The OOI Ocean Education Portal: Enabling the Development of Online Data Investigations

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OOI

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Introduction

The Ocean Observatories Initiative (OOI) was designed to transform ocean science, by establishing a long-term, multi-instrument, multi-platform research infrastructure at 7 arrays around the word. This unprecedented investment in ocean observation, funded by the National Science Foundation, provides a rich opportunity to reshape ocean science education as well.

As part of the initial construction effort, an online **Ocean Education Portal** was developed to support the creation and sharing of educational resources by undergraduate faculty at universities and community colleges. The portal includes a suite of tools that enable the development of online activities for use as group or individual projects, which can be used during lectures or as homework assignments.
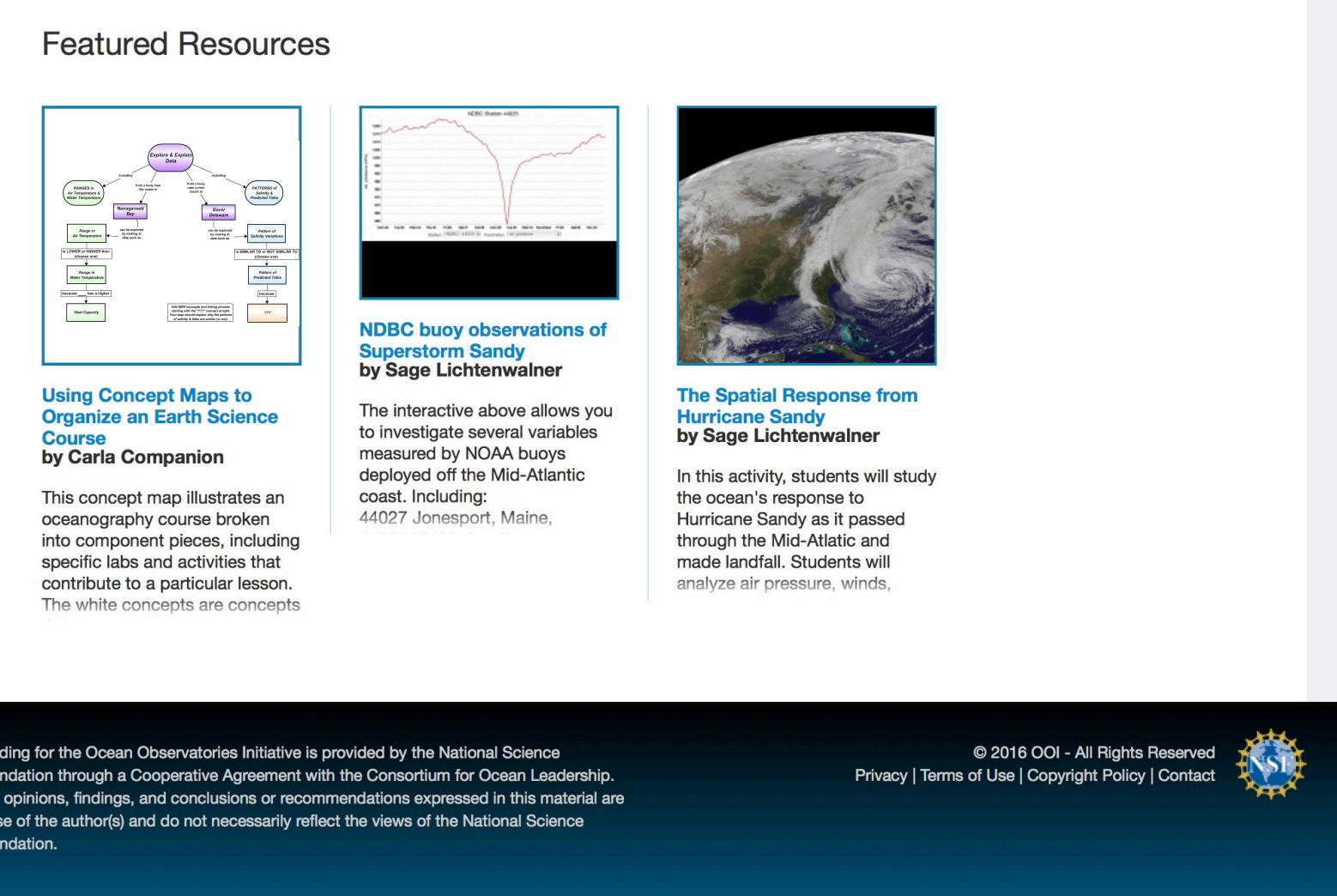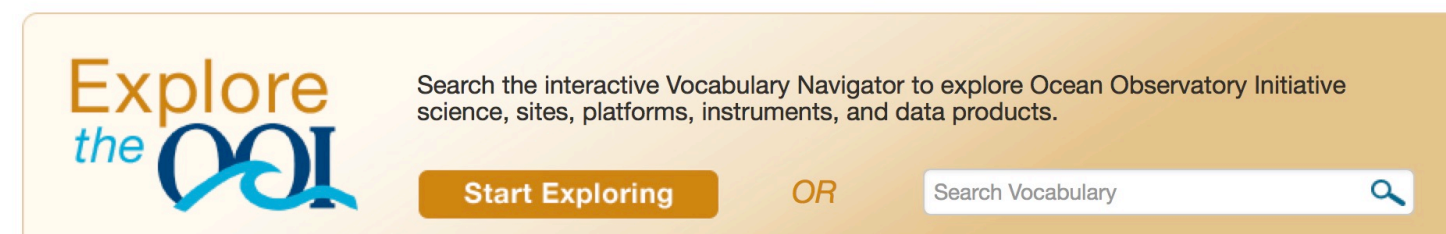
The site includes:

1. A suite of interactive educational data visualization tools that provide simple and targeted interfaces to interact with OOI datasets;
2. A concept map builder that can be used by both educators and students to build networked diagrams of their knowledge; and
3. A "data investigation" builder that allows faculty to assemble resources into coherent learning modules.

The site also includes a "vocabulary navigator" that provides a visual way to discover and learn about the OOI's infrastructure and scientific design. The site allows users to browse an ever-growing database of resources created by the community, and likewise, users can share resources they create with others.

As the OOI begins its 25-year operational phase, it is our hope that faculty will be able to use the tools and investigations on the *Ocean Education Portal* to bring real ocean science research to their undergraduate students.

1) Educational Visualization Tools

The site provides an extensible framework for delivering flexible and customizable visualization tools for use by educators and students.

Capabilities

- A collection of interactive visualization tools that allow you to explore and analyze OOI datasets
- An online interface to customize visualization tools to meet specific educational goals
- The ability to embed custom instances on third-party web pages
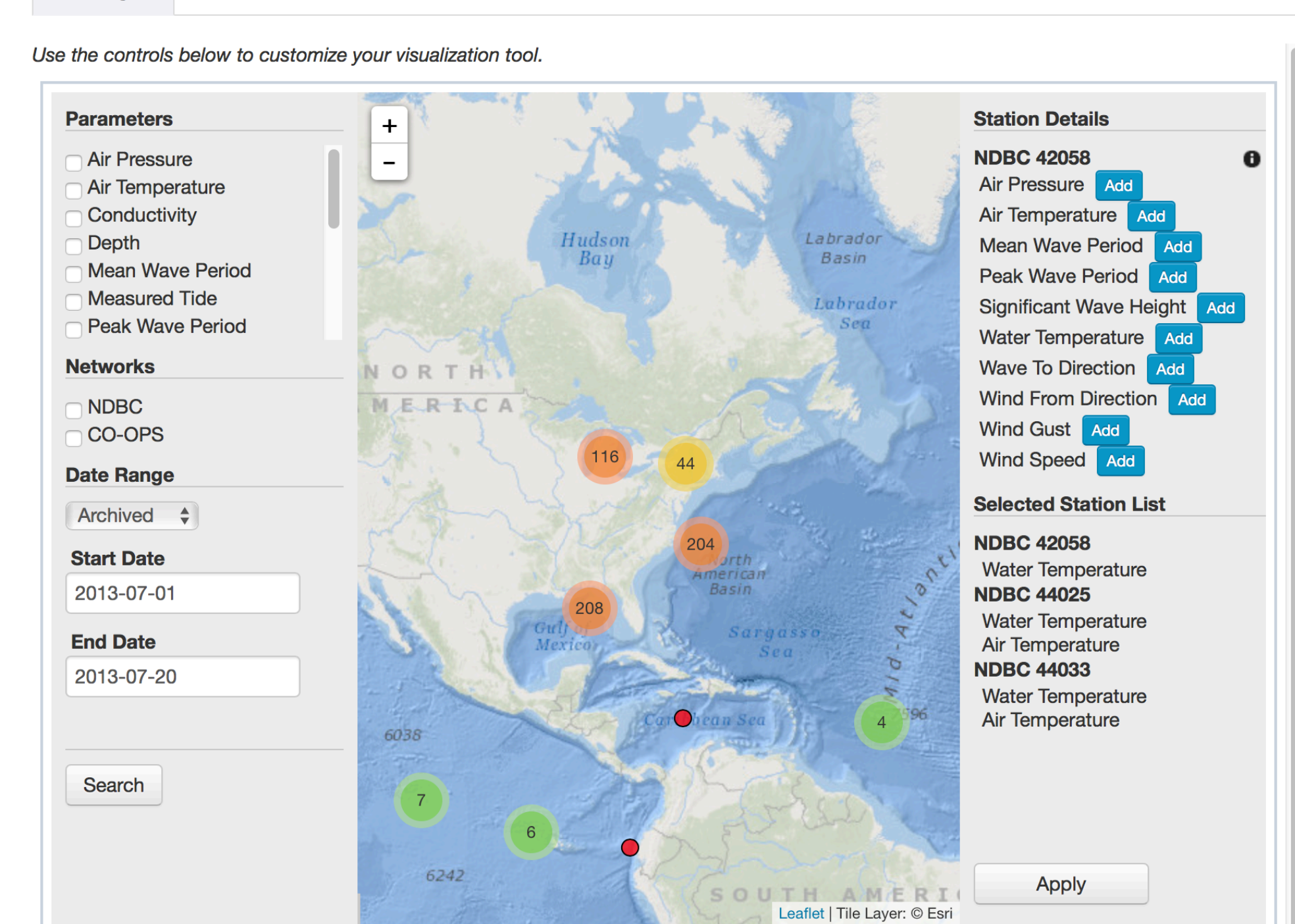- A searchable library of visualizations created by others
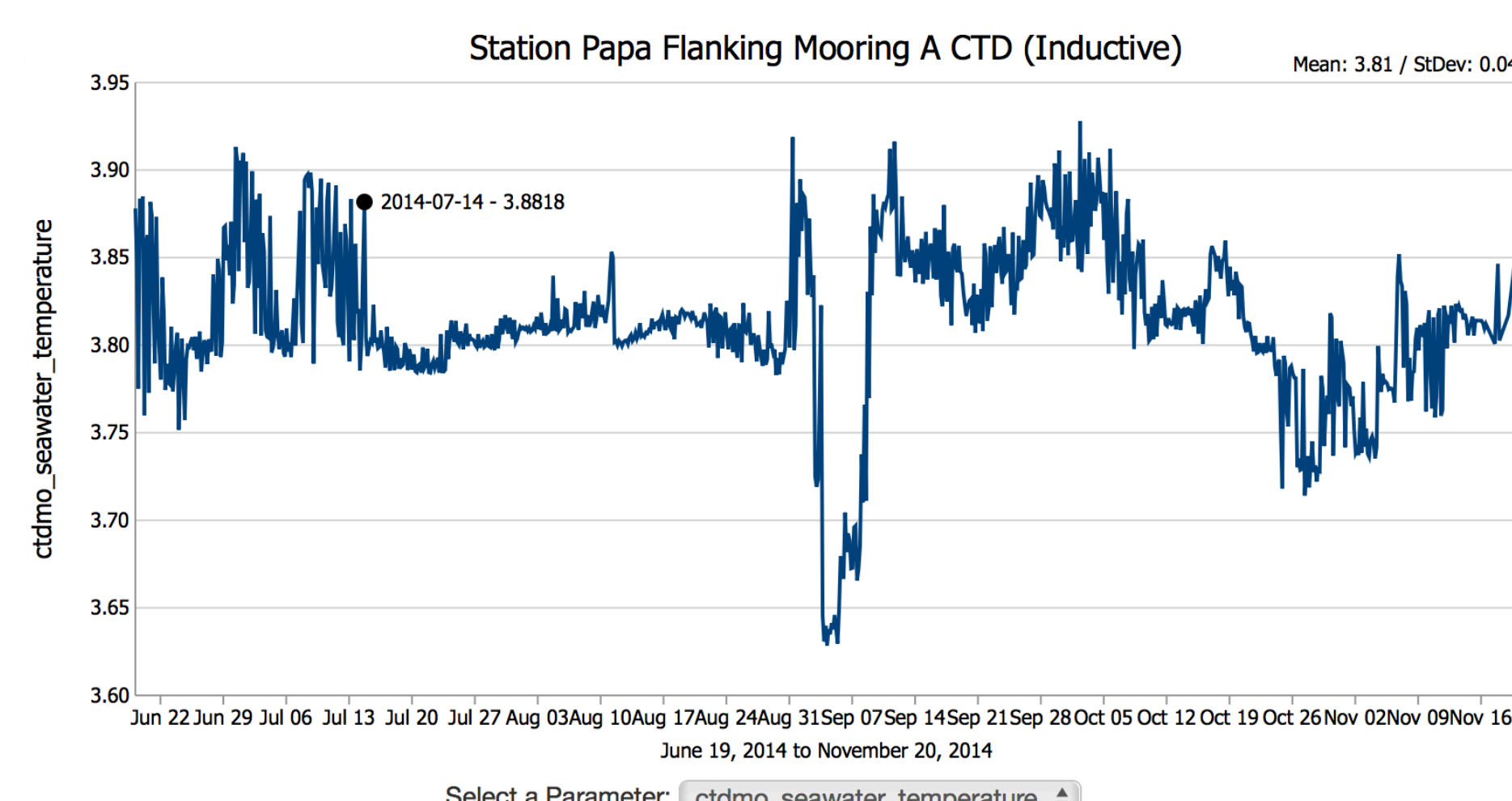
An example "front-end" of a *Single Time Series OOI* tool. This visualization tool has been customized to only show data form a specific instrument for a specific time period, though students can still change the displayed parameter.

Visualization Tool Design Philosophy

- *Simple* – Intuitive & easy to use
- *Interactive* – To support deeper understanding
- *Customizable* – Adaptable to fit your learning goals
- *Embeddable* – Place them in context within your lessons
- *Focused* – Learning outcome driven, not data driven – these are not your typical comprehensive complex data exploration tools
- *Educational* – Primary goal is to aid students' analysis and understanding of scientific processes, not dealing with data formats and graphing

An example "back-end" interface for the *Simple Time Series with Map* tool. This interface allows you to customize the visualization tool by choosing the specific NDBC and CO-OPS stations and parameters you want to make available, along with the specific date range students should see.

How can you contribute?

- Use the provided visualization tools to create custom visualization instances that highlight notable events and phenomena in the data that you would like students to explore.
- Do you know JavaScript? You can work with the OOI Education team to create a new visualization tool that others can use to interact with OOI or any other dataset available via web services.

2) Concept Map Builder

A Concept Map is a conceptual diagram used to graphically visualize the relationships between individual concepts. The *OOI Concept Map Builder* allows you to create your own concept maps to share.

Capabilities

- Add detailed descriptions to each concept and linking phrases between them
- Attach relevant images, videos, data visualizations, and other concept maps to each concept to add depth
- Categorize concepts using colors and then toggle concept groups on/off while presenting to build a map in stages to tell a story
- Import concepts from the *OOI Vocabulary Navigator* to seed a new concept map with relevant concepts
- Share concept maps with other users who can copy your map to create their own version
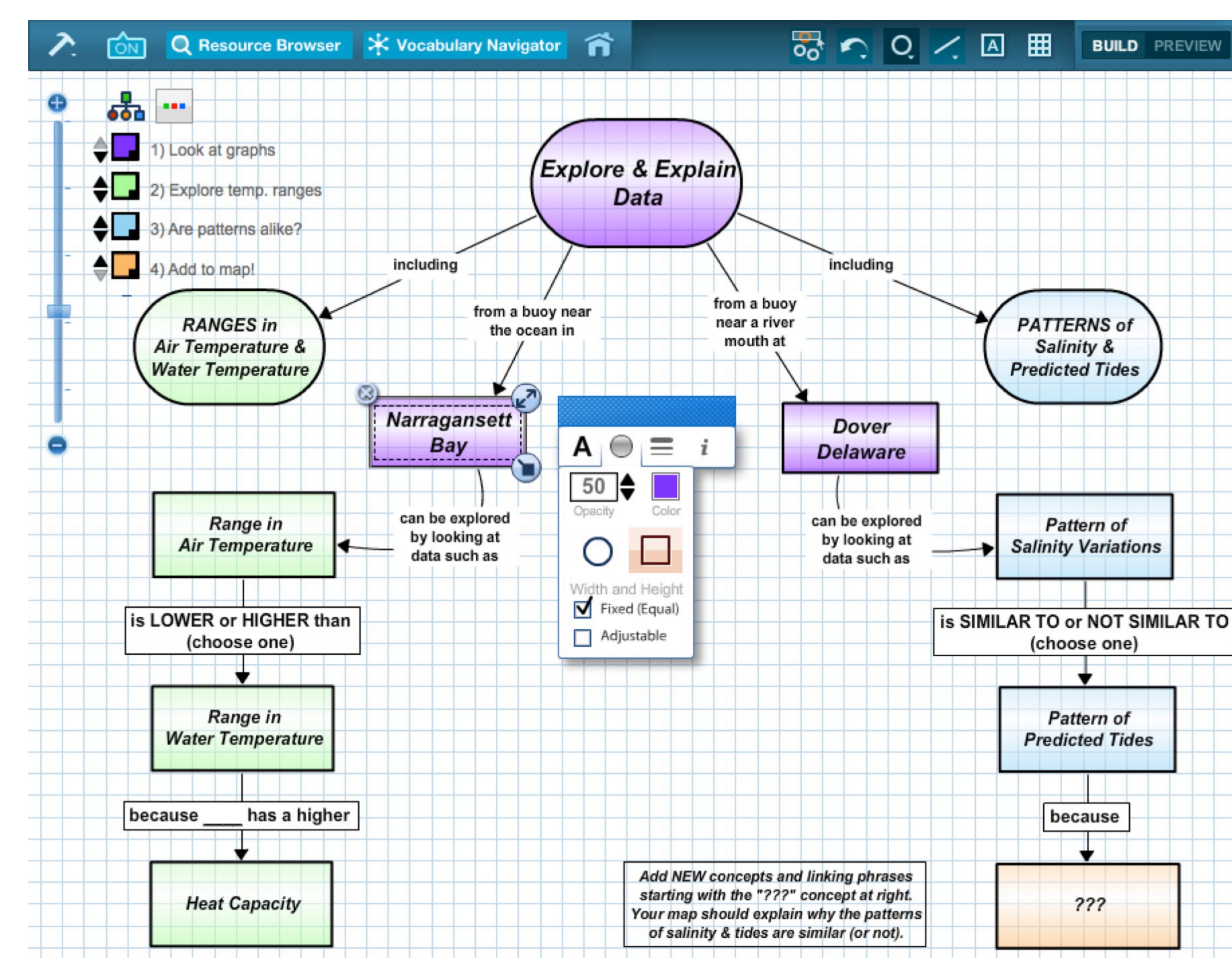
An example concept map being created in the *OOI Concept Map Builder*.

How can I use concept maps in my teaching?

- Create maps to visualize your lecture content or course curriculum
- Have students create their own maps to demonstrate how they have synthesized learned information
- Have students create maps before and after learning a topic to help them understanding how their knowledge has changed
- Have students use maps to plan and present group projects

OOI Vocabulary Navigator

The interactive Vocabulary Navigator allows you to explore OOI science, sites, platforms, instruments, and data products. These maps can then be imported into other maps you create.
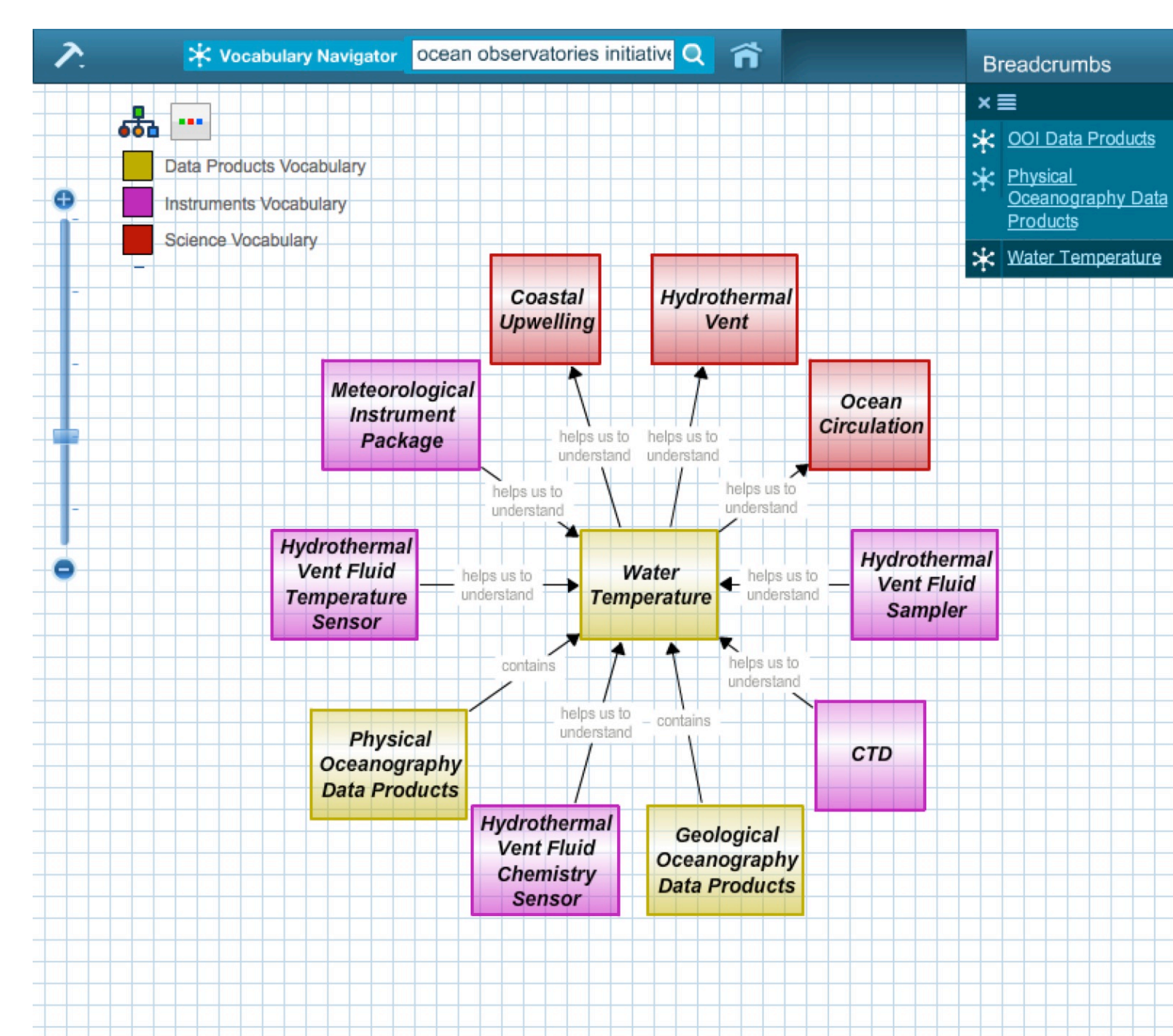

An example view from the Vocabulary Navigator showing the relationships between the "Water Temperature" concept, which is part of the "Data Product" vocabulary, and other concepts. Users can explore the vocabulary further by clicking on individual concepts, or they can view descriptions and related media.
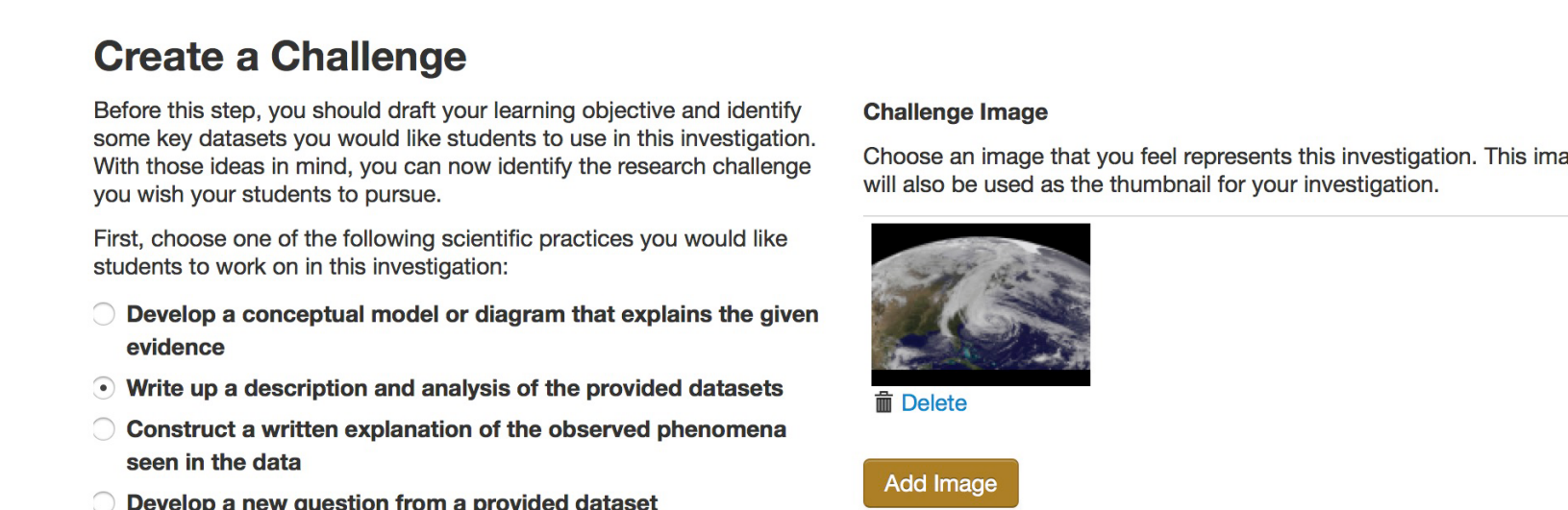
3) Data Investigation Builder

The Ocean Education Portal provides a platform for educational users, including students and teachers, to create online investigations to explore oceanographic datasets from the OOI and other observatories. The investigations help put oceanographic datasets and science into appropriate educational contexts.
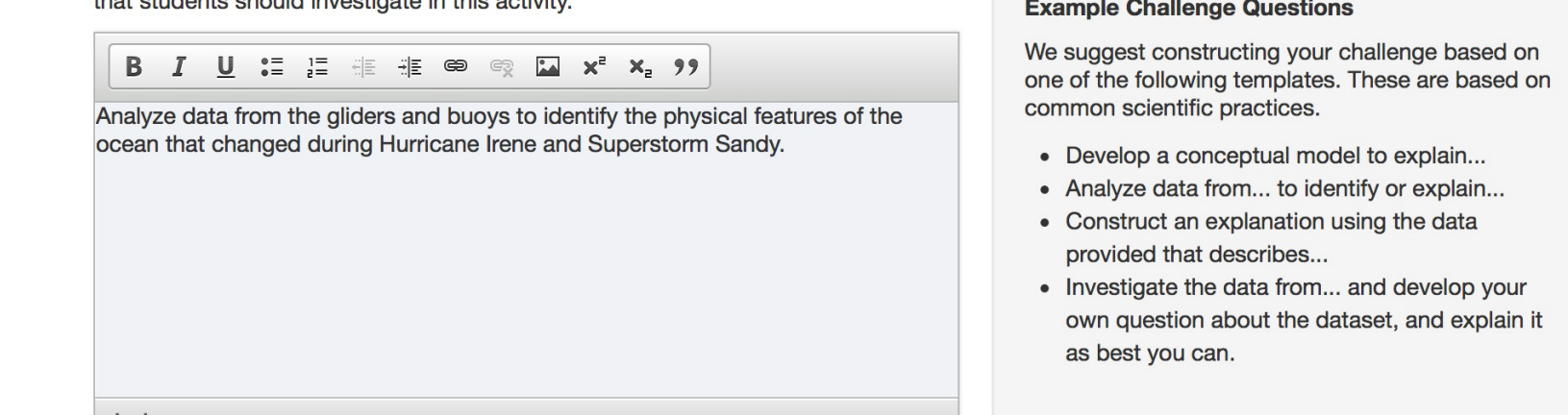
Capabilities

- The builder provides a wizard to assist in the creation of online educational units using an Engage, Explore, Explain approach
- Customized visualization tools, concept maps, images, and movies can all be embedded within an online investigation
- Units can be shared with students directly, to peer faculty, or to the community at large through the searchable library
- Units can be copied and customized to meet specific learning goals
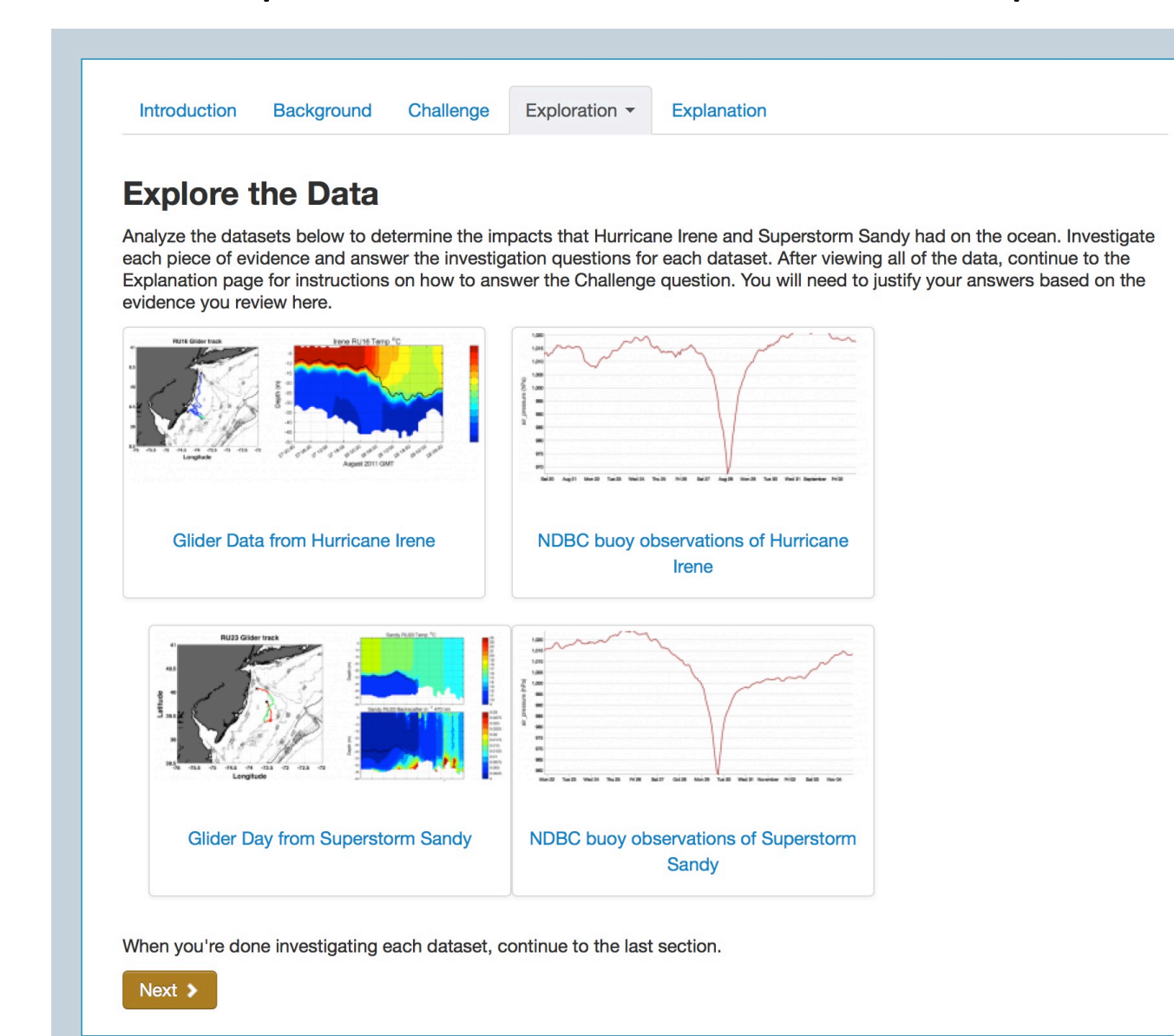
An example "student view" from an investigation showing several pieces of evidence that must be explored as part of an overall challenge question. Each piece of evidence can also include additional questions and background information to direct student thinking towards a larger goal or question.
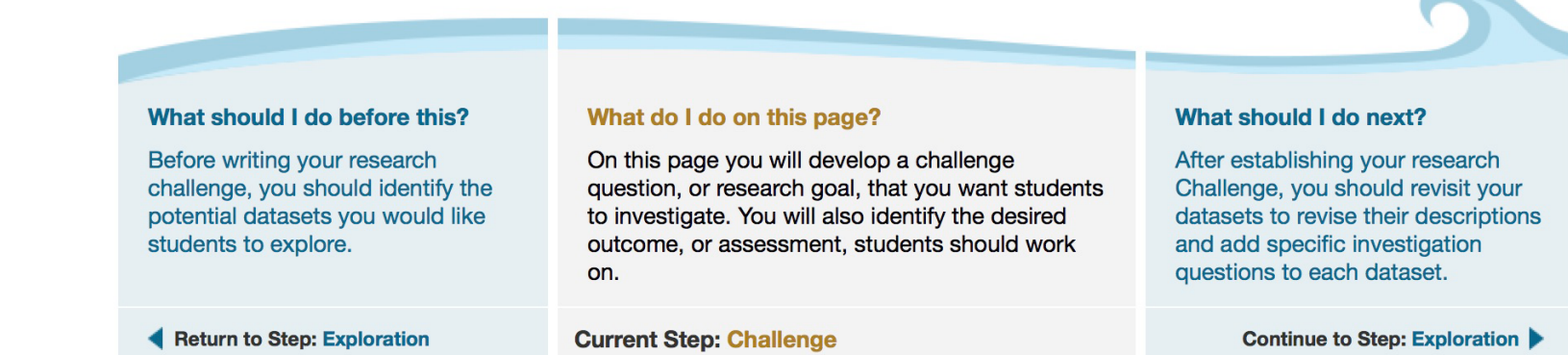

An example of the "wizard" interface that assists users in creating online investigations. Note how the blue tabs follow the same order as the student view while additional guidance on instructional pedagogy is provided at the bottom.

Get Started Today!

The OOI Education Portal is now live. We invite you log onto the site, play with the tools, create your own resources, and let us know what you think.
http://education.oceanobservatories.org

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