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SIDEBAR **Get Engaged with the Ocean Observatories Initiative**

By Greg A. Ulses, Leslie M. Smith, and Timothy J. Cowles

The Ocean Observatories Initiative (OOI) is an open community resource supported by the National Science Foundation (NSF) (Smith et al., 2018, this issue). Free access is provided to all OOI data through online interfaces (Vardaro and McDonnell, 2018, in this issue). Independent of an NSF-funded project, individual scientists can use OOI data to address specific scientific hypotheses, or to augment existing research projects. For example, publicly accessible OOI data can provide key resources for model simulations, as well as data to augment shipboard research or field research projects. Scientists conducting research in the regional domains of the OOI are encouraged to consider these opportunities and reach out to OOI staff to discuss how their research may be included in OOI cruise opportunities.

The OOI will grow, change, and reach its full utility as it is shaped by input from its user community. Here, we summarize some of the ways to interact with the OOI and its data.

USING OOI DATA

The primary way to engage with the OOI is to use its data. All OOI data are freely available for download as quickly as they can be made accessible (Vardaro and McDonnell, 2018, in this issue). The only requirement when using OOI data is to cite OOI as the data source. Full details of the OOI Usage Policy can be found on the OOI website (<http://oceanobservatories.org>).

OOI data have a wide range of possible applications, only some of which could be represented in this special issue of *Oceanography*. We encourage potential users to dive into this rich data resource.

SEEKING FUNDING TO ENGAGE WITH THE OOI

NSF is accepting OOI-related proposals through the core science and technology programs, and several awards have already been made. Scientists are encouraged to propose new applications and approaches, including, but not limited to (1) connection of new instruments and platforms onto the observatory network, (2) modification of sampling rates and missions for existing instrumentation, (3) execution of ancillary work during normally scheduled OOI cruises, (4) testing specific hypotheses with OOI data, and

(5) creation of educational programs using both OOI infrastructure and data (e.g., McDonnell et al., 2018, in this issue). For more information on the NSF proposal process, contact the NSF program officer for your science or technology program.

Adding Infrastructure

Infrastructure in the form of instruments or additional cabled nodes may be added to the OOI. On the Cabled Array, additional power and bandwidth are available to power the instrumentation and transmit data back to shore. Some uncabled platforms have the ability to provide power for instruments and telemeter data. However, most assets added to the uncabled components of the OOI will need to be self-powered and self-recording. When instrumentation is added to the OOI infrastructure, the data collected are also integrated into the OOI Cyberinfrastructure. The proposing scientists will have embargoed access to the data of the added instrument(s) for the first year, but the data thereafter will be a part of the OOI community resource available to all.

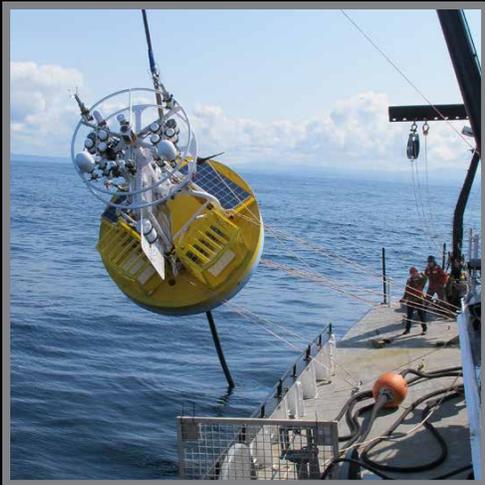
Adjusting Sampling Rates

Researchers are welcome to propose modifications to the sample rates of existing observatory instrumentation. The OOI instruments sample at “baseline sampling rates,” which were established with community input to address the long-term observational goals and objectives documented in the OOI Science Prospectus (<http://oceanobservatories.org/science-plan>). If the mooring platforms had additional available power upon deployment, the instruments were set to sample to the available power levels. These are called “as-deployed sampling rates.” Full details of OOI sampling strategies are contained in the OOI Observation and Sampling Approach document (<http://oceanobservatories.org/observation-and-sampling-approach>).

Researchers can propose modification of sampling rates to address science questions if they are lower than the as-deployed sampling rates and do not go below the OOI Science Prospectus baseline sampling rates. Any approved changes would need to be timed with deployment cycles for the specific mooring or array.

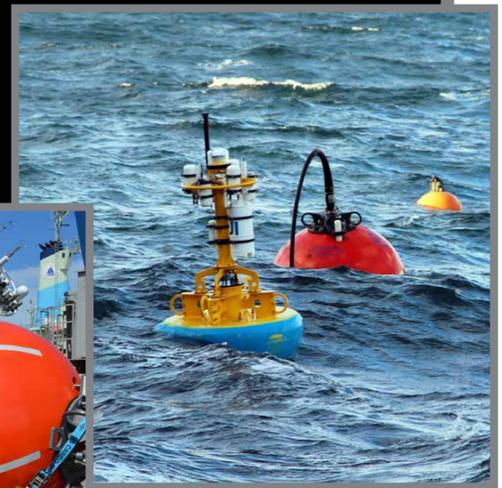
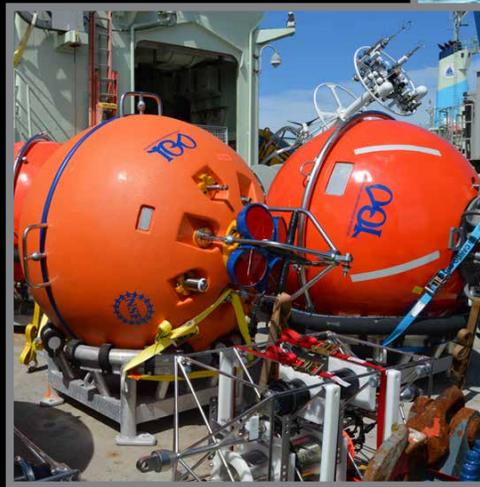
HD Video camera views “Mushroom” vent on the Axial Seamount. *Image credit: NSF-OOI/UW/ISS; Dive R1835; V15*





Coastal Surface Mooring is deployed at the Endurance Array. Image credit: OOI Endurance Array Program, OSU

Subsurface Flotation Buoys await on deck for deployment at the Irminger Sea Array. Image credit: OOI Global Array Program, WHOI



Coastal Profiler Mooring is lined up for recovery at the Pioneer Array. Image credit: OOI Pioneer Array Program, WHOI

Ships of Opportunity

Frequently, there are extra berths available on OOI maintenance cruises, as well as opportunities to take additional samples. Any proposed and approved additional activities would have to fit into the existing cruise schedule, be conducted by available personnel, and be subject to vessel size and safety restrictions. Proposals to spend extra days on station, add remotely operated vehicle dives, or visit remote sites could add unsustainable costs to the cruise and impact completion of OOI activities. All supplemental cruise activities must be added to the cruise plan, be pre-approved by OOI program management, and be subject to weather or safety concerns by the chief scientist and captain.

Using OOI Data and Testing Hypotheses

NSF welcomes proposals from researchers who wish to use OOI data only to answer science questions. These proposals do not require any modifications to be made to the observatory.

SUPPLEMENTAL ANALYSIS OF WATER SAMPLES

During maintenance cruises, CTD casts are conducted prior to deployment and following recovery of most OOI assets (glider deployments may involve a single reference CTD cast). Water samples are collected at multiple depths and analyzed for oxygen (Winkler), chlorophyll *a* fluorescence and pigment distribution, nitrate/nitrite (and potentially a full nutrient suite), total dissolved inorganic carbon and total alkalinity, pH, and salinity. Often there is sufficient water taken to support additional assays. Note that sensors used on CTD rosette casts are specific to the deployment vessel. For details of ship instrumentation, see the UNOLS website (<https://www.unols.org>). Researchers who require additional instrumentation of a specific type should contact the OOI project manager or project scientists to see if replicates can be arranged, or include the instrumentation request in an NSF proposal.

USING COMMUNITY-DEVELOPED TOOLS

Community-developed tools are an ever-expanding set of free resources shared by the OOI user community via the OOI website. Many of these tools consist of Python scripts that help transform raw OOI data into more usable forms, plot OOI netCDF data sets (courtesy of the OOI Data Team), convert broadband hydrophone files (courtesy of Pete Cable, Raytheon), and download specific portions of raw CAMHD data (courtesy of Tim Crone, Lamont-Doherty Earth Observatory).

USING OPEN SOURCE SENSOR ALGORITHMS

Sensor algorithms are free for the community to download and use with OOI raw data, or to adapt for their own observational data. The algorithm code used to generate each data product in the OOI Cyberinfrastructure system can be found in the ion-functions GitHub repository (https://github.com/oceanobservatories/ion-functions/tree/master/ion_functions/data). These modules, and the functions therein, represent the transforms and calculations used to provide the various OOI data products.

SUMMARY

The various OOI sites equipped with fixed and mobile instrumented platforms, along with over 200 freely available data products, provide users with a range of opportunities to explore new research questions, inform policy development based on extended time series of observations, and offer the public new insights into the how ocean processes contribute to our planetary system. We invite your engagement!

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