Introduction to the Ocean Data Lab Project

Janice McDonnell, Sage Lichtenwalner and Christine Bean
Rutgers University

Catherine Halversen, University of California Berkeley
Lawrence Hall of Science

Dr. Dax Soule, Queens College

Anna Pfeiffer-Herbert, Stockton University

Dr. Brooke Love, Western Washington University

Denise Bristol, Hillsborough Community College

Drs. Ellen Iverson & Ellen Altermatt, Carleton College (Evaluators)
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

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

Nation’s most popular Intro Textbook

![Image of Essentials of Oceanography textbook]
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
<table>
<thead>
<tr>
<th>Day One: OOI Background</th>
<th>Day Two: Exploring Python</th>
<th>Day Three: Creating a Plan</th>
<th>Day Four: Develop &amp; Refine Data Lab</th>
<th>Day Five: Reflection &amp; Presentations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Engage in hands on investigations of our collection of classroom ready Data Labs that use real time data from the OOI.</td>
<td>Build pedagogical skills and discuss data literacy for students. Generate ideas for how to bring OOI into an oceanography course.</td>
<td>Provide a chance to step back and think about pedagogy &amp; strategies for creating an on ramp for student success with data exploration.</td>
<td>Engage in Backwards Design planning and work with the Data Lab team to develop a customized product.</td>
<td>Participants present their progress and receive feedback from the group on improvements and next steps for their Data Lab.</td>
</tr>
</tbody>
</table>

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

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

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.

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.

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

- Overall: 5
- Organization of workshop: 4.8
- Facilitation of workshop: 5
- Amount learned during workshop: 4.94
- Opportunities to interact with data team: 4.95
- Accommodations: 4.75
- Meals: 4.87
Value of Workshop Components

<table>
<thead>
<tr>
<th>Activity</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>Using backwards design</td>
<td>3.5</td>
</tr>
<tr>
<td>Assessing and connecting to students' prior knowledge</td>
<td>3.75</td>
</tr>
<tr>
<td>Providing a motivating context</td>
<td>3.81</td>
</tr>
<tr>
<td>Designing assessments</td>
<td>3.81</td>
</tr>
<tr>
<td>Presentations to group</td>
<td>3.81</td>
</tr>
<tr>
<td>Introductio to Python</td>
<td>3.25</td>
</tr>
<tr>
<td>Pedagogy and strategies for teaching with data</td>
<td>3.87</td>
</tr>
<tr>
<td>Designing learning experiences using The Learning Cycle</td>
<td>3.69</td>
</tr>
</tbody>
</table>

1 = not at all valuable to 4 = highly valuable
Evaluation of Workshop Goals

Learn about the key scientific questions the OOI program seeks to address

1 = strongly disagree to 5 = strongly agree

4.81

Develop the skills and knowledge to use OOI data effectively in undergraduate teaching to help students to be more expert users of data

4.69

Network with other professors interested in using oceanographic data in undergraduate teaching

5
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.”
“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 data 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 have an oceanography class, they knew terrestrial plants and 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?

Join Our Newsletter or follow us on Twitter!