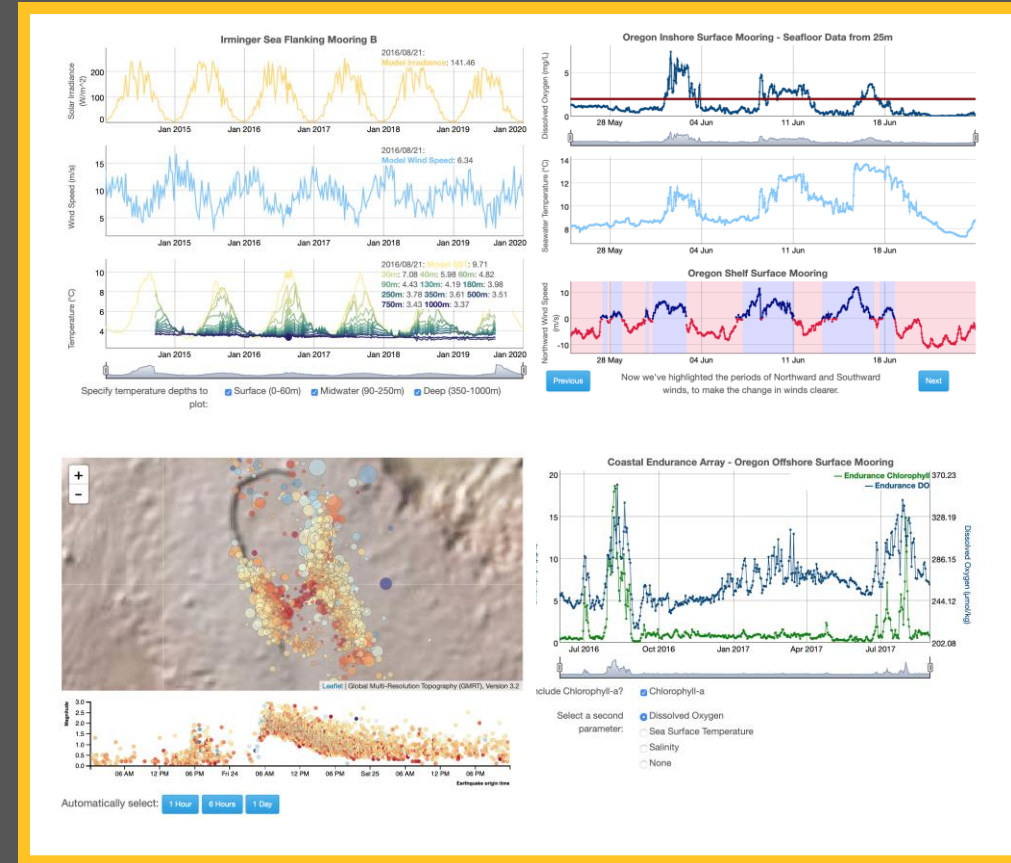


# OOI Data Labs 2.0

2023 Fall OOIFB  
Data Services Committee Meeting

Sage Lichtenwalner, Rutgers University

*This project is supported by NSF Grant OCE-2316075*



[datalab.marine.rutgers.edu](http://datalab.marine.rutgers.edu)

*\* Member of 1.0 team only*

# OOI Data Labs Team



Christine Bean\*, Janice McDonnell,  
Sage Lichtenwalner  
Rutgers University



Catherine Halversen\*  
UC Berkeley



Dax Soule  
Queens College CUNY



Kristin O'Connell  
SERC



Anna Pfeiffer-Herbert  
Stockton University



Brooke Love\*  
Western Washington Univ



Denise Bristol  
Hillsborough CC

# OOI Data Labs Project Goals

- Address the challenges of teaching with data & support opportunities for professors and undergraduates to become more expert users of OOI data.
- Increase undergraduates' engagement in and understanding of core concepts through use of OOI data.

<http://datalab.marine.rutgers.edu>

**Ocean Data Labs**

Home | Data Labs | Workshops | Teaching with Data | Project Info | Join Our Community | Data Lab Blog

Home You are here: Home

### THE OOI OCEAN DATA LAB PROJECT

The National Science Foundation's Ocean Observatories Initiative (OOI) is advancing our ability to understand the natural world by collecting large quantities of data to address complex oceanographic processes. This expanded access to data also provides professors in the geosciences with new opportunities to engage undergraduate students in authentic data experiences using real-world data sets to teach geoscience processes.

However, students struggle to work with data based on their limited experience and exposure to different data types and sources. Also, supporting students in engaging with the data can be challenging for professors too, as there is a lack of adequate tools to easily digest and manipulate large data sets for in-class learning experiences.

Therefore, the OOI Ocean Data Lab Project (formerly called Data Explorations), with funding from NSF, is developing, testing, refining, and disseminating easy to use, interactive Data Explorations and Data Lab Notebooks that will allow undergraduates to use authentic data in accessible ways while being easy for professors to integrate into their teaching.

Data Explorations	Workshops	About this Project
Use OOI data to support to introduction to Oceanography concepts in your undergraduate courses.	Join us at a future professional development workshop for undergraduate faculty.	Learn more about our project and goals.

#### Recent Blog Posts

**EDUCATION, THOUGHTS**  
**DISCRETE VS. CONTINUOUS DATA**

There are two key benefits of ocean serving systems: they collect data over long time periods, and in high-resolution. Many oceanographic experiments rely on a single cruise or mooring deployment. But when a location is designated as part...

**NEWSLETTERS**  
**AUGUST 2019 COMMUNITY NEWSLETTER**

Here's a quick snapshot of what's in this Data Labs project update: Updates from our June & July Workshops New Data Explorations in Development Ocean Sciences 2020 - Call for Abstracts Project EDDIE Module Development Workshop Updates...

**THOUGHTS, VISUALIZATIONS**  
**CAUTION... REAL DATA AHEAD!**

I love diving into data and discovering new things about the ocean, and we've been doing quite a bit of that lately\*. But one of the things that really amazes me about the OOI dataset, is that you don't have to dig far to find some...

# Early Pilot Projects (2016-2017)


## Objectives

- Crosswalk OOI Science themes with introductory oceanography textbooks
- Review sample activities using OOI data/data viz tools
- Discuss strategies to incorporate into curriculum
- Build long-term working relationships and collaborations on data investigation development



*Productivity Workshop 2016*

# What is a Data Exploration?

 Data Explorations Collections Workshops Instructor's Guides Project Info

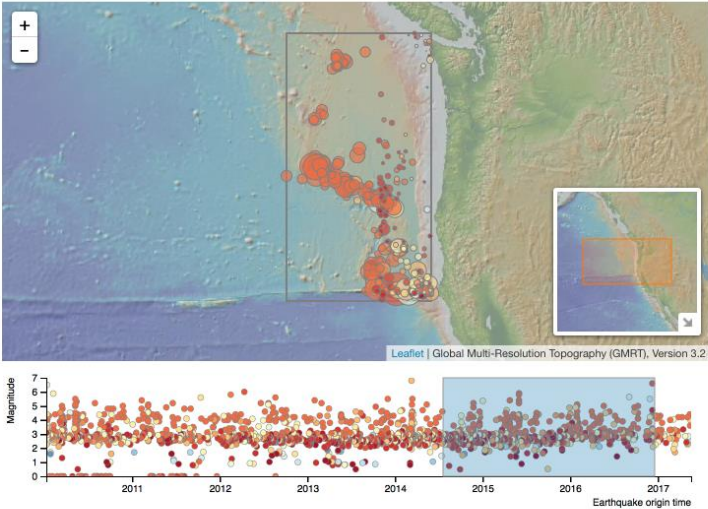
[Home](#) / [Tectonics & Seamounts](#) / [Plate Boundary Features](#) / Exploration

## Plate Boundary Features Exploration

### Your Objective

Use earthquake data from plate boundaries in ocean regions off of the Pacific Northwest to look if there are patterns between 2010-17.

- Make a prediction about what kind of patterns in earthquake magnitude and location you may observe over time.
- Explore the data below to see what you can observe.



Leaflet | Global Multi-Resolution Topography (GMRT), Version 3.2

Magnitude

Earthquake origin time

Automatically select: [1 Month](#) [6 Months](#) [1 Year](#)

## Data Tips

When the site loads, you are able to see all of the earthquake data from 2010 throughout the Coastal Endurance Array. You can interact with the data by:

- Selecting a different part of the time series to explore the data in ways that interest you by moving the highlighted section of the bottom graph to the right or left.
- Zooming in and out of the data to look at different time scales that interest you by changing the width of the highlighted section of the bottom graph (it loads with all of the data highlighted).
- Zooming in and out of the map to see more or less of the area of the ocean the earthquakes occurred.

Note, the color denotes earthquake depth, with darker blues representing deeper depths (up to 50km) and dark red representing shallower depths (0km). The yellows are in-between. The circles on the map are sized by the earthquake magnitude.

## Questions for Thought

### Orientation Questions

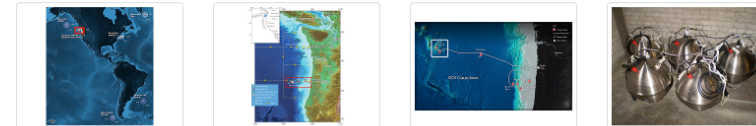
- Across what geographic area are you able to observe earthquake data in this map?
- What is the range of earthquake size (magnitude) in these data?

### Interpretation Questions

- What changes or patterns did you observe in earthquake location over this time period in the Northern Pacific Ocean?
- Where did you see these changes or patterns?
- What changes or patterns did you observe in earthquake magnitude over this time period in the Northern Pacific Ocean?
- What questions do you still have about what we can learn about plate boundaries from earthquake data over time?

## Background Information

Click on the images below to learn more about where and how the dataset above was collected.



## Dataset Information

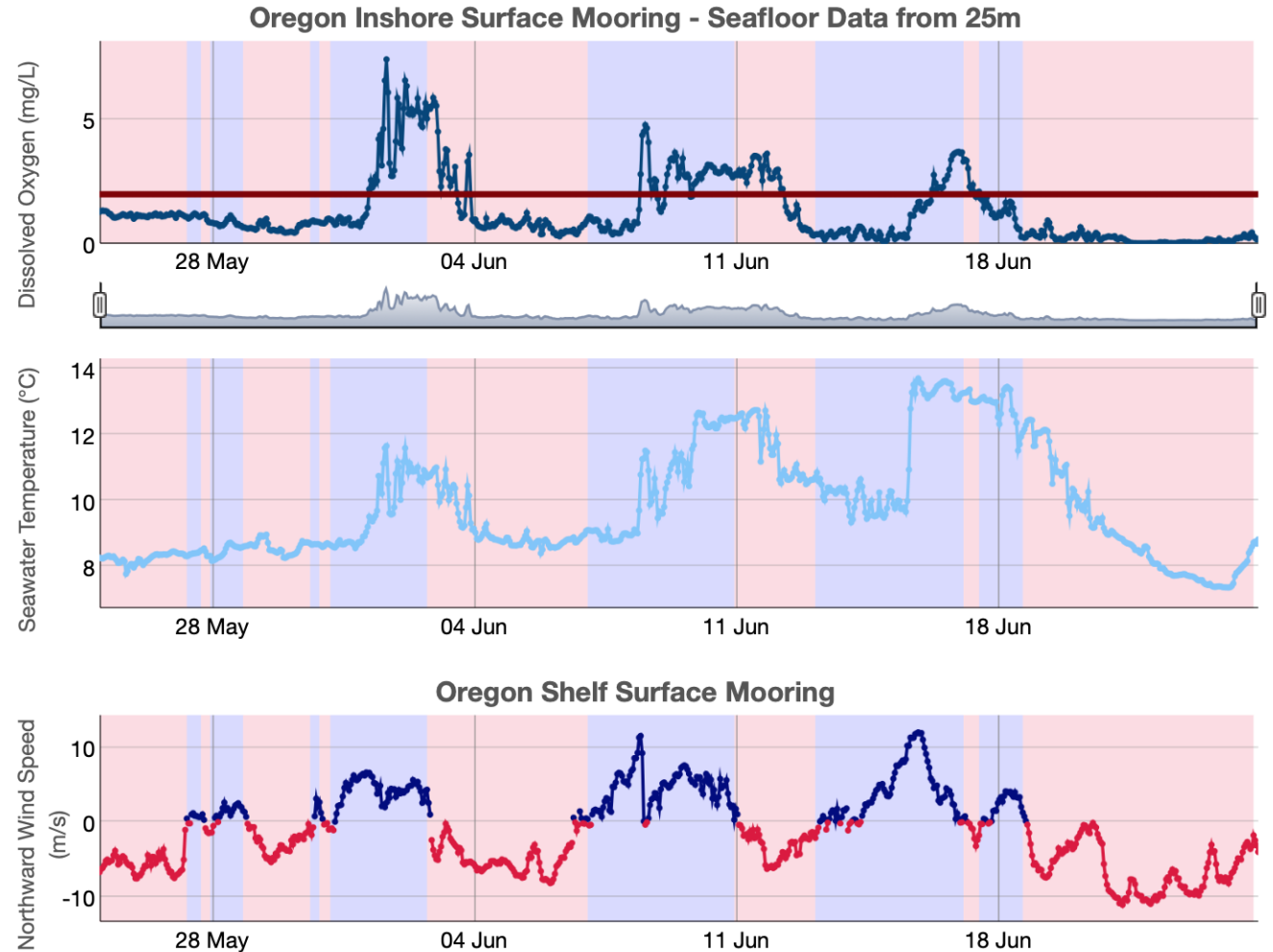
Data for this activity were retrieved from the [USGS Earthquake Catalog](#).

Finished the activity? Please take our quick [Student Survey](#)

# Guided Learning

## Anoxic Events (2019)

- Kathy Browne, Rider University
- Lauren Sahl, Maine Maritime Academy
- Rebecca Freeman, University of Kentucky
- Gabriella Smalley, Rider University
- Carol White, Southern Maine Community College



Previous

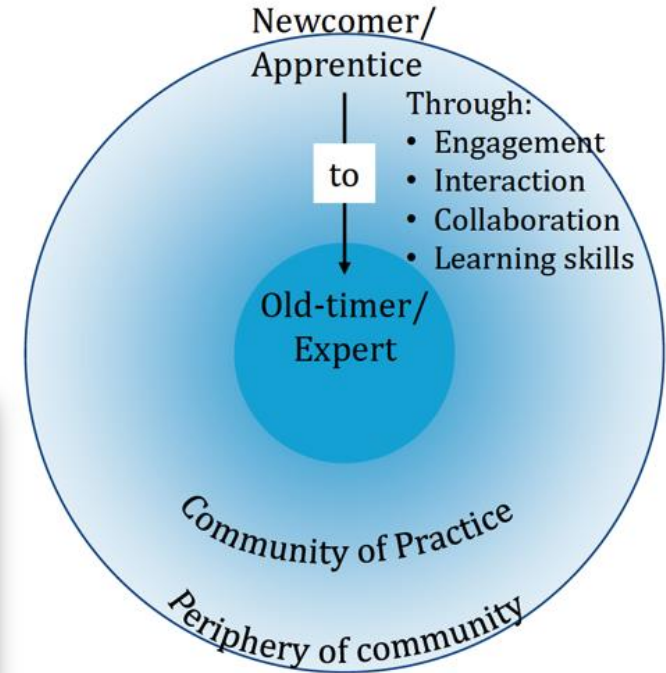
Finally, we've highlighted the periods of Northward and Southward winds on all of the graphs. Take a look again at the other variables to see how they change during the periods of N or S winds. What relationships do you see?

Next

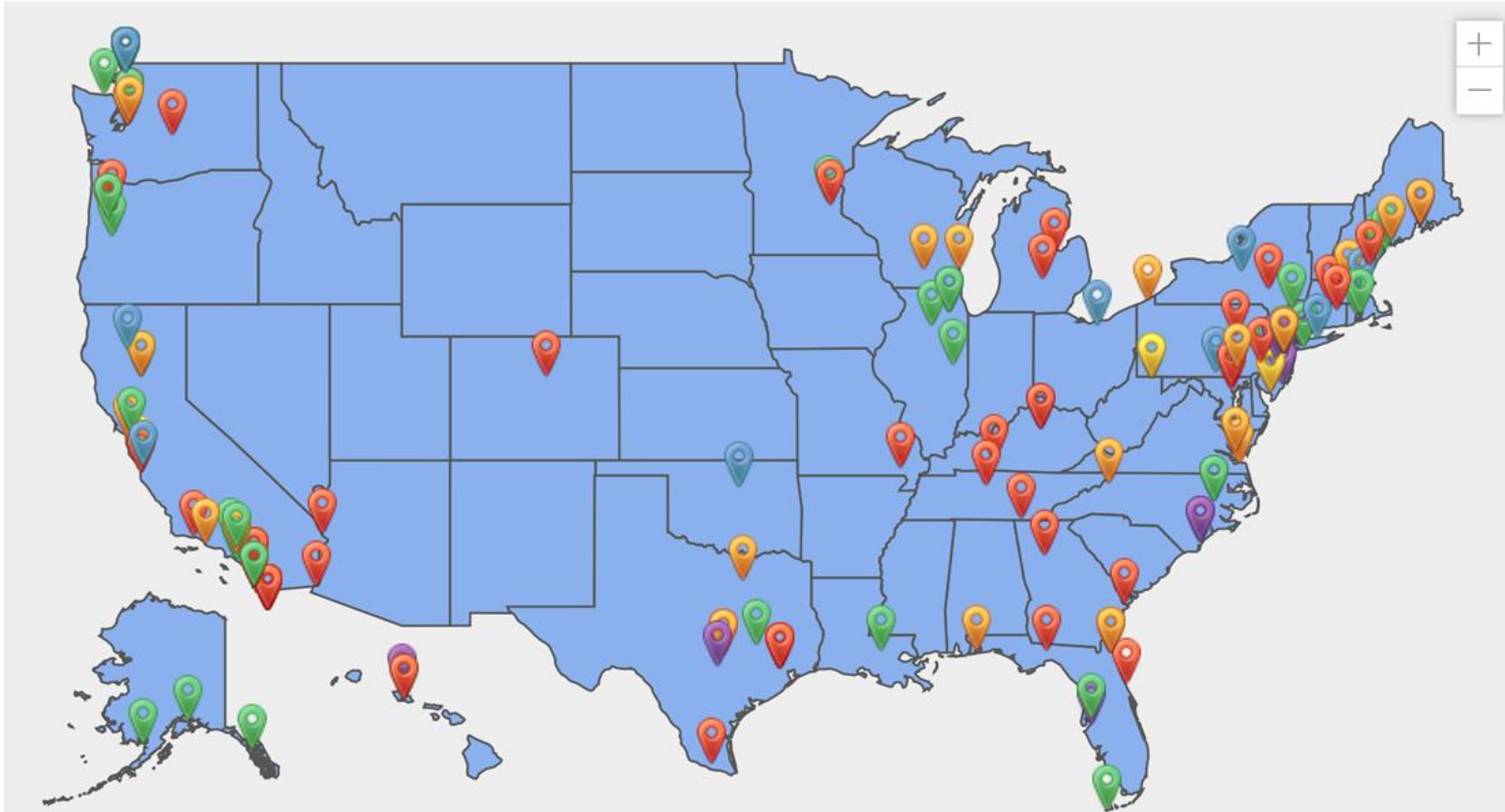
# OOI Data Labs Project (2018-2021)

## Key Goals

- Build a **Community of Practice** of undergraduate educators, interested in using OOI data with their students
- Create and pool **tools** to make OOI data more accessible to educators and students



# The growing Ocean Data Labs community!



**Developers** – participated in one of our 2019 weeklong development workshops

**Piloters** – attended one of our weekend pilot workshops in 2016-2017, or who have pilot tested our OOI Lab Manual

**Fellows** – 2020 cohort

**REU Mentors** – Faculty who helped mentor our 2020 Virtual REU students

**Leaders & Staff** – Members of the core project team

<https://datalab.marine.rutgers.edu/community-map/>





# OOI Data Labs

*A Summary of our project milestones*

Comprehensive  
Database  
Fall  
2018



**590 scientists**

2 undergraduates built a database of professors from around the country teaching Oceanography courses.

Development  
Workshops  
Spring  
2019



**56 professors**

Attended 4 week long workshops:

- Princeton, NJ.
- New Brunswick, NJ.
- Monterey, CA.
- Bellingham, WA.

Implementation  
Workshops  
Summer  
2019



**60 professors**

Attended Earth Science Teachers Rendezvous Nashville, TN July 2019

Ocean Science Meeting San Diego, CA February 2020.

Webinar  
Series  
Fall  
2019-2020



**19 professors**

8 webinars featuring data labs developed by workshop participants.

Open Source OOI  
Data Lab Manual  
Winter  
2020



**11 professors**

Designed workshop to develop an online lab manual for oceanography courses.

Fellowship  
Program  
Winter  
2020



**10 fellows**

6 professors collected data and feedback from students on the efficacy of the Data Labs.

4 created new Python notebooks with OOI data.

REU  
Program  
Summer  
2020



**9 professors**

Mentored students in a virtual REU using OOI data in an online REU program.

Cohort 1 & 2 Data  
Lab Manual Pilot  
Fall  
2020 & 2021



**42 professors**

Piloted the OOI Data Lab Manual created by 11 professors from the community.

# Data Labs Resource Collection

Want a ready-made lesson plan incorporating OOI datasets?



**Lesson Plans**

Want a series of lab activities with built-in student assessments?



**Online Lab Manual**

Ideal for introductory undergraduate majors or non-majors

Want a modular set of activities that you can adapt?



**Data Explorations**

Ideal for intermediate undergraduate majors or non-majors

Want to start from scratch using curated OOI datasets?



**OOI Nuggets**

Ideal for upper-level undergraduate majors or graduate level

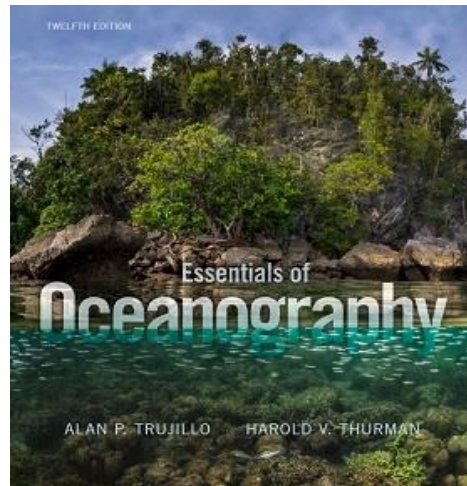


# Alignment to Intro Oceanography curriculum

## OOI Science Themes and Data Availability



## Common Oceanography Textbooks



## Lab Manual chapters

Topic	Chapter
Ocean geography	<b>Lab 1:</b> Introduction to the OOI, the collection of oceanographic data
Ocean technology	<b>Lab 1:</b> Introduction to the OOI, the collection of oceanographic data
Data skills for oceanography	<b>Lab 2:</b> Building data skills
Marine Geology	<b>Lab 3:</b> Plate tectonics and the seafloor <b>Lab 4:</b> Seafloor changes in a volcanically active setting
Ocean Chemistry	<b>Lab 5:</b> Investigating density stratification
Physical Oceanography	<b>Lab 6:</b> Waves generated by large storms
Biological Oceanography	<b>Lab 7:</b> Primary production <b>Lab 8:</b> Anoxic events

# Goals of the OOI Lab Manual

- Build **data literacy** and critical thinking skills in undergraduate students using **authentic** (“messy”) scientific data
- Visualize data in a user-friendly, **interactive** and authentic way
- Engage students with data activities that reinforce student confidence in scientific questioning, data analysis, and synthesis
- Provide a real-world context for **key concepts** in oceanography



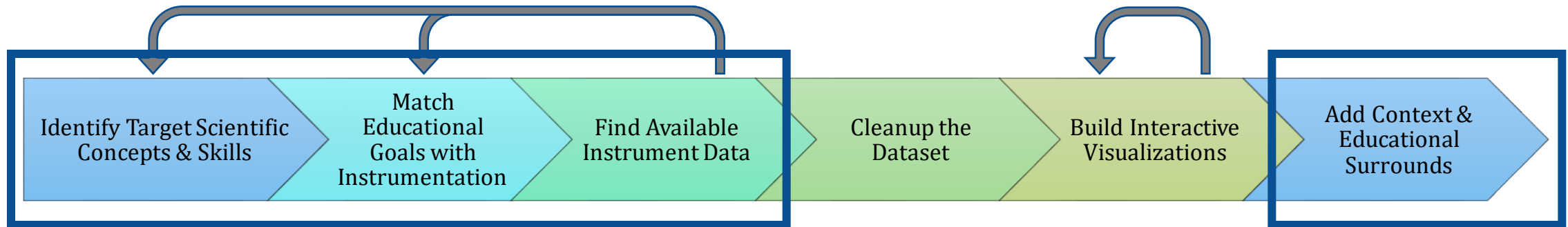
# OOI Data Labs 2.0 (2023-2025)

## Project Goals

- Continue to build and support the OOI educator community
  - Especially MSI, 2YC, PUI and R2
  - Special focus on the Mid Atlantic
- Develop “next level” activities
  - Fill in gaps in the existing OOI Data Labs manual
  - Domain-specific and level-appropriate programming notebook-based activities (?)

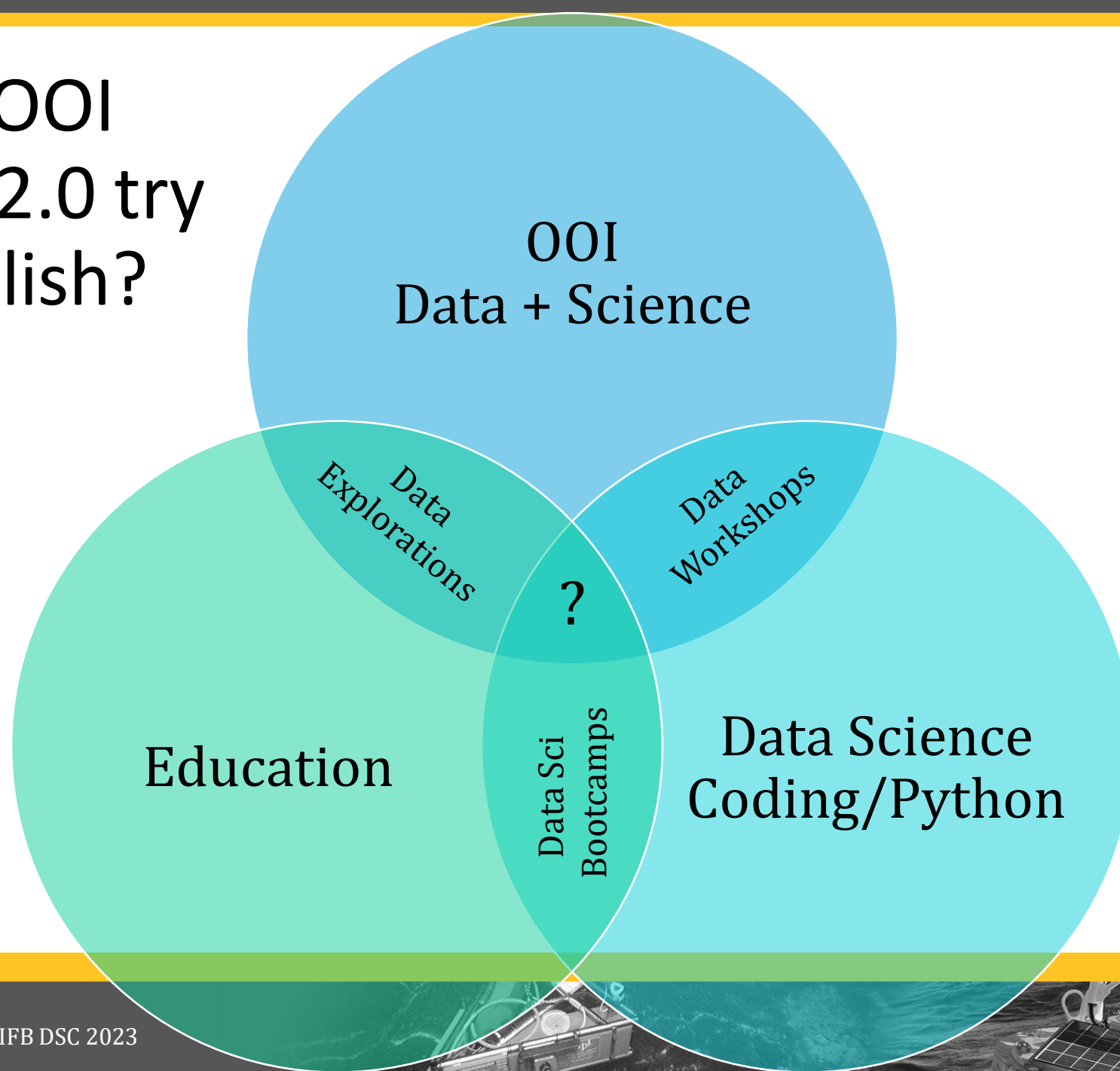


# Design Process – Lessons Learned



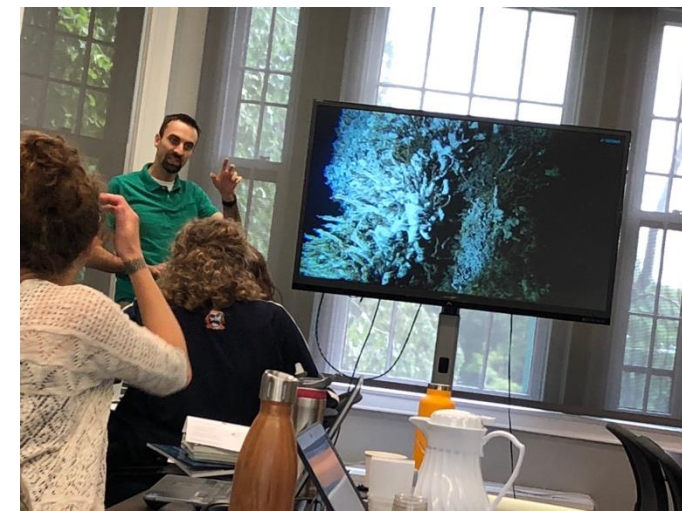
- Community Building – Defined process helps divide tasks and keep everyone on track
- Takes time and effort – Development is highly iterative (esp. 3&5)
- Educators can spearhead content selection and lesson development
  - Training is essential for new faculty to learn about the tools and instruments to find appropriate datasets, esp. those not familiar with OOI or using OOS.
  - With better data portals, they might also help with data and visualizations

# What will OOI Data Labs 2.0 try to accomplish?



# OOI Data Labs 2.0 – Key Tasks

- Engage a new community of faculty capitalizing on the Pioneer Array relocation
  - Refresh our database of potential faculty
  - “Regional” workshop focused on Pioneer’s potential
- Expand the collection of OOI education resources
  - “Development” workshop
- Continue to support the community
  - Two 1-day introductory workshops (e.g. OSM24)
  - Collecting and sharing resources
- Evaluation
  - Needs Assessment to identify community needs
  - Reach Survey to measure long-term impact





# FIN

