Joint Oceanographic Institutions

The Ocean Observatories Initiative (OOI)

UNOLS Fleet Improvement Committee Meeting Update

October 10, 2007

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Joint Oceanographic Institutions

Status

- NSF/MREFC Capital Investment: $331M over five years
- Operation Funding: Ramping to $50M annually
- Design lifetime: 25 years
- Successful Conceptual Design Review in August of 2006
- Included in FY 2007 Presidential Budget
- Included in FY 2008 Request
- Preliminary Design Review scheduled December 2007
- National Science Board review in spring of 2008
- Projected July 2008 start.

Status

- NEPA Programmatic Environmental Assessment is being performed by JOI on behalf of NSF.
- Team is in place:
  - JOI (Consortium for Ocean Leadership, soon): System Integrator
  - NSF Advisors
  - University of Washington: Regional-Scale IO
  - UC San Diego: Cyberinfrastructure (CI) Implementing Organization (IO)
  - Woods Hole Oceanographic Institution (with OSU and Scripps): Coastal and Global-Scale IO

NSF Projected Funding for OOI
(FY2008 Budget Request to Congress)

Regional-scale nodes	$169M	51%
Coastal and Global-scales	96	29%
Cyberinfrastructure	29	9%
Integration, management, education	21	6%
Environmental Assessment	6	2%
Management Reserve	10	3%

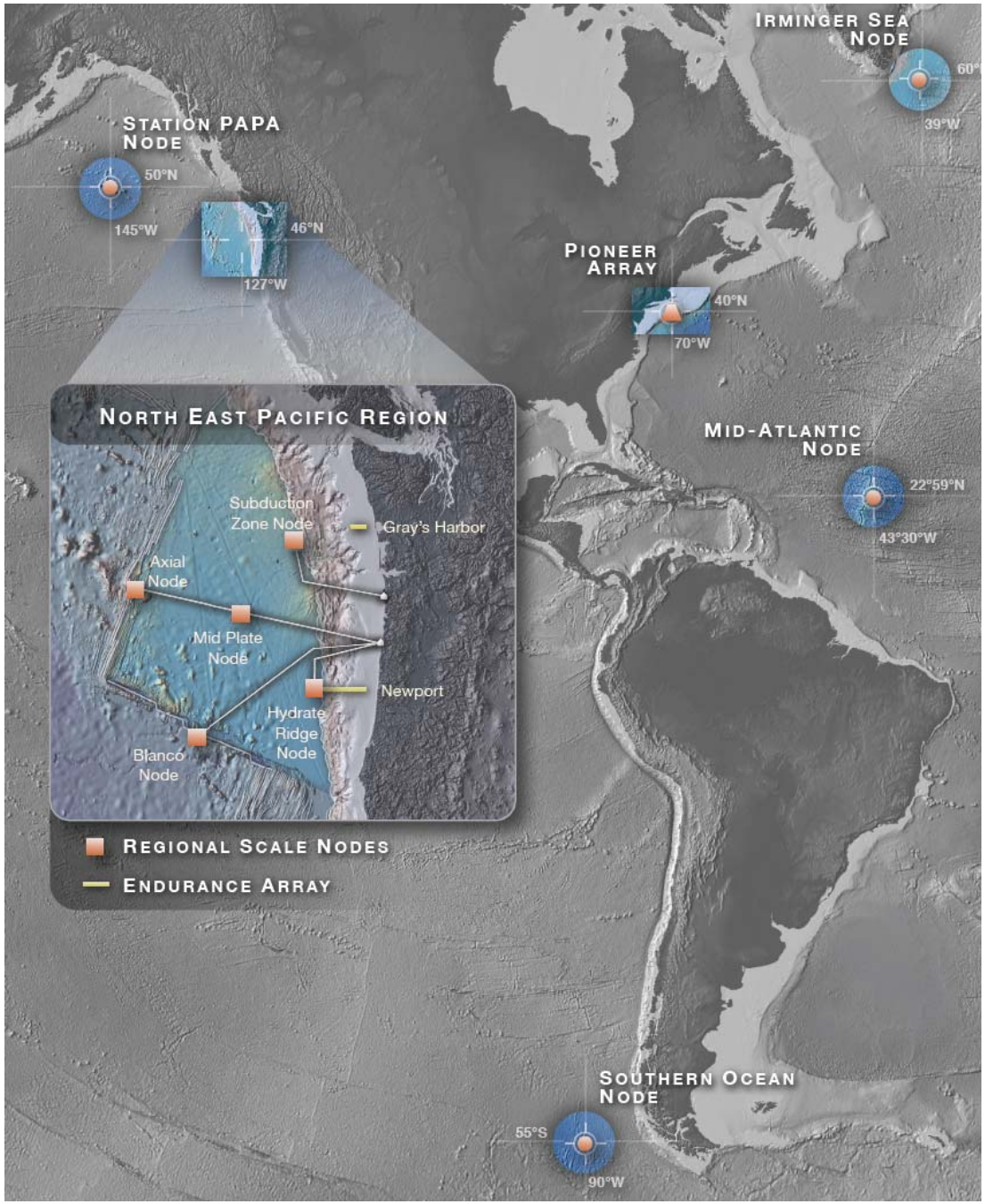
✓4 Global scale nodes in Southern Ocean, Station Papa, Irminger Sea, Mid-Atlantic

✓5 Regional-scale nodes in NE Pacific, cabled plate-scale observatory

✓Coastal-scale assets in Mid- Atlantic Bight shelf-break and NE Pacific continental margin.

✓Each scale incorporates mobile assets.

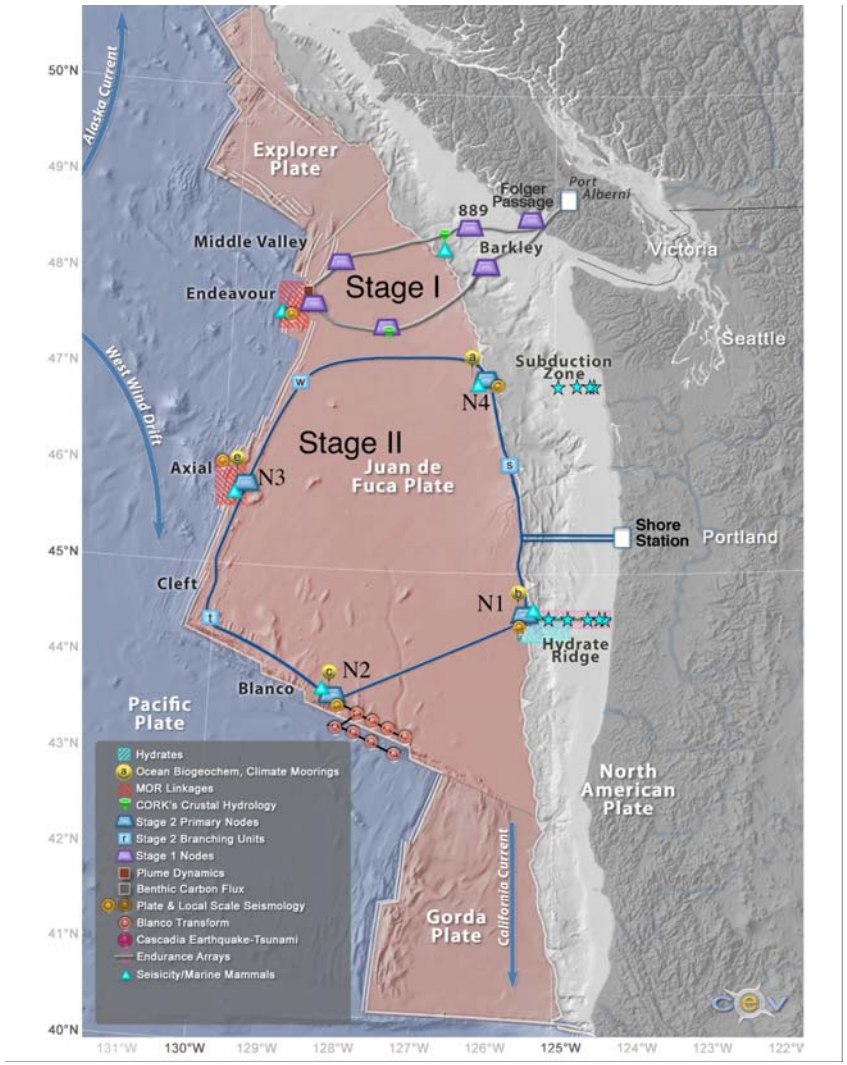
✓Cyberinfrastructure to allow adaptive sampling, collaborative experimentation and analyses.



Cabled Nodes, March 2007

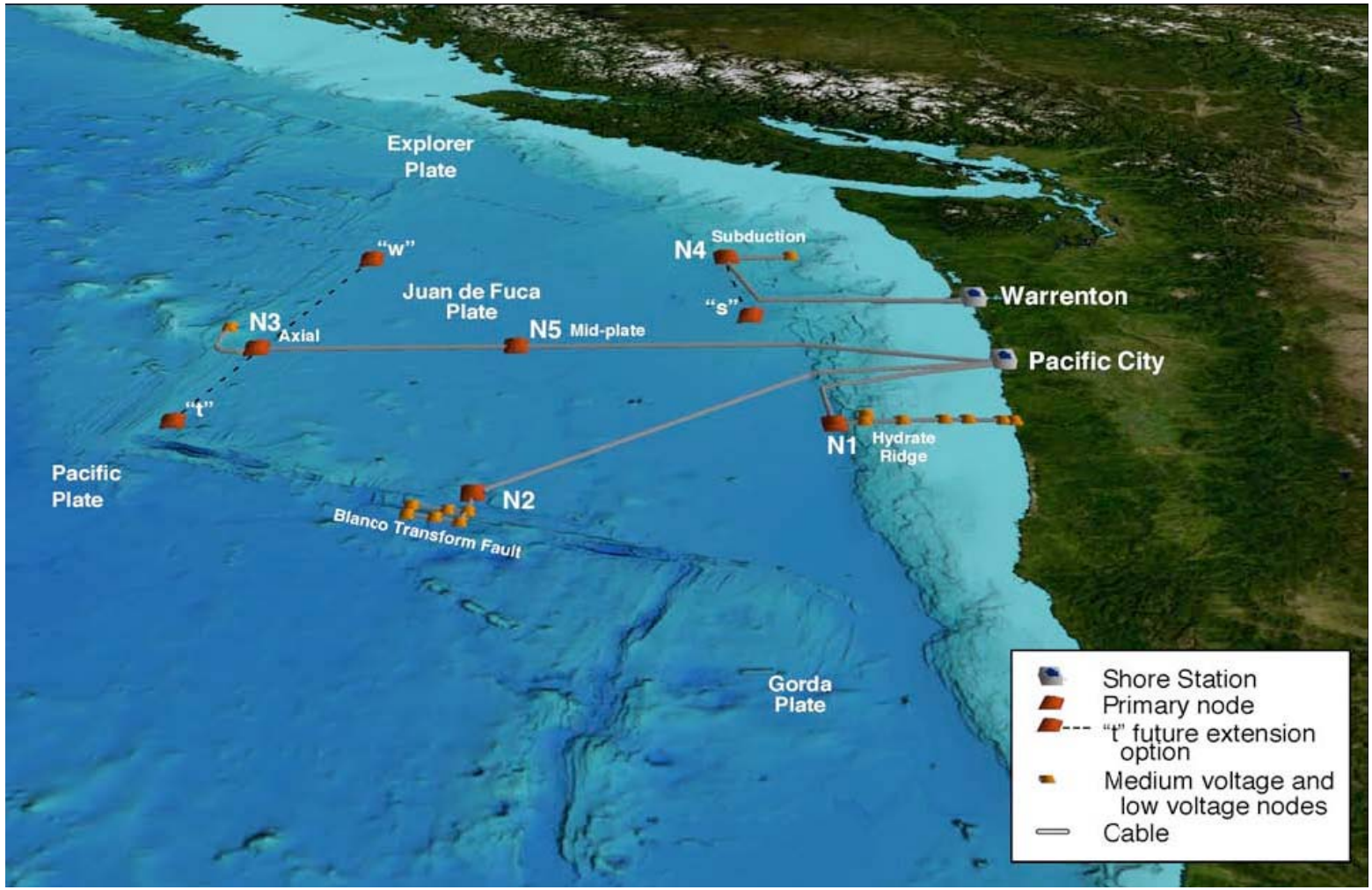
US Stage II

- June 2006 to March 2007, from 6 to 4 primary nodes
- No Connection to Stage I
- From 4 to 3 expansion/branching units
- Two Coastal Endurance Lines
- Desk-top study of cable routing.



Regional-scale Cabled Nodes – Star Design

5 primary nodes; 3 expansion nodes; 1 or 2 Endurance lines



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Advantages to Star Design

- Less Cable (albeit more armoring)
- Higher bandwidth per node
- Higher power per node
- Simpler node design
- Three repeater-less segments; one segment with regenerator at bonus Mid-plate Node
- Higher availability during maintenance and repairs

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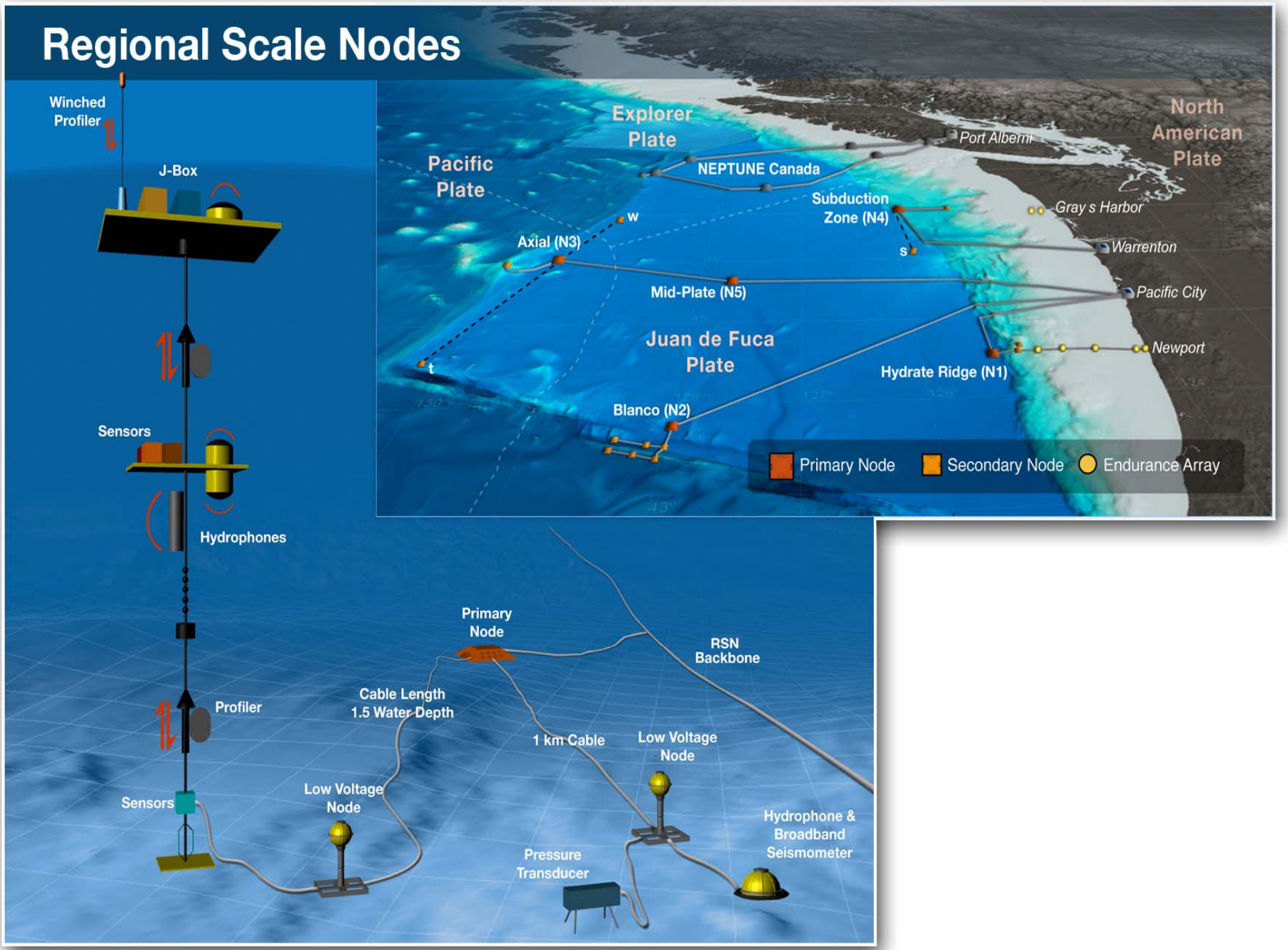
Advantages to Two Landing Stations

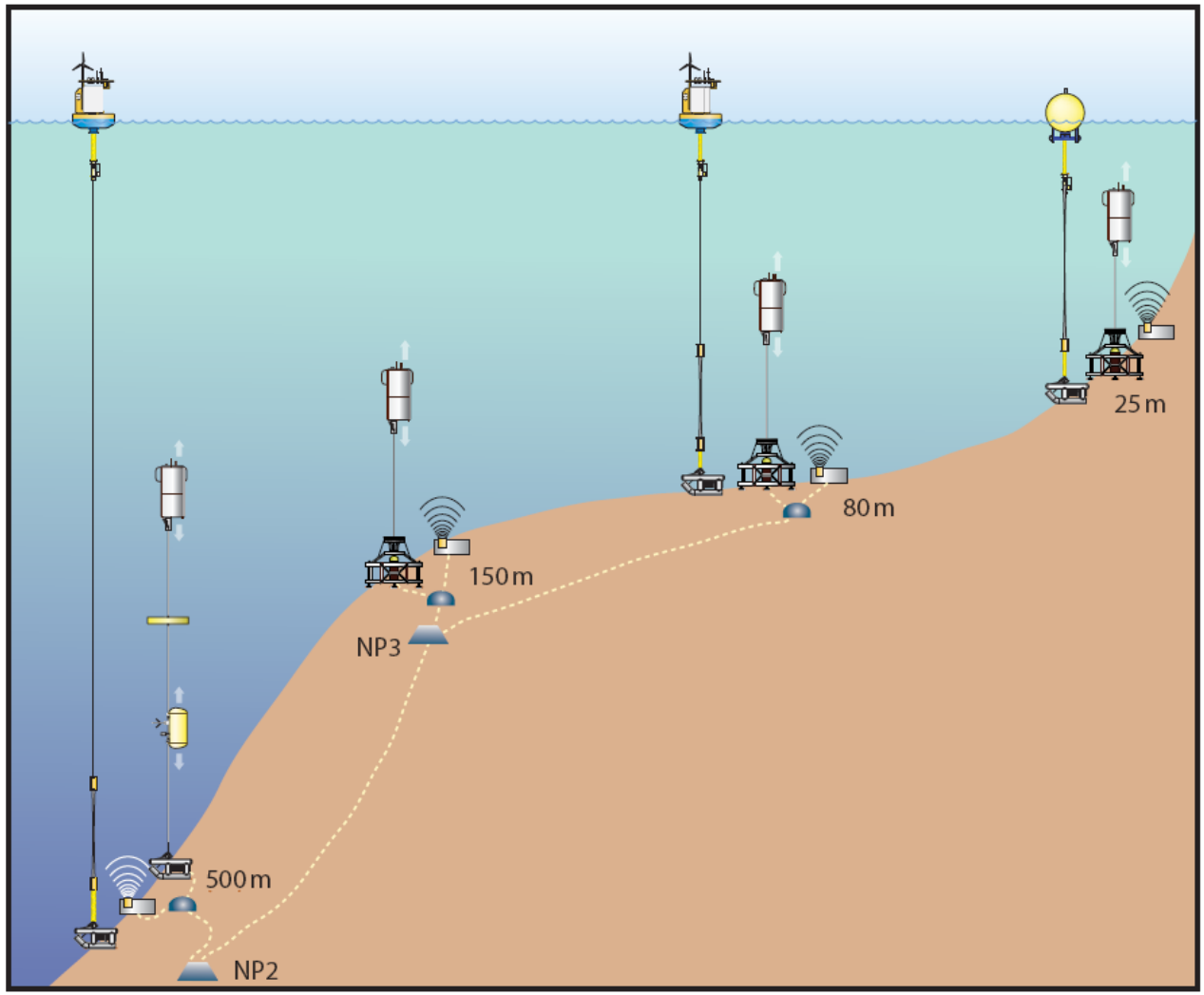
- Less Cable
- Fewer Cable Crossings (36 eliminated -- ring configuration with one landing)
- Avoid crowded landing at Nedonna Beach with space not fitted out
- Move into existing space with modest refurbishment
- Availability of existing backhaul, power systems

Regional Scale Nodes



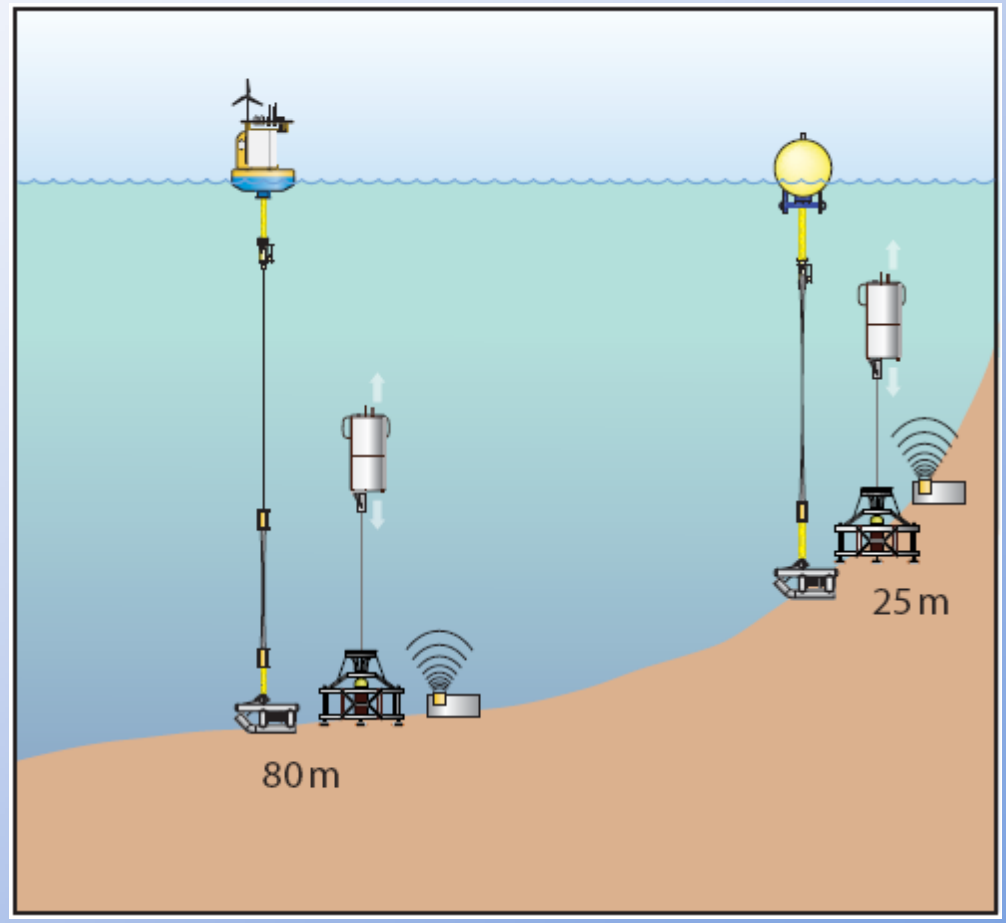
Endurance Array – Oregon Line

- Along Newport Line
- Surface moorings at 3 sites
- Subsurface profiler moorings at all sites
- 3 sites connected to RSN extension cable
- 50 m site not shown



Endurance Array – Washington Line

- Central WA; Grays Harbor
- Surface mooring at 80 m
- Subsurface profiler moorings at 80 and 25 m
- Contingent on costs



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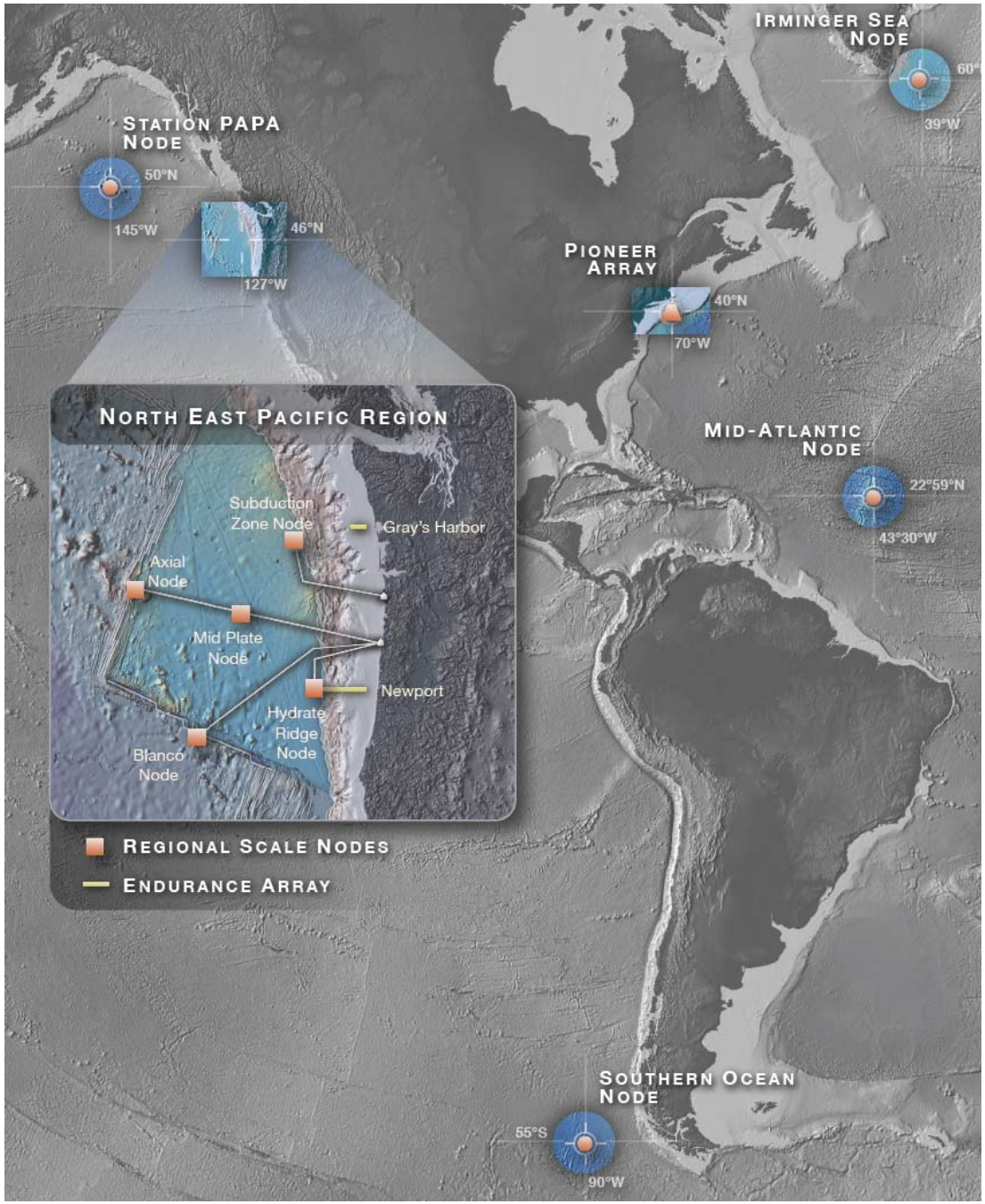
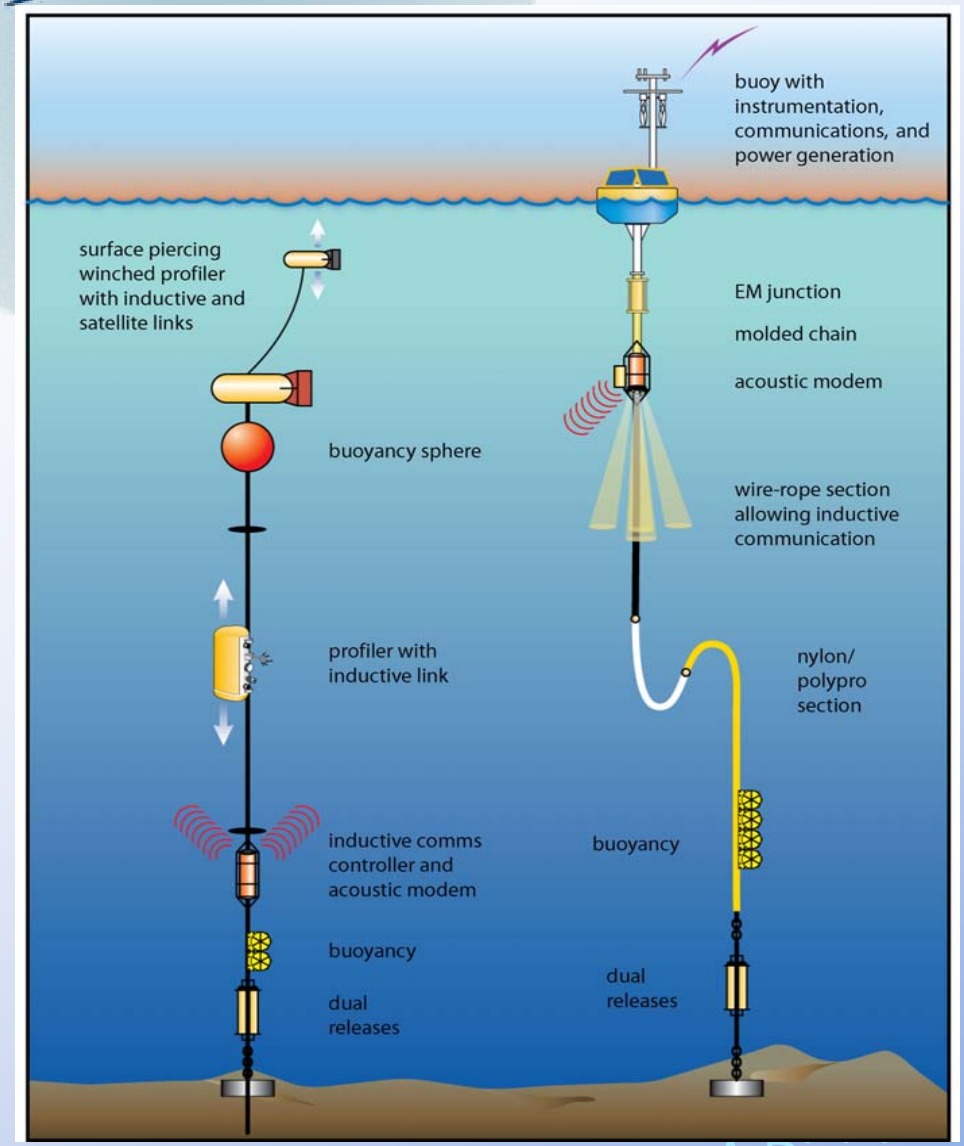


Global Site -- High Latitude Location



- Surface mooring provides platform for meteorology and air-sea flux sampling, power generation, and satellite communications; 8-9 m long and 2.8 m diameter
- Subsurface mooring with surface-piercing upper profiler, inductively linked lower profiler, acoustic modem
- Cable and seafloor junction box can be added
- Flanking moorings with fixed sensors; gliders are planned
- Launched, maintained, recovered by UNOLS vessels

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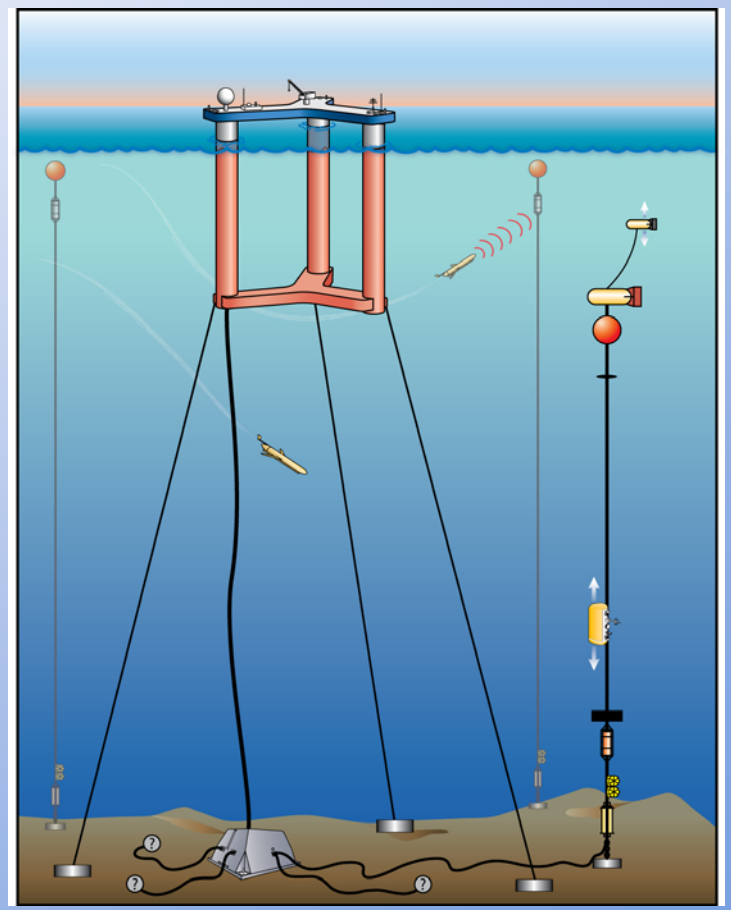
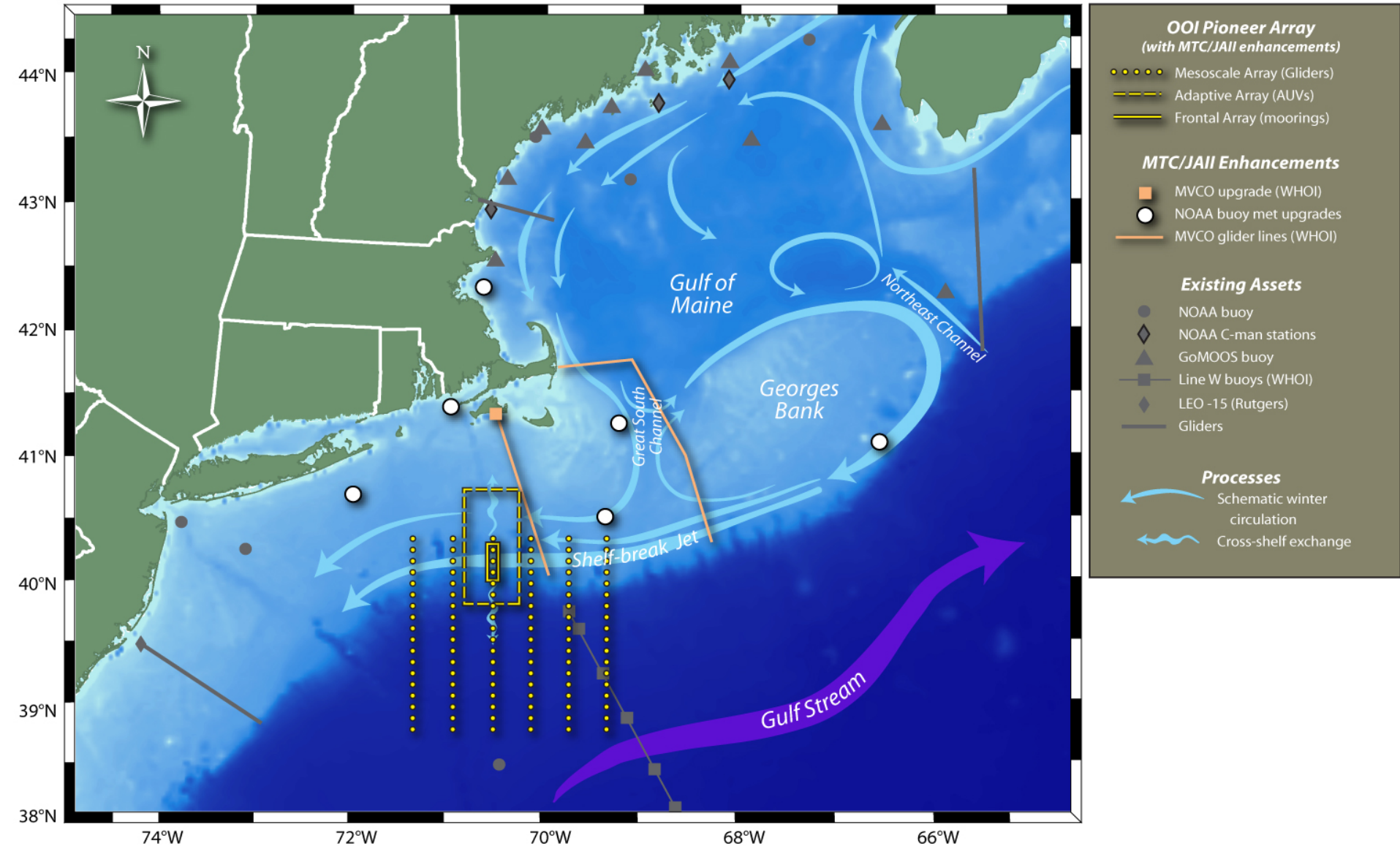
Global Site: Extended Draft Platform

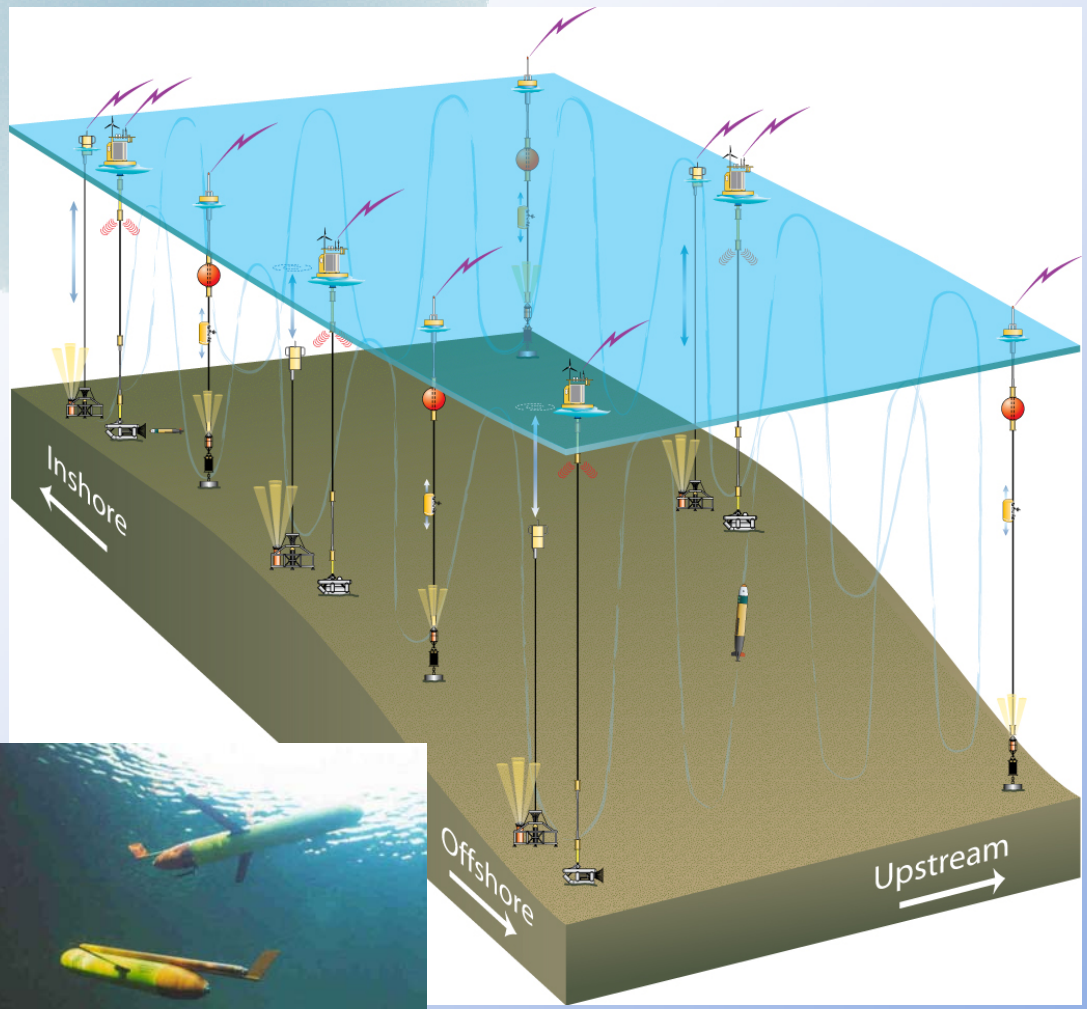
- Initial Location: Mid-Atlantic
- $8M industry contribution
- Stable platform with deck space 10 m above sea surface, 10 kW diesel generation, EO cable delivers > 500 W to seafloor experiments
- Testbed site for power generation, VSAT communications, sensor technologies
- Offshore supply vessel and small tug to transport/install; UNOLS vessel for instrumentation

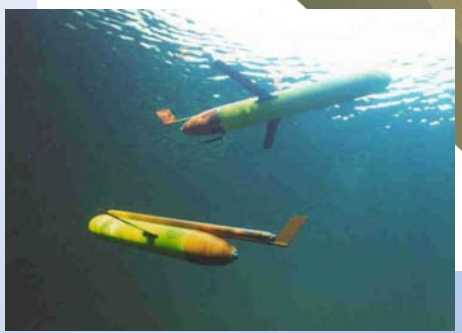


Initial Location: Pioneer Array



Details of Pioneer Array





- 4 EM / sub-surface profiling mooring pairs plus 4 sub-surface profiling moorings.
- 3 AUVs (2 docking stations) to enable autonomous, adaptive sampling at scales up to tens of km.
- At least 6-12 gliders for sampling far-field variability.
- Near-real time communications & wind/solar/wave power.

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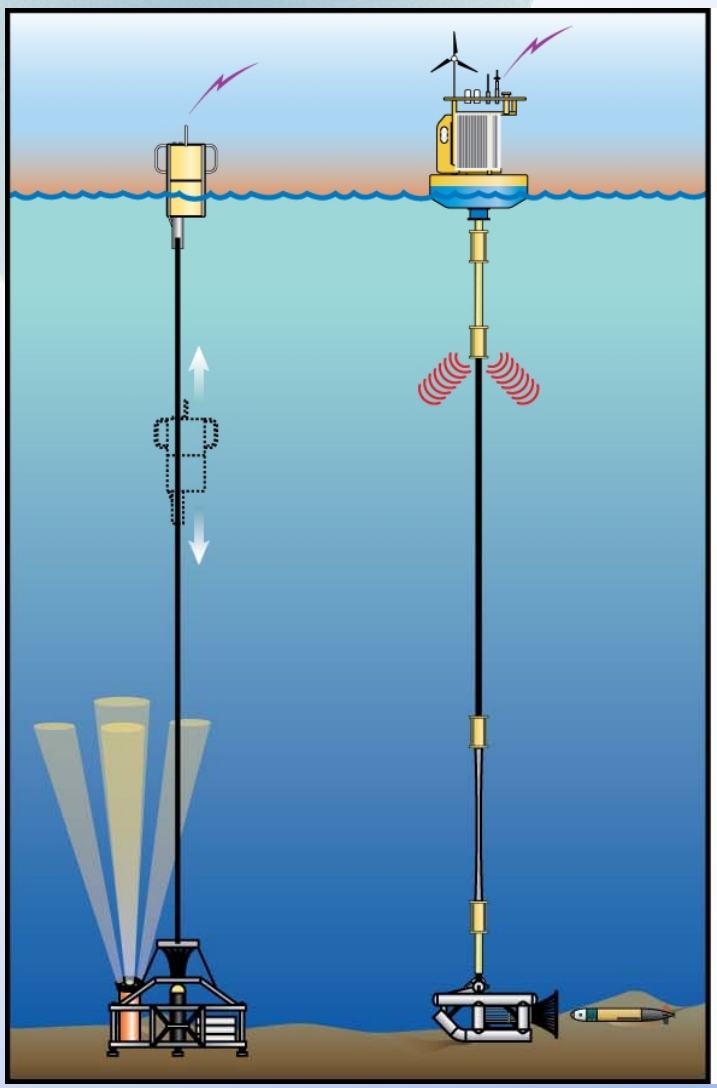
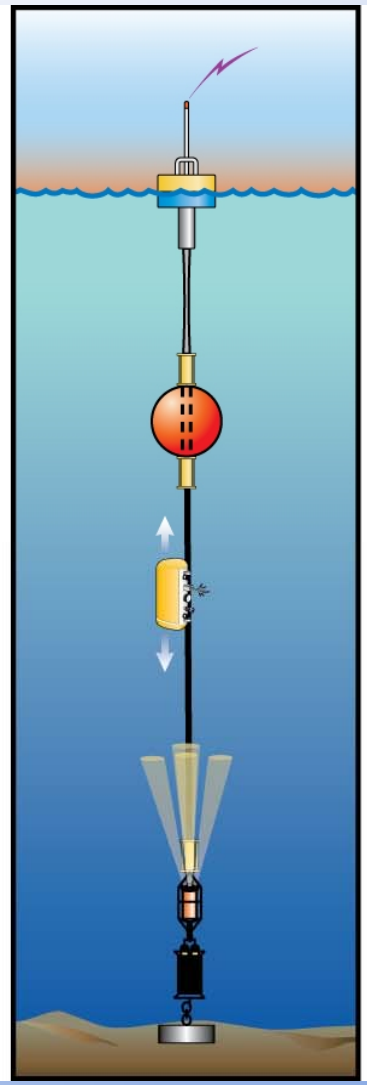
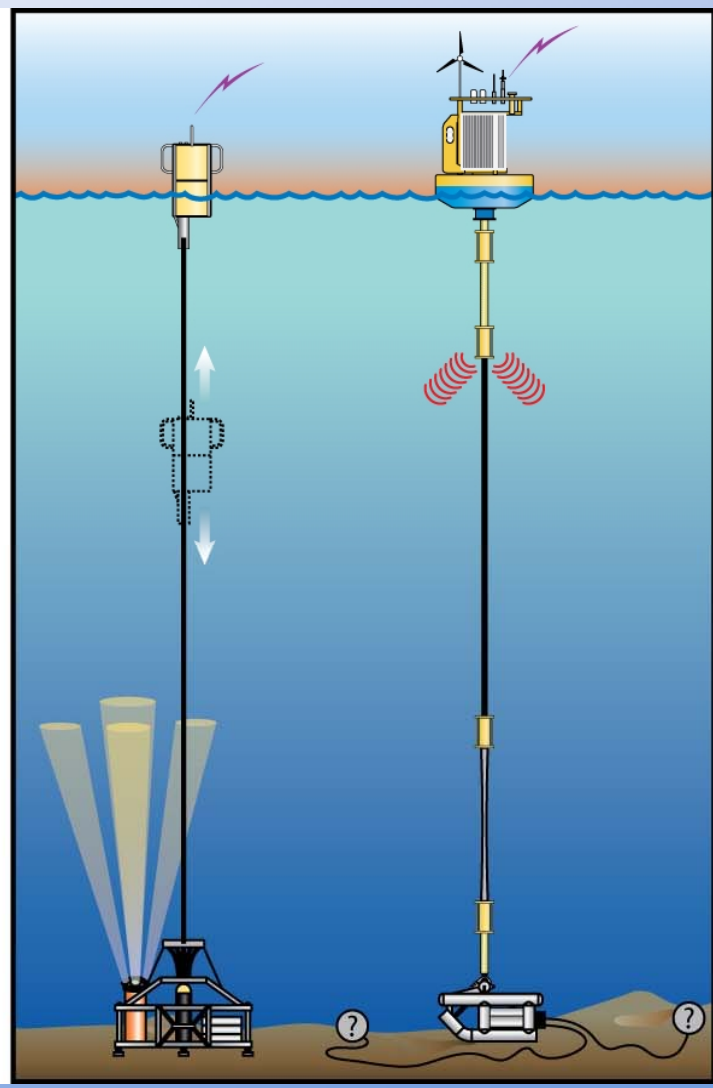
Pioneer Array Moorings







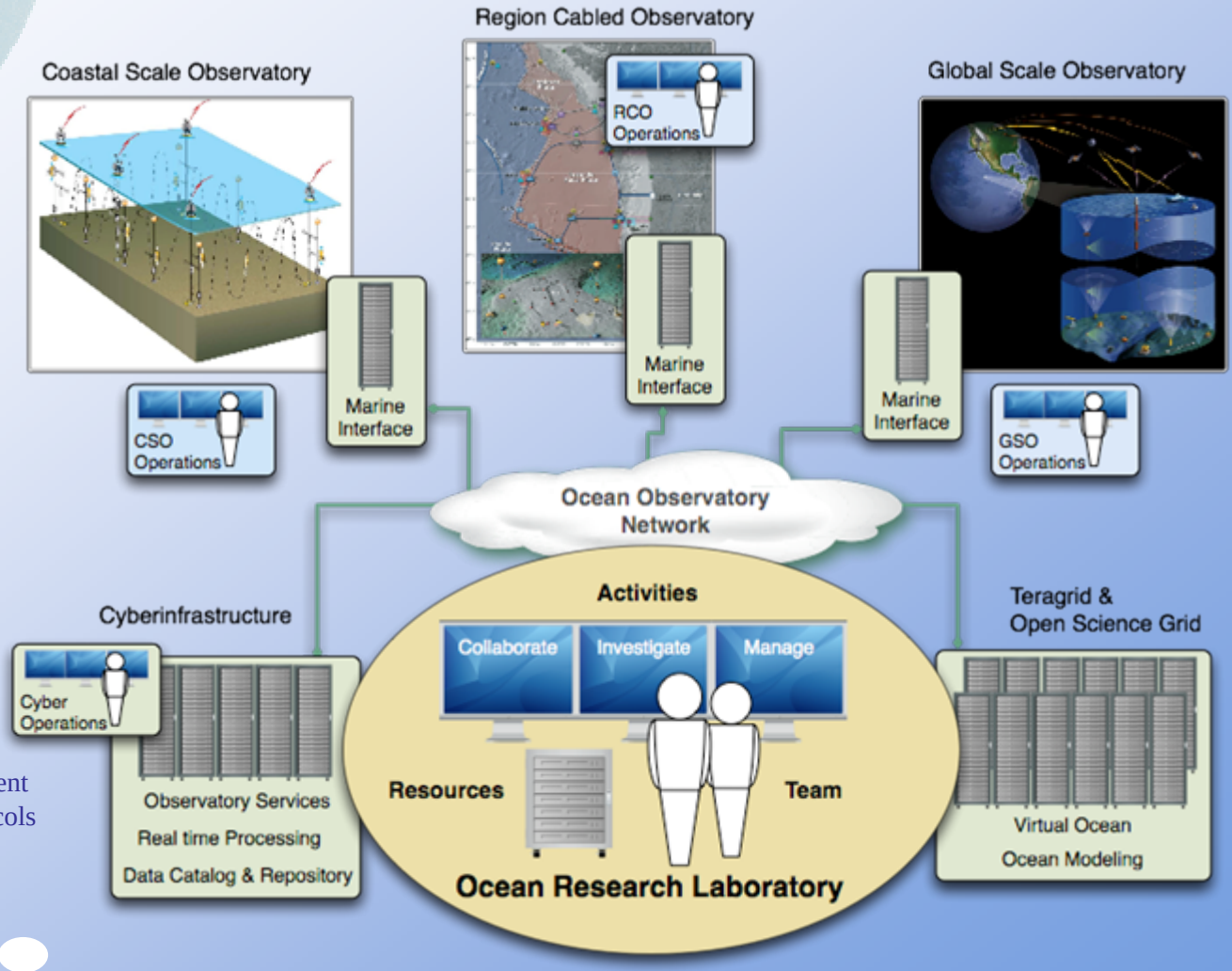
Integrated Observatory Architecture

3 Marine Components
- Coastal 3 sites
- Regional 5 sites
- Global 4 sites

Cyberinfrastructure
- Integrated Resource Network
- Service Oriented Architecture
- Peer to Peer Resource Connectivity

Integrated Management
- Distributed Management
- Shared 24x7 Operations
- Policy based Governance
- Connection & Message Level Security

Extendable Research Facilities
- Virtual Teams & Laboratories
- Incorporation of Local Resources
- Semantic based Knowledge Management
- Machine to Machine Interaction Protocols



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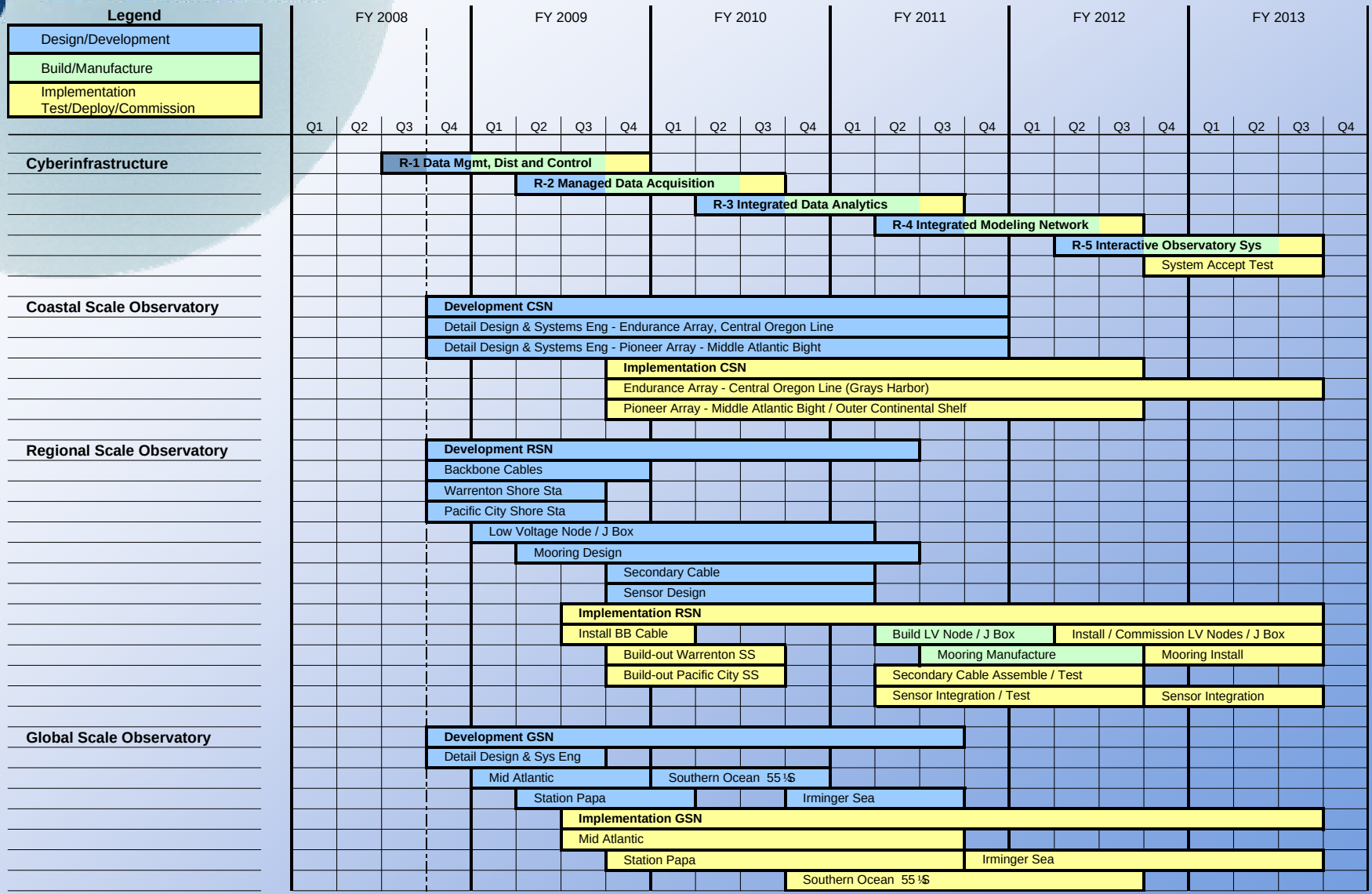

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OOI Estimated Days at Sea

Infrastructure	Vessel Class	Days at Sea by year 2009	2010	2011	2012	2013	2014	2015
Atlantic								
Pioneer Array	Intermediate		13	12	12	12	12	12
	< 80 ft.		8	18	18	18	18	18
Irminger Sea	Global			23	23	23	23	23
Mid-Atlantic	Global+ROV	19	19	23	23	23	23	23
Pacific								
Regional-scale Nodes	Cable vessel		30	20	20	20	20	20
	Global+ROV			30	60	60	60	60
Station Papa	Global		19	19	19	19	19	19
Southern Ocean	Global				23	23	23	23
Endurance Array - OR	Global+ROV		7	7				
	Regional/Coastal			10	15	15	15	15
	Regional w ROV				7	7	7	7
Endurance Array - WA	Regional/Coastal			5	10	10	10	10
Total by vessel class	Cable vessel	0	30	20	20	20	20	20
	Global/Intermediate	0	32	54	77	77	77	77
	Global+ROV	19	26	60	83	83	83	83
	Regional/Coastal	0	0	15	25	25	25	25
	Regional w ROV	0	0	0	7	7	7	7
	< 80 ft.	0	8	18	18	18	18	18

Estimated UNOLS DAS