



OCEAN
OBSERVATORIES
INITIATIVE

Coastal & Global Scale Nodes: Operational Status

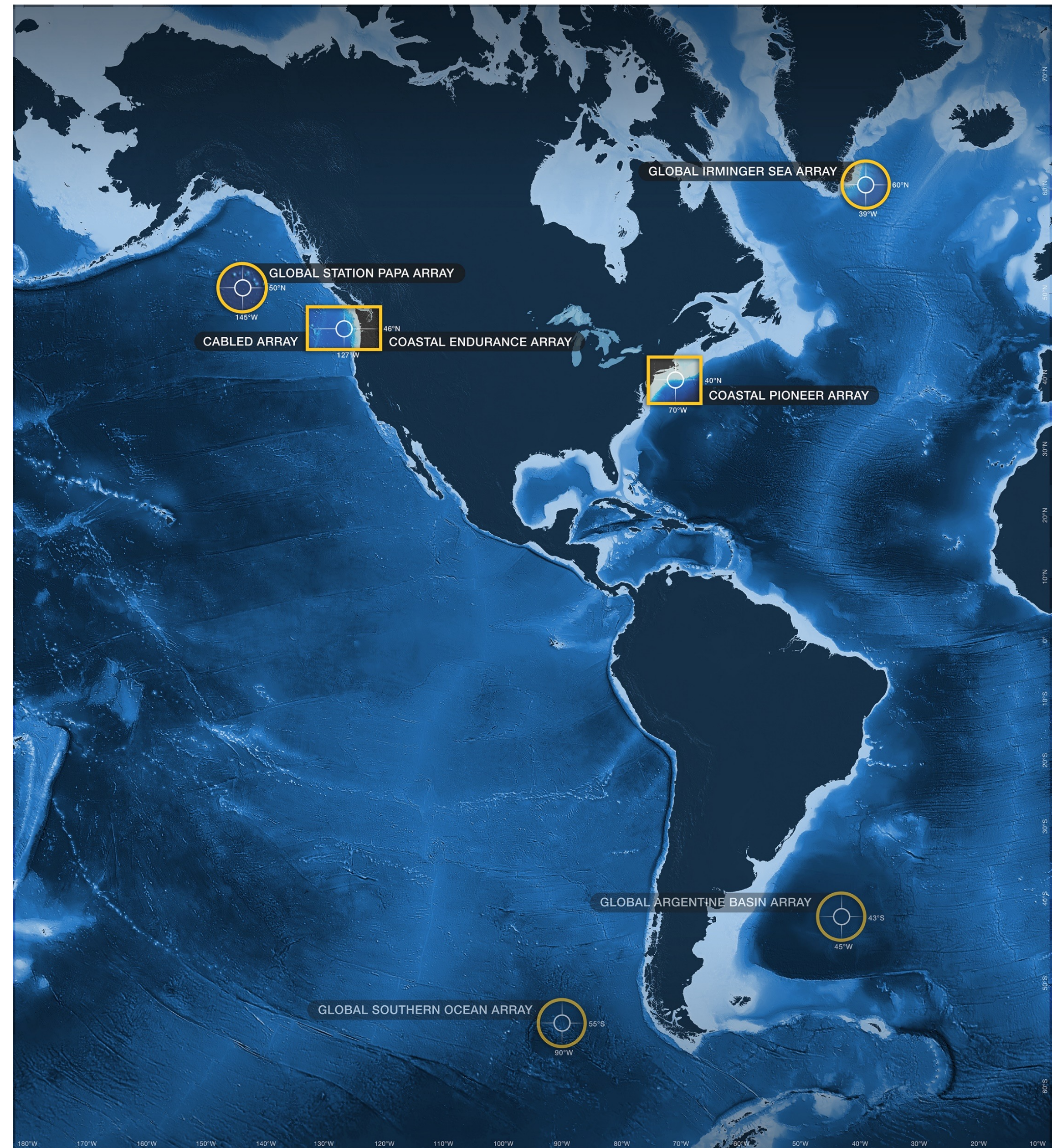
CGSN Team

OOIFB Fall Meeting
27 Oct 2022

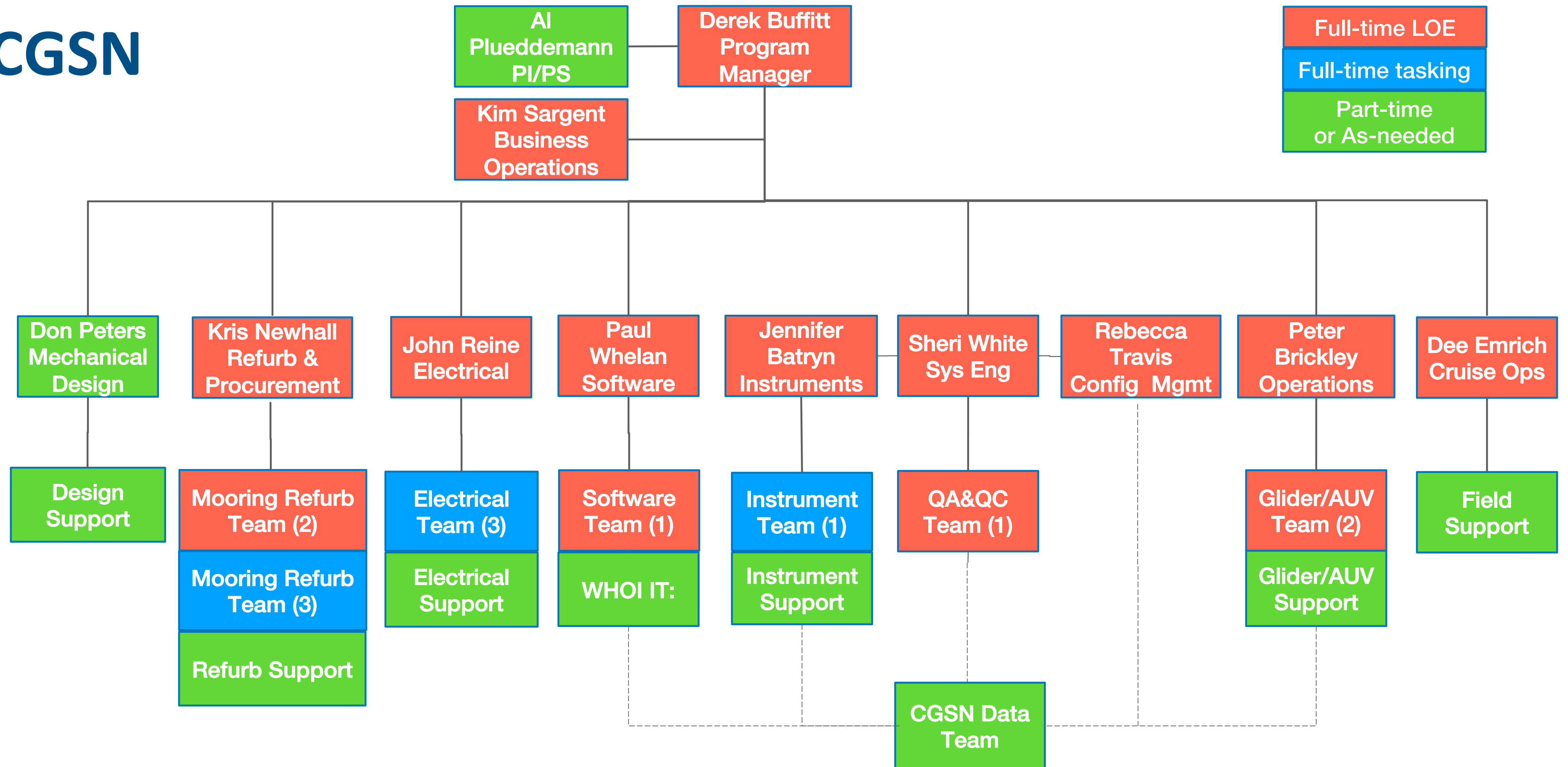


Coastal and Global Scale Nodes (CGSN)

- Three arrays
 - Global Irminger
 - Global Papa
 - Coastal Pioneer
- Two legacy arrays
 - Global Argentine Basin
 - Global Southern Ocean
- Shared infrastructure
 - Surface moorings
 - Profiler moorings
 - Gliders



CGSN

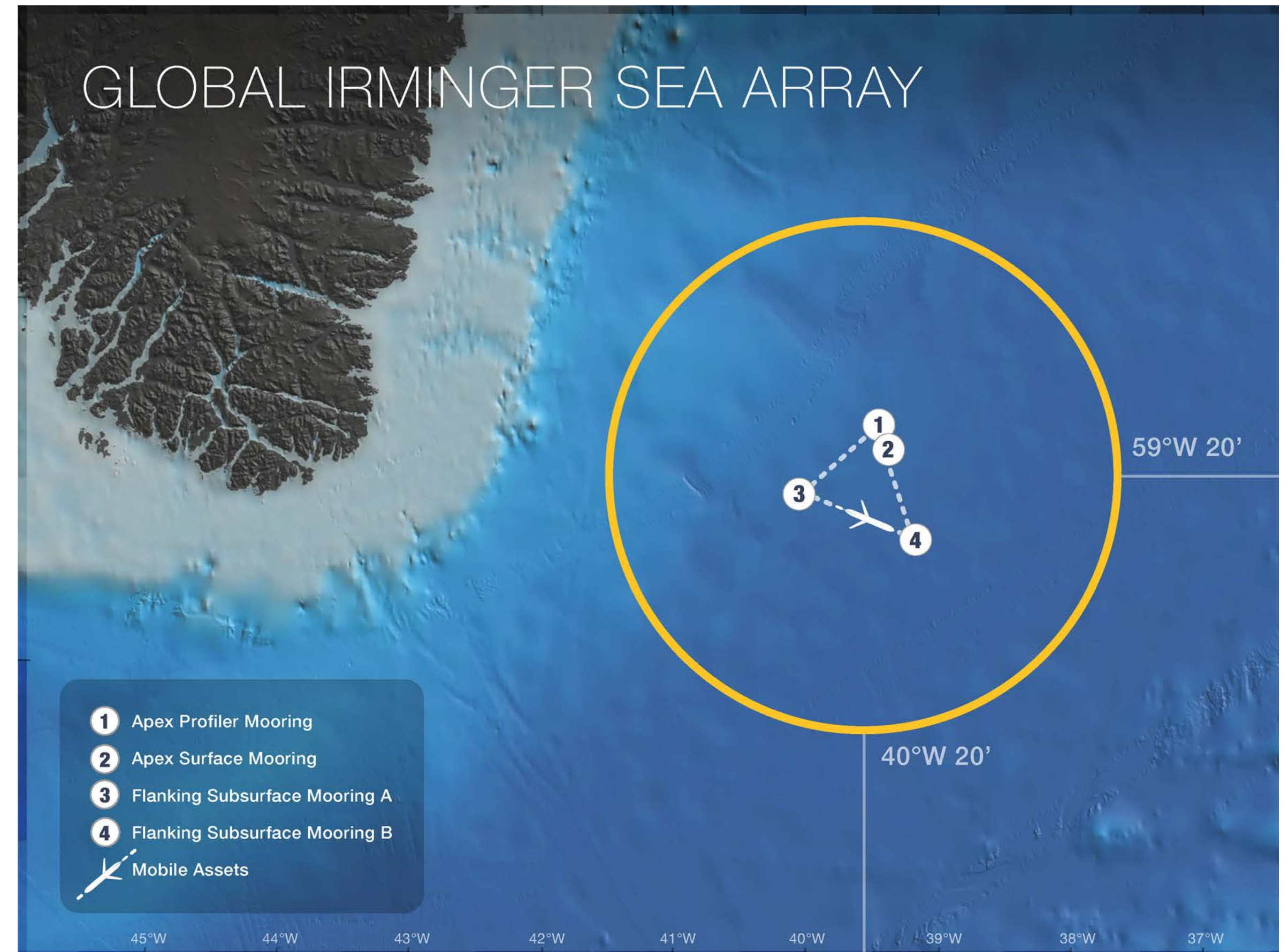


Total ~24 FTE plus part time support



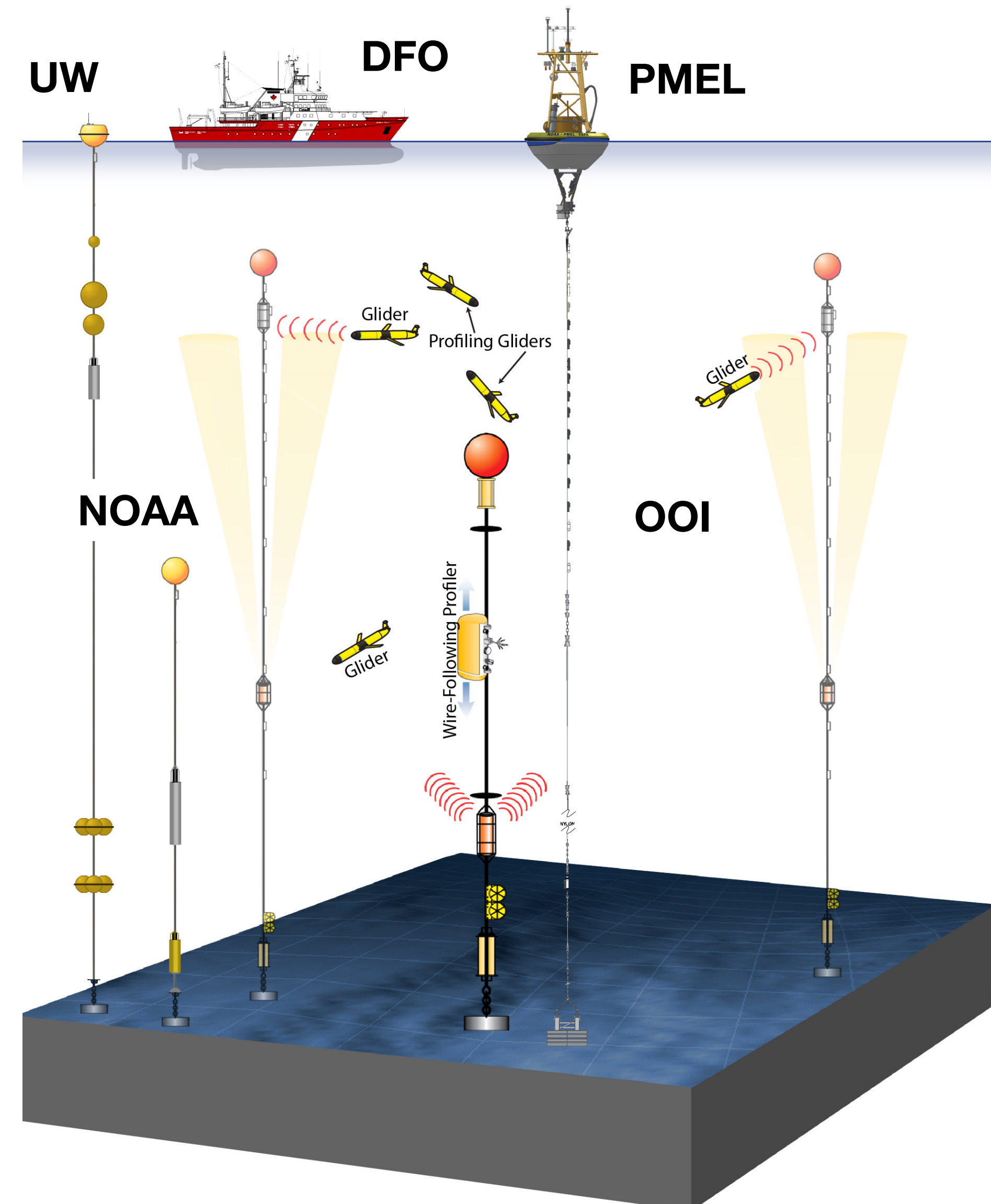
Global Irminger

- Triangular Array
 - SUMO, HPYM, 2x Flanking, gliders
- Science Themes
 - Climate variability & BGC cycles
 - Atmosphere-ocean exchange
 - Mixing and biophysical interaction
- Collaborative science
 - Flanking moorings part of OSNAP-East array
 - OSNAP Instruments added
 - Joint field operations



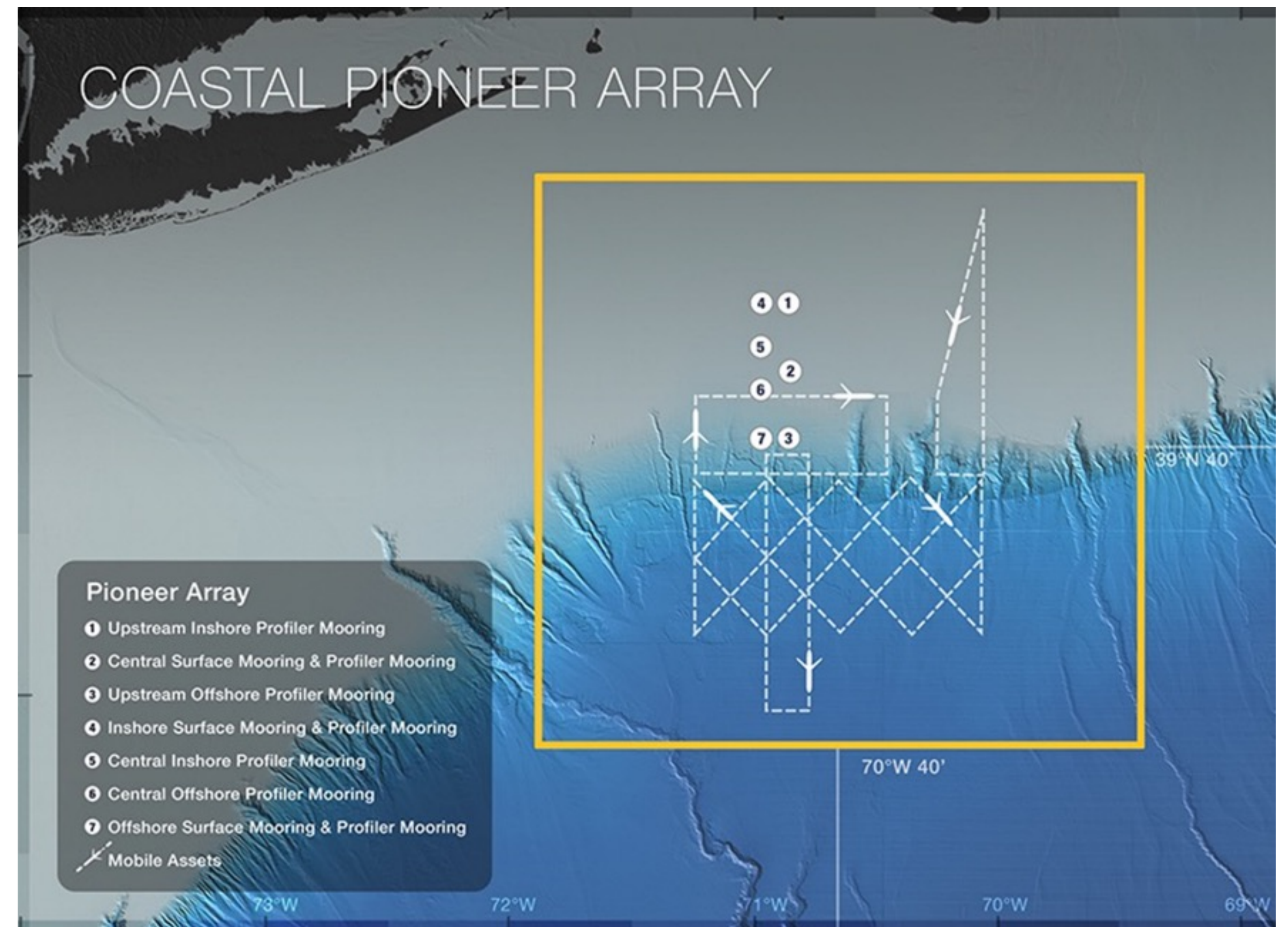
Global Papa

- Triangular Array
 - HPYM, 2x Flanking, gliders
- Science Themes
 - Climate variability & BGC cycles
 - Atmosphere-ocean exchange
 - Mixing and biophysical interaction
- Collaborative science
 - PMEL surface mooring
 - NOAA noise reference station
 - UW waverider
 - DFO Canada Line P



Coastal Pioneer

- Multi-scale array
 - 3x CSM, 5x CPM, gliders, AUVs
- Science Themes
 - Climate variability & BGC cycles
 - Atmosphere-ocean exchange
 - Mixing and biophysical interaction
 - Coastal dynamics & ecosystems
- Collaborative science
 - SPIROPA process study
 - NESBA acoustics study
 - NES-LTER surveys



Infrastructure: Pioneer Example

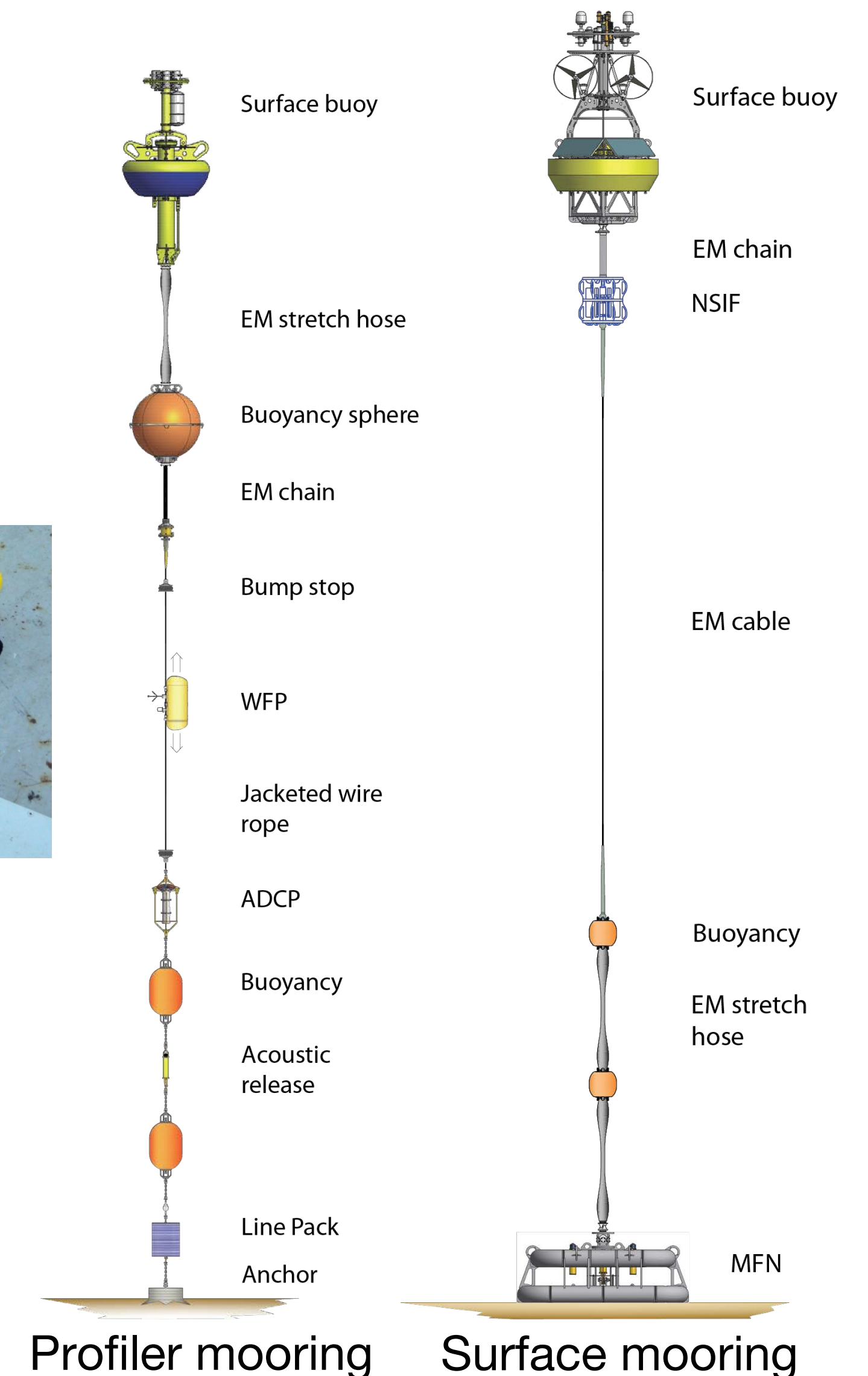
- Coastal Surface Mooring (CSM; 3x)
 - Buoy
 - Near-surface frame (NSIF)
 - Bottom frame (MFN)
- Coastal Profiler Mooring (CPM, 7x)
 - Wire following profiler
 - Uplooking ADCP
- Glider (5x)
- AUV (2x)
- Instruments (189)



Glider

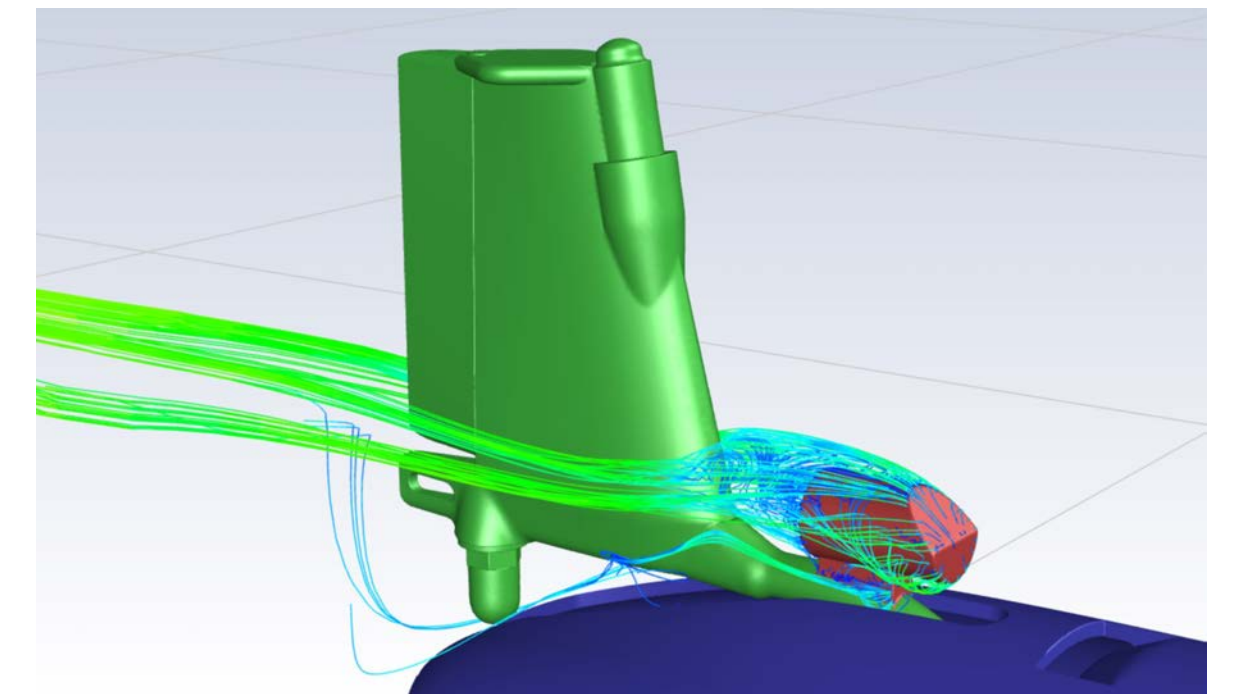
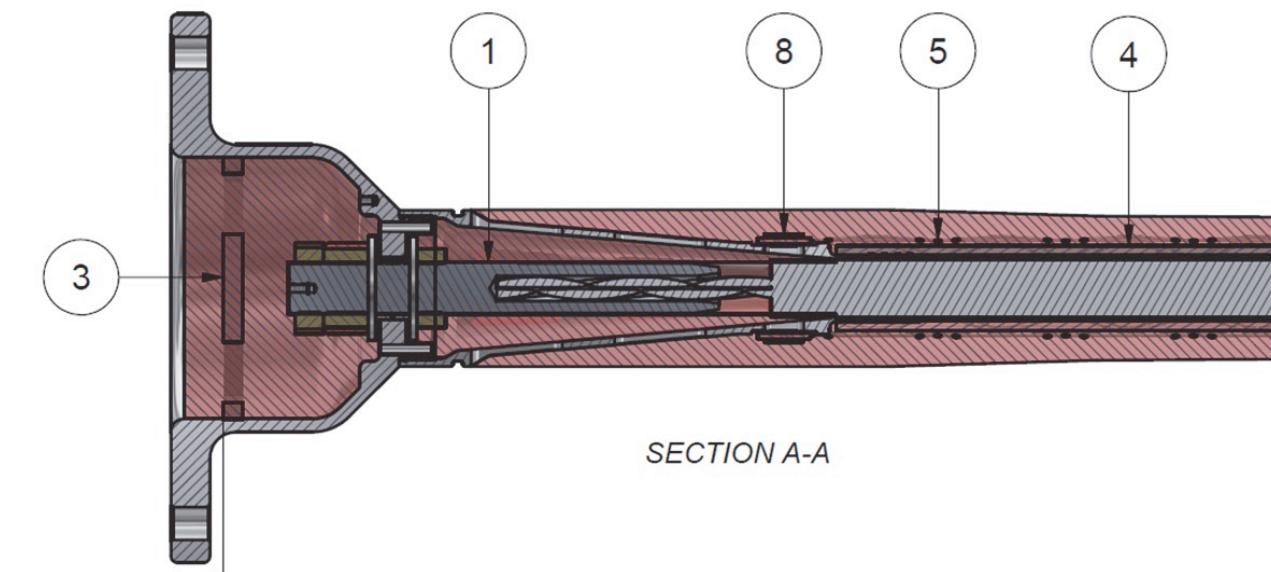


AUV



Technology Highlights

- Pressure compensated terminations
 - All stretch hose terminations for Pioneer Array
 - EM chain termination on Pioneer OSSM
- Rechargeable batteries
 - Prototype deployed on Pioneer OSPM
- Upgraded Iridium modem
 - Deployed on Pioneer surface and profiler moorings
- Upgraded secondary controller
 - Implemented on Irminger subsurface moorings
- Glider optode air calibration
 - Completed CFD modeling; At-sea testing underway
- Glider technology review
 - Completed assessment of technologies and vendors



Maintenance Cruises

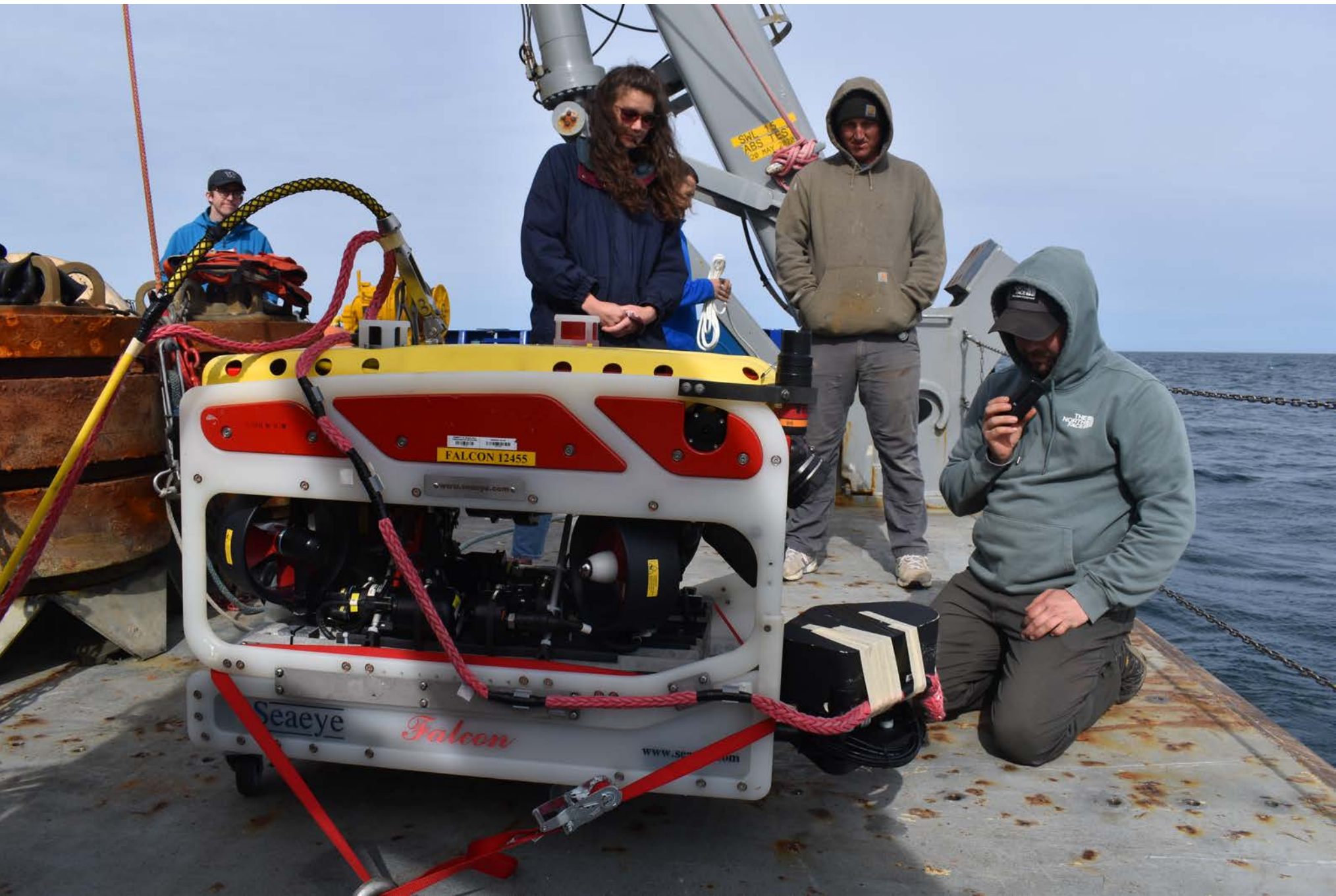
- Global arrays
 - Annual maintenance cruises
 - Prep and shipment to remote ports
 - Accommodate collaborators and ancillary activities
- Coastal Pioneer
 - Maintenance cruise 2x per year
 - Glider and AUV cruises as needed
 - Operate out of Woods Hole
 - Accommodate collaborators and ancillary activities



Operations Summary: Pioneer

- Operations
 - Pioneer-18 cruise, April 2022
 - Ancillary work with LTER, NOAA
 - All moorings operational; CSM power generation and delivery issues; CPM snags
 - All anchors recovered
- Refurbishment
 - Mooring refurb for Pioneer MAB tests
 - Instruments delivered to vendors
- Planning
 - Pioneer MAB test deployments and site survey, Feb 2023
 - R/V Armstrong, Charleston – Charleston

Platform	Infrastructure %	Instruments %	Delivered XMIT %	Data Collected %
CNSM	65%	78%	52%	84%
ISSM	98%	76%	59%	86%
OSSM	81%	77%	52%	83%
PMCI	86%	100%	100%	100%
PMCO	100%	100%	100%	100%
PMUI	100%	100%	100%	100%
PMUO	86%	100%	100%	100%
OSPM	86%	100%	100%	100%



Operations Summary: Papa

- Operations
 - Papa-9 cruise, May 2022
 - Ancillary work with NOAA, UW, DFO
 - All moorings fully operational; some acoustic comms issues
- Refurbishment
 - Mooring refurb to start next quarter
 - Instruments delivered to vendors
- Planning
 - Papa 10 cruise, May–Jun 2023
 - R/V Sikuliaq, Seward - Seward



Operations Summary: Irminger

- Operations

- Irminger-9 cruise, June 2022
- Ancillary work: OSNAP; CTD processing
- All moorings fully operational; some acoustic comms issues

- Refurbishment

- Mooring refurb to start next quarter
- Instruments delivered to vendors

- Planning

- Irminger 10 cruise, Aug –Sep 2023
- R/V Armstrong, Reykjavik - WHOI

Platform	Infrastructure %	Instruments %	Delivered XMIT %	Data Collected %
GI01SUMO	100%	100%	100%	100%



Operational Statistics: Last six months

- Infrastructure and data

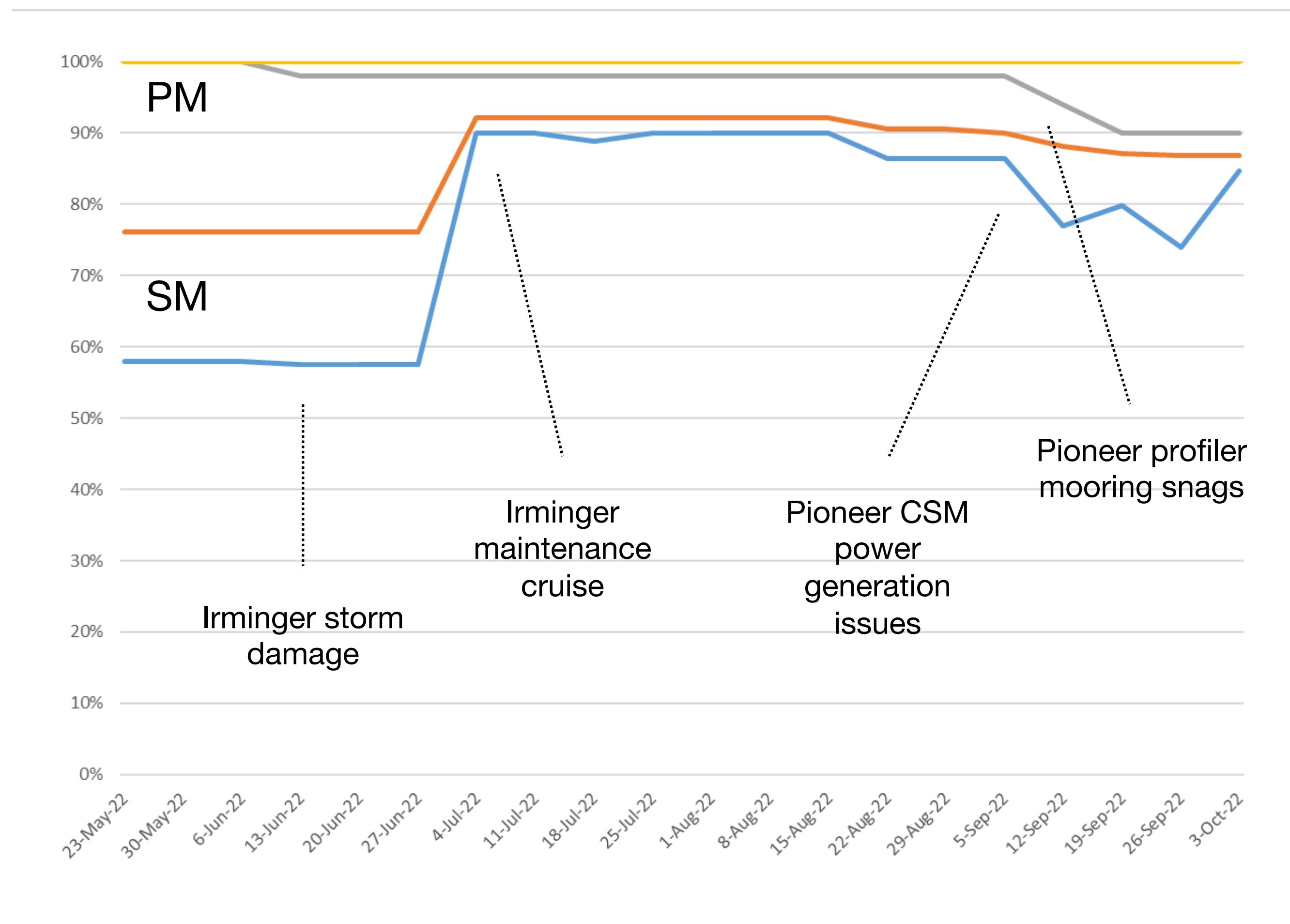
- Profiler moorings (PM)
- Surface moorings (SM)

- Impacts:

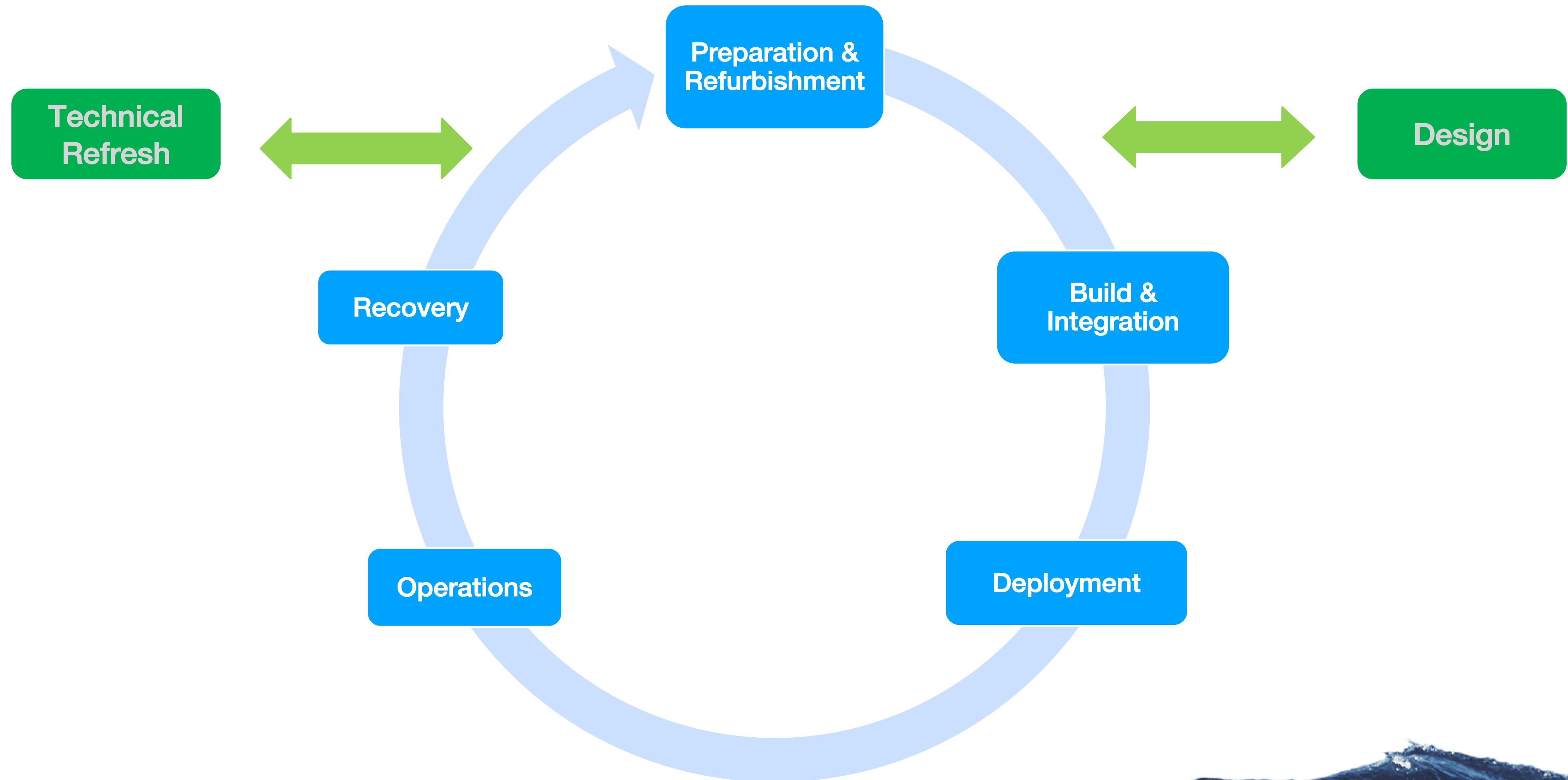
- Storm damage
- Fouling, profiler snags

- Mitigation

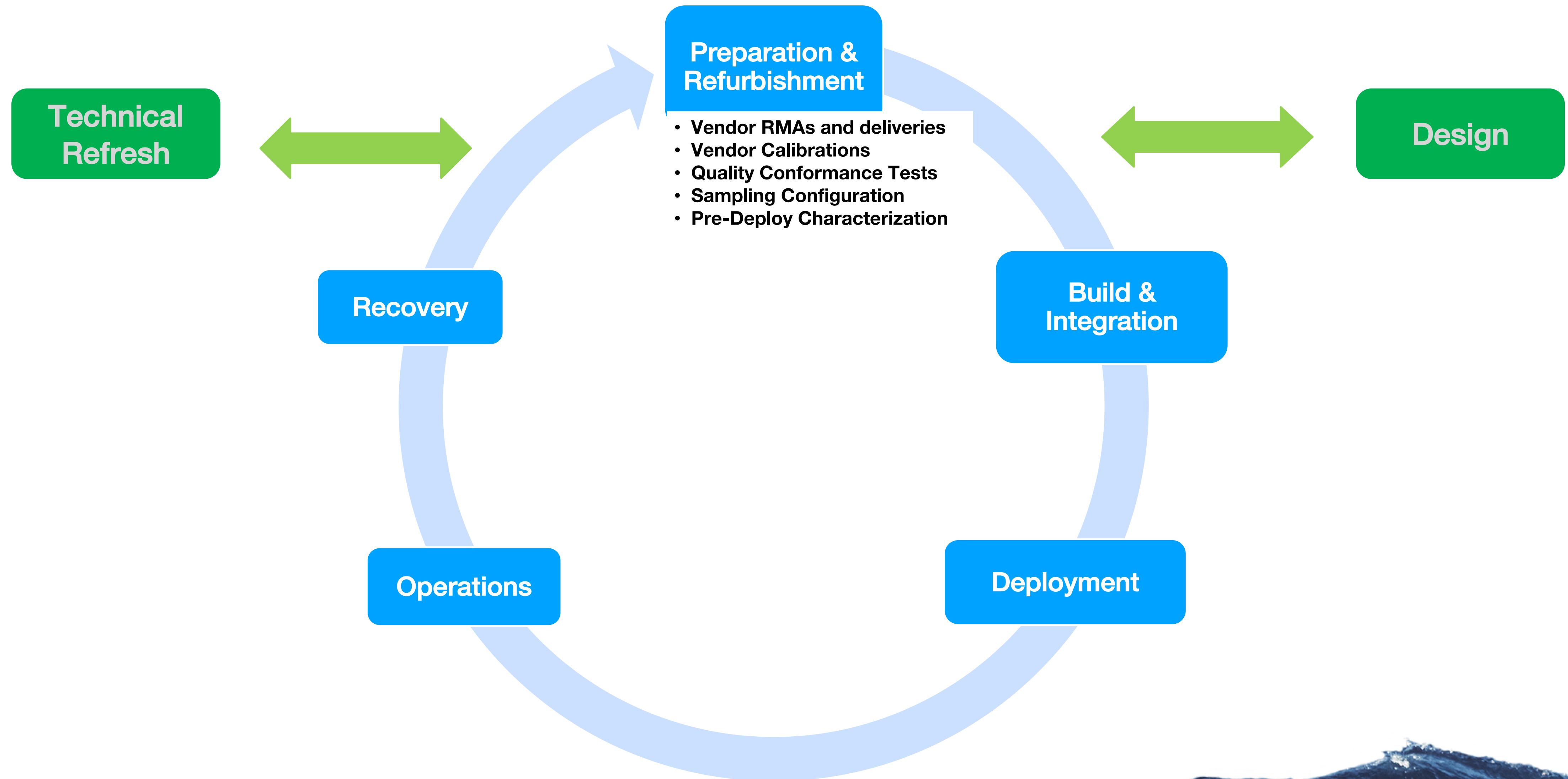
- Operator interventions
- Maintenance cruises



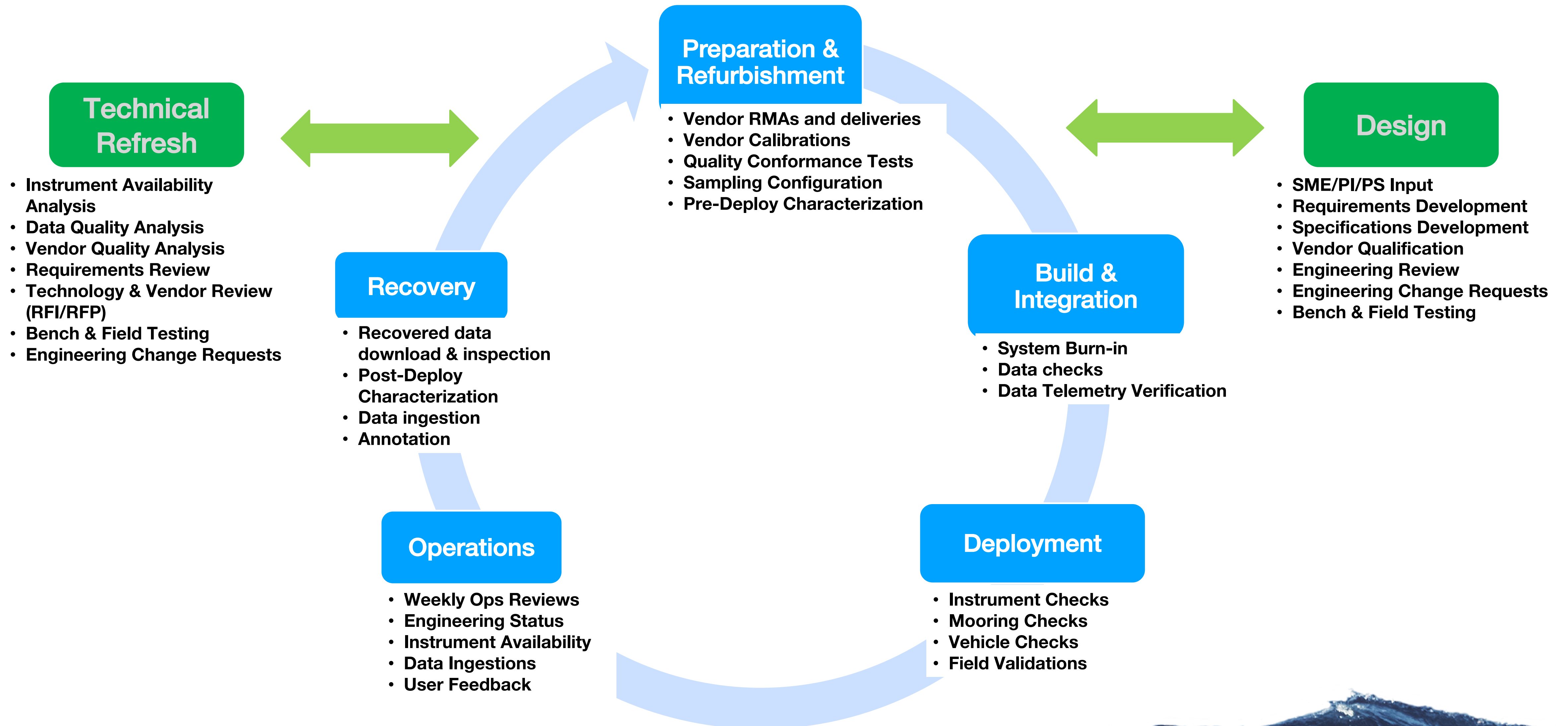
Operational Data Workflow



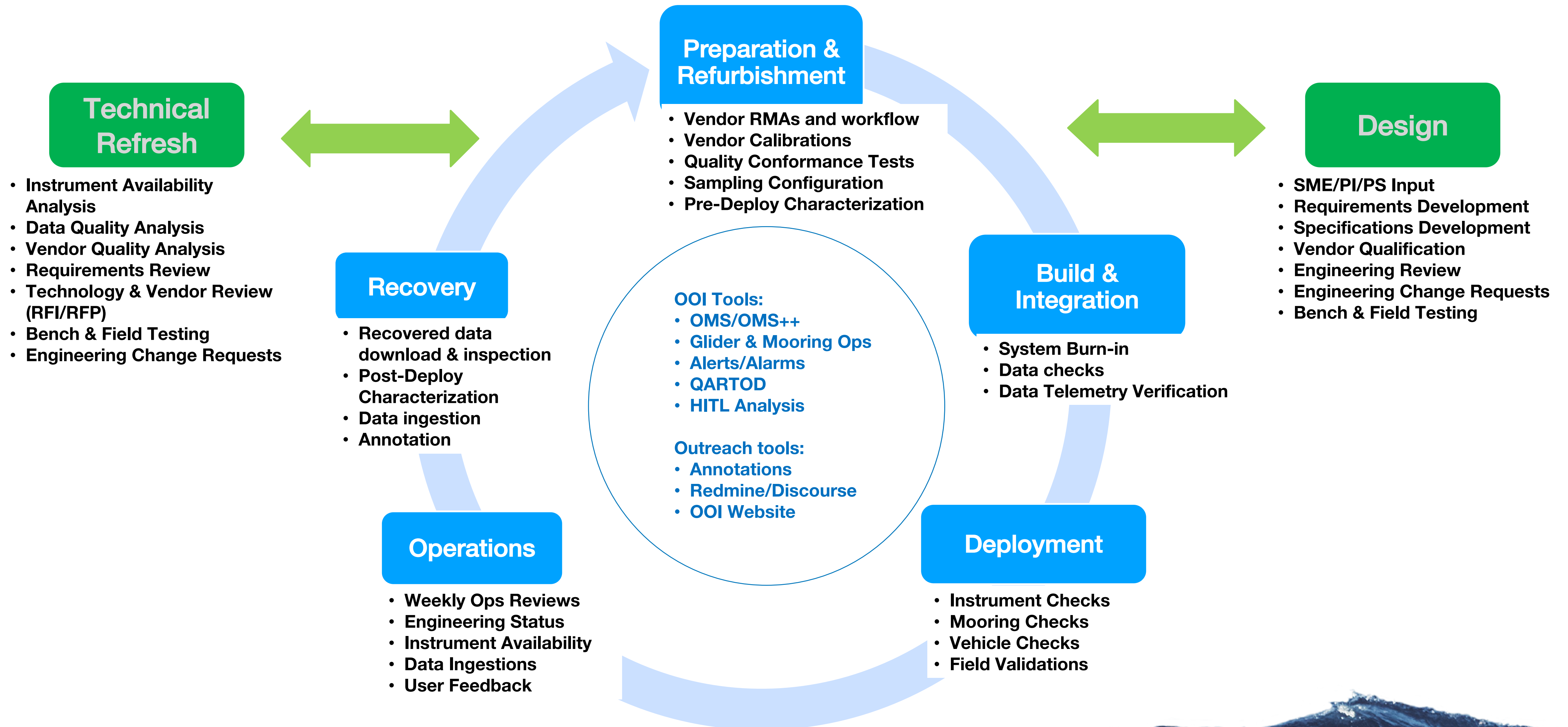
Operational Data Workflow



Operational Data Workflow



Operational Data Workflow





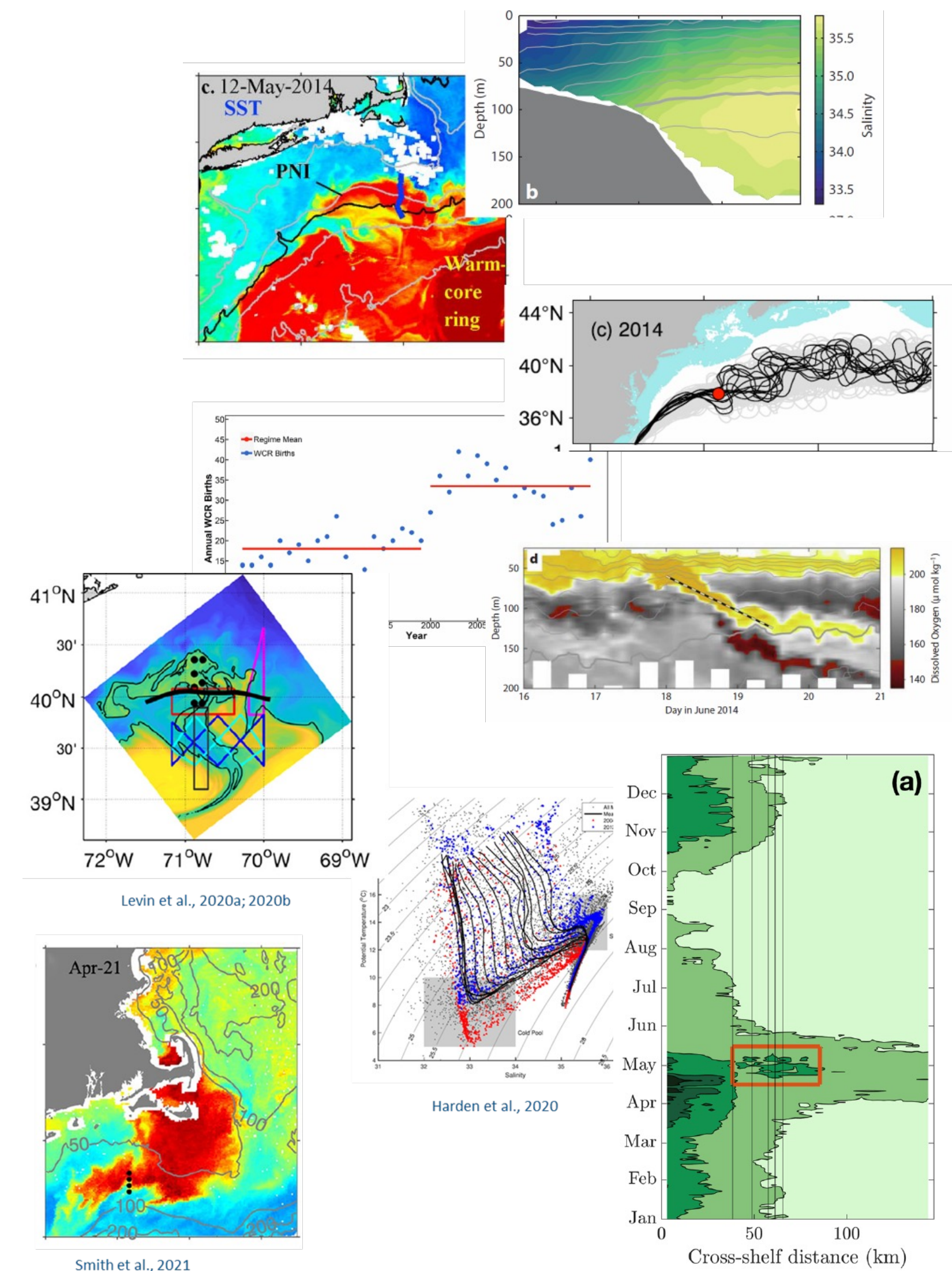
QARTOD Working Group – Cross MIO + CI

- QARTOD Gross Range Test (GRT) and Climatology Test (CT)
 - Tests operational for CTD, PHSEN, PCO2, PRESF
 - Accounts for ~15% of OOI data volume
 - Current effort is focused on FLORT, DOSTA, PAR, METBK
 - Next group will be NUTNR, SPIKR, PREST, ADCP, WAVSS, VEL
- Additional QARTOD-related efforts
 - CI developing UI to simplify input and management of QARTOD test parameters by MIOs
 - Considering how QARTOD flags may be used to support better visualization of data in Data Explorer
 - Plan to communicate available tests and QARTOD status to community through OOI website



NES Pioneer Science Highlights

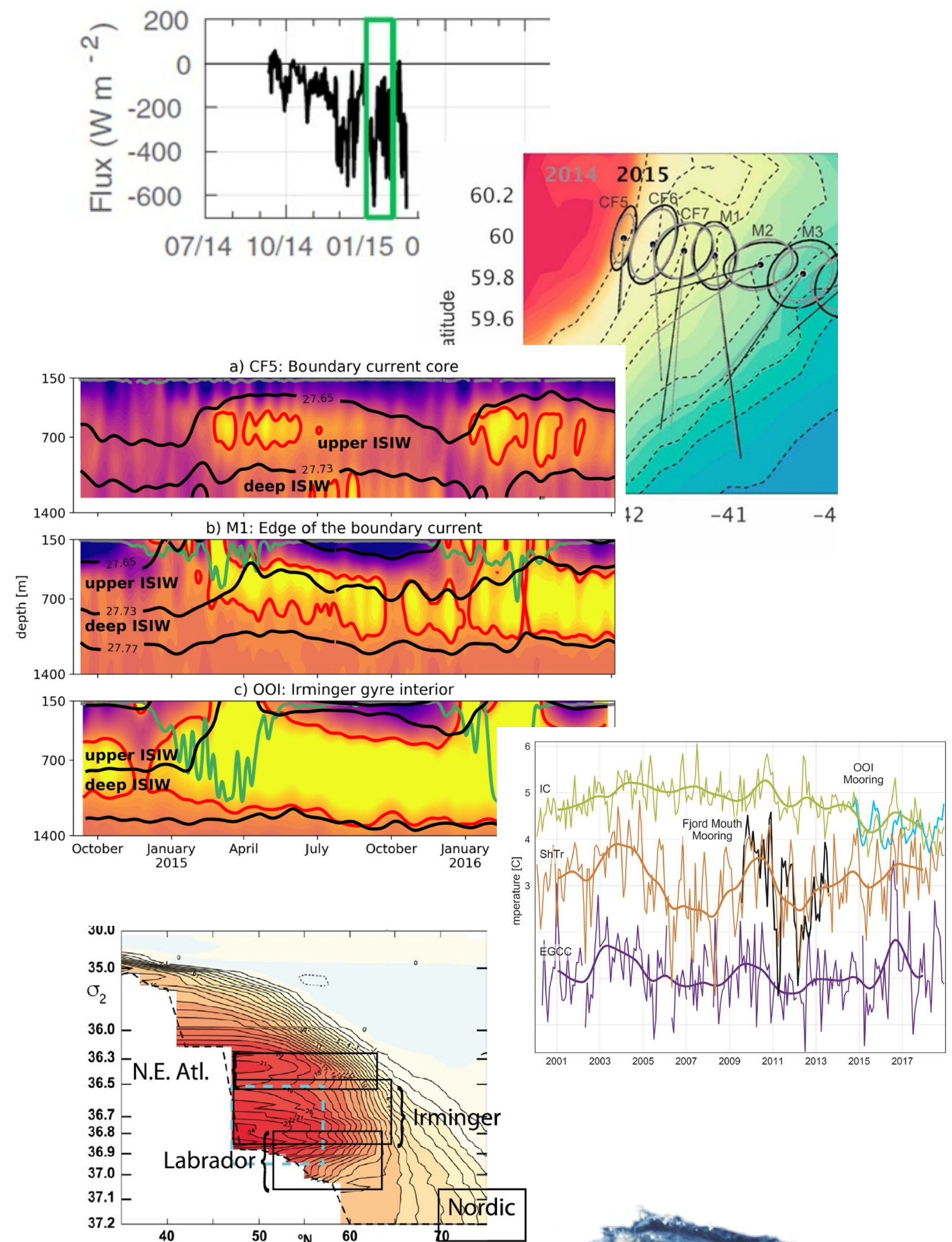
- First sustained, interdisciplinary shelfbreak observatory
- Over 20 publications showing:
 - New frontal dynamics and exchange mechanisms
 - Intrusions, subduction, warm core rings
 - Changing shelf water properties
 - Primary production on shelf and at shelfbreak
- First glimpse of a changing coastal regime
- More to come
 - BGC processes
 - Carbon cycling
 - ...





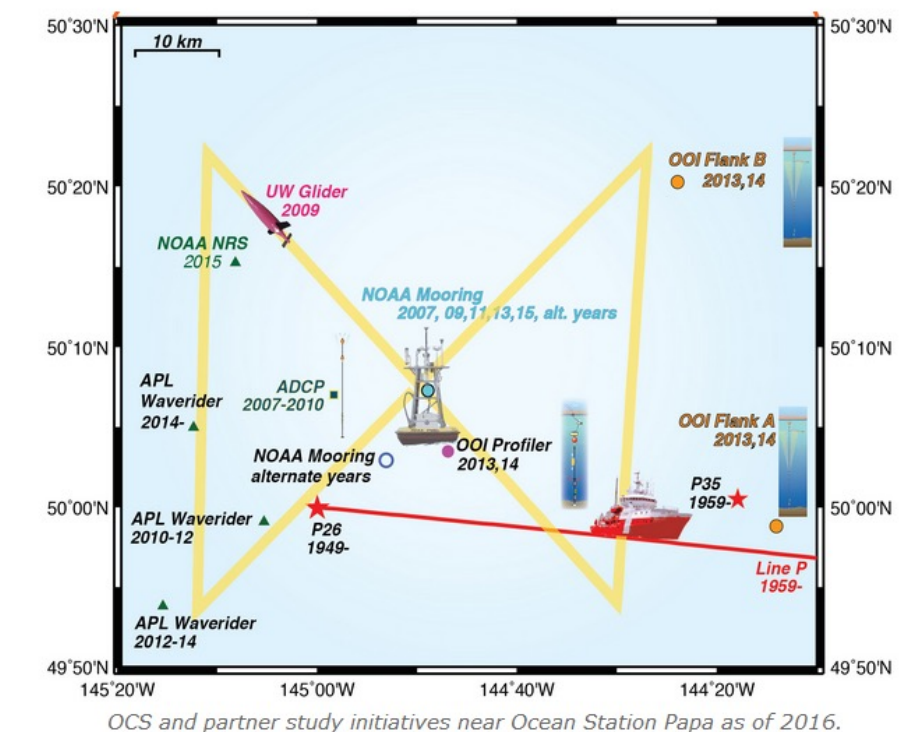
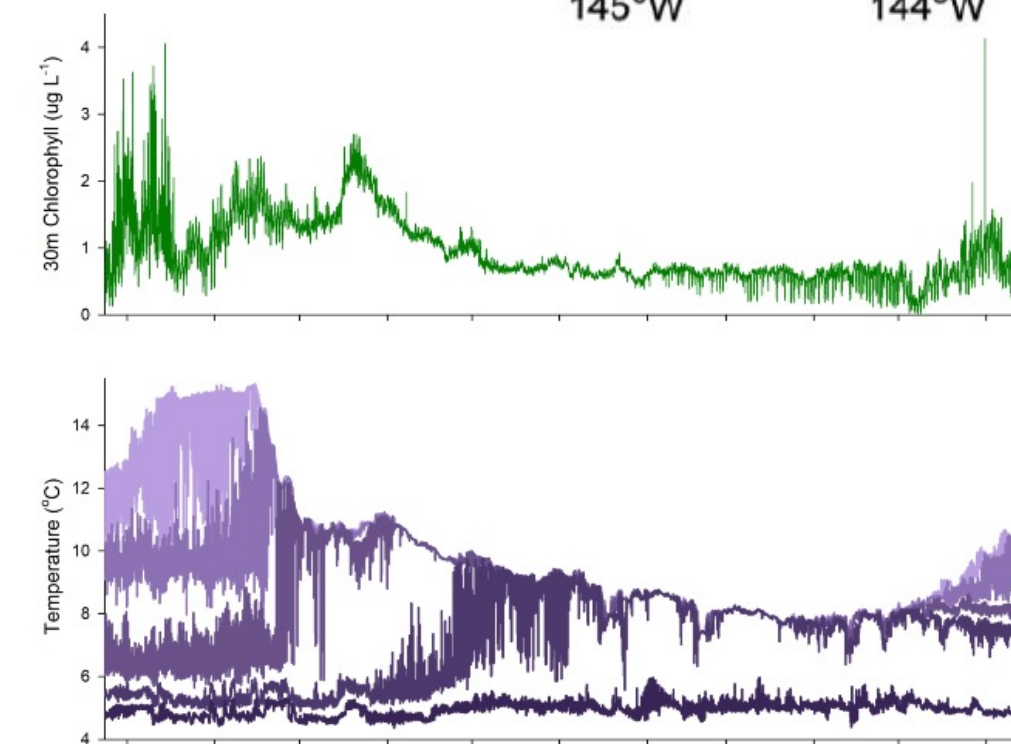
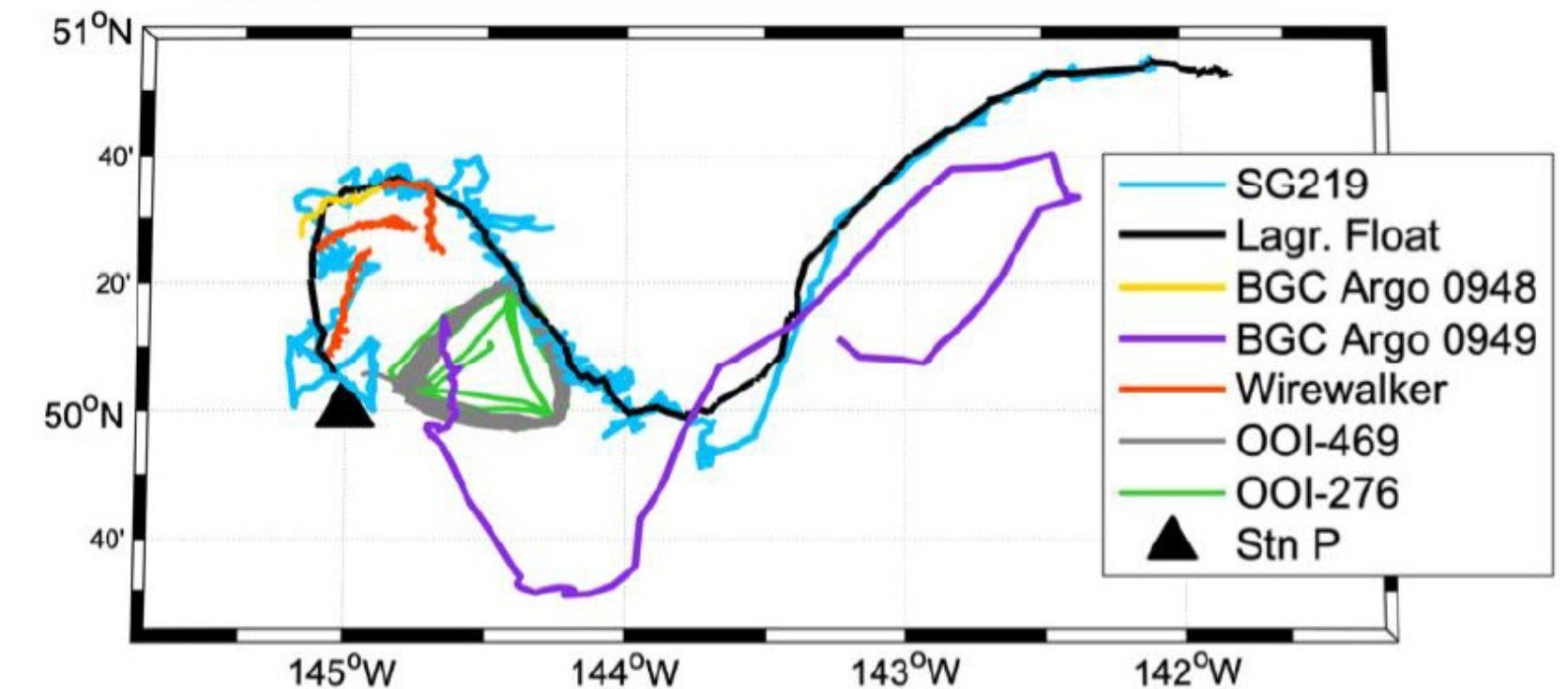
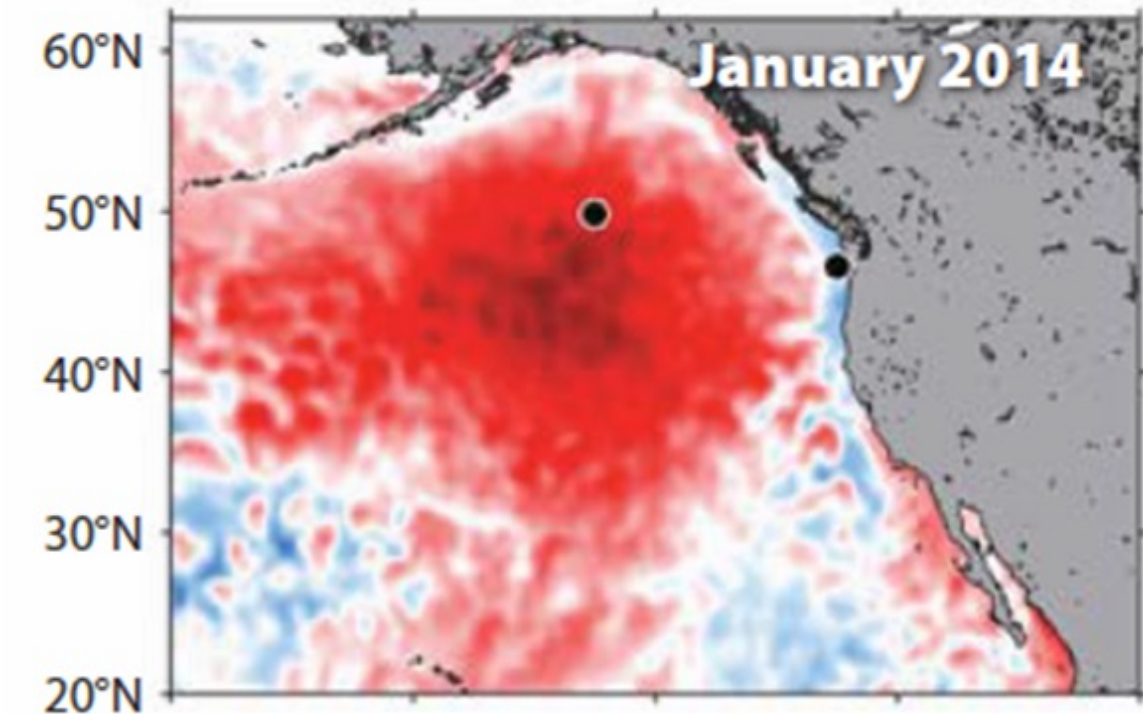
Irminger Science Highlights

- Sustained surface/subsurface array in a challenging environment
- Over 20 publications showing:
 - First evidence of Irminger deep water formation
 - First direct observations of winter heat loss
 - First long-term estimate of DWBC transport
 - First estimate of seasonal carbon cycle
- Controversial in 2003, now unequivocal that Irminger plays key role in AMOC
- Collaborative science
 - OSNAP instruments, moorings, drifters
 - OSNAP Post-processed CTD data with DOIs



Papa Science Highlights

- Collaborative site with historical continuity
- Multiple studies exploring:
 - NE Pacific heat waves and ecosystem impacts
 - Fate of primary production (EXPORTS)
 - Seasonal cycle of primary production
 - Internal wave propagation
- Regional connectivity (EA, RCA, IOOS)
- Collaborative science
 - NOAA, PMEL, UW, DFO field operations
 - NE Pacific Workshop – modeling interest



OCS and partner study initiatives near Ocean Station Papa as of 2016.

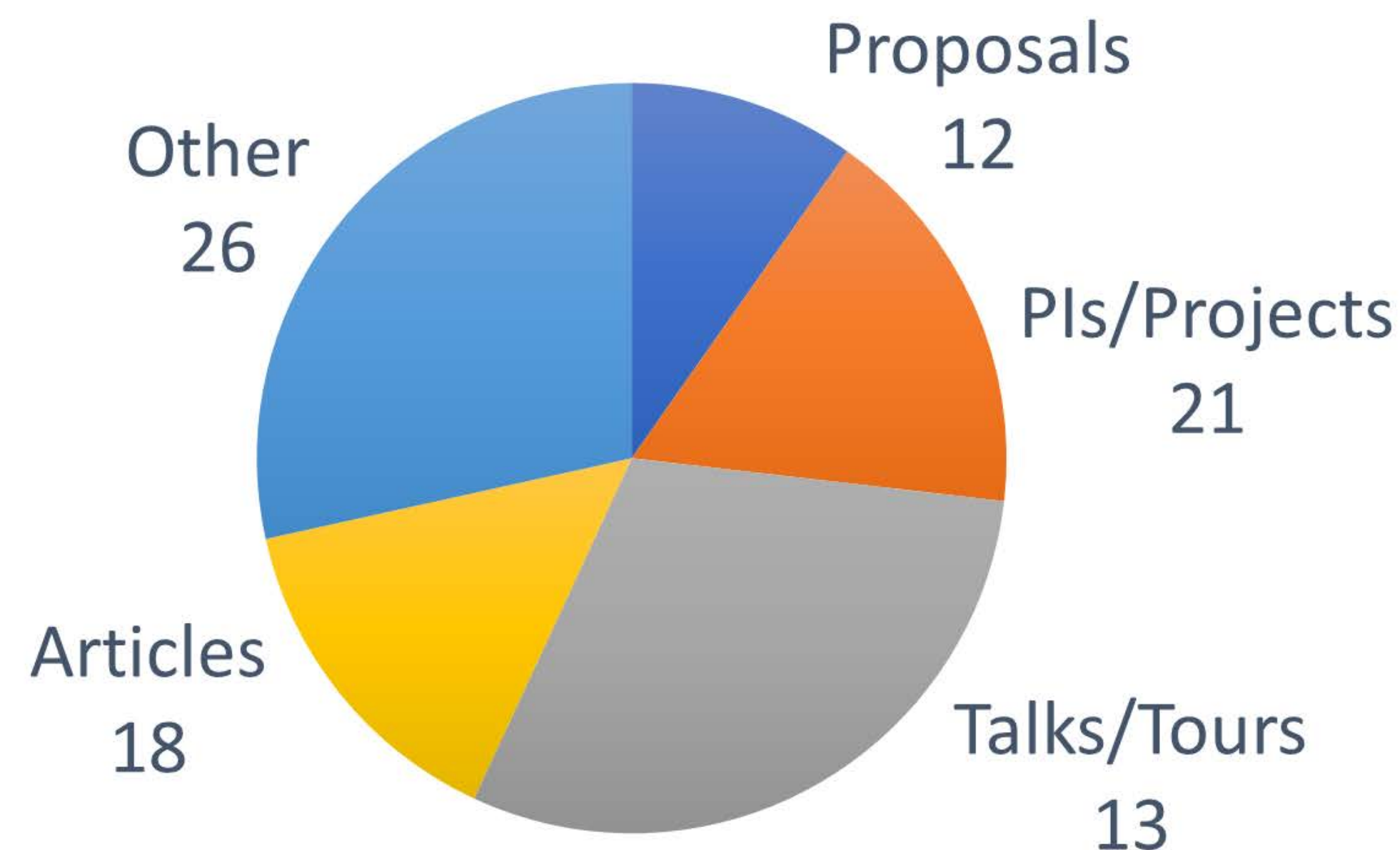


Community Engagement Statistics

Over 100 reportable activities in PY-IV

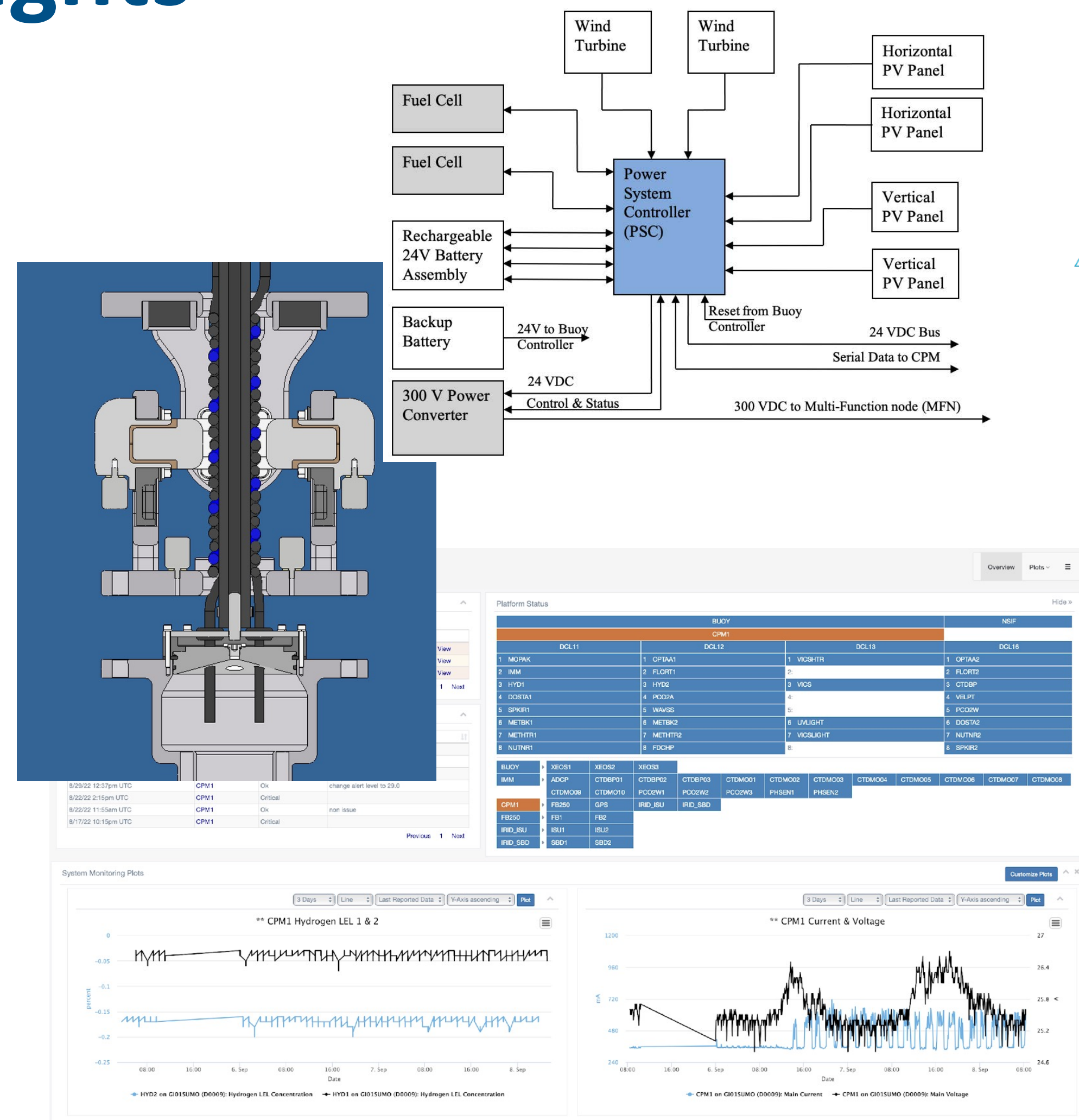
- Proposal-Related:
 - Feasibility assessment, subcontract
- Pls and Projects:
 - Collaborations and Ancillary Activities
- Talks and Tours:
 - From LOSOS to national conferences
- Articles:
 - Contribution to Newsletter and Website
- Other:
 - Interns, committees, working groups, ...

Engagement Activities



Community Engagement Highlights

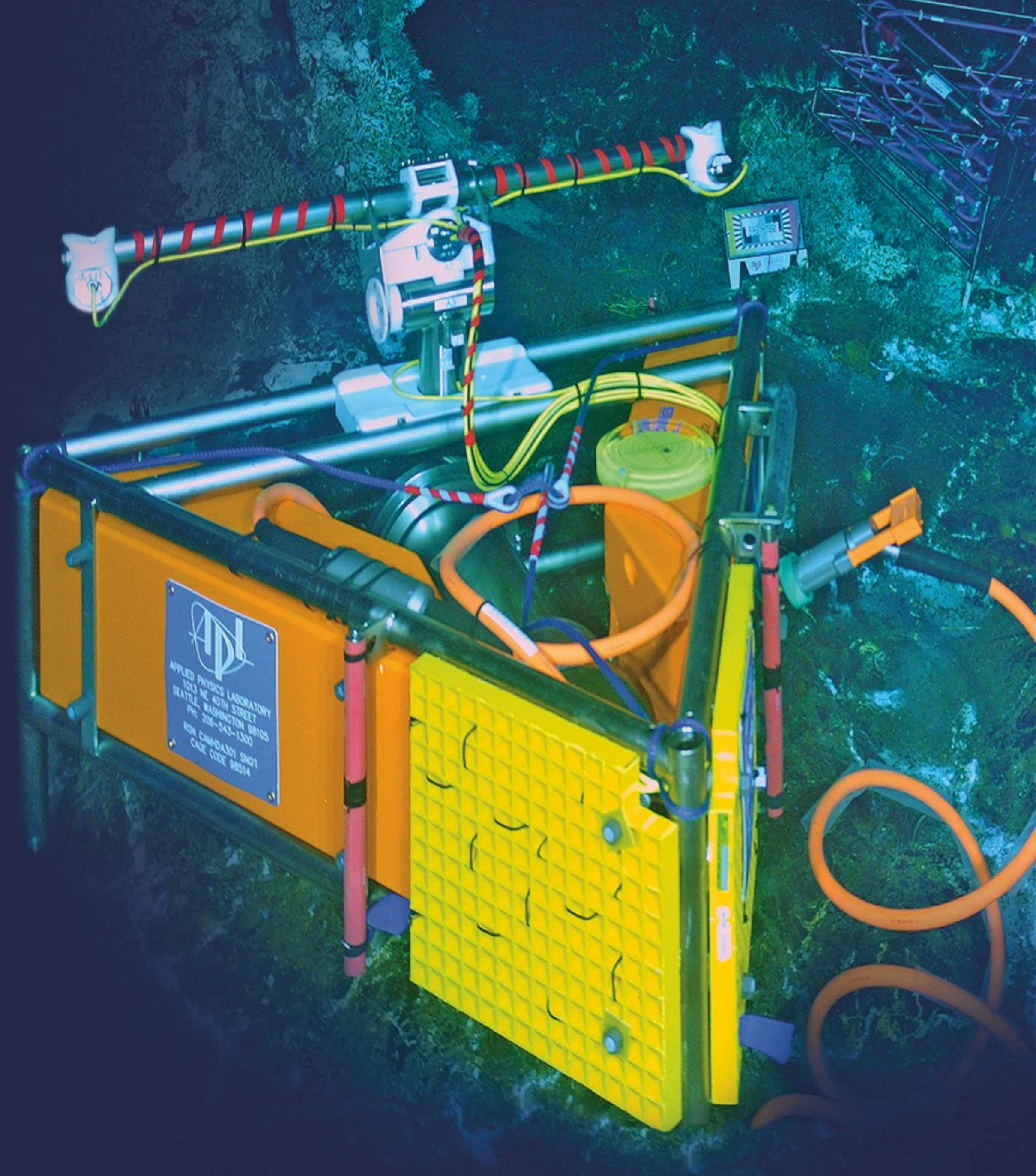
- Talks and Tours
 - Eng students, Sea Grant Girls in Science, Oceanog of the Navy
- MTS Buoy Workshop
 - Pioneer relocation update
 - Surface mooring hardware, software and power systems
- UG2 Glider Workshop
 - Pioneer glider operations review
- MABPOM
 - Pioneer relocation update





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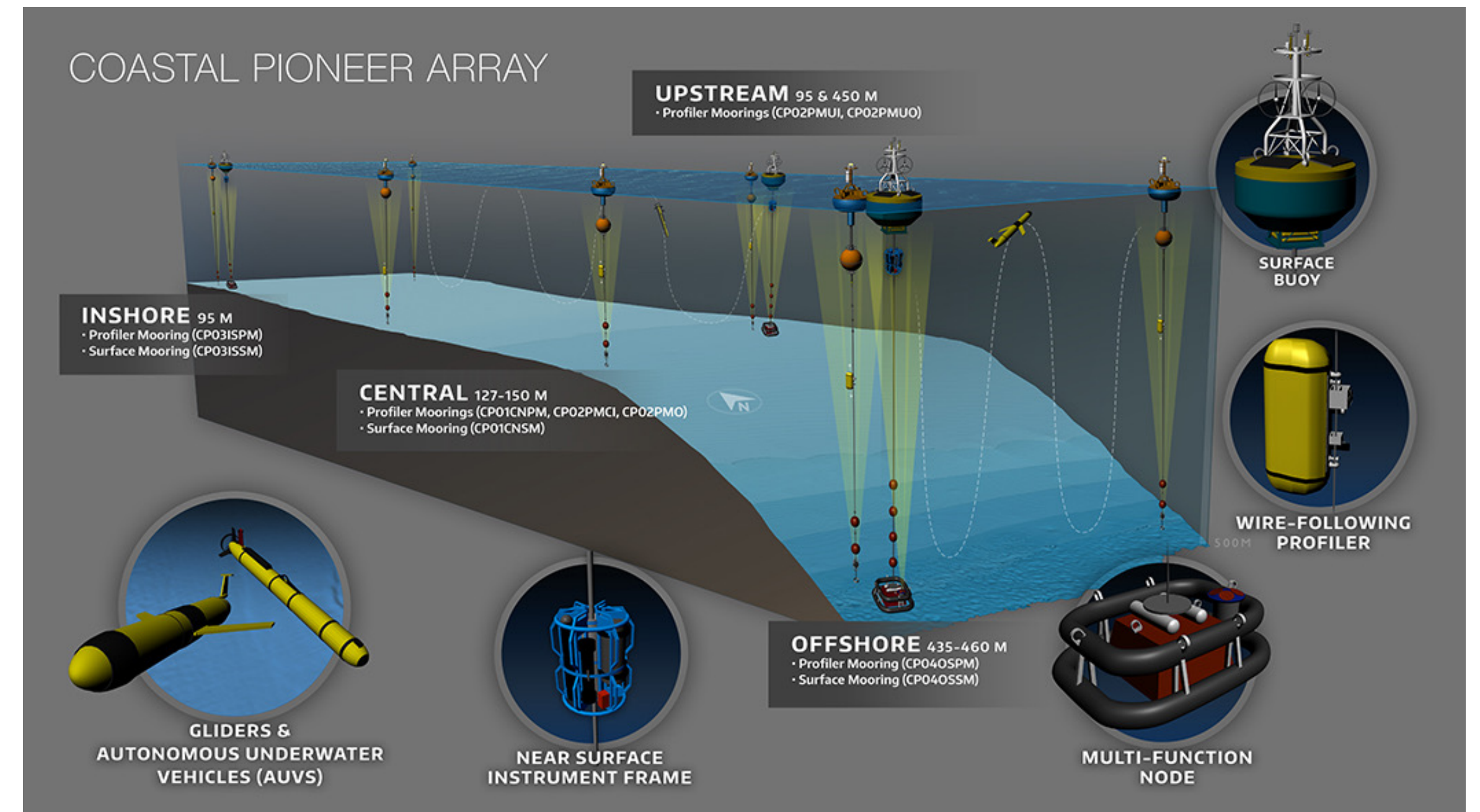
Questions?



Extras

Pioneer Impacts

- First sustained, interdisciplinary shelfbreak observatory
- New frontal dynamics and exchange mechanisms
- First glimpse of a changing coastal regime
- Towards modeling and prediction of continental shelf ecosystems



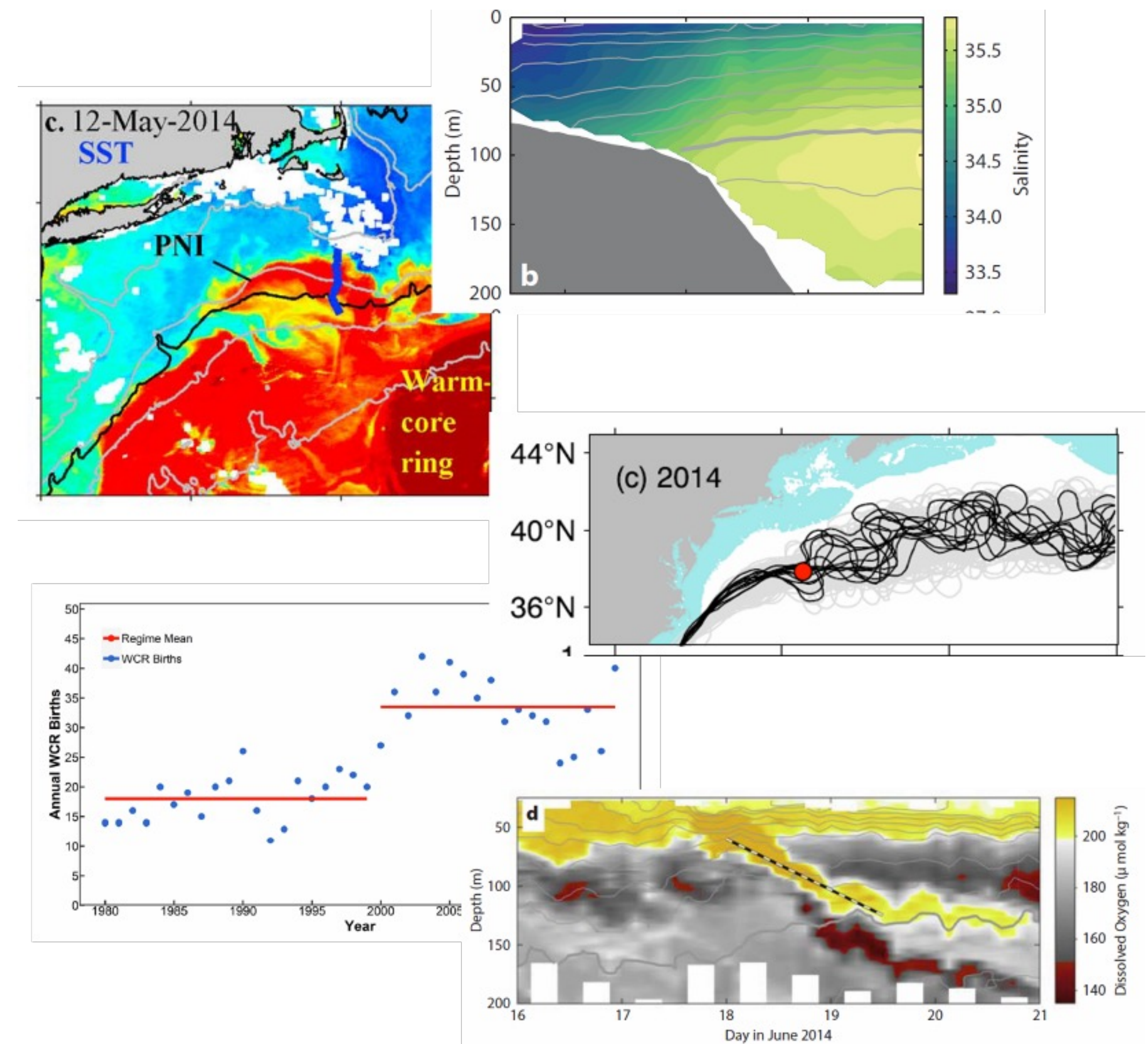
QAQC Scope

- Vendor Qualification & Management
- Quality Conformance Testing
- Burn-In Testing
- Instrument & Platform Checks
- Field Validations
- Infrastructure & Instrument Availability
- Data Delivery Verification
- Data Ingestions
- Metadata Delivery
- Data Annotations
- HITL Data Reviews
- QA/QC Process & Tool Development
- QARTOD
- User Requests and Data Questions



Science Highlights: Pioneer

- T/S changes at the shelfbreak
 - Gawarkiewicz et al., 2012; Harden et al., 2020
- Ring water intrusion
 - Zhang and Gawarkiewicz, 2015
- Slope water subduction
 - Zhang and Partida, 2018
- Subsurface intrusions
 - Chen et al., 2022; Gawarkiewicz et al., 2022
- More WCR in the slope sea
 - Gangopadhyay et al., 2019; 2020; Silver et al., 2021; Silver et al., 2022



Science Highlights: Pioneer

- Shelf water getting warmer
 - Chen et al., 2018; Gawark et al., 2019; Chen et al., 2020; Perez et al., 2021
- Shelf water getting saltier
 - Gawarkiewicz et al., 2018
- Assimilative regional modeling
 - Levin et al., 2020, Part 1 & 2; Lopez et al., 2020; Moore et al., 2021
- Phytoplankton at shelf and shelfbreak
 - Chen et al., 2022; Gawark. et al., 2022
- Community production
 - Mehta, 2022

