Engaging Introductory Oceanography Students with Real Data in the Classroom and Online: OOI Data Exploration and Data Labs.

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Abstract
Teaching with real-world data is a fun and engaging tool to engage students in the true nature and process of scientific inquiry. The Data Explorations and Ocean Data Labs activities from the Ocean Observatories Initiative (OOI) incorporate various datasets collected by remote instrumentation into shareable interactive activities that can be modified for different academic levels.

One example of this is the “Dynamic Air-Sea Interaction” dataset, which uses atmospheric and oceanographic data to show the 2018 “Bomb Cyclone” that hit the northeastern U.S. Like many of the other lab activities, the online graphs are interactive allowing students to zoom into certain hours of data collection, toggle the visibility of other data sets for comparison, and create their own predictive rainfall curves. This type of exercise was designed to be incorporated into introductory oceanography laboratory classes, but it can also be modified with further challenges for upper-level courses.

This presentation will share reflections on how the Data Explorations and the Ocean Data Labs activities can guide students through the scientific inquiry process. We will share effective strategies we have found to be essential to aid students, including step-by-step instructions, videos, and knowledge checks. Our experience has shown that students using these types of datasets become more comfortable with analyzing data, recognizing patterns and trends between datasets, and developing and testing hypotheses. Online activities like these labs have been valuable in both classroom or online environments.

Example: OOI Data Exploration— Dynamic Air-Sea Interactions
Using data from the 2018 “Bomb Cyclone” to illustrate the interaction between atmospheric conditions and the ocean’s surface.

Classroom Setting:
As described herein, this exercise is used for a 100-level, non-science major classroom. This is used for both in-person and online lab settings after lecture on atmospheric cells, winds, and currents.

Learning Goals:
1. Building student confidence in analyzing data
2. Creation of hypothesis using data
3. Testing and evaluation of hypotheses

Teaching Tips and Strategies

For any Modality:
✓ Be sure students understand the interactive aspects of the OOI Data Explorations.
✓ Find a video that shows the effects of the Bomb Cyclone and be sure that students watch it after they have written a hypothesis explaining what the data is illustrating (bit harder to enforce with online).
✓ Ask the question of how they believe an event such as this would impact the true nature and process of scientific inquiry. The Data Explorations and the Ocean Data Labs activities can guide students through the scientific inquiry process. We will share effective strategies we have found to be essential to aid students, including step-by-step instructions, videos, and knowledge checks. Our experience has shown that students using these types of datasets become more comfortable with analyzing data, recognizing patterns and trends between datasets, and developing and testing hypotheses. Online activities like these labs have been valuable in both classroom or online environments.

Online/Asynchronous:
✓ Provide an online video tutorial. Walk the students through the use of the webpage and widgets.
✓ Create a worksheet that is fillable. I use a Word document and insert one table box for the students to use for answers—it is expandable.

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