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Relocation of the Pioneer Array

Al Plueddemann and the CGSN Team

OOIFB Town Hall

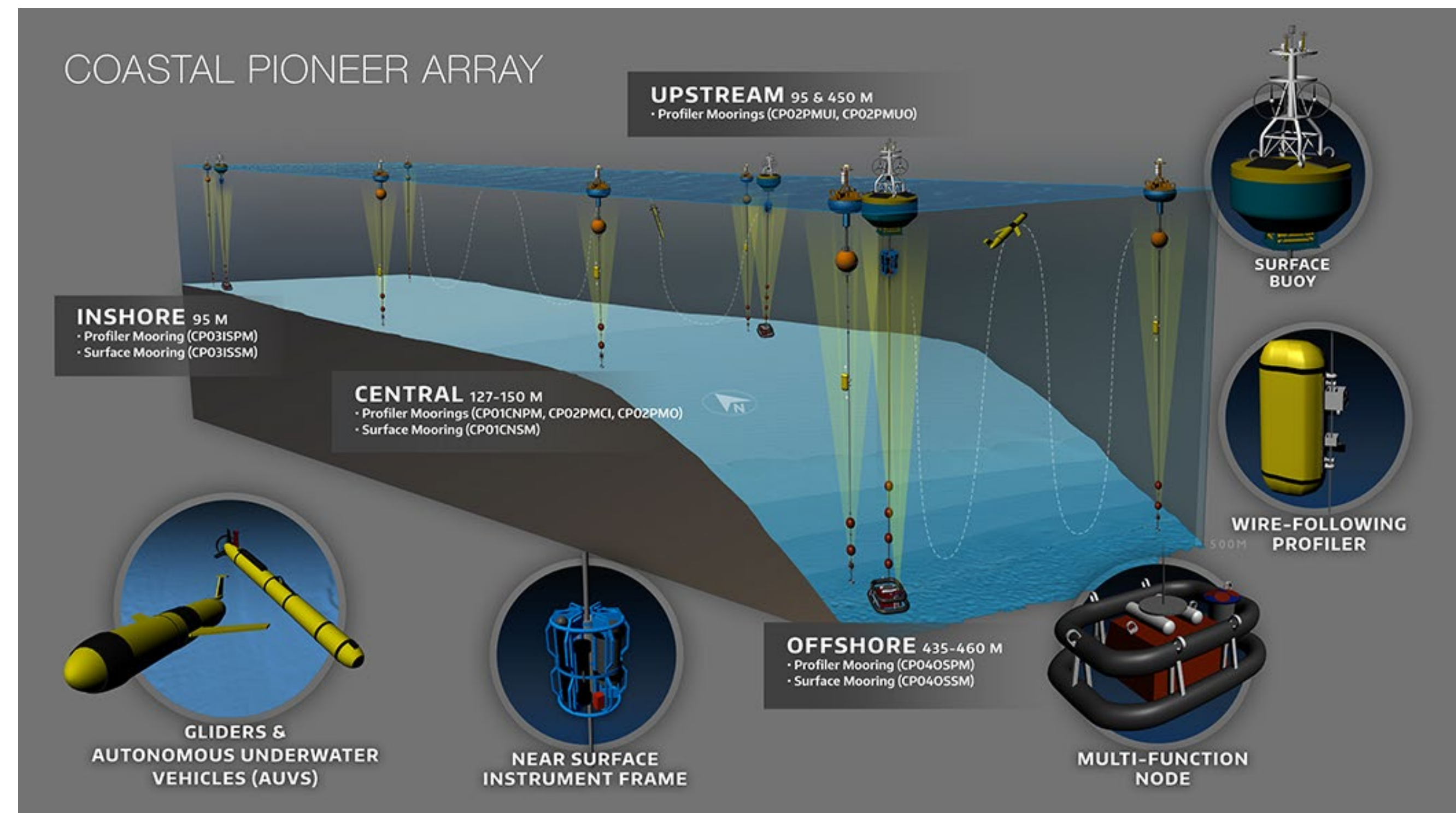
20 Feb 2024





Pioneer Array Relocation

- The Pioneer Array was conceived within OOI as a re-locatable, coastal array suitable for moderate wave and current regimes on the continental shelf and upper slope.
- Deployed on the New England Shelf 2016-2022
- To be relocated to the southern MAB offshore of North Carolina in April 2024
- A community workshop will be held in Sep 2024 to inform and engage users.





Relocation Milestones

- NSF Announcement of intent to relocate (or retain)
 - Ocean Sciences Town Hall, Feb 2020
- Extensive community input from two Innovations Labs
 - 15-19 March and 21-15 June 2021
- NSF decision to relocate to southern MAB – Apr 2021
- Relocation process begins – Jul 2021
- NES Array recovered – Nov 2022



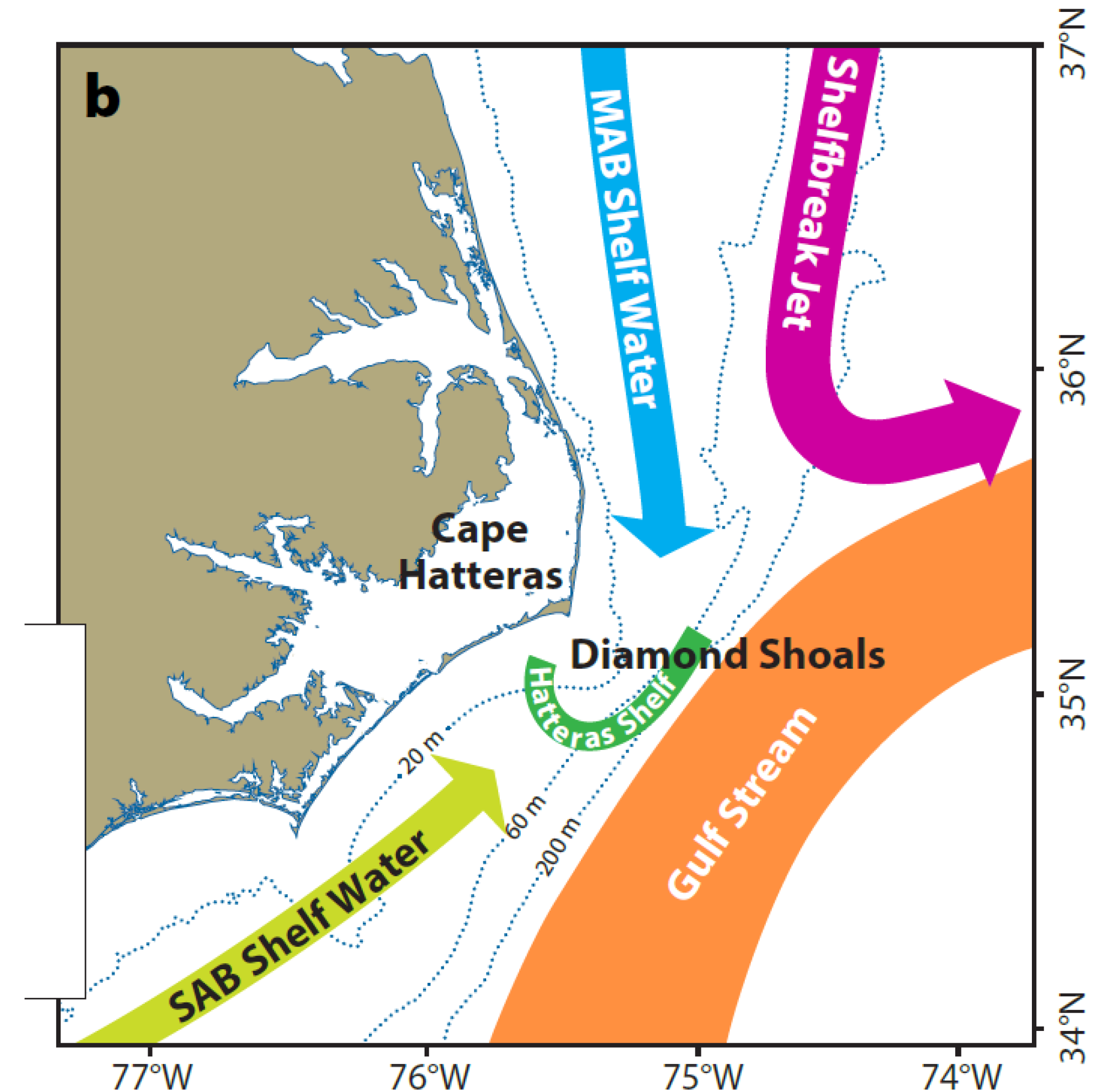
Relocation Process

- Approach
 - Guided by community input from Innovations Labs:
 - Address high-level science themes
 - Implement consensus Array design
 - Assessment and refinement by OOI Team
- Constraints
 - Optimize use of existing inventory
 - Ensure feasible implementation
 - Operate within existing budget



MAB Science Themes

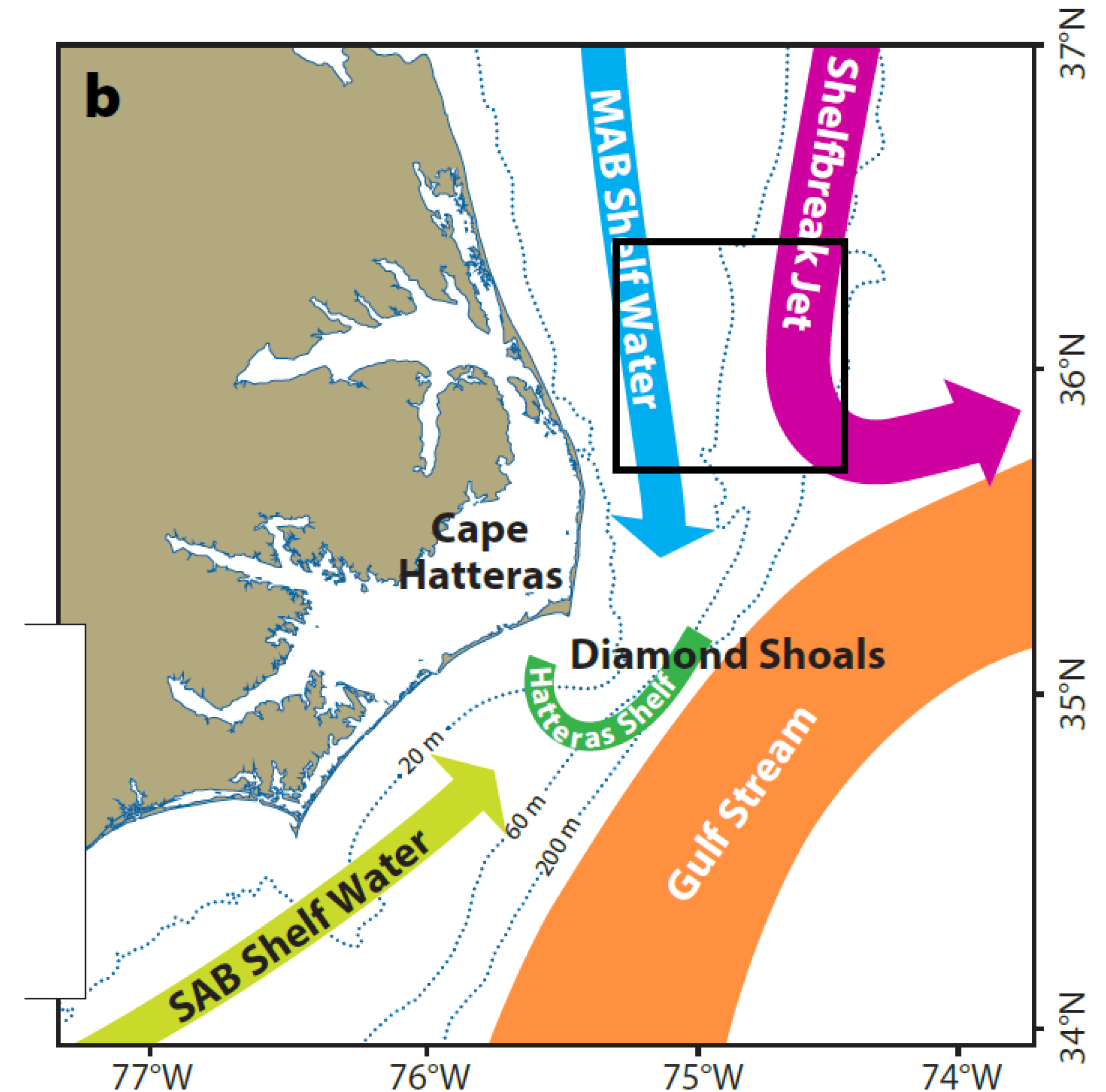
- Approach
 - Created broad themes based on Innovations Lab input and ranking
- High level themes
 - Dynamics of shelf/slope exchange
 - Wind forcing, frontal instability, Gulf Stream influence
 - BGC cycling and transport
 - Carbon, nutrients, particulates
 - Ecosystem response
 - Extreme events
 - Hurricanes, freshwater outflows



Dana Savidge (Skidaway) and the PEACH Project

MAB Observing Region

- Constraints
 - Away from: Gulf Stream, shallow water, strong fronts, strong currents
 - Waterspace management
 - Environmental compliance
- Limits of spatially coherent array
 - Moored array ~ 60 km x 60 km
- Decision to focus on:
 - Shelf-slope region
 - S of Chesapeake, N of Hatteras

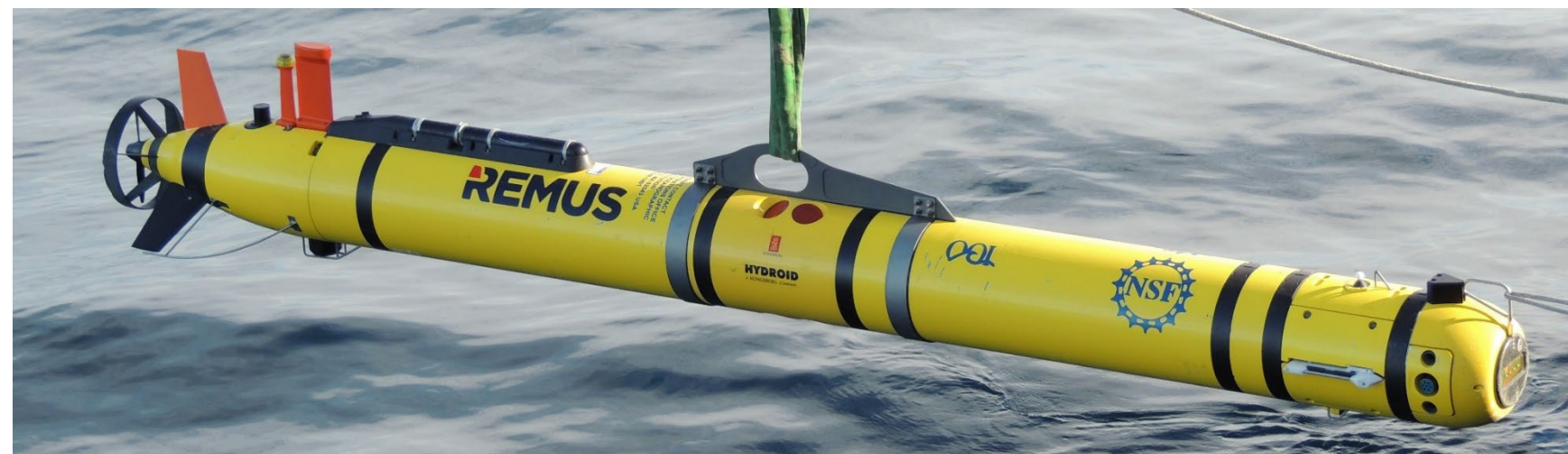


Dana Savidge (Skidaway) and the PEACH Project

Platforms

<https://oceanobservatories.org/ooi-infrastructure/>
Gawarkiewicz and Plueddemann, 2021, JOO

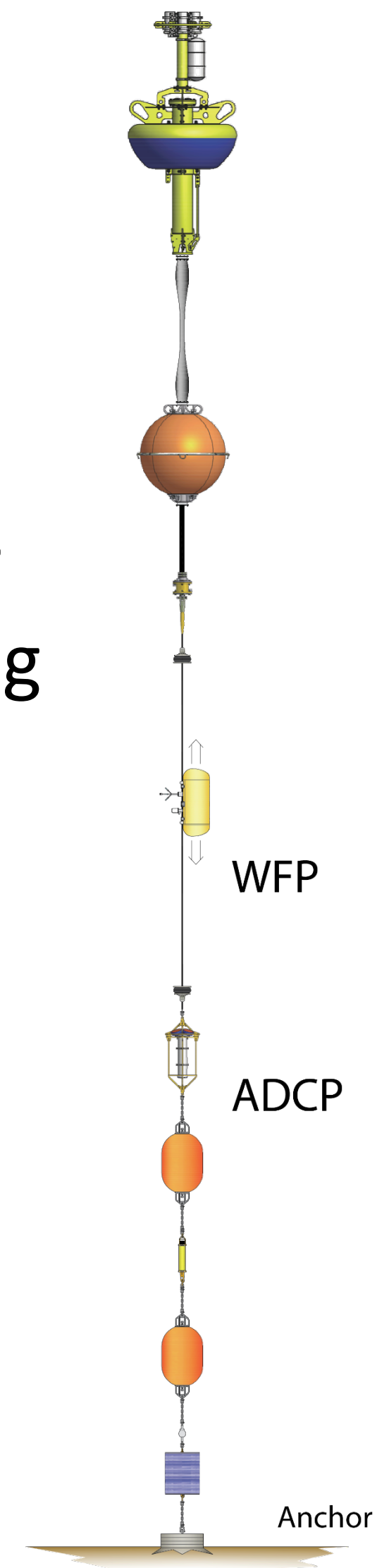
AUV



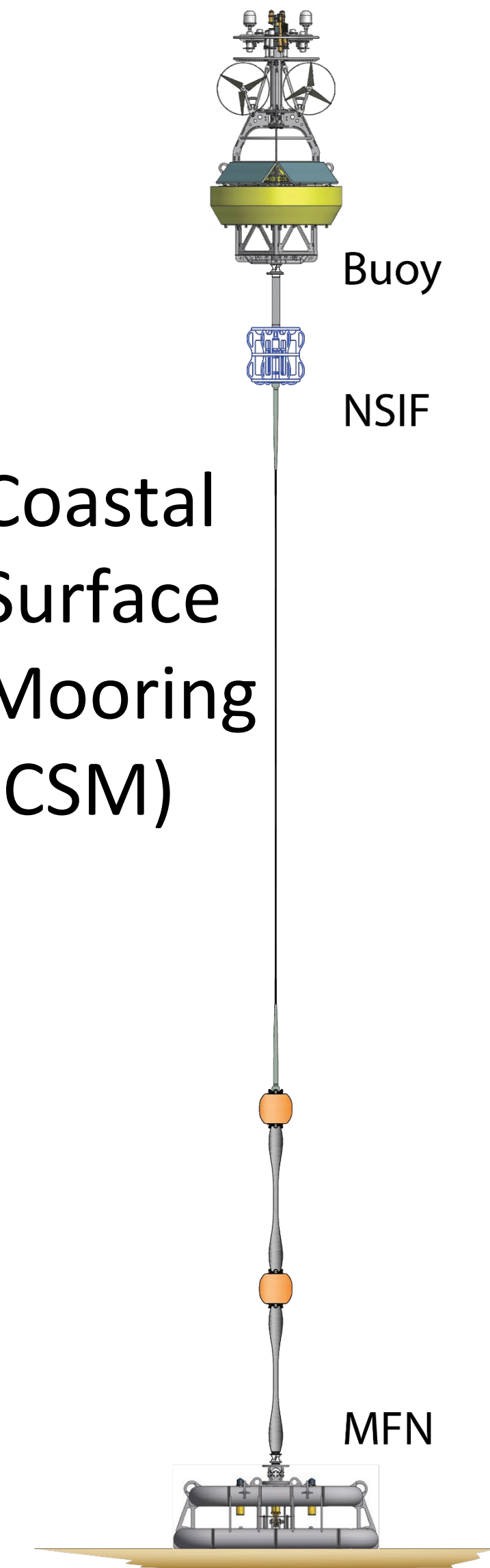
Glider



Coastal Profiler Mooring (CPM)

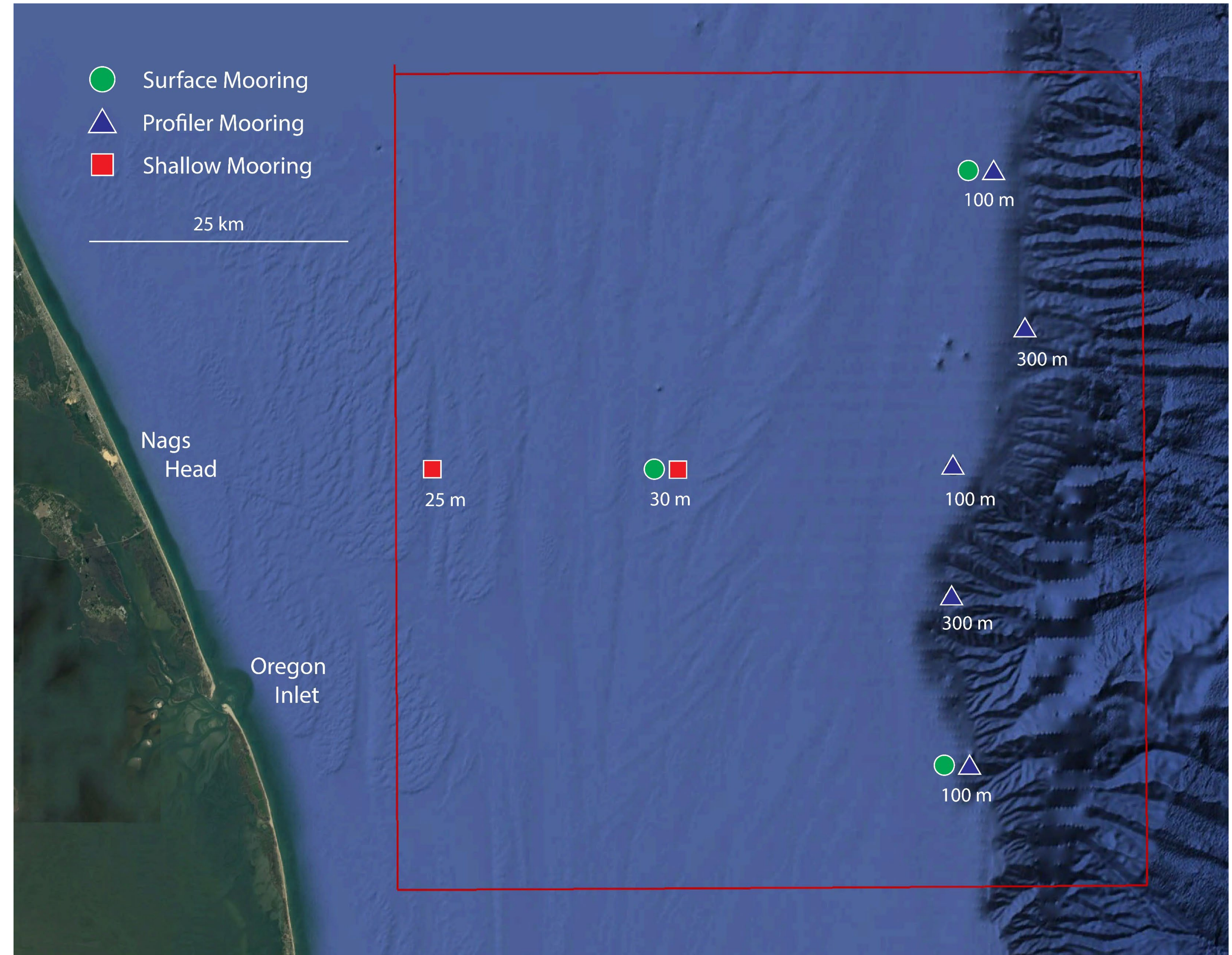


Coastal Surface Mooring (CSM)



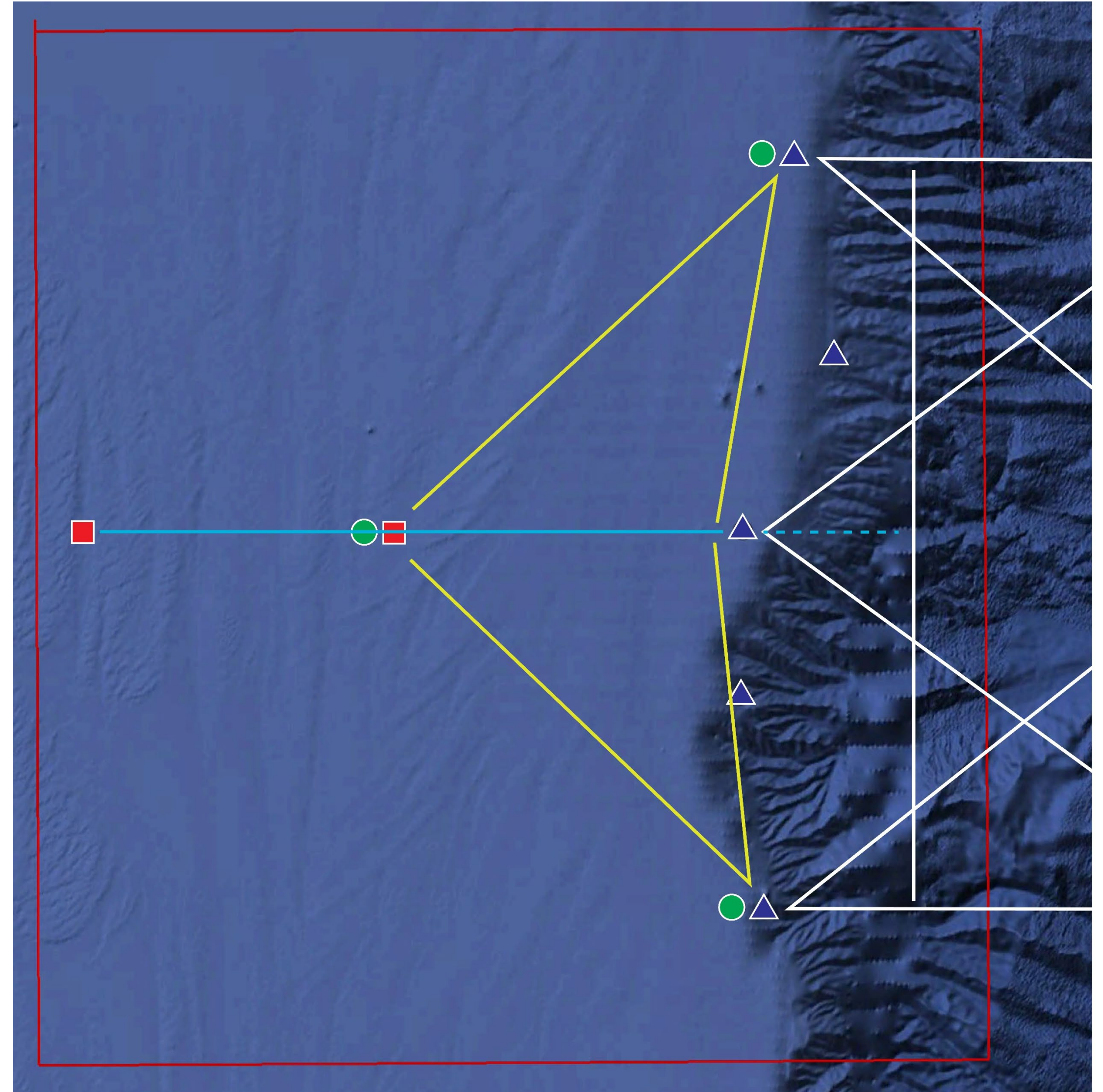
Moored Array

- Proposed Design
- Components
 - 3 CSM
 - 5 CPM
 - 2 SWM



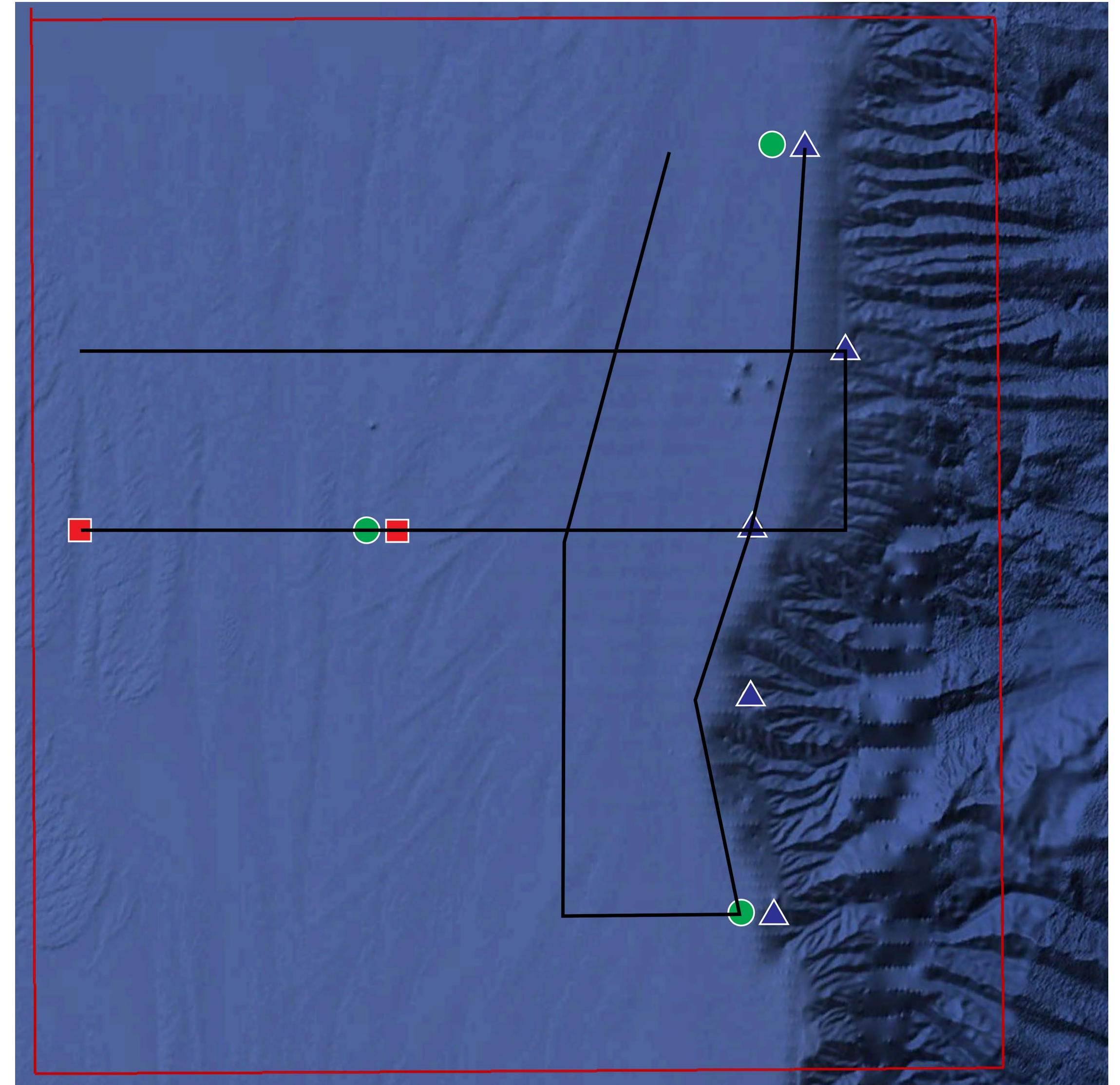
MAB glider plan

- Proposed design
- Four main tracklines
 - Offshore mesoscale (white)
 - Offshore flux (white)
 - Moored array (yellow)
 - Cross-shelf (blue)
- Supplemental lines
 - Norfolk Canyon (2x/yr)



MAB AUV plan

- Proposed design
- Operations
 - Two REMUS-600 AUVs
 - “Campaign mode”
 - 4-6 missions/yr
- Two mission boxes
 - Cross-shelf box (20 hr)
 - Along-shelf box (20 hr)
- Objectives
 - Synoptic transects
 - Resolve shelfbreak front



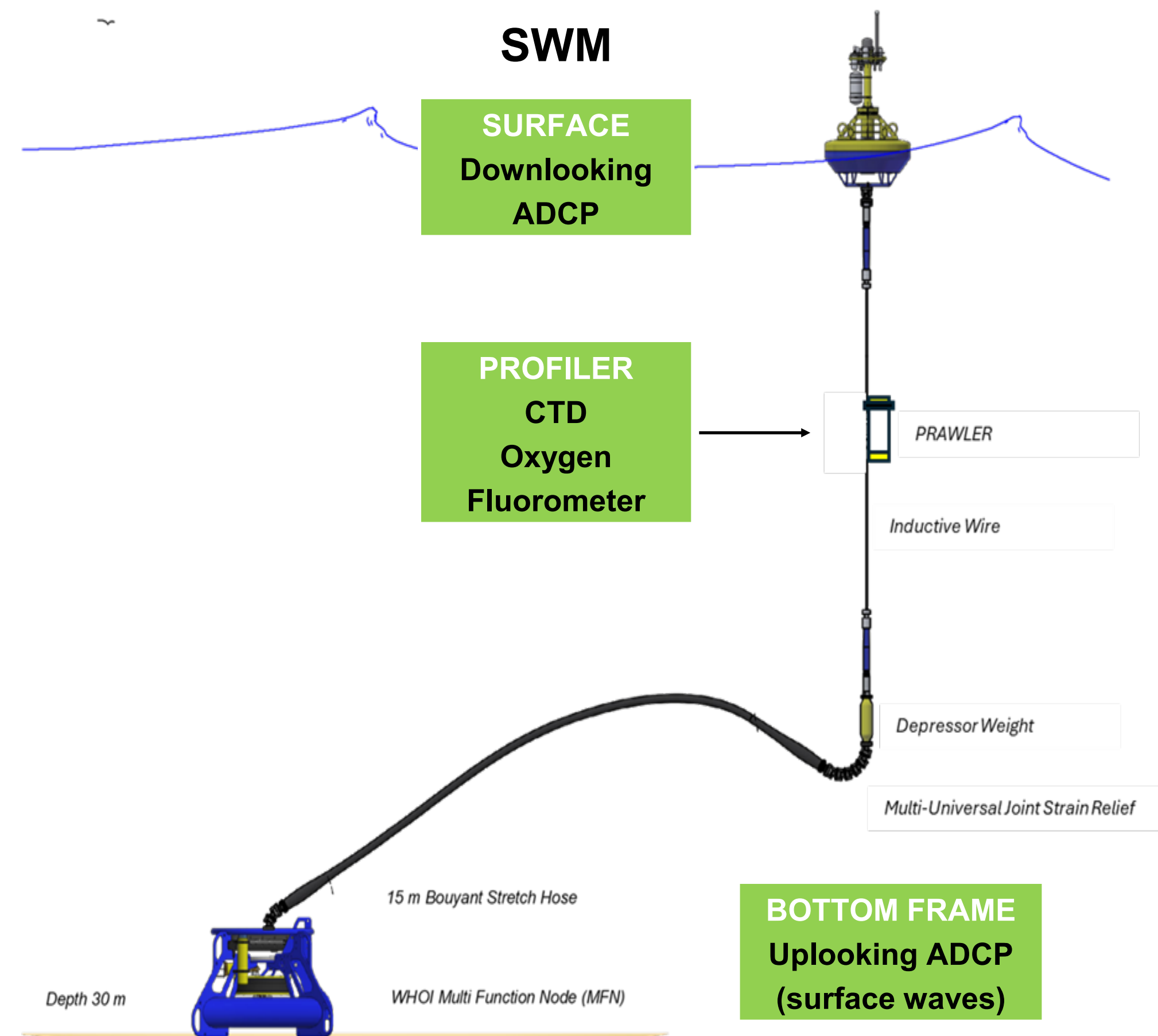
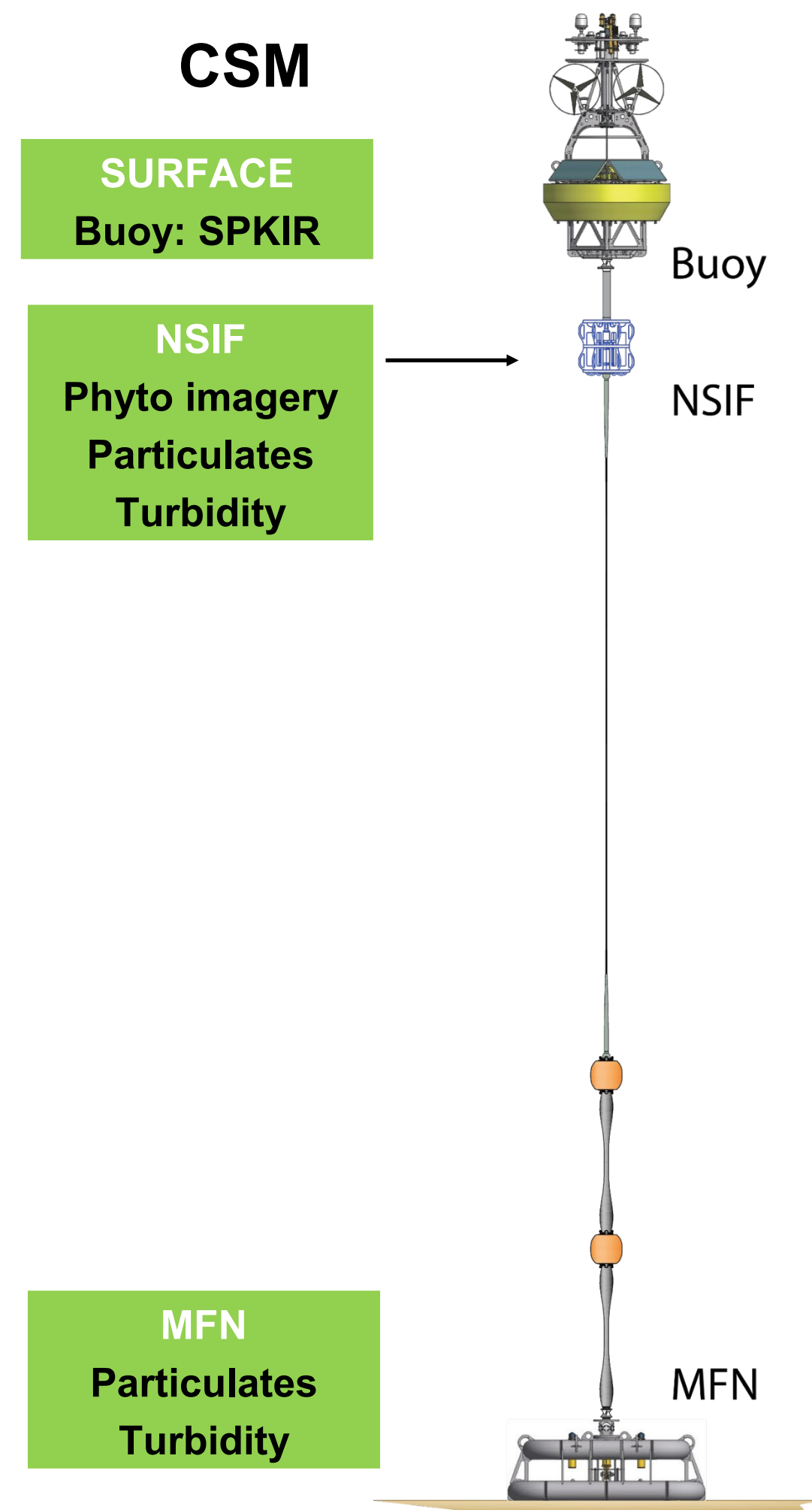
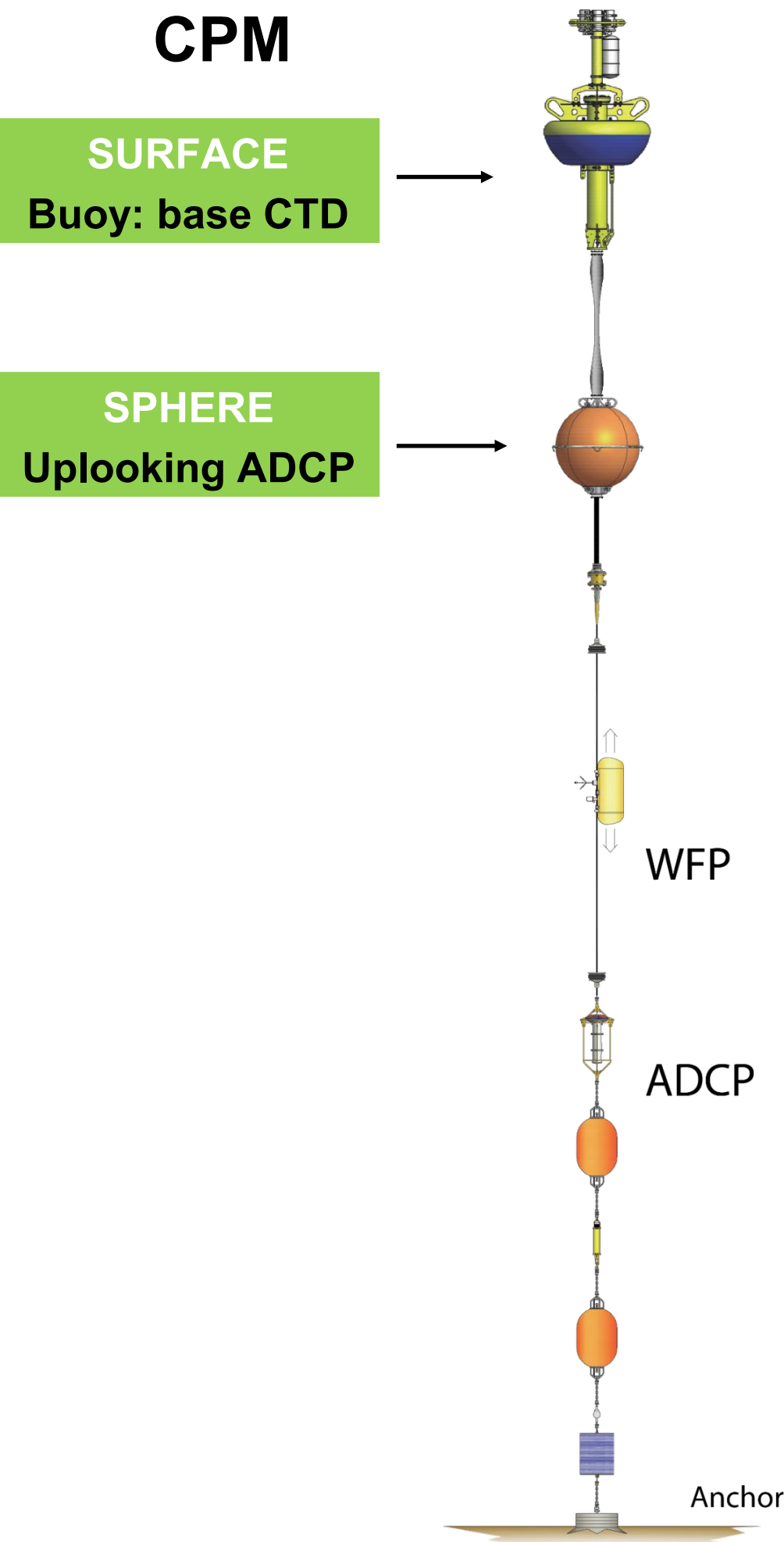
Instruments

<https://oceanobservatories.org/instruments/>
Gawarkiewicz and Plueddemann, 2021, JOO

Pioneer Array Core Instrumentation		
Instrument Series	Measurement(s)	Platform
CTD	Temp, cond, press	all
Oxygen	Dissolved oxygen	all
Fluorometer	Chl-a, CDOM, optical backscatter	all
Radiometer	Spectral irradiance or PAR	all
Velocity profile	Profile and/or single point	all
Nutrients	Nitrate concentration	CSM, AUV
Surface Meteorology	AT, RH, BP, PRC, WSPD, WDIR, SWR, LWR, SST, SSS, covariance flux	CSM
Surface Waves	Surface wave properties	CSM
CO2	Partial press CO2 in air, water	CSM
pH	Seawater pH	CSM
Pressure	Seafloor pressure	CSM
Spectrophotometer	Optical absorp, attenuation	CSM
Bio-acoustics	Multi-frequency acoustic backscatter	CSM



Instrument Additions





Relocation Milestones

- MAB Array to be deployed – Apr 2024
 - Real-time data available immediately after deployment
- OOIFB Community Workshop – 10-12 Sep 2024
 - Old Dominion University, Norfolk, VA
 - Apply online by 26 March at <https://ooifb.org/meetings/pioneer-array-workshop-2024/>

Learn about the Pioneer MAB Array, develop collaborations, and foster the research and proposal development process.





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Questions?

