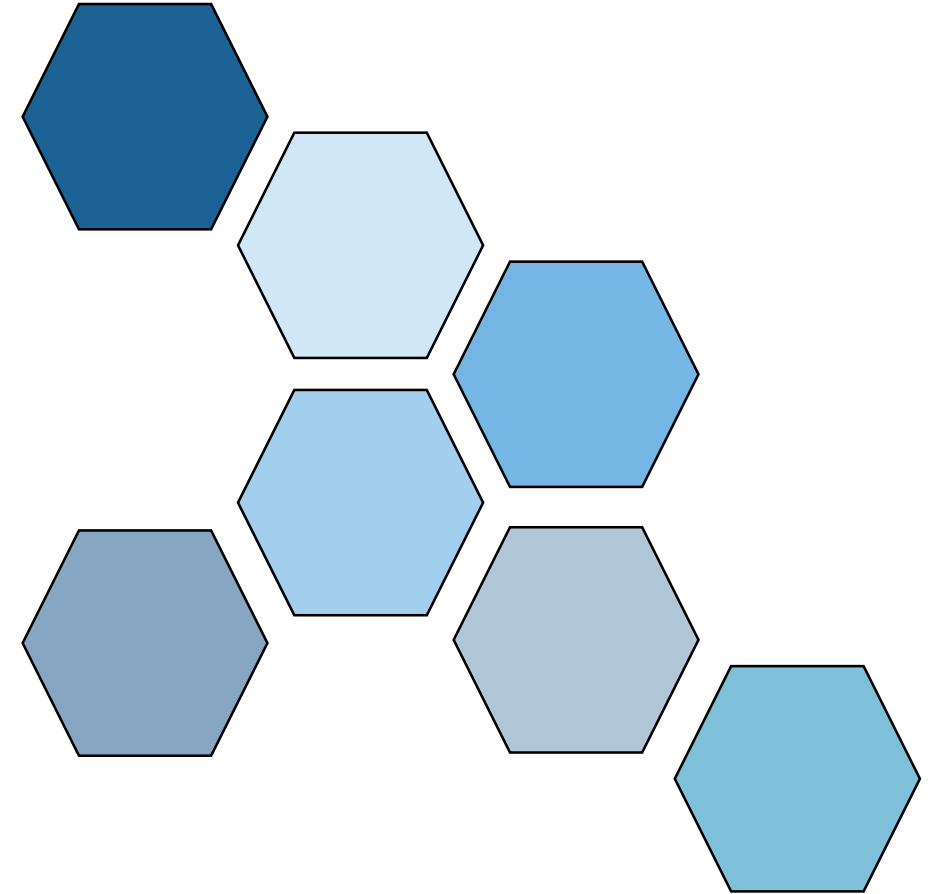


# P-ONE Virtual Meeting

## **STRAW-b** deployment/mechanics lessons learned

M. Böhmer, C. Fink, C. Fruck, R. Gernhäuser, A. Gärtner, C. Haack, F. Henningsen, K. Holzapfel, Na. Khera, Ni. Khera, K. Leismüller, L. Papp, I.C. Rea, E. Resconi, C. Spannfellner, M. Traxler, J. Michel, L. Winter, L. Ruohan, C. Bellenghi, D. Vivolo

**TUM – Experimental Physics with Cosmic Particles**



# STRAW-b – 2nd P-ONE pathfinder

## Timeline of deployment:

**26/09** – Last module check (connection and p/T/H good)

**27/09** – Deployment

**01/10** – Dive for inspection and connection

## Pictures/Video available at:

Deployment video: <https://drive.google.com/drive/folders/1Le9GOW4JN7sDwViPvc82T9hcuQVSfT9p?usp=sharing>

Deployment pictures: <https://drive.google.com/drive/folders/1apyrWeZ6DQNUVKn6Ooe1Cg2ZvIvKivNI?usp=sharing>

Dive video: <https://data.oceannetworks.ca/SeaTube> (dive OY062)

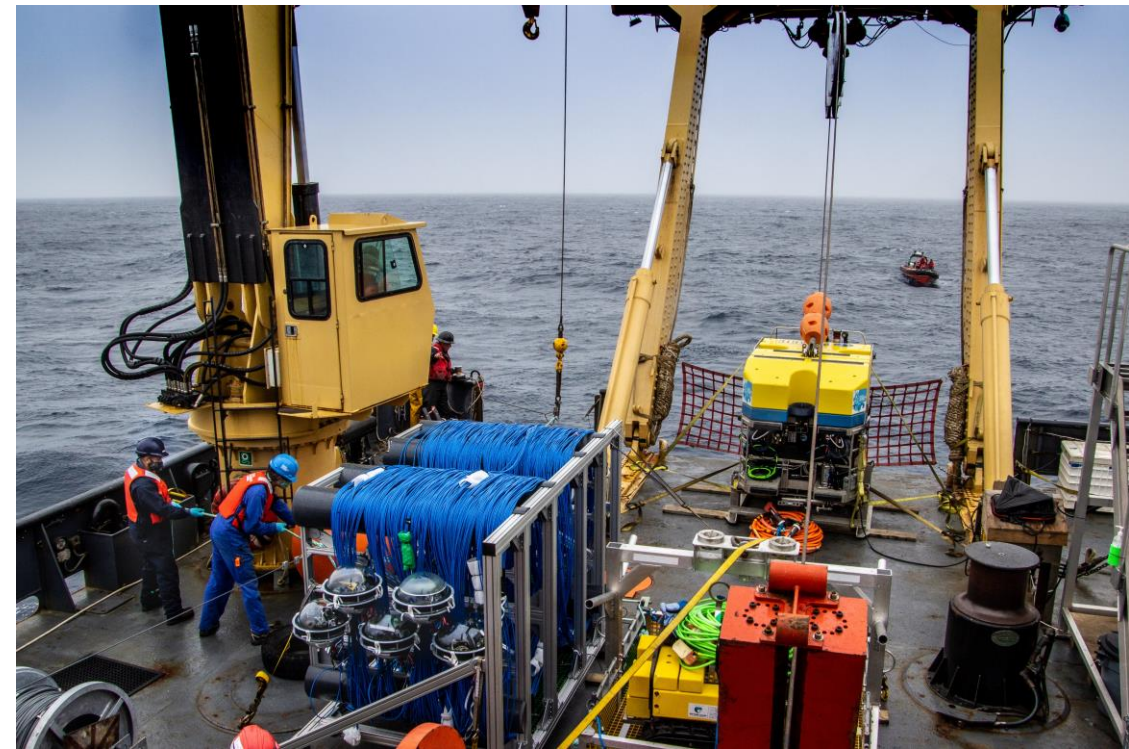
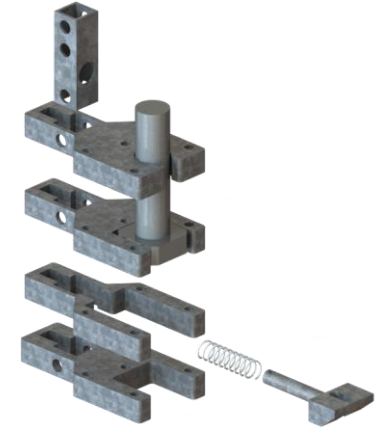
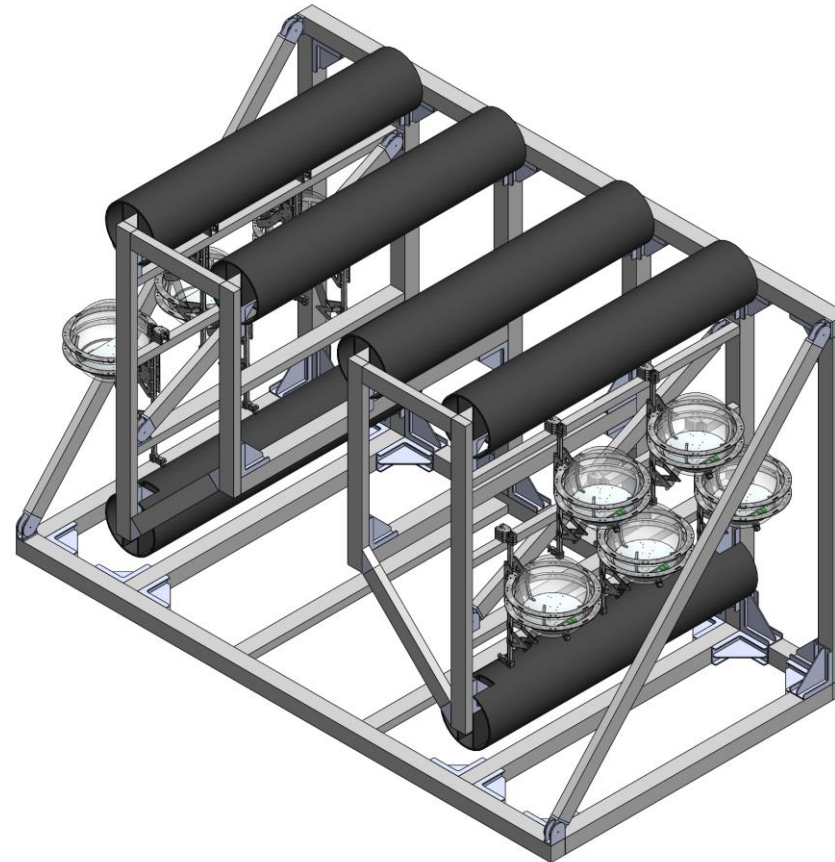


Image: Ocean Networks Canada

# STRAW-b – deployment recap

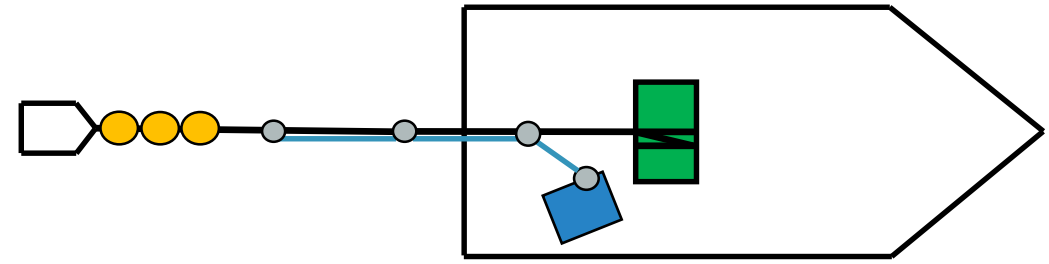
- **Instrument tray**
  - Built from aluminum profiles (weight: 1 200kg (equipped))
  - 5 modules can be stored on each side
  - Communication cable (VEOC) is spooled in an eight
- **Module mechanics**
  - Protection of glass sphere via EPDM rubber layer
  - Click-in mechanism to merge with ferrules on wire rope



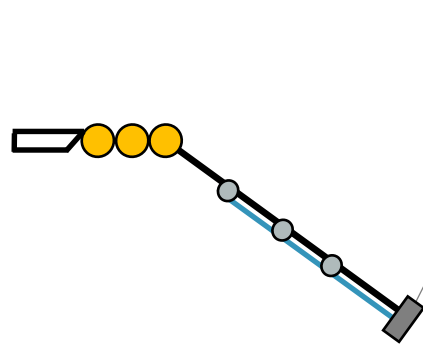
# STRAW-b – deployment recap

- Buoy first deployment for risk mitigation
- Separated components – merged on ship

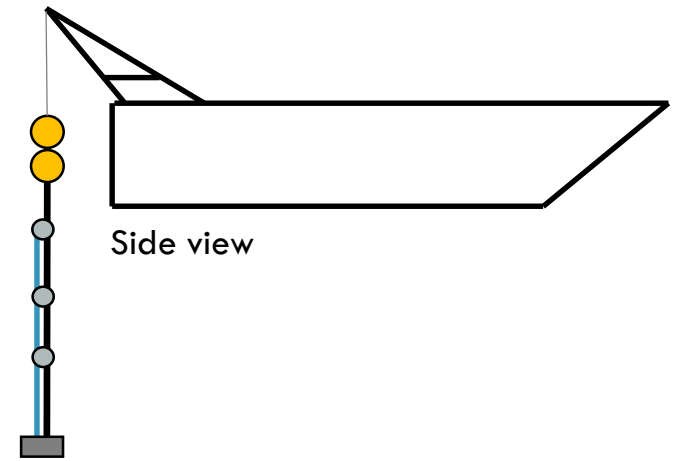
- 1) Mooring line is stretched on sea surface
- 2) Anchor lowered in controlled way (acoustic release) - bring mooring in upright position
- 3) Load transfer to buoy (release of add. float)
- 4) STRAW-b is lowered to seabed with controlled speed (0.3m/s)



Top view



Side view



Side view

# Deployment and mechanics issues



# Deployment/mechanics issues

## 1) Complexity of STRAW-b mooring line

- „Divided“ system added a lot of complexity
- Slack management:
  - Bungee as dynamic strain relief system proved to be difficult to handle
  - Difficult load transfer due to additional wire rope
  - Additional slack spool needed at MJB

## 2) Deployment strategy

- Required a lot of hands-on time on back deck
- Inconsistent staff led to knowledge gaps
- Only skeleton crew available due to Covid-19

## 3) Individual parts – issues

- Dual buoys led to strange oscillations during deployment
- Winch assembly – ferrules got caught on looser wraps (probably due to ship movement)
- VEOC showed length deviations of up to 2m (compared to delivery note)
- Acoustic release prevented by sea state (captains call)



Image: Ocean Networks Canada

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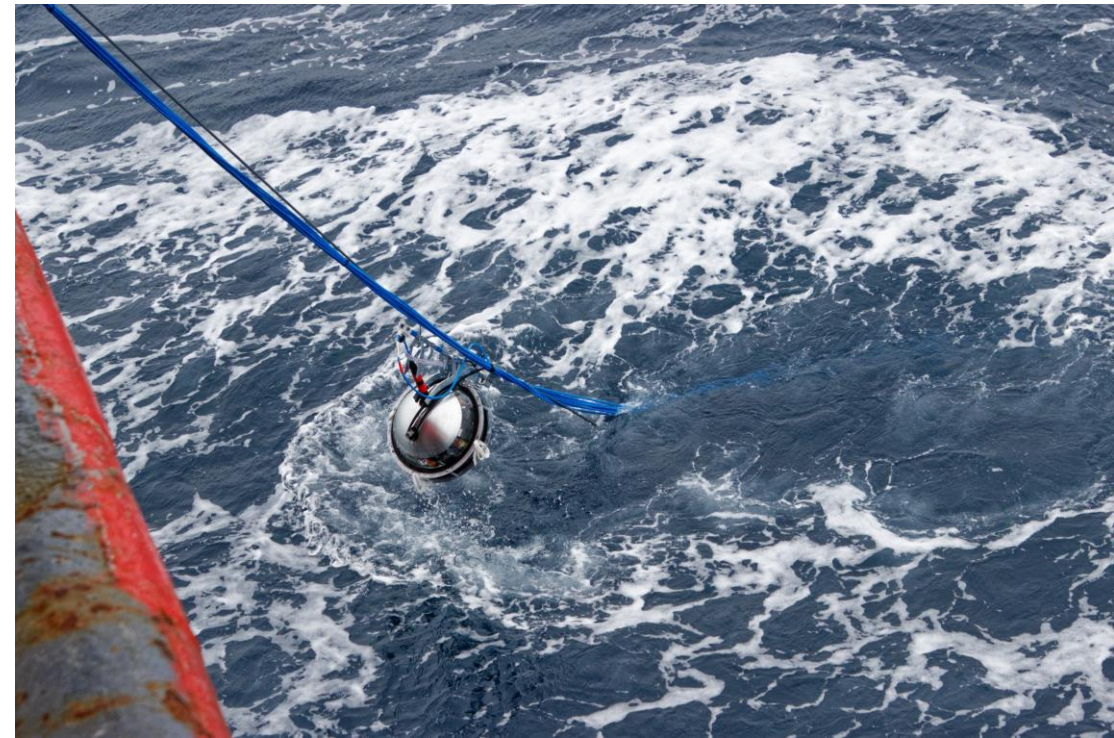


Image: Ocean Networks Canada



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Image: Ocean Networks Canada

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Image: Ocean Networks Canada

# Deployment and mechanics lessons learned

# Deployment/mechanics lessons

## 1) Deployment

- Pursue a less complex system for P-ONE
  - Ease of knowledge transfer and hands-on time during deployment to allow better management of deck activities
- Shipment of an integrated system to MTC
- Close work of TUM and MTC crew from beginning of project
  - Benefit from experience/knowledge on both sides and minimize „design/knowledge gaps“
- Reconfirm environmental criterias (sea state etc.) prior to deployment (weather chart over year)
- Direct communication line to ship

## 2) Administration

- Establish realistic project milestone dates at beginning of project
  - Avoid/tackle project delays
- Mirrored counterparts
  - Clear contact persons, better/direct communication between MTC/TUM
- Continue documenting project infos on wiki
  - Every information in one place
- Further follow bi-weekly calls



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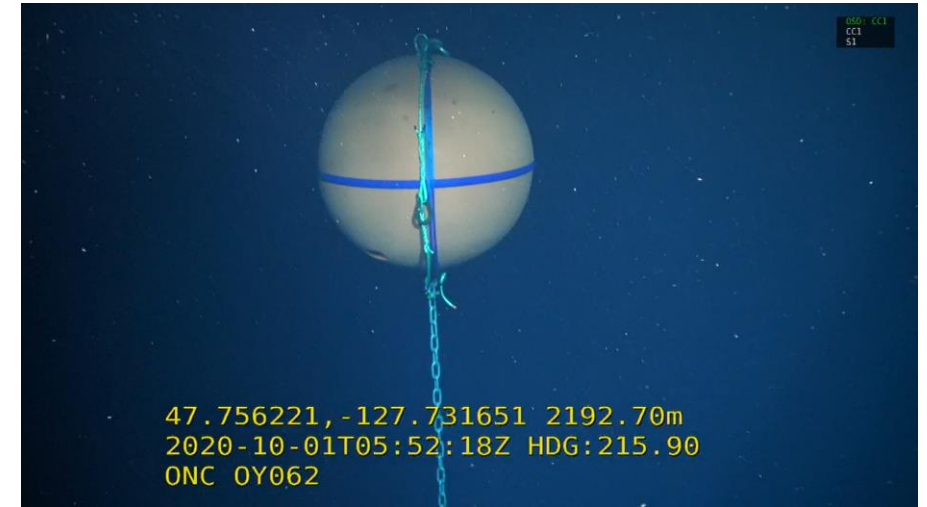
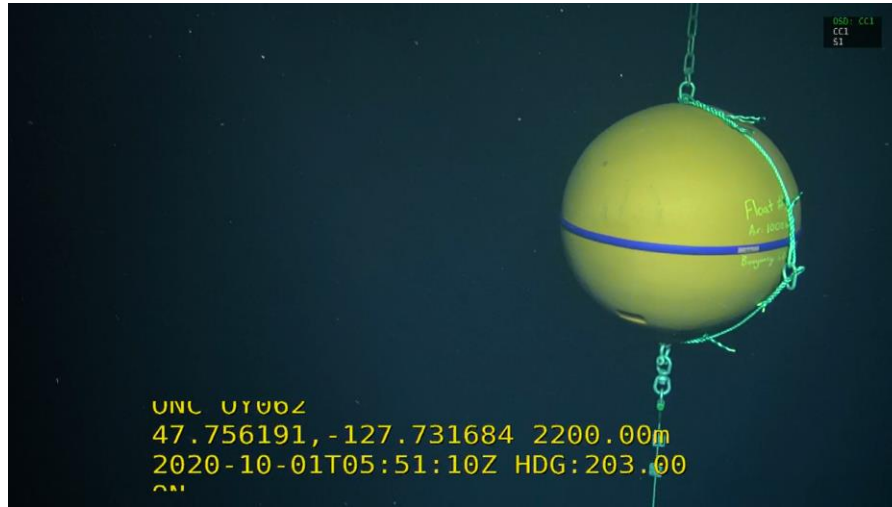
Thank you for the attention!

# Backup



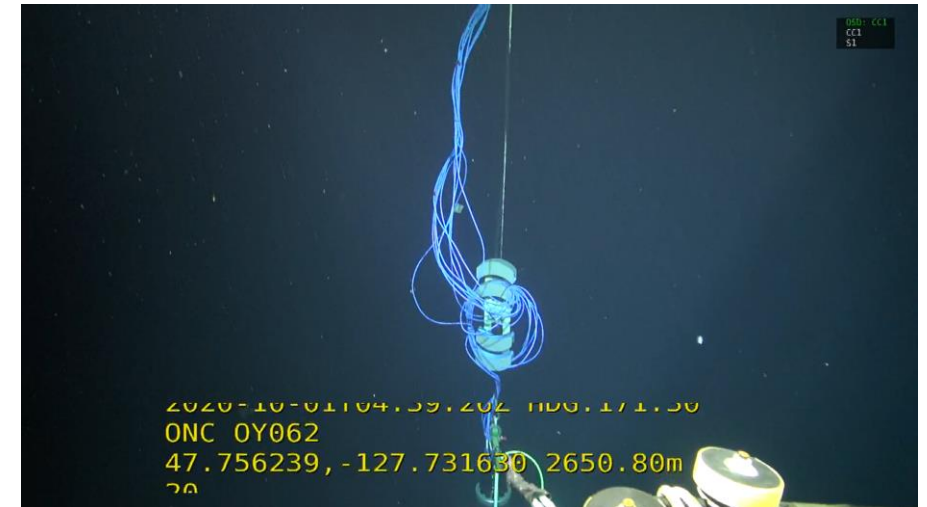
### Floats

Depth: 2192m; 2200m



### Mini Junction Box (MJB)

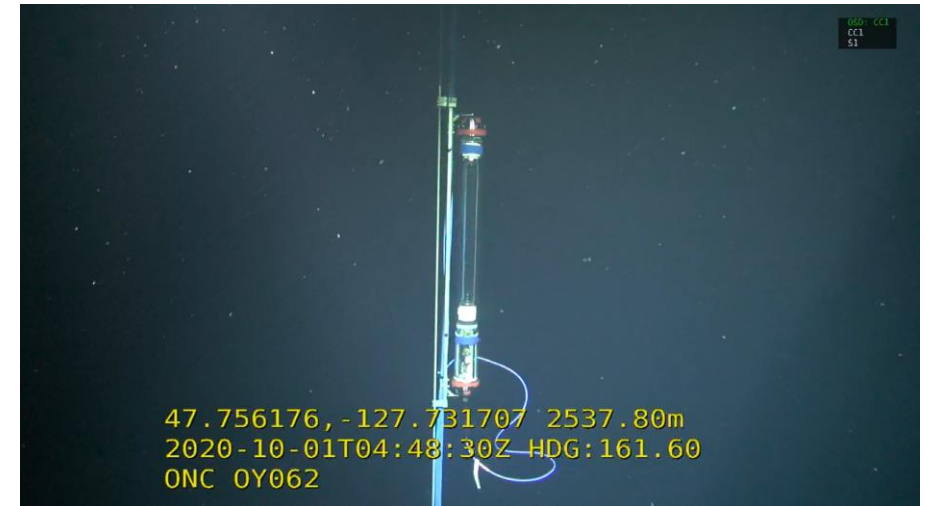
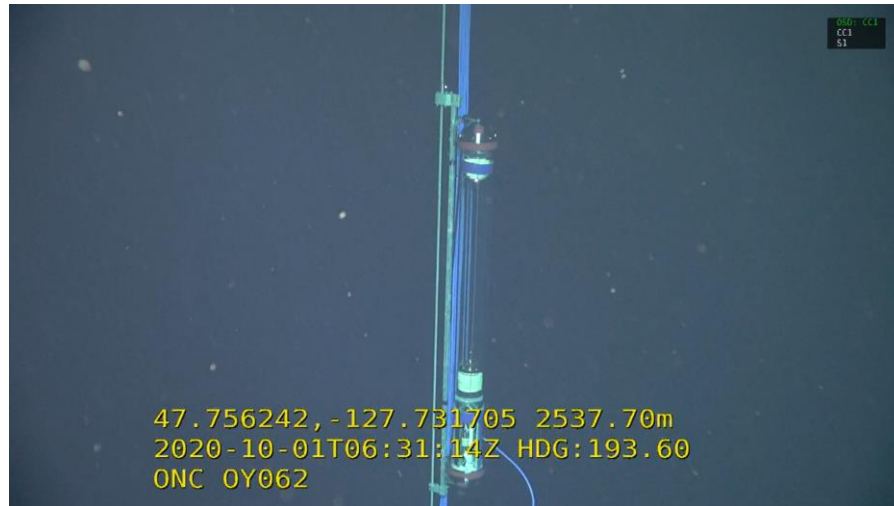
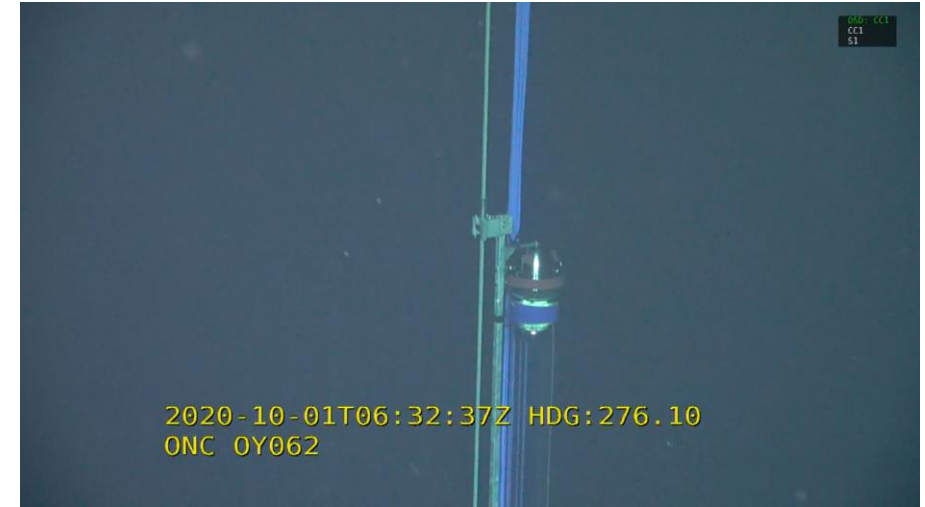
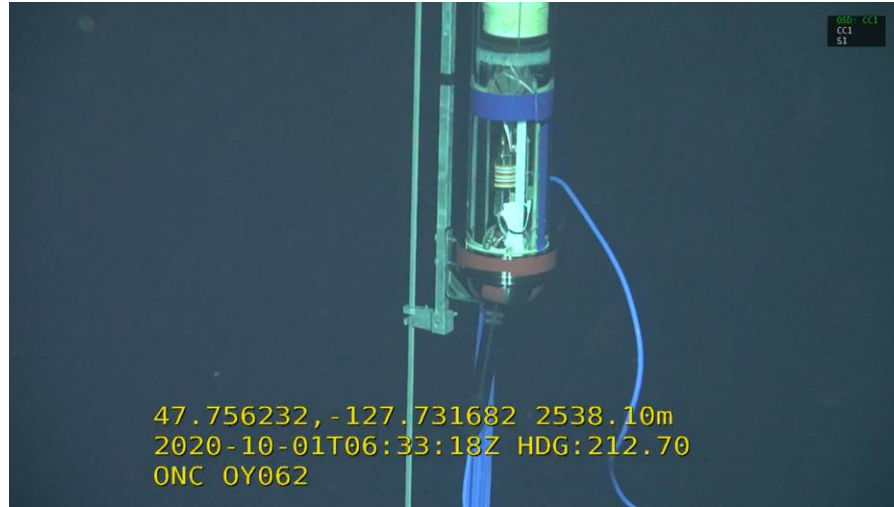
Depth: 2656m



## WOM

ONC IP: 10.136.117.169

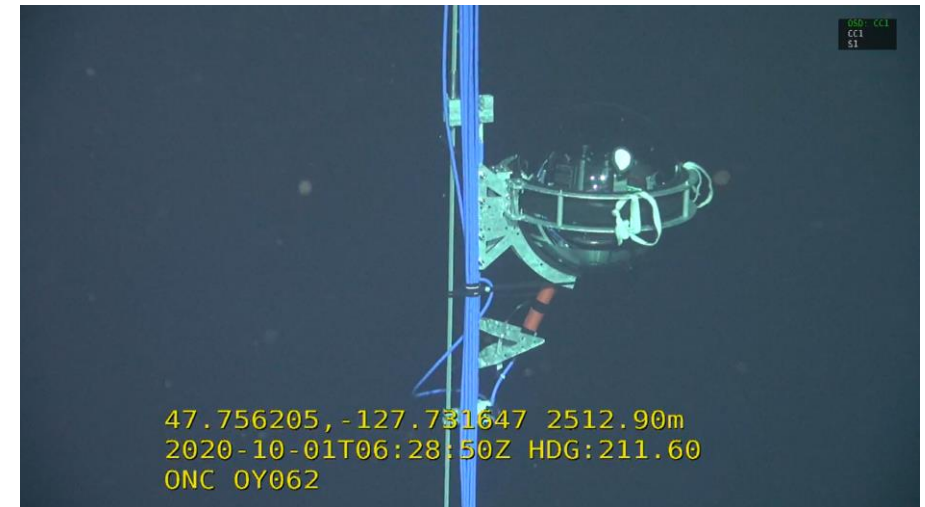
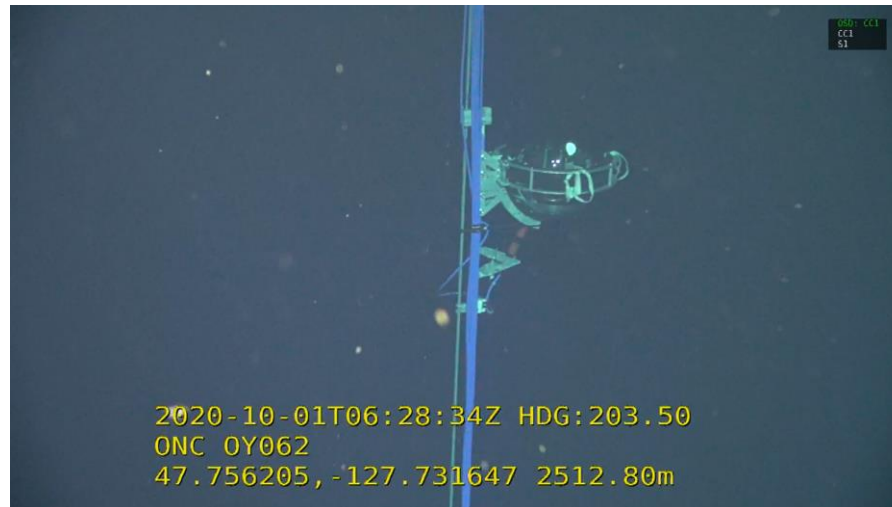
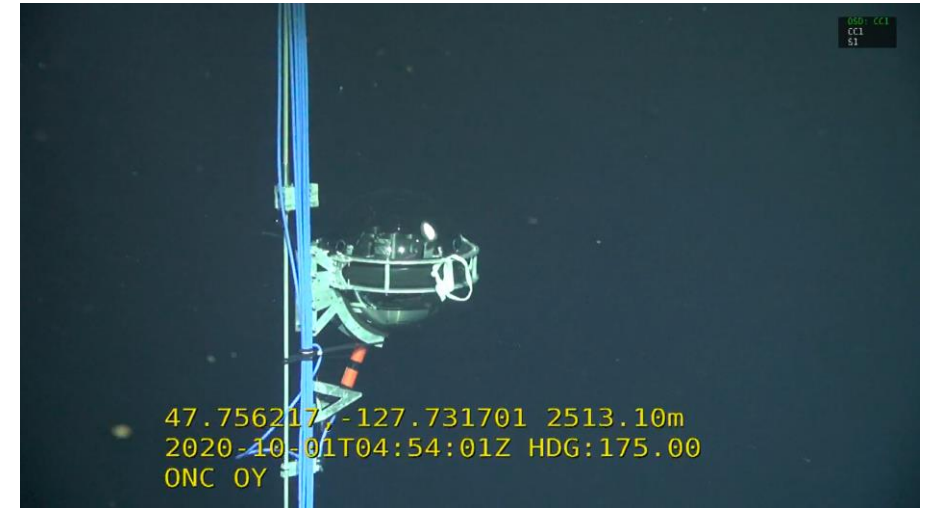
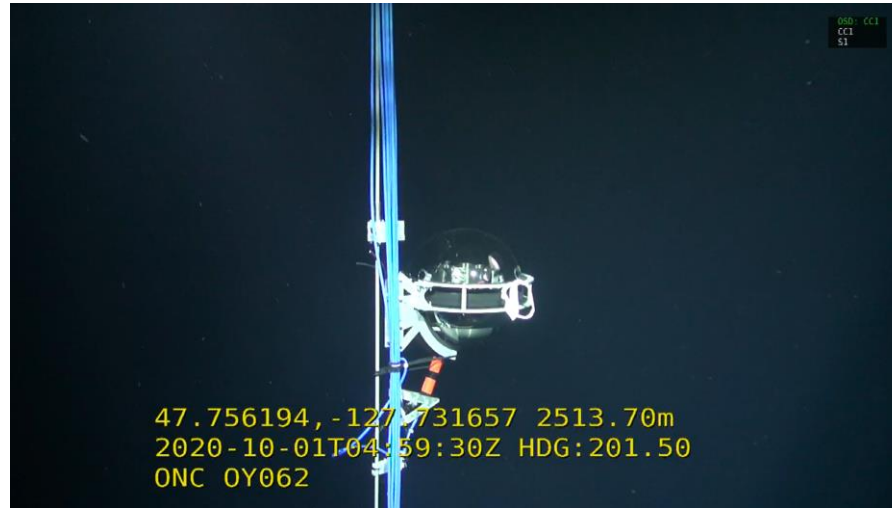
Depth: **2536m** (120m VEOC)



## PMT spectrometer 1

ONC IP: 10.136.117.168

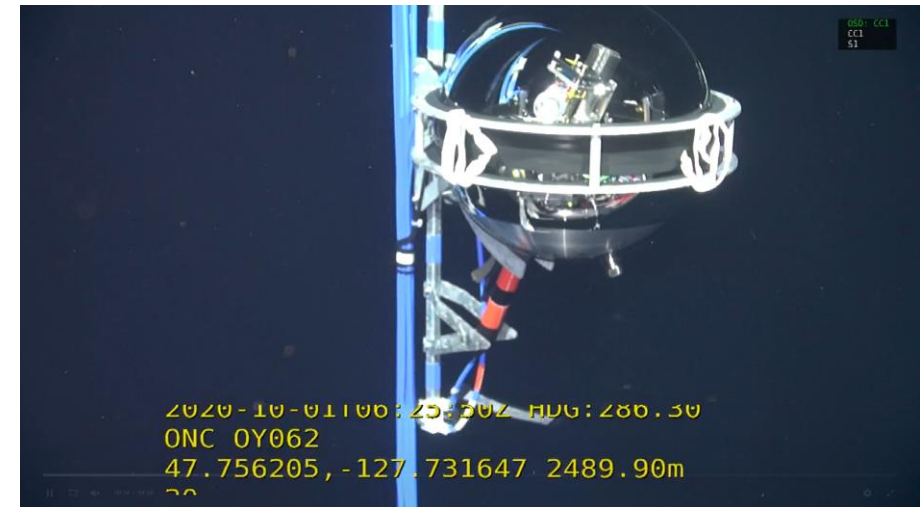
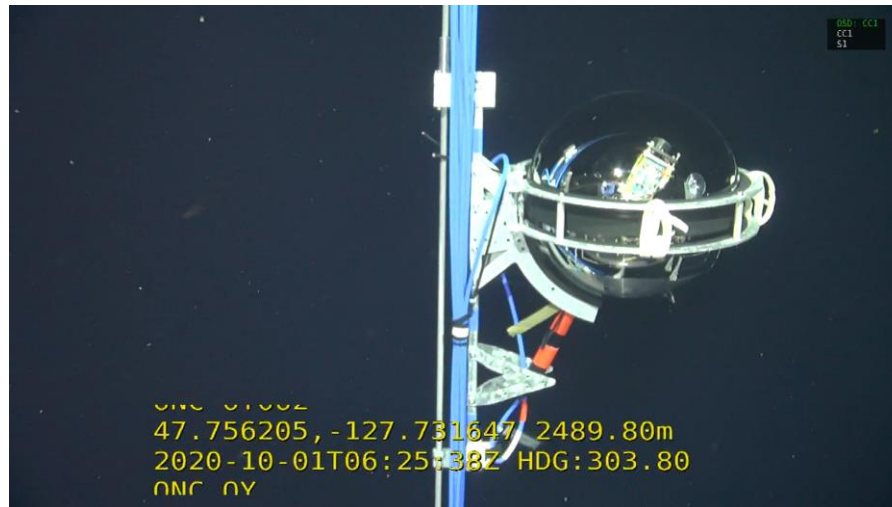
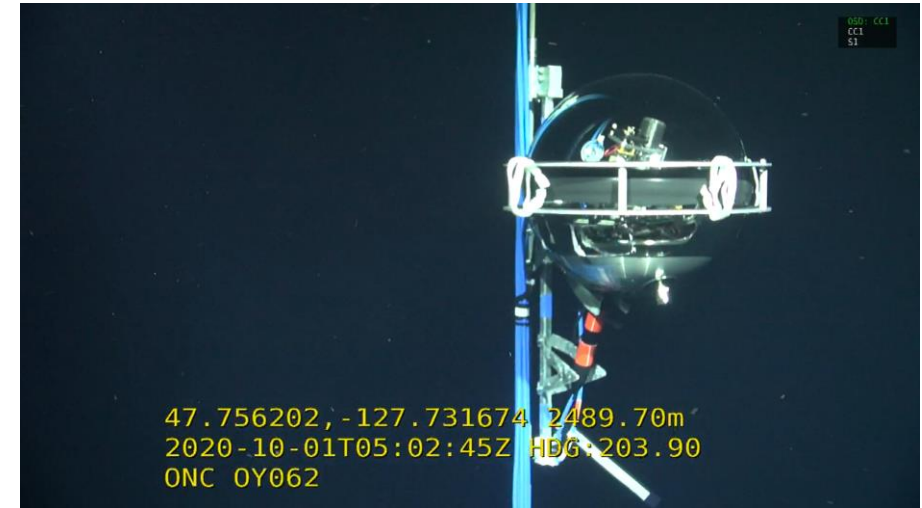
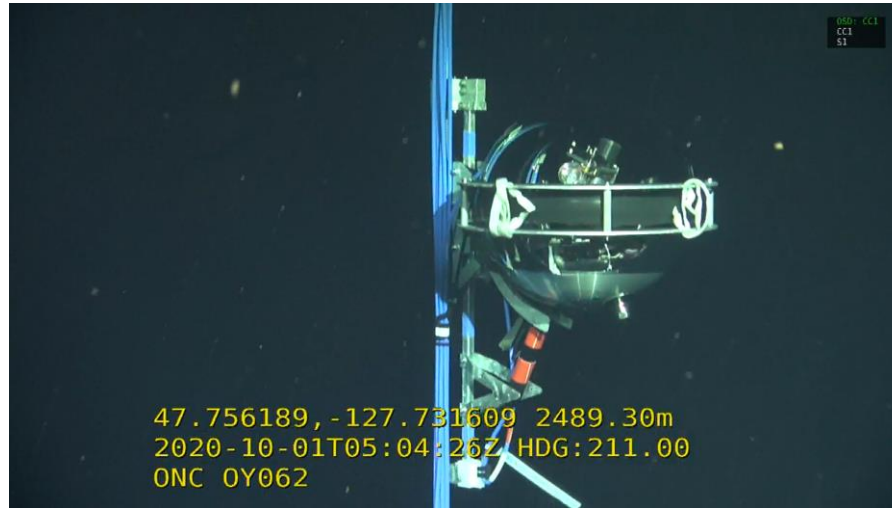
Depth: **2512m** (144m VEOC)



# LiDAR 1

ONC IP: 10.136.117.167

Depth: **2489m** (168m VEOC)

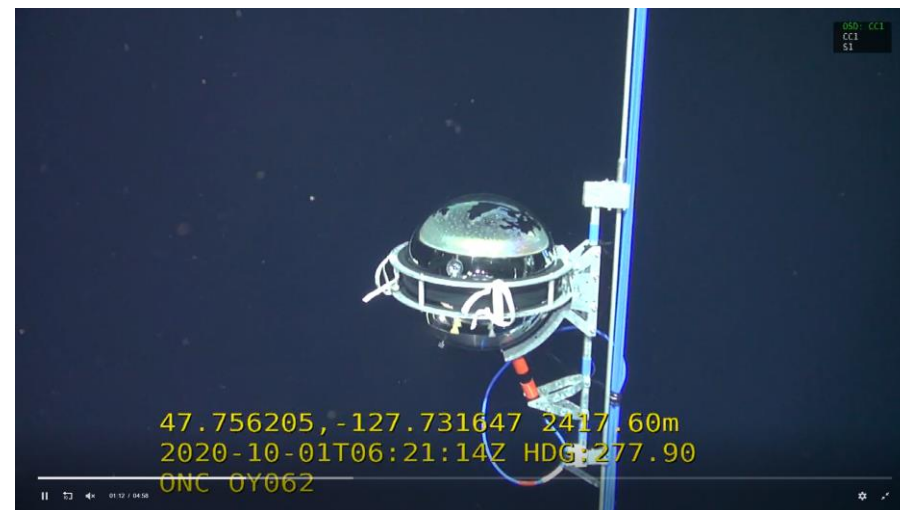
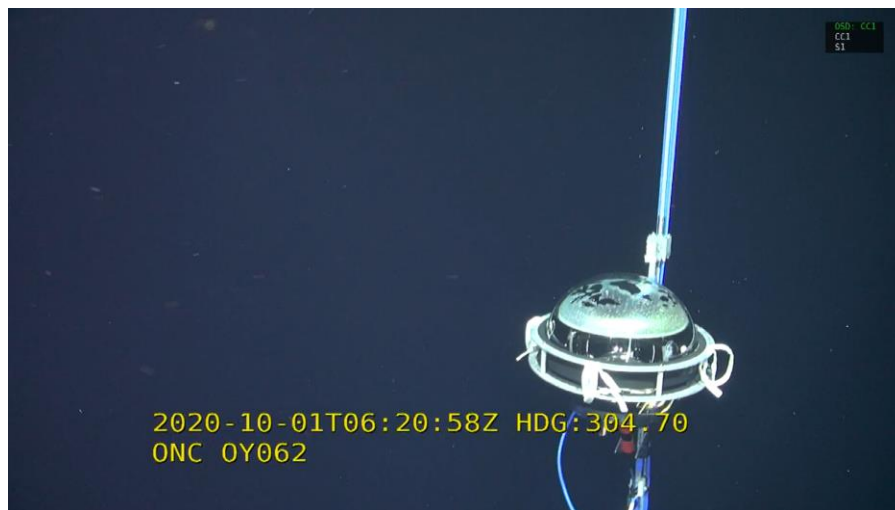
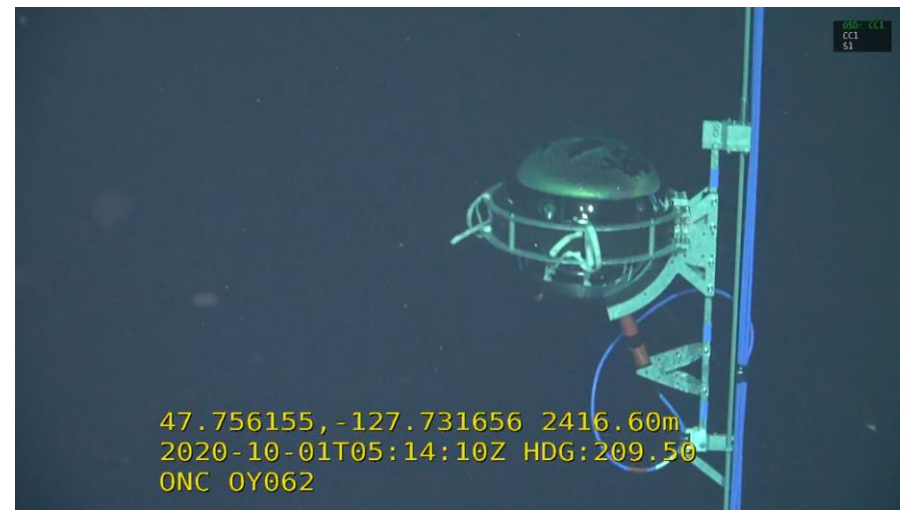
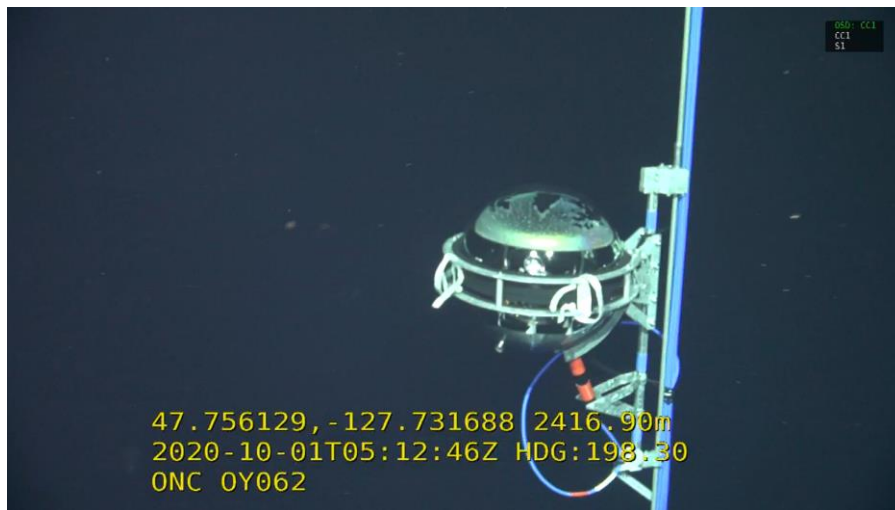




## Standard module 1

ONC IP: 10.136.117.166

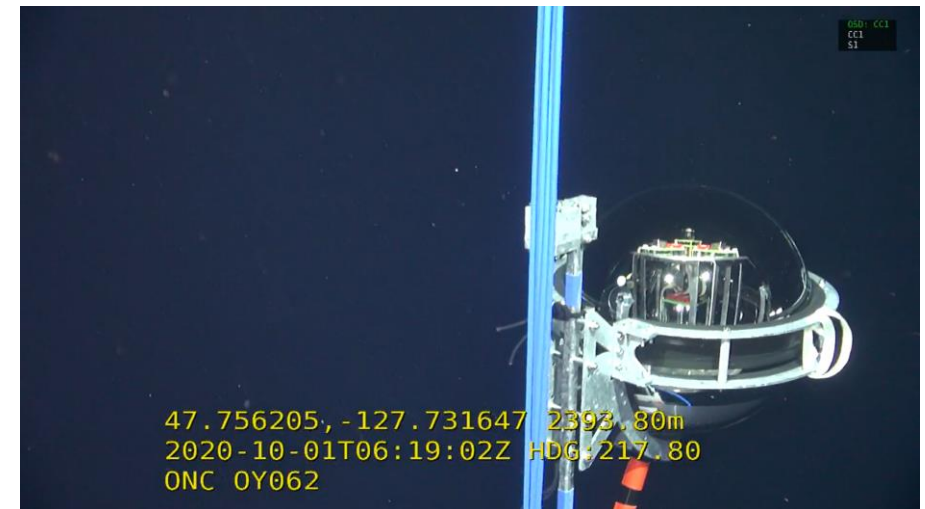
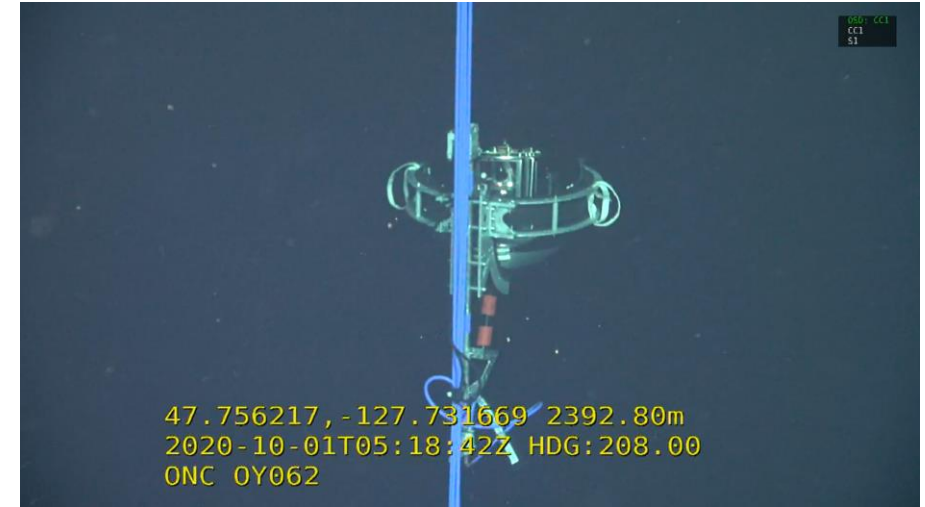
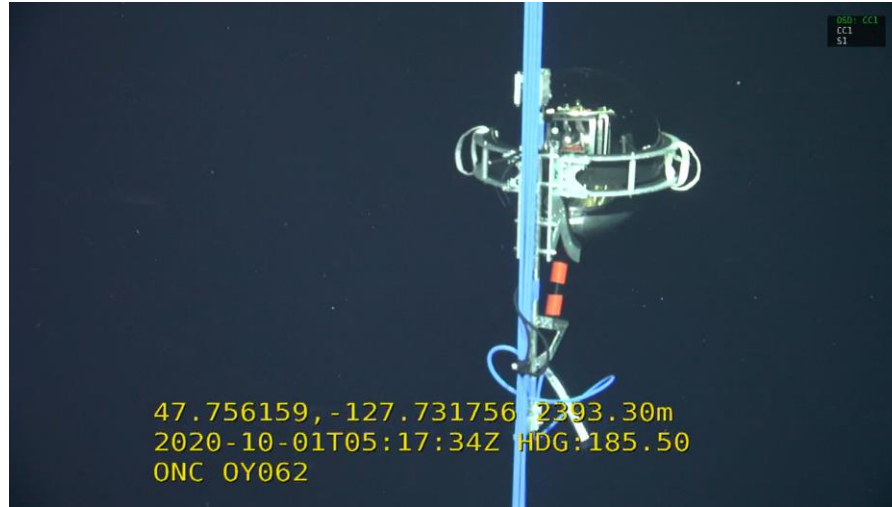
Depth: **2417m** (240m VEOC)



## Mini spectrometer

ONC IP: 10.136.117.165

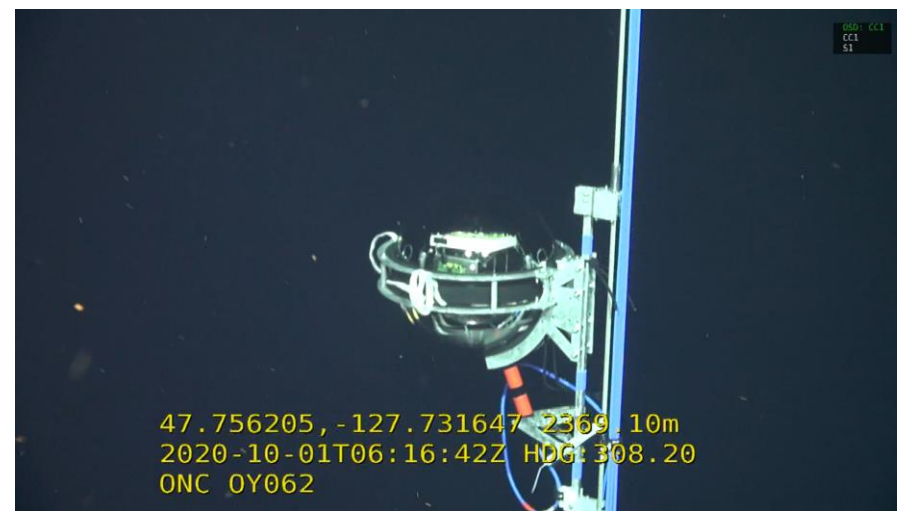
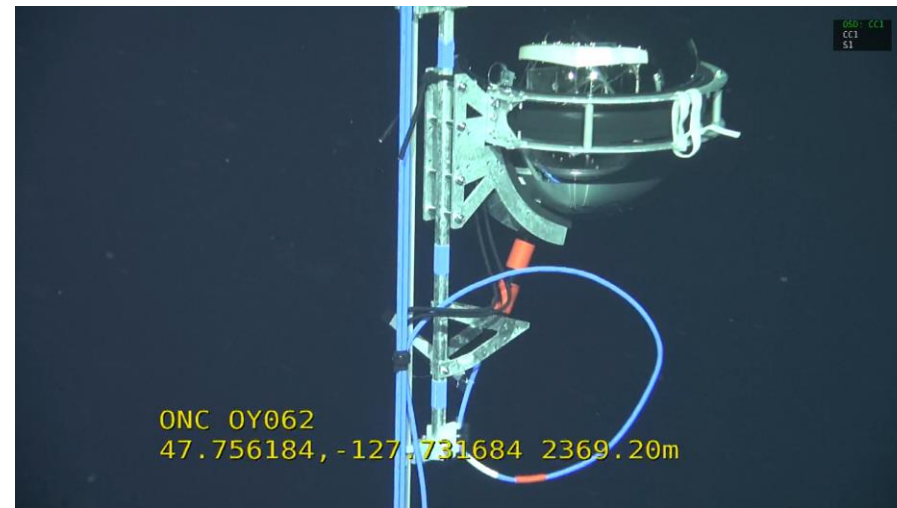
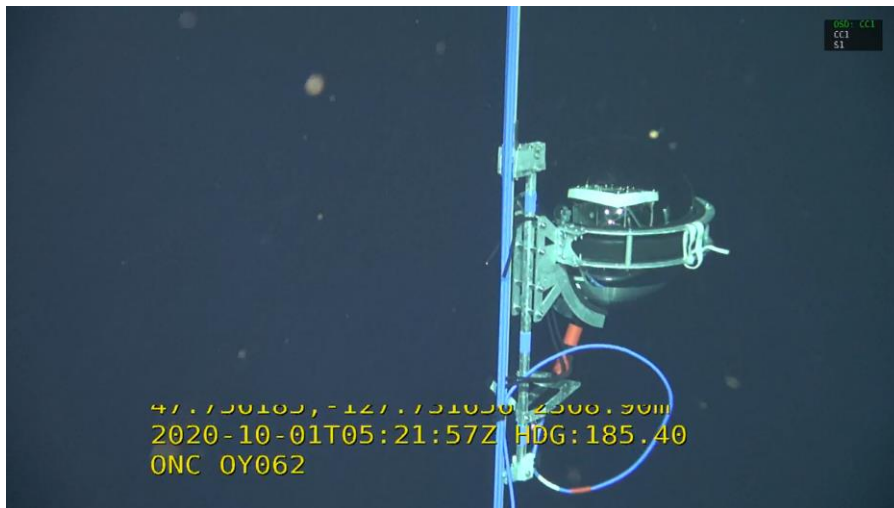
Depth: **2393m** (264m VEOC)



## Muon tracker

ONC IP: 10.136.117.164

Depth: **2369m** (288m VEOC)

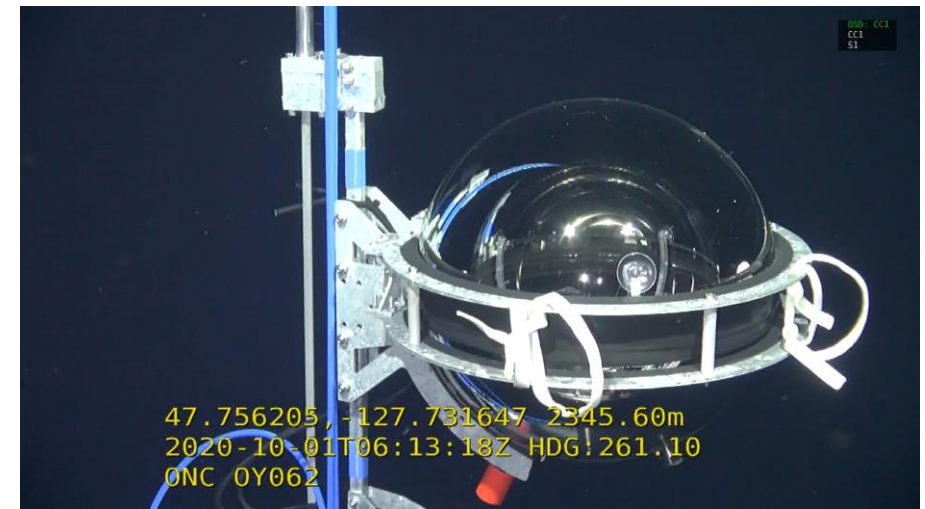
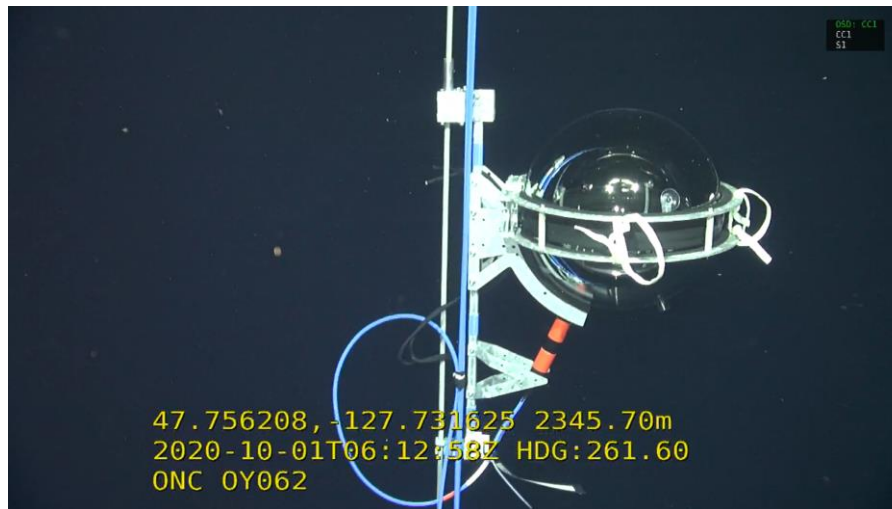
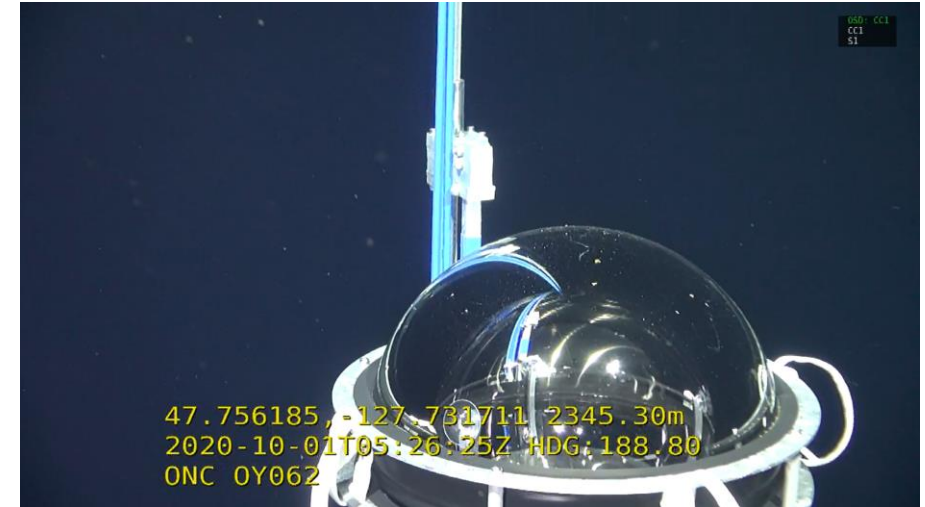
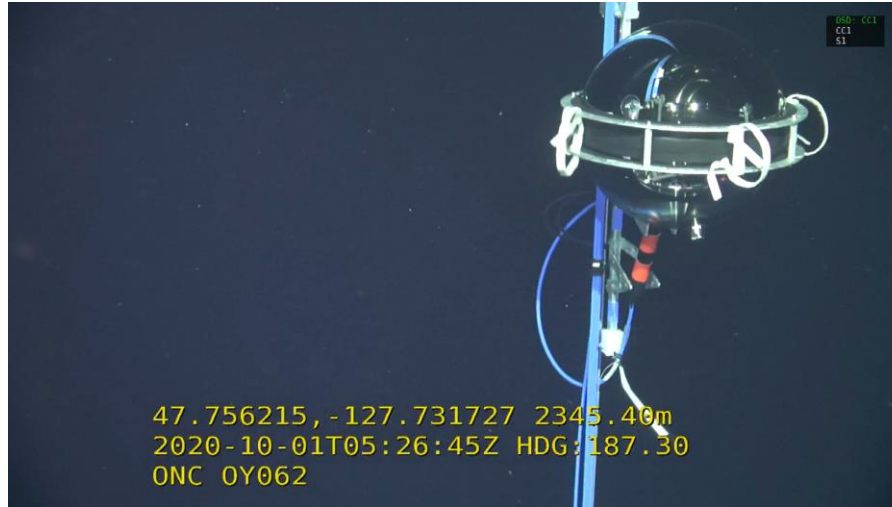




## Standard module 4

ONC IP: 10.136.117.180

Depth: **2345m** (312m VEOC)

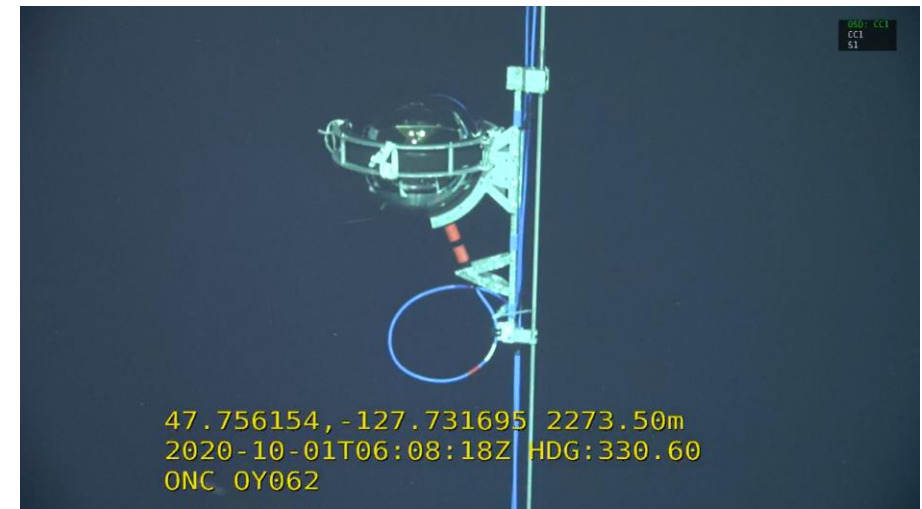
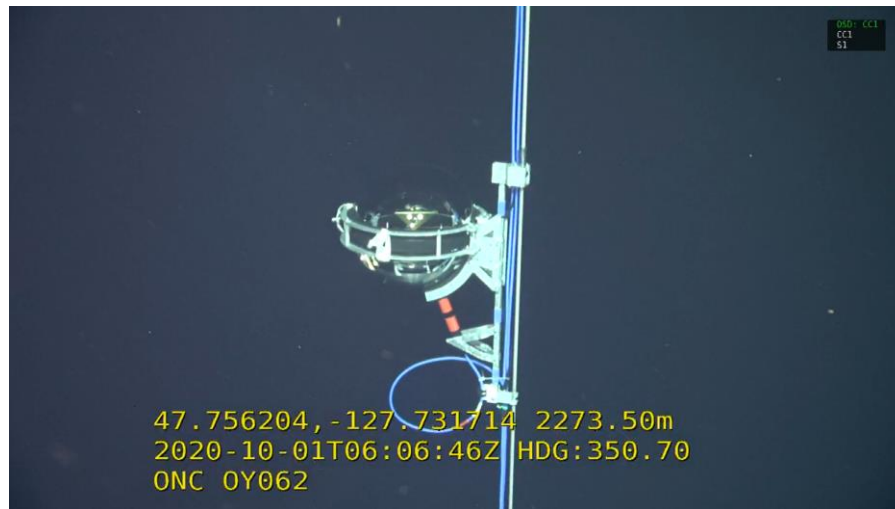
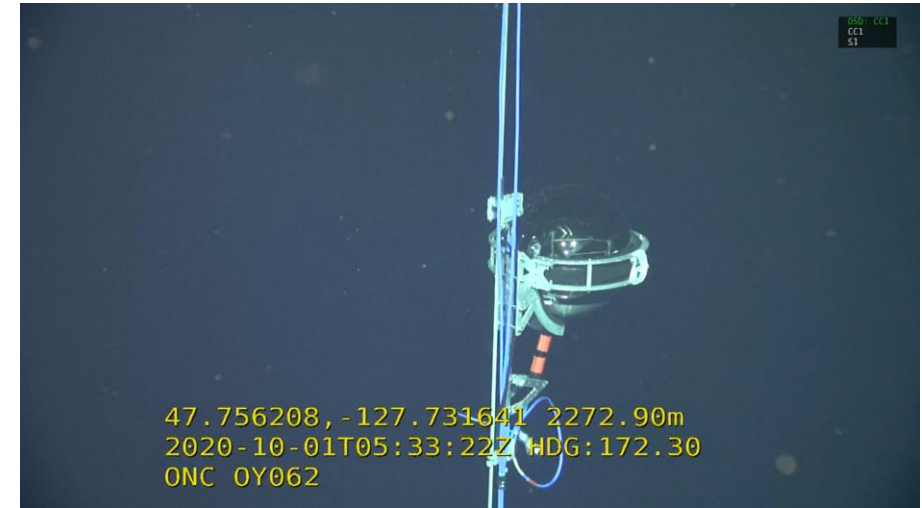
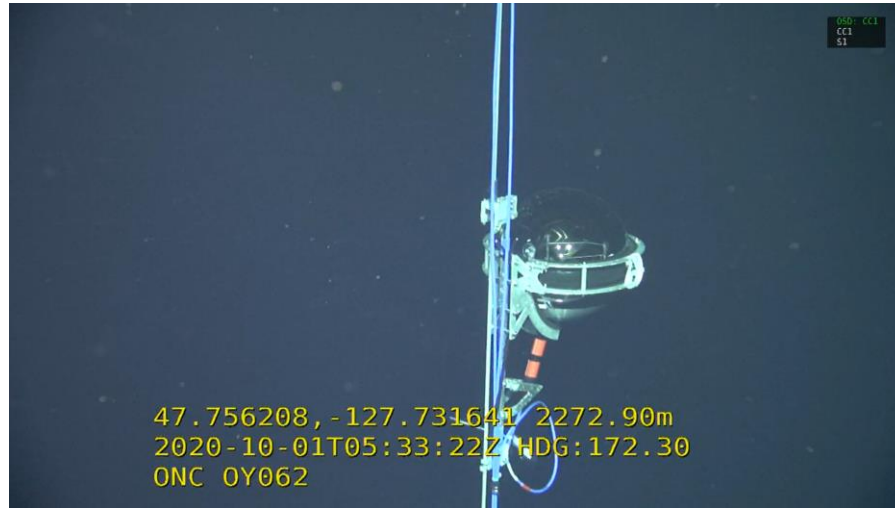




### Standard module 3

ONC IP: 10.136.117.162

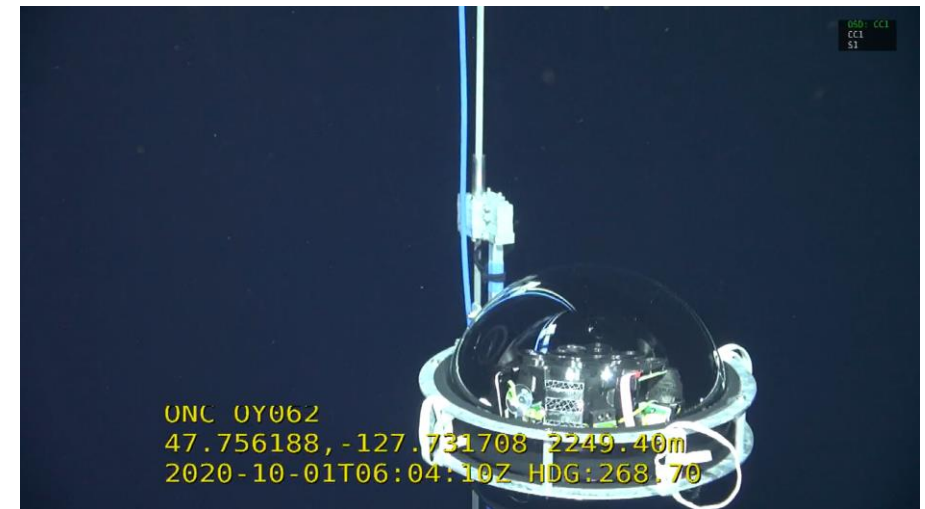
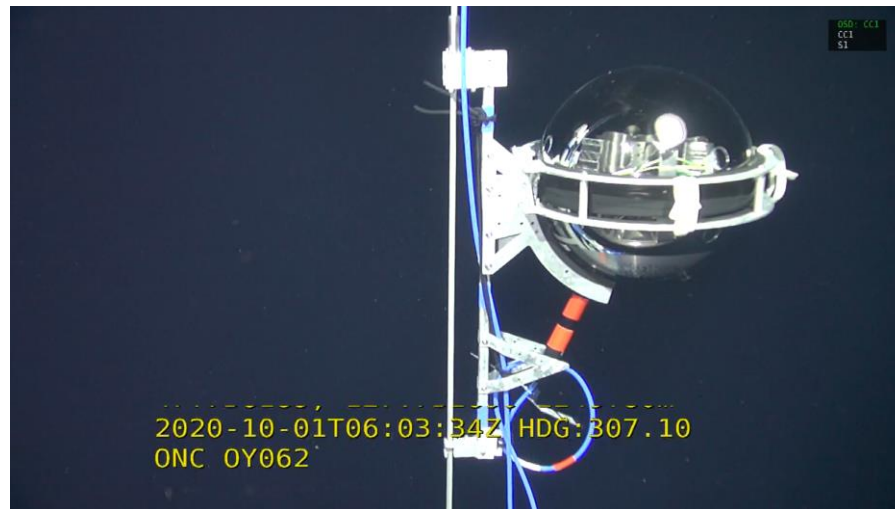
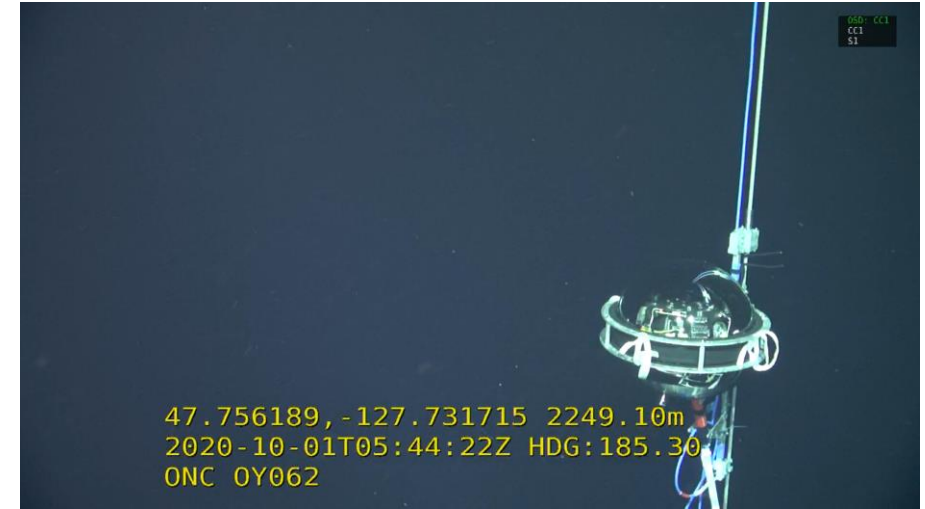
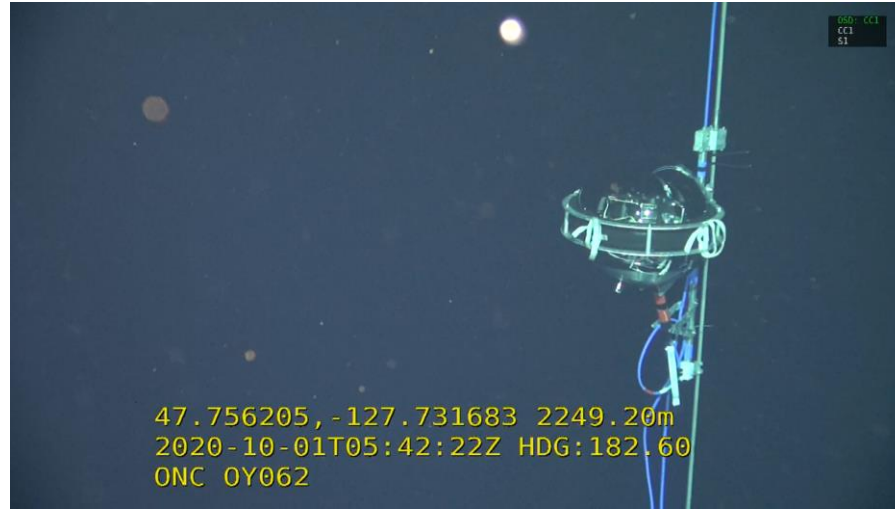
Depth: **2273m** (384m VEOC)



## PMT spectrometer 2

ONC IP: 10.136.117.161

Depth: **2248m** (408m VEOC)



## LiDAR 2

ONC IP: 10.136.117.160

Depth: **2226m** (432m VEOC)

