



NSF Update on Ocean Observing Assets Ocean Observing Science Committee

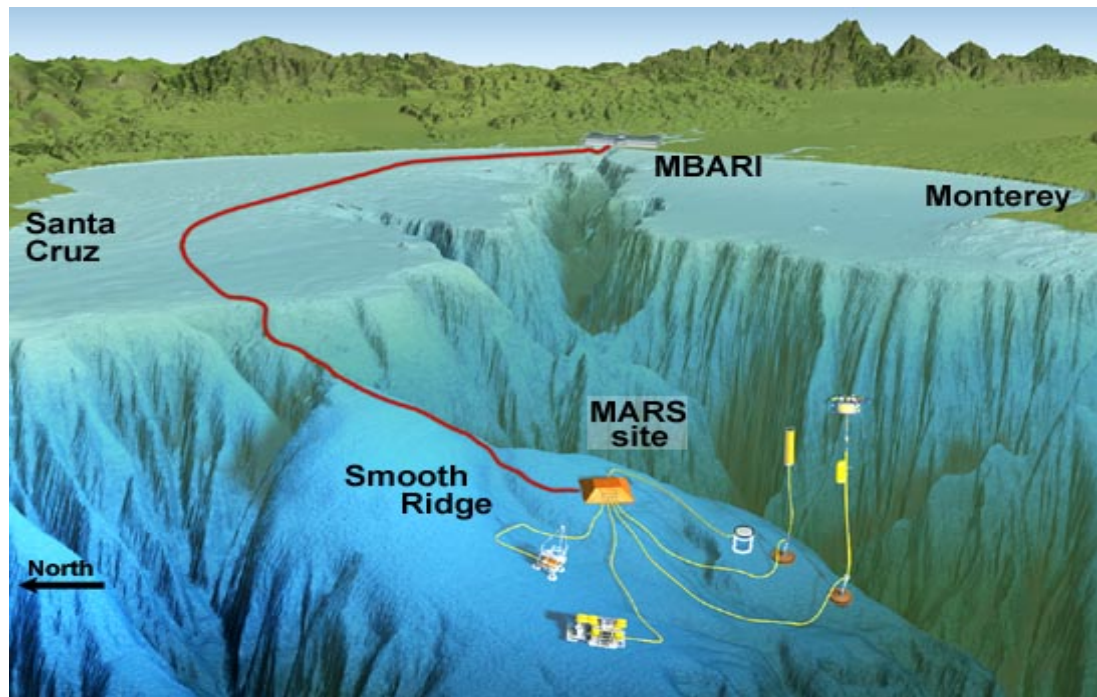
Jean McGovern

May 16, 2012



NSF Observing Infrastructure Update

- Monterey Accelerated Research System (MARS)
 - Second Year of a 3 year Operations & Maintenance Award
 - Mature, agile processes, policies and procedures





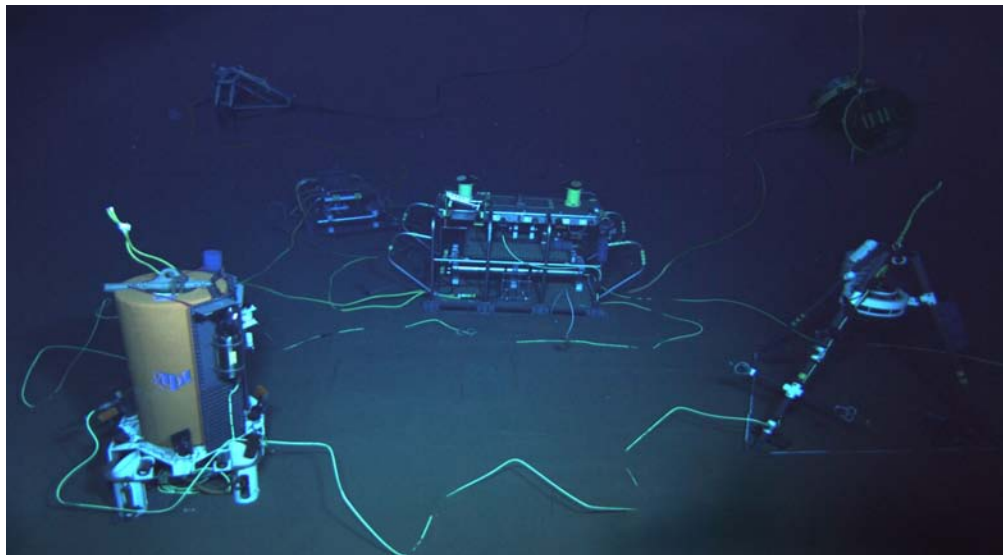
MARS – Current Projects

- **Photographic Benthic Observing System (PhoBOS)**, Craig Dawe, MBARI. PhoBOS is an integrated suite of instruments that have been placed at the MARS site to monitor ocean conditions and seafloor life.
- **Benthic Microbial Fuel Cell (BMFC)** – Claire Reimers OSU. The benthic microbial fuel cell converts chemical energy from seafloor microbes into electrical current. The objective of these fuel cell experiments is to generate a steady supply of power that could eventually be used to operate remote oceanographic instruments.
- **Free-ocean carbon dioxide enrichment experiment (FOCE)** – Peter Brewer MBARI. The FOCE experiment is designed to study the effects of increased carbon dioxide concentrations in seawater on marine animals.
- **Monterey Ocean-Bottom Broadband seismometer (MOBB)** - Barbara Romanowicz, Berkeley Seismological Laboratory and Paul McGill, MBARI. The MOBB broadband seismometer records everything from very slight shaking that happens as fast as 20 times per second to shocks from large, distant earthquakes that arrive several minutes apart.



Aloha Cabled Observatory

- Construction and deployment award was recently extended 1 year beyond the 31 May 2012 expiration date. Proposal for 3 years of O&M currently out for external review.
- Major Science/Projects – ACO "saw light." In early 6 June 2011.
- The O&M proposal lists a number of potential users but currently no funded science projects.





OOI – Quick Description

- OOI is a multi-scale ocean observatory in Year 3 of Construction
 - \$386.42M (NSF is the sole funding agency) **
 - 66 months of construction (Sept 2009 start)
 - Funding budgeted for initial operations (end 2017) **
 - 25 years of planned operations
 - OOI is a system of systems that will document, for 25 years, air-sea, water column and seafloor processes, across full ocean depths using the best available technologies
 - Pioneer Array is designed to be a redeployable array based on proposal review
- ** Subject to the realities of federal budgeting process

OOI Network Design

Multi-scale Observatory

Global Arrays

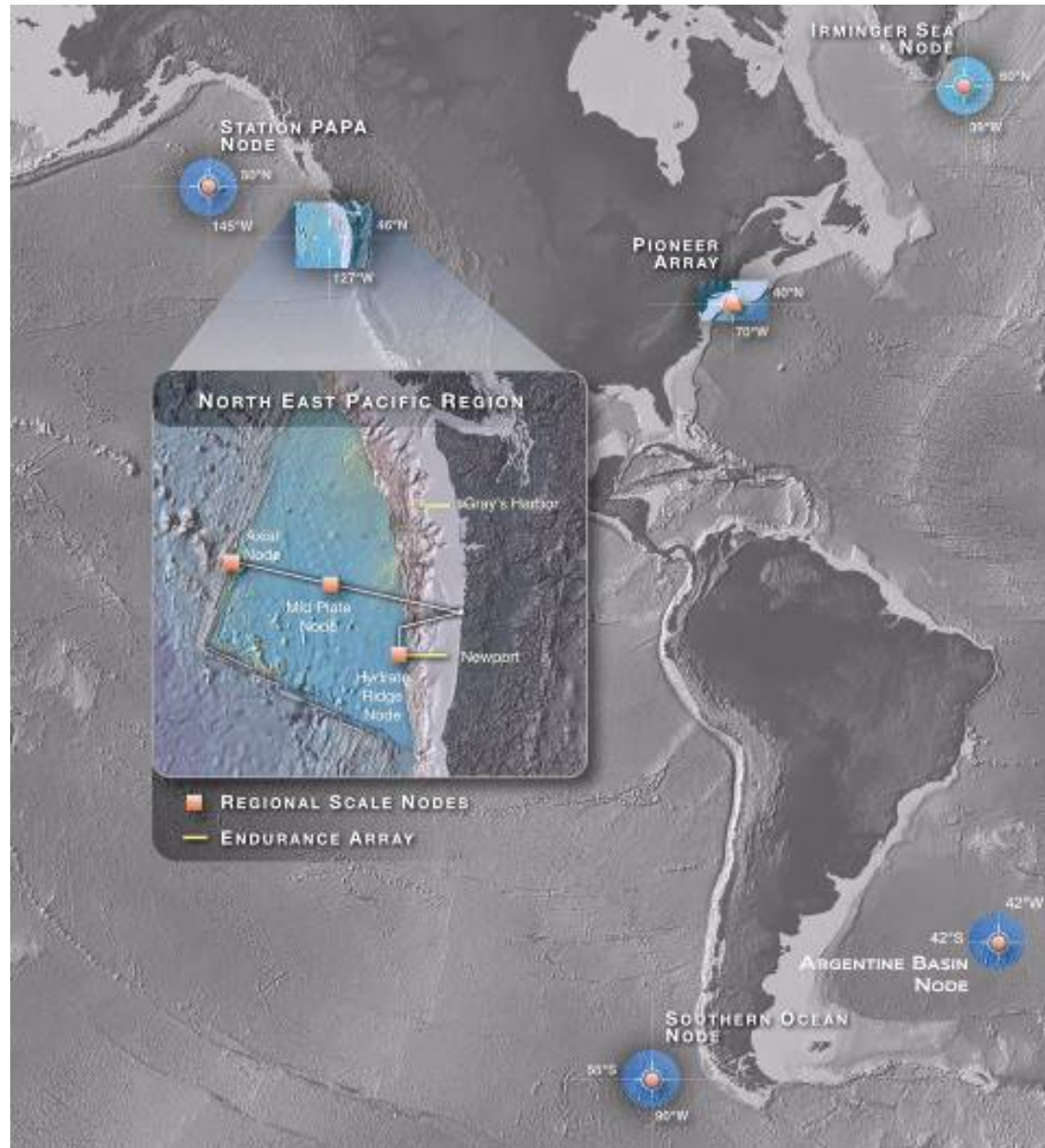
- Gulf of Alaska
- Irminger Sea
- Southern Ocean
- Argentine Basin
- Ocean Gliders

Regional

- Cabled
- Juan de Fuca Plate
- Oregon

Coastal Arrays

- Pioneer
- Endurance
- Coastal Gliders
- AUVs on Pioneer





OOI – Construction Update

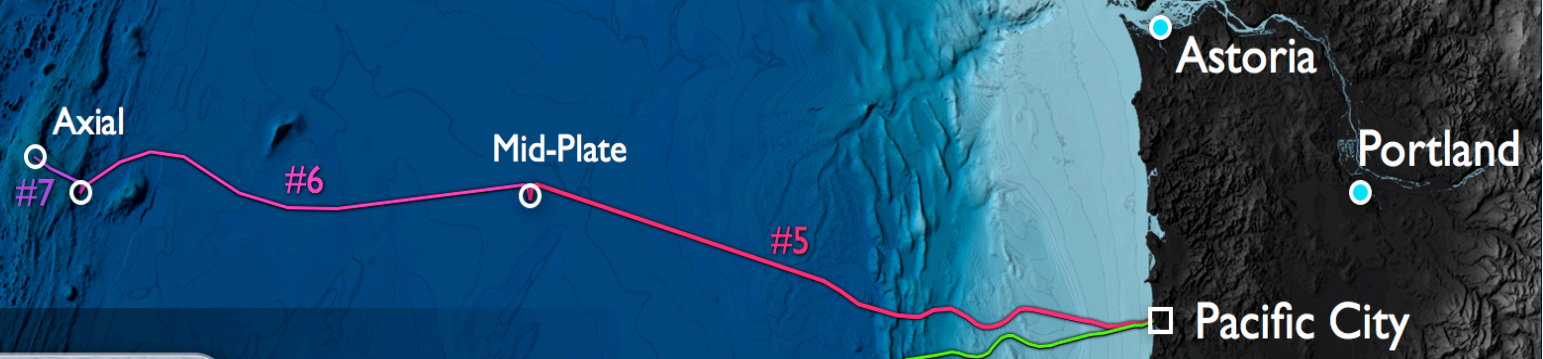
- October 2011 (our Axial Meeting) & May Construction Review
 - Funding Concern - Good news
 - FY12 funding authorization is for \$102M, full request
 - Funding profile condensed to 2 more years
 - Project Execution Issues update
 - Project Schedule – HUGE issue – no end to end schedule delivered
 - NSF rescoping review process
 - High Visibility – Government Oversight Increase
 - Data Management – review suggested last May canceled twice
 - Review was rescoped to NSF internal review
 - Process for build of data management capability stabilized
 - Schedule and Execution are still large issues – weak progress



Statusthe positive

- Many procurements AWARDED
 - Teledyne Webb Gliders – Coastal, Ocean
 - Hydroid – AUVs
 - CTDs (Seabird)
 - Wire Following Profilers (McLane)
- Cable is on the Ocean Floor
- Mooring Designs and tests – to be complete by 2013
- Release 1 of software is complete
- Education piece is awarded to Rutgers up & running
- NSF Funded Science Workshops (2)

RSN CABLE SEGMENTS



Segment 1 Landing
July 12, 2011

Segment 5 Landing
July 15, 2011



A dedicated cable-laying ship, the TE SubCom C.S. Dependable, performed the majority of the installation

Segments

#1 #2 #3 #4 #5 #6 #7

○ Future Node Locations



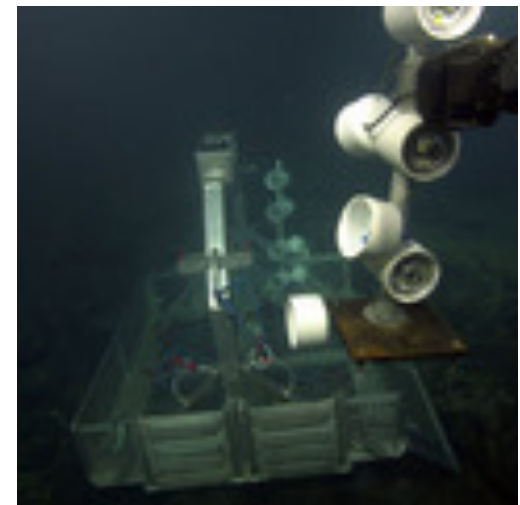
Plow on Deck....



The Cable Has Landed!



Cruise last summer



Test Mooring Development



AST2 Recovery - Global Hybrid Profiler



West Coast Tests





OOI – O&M Update

- Struggle to define construction schedule negatively impacts transition to operations definition
- Staffing must align to construction progress
- OCE Division Director requests a \$55M budget cap
 - Project has a workshop in February
 - Lessons learned from other projects about transition
 - \$55M is feasible
 - Budget transition in process -- *belt tightening is always painful*
 - Major Cost Drivers and Reductions
 - MANAGEMENT COSTS (typical issue)
 - Supply chain management & life cycle costs
- Endurance Glider transition is first planned – more later....

Proposed OOI Installation Schedule	2011				2012				2013				2014			
	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND

Global Sites	Argentine Basin															
	Irminger Sea															
	Southern Ocean 55 S															
	Station Papa															

Coastal Arrays	Endurance															
	Pioneer															

Regional Arrays	Primary Infrastructure															
	Secondary Infrastructure															

Legend
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 Installation

 Data Flow

 Commissioning

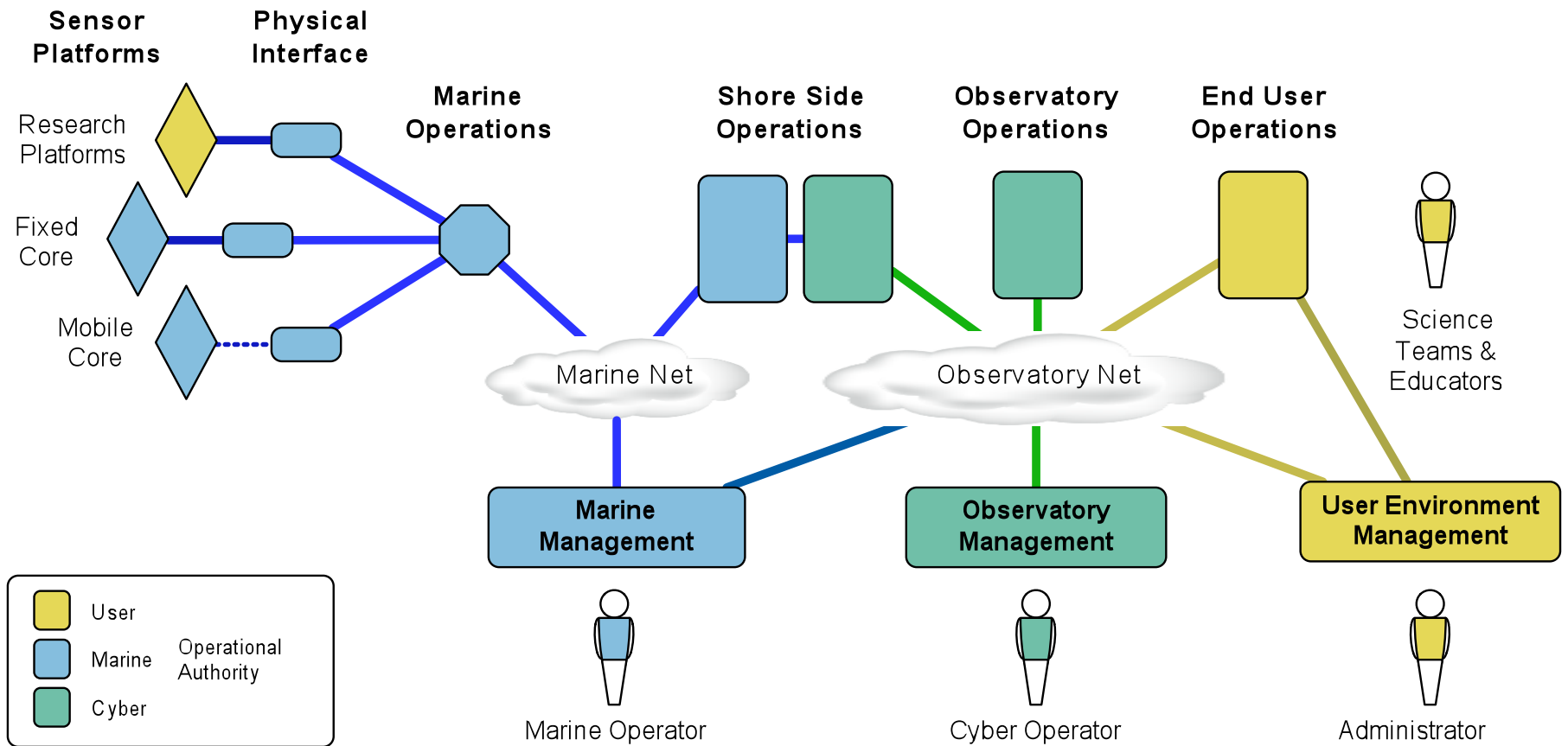
 Gliders Deployed

 AUVs Deployed

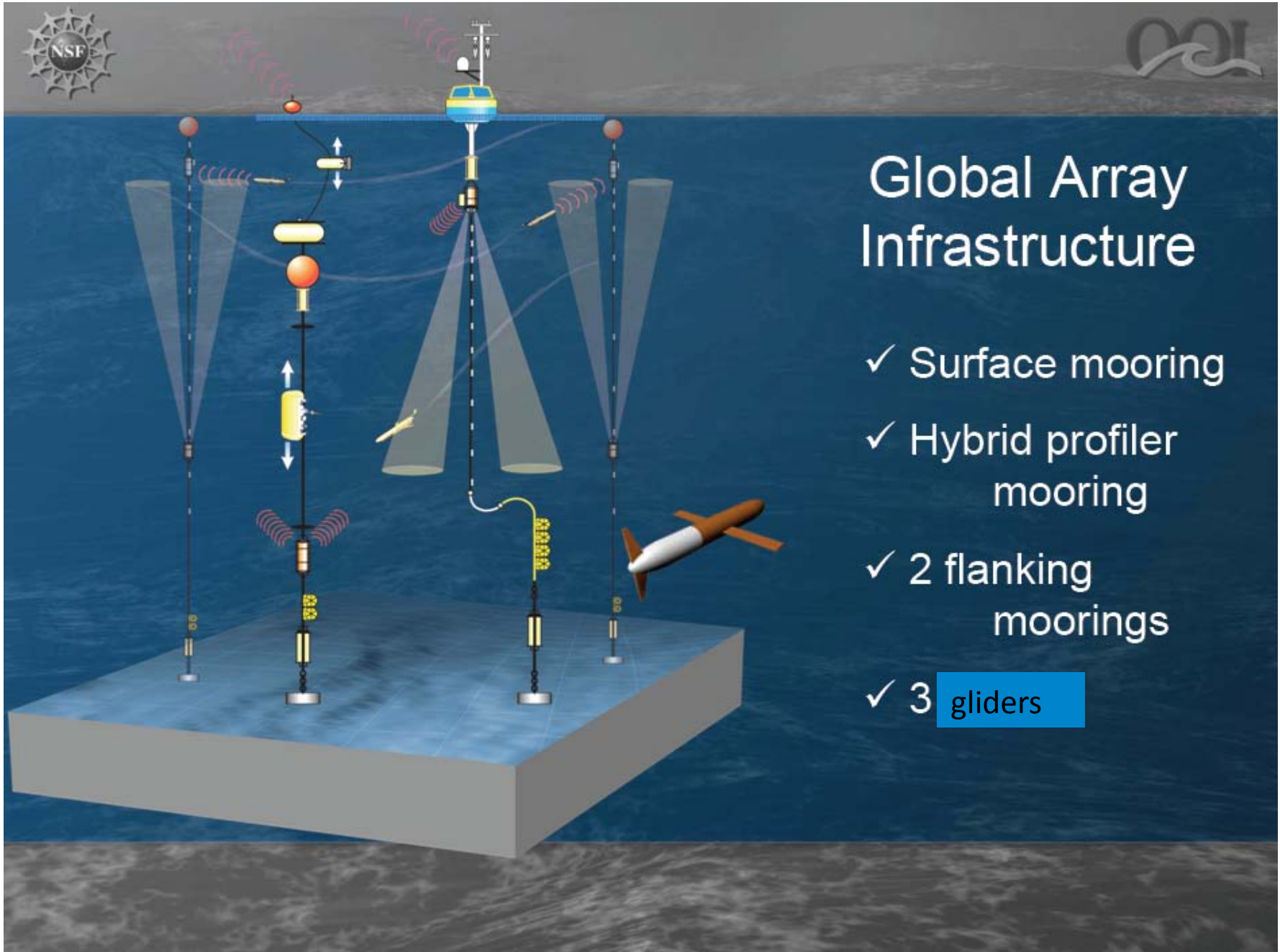
OOI Installation Schedule		2011				2012				2013				2014				2015			
		Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND	Q1 JFM	Q2 AMJ	Q3 JAS	Q4 OND
Cyber- infrastructure	Software Release			R1				R2					R3 C			R4 C					
	Global Sites	Argentine Basin																		G I C	
	Irminger Sea										G I									I C	
	Southern Ocean 55 S												G I C								
	Station Papa														G I C						
Coastal Arrays	Endurance						G						Cabled I Uncabled I	I C						I C	
	Pioneer			T			G						A I	AUVs Deployed I	I					I C	
Regional Arrays				I Submarine Cable Installed				I Primary Nodes				I Secondary Infrastructure								I Moorings, Sensors, & BEP	

Legend
2012-02-03_ver_4-15

- R# Release #
- ↕ Data Flow
- I Installation
- C Commissioning
- G Gliders Deployed
- A AUVs Deployed
- T Test Data Available



Integrated Observatory Operational Domains



Global Array Infrastructure

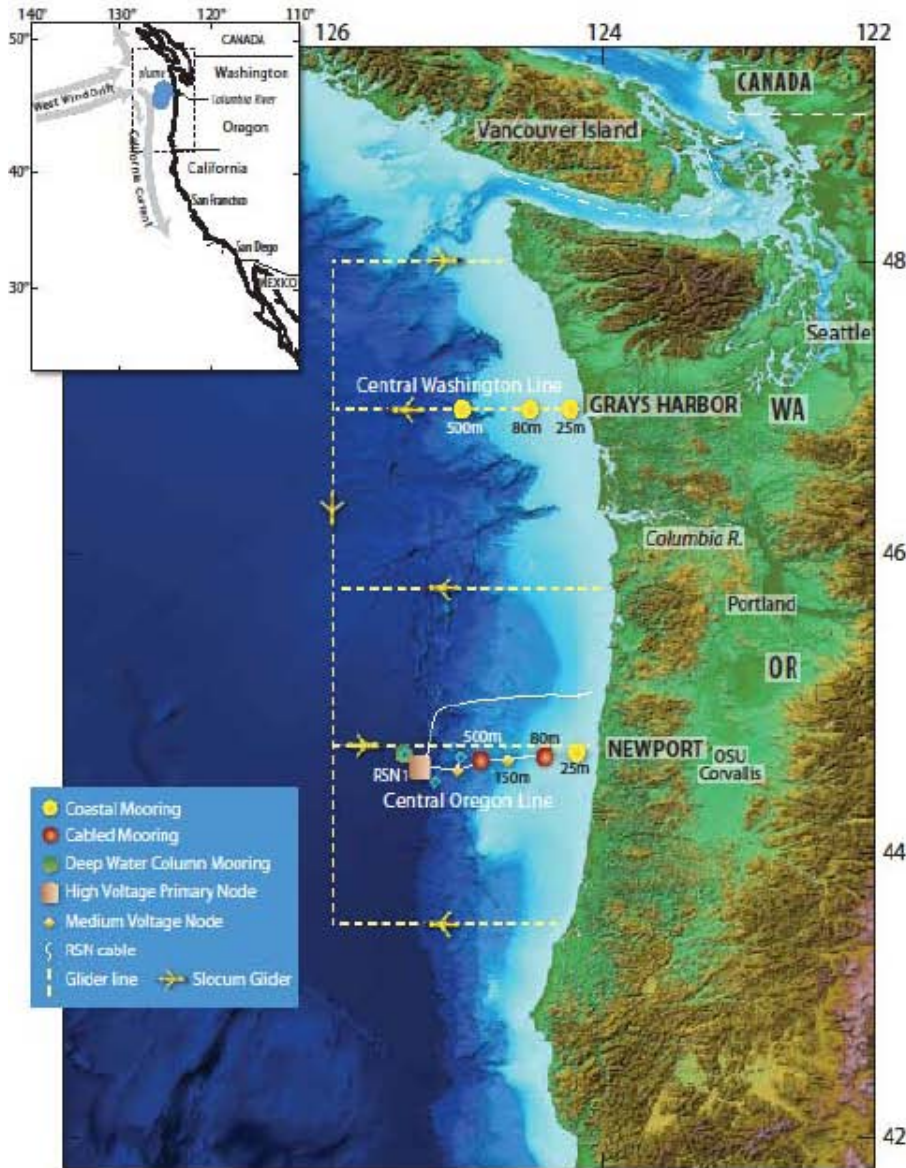
- ✓ Surface mooring
- ✓ Hybrid profiler mooring
- ✓ 2 flanking moorings
- ✓ 3 gliders



Irminger --- Deploy Partial in 2013 or Wait until 2014???

- Project Paper received last Friday
 - “schedule doubt” is high, lack of supply chain or procurement schedules
 - Procurement performance has been weak
- High Level Trade off
- R&RA impacts
 - Wait until 2014 defers 1 cycle of maintenance and saves a minimum of \$2M due to fuel costs to Irminger
- Science Impacts
 - Deploy in 2013 seeds science interest
- Project learning curve
 - Time to respond to issues from on-site deployment

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



Gliders & AUVs – plan and input

Endurance

6 gliders

OSU is the operator

Review and Input on cost estimate

Glider contract award pending budget reallocation

Late summer/fall deployments are expected, pending contract

Pioneer -- **Who/how to operate?????**

2 AUVs

WHOI is planned operator

No final O&M cost developed – baseline unclear due to change

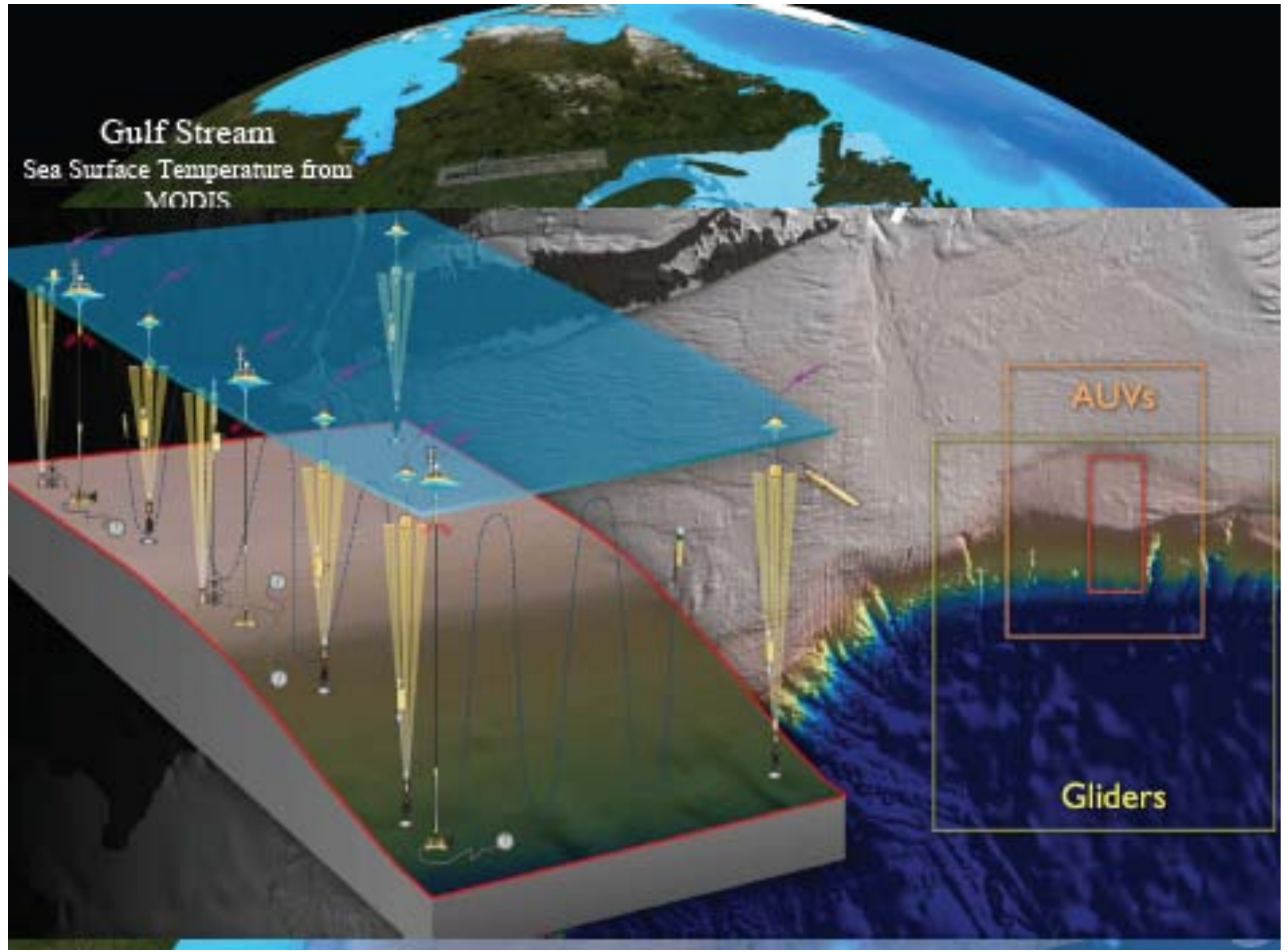
6 gliders

Operator and baseline budget --- loss of efficiency?

Global – **Who/how to operate???**

12 Ocean Gliders - Operator -- TBD

Gulf Stream
Sea Surface Temperature from
MODIS



Pioneer Infrastructure

Moored Array

30 x 10 km

Site spacing

6-8 km cross

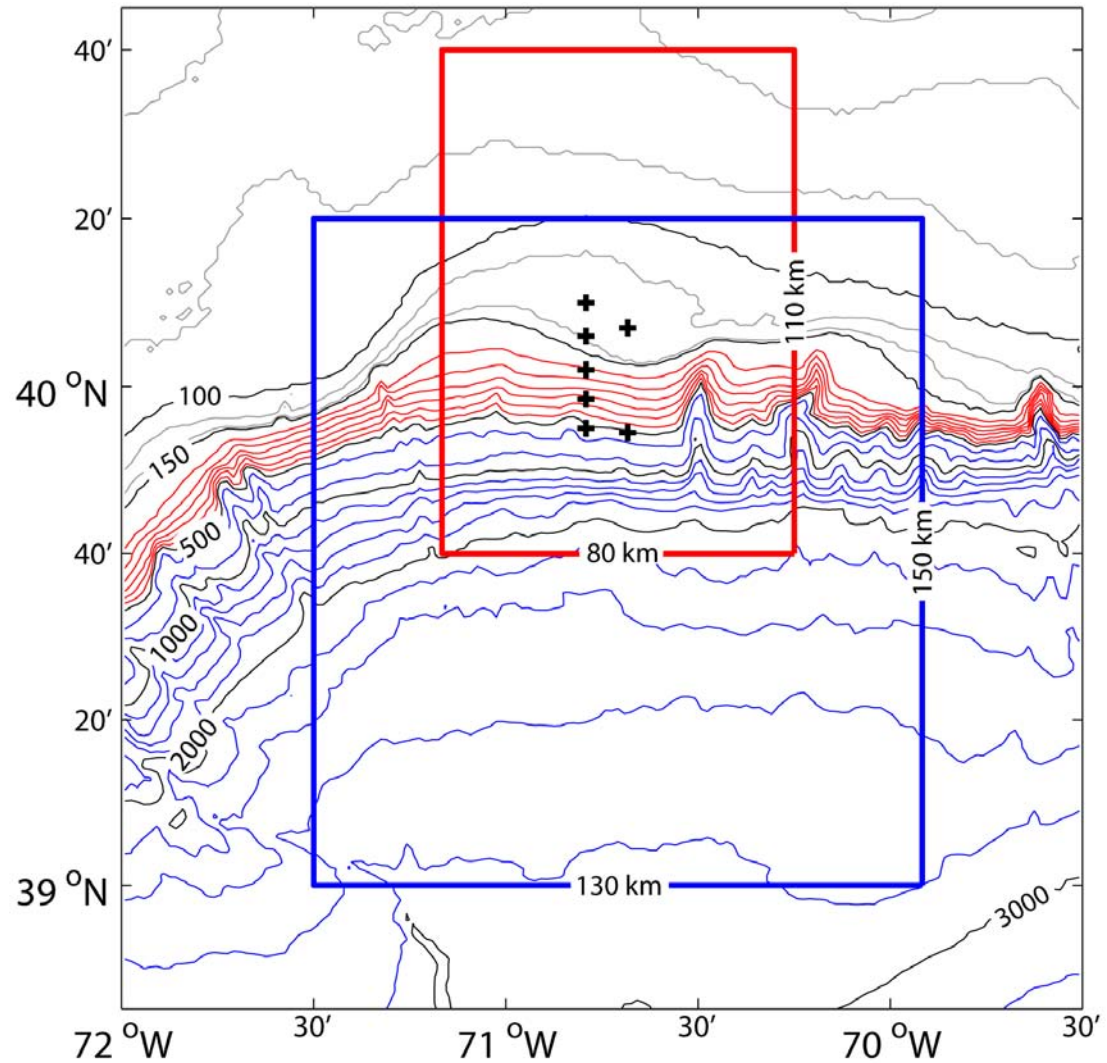
10 km along

AUV Region

110 x 80 km

Glider Region

150 x 130 km





Pioneer – deploying partial

- Six of Ten Moorings will be deployed
- Coastal Surface Piercing – not awarded yet
- Revised test for Global Surface Mooring – Power
- Supply Chain schedule still a concern