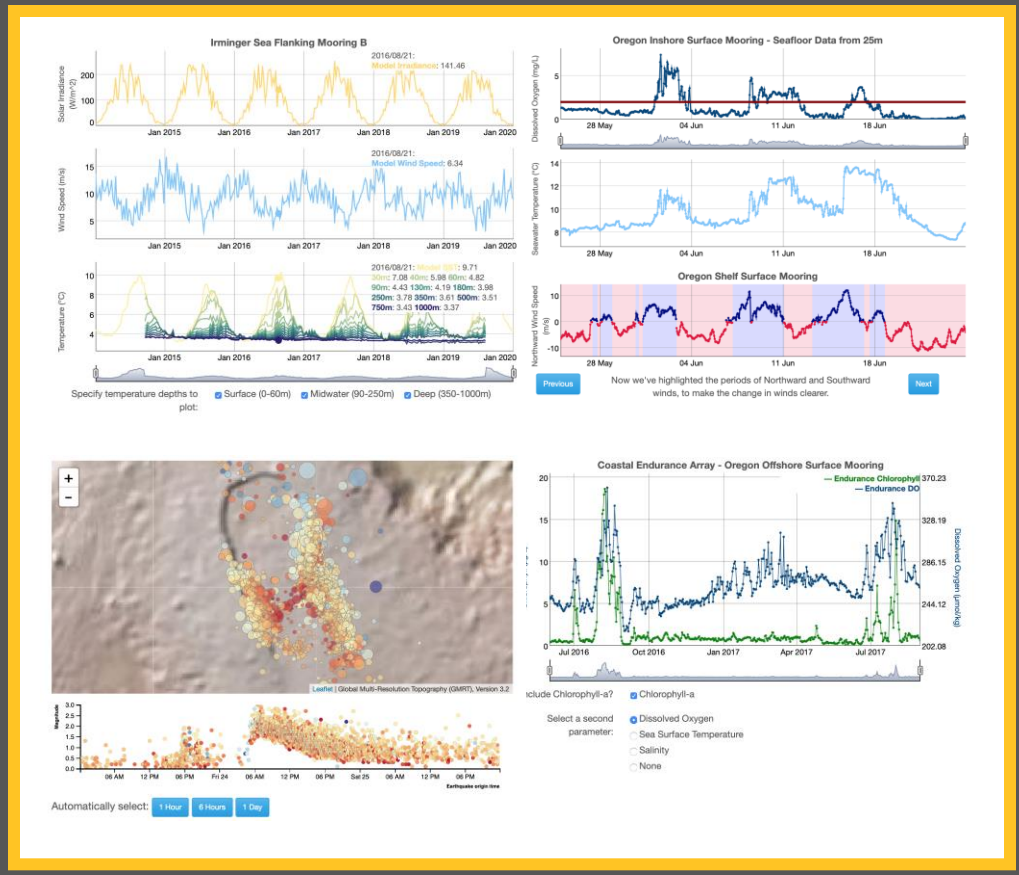
OOI Data Labs 2.0

2023 Fall OOIFB
Data Services Committee Meeting

Sage Lichtenwalner, Rutgers University

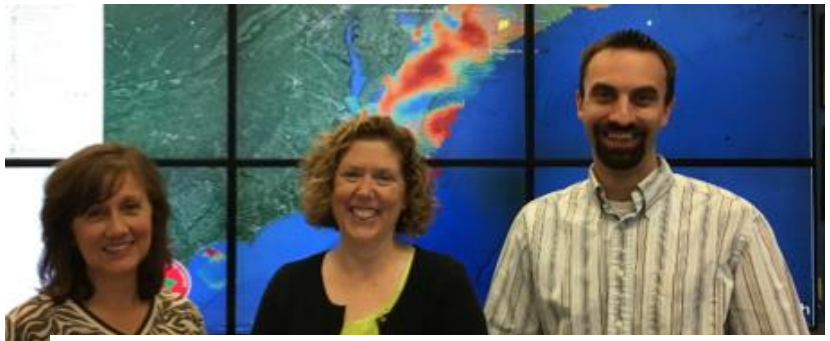
This project is supported by NSF Grant OCE-2316075



datalab.marine.rutgers.edu

** Member of 1.0 team only*

OOI Data Labs Team



Christine Bean*, Janice McDonnell,
Sage Lichtenwalner
Rutgers University

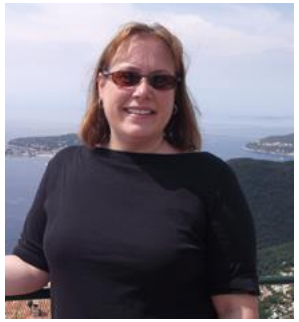
Catherine Halversen*
UC Berkeley

Dax Soule
Queens College CUNY

Kristin O'Connell
SERC

Anna Pfeiffer-Herbert
Stockton University

Brooke Love*
Western Washington Univ

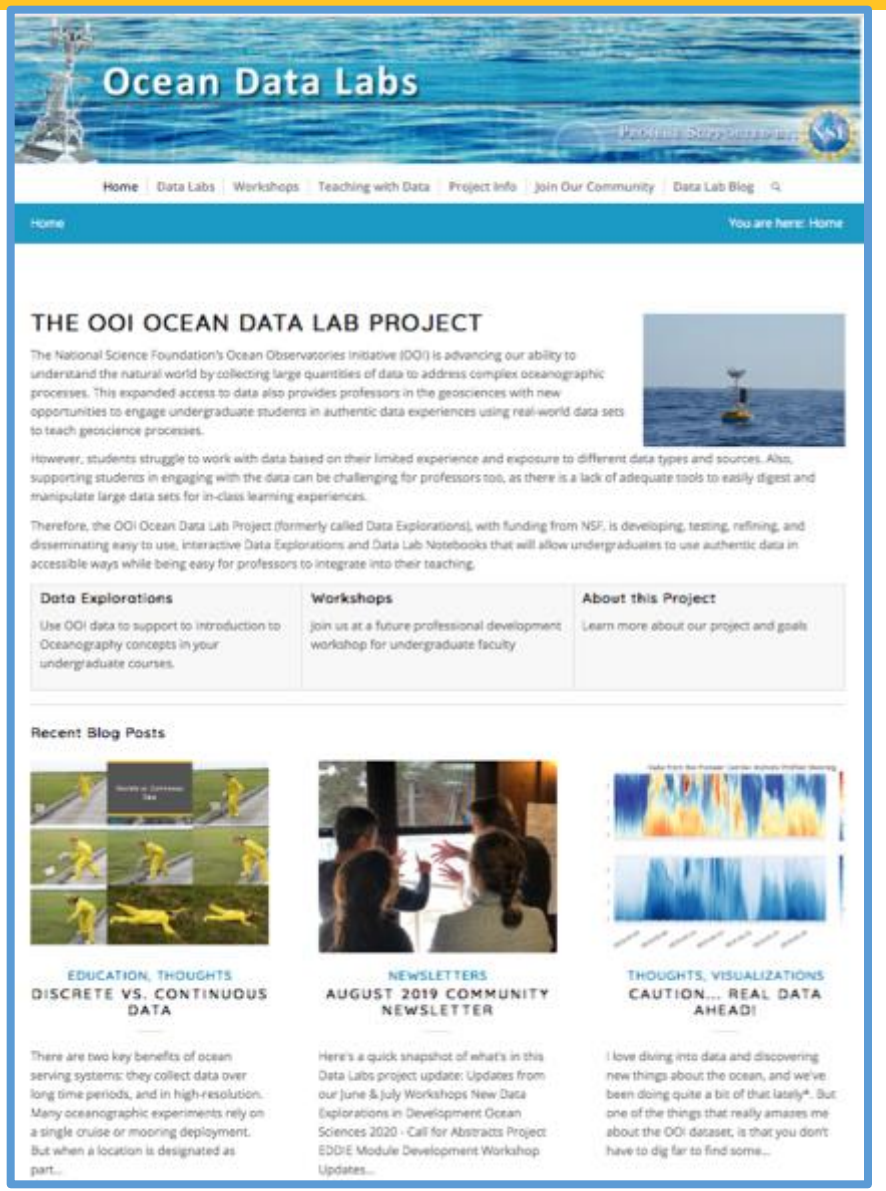


Denise Bristol
Hillsborough CC

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



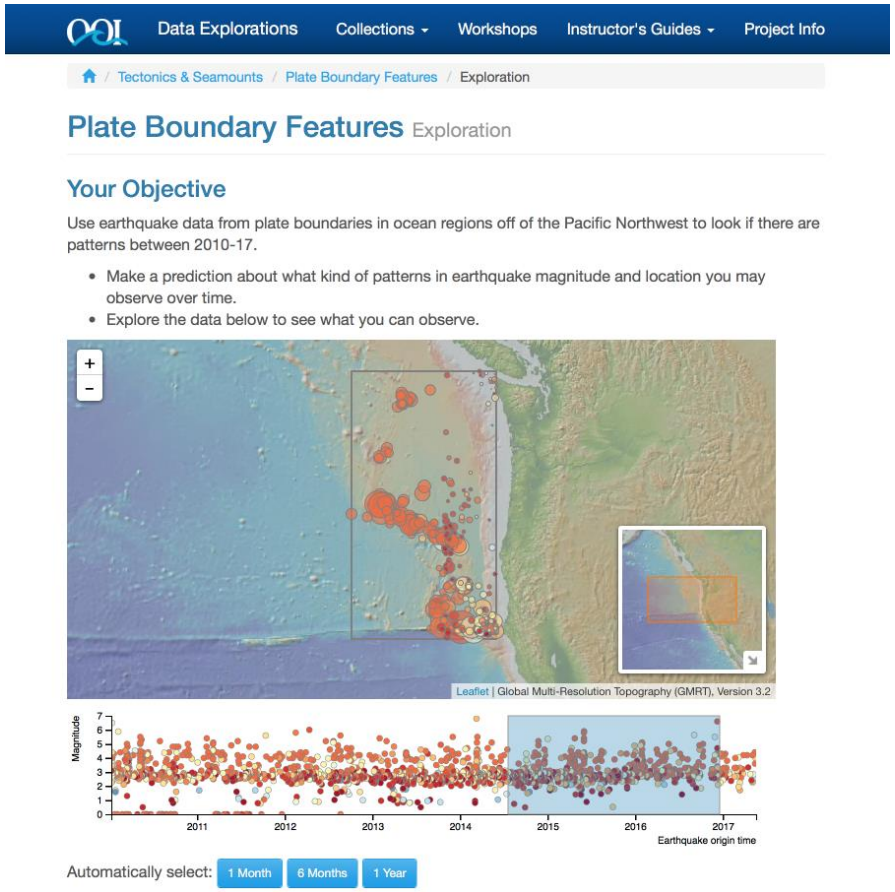
Early Pilot Projects (2016-2017)

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 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

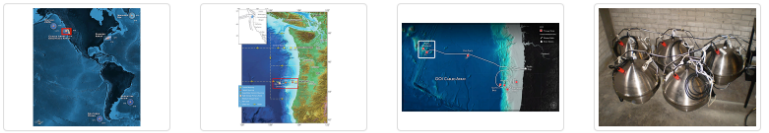
- Across what geographic area are you able to observe earthquake data in this map?
- What is the range of earthquake size (magnitude) in these data?

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

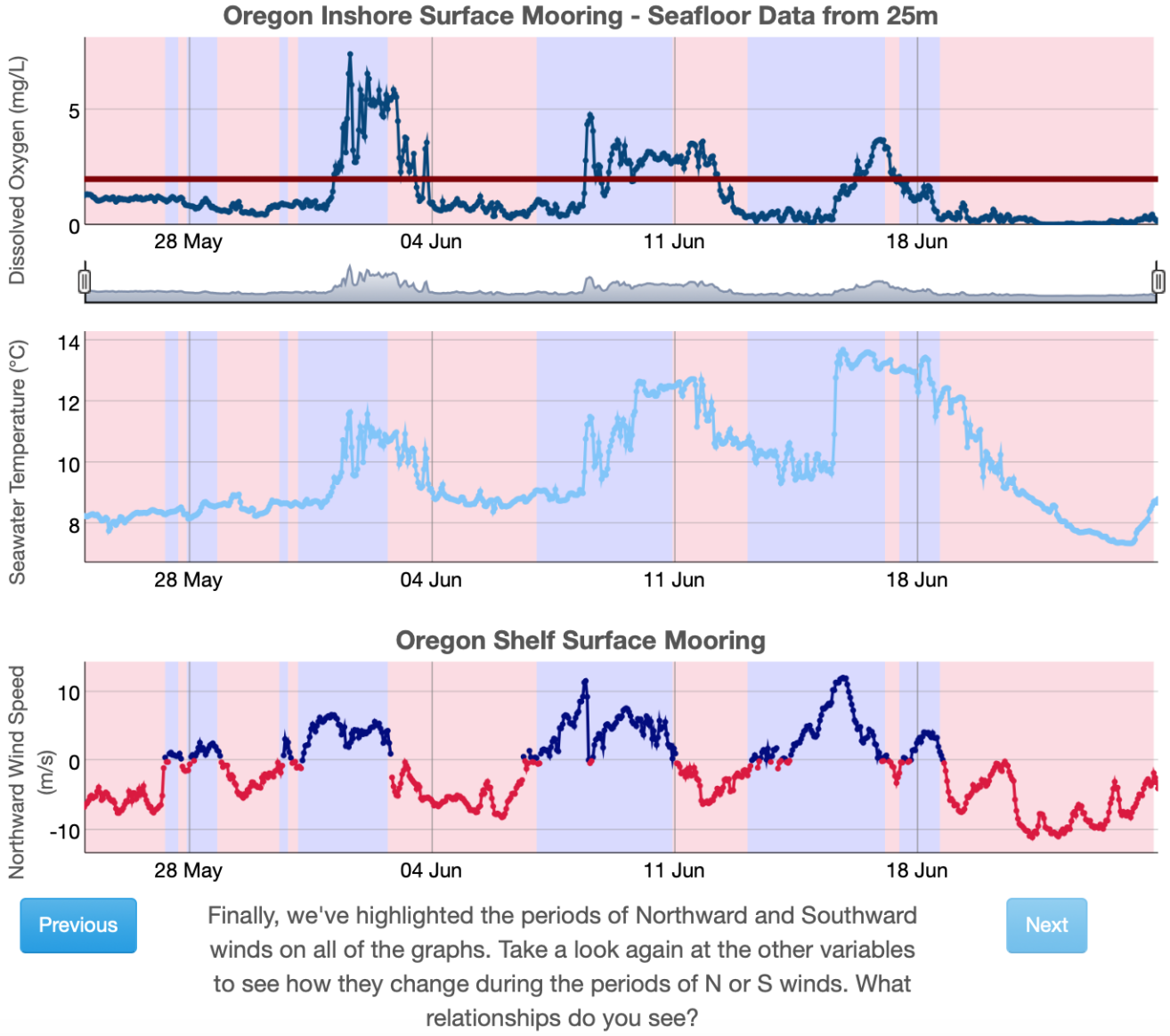
Data for this activity were retrieved from the USGS Earthquake Catalog.

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



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.

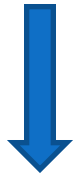
Cohort 1& 2 Data Lab Manual Pilot
Fall 2020 & 2021

42 professors

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

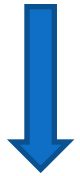
Data Labs Resource Collection

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

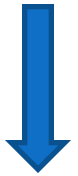
Ideal for introductory undergraduate majors or non-majors

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

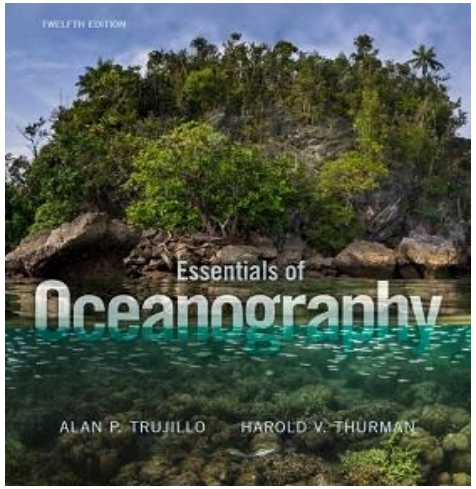
More guided *More open-ended*

Explore the collection: datalab.marine.rutgers.edu/data-labs/

Alignment to Intro Oceanography curriculum

OOI Science Themes and Data Availability

Common Oceanography Textbooks



Lab Manual chapters

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

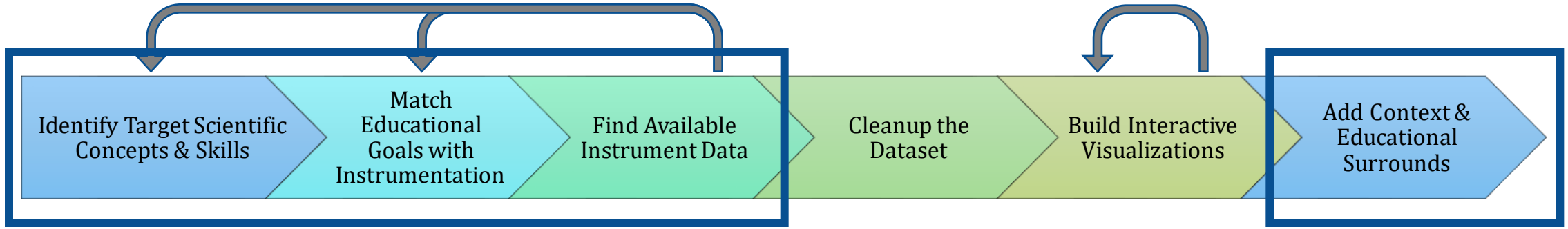
Project Goals

- 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 (?)

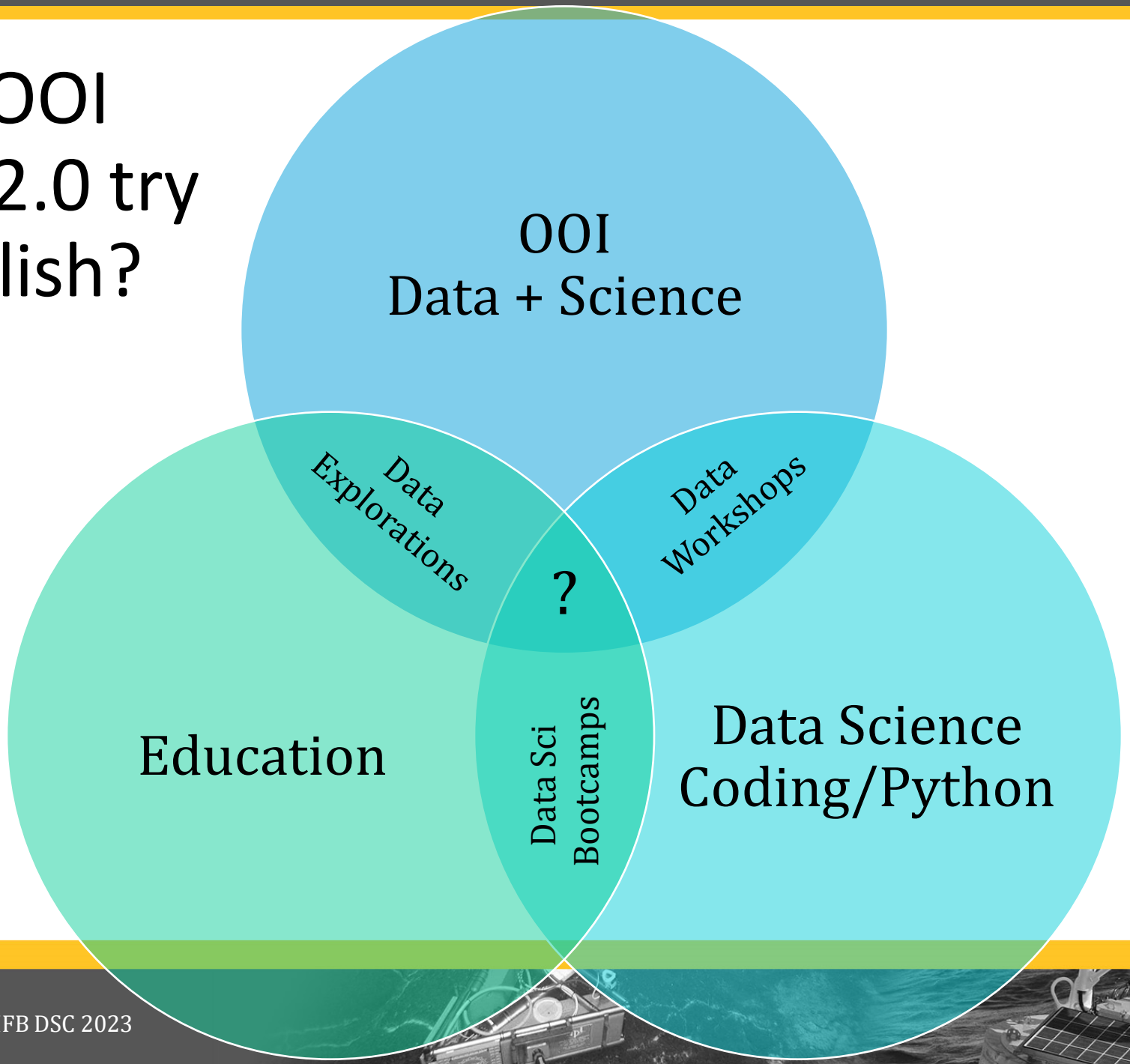
Lichtenwalner, 2021

Design Process – Lessons Learned



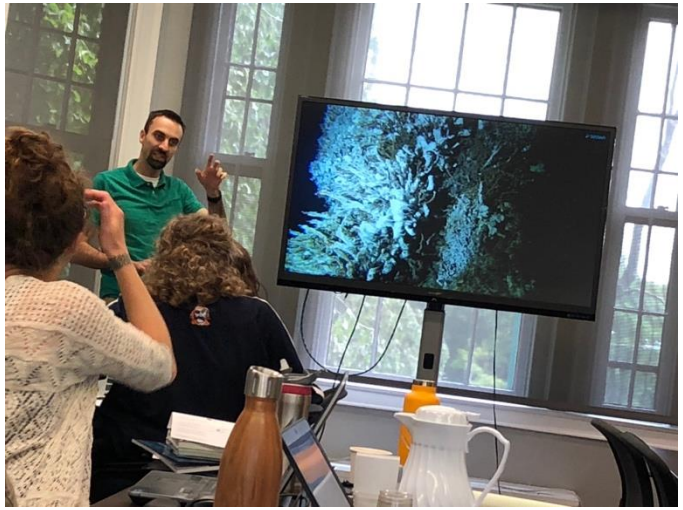
- Community Building – Defined process helps divide tasks and keep everyone on track
- Takes time and effort – Development is highly iterative (esp. 3&5)
- Educators can spearhead content selection and lesson development
  - Training is essential for new faculty to lean about the tools and instruments 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


GLOBAL IRMINGER SEA ARRAY
60°N
30°W
GLOBAL STATION PAPA ARRAY
50°N
145°W
CABLED ARRAY
46°N
127°W
COASTAL ENDURANCE ARRAY
40°N
70°W
COASTAL PIONEER ARRAY