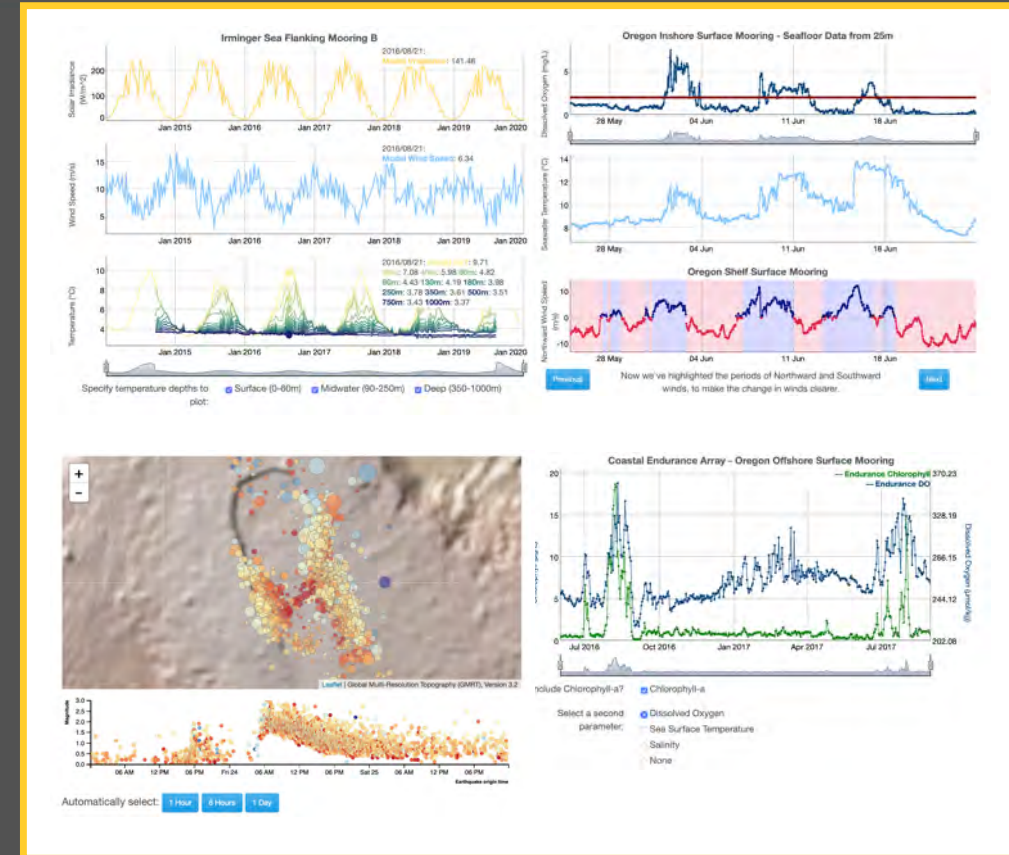


An Update on the OOI Data Explorations/Data Labs

Presentation to the OOI FB

May 14, 2020

Janice McDonnell and Sage Lichtenwalner

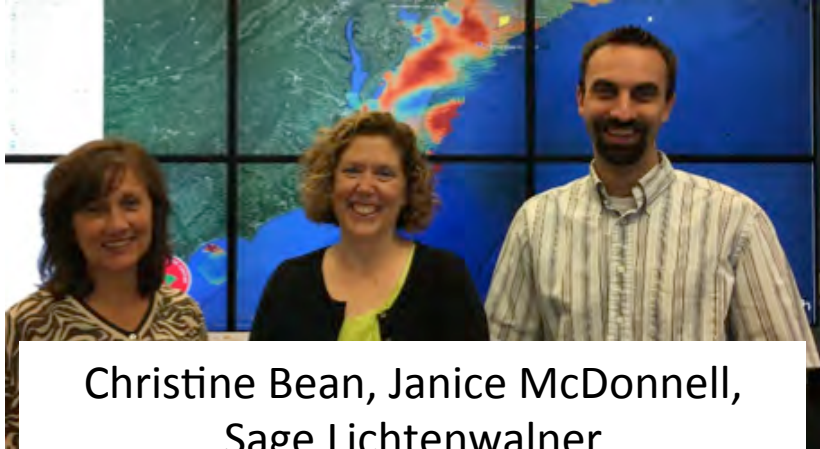


datalab.marine.rutgers.edu

Thanks to the National Science Foundation



NSF Grant #1831625



Christine Bean, Janice McDonnell,
Sage Lichtenwalner
Rutgers University



Catherine Halversen
UC Berkeley



Dax Soule
Queens College CUNY



Anna Pfeiffer-Herbert
Stockton University



Brooke Love
Western Washington Univ



Denise Bristol
Hillsborough CC

OOI Data Labs Project

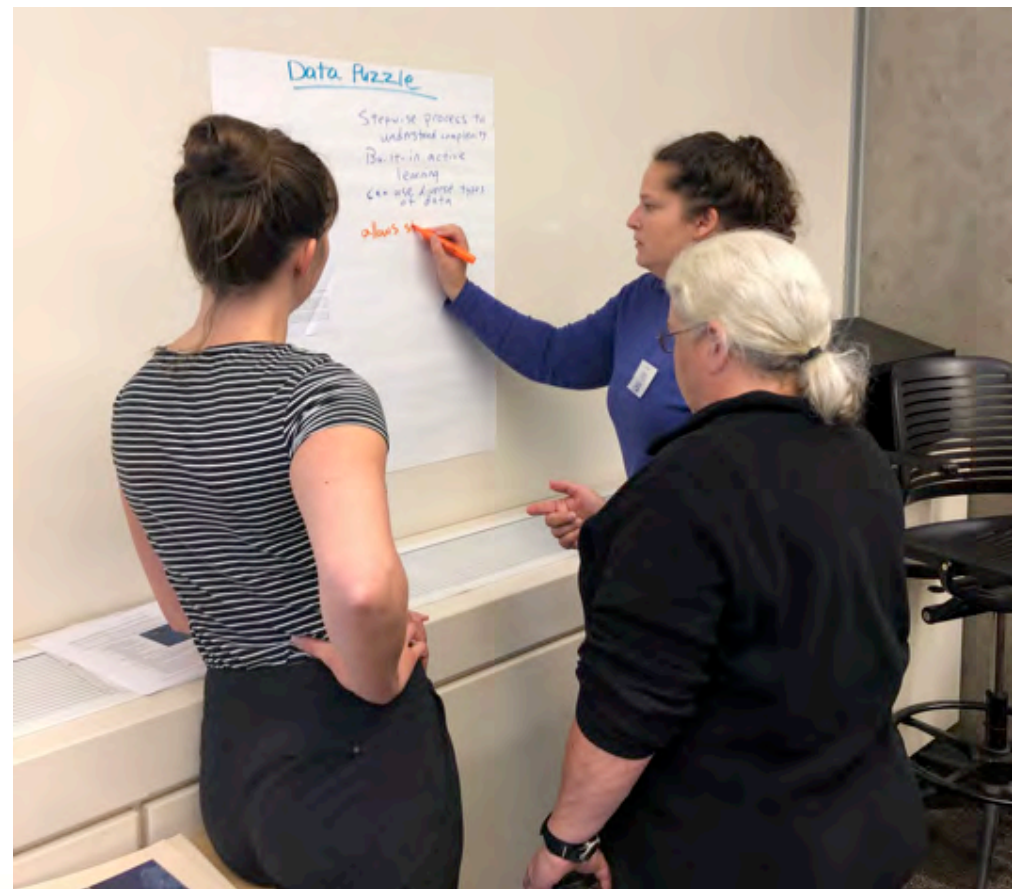
Key Goals

- Build a **Community of Practice (CoP)** of undergraduate educators, interested in using OOI data with their students
- Make OOI data more **accessible** to educators and students



Our Professional Development Model

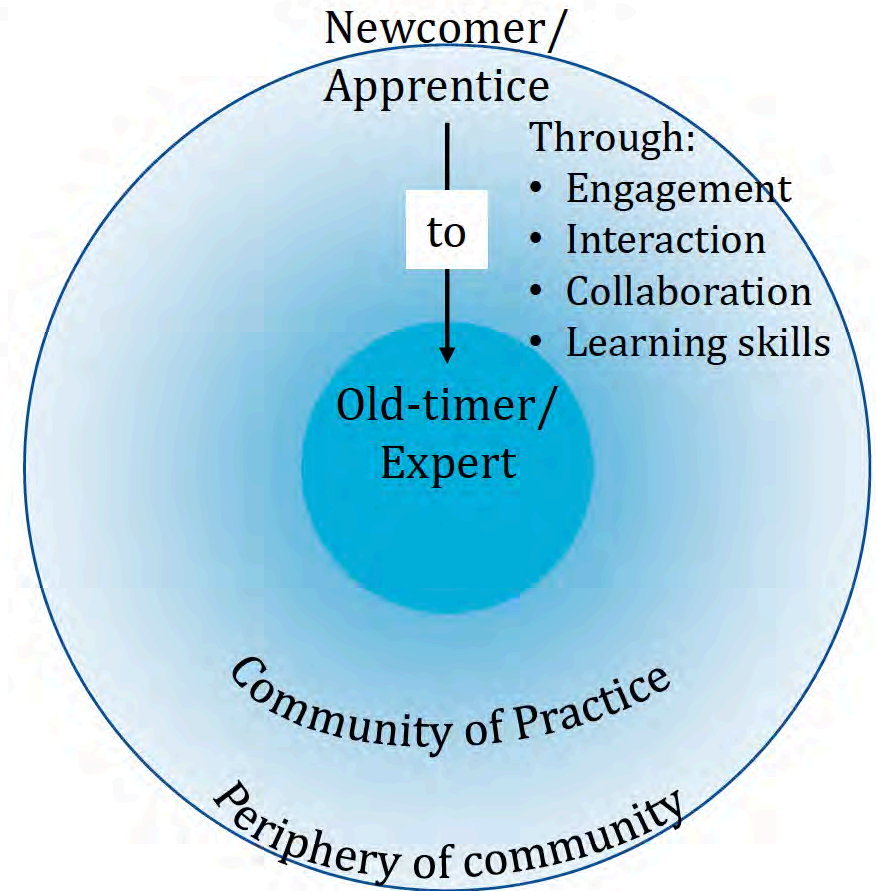
Grounded in Educational Theory



Community of Practice (CoP)

Learning defined as ...growth in one's ability to participate meaningfully and centrally in communities of practice [Lave, 1991]

- Novices begin by taking on simple but valued tasks
- As novices continue to participate and learn, they move towards the center of the community

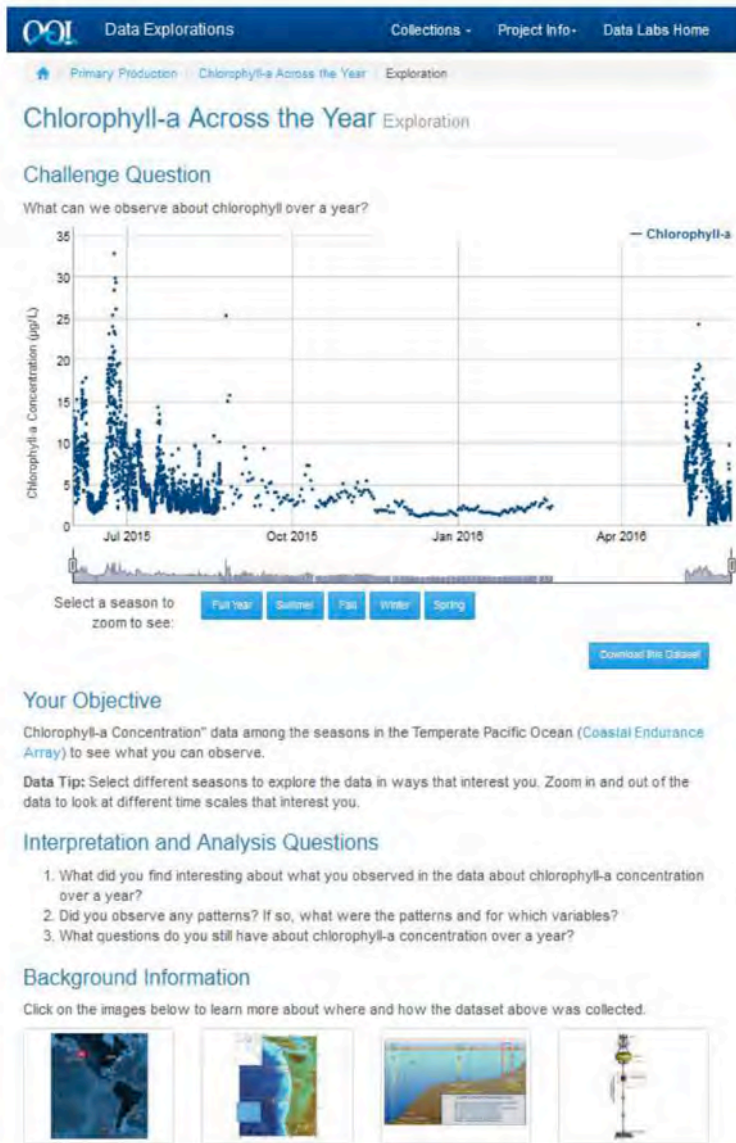


Building a CoP Using OOI Data in Teaching

Sustained professional development opportunities

Facilitating sharing of ideas and teaching practice



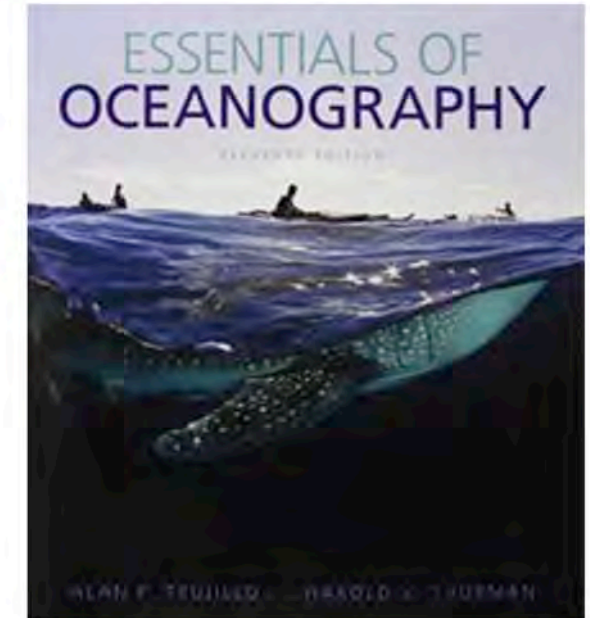


OOI Data Labs:

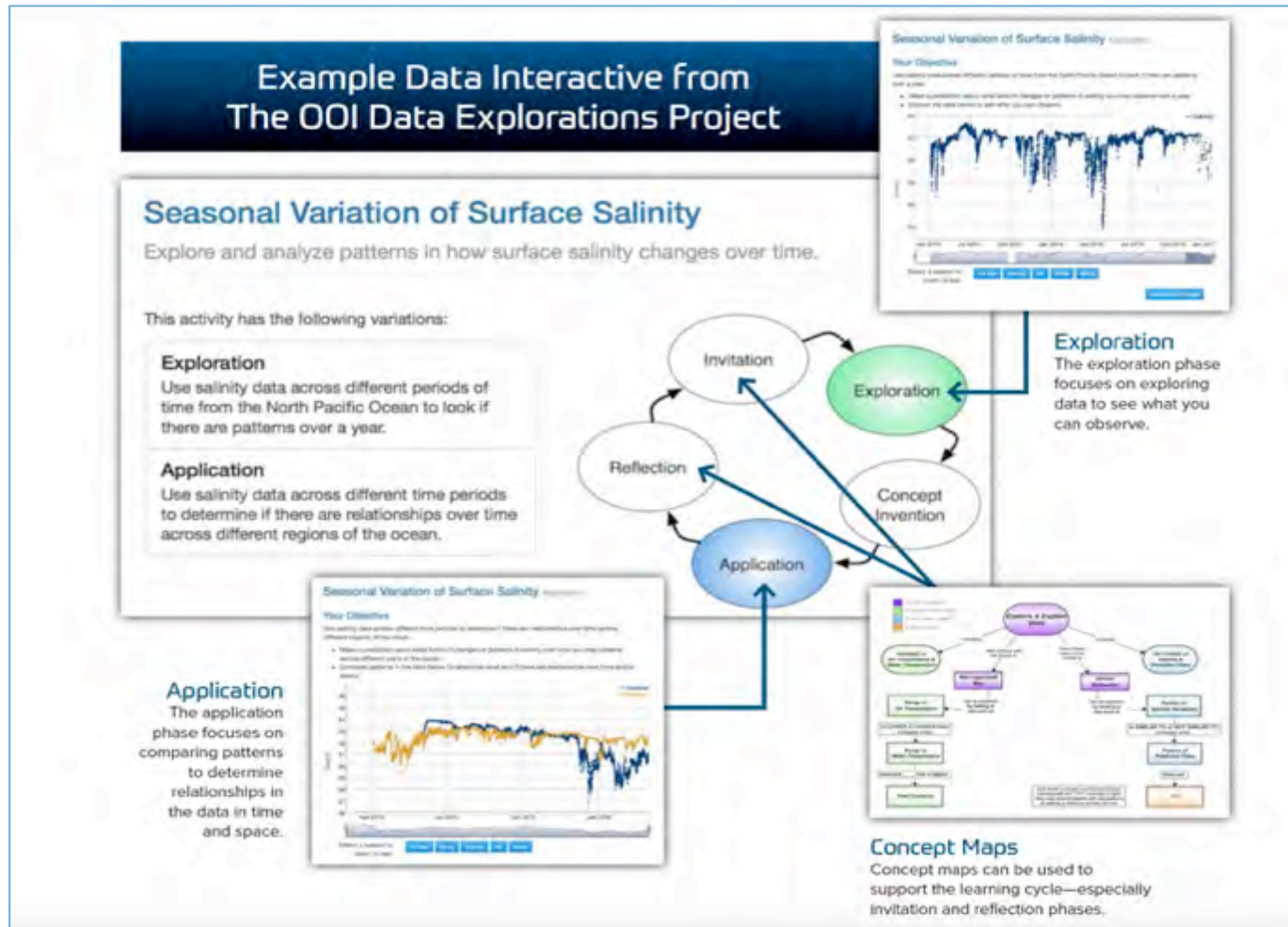
Integration of OOI data into Introductory Oceanography courses

← Online interactive data activities

Connected to core concepts →



Data Labs are structured in learning science theory



Data Labs combine current learning science theory (learning cycle), data visualization user design, and effective teaching practices to provide easy-to-use interactive experiences with real data.

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 101 like courses.

Development
Workshops

Spring 2019



56 professors

4 week long workshops.

- Chauncey Center - Princeton, NJ.
- Rutgers University - New Brunswick, NJ.
- Asilomar- Monterey, CA.
- Western Washington University - Bellingham, WA.

Implementation
Workshops

Summer 2019



60 professors

2 workshops focused on using OOI Data Labs in the classroom.

- Earth Science Teachers Rendezvous in Nashville, TN July 2019
- Ocean Science Meeting in San Diego, CA in February 2020.

Webinar Series

Fall 2019



11 professors

4 webinars featuring data labs developed by workshop participants.

11 professors led these webinars

Open Source Lab
Notebook

Winter 2020



11 professors

1 design workshop to develop an open source and online laboratory notebook that will serve as a companion online lab manual for oceanography courses.

Fellowship
Program

Winter 2020



11 fellows

7 professors are collecting data and feedback from students on the efficacy of the Data Labs.

4 are creating new Python notebooks with OOI data.

REU Program

Summer 2020



13 professors

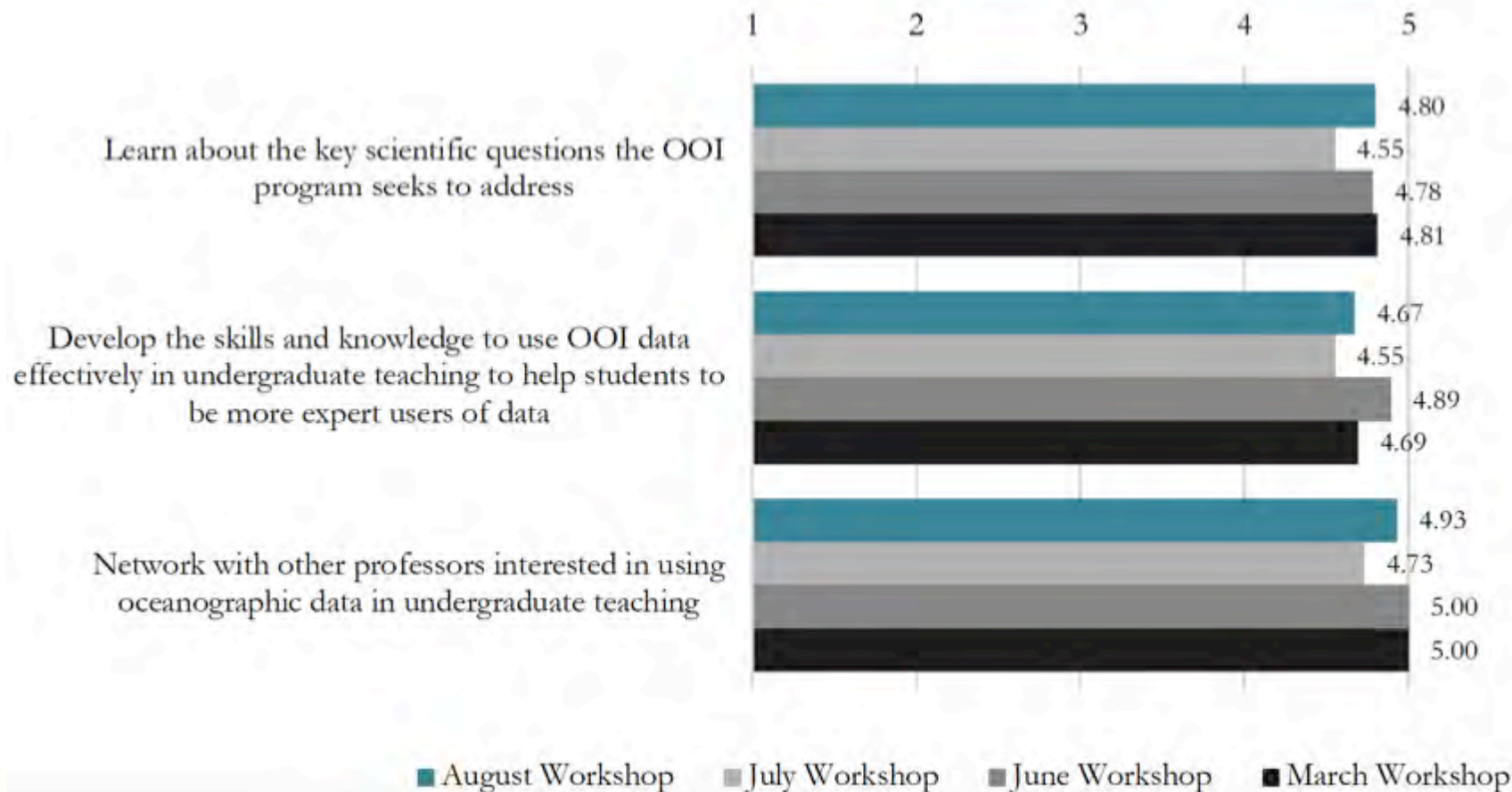
13 professors volunteered to be mentors in a virtual REU using OOI data in an online REU program

Evaluating our Success

- Led by Dr. Ellen Altermatt, Carleton College
- Formative and Summative surveys
- Interviews

Development Workshop Evaluation Results

1 (strongly disagree) to 5 (strongly agree)



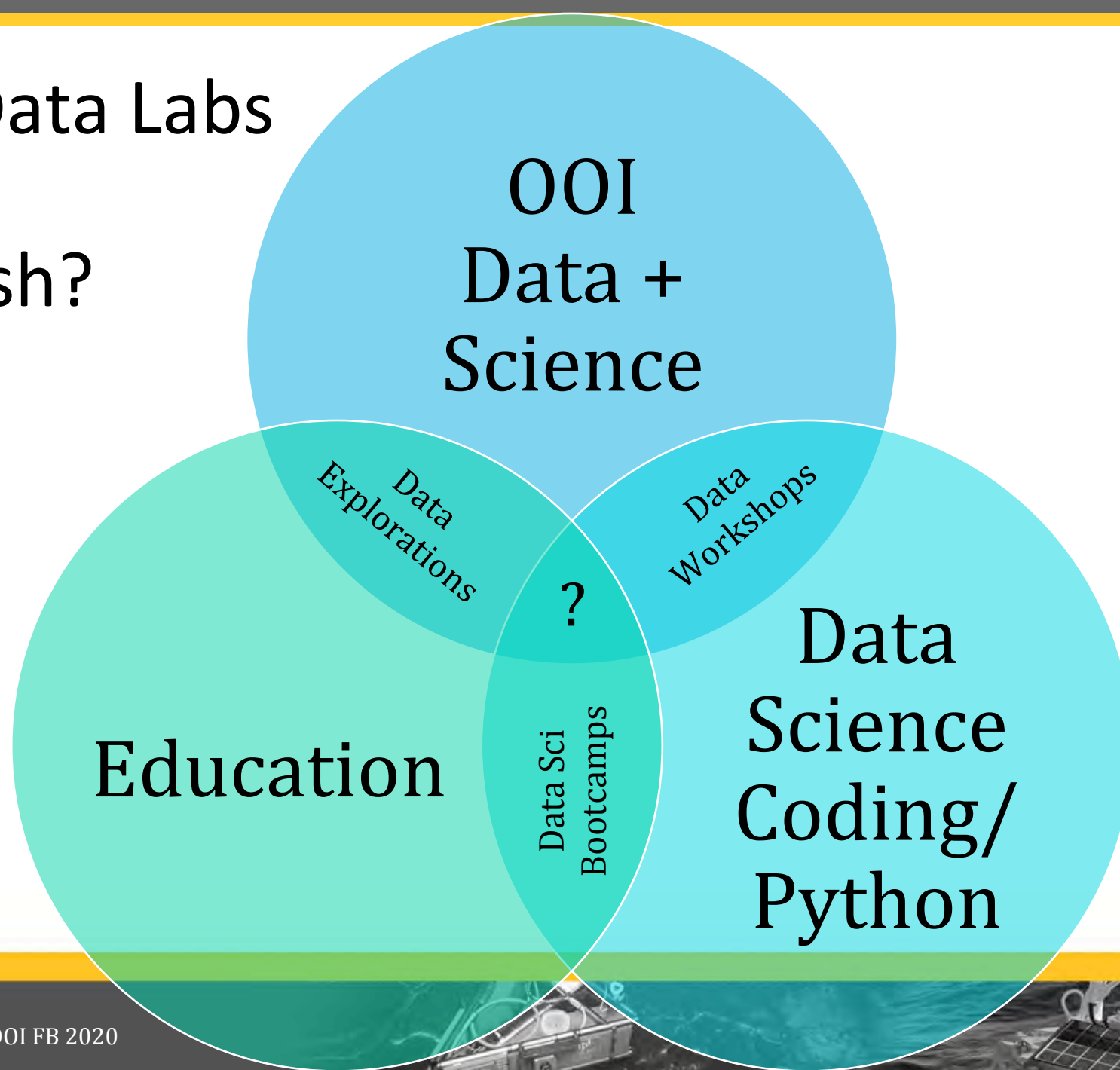
The growing Ocean Data Labs community



- Data Exploration pilot testers (27)
- Data Lab developers (56)
- 2020 Data Lab Fellows (11)
- Data Lab project team leaders

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

What is Data Labs
trying to
accomplish?



Development Workshops–Interactive Widgets

- 18 Pilot Data Explorations (from 2016-2017)
- 13 New Data Explorations from 2019 Workshops
 - Many have 2-3 variants



Development Tools:

- dygraphs.js – Used for most time-series widgets
- d3.js – More complex widgets, including profiles
- Leaflet.js - Spatial maps

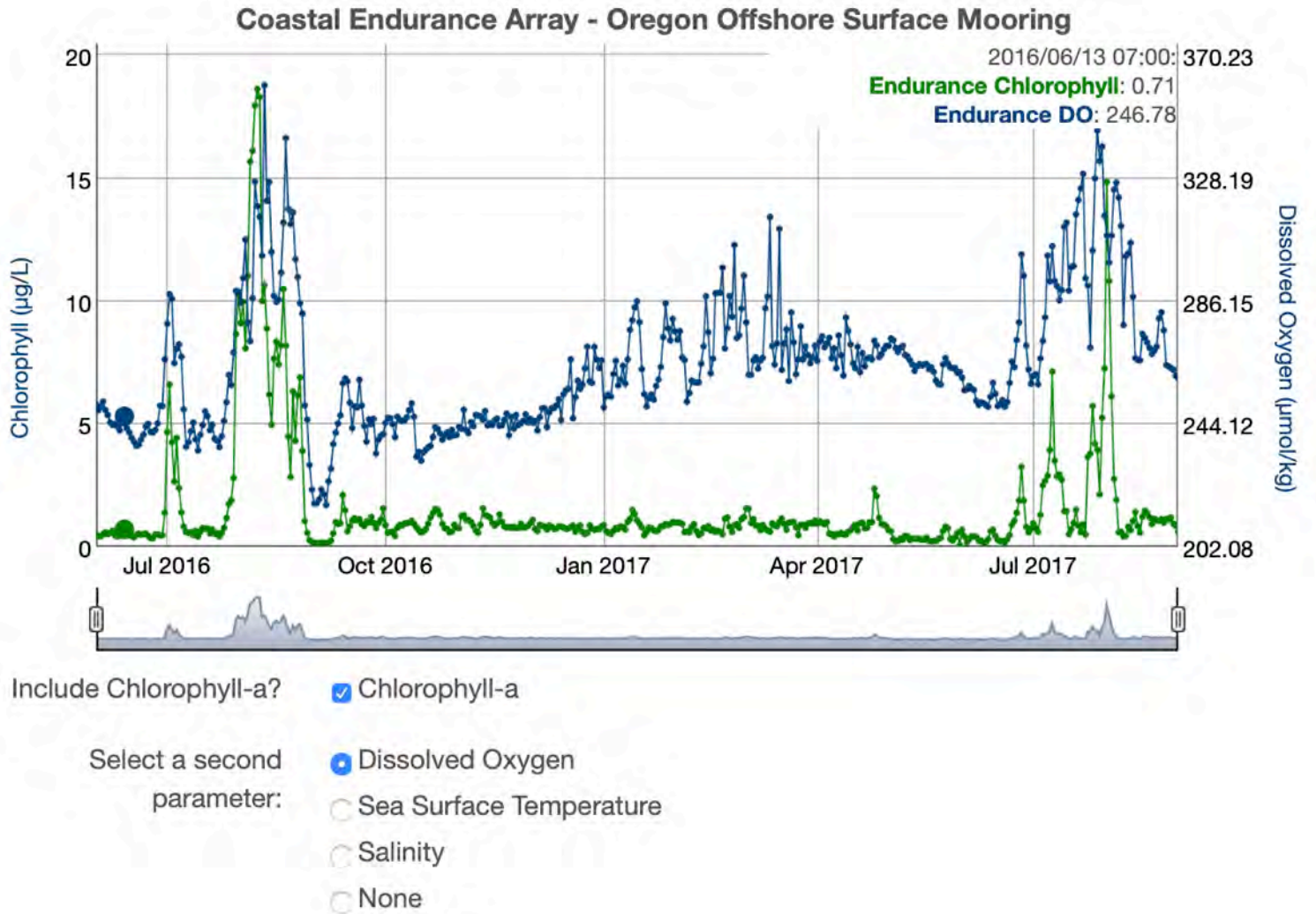
dygraphs



Exploring Data

Chlorophyll-a in Upwelling and Stratified Temperate Regions

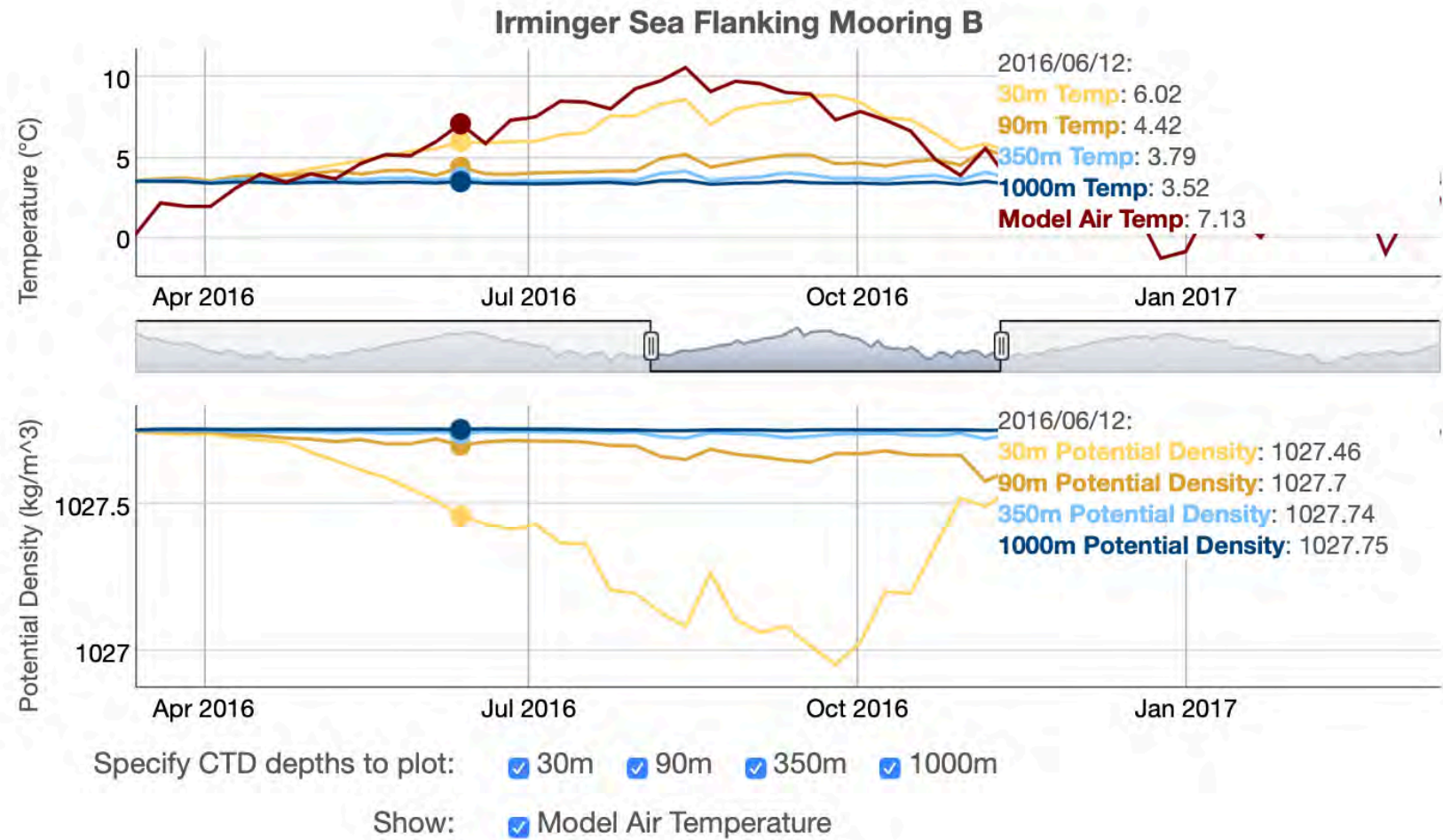
- Karen Baker, Orange Coast College
- Claire Condie, Middlesex County College
- Robert Ellis, Orange Coast College
- Colleen Petrik, Texas A&M University



Focus + Context

Thermohaline Circulation

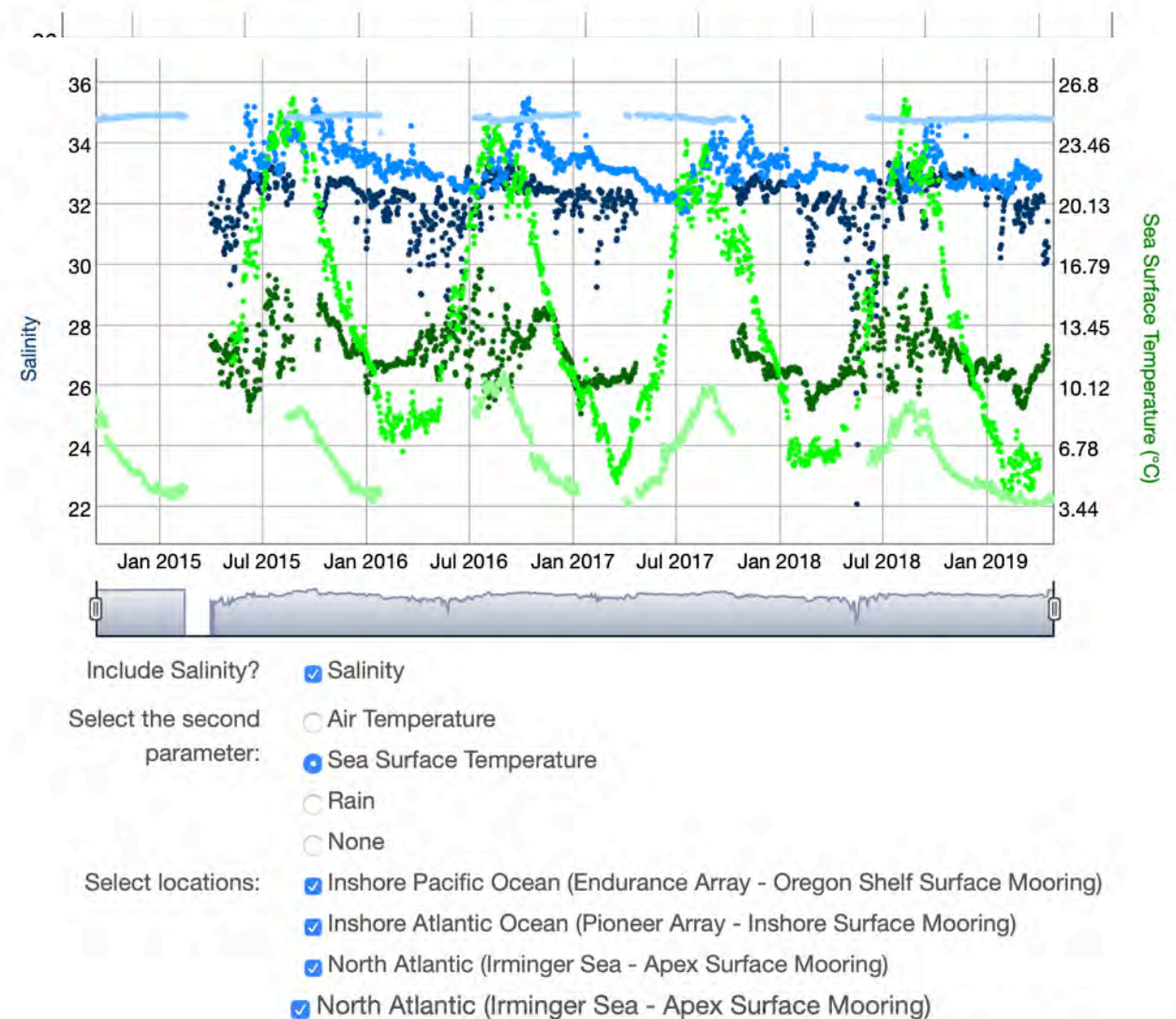
- Rich Dixon, Texas State University
- Nicholas Beaird, Rutgers University



Compare Variables and Locations

Changes in Salinity

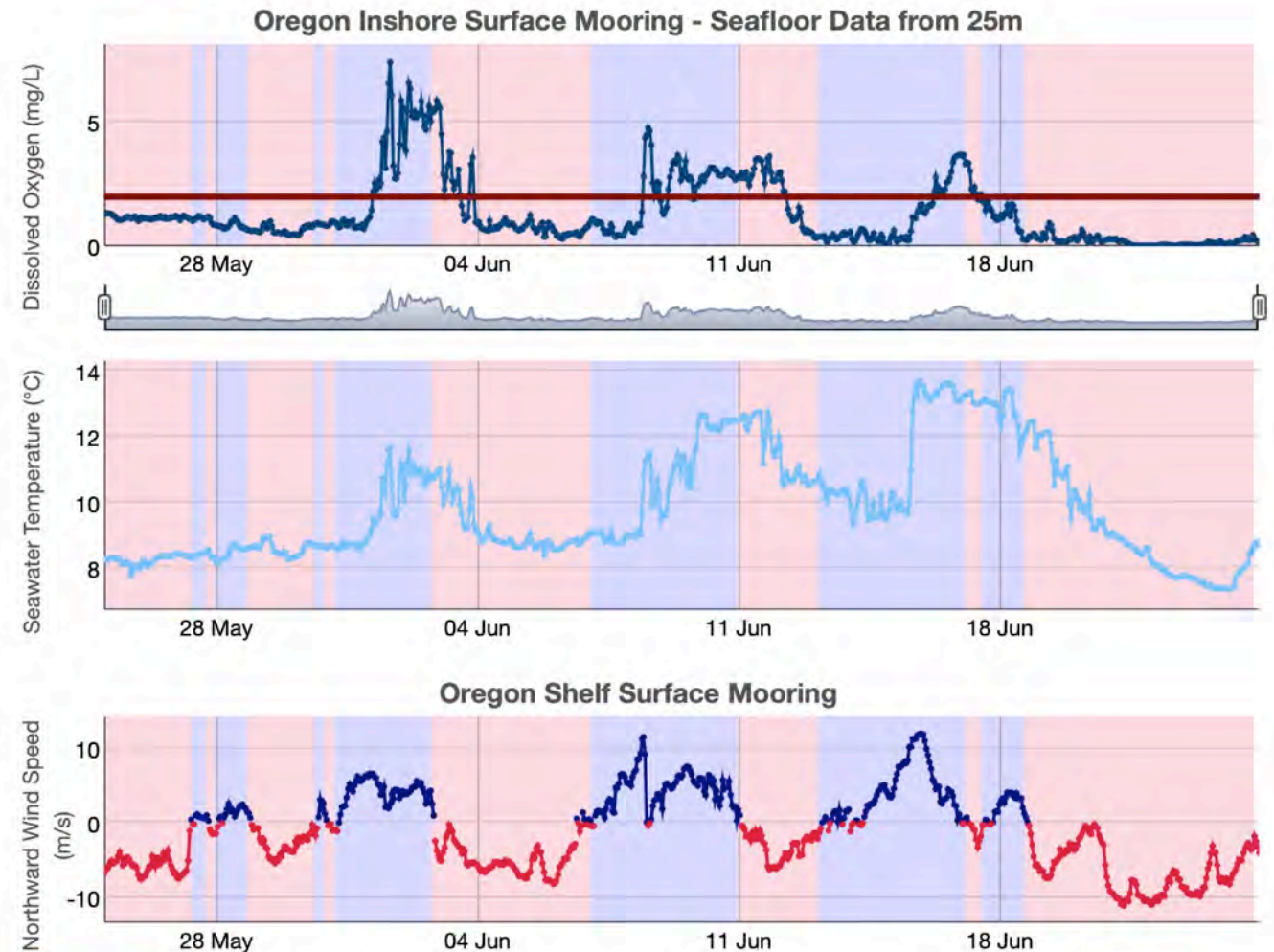
- Michael Phillips, Illinois Valley Community College
- Karen Helgers, SUNY Ulster
- Jessica Olney, Hillsborough Community College
- Matthew Semcheski, Florida Keys Community College



Guided Learning

Anoxic Events

- 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

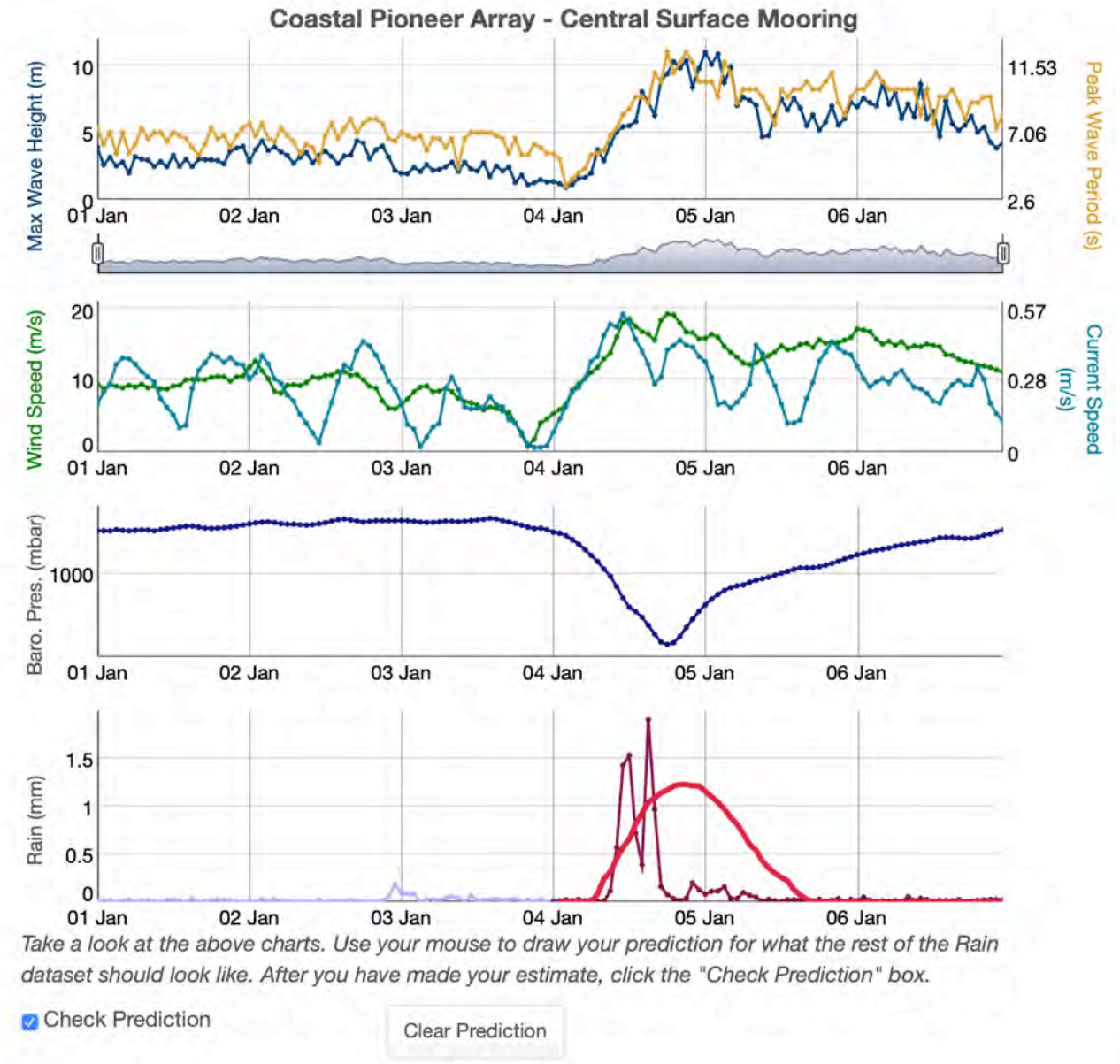
Finally, we've highlighted the periods of Northward and Southward winds on all of the graphs. Take a look again at the other variables to see how they change during the periods of N or S winds. What relationships do you see?

Next

Student Predictions

Dynamic Air-Sea Interactions

- Jacqui Degan, Cape Fear Community College
- Melissa Hicks, Onondaga Community College
- Siddhartha Mitra, East Carolina University
- Paul Webb, Roger Williams University



Development Workshop– Python/Matlab/R Notebooks

Notebooks can be used for:

- Tutorials
- Exercises/practice (in-class or out)
- Guided discovery
- Self-directed inquiry (aka research projects)

Enables Community Driven
interactive datasets, lessons and
research

- 31 Example OOI Data Processing Notebooks to date
 - <https://github.com/ooi-data-lab/data-lab-workshops>
- 4 “Data Labs Fellows” working on Educational notebooks

New visualization libraries enable
interactive exploration

- Altair
- HoloViz

Fellowship Program

- 7 fellows are IRB approved to test DL in their classrooms
- Impacted by COVID-19

12:24pm



Janie J. commented on [OOI Virtual Field Trip Resources](#)

You folks are the BEST! I like to provide background information to my students as how certain ideas/concepts/theories evolved when we are studying them. In fact, sometimes the history is more interesting than the theory. This is exactly what I needed to "set the scene" for them. Thanks a bunch!

- 4 fellows are working on Python Notebooks

5:00pm



Tracy Q. answered: [Very briefly, what have you been working on or accomplished during the past 2 weeks?](#)

In the way of programming, I've been knocking off one challenge only to find another. As Tom said, we've been doing a lot of communal problem solving, for which I am very grateful. On a more general note, I may be finally getting into a good work from home routine.

Evaluating our Community of Practice

Case Study #1 Kathy Browne, Rider University

Participated in
March
Development
Workshop
(2019)

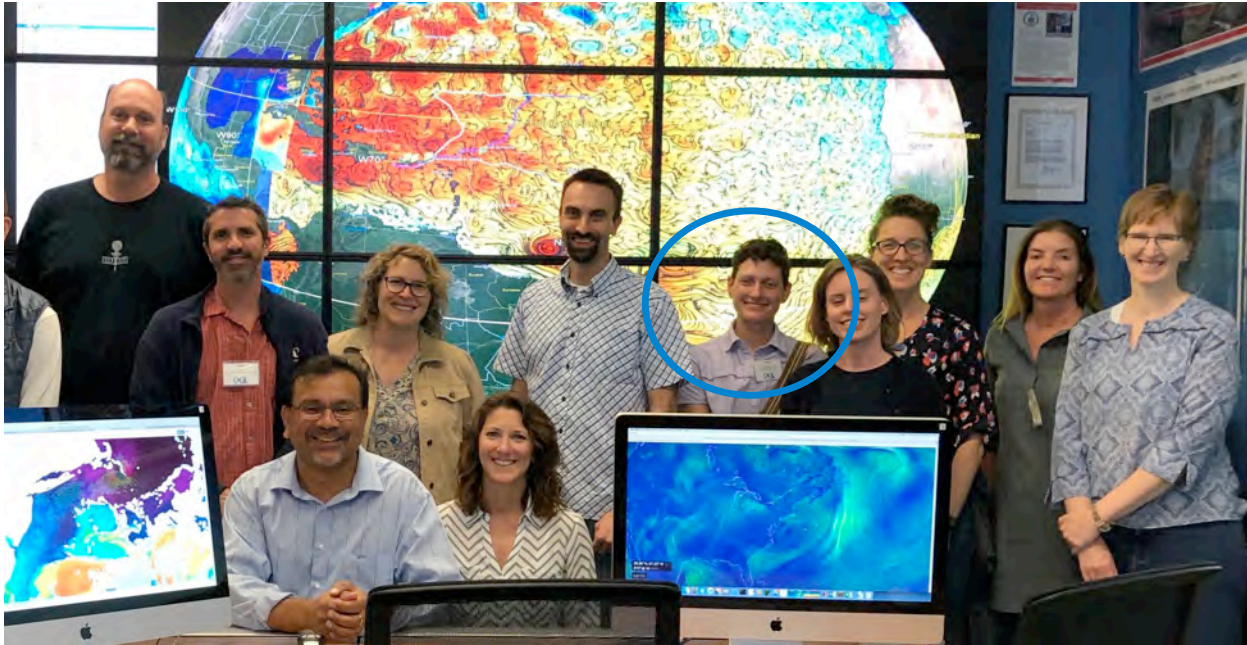
Peer mentor in
EER
Implementation
Workshop (July
2020)

Lab Notebook
Designer
(January 2020)

PI IUSE grant
studying OOI
data and
learning



Case Study #2 Melissa Hicks, SUNY Onondaga



Development
workshop (June 2019)

Peer trainer/leader in
a webinar (2020)

Data Lab Fellow
(2020)

Case Study #3: Sean Crosby, Western Washington University

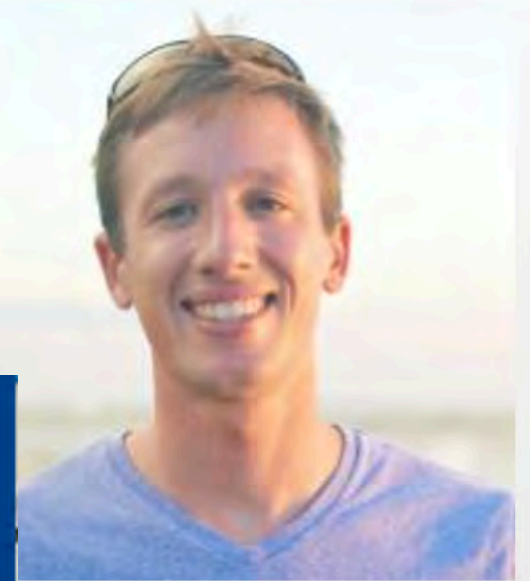
Not on any
of our
original
lists!

Networked
into project
by WWU
faculty

Attended
webinars as
a
participant

Became a
Data Lab
Fellow
(2020

Dr. Sean Crosby



Case Study #4: Anna Pfeiffer-Herbert Stockton University

2016-17 -
attended 2.5
day
workshop

Regional
Facilitator
and project
team

Peer
presenter at
3 of 4
development
workshops

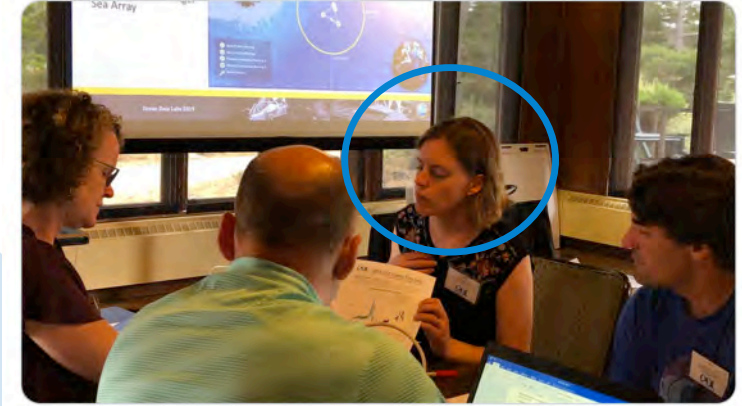
Co-facilitated
OSM mini
workshop

Presented at
OSM

Co-editor /
co-leader of
DL Notebook
cohort

Volunteered
to be a
mentor

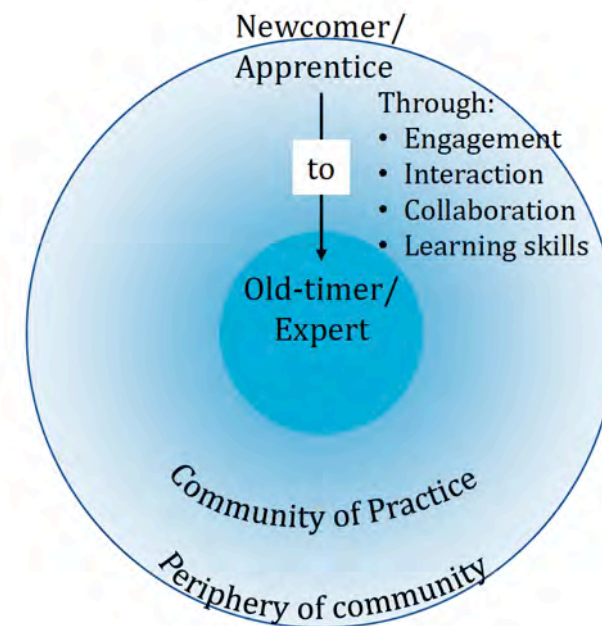
OOI Ocean Data Lab @ooidatalab · Jul 23, 2019
Welcome to OOI Ocean Data Lab Cohort 3! Drs. Erica McPhee-Shaw @GOT7WWU, Benjamin Jordan @byuhawaii, Matthew Lacchei @HPU, and Anna Pfeiffer-Herbert @Stockton_edu, explore data from the Irminger Sea.



Building a CoP: Moving to the Center of the Community

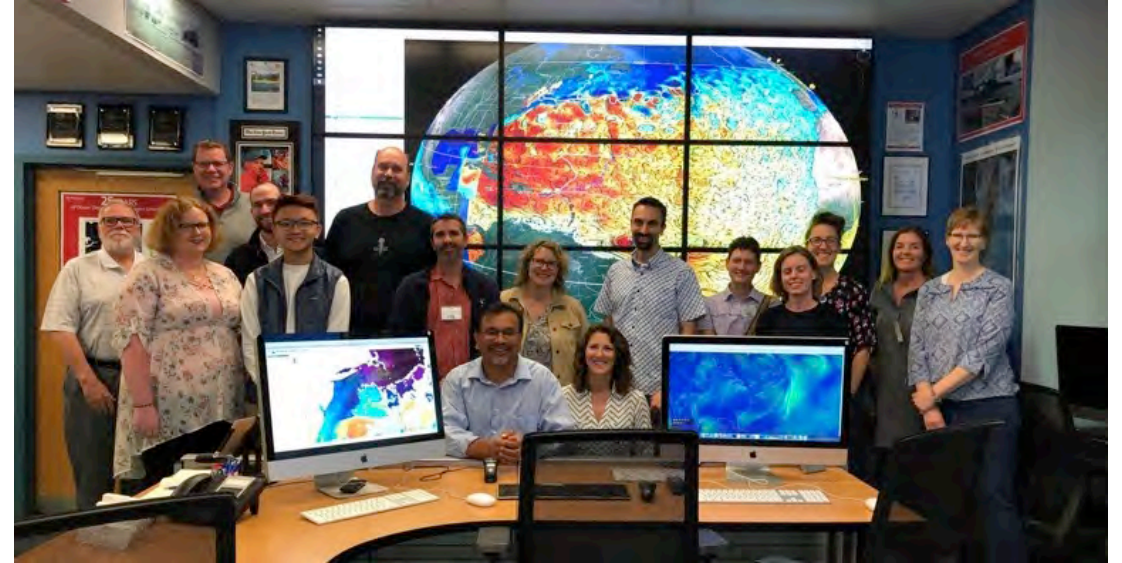
Of the 116 we worked intensively with in workshops:

- 11 delivered OOI DL webinars, presenting the DL they had developed during workshop
- 11 became DL Fellows
- 11 are designing and building the DL Notebook
- 8 became peer presenters at mini workshops
- 10 presented on OOI at Ocean Sciences Meeting in San Diego, CA
- 13 volunteered to be an OOI Virtual REU mentor



Notable Professor Quotes

- “When I asked the students if they wanted to continue this; **they overwhelmingly said ‘yes.’**”
- “I was so excited about the data portal and the new data labs that my students and I look at either OOI data or some other data portal **every single day in class.**”
- *“The data set is fantastic. One thing I would like to tell [project leaders] is that this gives the oceanography students the kind of skills which they can take **even if they don't want to continue in the oceanography field**”*
- “We had some really good discussions. It was **one of the best weeks of the semester** where students were engaged, they put the work in, and they really thought about the questions I was asking them.”



Summary

- 13 new Data Explorations/Interactives
- Building a promising CoP
- Reach Survey to be released May 15th
- Active Blog and mailing list
- Webinar series planned for Fall 2020
- New Video on Teaching with Data
- DL Online Manual for Oceanography 101
- Fellows program in Fall 2020
- REU with DL Alumni as mentors!



FIN



The Data Explorations – Design Process



Faculty
Development
Workshops

Science Papers
e.g. OOI Special Issue

“Nuggets” from
OOI 1.0 Data Review

<https://datareview.marine.rutgers.edu/nuggets>



Guidance from the
Lawrence Hall of Science

- Active Learning
- The Learning Cycle

Constructing a Path

- Follow up ZOOM calls
- Lots of mentorship
- Celebration & recognition of success
- Scholarly presentations at conferences/ meetings

