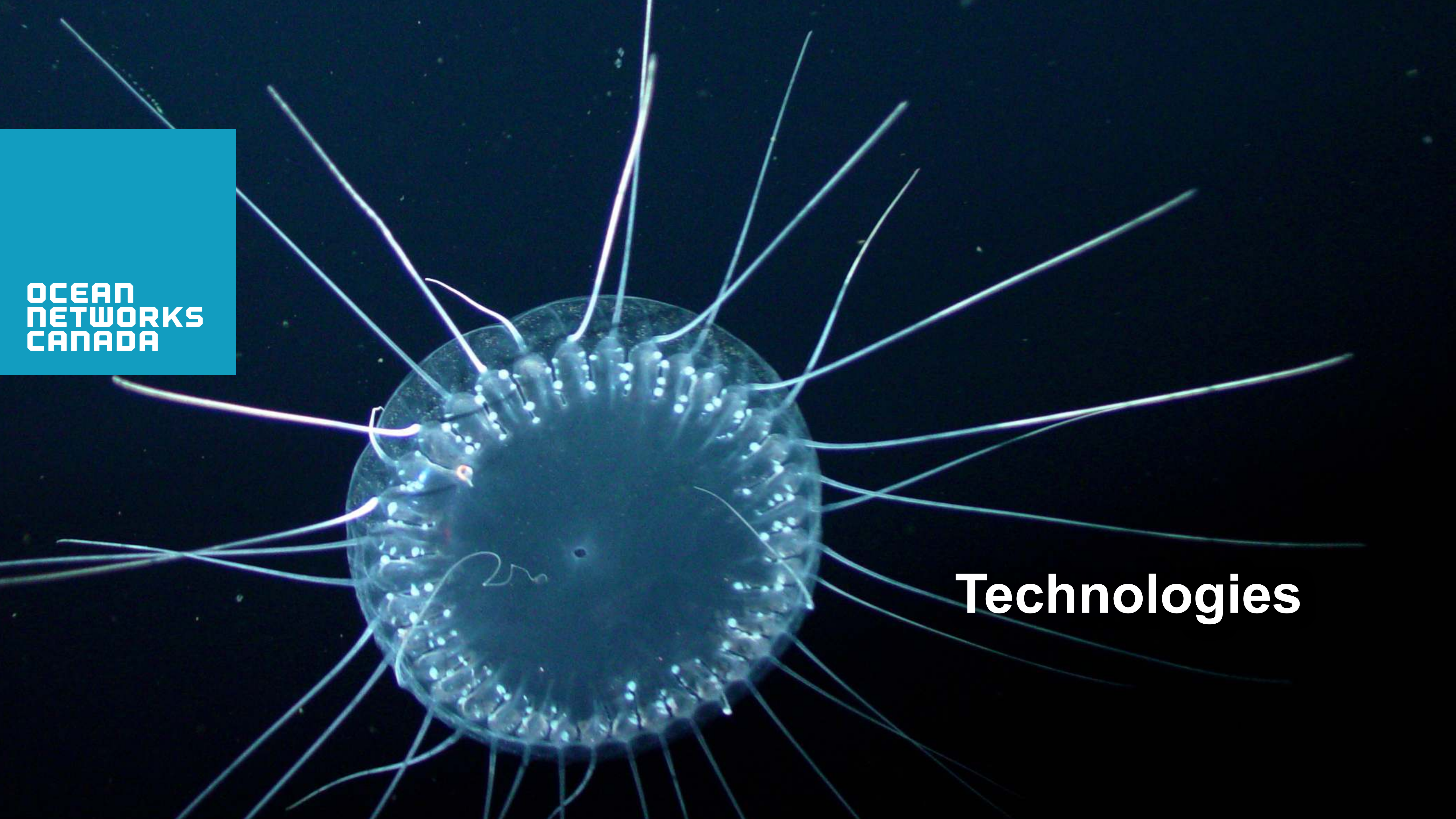


Ocean Networks Canada: Continuously Delivering Multidisciplinary Data from the Deep

Benoît Pirenne — Director, User Engagement — Oct. 18, 2023

A glowing jellyfish is the central focus, its body emitting a soft blue light. Numerous thin, white fiber optic cables are attached to its tentacles, extending outwards in all directions. The background is a deep, dark blue, making the jellyfish and its glowing tentacles stand out prominently.

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About Us



180+ Staff



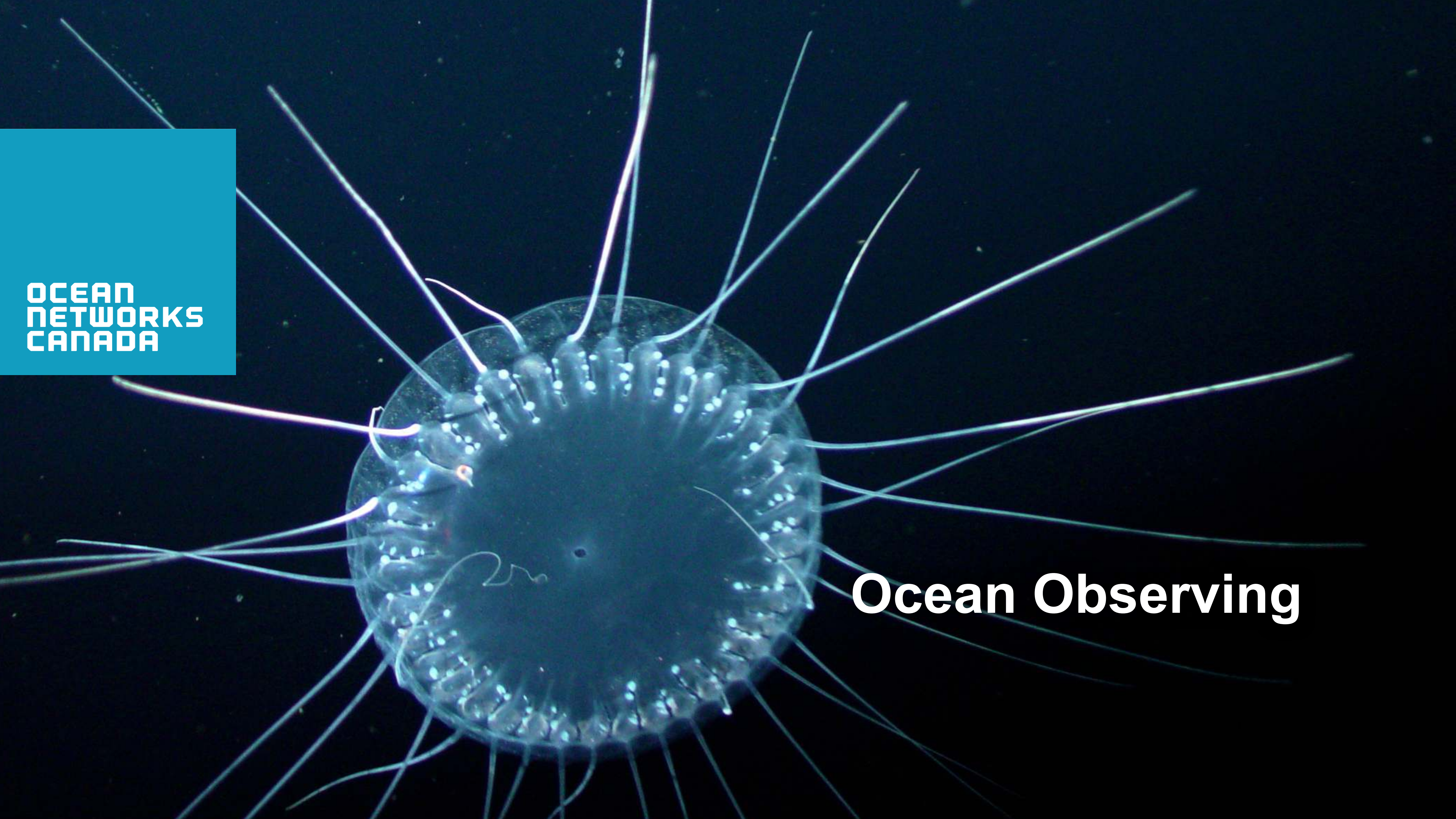
\$650M Investment



>1.3 Petabyte of data



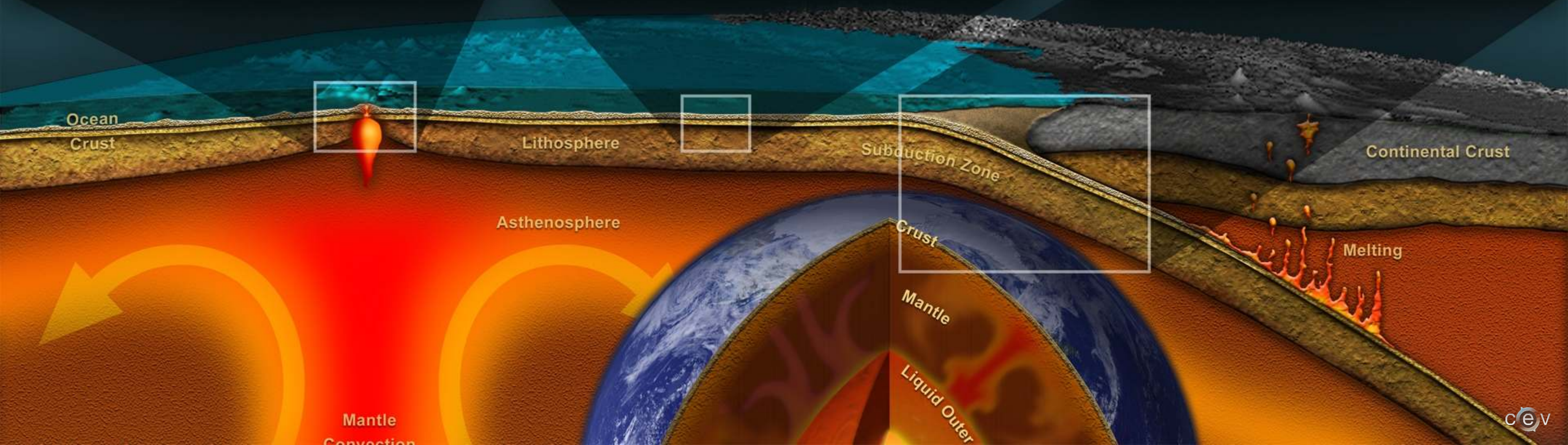
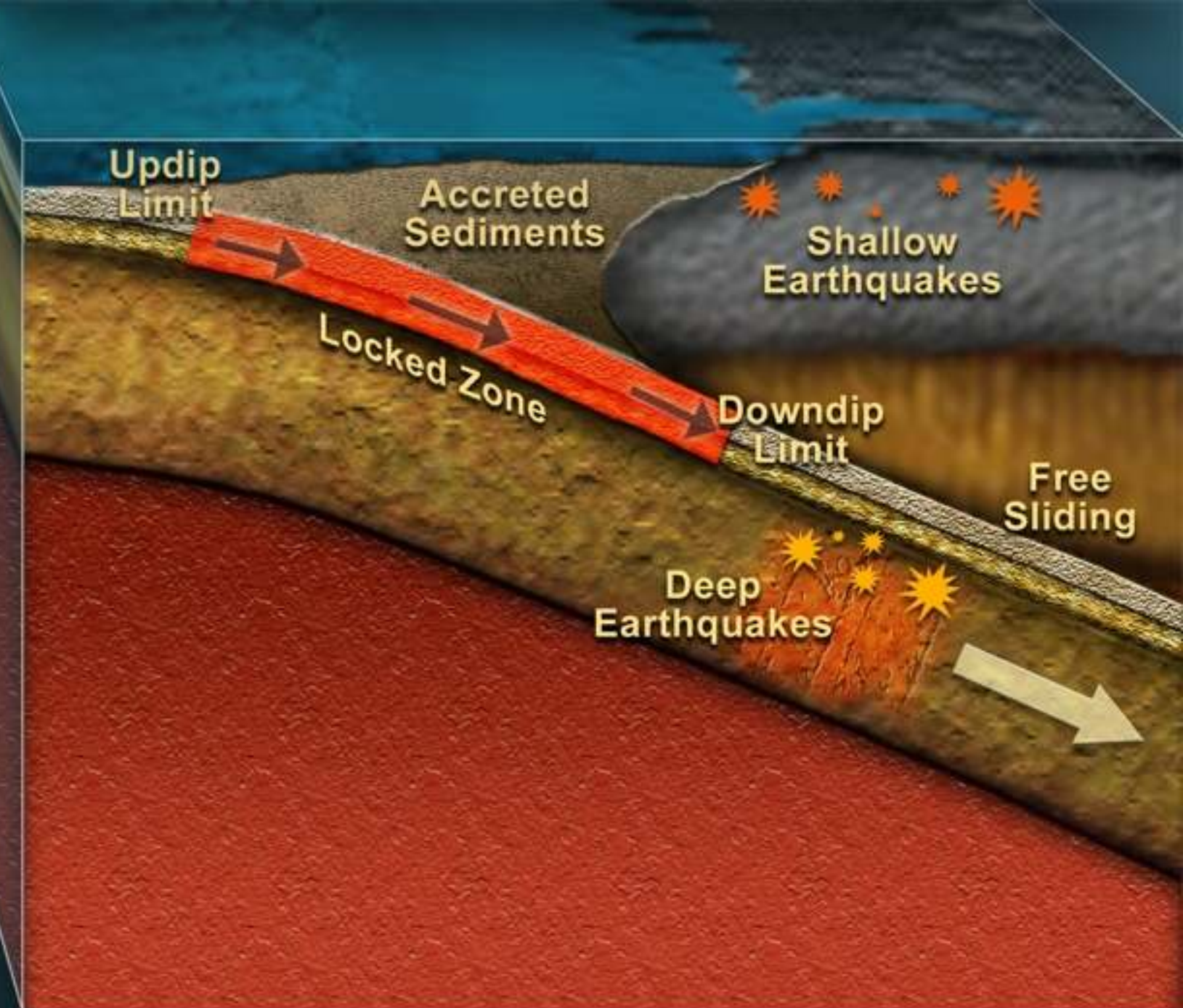
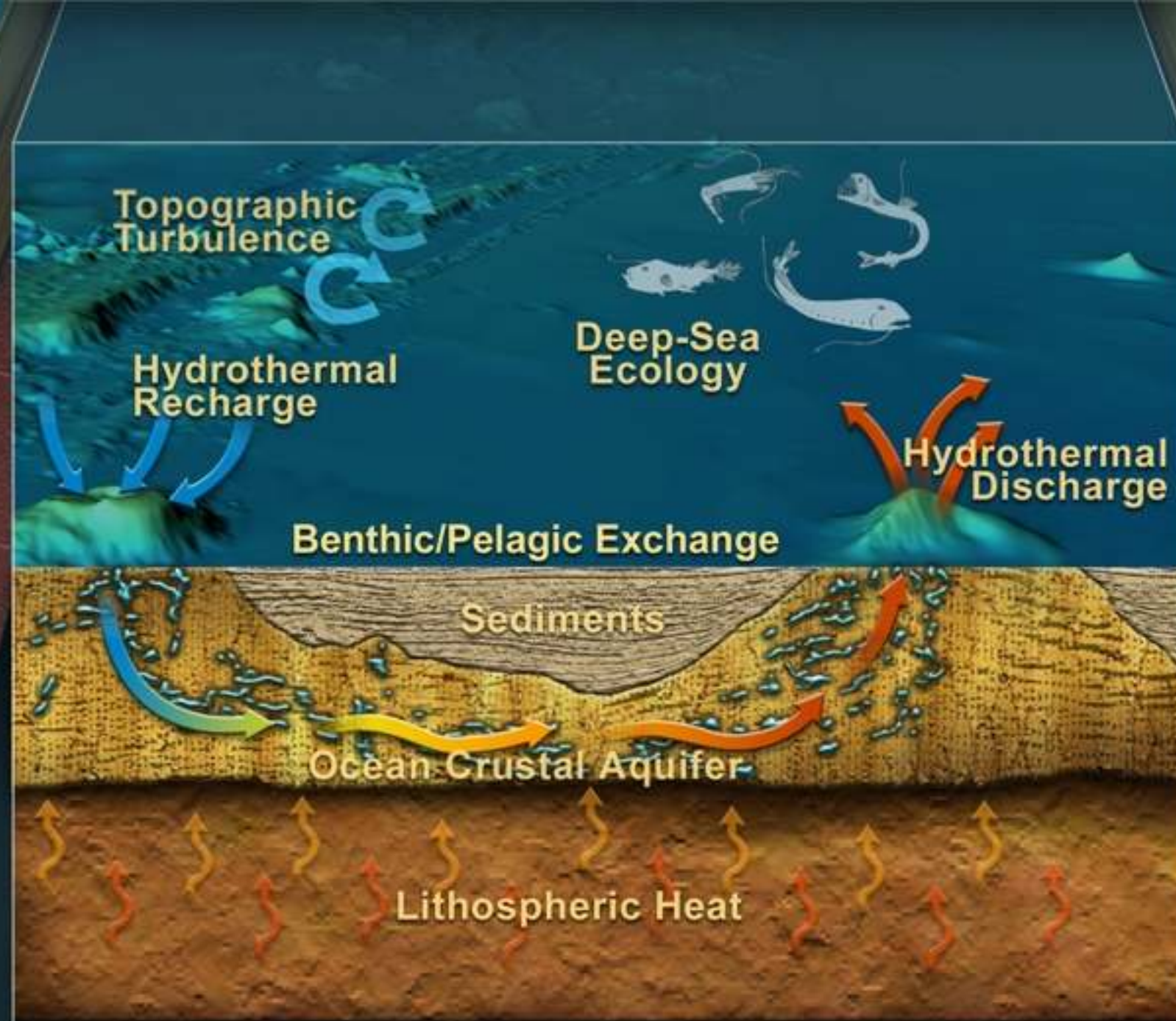
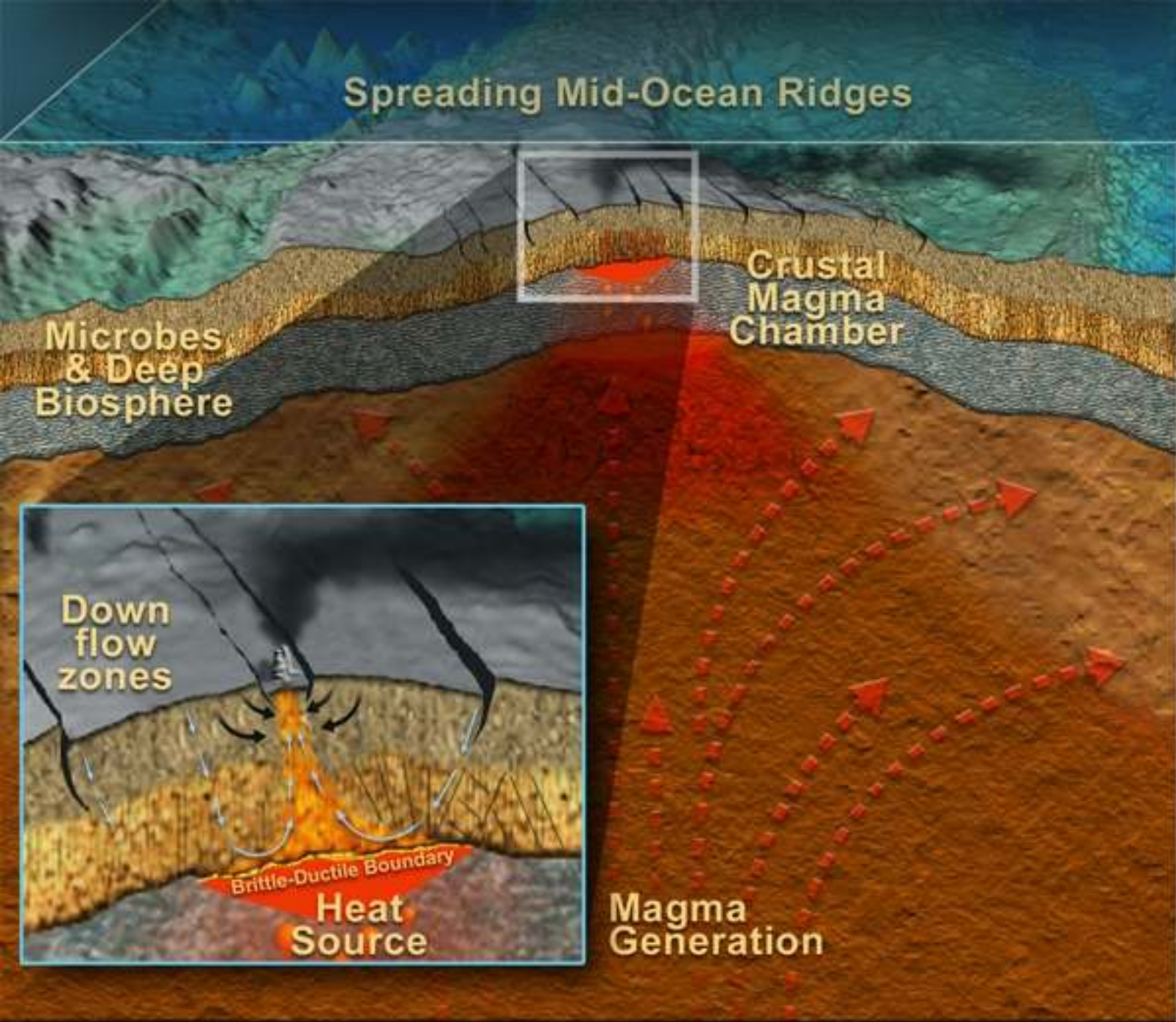
World-leading ocean observing facility — with a societal mandate



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Ocean Observing

THE COMPLEX OCEAN SYSTEM



ONC supports long-term monitoring & experiments

Ocean Networks Canada Data Preview
Oceans 3.0

Navigation: Home | Data Preview | Data Search | Plotting Utility | SeaTube | More

Sort by: Instruments by Location
Filter on: No Filter

- Ocean Networks Canada
 - Arctic
 - Atlantic
 - Mobile Platforms
 - Pacific
 - British Columbia Lower Fraser
 - British Columbia North Coast
 - Northeast Pacific Ocean
 - Salish Sea
 - Baynes Sound
 - Burrard Inlet
 - Discovery Passage
 - East Point
 - Juan de Fuca Strait
 - Monarch Head
 - Saanich Inlet
 - Patricia Bay
 - Saanich Inlet VENUS Instrume**
 - Yarrow Point
 - Strait of Georgia
 - Vancouver Island

Summary | Day | Month | Latest

OCEAN NETWORKS CANADA
Patricia Bay • Saanich Inlet VENUS Instrument Platform • 48.6513° N • 123.4863° W • 95.6 m
State of Ocean Plot • 1 Hour Average Data

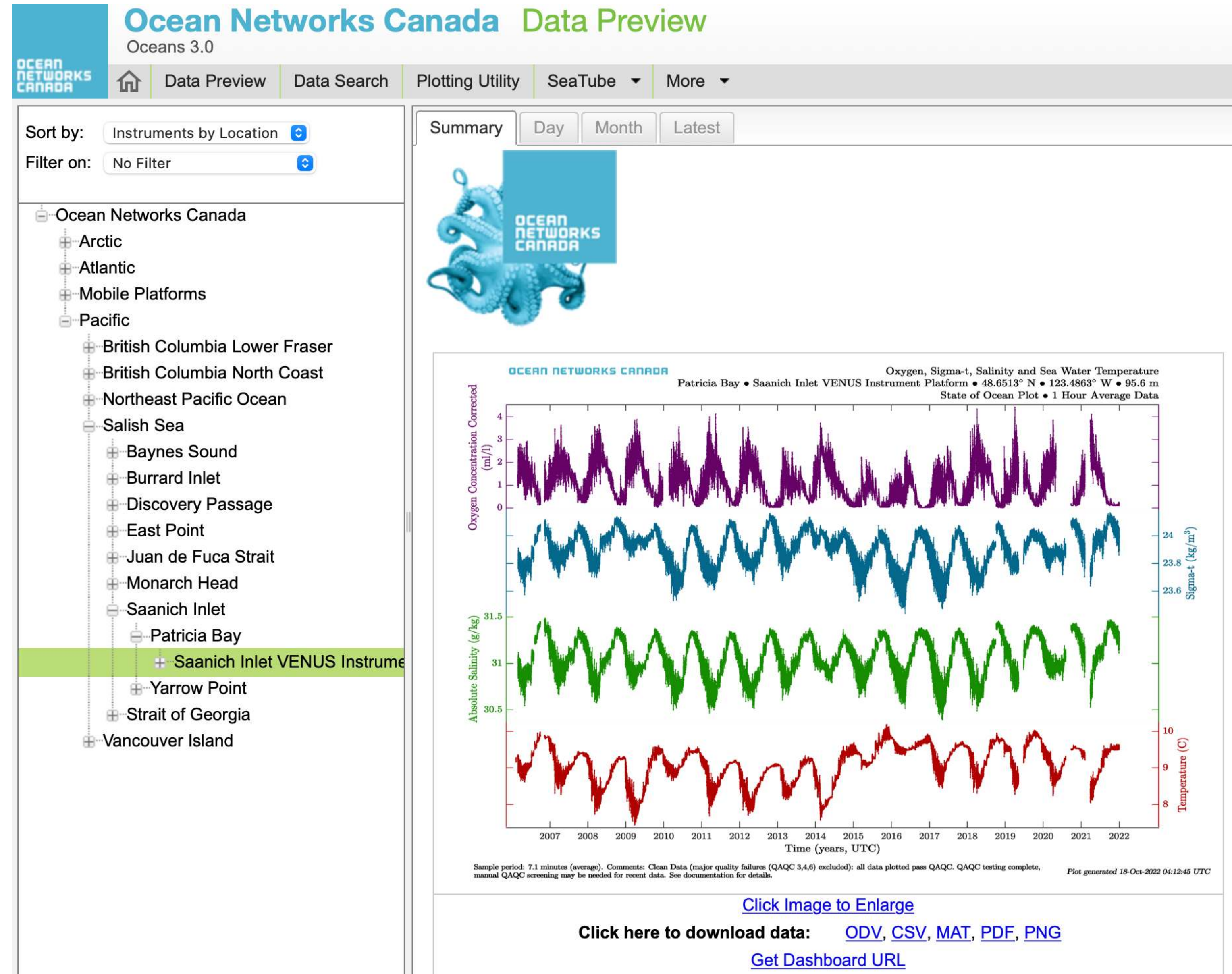
Time-series plot showing four variables from 2007 to 2022:

- Oxygen Concentration Corrected (ml/l) - purple line, left axis (0-4)
- Sigma-t (kg/m³) - blue line, right axis (23.6-24)
- Absolute Salinity (g/kg) - green line, left axis (30.5-31.5)
- Temperature (C) - red line, right axis (8-10)

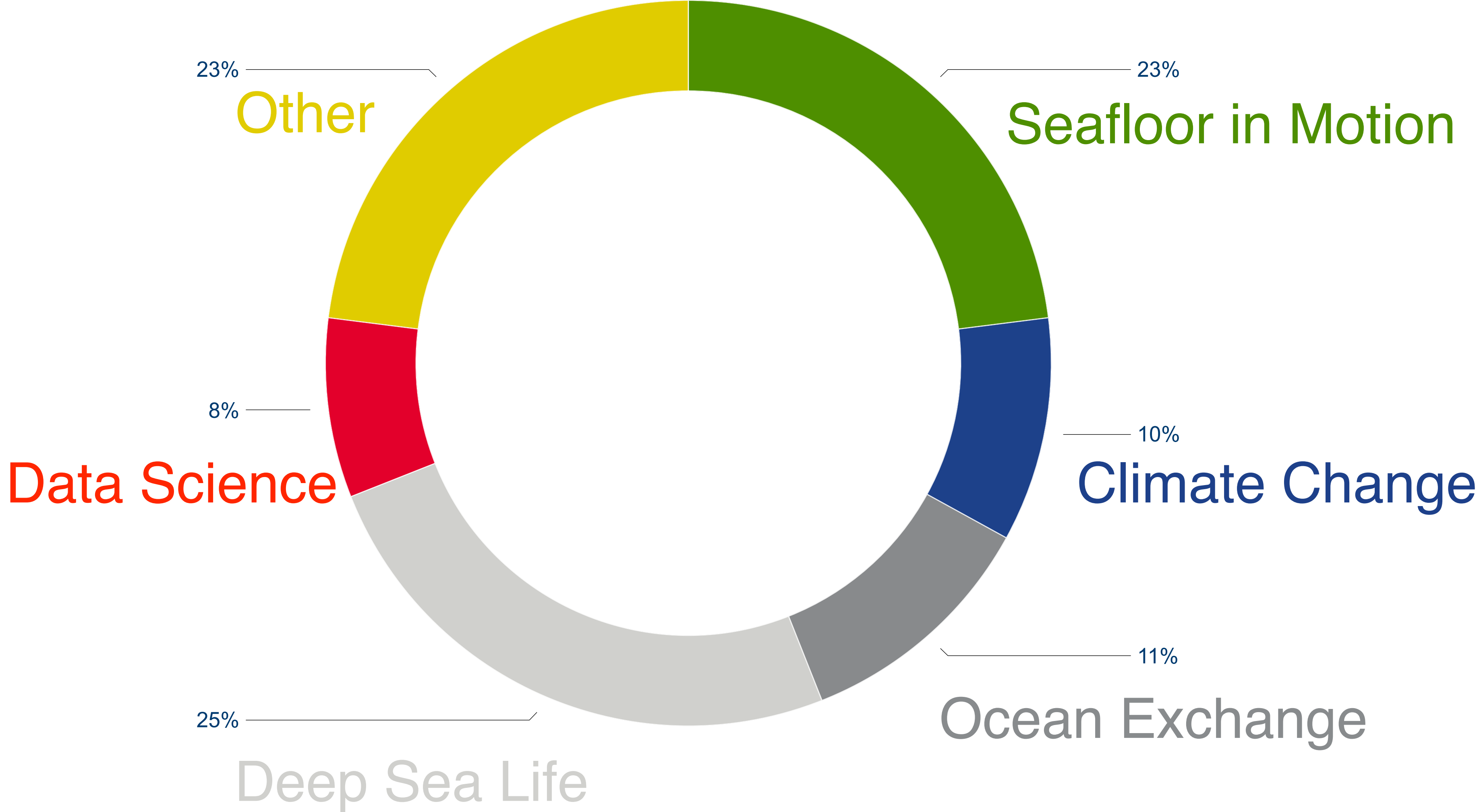
Sample period: 7.1 minutes (average). Comments: Clean Data (major quality failures (QAQC 3,4,6) excluded): all data plotted pass QAQC. QAQC testing complete, manual QAQC screening may be needed for recent data. See documentation for details. Plot generated 18-Oct-2022 04:12:45 UTC

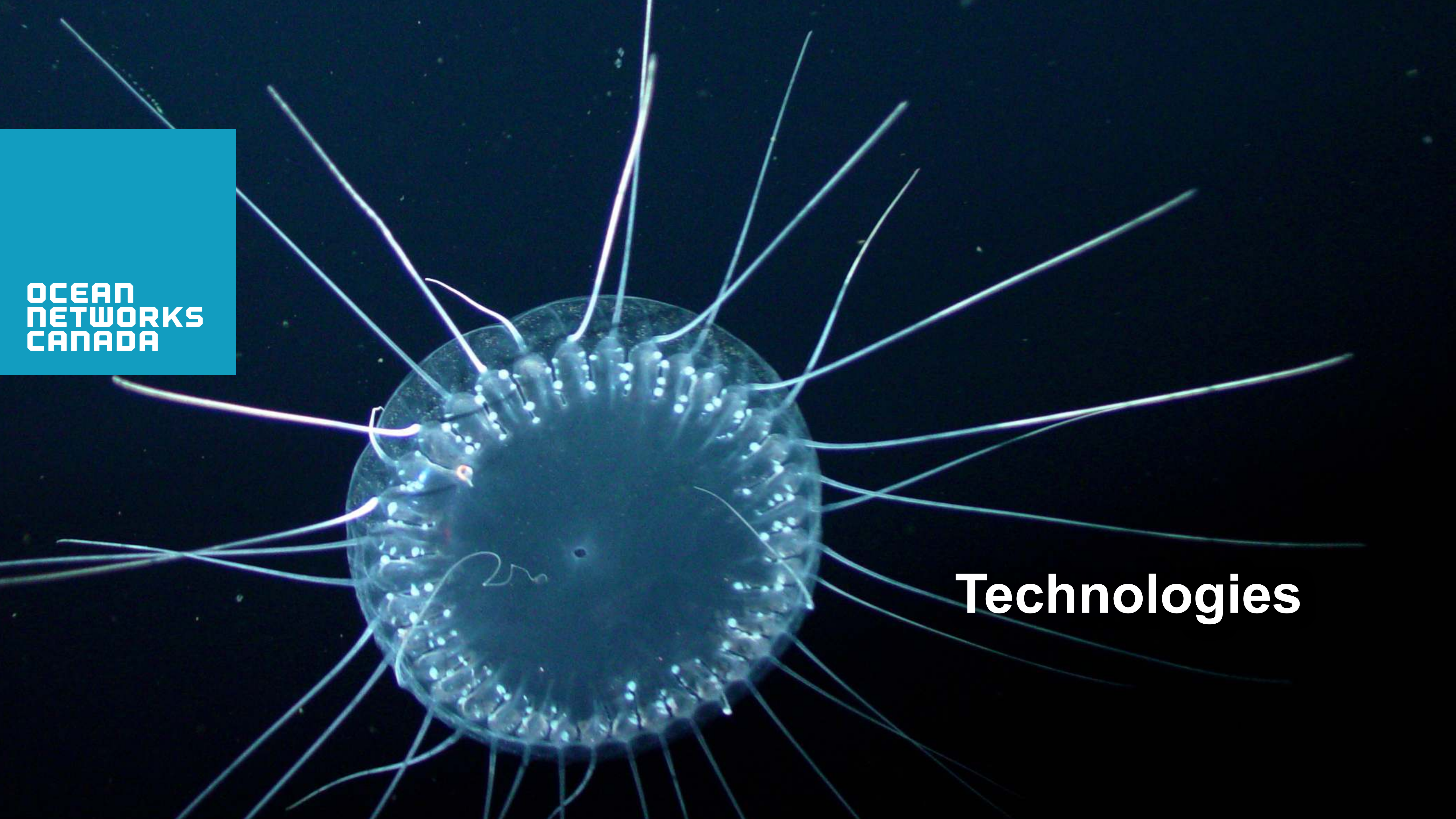
[Click Image to Enlarge](#)
Click here to download data: [ODV](#), [CSV](#), [MAT](#), [PDF](#), [PNG](#)
[Get Dashboard URL](#)

16 Years of Continuous Essential Ocean Variable Measurements at 1Hz!



SCIENCE BY THEME: 2006 — 2020



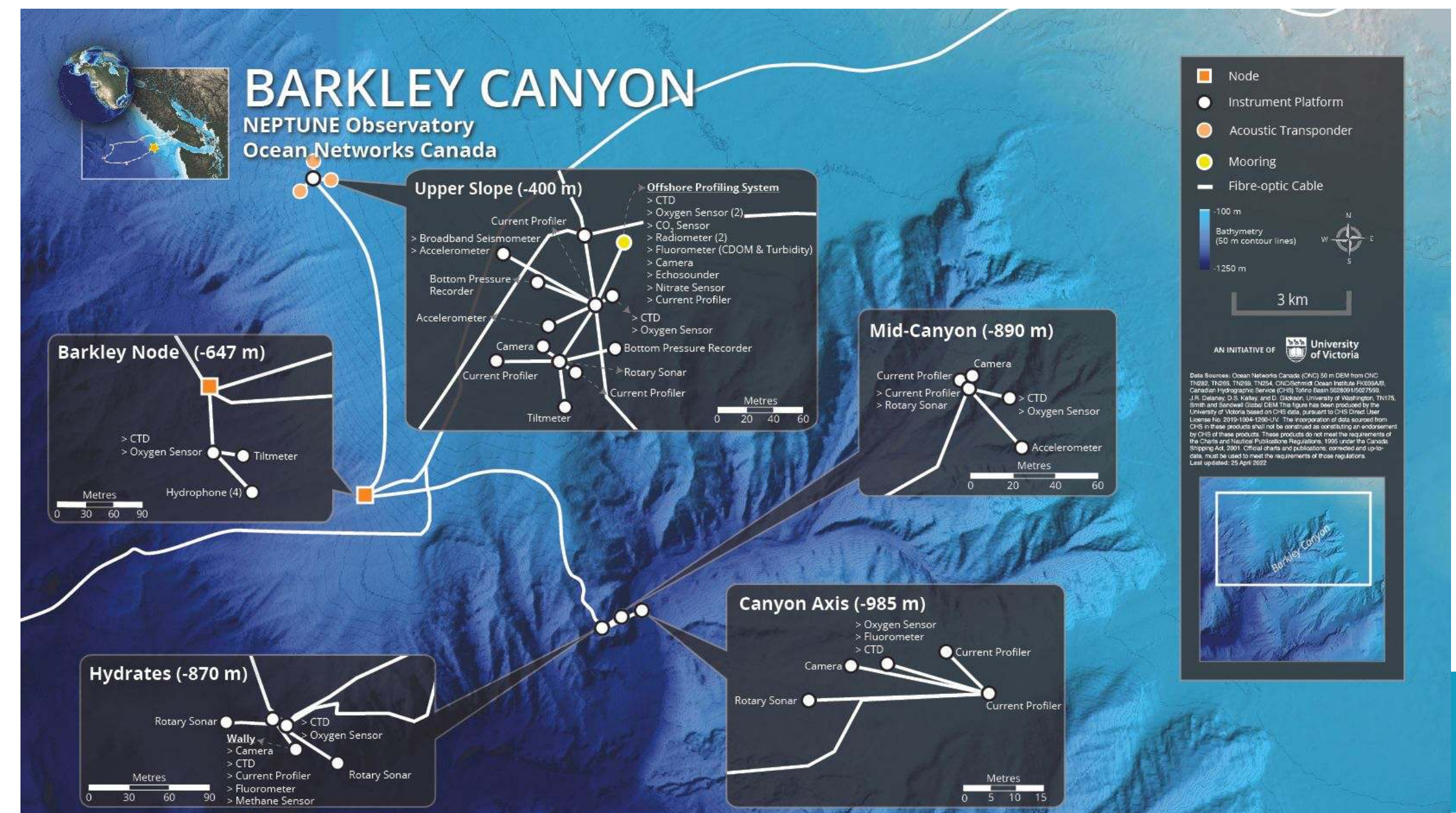
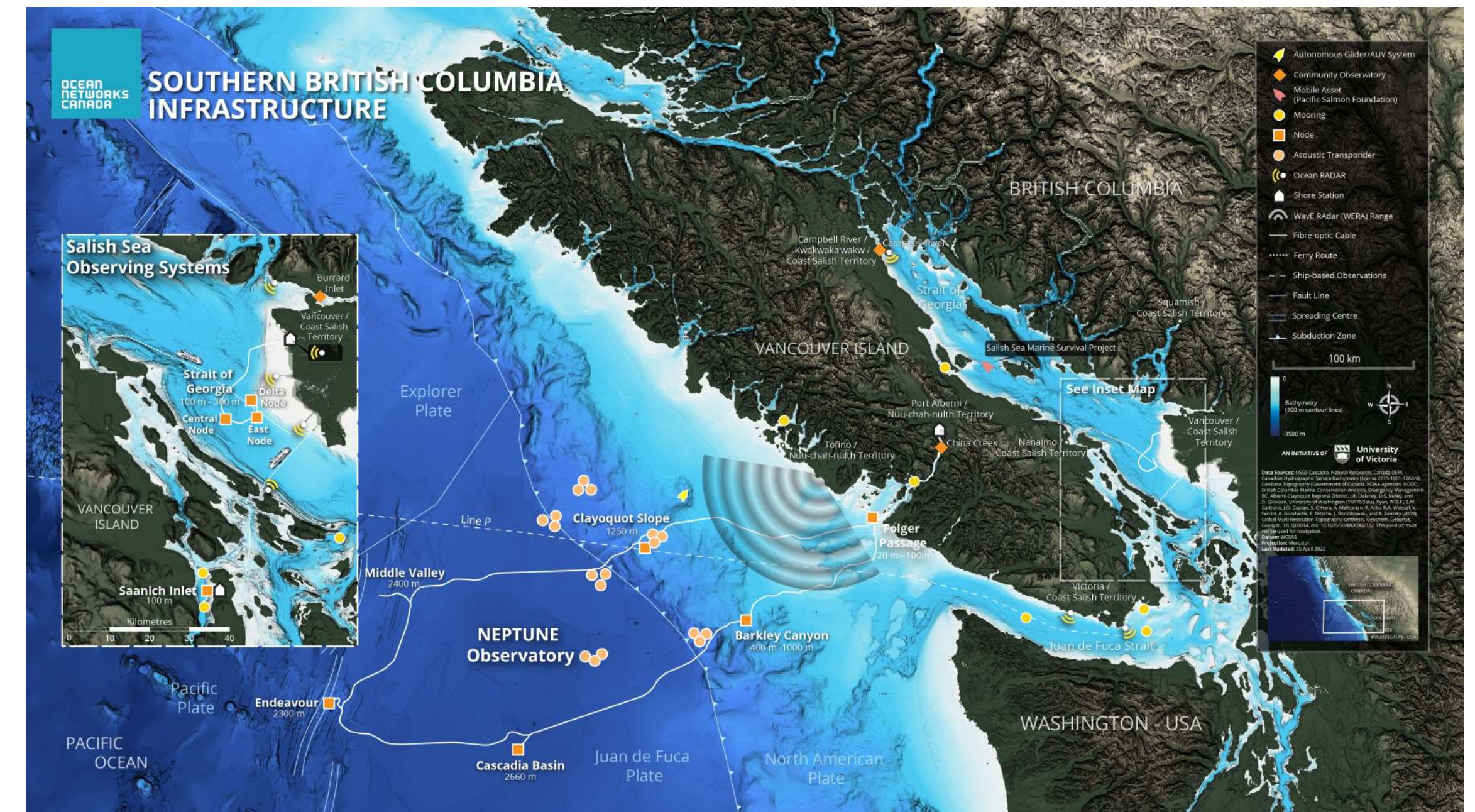
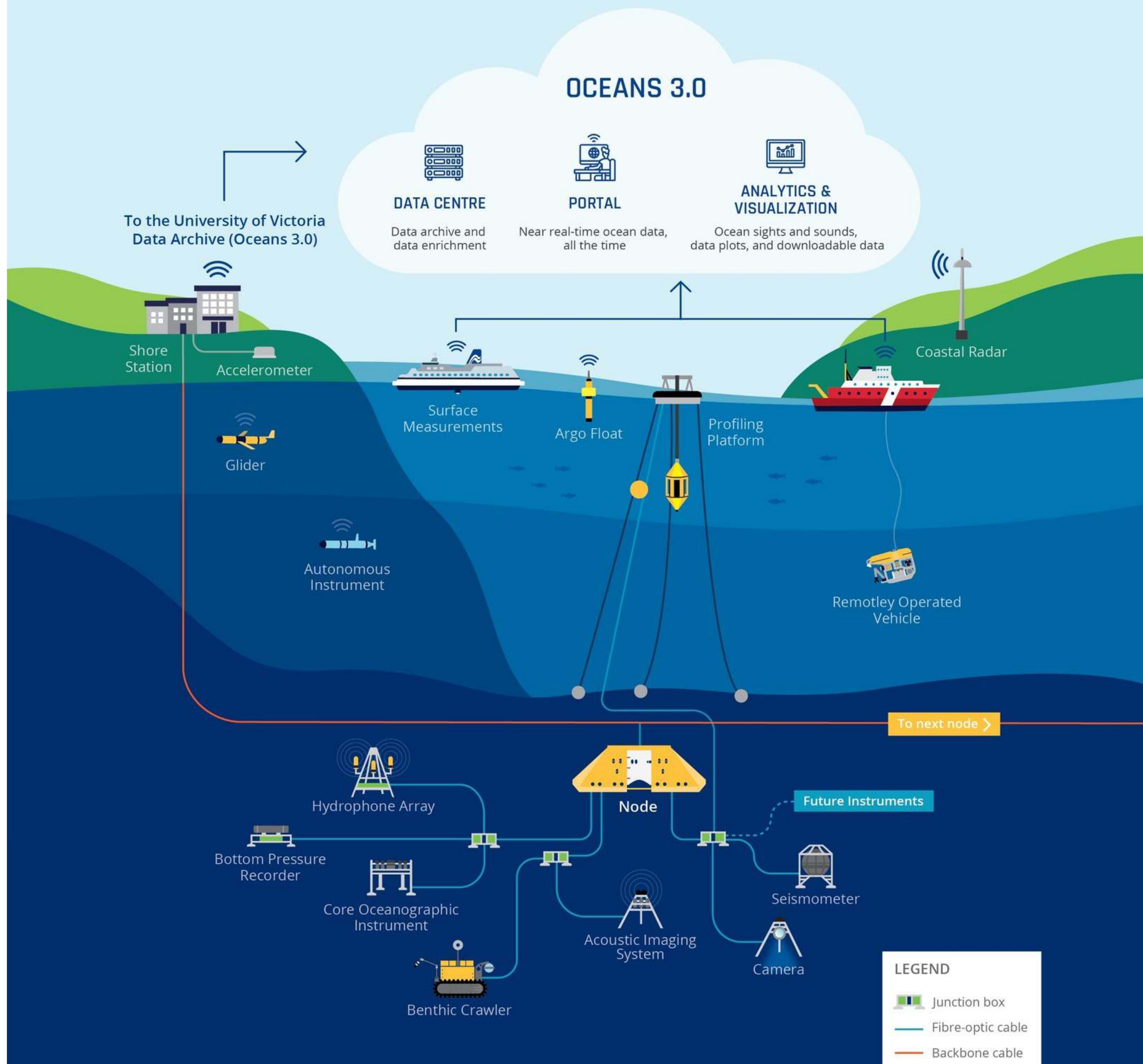
A glowing jellyfish is the central focus, its body emitting a soft blue light. Numerous thin, white fiber optic cables are attached to its tentacles, extending outwards in all directions. The background is a deep, dark blue, making the jellyfish and its glowing tentacles stand out prominently.

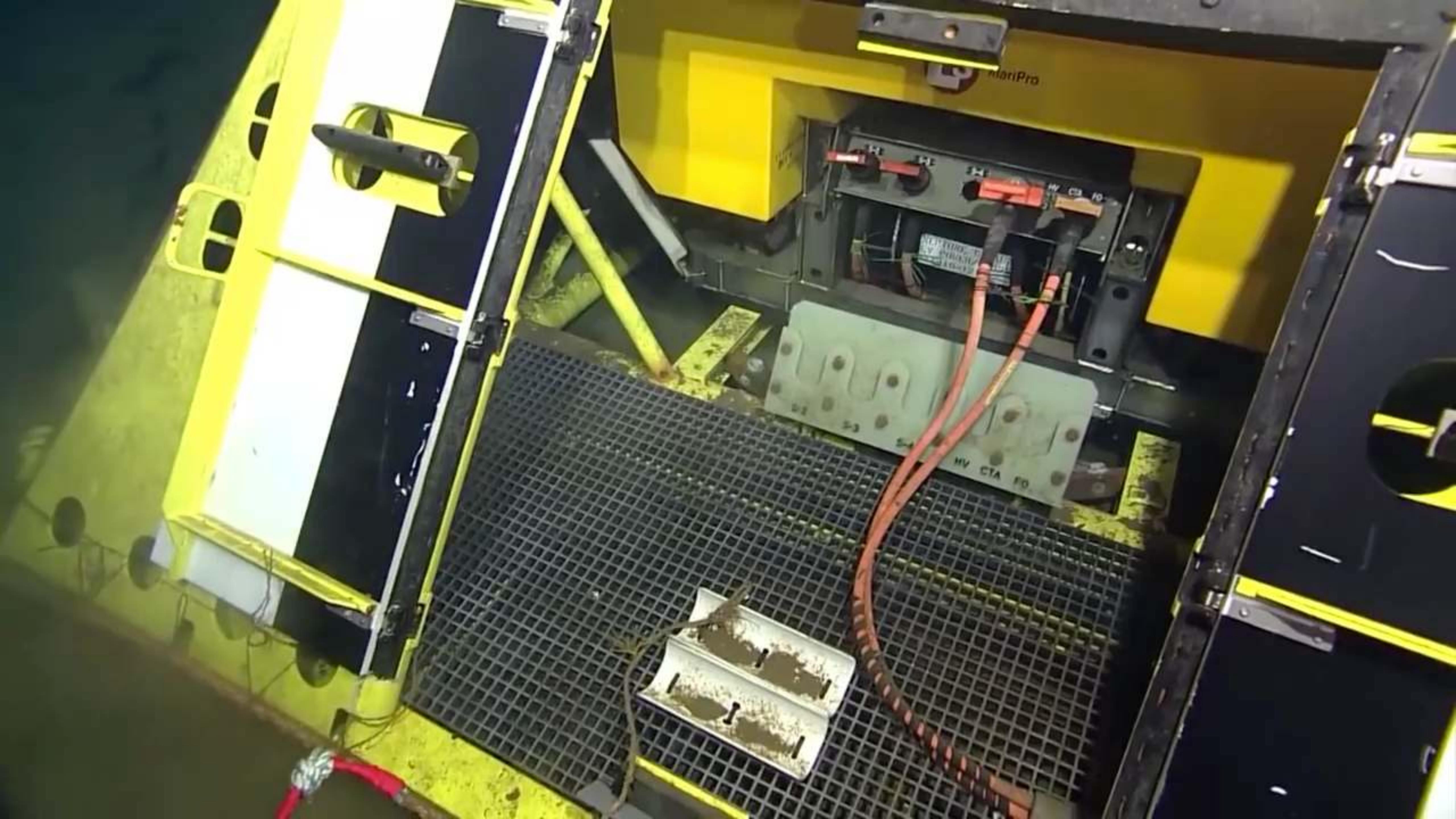
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Technologies

BRINGING DATA TO THE SURFACE

For science, society and industry





MiniPro

S1E S2E S2A HV CTA FO

HV CTA FO

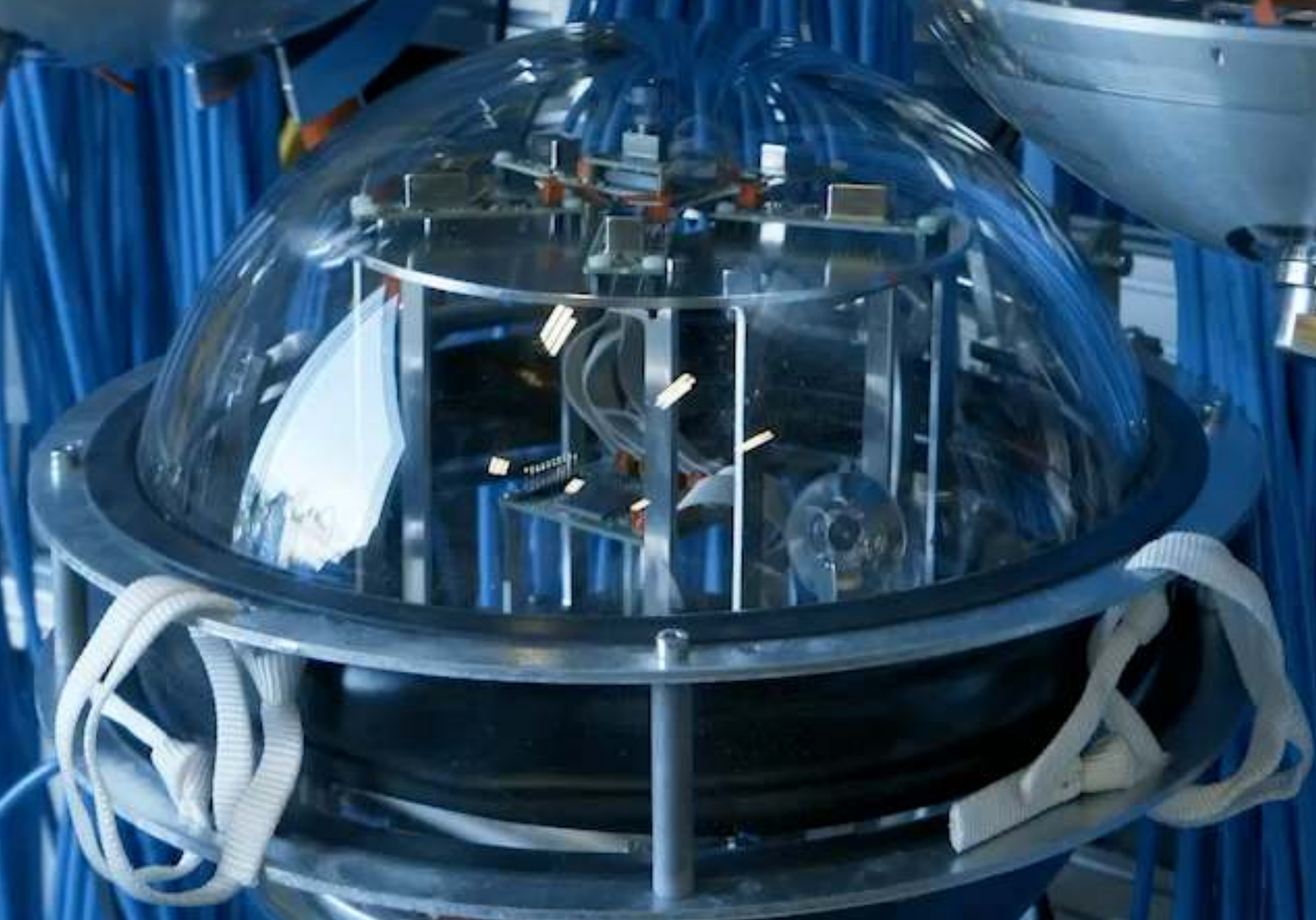
1 2 3 4

EV NAUTILUS



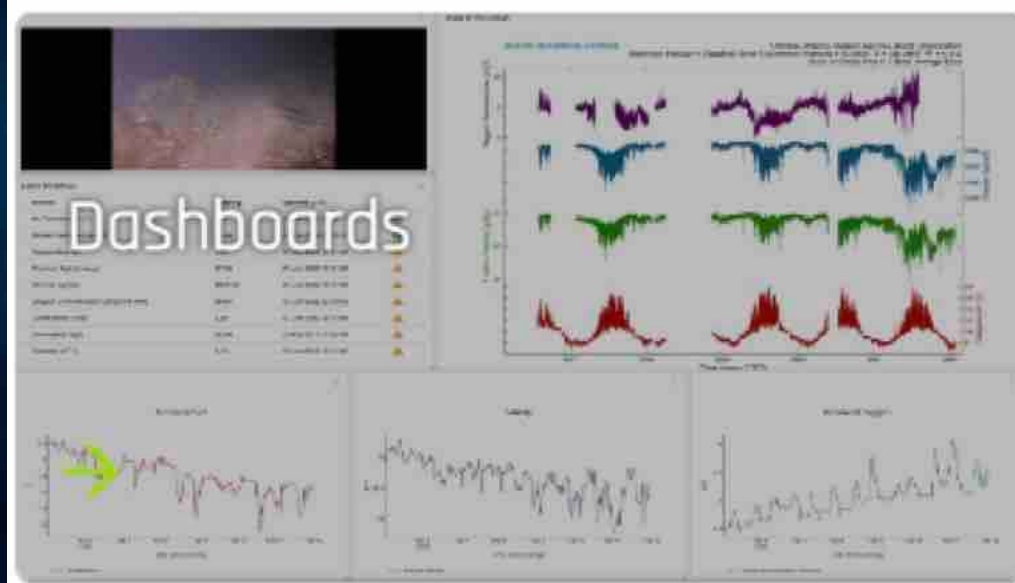
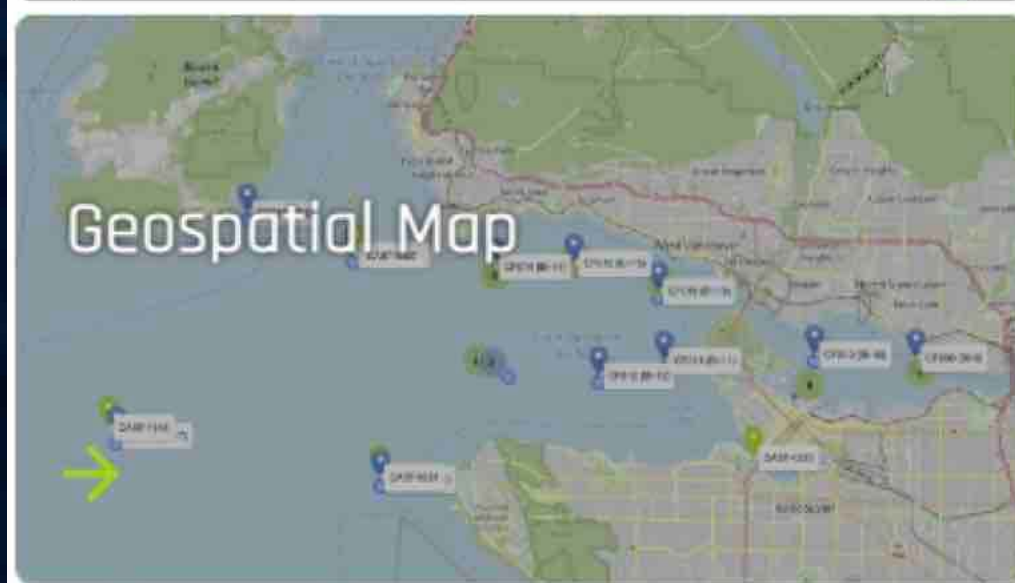
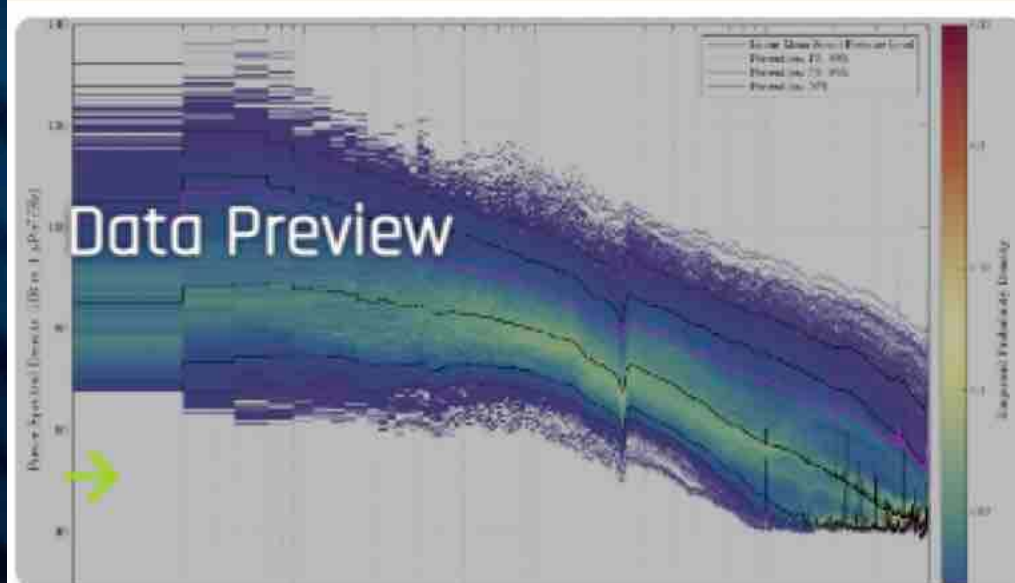
WORLD LEADING DISCOVERIES AT A CRITICAL TIME

**WARNING
ELECTRICAL
HAZARD**



REMOVE BEFORE FLIGHT

OCEANS 3.0 - OPEN DATA MANAGEMENT SYSTEM

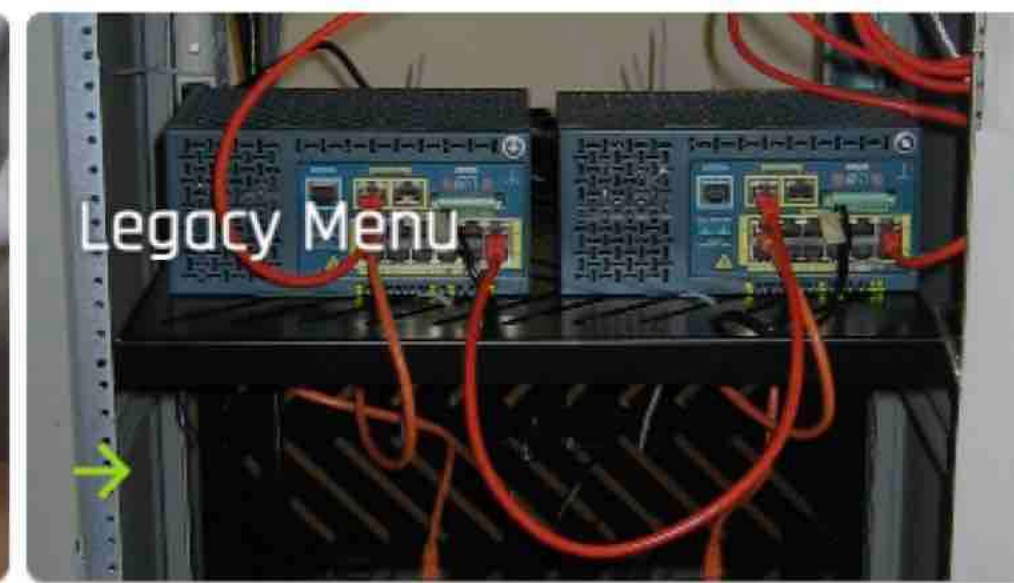


```
import glob
import requests

def get_devices_category_codes(parameters):
    url = "http://data.oceannetworks.ca/api/deviceCategories"
    params = [{"method": "get"}, {"category": "all"}]
    response = requests.get(url, params=params)

    if response.status_code == 200:
        print("Success: {}".format(response.json()))
    else:
        if response.status_code == 404:
            error = json.loads(response.content, 'utf-8')
            print(error)
        else:
            print("Error: {}".format(response.status_code, response.reason))

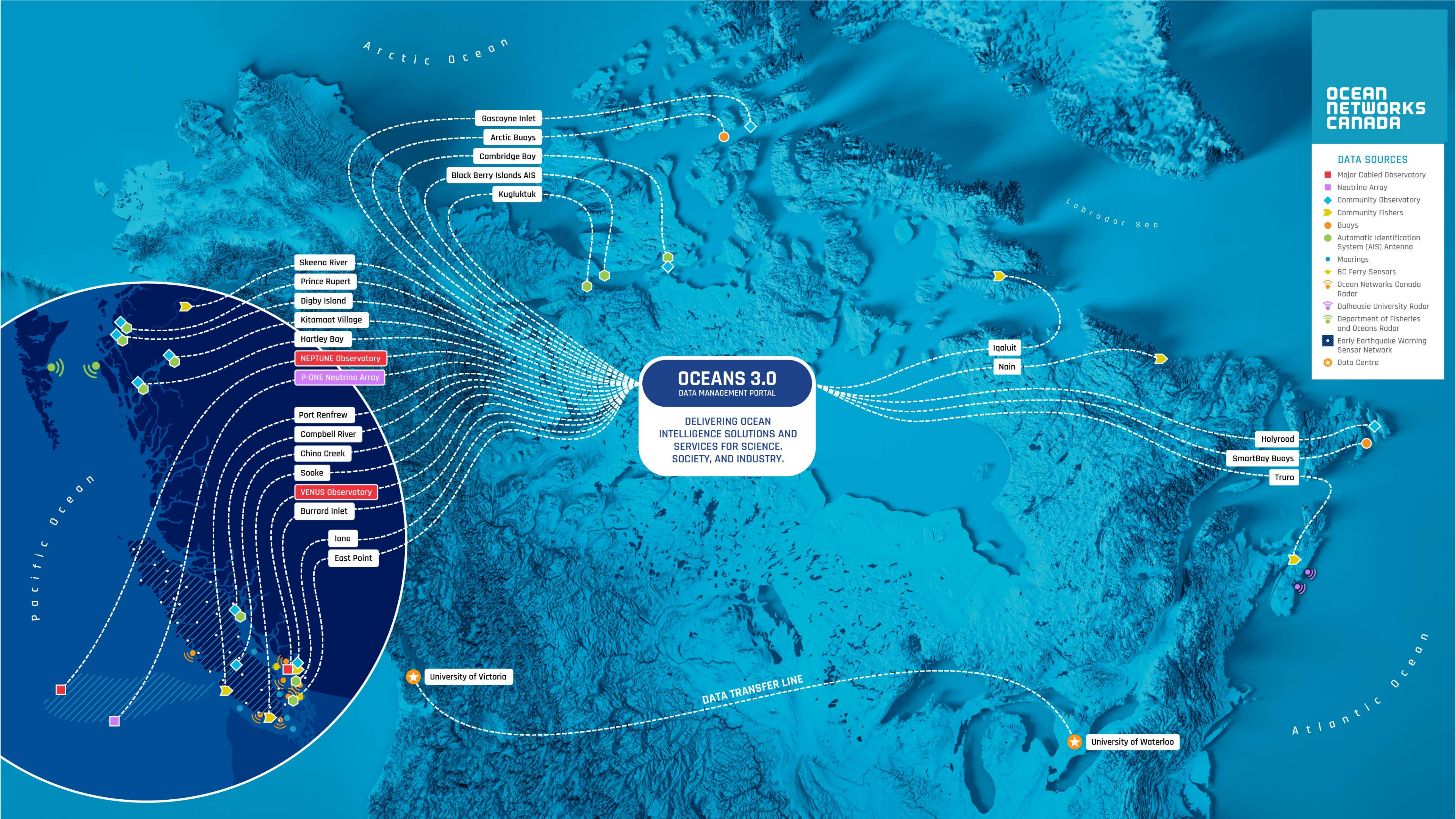
if __name__ == '__main__':
    with open(glob.glob('*/data/processed/etoken.csv')[0], 'r') as file:
        etoken = file.read().strip('\n')
        user_headers = {'token': etoken, 'propertyCode': 'salinity'}
```



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DATA SOURCES

- Major Cabled Observatory
- Neutrino Array
- ◆ Community Observatory
- ▶ Community Fishers
- Buoys
- Automatic Identification System (AIS) Antenna
- Moorings
- ▶ BC Ferry Sensors
- ⊙ Ocean Networks Canada Radar
- ⊙ Dalhousie University Radar
- ⊙ Department of Fisheries and Oceans Radar
- ▨ Early Earthquake Warning Sensor Network
- ★ Data Centre



OCEANS 3.0
DATA MANAGEMENT PORTAL

DELIVERING OCEAN INTELLIGENCE SOLUTIONS AND SERVICES FOR SCIENCE, SOCIETY, AND INDUSTRY.

DATA TRANSFER LINE

Arctic Ocean

Labrador Sea

Pacific Ocean

Atlantic Ocean

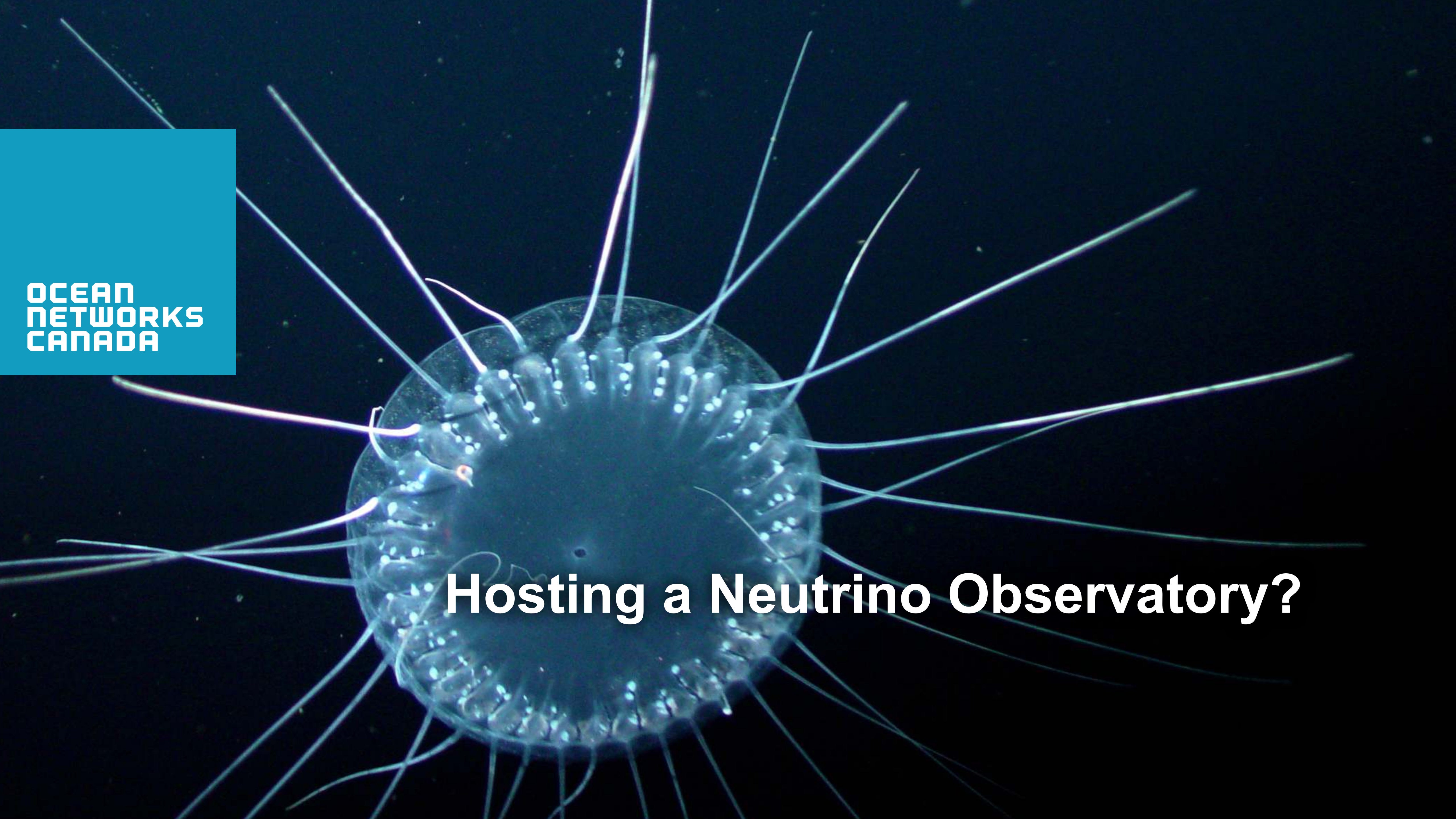
- Gascoyne Inlet
- Arctic Buoys
- Cambridge Bay
- Black Berry Islands AIS
- Kugluktuk
- Skeena River
- Prince Rupert
- Digby Island
- Kitamaat Village
- Hartley Bay
- NEPTUNE Observatory
- P-ONE Neutrino Array
- Port Renfrew
- Campbell River
- China Creek
- Sooke
- VENUS Observatory
- Burrard Inlet
- Iona
- East Point

- Iqaluit
- Nain

- Holyrood
- SmartBay Buoys
- Truro

University of Victoria

University of Waterloo

A glowing blue jellyfish is the central focus, its bell and tentacles emitting a soft blue light. Numerous thin, white fiber optic cables are attached to the top of the jellyfish's bell, extending outwards in various directions. The background is a deep, dark blue, making the jellyfish and its lights stand out prominently.

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Hosting a Neutrino Observatory?

“FIRST CONTACTS”

- Technische Universität München & University of Alberta
- Independently heard about ONC and reached out
 - First visit to ONC in August 2017
 - Decision for, and design of test moorings: last quarter of 2017
 - Built and delivered to ONC by Spring of 2018
 - Successfully deployed and commissioned during Summer of 2018
 - Continuously worked for 5 years

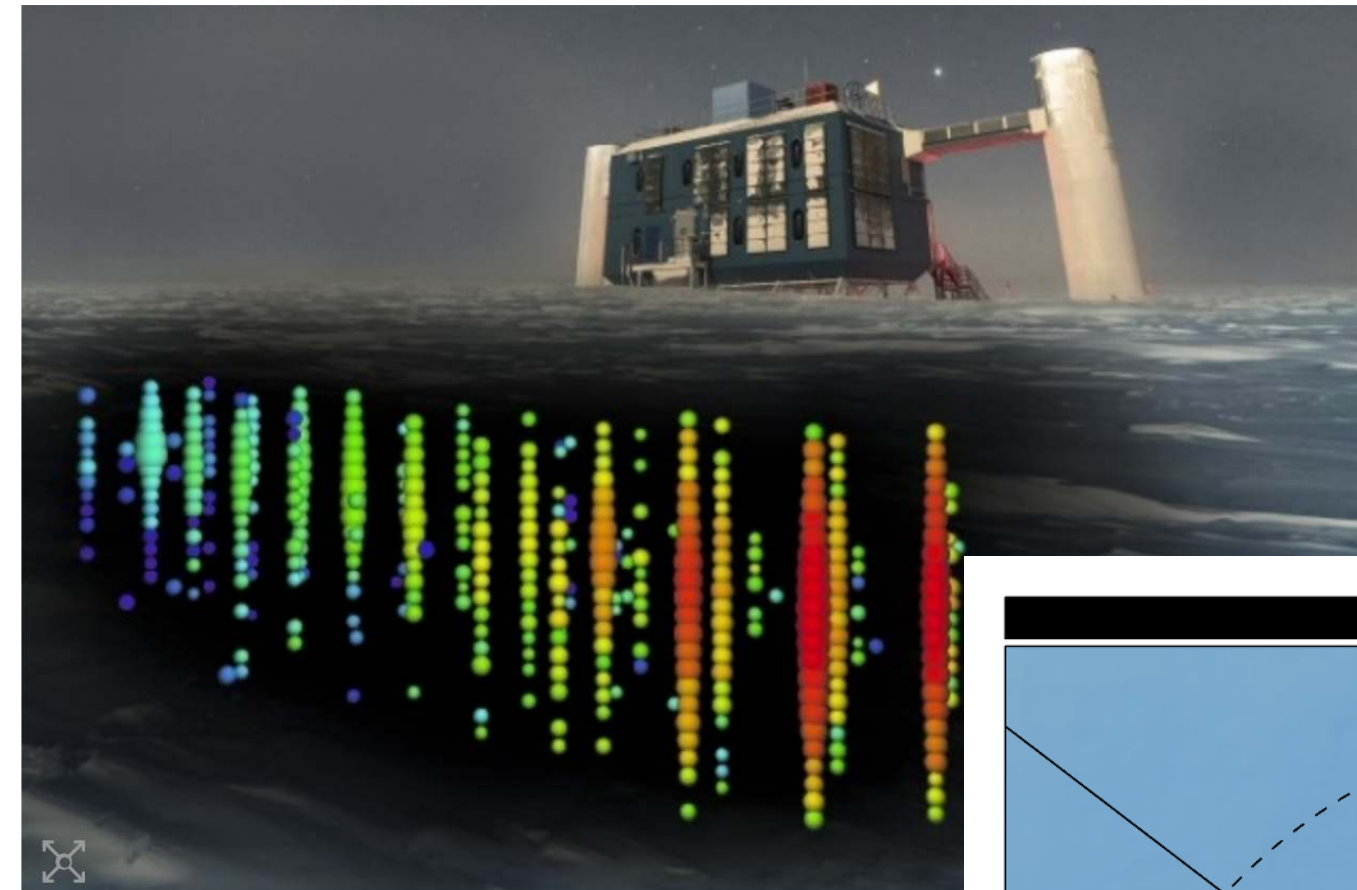


THE PACIFIC OCEAN NEUTRINO EXPERIMENT

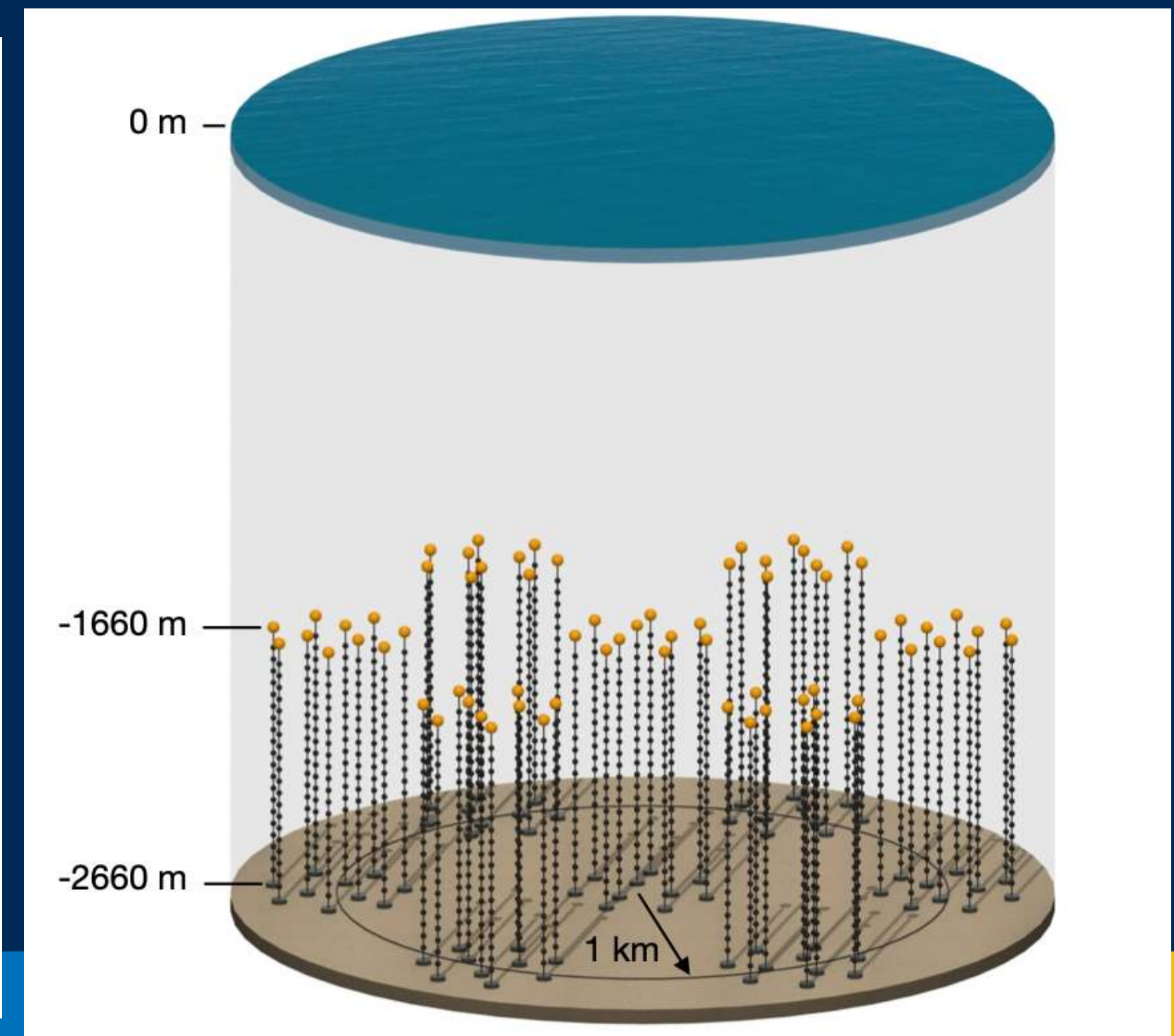
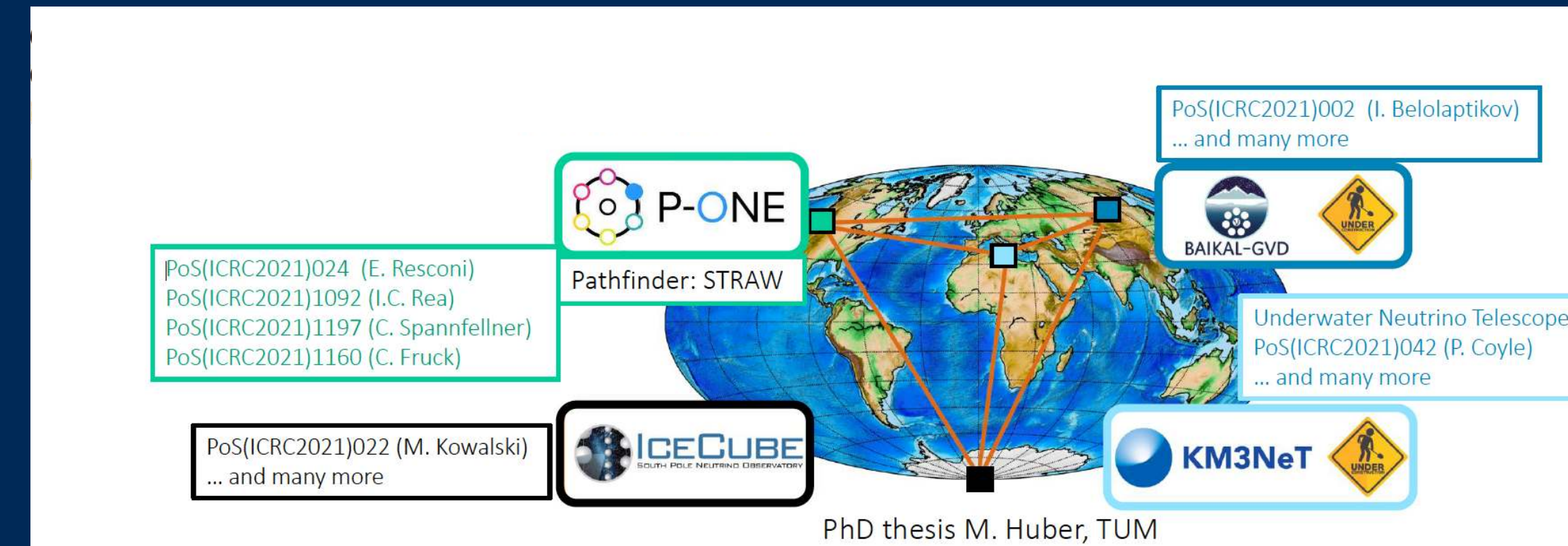
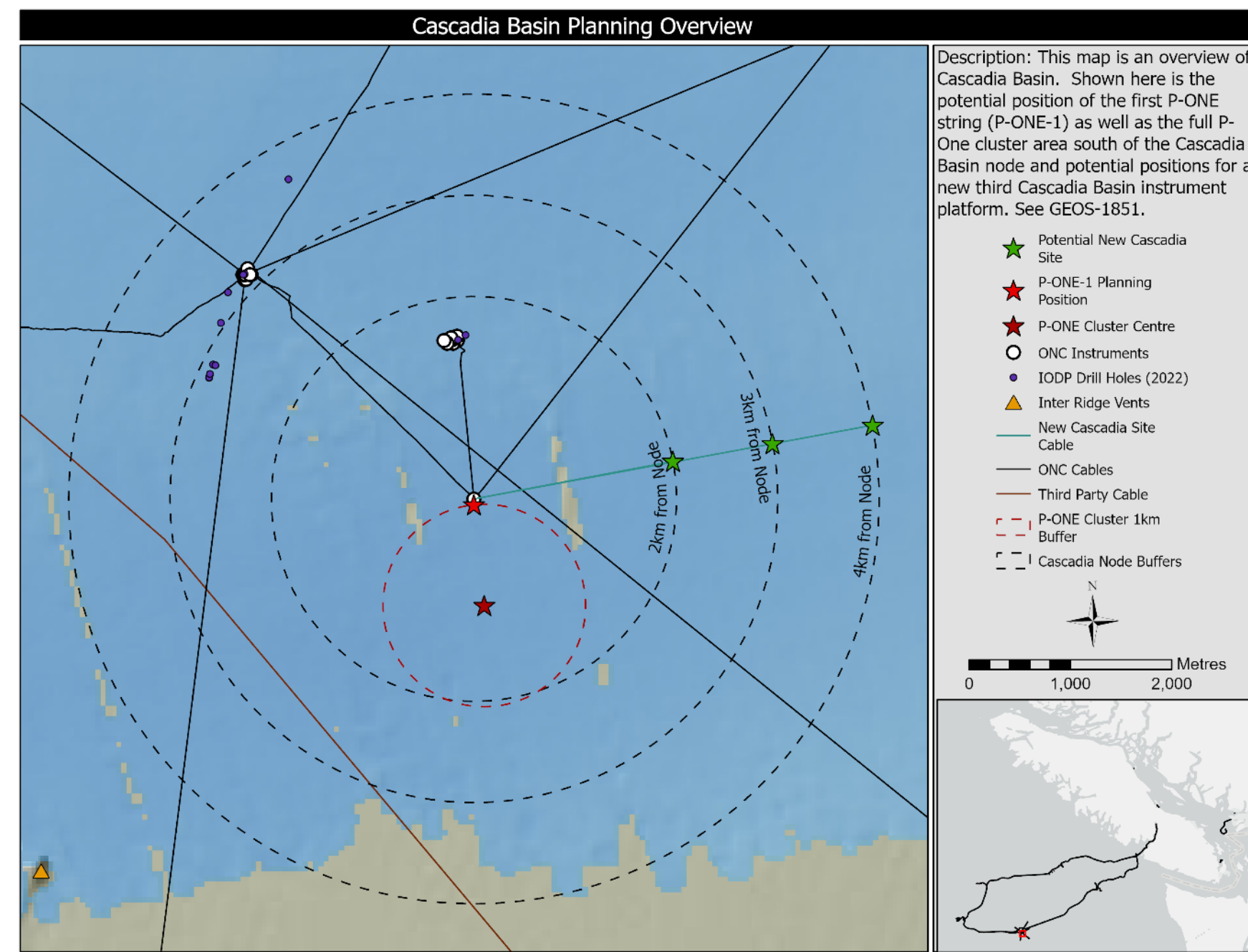
TELESCOPES AND SPACE MISSIONS | NEWS

Astronomers plan huge neutrino observatory in the Pacific Ocean

18 Sep 2020



Ocean bound: P-ONE will consist of seven groups of 10 detector strings, like the existing IceCube experiment (pictured). (Courtesy: IceCube Collaborator)

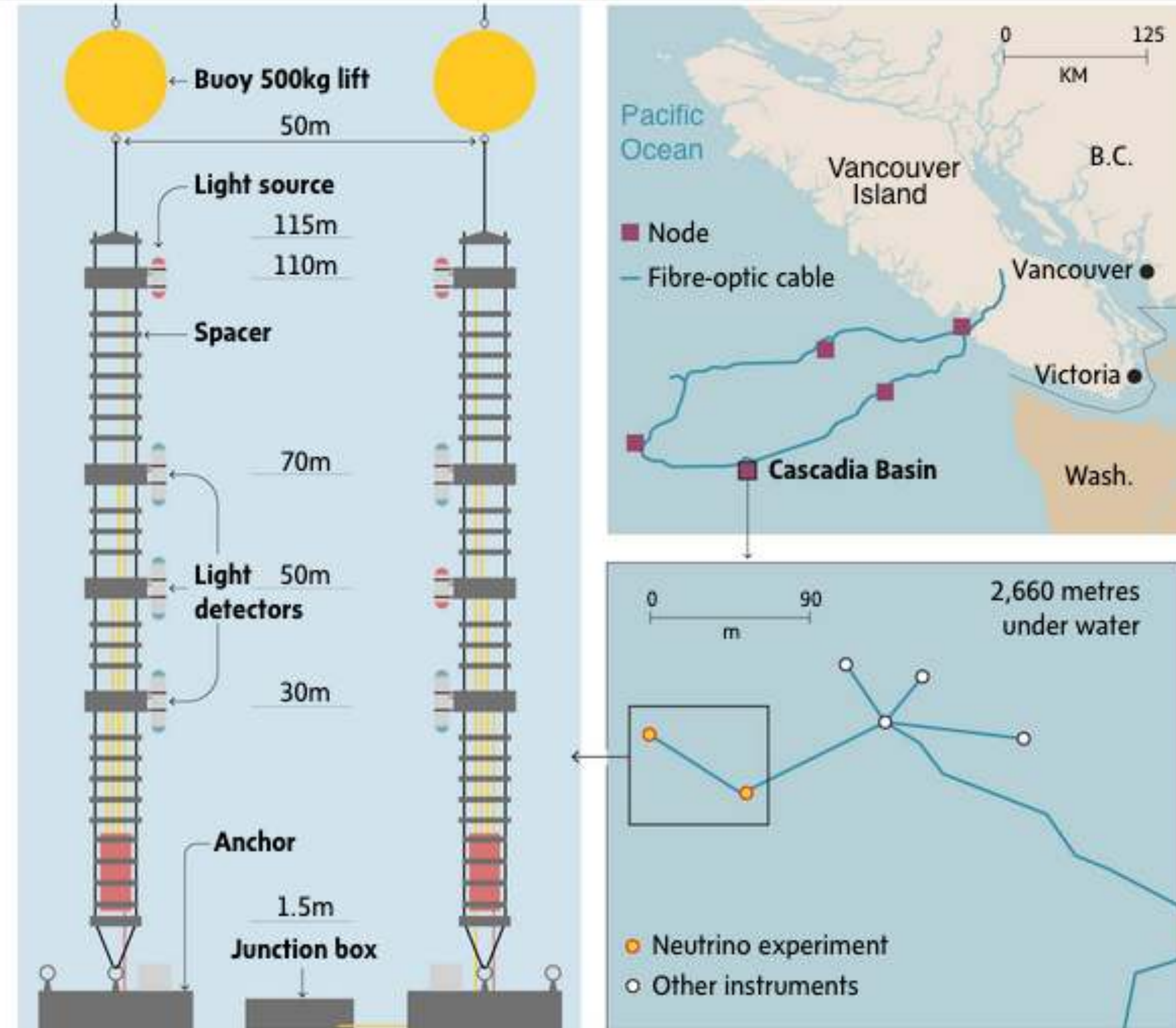


TESTING ONC AND THE SITE

- STRAW project: a first deployment of two 125 m test moorings in 2018 to verify the suitability of the site (recovered 2023)



CANADA



MURAT YÜKSELİR / THE GLOBE AND MAIL, SOURCE: OCEAN NETWORKS CANADA

2020 INSTALLATION: STRAW-B

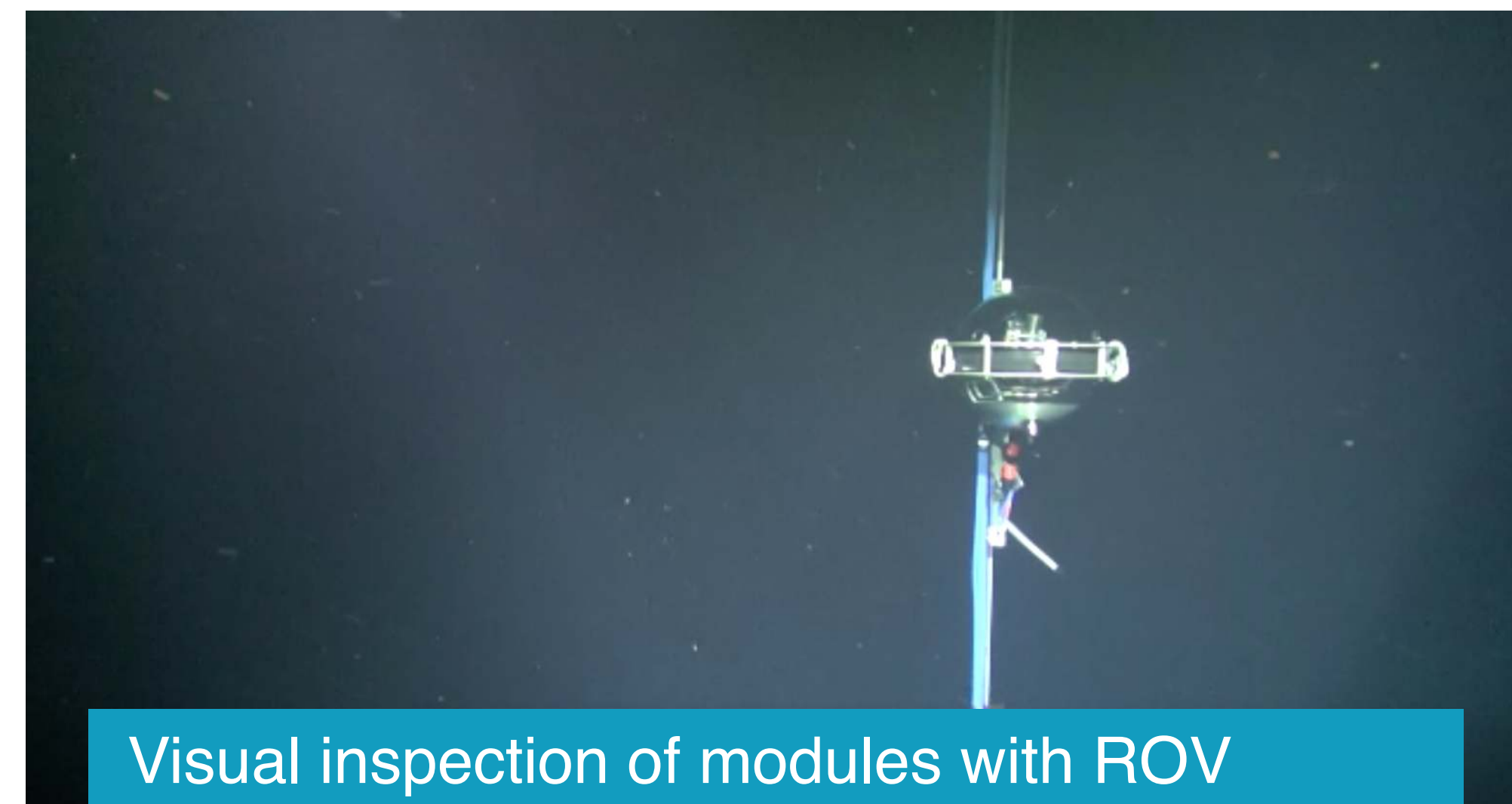
- Building the STRAW experience
- 10 module, 500 m long electrical-optical cable
- Led by Technical University of Munich



Deploying STRAW-b



Modules & Cable ready for deployment

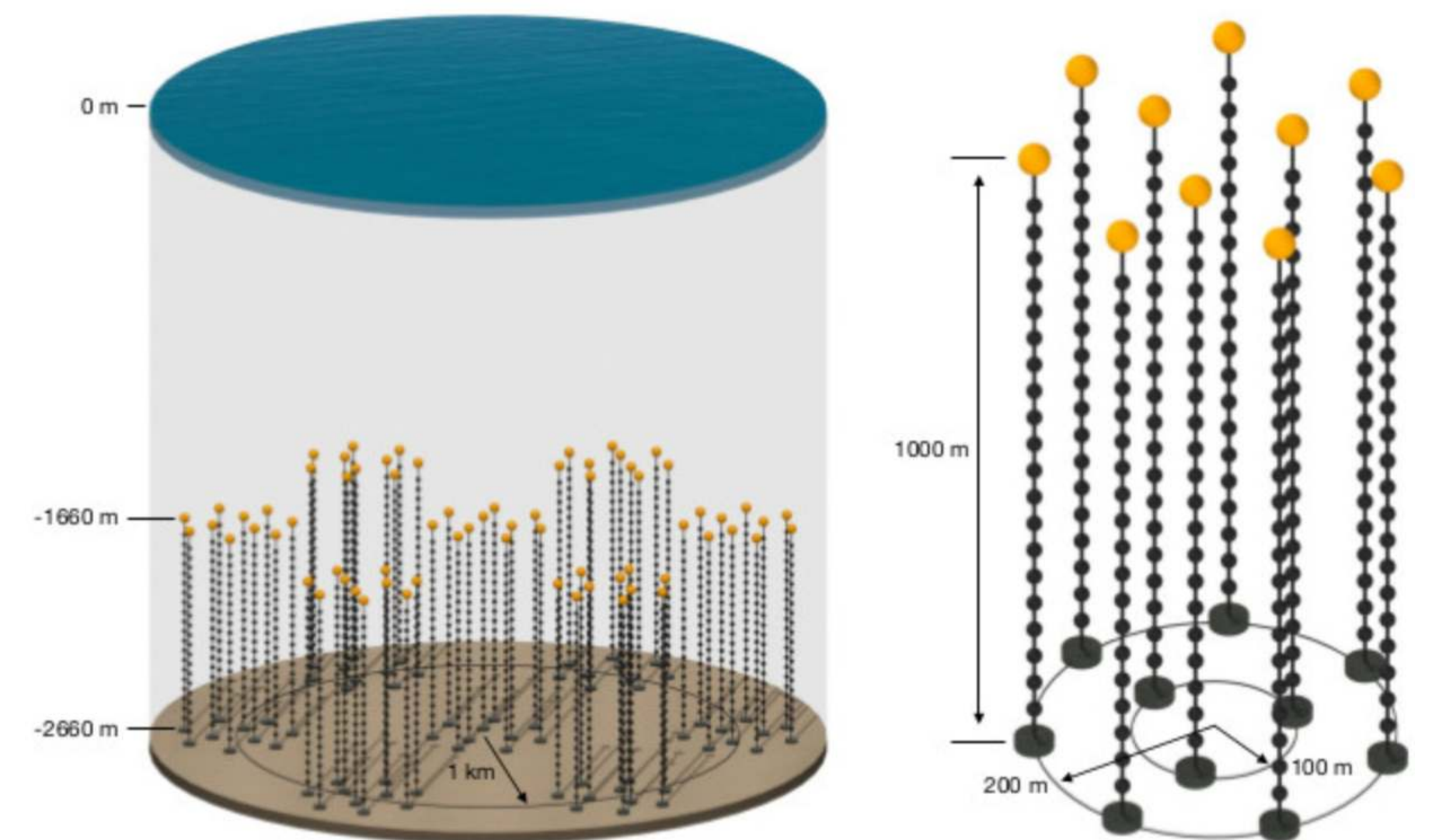


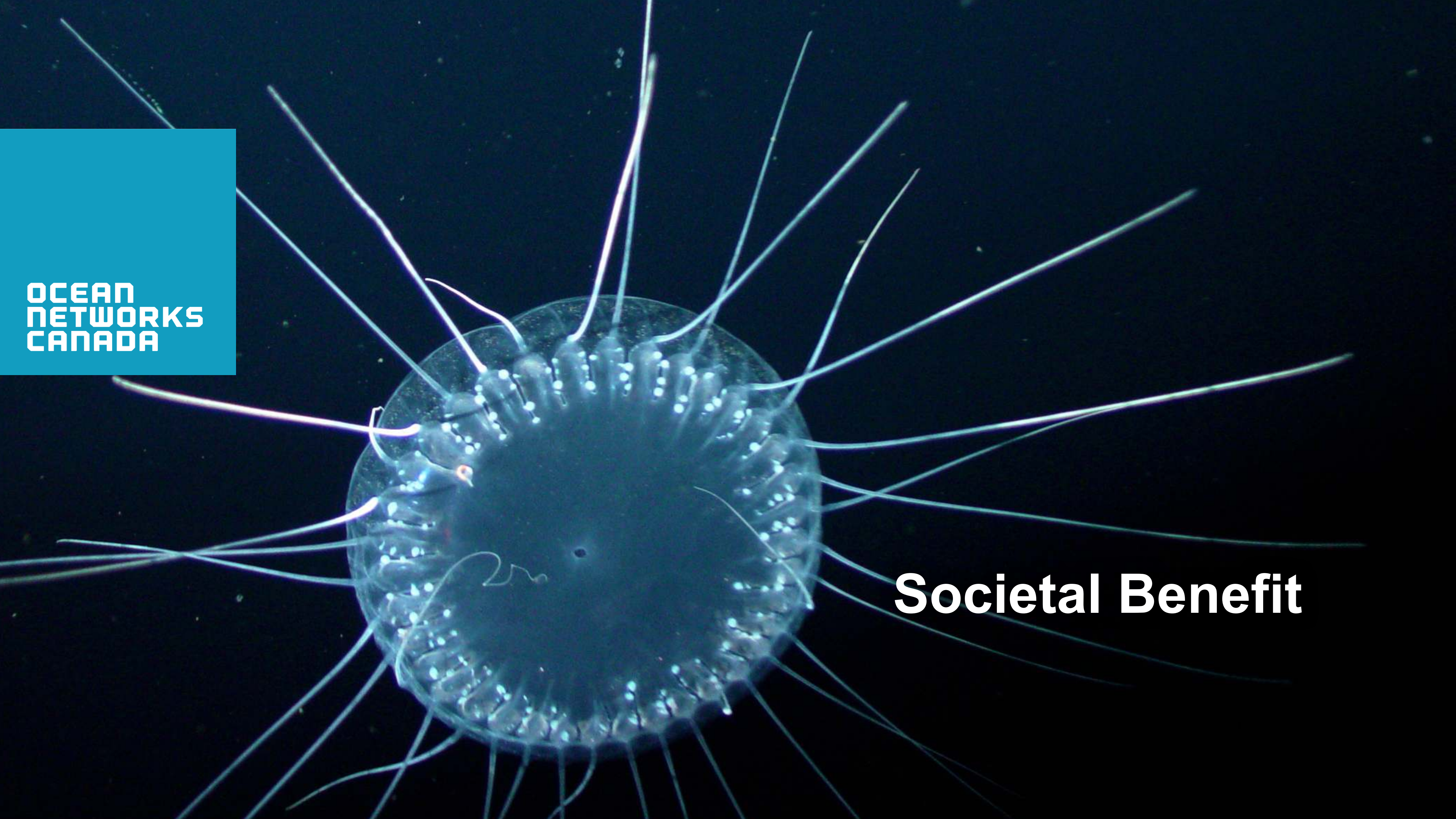
Visual inspection of modules with ROV



P-ONE: THE NUMBERS

- Seventy 1-km tall mooring lines (strings) within a 1 km diameter space, organized in seven 10-string sub-detectors => $\geq 1\text{km}^3$
- 20 optical modules per string (=> 1440 optical modules total)
- Each optical module will contain 16 PMTs
- Hierarchical architecture with processing/filtering/triggering per module, per string and per sub-detector
- Power budget is 5 kW/per sub-detector
- Data bandwidth today is 1 Gbps to shore for the first sub-detector
- Upgrade path to 100 Gbps to shore in the works



A glowing jellyfish is the central focus, its body emitting a soft blue light. Numerous thin, white fiber optic cables are attached to its tentacles, extending outwards in all directions. The background is a deep, dark blue, making the jellyfish and its glowing tentacles stand out prominently.

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Societal Benefit

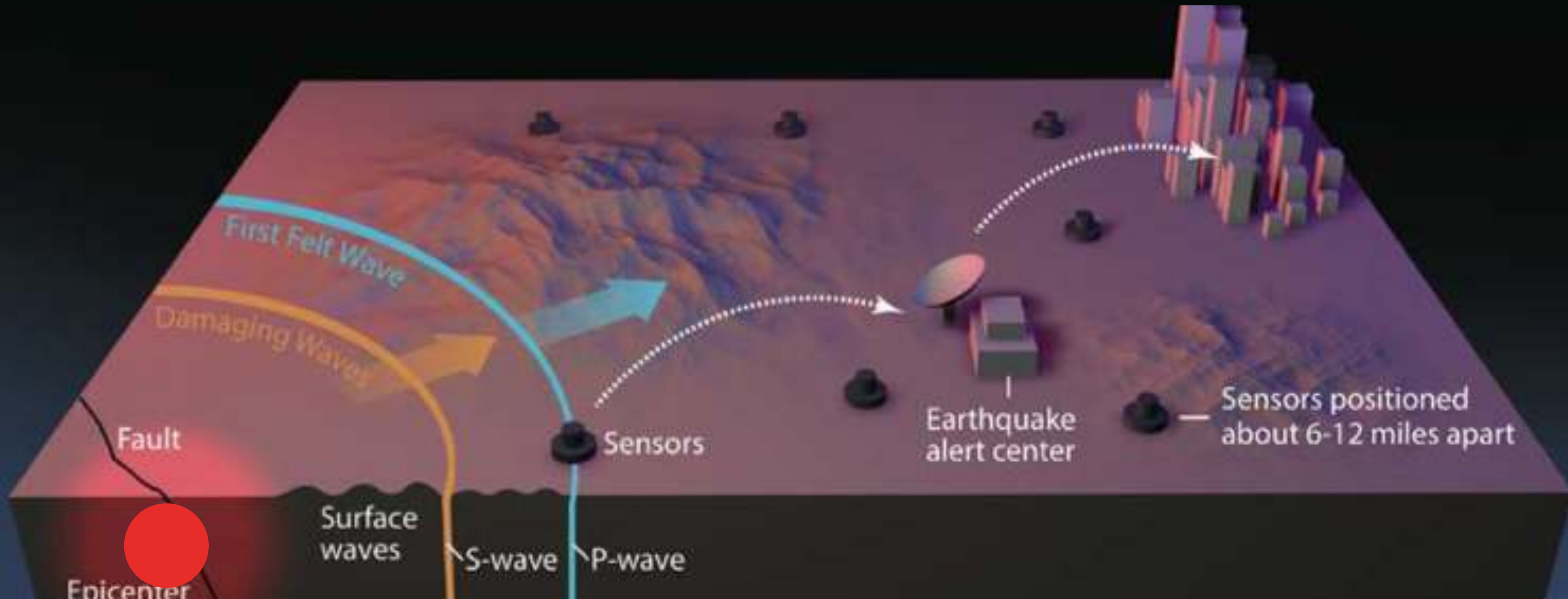
COMMUNITY FISHERS – CITIZEN SCIENCE



SOCIETAL BENEFITS MISSION:

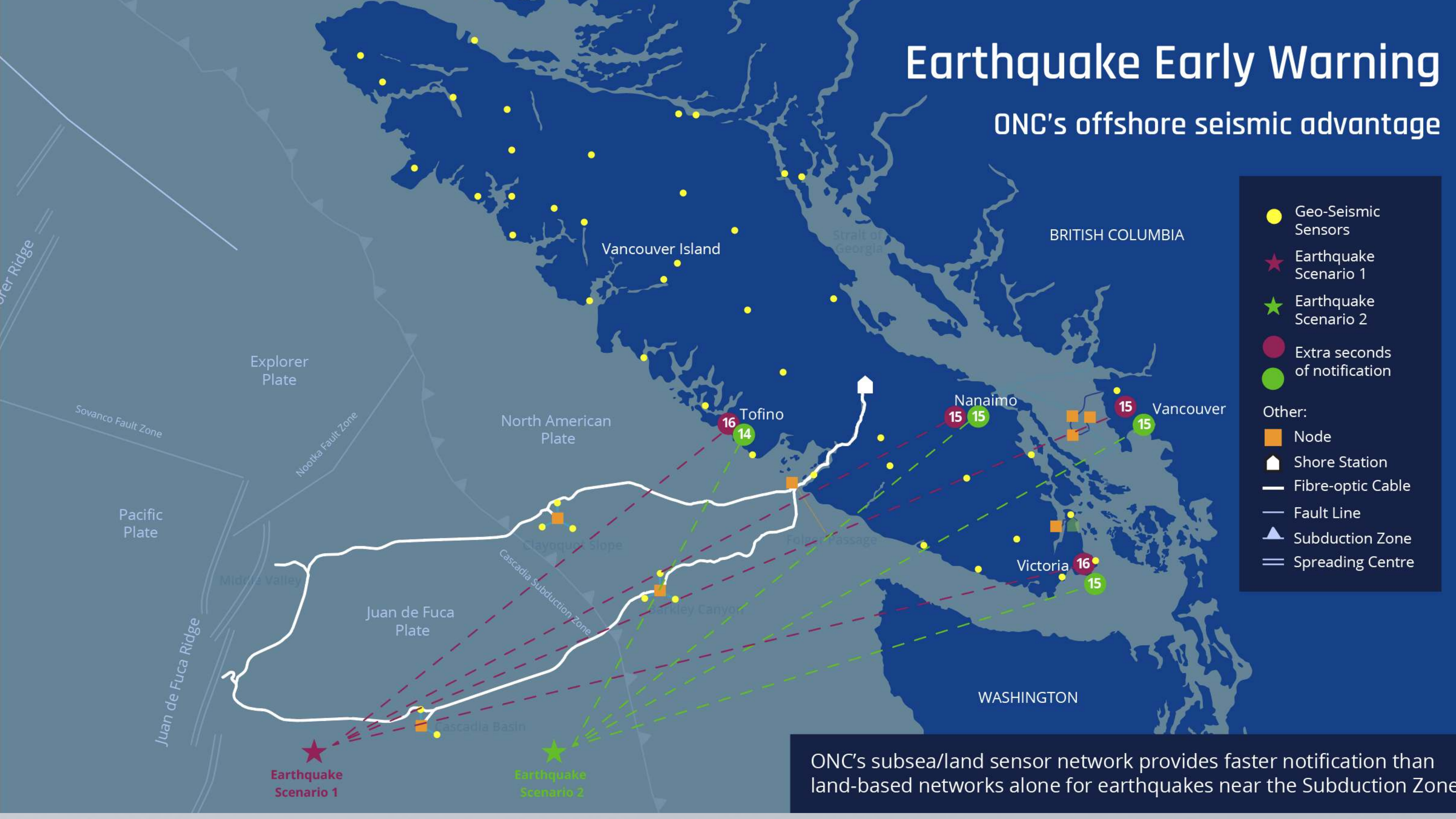
- Providing data products to support decision making for Gov't & Industry*
- Supporting Indigenous Communities by empowering them*

Earthquake Early Warning



Earthquake Early Warning

ONC's offshore seismic advantage



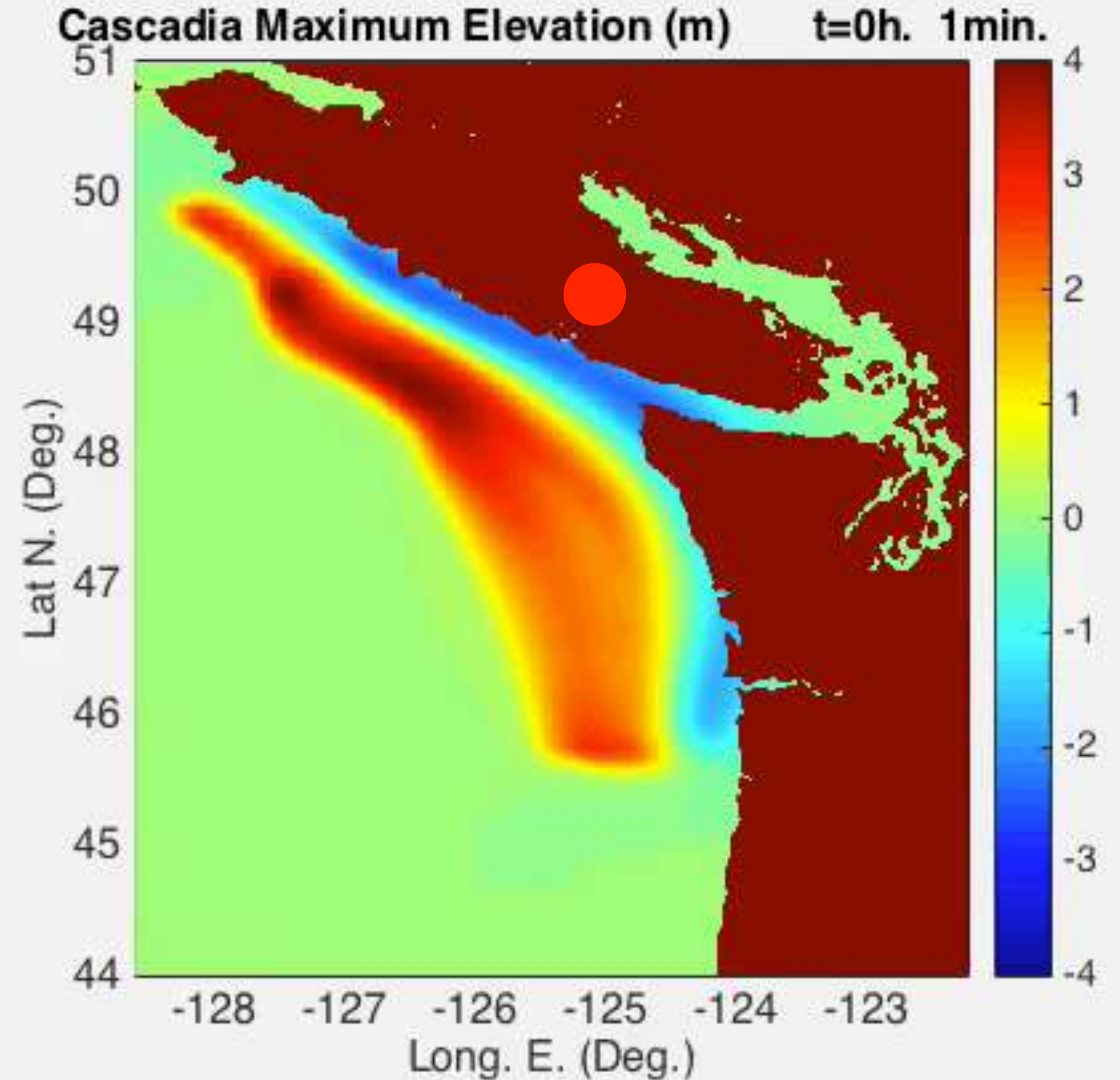
ONC's subsea/land sensor network provides faster notification than land-based networks alone for earthquakes near the Subduction Zone



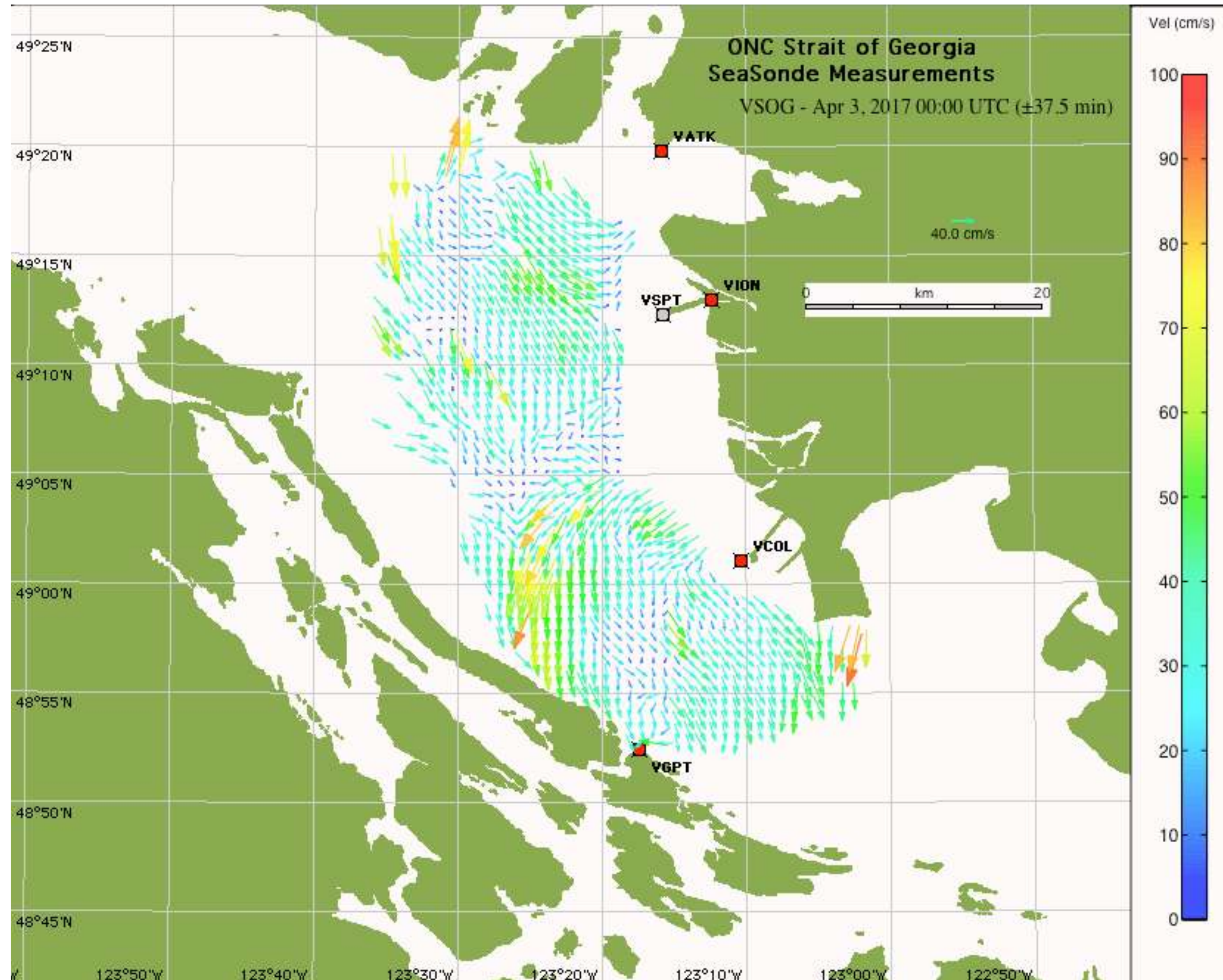
**Accelerometers
installed on
seafloor**

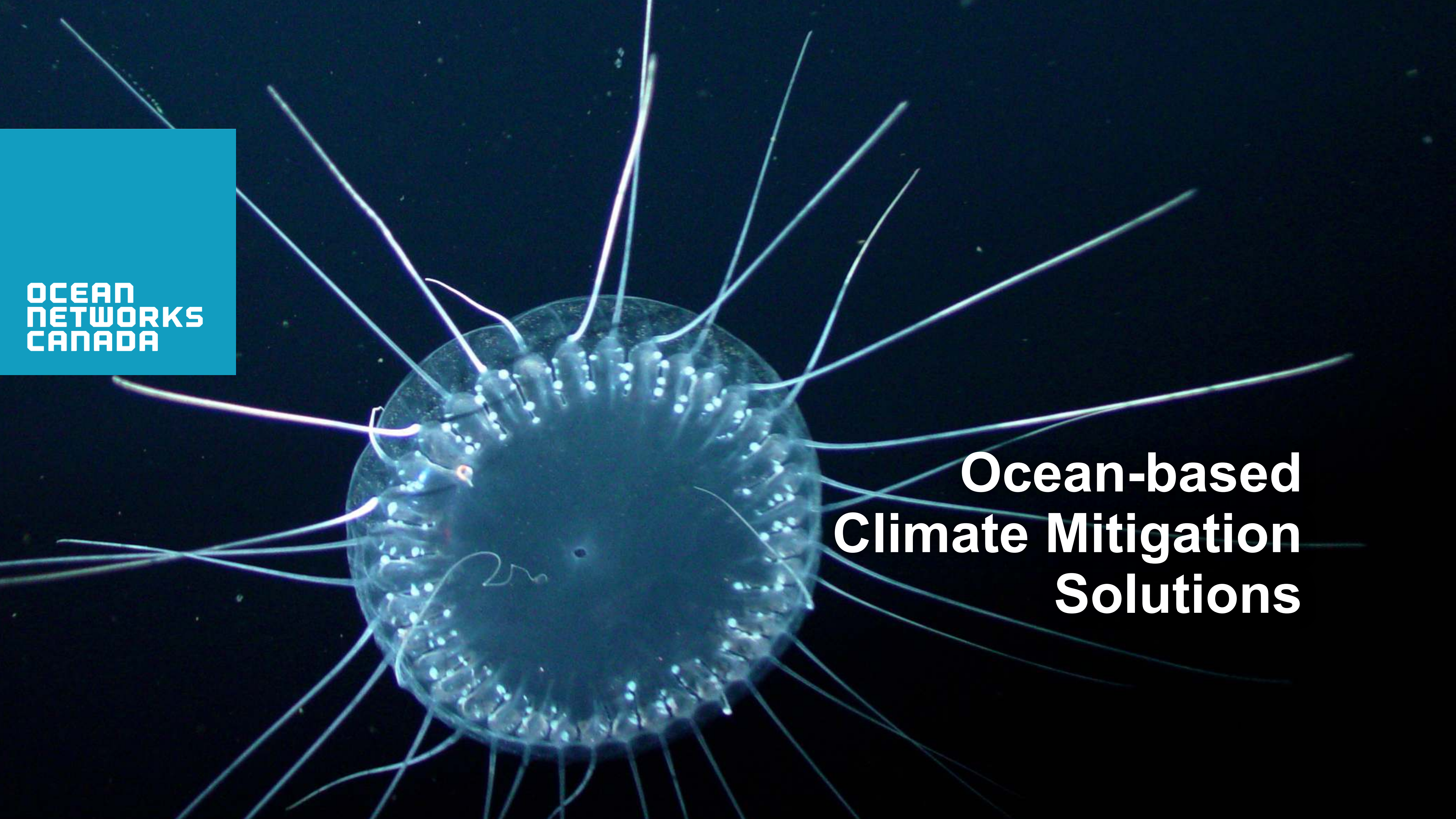
TSUNAMI IMPACT SIMULATION

- Digital Elevation Models
- Barkley Sound & Port Alberni
- Wave propagation models
- Time of arrival, wave height, inundation map
- Tsunami preparedness for coastal First Nations



SURFACE CURRENT MEASUREMENTS

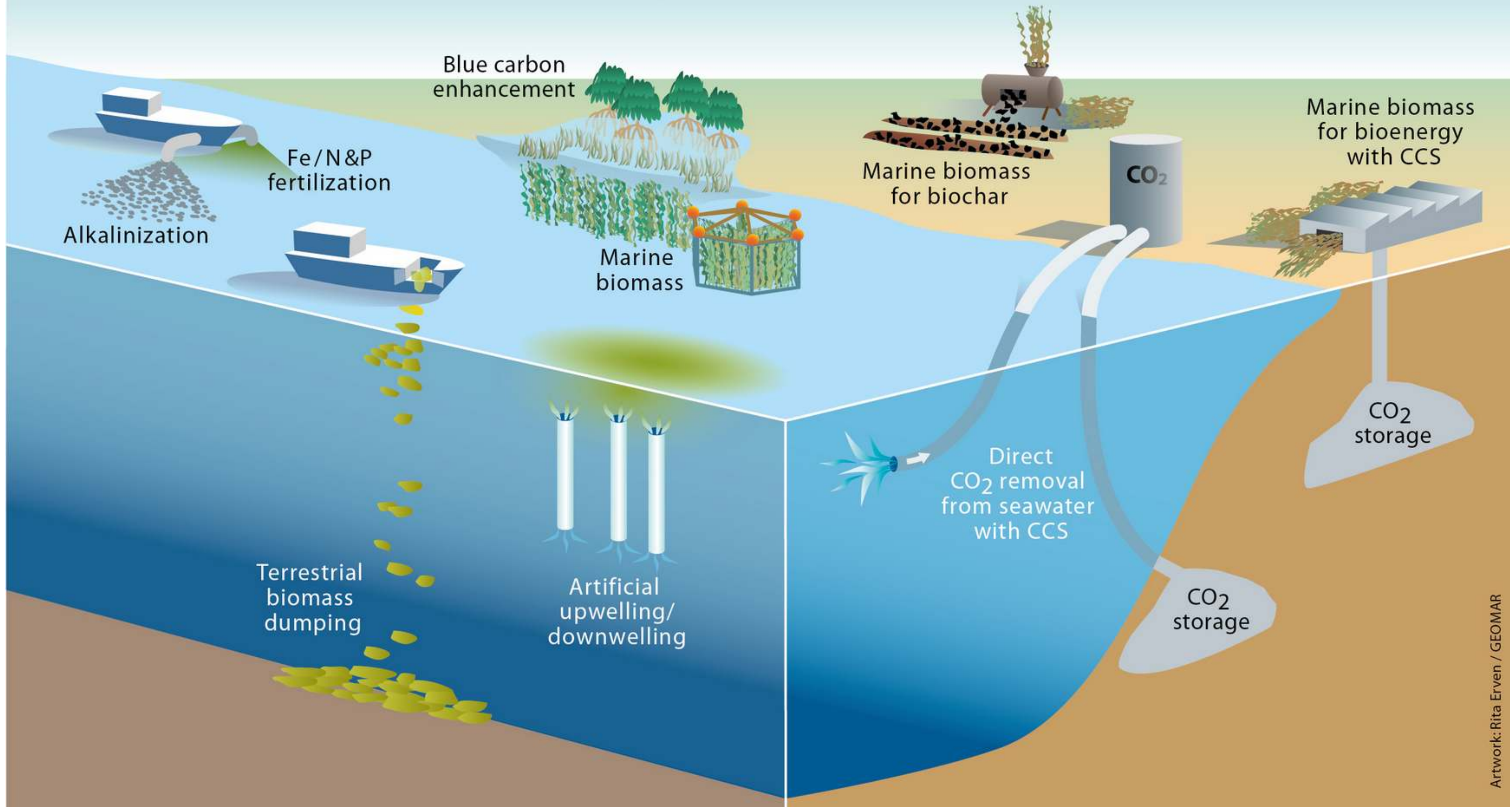


A glowing jellyfish with long, thin tentacles is centered in the frame against a dark background. The jellyfish's body and tentacles emit a soft, ethereal light. In the top left corner, there is a teal square containing the text 'OCEAN NETWORKS CANADA'. On the right side, there is a large white text overlay.

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Ocean-based Climate Mitigation Solutions

Ocean-based Negative Emission Technologies



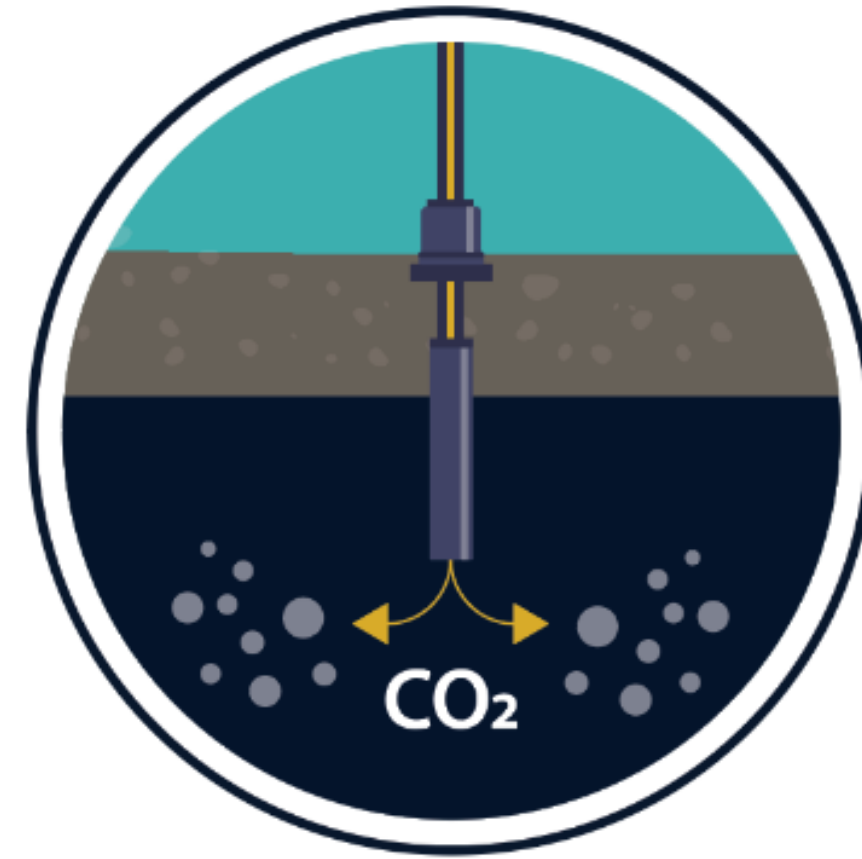
Artwork: Rita Erven / GEOMAR

SOLID CARBON

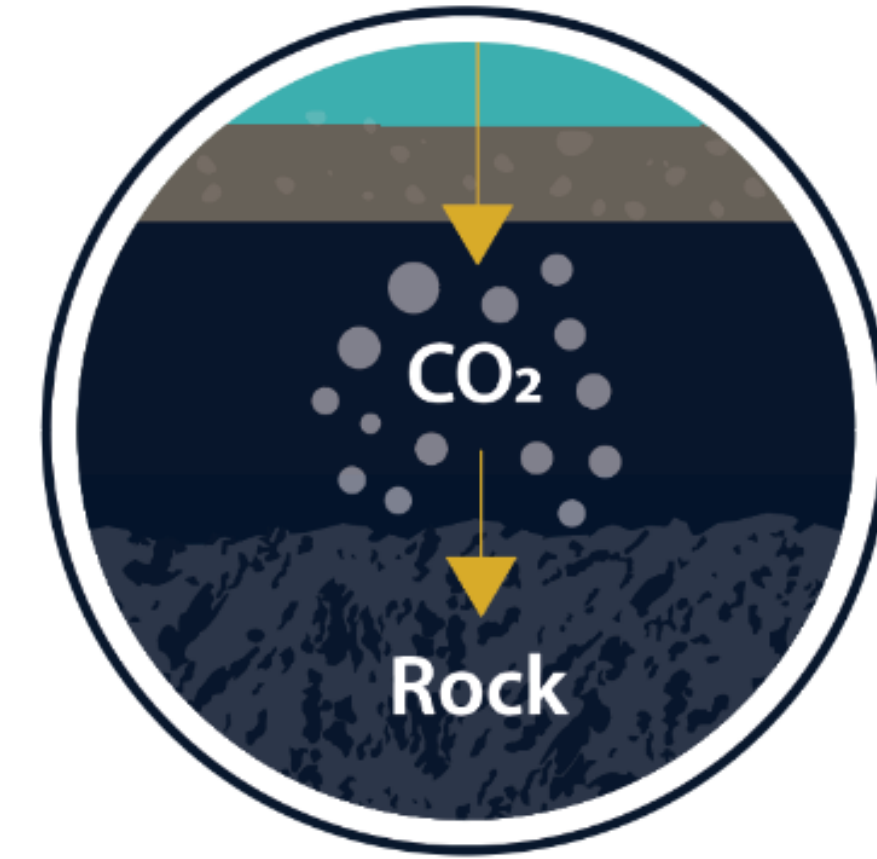
The Solid Carbon Solution



Capture carbon dioxide
Pull CO₂ out of the atmosphere



Pump below seafloor
Pump CO₂ down through
the water column into
the sub seafloor



Turn into rock
In a short amount of time,
the CO₂ becomes rock

Global scalability

We are here