

Ocean Observatories Initiative Facility Board (OOIFB) Town Hall

Friday, February 25, 2022





# **Session Reminders and Discussion Time**

For those joining virtually:

- Please mute yourself (unless you are the presenter).
- We hope to have time at the end of the Town Hall for discussion.
   Questions and comments can be typed into the chat box throughout this session and will be addressed during the Q&A period.
- Questions that cannot be answered during the Town Hall can be addressed by email afterwards (include your email with your question).



# **OOIFB Town Hall Agenda**

- 1200 Welcome, Introductions, Activity Update Kendra Daly (USF), OOIFB Chair
- 1205 Updates from the National Science Foundation Lisa Clough and Bob Houtman (NSF)
- 1210 Pioneer Array Relocation
  - Selection of the next Pioneer Array location Lisa Clough and Bob Houtman (NSF)
  - Pioneer Relocation timeline and Process Al Plueddemann (WHOI)
- 1220 Updates from the OOI Operator John Trowbridge (WHOI)
- 1225 Report from the OOI Biogeochemical Sensor Data Working Group Hilary Palevsky (BC), Sophie Clayton (ODU), and Heather Benway (WHOI)
- 1230 OOI Education future plans– Lisa Rom (NSF)
- 1235 Lightning Talk Presentations
- 1300 End of Town Hall



"The National Science Foundation's Ocean Observatories Initiative Facility Board (OOIFB) provides independent input and guidance regarding the management and operation of the Ocean Observatories Initiative (OOI)." Oversight, Conduit, Collaborate, Equality, Evolution



# **About OOIFB**

- NSF formed the OOIFB in 2017
- OOIFB Membership:
  - Kendra Daly (Chair), University of South Florida
  - Tim Crone (DSC Chair), Lamont-Doherty Earth Observatory
  - Paulinus Chigbu, University of Maryland Eastern Shore
  - Edward Dever, Oregon State University (OOI appointee)
  - Brian Glazer, University of Hawaii
  - Ruoying He, North Carolina State University
  - Deborah Kelley, University of Washington (OOI appointee)
  - Dax Soule, Queens College
  - John Wilkin, Rutgers, The State University of New Jersey
- One Standing Committee:
  - Data Systems Committee
- OOIFB Administrative Support Office located at URI:
  - Annette DeSilva, Pl
  - Karen Besson, Administrative Assistant
  - Abigail Ernest-Beck, Project Assistant



## OOIFB Activities in 2021/2022 www.ooifb.org

- January 22, 2021 OOIFB publishes, <u>The Ocean Observatories Initiative</u> (OOI) Science Plan: Exciting Opportunities Using OOI Data
- OOIFB hosted a virtual lab series for selection of the next Pioneer Array Location
- May 26, 2021 OOIFB Spring Meeting (virtual).
- June 4, 2021 Feedback provided to NSF regarding the OOI Annual Work Plan for Program Year 4.
- September 23, 2021 The first Larry P. Atkinson Travel Fellowship is awarded to Elizabeth Ferguson (California State University San Marcos and the CEO of Ocean Science Analytics).
- December 7-8, 2021 OOIFB holds Fall Meeting (virtual).
- December 14, 2021 OOIFB Town Hall at the Fall AGU Meeting

Dec 2021 – Jan 2022 – DSC conducts community survey on OOI Data Explorer and other data delivery systems





### **Northeast Pacific OOI Community Workshop**

#### June 7 to 9, 2022 Portland, OR

The OOIFB will host a workshop focusing on current and future science addressed by the OOI infrastructure in the Northeast Pacific. The workshop is aimed at researchers and resource managers who are using or are considering using OOI data, researchers interested in adding instrumentation to the OOI infrastructure, and educators at all levels interested in OOI's Cabled, Endurance, and Station Papa Arrays.

- A hybrid model is planned with both in-person and virtual participation
- The Workshop will include:
  - Hands-on demonstrations Accessing OOI Data
  - Plenary presentations highlighting the research, modeling, technology, and education programs that use OOI data
  - Breakout sessions for group discussions on science questions that can be addressed by the observatory assets in the Northeast Pacific.
  - Evening Poster Sessions
  - Education, Partnership, and Broader Impact sessions and discussions.
  - Opportunities to provide feedback on the OOI Program
- Applications for the Workshop are now being accepted! Apply by March 20<sup>th</sup>.

For details visit: <u>https://ooifb.org/meetings/northeast-pacific-ooi-community-workshop-2022/</u>







# Updates from the National Science Foundation

Lisa Clough and Bob Houtman





### **Pioneer Relocation Update**

Al Plueddemann, Derek Buffitt

OOIFB Town Hall 25 February 2022



![](_page_9_Picture_5.jpeg)

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#### Background

- NSF Announcement of intent to relocate (or retain)
  - Ocean Sciences Town Hall, Feb 2020
- Extensive community input from two Innovations Labs
  - 15-19 March and 21-15 June 2021
- Decision to relocate to southern MAB
  - Announced in Apr 2021
- Relocation planning
  - Initiated Jul 2021

![](_page_10_Picture_10.jpeg)

#### **Relocation Timeline**

- Three main phases: Planning, Engineering, Implementation
- NE Shelf Pioneer ends Fall 2022; MAB Pioneer starts Spring 2024

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![](_page_11_Picture_5.jpeg)

### **Planning Phase Status**

- Focus Group established
  - Feedback at each phase, response to targeted inquiries
- Consolidation of Innovation Labs input
  - Science themes, array design, instrumentation
- Site Characterization
  - Waves, currents, surface met, bathymetry, etc.
- Waterspace management
  - Shipping lanes, seafloor cables, ship wrecks, wind farms, etc.
- Regulatory Study
  - Consultant to establish the process (not filing for permits yet)
- Engineering Assessment
  - Mooring design changes, performance assessment
- Modeling assessment
  - Array suitability to environment and science goals

#### **MAB Pioneer Science Themes**

- Approach
  - Grouped into broad themes based on Innovations Lab input and ranking
- High level themes
  - Dynamics of shelf/slope exchange
    - Wind forcing, frontal instability, Gulf Stream influence
  - BGC cycling and transport
    - Carbon, nutrients, particulates
    - Ecosystem response: Primary production to marine mammals
  - Extreme events
    - Hurricanes, fresh water outflows

![](_page_13_Figure_12.jpeg)

Dana Savidge (Skidaway) and the PEACH Project

![](_page_13_Picture_14.jpeg)

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### **MAB Pioneer Array**

- Region
  - Offshore of North Carolina, north of Cape Hatteras
- Moorings
  - Shelf and slope
  - East of Nags Head, NC
- Gliders/AUVs
  - Shelf and offshore
  - North to Norfolk
     Canyon

![](_page_14_Picture_10.jpeg)

![](_page_14_Picture_11.jpeg)

### **Moored Array**

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- Preliminary Design
- Components
  - 3 CSM
  - 5 CPM
  - 2 Shallow
- Challenges

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- Regulatory
- Shallow water
- Instruments

![](_page_15_Picture_10.jpeg)

#### Instruments

- Innovations Lab input:
  - >40 instruments or measurement concepts suggested
  - "Short List" based on cross-group consensus
- Refine input based on
  - Science themes
  - Technical readiness
  - Operational feasibility/array design
  - Budget impacts
- Approach
  - Assessment by OOI (SMEs, vendor RFIs as warranted)
  - Input from Focus Group
  - RFPs and procurement as appropriate

### **Outreach and Communication**

- Science opportunities, partnerships and collaborations
  - Meetings, discussions, site visits
- Waterspace management
  - Specifics driven by regulatory and permitting requirements
  - Fishers, wind farms, US Navy, USCG, ...
- OOI Website, Newsletter and social media postings
  - Timeline posted Sep 2021, soon: Science Themes, Array Design
- Updates with Q&A at national and regional meetings
  - AGU and Ocean Sciences (Town Halls, OOI Booth)
  - Regional stakeholders (e.g. IOOS, MABPOM)

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# **Questions?**

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### Update from the Operator OOIFB Town Hall Ocean Sciences Meeting

John Trowbridge February 25, 2022

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INSF

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**DCEANOBSERVATORIES.OR** 

### **Mission: Sustained Data for a Changing Ocean**

![](_page_24_Picture_2.jpeg)

Sponsored by NSF. Operated and managed by WHOI, UW, and OSU.

- Management
- Refurbishment
- Cruises
- Cyberinfrastructure
- Community Engagement

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![](_page_24_Picture_10.jpeg)

# **OOI 2.0 Accomplishments**

- Nearly full marine scope
- Data Explorer launch
- Enhanced data QA/QC
- New Data Center
- Mitigation of COVID-19
- Expanded community reach

![](_page_25_Picture_8.jpeg)

Research Vessel *Nathaniel B. Palmer* services the OOI Array in the Southern Ocean. Photo credit: WHOI.

![](_page_25_Picture_10.jpeg)

ANSIA

#### $\triangle$

# **Science Impacts**

# 202 OOI-related publications in refereed journals thru 30 Sep 2021

- 177 lead authors
- 92 lead institutions
- 21 countries
- 5 continents

# 97 NSF awards using OOI data or infrastructure thru 30 Sep 2021

- \$53.1m total
- 74 lead PIs

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• 34 lead institutions

Home	Browse By Author	Browse by Topic OOI Main Site	-				
02	OCEAN OBSERVATOR INITIATIVE	ES					
ROWSE	BY OOI ARRAY	Missing publications? If you have an OOI-related peer-reviewed journal publication that is					
View All P	ublications	us know so we can include it. Su https://oceanobservatories.org	us know so we can include it. Submit your citation at https://oceanobservatories.org/science/ooi-publication-tracker/.				
All Arrays		Citing OOI-related publications					
Regional Cabled		All publications citing OOI data should include an acknowledgment of					
Coastal Pi	oneer	by the National Science Foundation	by the National Science Foundation under Cooperative Agreement !				
Coastal Endurance		supports the OOI) or other rele	supports the OOI) or other relevant NSF award number."				
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A. M. Moore, Levin, J., Arango, H. G., and Wilkin, J., "Assessing the observing, analysis and forecast System for the Mid-Atlantic E

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# Why It Matters

Nature Climate Change: Increased risk of a shutdown of ocean convection

*Nature Scientific Reports:* Anomalous near-surface low-salinity pulses off the central Oregon coast

*Nature Scientific Reports:* Direct interaction between the Gulf Stream and the shelfbreak south of New England

*Science*: Inflation-predictable behavior and co-eruption deformation at Axial Seamount

*Nature Communications*: The mechanism of tidal triggering of earthquakes at mid-ocean ridges

![](_page_27_Picture_7.jpeg)

![](_page_27_Picture_8.jpeg)

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# Thank you!

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#### **OOI Biogeochemical Sensor Data Working Group**

- Goal: To broaden the use of OOI biogeochemical sensor data and increase community capacity to produce analysisready data products
- Working Group formed with 25 members in July 2021

OOI BGC WG Organisers: Sophie Clayton (ODU) Hilary Palevsky (Boston College) Heather Benway (WHOI)

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![](_page_30_Picture_6.jpeg)

Ocean Carbon & Biogeochemistry

#### https://www.us-ocb.org/ooi-dataset-community/

- $_{\circ}$  3 day virtual kick-off meeting in July 2021
- Ongoing collaboration in sub-groups + 4 full working group follow on meetings in 2021 and 2022
- 4 day in person workshop planned for June 2022 at WHOI (in conjunction with OCB)

**Working Group Scope:** four groups of biogeochemical variables and associated sensors which have been widely deployed across the OOI arrays and are also commonly used in other ocean observing and autonomous biogeochemical sensor programs

		Oxygen (chapter 2)		Nitrate (chapter 3)	Carbonate chemistry (chapter 4)			<b>Bio-optics</b> (chapter 5)
Array	Platform	Aanderaa	SeaBird	SUNA/ISUS	pH: SAMI	pCO <sub>2</sub> : SAMI	pCO <sub>2</sub> : Pro- Oceanus	WetLabs fluorometers
Global	Fixed	7	0	2	4	4	1	7
	Profiler	2	0	0	0	0	0	2
	Gliders	2	0	1	0	0	0	2
Pioneer	Fixed	6	0	3	6	3	3	3
	Profiler	0	7	0	0	0	0	7
	Gliders	2	0	2	0	0	0	2
Endurance	Fixed	12	0	6	12	8	4	8
	Profiler	6	2	5	2	2	0	7
	Gliders	2	0	0	0	0	0	2
Cabled	Fixed	4	0	0	2	0	0	2
	Profiler	2	2	2	2	2	0	4
OOI program total		72	11	28	38	27	10	73

#### **OOI BGC Working Group membership**

Oxygen Sub-Group Kristen Fogaren (Boston College) Susan Hartman (National Oceanography Centre) Isabela Le Bras (WHOI) Cara Manning (UConn) Jon Fram (OOI, OSU)

Carbon Sub-Group Andrew Reed (OOI, WHOI) Ellen Briggs (Univ. Hawaii) Roman Battisti (Univ. Washington/NOAA PMEL) Dariia Atamanchuk (Dalhousie Univ.) Jennie Rheuban (WHOI) Rachel Eveleth (Oberlin College)

#### **Bio-optics Sub-Group**

Merrie Beth Neely (NOAA) Filipa Carvalho (National Oceanography Centre) Alison Chase (Univ. Washington, APL) Rob Fatland (Univ. Washington) Christina Schallenberg (Univ. Tasmania) Chris Wingard (OOI, OSU)

Nitrate Sub-Group Annie Bourbonnais (Univ. South Carolina) Hilde Oliver (WHOI) Ian Walsh (Freelance Researcher) Jennifer Batryn (OOI, WHOI) Joseph Needoba (Oregon Health & Science Univ.)

### **Planned Working Group Products**

- "Cookbook" intended for current and potential users of OOI biogeochemical data from across the oceanographic research community
  - User-friendly guide that will ultimately be submitted to the Ocean Best Practices repository & could be linked from the OOI website
  - Introduction chapter with overview material relevant to all types of OOI BGC sensors + four separate chapters for each sensor type
  - Goal: Complete and submit for review by external-to-working group experts in spring
     2022
- Peer-reviewed publication citing and presenting the cookbook
  - Intend to draft in 2022 after cookbook draft is submitted for external expert review
- Synthesis report with recommendations for OOI
  - Intend to draft in 2022 after cookbook draft is submitted for external expert review

### SAVE THE DATE! Ocean Observatories Initiative (OOI) Biogeochemical Sensor Data User Workshop (June 16-18, 2022, Woods Hole, MA)

- In person workshop associated with the annual Ocean Carbon & Biogeochemistry (OCB) summer workshop
- We will circulate an application to identify ~15-20 current or prospective OOI biogeochemical sensor data users (in addition to the working group members) to join the workshop
- Workshop agenda: present Working Group products to date & discuss science questions that can be addressed using OOI BGC data

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# **Ocean Observatories Education**

OOI Town Hall February 25, 2022 Lisa Rom (ELRom@nsf.gov) Program Director, Ocean Education

# **OOI Education proposals**

OCE Education is encouraging proposals to use OOI for education projects:

- DCL for Workshops is still active NSF 20-047;
- Submit to Ocean Education via PAPPG 21-1

#### Other programs of Interest:

- Improving Undergraduate STEM Education
- GEOPATHS
- Advanced Technology Education
- CAREER

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### Dear Colleague Letters – new!

• DCL Research Experiences for Teachers (RET) Supplement Opportunity (NSF 22-043) support to include K-12 teachers or community college faculty, as partners in research projects.

• DCL Directorate of Geosciences-Veterans Education and Training Supplement (GEO-VETS) Opportunities (NSF 22-044) supplements to include veterans who are students, K-12 teachers, or 2-year college faculty in research being conducted with active GEO awards.

### Elrom@nsf.gov

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![](_page_39_Picture_0.jpeg)

![](_page_40_Picture_0.jpeg)

# **Lightning Talk Presentations**

Shima Abadi, University of Washington Tiago Carrilho Bilo, Scripps Institution of Oceanography, UCSD Rob Fatland, eScience Institute, University of Washington Melanie R. Fewings, Oregon State University Derya Gumustel, University of Washington (Presenter: Wu-Jung Le, UW) Artash Nath, Monitor My Ocean Monica Nelson, Scripps Institution of Oceanography, UCSD Justin Stopa, University of Hawaii at Manoa

Please join the OOI Exhibit Booth on Thursday, March 3<sup>rd</sup> at 3pm ET for a Lightning Talk redux with time for discussion with the presenters.

#### Long-term Ambient Sound Correlation using OOI Acoustic Data PI: Shima Abadi, University of Washington, abadi@uw.edu Ph.D. Student: John Ragland, University of Washington, jhrag@uw.edu of Hydrophones Goal: To characterize the ocean ambient sound in NE Pacific Ocean **Data**: OOI acoustic data at the Regional Cabled Array and Coastal Endurance Array **Uniform Source Distribution** Time Domain Green's Function OOIP 0.012 Noise 0 0 1 0 Interferometr 0.008 0.006 **Central Caldera Ambient Sound** 레 0.004 A Python toolbox 1 60 Man Marker Marker 0.002 for analyzing the 0.000 40--0.007 **OOI** acoustic data delay [s] 2016 2017 2018 2019 2020 time (year) Long-term Noise Crosss1b0E s2b1B Map of the Seismic **Correlation Function** 0.2727 0.2424 Contribution Survey (NCCF) 0.2121 of each point 0.1818 0.1515 on NCCF 0.1212 0.0909 0.060 0.0303 s2b1A s1b0/ 0.000 2015 2017 2018 2019 2020 -1010 20 0 x [km] dates

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1. Ragland, Abadi, Sabra, (2022). "Long-term noise interferometry analysis in the northeast Pacific Ocean," JASA, 151, 194–204.

2. Ragland, Schwock, Munson, Abadi, "An overview of ambient sound using Ocean Observatories Initiative hydrophones," JASA, in review.

### ARRIVAL OF NEW GREAT SALINITY ANOMALY WEAKENS CONVECTION IN THE IRMINGER SEA

Tiago Carrilo Biló<sup>1</sup>, Fiammetta Straneo, James Holte, and Isabela Le Bras

<sup>1</sup>tcarrilhobilo@ucsd.edu

![](_page_42_Picture_3.jpeg)

#### Argo salinity anomalies (0-200 m)

![](_page_42_Picture_5.jpeg)

FLB-mooring: upper ocean buoyancy (dots) ERA5 buoyancy removed during wintertime (bars)

![](_page_42_Figure_7.jpeg)

#### **OOI** Regional Cabled Array: Open Data Analysis

Rob Fatland, Research Computing Director, University of Washington: rob5@uw.edu

#### https://github.com/robfatland/ocean binder sandbox: https://mybinder.org/v2/gh/robfatland/ocean/HEAD

![](_page_43_Figure_3.jpeg)

![](_page_44_Picture_0.jpeg)

Melanie Fewings (melanie.fewings@oregonstate.edu), Brandy Cervantes, Craig Risien, Oregon State University; Jennifer Fisher, NOAA/NWFSC

![](_page_44_Picture_1.jpeg)

Background

Oregon Stat University

- Marine heat waves (MHW) impacted the northeast Pacific in 2014-16 and 2019-2020 (Bond et al. 2015, Jacox et al. 2016, Amaya et al. 2020).
- In the NCC, the subsurface expression of the MHWs is not well-characterized.

#### **Data and Analysis**

- At NH-10 on the 80-m isobath off Oregon, six observing programs collected hydrographic and velocity data during 1997-present: OSU-NOPP, GLOBEC-LTOP, OrCOOS, NANOOS, CMOP, OOI Endurance Array
- We concatenated these data sets into a single, consistent 24+ year record.
- We calculated best-fit climatological cycles, subsurface temperature (T) anomalies, and MHW characteristics following Hobday et al. (2016).

#### Findings

- MHWs increased in **frequency** and **intensity** at **all depths** during 1997-2021.
- The surface, near-surface, and subsurface expressions of the MHWs all differ.
- The seasonal timing and vertical structure of T anomalies was not the same in the 2014-16 and 2019-20 MHWs.

#### Significance

- This multi-program ocean observing record spans >24 years, approaching a climate science community standard: a 30-year base period for statistically robust climatology & anomalies.
- The depth-varying structure of the T anomalies indicates satellite observations are insufficient to characterize MHW in the NCC and must be supplemented by subsurface observations.

![](_page_44_Figure_16.jpeg)

Thanks to NOAA/NWFS: Bill Peterson, Kym Jacobson; OSU/CIMRS: Michael Banks, LeAnne Rutland;

OSU/CEOAS: Ted Strub, Phil Barbour, Mike Kosro, Jack Barth. Funded By: NOAA Climate Observations and Monitoring Program, NASA Ocean Vector Winds Science Team

![](_page_45_Picture_0.jpeg)

#### W UNIVERSITY of WASHINGTON

![](_page_45_Picture_2.jpeg)

#### Low-Dimensional Representation of Temperature and Salinity Profiles Captures Seasonal Water Column Variability escience Institute

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50 -(dbar)

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50 -(dbar)

75. 100 -

125

150 -

175-

Derva Gumustel, Wu-Jung Lee, Valentina Staneva, Emilio Mayorga University of Washington, contact: deryag@uw.edu

#### Goal: Develop a data-driven workflow to characterize intrinsic seasonal structures in water column data.

![](_page_45_Picture_6.jpeg)

app.interactiveoceans.washington.edu/map

Presentation session: OD05 #3 Room 15, March 1 2022, 5:00 PM ET

Long-term datasets from the OOI Coastal Endurance array Oregon Offshore profiler were smoothed and gridded. Principal component analysis (PCA) is applied to standardized temperature and salinity profiles to find structures along depth across time.

PC1 and PC2 jointly explain 84% of the variance. The components capture variation in different parts of the water column and differ in their patterns of temporal activation.

![](_page_45_Figure_11.jpeg)

![](_page_45_Figure_12.jpeg)

The time series of activations captures seasonal trends in the data. Similar seasonal variability was observed when applying PCA to WA coast offshore profiler data.

![](_page_45_Picture_14.jpeg)

# **MonitorMyOcean.com** Interactive WebApp

#### Measuring Anthropogenic Noise in Global Oceans: Using Hydrophone Data from 8 Locations

![](_page_46_Picture_2.jpeg)

#### Frequency Analysis

![](_page_46_Figure_4.jpeg)

![](_page_46_Figure_5.jpeg)

![](_page_46_Figure_6.jpeg)

![](_page_46_Picture_7.jpeg)

Artash Nath Founder MonitorMyOcean.com

> Grade 10 Student Toronto, Canada

#### Artash.Nath@gmail.com

![](_page_46_Picture_11.jpeg)

![](_page_46_Picture_12.jpeg)

### Annual heat budget at the OOI Irminger Array

![](_page_47_Picture_1.jpeg)

stored heat = air-sea heat flux + horizontal heat convergence

Data:

- OOI data
- Roemmich and Gilson Argo product
- ERA5 reanalysis

![](_page_47_Figure_7.jpeg)

- Heat loss to the atmosphere balanced by horizontal advection of heat
- A lot of year-to-year variability
- No clear regime changes with the recent middepth cooling

![](_page_47_Figure_11.jpeg)

![](_page_47_Picture_12.jpeg)

![](_page_47_Picture_13.jpeg)

Monica Nelson (<u>m3nelson@ucsd.edu</u>), Fiamma Straneo, Sarah Purkey

#### Justin Stopa : stopa@hawaii.edu

Ocean Resources & Engineering, SOEST, The University of Hawai'i at Mānoa

<u>Method</u>: Map sea surface roughness from satellite to atmospheric stability - Richard Number (*Ri*)

*Ri* - expresses the ratio of <u>buoyancy</u> to the <u>flow shear</u>
Model improvements/hand-labeling - *Who is correct!?*OOI buoy contain the necessary info to estimate *Ri*298 S-1A co-locations at Global Array SO OOI

![](_page_48_Figure_4.jpeg)

$$Ri = \frac{g}{T_{10v}} \frac{z_{10} \left( T_{10v} - SST_v \right)}{U_{10N}^2}$$

![](_page_48_Figure_6.jpeg)

### OCEAN SCIENCES MEETING 2022

For more information about OOIFB, visit www.ooifb.org

Thank you for attending

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