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Ocean Observatories Initiative (OOI) Data Explorer step-by-step guide

Version 1

2023-09-22

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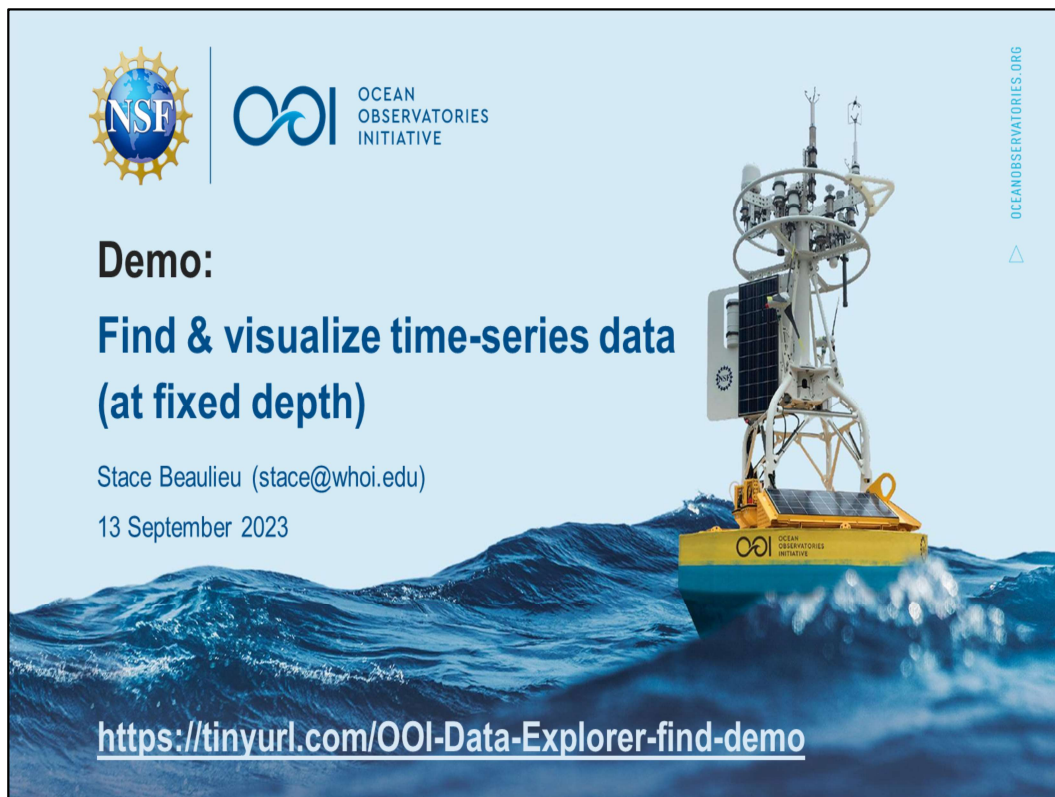
Title of demo	Page no.	Link to:	Link to *:
Find & visualize time-series data (at fixed depth)	2	Slides	Recording
Compare time-series data	18	Slides	Recording
Find & visualize glider data	34	Slides	Recording
Find & visualize profiler data	48	Slides	Recording
Using QARTOD flags for OOI data	Not applicable	Slides	Recording

* recorded videos are 6-8 minutes each

This step-by-step guide to the Ocean Observatories Initiative (OOI) Data Explorer was developed for a coastal oceanography course at Oregon State University.

- These demos will be related to the [preloaded Data View “Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)”](#).
- Several of the demos refer to the [OOI Nugget “Coastal upwelling along the northern California Current”](#) from the Ocean Data Labs.
- For a longer demo relevant to upwelling off Oregon, see the first half of the Data Explorer session from the 2022 Northeast Pacific OOI Workshop [link to [slides](#)] [link to [recording](#)].

This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.



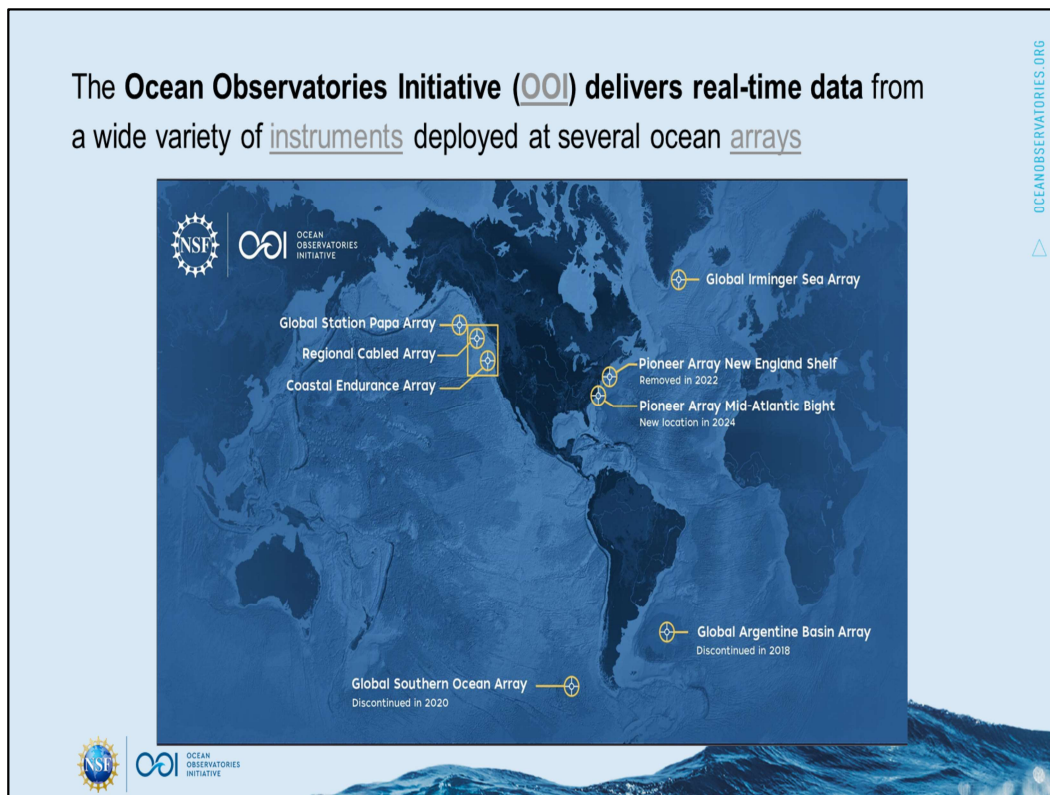
link to slides <https://tinyurl.com/OOI-Data-Explorer-find-demo>

link to recording on YouTube <https://youtu.be/9CA5GsGL2-0>

This is one of several demos in a step-by-step guide

[<https://tinyurl.com/OOI-Data-Explorer-stepbystep-v1>] to the Ocean Observatories Initiative (OOI) Data Explorer, developed for a coastal oceanography course at Oregon State University and related to the [preloaded Data View “Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)”](#).

This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.



The [Ocean Observatories Initiative \(OOI\)](https://oceanobservatories.org/) is an ocean observing network that delivers data from hundreds of instruments deployed in 5 arrays * in the northern hemisphere (plus 2 decommissioned arrays in the southern hemisphere). OOI data are freely available online to anyone with an Internet connection. OOI is funded by the U.S. National Science Foundation.

<https://oceanobservatories.org/>
<https://oceanobservatories.org/about-ooi/>



Goals for this demo:

1. Introduce Data Explorer
2. Find time-series dataset
3. Visualize time-series dataset (at fixed depth)
4. Zoom into event
5. Visualize other data from same instrument
6. Save / share your data visualization

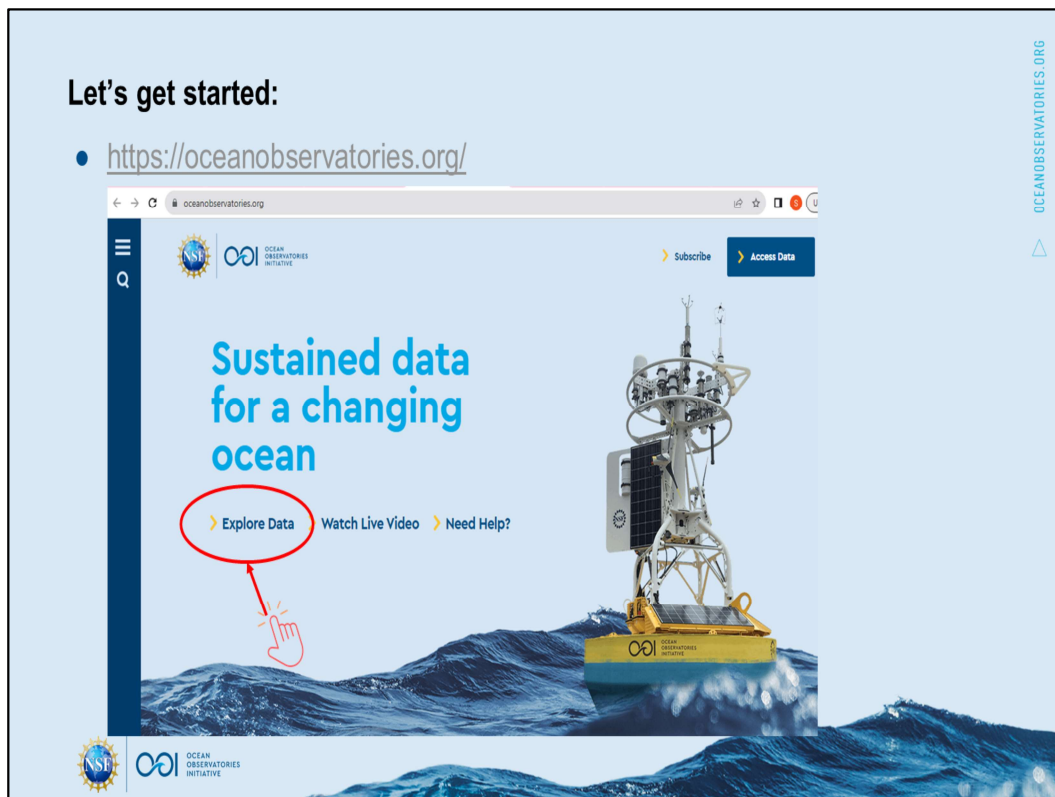
Software used:

- OOI's Data Explorer (<https://dataexplorer.oceanobservatories.org/>) in a web browser



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On [OOI's homepage](https://oceanobservatories.org/), you'll notice two options related to finding data: "> Explore Data" and "> Access Data". "> Explore Data" will take you directly to the OOI Data Explorer, the primary gateway to visualize and access OOI data, which I will demo here. "> Access Data" will take you to a webpage listing additional options. *[click on > Explore data]*

https://www.flaticon.com/free-icon/click_7162383 Flaticon license: Free for personal and commercial use with attribution.

Step 1: Introduce Data Explorer

- <https://dataexplorer.oceanobservatories.org/>



OOI Data Explorer

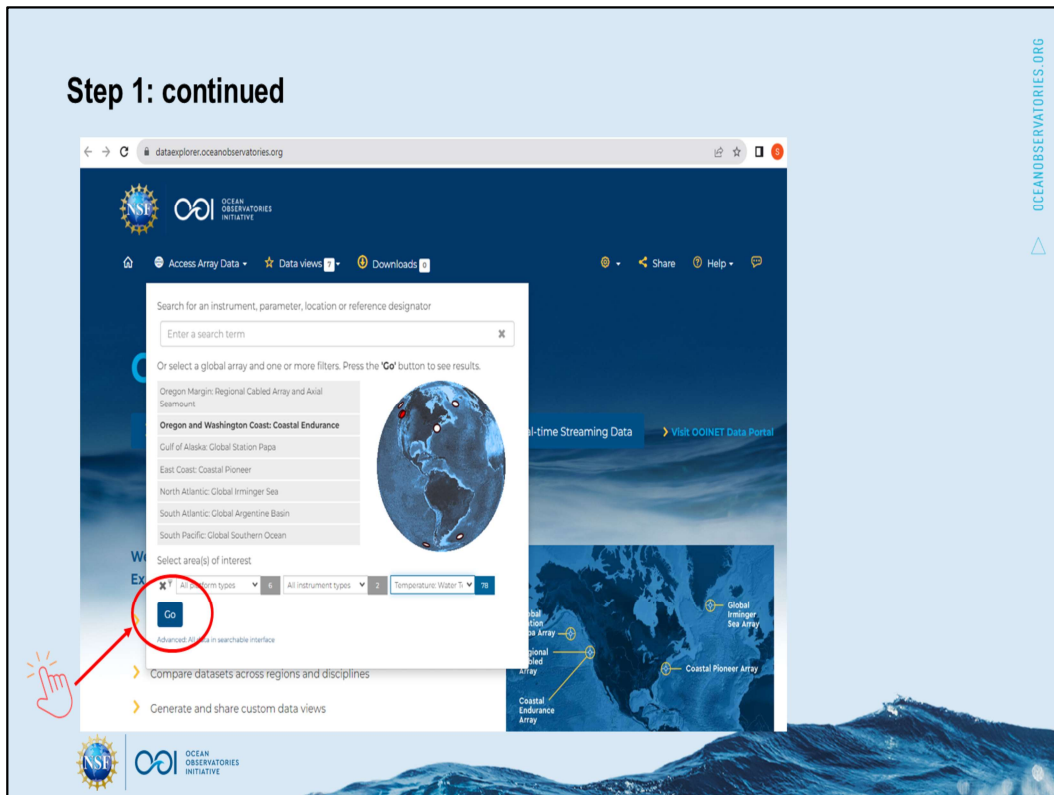
Welcome to the Ocean Observatories Initiative Data Explorer, where you can:

- Search and download cabled, uncabled, and recovered data for physical, chemical, geological, and biological observations from the field
- Compare datasets across regions and disciplines
- Generate and share custom data views

Global Station Papa Array, Regional Cabled Array, Coastal Endeavour Array, Global Venting Site Array, Coastal Pioneer Array

This demo will help you get started with finding and visualizing data in OOI's Data Explorer. The Data Explorer homepage provides several ways for you to dive in. For best results use Chrome or Firefox web browser. Note that I'll be doing the demo on a laptop; you may need to adjust some of the steps if you are following along on a smartphone. The leftmost 3 blue buttons send you down to sections with more information on this page. [Clicking on the "Access Array Data"] in the header is a quick shortcut for today's demo.

Step 1: continued



You might want to find data from a certain array. In that case you can *[click and hold your mouse to rotate the globe]* then hover to select a particular array. You can further refine your selection by selecting a type of platform, instrument, or parameter from drop-down lists. Or you can further refine by entering a search term as free text.

For today's demo I want to find data *[click off the coast of Oregon]* that might indicate an upwelling event. *[Scroll the parameters]* I know that I am going to want water temperature data, and ultimately I will also want to look at wind data. With just the 2 constraints (Coastal Endurance Array and water temperature) I hit on 259 (this number may change) datasets!

https://dataexplorer.oceanobservatories.org/#ooi/array/CE/parameter/7/data?sort=end_time_desc&platform_id=moorings

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Step 2: continued

- https://dataexplorer.oceanobservatories.org/#ooi/array/CE/info?sort=end_time_desc&platform_id=moorings

dataexplorer.oceanobservatories.org/#ooi/array/CE/info?sort=end_time_desc&platform_id=moorings

Coastal Endurance

Overview **More information** Nodes Instrument types Parameters Platform types Search Glider and Cruise selector

The Endurance Array is a multi-scaled array utilizing fixed and mobile assets to observe cross-shelf and along-shelf variability in the coastal upwelling region of the Oregon and Washington coasts. The array also provides an extensive spatial footprint that encompasses a prototypical eastern boundary current regime and connectivity with the Cabled Array. The backbone of the Endurance Array includes two cross-shelf moored array lines, the Oregon Line (also called the Newport Line) and the Washington Line (also known as the Grays Harbor Line). Nominally, the Oregon Line is located at 44° 35'N, 125°W to coast. The Washington Line is nominally located at 47°N, 125°W. Each of these lines contain three fixed sites spanning the slope (~500-600 m), shelf (~80-90 m) and inner-shelf (~25-30 m). The three sites across the shelf and slope are associated with unique physical, geological, and biological processes. All six sites contain fixed sensors at the top and bottom of the water column paired with an adjacent water column profiler. The Oregon and Washington Lines are both affected by wind-driven upwelling and downwelling, but shelf stratification and upper-ocean properties are influenced differently at each location by the Columbia River outflow. The Washington Line is North of the Columbia River outflow and the Oregon Line is South of it. Observations at both locations allow for a greater understanding of coastal ocean ecosystem responses to climate variability. Mooring lines provide synoptic, multi-scale observations of the eastern boundary current regime. Coastal Gliders bridge the distances between the fixed sites and to allow for adaptive sampling. For more information, check out the Endurance Array related news stories.

Diagrams

Washington Line

Oregon Line

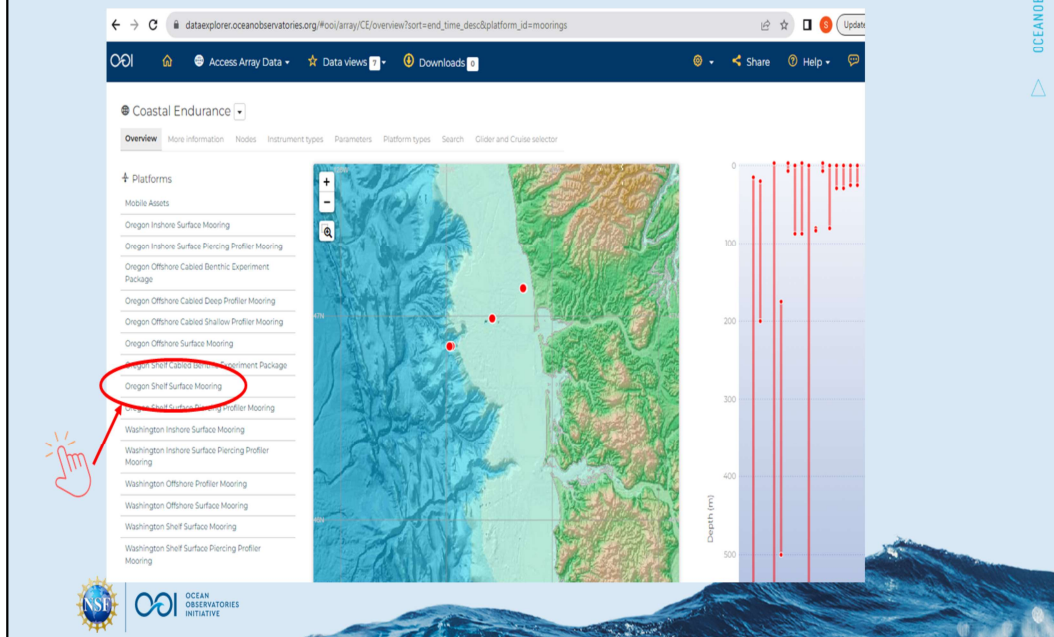
Themes

Climate Variability, Ocean Circulation, and Ecosystems Coastal Ocean Dynamics and Ecosystems Ocean-Atmosphere Exchange Turbulent Mixing and Biophysical Interactions

... I really appreciate this diagram that helps me see that I want to use the Oregon Line, either Shelf or Inshore locations, and that there are a couple platforms at each of those. I'll [click on Overview] which ...

Step 2: continued

- https://dataexplorer.oceanobservatories.org/#ooi/array/CE/overview?sort=end_time_desc&platform_id=moorings

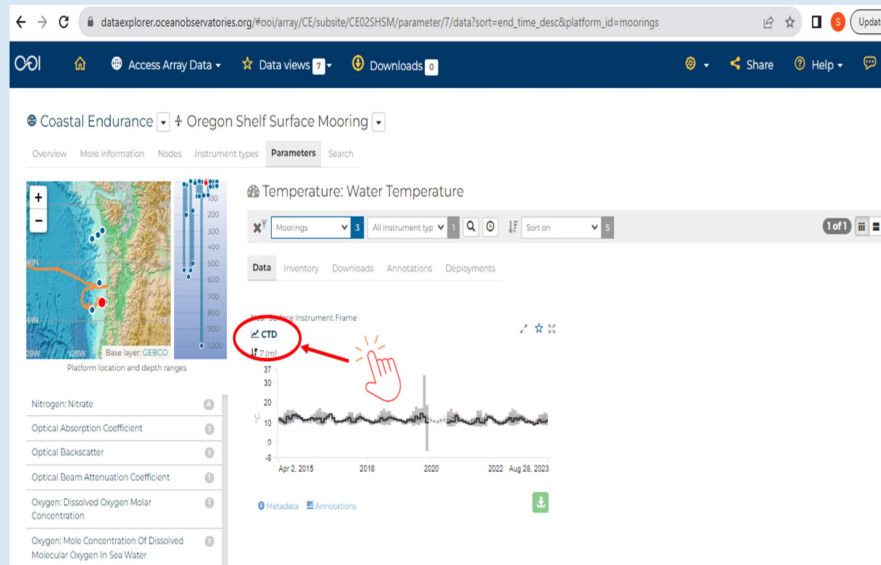


... not only Zooms into the map but also lists the platforms. I would like to find a near-surface expression of upwelling, so I [click on Oregon Shelf Surface Mooring] [\[https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM\]](https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM), and then have to [select again the parameter Water Temperature *]. [\[https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM/parameter/7/data?sort=end_time_desc&platform_id=moorings\]](https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM/parameter/7/data?sort=end_time_desc&platform_id=moorings)

* You may also select the parameter “Sea Surface Temperature” to access water temperature data from the Surface Buoy.

Step 3: Visualize time-series dataset (at fixed depth)

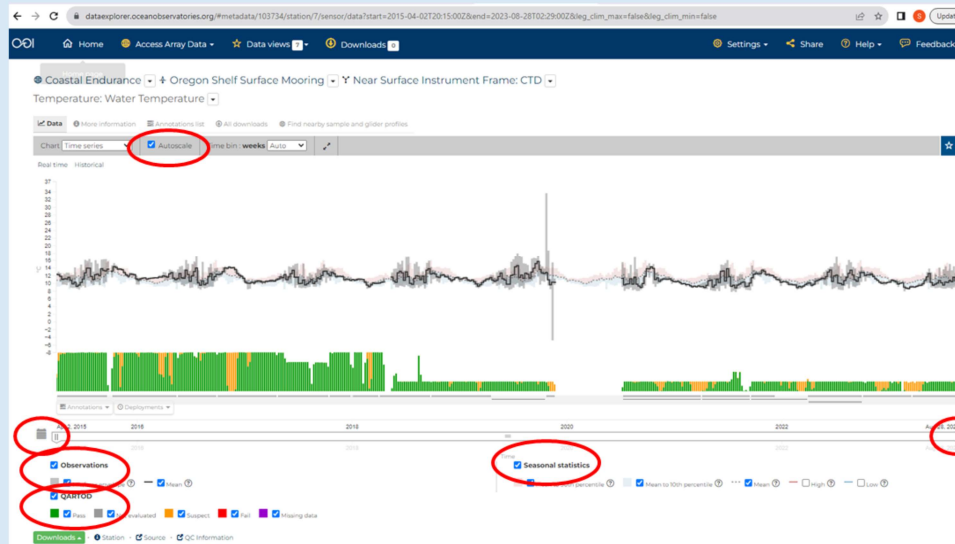
- https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM/parameter/7/data?sort=end_time_desc&platform_id=moorings



Now I can [click to open this dataset] to interact with the time-series visualization [https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2015-04-02T20:15:00Z&end=2023-08-16T02:29:00Z&leg_clim_max=false&leg_clim_min=false]. (note the end date will be today's date)

Step 3: continued

- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2015-04-02T20:15:00Z&end=2023-08-28T02:29:00Z&leg_clim_max=false&leg_clim_min=false



When I first open the dataset, I see the entire length of time available to me, starting in 2015 all the way to today. I see the measured observations as a black line, default here is mean for time binned by week. And I see a gray min/max envelope and color shading for seasonal statistics. I like to *[turn off the seasonal statistics]* when finding data so as to be able to see if there are any gaps in the time series. For some parameters including water temperature you'll see these colored bars underneath the time series plot to indicate quality control flags (QARTOD; I'll provide a link in the notes to a demo using QARTOD flags *). Note that green indicates good, and orange is listed here as suspect but actually could be data of interest. In my case I am interested in cold water, so I want to adjust the vertical (y-) axis *[un-check Autoscale and re-scale y-axis]*. I'll *[turn off the min/max]* so as not to distract my eye. *[Hover over]* the low points of the graph, and I see June 2015, July 2016 **, July 2017 ***... with an extended duration in mid-June 2019, so let's Zoom in on that.

To Zoom into June 2019, you could either *[click into the calendar]* to type in dates (Jun 1 to Aug 1) or *[click and drag]* to restrict time slider. *[I'll click and drag both ends of the time slider.]*

* <https://tinyurl.com/OOI-QARTOD-demo> using QARTOD flags in Data Explorer to rapidly identify a time period of interest [\[demo on YouTube\]](#)

** If you'd like to explore summer 2016, you can also refer to this OOI Nugget from the Ocean Data Labs (<https://datalab.marine.rutgers.edu/ooi-nuggets/coastal-upwelling/>).

*** Relevant blog post for summer 2017 <https://medium.com/geekculture/data-shows-how-coastal-upwelling-affects-sea-surface-temperature-in-oregon-30761986eec9>



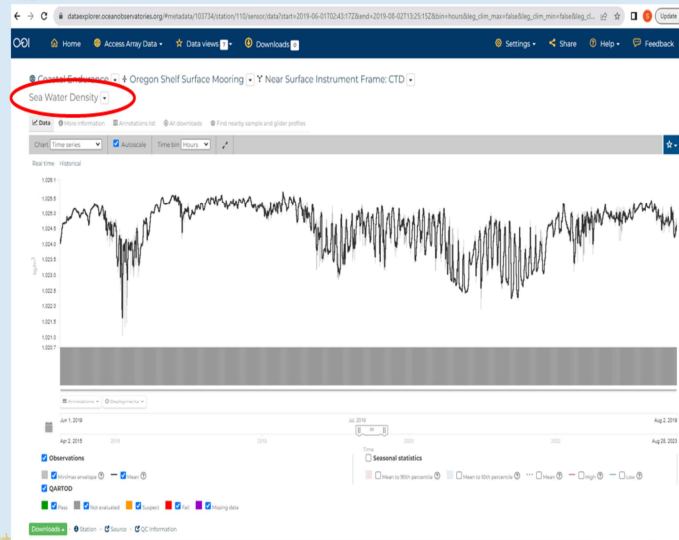
[I'll switch time resolution to hours, and adjust the y-axis] a bit. You can see the week or so mid-June with low water temperature, followed by high water temperature in mid-July, followed by low water temperature in late July. Note QARTOD flags for mid-July 2019 might indicate data of interest - perhaps related to a marine heatwave (Amaya et al., 2020, <https://doi.org/10.1038/s41467-020-15820-w>).

Low but how low? I know from colleagues in Oregon to look for 8 degrees C as an indicator of upwelling, and [hover to show] it gets close to 8 in mid-June. Perhaps a better indicator would be density, I would like to look for the 25.8 isopycnal that Austin and Barth (2002, <https://doi.org/10.1029/2001JC000858>) define as the upwelling front. [Click drop-down to] Note there are a couple other parameters available for this instrument (CTD) *, which you could [switch the plot to, including density].

* Note in the Parameter Information at the bottom of the webpage, the Min Depth and Max Depth are presently listed as 0. Please note the nominal deployed depth is in metadata (see tab "More information"). For actual depth as calculated from pressure, switch the plot to Parameter Sea Water Pressure.

Step 5: Visualize other data from same instrument

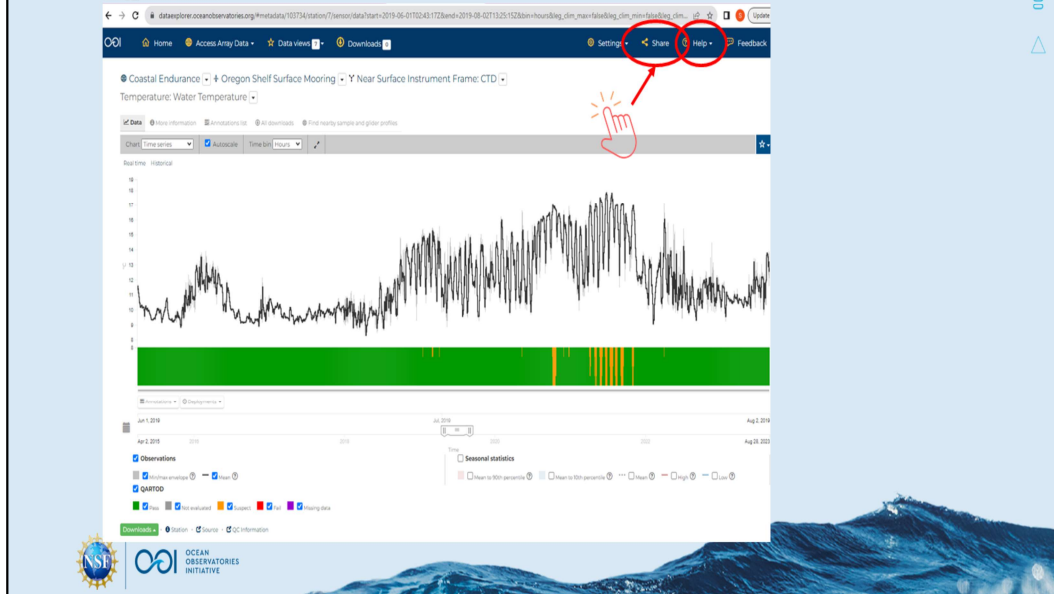
- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/110/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false



[Toggle off Seasonal statistics if showing] Note for the units here, I'll be looking for values exceeding 1025.8 kg/m³. Hourly records do not quite exceed but are close mid-June, and then again in late July. [Use drop-down to go back to Water Temperature]

Step 6: Save / share your data visualization

- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false



To conclude this demo, I'd like to share the zoomed-in temperature chart. [*Toggle off Seasonal statistics if showing*] Note you can copy the URL at the top of the webpage to return in the future to this dataset with this constrained time period and scaling. You can copy that from your browser, or grab it quickly with [*click the Share button*] in the header.

[*Note the Help*] resources in the rightmost header.

Please tune into other demos in this series to compare this water temperature time series with wind data as a subset of the [*hover over Data view in header*] [preloaded Data View “Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)”](#), or to find nearby glider data, or to plot with profiler data in a Data View.



For additional tips, see the [Data Explorer Documentation](#) HOW-TO:

- [Catalog](#)
- [Data Charts](#)

For a longer demo relevant to upwelling off Oregon, see the first half of the Data Explorer session from the 2022 Northeast Pacific OOI Workshop [link to [slides](#)] [link to [recording](#)].

References:

- Amaya, D.J., et al. (2020) Physical drivers of the summer 2019 North Pacific marine heatwave. *Nature Communications*, 11, <https://doi.org/10.1038/s41467-020-15820-w>
- Austin, J.A., and Barth, J.A. (2002) Variation in the position of the upwelling front on the Oregon shelf. *Journal of Geophysical Research: Oceans*, 107, <https://doi.org/10.1029/2001JC000858>



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Questions?

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Feel free to use the Feedback button on Data Explorer

OOI Discourse HelpDesk
<https://discourse.oceanobservatories.org/>

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Demo: Compare time-series data

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12 September 2023

<https://tinyurl.com/OOI-Data-Explorer-compare-demo>



link to slides <https://tinyurl.com/OOI-Data-Explorer-compare-demo>

link to recording on YouTube: <https://youtu.be/SEwHMSyQFUg>

This is one of several demos in a step-by-step guide [<https://tinyurl.com/OOI-Data-Explorer-stepbystep-v1>] to the Ocean Observatories Initiative (OOI) Data Explorer, developed for a coastal oceanography course at Oregon State University and related to the [preloaded Data View "Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)"](#).

Note this demo follows from:

- Demo: Find & visualize time-series data (at fixed depth)

This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.

The **Ocean Observatories Initiative (OOI)** delivers real-time data from a wide variety of instruments deployed at several ocean arrays



This video is part of a series to demonstrate features of the Data Explorer for the Ocean Observatories Initiative (OOI) sponsored by the U.S. National Science Foundation.

This demo follows from the Demo: Find & visualize time-series data, in which we found and visualized water temperature from a mooring in the [hover] Coastal Endurance Array...

<https://oceanobservatories.org/>

<https://oceanobservatories.org/about-ooi/>



Goals for this demo:

1. Initiate Data View with a time-series dataset
2. Find second time-series dataset (includes checking Annotations)
3. Add second time-series dataset to Data View
4. Show Comparison Chart in Data View
5. Save / share your Data View

Software used:

- OOI's Data Explorer (<https://dataexplorer.oceanobservatories.org/>) in a web browser



Let's get started:

- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false



For best results use Chrome or Firefox web browser. Note that I'll be doing the demo on a laptop; you may need to adjust some of the steps if you are following along on a smartphone.

Here, we will start with a time series of *[hover]* water temperature from the *[hover]* Oregon Shelf Surface Mooring in the *[hover]* Coastal Endurance Array. I found these data and zoomed into this particular *[hover]* time period because I thought they might indicate an upwelling event (or two), *[hover to point mid-June and end July]*. In this demo I'll explore further, showing you how to create a Data View with a Comparison Chart.

I know that upwelling off Oregon results from southward wind, so I also want to find wind data, and I want to visually compare both time series.

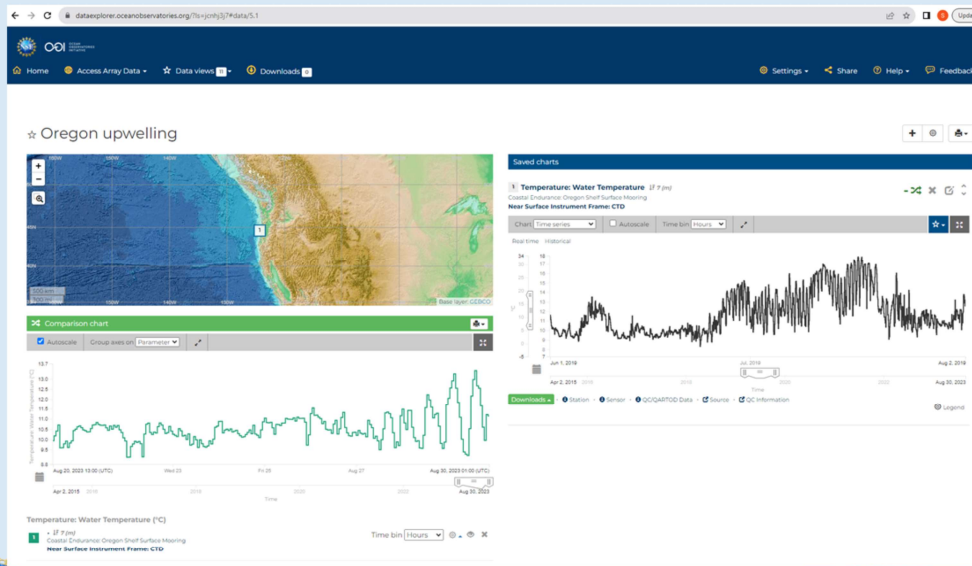
Data Explorer has a feature called Data Views that lets you visualize and compare datasets together on the same webpage. Note in the page header you can click on a button for Data views *[hover - my webpage says there are 10]*, but you'll likely see a different number because it accounts for preloaded Data views as well as those that you personally create in your browser.

To create a new Data view we'll *[click on the star]* in the upper right of the chart, then *[click on the +]* next to Manage views, then *[add a label, e.g., Oregon upwelling,]* then *[click the +]* next to your new label, then *[check the box Save to data view,]* and finally last step *[check the box Add to compare chart]*. *[open your new Data view]*.

https://www.flaticon.com/free-icon/click_7162383 Flaticon license: Free for personal and commercial use with attribution.

Step 1: Initiate Data View with a time-series dataset

- <https://dataexplorer.oceanobservatories.org/?ls=jcnhj3j7#data/5.1>



[Note that we would not be able to copy/paste the URL from the browser to share the Data view. The URL provided on this slide was generated by clicking the Share button and is unique to the application state.]

To orient you to the Data view: you'll see your saved chart on the right, and on the left is where we'll start to build a comparison chart with time-series data (at fixed depth or height). This doesn't mean much to you yet, because we haven't selected any data to compare with yet, but I wanted you to be aware that this has been created, and is also now listed in your Data views from the [hover] button at the top.

Step 2: Find second time-series dataset (includes checking Annotations)

- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false

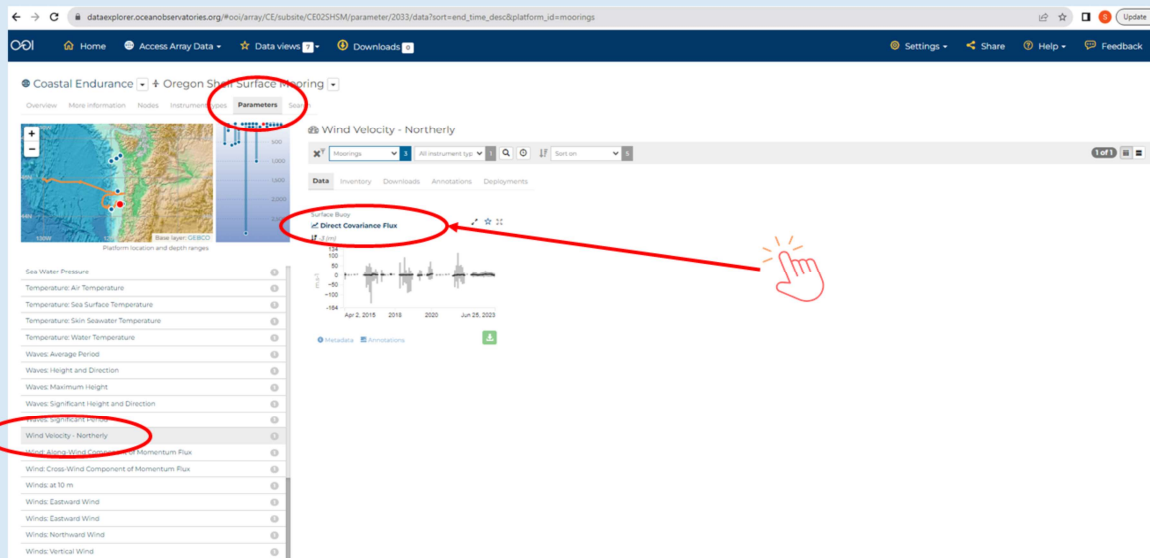


[from Data view click on Oregon Shelf Surface Mooring in the saved chart on right]

To find wind data, we could start all the way back at the *[hover]* Data Explorer homepage, as we did for water temperature data in the previous demo. However, we are already 'here' at the Oregon Shelf Surface Mooring... are there any wind data here? *[click on Oregon Shelf Surface Mooring]*

Step 2: continued

- https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM/parameter/2033/data?sort=end_time_desc&platform_id=moorings



[starts at <https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM>]

I could click on Instrument types to see a list of instruments deployed on this mooring, but I also can [click on *Parameters*]. In parameters I see 2 options Wind Velocity: Northerly (from the north) and Winds: Northward Wind (to the north). [Click on parameter *Wind Velocity: Northerly*

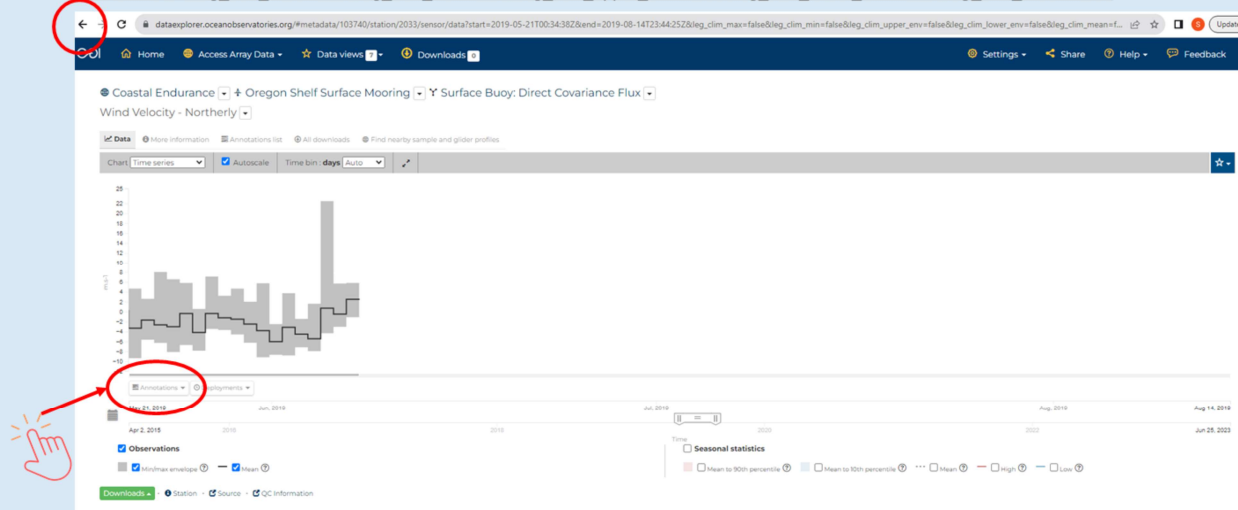
https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM/parameter/2033/data?sort=end_time_desc&platform_id=moorings]

[Then click open the *Direct Covariance Flux* dataset

https://dataexplorer.oceanobservatories.org/#metadata/103740/station/2033/sensor/data?start=2015-04-02T21:20:00Z&end=2023-06-25T20:21:00Z&leg_clim_max=false&leg_clim_min=false]

Step 2: continued

- https://dataexplorer.oceanobservatories.org/#metadata/103740/station/2033/sensor/data?start=2019-05-21T00:34:38Z&end=2019-08-14T23:44:25Z&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false



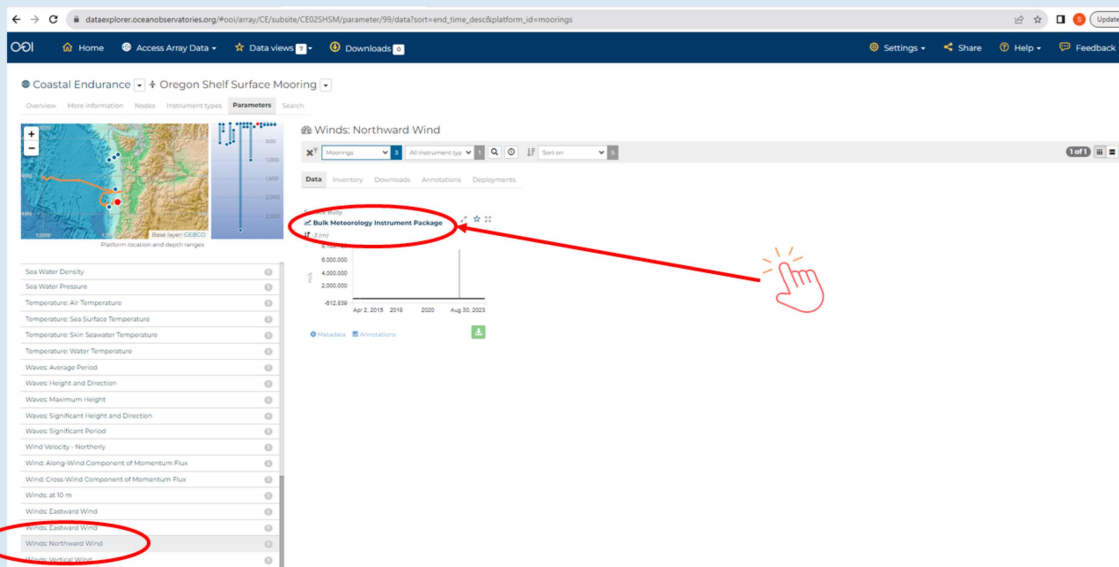
When I [zoom into June 2019, un-check Seasonal statistics

https://dataexplorer.oceanobservatories.org/#metadata/103740/station/2033/sensor/data?start=2019-05-21T00:34:38Z&end=2019-08-14T23:44:25Z&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false] I do not see any data available. Note that I can check the Annotations for an explanation of missing data [click Annotations, hover over Status], and it says Not operational.

So let's go back to the other option Winds: Northward Wind [back in browser]...

Step 2: continued

- https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE02SHSM/parameter/2033/data?sort=end_time_desc&platform_id=moorings

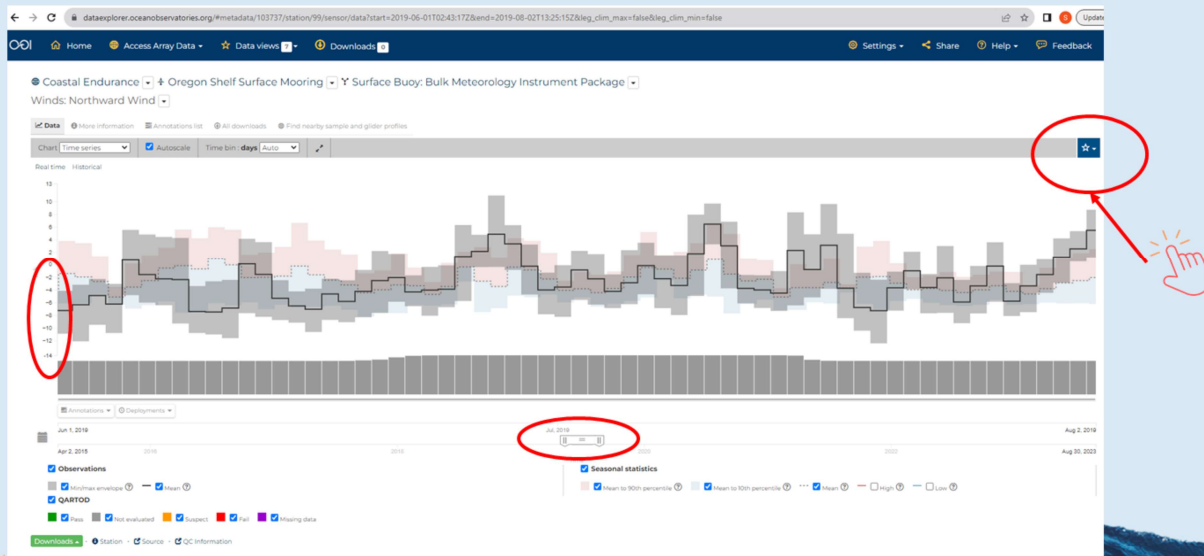


[click on Winds: Northward Wind, click open Bulk Meteorology Package

https://dataexplorer.oceanobservatories.org/#metadata/103737/station/99/sensor/data?start=2015-04-02T20:41:00Z&end=2023-08-16T02:37:00Z&leg_clim_max=false&leg_clim_min=false].

Step 2: continued

- https://dataexplorer.oceanobservatories.org/#metadata/103737/station/99/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&leg_clim_max=false&leg_clim_min=false



[Constrain the time period

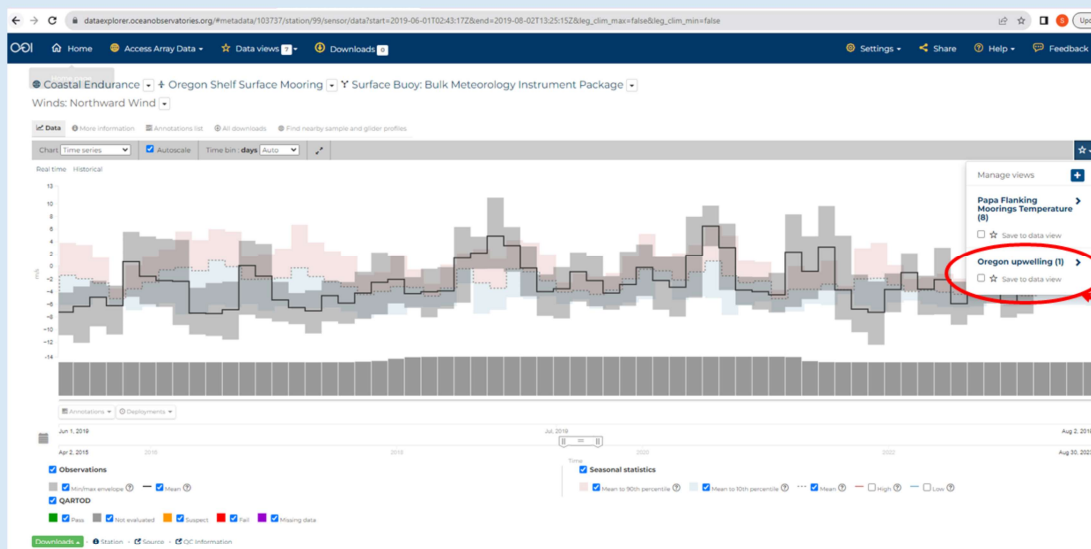
https://dataexplorer.oceanobservatories.org/#metadata/103737/station/99/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&leg_clim_max=false&leg_clim_min=false

] to get rid of the extreme outlier. Data are available for the same 2 months that we plotted for water temperature. [Hover] I want to look for southward wind, so that'll just be values with a (-) sign.

Now let's add these wind data to our Data view. [Click the star] upper right...

Step 3: Add second time-series dataset to Data View

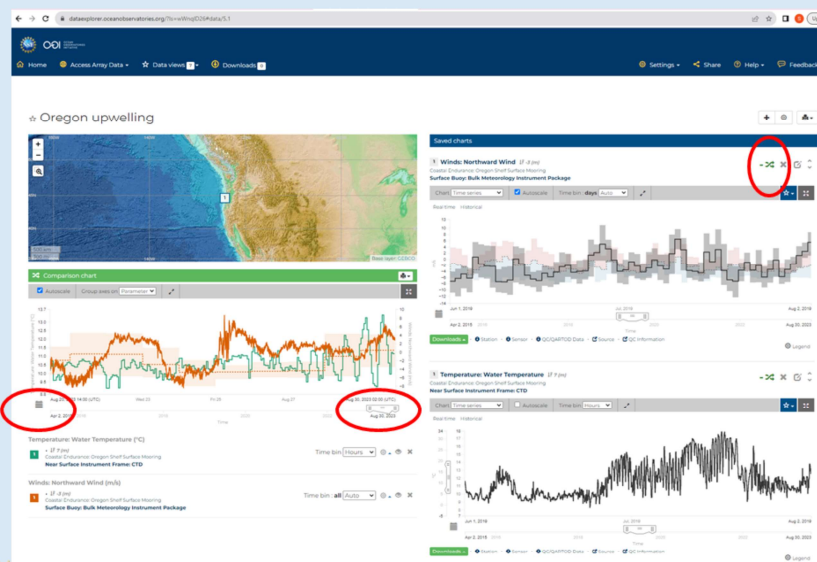
- https://dataexplorer.oceanobservatories.org/#metadata/103737/station/99/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&leg_clim_max=false&leg_clim_min=false



... for your labeled data view [check the box Save to data view], you don't have to [check the box for Add to compare chart] yet, but let's do so. [open your Data view.]

Step 4: Show Comparison Chart in Data View

- <https://dataexplorer.oceanobservatories.org/?ls=wWnqlD26#data/5.1>



[Note that we would not be able to copy/paste the URL from the browser to share the Data view. The URL provided on this slide was generated by clicking the Share button and is unique to the application state.]

Now you'll see both of your saved charts on the right, and on the left they are plotted with 2 y-axes on a comparison chart. [demo the toggle / add to compare chart]

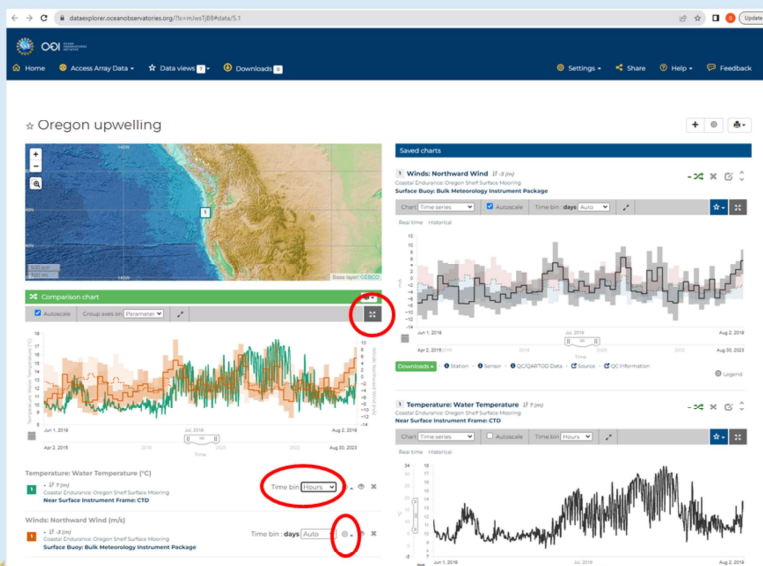
By default the Comparison chart is constrained to the most recent 1 week of data, so I need to [adjust the time bar slider on the Comparison chart] [Or, use the calendar icon lower left;] to the 2 month period in my plots on the right (Jun 1 to Aug 2, 2019). * **

* If you'd like to compare these datasets in summer 2016, you can also refer to this OOI Nugget from the Ocean Data Labs (<https://datalab.marine.rutgers.edu/ooi-nuggets/coastal-upwelling/>).

** Relevant blog post for summer 2017 <https://medium.com/geekculture/data-shows-how-coastal-upwelling-affects-sea-surface-temperature-in-oregon-30761986eec9>

Step 4: continued

- <https://dataexplorer.oceanobservatories.org/?ls=mJwsTjBB#data/5,1>

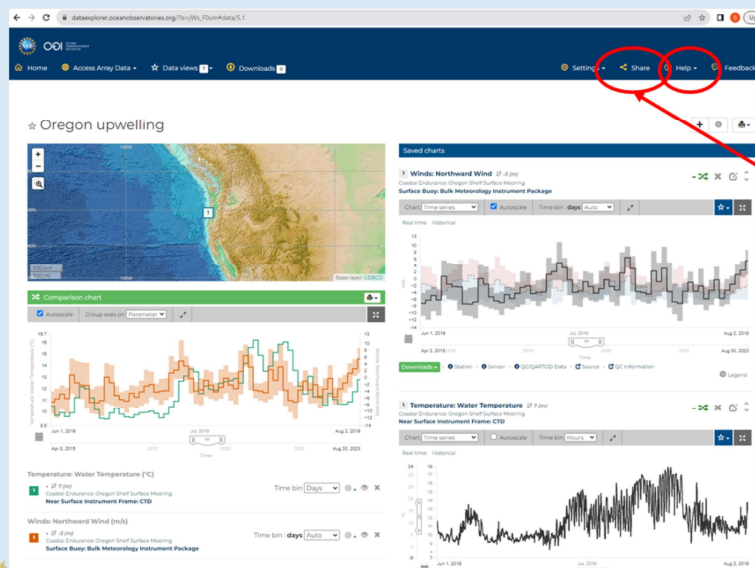


I do not want to be distracted by seasonal statistics, so I [click on the settings (gear icon)] for the wind data in the Comparison chart to turn those off. The observations minimum might be useful to me for the winds, so I leave those on, and let's plot both of these with the same time bins [click for daily averages].

[click enlarge to discuss] Winds [right y-axis] are consistently southward for a week in mid-June. But the more dramatic event to me appears to be the southward wind with greater magnitude on July 19 which appears to precede the most dramatic drop in temperature. [close enlarge pop-up]

Step 5: Save / share your Data View

- https://dataexplorer.oceanobservatories.org/?ls=jWs_F0um#data/5,1



This Data view is available to you, in this browser, from your Data views drop-down button. However, to view this in other browsers and to share this with others for discussion, you need to save the application state by *[clicking the Share button]* in the header upper right and copying the URL link into your notes/email/Slack.

This concludes this portion of the demo. Feel free to add more datasets to your Data view to re-create the [preloaded Data View “Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)”](#) that focuses on mid-June 2019.

But what about the end of July 2019? Please tune into the Demo: Find & visualize glider data to explore further...

[*Note the Help*] resources in the rightmost header.



For additional tips, see the Data Explorer Documentation HOW-TO:

- Data Views > Comparison Charts
- Data Charts > Annotations

For a longer demo relevant to upwelling off Oregon, see the first half of the Data Explorer session from the 2022 Northeast Pacific OOI Workshop [link to [slides](#)] [link to [recording](#)].

For more examples of how to create a Data View, see slides from workshop for Massachusetts Marine Educators <https://tinyurl.com/WildOceanData>

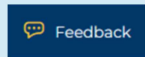




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Questions?

Stace Beaulieu (stace@whoi.edu)



Feel free to use the Feedback button on Data Explorer

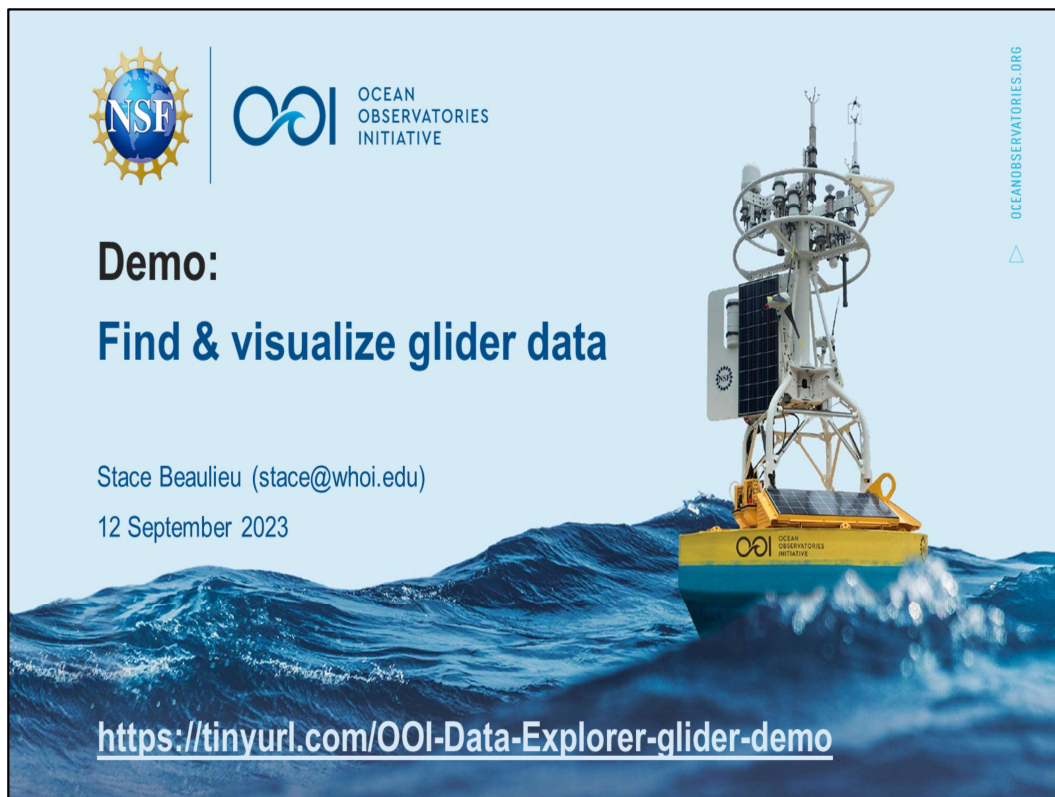
OOI Discourse HelpDesk



<https://discourse.oceanobservatories.org/>

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This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.



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Demo:
Find & visualize glider data

Stace Beaulieu (stace@whoi.edu)
12 September 2023

<https://tinyurl.com/OOI-Data-Explorer-glider-demo>

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link to slides <https://tinyurl.com/OOI-Data-Explorer-glider-demo>

link to recording on YouTube: <https://youtu.be/smrSzcO4RY>

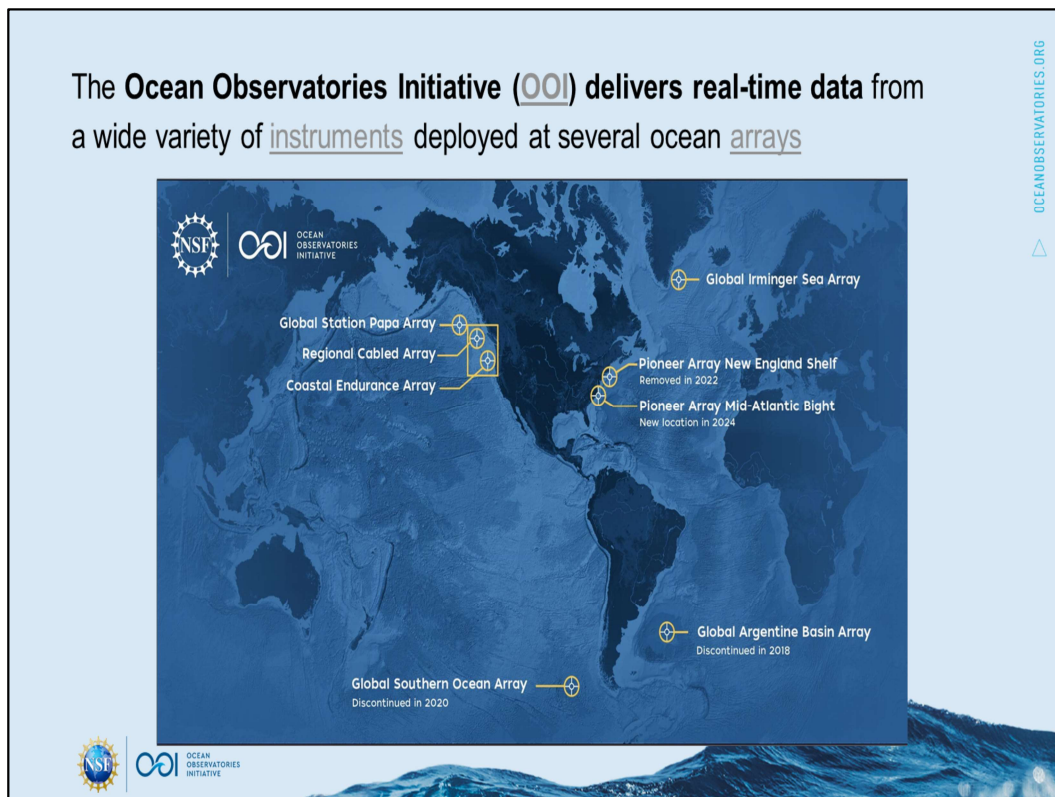
This is one of several demos in a step-by-step guide

[<https://tinyurl.com/OOI-Data-Explorer-stepbystep-v1>] to the Ocean Observatories Initiative (OOI) Data Explorer, developed for a coastal oceanography course at Oregon State University and related to the [preloaded Data View “Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)”](#).

Note this demo follows from:

- Demo: Find & visualize time-series data (at fixed depth)

This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.



This video is part of a series to demonstrate features of the Data Explorer for the Ocean Observatories Initiative (OOI) sponsored by the U.S. National Science Foundation.

This demo follows from the Demo: Find & visualize time-series data, in which we found and visualized water temperature from a mooring in the [hover] Coastal Endurance Array...

<https://oceanobservatories.org/>
<https://oceanobservatories.org/about-ooi/>

**Goals for this demo:**

1. Find glider profiles near a moored time series
2. Visualize glider deployment data
3. Show glider deployment on map with mooring locations
4. Find all the glider data for an Array

Software used:

- OOI's Data Explorer (<https://dataexplorer.oceanobservatories.org/>)
in a web browser

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-

https://www.flaticon.com/free-icon/click_7162383 Flaticon license: Free for personal and commercial use with attribution.

Step 1: Find glider profiles near a moored time series

- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/profile_search?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false



When I open this I see 3 panels:

upper left is a profile, in this case a profile from a glider deployment (note this may show both recovered and telemetered profile for same deployment);

upper right is a map centered on the moored time series location, showing if applicable other sites, glider profiles, and cruise data profiles;

lower panel actually has two plots: lowermost is the moored time series, and above that, see the intermittent gray bars indicating nearby profiles from gliders (or from CTD casts on cruises).

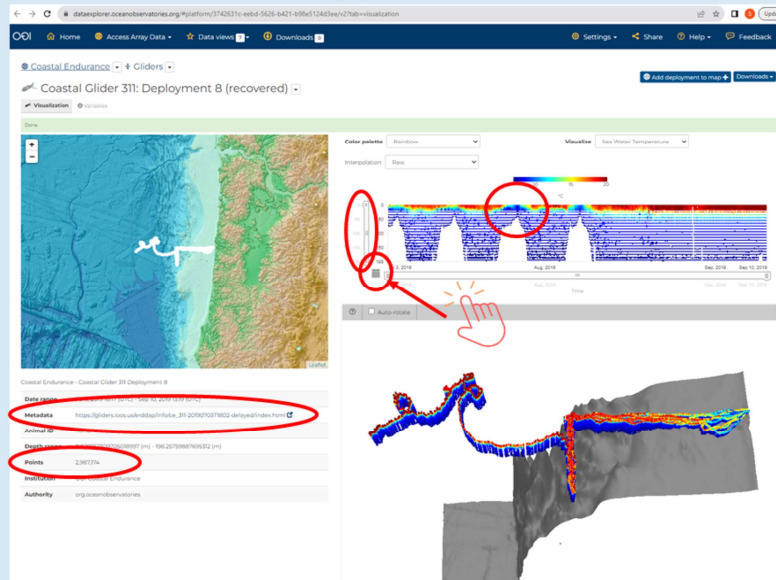
Unfortunately there's no nearby glider data in mid-June 2019 (the little gray bar is for an OOI cruise profile *). Upwelling in mid-June 2019 is documented in [preloaded Data View "Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)"](#).

Let's check the 2 gray bars with glider profiles near the end of July. This first profile is on *[hover]* July 28, and I am seeing *[hover x-axis]* greater than 10 degree C water temperature *[hover y-axis]* near surface. I'll *[click the arrow to step backwards in time to the next relevant profile; you could also drag the hatched slider over to the next gray bar]*. *[hover over the glider profile to see values > 10]*, so I do not see compelling evidence yet for upwelling near this location at the end of July. But I'd like to see more of this glider deployment *[right click in upper left panel new tab for deployment (recovered)]*.

* for other cruise profiles on the Newport Hydrographic Line, you could use data from Risien et al. (2022, <https://doi.org/10.1016/j.dib.2022.107922>).

Step 2: Visualize glider deployment data

- <https://dataexplorer.oceanobservatories.org/#platform/3742631c-eebd-5626-b421-b98e5124d3ee/v2?tab=visualization>



When I [open glider deployment tab] I see 3 panels:

left is a map showing the full track of the deployment;

upper right is a time series, presently showing Sea Water Temperature;

lower right is a 3D visualization, I can rotate this [click and hold];

Note when I [hover in the map] I can see the point in the time series and in the 3D visualization. And vice versa.

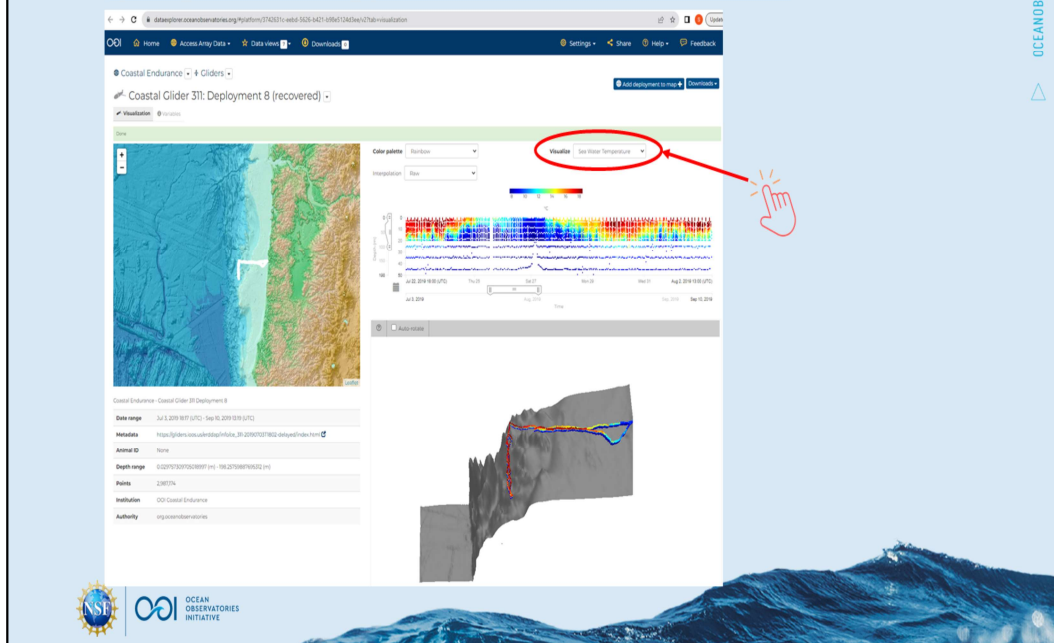
I'm interested in the time period near the end of July, and I am seeing blue colors near surface in the time series [hover in time series blue end July]. Note the red circle on the map - this looks to me that the glider was quite inshore at that time. [for 3D use the right mouse button to move the plot when you want to Zoom in]

[Constrain depth to top 50 m] and [hover to] clearly see deep water temperatures at surface on July 27, 2019. Note that there is likely some binning and decimation of these data. Note in metadata provided here [point to lower left text] for this deployment: ~3 million points. Note the link provided here, next to the word "Metadata" actually takes you to the metadata - and data - as provided by the IOOS Glider Data Assembly Center (DAC). There are additional data visualization tools available to you through the Glider DAC ERDDAP.

But let's get back to this visualization, [let's use calendar to constrain time around July 27]...

Step 2: continued

- <https://dataexplorer.oceanobservatories.org/#platform/3742631c-eebd-5626-b421-b98e5124d3ee/v2?tab=visualization>



I'll do Jul 22 to Aug 2 for the last 10 days or so of the moored time series that we started with. [zoom into 3D], looks like the glider turned in pretty shallow depth (~20 m); and I [hover in time-series] see 8 degree water just before the turn.

I would like to look for the 25.8 isopycnal that Austin and Barth (2002, <https://doi.org/10.1029/2001JC000858>) define as the upwelling front. [Click Visualize drop-down to] Note there are several other parameters measured by this glider, I'll [select density]...

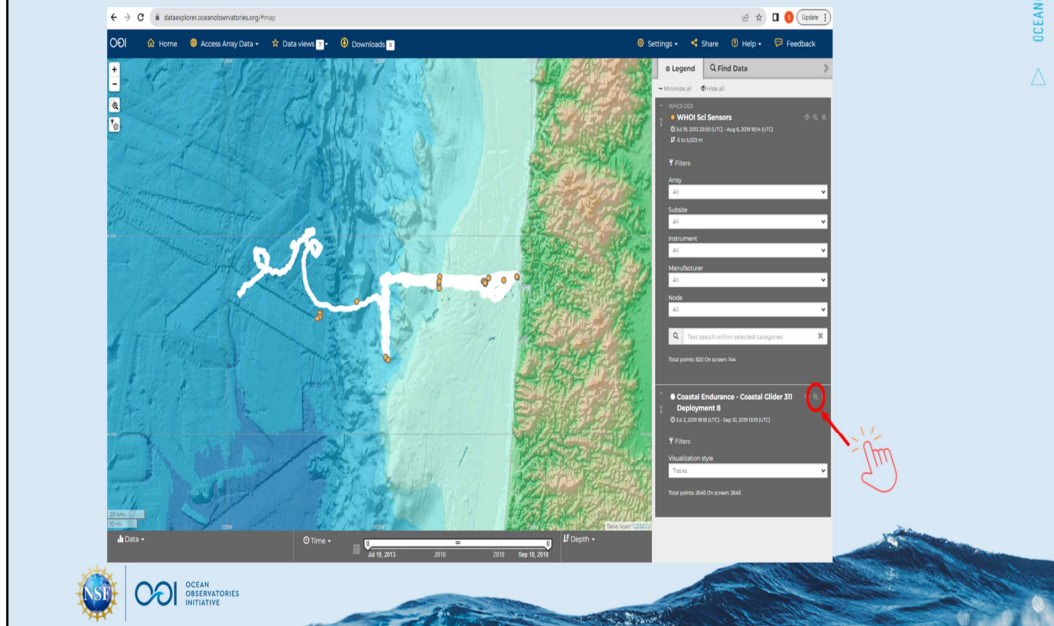
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I wonder how close this is to the location of Inshore moorings. I can check that by [\[click to\]](#) add deployment to map. Go to map button appears, [\[Right click Go to map button\]](#) to open in a new tab.

Step 3: Show glider deployment on map with mooring locations

- <https://dataexplorer.oceanobservatories.org/#map>



[note for this URL (<https://dataexplorer.oceanobservatories.org/#map>): you must already have added your glider deployment to the map]

[click the icon to zoom to layer extent] [click + to zoom in more] [Hover to show shelf mooring location where we started this demo.]

[hover to show Oregon Inshore Moorings] The glider turned very near the Inshore Surface Piercing Profiler Mooring.

Curious about Inshore profiler data at the end of July 2019? Please tune into the Demo: Find & visualize profiler data to explore further...

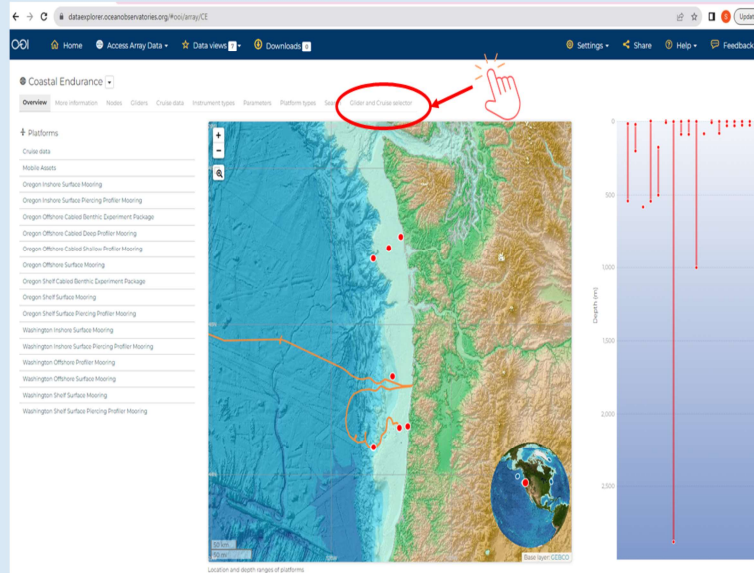
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The screenshot shows the OOI website interface. The top navigation bar includes links for Home, Access Arty Data, Data views, Downloads, Settings, Share, Help, and Feedback. The 'Coastal Endurance' link is circled in red, and a red arrow points to it from the left. Below the navigation bar, the page title is 'Coastal Endurance - Ciders'. The main content area features a map of the deployment area, a color palette for water density, and a time-series plot of water density. A red circle highlights the 'Coastal Endurance' link in the top navigation bar, and a red arrow points to it from the left. A hand icon is also visible on the left side of the page.

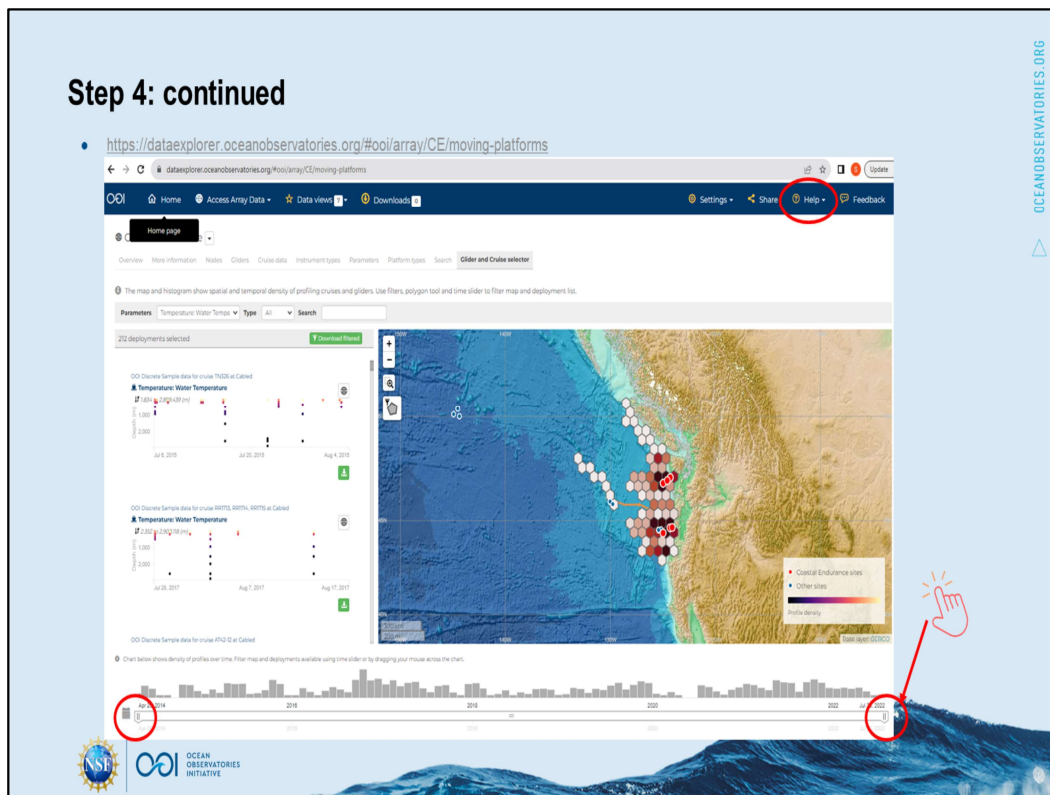
Instead, *[click on the Array title]*...

Step 4: continued

- <https://dataexplorer.oceanobservatories.org/#oii/array/CE>



...and then again Gliders, and also Mobile Assets, go to a list of all glider deployments; rather [*click on this top menu item Glider and Cruise Selector*] for spatiotemporal information. It takes a moment to load the many deployments...



... into this polygon map, in which the darker polygons indicate the most data available. *[Zoom in and hover to show Oregon Shelf and Inshore Moorings]*

At the bottom you see a timeline, and you can constrain this to subset the data shown on the map. I'll end by *[using the time slider to limit to summer 2019]* *.

[Click on polygon in between the 2 mooring locations to update list in left panel]
[hover on a listed deployment to show on map]

[Note the Help] resources in the rightmost header.

* As another example, you may be interested in selecting glider data in summer 2016; see this OOI Nugget from the Ocean Data Labs (<https://datalab.marine.rutgers.edu/ooi-nuggets/coastal-upwelling/>).



For additional tips, see the [Data Explorer Documentation](#) HOW-TO:

- Catalog > Find Nearby Sample and Glider Profiles
- Glider and Cruise Selector
- Map

References:

- Austin, J.A., and Barth, J.A. (2002) Variation in the position of the upwelling front on the Oregon shelf. *Journal of Geophysical Research: Oceans*, 107, <https://doi.org/10.1029/2001JC000858>
- Risien, C.M., et al. (2022) Spatially gridded cross-shelf hydrographic sections and monthly climatologies from shipboard survey data collected along the Newport Hydrographic Line, 1997 - 2021. *Data in Brief*, 41, 107922, <https://doi.org/10.1016/j.dib.2022.107922>





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Questions?

Stace Beaulieu (stace@whoi.edu) 

Feel free to use the Feedback button on Data Explorer

OOI Discourse HelpDesk
<https://discourse.oceanobservatories.org/>

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This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.

The slide has a light blue background. In the top left corner, there is the NSF logo (a blue sun-like emblem with 'NSF' in the center) and the OOI logo (a blue infinity-like symbol with 'OCEAN OBSERVATORIES INITIATIVE' text to its right). On the right side, there is a vertical text 'OCEANOBSERVATORIES.ORG' and a small blue triangle icon. The main title 'Demo: Find & visualize profiler data' is in a large, bold, dark blue font. Below the title, the text 'Stace Beaulieu (stace@whoi.edu)' and '13 September 2023' is displayed. A photograph of a yellow and blue profiler buoy with various sensors and a solar panel is shown on the right, floating on a blue ocean with white-capped waves. At the bottom, a URL is underlined: <https://tinyurl.com/OOIDataExplorer-profiler-demo>.

link to slides <https://tinyurl.com/OOIDataExplorer-profiler-demo>

link to recording on YouTube: <https://youtu.be/ql8JvTGyrmI>

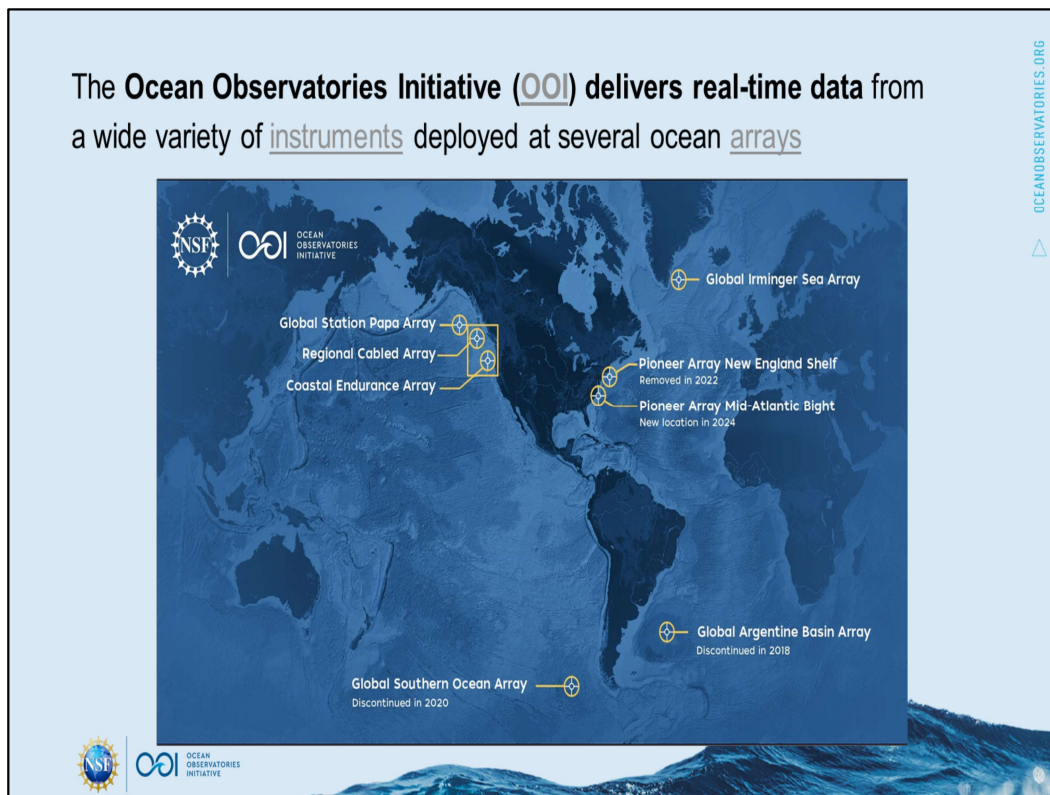
This is one of several demos in a step-by-step guide

[<https://tinyurl.com/OOIDataExplorer-stepbystep-v1>] to the Ocean Observatories Initiative (OOI) Data Explorer, developed for a coastal oceanography course at Oregon State University and related to the [preloaded Data View “Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)”](#).

Note this demo follows from:

- Demo: Find & visualize time-series data (at fixed depth)
- Demo: Compare time-series data

This material is based upon work supported by the Ocean Observatories Initiative (OOI), which is a major facility funded by the National Science Foundation under Cooperative Agreement No. 1743430.



This video is part of a series to demonstrate features of the Data Explorer for the Ocean Observatories Initiative (OOI) sponsored by the U.S. National Science Foundation.

This demo follows from the Demos: Find & visualize time-series data, and Compare time-series data, in which we found, visualized, and created a Data View for water temperature and wind data from a mooring in the [hover] Coastal Endurance Array...

<https://oceanobservatories.org/>
<https://oceanobservatories.org/about-ooi/>



Goals for this demo:

- Find a profiler dataset
- Visualize a profiler dataset
- Zoom into event
- Visualize another parameter from the same profiling instrument
- Add profiler dataset to Data View
- Save / share your Data View

Software used:

- OOI's Data Explorer (<https://dataexplorer.oceanobservatories.org/>) in a web browser

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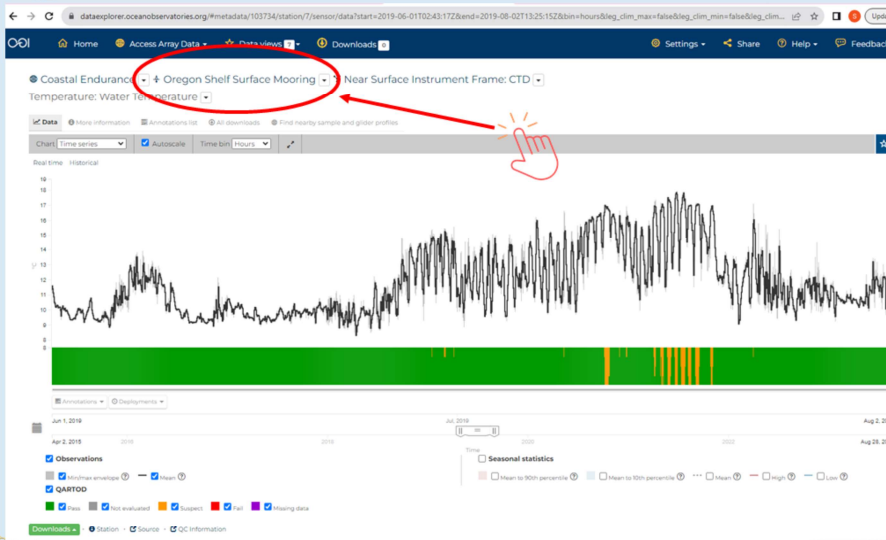
Link for next slide:

[start in

For best results use Chrome or Firefox web browser. Note that I'll be doing the demo on a laptop; you may need to adjust some of the steps if you are following along on a smartphone.

Let's get started:

- https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false



Here, we will start with a time series of [hover] water temperature from the [hover] Oregon Shelf Surface Mooring in the [hover] Coastal Endurance Array. I found these data and zoomed into this particular [hover] time period because I thought they might indicate an upwelling event (or two), [hover to point mid-June and end July]. But these data are at a fixed depth *, so...

In this demo I'll explore further, showing you how to find and visualize profiler data. This demo also is tailored to show you how to quickly find other data when you already have a dataset open.

A quick way to find profiler data within [point to this] Coastal Endurance Array is to check [click upper left second subtitle drop-down] for other platforms. I could [point to] select the surface piercing profiler mooring at this same Oregon Shelf location, but if you've seen the demo for glider data **, you'll know I want the profiler data at the Inshore location, so I [right click to select the Oregon Inshore Surface Piercing Profiler Mooring in new tab.]

* Note in the Parameter Information at the bottom of the webpage, the Min Depth and Max Depth are presently listed as 0. Please note the nominal deployed depth is in metadata (see tab "More information"). For actual depth as calculated from pressure, check the co-located CTD Parameter Sea Water Pressure.

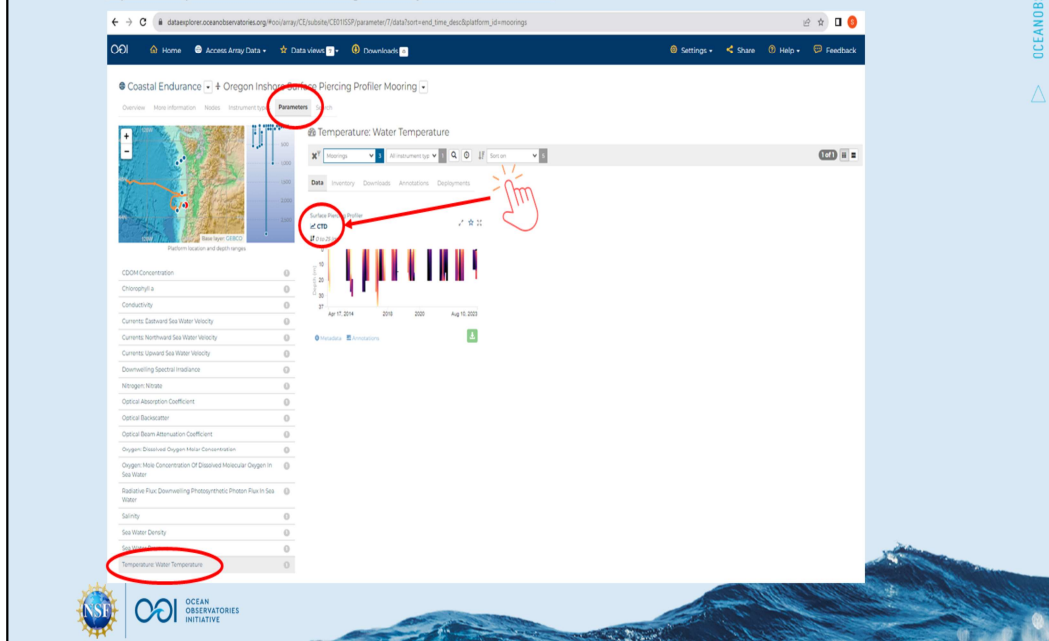
** if you [start in the demo for glider data

<https://dataexplorer.oceanobservatories.org/?ls=vcaNqPlh#platform/3742631c-eebd-5626-b421-b98e5124d3ee/v2?tab=visualization>] similarly you can [click the drop-down (upper left subtitle Gliders)] to select the Inshore profiler mooring.

https://www.flaticon.com/free-icon/click_7162383 Flaticon license: Free for personal and commercial use with attribution.

Step 1: Find a profiler dataset

- <https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE01ISSP>



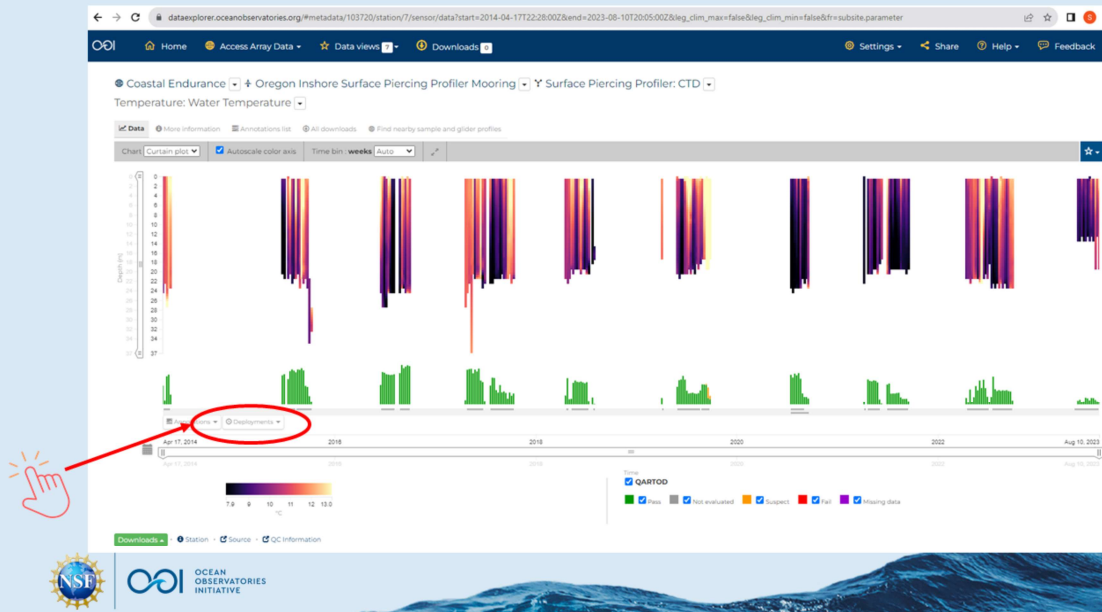
[open new tab

<https://dataexplorer.oceanobservatories.org/#ooi/array/CE/subsite/CE01ISSP>

[Click on Parameters]. [Select from left list: Water Temperature] results in one CTD dataset, which I will [click open]

Step 2: Visualize a profiler dataset

- https://dataexplorer.oceanobservatories.org/#metadata/103720/station/7/sensor/data?start=2014-04-17T22:28:00Z&end=2023-08-10T20:05:00Z&leg_clim_max=false&leg_clim_min=false&fr=subsite.parameter



[continue in tab with CTD temperature

https://dataexplorer.oceanobservatories.org/#metadata/103720/station/7/sensor/data?start=2014-04-17T22:28:00Z&end=2023-08-10T20:05:00Z&leg_clim_max=false&leg_clim_min=false&fr=subsite.parameter]

First let me orient you to what we are looking at: full time series from 2014 to today for the depth of the profiler [hover] colored by temperature. The green (and sometimes orange) vertical bars under the plot are quality control flags (QARTOD; I'll provide a link in the notes to a demo using QARTOD flags *). Looks like it is only deployed for part of each year **, and I can confirm that by [clicking on Deployments tab] with these grey horizontal bars.

[hover over deployment] with data for June and July 2019. I could use the [point to] calendar time bounds, but I find it easy to use the time slider]. [constrain time period: June 1 to Aug 2, 2019

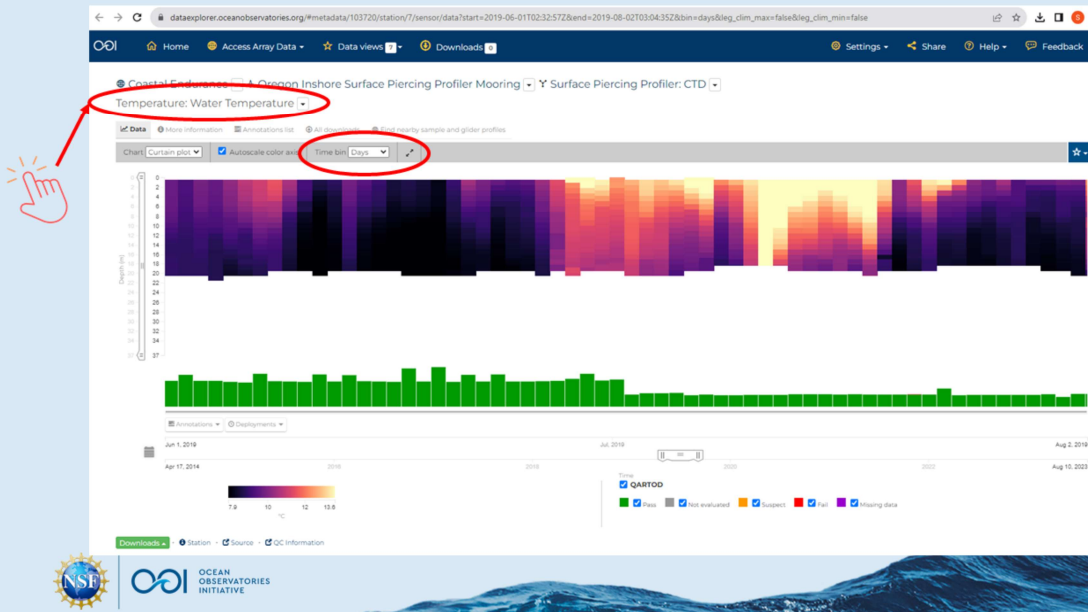
https://dataexplorer.oceanobservatories.org/#metadata/103720/station/7/sensor/data?start=2019-06-01T02:32:57Z&end=2019-08-02T03:04:35Z&leg_clim_max=false&leg_clim_min=false]

* <https://tinyurl.com/OOI-QARTOD-demo> using QARTOD flags in Data Explorer to rapidly identify a time period of interest [demo on YouTube](#)

** Oregon Inshore Surface Piercing Profiler Mooring is only deployed in the spring and summer because seas are too rough in the fall and winter for this platform at water depth approximately 25 meters.

Step 3: Zoom into event

- https://dataexplorer.oceanobservatories.org/#metadata/103720/station/7/sensor/data?start=2019-06-01T02:32:57Z&end=2019-08-02T03:04:35Z&leg_clim_max=false&leg_clim_min=false



[continue in tab with constrained time period

https://dataexplorer.oceanobservatories.org/#metadata/103720/station/7/sensor/data?start=2019-06-01T02:32:57Z&end=2019-08-02T03:04:35Z&leg_clim_max=false&leg_clim_min=false]

Data are available in my target time period. I would like for the time bin in days [hover to show where to switch]. You can see the week or so mid-June with low water temperature, followed by high water temperature in mid-July, followed by low water temperature in late July.

Low but how low? I know from colleagues in Oregon to look for 8 degrees C as an indicator of upwelling, and [hover to show] it gets close to 8 at the surface in mid-June. [Hover to note depth bins by meter.] It doesn't quite reach 8 degrees at the surface at the end of July. Perhaps upwelling June 15-18, and possibly on ~July 28 although not as strong an event.

Perhaps a better indicator would be density, I would like to look for the 25.8 isopycnal that Austin and Barth (2002, <https://doi.org/10.1029/2001JC000858>) define as the upwelling front. [Click drop-down to] Note there are a couple other parameters available for this instrument (CTD), which you could [switch the plot to, including density].

Step 4: Visualize another parameter from same profiling instrument

- https://dataexplorer.oceanobservatories.org/#metadata/103720/station/110/sensor/data?start=2019-06-01T02:32:57Z&end=2019-08-02T03:04:35Z&bin=days&leg_clim_max=false&leg_clim_min=false



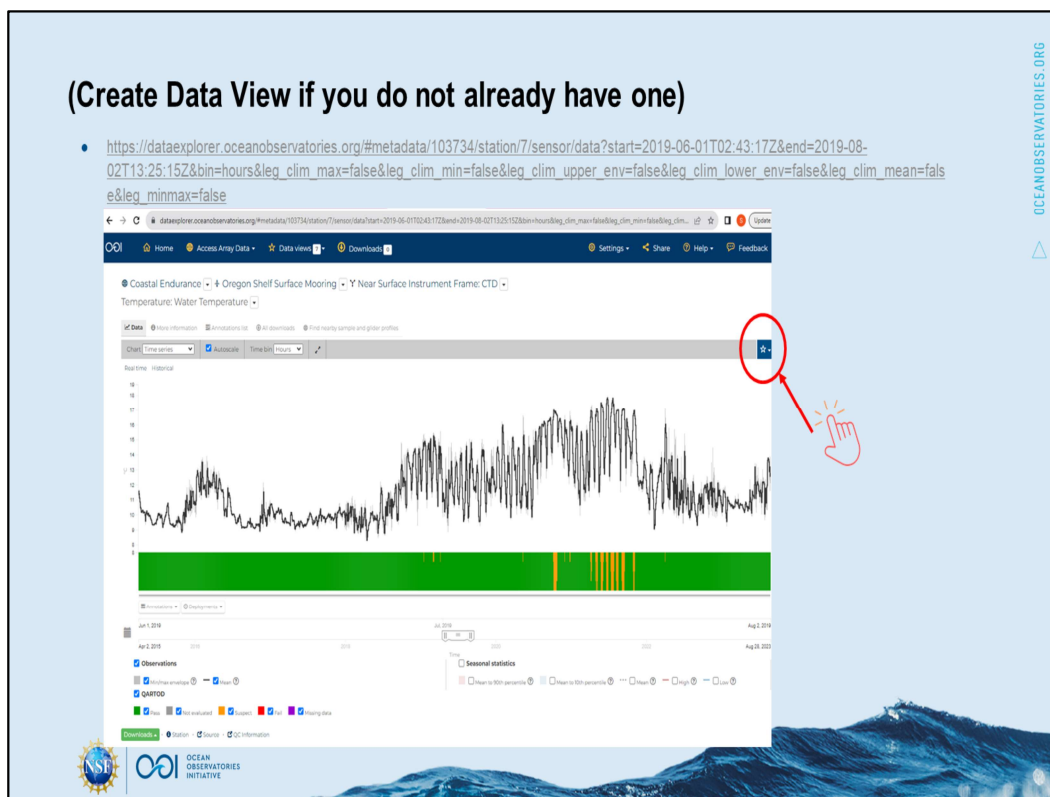
[continue in tab with density]

https://dataexplorer.oceanobservatories.org/#metadata/103720/station/110/sensor/data?start=2019-06-01T02:32:57Z&end=2019-08-02T03:04:35Z&bin=days&leg_clim_max=false&leg_clim_min=false

Note for the [point] units here, I'll be looking for values exceeding 1025.8 kg/m³. Even with daily time bins, [hover to show] values exceed this near surface for a week in mid-June, and then again at the end of July.

I'd like to conclude this demo by adding the Inshore profiler data to the same Data View as the Shelf surface mooring data [point] in our other tab.

If you already have a Data view from the Demo: Compare time-series data, there is no need to do this next step.



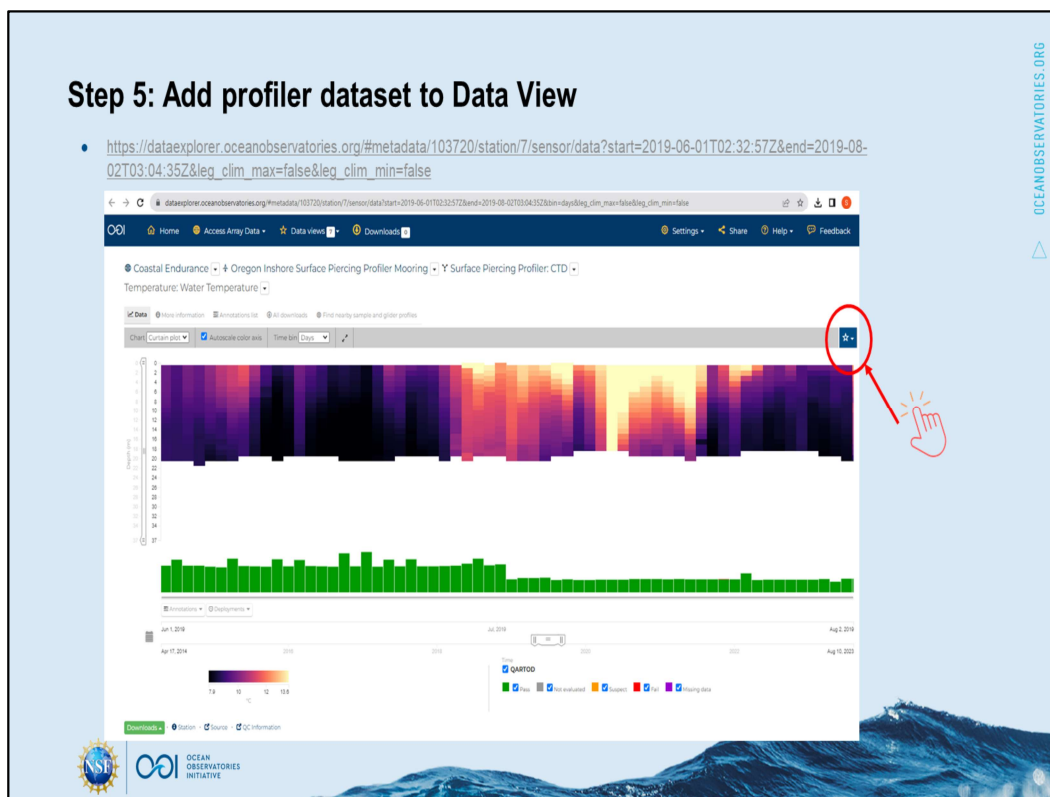
[click into original tab

https://dataexplorer.oceanobservatories.org/#metadata/103734/station/7/sensor/data?start=2019-06-01T02:43:17Z&end=2019-08-02T13:25:15Z&bin=hours&leg_clim_max=false&leg_clim_min=false&leg_clim_upper_env=false&leg_clim_lower_env=false&leg_clim_mean=false&leg_minmax=false]

I will quickly go through the steps to create a Data view; please refer to the Demo: Compare time-series data.

[Click star, click plus, add label Oregon Shelf and Inshore, click plus, check box save to data view]

Now that's done, I'll return to the profiler tab...



[go to profiler tab

https://dataexplorer.oceanobservatories.org/#metadata/103720/station/110/sensor/data?start=2019-06-01T02:32:57Z&end=2019-08-02T03:04:35Z&bin=days&leg_clim_max=false&leg_clim_min=false

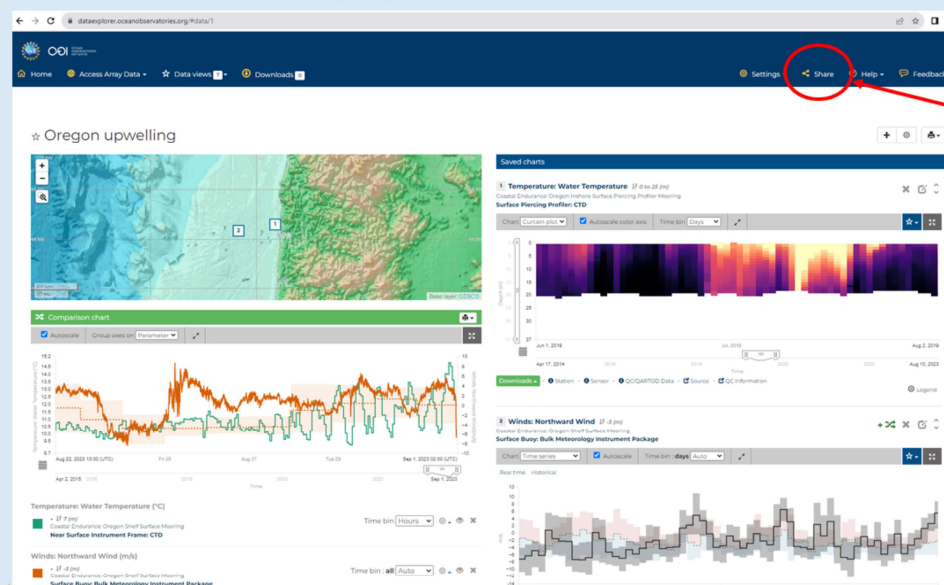
First I'll [change this back to temperature] which will also refresh this webpage so that my browser registers the Data view that I created in the other tab.

Then [click the star and check the box] to add to a Data view. If you already have a Data view from Demo: Compare time-series data, add to that one , else to the new one just created.

[Right click to open a Data view in new tab]

Step 6: Save / share your Data View

- <https://dataexplorer.oceanobservatories.org/?ls=gApAAFlr#data/1>



[open new (3rd) tab Data view ; note that we would not be able to copy/paste the URL from the browser to share the Data view. The URL provided on this slide <https://dataexplorer.oceanobservatories.org/?ls=gApAAFlr#data/1> was generated by clicking the Share button and is unique to the application state]

[move fixed-depth temperature time series up under the profiler data panel]

[Hover over the green crossing arrows icon to] note you can't add profiler data to a Comparison Chart. To learn more about the Comparison Chart, please see Demo: Compare time-series data.

[click share button to generate a link] that I need to copy into my notes or send to my colleague in a Slack or email

[click on top menu Data views] refer to [but do not click on] [preloaded Data View "Seasonal Upwelling off the Central Oregon Coast \(ORSEA\)"](#). The preloaded Data View uses a number of datasets from both the Shelf and Inshore locations.

[Note the Help] resources in the rightmost header.

As a parting note, to further explore these OOI profiler data in the context of the long time series of CTD profiles on the Newport Hydrographic Line, you could use data from Risien et al. (2022, <https://doi.org/10.1016/j.dib.2022.107922>).

For additional tips, see the [Data Explorer Documentation](#) HOW-TO:

- Catalog
- Data Charts
- Data Views

For a longer demo relevant to upwelling off Oregon, see the first half of the Data Explorer session from the 2022 Northeast Pacific OOI Workshop [link to [slides](#)] [link to [recording](#)].

References:

- Amaya, D.J., et al. (2020) Physical drivers of the summer 2019 North Pacific marine heatwave. *Nature Communications*, 11, <https://doi.org/10.1038/s41467-020-15820-w>
- Austin, J.A., and Barth, J.A. (2002) Variation in the position of the upwelling front on the Oregon shelf. *Journal of Geophysical Research: Oceans*, 107, <https://doi.org/10.1029/2001JC000858>
- Risien, C.M., et al. (2022) Spatially gridded cross-shelf hydrographic sections and monthly climatologies from shipboard survey data collected along the Newport Hydrographic Line, 1997 - 2021. *Data in Brief*, 41, 107922, <https://doi.org/10.1016/j.dib.2022.107922>





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Questions?

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Feel free to use the Feedback button on Data Explorer

OOI Discourse HelpDesk
<https://discourse.oceanobservatories.org/>

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