OOI Update: Design and Capabilities to Address OCB Research

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Consortium for Ocean Leadership

OOI Science Themes

- Ocean-Atmosphere Exchange
- Climate Variability, Ocean Circulation, and Ecosystems
- Turbulent Mixing and Biophysical Interactions
- Coastal Ocean Dynamics and Ecosystems
- Fluid-Rock Interactions and the Sub-seafloor Biosphere
- Plate-scale, Ocean Geodynamics

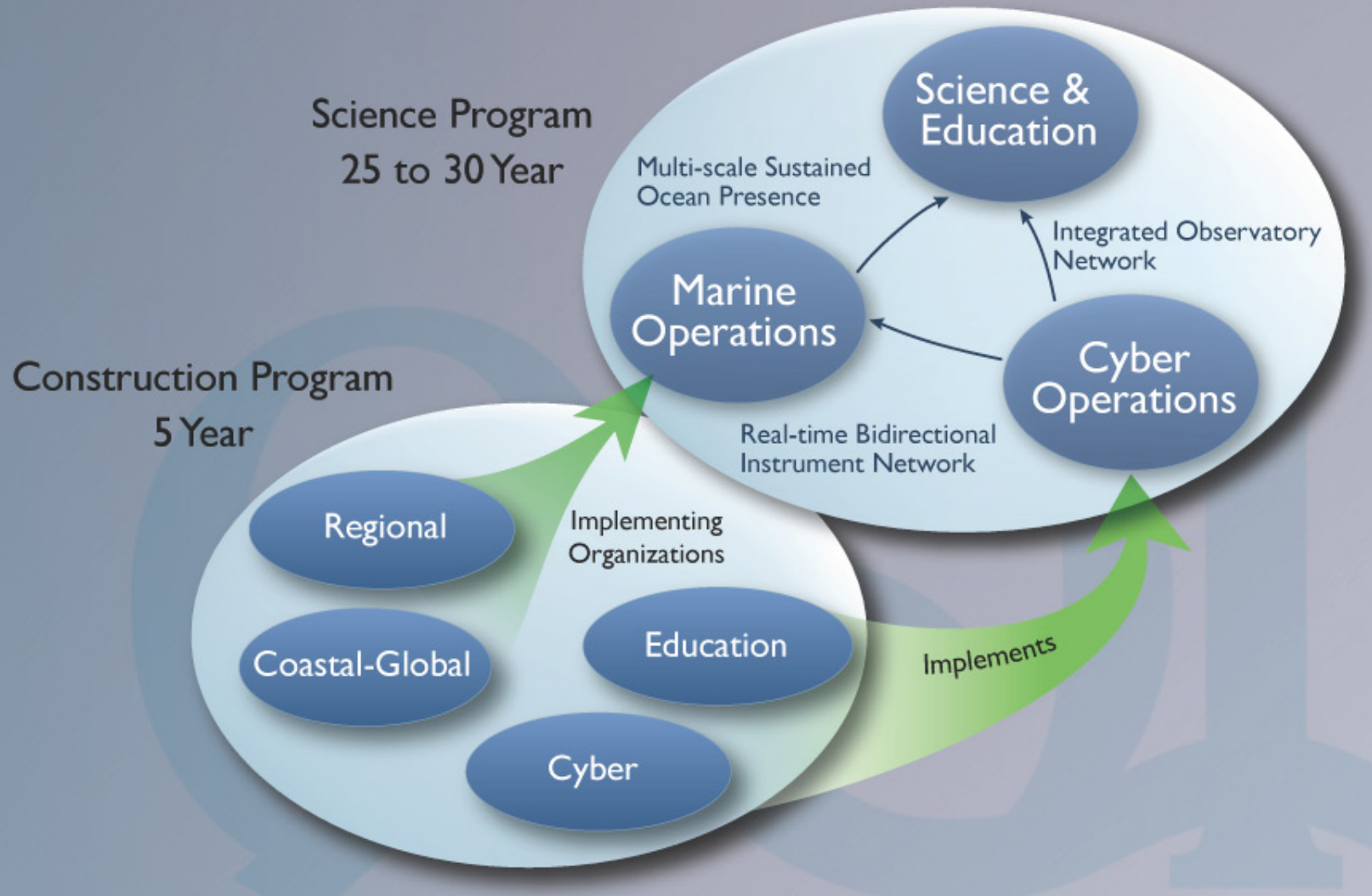
Additional Science Focus on:

- Ocean ecosystem health
- Climate change
- Carbon cycling
- Ocean acidification

Current Status

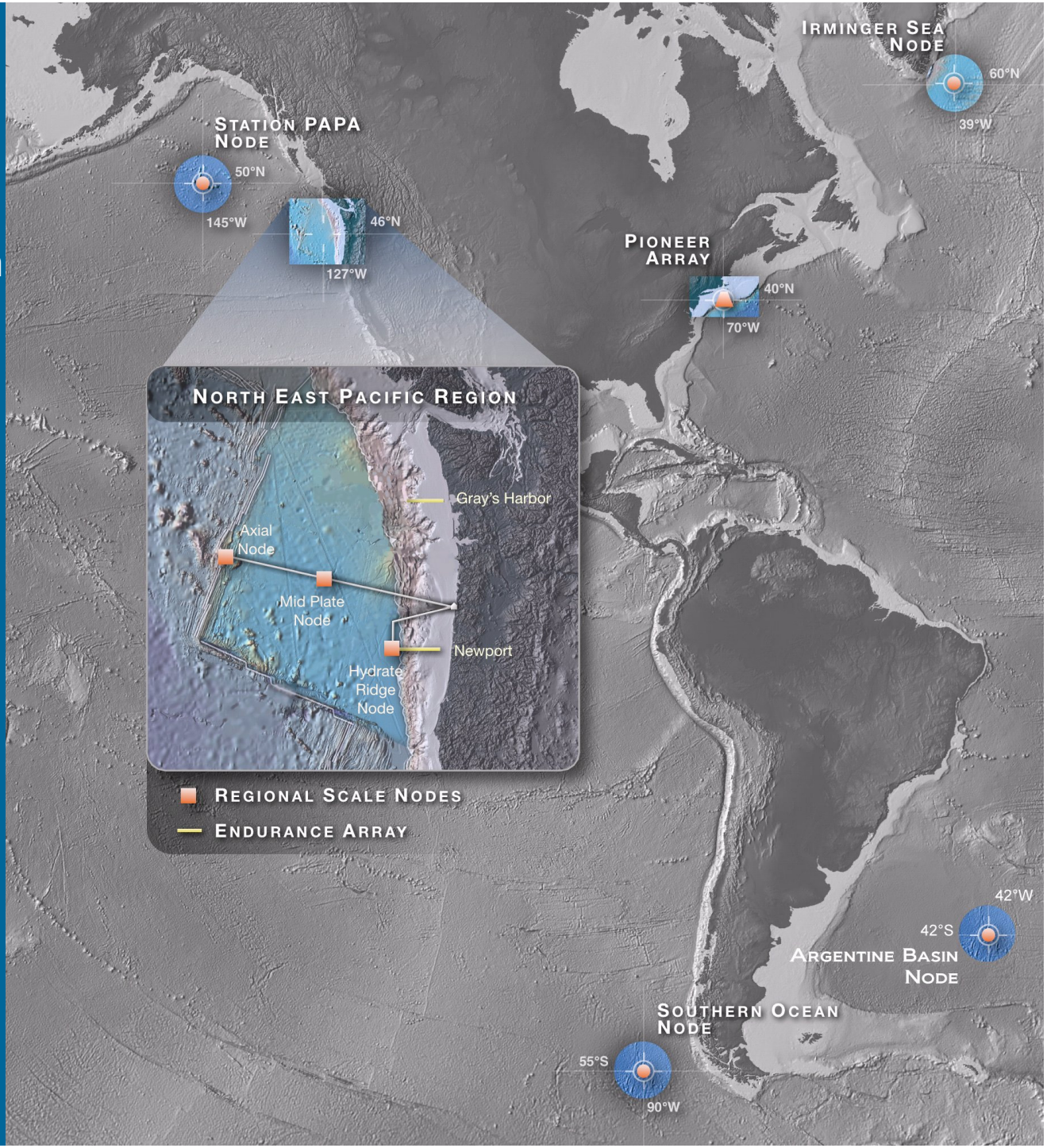
- Successful Preliminary Design Review, Dec 2007
- Successful Final Design Review, Nov 2008
- Design modification review, March 2009
- National Science Board approval in May 2009
- Funding identified FY2009; in FY2010 request
- Projected construction start in fall 2009

Program Structure



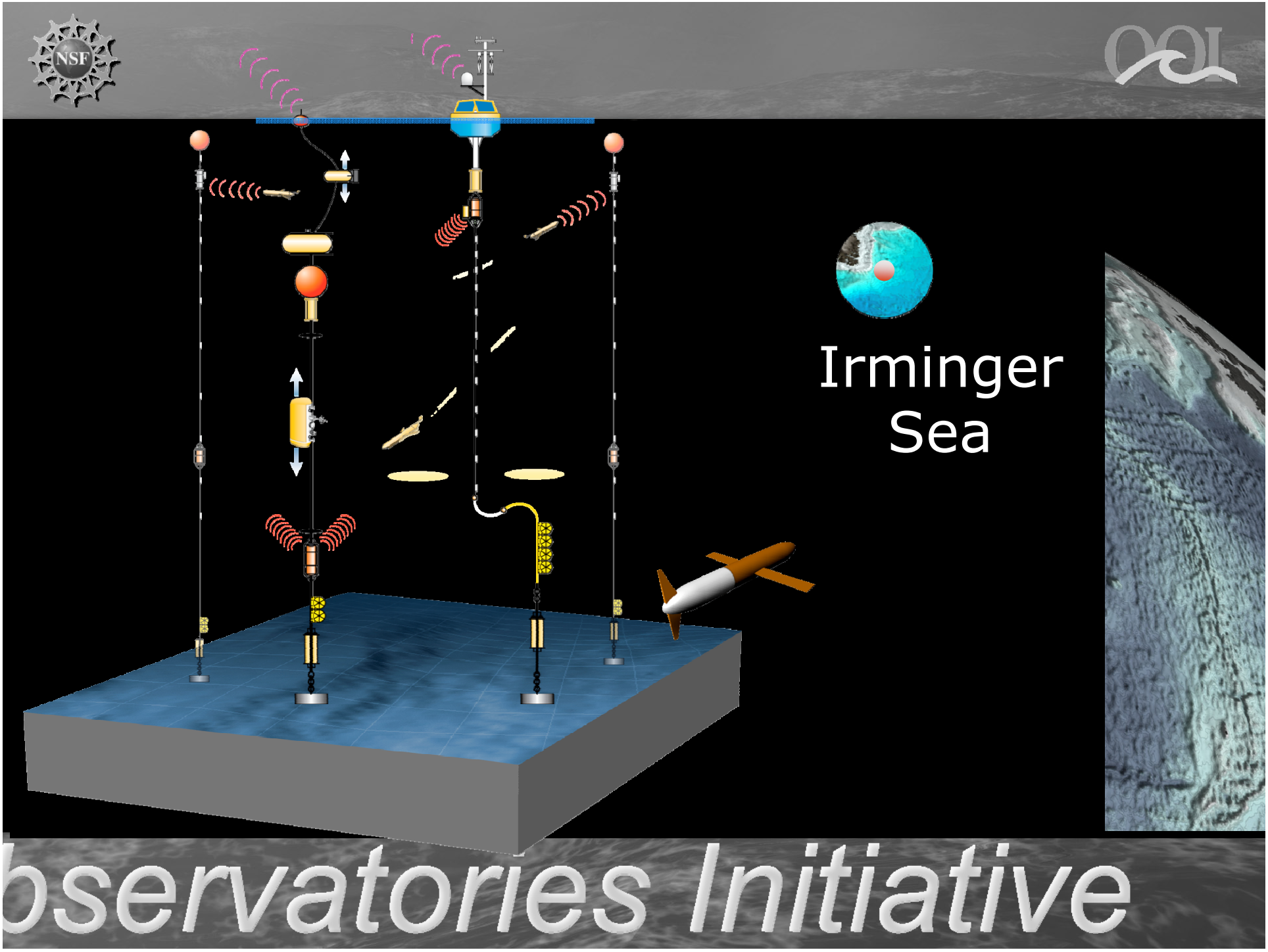
Design Elements

- 4 Global scale sites
- 3 Regional cabled sites in the NE Pacific
- Coastal scale arrays: Mid-Atlantic Pioneer Array, PNW Endurance Array
- Each scale incorporates mobile assets
- Cyberinfrastructure: enable adaptive sampling, custom observatory view, collaborative analysis
- Interfaces for education users



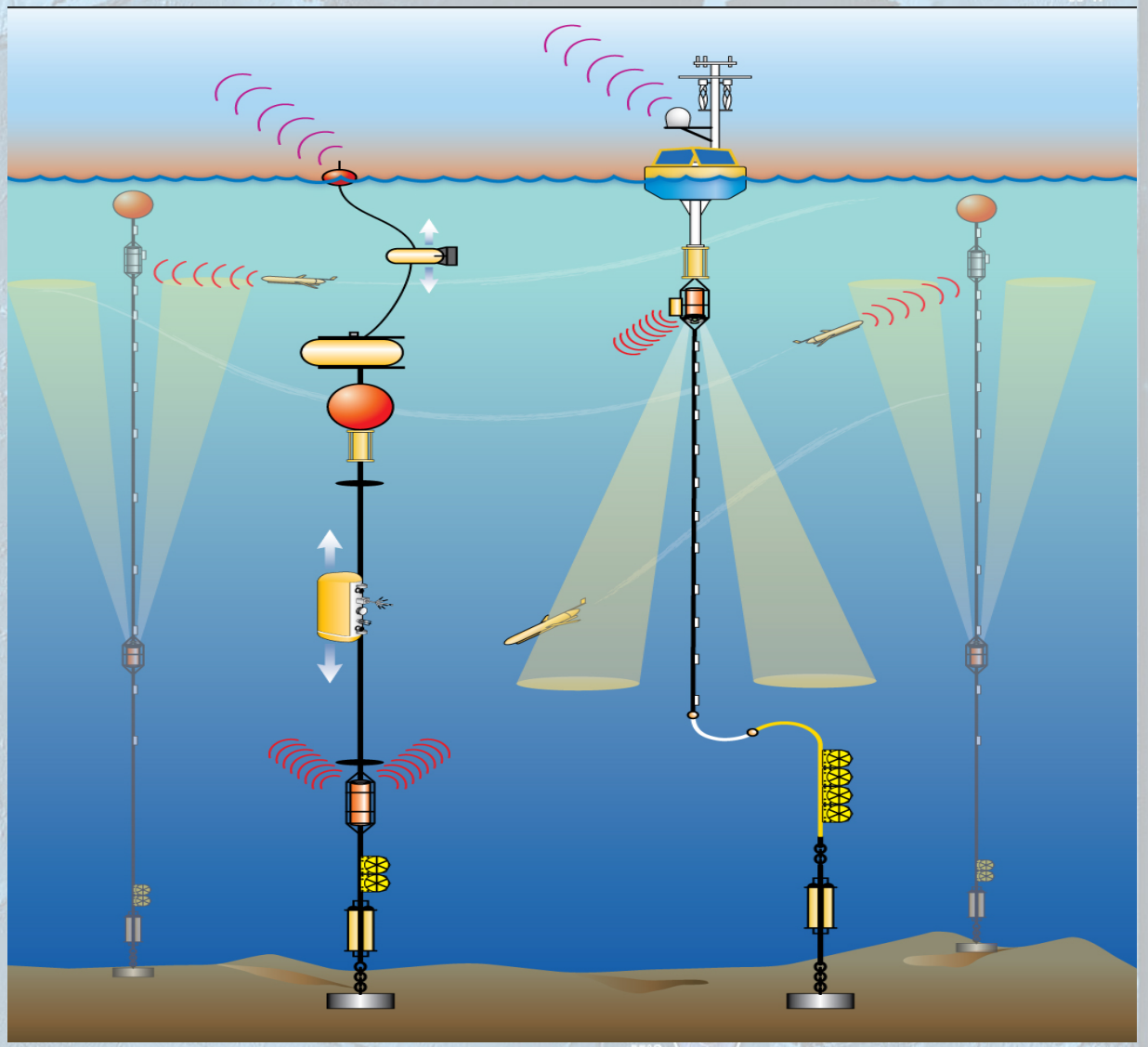
OOI Project Team

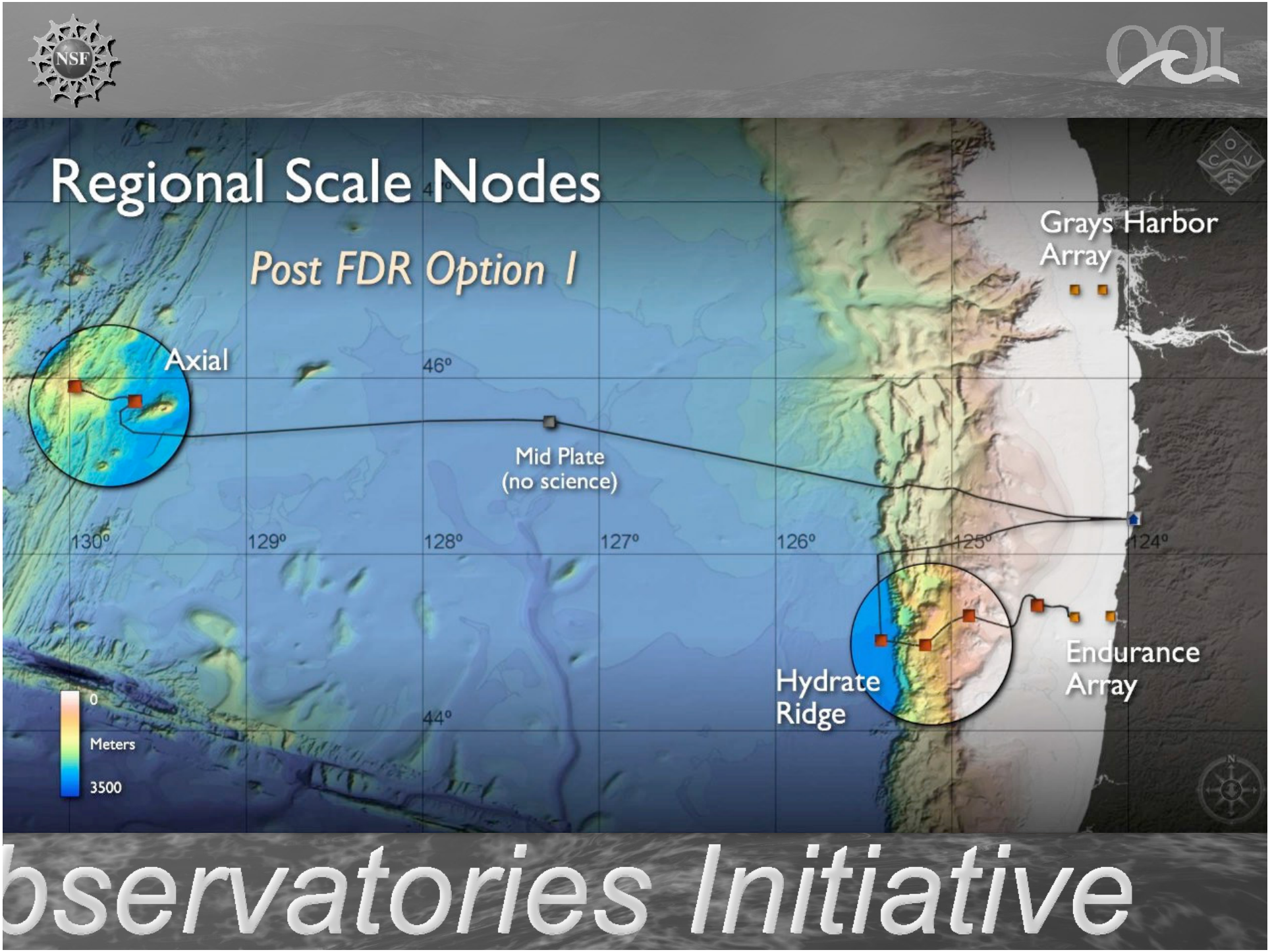
- Coordination/Integration: Ocean Leadership
- Cyberinfrastructure: UC San Diego
- Coastal and Global-Scale: WHOI (with OSU and Scripps)
- Regional-Scale: U. Washington
- Education and Public Engagement: TBD

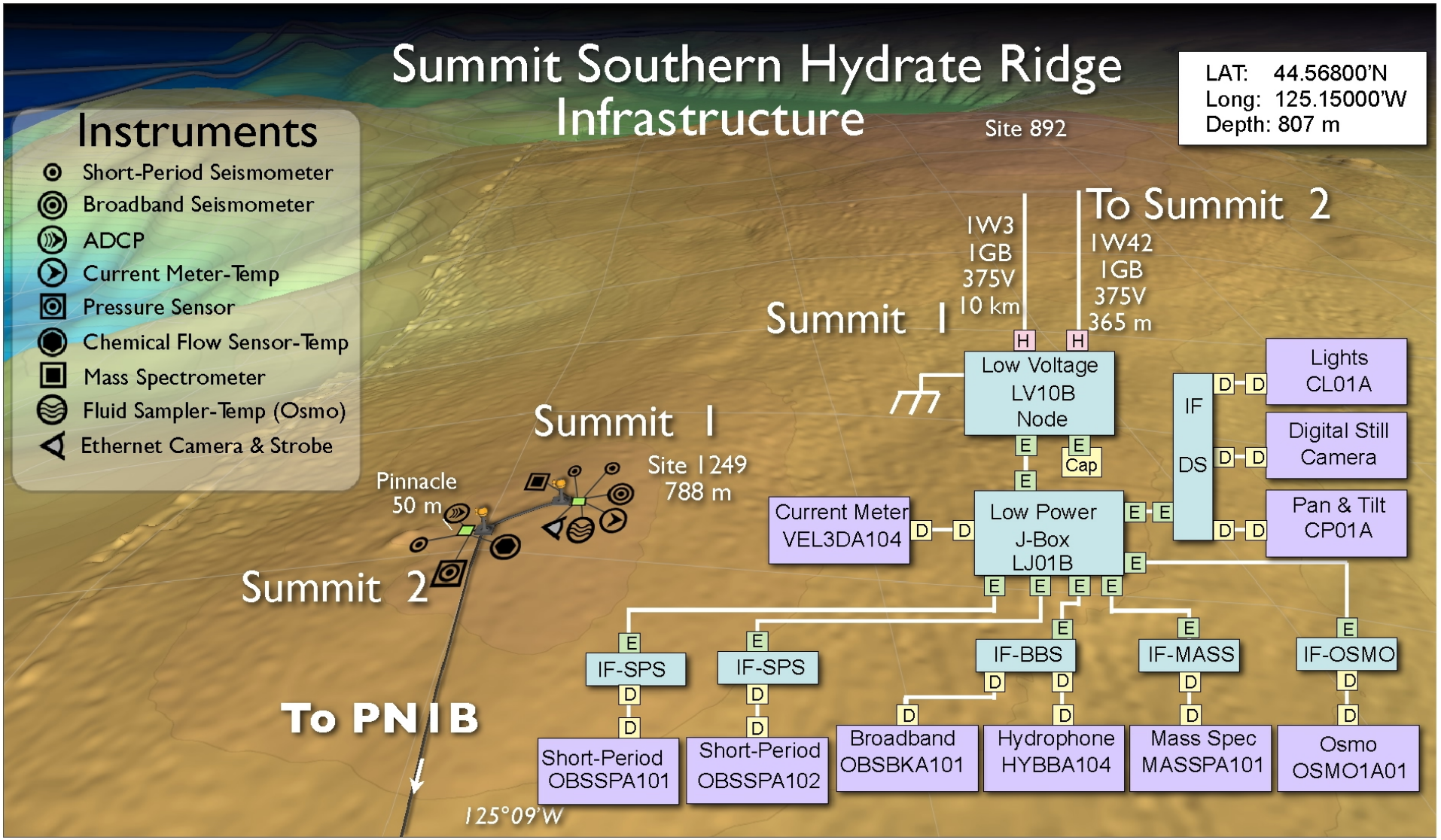

Irminger
Sea
bservatories Initiative

Global Arrays

- Fixed and mobile assets
- Extended duration
- Surface to near bottom water column coverage
- Mesoscale footprint
- Irminger Sea
- Argentine Basin
- Southern Ocean
- Station PAPA*

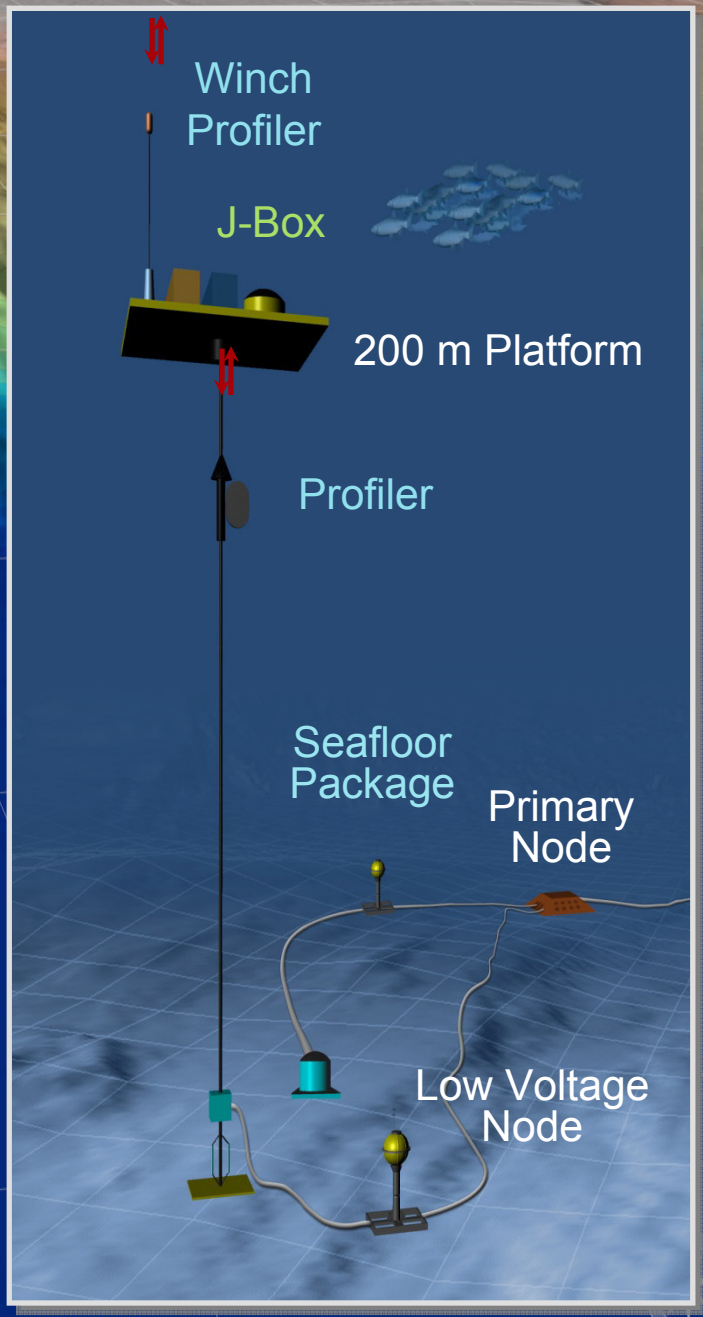


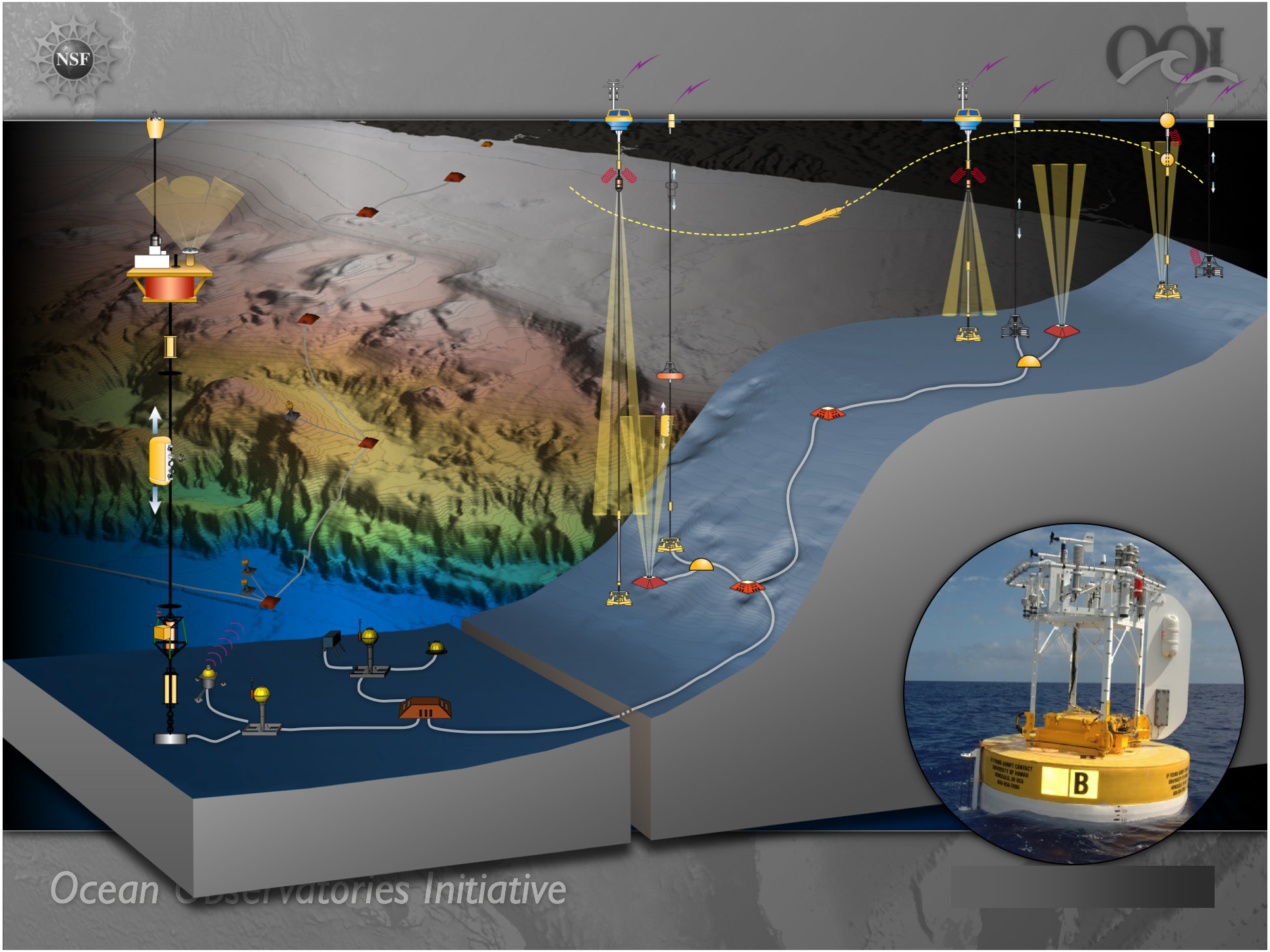

Regional Scale Nodes
Post FDR Option 1
Axial
Mid Plate
(no science)
Grays Harbor
Array
Endurance
Array
Hydrate
Ridge
46°
130°
129°
128°
127°
126°
125°
124°
44°
0
Meters
3500
bservatories Initiative



bservatories Initiative

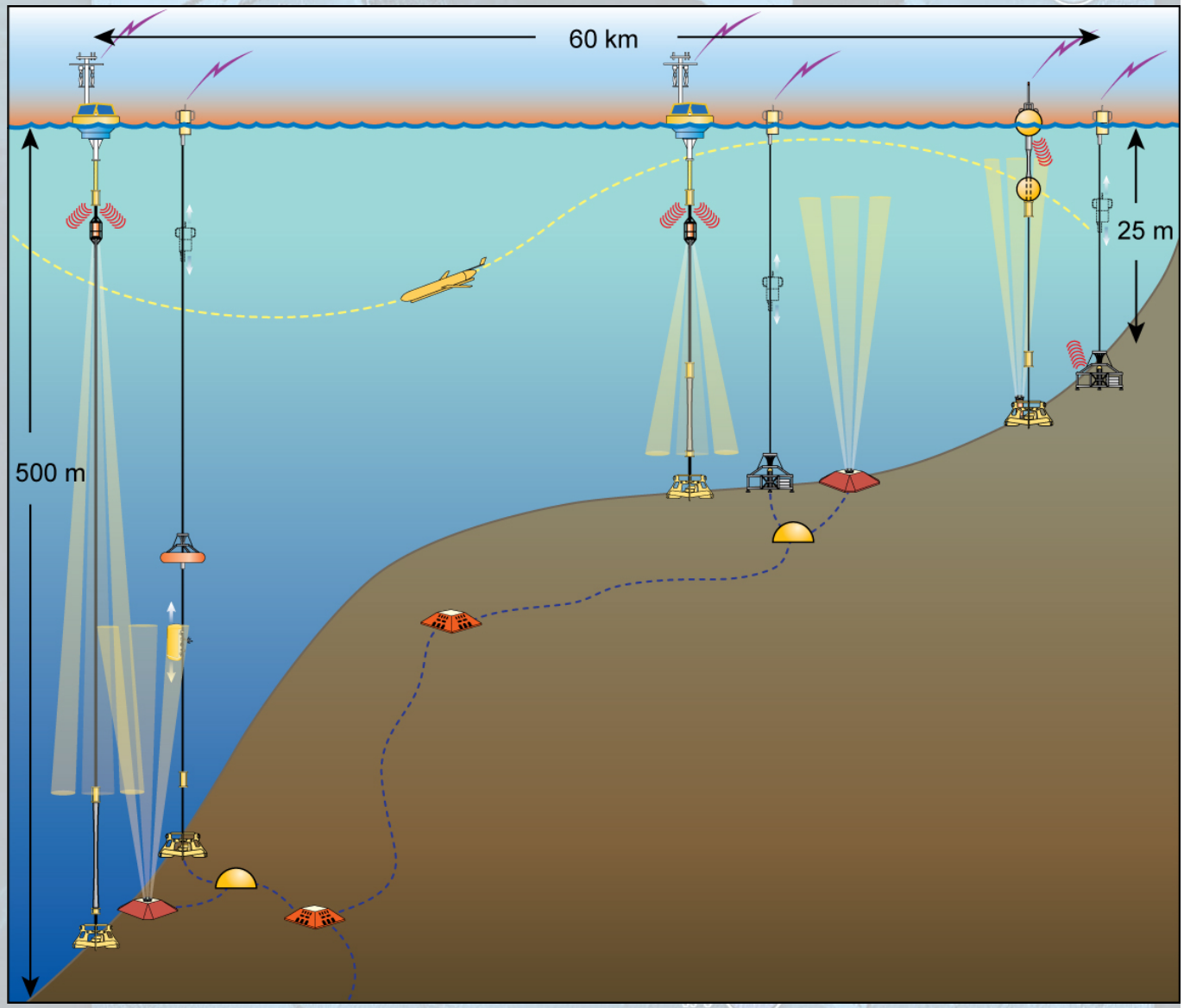
NODE 1A Instrumentation



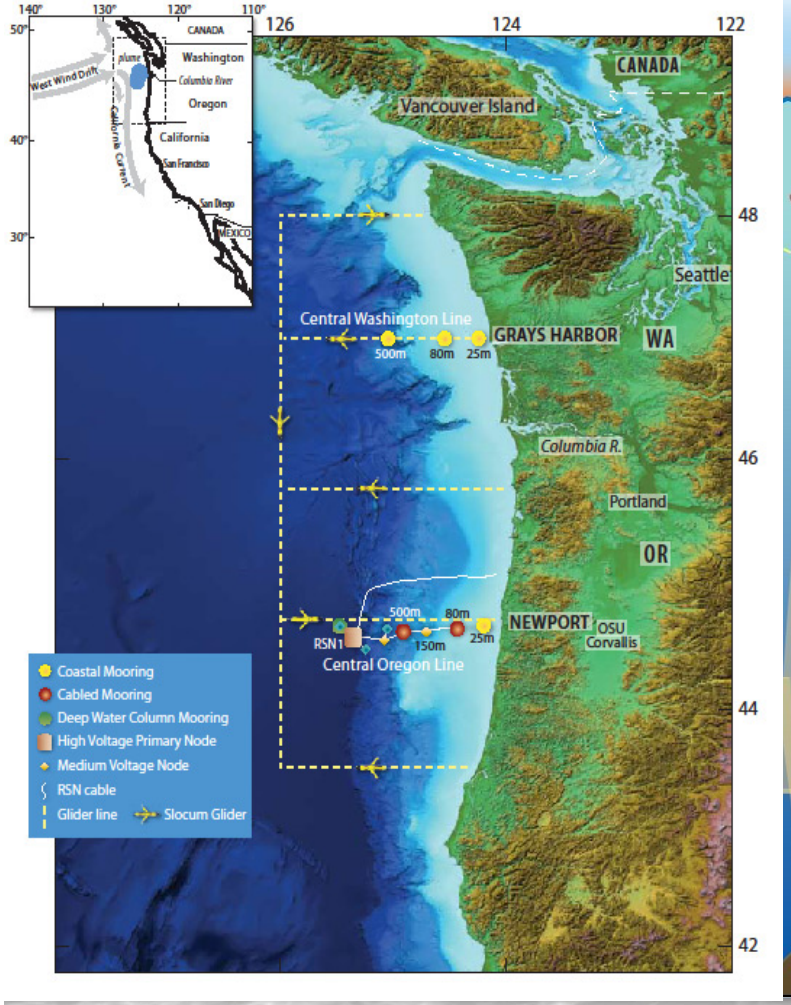

NSF
OOI
B
Ocean Observatories Initiative

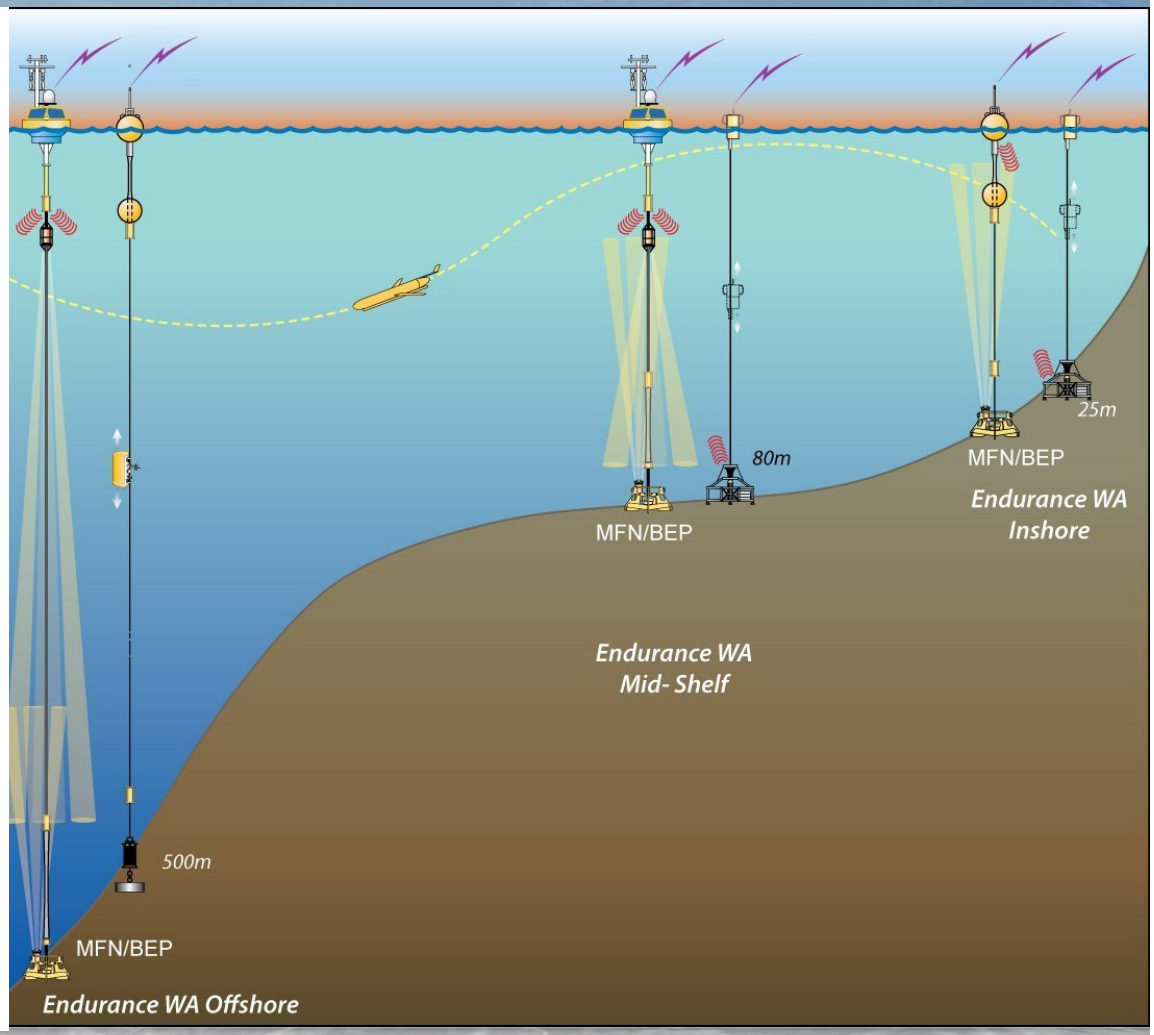
Endurance Oregon Line

- Multi-platform, multi-scale
- Fixed and mobile assets
- Cabled High-power and high-bandwidth
- Full water column
- Cross-shelf resolution
- Benthic experiment nodes



Endurance Washington Line



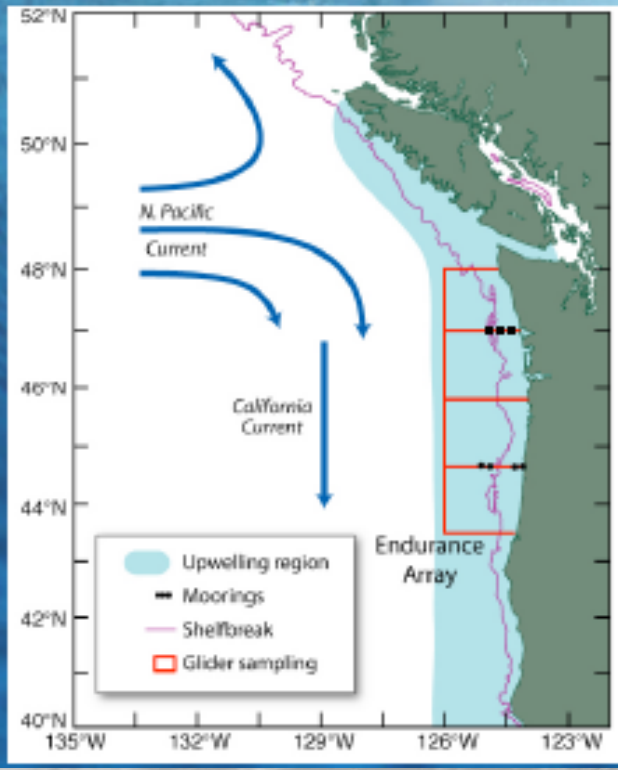


Coastal Infrastructure

Coastal Scale Nodes

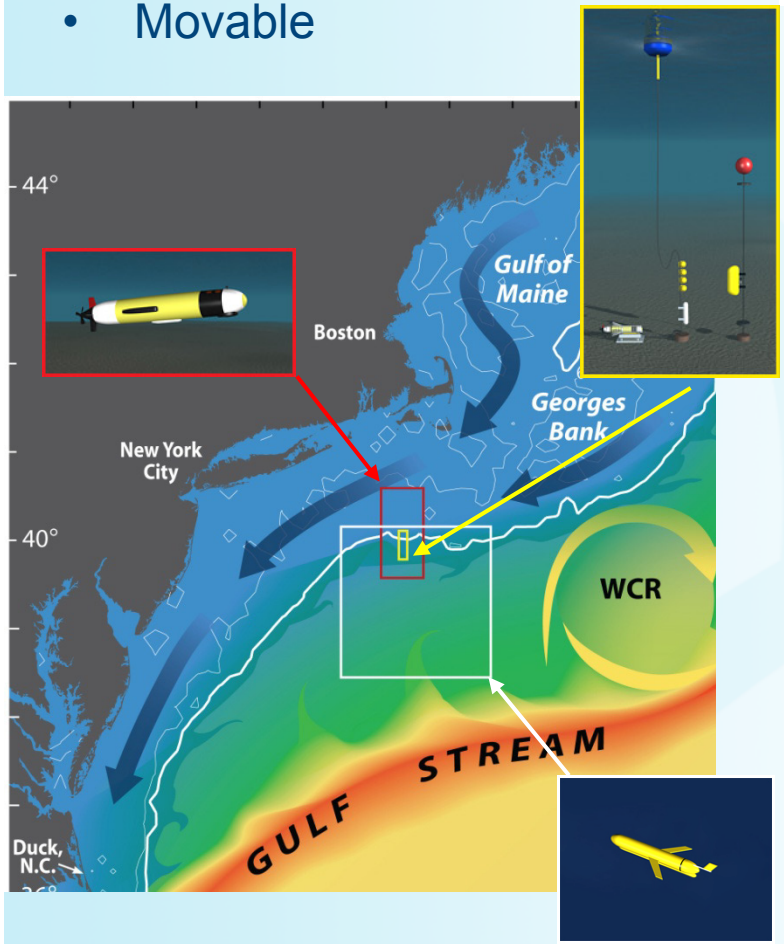
Prototypical eastern boundary
Wind-driven upwelling
Link to climate forcing (PDO, ENSO)

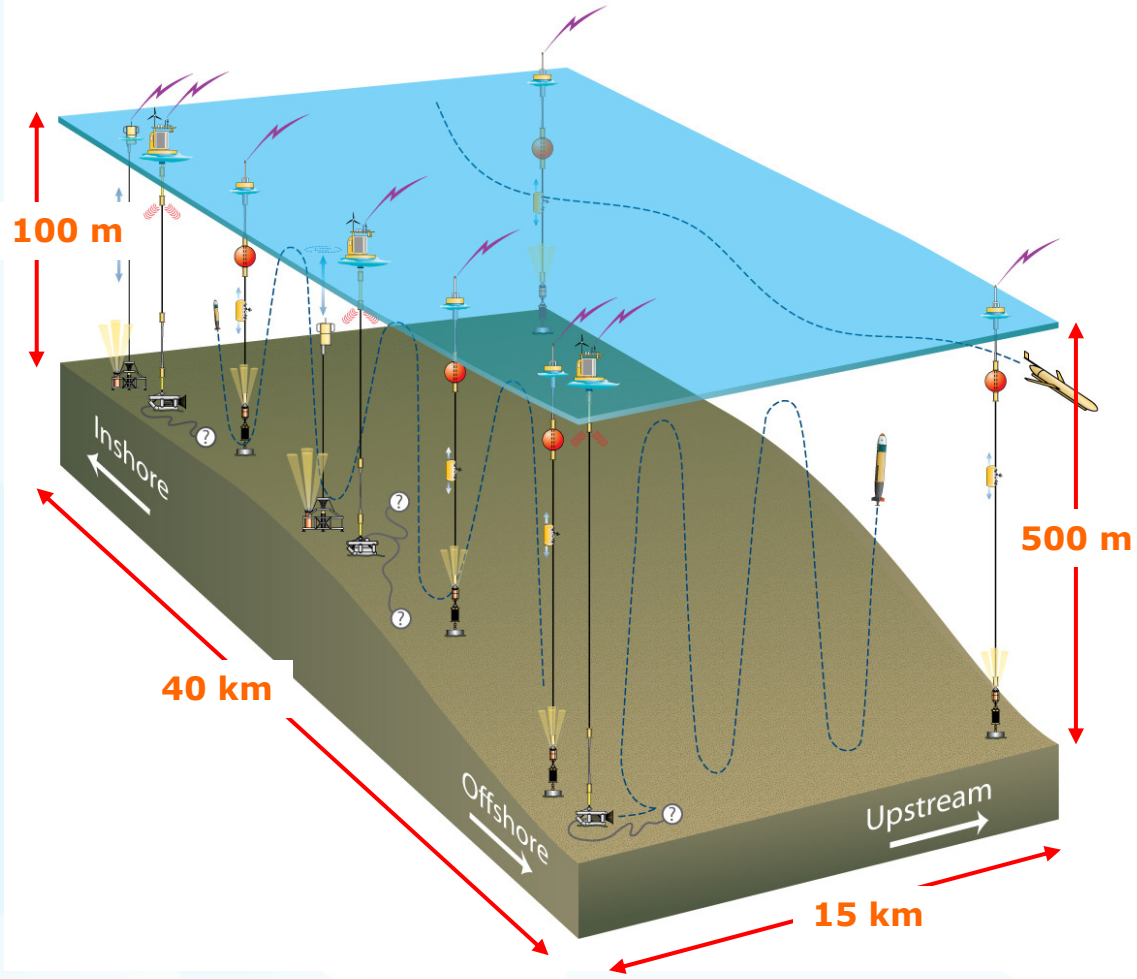
Prototypical shelfbreak system
Buoyancy-driven current
Link to climate forcing (NAO)



Pioneer Array

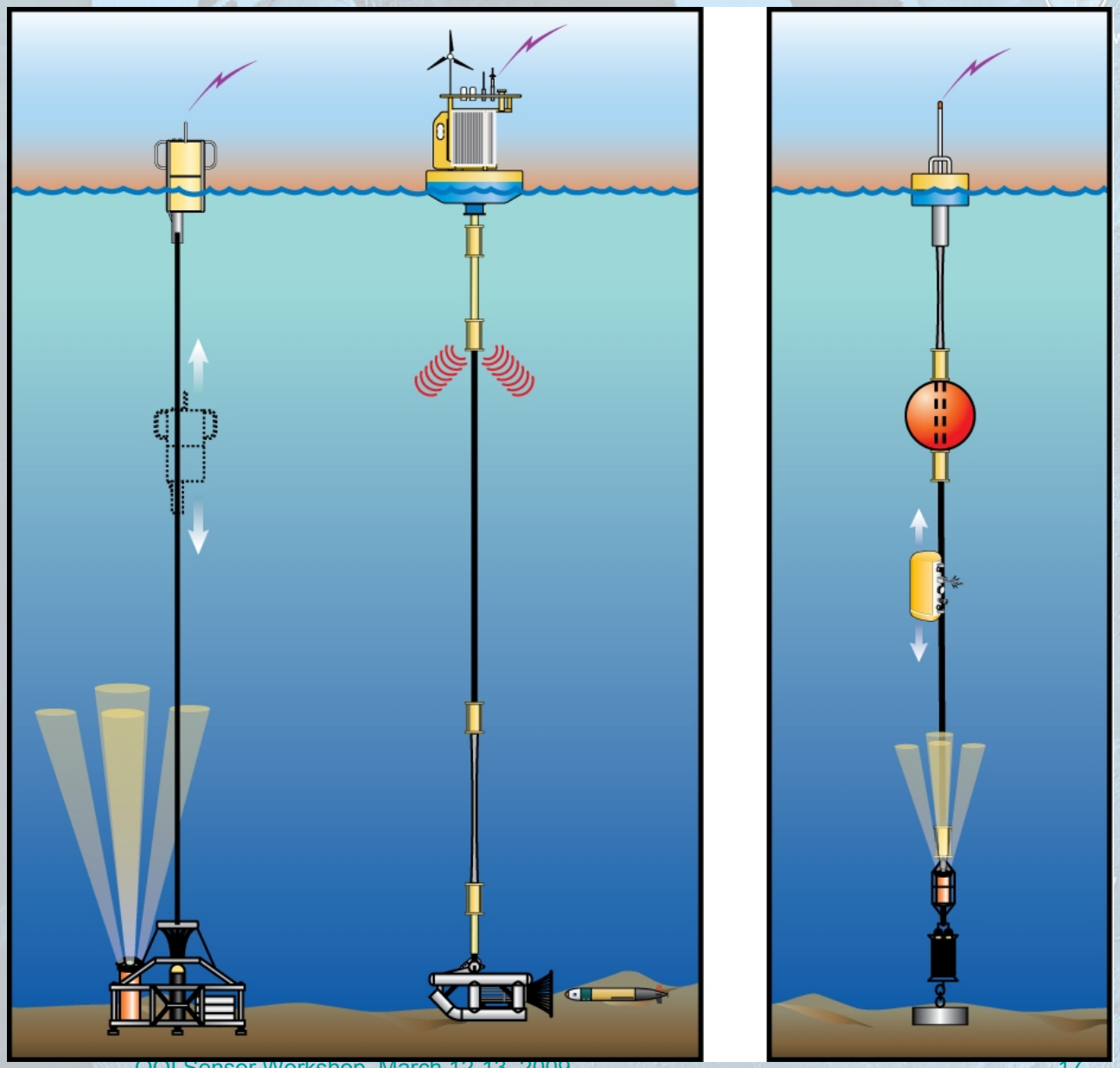
- Denser array
- Process resolving
- Fixed and mobile assets
- Reconfigurable
- Movable





Pioneer Mooring Design

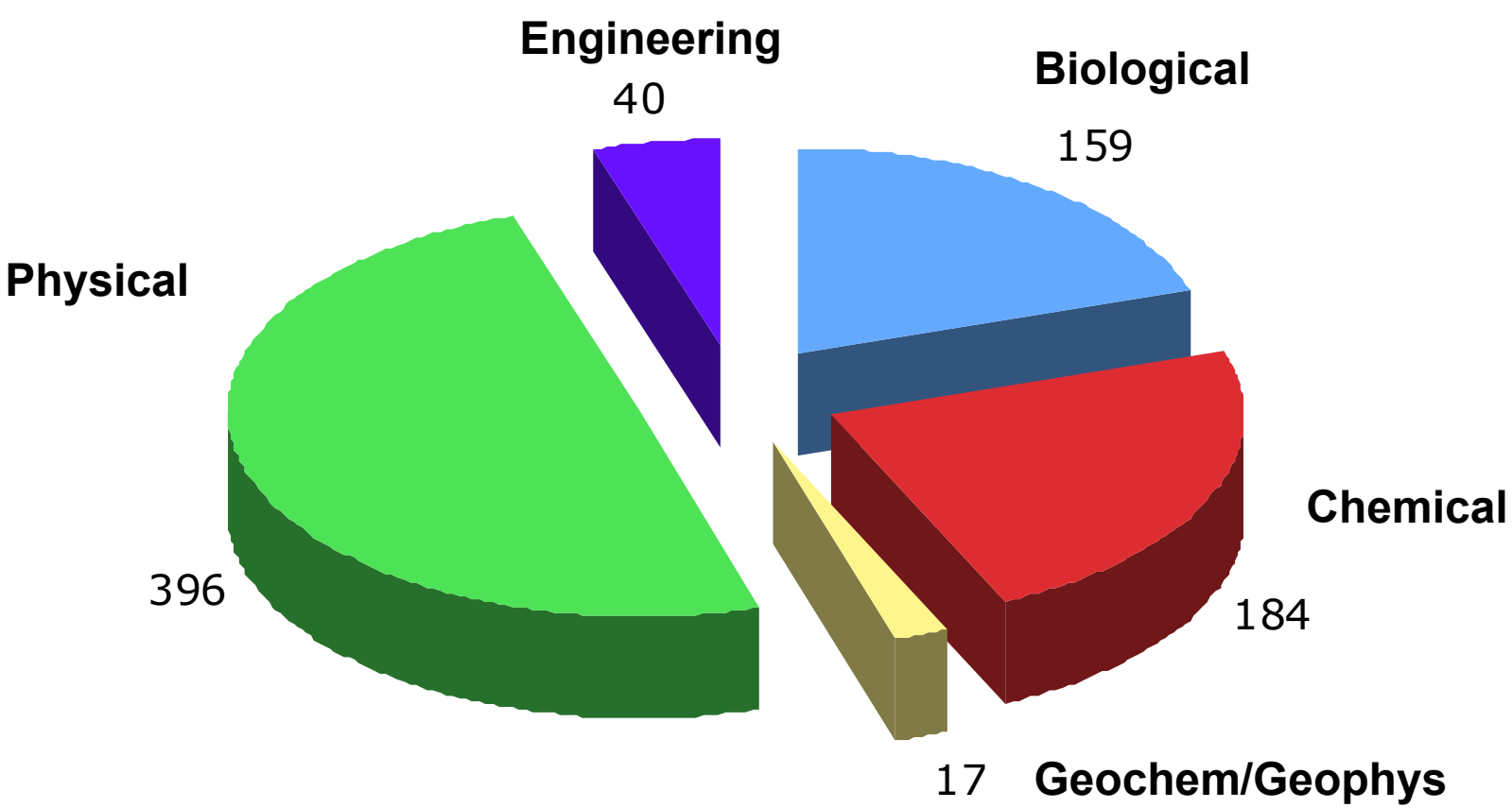
- Multi-platform
- Fixed and mobile assets
- Multi-function nodes
- AUV docks
- Full water column
- 3D volume sampling



“It’s all about the sensors.”

Number of Sensor Types	Number of Sensors	Sensor Location
49	796	All OOI core sensors
33	108	RSN Total
32	688	CGSN Total: 301 Global; 150 Pioneer; 237 Endurance
16	416	Common sensors on both RSN and CGSN
17	34	Unique to RSN only
16	346	Unique to CGSN only

Core Sensors

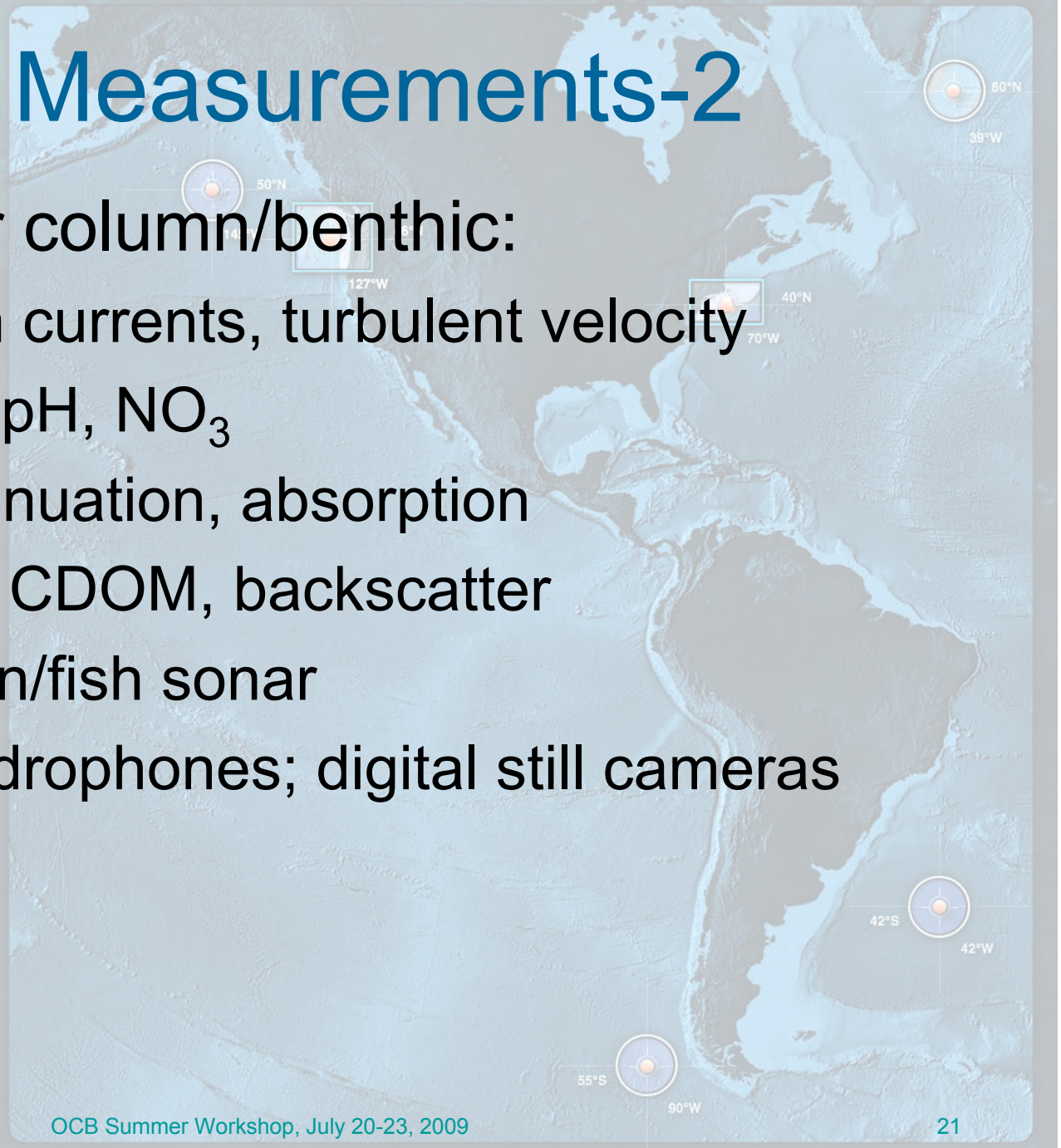


Core Measurements

- Surface buoys (air-sea interface):
  - bulk meteorology, DC Flux, wave spectra
  - CO_2 flux
- Upper water column:
  - CTD, mean currents, turbulent velocity
  - DO, pCO_2, pH, NO_3
  - Optical attenuation, absorption
  - Spectral irradiance; PAR
  - Chl-a fluor, CDOM, backscatter

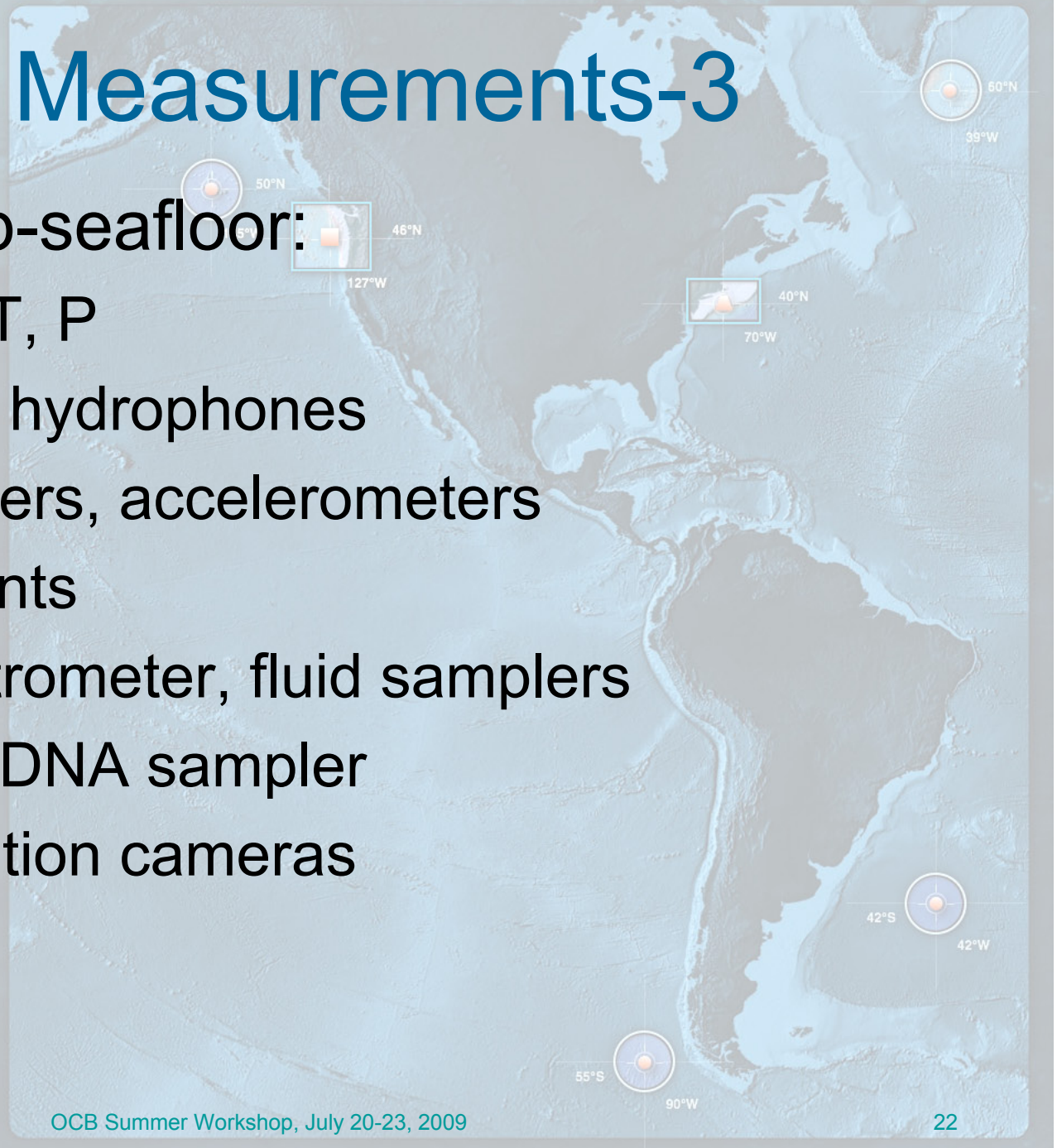
Core Measurements-2

- Lower water column/benthic:
  - CTD, mean currents, turbulent velocity
  - DO, pCO_2, pH, NO_3
  - Optical attenuation, absorption
  - Chl-a fluor, CDOM, backscatter
  - Zooplankton/fish sonar
  - Passive hydrophones; digital still cameras



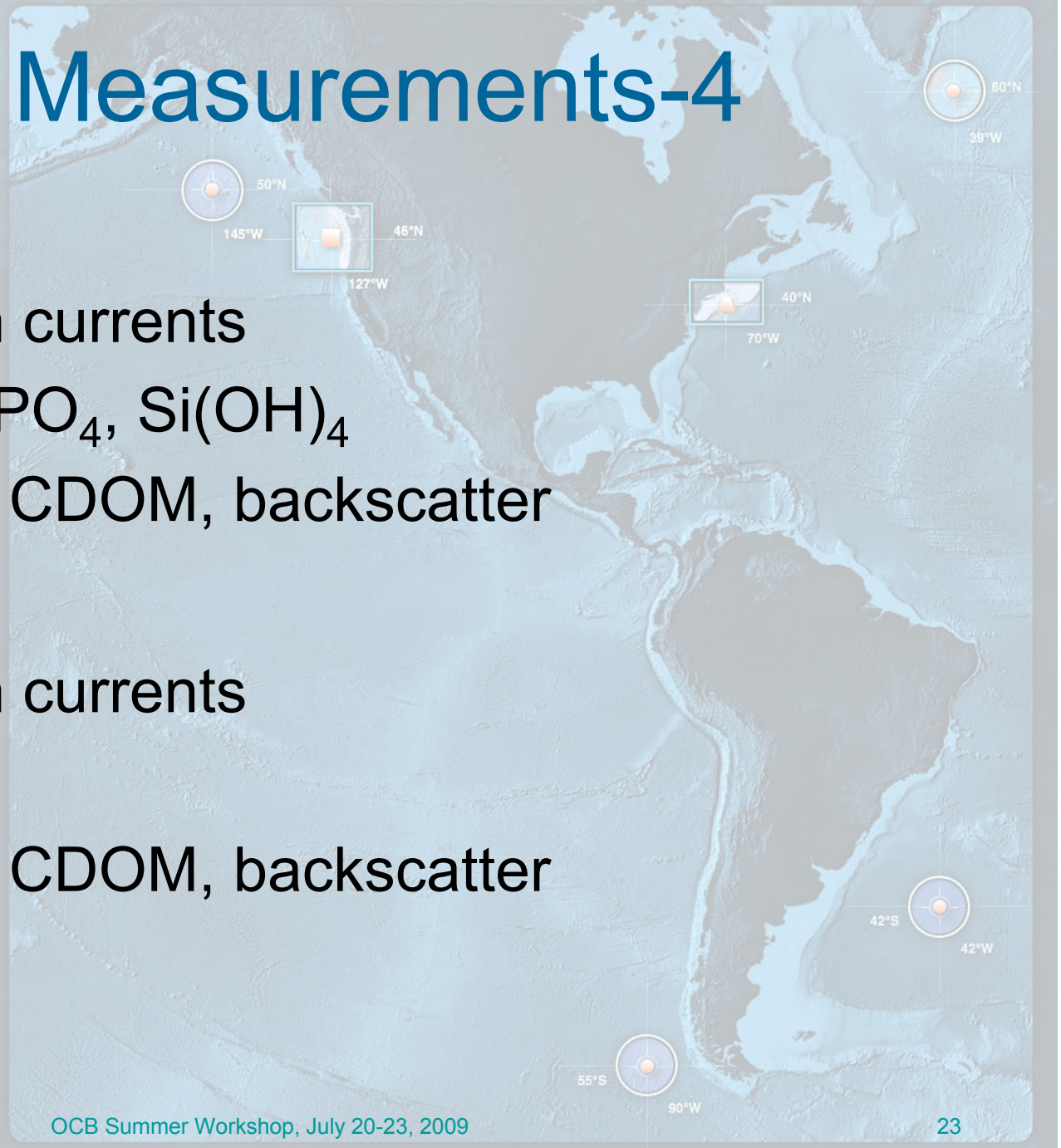
Core Measurements-3

- Seafloor/sub-seafloor:
  - Vent/seep T, P
  - Broadband hydrophones
  - Seismometers, accelerometers
  - Local currents
  - Mass spectrometer, fluid samplers
  - Particulate DNA sampler
  - High resolution cameras



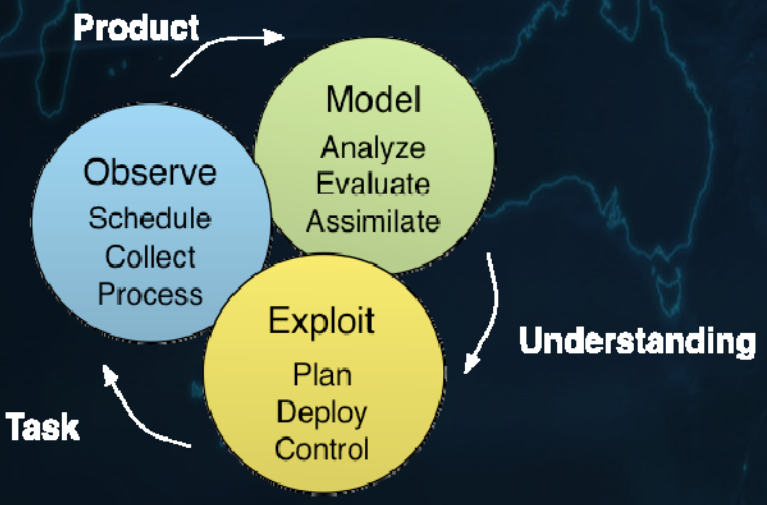
Core Measurements-4

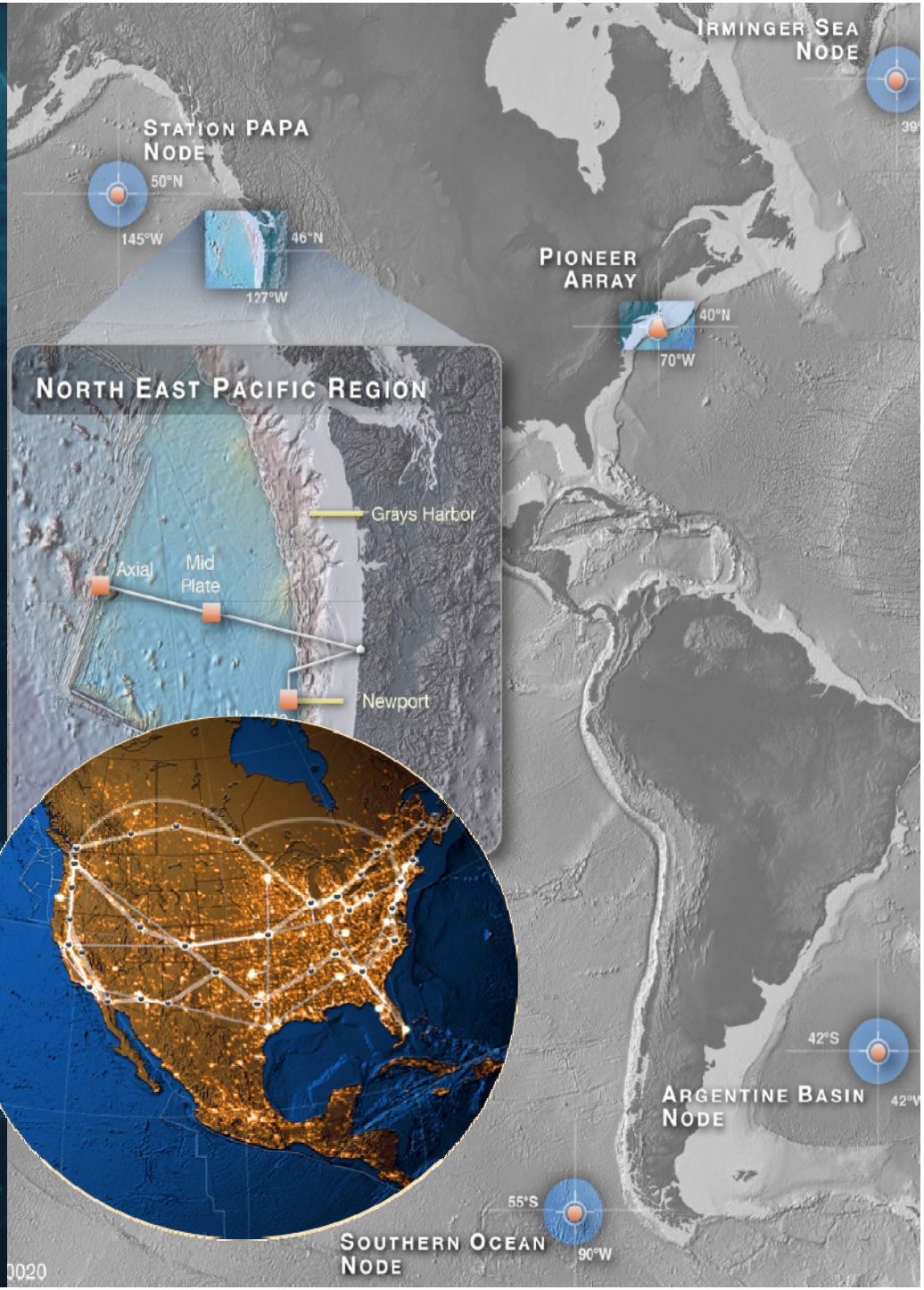
- AUVs:
  - CTD, mean currents
  - NO_3, NO_2, PO_4, $Si(OH)_4$
  - Chl-a fluor, CDOM, backscatter
- Gliders:
  - CTD, mean currents
  - DO
  - Chl-a fluor, CDOM, backscatter



An interactive ocean laboratory integrated by a leading-edge, multi-scalar cyberinfrastructure.

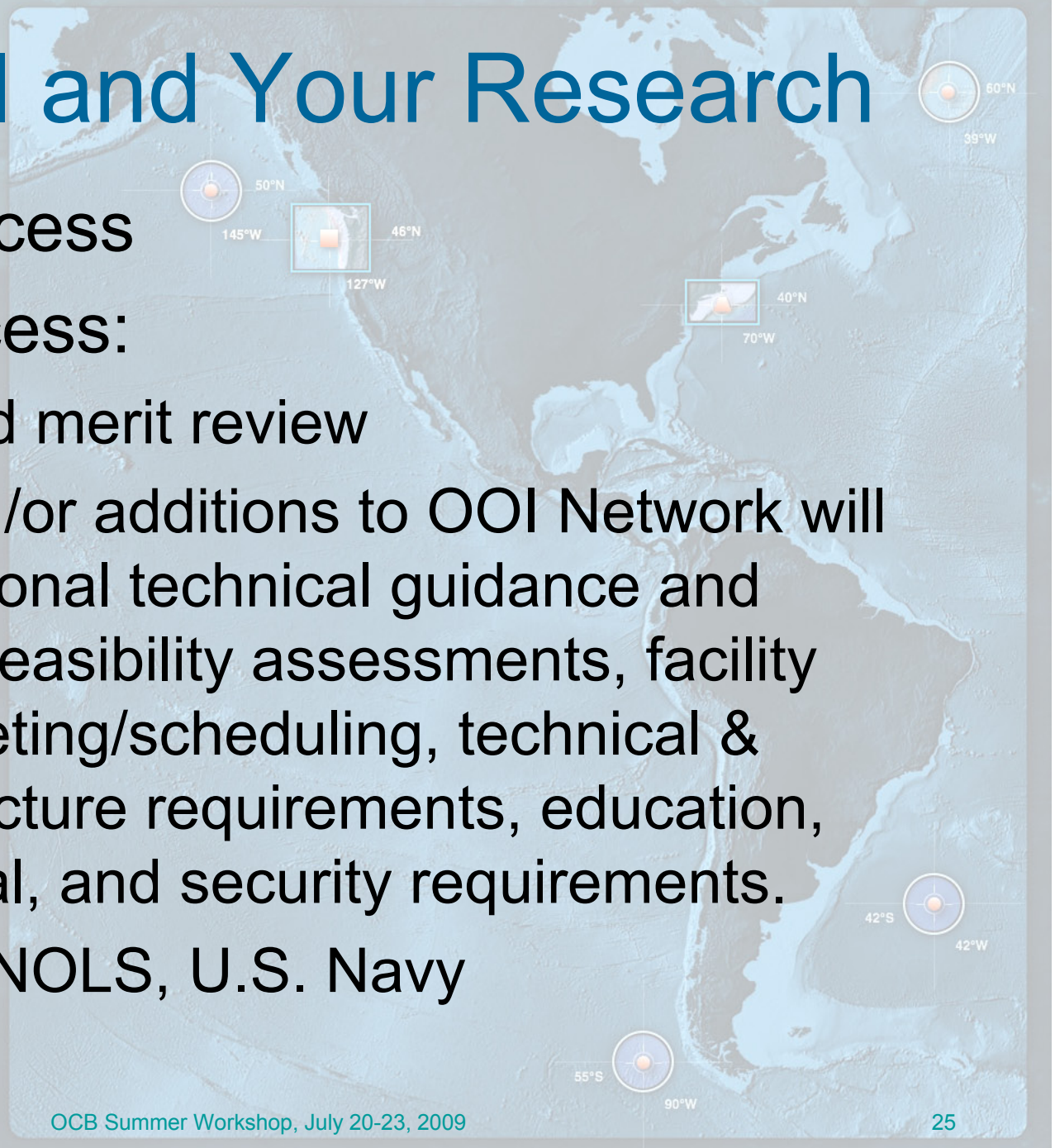
- Open data policy
- Near-real-time
- Interactive
- Scalable
- Data provenance
- Social Networking





The OOI and Your Research

- Open data access
- Proposal process:
  - NSF standard merit review
  - Changes and/or additions to OOI Network will require additional technical guidance and information (feasibility assessments, facility usage, budgeting/scheduling, technical & cyberinfrastucture requirements, education, environmental, and security requirements.
  - NSF, OOI, UNOLS, U.S. Navy



Participation

- OOI Advisory Committees
  - Program Advisory Committee
  - TBD subcommittees and/or working groups
- NSF Scientific Oversight Committee
- Project reviews
- Community Science Workshops (fall 2009 and spring 2010)
- Future competitions for:
  - Pioneer Array location (3-5 year intervals)
  - Infrastructure Operations

New OOI website to go live soon…

http://www.oceanleadership.org/ocean_observing