Pioneer Array
Relocation Status

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Overview

• The Pioneer Array was conceived within OOI as a re-locatable coastal array suitable for moderate wave and current regimes on the continental shelf and upper slope.

• The Array has been on New England Shelf since 2016, final recovery Nov 2022.

• Existing infrastructure will be utilized to create a new Array

• The new location is the shelf and slope offshore of North Carolina, starting in 2024
Background

- NSF Announcement of intent to relocate (or retain)
  - Ocean Sciences Town Hall, Feb 2020
- Extensive community input from two Innovations Labs
  - 15-19 March and 21-15 June 2021
- Decision to relocate to southern MAB
  - Announced in Apr 2021
- Relocation process
  - Initiated Jul 2021
Relocation Process

• Approach
  • Guided by Innovations Lab science questions
  • Array design based on Innovations Lab consensus
  • Assessment and refinement by OOI Team

• Goals
  • Address science questions
  • Implement the consensus array design
  • Optimize use of existing inventory
  • Ensure feasible implementation
  • Operate within existing budget
Relocation Timeline

- Three main phases: Planning, Engineering, Implementation
- NE Shelf Pioneer ends Fall 2022; MAB Pioneer starts Spring 2024

**Phase 1: Planning**
- 10 months
  - Consolidation of community input
  - Environmental Assessment
  - Engineering Assessment
  - Regulatory Study

**Phase 2: Engineering**
- 8 months
  - Mooring design
  - Site design
  - Instrument Requirements

**Phase 3: Implementation**
- 16 months
  - Regulatory Approvals
  - Procurement
  - Mooring Builds
  - System Tests
  - First Deployment

- MAB Pioneer begins Spring 2024
- NES Pioneer ends Fall 2022
Planning Phase Tasks

- Establish Focus Group
- Consolidate Innovation Labs input
  - Science themes, array design, instrumentation
- Site Characterization
- Waterspace management
- Regulatory study
- Mooring modeling
- Regional ocean modeling
- Instrumentation assessment
- Array design
Engineering Phase Tasks

• Complete Site Characterization
• Waterspace management
• Stakeholder engagement
• Regulatory/Permitting
• Final array design
• At-sea tests and site survey
• Final mooring design
• Instrument Procurement
• Configuration management
• CI assessment and planning
MAB Science Themes

• **Approach**
  • Grouped into broad themes based on Innovations Lab input/ranking

• **High level themes**
  • Dynamics of shelf/slope exchange
    • Wind forcing, frontal instability, Gulf Stream influence
  • BGC cycling and transport
    • Carbon, nutrients, particulates
    • Ecosystem response
  • Extreme events
    • Hurricanes, freshwater outflows

Dana Savidge (Skidaway) and the PEACH Project
MAB Observing Region

- Environmental constraints
  - Away from: Gulf Stream, shallow water, strong fronts, strong currents
- Limits of spatially coherent array
  - Moored array ~ 60 km x 60 km
- Decision to focus on:
  - Shelf-slope region
  - S of Chesapeake, N of Hatteras
- Desire to extend offshore & north:
  - Glider domain

Dana Savidge (Skidaway) and the PEACH Project
Moored Array

- **Components**
  - 3 Surface Moorings
  - 5 Profiler Moorings
  - 2 Shallow Water

- **Challenges**
  - Regulatory
  - Shallow water
  - Instruments
  - Logistics
  - Budget
MAB AUV Plan

- **Operations**
  - Two REMUS-600 AUVs
  - “Campaign mode”
  - 4-6 missions/yr
- **Two mission boxes**
  - Cross-shelf box
  - Along-shelf box
- **Objectives**
  - Synoptic transects of moored array
  - Resolve shelfbreak front
MAB Glider Plan

• Operations
  • Occupy four track lines
  • ~90 day endurance

• Four main track lines
  • Moored array (yellow)
  • Cross-shelf (blue)
  • 2x Slope Sea (white; N-S line and X pattern)

• Supplemental line
  • Norfolk Canyon (dashed; 2x/yr)
Instrument Assessment

• Baseline: Current OOI core sensors
  • Oceanobservatories.org

• Innovations Lab Input
  • >40 instruments or measurement concepts suggested
  • Short list of 12 based on cross-group consensus

• Refined to “Tier 1” implementation list based on:
  • Science themes, technical readiness, operational feasibility, budget impacts

• Next steps
  • Requirements, specifications, RFIs, evaluation, procurement
Instrument Additions

- Tier 1 instruments and new procurements
  - Temperature and salinity, near surface
  - Velocity profile, near-surface
  - Turbidity*, water column and near bottom
  - Suspended particulates, near surface and near bottom
  - Phytoplankton imaging, near surface
  - Incident radiation, surface buoys
  - Nitrate, glider

* Preference for using existing FLORT instrument with manufacturer calibration for turbidity
Current Status and Look-Ahead

• Planning Phase - complete
• Engineering Phase – in progress
• Implementation Phase – early 2023
• Initial deployment – Spring 2024
Questions?