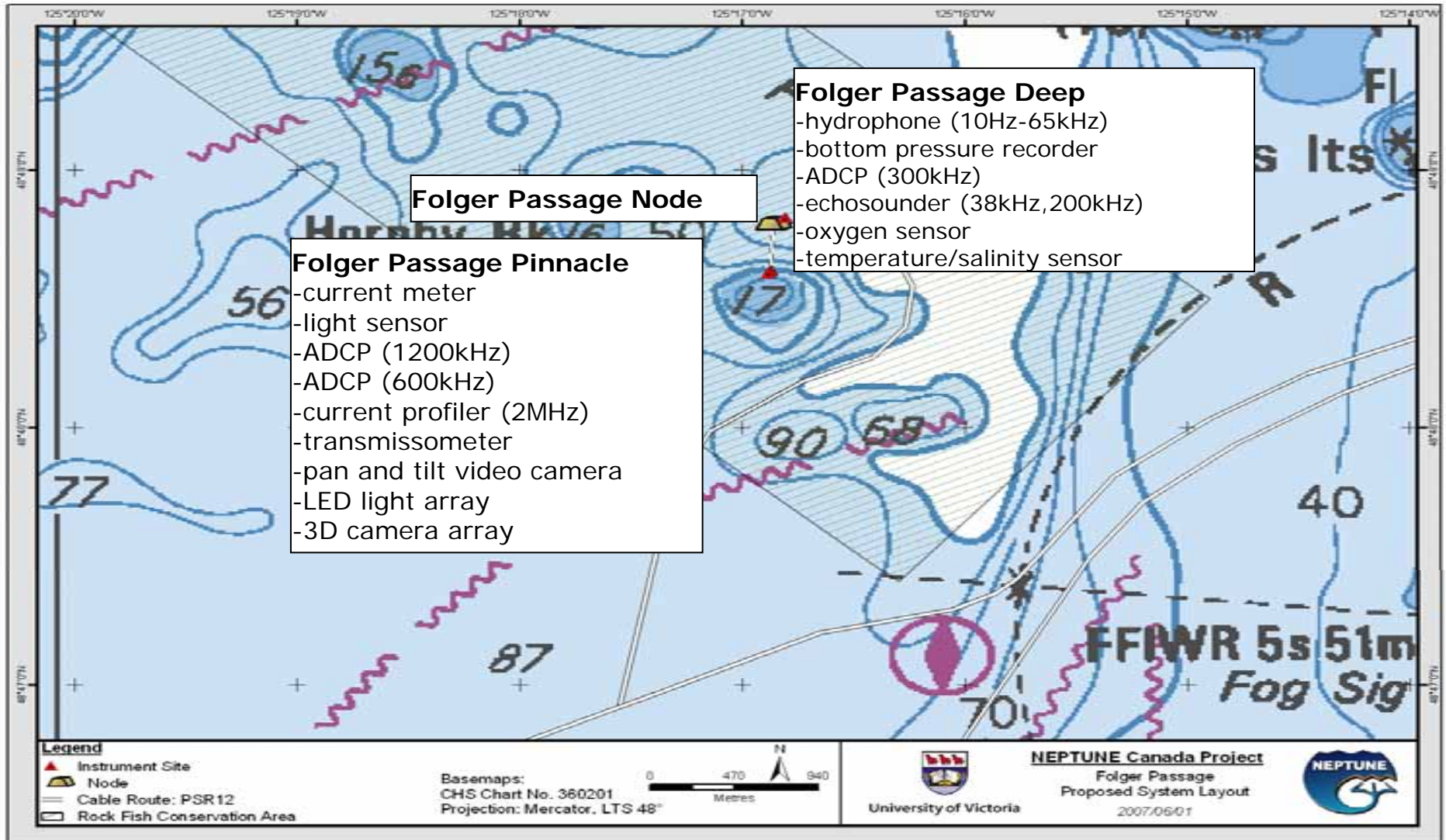
University of Victoria

NEPTUNE Canada Observatory
 Proposed System Layout



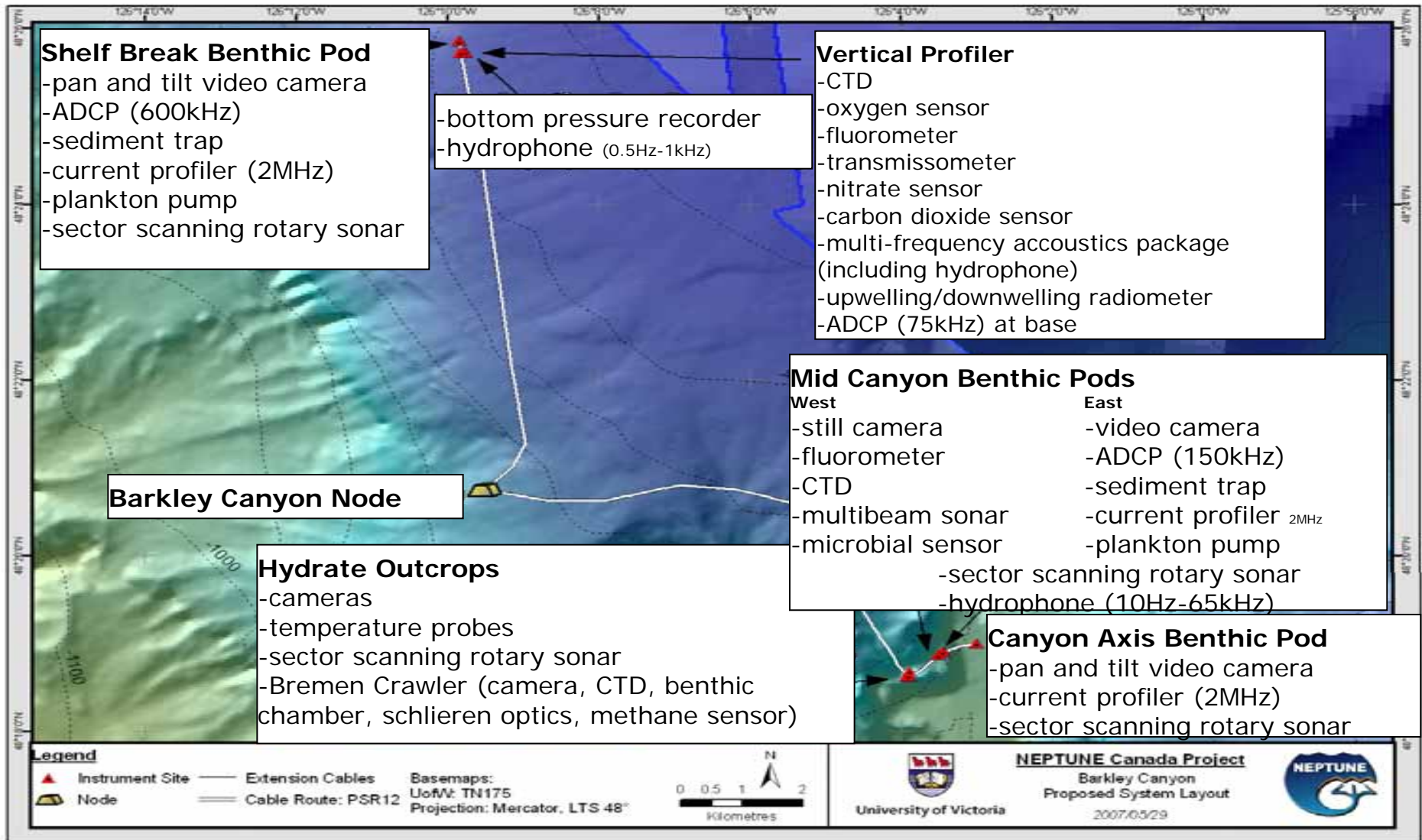
2007/05/14

Folger Passage



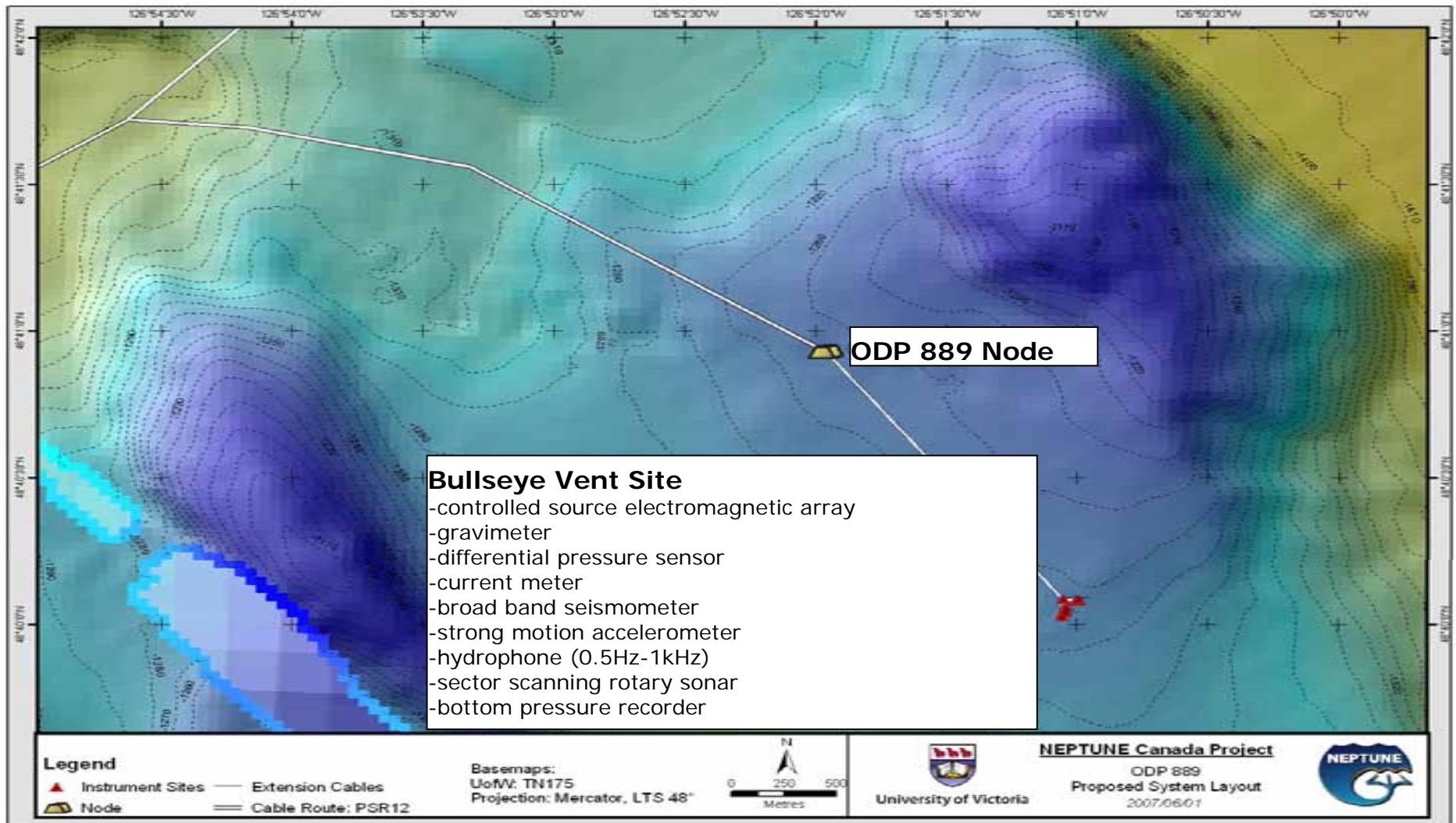


Barkley Canyon



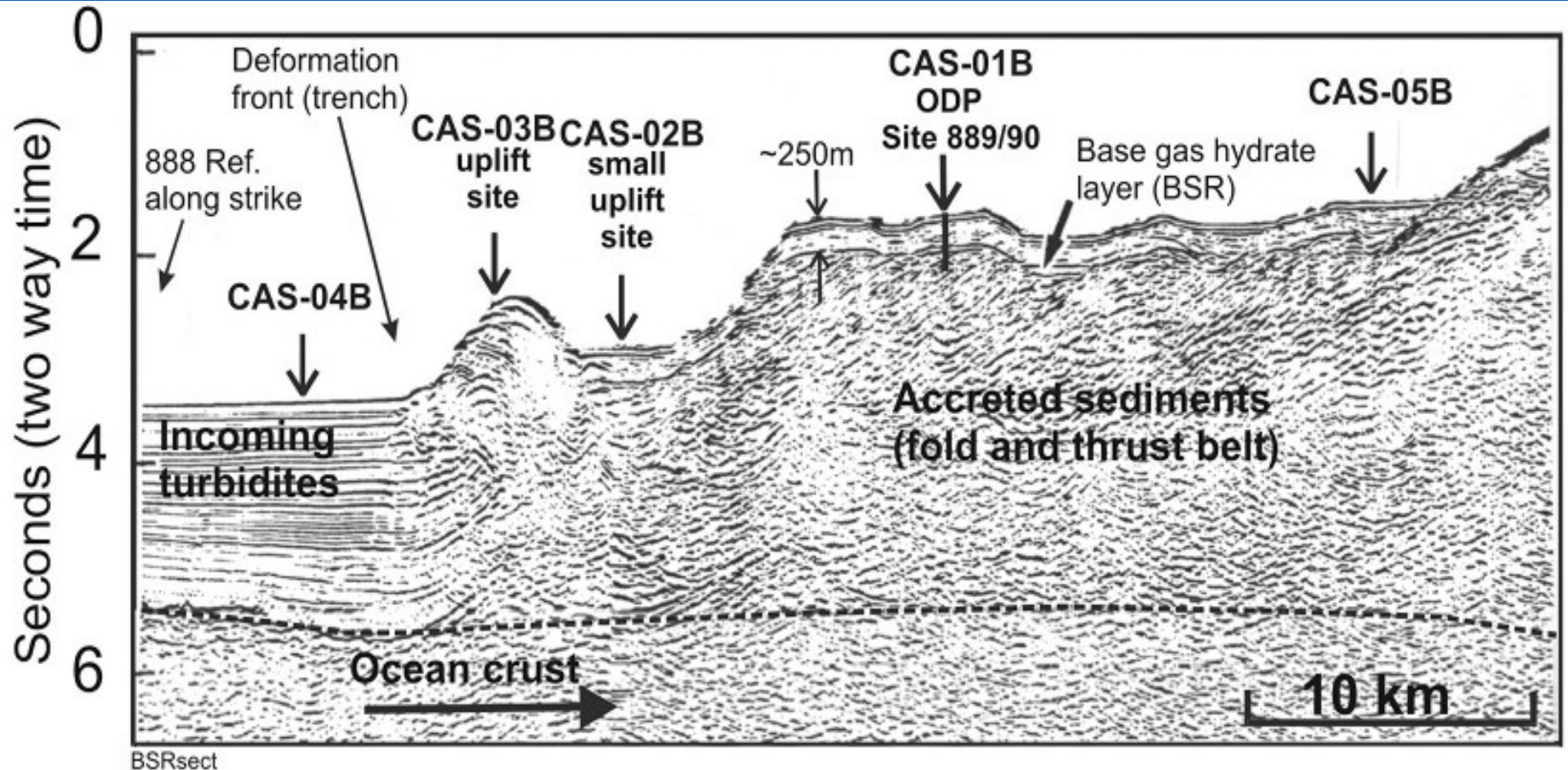


ODP 889

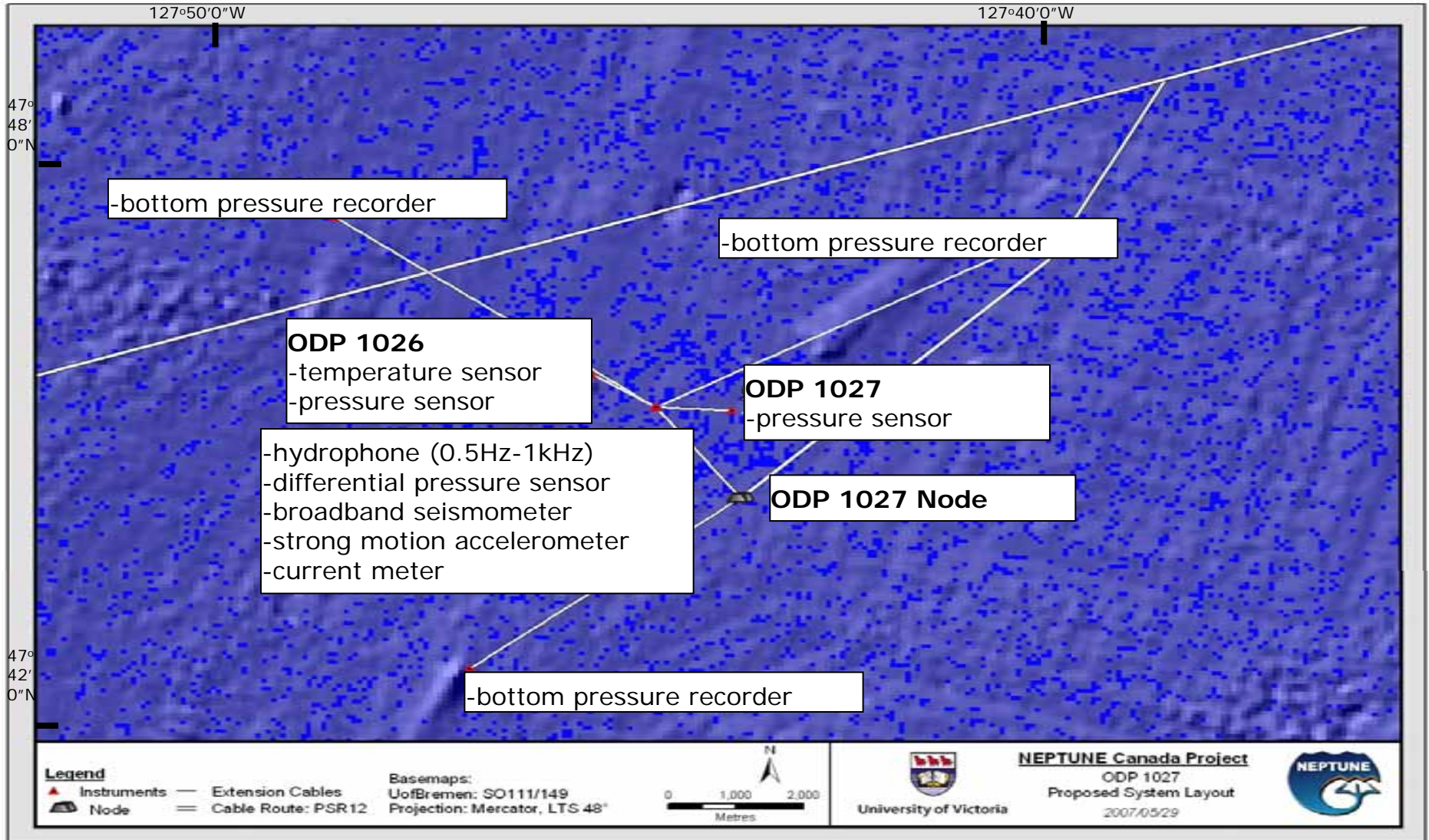


Cascadia Gas Hydrates

Seismic

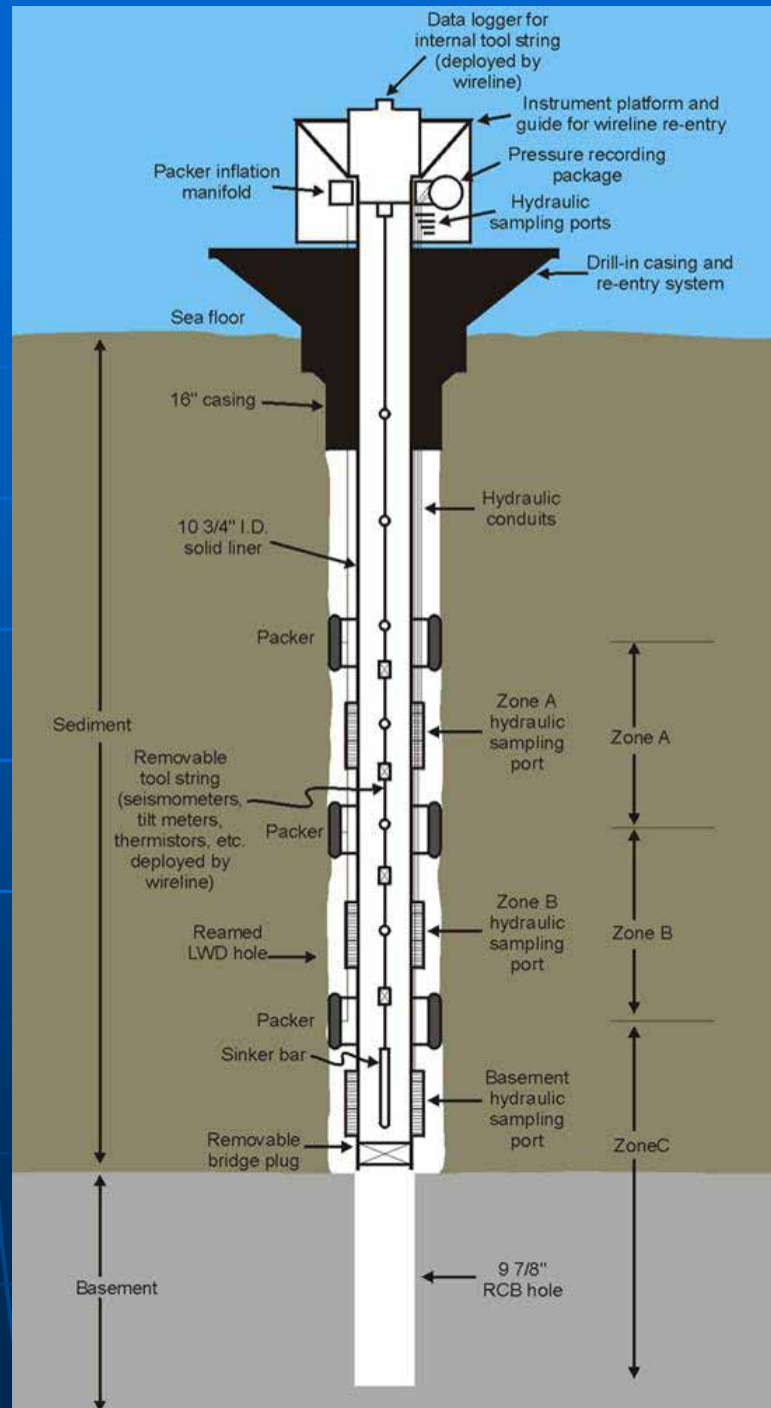


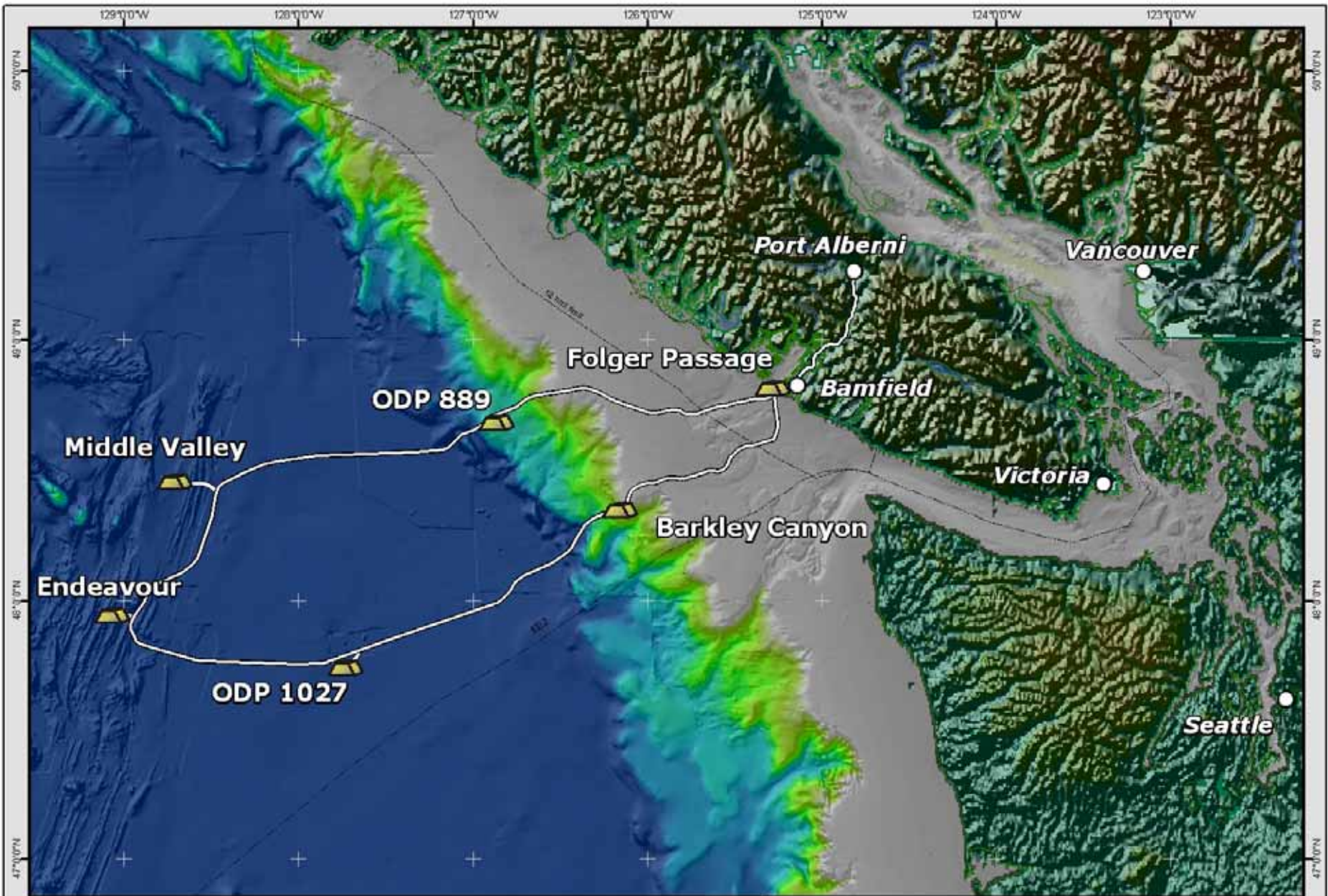
ODP 1027





Advanced CORK System for Ocean Bottom Boreholes

(courtesy of E. Davis)





Legend

-  Science Node
-  Cable Route PSR12

Basemaps:
 USGS Open File No. 99-369
 Projection: Mercator, LTS 48°



University of Victoria

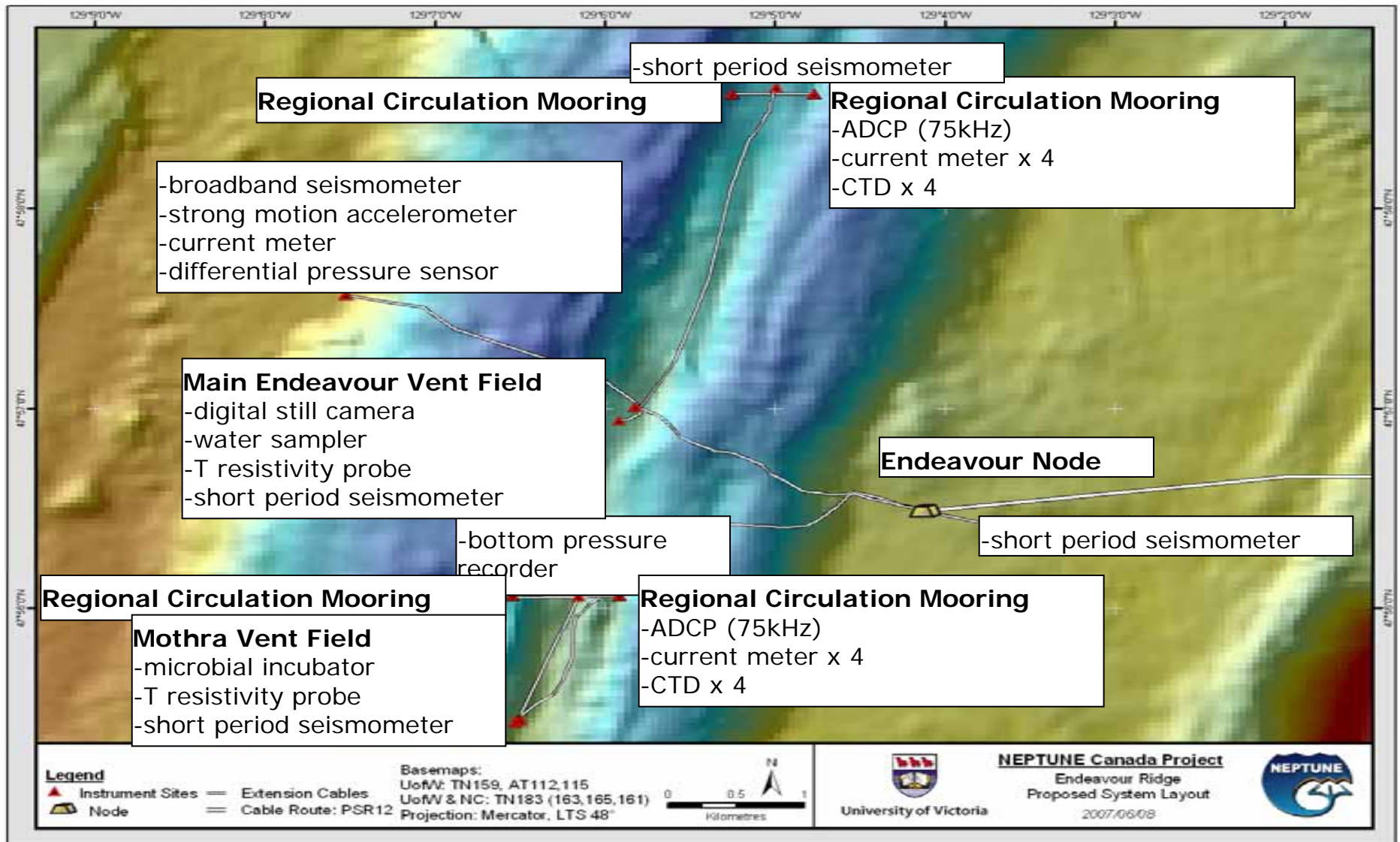
NEPTUNE Canada Observatory
 Proposed System Layout



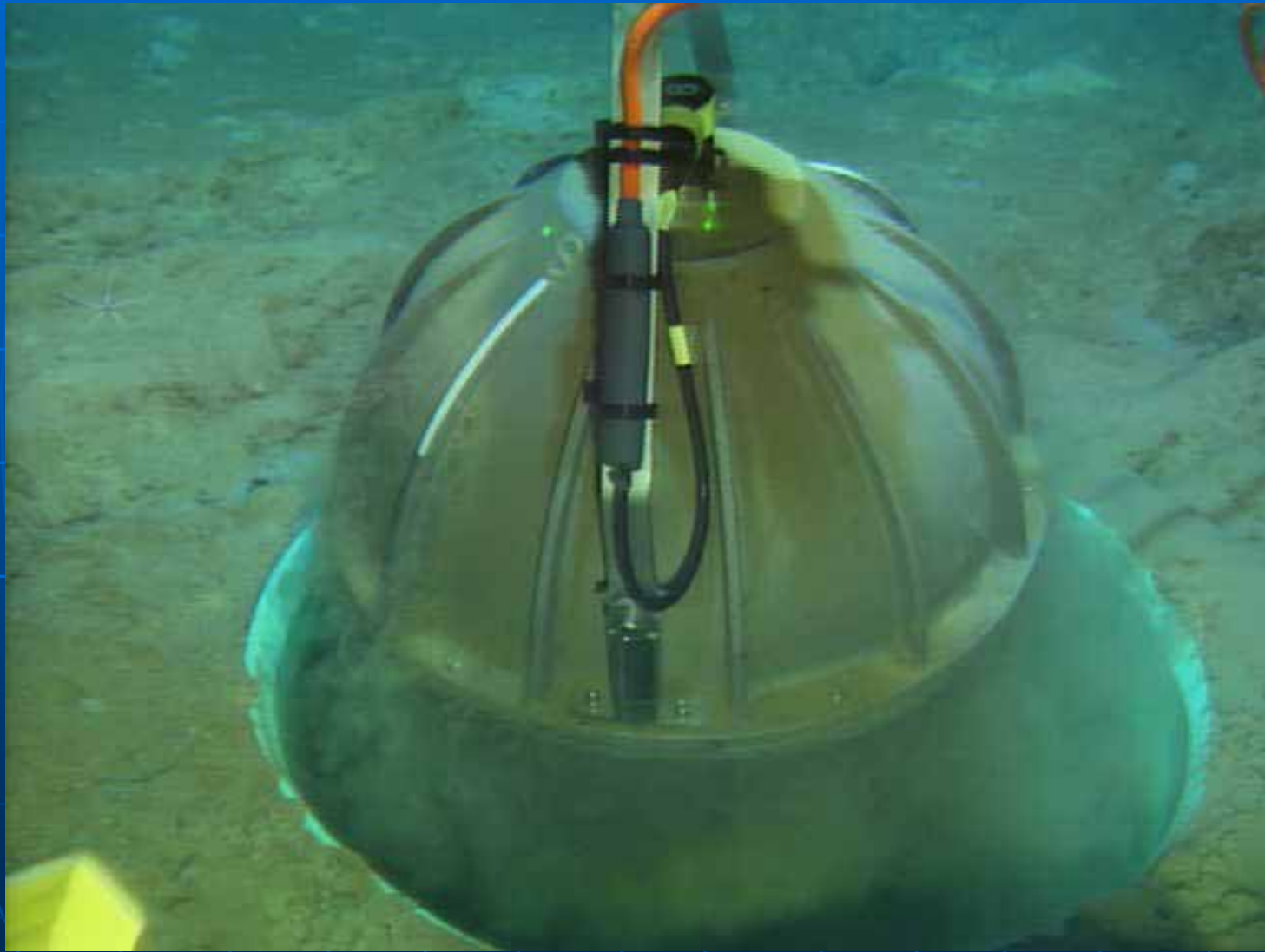
2007/05/14



Endeavour Ridge



Broadband Seismometer



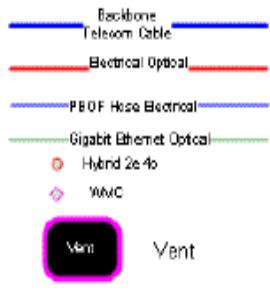
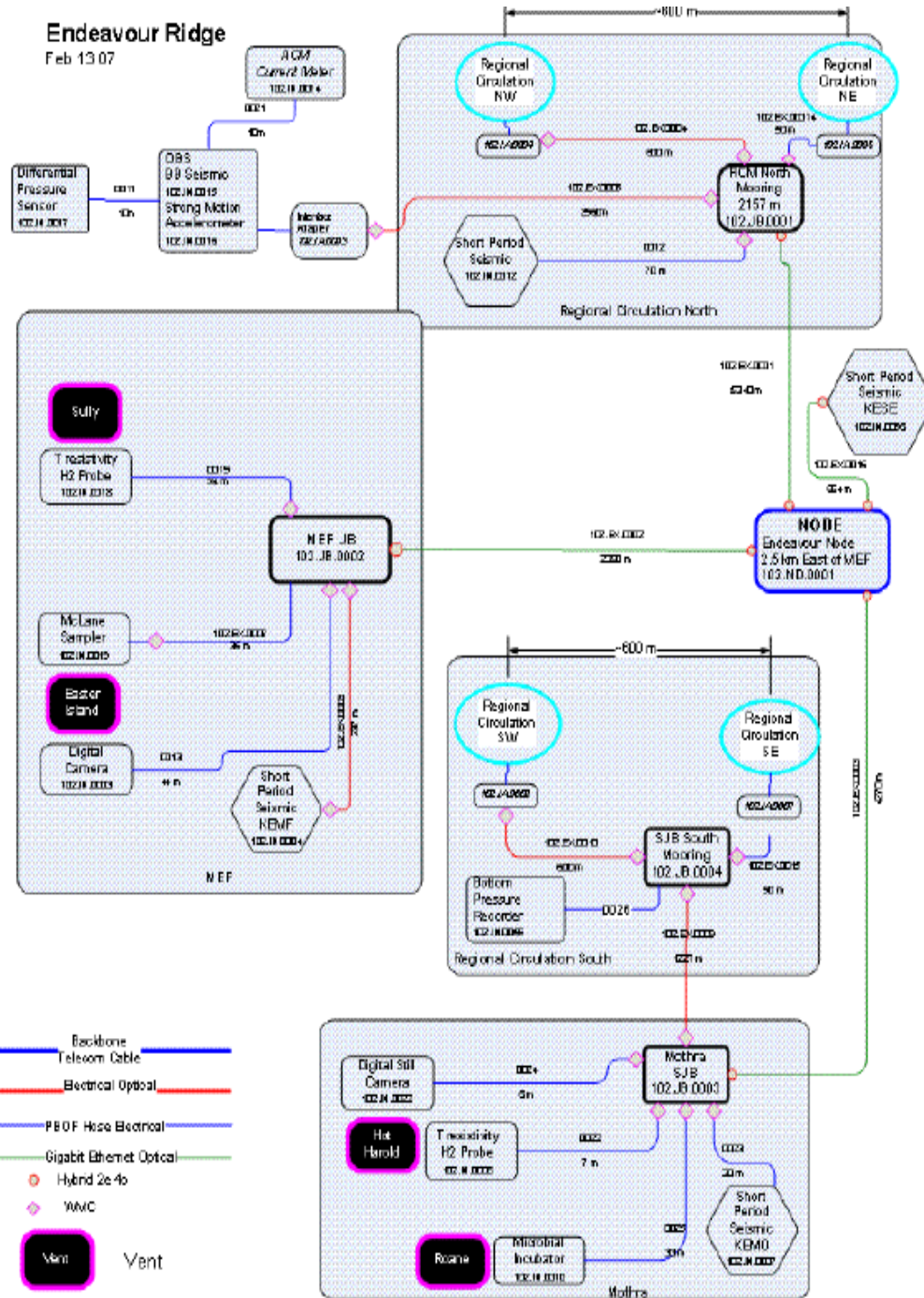
■ Gary Rogers (PGC)

Short Period Seismometers

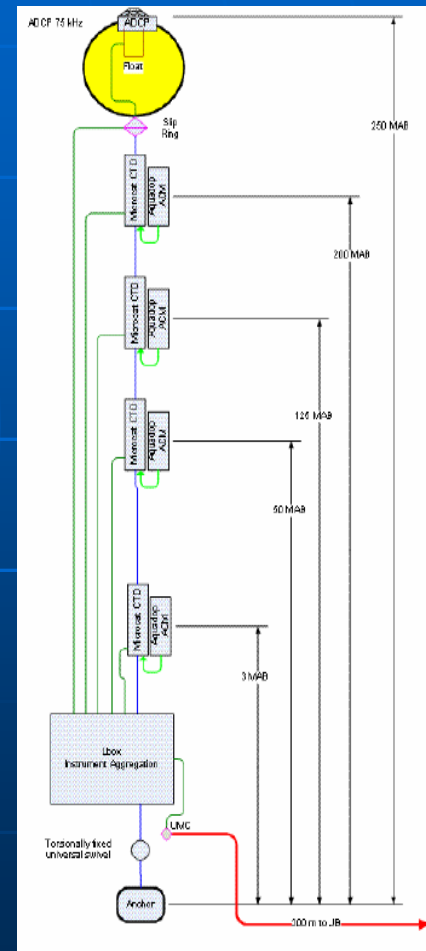


- Will Wilcock (UW) & Gary Rogers (PGC)

Endeavour Ridge
Feb 13 07



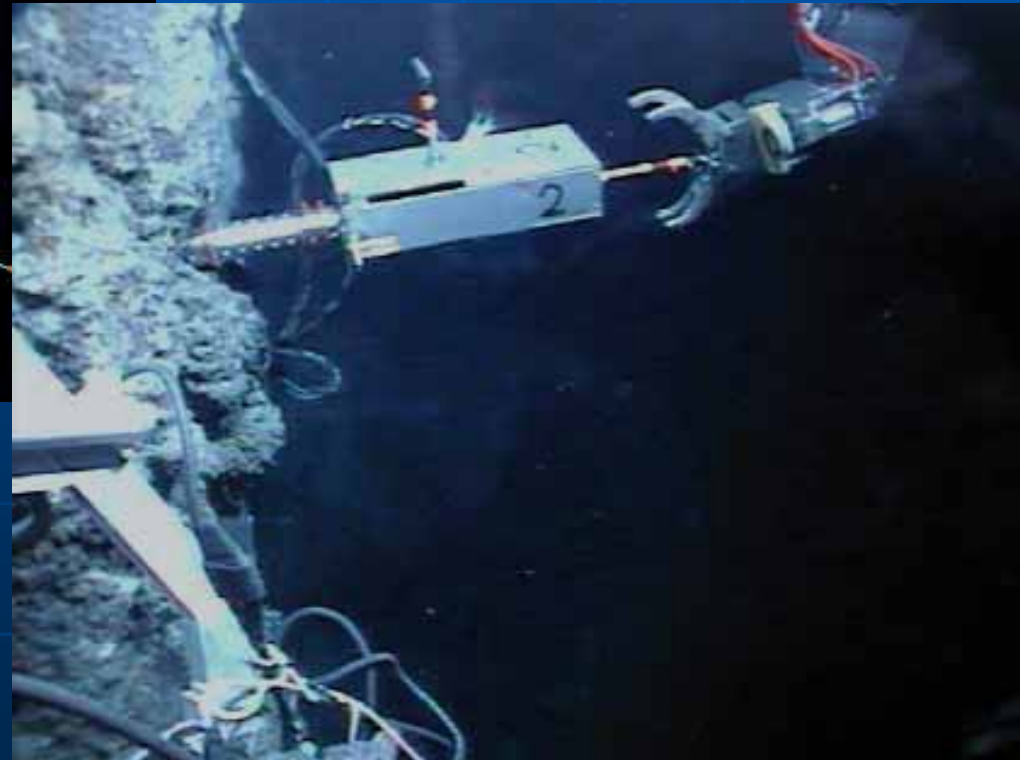
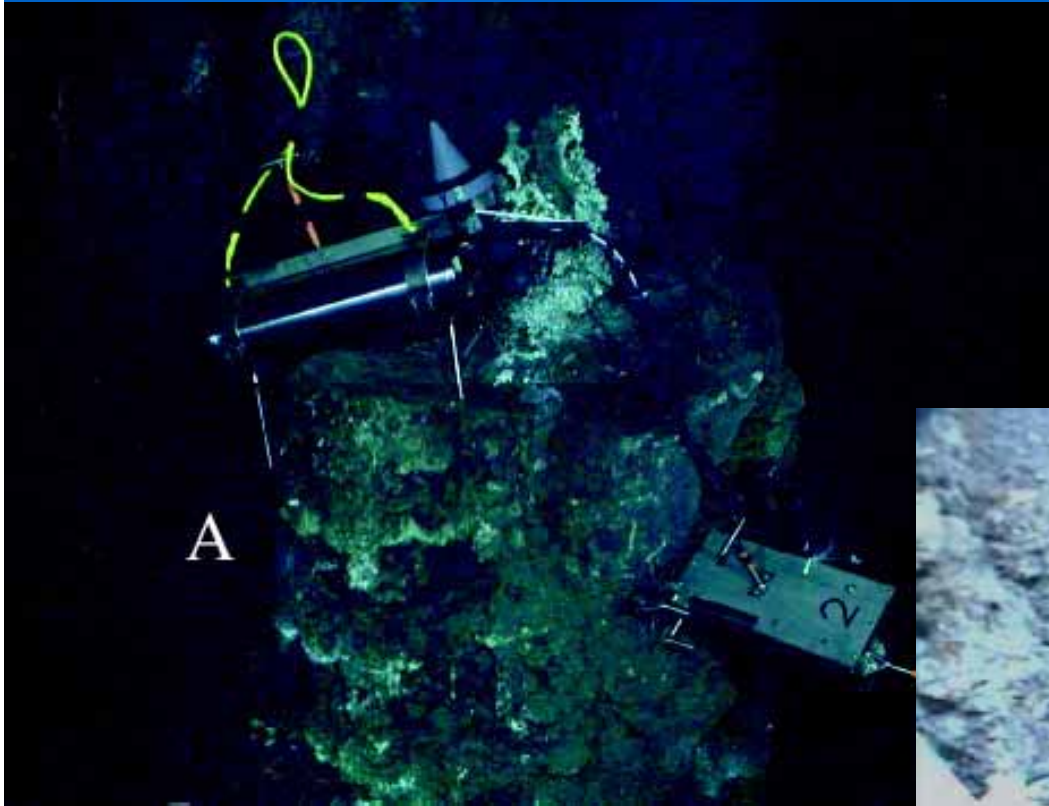
Endeavour Block Diagram



Regional Circulation

- real-time snapshots and a long-term picture of the dynamics of the hydrothermal plume in the axial valley
- supporting information for complementary studies of biogeochemical processes in hydrothermal plumes
- data from the NEPTUNE instruments can be used to design optimal sampling strategies for mass balance studies of interactions between microbes and elements in vent plumes
- sampling plans could be fine-tuned in the field using real-time data from moorings.
 - Rick Thomson (IOS)

Microbial Incubator



- Deb Kelly (UW)

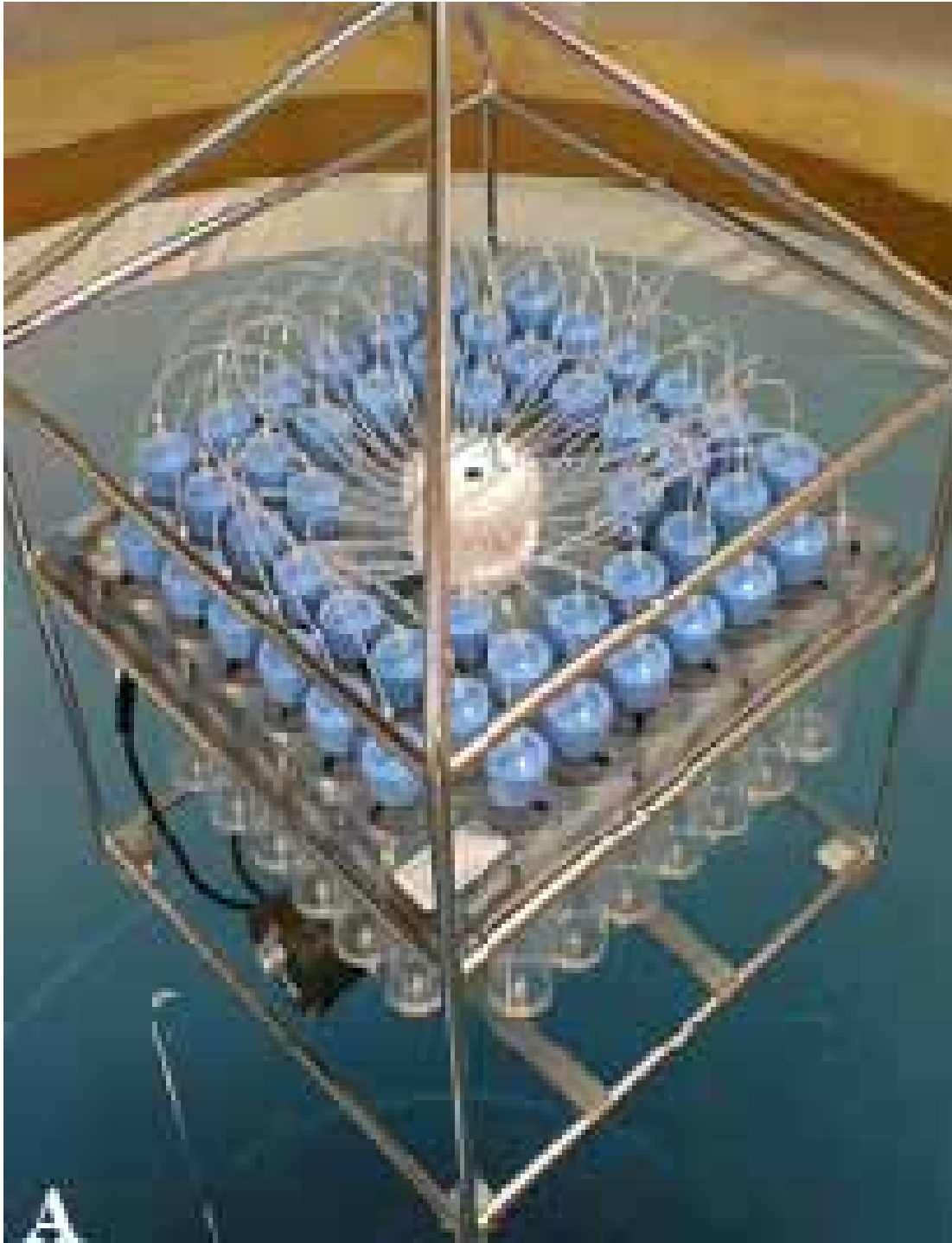
Microbial Incubator

- real-time temperature data
- recovered annually to provide data on microbial growth within the chimney walls
- first step along a developmental pathway leading toward having gene chips or some future microbial sensors inserted in the chimney walls
 - potential real-time info on microbial processes in relation to fluid flow within the sulphide edifice and links to subsurface hydrology and seismic activity

Temperature-Resistivity Probe



- Marv Lilley (UW)



McLane Water Sampler

- Dave Butterfield
(PMEL)