

The Ocean Observatories Initiative: An Operational, Long-Term, Real-Time Observatory Dataset For All

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2018 Ocean Sciences Meeting



Overview

1. Introduction to OOI
2. Data Flow & Products
3. Data Access
4. Data Review
5. Conclusions
 - a) An enormous amount of high value data is being collected
 - b) Data delivery & review are our primary goals
 - c) Accelerating data review via development of specialized tools
 - d) OOI is providing a curated, consistent data system, delivering data and metadata to the community



OOI By the Numbers



7 Arrays

57 Stable Platforms
Moorings, Profilers, Nodes

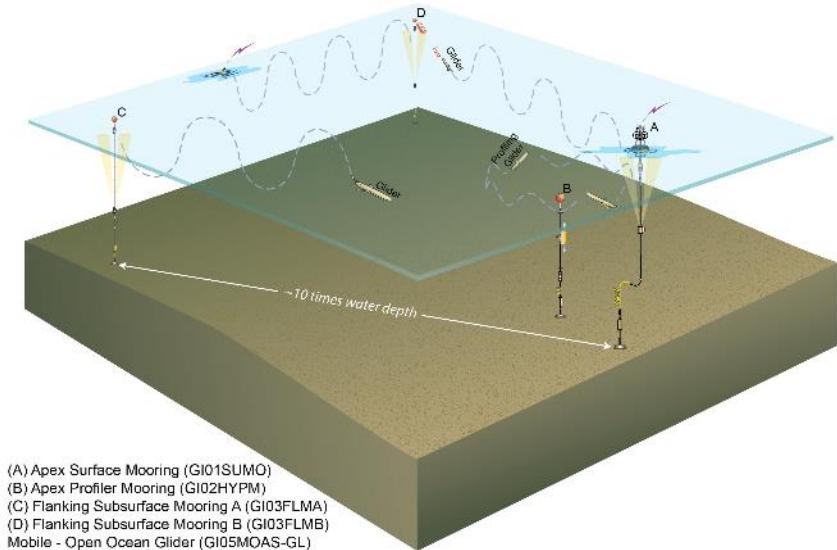
32 Mobile Assets
Gliders, AUVs

1227 Instruments (857 deployed)

>2500 Science Data Products

>100K Science/Engineering Data Products

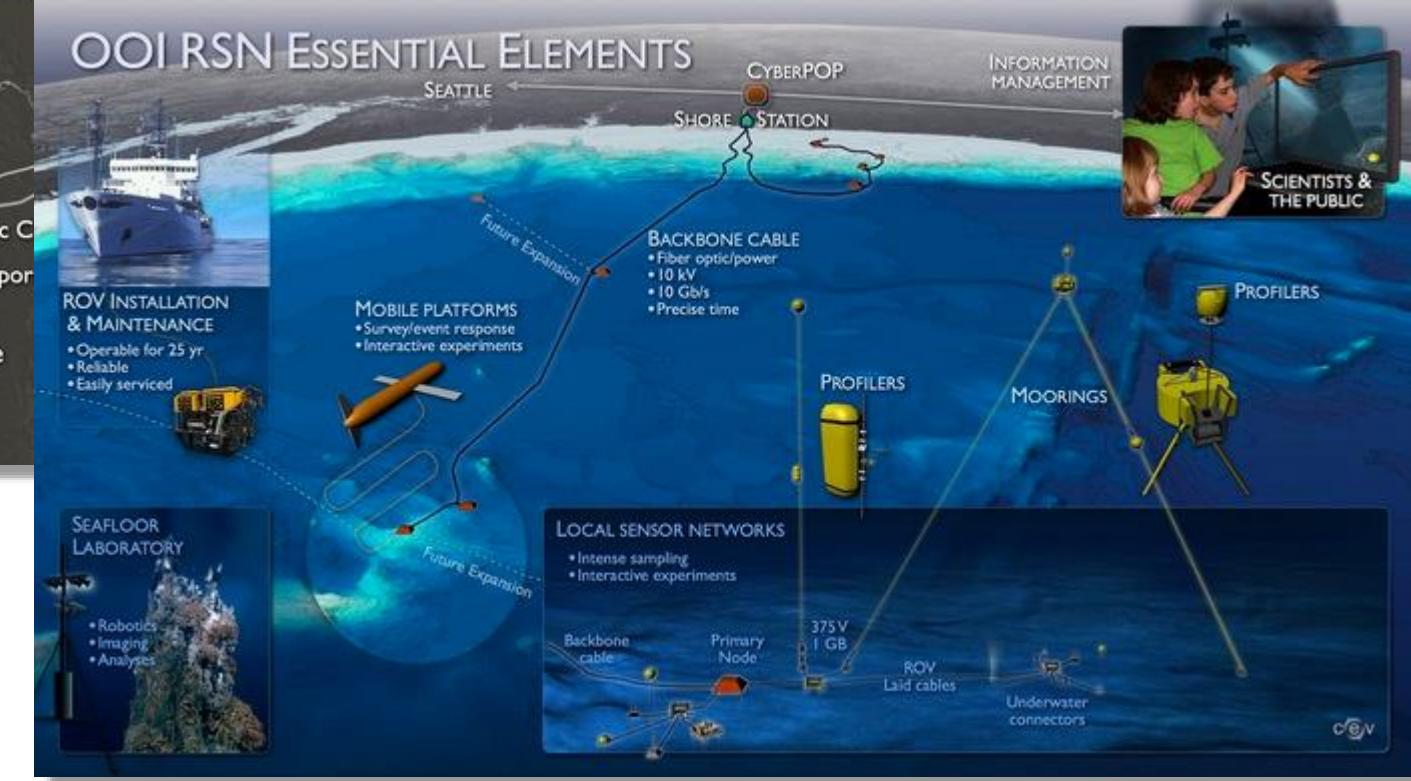
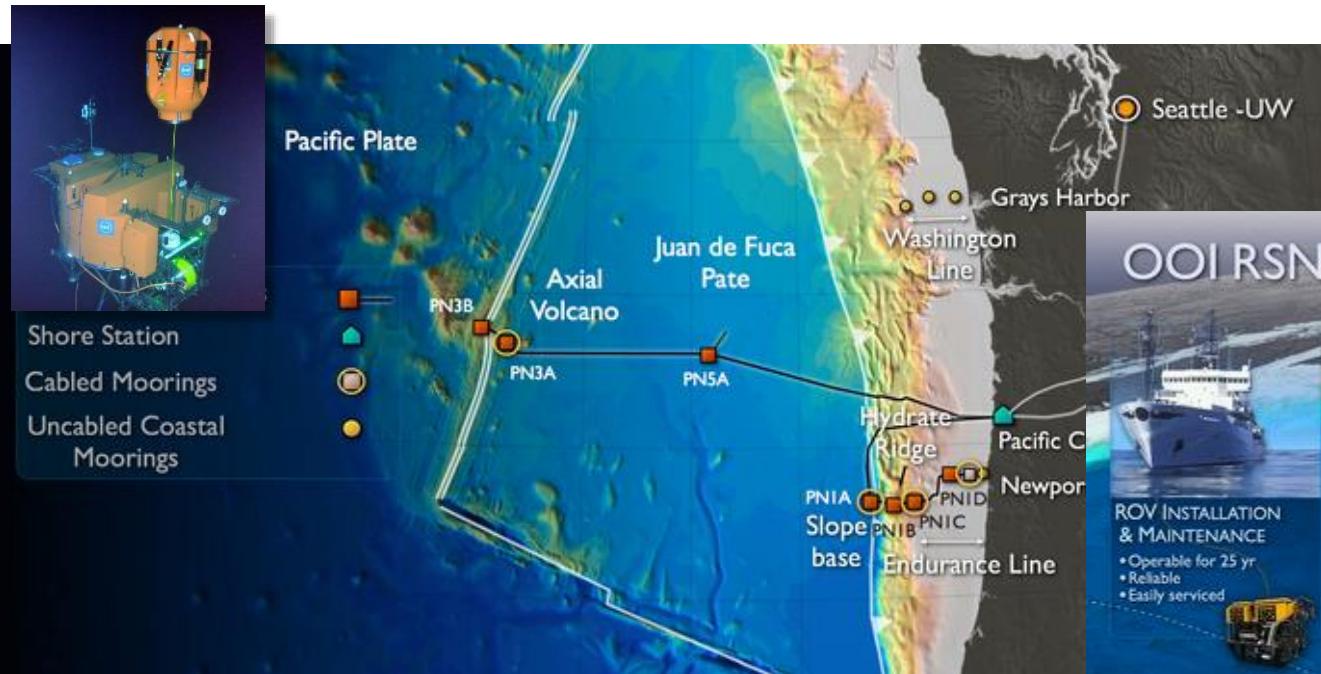
OOI Components: Global Array



- Four* Global Sites
 - Flanking Moorings
 - Profiler Mooring
 - Surface Mooring
 - Gliders (5)
 - Bio-Acoustics
 - Telemetered & recovered data



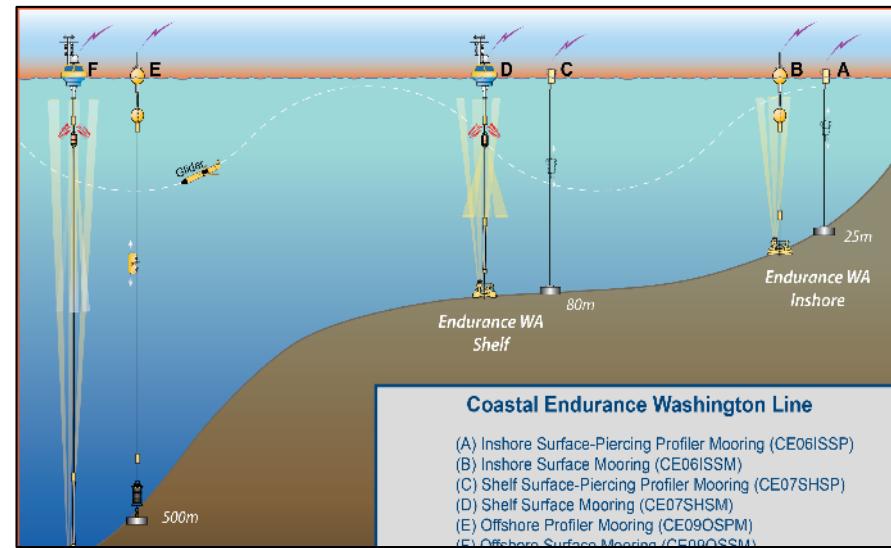
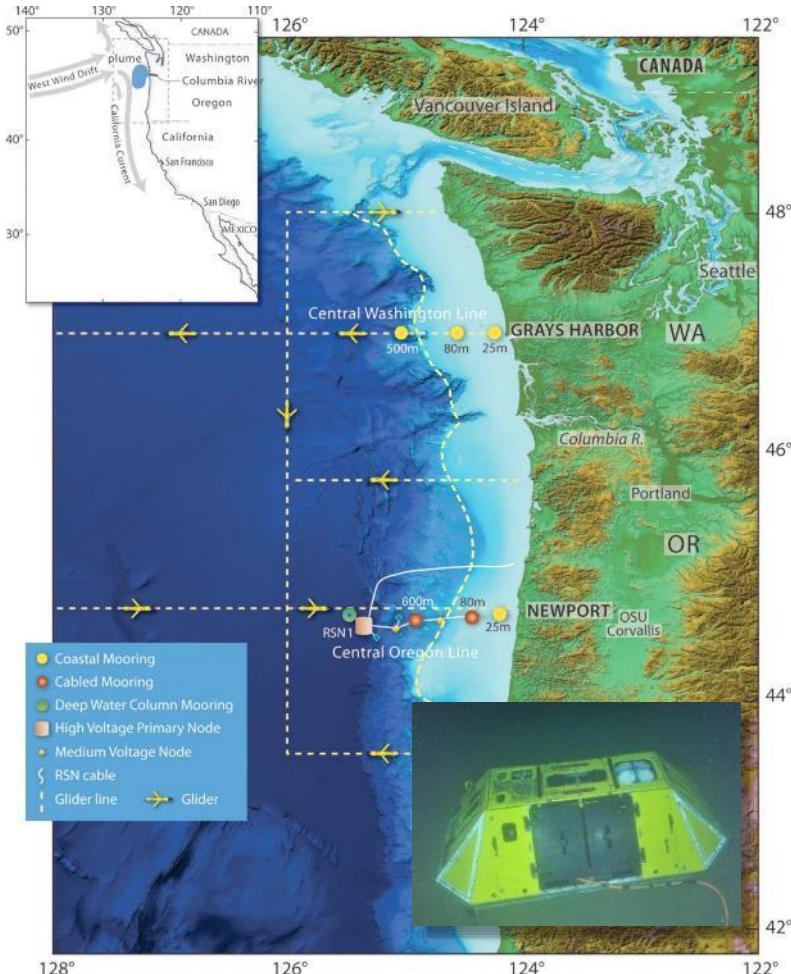
OOI Components: Cabled Array



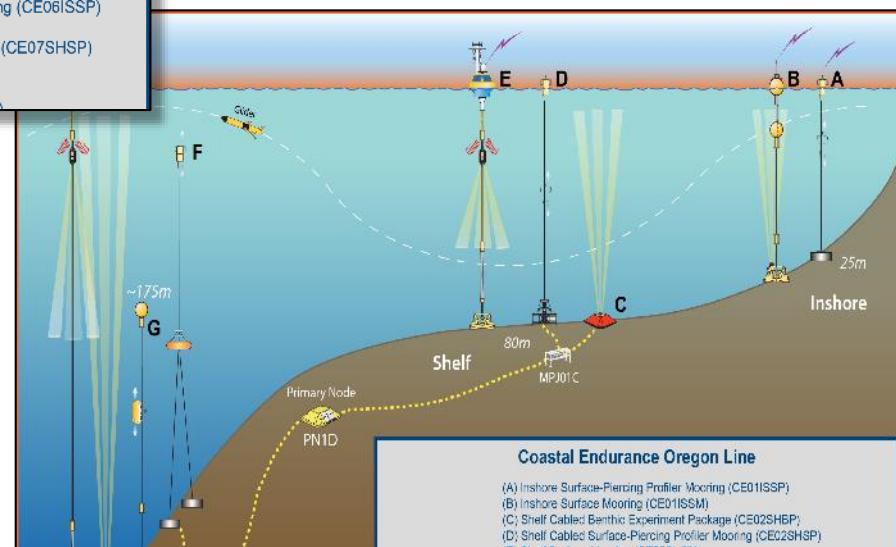
- Moorings
- Profilers
- HD Video
- Hydrophones
- Seismic



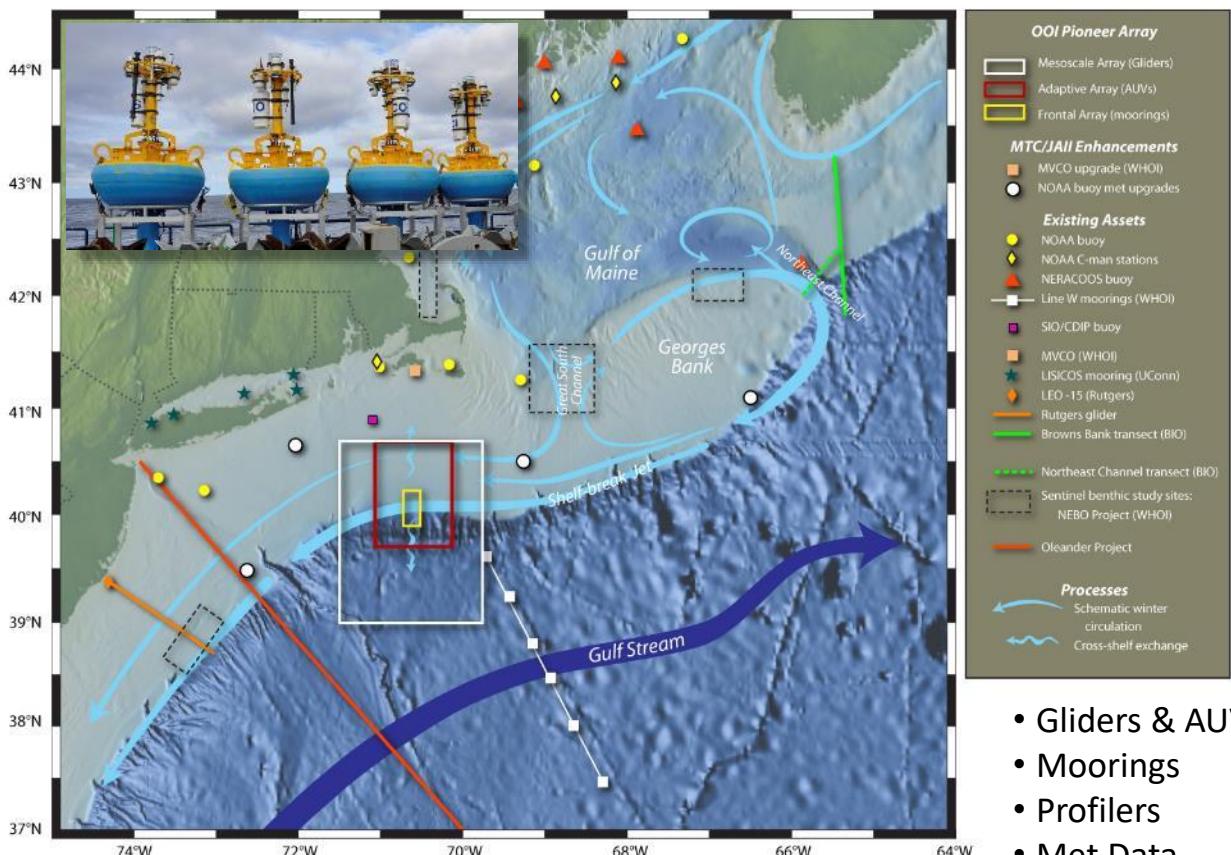
OOI Components: Endurance Array



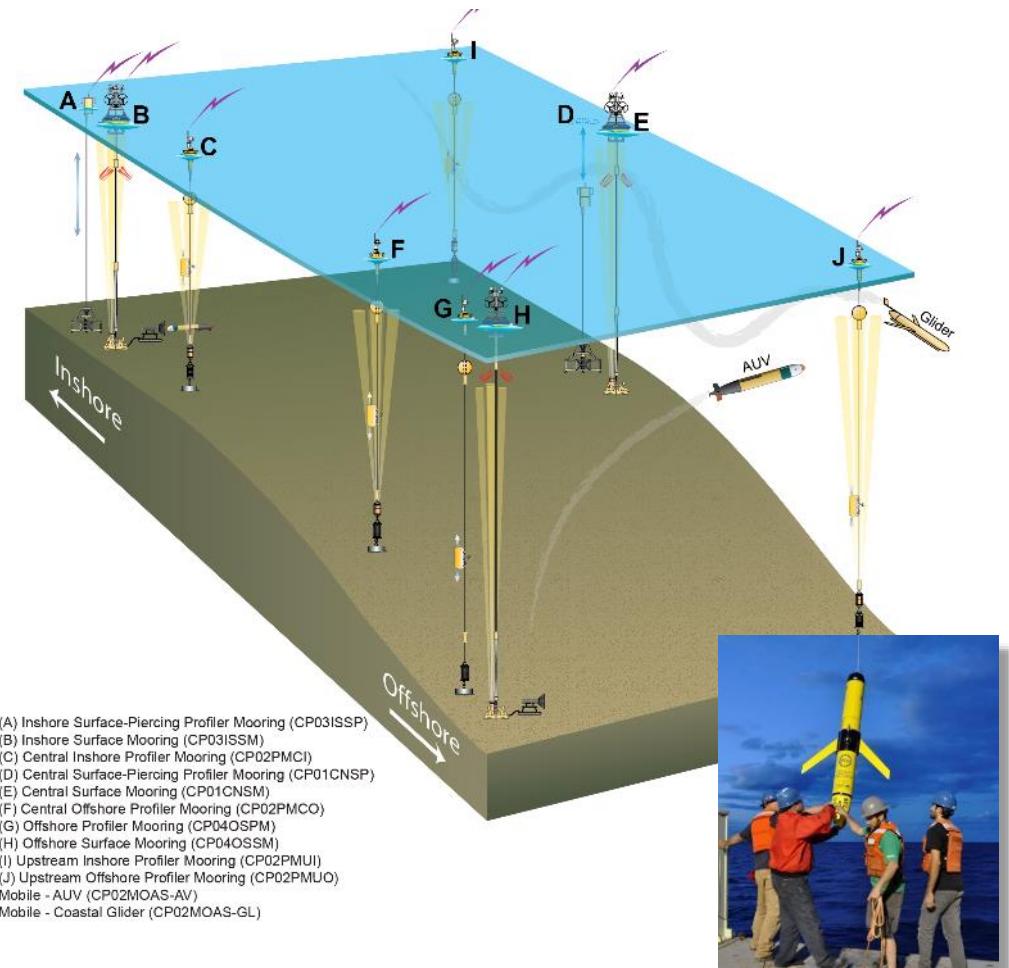
- Gliders
- Moorings
- Profilers
- Met Data
- Telemetered & recovered



OOI Components: Pioneer Array



- Gliders & AUVs
- Moorings
- Profilers
- Met Data
- REMUS AUV (late 2016)
- Telemetered & recovered



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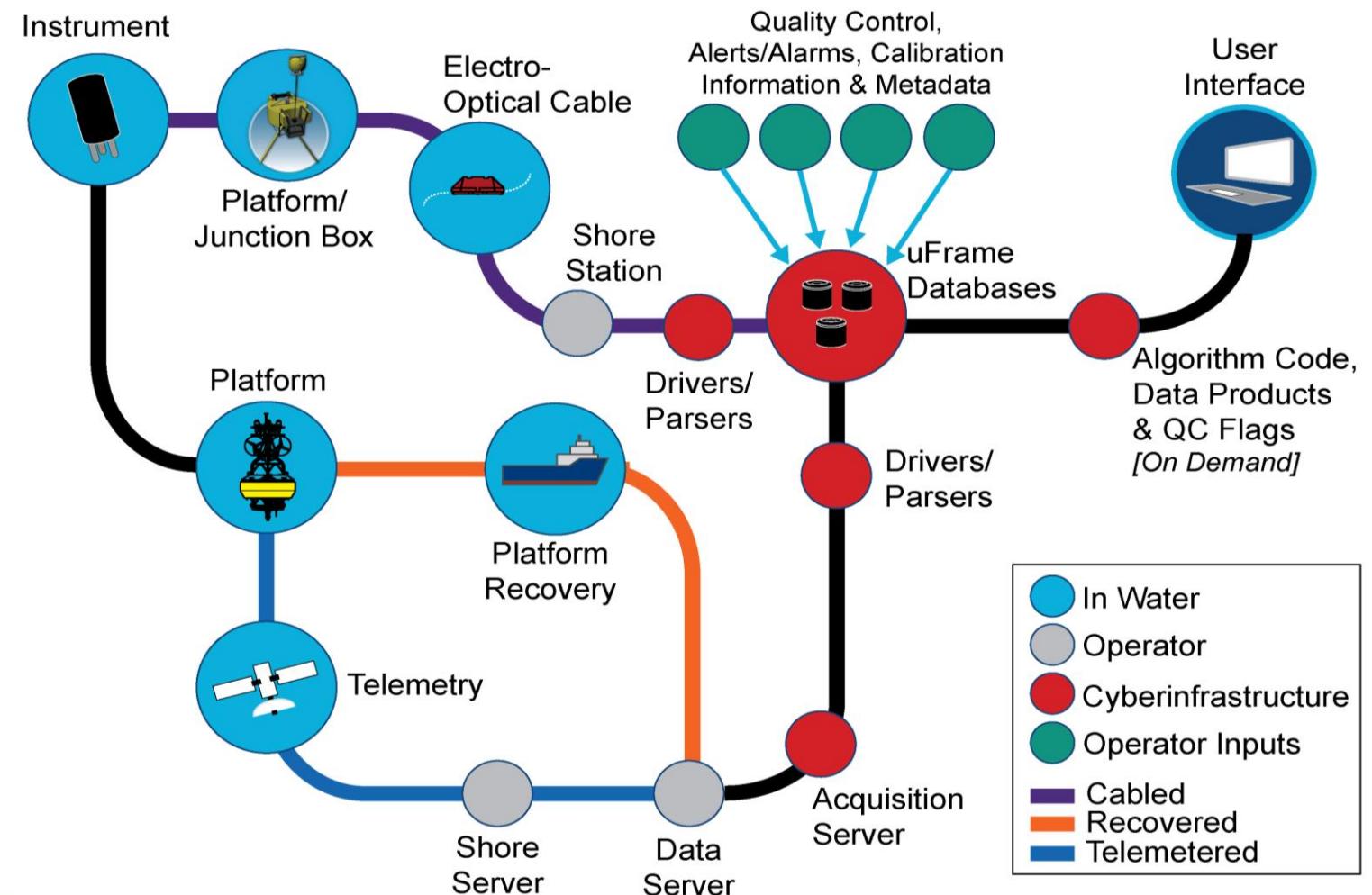
Data Flow Chart

Data types:

- Telemetered Data
- Recovered Data
- Streamed Data
- Shipboard Data
- Metadata (CF 1.6)

Data product levels:

- Raw, L0, L1, L2



OOI Data Status

- All available telemetered and recovered data are ingested and accessible for download
- Rutgers CI currently storing >250 TB of OOI data, including >100 TB of HD video data
- >63 TB of raw and processed data delivered to users
- 5.34 TB of raw data delivered in the last quarter
- All known issues have been annotated. Unless otherwise remarked, the data have not been validated against *in situ* samples taken by instrumentation external to the system.



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OOI: Web Portals

The OOI is funded by the National Science Foundation.

OOI Updates

- 2016 AGU Fall Meeting OOI Town Hall
- November 22, 2016 - We look forward to seeing each of you at the upcoming 2016 AGU Fall Meeting in San Francisco, CA. The OOI will be hosting a town hall Tues., Dec. 13, from 8:15-10:15 PM in Moscone West, Room 2008. The focus of the town hall will be on you, our users, and using OOI data.
- Management and Operation of the Ocean Observatories Initiative (OOI)
- November 22, 2016 - The Division of Ocean Sciences (DOE) of the National Science Foundation (NSF) has recently announced a solicitation (NSP 17-024) that seeks the services of a qualified organization to provide scientific and technical management and operation of the Ocean Observatories Initiative (OOI).
- NOTICE: Oxygen Sensor Calibration Issue**
- November 31, 2016 - A data anomaly came to our attention during the Portland workshop last month regarding some of the OOI oxygen data.

URDLS hosts Workshop Focused on OOI's North East Pacific Array.

October 21, 2016 - The University Research Data Leadership Team (URDLS) hosted a workshop focused on the OOI's North East Pacific Array. The workshop was held at the University of Washington in Seattle, WA.

Main

Research Arrays Select an array on the map or choose from the list.

- Endurance
- Station Papa
- Pioneer
- Argentine Basin
- Iminger Sea
- Southern Ocean
- Cabled Array

Map showing the locations of various research arrays across the Arctic and South Pacific Oceans.

OOINET

Welcome

The Ocean Observatories Initiative (OOI) is a major international science facility that uses advanced technological capabilities to collect data in the ocean and seafloor in real time to measure marine life, climate, and ecosystem health. The OOI also provides a unique platform for education and outreach, and its data are available to the world via a variety of formats, including datasets, publications, and the public.

Mission Data

The OOI is the first truly global ocean observatory system for the long-term collection and integration of data from the ocean floor and surface. It is designed to support scientific research, education, and outreach, and to enable the development of new technologies and applications being developed by the OOI.

Connect Concepts

The OOI is a great place to learn about ocean science and what it means to be a scientist. It also provides a wealth of educational resources for students and teachers, including video clips, interactive games, and activities that help them learn more about the ocean and the science being conducted by the OOI.

Cruise Investigations

The OOI is a great place to learn about ocean science and what it means to be a scientist. It also provides a wealth of educational resources for students and teachers, including video clips, interactive games, and activities that help them learn more about the ocean and the science being conducted by the OOI.

Education

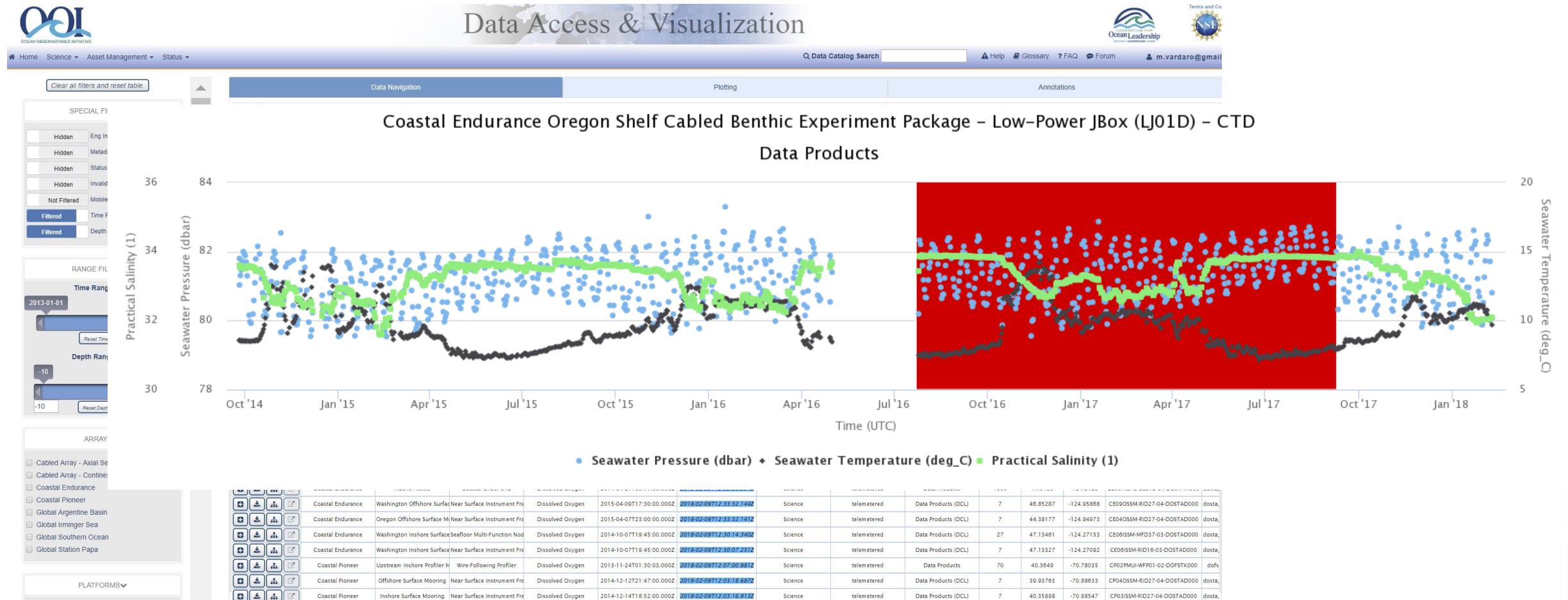
ERDDAP > List of All Datasets

Pick a Dataset

Or use the following search terms:

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All	All	CEMOSR-SP01-02-CTEMOSR-01-streamed_cptp_01_level_0068	Small	HTML	Never			Ocean Observing	oceanobservatories/cemosr_sp01_02_ctemosr_01_ctemosr_01_streamed_cptp_01_level_0068
All	All	CEMOSR-SP01-02-CTEMOSR-01-streamed_cptp_01_level_0069	Small	HTML	Never			Ocean Observing	oceanobservatories/cemosr_sp01_02_ctemosr_01_ctemosr_01_streamed_cptp_01_level_0069
All	All	CEMOSR-SP01-02-CTEMOSR-01-streamed_cptp_01_level_0070	Small	HTML	Never			Ocean Observing	oceanobservatories/cemosr_sp01_02_ctemosr_01_ctemosr_01_streamed_cptp_01_level_0070
All	All	CEMOS							

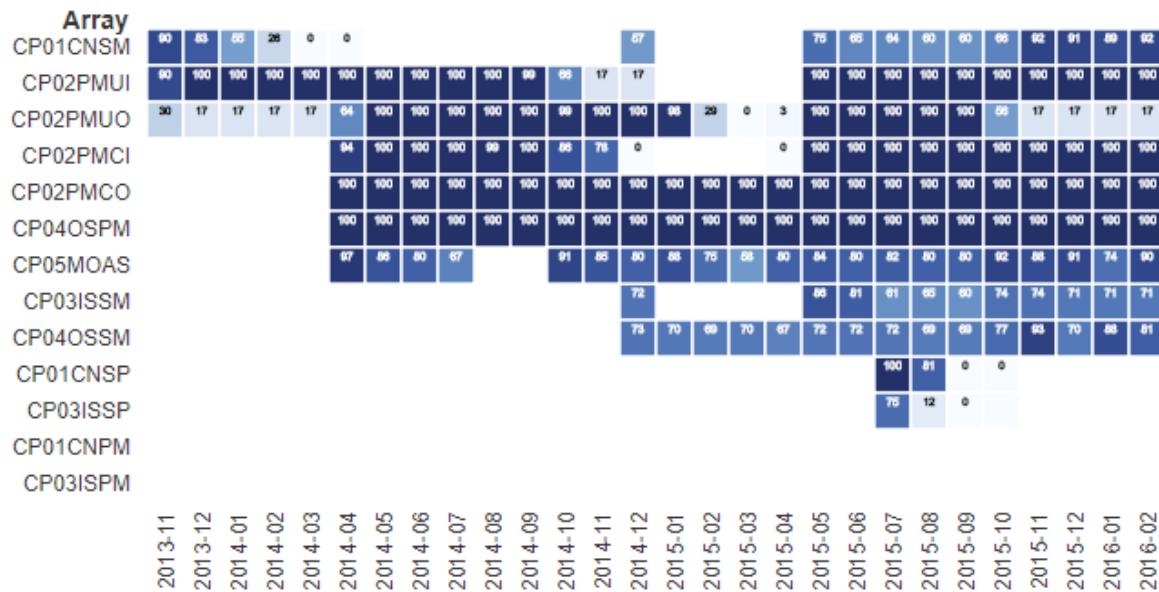
Quick Plots and Data Download



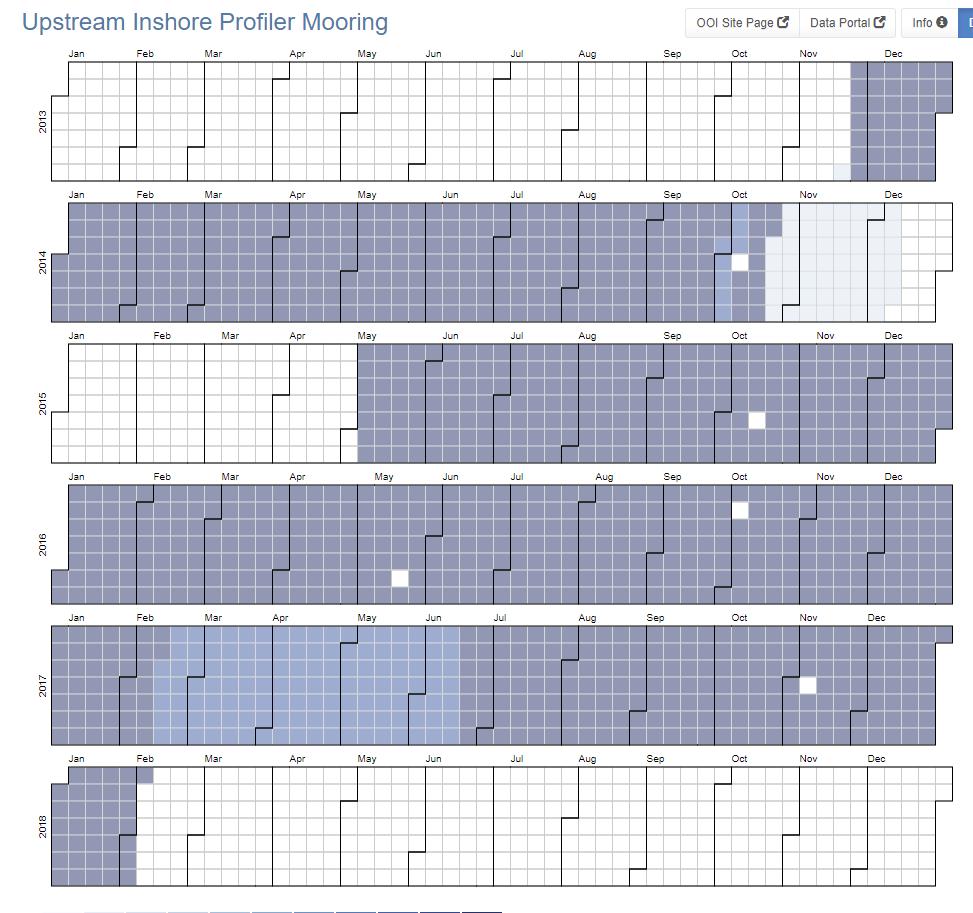
Data Availability

- QC Database: ooi.visualocean.net

Coastal Pioneer

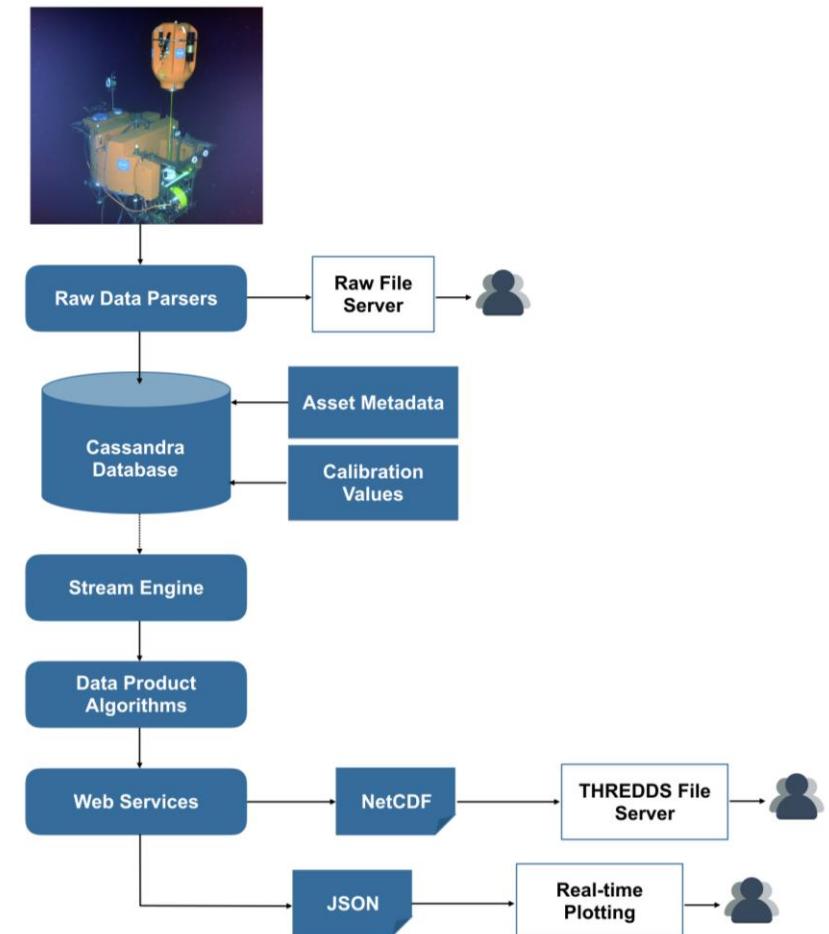


Upstream Inshore Profiler Mooring



Machine-to-Machine RESTful API

- Raw data, metadata, & calibration values extracted on demand, algorithms applied
- NetCDF data/metadata always the full time range requested, assembled once data products are created (asynchronous)
- Synchronous JSON requests decimated down to a maximum of 20,000 data points
- JSON response is instantaneous, making it useful for real-time plotting applications
- **Poster # OD44A-2786 – Friedrich Knuth**



OOI ERDDAP

Current ERDDAP Status

- 1655 streams available
- Telemetered, currently deployed systems
- Data available via uFrame

Future Updates

- Additional telemetered data sets updated as deployed
- Cabled Array data
- Recovered data (requires additional storage)
- Multidimensional dataset issues

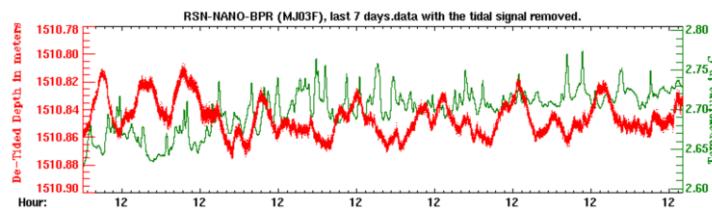
The screenshot shows a table with 1394 rows, each representing a dataset. The columns are: Grid, Sub-DAP, Table, Make, W, Source, Data, Title, Summary, FGDC, ISO, Metadata, Back-ground Info, RSS, E-mail, Institution, and Dataset ID. The 'Title' column contains entries like "The List of All Active Datasets in this ERDDAP", "Coastal Endurance Oregon Inshore Surface Mooring Near Surface Instrument Frame 3-Wavelength Fluorometer", and "Coastal Endurance Oregon Inshore Surface Mooring Near Surface Instrument Frame CTD ctdbp_cdef_dcl_instrument". The 'Summary' column mostly shows 'M' (Deployment) or 'D' (Deployment/Recovered). The 'Institution' column consistently lists 'OOI'. The 'Dataset ID' column includes identifiers such as 'CE01ISSM-RD16-02-FLORTD000-flort_dcl_instrument-telemetered-deployment0007-tabledap' and 'CE01ISSM-RD16-03-CTDBPC000-ctdbp_cdef_dcl_instrument-telemetered-deployment0007-tabledap'.

<https://erddap-uncabled.oceanobservatories.org/uncabled/erddap/index.html>

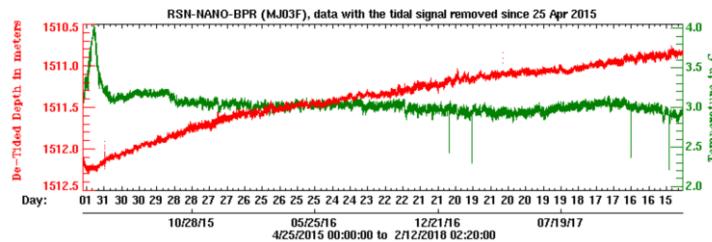


Community Datasets & Tools

<http://oceanobservatories.org/community-tools/>

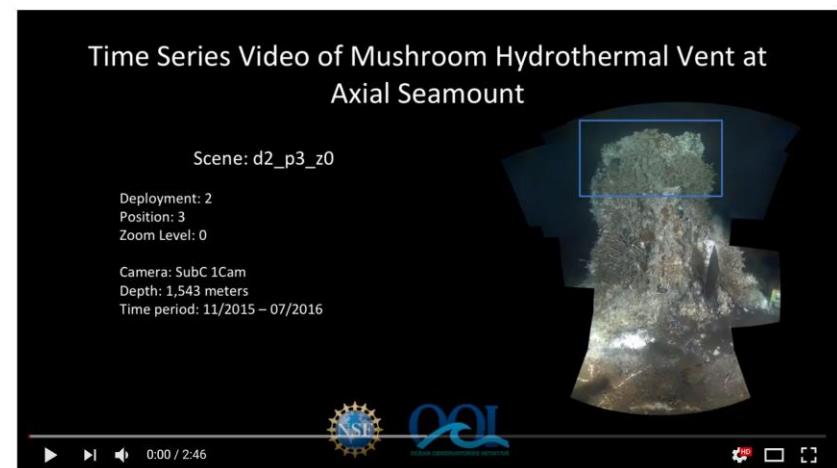


Plot 1: NANO-BPR pressure data with predicted tides removed (red) and temperature (green), over the last 7 days.



De-tided Bottom Pressure
Recorder (BOTPT) data
W. Chadwick (OSU/CIMRS)

Student-collated biology catalog
from Axial Seamount, using
ROV and HD video records
*D. Kelley (UW) & L. Sautter
(Charleston)*



Time-lapse videos of vent dynamics at Axial Seamount, using HD Video data
A. Marburg (UW/APL), T. Crone (LDEO) & F. Knuth (Rutgers)



Partnerships

IRIS



Data Services Newsletter

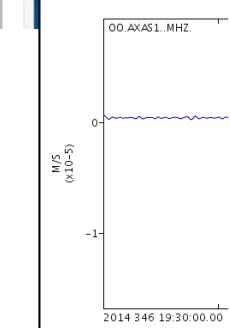
Volume 16 : No 3 ; Winter 2017

Previous: Building the EarthCube GeoWS block access across multiple geoscience domains

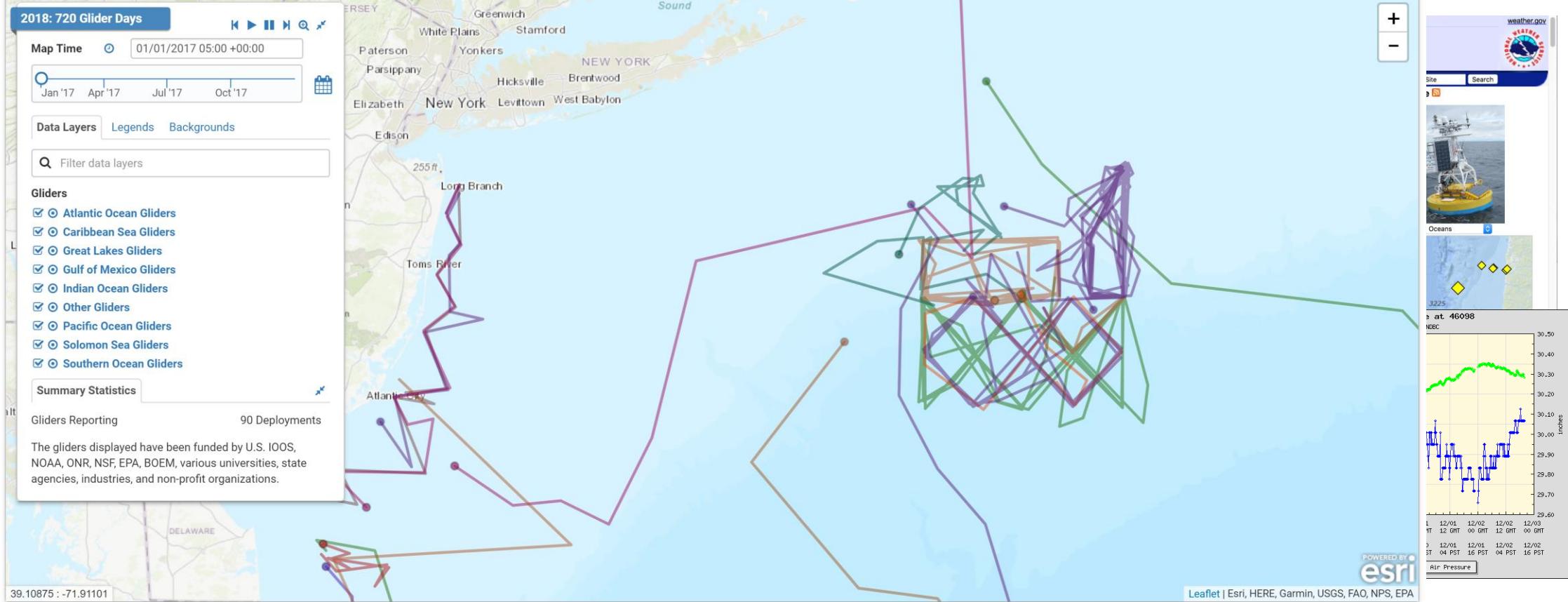
Data from the OOI Catalog

IRIS has been working with the Ocean Leaders along the coast of Washington and Oregon available through the IRIS DMC. The seismic network code for the Oceans

Read the Ocean Leadership announcement »



IOOS | Underwater Glider DAC Map

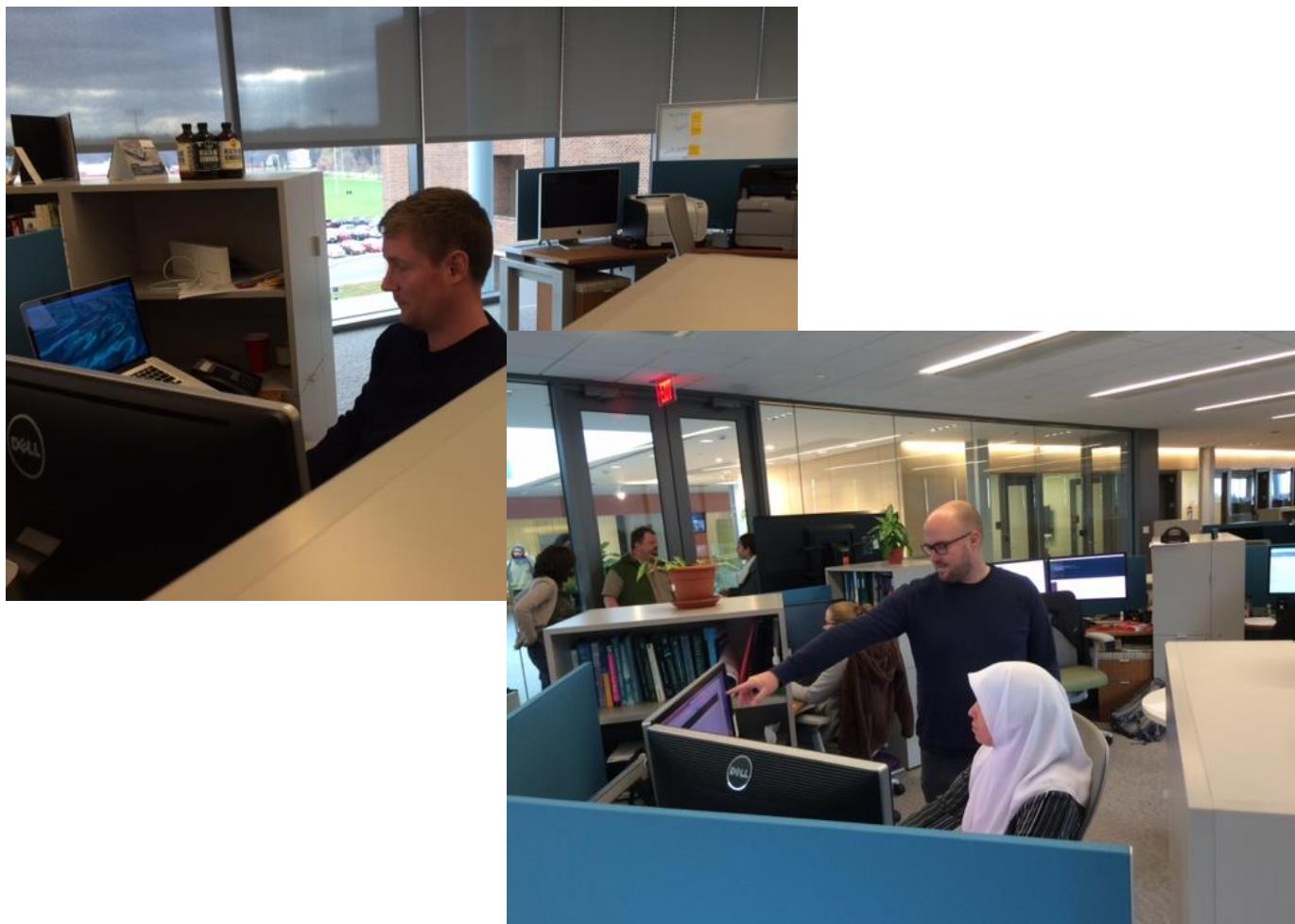


Overview

1. Introduction to OOI
2. Data Flow & Products
3. Data Access
4. Data Review
5. Conclusions



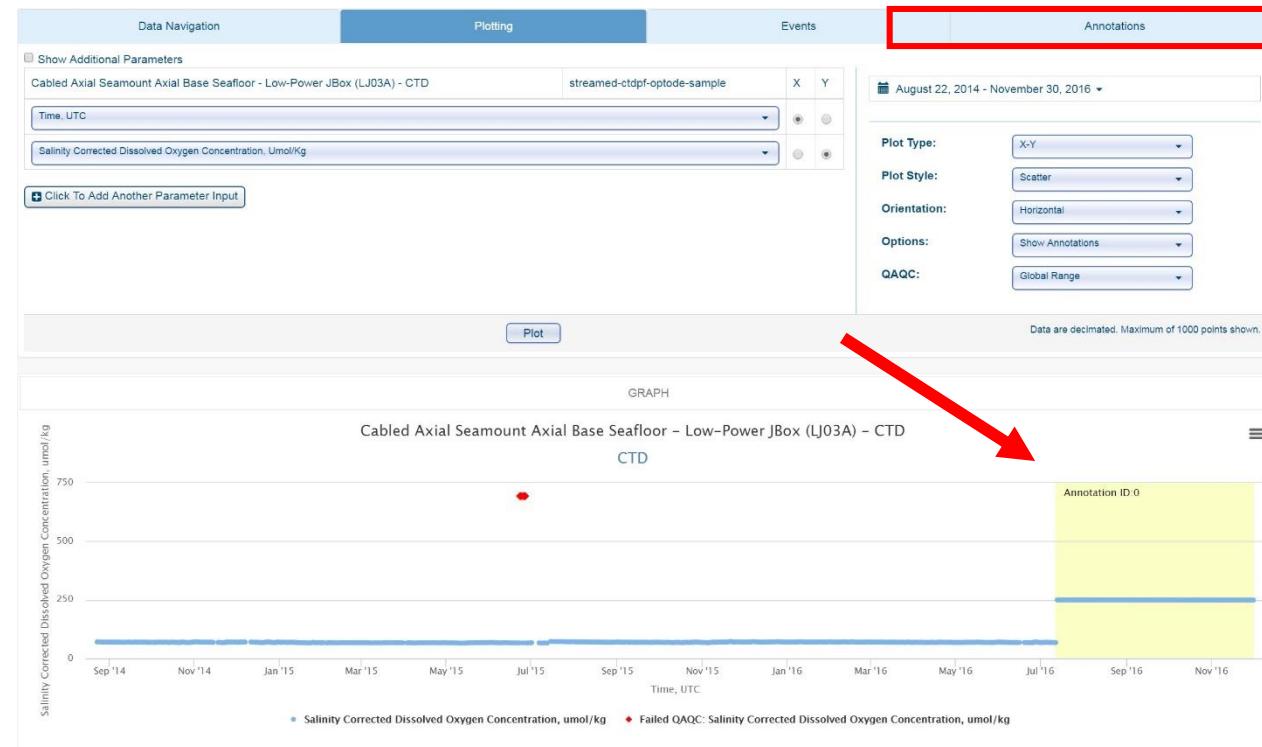
Data Team Primary Goals



1. Monitor the operational status of data flowing through the OOI system
2. Ensure the availability of OOI datasets in the system (raw, processed, derived, and cruise)
3. Ensure that data delivered by the system meets quality guidelines
4. Report operational statistics on data availability, data quality, and issue resolution

Data Annotation

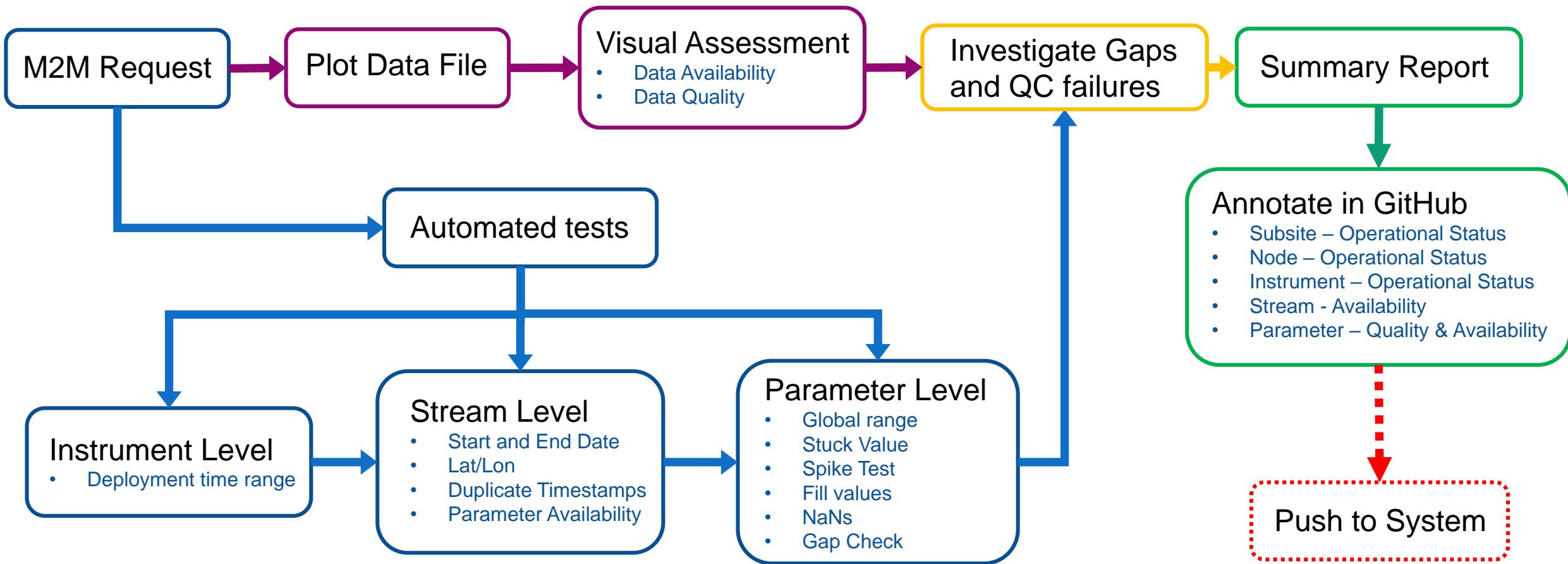
- Annotations are the primary means of communication between data team and users
- Annotations can be directly entered via the GUI for specified data streams
- Annotation text appears in a tab on the data catalog/plotting page
- Annotation time ranges can be shown on plots (via “Options” interface)
- Annotations also included in downloaded data



Annotation ID	Annotation	Reference Designator	Stream Name	Start Date	End Date	Exclude Data?
0	These data are suspect, possibly due to incorrect vendor calibration values. Raw phase data should be correct, but the derived O2 products should not be used from 7/12/16 onwards.	RS03AXBS-LJ03A-12-CTDPFB301	streamed_ctdpf-optode-sample	Tue, 12 Jul 2016 00:00:00 GMT	Thu, 01 Dec 2016 23:41:00 GMT	false

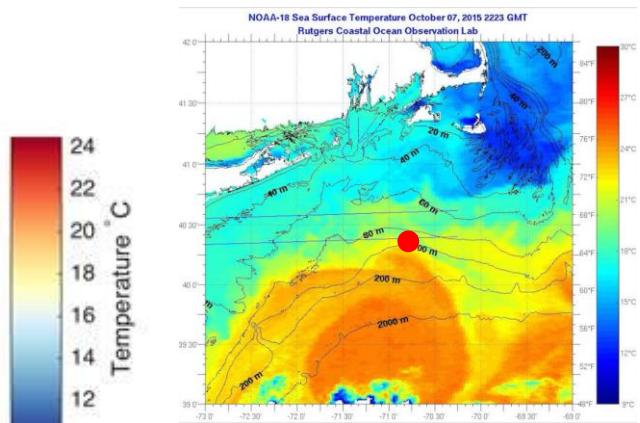
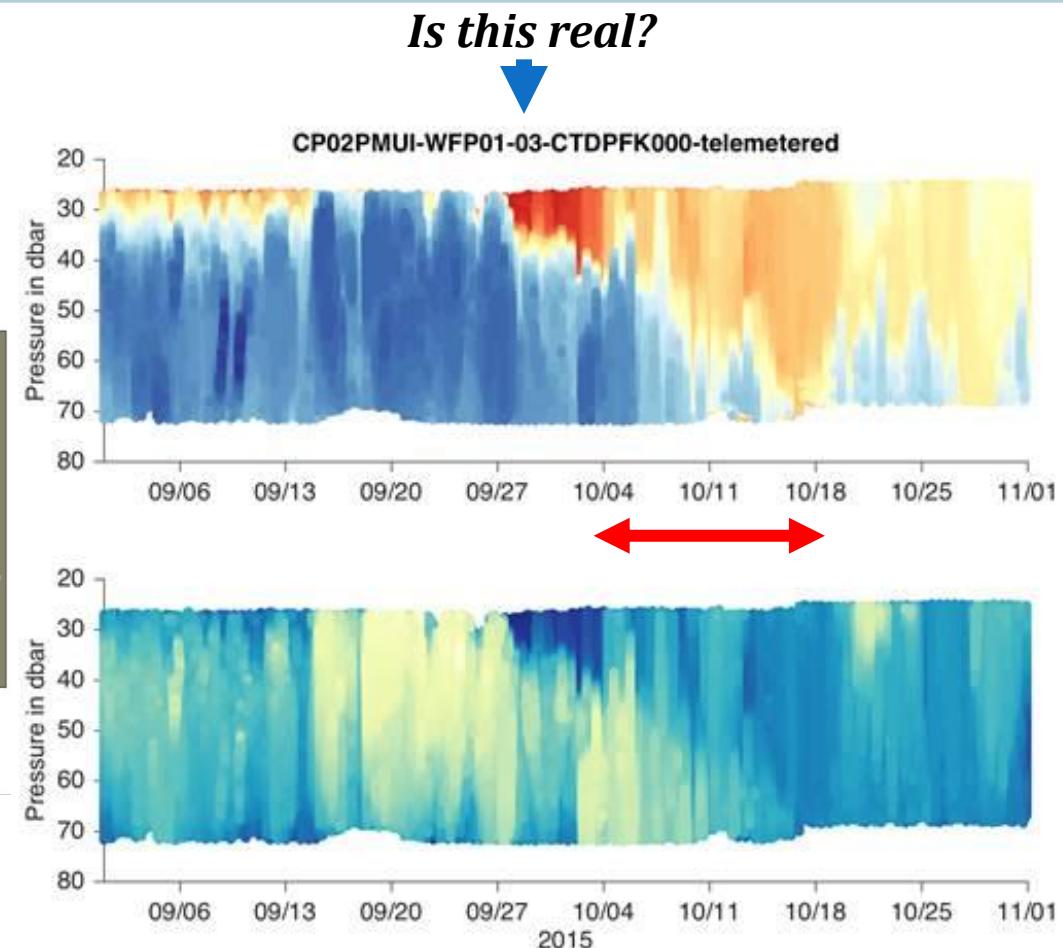
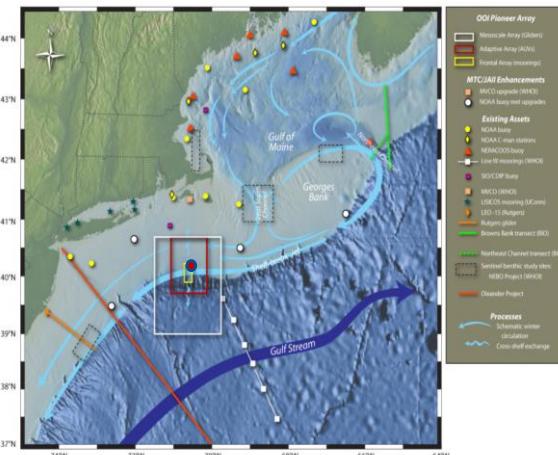


Rest in Class Data Review Workflow

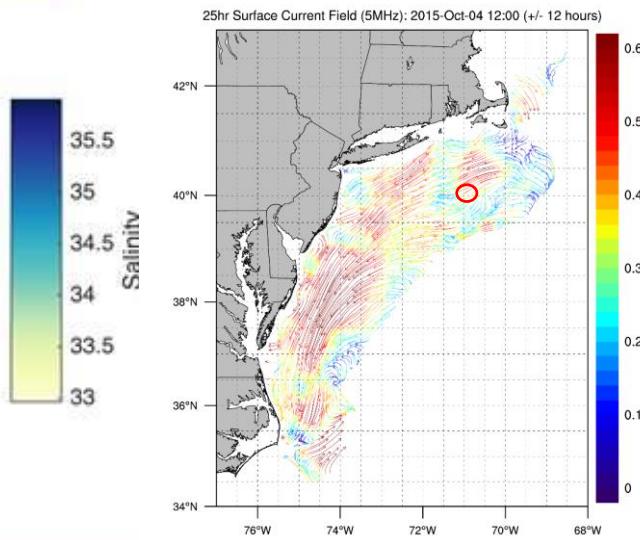


Science Evaluation: Are ocean features encountered real? Outside local range

Taking advantage of all assets, even non-NSF, to assess data quality

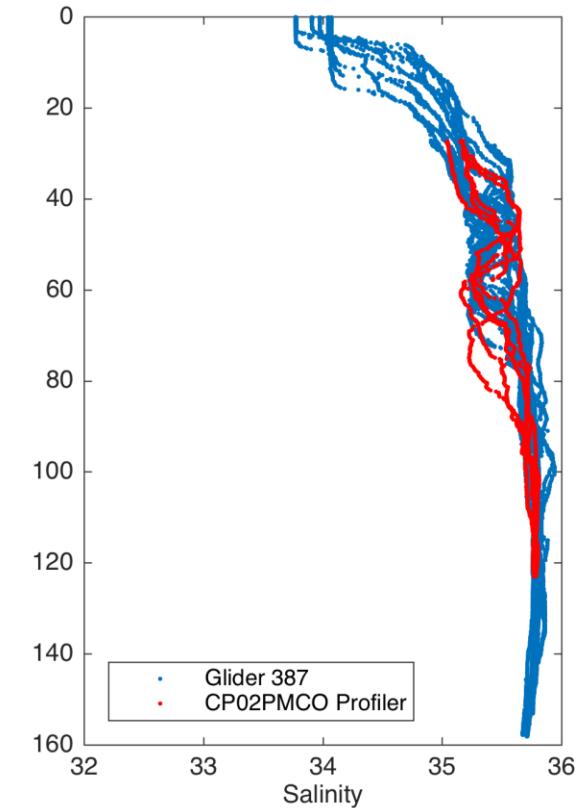
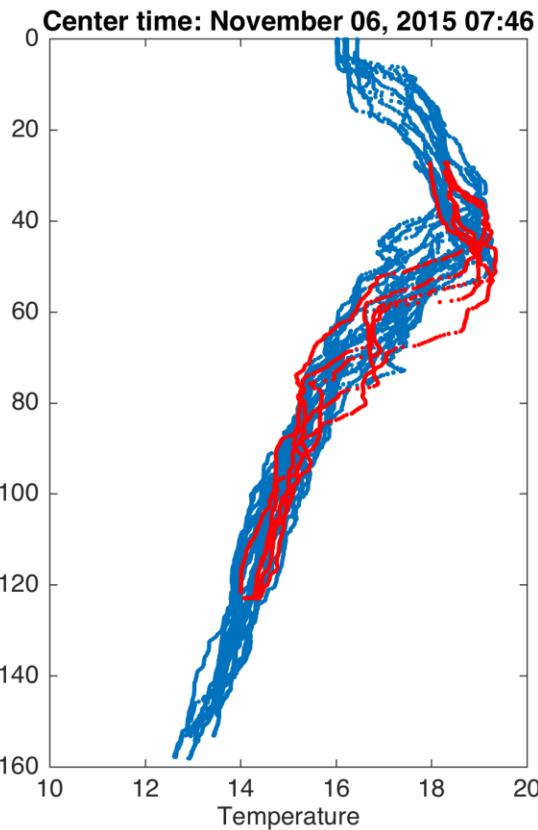
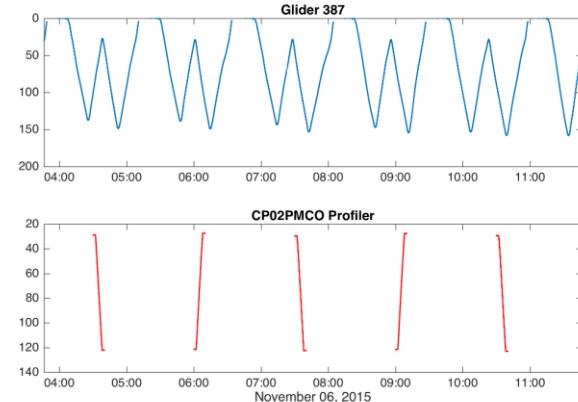
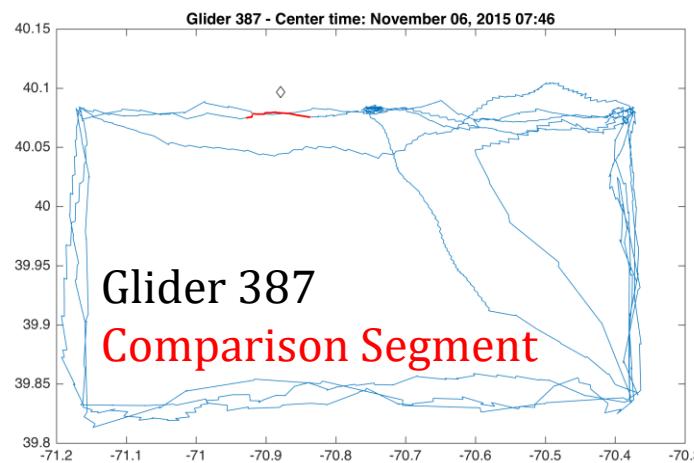


100S data shows presence of warm core ring



*IOOS data
shows
ocean
response
to storm*

Vicarious Calibration - Comparisons enabled by ERDDAP



Co-located and concurrent Temperature and Salinity Profiles
Blue – Glider 387 Red – Coastal Pioneer Profiler Mooring



CI Priorities

- Data product creation: Hydrophone data, Osmosampler, pCO₂ Flux, VADCP, interpolation issues
- Data discovery: navigation of data catalog, missing pressure data, image galleries, stream name consistency
- User experience: login fixes, interpolated plots, data download issues (missing status, provenance errors), status indicators and dashboard, addition of multiple-stream download
- Quality control: data displayed outside deployment time range, QC lookup values, fill value support, improved annotations



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Conclusions

1. A large amount of high quality data has been and continues to be collected, with high science value
2. Data review is our primary focus, given maturation of the system and control over data ingestion
3. Data team accelerating review via development of specialized tools
4. Short-term, medium-term, and long-term goals for improving data quality and delivery
5. OOI is providing a curated, consistent data system delivering data and metadata to the community



Rutgers Data Team



Mike Crowley



Mike Vardaro



Sage
Lichtenwalner



John Kerfoot



Leila
Belabassi



Mike Smith



Friedrich
Knuth



Lori Garzio



Questions?

- OOI Main Web site: <http://oceanobservatories.org>
- Data Portal: <http://ooinet.oceanobservatories.org>

Help Desk: help@oceanobservatories.org

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Acknowledgements: NSF, COL, Rutgers University, University of Washington, WHOI, Oregon State University, Raytheon

