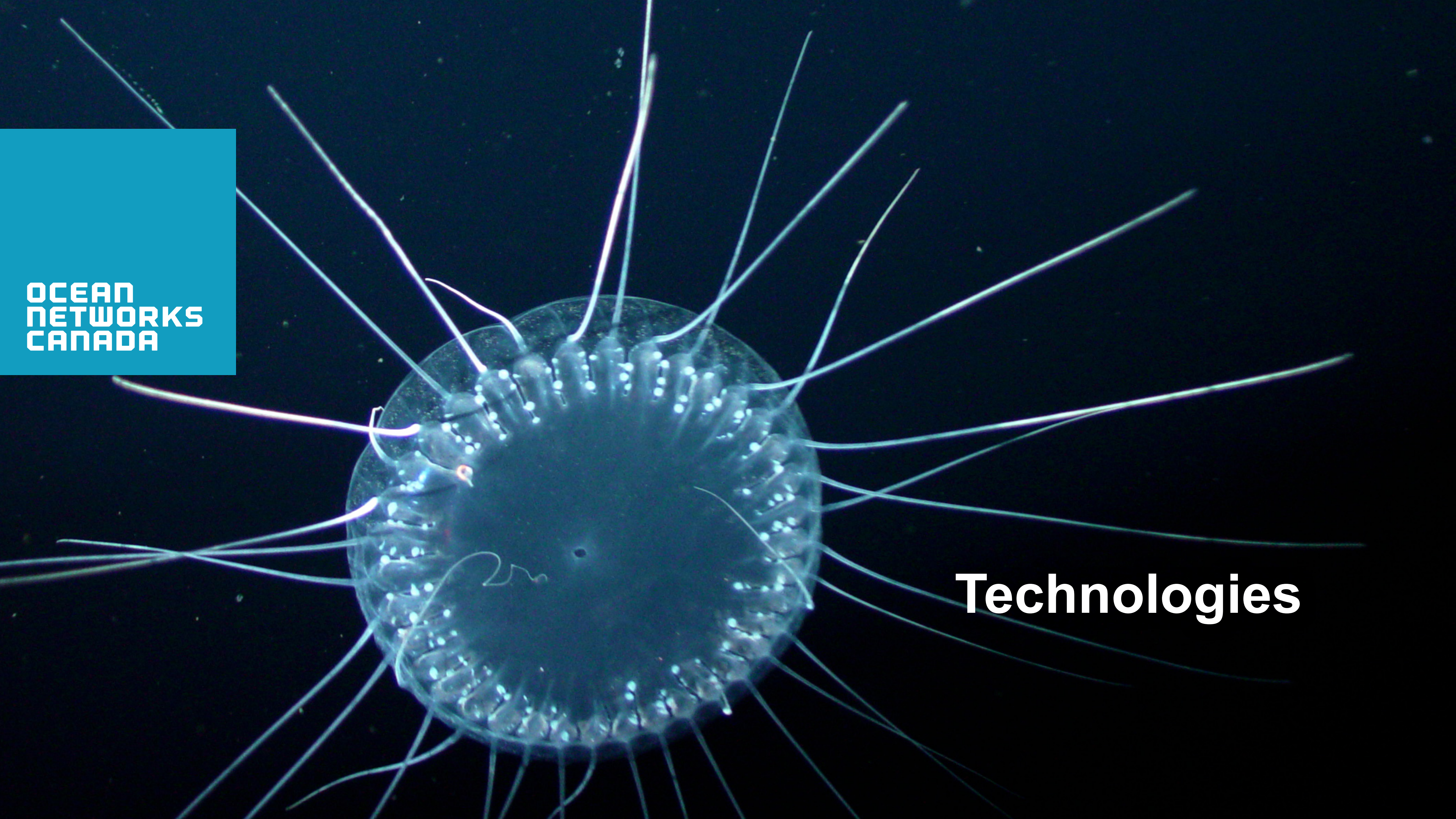


Ocean Networks Canada: Continuously Delivering Multidisciplinary Data from the Deep

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

A glowing blue jellyfish with long, thin tentacles is centered in the frame against a dark background. The jellyfish's body is circular and emits a bright blue light, with its tentacles extending outwards in all directions. The overall aesthetic is futuristic and high-tech.

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About Us



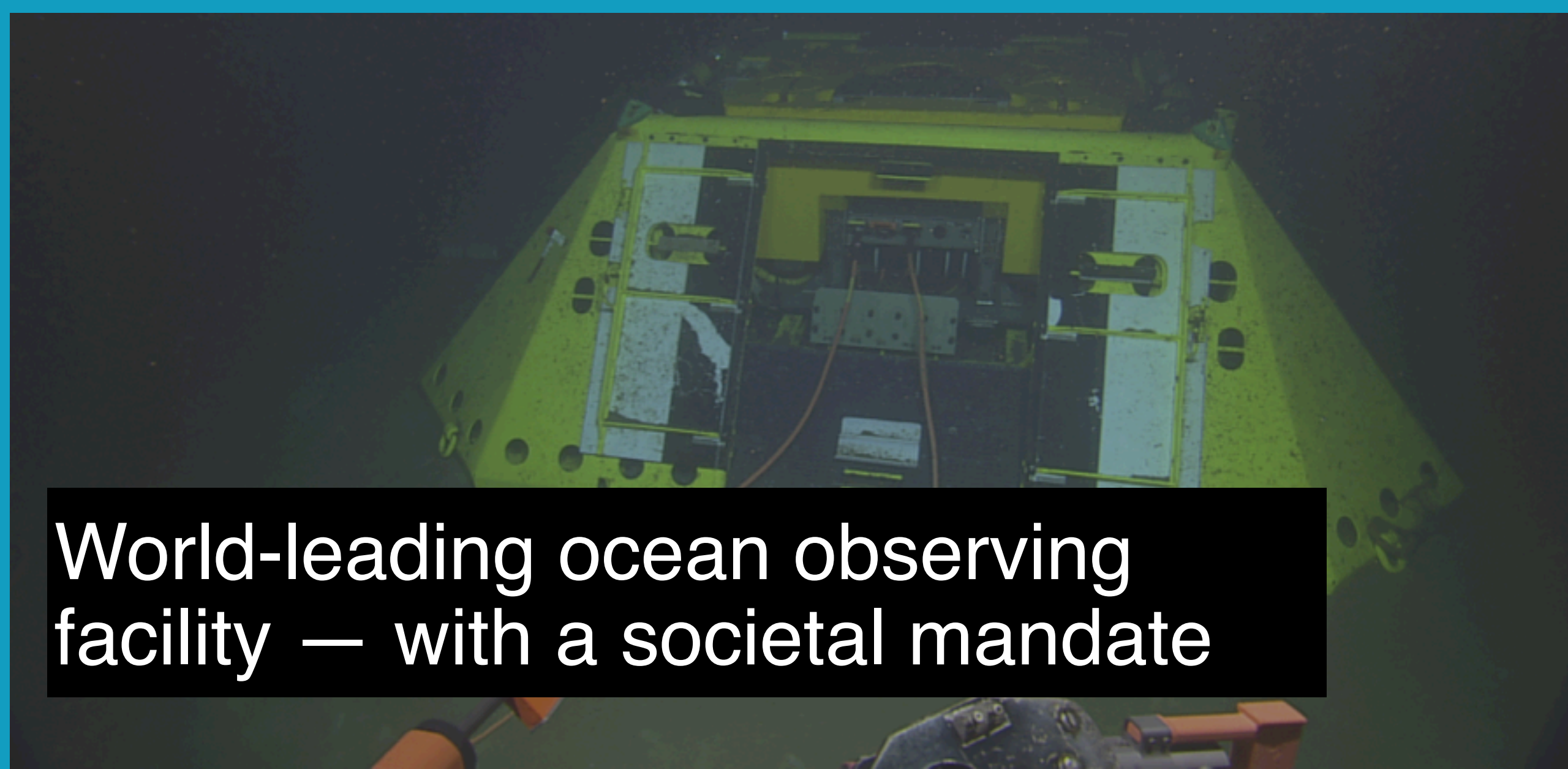
180+ Staff



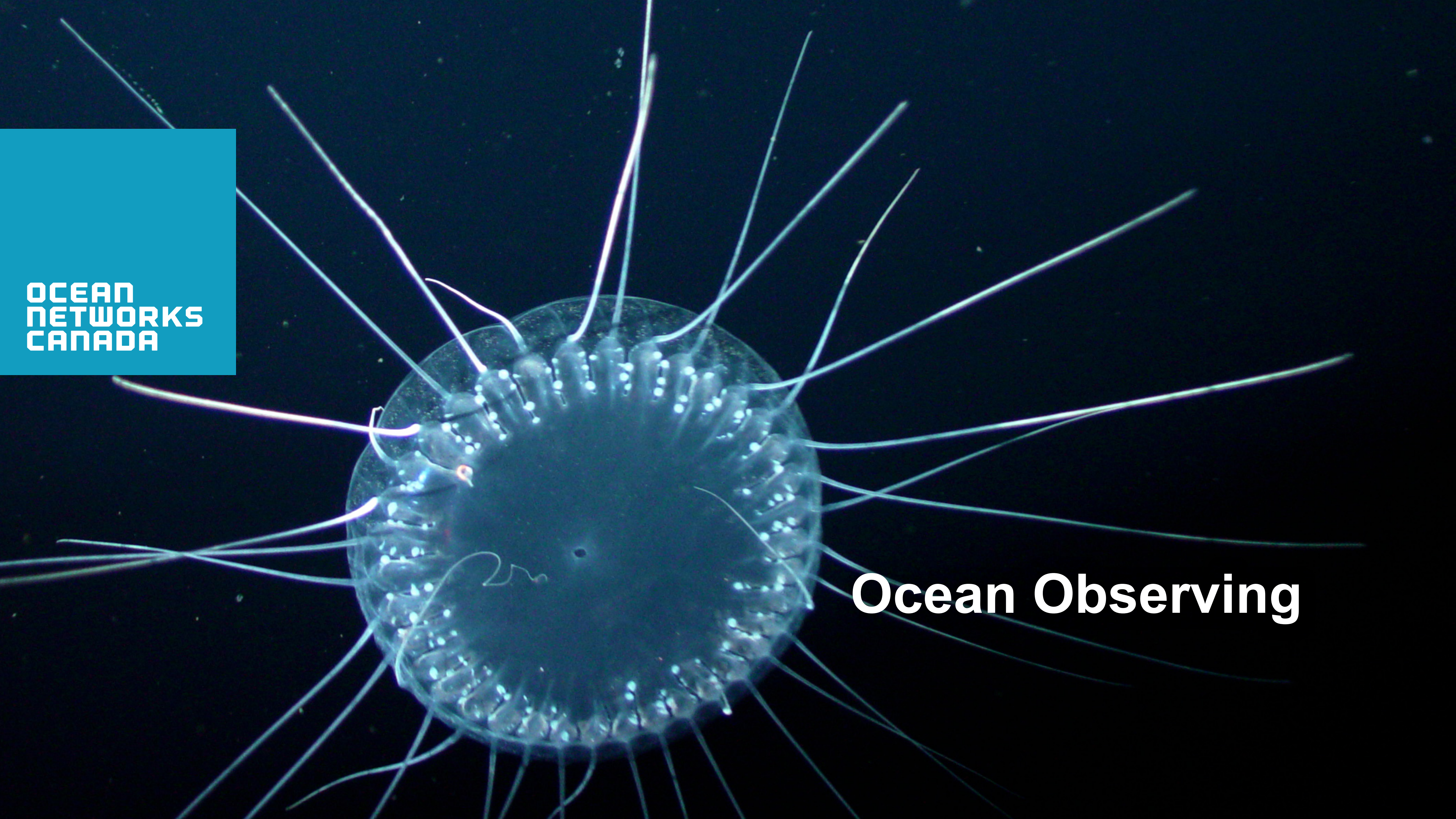
\$650M Investment



>1.3 Petabyte of data



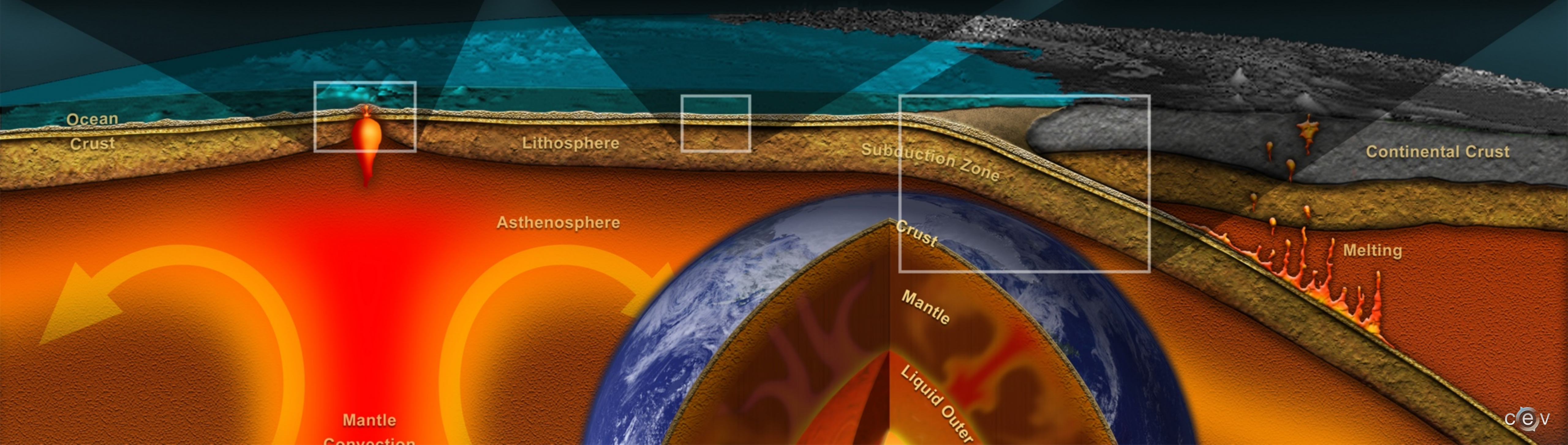
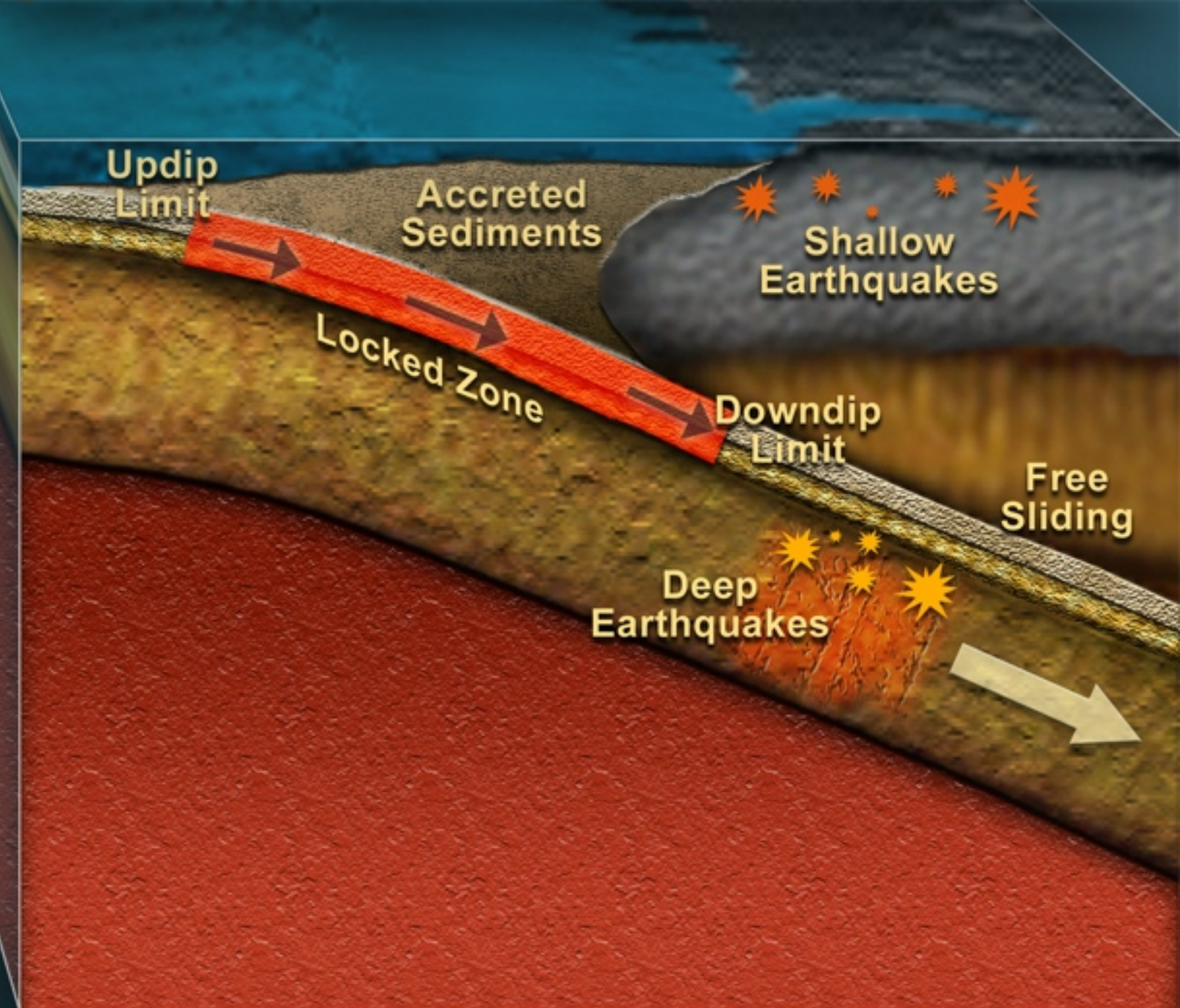
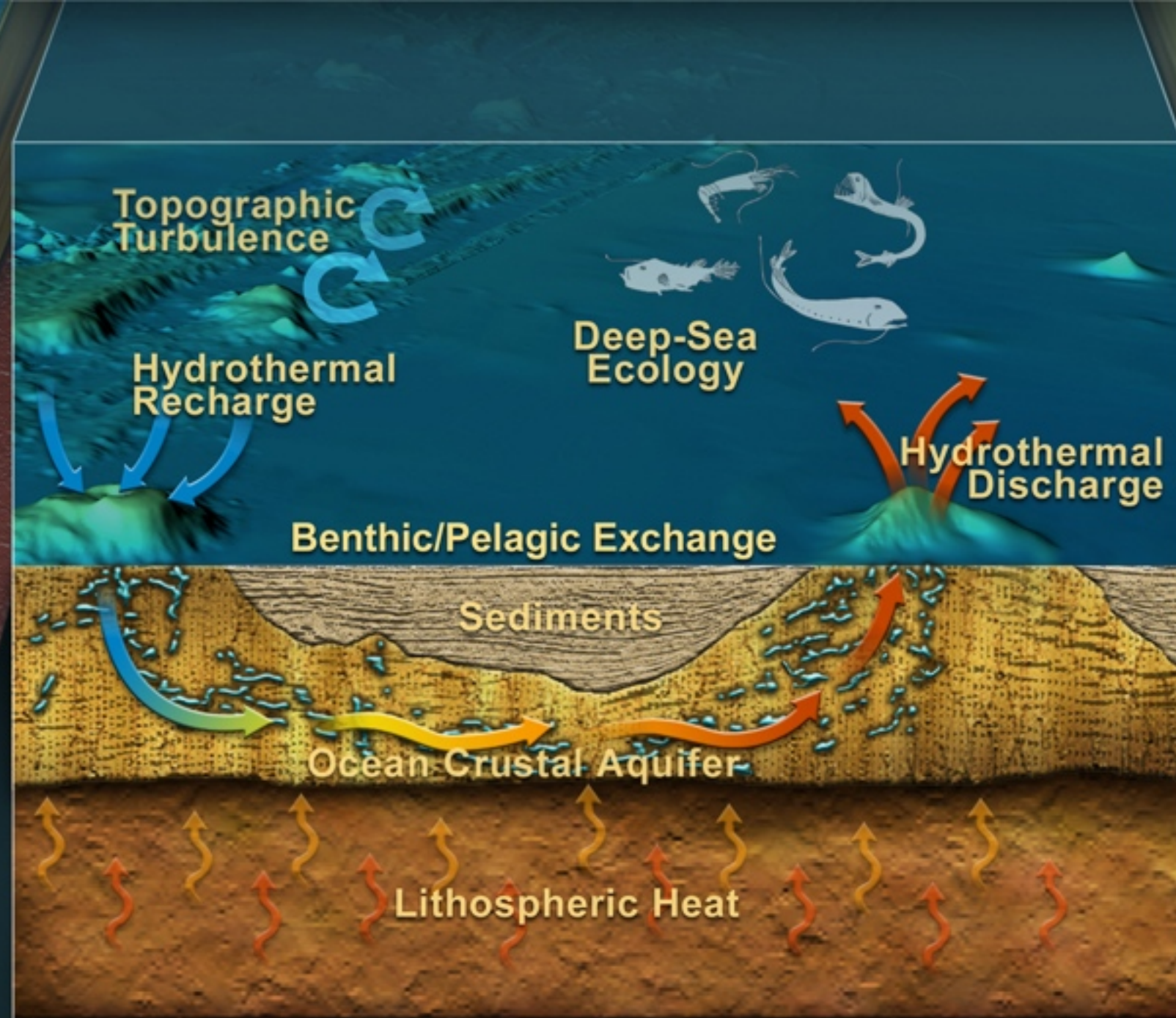
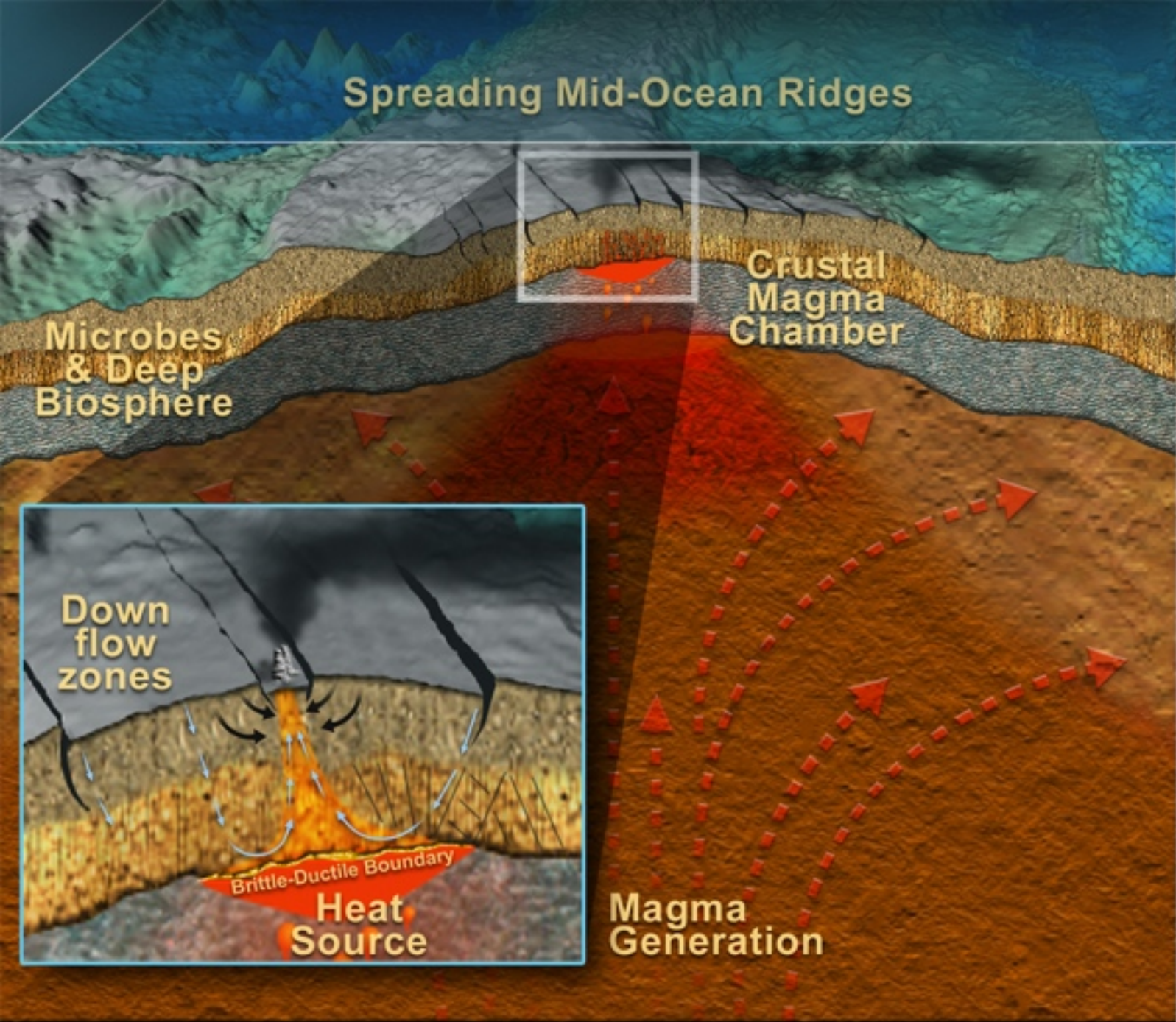
World-leading ocean observing facility — with a societal mandate

A glowing jellyfish is shown against a dark background. Numerous thin, fiber optic cables are attached to the outer edge of its bell, radiating outwards. The jellyfish's internal structure is visible, showing a grid of small, glowing points. The overall scene is illuminated with a blue and purple glow.

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Ocean Observing

THE COMPLEX OCEAN SYSTEM



ONC supports long-term monitoring & experiments

Ocean Networks Canada Data Preview

Oceans 3.0

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

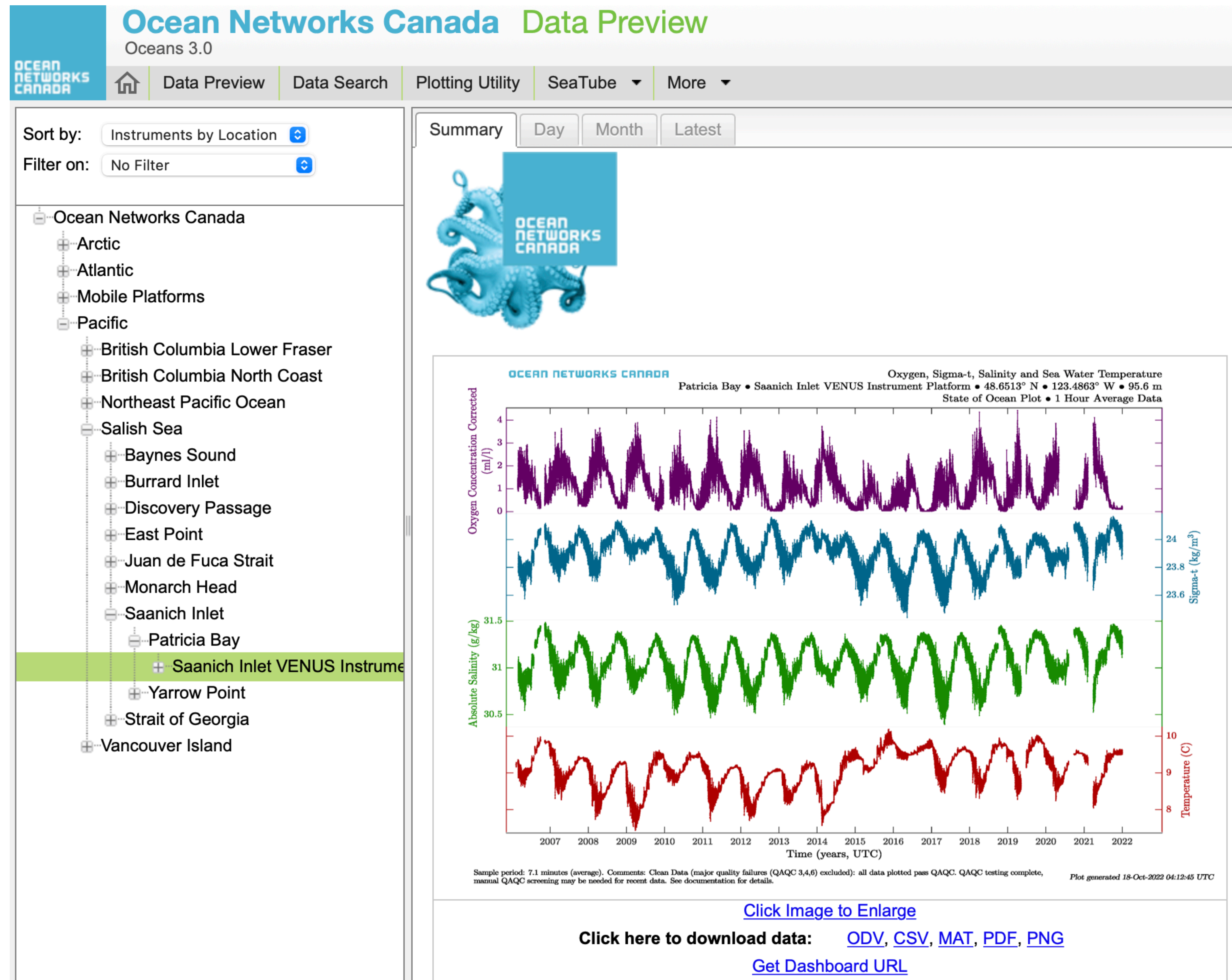
Sample period: 7.1 minutes (average). Comments: Clean Data (major quality failures (QAQC 3,4,6) excluded): all data plotted pass QAQC. QAQC testing complete, manual QAQC screening may be needed for recent data. See documentation for details. Plot generated 18-Oct-2022 04:12:45 UTC

[Click Image to Enlarge](#)

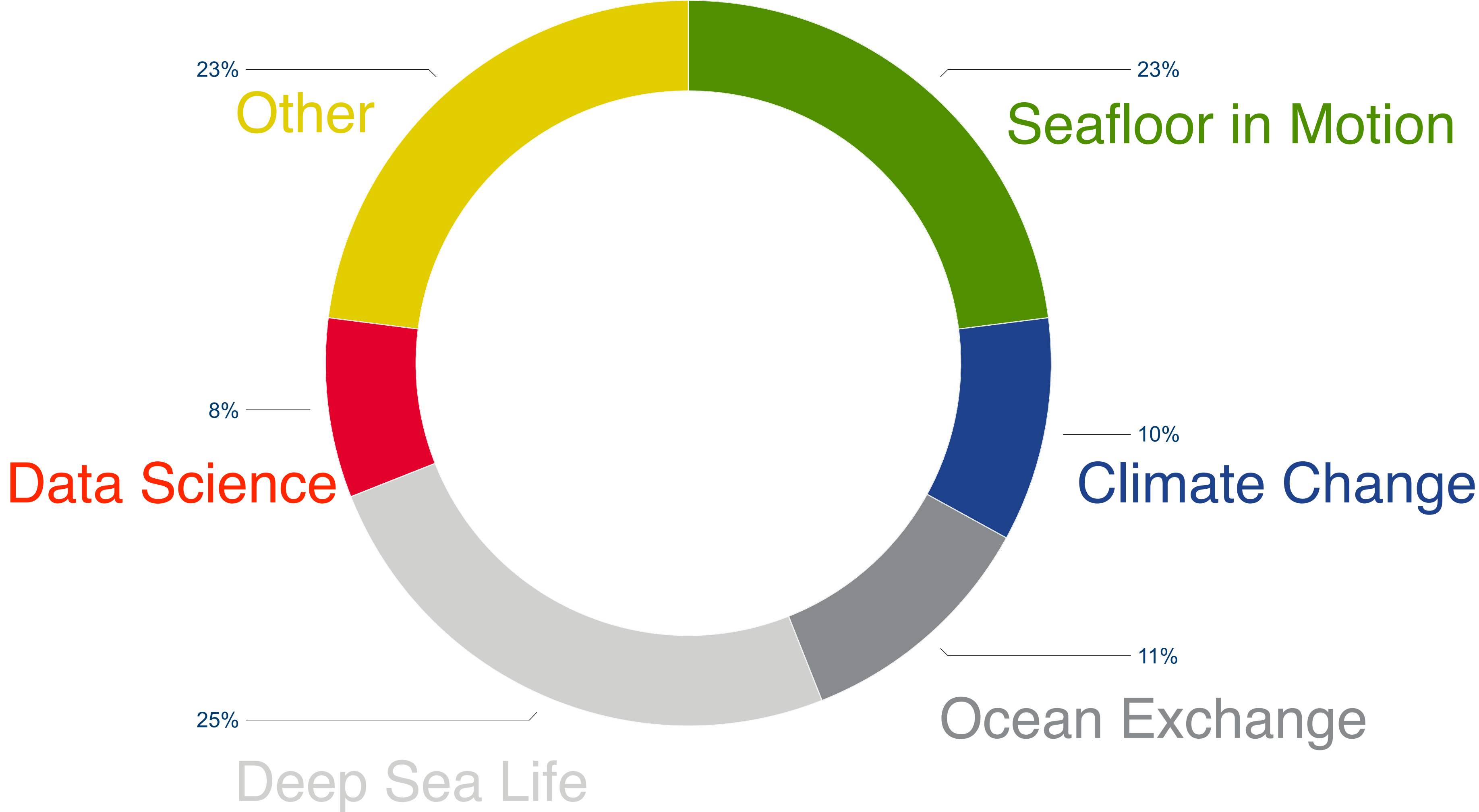
Click here to download data: [ODV](#), [CSV](#), [MAT](#), [PDF](#), [PNG](#)

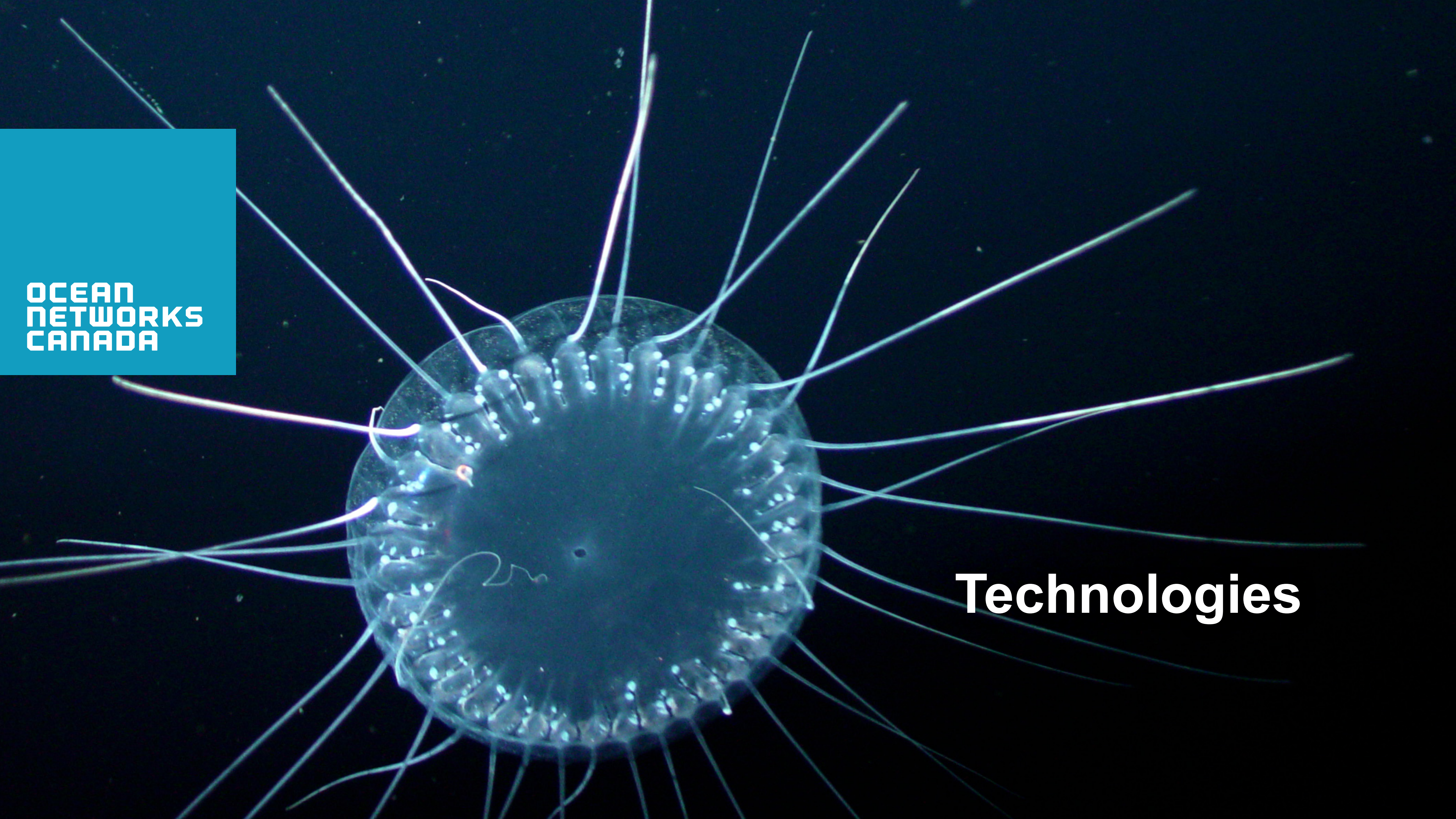
[Get Dashboard URL](#)

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



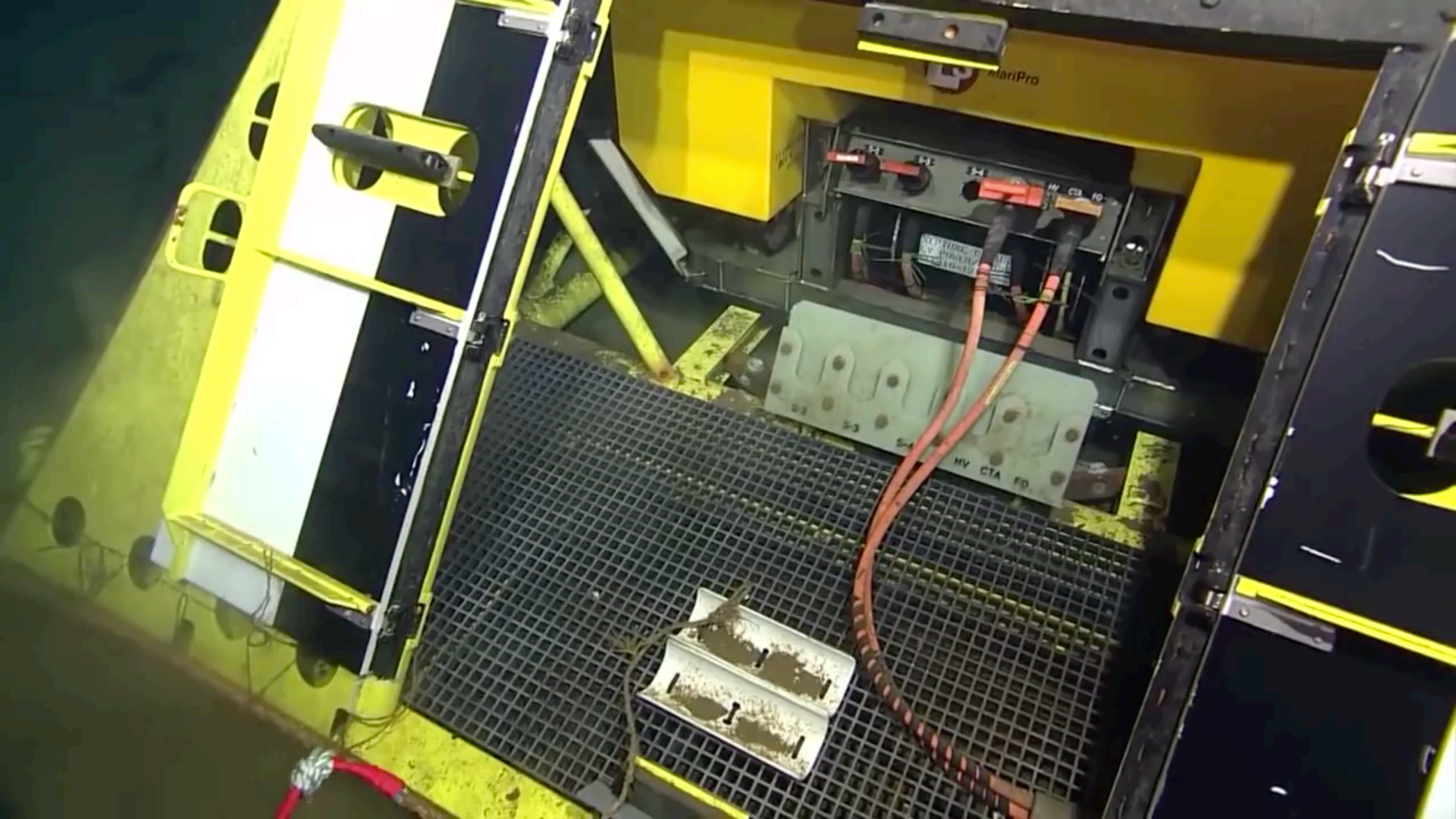
SCIENCE BY THEME: 2006 — 2020





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Technologies

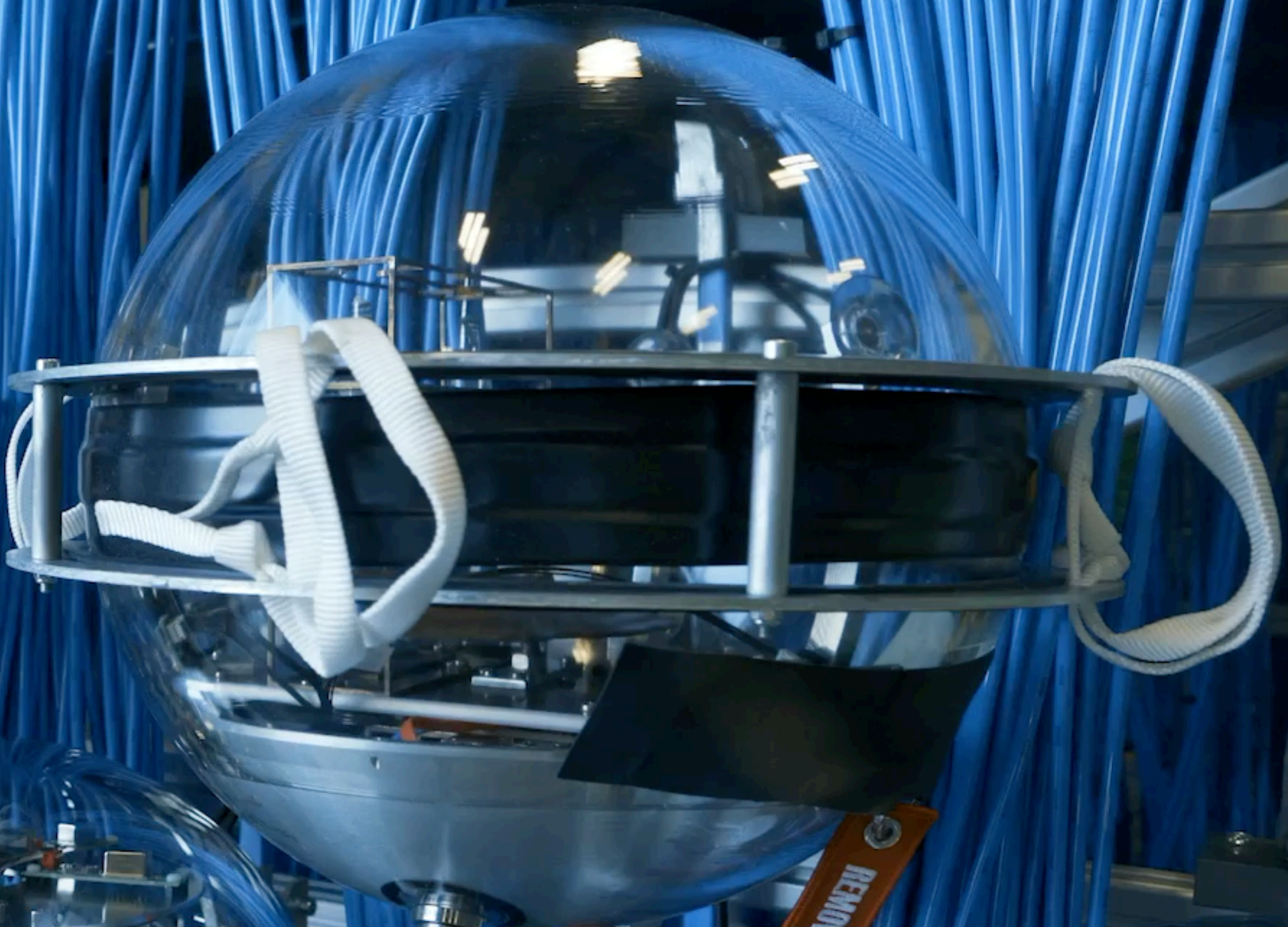
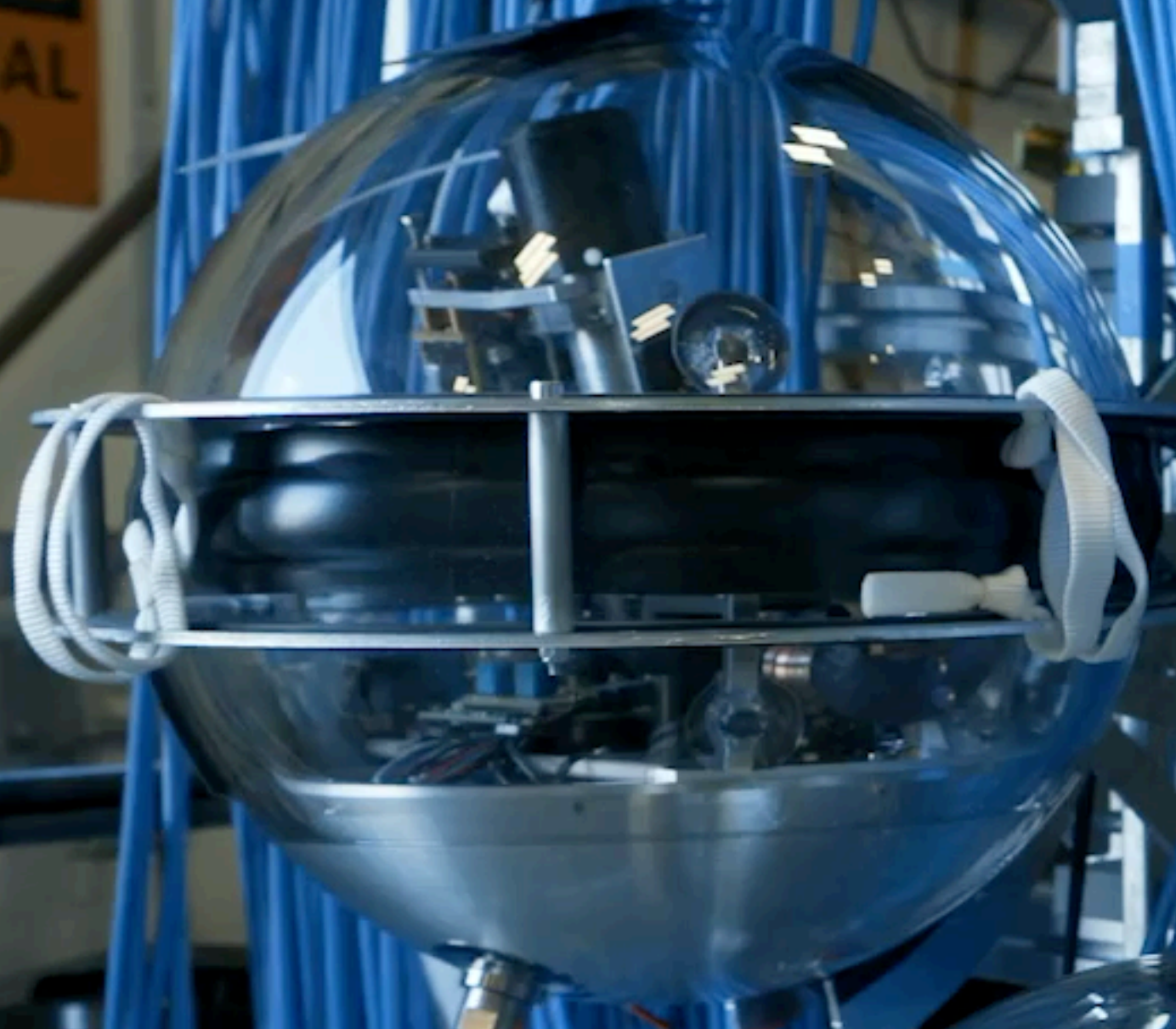


EV NAUTILUS

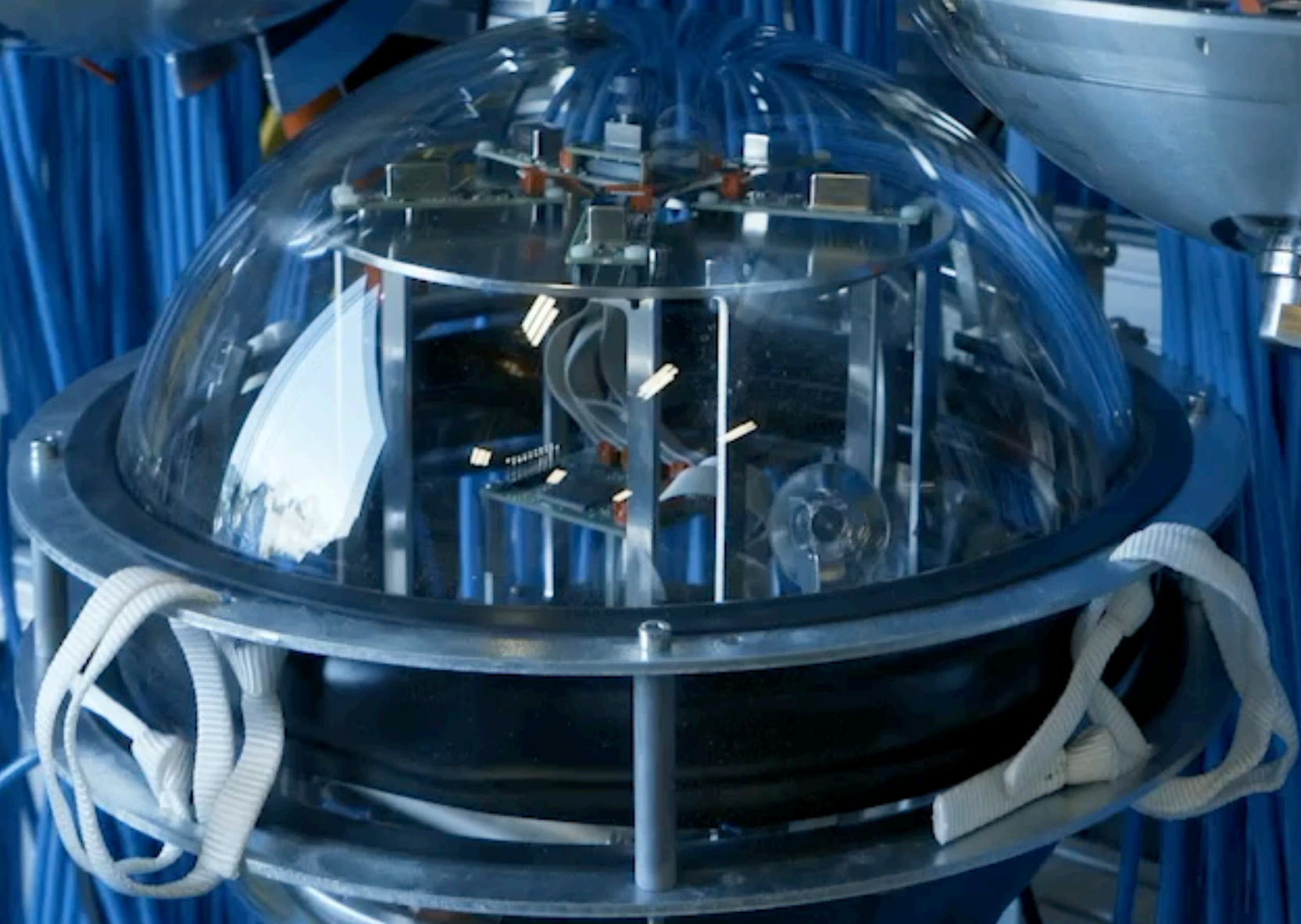


WORLD LEADING DISCOVERIES AT A CRITICAL TIME

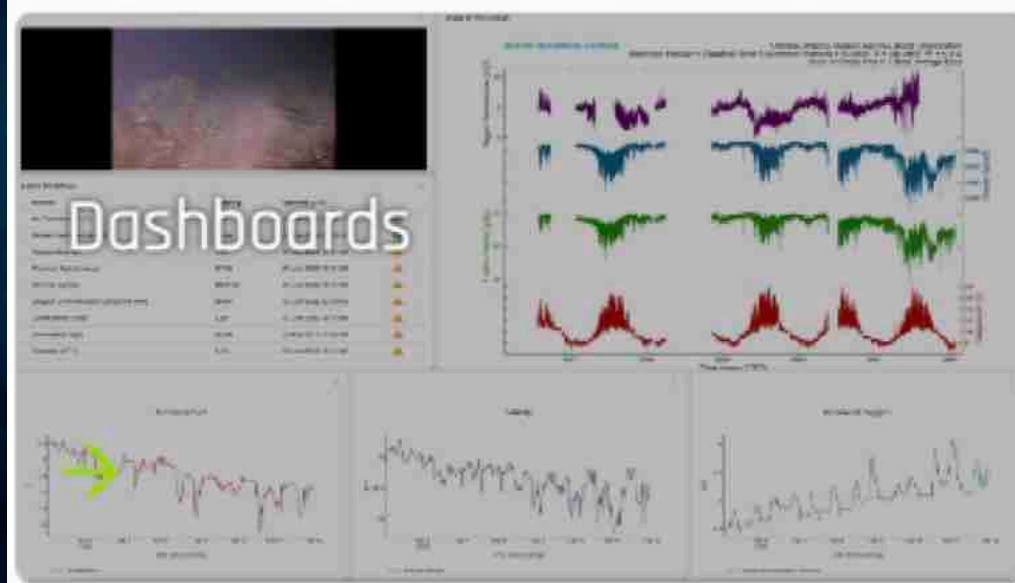
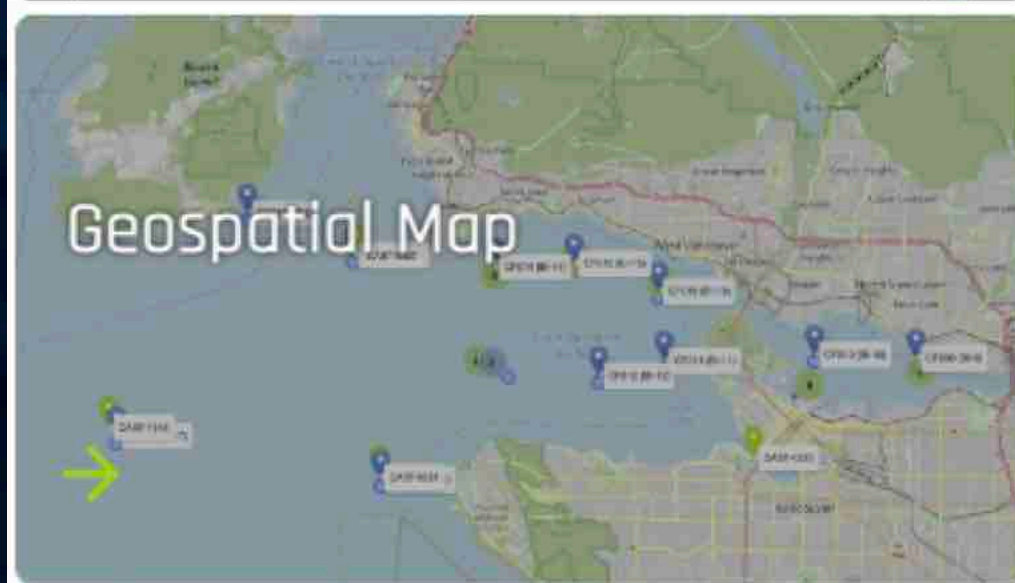
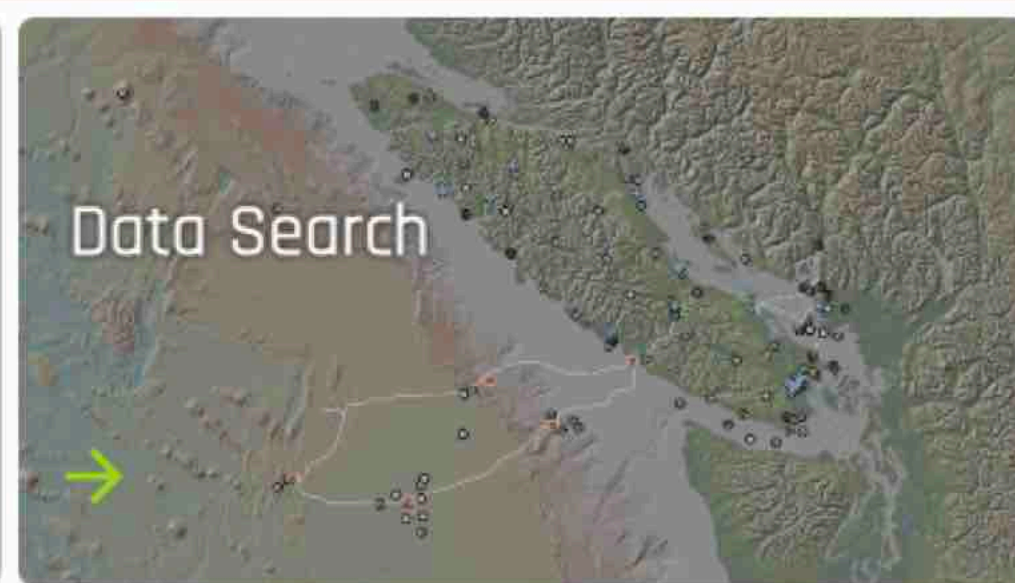
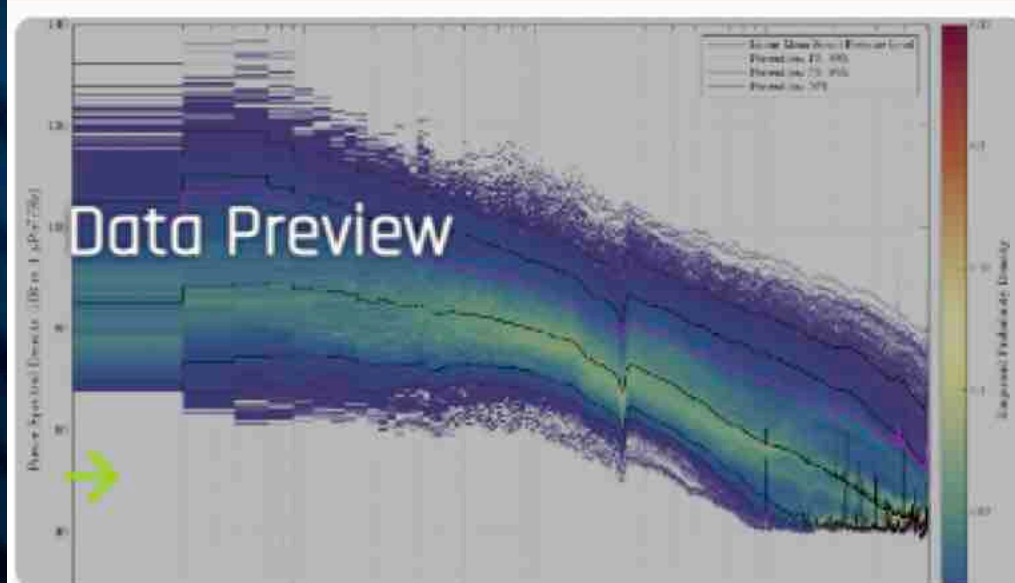
**WARNING
ELECTRICAL
HAZARD**



REMOVE BEFORE FLIGHT



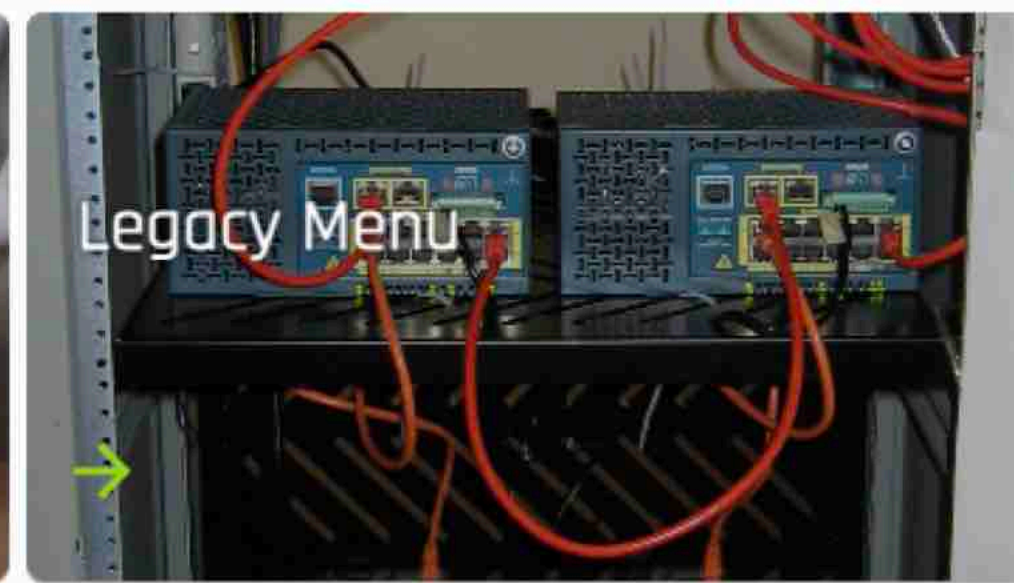
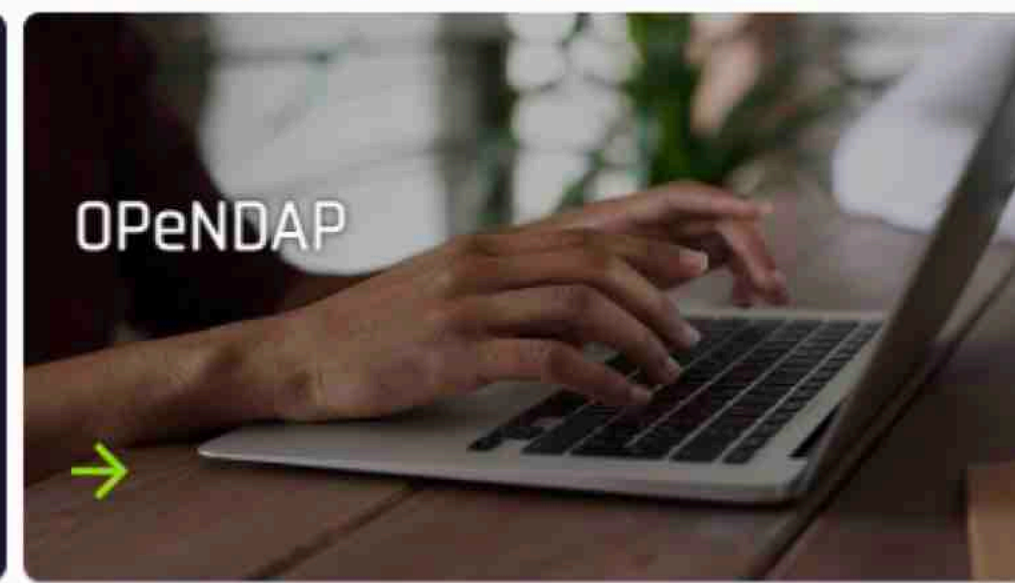
OCEANS 3.0 - OPEN DATA MANAGEMENT SYSTEM



```
import glob
import requests

def get_devices_category_codes(parameters):
    url = "https://data.oceannetworks.ca/api/deviceCategories"
    params = [{"method": "get"}, {"params": parameters}]
    response = requests.get(url, params=parameters)
    print(response.json())
    return response.json()

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



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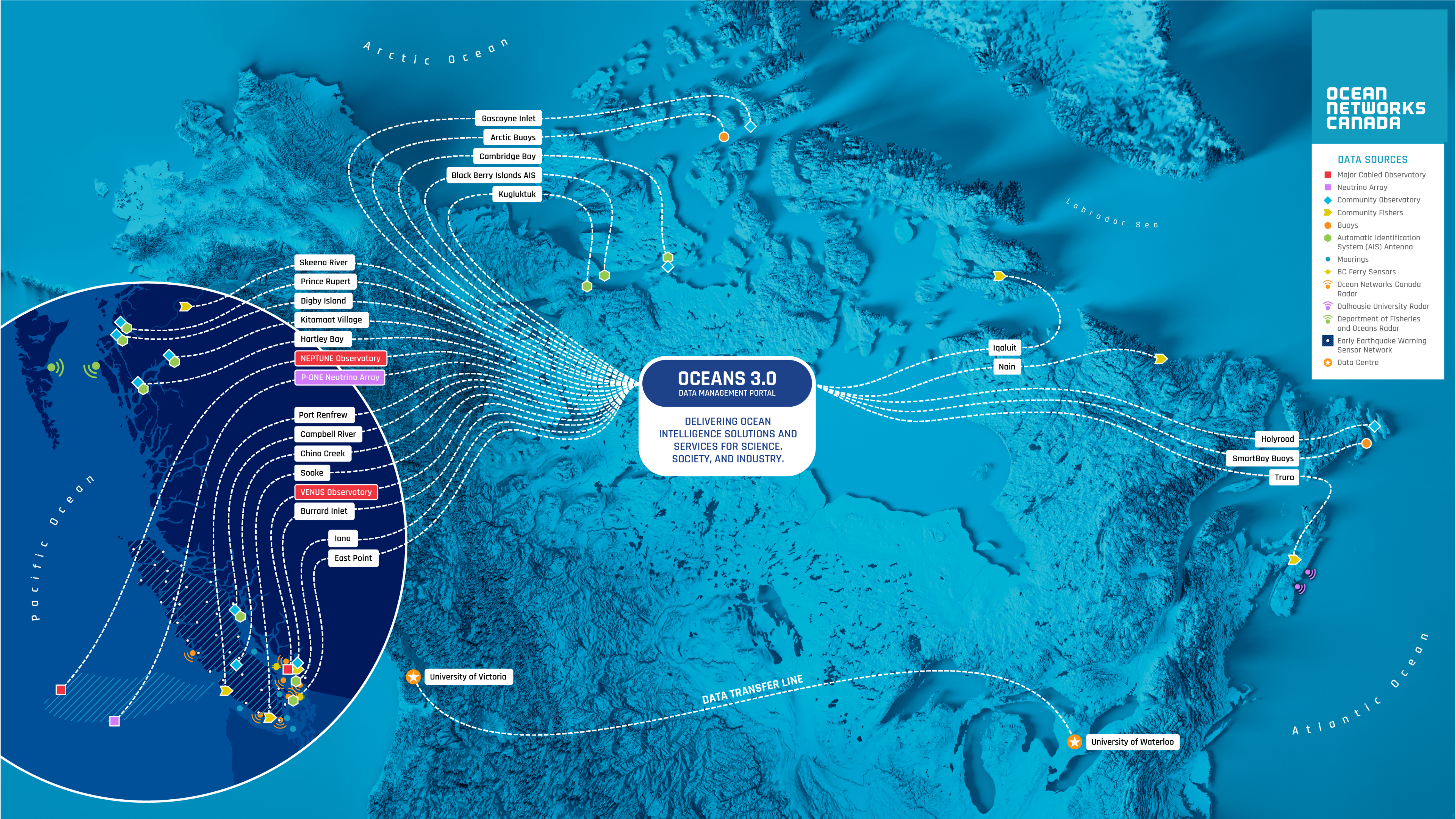
DATA SOURCES

- 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.



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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

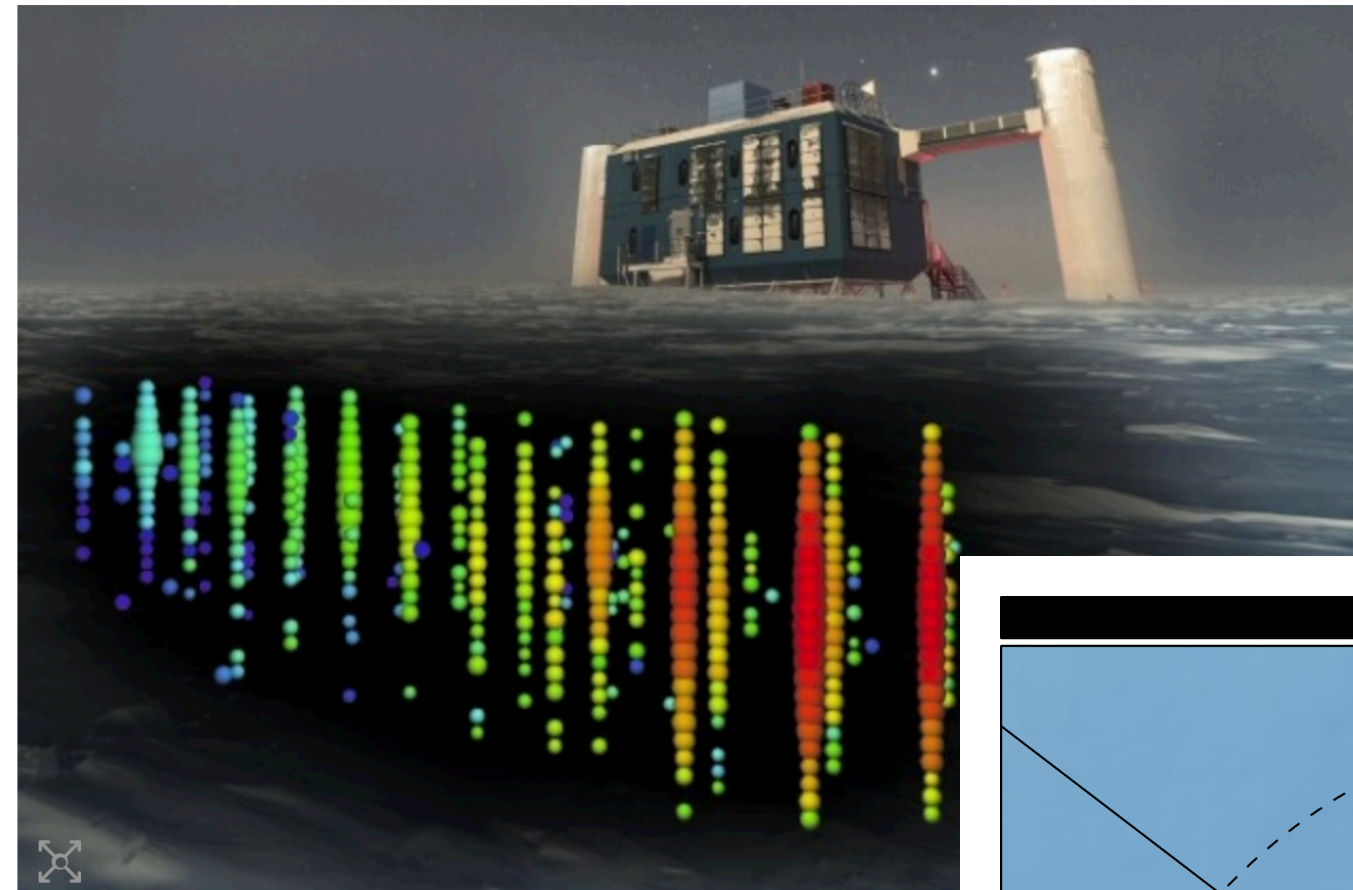


THE PACIFIC OCEAN NEUTRINO EXPERIMENT

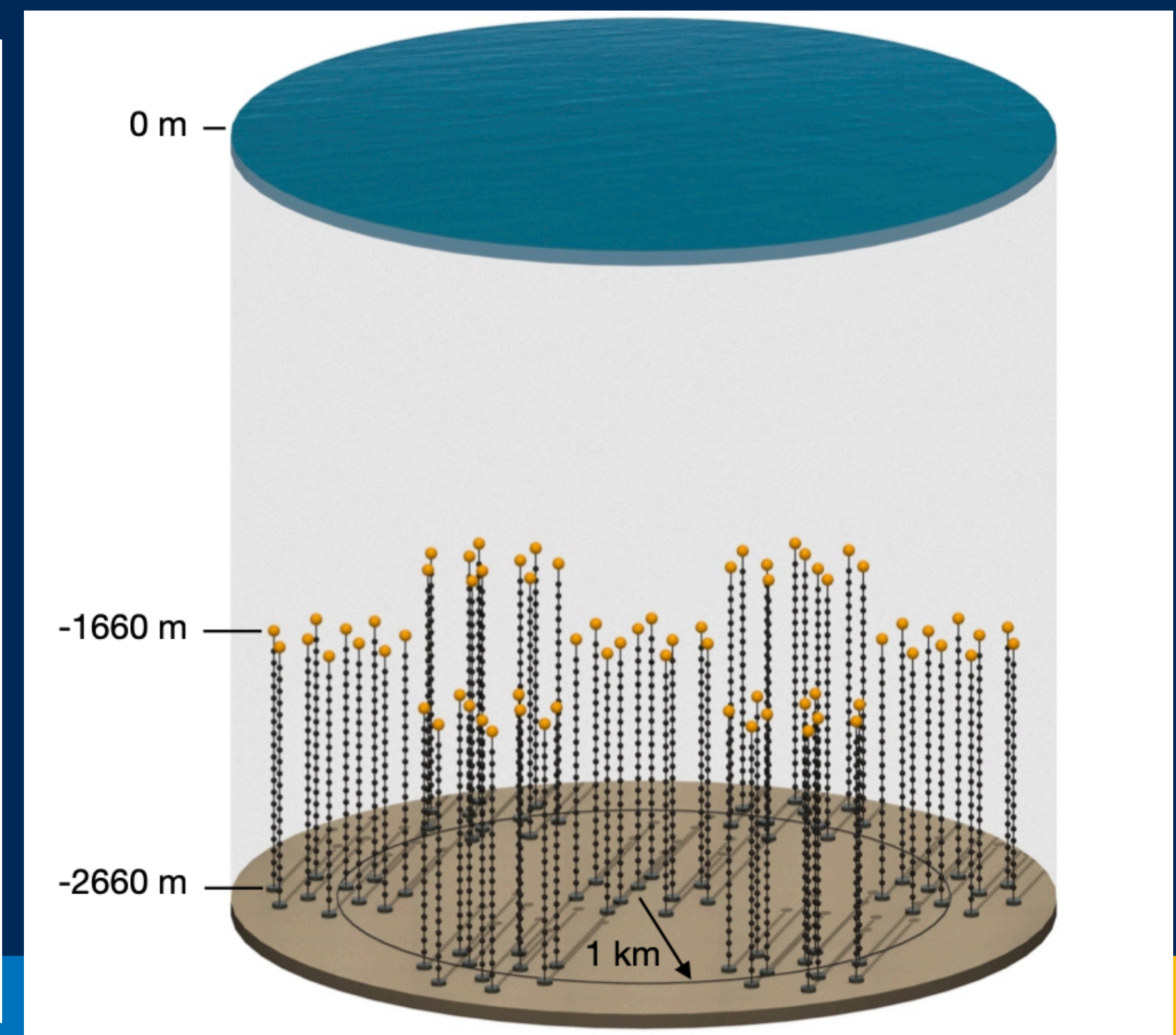
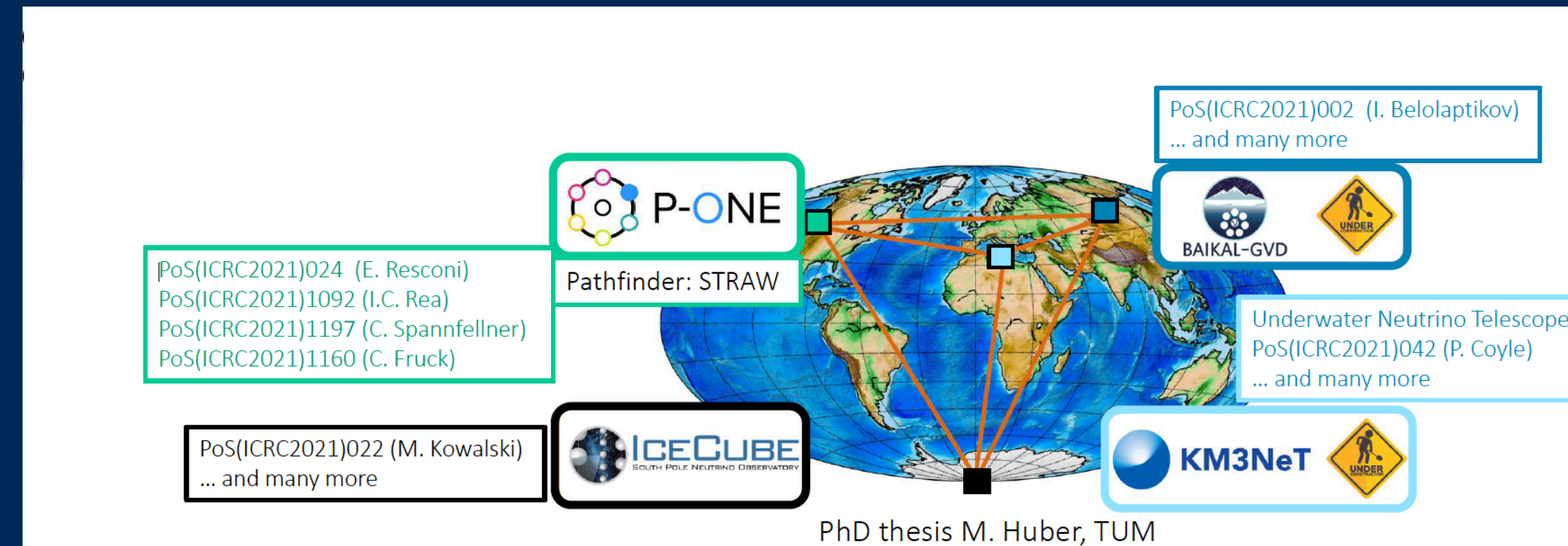
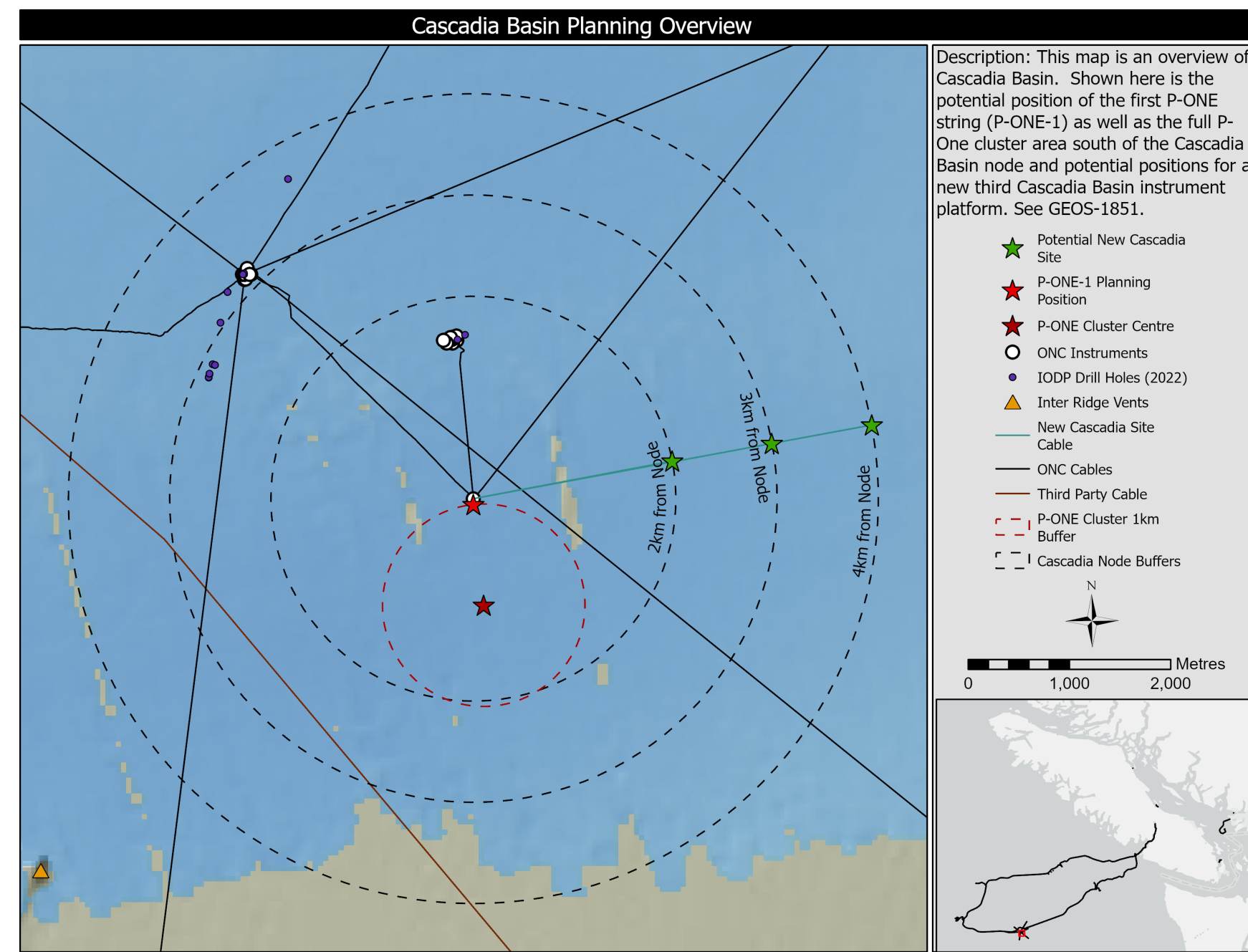
TELESCOPES AND SPACE MISSIONS | NEWS

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, cre the existing IceCube experiment (pictured). (Courtesy: IceCube Collaborator)

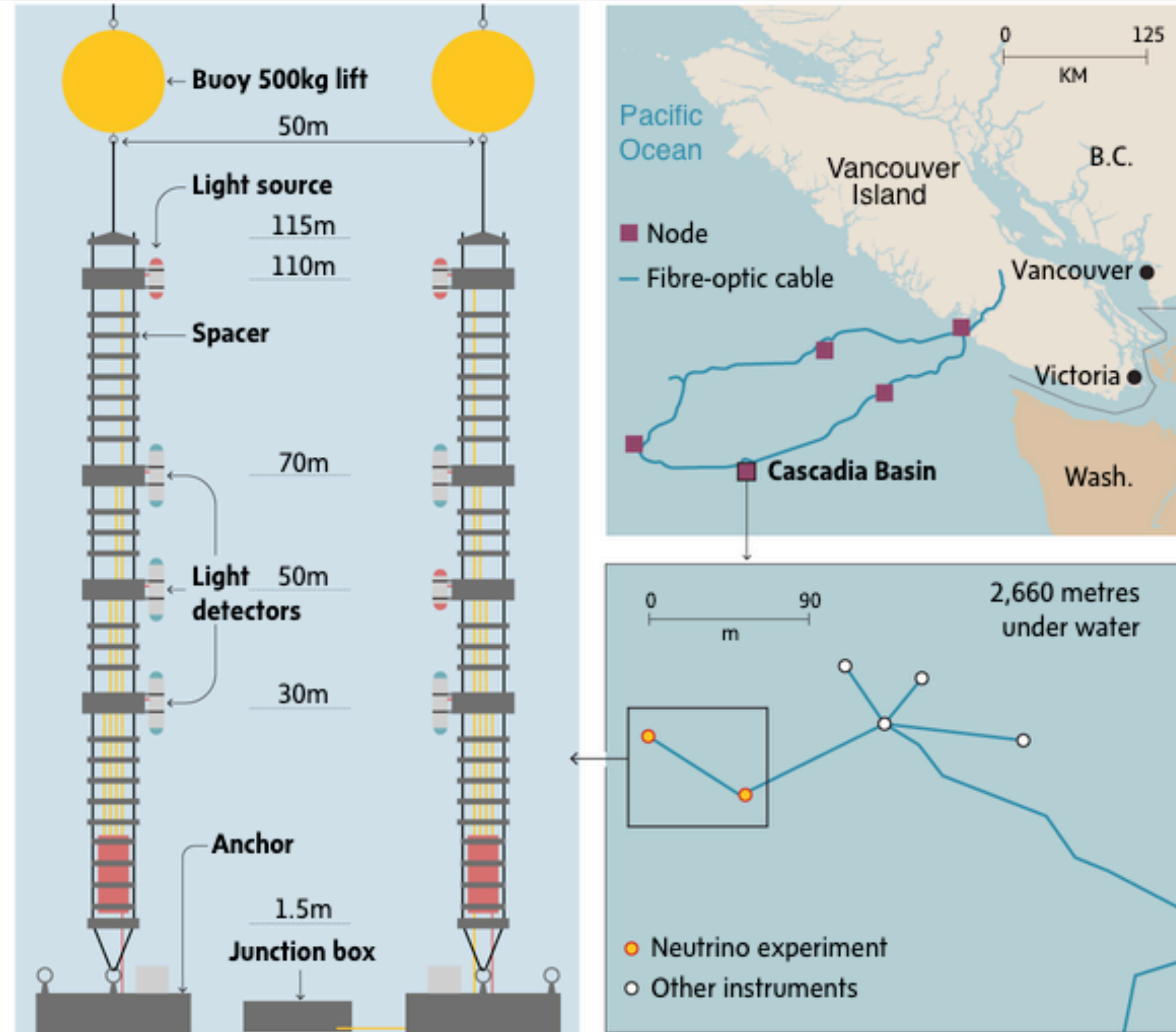


TESTING ONC AND THE SITE

- 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

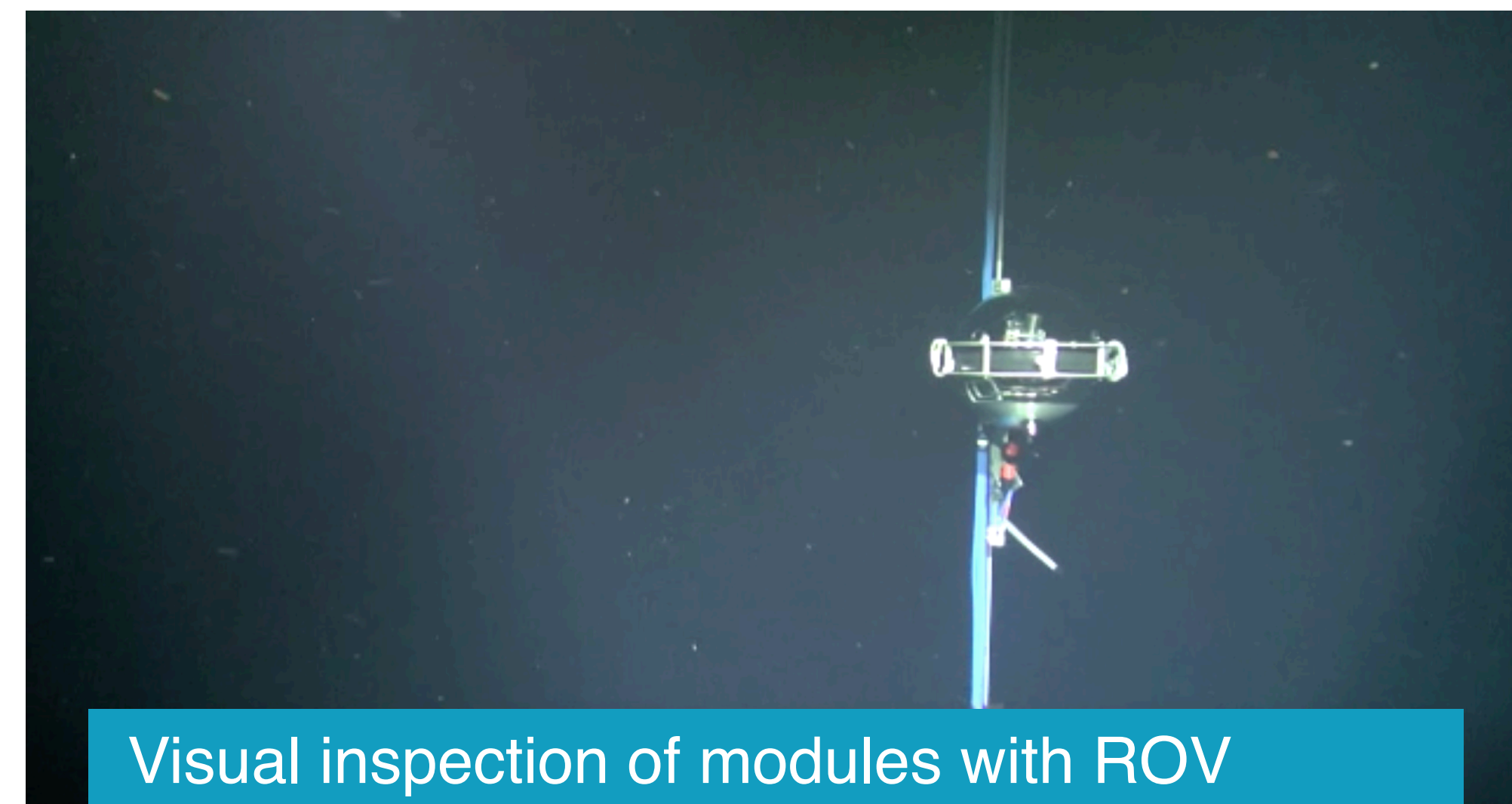
- Building the STRAW experience
- 10 module, 500 m long electrical-optical cable
- Led by Technical University of Munich



Deploying STRAW-b



Modules & Cable ready for deployment

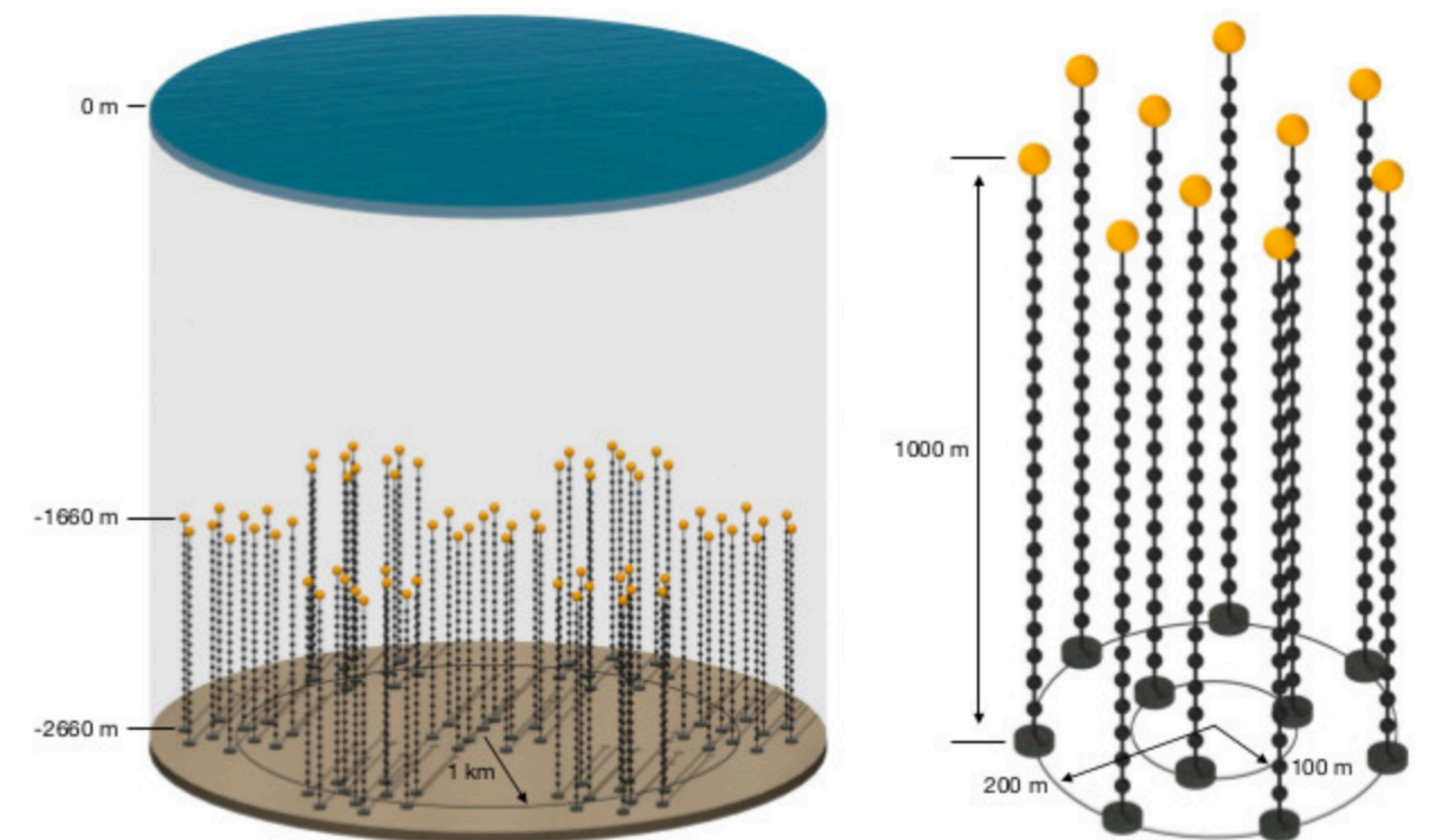


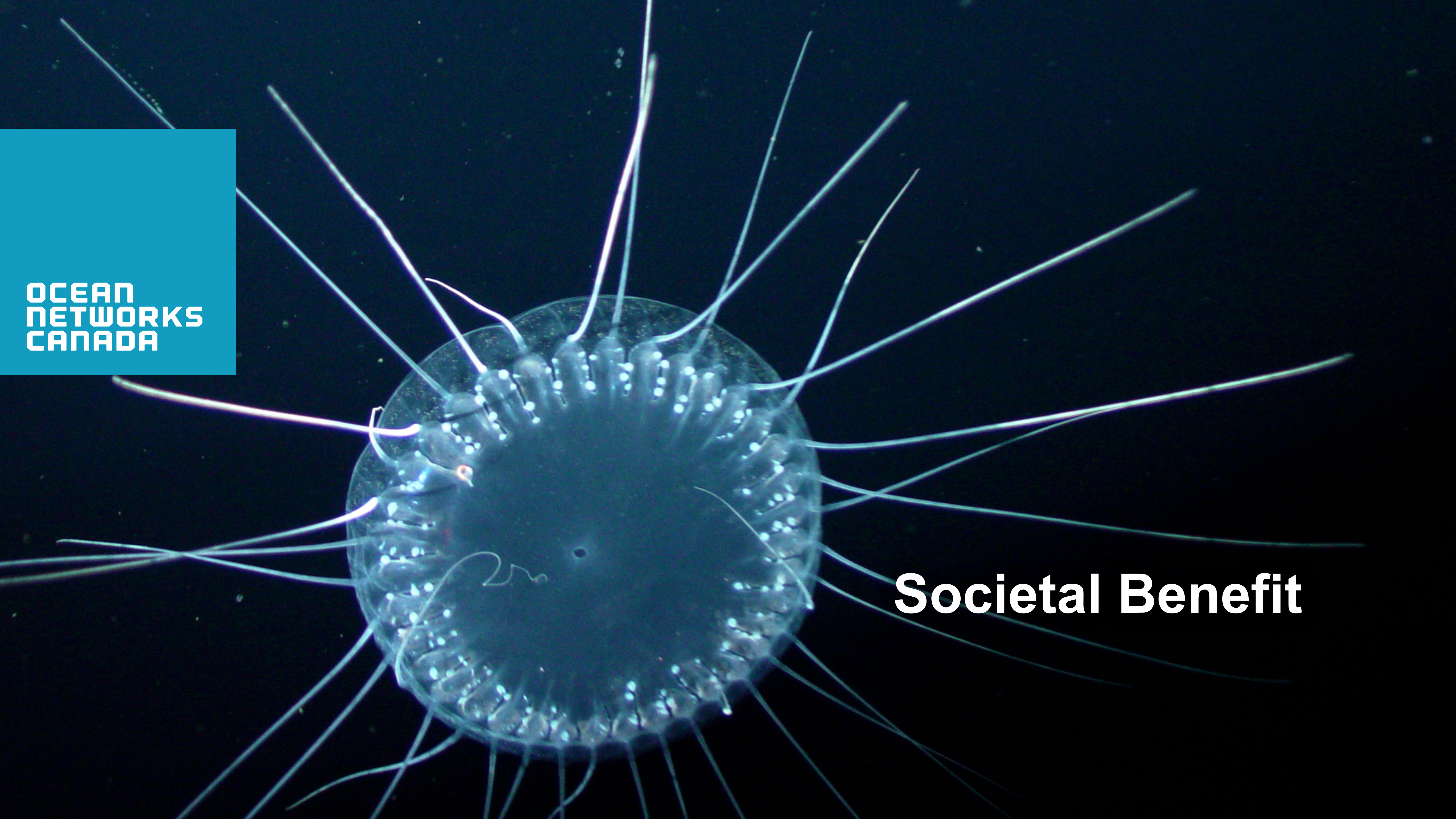
Visual inspection of modules with ROV



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

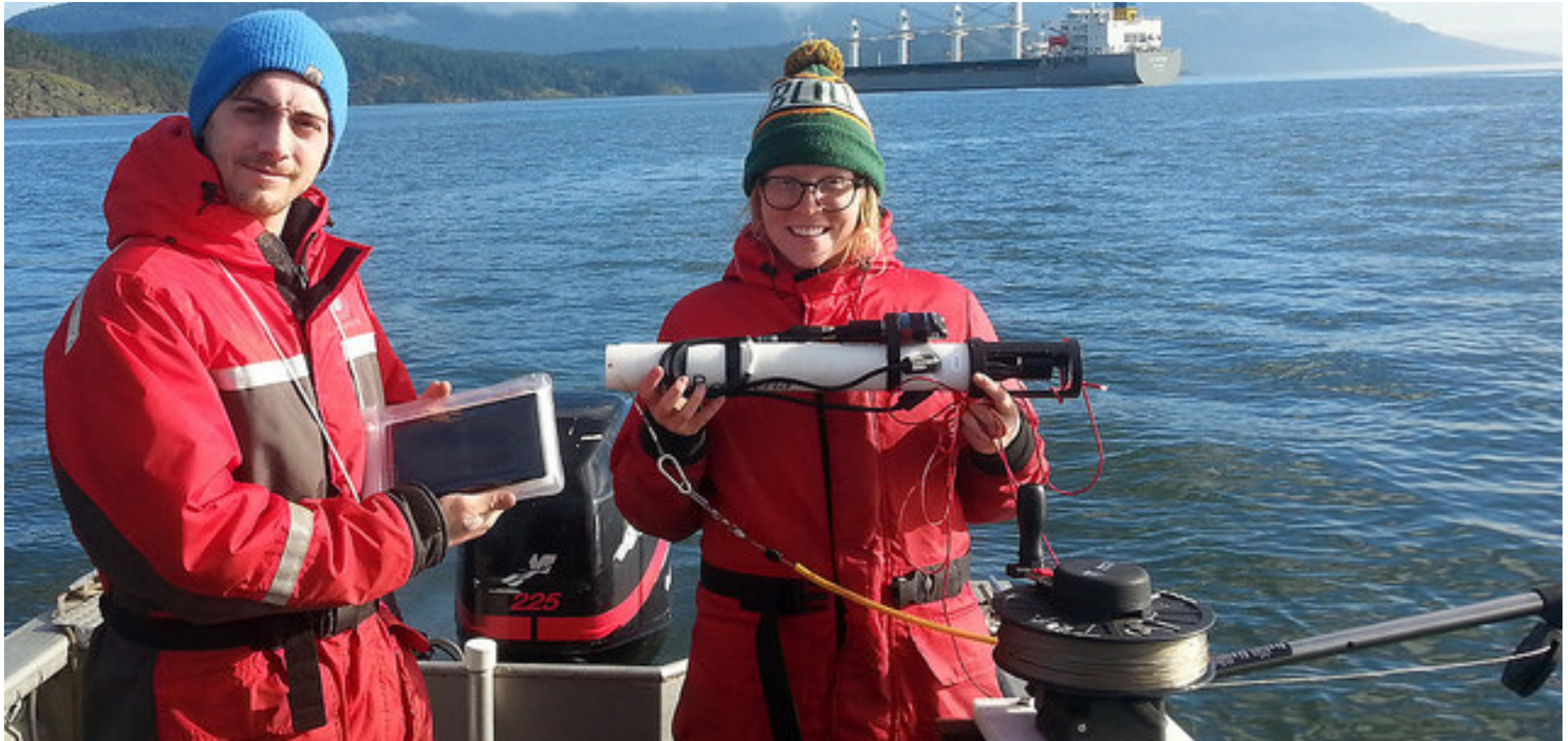


A glowing blue jellyfish with long, thin tentacles is centered in the frame against a dark background. The jellyfish's body is translucent and emits a bright blue light, with its tentacles also glowing. The overall aesthetic is futuristic and high-tech.

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Societal Benefit

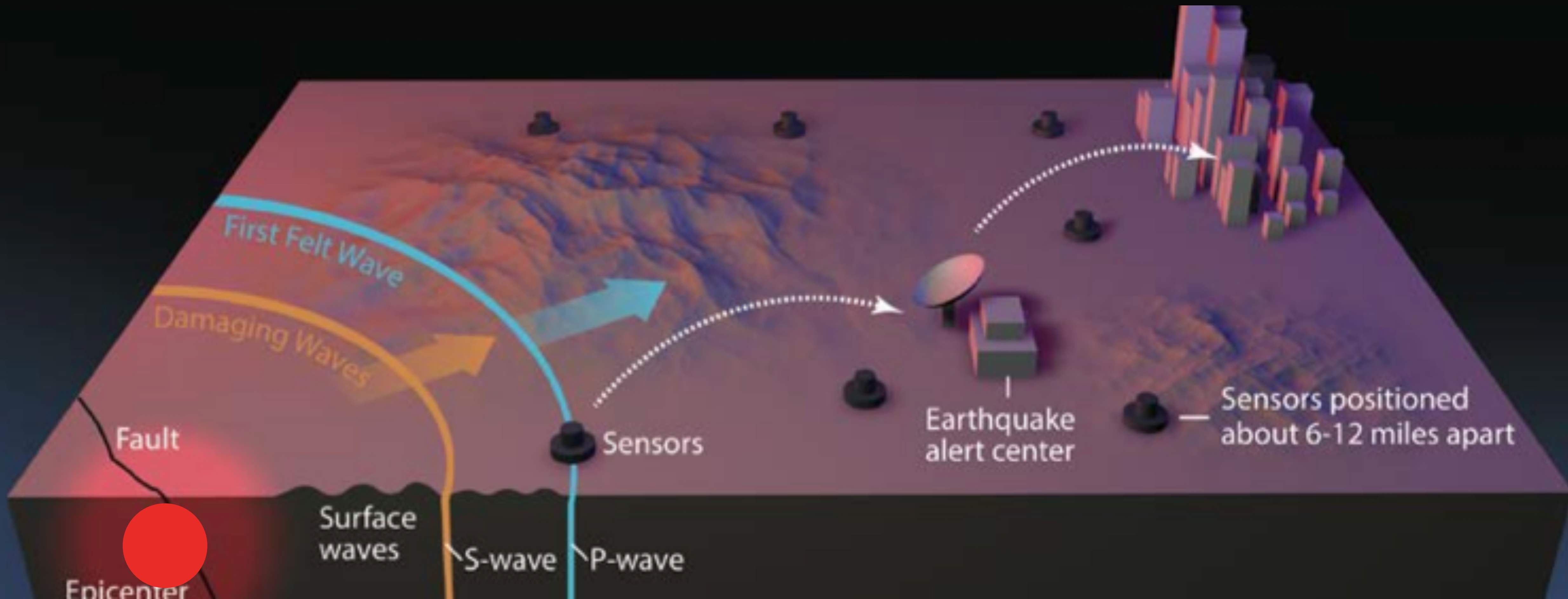
COMMUNITY FISHERS – CITIZEN SCIENCE



SOCIETAL BENEFITS MISSION:

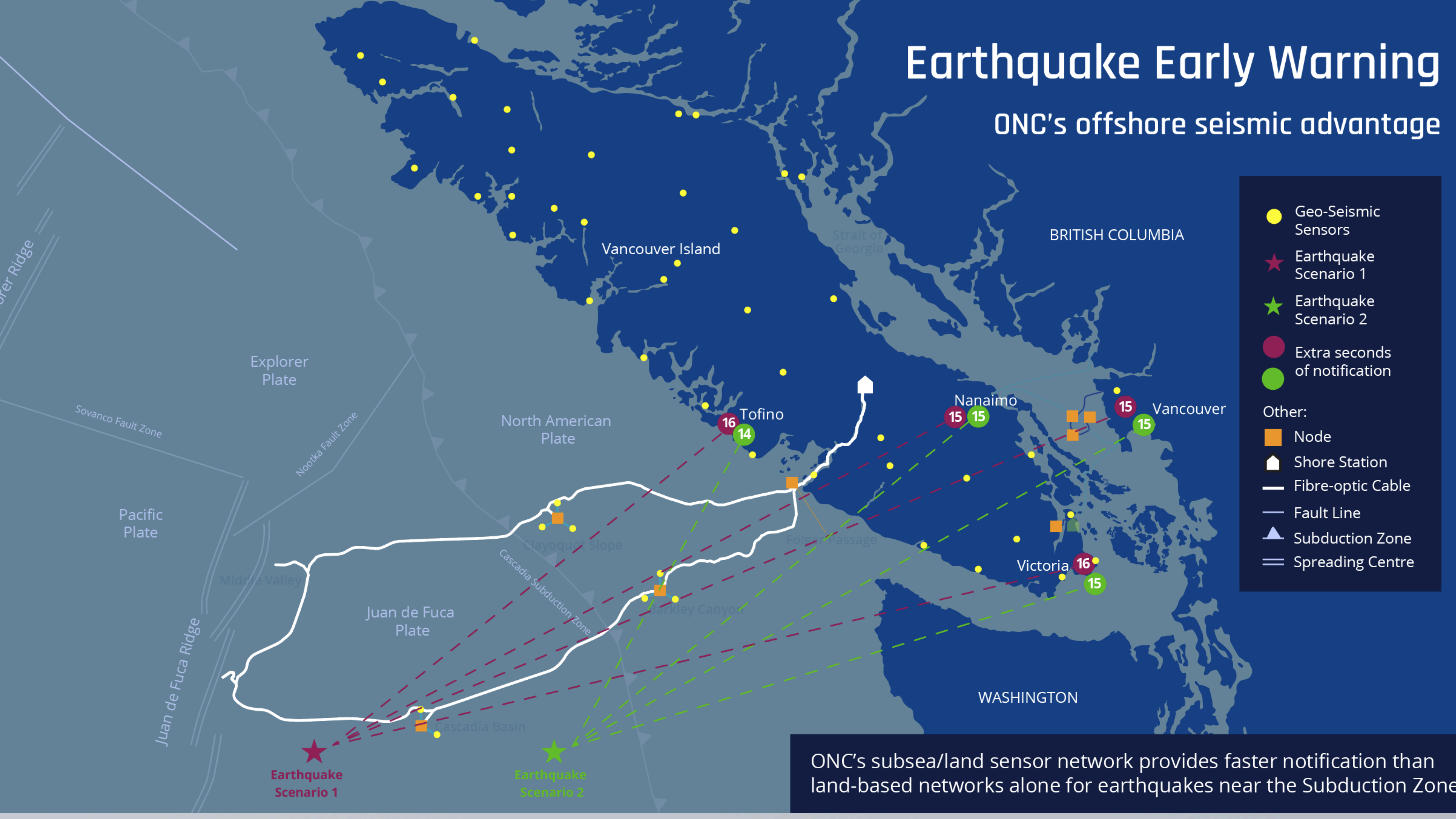
- Providing data products to support decision making for Gov't & Industry*
- Supporting Indigenous Communities by empowering them*

Earthquake Early Warning



Earthquake Early Warning

ONC's offshore seismic advantage



- Geo-Seismic Sensors
- ★ Earthquake Scenario 1
- ★ Earthquake Scenario 2
- Extra seconds of notification
- Other:
 - Node
 - 🏠 Shore Station
 - Fibre-optic Cable
 - Fault Line
 - ▲ Subduction Zone
 - ≡ Spreading Centre

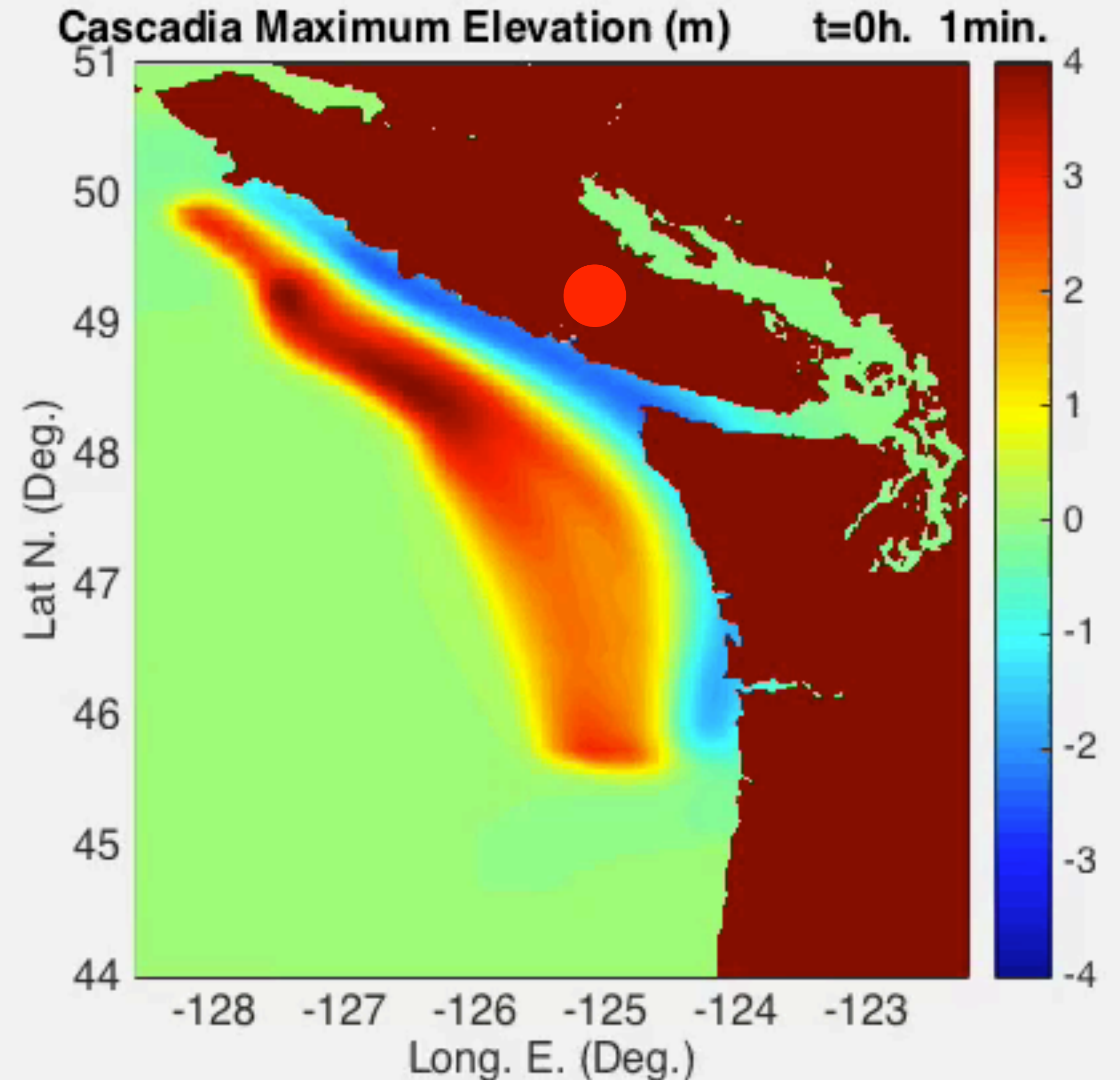
ONC's subsea/land sensor network provides faster notification than land-based networks alone for earthquakes near the Subduction Zone



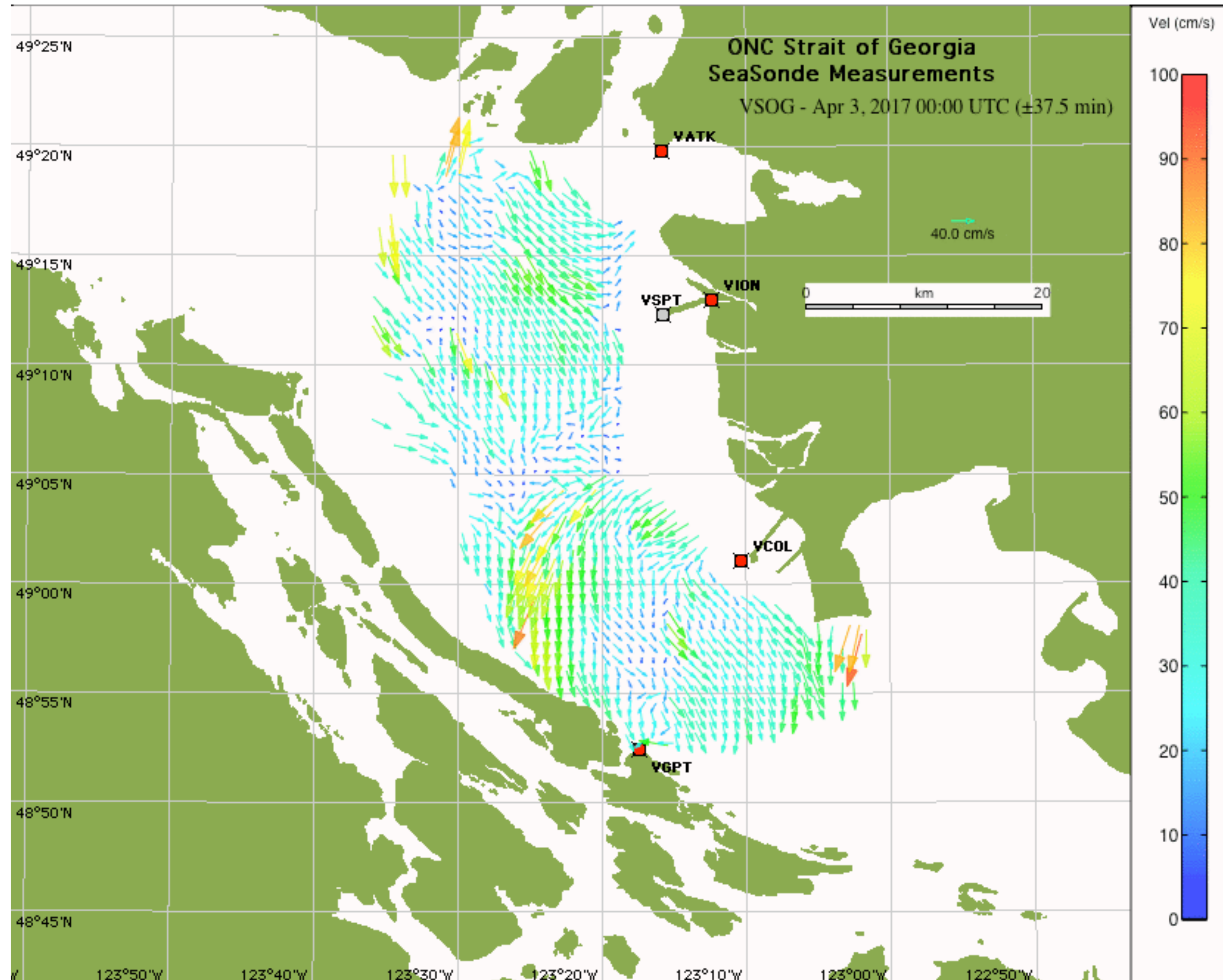
**Accelerometers
installed on
seafloor**

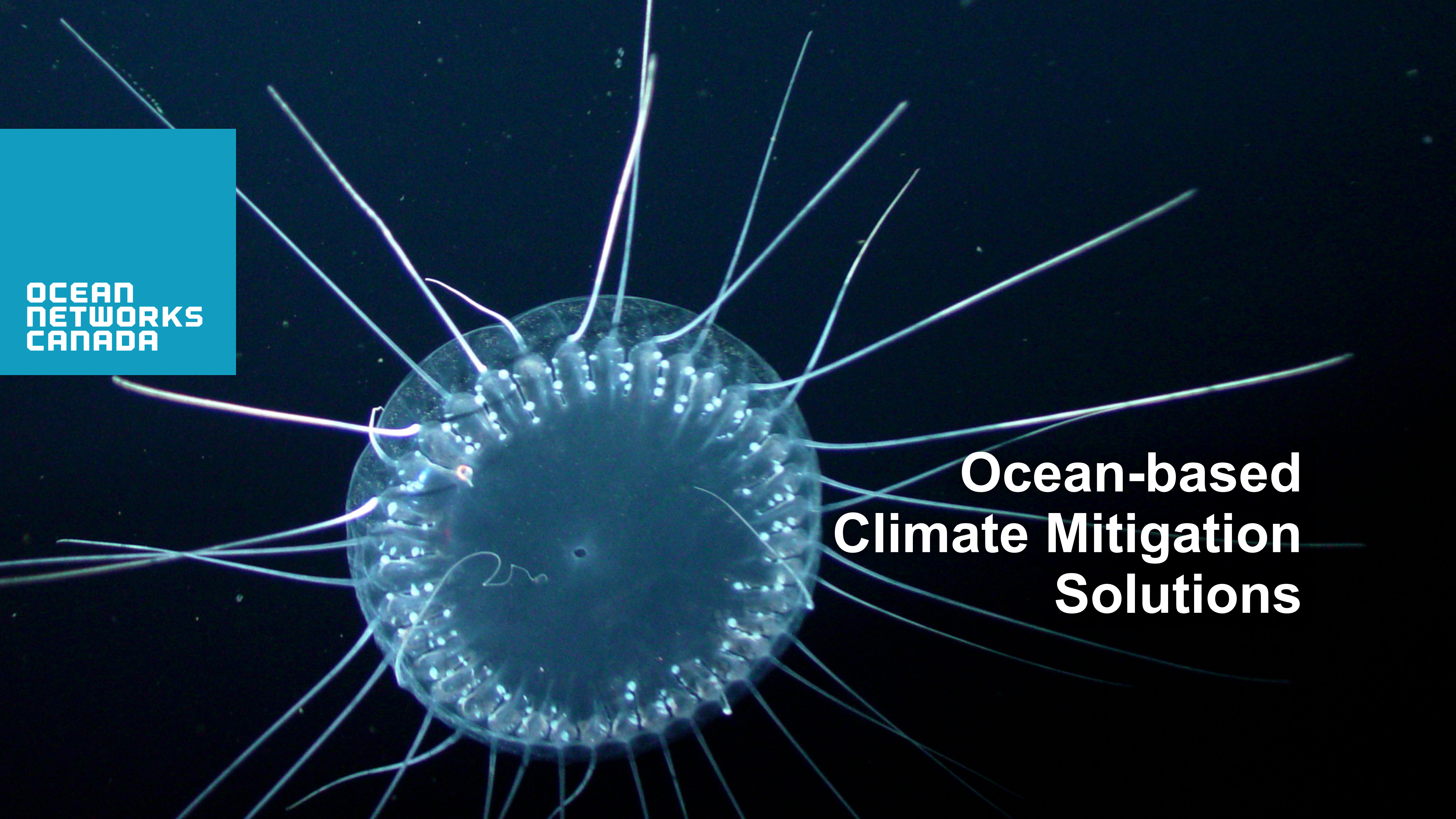
TSUNAMI IMPACT SIMULATION

- 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

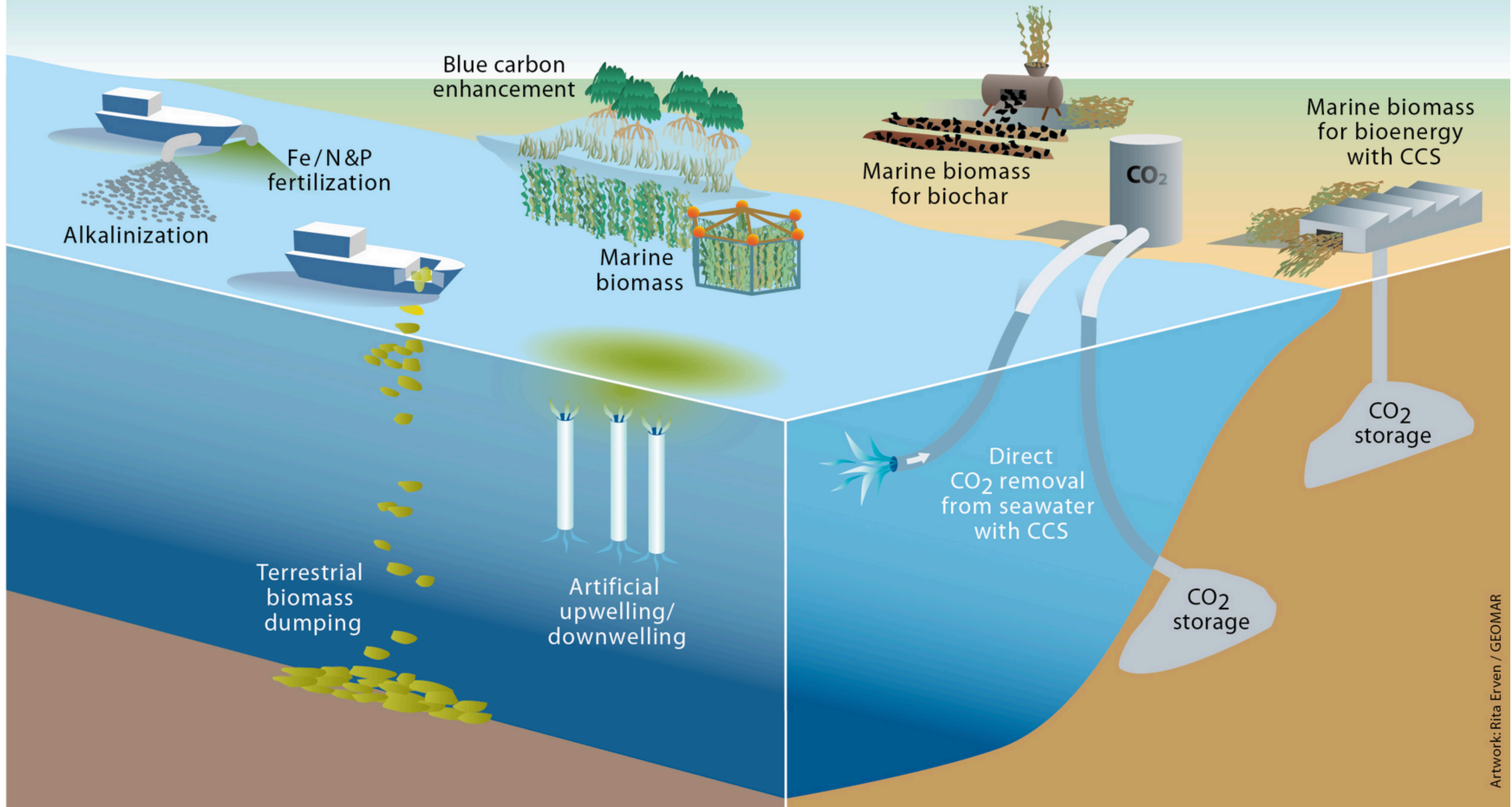


A glowing blue jellyfish with long, thin tentacles is centered in the frame against a dark background. The jellyfish's body is translucent and emits a bright blue light, with its tentacles also glowing. The overall aesthetic is futuristic and scientific.

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Ocean-based Climate Mitigation Solutions

Ocean-based Negative Emission Technologies

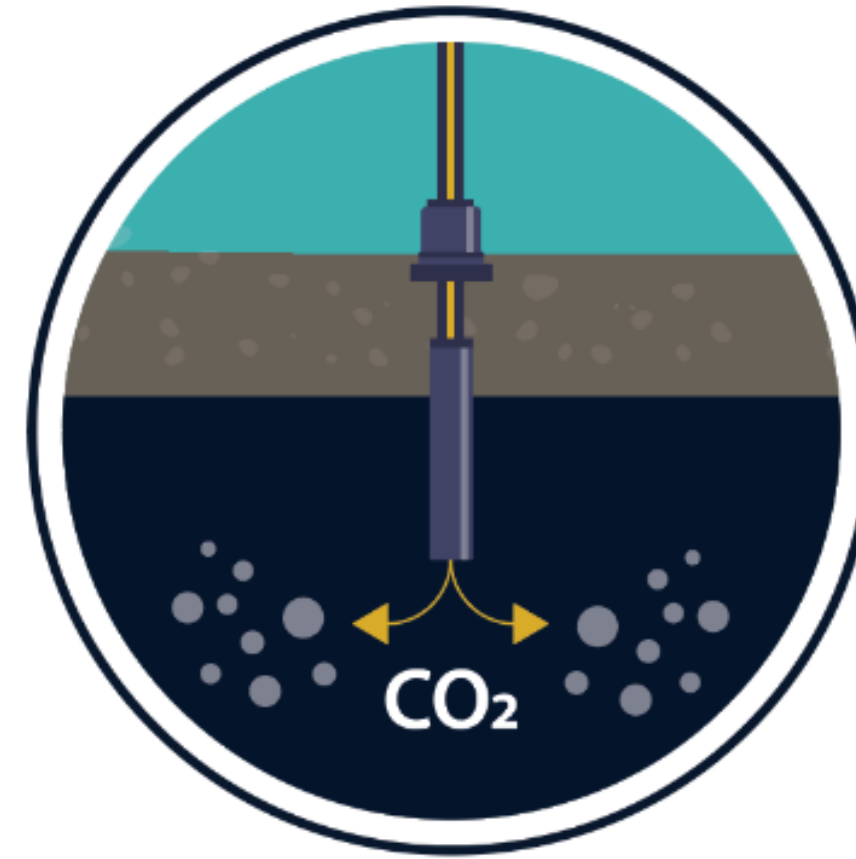


SOLID CARBON

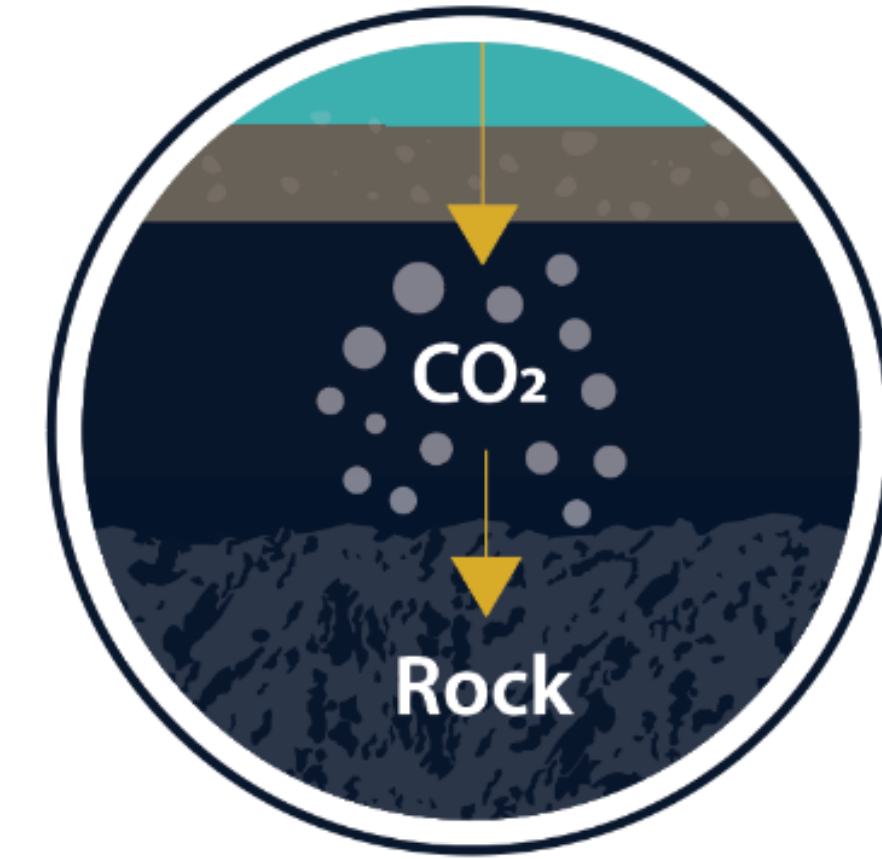
The Solid Carbon Solution



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