Unprecedented access to real-time data streaming from the OOI Cabled Array

Abstract ID 92123
Poster # OD14A-2397

Friedrich A. Knuth[1] Michael Vardaro[1] Leila Belabassi[1] Michael Smith[1]
Lori Garzio[1] Michael Crowley[1] John Kerfoot[1] Orest E. Kawka[2]
[1]Rutgers University, New Brunswick, NJ, USA [2]University of Washington, Seattle, WA, USA

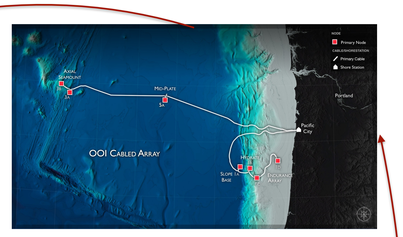
contact knuth@marine.rutgers.edu

Overview

Here, we present the technical aspects of data streaming from the Cabled Array through the OOI Cyberinfrastructure. We illustrate an overview of deployed instruments types, examples of data products becoming available, how the OOI Cyberinfrastructure processes data and provide pointers to various data access points.

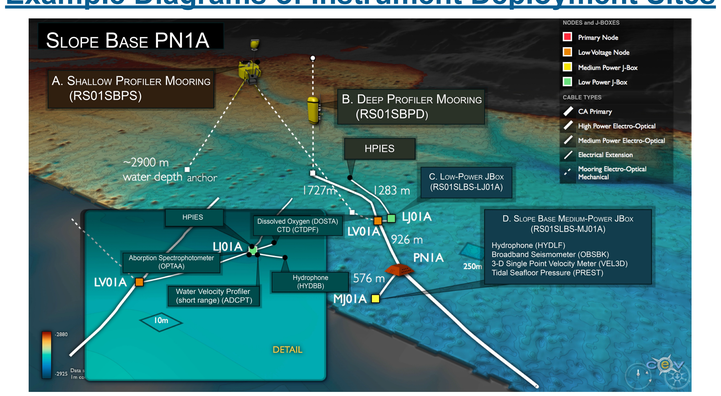
Ocean Observatories Initiative: Cabled Array

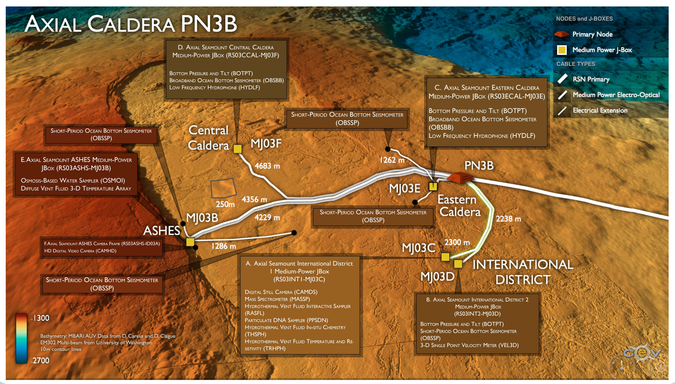
The National Science Foundation's Ocean Observatories Initiative (OOI), is a broad-scale, multidisciplinary facility that provides users with unprecedented access to long-term datasets from a variety of deployed physical, chemical, biological, and geological sensors.



The Cabled Array component of the OOI, installed and operated by the University of Washington, is located on the Juan de Fuca tectonic plate off the coast of Oregon. It is a unique network of >100 cabled seafloor-based and water column profiling instruments transmitting data to shore in real-time via fiber optic technology. Instruments now installed include HD video and digital still cameras, mass spectrometers, a resistivity-temperature probe inside the orifice of a high-temperature hydrothermal vent, upward-looking ADCP's, pH and pCO_2 sensors, Horizontal Electrometer Pressure Inverted Echosounders and many others, listed in the table to the right.

Example Diagrams of Instrument Deployment Sites



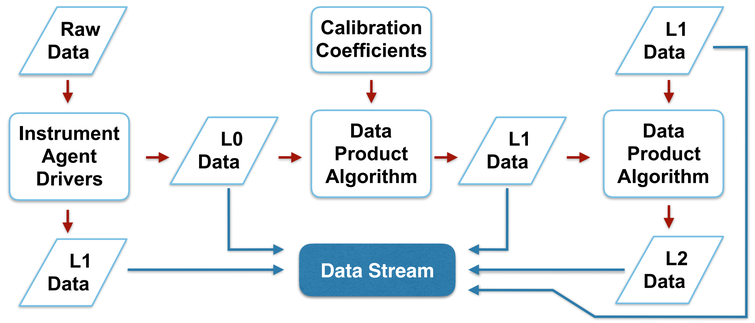


OOI Cabled Instruments

The table below lists all instrument types deployed across Cabled Array sites, organized by scientific discipline.

Primary Discipline	Instrument Name	Instrument Class ID
Biological	Digital Still Camera with Strobes	CAMDS
Biological	HD Digital Video Camera with Strobes	CAMHD
Biological	2-Wavelength Fluorometer	FLORD
Biological	3-Wavelength Fluorometer	FLORT
Biological	Absorption Spectrophotometer	OPTAA
Biological	Photosynthetically Available Radiation	PARAD
Biological	Hydrothermal Vent Fluid Particulate DNA Sampler	PPSDN
Biological	Bioacoustic Sonar	ZPLSG
Biological	CDOM Fluorometer	FLCDR
Biological	Chlorophyll-a and Backscatter Fluorometer	FLNTU
Chemical	Dissolved Oxygen Fast Response	DOFST
Chemical	Dissolved Oxygen Stable Response	DOSTA
Chemical	Dissolved Nitrate	NUTNR
Chemical	Seawater pCO_2	PCO2W
Chemical	Seawater pH	PHSEN
Chemical	Hydrothermal Vent Fluid Interactive Sampler	RASFL
Chemical	Hydrothermal Vent Fluid In-situ Chemistry	THSPH
Chemical	Hydrothermal Vent Fluid Temperature and Resistivity	TRHPH
Chemical	Benthic Fluid Flow	FLOBN
Chemical	Osmosis-Based Water Sampler	OSMOI
Chemical	Dissolved Gas Mass Spectrometer	MASSP
Geological	Bottom Pressure and Tilt	BOTPT
Geological	Broadband Ocean Bottom Seismometer	OBSBB
Geological	Short-Period Ocean Bottom Seismometer	OBSSP
Geological	Low Frequency Broadband Acoustic Receiver (Hydrophone) on Seafloor	HYDLF
Physical	Velocity Profiler (long range); Velocity Profiler (short range)	ADCPS;ADCPT
Physical	Conductivity, Temperature, Pressure (Depth)	CTDPF;CTDBP
Physical	Horizontal Electric Field, Pressure and Inverted Echo Sounder	HPIES
Physical	Broadband Acoustic Receiver (Hydrophone)	HYDBB
Physical	Tidal Seafloor Pressure	PREST
Physical	Spectral Irradiance	SPKIR
Physical	Diffuse Vent Fluid 3-D Temperature Array	TMPSF
Physical	5-Beam, 600 kHz Acoustic Doppler Current Profiler (= 50 m range)	VADCP
Physical	3-D Single Point Velocity Meter	VEL3D
Physical	Single Point Velocity Meter	VELPT

OOI Cyberinfrastructure System

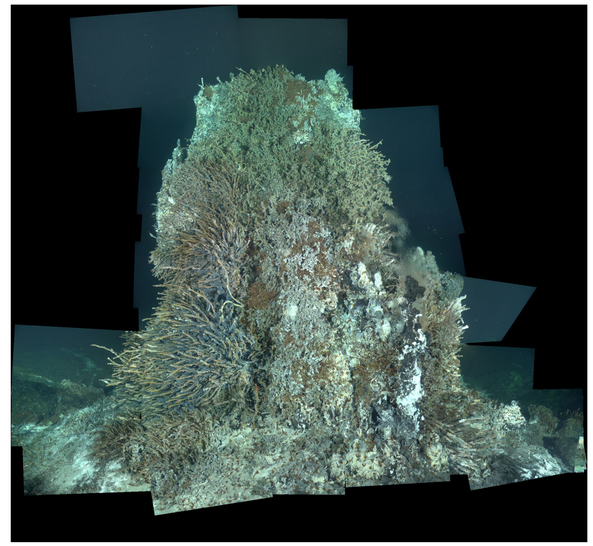


Raw data coming from cabled instruments is parsed into uncalibrated Level 0 (L0) and/or calibrated Level 1 (L1) Data Products by Instrument Agent Drivers. L0 data is further processed through Data Products Algorithms (DPAs), which apply calibration coefficients and create additional L1 products. In some instances, higher order Level 2 (L2) Data Products are created by combining multiple L1 products from one or more instruments with appropriate DPAs. The final collection of L0, L1, and L2 data, referred to as a Data Stream, contains all of the Data Products expected from an instrument. More information about specific Data Products can be found at oceanobservatories.org/data-products/.

OOI Data Team at Rutgers

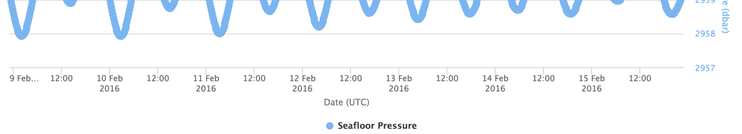
The mission of the OOI Data Team at Rutgers University is to facilitate access to quality-controlled and annotated OOI datasets. We encourage researchers to collaborate through the use of these simultaneous, interdisciplinary measurements, in the exploration of short-lived events, as well as long-term trends in ocean systems.

Cabled HD Video Data is Live!



Mushroom Hydrothermal Vent at Ashes field in Axial Caldera. Panographic image made from ~40 frame grabs off streaming video from the HD Camera, courtesy of Mark Stoermer and Hunter Hadaway at the University of Washington. Live streaming video is available at 7:00 am, 10:00 am, 1:00 pm, 3:00 pm, 7:00 pm, 10:00 pm, 1:00 am, and 3:00 am CST via ooinet.oceanobservatories.org/cameras and http://novae.ocean.washington.edu/story/Ashes_CAMHD_Live. To download video data as .mov or .mp4, please visit the HYRAX server via oceanobservatories.org/large-format-datasets/.

Data Access



Tidal Seafloor Pressure signal in decibar from the PREST instrument at the Slope Base Medium-Power Junction Box (RS01SLBS-MJ01A), seen in the Slope Base PN1A diagram on the left. The instrument is deployed at ~2908 m below the sea surface. To generate similar quick plots of preliminary data, visit ooinet.oceanobservatories.org/. Preliminary NetCDF data is available for download via oceanobservatories.org/thredds-server/. Preliminary large format data (e.g. video, digital stills, seismic and hydrophone data) is available for download via oceanobservatories.org/large-format-datasets/. All OOI seismometer and low-frequency hydrophone data are currently also served by the Incorporated Research Institutions for Seismology (IRIS) consortium. See oceanobservatories.org/cabled-array-seismometer-data/ link for information and access.

OOI Sampling Strategy and Algorithms

Observation and Sampling Strategy documentation
oceanobservatories.org/observation-and-sampling-approach/

Data Product Algorithms are available via
github.com/ooici/ion-functions/tree/master/ion_functions/data

More information about Data Products can be found at
oceanobservatories.org/data-products/

oceanobservatories.org

Funding for the Ocean Observatories Initiative is provided by the National Science Foundation through a Cooperative Agreement with the Consortium for Ocean Leadership. The OOI Program Implementing Organizations are funded through sub-awards from the Consortium for Ocean Leadership. Any opinions, findings, and conclusions or recommendations expressed in this material are those of the author(s) and do not necessarily reflect the views of the National Science Foundation.

OOI Official Website

visit oceanobservatories.org

OOI Feedback

email help@oceanobservatories.org

Acknowledgements

The OOI is funded by the National Science foundation and managed by the Consortium for Ocean Leadership. Images, graphics and diagrams provided courtesy of the Center for Environmental Visualization (CEV) and the Paros Endowed Chair at the University of Washington.