



Ocean Observatories Initiative

UNOLs Briefing

March 8, 2011

Jean McGovern

OOI Program Director, NSF





OOI Project Team



Role	Organization	Project
	Consortium for Ocean Leadership	NSF Awardee & Systems Integrator
	Woods Hole Oceanographic Institution <ul style="list-style-type: none"> • Oregon State University • Scripps Institution of Oceanography • Raytheon 	Coastal and Global
	University of Washington	Regional
	UC San Diego	Cyberinfrastructure
	Soon to Be Selected	Education & Public Engagement



OOI Network Design

Multi-scale Observatory

Global Arrays

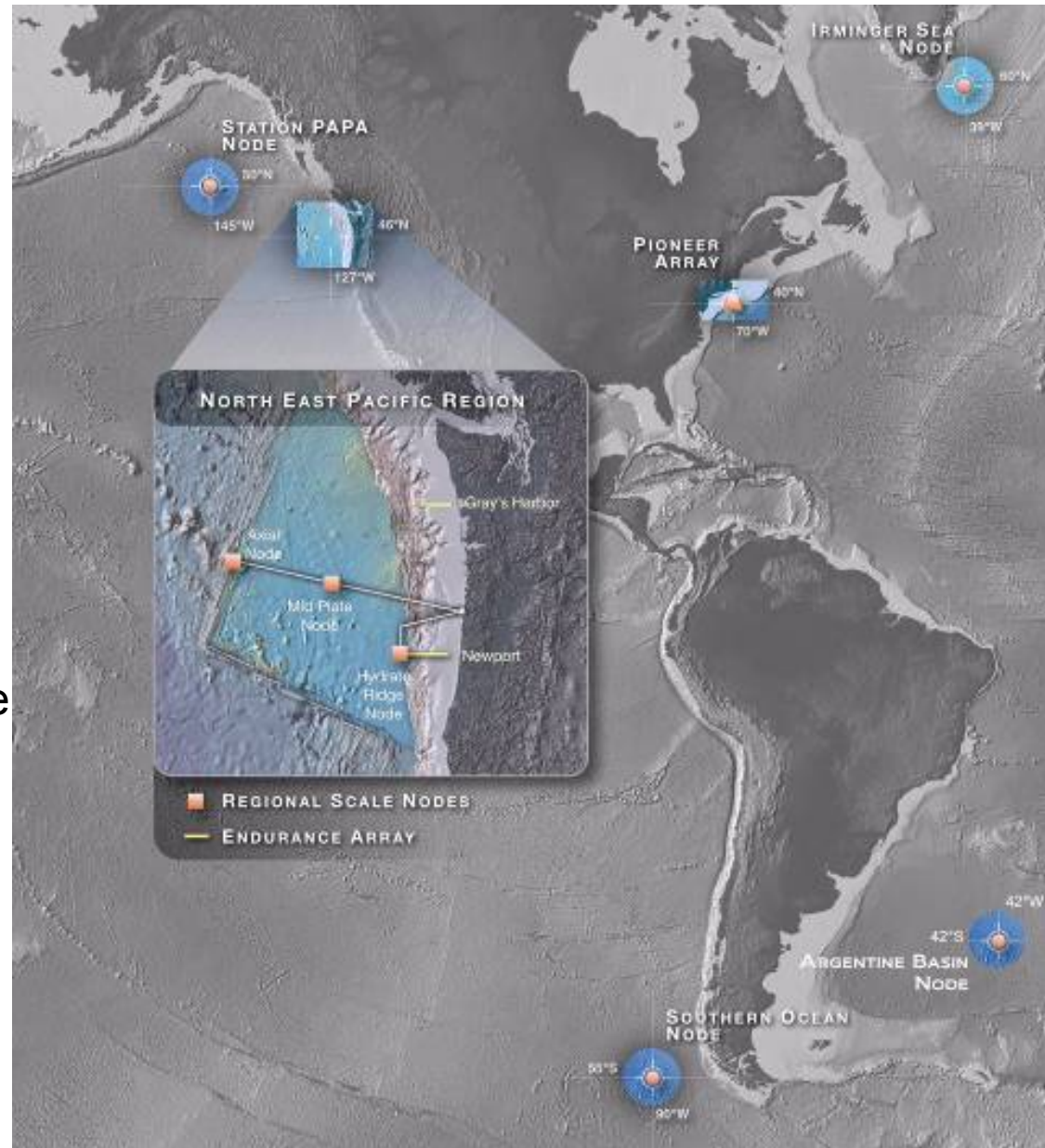
- Gulf of Alaska
- Irminger Sea
- Southern Ocean
- Argentine Basin

Regional

- Cabled
- Juan de Fuca Plate
- Oregon

Coastal Arrays

- Pioneer
- Endurance



OOI Subsystems

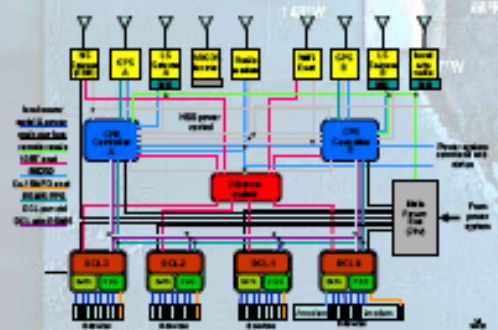
Buoys, Power, Telemetry



AUV/Dock



Platform Control, DCL



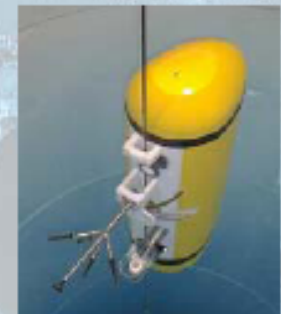
Sensors

Moorings

Benthic Nodes



Shore Station



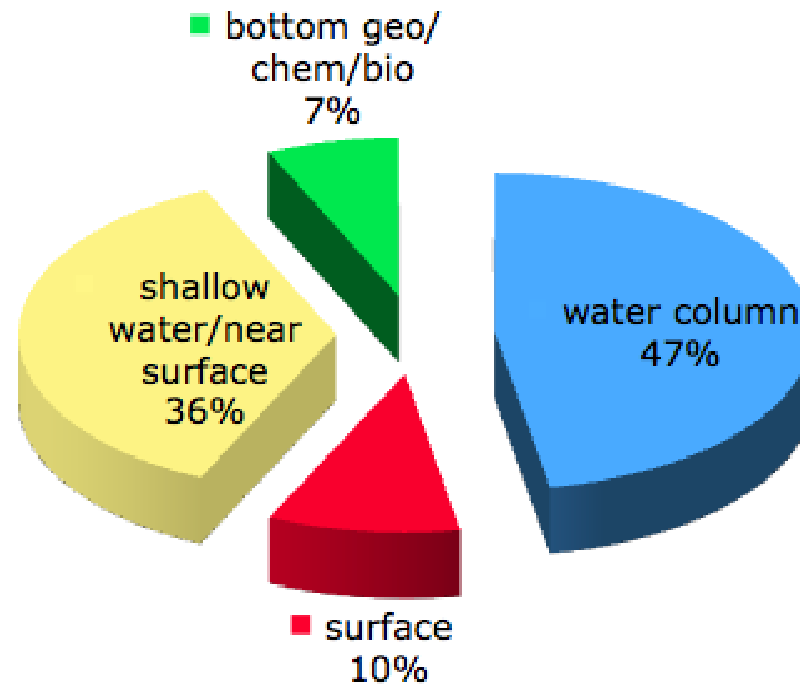
Profilers

Gliders



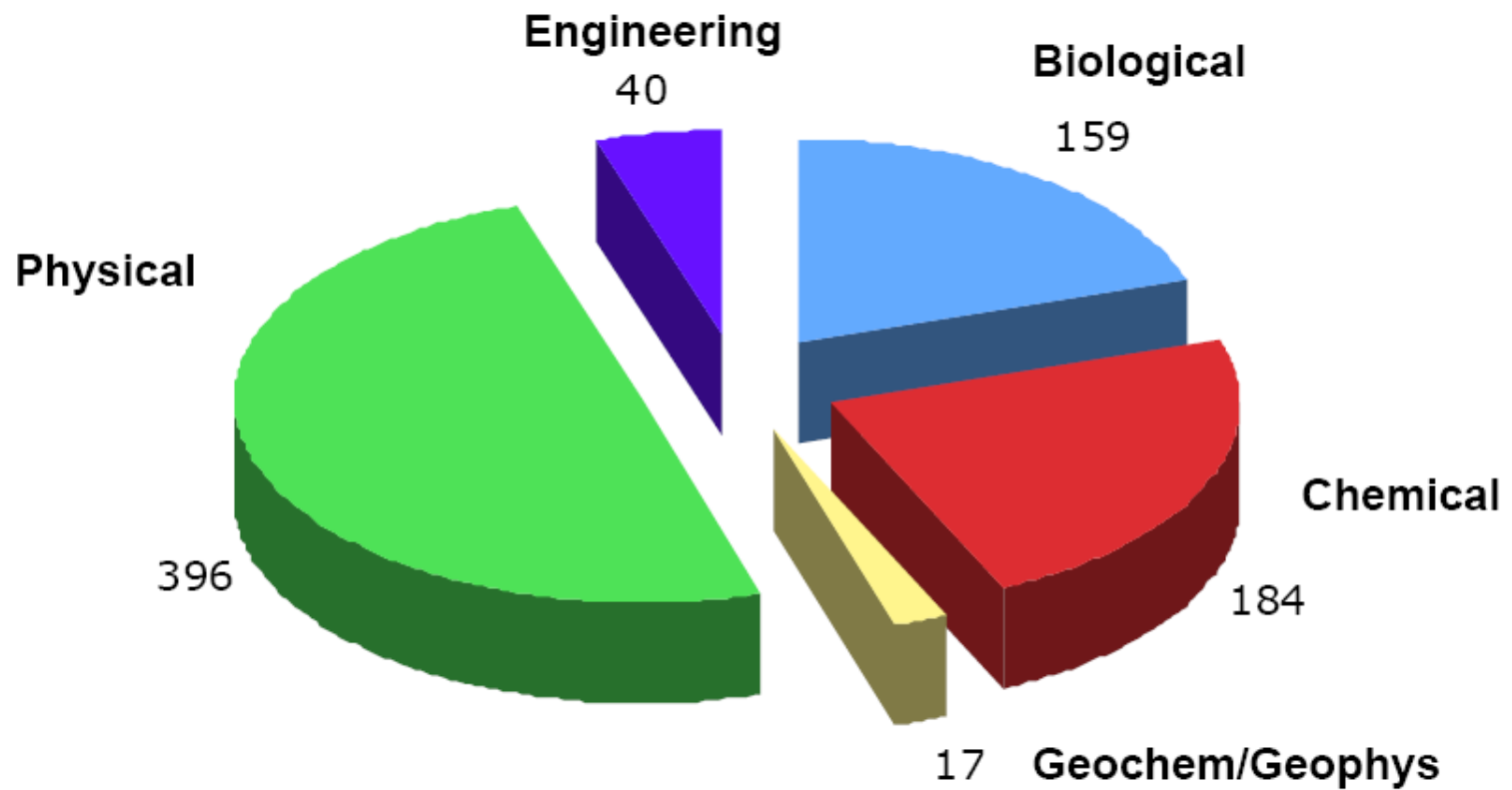
Water Column	Sensor Type	#
	Acoustic Doppler Current Profiler	39
	Conductivity/Temp.	210
	Hydrophone	10
	Inverted echo sounder	5
	pH	37
	Velocity, single point	53
Surface		
	Waves	10
	Meteorology	18
	pCO2	36
	Direct covariance flux	10
Shallow water		
	Fluorometer	81
	Nutrients	25
	Dissolved oxygen	82
	Spectral irradiance	22
	Photosynthetically available radiation	20
	Optical absorption	31
	Zooplankton sensor	13
Bottom		
	Mass spectrometer	2
	Seafloor temperature	1
	Seismometer	13
	Camera	13
	Benthic flow	1
	Particulate DNA	1
	Vent chemistry	2
	Chemical sampling	3
	Seafloor pressure	15

Sensor Distribution



Core Sensors

Sensor Numbers by Primary Discipline



OOI Data Policy

- Rapidly disseminated, open, and freely available
- Near-real-time with latencies as small as technically feasibility allows
- PI data shall be publicly available*
 - * PIs may request exclusive access (up to 1 year)
 - * Requests on a case by case basis
 - * All data public when exclusivity expires

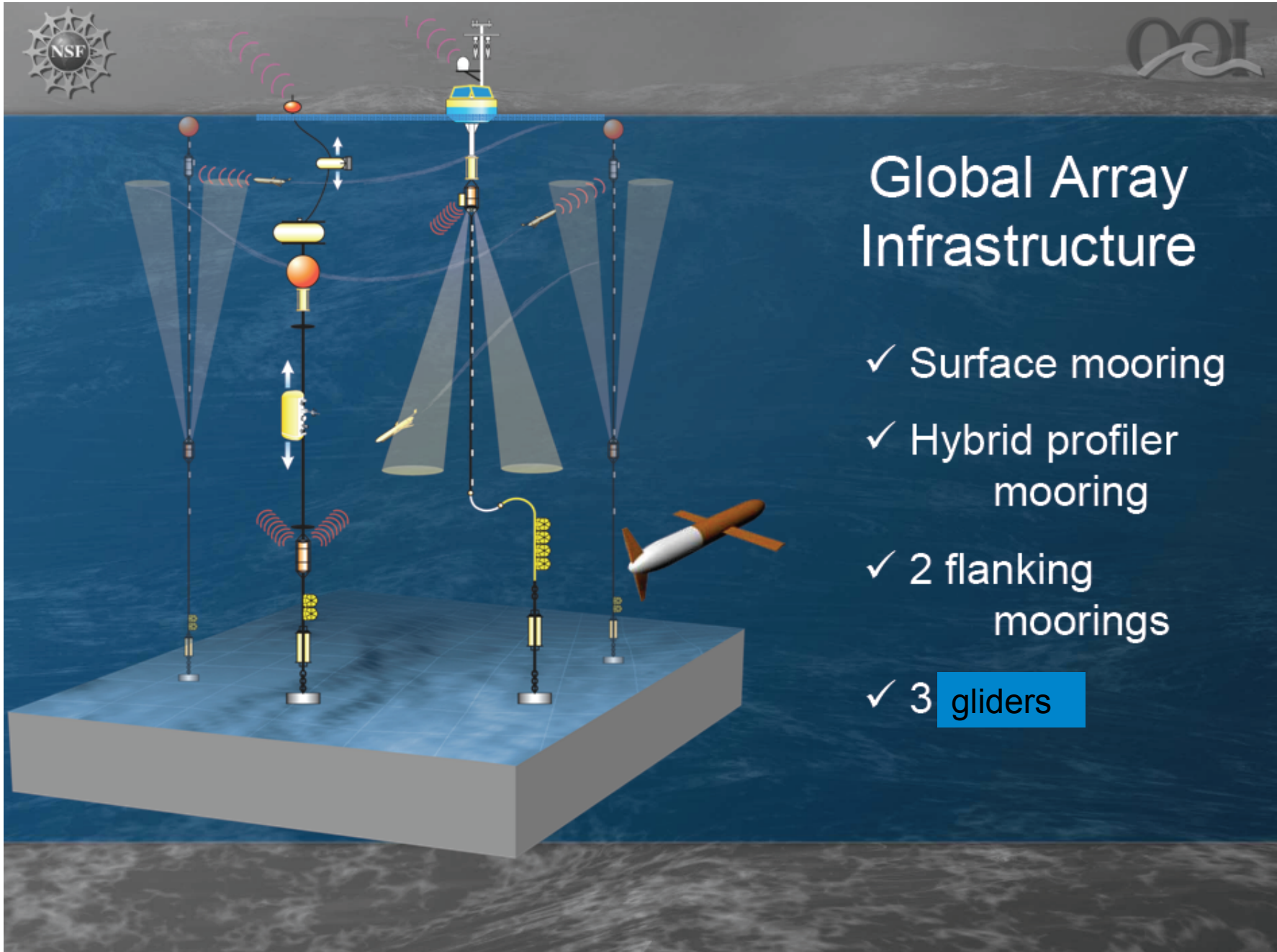
OOI Components

Currently 3 Components:

- Coastal / Global
 - Four Global Scale Sites (high latitude moorings)
 - Two Coastal Scale Arrays
 - Pioneer (Atlantic)
 - Endurance (Pacific)
- Regional Scale Nodes
 - 2 submarine cables
 - 3 Sites, 7 Nodes
- Cyber-infrastructure
connecting nodes together

Note: The Regional Scale Nodes and Endurance Array are shown together.





Global Array Infrastructure

- ✓ Surface mooring
- ✓ Hybrid profiler mooring
- ✓ 2 flanking moorings
- ✓ 3 gliders

Test Deployments to Evaluate Designs

At Sea Test 2 (AST2):
September 2011 – April
2012

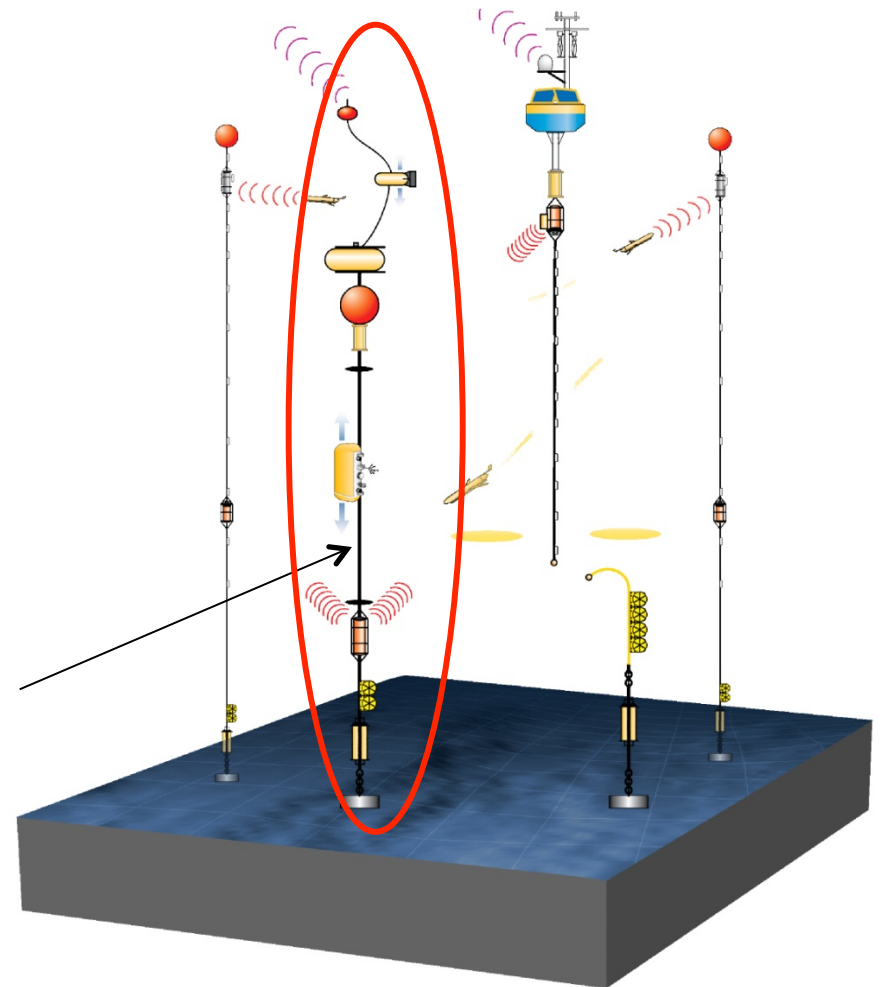
Seward of the Pioneer
Array site,

a global hybrid profiler
mooring

to be tested in 2,500 m
of water.

Concerns about global
surface profiler and
operations with
compound mooring
deployment/recovery to
be addressed.

Hybrid profiler
mooring



At Sea Test 2 (AST2) Roadmap

2011											
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

★
All Burn-in
Components
Released

★
All Parts
In-house

★
AST2 Cruise
Sept 22, 2011

AST2 Design

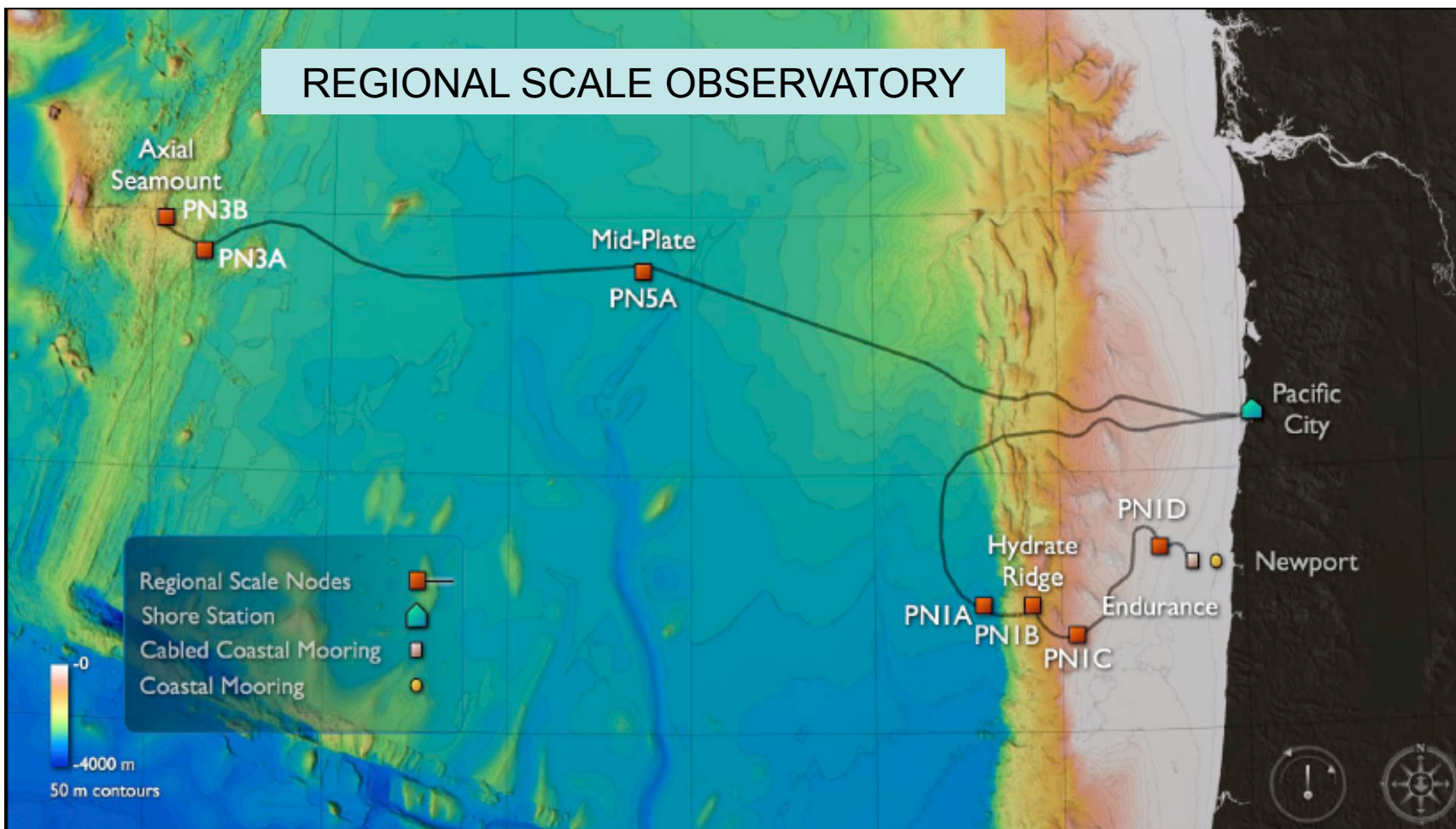
AST2 Manufacture and Build

AST2 Integration

Burn-in

Water Test
(thru April 2011)

REGIONAL SCALE OBSERVATORY



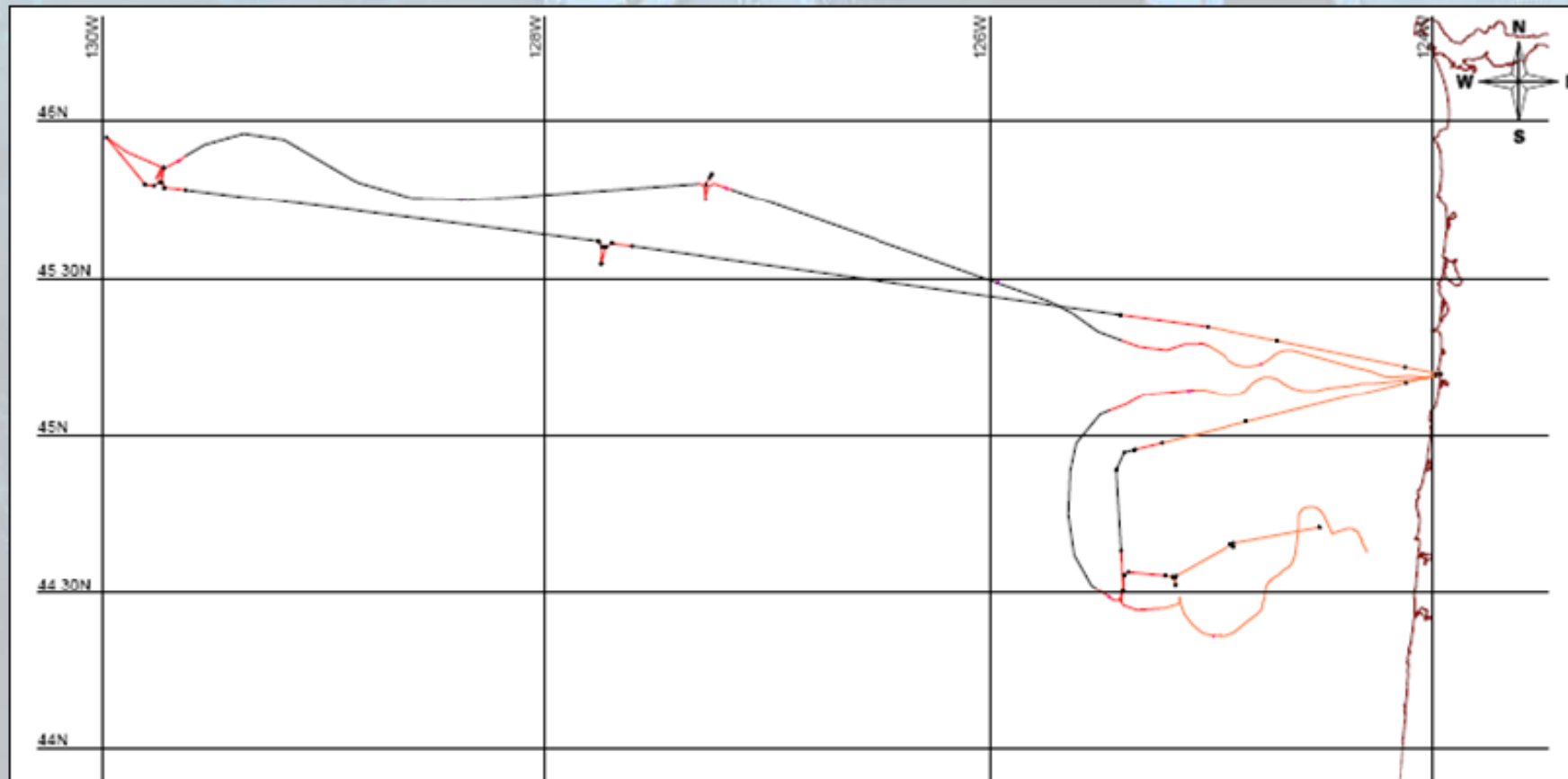
PRIMARY NODES



Shore Station - Pacific City, OR



Route Survey – Route Comparison



Original cable length (initial layout):

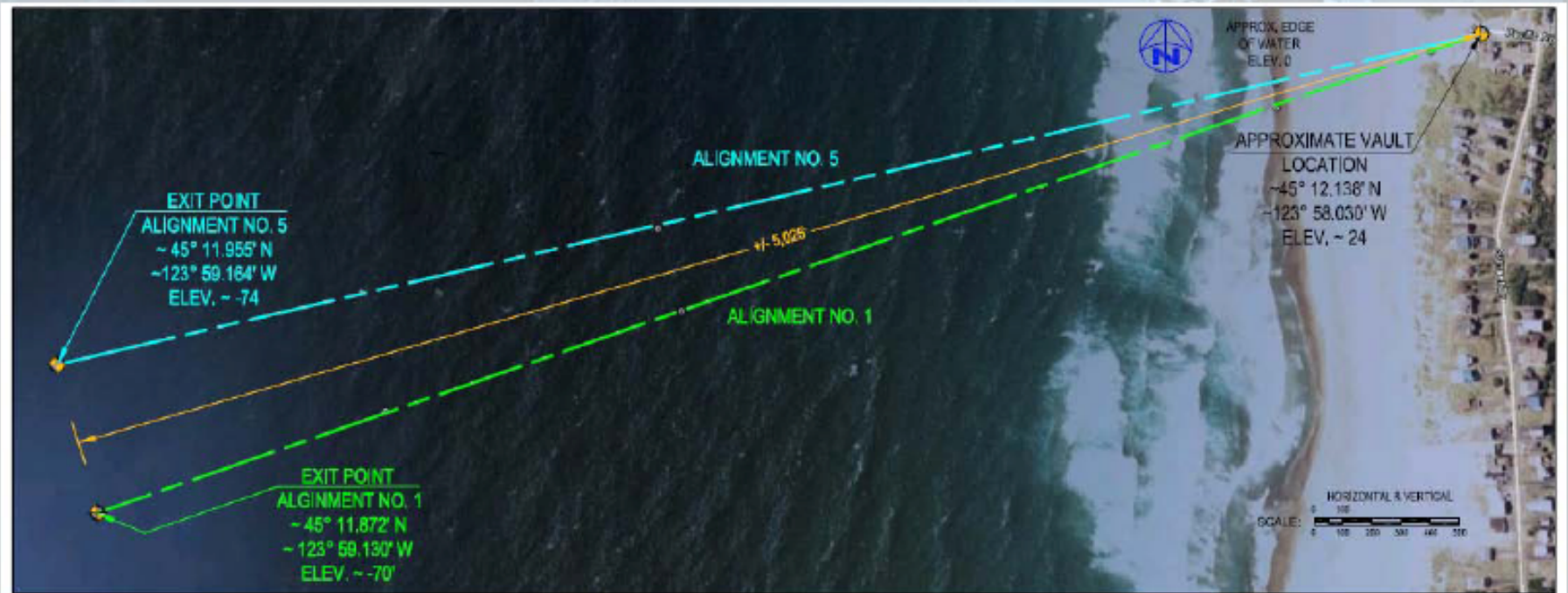
~791 km of primary Cable (256.5 km Buried – 534.5 km Surface Laid)

Post-Survey Cable Amounts:

~885km Total Cable (291.5 km Buried – 593.4 km Surface Laid)

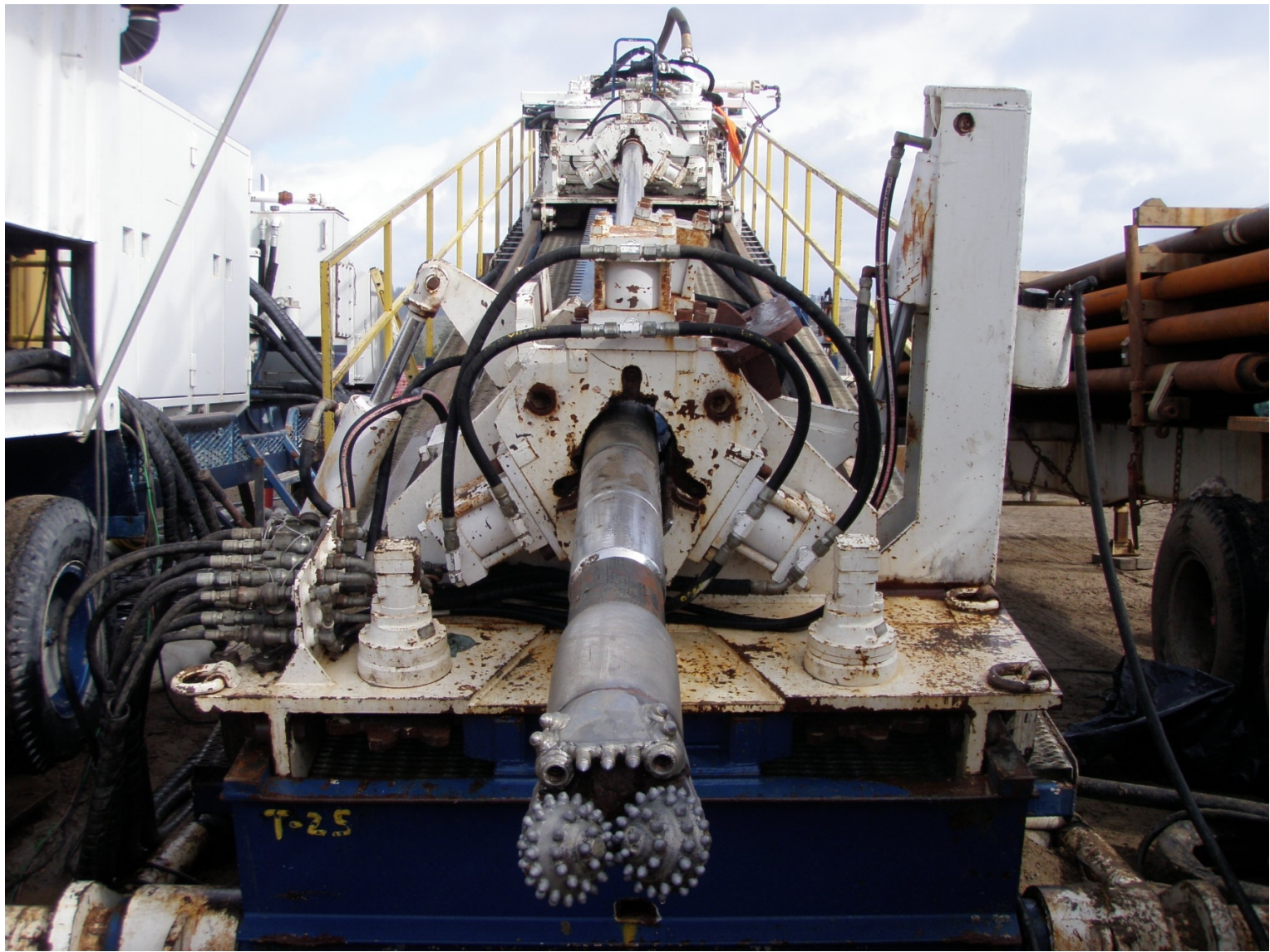
HDD Specifications

- Drill from and tie into existing Beach Manhole.
- Two HDD pipes to be drilled and left in place for permanent conduit along RSN segment 1 and 5 route.
- Each pipe to be approximately 1,524m long (5,000').
- Target exit location is 20m water depth.
- G-105 White Band (5" OD; 3.75" ID).











OOI Components

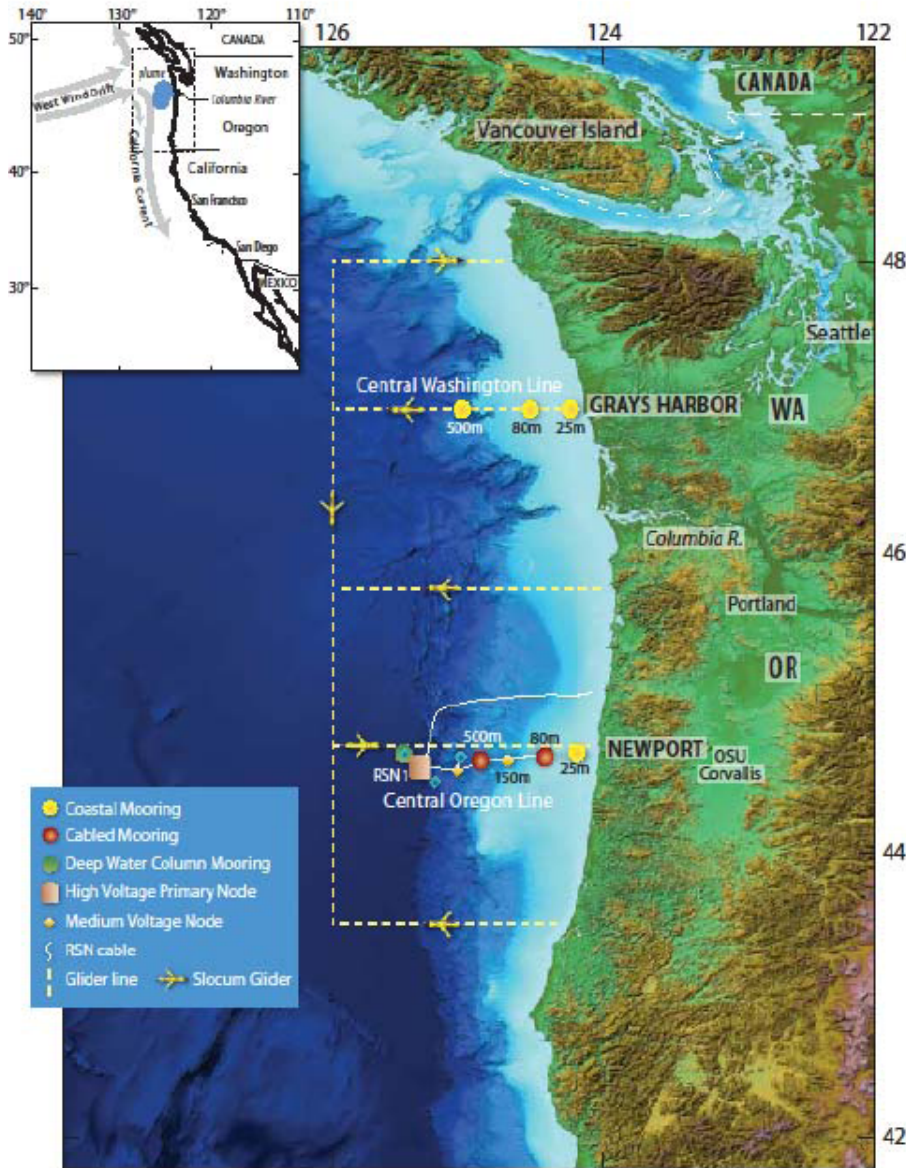
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Note: The Regional Scale Nodes and Endurance Array are shown together.



Endurance Array



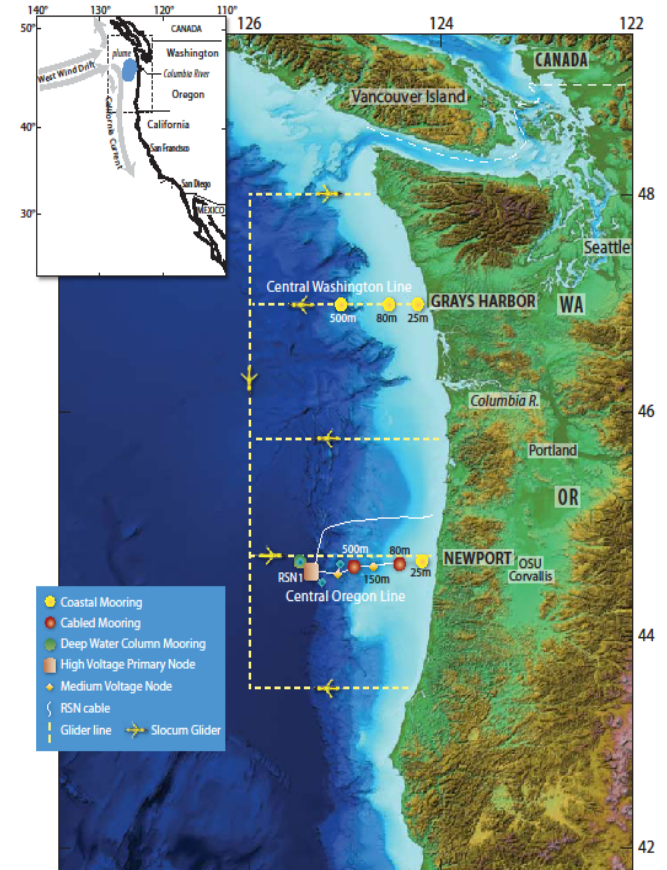
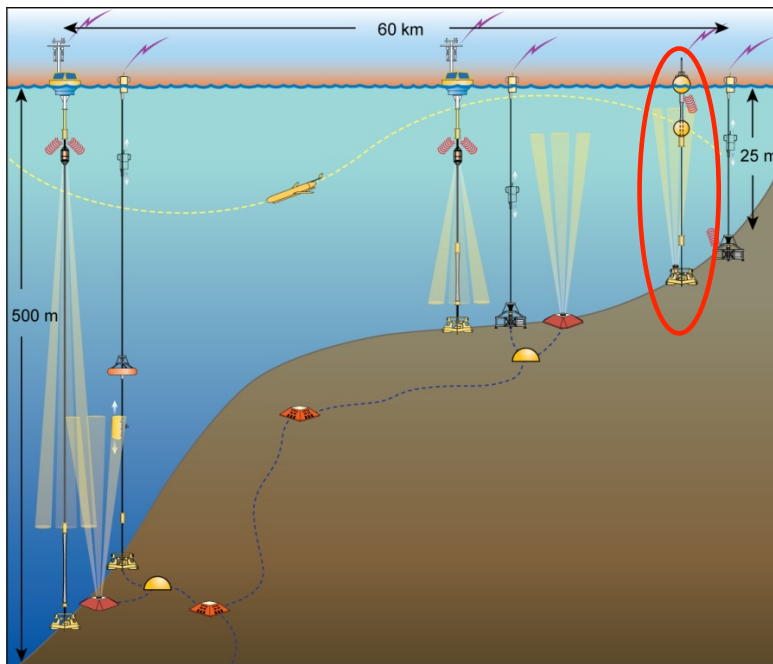
- ✓ 2 cross-shelf lines
- ✓ Moorings on inner shelf, mid-shelf, and slope
- ✓ Air-sea, water column, and benthic observing
- ✓ 6 gliders
- ✓ Oregon Line connects to Regional cable; continuity with RSN mooring and PAPA
- ✓ Coastal to deep ocean observing

Test Deployments to Evaluate Designs

Example: In Shore Test Mooring 2 (ISTM2): March 2011 – July 2011

At the Endurance Array site, surface wave heights that are large fractions of water depth are a large design challenge.

Testing: Mooring and buoy design for 25 m site.

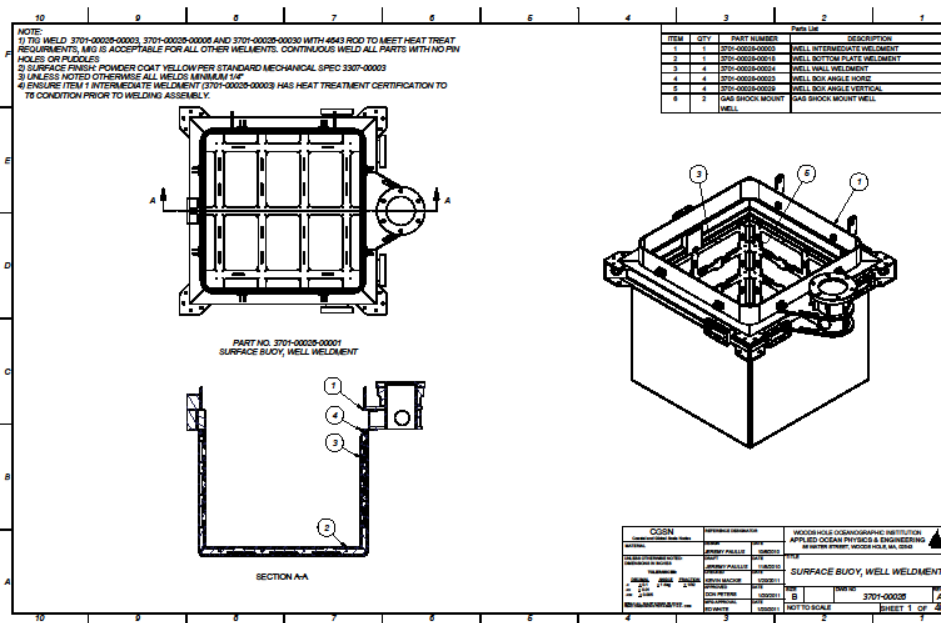


AST2 Drawings, Models, Equipment

- AST2 Coastal Surface Mooring, also, because of common design elements, prototypical of Global Surface Mooring

- AST2 Coastal Surface Mooring buoy well drawing and snapshot from fabrication, March 2, 2011

Mooring



Test Deployments to Evaluate Designs

Example: In Shore Test Mooring 2 (ISTM2): March 2011 – July 2011

Designs complete: ready to deploy



Newport, OR dock



'Hardened 25 m surface buoy'

Test Deployments to Evaluate Designs

Example: In Shore Test Mooring 2 (ISTM2): March 2011 – July 2011



Redesigned universal joint



Buoy (foreground) and stretch hose (background)

Endurance Array Status

Precedents to ISTM2, concurrent activities:

- Joint work with Regional Scale Nodes (RSN) (ongoing)
- Permitting (significant progress)
- Endurance bathymetric survey (complete)
- ISTM1 - revealed design issue on bottom universal joint (complete)
- Coastal Glider Development (vendor contract this week)
- Coastal Surface Mooring (CSM), Coastal Profiling Mooring (CPM) – commonality with Pioneer and under test in ASTM2 (designs to be completed May 2011, integration and test June-August 2011, deploy Sept 2011)

OOI Network Design

Multi-scale Observatory

Global Arrays

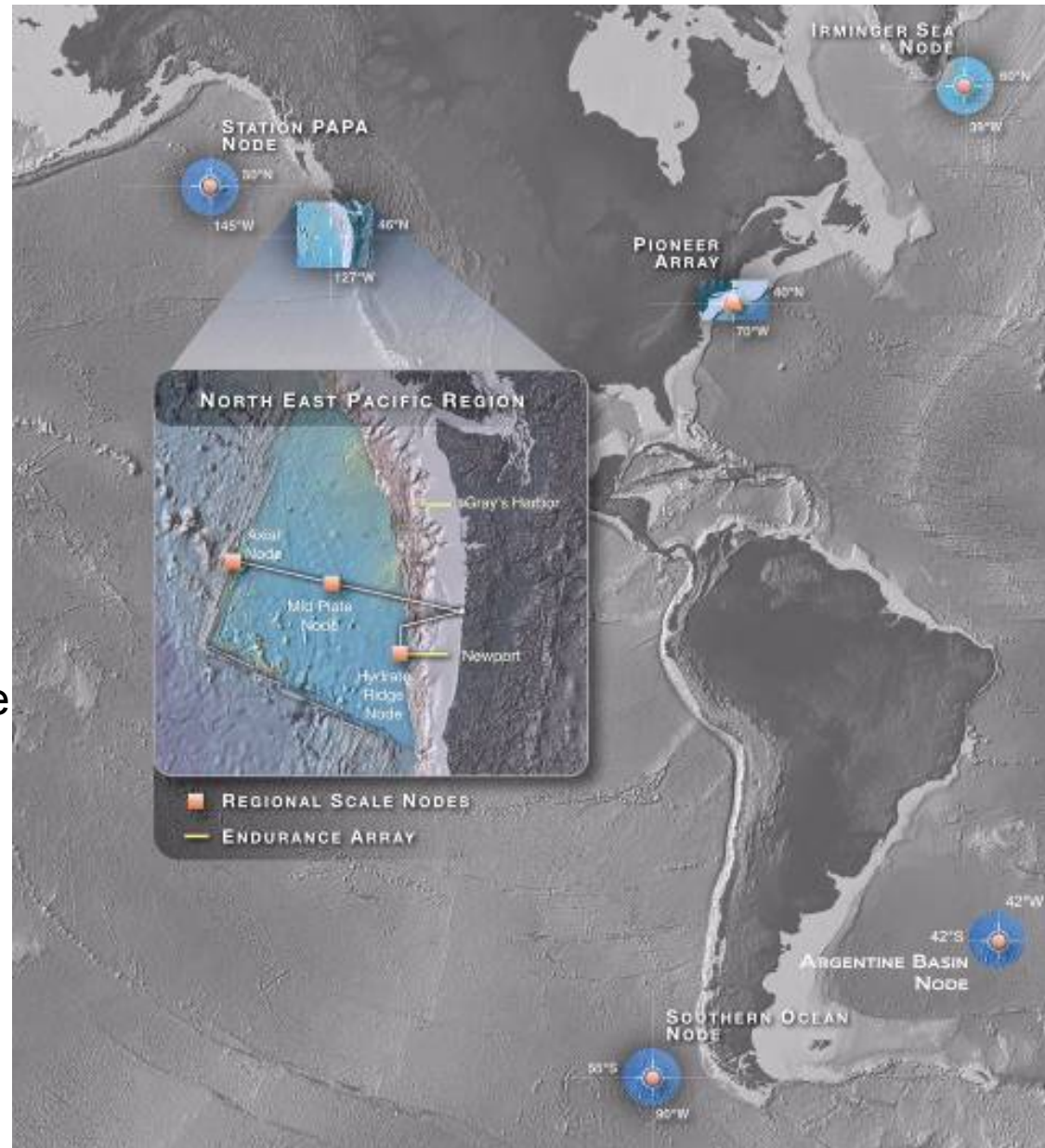
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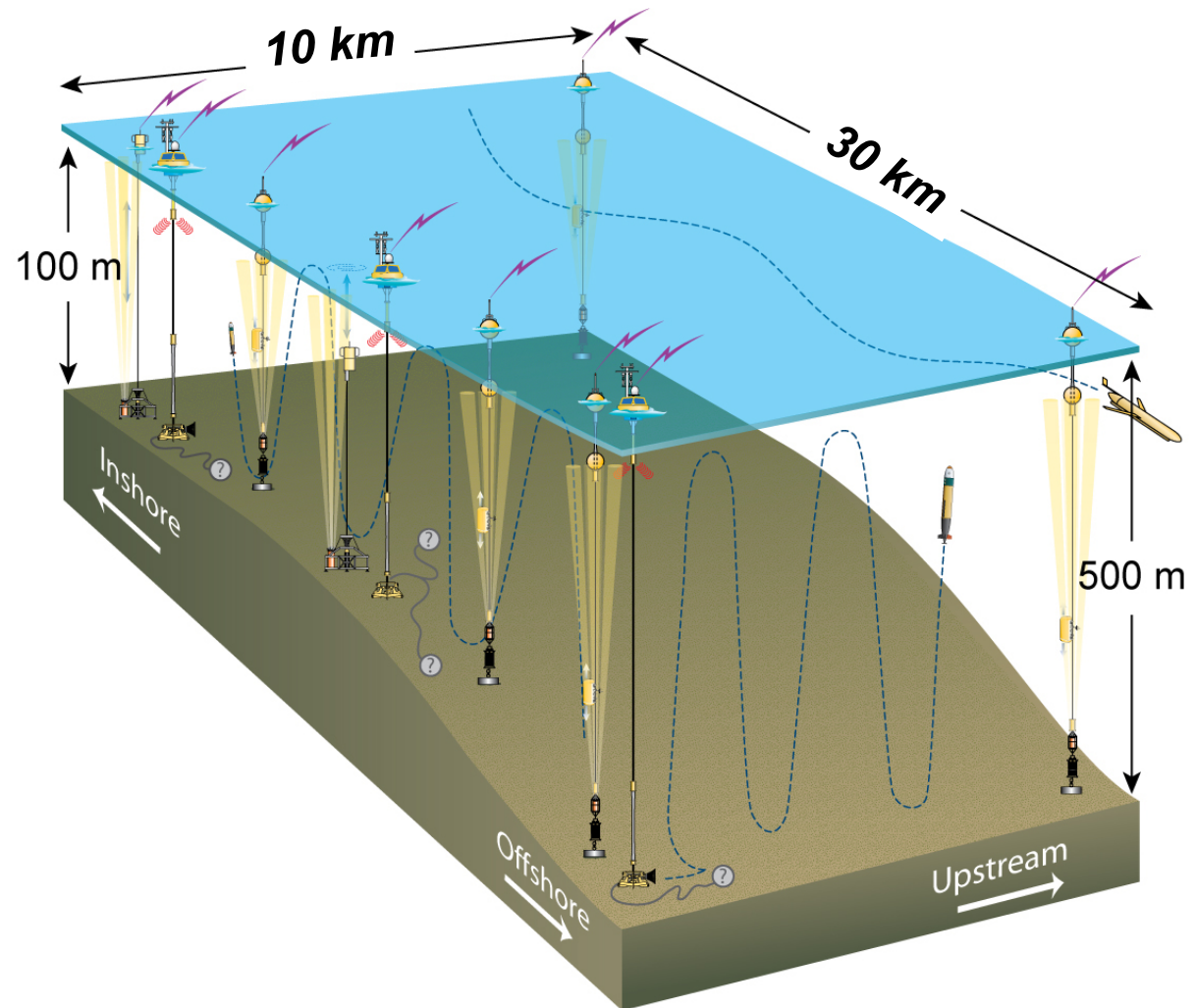
Coastal Arrays

- Pioneer
- Endurance



Pioneer Array

- Full water column
- Cross-front resolution
- Power-generating buoys
- Multi-function nodes
- AUV docks



Test Deployments to Evaluate Designs

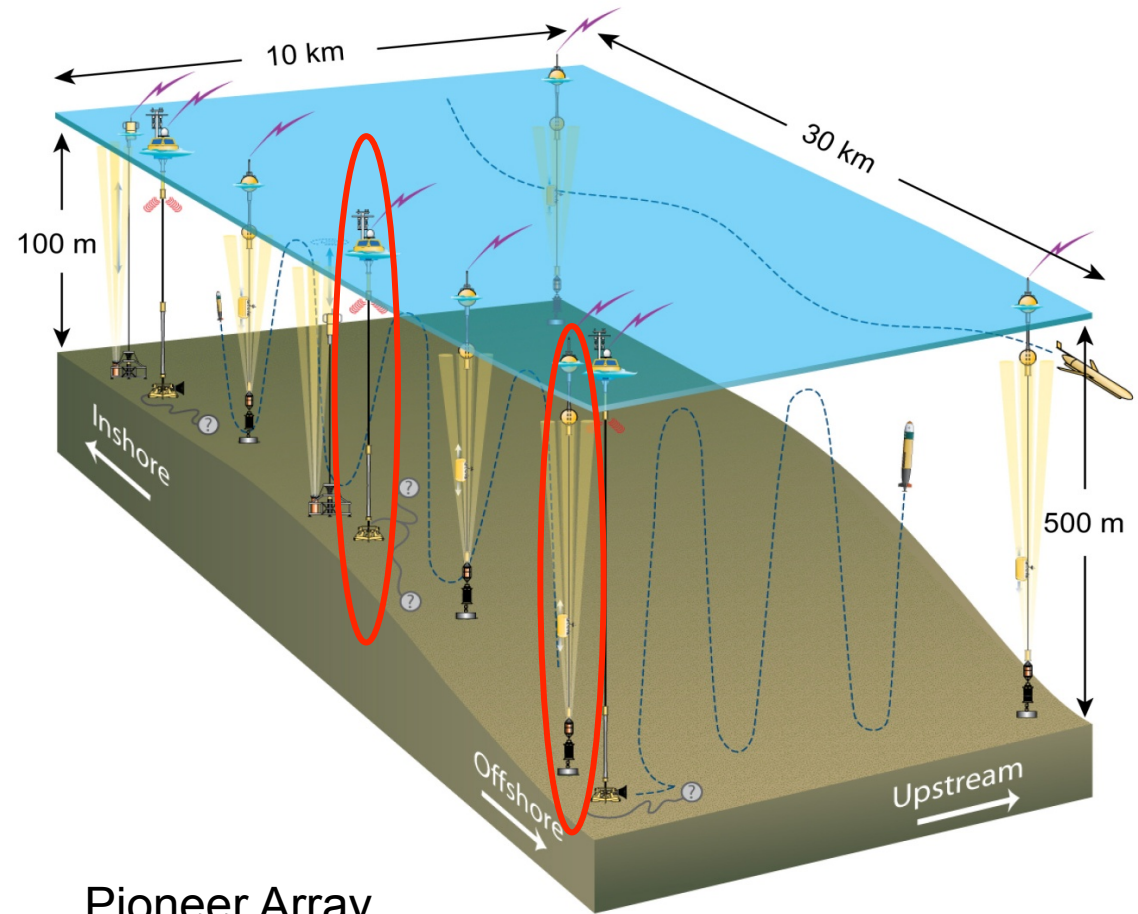
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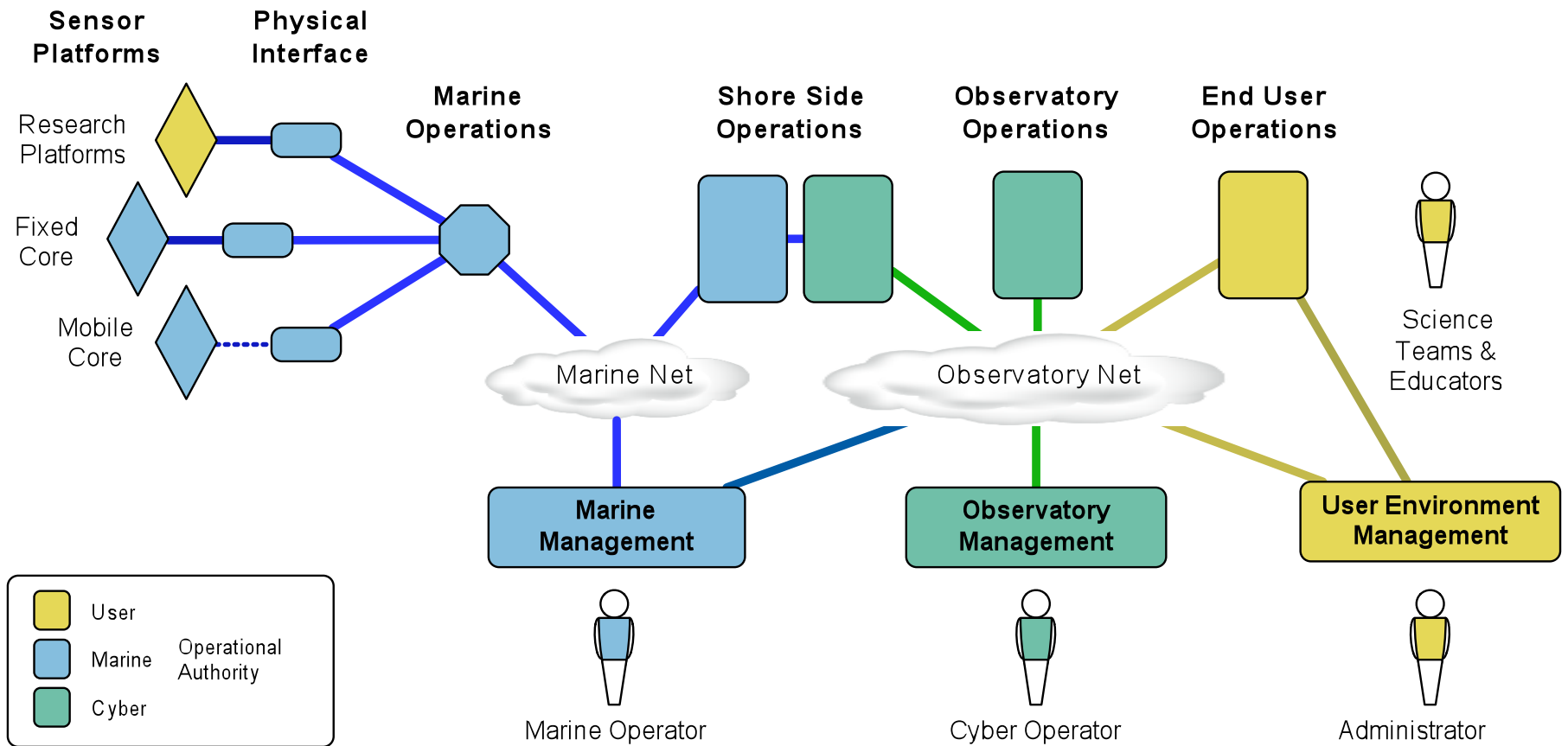
At the Pioneer Array
site a

Coastal Surface
Mooring (CSM) and a

Coastal Profiler
Mooring (CPM)

to be tested in 500 m of
water.





Integrated Observatory Operational Domains



OOI Major Accomplishments Years 1 and 2

- Staffing Ramp Up at all Institutions
- Environmental Assessment – FONSI issued on 1/31/2011
- Major Design Work
- Major Procurements Completed & Underway
- Prototypes & Testing Underway

Looking Ahead - Cruises: the Jiffy-Pop Diagram

