Ocean Data Labs

Project Supported by: NSF

Introduction to the Ocean Data Lab Project

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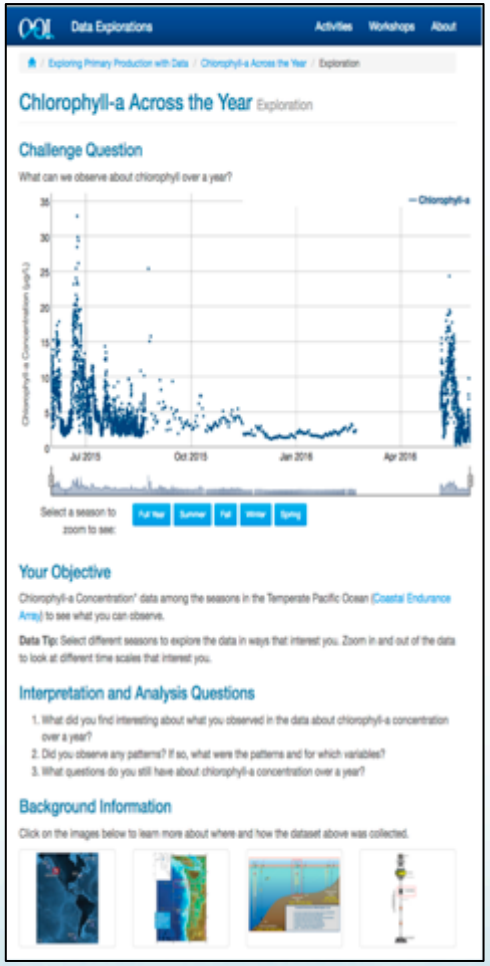
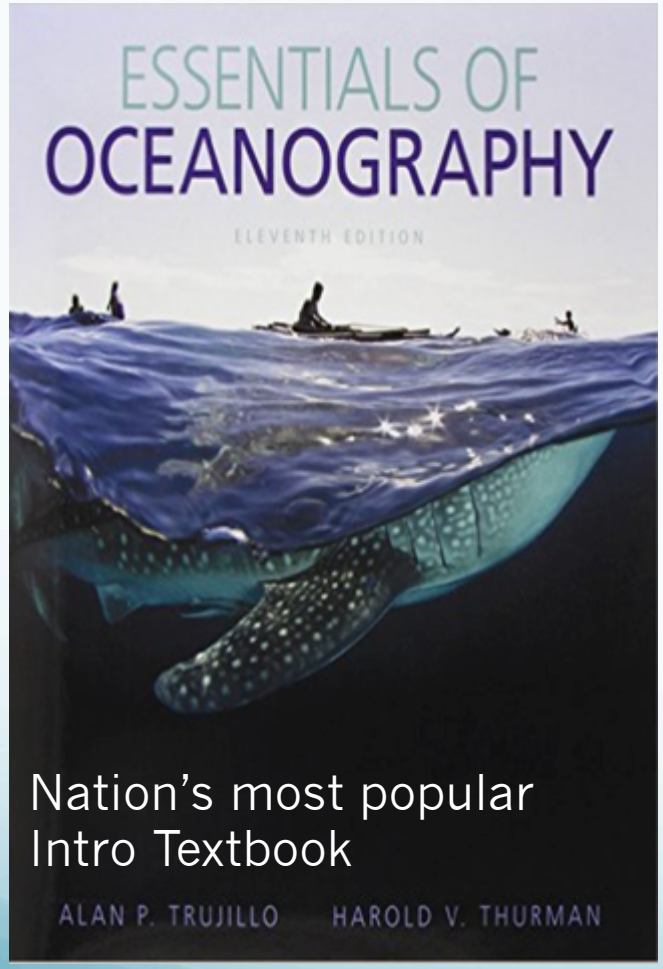
New Educational Content for OOI



Goals: 1) address the challenges of teaching with data & support opportunities for professors and undergraduates to become more expert users of OOI data. 2) Increase undergraduates engagement in and understanding of core concepts through use of OOI data.

Method: Develop user-friendly, online data interactives that provide short interactions with OOI data to augment teaching & learning of core concepts in Introduction to Oceanography courses.

Integration of OOI into Introductory Oceanography Courses



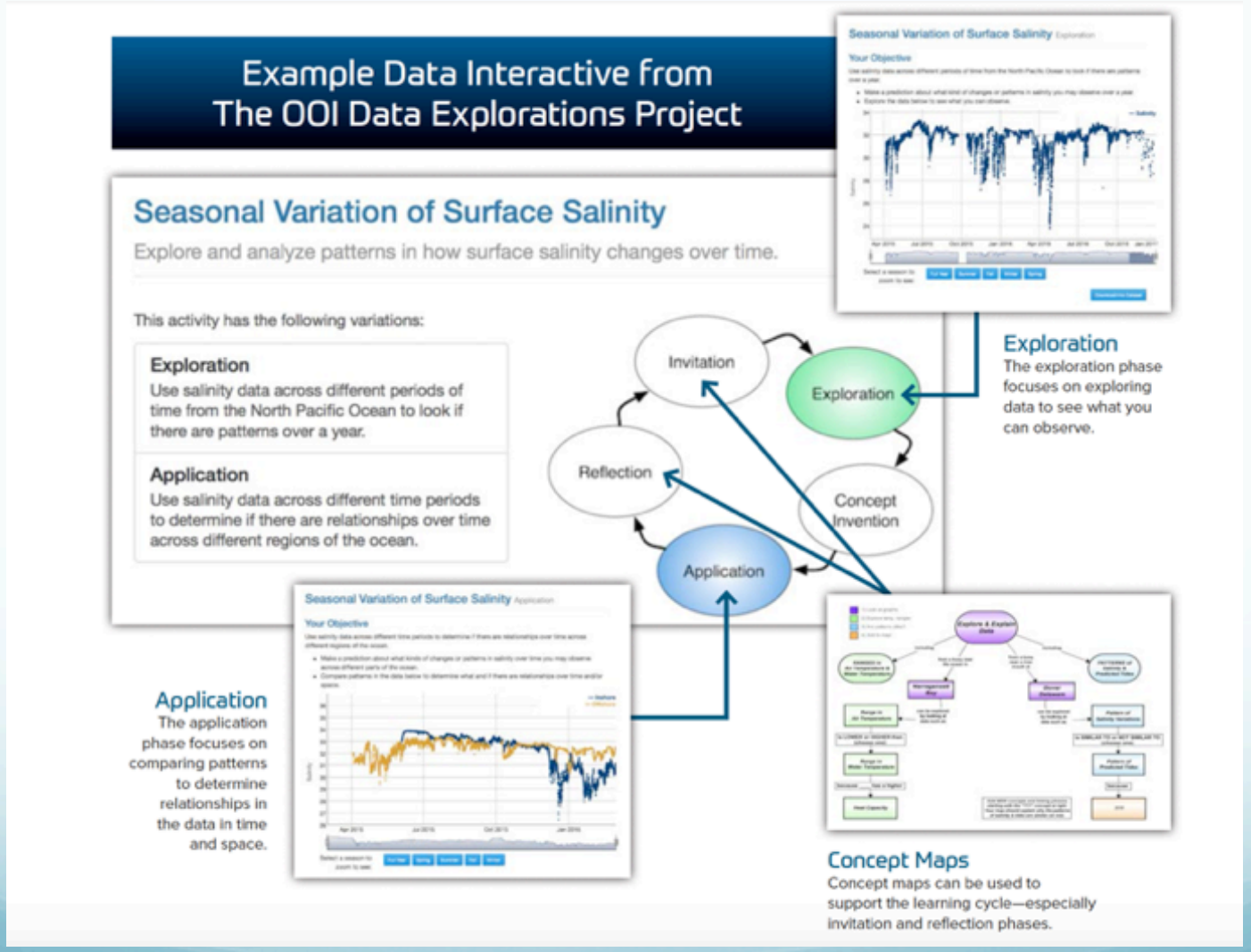
Nation's most popular Intro Textbook

Cross-walk of A.P. Trujillo Textbook Chapters/Topics with OOI Data Assets (12 of 16 Chapters are closely aligned)

Chapter	Section	Topics	Pacific Ocean				Atlantic Ocean		
			Global Station Papa	Cabled Array	Coastal Endurance	Global Southern Ocean	Global Irminger Sea	Coastal Pioneer	Global Argentine Basin
12. Marine life and the marine environment		Species in pelagic and benthic environments							
	12.4 How are marine organisms adapted to the physical conditions of the ocean?	Need for physical support							
		Water's viscosity							
		Temperature	x		x	x	x	x	x
		Salinity	x		x	x	x	x	x
		Dissolved gases							
		Water's high transparency							
		Pressure	x		x	x	x	x	x
	Diving Deeper 12.1 Historical Feature	Diving into the marine envrionment							
	12.5 What are the main divisions of the marine environment?	Pelagic (open sea) environment							
		Benthic (sea bottom) environment							
13. Biological productivity and energy transfer	13.1 What is primary productivity?	**Measurement of primary productivity**	x		x	x	x	x	x
		Factors affecting primary productivity							
		Light transmission in ocean water	x		x	x	x	x	x
		Why are the margins of the ocean so rich in life?							
	13.2 What kinds of photosynthetic marine organisms exist?	Seed-bearing plants (Anthophyta)							
		Macroscopic (large) algae							
		Microscopic (small) algae							
		Ocean eutrophication and dead zones							
		Photosynthetic bacteria							
	13.3 How does regional primary productivity vary?	**Productivity in polar (high latitude) oceans: 60 to 90 degrees North and South Latitude**	x			x	x		x
		Productivity in tropical (low latitude) oceans: 0 to 30 degrees North and South Latitude							
		Productivity in middle latitude (temperate) oceans: 30 to 60 degrees North and South Latitude			x			x	
		Comparing regional productivity	x		x	x	x	x	x
	13.4 How are energy and nutrients passed along in marine ecosystems?	Flow of energy in marine ecosystems							
		Flow of nutrients in marine ecosystems	x		x	x	x	x	x
		Oceanic feeding relationships							
		Marine ecosystems and fisheries							

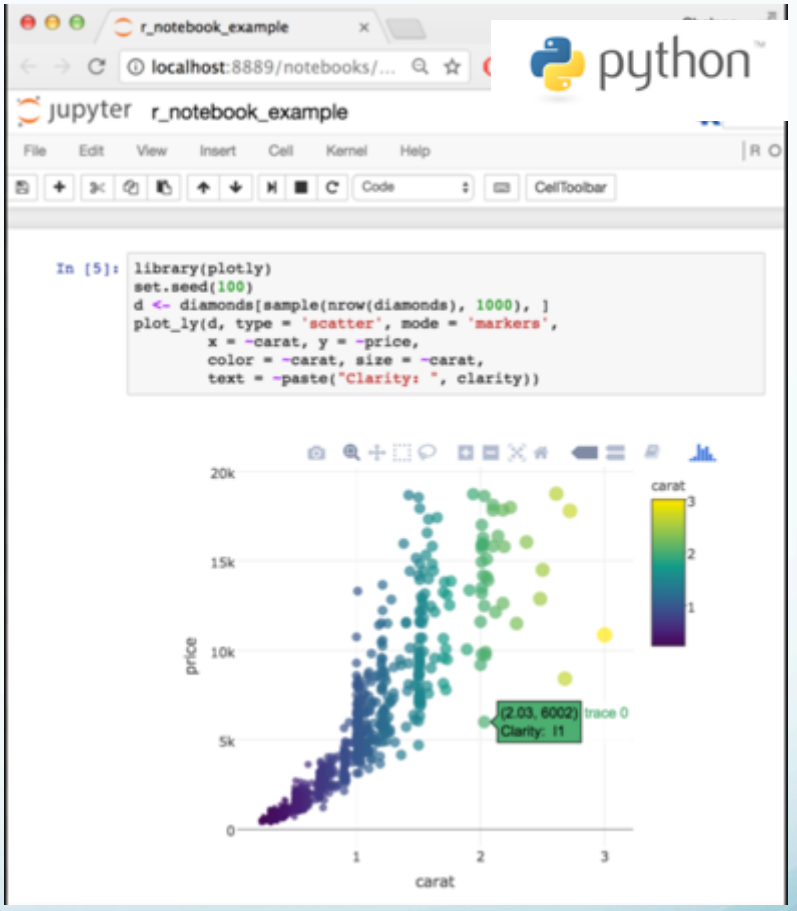
Data Explorations

(2016 (1 Biology workshop) and 2017 (2 workshops- Chemistry and Geology)



OOI Data Labs Project (2018-2020)

- Develop, test, refine, and disseminate easy to use Data Labs that will engage, motivate, and support undergraduates to use authentic data from OOI
- Develop a sustainable mechanism for community college, PUI, and HBCU professors to access, use, and update OOI data for teaching.



Data Labs Workshop Goals

Participants:

- Learn about the OOI program and key science questions it addresses
- Access existing tools and resources designed to integrate OOI data into undergraduate teaching
- Are introduced to Python as a tool for working with and engaging students in OOI data
- Learn how to effectively incorporate OOI data labs into undergraduate teaching
- Create a customized new resource to bring OOI data into their classes
- Have an opportunity to network with other professors interested in using oceanographic data in undergraduate teaching.

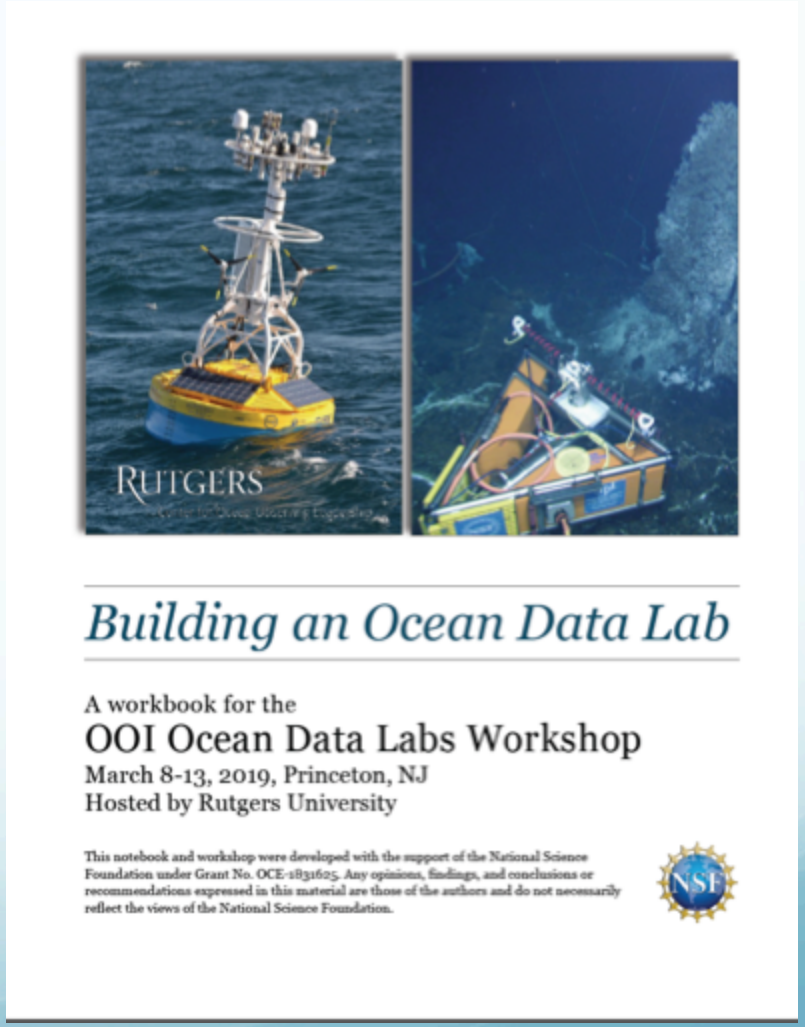
Data Labs Workshop Schedule

- ✓ **NJ: Princeton, NJ – March 8-13, 2019**

NJ: Rutgers University, New Brunswick, NJ June 1-6, 2019

CA: Asilomar Conference Center, Monterey, CA July 22-26, 2019

WA: Western Washington University, Bellingham, WA August 19-23, 2019



Data Lab Workshop Agenda

Goal: Participants develop a customized resource to bring OOI data into their classrooms.

Day One: OOI Background

Engage in hands on investigations of our collection of classroom ready Data Labs that use real time data from the OOI.

Activity topics include primary production, properties of seawater, and tectonics/seamounts. Activities are cross-referenced to typical oceanography textbooks.

Day Two: Exploring Python

Build pedagogical skills and discuss data literacy for students. Generate ideas for how to bring OOI into an oceanography course.

Introduce participants to the basics of using Python for data analysis using OOI datasets (using an example from Irminger Sea).

Day Three: Creating a Plan

Provide a chance to step back and think about pedagogy & strategies for creating an on ramp for student success with data exploration.

Discuss data literacy and pedagogy. Revisit existing collection of Data Labs and discuss their design and how they might be "tweaked" or revised with new OOI data.

Day Four: Develop & Refine Data Lab

Engage in Backwards Design planning and work with the Data Lab team to develop a customized product.

Participants work in groups of 2-4 to develop a product based on mutual topical interest. This is a work day for the participants to have one-on-one support from the Data Lab team.

Day Five: Reflection & Presentations

Participants present their progress and receive feedback from the group on improvements and next steps for their Data Lab.

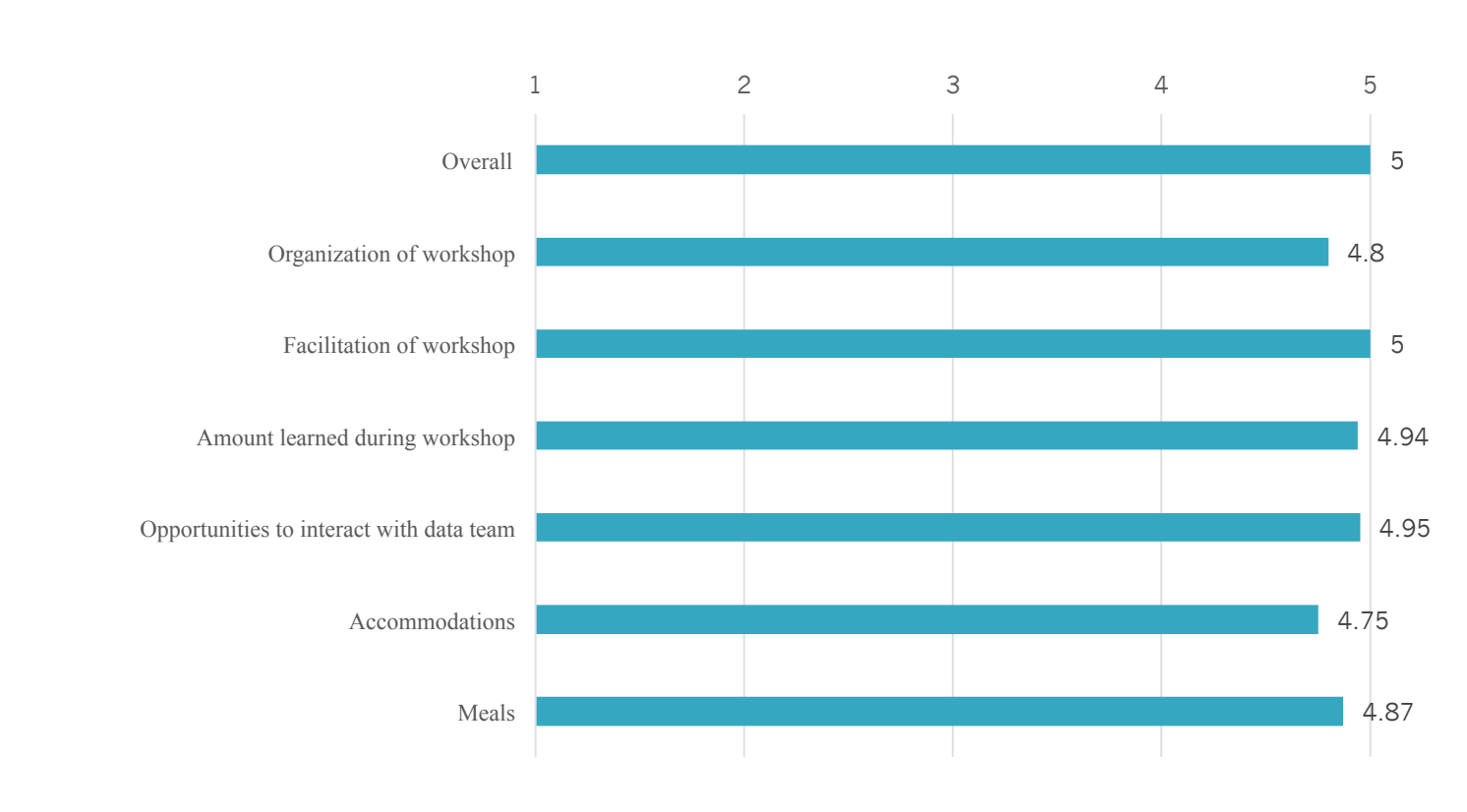
Groups engage in post conference (4) calls with the Data Lab team to fine tune and finalize their Data Lab.. Participants are encouraged to apply for a mini grant to create Jupyter notebooks with OOI data.

Building a Community Map for Success

- Well crafted agenda
- Engagement based on scientific identity
- Structured path to completion
  - 4 follow up ZOOM calls
  - Lots of mentorship
  - Celebration/recognition of success!
  - Scholarly presentations at other conferences/ meetings

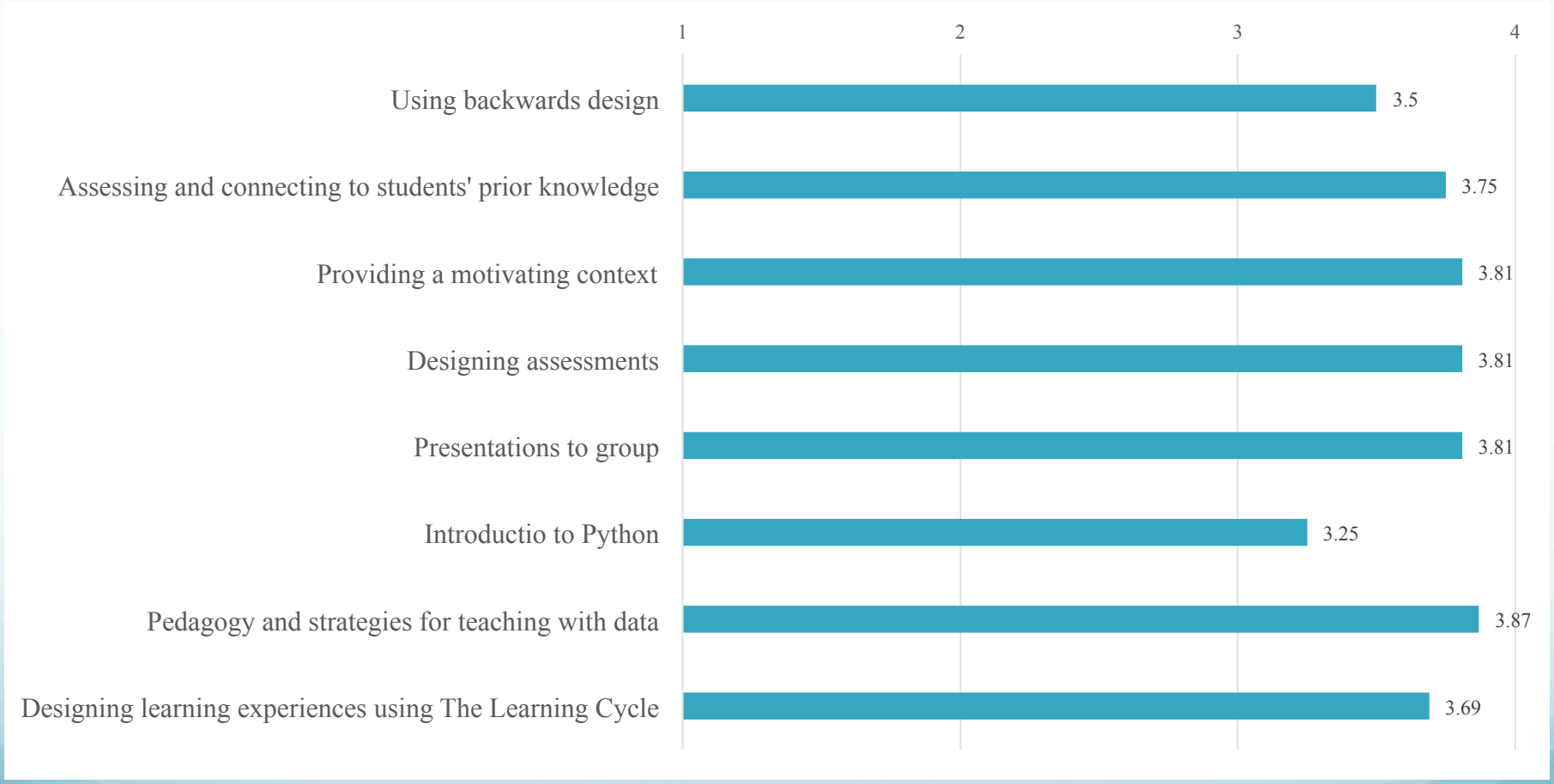
How are we doing so far?

Princeton Workshop Satisfaction Survey



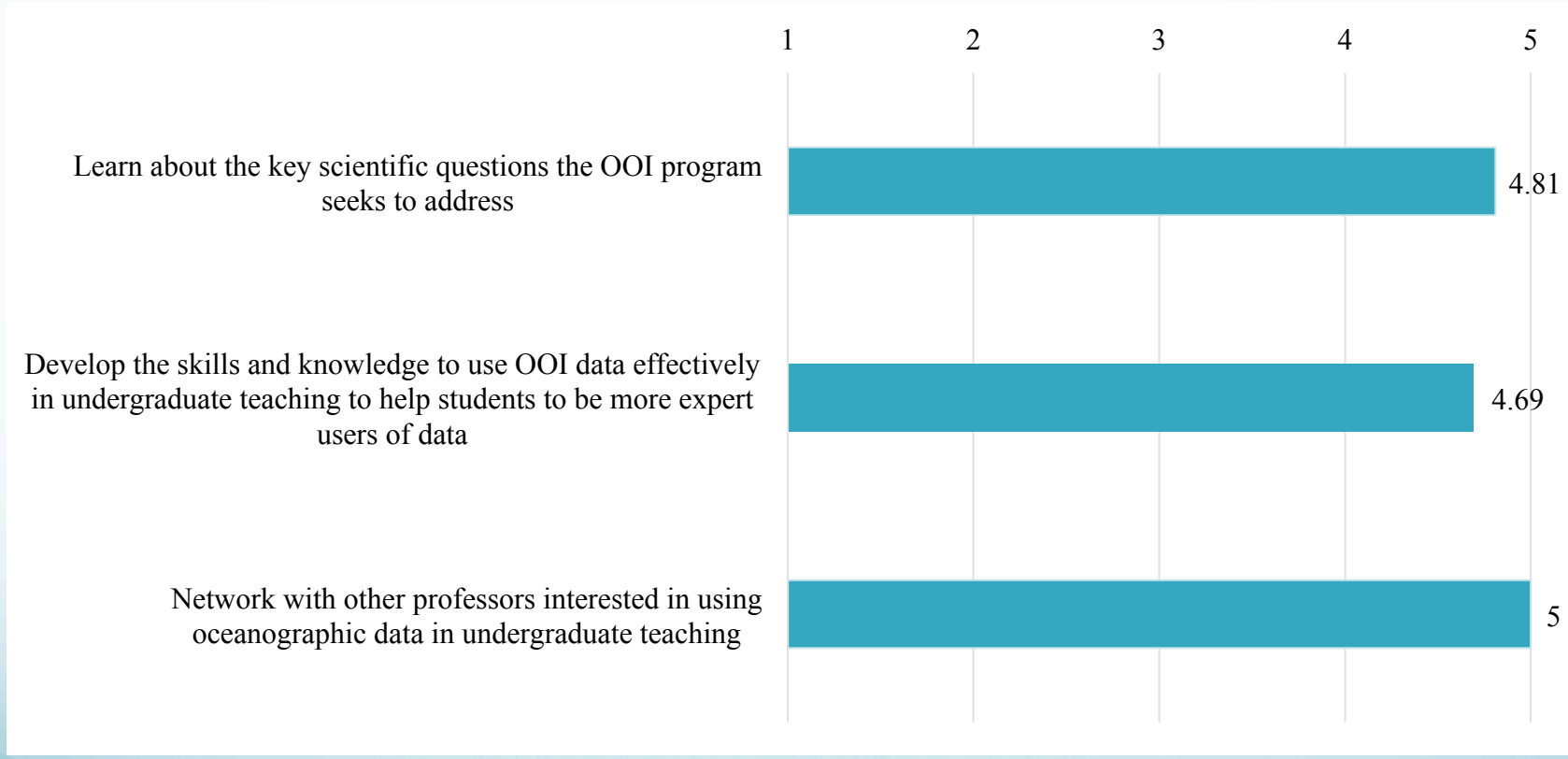
1= very dissatisfied to 5= very satisfied

Value of Workshop Components



1 = not at all valuable to 4 = highly valuable

Evaluation of Workshop Goals



1 = strongly disagree to 5 = strongly agree

Do you plan to use OOI in your teaching?

All 16 respondents indicated that they planned to use OOI data in their teaching.

- *"Definitely! My groups' activity is ready for a test drive and I would like to use it next week. I see an application for a different groups' activity. And I feel I am off to the races with exploring and using the data on my own, although I hope to collaborate with workshop participants in the future."*
- *"I do plan to use OOI data in my teaching with the explorations that are currently available and then those that will be developed. In addition, I foresee my using the data even from the OOI site directly without needing to use a programming software initially just to "grab" bits of real-time data for students as a point of discussions about graphs or concepts or hopefully linking those two."*
- *"Yes, [I plan to] at least use some already made visualization of data. My project right now is not ready to be used in my classes but I could use the already developed activity on photosynthesis as a small group activity in my classroom."*

GEOS 250 Computer Aplication in Geoscience

“For Python, I just provided them with some code and then asked them to upload and plot a CSV file of their own and make some simple scatter plots. I then introduced them to the OOI platform and the type of instruments available to measure parameter such as light, oxygen, chlorophyll, pH, salinity.....

I then provided the students with a netcdf file and they again had to plot data related to oxygen distribution and chlorophyll fluorescence at the Oregon coast. They plotted all the datsa in a certain timeframe and then time sliced the data to extract just a single day for each month and plotted these.

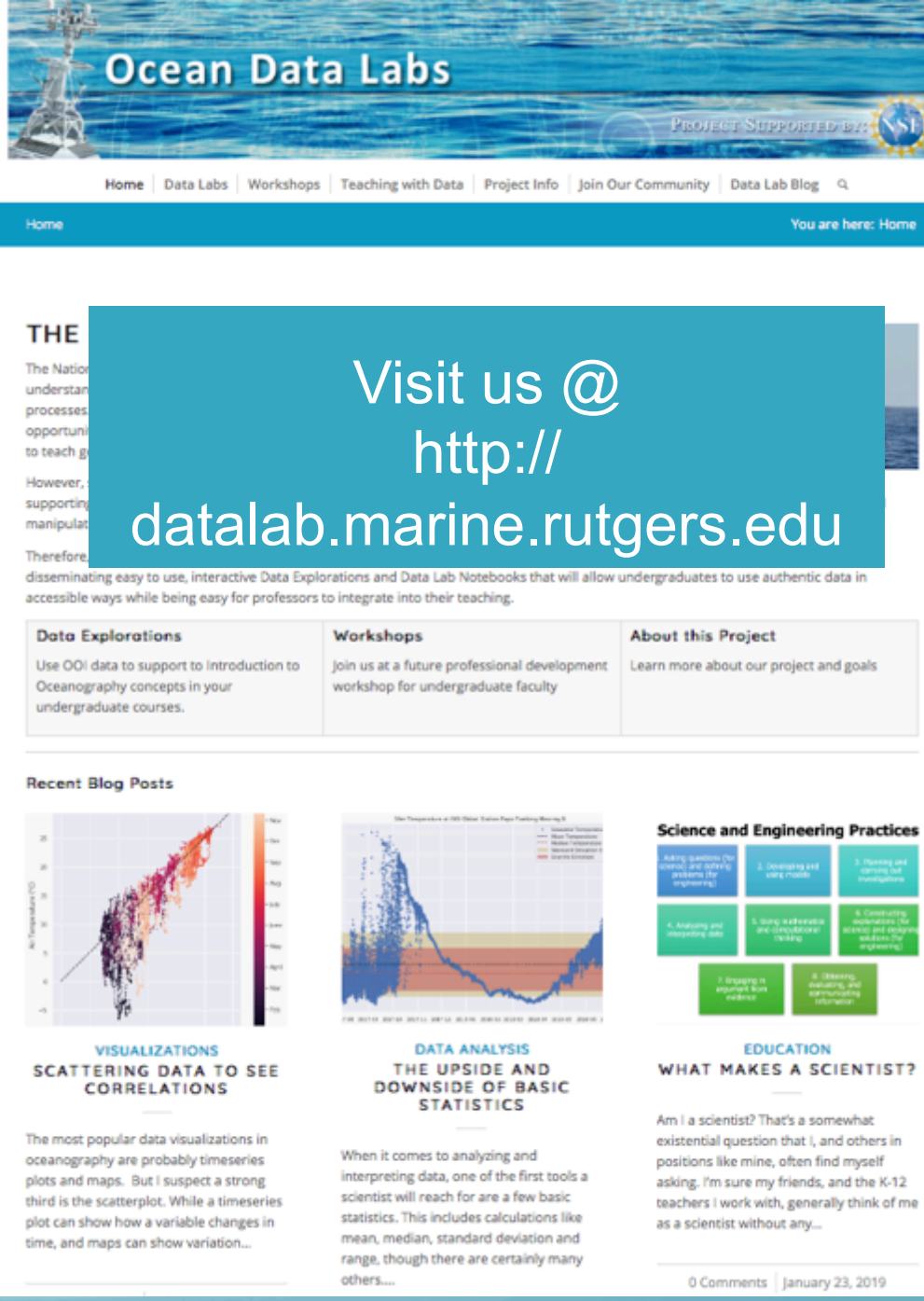
I then discussed the data with them using their knowledge about terrestrial plants. Although they did not had an oceanography class, they knew terrestrial plants sand environments and so it was easy to make the connection that phytoplankton produces oxygen and therefore the presence of phytoplankton could be related to the presence of Oxygen in the water column”.

Dear Janice, Anna, Catherine, Kristin, Dax and Sage,

I just wanted to thank you all so much for the wonderful, thought-provoking, super organized, well-run, informative and FUN workshop last week. I got much more out of it than I could have ever anticipated. I came home VERY excited to revise ALL of my classes immediately to include every single one of your tips! Obviously that is a little overly optimistic, but I have actually made many substantial changes already.

Once again, I thank you, and I'm sure my students are also appreciative. You ran a wonderful workshop and I will never teach the same way again!

Sincerely, CC Professor



Thank you & Questions ?

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