UNOLS OOI Community Workshop: Cabled, Endurance, Station Papa Arrays

Participant Slides – Group 2
Sajjad Abdullajintakam
Graduate Student in Coastal and Marine System Science
Texas A&M University-Corpus Christi

**Specialization:**
- Marine Geology & Geochemistry

**Research Interests:**
- Methane Biogeochemistry
- Deep Sea Carbon Cycling (DIC and DOC)
- Paleoceanography

**Areas of Interest in the Workshop**
- Cabled Continental Margin
- Southern Hydrate Summit Seafloor Observations
- In situ Biogeochemistry → Carbon Fluxes and Coupling

**Applications**
- Spatiotemporal variations in Methane Seepages: Their causes and impacts
- Contribution of Methane/Hydrocarbon Seepages to DOC budget
- Their application to paleoclimate: Evolution and dynamics of Carbon cycling in geological past along time periods of distinct redox variations
How are hydrothermal systems impacted by tectonic and magmatic events?
What is the response time of hydrothermal systems to such events?
Understanding patterns of diffuse flow
Karen Bemis, Darrell Jackson, Guangyu Xu, Tim McGinnis

TMPSF – 3D Thermistor Array: consistency and variation

COVIS – Cabled Observatory Vent Imaging Sonar: Spatial patterns

Narrow, persistent plumes? @ ASHES

Hot (?) spots @Grotto

What does diffuse discharge look like in 3D? What controls localization of discharge? Is diffuse output at large sulfide mounds fundamentally different from diffuse output from narrow cracks?

We’d like to use COVIS 2D & 3D mapping capabilities in combination with the 3D thermistor array and ADCP based current meters to test hypotheses about the spatial and temporal patterns of diffuse flow.

Both may exhibit plume-like mixing
Patterns and processes of coastal zooplankton in a changing ocean

- Effects of changes in OMZ, pH, and temperature...
- ...on distribution, abundance, physiology and condition of zooplankton along the Oregon Coast
What is the balance of physical and biological controls in setting plankton distributions? (or, what sets the patchiness of biological tracers?)

High-resolution spatial/temporal observations

Analyst data for characteristic scales of variability

Sophie Clayton
Cheryl Greengrove
Associate Professor of Geoscience

Research: Physical oceanographer studying HABS in Puget Sound and the fjords along west coast Vancouver Island

Plan for use of OOI data: Integrate real-time data and video into Introductory Oceanography and upper division Ocean Science courses at UWT
RSN: Particulate DNA Sampler

Future: Instrumentation for interactive, manipulative experimentation & sampling in response to environmental cues

Incubator: UW & MBL
Sievert & Taylor

Deep ESP: MBARI

Julie Huber
Interest in Using OOI Endurance Array Data (U.A. Korde*)

Name: Umesh A. Korde  
Affiliation: SD School of Mines (SDSM&T) (< Dec. 2016); Michigan Tech (MTU) (Dec. 2016)  
E-mail: uakorde@mtu.edu

Expertise: Hydrodynamics/Dynamics and Control off floating-body motion, wave energy conversion  
Ocean Measurements Relevance: Energy for sensors; Modeling, Control

Ongoing Projects

DARPA: 10x Efficiency  
ONR: Object detection  
NAVFAC: Meas. & Control  
NSF: Plankton counting  
(target)

Data of Interest (Endurance Array)

- 3D Motion (surface moorings)  
- Wave spectra (+ any real-time wave profile measurements if available)

Purpose

Validate current models; investigate new response modeling and control techniques — publications, proposals, PhDs, new research questions and directions, etc.

*Full group includes: MTU: R.D. Robinett, O.O. Abdelkhalik; Sandia National Labs: D.G. Wilson, G. Bacelli
Improve surface waves:
- Wave model performance
- Breaking parameterization

Comparison of the extent of the NRI plume (surface layer)
RCRV Datapresence

Turning Observational Data Into Operational Information Through Remote Participation

New Regional Class Research Vessels
up to three new vessels funded by NSF

Datapresence Capability

27 sensors operating continuously on the ship
real-time streaming between ship and shore
enables virtual participation
increases efficiency of operations
education & outreach opportunities

RCRV & OOI
similar goals and challenges
efforts are complementary

Demian Bailey  Project Manager
Clare Reimers  Project Scientist
Chris Romso  Datapresence Systems Engineer
Jasmine Nahorniak  Datapresence Systems Assistant
Katie Watkins-Brandt  Marine Science Technical Assistant

http://ceoas.oregonstate.edu/ships/rcrv/
Using Observatories Objectives

- Understand how changes in biogeochemistry impact ecosystem dynamics, especially in NE Pacific
- Understand use cases necessary to improve existing instrument capabilities and data usability:
  - Understand measurement/data need for critical science questions
    - Added functionality
    - Combined / New measurement parameters
- Learn community pain points
  - Where is most of the time spent in working with the data/sensors
  - What improvements are needed to make data more accessible and useable
- Understand data needs – operators and users
  - QA/QC functions
  - Metadata on sensor
  - Measurement interactivity

Cristina Orrico
Technology Office Program Manager
Sea-Bird Scientific
cris@wetlabs.com
• Name: Tetjana Ross
• Organization: Fisheries and Oceans Canada
• OOI location of interest: Global Station Papa
• Primary use: For annual reporting on the state of the ocean (fills in gaps between Line P cruises in Feb, Jun & Aug)
• Primary data/instruments of interest: CTD, fluorometry, ADCP (backscatter?)
**Ethnography of Ocean Observatories Initiative (4 yrs)**

**Methods**
- Field Observation
- Interviews
- Historical and Archival Analysis
- Policy Analysis

**Themes**
- Social study of cyberinfrastructure and e-Science
- Science and Technology Policy
- Shifts in material practices, values, labor, people
- Challenges in the organization of large-scale longterm technical endeavors
- History of the observatory and big data
Yen Joe Tan - Columbia University

High precision earthquake relocation

Measure temporal velocity changes using ambient seismic noise
Research Ideas for OOI Workshop

- Investigate relationship between coastal up/down-welling, annual Columbia River salmon counts, and inter-decadal climate variations (e.g., ENSO, PDO, etc.)
- Investigate evolution of and relationship between sea-level gradients in both the cross- and along-shelf directions, tides, and satellite altimetry in Washington and Oregon
- Investigate relationship between the Columbia River plume, coastal up/down-welling, and along-shelf sea-level gradients
OCNMS use of OOI data

- Gray’s Harbor OOI line just south of southern boundary of OCNMS
- Oceanographic data will be useful for **Olympic Coast Sentinel Site for OA**; surface and depth measures for DO, salinity, temperature
- Elucidate onshore movement of upwelled water being channeled via offshore canyons
- Data to help inform work in proposed LTER site (fingers crossed!)
Future world state:

Autonomous data streams provide the bulk of observational oceanographic measurements.

Ocean data drives assimilation models used to manage resources and economically important societal needs.

The OOI data streams are a resource for building better observations:

- QA/QC analysis
- Existing Methods
- QA/QC Development
- Evaluation of factory and in situ calibrations
- Evaluation of visualization tools and products
- New sensors and instruments

Ad hoc event analysis

Ian Walsh
Director of Science
Senior Oceanographer
Sea-Bird Scientific

ian@wetlabs.com
ED ZARON’S PLANS & INTERESTS RE: OOI

**Long-Term Observations – Internal tides**
- Stationary vs. non-stationary.
- Relation to internal wave continuum.
- Modal structure.
- Interactions with ambient.

**New instrument – Two-axis laser-Doppler velocimeter system-on-a-chip:**
- Philips PLN20xx sensor.
- Approx. 1 cm × 1 cm × 0.5 cm.
- 50 mW power consumption.
my interests in the Observatories

Huaiyang Zhou (zhouhy@tongji.edu.cn)
School of Ocean and Earth Science
Tongji University
Shanghai/China

• to understand subsurface processes and their interactions with deep ocean by using observed high resolution data

• to learn the sensors types, sampling frequency and consistent data management for the geo–events (variation in hydrothermal focused venting/diffuse discharge or cold seeping, earthquake or other geo–hazards) detection and prediction

• to examine the timely response or interaction relationships among different geologic processes in different locations.

• to learn the valuable experiences for Chinese Scientific Observatories establishment and utility.