



OCEAN
OBSERVATORIES
INITIATIVE

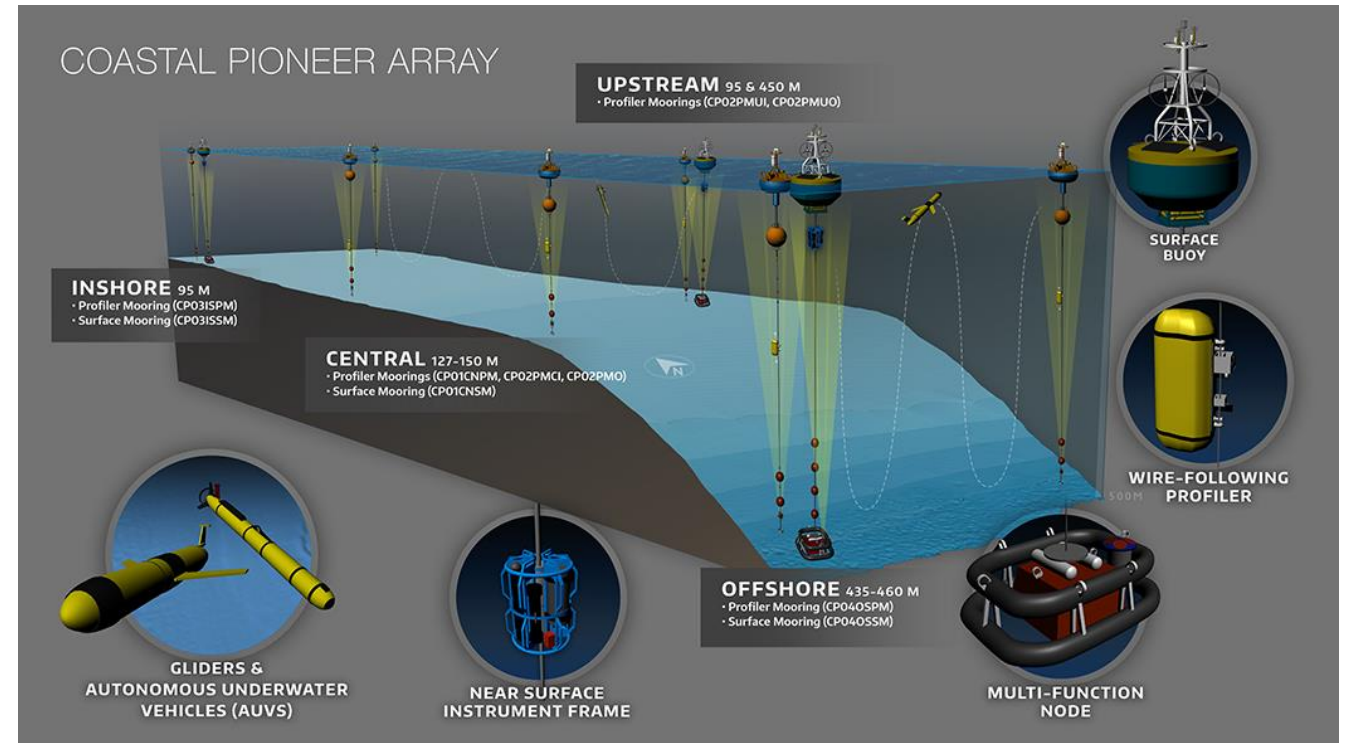
Pioneer Array Relocation Status

Al Plueddemann and Derek Buffitt
Fall AGU 12 Dec 2022



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



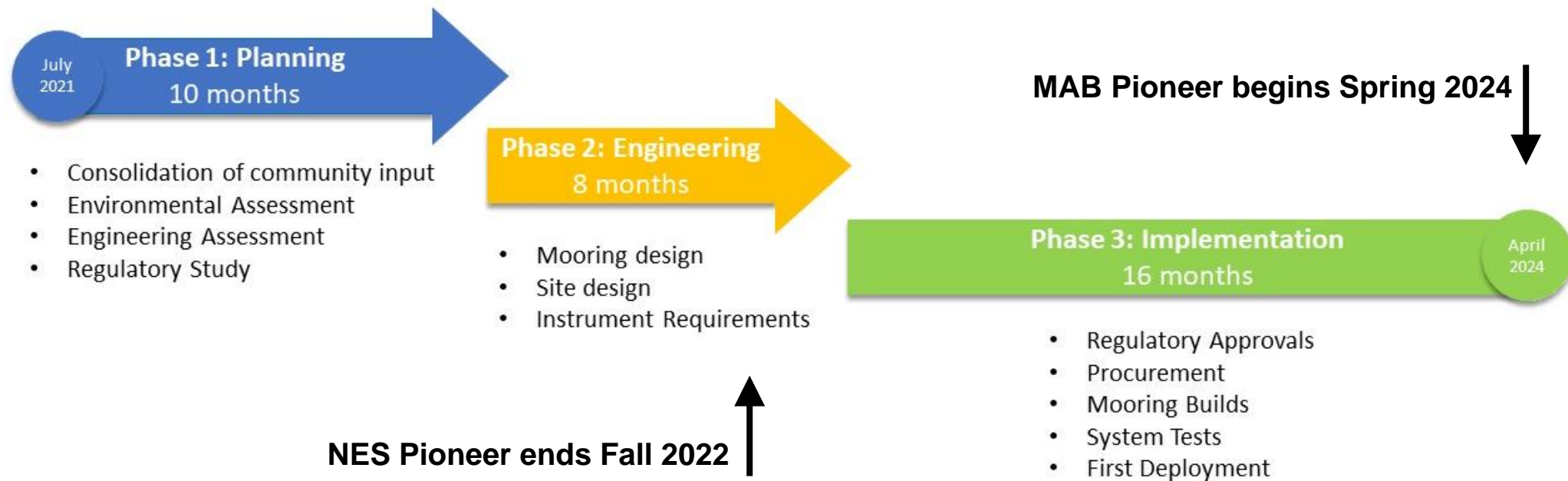
Relocation Process

- 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



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



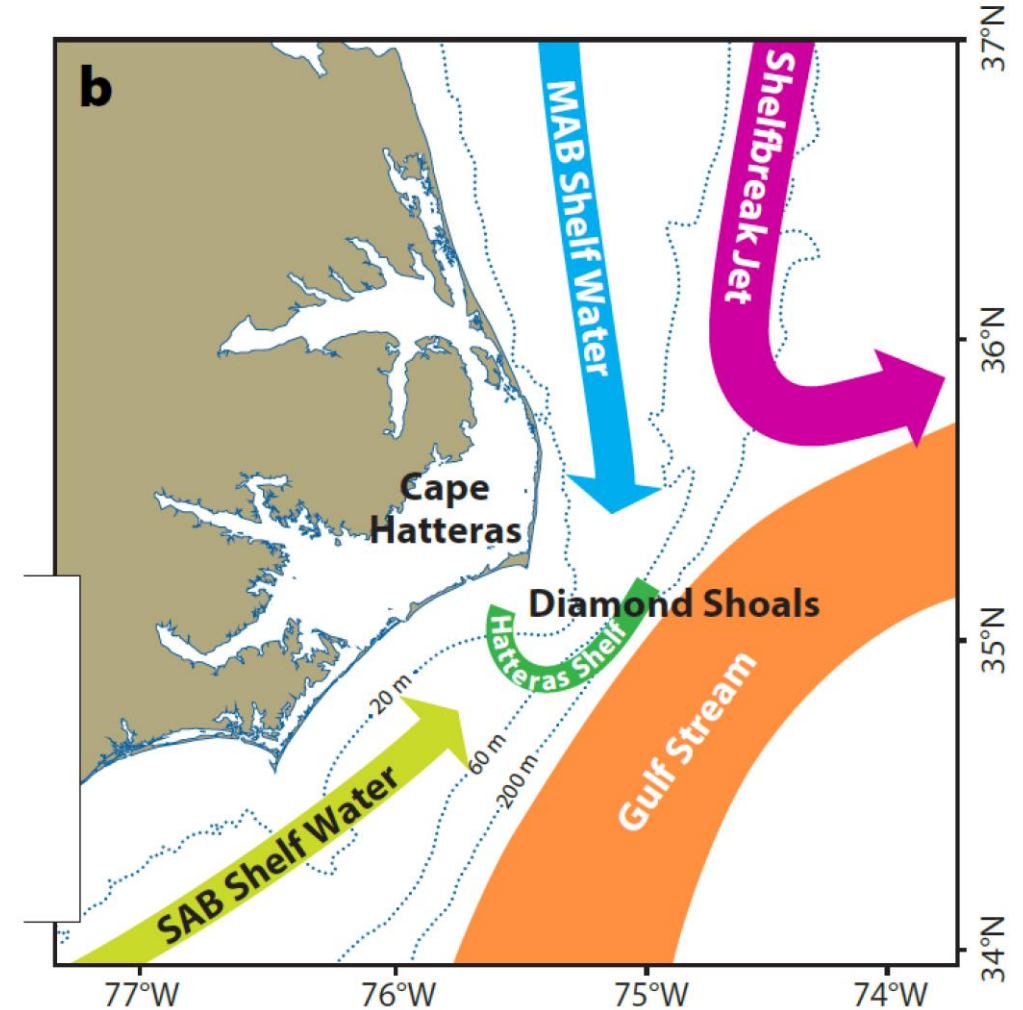
Engineering Phase Tasks

- 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

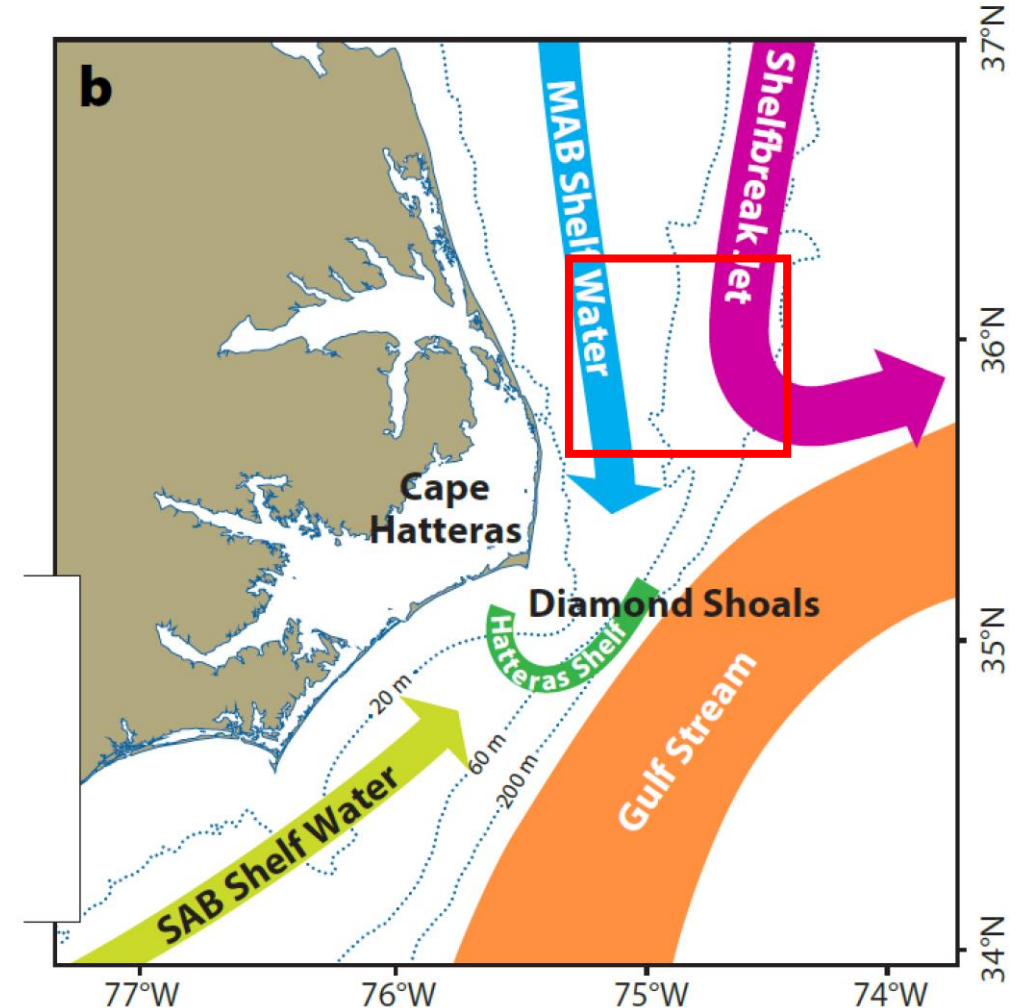
- Approach
 - Grouped into broad themes based on Innovations Lab input/ranking
- High level themes
 - Dynamics of shelf/slope exchange
 - Wind forcing, frontal instability, Gulf Stream influence
 - BGC cycling and transport
 - Carbon, nutrients, particulates
 - Ecosystem response
 - Extreme events
 - Hurricanes, freshwater outflows



Dana Savidge (Skidaway) and the PEACH Project

MAB Observing Region

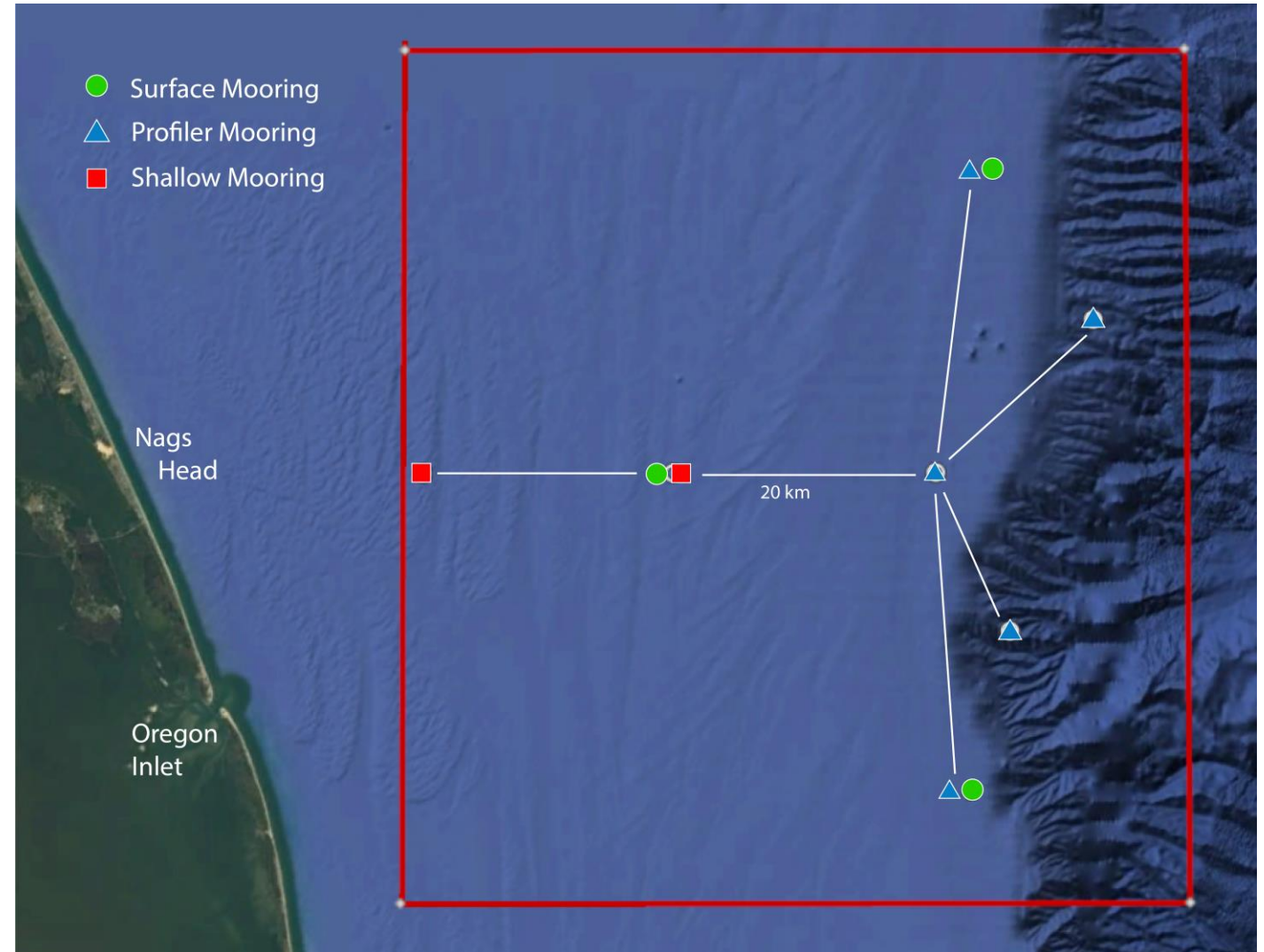
- Environmental constraints
 - Away from: Gulf Stream, shallow water, strong fronts, strong currents
- Limits of spatially coherent array
 - Moored array ~ 60 km x 60 km
- Decision to focus on:
 - Shelf-slope region
 - S of Chesapeake, N of Hatteras
- Desire to extend offshore & north:
 - Glider domain



Dana Savidge (Skidaway) and the PEACH Project

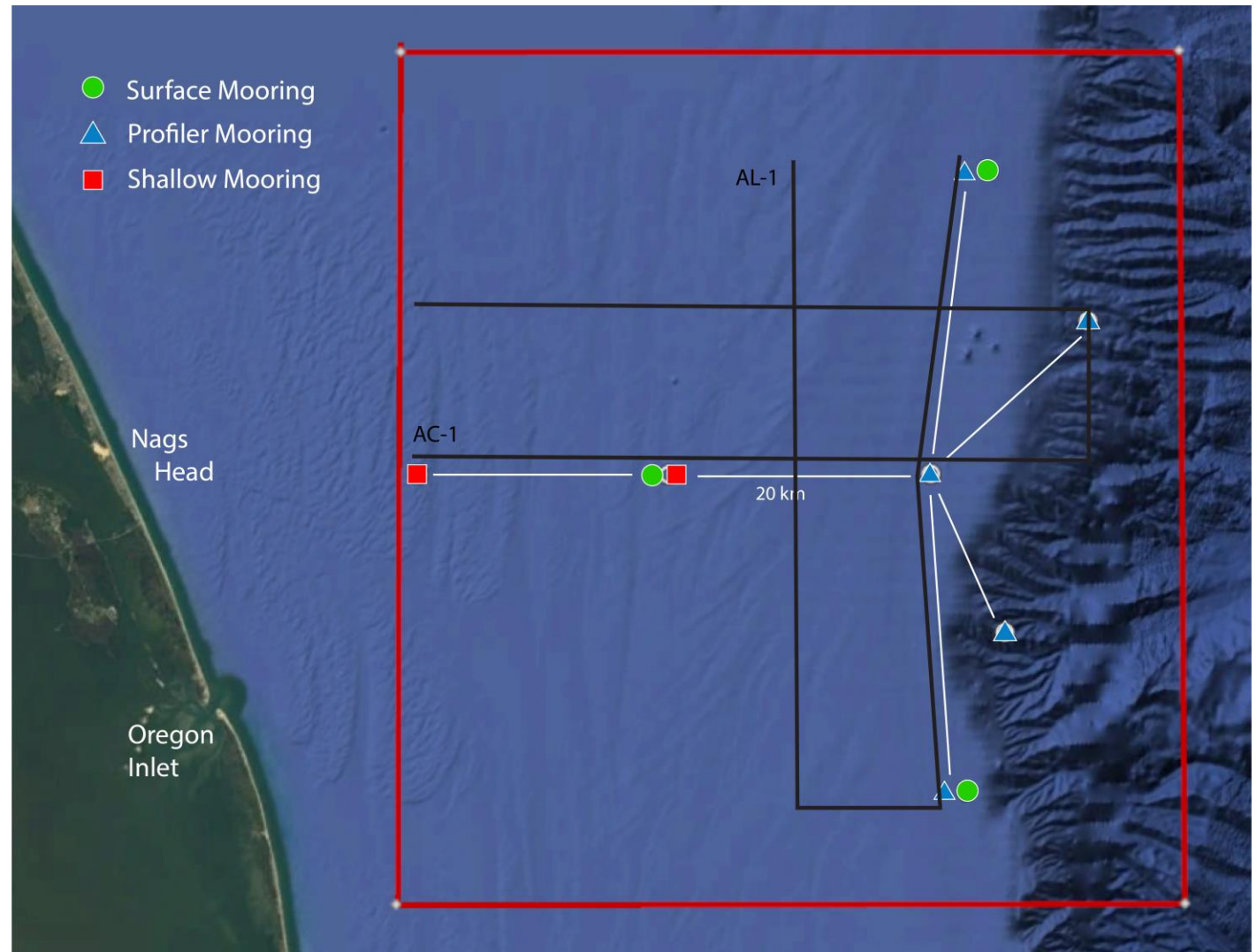
Moored Array

- Components
 - 3 Surface Moorings
 - 5 Profiler Moorings
 - 2 Shallow Water
- Challenges
 - Regulatory
 - Shallow water
 - Instruments
 - Logistics
 - Budget



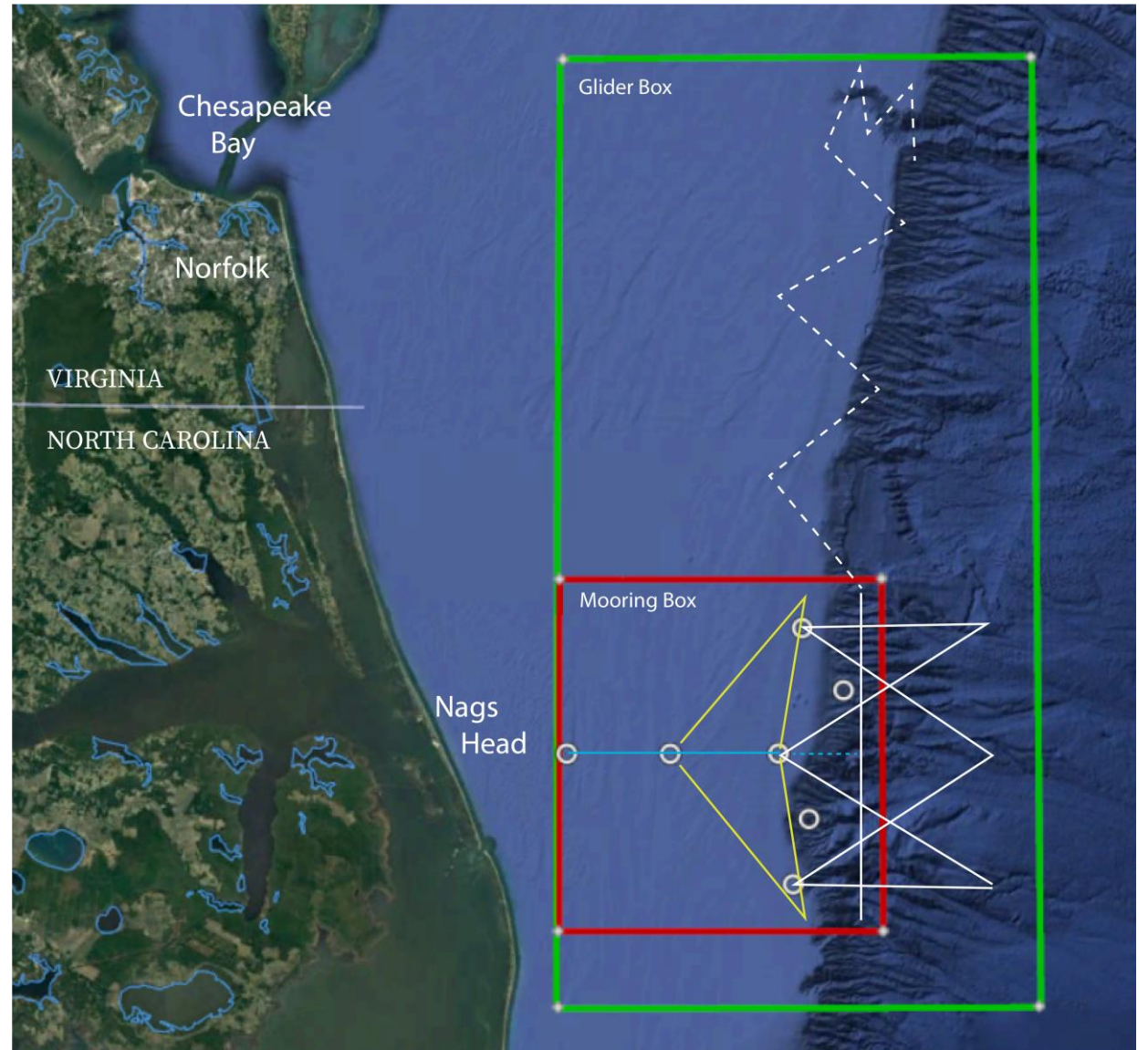
MAB AUV Plan

- 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





OCEAN
OBSERVATORIES
INITIATIVE

Questions?

