OCEAN
OBSERVATORIES
INITIATIVE FACILITY BOARD

OOIFB

OOIFB Town Hall

Lightning Presentations

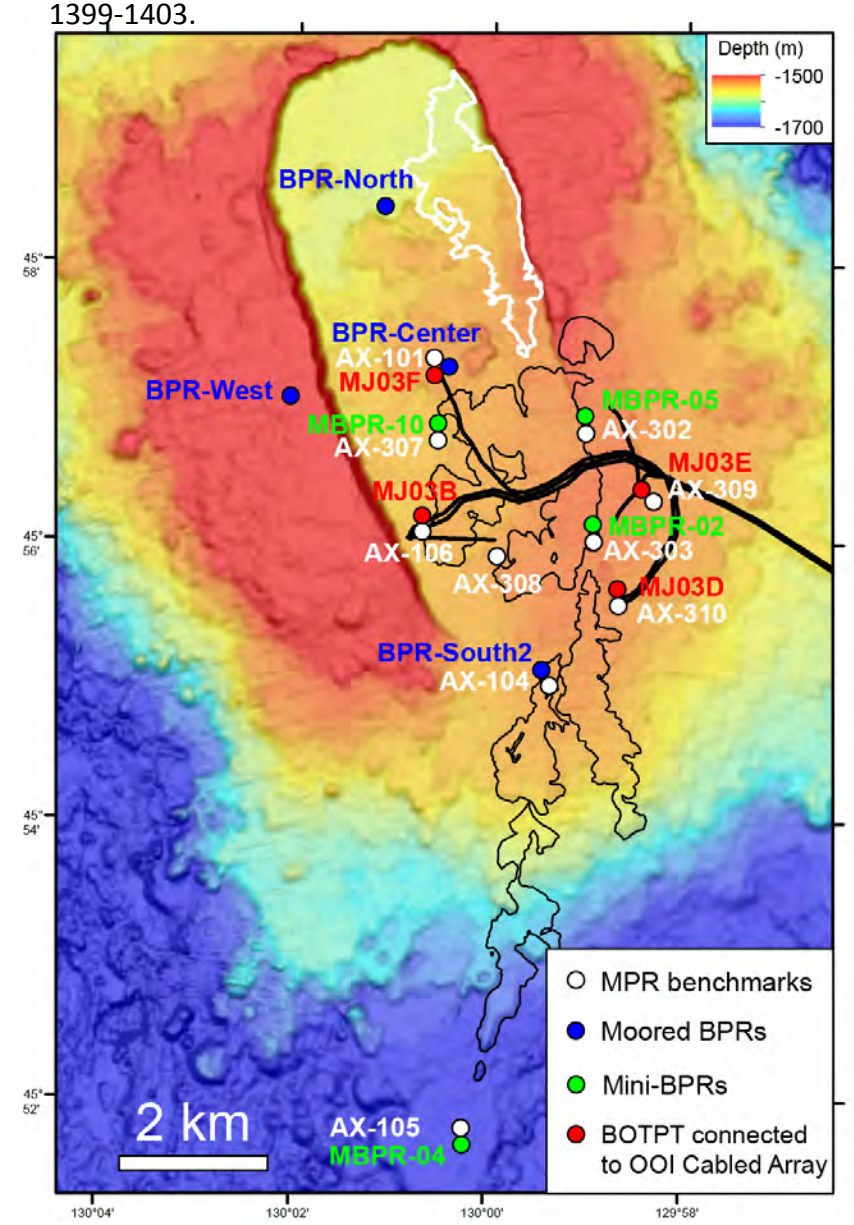
February 13, 2018

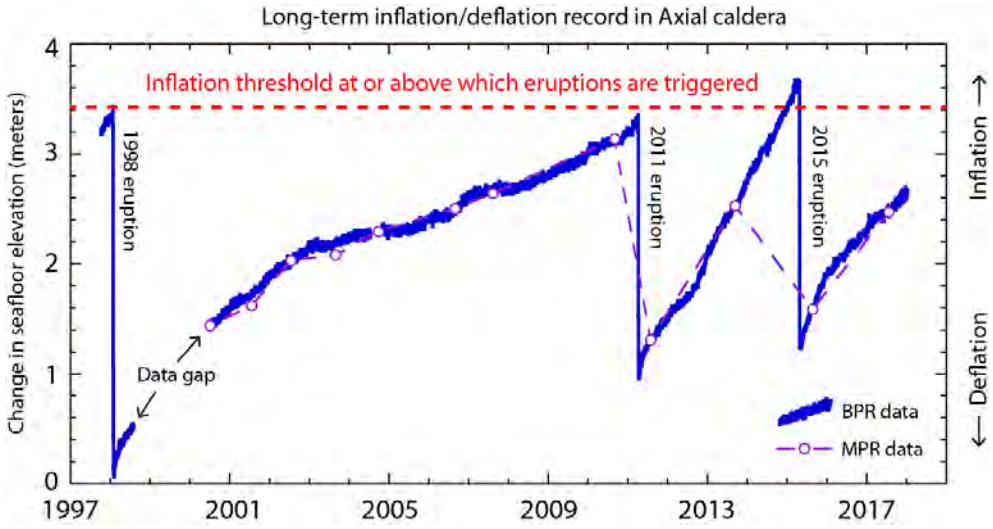
USE OF OOI CABLED ARRAY DATA FOR GROUND DEFORMATION STUDIES AT AXIAL SEAMOUNT

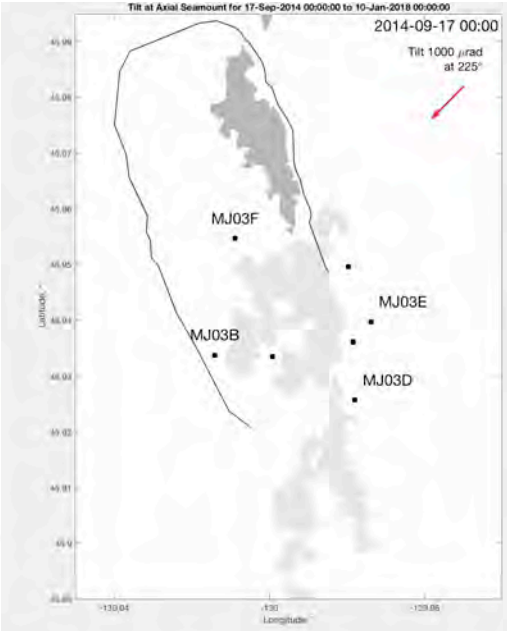
William Chadwick (NOAA/PMEL, william.w.chadwick@noaa.gov) and Scott Nooner (Univ. North Carolina, Wilmington)

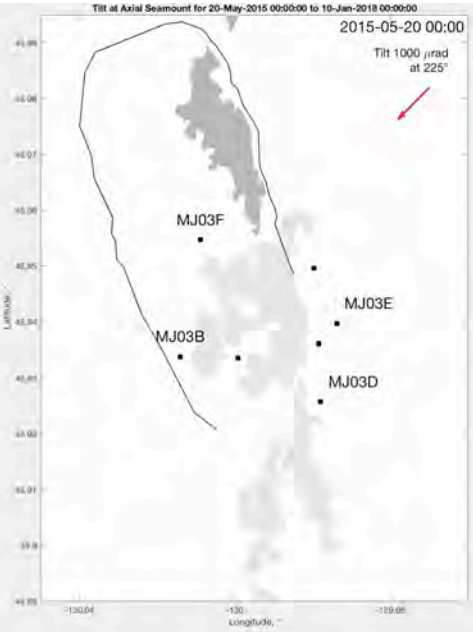
REAL-TIME PLOTS OF OOI BOTPT DATA: www.pmel.noaa.gov/eoi/rsn/

LATEST PAPER: Nooner, S. L., and W. W. Chadwick, Jr. (2016), *Science*, v.354, p. 1399-1403.

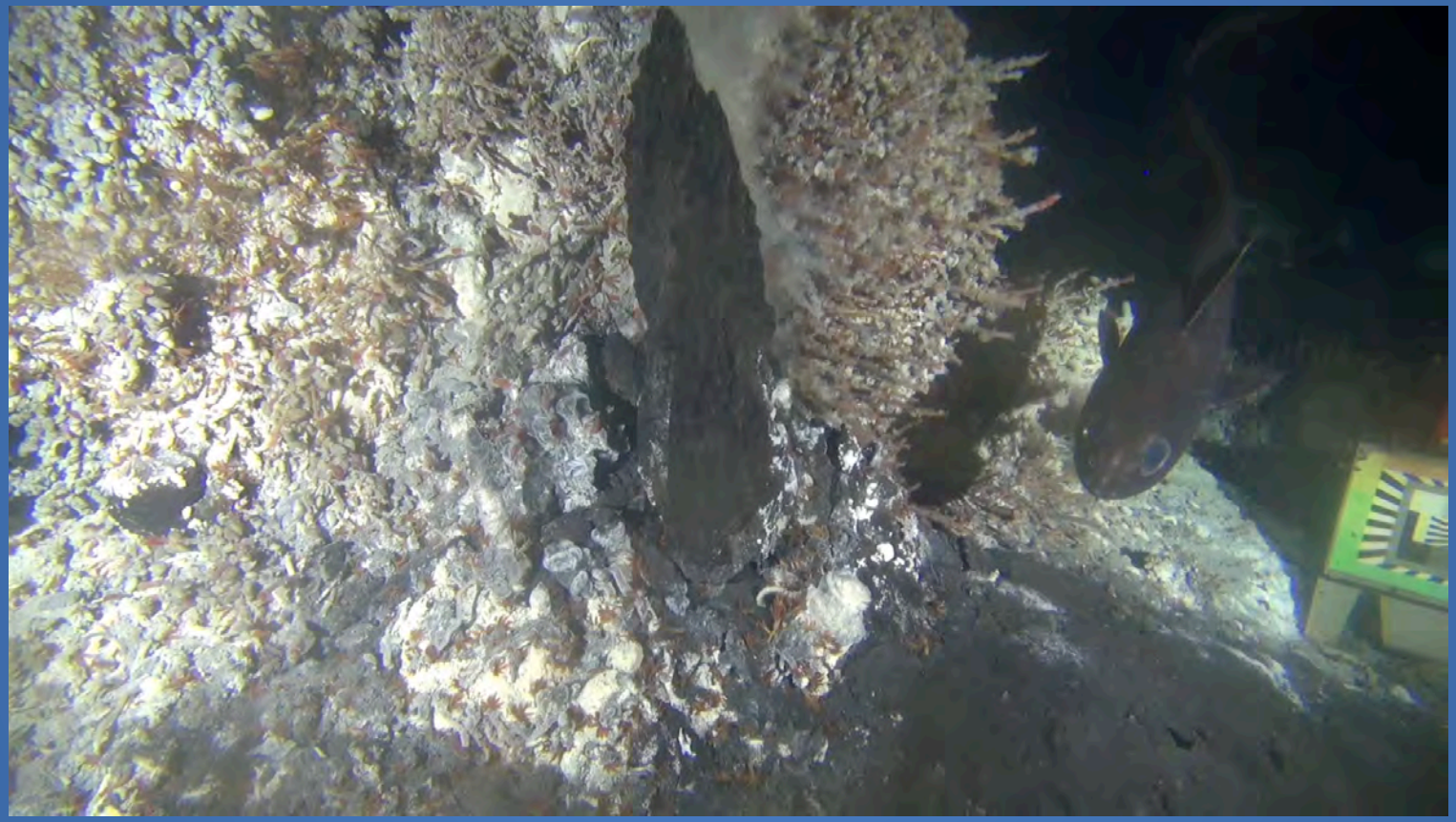


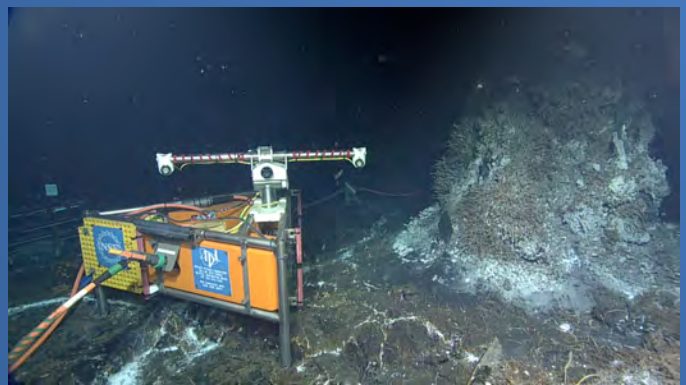






Time-series analysis of Cabled Array HD video with computer vision





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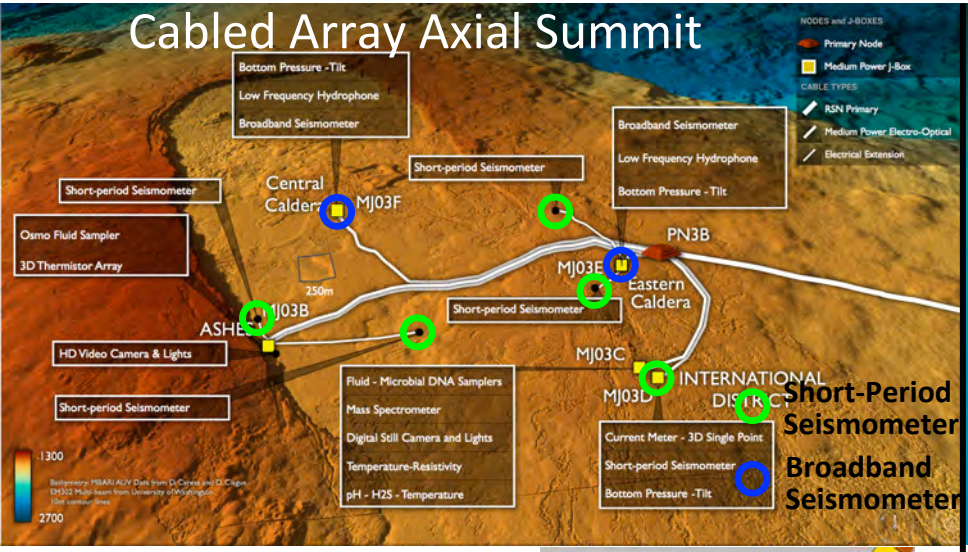
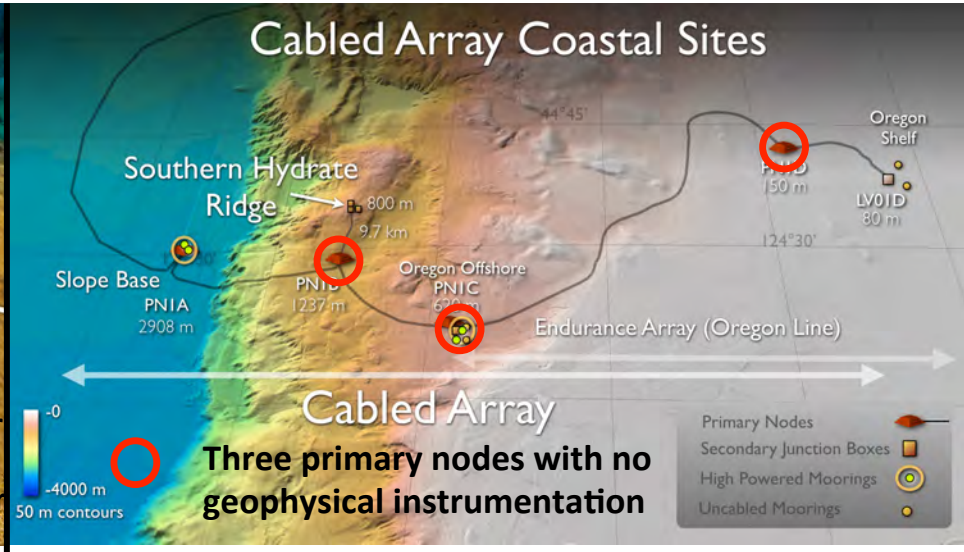
with
Tim Crone @LDEO
Friedrich Knuth @Rutgers

Generously supported by NSF OCE1700850
Poster **OD24D-2741**

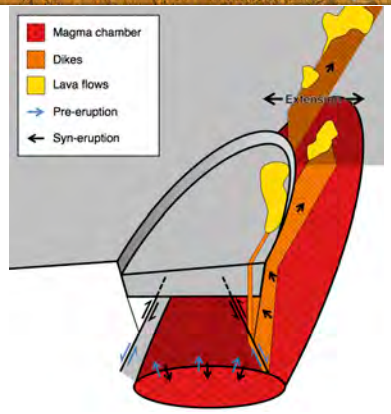
Geophysical Studies with the Cable Array – William Wilcock

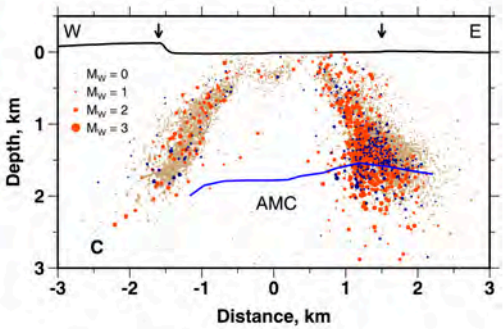




April 24, 2015 eruption of Axial Seamount

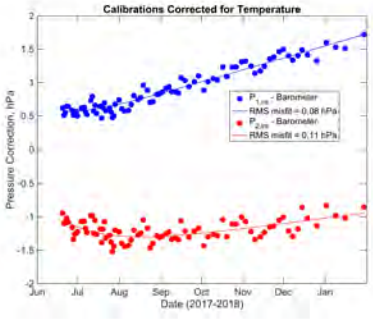
- >100,000 earthquakes on ring fault
- Caldera inflation and deflation
- Explosive signals discovered
- Improved observations of the next eruption





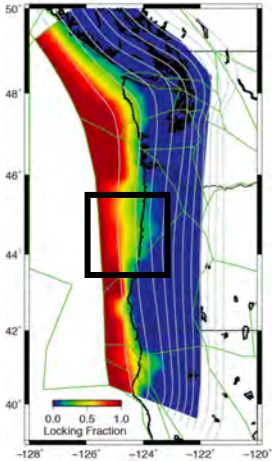
Wilcock et al., 2016

Poster #2615 this afternoon
A-0-A calibrations of seafloor pressure to 1 mm of water

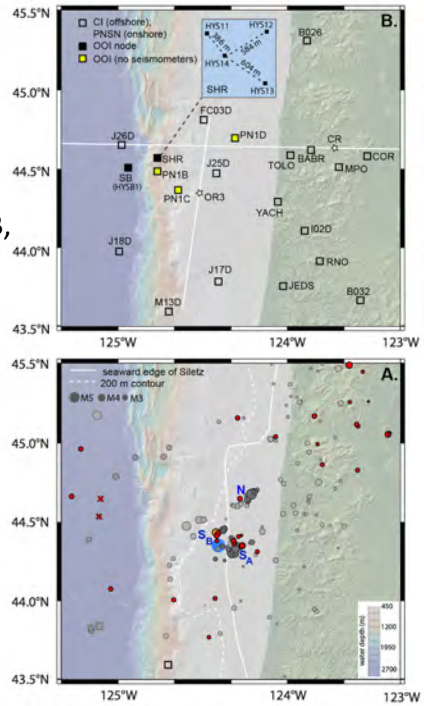


Cascadia Subduction Zone

- M9 earthquakes
- Offshore central Oregon
  - earthquakes, creep, slow slip?
- We have the sensors
- We need to instrument nodes PN1B, C, and D



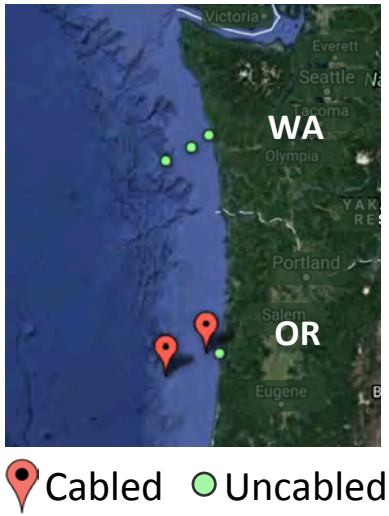
Schmalzle et al., 2014

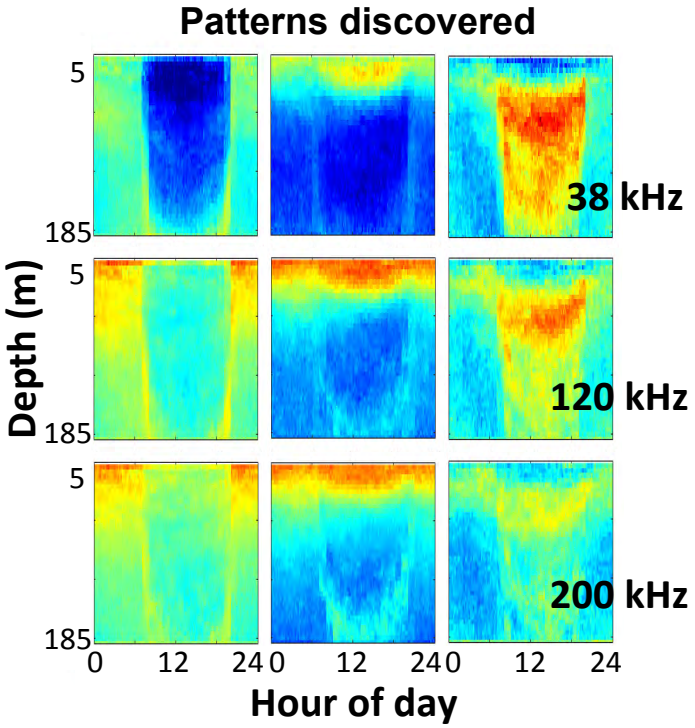


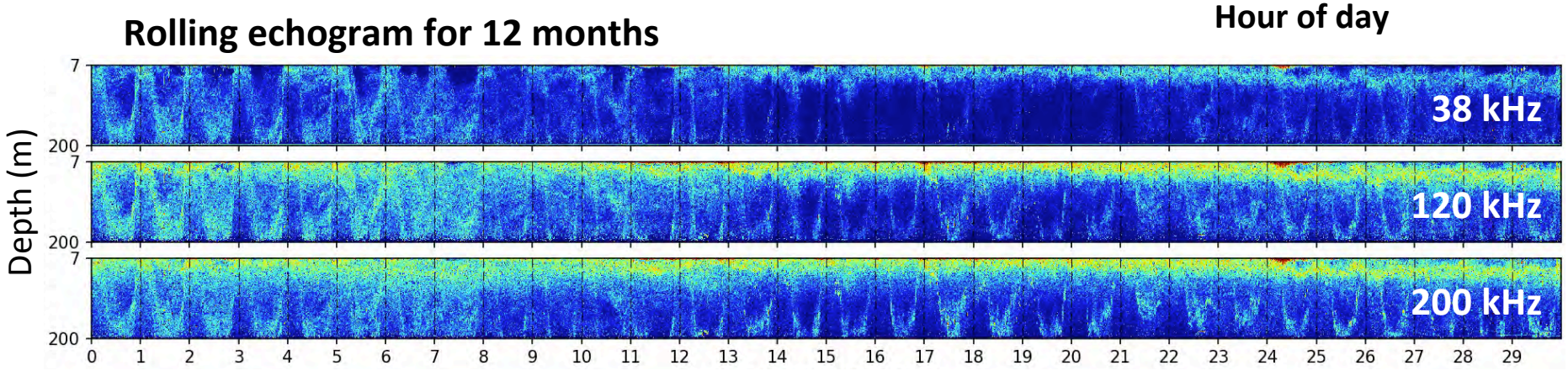
Tréhu et al., 2018

Wu-Jung Lee | wjlee@apl.washington.edu
Applied Physics Lab, University of Washington

- Sensor network ⇨ **???** ⇨ Hypotheses
- Challenges:
  - No calibration
  - No biological ground truth
- Opportunities:
  - Trends and patterns contain information too!
- **??? = Data-driven methods [OD53A-02 / Friday 2:15 PM]**



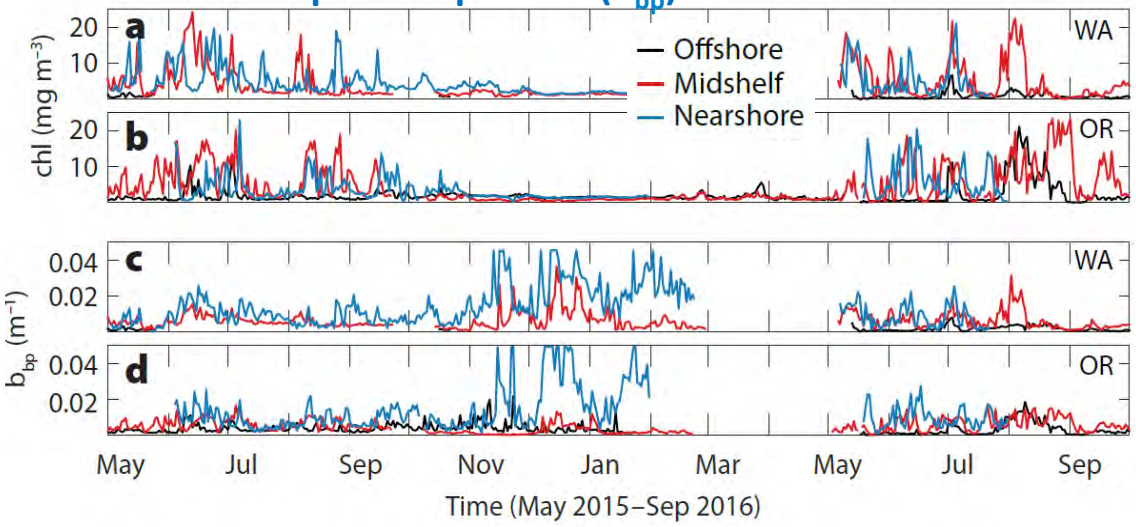




Temporal and Spatial Dynamics of Physical and Biological Properties along the Endurance Array of the California Current Ecosystem

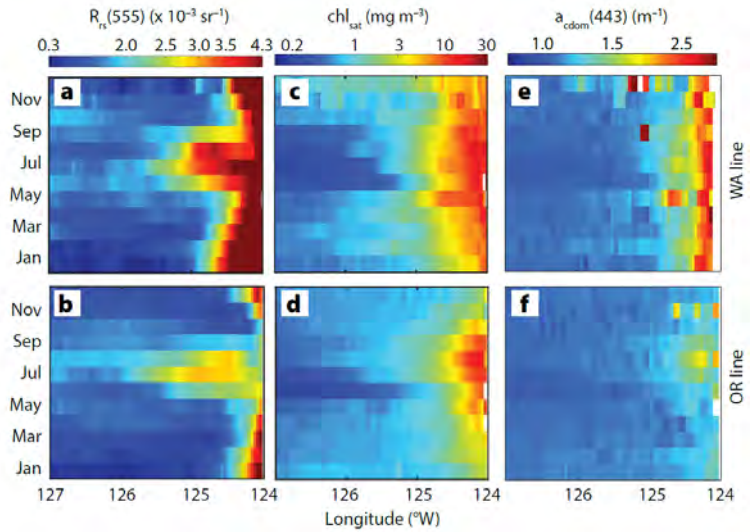
Fernanda Henderikx Freitas, Gonzalo S. Saldias, Miguel Goni, Kipp Shearman, and Angelicque White
Oregon State University

Mooring estimates of chlorophyll and suspended particle (b_{bp}) concentrations

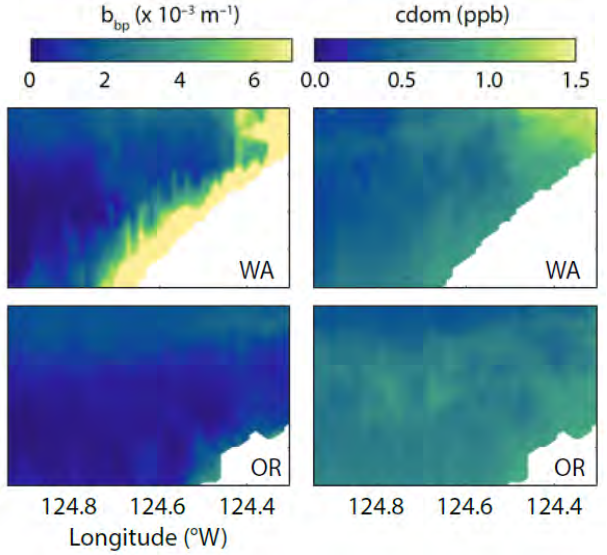


- Similar magnitudes of chl blooms in WA and OR despite weaker winds in WA
- River plumes and re-suspension patterns control suspended particle distributions
- CDOM contamination of satellite retrievals of chl appear to be significant, particularly along the WA line

Satellite retrievals of suspended matter, chl and CDOM concentrations



Glider estimates of suspended particle and CDOM concentrations

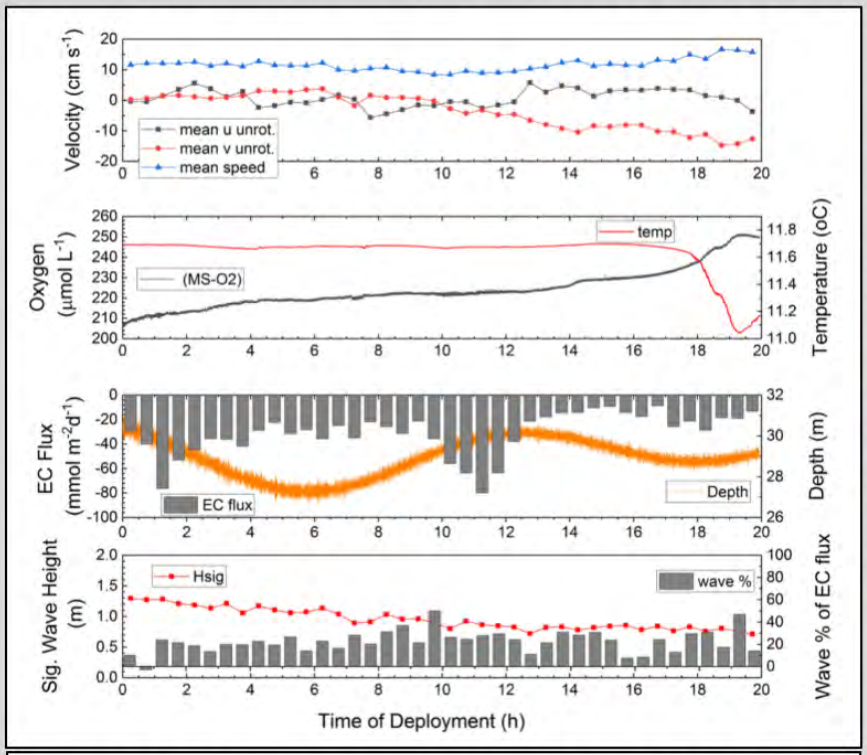


Oregon State University
College of Earth, Ocean, and Atmospheric Sciences

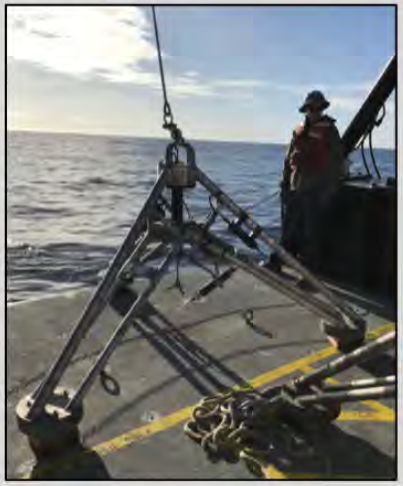
Benthic Biogeochemical Exchange Dynamics on the Oregon Shelf

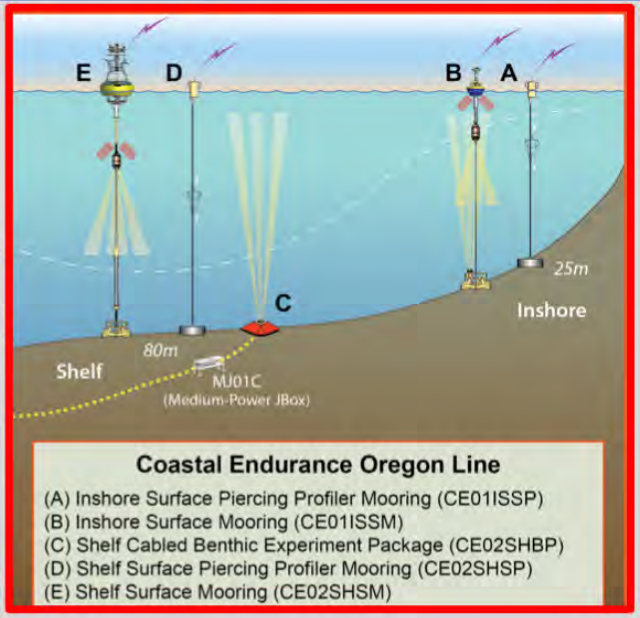
Clare E. Reimers, creimers@coas.oregonstate.edu

Using Aquatic Eddy Covariance to measure benthic oxygen consumption seasonally at Oregon shelf and inshore stations



Eddy Covariance Data, Dec. 6-7, 2017
Avg. Inshore O_2 Flux = -31.4 mmol $m^{-2}d^{-1}$



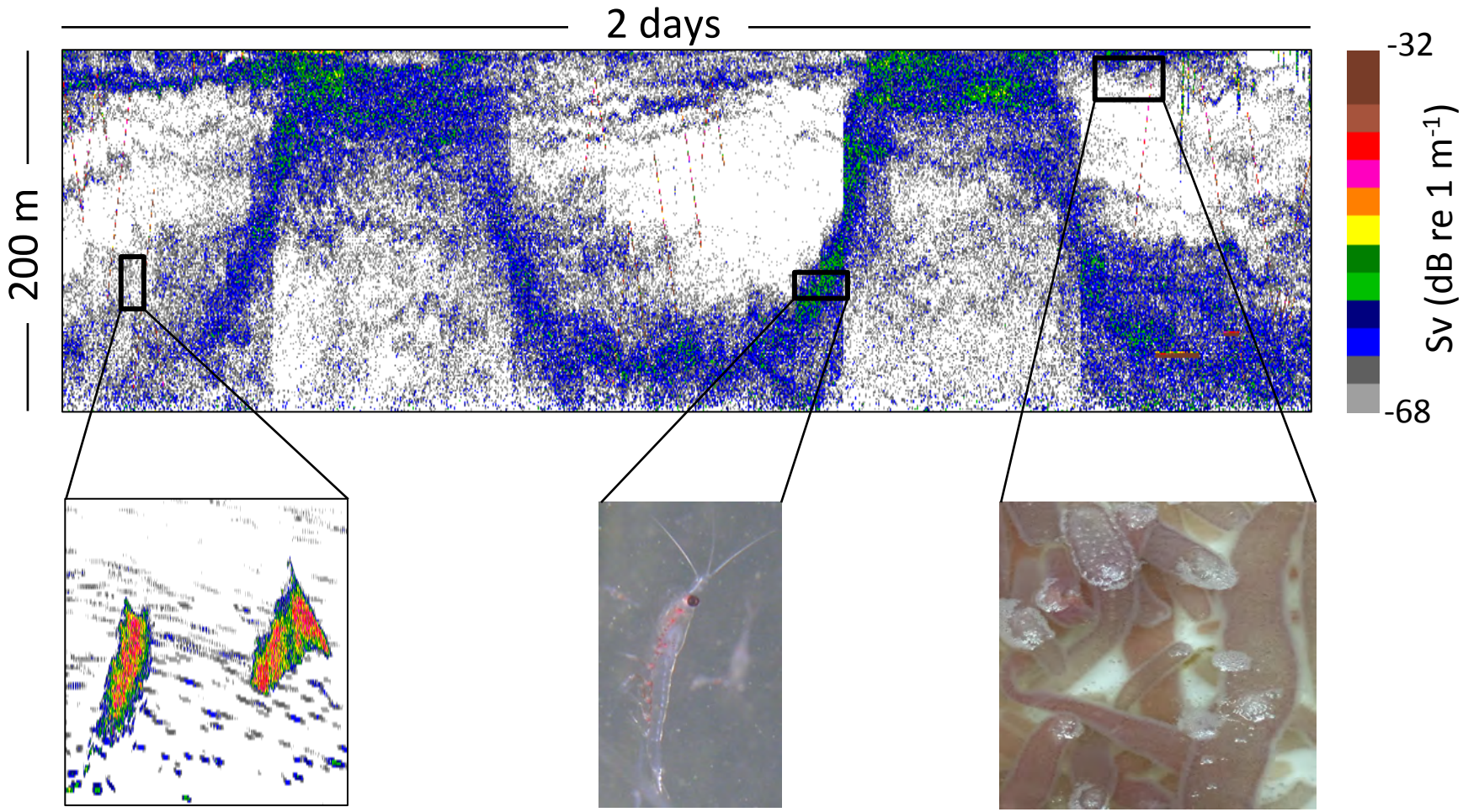


Cruise Schedule:

- Dec. 4-7, 2017 ✅
- Jan. 28-31, 2018 ✅
- Feb. 27-Mar. 2
- May 12-15
- Jul. 2-5
- Aug. 1-3
- Oct. 3-9

How do small-scale changes in upwelling alter animal behavior?

Mei Sato, University of British Columbia (m.sato@oceans.ubc.ca)

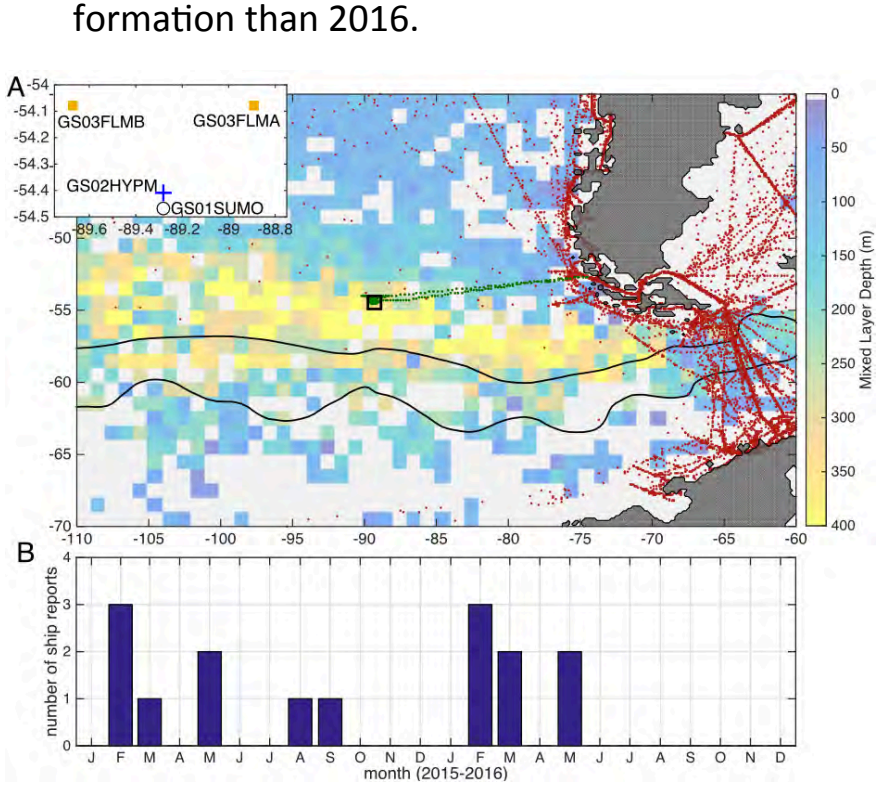


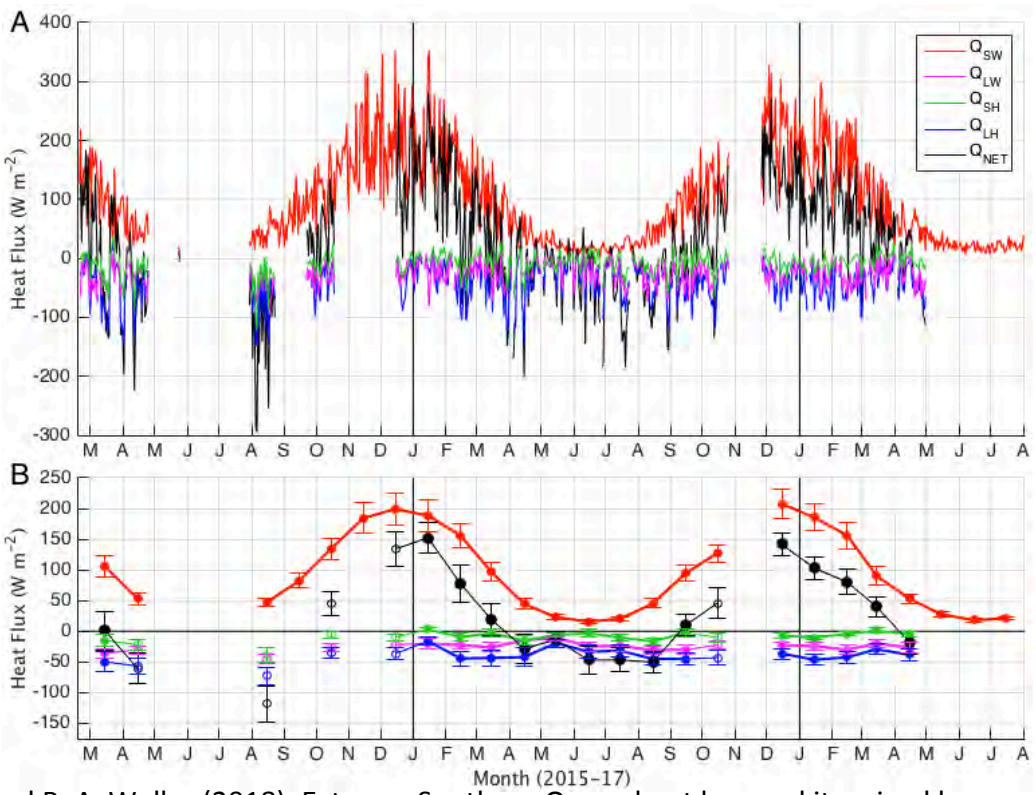
OOI Southern Ocean air-sea heat fluxes and mixed layer variability

Veronica Tamsitt, Scripps Institution of Oceanography, vtamsitt@ucsd.edu

Poster AI24A-1604 4-6pm today

- The southernmost long-term open ocean mooring yields the first multi-year air-sea flux results south of 50°S.
- Extreme turbulent heat loss events occur year-round, and are driven primarily by cold, dry northeastward winds.
- Winter 2015 had more intense heat loss events, deeper mixed layers, and greater Subantarctic Mode Water formation than 2016.

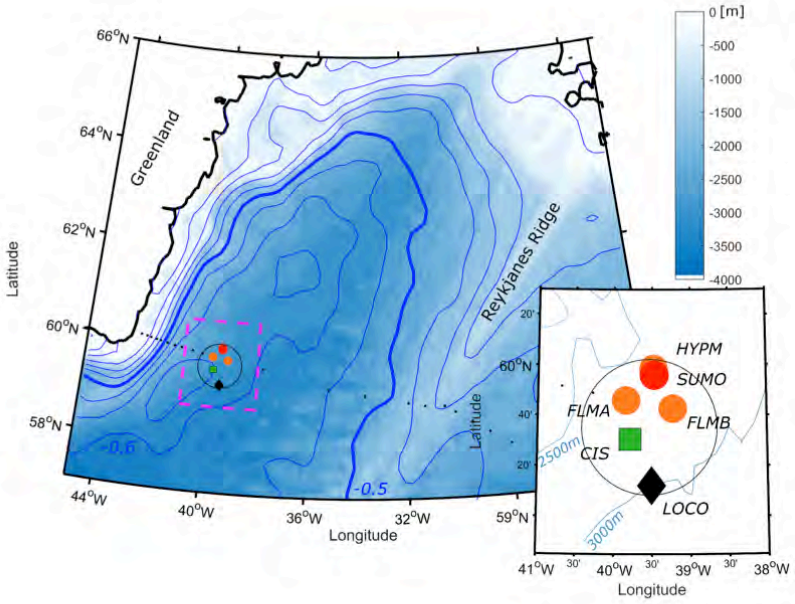


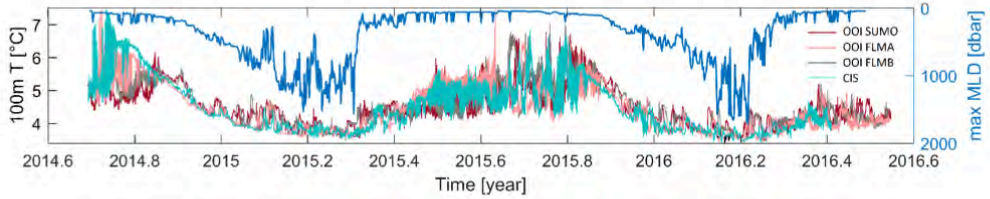


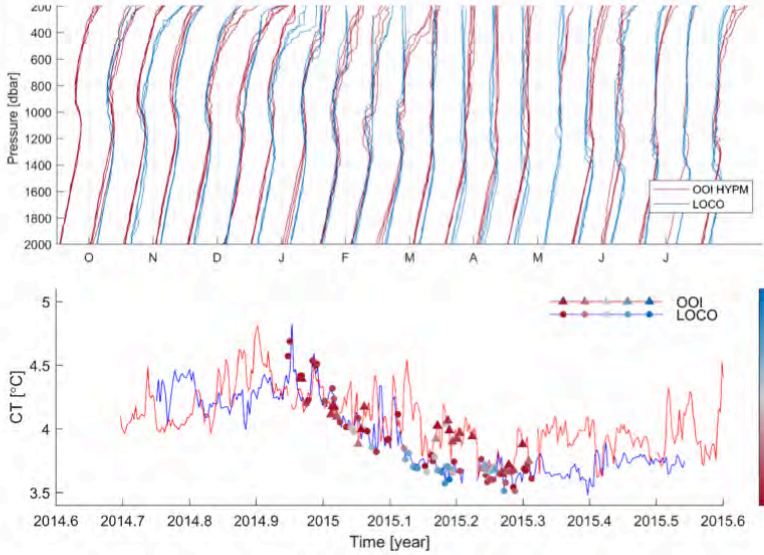
Ogle S., V. Tamsitt, S. A. Josey, S. T. Gille , I. Cerovečki, L. D. Talley and R. A. Weller (2018). Extreme Southern Ocean heat loss and its mixed layer impacts revealed by the furthest south multi-year surface flux mooring. *in revision at Geophysical Research Letters*

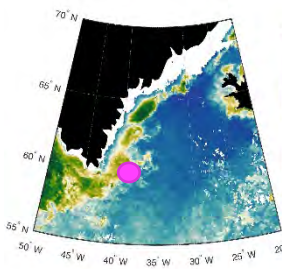
Deep convection in the Irminger Sea observed with a dense mooring array

M. Femke de Jong[1] (femke.de.jong@nioz.nl), Marilena Oltmanns[2], Johannes Karstensen[2], Laura de Steur[1,3]
[1]Royal Netherlands Institute for Sea Research, [2]GEOMAR Helmholtz Centre for Ocean Research Kiel, [3]Norwegian Polar Institute



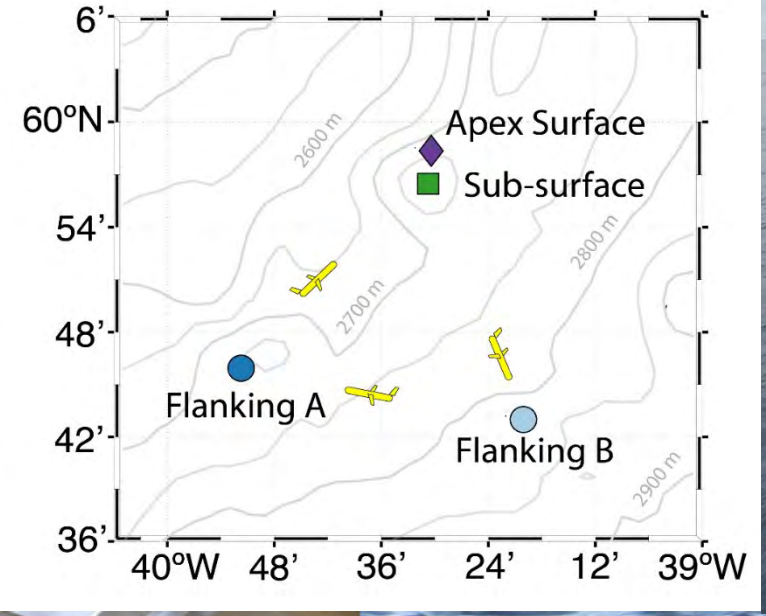


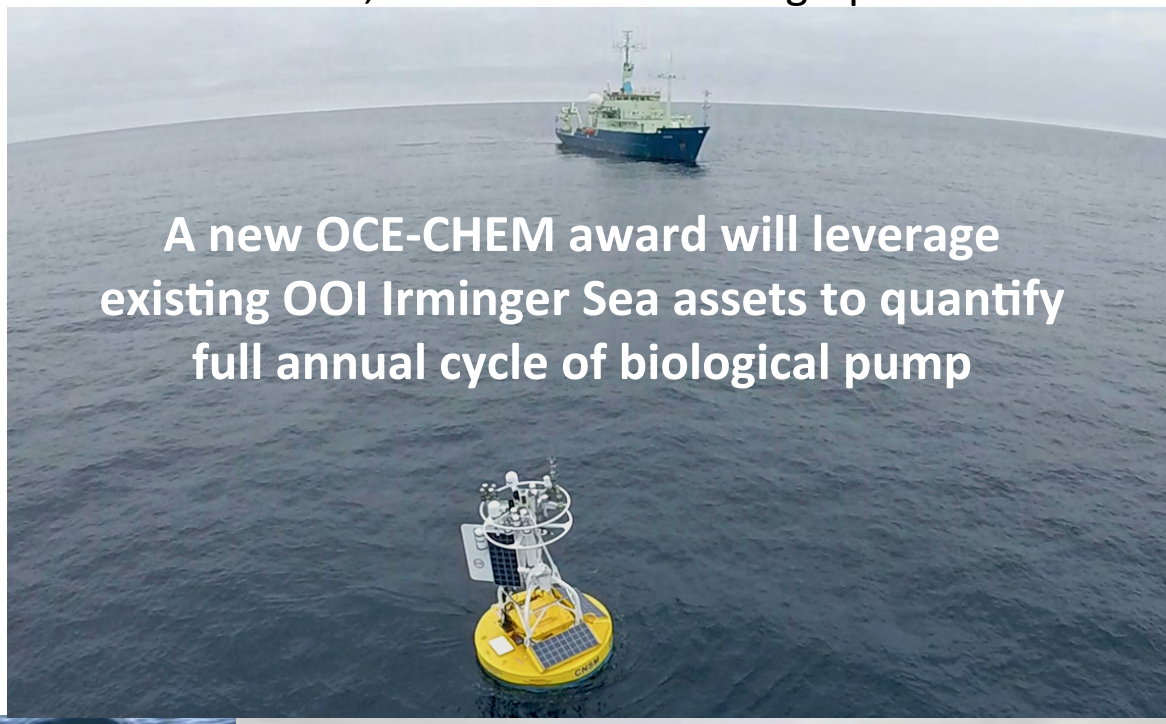




OOI Irminger Sea Array is located in a critical region for carbon uptake and export (the biological pump)

Hilary I. Palevsky and David P. Nicholson, Woods Hole Oceanographic Institution
hpalevsky@whoi.edu





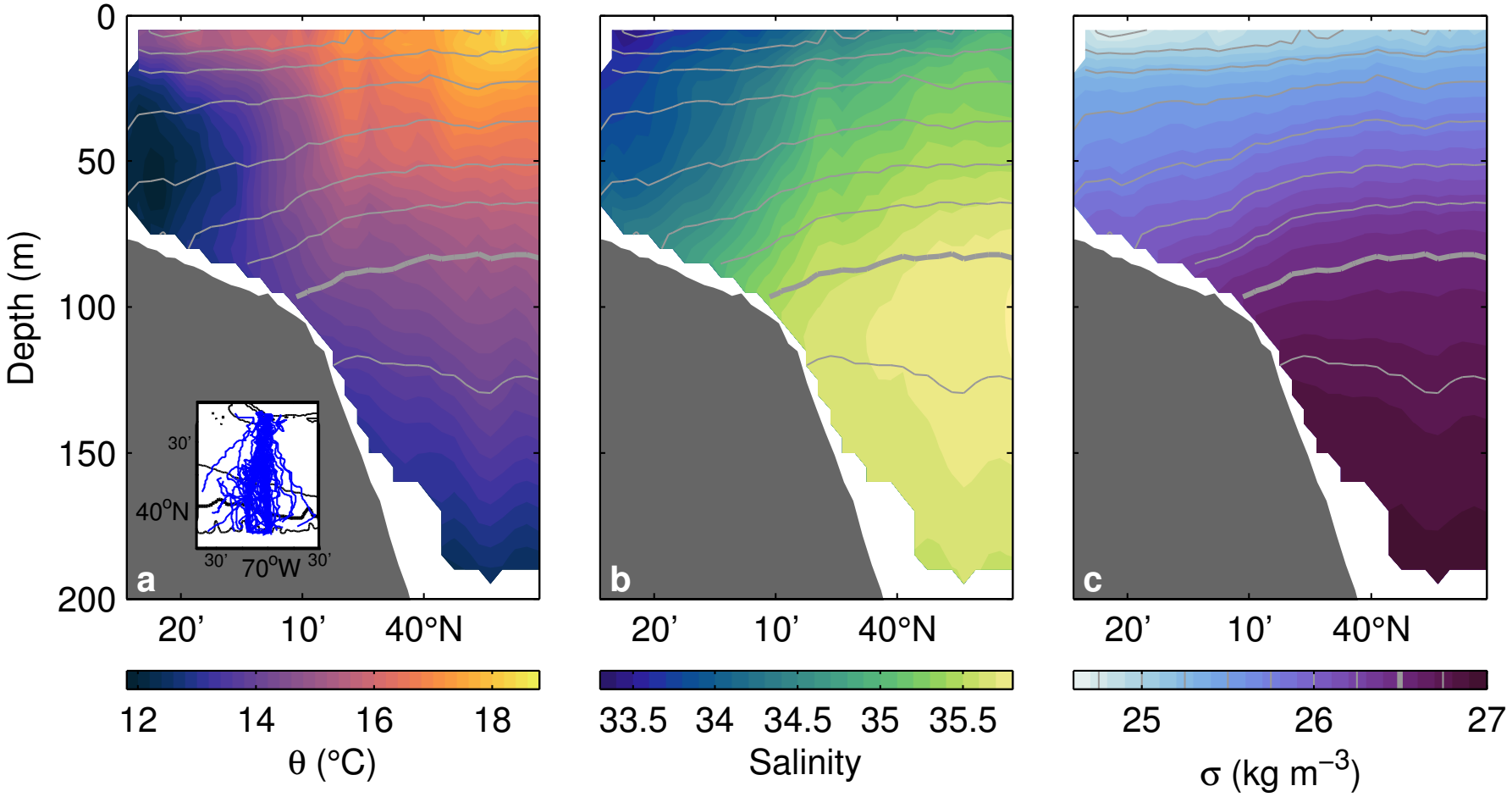
Configure gliders to calibrate oxygen sensor in air

Irminger Sea field deployment in 2018 and 2019

Analysis of Pioneer Array Glider Observations

Robert E. Todd, Woods Hole Oceanographic Institution, rtodd@whoi.edu

- Full quality control of temperature and salinity data completed for 38 Pioneer Array glider missions through early 2017 (2625 glider-days of measurements).
- Processing and quality control of velocity measurements (depth averaged and DVL) is underway.
- Mean temperature, salinity, and density transects from the eastern boundary (EB) line show notably saltier Cold Pool waters and warmer waters over the upper slope compared to prior climatologies.



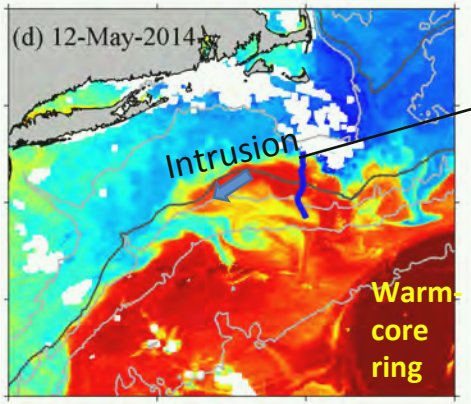
[Gawarkiewicz et al., 2018, *Oceanography*]

New Processes of Cross-shelf Water Exchange Revealed by OOI Pioneer Array

Weifeng (Gordon) Zhang, Woods Hole Oceanographic Institution, wzhang@whoi.edu
Collaborators: Glen Gawarkiewicz, Robert Todd, Jacob Partida

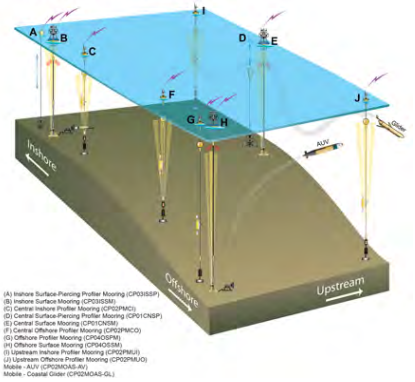
1) Onshore intrusion of the ring water

Satellite Sea Surface Temperature

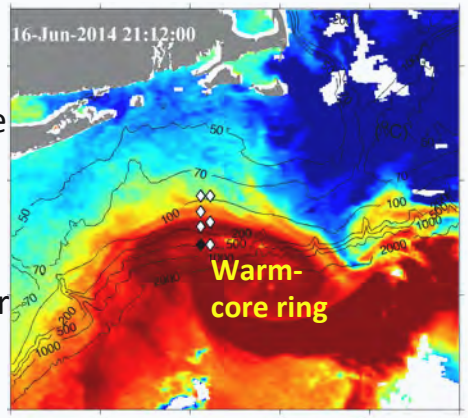


Glider track

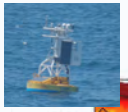
Pioneer Array glider data

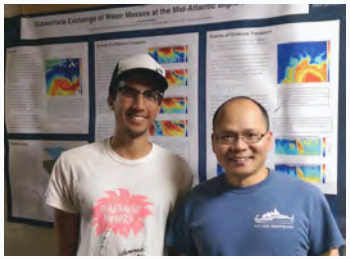


2) Subsurface offshore intrusion of the shelf water



Pioneer Array mooring data





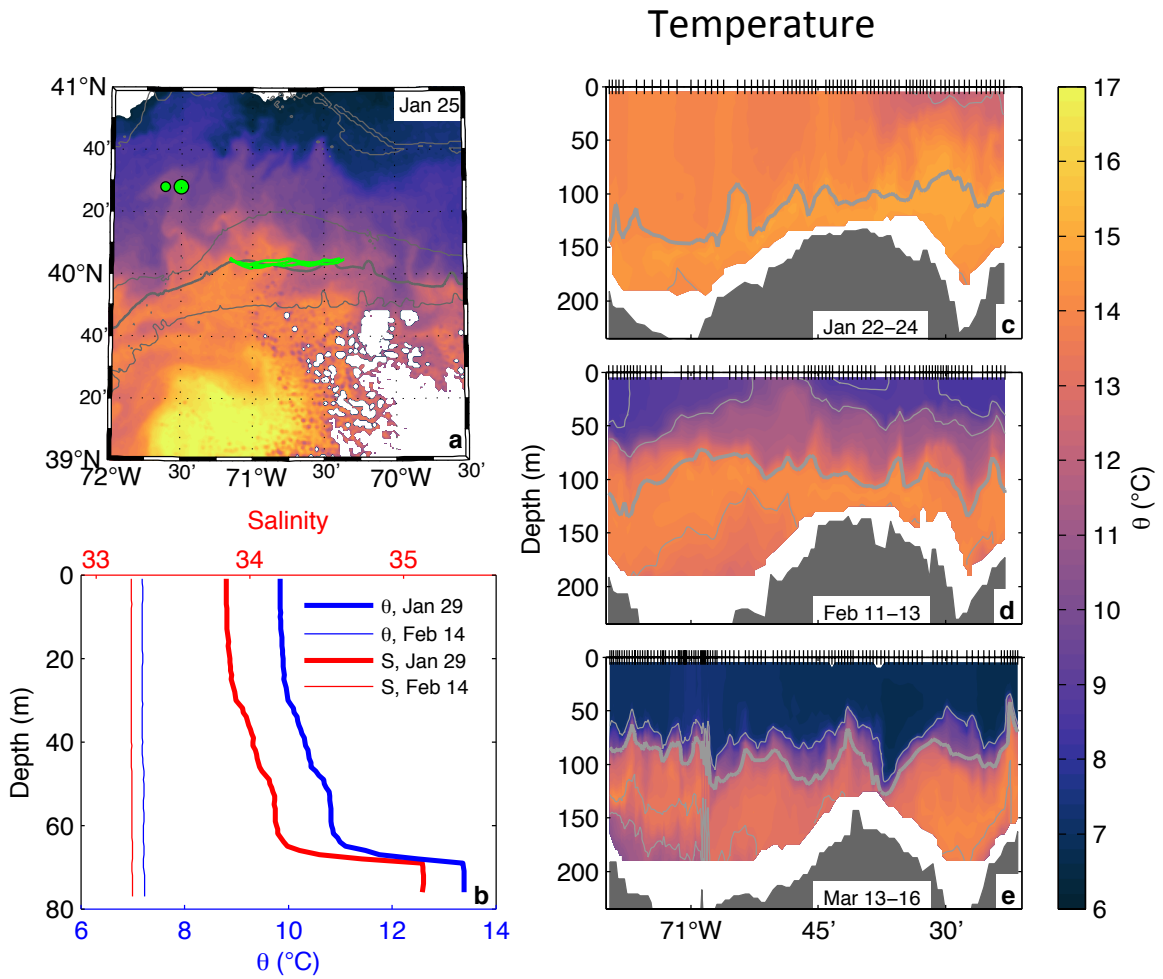
Jacob Partida
(Humboldt University, CA)

Pioneer Array data – i) revealed the subsurface structure of the onshore and offshore intrusions
ii) provided the density distribution for dynamical analysis of the mechanisms
iii) helped quantifying the cross-shelf transport
iv) provided the educational opportunity for an undergraduate student

Publications: Zhang and Gawarkiewicz, *GRL*, 2015; Gawarkiewicz, et al, *Oceanography*, 2018;
Zhang and Partida, *JGR, in review*

OOI Pioneer Array Science-Extreme Shelfbreak Exchange Events

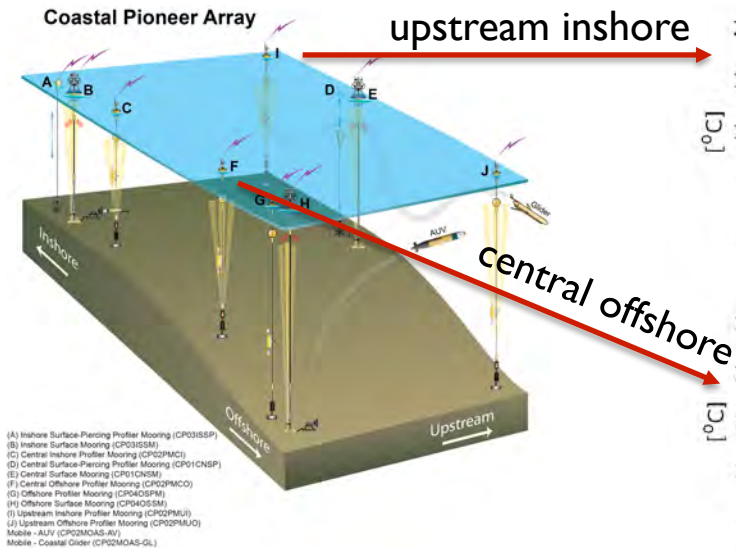
Glen Gawarkiewicz WHOI email gleng@whoi.edu

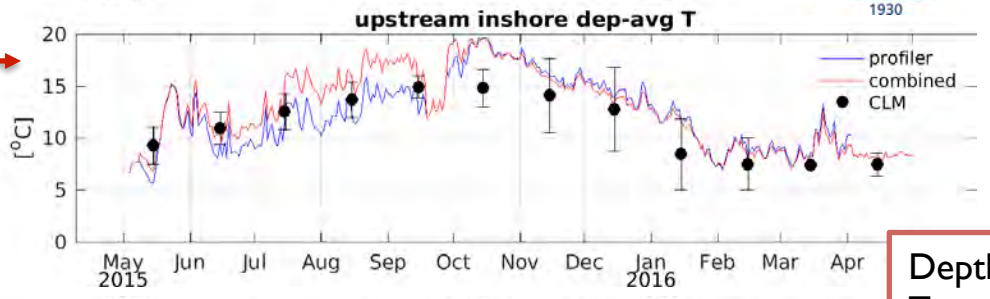


- OOI Glider data shows extremely warm water offshore of continental shelf (15°C) in January 2017.
- Data collected by commercial fishermen show 10°C water extending across continental shelf (5°C warm anomaly)

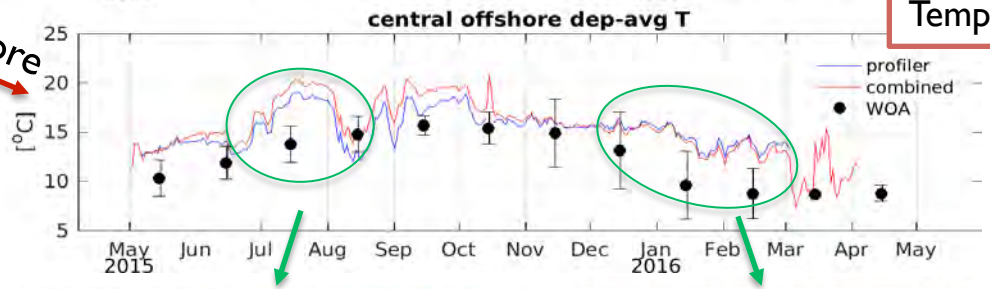
Atmospheric and offshore forcing of temperature variability at the shelf break

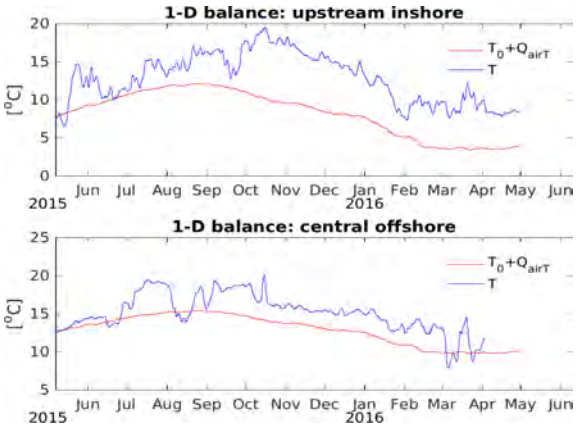
Ke Chen (kchen@whoi.edu), Woods Hole Oceanographic Institution
Collaborators: Glen Gawarkiewicz, Al Plueddemann

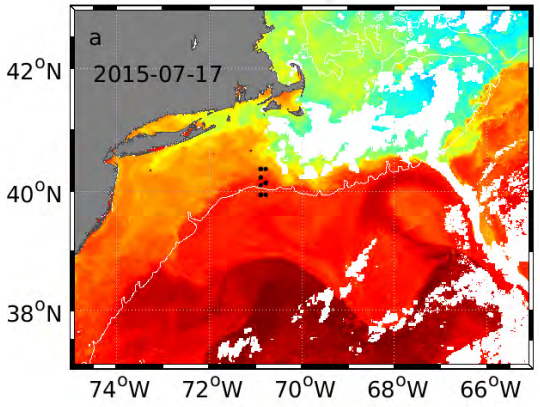


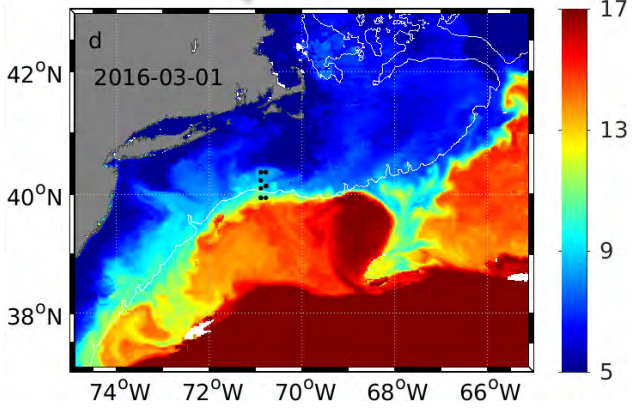


Depth-averaged Temperature









1. Large contrast in temperature variability, only 30 km apart
2. Significant impact from Gulf Stream warm core ring activity
3. Advective flux dominates the heat balance

Reference:
Chen et al., Atmospheric and Offshore Forcing of Temperature Variability at the Shelf break: Observations from the OOI Pioneer Array, *Oceanography*, in press.

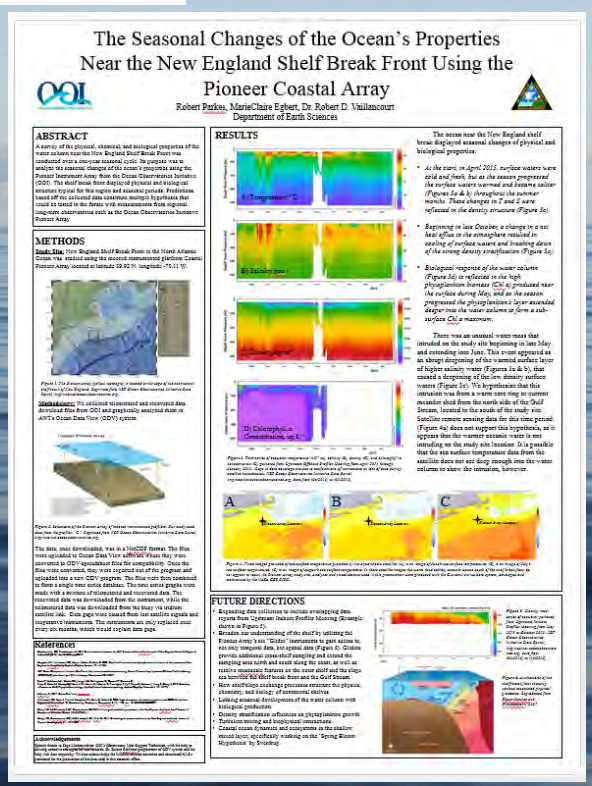
Pioneer Array – A Versatile and Indispensable Tool for Ocean Science Education and Research in a Land-Locked Undergraduate *Teaching* University

Robert D. Vaillancourt, Associate Professor of Ocean Sciences and Coastal Studies
Millersville University, Millersville, PA (robert.vaillancourt@millersville.edu)

Education

- Time & Space Scales
- Eulerian vs. Lagrangian
- Water masses & fronts
- Seasonal changes
- Vertical density stratification
- Real vs. idealized data
- Databases, data mining
- Hypothesis testing

Research



The Seasonal Changes of the Ocean's Properties Near the New England Shelf Break Front Using the Pioneer Coastal Array

Robert Parkes, MarieClaire Egbert, Dr. Robert D. Vaillancourt
Department of Earth Sciences

ABSTRACT

METHODS

RESULTS

FUTURE DIRECTIONS

References

Acknowledgements

Cheryl Greengrove

Integrating OOI Data into Undergraduate Oceanography Courses

Deb Kelley

Tacoma

Julie Masura

University of Washington

Contact: Cheryl Greengrove cgreen@uw.edu

Mikelle Nuwer

Seattle

What done so far and plan to do more…

- Participated in Rutgers University OOI workshop for educators. (see talk by Sage Lichtenwalner)[2]
- Beta tested some tools (widgits) for integrating static data into oceanography and geology classes.
- Developed plan, new lab, instrument and got IRB approval to test salinity widgets in Fall Introductory Oceanography classes at UWT & UWS. (see our poster)[1]
- Questions asked:
  - Are there improvement differences in demonstration of knowledge between students using the old salinity lab versus the new salinity OOI widget lab (3 sections each UWS)?
  - Are there improvement differences in demonstration of knowledge between students using the new salinity OOI widget lab in a large class (UWS) versus a small class (UWT)?
  - Qualitatively, what did students think of the lab?
  - Are there any demographic patterns observed with these data?

[1] **Thursday Feb 15 2018 - 4:00 PM – 06:00 PM, Poster Hall**

ED44C-2483: Integrating Ocean Observatories Initiative Data into Undergraduate Introductory Oceanography Courses

Julie E Masura, Mikelle Nuwer, Cheryl Lee Greengrove, Deborah S Kelley from University of Washington

[2] **Thursday Feb 15 2018 - 9:30 AM – 9:45 AM, Room: D139-D140**

ED41A-07: Engaging Introductory Undergraduate Students with Online Data Explorations

Charles Sage Lichtenwalner, Janice D McDonnell, Kristin I Hunter-Thomson from Rutgers University, Catherine Halversen from University of California Berkeley

Thank you!