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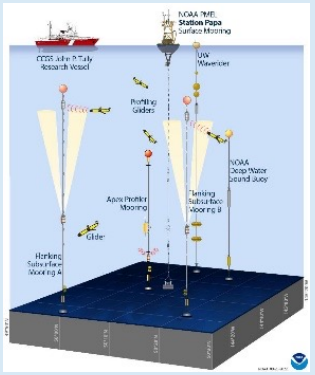
Community Engagement Report
2024 OOIFB Spring Meeting

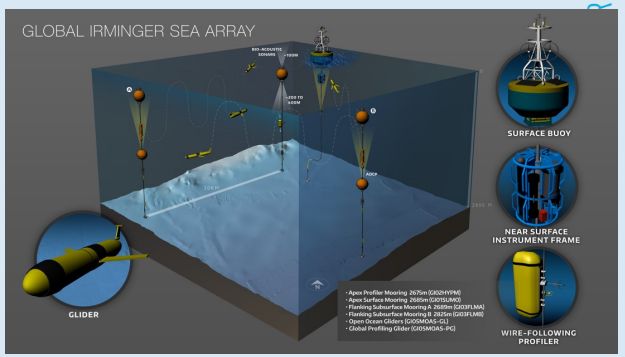
Jim Edson

May 8, 2024

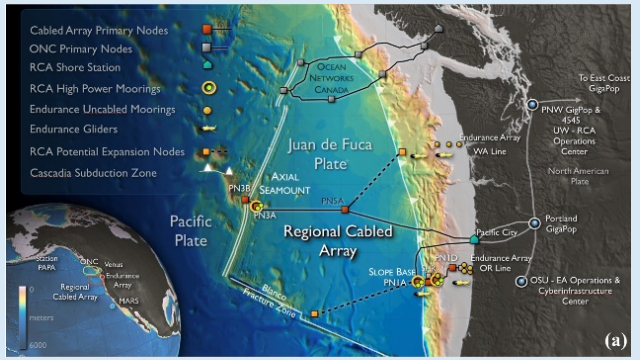
NSF's Ocean Observatories Initiative

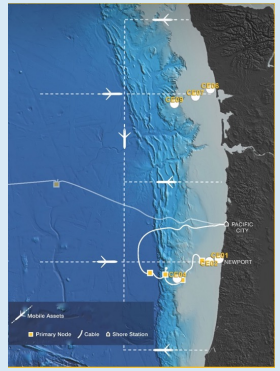
A System of Systems



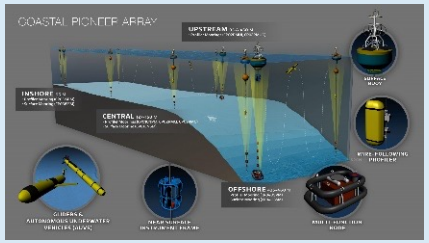


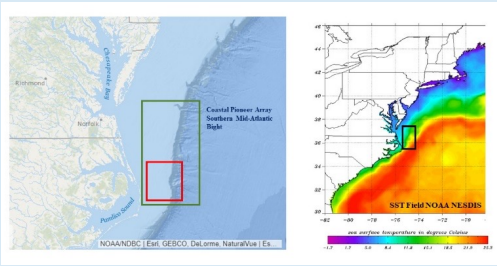
Global Station Papa and Irminger Arrays





Regional Cabled and Coastal Endurance Arrays





Coastal Pioneer Arrays at NES and MAB

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Democratization of Data

The OOI provides research quality data to the user community. These data are freely available to researchers, educators, and the general public in near real-time at:

https://oceanobservatories.org/

Palevsky et al., 2023: *OOI Biogeochemical Sensor Data Best Practices and User Guide. Version 1.1.1. OOI* Biogeochemical Sensor Data Working Group. https://doi.org/10.25607/OBP-1865.2 **GOOS ENDORSED PRACTICE**

Riihimaki et al., 2024: *Ocean Surface Radiation Measurement Best Practices,* Frontiers, accepted.

ECV Collected

Surface Variables

- Pressure
- Radiative Fluxes
- Temperature
- Humidity
- Precipitation
- Moisture/Evaporation
- Vector Wind
- DC Stress & Buoyancy Flux

Oceanographic

- Net Surface Heat Flux
- Temperature Profiles
- Salinity Profiles
- Currents Profiles
- Sea Level

Biogeochemical Sensors (at multiple depths)

- pH
- pCO_2
- Oxygen
- Plankton & zooplankton
- Nitrate
- Chlorophyll-*a*
- Methane
- Sound

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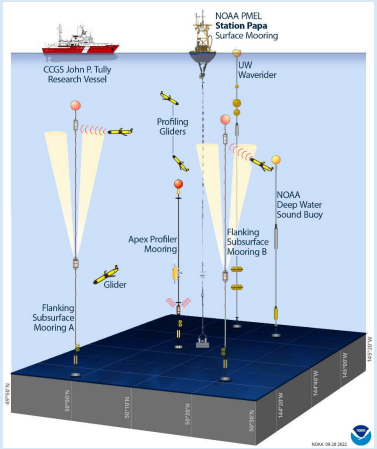
Some Recent Activities

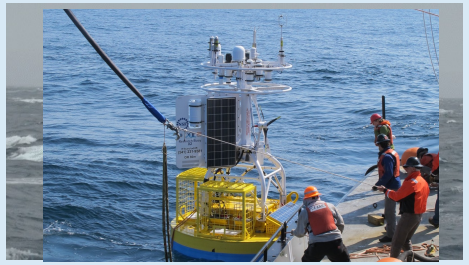
- Station Papa

  Effort to better combine the CGSN and PMEL components of Papa into a more integrated array, and to add an FDCHP on the PMEL surface mooring to mimic the Irminger global array.



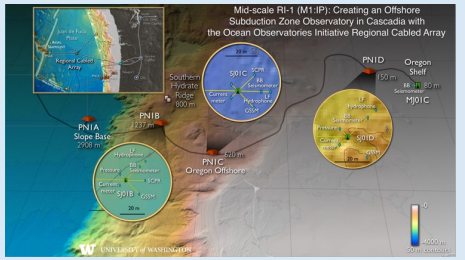
- Wave Energy Conversion (WEC)

  Working with several companies to provide wave energy to our Coastal and Global by harvesting the platform motion. This would provide more continuous energy in additional to our solar and wind turbine systems.



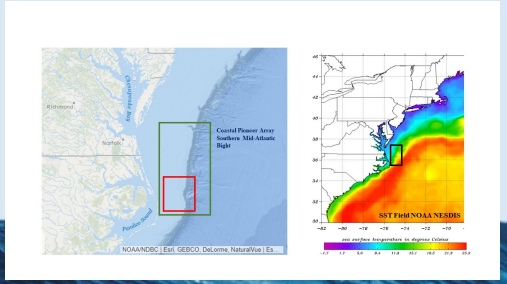
- Mid-Scale RI-1 Project

  Creating an Offshore Subduction Zone Observatory in Cascadia with the OOI Regional Cabled Array.



- Pioneer Re-location

  Moving the array from the New England Shelf to the Mid-Atlantic Bight. More from Al.



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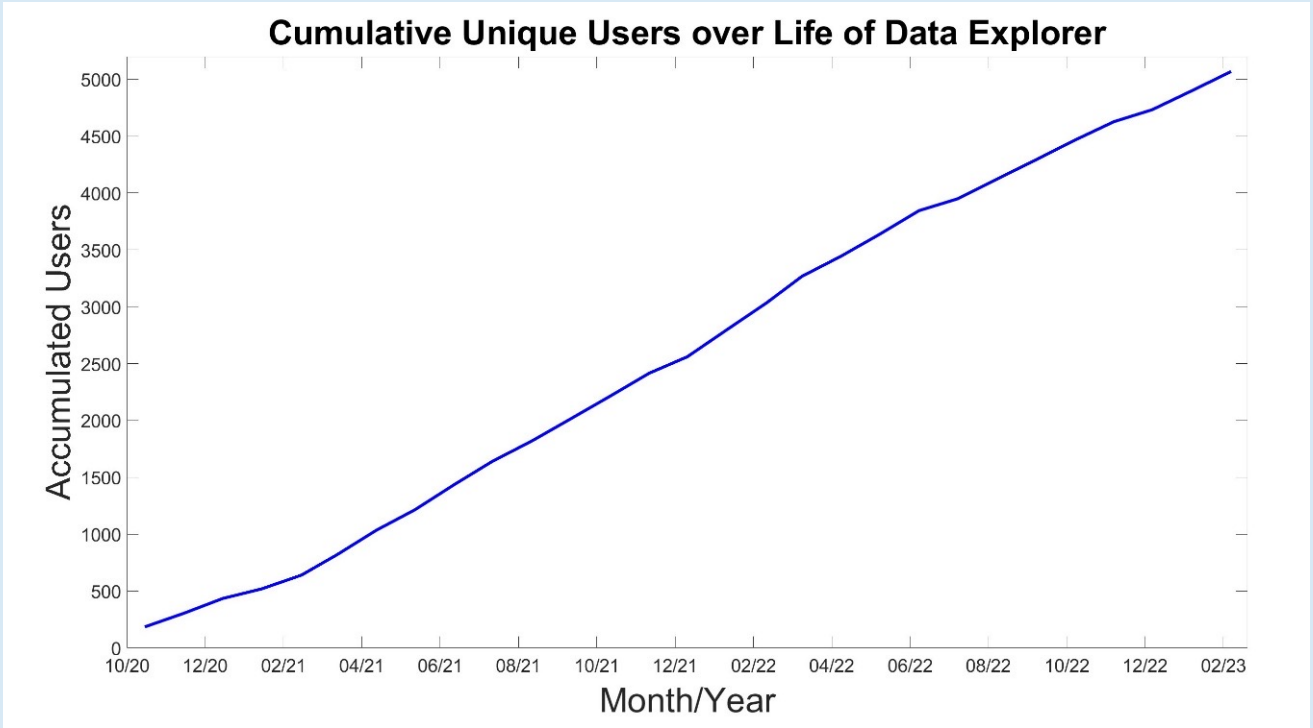
Increased Visibility = Community Growth

- Steady and growing data requests
- Steady and growing data user community
- Steady and growing publications



- **The OOI does not require user to register before downloading data.**
- A unique user is defined as an individual that comes to the Data Explorer website at least once as defined by Google Analytics.
- Each user is counted only once, i.e., a person who visits Data Explorer a hundred times is counted as one unique user.
- These numbers do not include users who access OOI data via distributors such as IRIS, NDBC, IOOS, and the Glider DAC.

Increased Visibility = Community Growth

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- Steady and growing data user community
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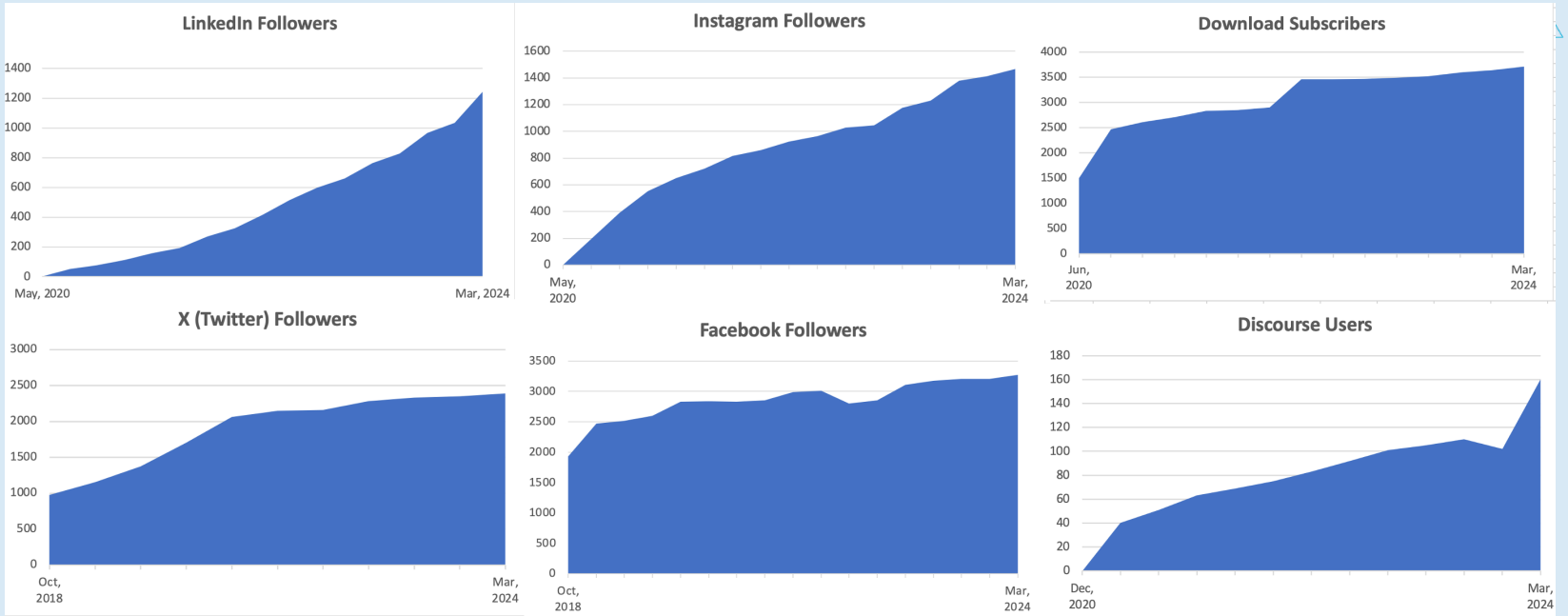
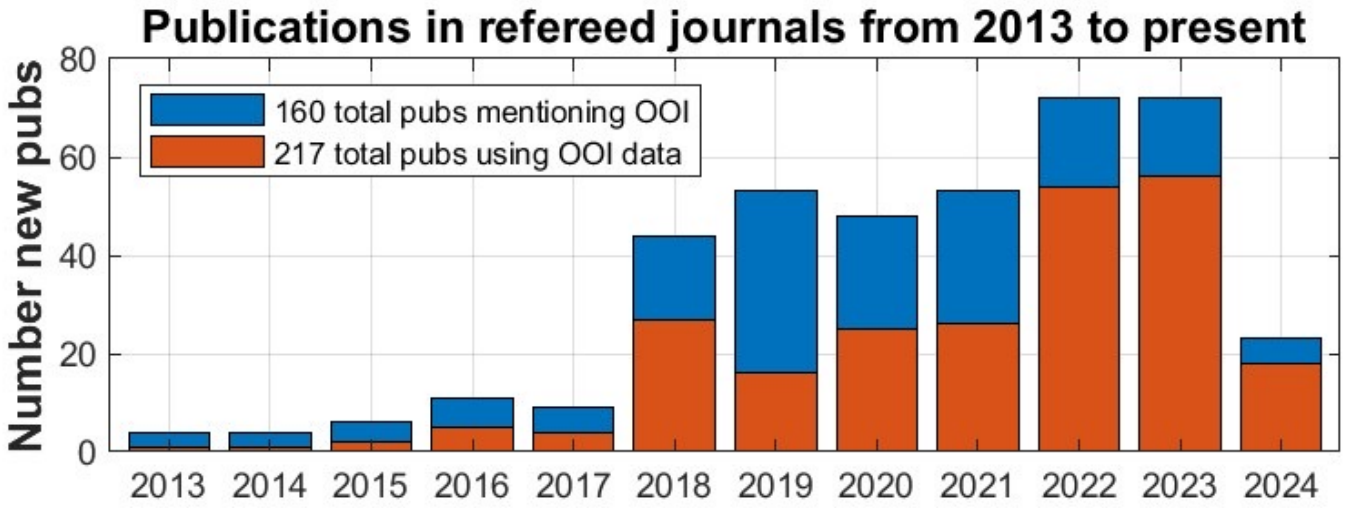
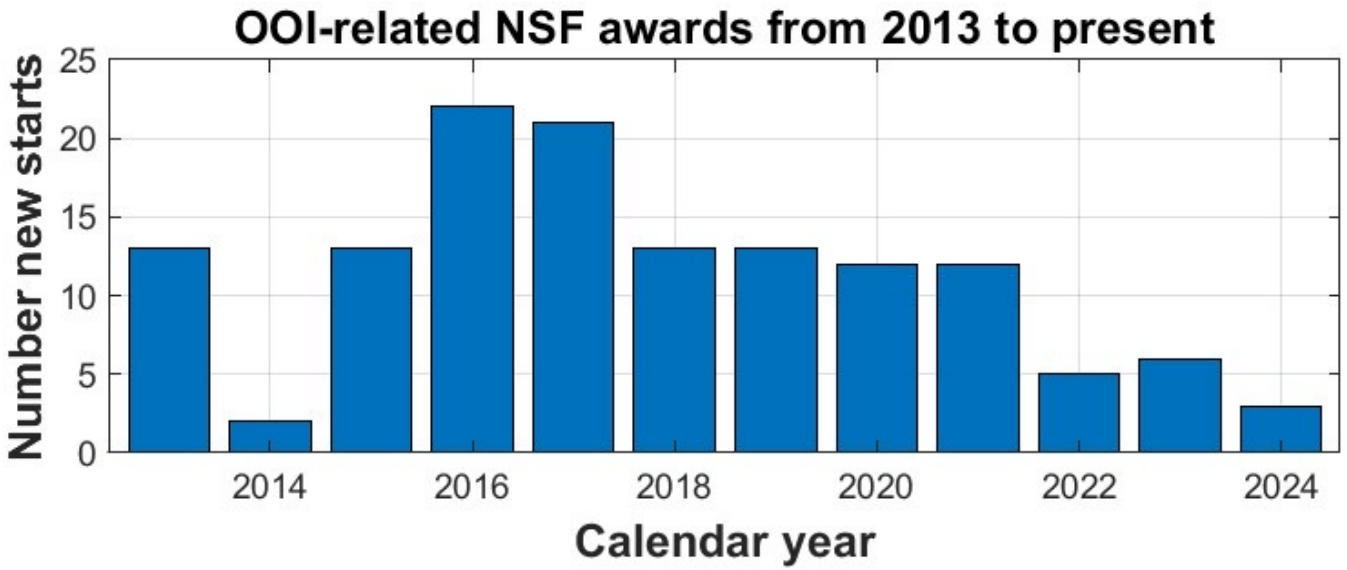


Reaching Audiences: How are we doing?

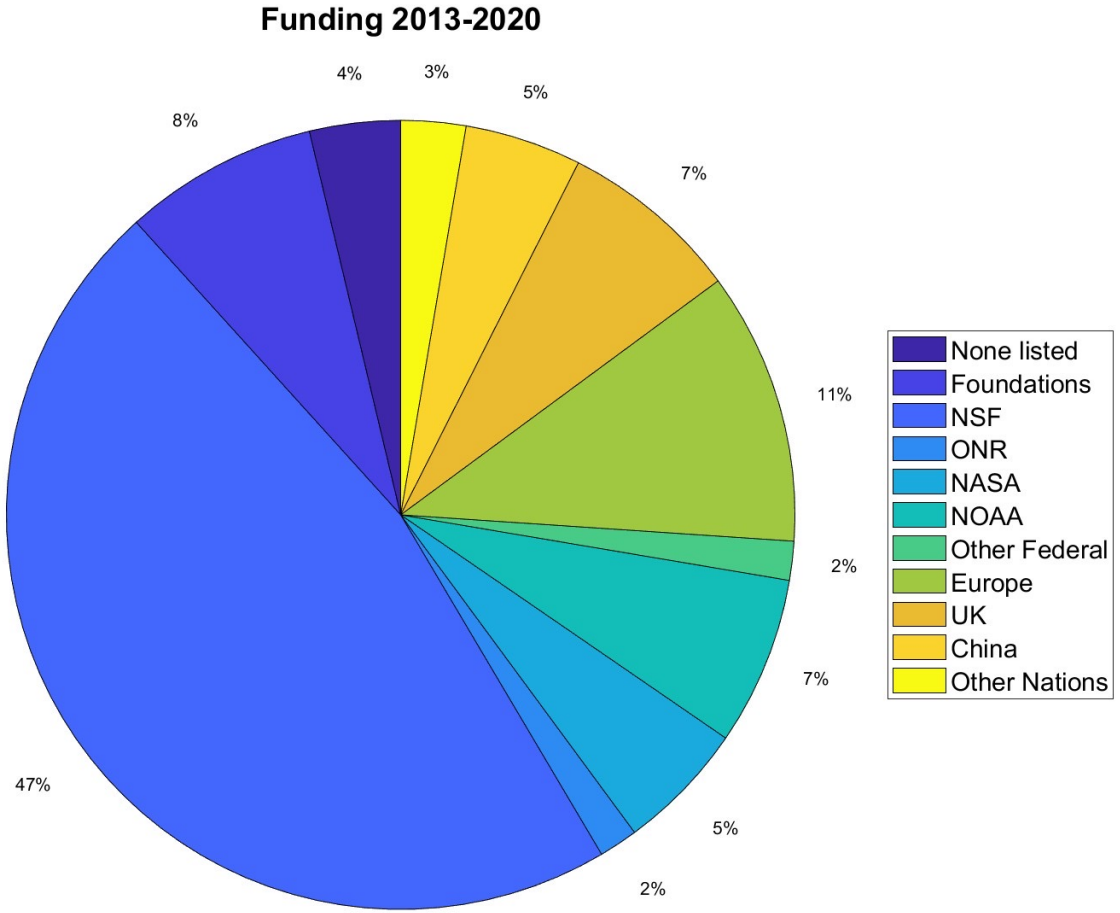
Increased Visibility = Community Growth

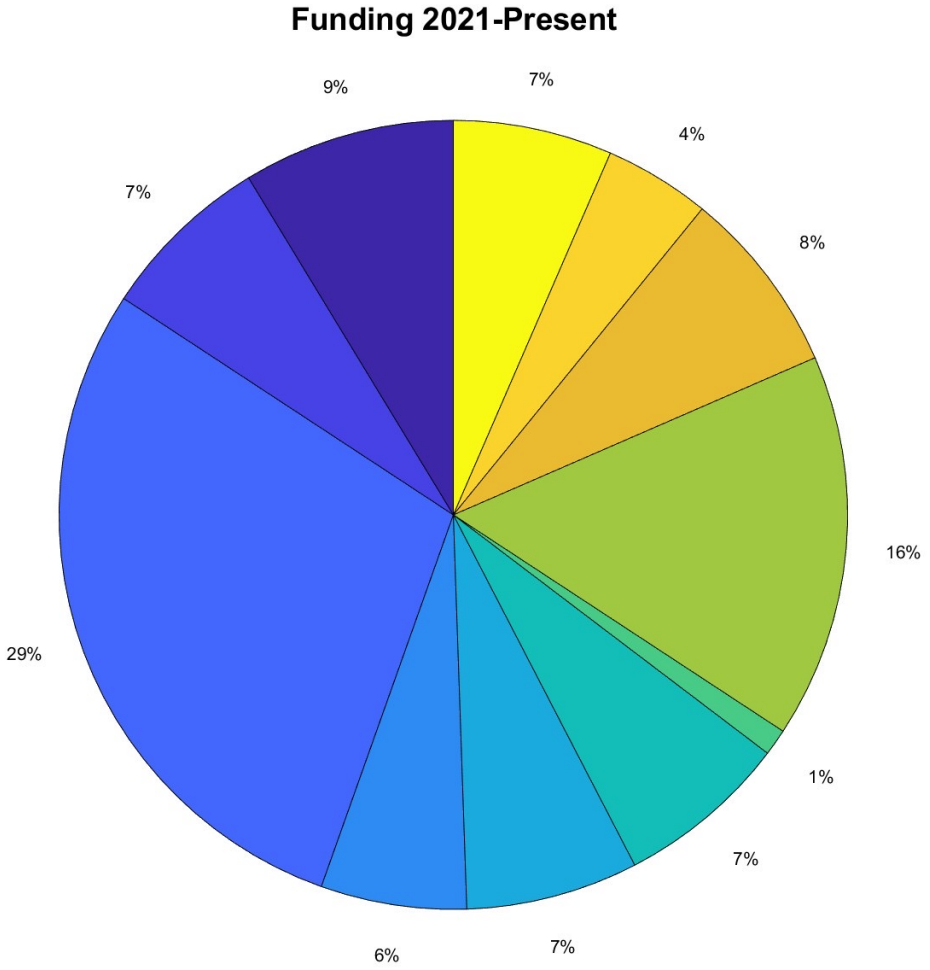
- Steady and growing data requests
- Steady and growing data user community
- Steady and growing publications
- Steady and growing external funding





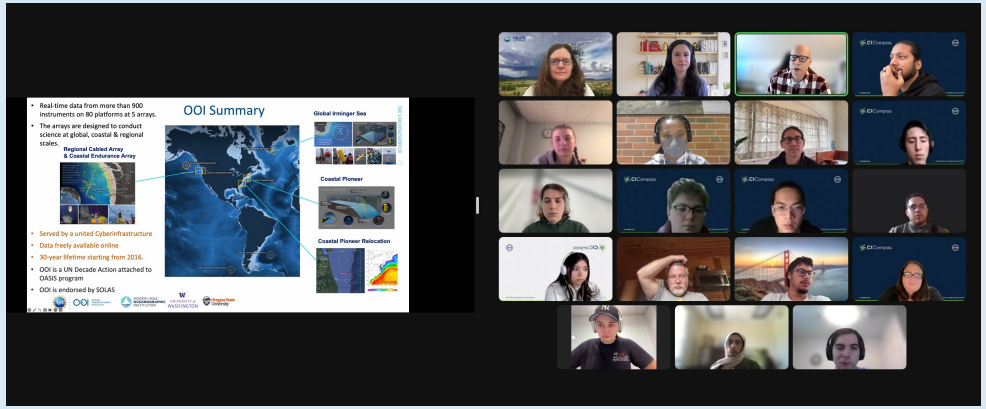
Increased Visibility = Community Growth





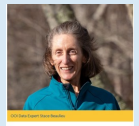
Community Engagement Highlights

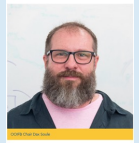
- Represented OOI at COP 28 in Ocean Pavilion
- **Established Partnership for Observation of the Global Ocean (POGO) Fellowship Program**
- Participation of UNOLS cruise volunteers on Endurance
- Presentations and posters at the AGU Fall and Ocean Sciences Meeting
- **Data demos at OOI booth at Ocean Sciences Meeting**
- **Collaboration between OOI CGSN, EA and OceanSITES**
- Highlighting the Pioneer MAB Deployment and updating web description
- Collaboration with Peninsula College, Port Angeles, WA
- Continued undergraduate research opportunities and internships
- **CI presentation to COMPASS interns**

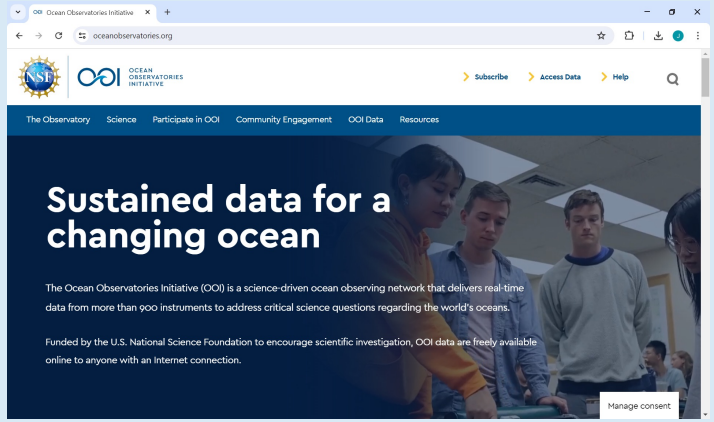


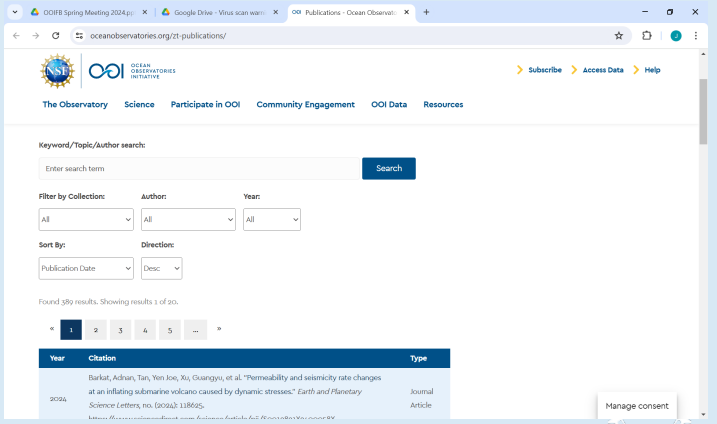
Community Engagement Highlights

- Continued partnership building efforts – from OceanSITES to tribal communities
- Presented at AMS and POGO Annual Meetings
- Participated in NSF Research Infrastructure Meetings and CERF Biannual Conference
- Interviewed for Community Engagement Manager
- Presented at OASIS, RI Ecosystem, NASA PBL & Inclusive and Equitable Ocean Workshops
- IDEA Podcast
- Four-part tutorial on Data Explorer
- **Town Halls on Jupyter Notebook and Data Explorer 1.6**
- **Updated website**
- **Implementation of Zotero as a publications research tool**









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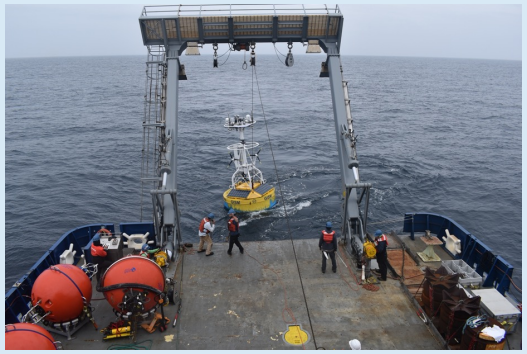
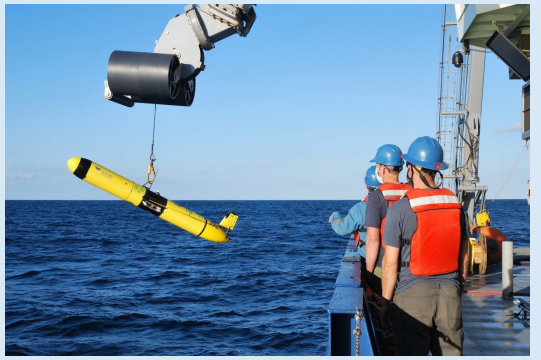
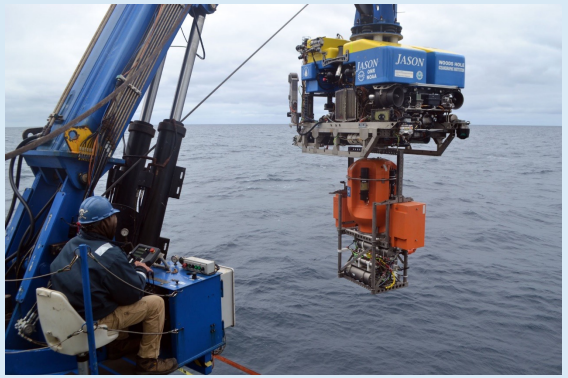
OOI 2.5 Renewal

The OOI has been awarded a Cooperative Agreement for support of Operations and Maintenance for the next five years.

- $220M award for OOI 2.5.
- Does not include ship costs, which will now be handled as normal between NSF and UNOLS with input from OOI.







Proposed Program Enhancements

- **Data Specialist for each MIO:** Much needed help with our ongoing QA/CC efforts and generation of curated data sets for the research and educational communities.
- **Associate Project Scientists:** The next generation of OOI scientists. Discussions have also included hiring post-docs, ECS, visiting scientists, sabbatical support to expose more researchers to OOI.
- **Data Ambassador Program:** Teams of scientists/engineers and data specialist to provide presentations and data training sessions for new and existing users.
- **Tech Refresh:** Replace aging infrastructure, new data center for CI, improved technology upgrades, and some new sensors.
- **Science User Groups for Research (SUGR) Meetings:** Not to replace OOIFB workshops and other activities, but to enhance interaction with the user community.

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Community Engagement in Development

- Data Ambassador Program
- SUGR Meetings
- Analysis Ready, Research Ready, and Curated Data
  - Qartod
  - DOIs
  - External PI Efforts
  - Low Hanging Fruit Data

Data Ambassador Program

The Data Ambassador (DA) Program is designed to get members of the MIOs out in the community to elevate the visibility of the OOI and grow the user base.
The DA program will provide additional opportunities for engagement, increase the use of OOI data for research and education, and enhance opportunities for underserved populations in oceanography and marine sciences. The DA program will accomplish this by reaching out to the community of potential data users to provide them with the tools and resources needed to use OOI data. In so doing, the OOI seeks to build a diverse and inclusive user base that is using its data for research and in the classroom.

The DA program will take many forms; from demonstrations on how to use Data Explorer at meetings and workshops to onsite visits at a variety of locations. These locations will include research universities, minority-serving institutions, community colleges, tribal communities and other organizations that could benefit from OOI data. The visits would describe how to access OOI data and, in turn, learn how others are using OOI data. The DA program will take advantage of DEI resources at the participating Institutions to help identify and reach underserved populations.

Activities will be considered part of the Data Ambassador Program if the activities encourage use of OOI data.
In our standard model, Data Ambassador teams will consist of an Assistant Project Scientist (APS) or Principal Investigator (PI) and an OOI Data Specialist (DS). The APS or PI will present a talk or seminar, followed by a mini workshop on how to use OOI data by the DS on how to access the data. The workshops could be in the form of a live or virtual presentation by the DS, a pre-recorded webinar presented by the APS/PI or DS, and/or one-on-one sessions with the APS/PI or DS. In all cases, the presentation would be followed by a question and answer period, in person and/or virtual.

Other Data Ambassador Activities.
The DA activities are expected to be diverse and will take advantage of opportunities that support our DA program objectives. For example, providing data demos at OOI booth at Ocean Sciences Meetings. Another involves interaction with colleagues funded by external NSF Educational activities such as Ocean Data Labs will be encouraged. We will also encourage the MIOs to take advantage of visiting individuals or groups to their facilities to provide demonstrations on how to access and use OOI data. Webinars and town halls explaining Data Explorer advances also fall under the rubric of DA activities. Lastly, when a PI, APS, DS, engineer, or technician travel to other facilities and national meetings; it is recommended that they seize the opportunity to present about OOI, OOI data availability, opportunities to use OOI data, and engagement activities with the broader OOI data user community. In this way, all OOI staff will, in effect, serve as OOI data ambassadors, encouraging and growing the OOI data user community.

Community Engagement in Development

Data Ambassador Program: How will the institutions be chosen?

The overarching goal of the Data Ambassador Program is to increase visibility of OOI and engage users with OOI data through visits to a variety of institutions. A visit should meet one or more of these Criteria:

- Reach out to MSIs and HBCUs
- Reach out to Tribal communities.
- Reach out to smaller ocean research institutions
- Ensure that the R-1 institutions and funding agencies are engaged
- Engage institutions with graduate programs and active researchers
- Engage groups not currently using OOI data, but with potential to do so
- Stimulate workforce development/encourage the next generation of marine scientists
- Proximity to the MIO to allow multiple visits
- Proximity to an OOI array (to take some ownership)

Another question that requires discussion is whether these visits are to be conducted once at the chosen institution or would involve multiple visits, keeping in mind that there are limited funding/resources for these activities. The idea behind the single visit approach to ten or so institutions per year is to introduce OOI data for a large audience to build interest in a number of participants. These individuals would be encouraged to use the OOI tools available for their research including the Help Desk and Discourse.

Community Engagement in Development

Data Ambassador Program: How will the institutions be chosen? What resources are needed? Who will lead each? What will the metric for success be? How many people will be engaged?

The previous criteria will be used to select the institutions with input from the MIO's DEI offices, the PI's own experiences, and recommendations by the OOIFB. For example, Hampton University was used in the AWP as a potential institution for a Data Ambassador visit. It is a HBU, it has a strong program in Marine and Environmental Sciences, it is located near the MAB Pioneer Array and the lead PI has Hampton University colleagues to help organize the visit.

The DA program will be limited by available funds for travel. This will require some creativity on our part to, e.g., take advantage of travel to national meetings to visit nearby institutions that meet our criteria.

The AWP calls for 2-3 visits by the three MIOs (6-9 total) and 3-5 by the PMO. The DA teams would generally be led by the PI but could be led by the Data Specialists when they are leading the charge. For example, when the DS is providing help to colleagues funded by external NSF Educational activities such as Ocean Data Labs. Here, the colleagues can be thought of as DA scientists with the DS assisting with access to OOI data.

The metrics for success will take several forms and include:

- The number of DA visits were made over the year
- The number of participants in the activity at the host institution.
- Any follow up between the OOI DA team and the host institutions.
- Follow-up activities pursued, e.g., visits to the MIOs or participation on cruises.
- Whether DA activities led to the use of OOI data for conference presentations, abstracts, publications, or funding.

Community Engagement in Development

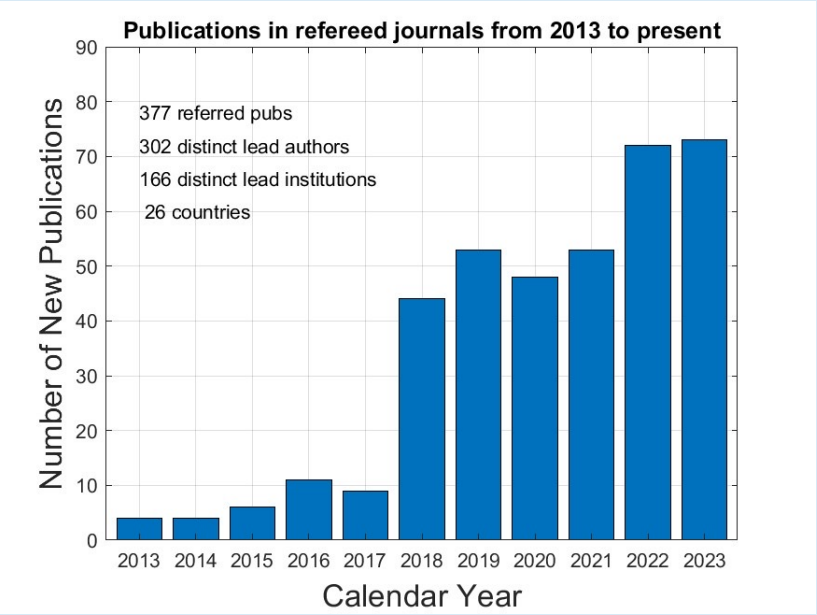
SUGR Meetings

SUGR meetings are not to replace OOIFB workshops and other activities, but to enhance interaction with the user community. There is no charter and the expectation is to hold these when and where needed to address issues. The Community Engagement team would greatly appreciate input from the OOIFB during the it Spring and Fall meetings. For example, a topic of interest during this meeting are discussions about “curated” data sets. The primary mission of the SUGR meetings is to bring this discussion to the community with a presentation followed by ample time for discussion and ultimately action items.

A Focus on Data Quality and Data Delivery

The OOI plans to hire data specialists and staff scientists to provide much needed help in day-to-day OOI activities.

- **Quality Control**
  - QARTOD for sensors when available
  - QARTOD-inspired QC for sensor without formal QARTOD
  - Humans-in-the-Loop creating Annotations
- **Analysis or Research Ready Data**
  - We heard from the modeling community and we will continue to work with them to address RRD (e.g., through SUGR Meeting)
  - PI Generated Data Sets from Publications
  - PI added data sets
  - Collaboration with BCO-DMO
  - Data Explorer



Toole, J. M., Musgrave, R. C., Fine, E. C., Steinberg, J. M., & Krishfield, R. A. (2023). On the Vertical Structure of Deep-Ocean Subinertial Variability. *Journal of Physical Oceanography*, *53*(12), 2913–2932. https://doi.org/10.1175/JPO-D-23-0011.1

Wilcock, W., & Ocean Observatories Initiative. (2023). Rapid: A Community Test of Distributed Acoustic Sensing on the Ocean Observatories Initiative Regional Cabled Array [Data set]. Ocean Observatories Initiative. **https://doi.org/10.58046/5J60-FJ89**

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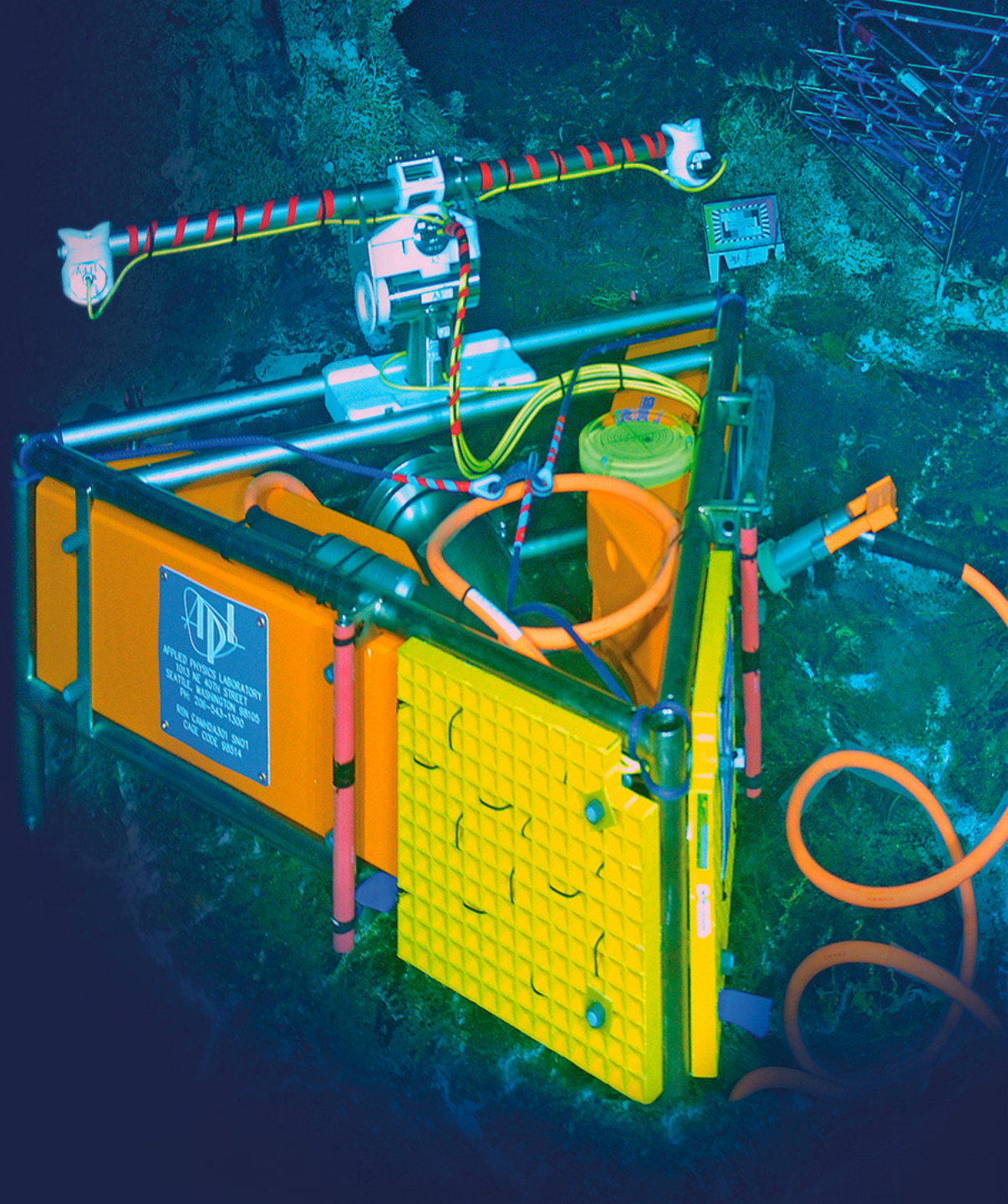
QUESTIONS?



Community Engagement in Development

Linking OOI and OceanSITES

Background: OOI is an NSF-funded, distributed ocean observatory with multiple assets at deep ocean sites. The OOI has its own data storage and distribution system and has developed its own data and metadata formats following community standards (e.g. NetCDF/CF). OceanSITES is the global coordination network for fixed, deep-ocean time series stations (i.e. moorings) that collect climate-quality data. Endorsed by the Observation Coordination group (OCG) of the Global Ocean Observing System (GOOS), OceanSITES is the official entry point for Eulerian time-series observations to GOOS. OceanSITES has developed and documented data formats and metadata standards for the global community. OceanOPS is the GOOS metadata repository for international observational efforts that contribute to the GOOS-endorsed networks (e.g. Argo, OceanSITES, OceanGliders GO-SHIP). Data and metadata are input to OceanOPS via the respective global coordination network (e.g. for open ocean moorings the global coordination is via OceanSITES, for gliders it is OceanGliders).

Community Engagement in Development

Goal: Make OOI mooring data discoverable as a part of the NSF funded US contribution to GOOS

Approach: For mooring observations to be recognized a contribution to GOOS two actions are needed: 1) the respective mooring site (defined by a polygon of geographical coordinates) has to be registered with OceanSITES (via the technical coordinator at projectoffice@oceansites.org). This registration will automatically create a registration with OceanOPS. 2) After registration, the metadata for each deployment is exchanged with OceanOPS. For OOI, it is expected that this exchange will be done through a machine-to-machine interface (e.g. ERDDAP). Note, the metadata may include a link that points to where the data is stored, making OceanOPS also a data discovery tool; the OOI data files would not be stored on or served from an OceanSITES GDAC but only a link shared. The OOI/OceanOPS exchange will be done based on the metadata that is currently available from the OOI installations. In this process the OOI metadata may need a "translation" to match the OceanOPS (OceanSITES specific) metadata fields. Note, these fields have been defined in a dialogue between OceanSITES and OceanOPS and further fields may be introduced if needed. To appear in the GOOS maps only a very limited set of metadata fields are required, however, as more metadata fields are being provided the more far-reaching the contribution to GOOS can be represented with the help of metadata derived indicators.