



# Sensor Platform Project

Fundy Ocean Research Center for Energy  
[fundyforce.ca](http://fundyforce.ca)



# Fundy Applied Sensor Technology (FAST) Project

Fundy Ocean Research Center for Energy  
[fundyforce.ca](http://fundyforce.ca)

# Objectives:

1. To enhance confidence that we understand the site and the effects of turbines on the environment.
2. Develop Canadian expertise in tidal site characterization
3. Develop the infrastructure, equipment and techniques to reliably:
  - A. Characterize and monitor high flow sites
  - B. Assess the interaction of turbines on its surroundings



Deployment  
and O&M  
Costs

Research  
Programs

Infrastructure  
Requirements

# Establishing Research and Monitoring Priorities

## Measurements near a Turbine

Need	Measurement
1A	Detection/identification of fish and mammals in immediate vicinity of a turbine
1B	Measure turbulence in the water column
1C	Measure currents in the water column
1D	Measure suspended sediments in the water column
1E	Measure ambient and turbine noise

## Measurements for site characterization

Need	Measurement
2A	Detection/identification of fish and mammals at potential site
2B	Measure turbulence in the water column
2C	Measure currents in the water column
2D	Measure suspended sediments in the water column
2E	Measure ambient noise (including mammals)
2F	Measure bottom stability

# FAST Science Advisory Board:

## Mission

To provide advice and guidance to FORCE to develop and implement an effective measurement methodology evaluation and research program for the FAST Project.

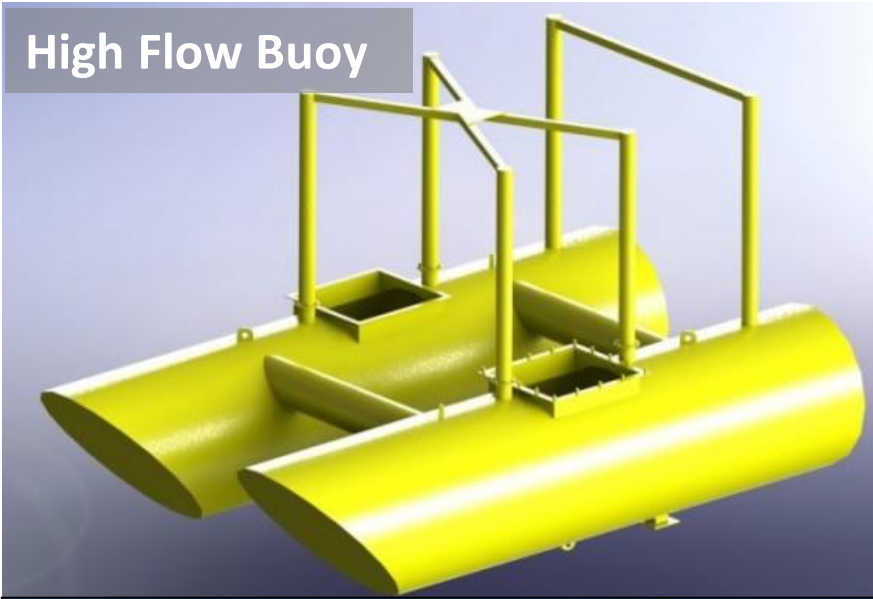
## External Members

- Dr Alex Hay, Dalhousie University
- Dr. Richard Karsten, Acadia University
- Dr. Gary Melvin, DFO
- Dr. Suzanne Craig, Dalhousie University
- Dr. Fred Cotaras, Chief Scientist Ultra Marine Systems
- Dr. Michael Li, Geological Survey Canada
- Dr Stan Matwin, Dalhousie University

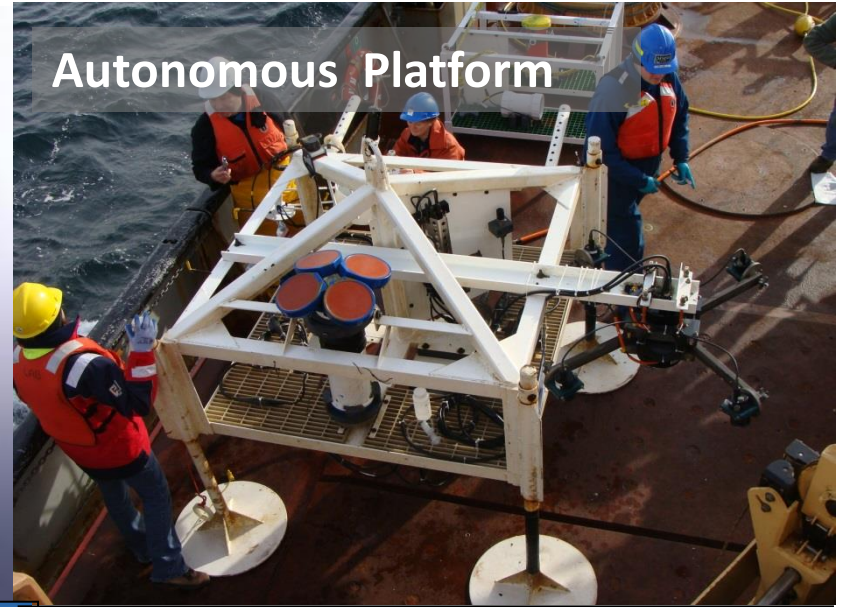


# Infrastructure: A Number of Possible Solutions

High Flow Buoy



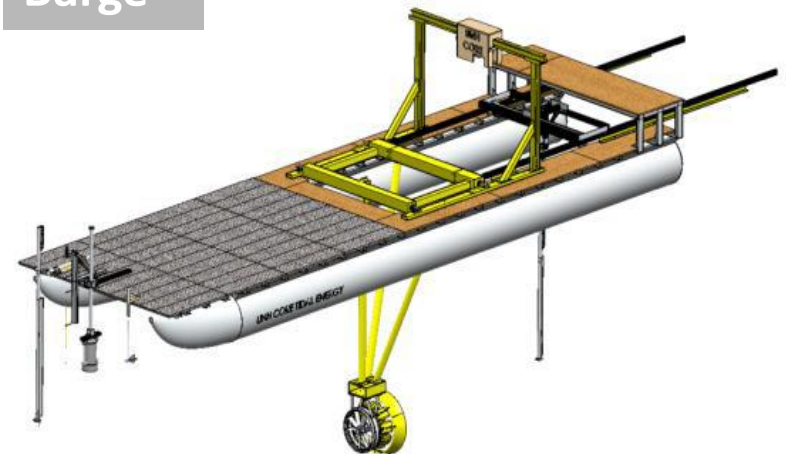
Autonomous Platform



Cabled Platform



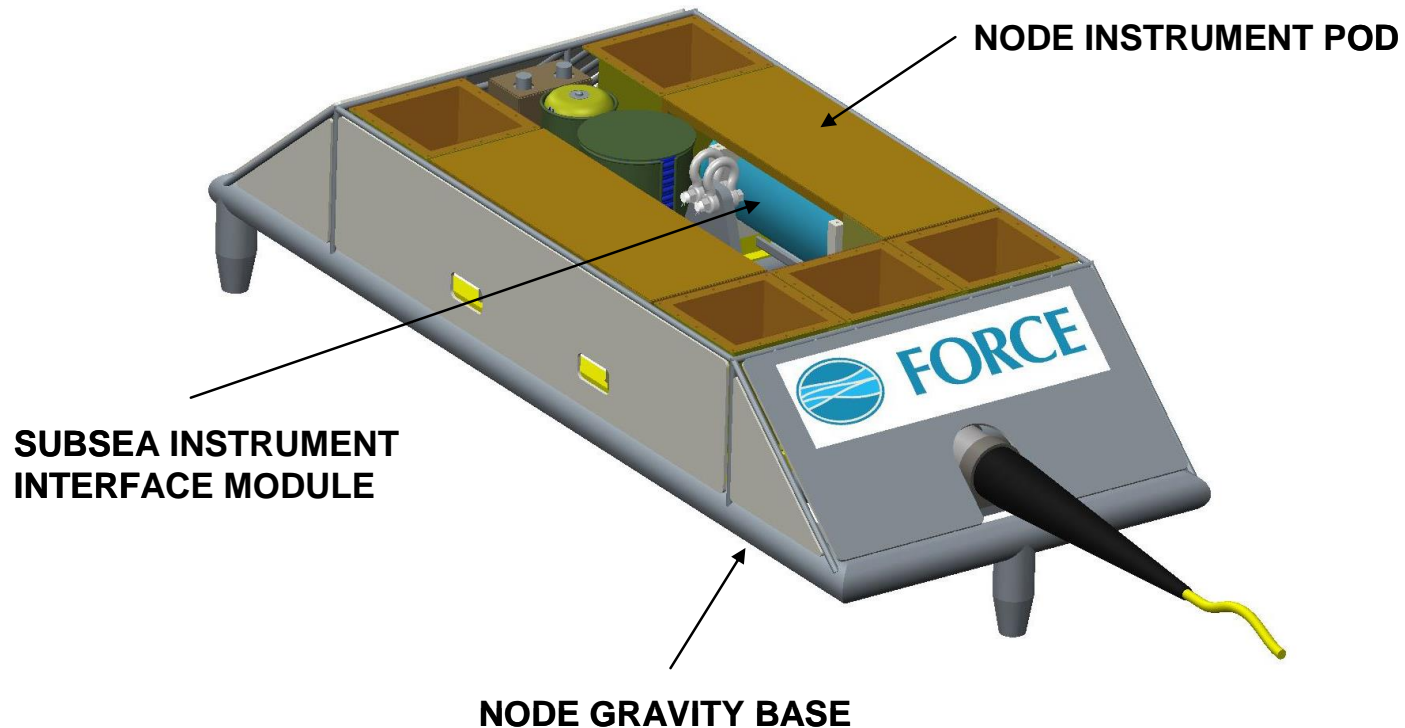
Barge



# Infrastructure: Initial Concept

## A recoverable cabled platform

- A cabled node in conjunction with autonomous instrument pods
- Removable instrument bay – 5 berths
- Serviced by moored surface vessel – most likely a barge
- 2 or 3 recovery operations a year





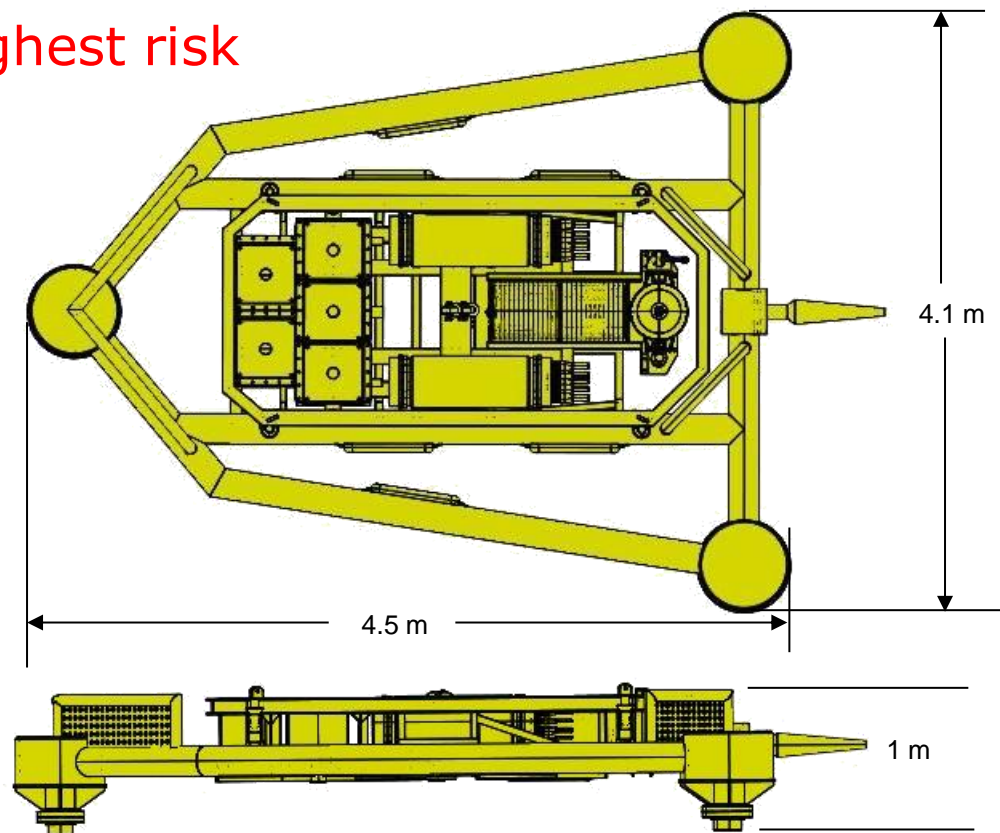
# Status: Preliminary Design of Cabled Instrument Platform

## Risk Studies:

- **Operations – Assessed highest risk**
- Stability Assessment
- Data Cable Procurement
- Float Release Mechanism

### Physical Specifications Summary

- $\approx 4.5 \text{ m} \times 4.1 \text{ m} \times 1.0 \text{ m}$
- Weight in air  $\approx$  **10 tonnes**
- Weight in water  $\approx$  8.7 tonnes



# Critical Design Review Completed:

## Float Mechanism(2 Release Beacons)

Acoustic Release (Teledyne  
Benthos 875-TE)

Marine Flasher (Xeos  
XMF-7500)

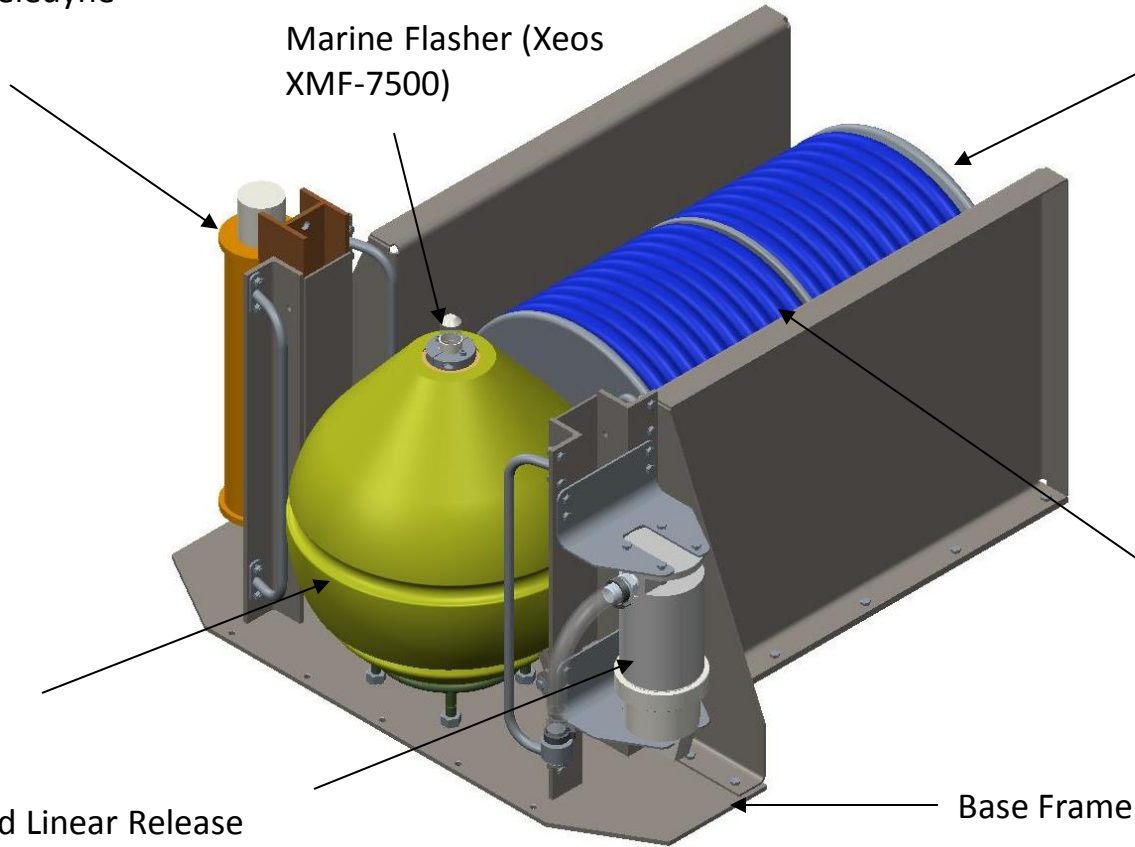
Rope Drum

Syntactic Buoy

Lift Line (3/4" Plasma  
12 Strand)

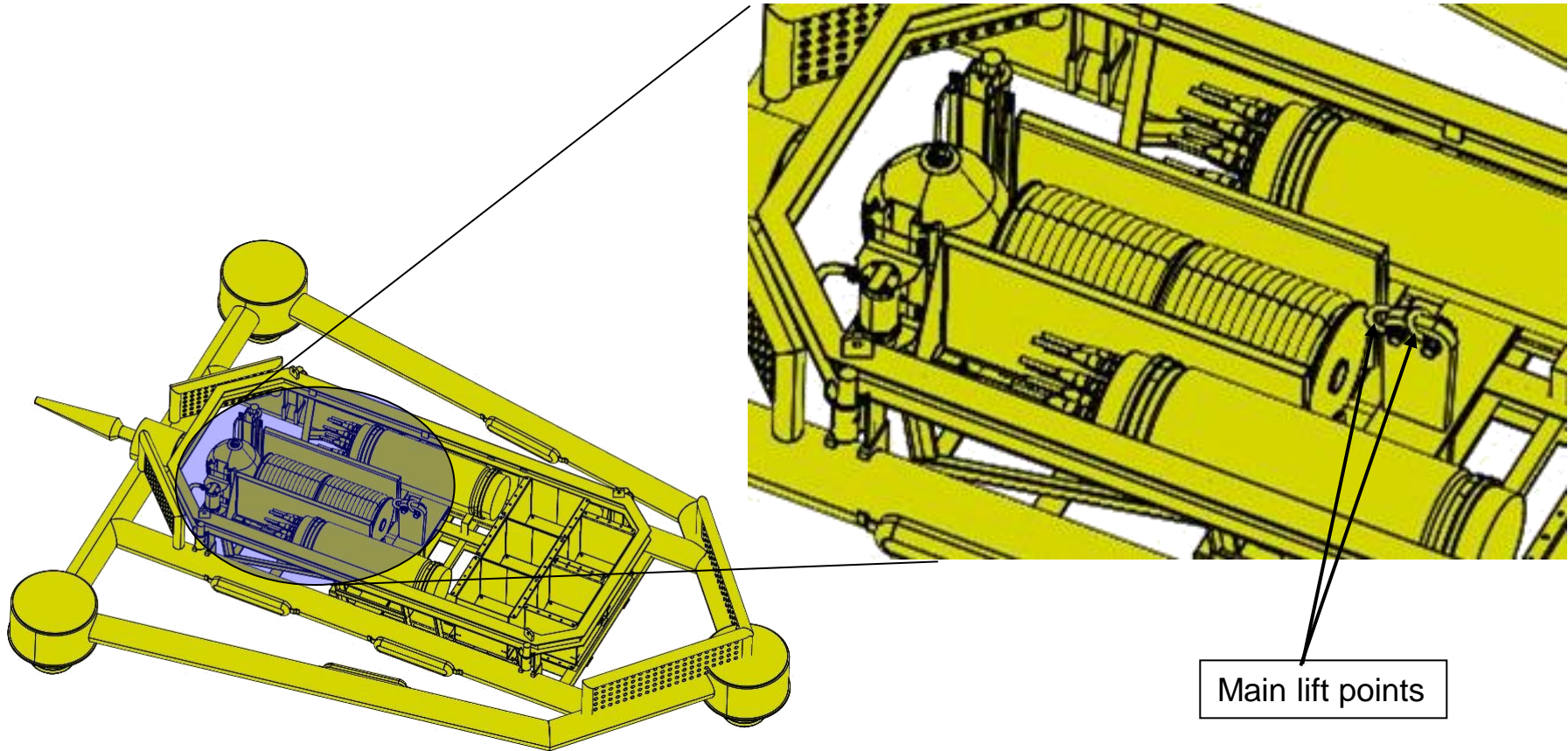
Pull Solenoid Linear Release

Base Frame



# Float Release Mechanism - Installed

- The lift line for the Node is contained within the Node itself in the Float Release Assembly.

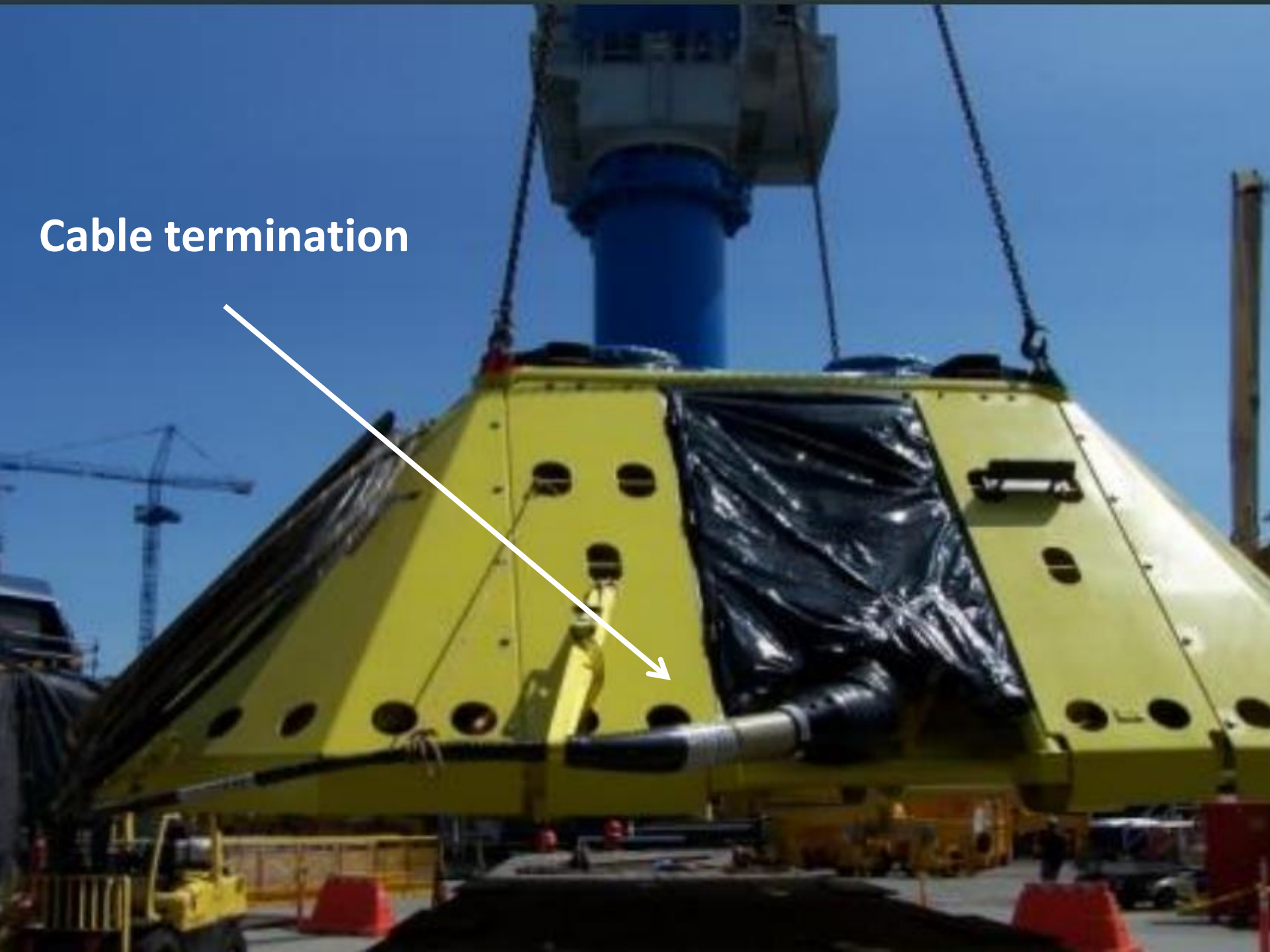




# Data Cable and Node Termination:

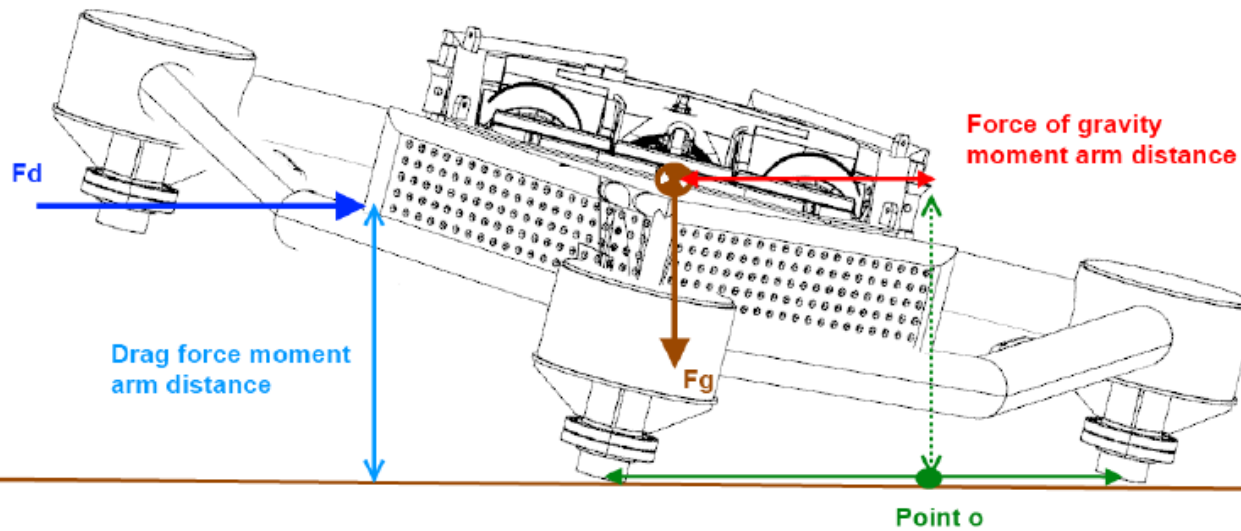
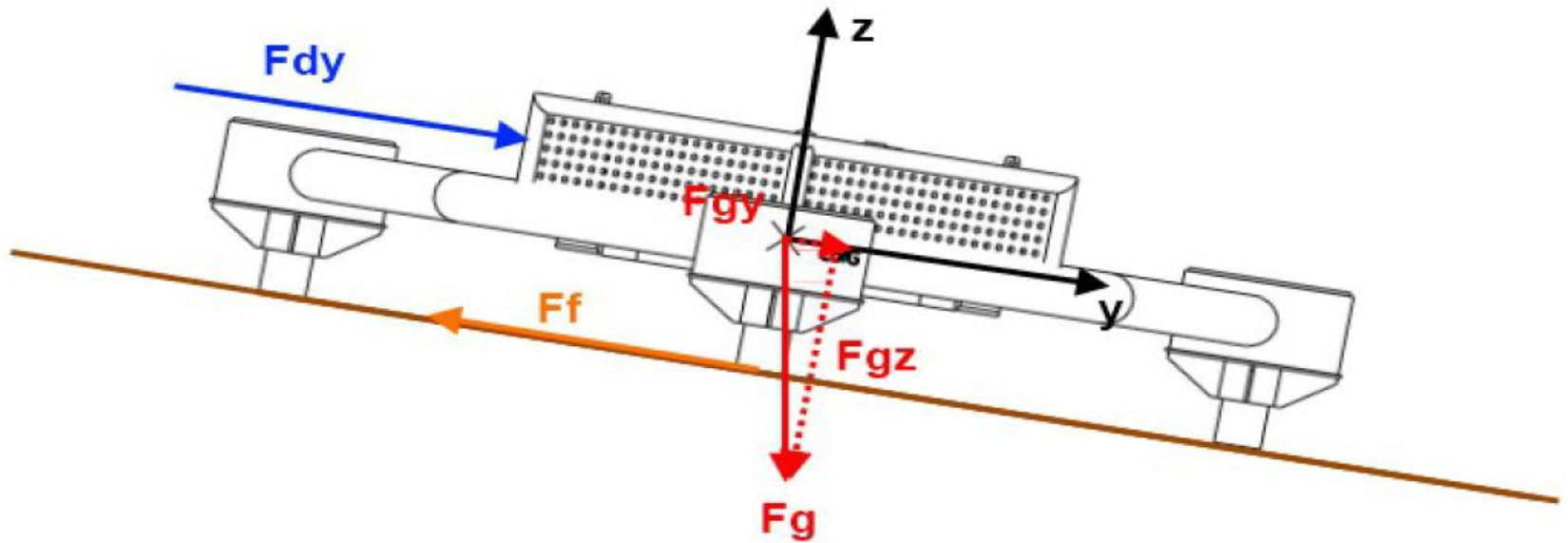


Cable termination

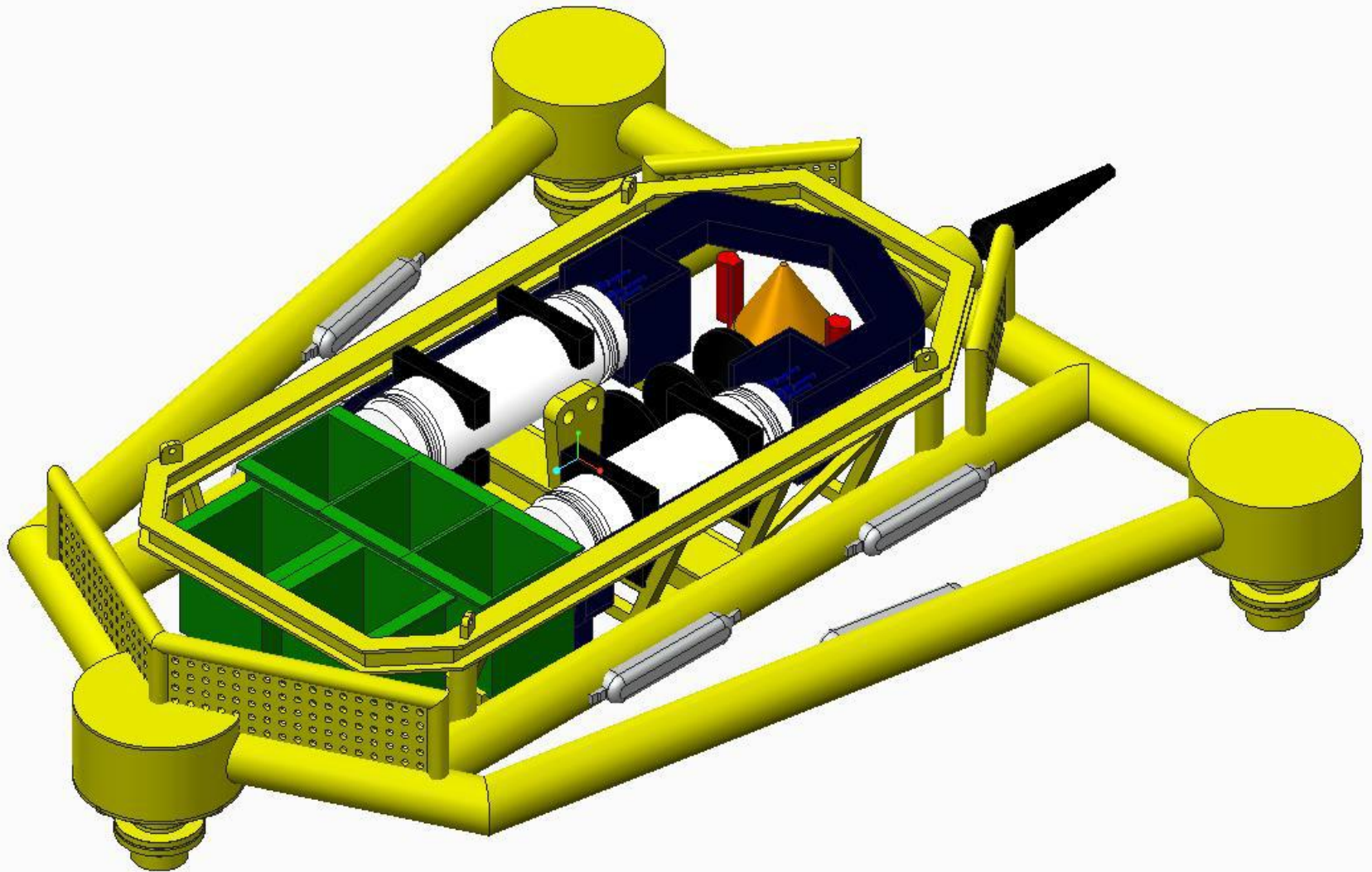




# Stability Analysis:



# Node Preliminary Design:



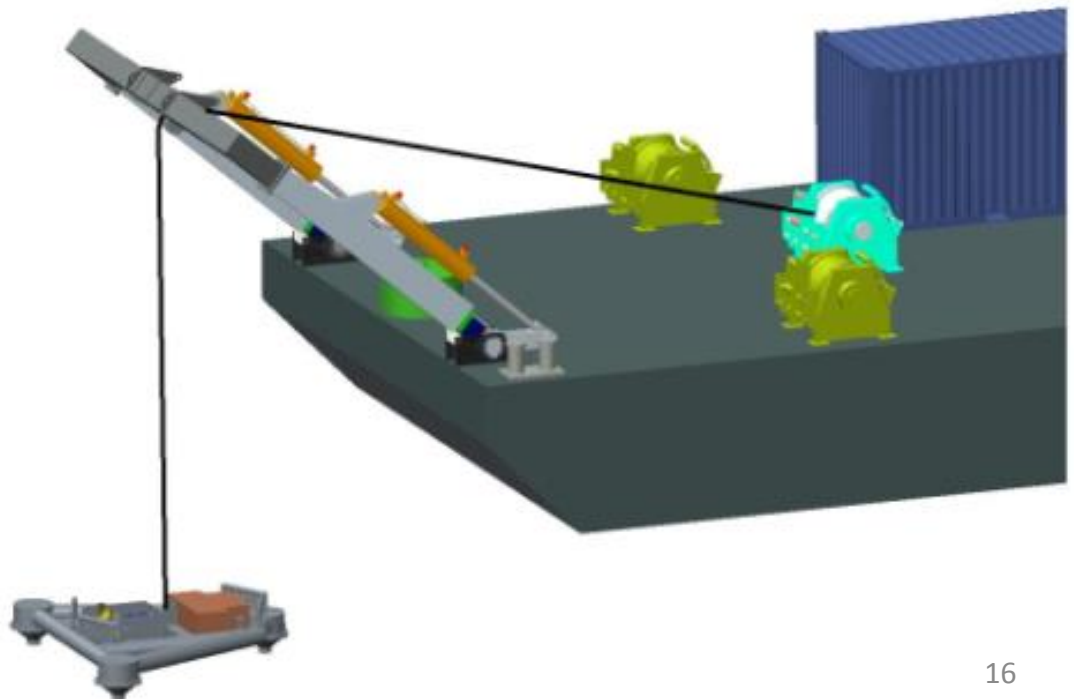
# Operations – Node Recovery

## Marine Trials:

*Retire risks associated with operations to the greatest extent possible*

## Demonstrate:

- Mooring
- Recovery
- ROV Capability



# Operations – Developing a deployment solution

---

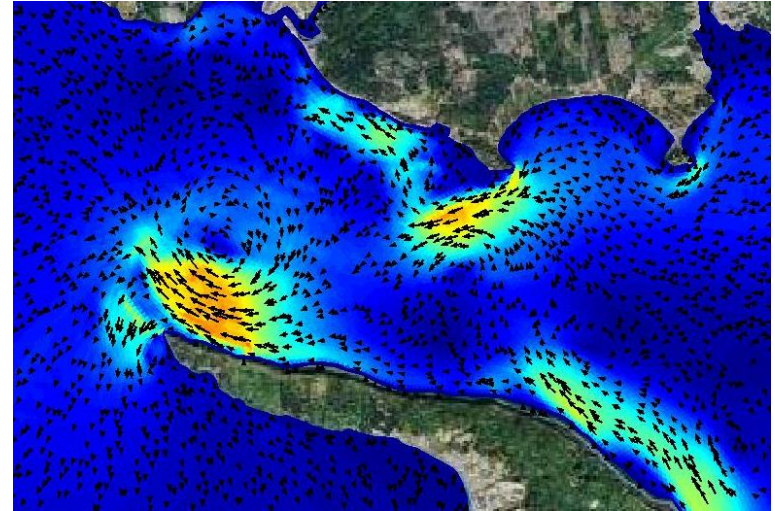




# Other Project Initiatives

## Hydrodynamics Researcher:

- Turbulence assessments
- Surface currents
- Enhanced Modeling



## Weather Station:

- High Res Imagery
- Real time tide gauge
- Web enabled





# Fundy Applied Sensor Technology (FAST) Project

Need	Measurement	Technology	Power	Communication	Data Storage	DMAS Driver	Cost
1A,2A, 2F	Detection/ identification of fish and mammals	Acoustic Camera (ARIS) (with pan/tilt)	95W	Ethernet/ Serial	275GB/d	Yes (some work)	\$110k
1A,2A	Detection/ identification of fish and mammals	Split Beam (Biosonics DT-X)	30W	Ethernet	10GB/d	Yes (some work)	\$100k
1A,2A, 2F	Detection/ identification of fish and mammals	Low Light Camera (SubC Star Gazer) (with pan/tilt, lights/laser)	100W /80W	Ethernet/ Serial	30GB/d	Yes	\$100k
1B,2B	Turbulence	ADV (Nortek 6MHz)	3W	Serial	0.5GB/d	Yes (some work)	\$15k
1B,2B	Turbulence	ADCP (Nortek AWAC)	3W	Serial	0.5GB/d	No	\$25k
1C,2C	Water column currents	ADCP (Nortek Aquadopp)	1.5W	Serial	0.3GB/d	Yes	\$15k
1D,2D	Suspended sediments	Laser particle counter (Sequoia LISST-100X)	1.5W	Serial	0.008GB/d	Yes	\$35k
1D,2D	Suspended sediments	Acoustic backscatter profile (ASL ZAP)	10W	Serial	0.25GB/d	Yes	\$35k
1E,2E	Ambient noise	Hydrophone (Ocean Sonic HF)	2W	Ethernet	70GB/d	Yes	\$8k
2 (all)	Site Characterization	Mini-Lander interface (acoustic modem)	10W	Serial	NA	No	\$15k