

## **Plenary Session 2. Studying Spatial and Temporal Variability in the Ocean with Shipboard and Autonomous Platforms**


**Chairs: Susanne Neuer (Arizona State Univ.), Michael Lomas (Bigelow Laboratory), Angelicque White (Oregon State Univ.)**

**8:15 Introduction: OCB Ocean Time-series Committee and activities (Susanne Neuer, Arizona State Univ.)**


# Congratulations!!

Meet the innovators whose ocean sensor technologies won and are securing the future for ocean health.

Twenty-four teams from around the world competed to develop affordable and accurate ocean pH sensor technology to help better measure our planet's chemistry. After months of testing from the lab, salt-water tanks in California to the deep blue seas off Hawaii, winners have surfaced and we are one step closer to turning the tide on ocean health.

**SUNBURST SENSORS**  
UNITED STATES  
TEAM LEADER: JAMES B...



**ANB SENSORS**  
UNITED KINGDOM  
TEAM LEADER: DR. NATHAN LAWRENCE



**TEAM DURAFET**  
UNITED STATES  
TEAM LEADER: BOB CARLSON




**HPHS**  
JAPAN  
TEAM LEADER: YOSHIYUKI NAKANO



**TEAM XYLEM**  
UNITED STATES  
TEAM LEADER: JOSTEIN HOVDENES



**BLUE DEVIL OCEAN ENGINEERING**  
UNITED STATES  
TEAM LEADER:



**SUNBURST SENSORS**

Sunburst Sensors strives to provide its customers high-quality chemical sensors for marine and freshwater



**ANB SENSORS**

The ANB team comprises three partners, Schlumberger, Cambridge Microfab and Hull University. Schlumberger is providing the sensing



**TEAM DURAFET**

This team combines expert researchers from multiple groups; Monterey Bay Aquarium Research Institute, Scripps Institution of



# Ocean Time-series Committee (OTC)

- ◆ Formed 2007 as a sub-committee of the OCB SSC – OTSAC

*“to facilitate communication among U.S. time-series PIs, funding agencies, and the time-series user community “*

- ◆ 2014, Revised charge – OTC

## Specific roles

1. Focus still on ship-board TS as unique observing assets to the oceanographic community
2. Encourage synergistic and collaborative technology and methods development, including autonomous devices, and their possible integration into existing time-series observations
3. Improve communication and collaboration among U.S. and international scientists engaged in ocean time-series science



# Ocean Time-series Committee (OTC)

## Members

Susanne Neuer (Arizona State Univ.) – chair  
Craig Carlson (Univ. California, Santa Barbara)  
Michael DeGrandpre (Univ. Montana)  
John Dunne (NOAA/Geophys. Fluid Dynamics Laboratory)  
Richard Lampitt (National Oceanography Centre)  
Ricardo Letelier (Oregon State Univ.) – ex officio  
Mary Jane Perry (Univ. Maine)  
Paul Quay (Univ. Washington)

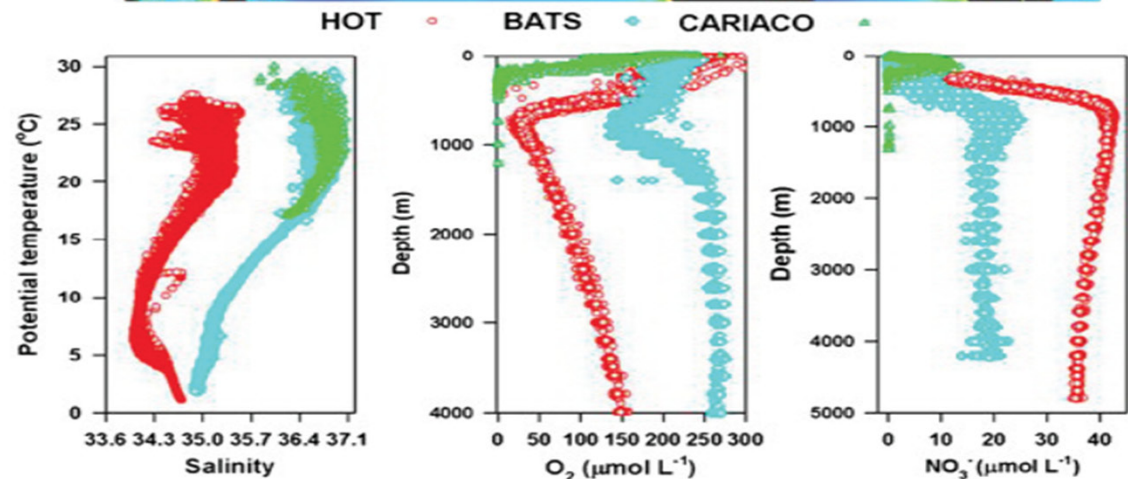
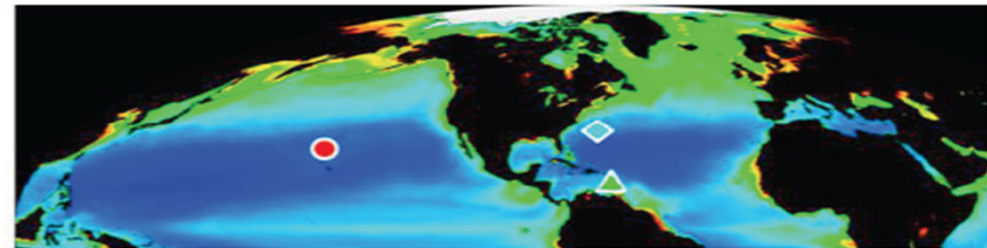
<http://www.us-ocb.org/about/subcommittees.html>



# OCB Ocean Time-Series Activities and Products

1. Sea Change: Charting the Course for Ecological and Biogeochemical Ocean Time-Series Research (Honolulu, Hawaii, Sept. 21-23, 2010)

**Outcome:** Deep-Sea Research Part II: Topical Studies in Oceanography 93, 2-15) (Lomas, Church, Muller-Karger, eds)



Church, Lomas, Muller-Karger 2013. Sea change: Charting the course for biogeochemical ocean time-series research in a new millennium. Deep-Sea Research Part II: Topical Studies in Oceanography 93, 2-15)



Global Intercomparability  
in a  
**CHANGING OCEAN**



**Global Intercomparability in a Changing Ocean:  
An International Time-Series Methods Workshop**

November 28-30, 2012

(Bermuda Institute of Ocean Sciences, St. Georges, Bermuda)

<http://www.who.edu/website/TS-workshop/>

**OCB Ocean Time-  
Series Activities and  
Products**

**2. Global Intercomparability  
in a Changing Ocean: An  
International  
Biogeochemical Time-Series  
Methods Workshop**

(St. Georges, Bermuda,  
November 28-30, 2012)

**Outcomes:** Best practices  
guide and  
global compilation of time-  
series (**Lorenzoni and  
Benway, eds. 2013**)



**Recommended citation:**

Lorenzoni, L., Benway, H. M. (Editors), 2013. Report of *Global intercomparability in a changing ocean: An international time-series methods workshop*, November 28-30, 2012, Ocean Carbon and Biogeochemistry (OCB) Program and International Ocean Carbon Coordination Project (IOCCP), 61 pp.

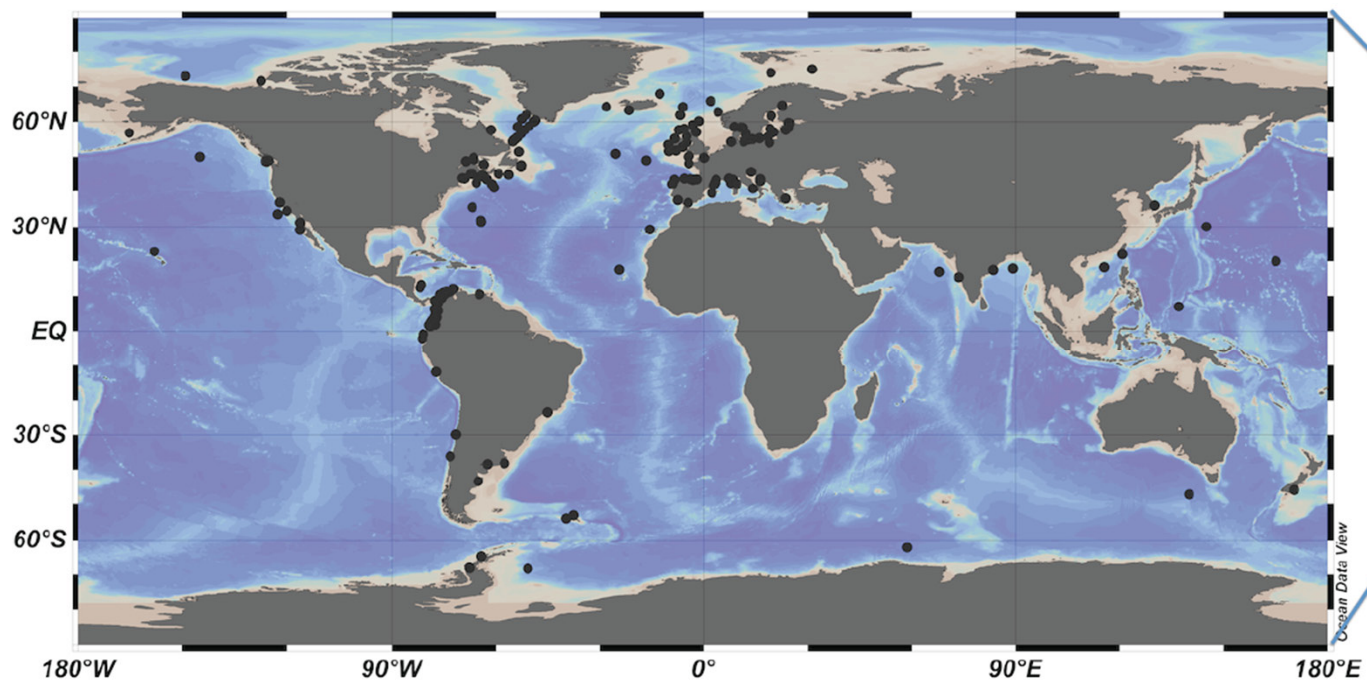
**Report contributors:** N. Bates, C. Carlson, C. Chandler, M. Church, M. Conte, A. Dickson, B. Fiedler, K. Isensee, M. Ishii, K. Johnson, O. Kawka, A. Körtzinger, R. Lampitt, R. Letelier, M. Lomas, V. Lutz, F. Muller-Karger, M. Telszewski, L. Valdes

IOCCP and OCB gratefully acknowledge the support of IOC-UNESCO, SCOR, NSF, NASA, NOAA, and BIOS for this workshop.



## OCB Ocean Time-Series Activities and Products

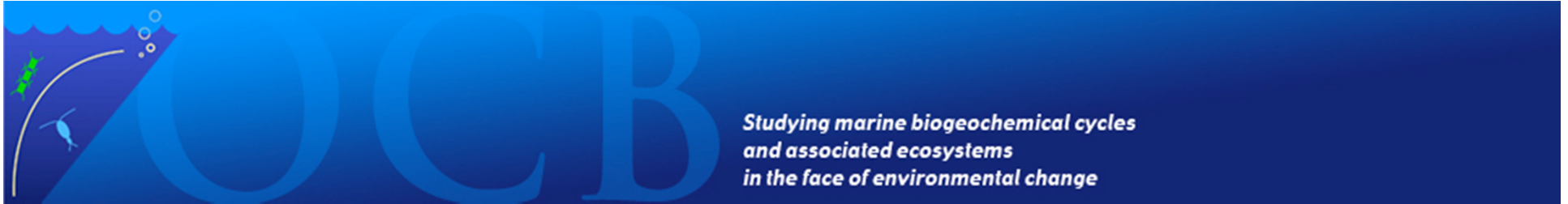
### Global Compilation of Shipboard Biogeochemical Time-Series



- Location (lat/long)
- PI and contact information
- Duration and frequency of measurements
- Parameters measured
- Method(s) used for each parameter
- Data access information

<http://www.whoi.edu/website/TS-network>





## Other OCB Community Activities:



**International Group for Marine Ecological Time-Series (IGMETS)** - Scientist-driven effort led by IOC-UNESCO, IOCCP, and OCB to identify and integrate a suite of in-situ biogeochemical variables from time-series sites, together with satellite-derived information, to look at holistic changes within different ocean regions, explore plausible reasons and connections at a global level, and highlight any locations of especially large changes that may be of special importance. <http://igmets.net/>

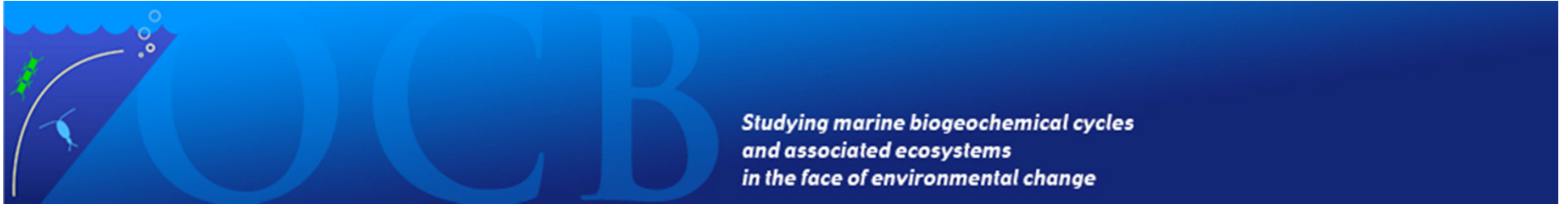




# OCB Ocean Time-series Committee (OTC)

## International Connections

1. S. Neuer **contribution to the first FixO<sup>3</sup> newsletter** (Vol 1, Issue 1, summer 2014 on challenges facing global ocean observations) [www.fixO3.eu](http://www.fixO3.eu)
2. Neuer and Benway: EGU General Assembly 2015: **“Introducing the US Ocean Carbon Biogeochemistry Subcommittee on Ocean Time-Series”**



**Today:**

**OCB Ocean Time-series  
Committee (OTC) presents...**

**Plenary Session 2. Studying Spatial and  
Temporal Variability in the Ocean with  
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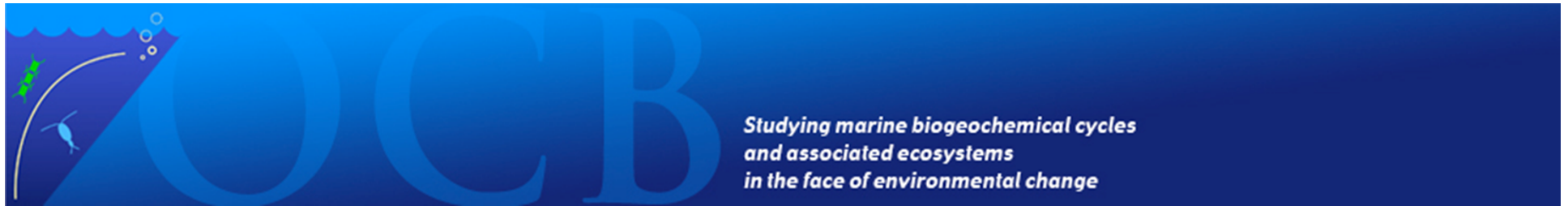
## Plenary Session 2. Studying Spatial and Temporal Variability in the Ocean with Shipboard and Autonomous Platforms

### Part 1. Overview Talks

8:30 Observing climate change trends in ocean biogeochemistry: When and where (Stephanie Henson, National Oceanography Centre)

9:05 How do autonomous assets expand the temporal and spatial footprint of a time-series station? (Matthew Church, Univ. Hawaii)

9:40 How do autonomous assets expand the temporal and spatial footprint of a shipboard process study? (Mary Jane Perry, Univ. Maine)



## **Plenary Session 2. Studying Spatial and Temporal Variability in the Ocean with Shipboard and Autonomous Platforms**

**Chairs: Susanne Neuer (Arizona State Univ.), Michael Lomas (Bigelow Laboratory), Angelicque White (Oregon State Univ.)**

**10:45 Community discussion on integrated ocean observing strategies: Science questions and leveraging opportunities**

**(Moderated by Debbie Bronk, Virginia Inst. Marine Science)**

**\*Support roles of OTC**

**\*Town-Hall Ocean Sciences 2016**





## Plenary Session 2. Studying Spatial and Temporal Variability in the Ocean with Shipboard and Autonomous Platforms

### *Part 2. Scientific Highlights from Integrated Measurement Approaches*

**11:30-12:30 pm:** OPEN OCEAN: BATS (Lomas, Bates); Line P (Hamme); Cape Verde Ocean Observatory (Fiedler)

**2-2:40 pm:** Coastal: CARIACO (Lorenzoni); CalCOFI/CCE-LTER (Ohman), GNATS (Balch)

**3-4 pm:** High-Latitude: SOCCOM (Sarmiento), MIZP (Lee), Palmer-LTER (Schofield)



## Plenary Session 2. Studying Spatial and Temporal Variability in the Ocean with Shipboard and Autonomous Platforms

**4:20-5pm**

***Part 3. Comparative Efforts and Policy Applications***

**IGMETS (Wiebe); Floats and Boats (Juraneck); Observations to Policy (Valdes)**

**5:20pm *Poster Session***

*Invited Posters:*

**New technology:**

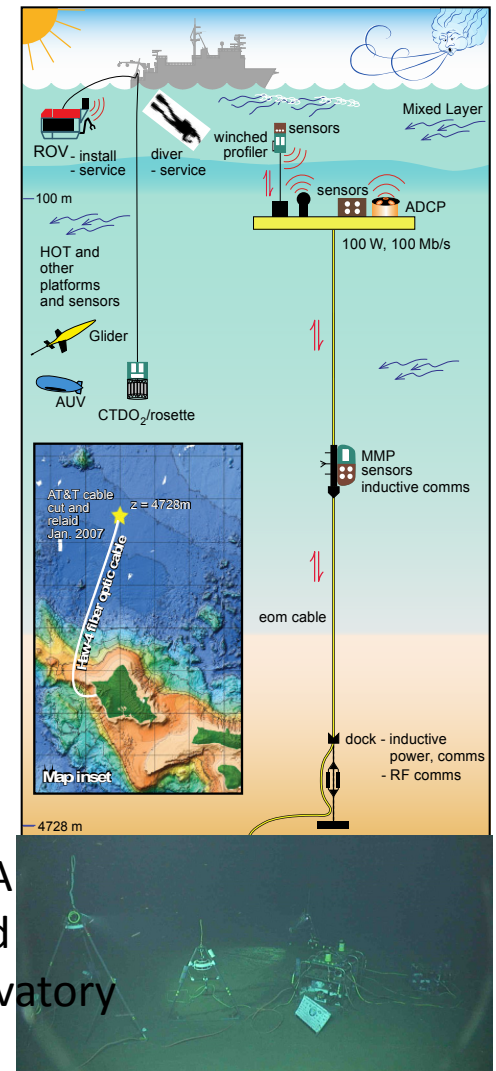
**Howe , B. M.,** Enabling water column science at Station ALOHA: A profiling mooring system

**Ruhl, H. A. et al.,** Porthole: Evolving biological carbon pump research



Long range AUVs

- Optical backscatter & chl-a fluorescence
- Holographic particle sensing
- Pelagic stereo & seafloor cameras





## *Invited Posters:*

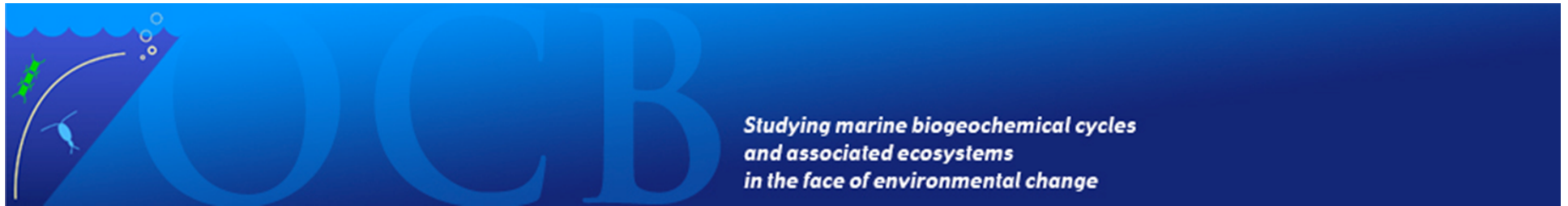
### **Coordination and networks:**

**Lampitt, R.,** Luisa Cristini: Fixed point Open Ocean Observatory network (FixO 3): Multidisciplinary observations from the air-sea interface to the deep seafloor

**Santamaría del Angel, E. et al.,** Climate change evaluated at marine time-series stations: The Antares Network, an effort of the Americas in long term studies

**Lorenzoni, L., H. Benway,** An integrated observation system of biogeochemical time-series





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