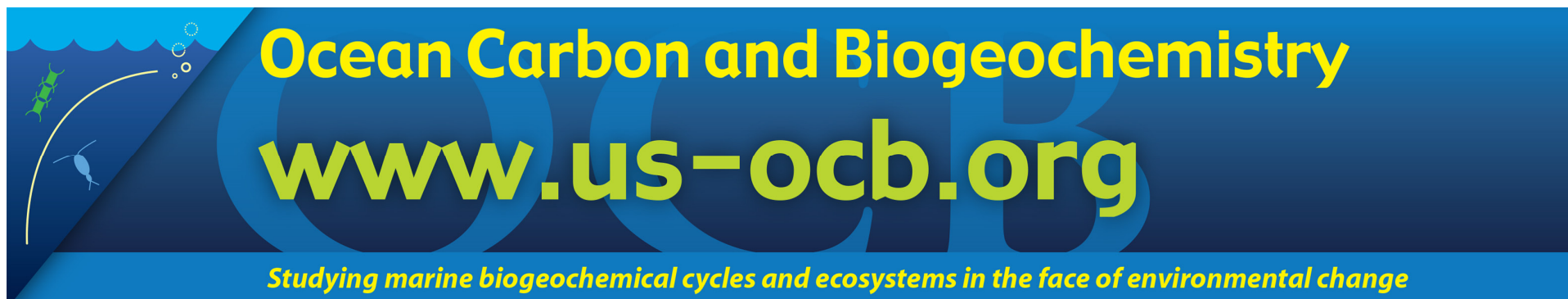


**Welcome**

**10<sup>th</sup> Annual Ocean Carbon and  
Biogeochemistry (OCB)  
Summer Workshop**

Craig Carlson (UCSB), Chair, OCB SSC  
Heather Benway (WHOI), Exec. Officer, OCB Project Office





**Monday:** Plenary Session 1. Atmospheric Nutrient Deposition: Impacts on Marine Ecosystems and Biogeochemical Cycles (Chair: Scott Doney)

**Tuesday:** Plenary Session 2. Studying Spatial and Temporal Variability in the Ocean with Shipboard and Autonomous Platforms (Chairs: Susanne Neuer, Mike Lomas, Angle White)

**Wednesday:** Plenary Session 3. Evolving Views on Physical, Ecological, and Biogeochemical Underpinnings of Plankton Blooms (Chairs: Matt Church and Hugh Ducklow)

**Thursday:** Internal Cycling of Trace Elements: A Budding GEOTRACES/OCB Collaboration (Chair Bob Anderson)

### **Ocean Biology and Biogeochemistry Pre-Decadal Survey Meeting (Carriage House)**

This is an important scientific planning discussion for the Decadal Survey of Earth Science, and members of the OCB community are urged to participate!

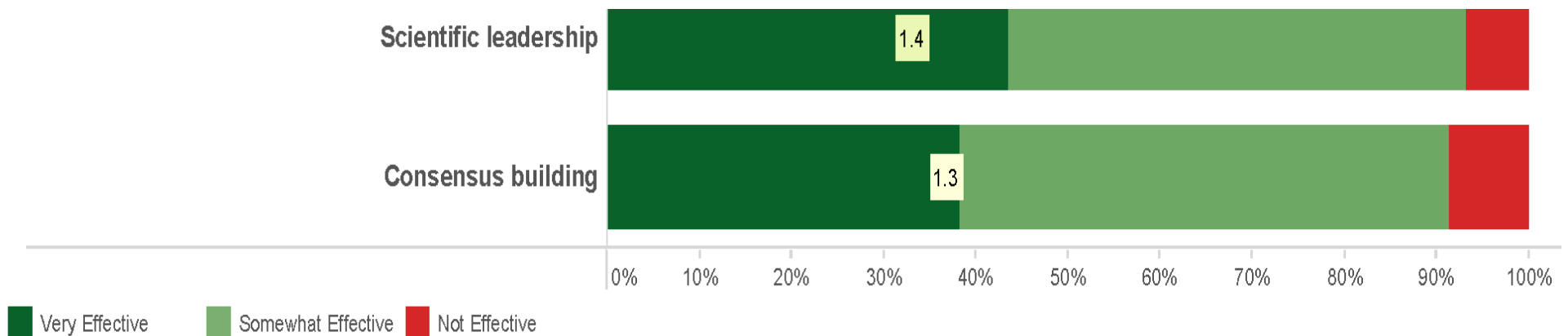


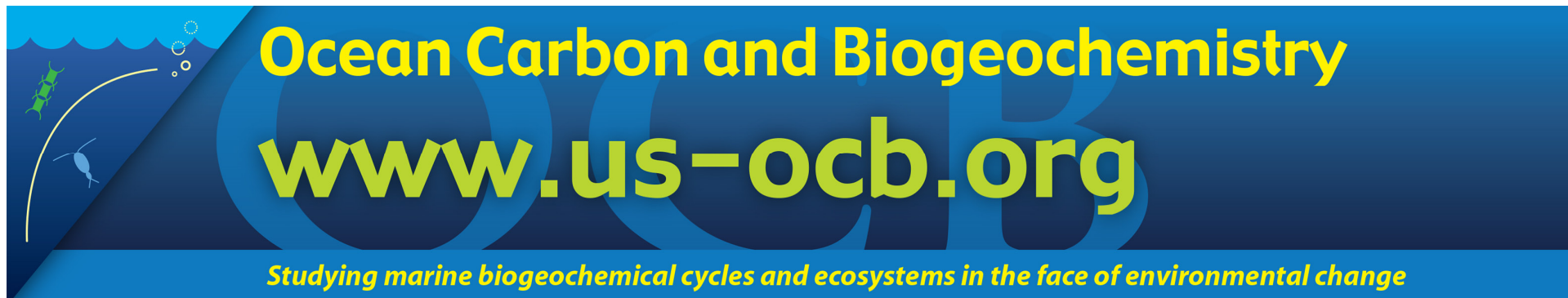
# OCB Program Review

## ■ Effectiveness of OCB's Scientific Coordination Effort



**Community Building** - OCB provides a unifying framework that brings together an otherwise disparate group of individually funded researchers to address important science questions

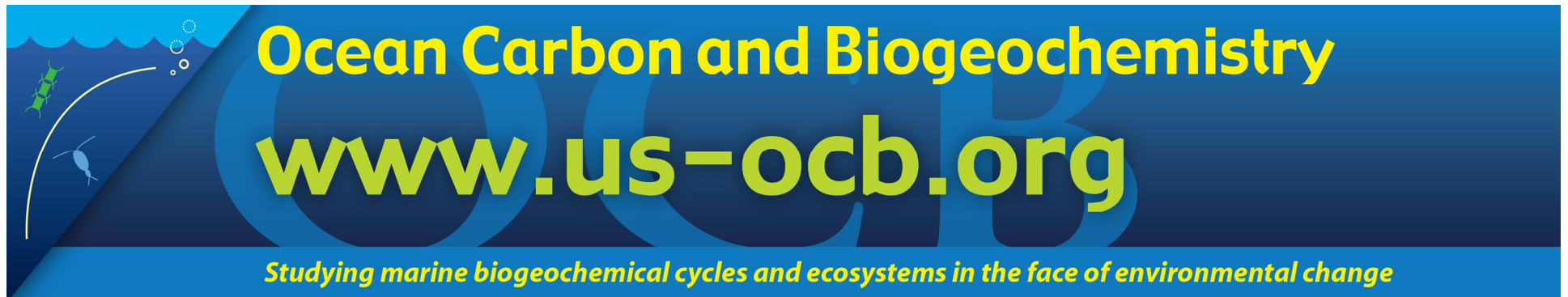




## OCB Summer Workshops

- **Total participation has almost doubled over past 5 years**
- **Student/postdoc participation has increased** -provided travel support, opportunities to give presentations, opportunities to meet with program managers, etc)
- **Disciplinary representation has broadened and led to new partnerships:**





## OCB Summer Workshops

**Disciplinary representation has broadened and led to new partnerships:**

**2011:** Joint science session with US CLIVAR kicked off our ongoing partnership

**2012:** Satellite data session (links to ocean color/remote sensing community), land-ocean transport (increased links to terrestrial and estuarine/coastal C community)

**2013:** Evolutionary biology (led to OCB scoping workshop for Lomas workshop), trace metals (links to GEOTRACES and GEOMICS)

**2014:** North Atlantic-Arctic (physics, ecology, etc.), sea ice and atm-ocean-ice CO<sub>2</sub> exchange (SOLAS)

**2015:** Atmospheric sciences (Atm. nutrient deposition session joint with SOLAS)



# OCB PARTNER ACTIVITIES (cont'd)

## IOCCP/ OCB International Shipboard Biogeochemical Time-Series Network

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.whoi.edu/website/TS-workshop/>

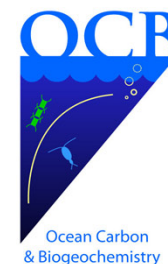
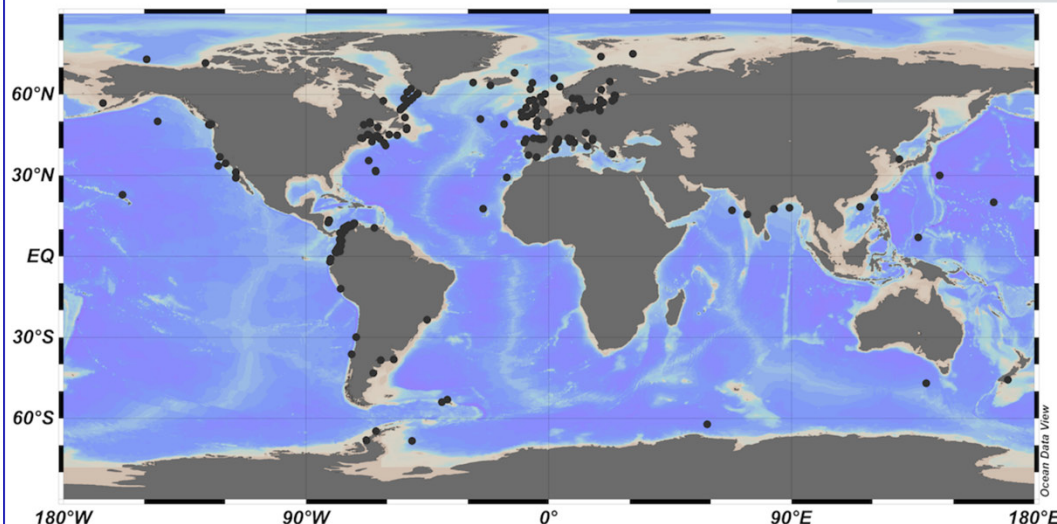


#### Recommended citation:

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), 60 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.



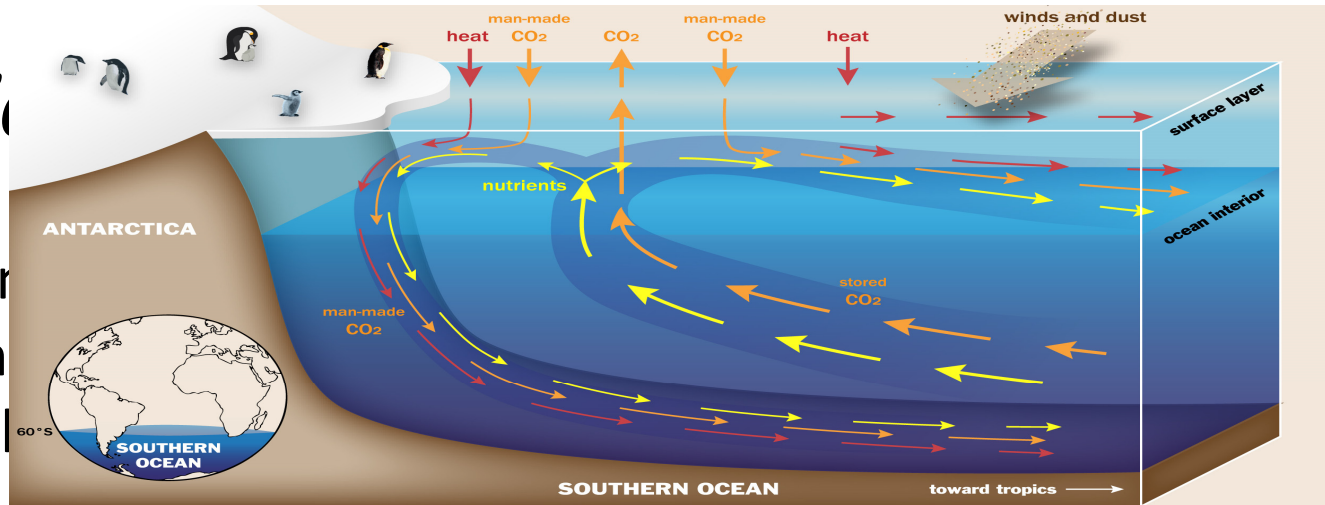
# OCB PARTNER ACTIVITIES (cont'd)

## US CLIVAR/OCB Joint Working Groups

### Oceanic

#### Objective:

comparison  
physical and  
uptake in the

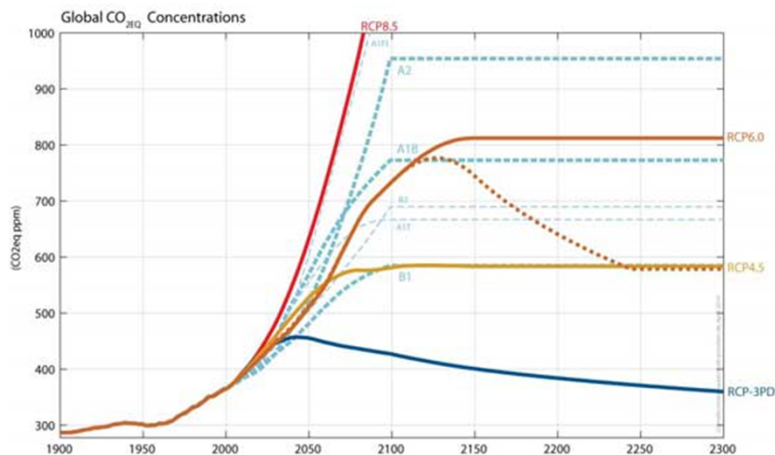


### Models

## Heat and carbon uptake by the Southern Ocean

Driving Forces for CMIP5: All Anthro.  
Forcings

and models (and develop data/model  
Ocean response to climate change, with  
the importance of mesoscale eddies in

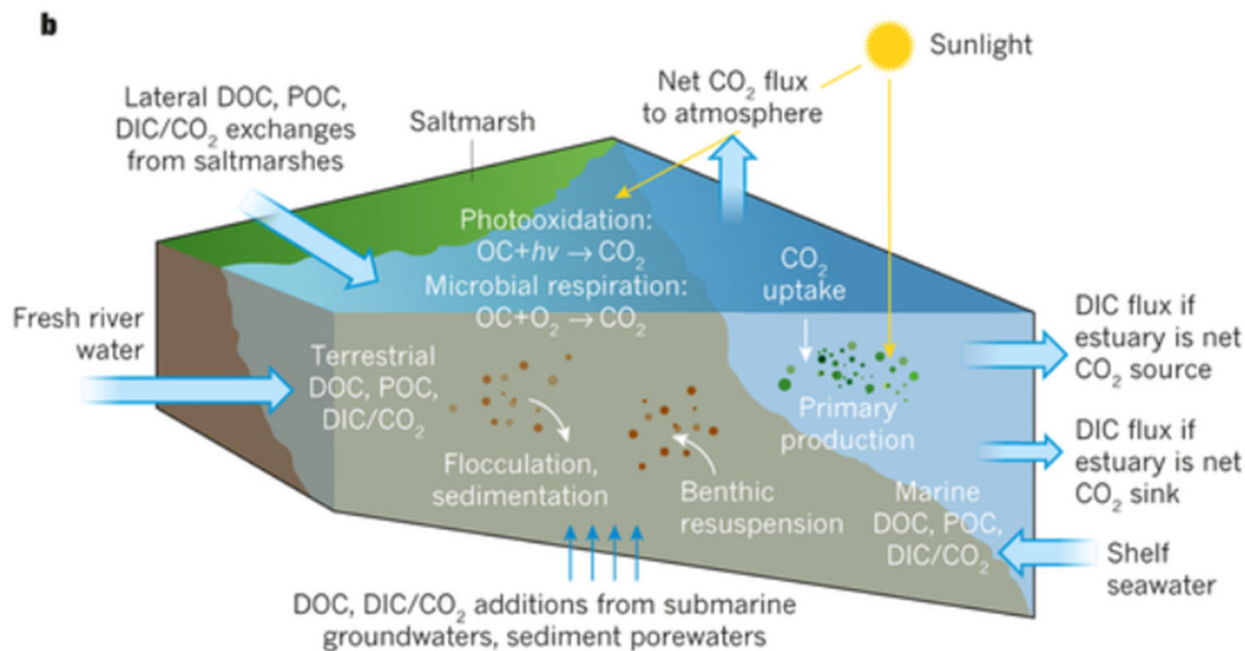


# OCB PARTNER ACTIVITIES

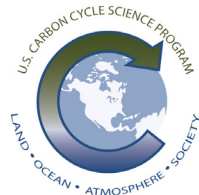
## NACP/OCB Coastal Carbon Synthesis (CCARS)

### Outcomes

- Updated regional coastal carbon budgets for North America
- Science plan to inform future coastal carbon research
- Multiple peer-reviewed papers



**c**

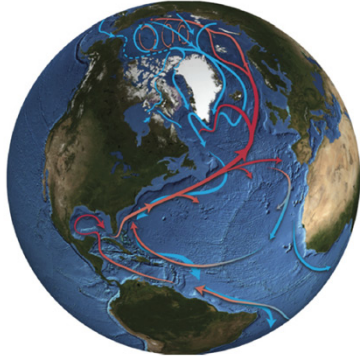


North  
American  
Carbon  
Program

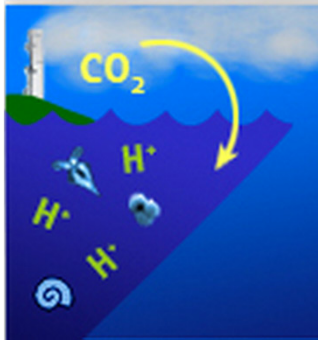




# Coordination and Leadership roles in



**North Atlantic-Arctic International meeting and Science Plan-** help with scientific team building / coordinating



**Ocean acidification** - PI meetings, short course, outreach products/activities, etc.

**OCB provided feedback** to important planning initiatives through the SSC and greater OCB community



# Increasing visibility of oceans in C cycle science- engaging the CCIWG and CCSSG

Randerson et al. 2015

AGU PUBLICATIONS

## Global Biogeochemical Cycles

RESEARCH ARTICLE

10.1002/2014GB005079

### Key Points:

- We assessed climate-carbon feedbacks with CESM1 to 2300 for RCP/ECF8.5
- ...sensitivity to climate

## Multicentury changes in ocean and land contributions to the climate-carbon feedback

J. T. Randerson<sup>1</sup>, K. Lindsay<sup>2</sup>, E. Munoz<sup>2</sup>, W. Fu<sup>1</sup>, J. K. Moore<sup>1</sup>, F. M. Hoffman<sup>3</sup>, N. M. Mahowald<sup>4</sup>, and S. C. Doney<sup>5</sup>

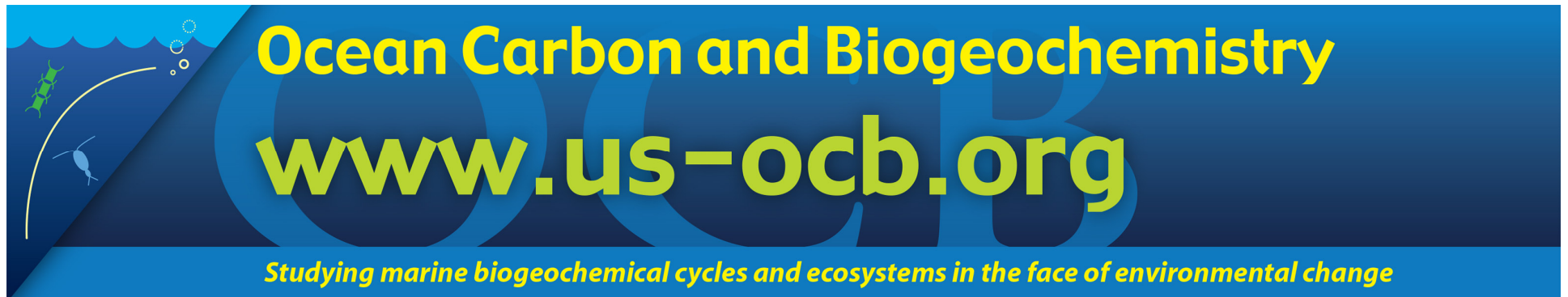
<sup>1</sup>Department of Earth System Science, University of California, Irvine, California, USA, <sup>2</sup>National Center for Atmospheric Research, Colorado, USA, <sup>3</sup>Oak Ridge National Laboratory, Oak Ridge, Tennessee, USA, <sup>4</sup>Department of Earth and Atmospheric Sciences, Cornell University, Ithaca, New York, USA, <sup>5</sup>Woods Hole Oceanographic Institution, Woods Hole, Massachusetts, USA

McKinley et al. EOS in press

## CARBON CYCLE SCIENCE TO INFORM TARGETED CLIMATE POLICIES

Galen A. McKinley<sup>1</sup>, Craig A. Carlson<sup>2</sup>, Arlyn Andrews<sup>3</sup>, Dan Brown<sup>4</sup>, Paty Romero-Lankao<sup>5</sup>, Gyami Shrestha<sup>6</sup>

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2. University of California-Santa Barbara, Santa Barbara, CA
3. National Oceanic and Atmospheric Administration, ESRL, Boulder, CO
4. University of Michigan, Ann Arbor, MI
5. National Center for Atmospheric Research, Boulder, CO
6. US Carbon Cycle Science Program, US Global Change Research Program, Washington DC



## Training of early career scientists

- pH sensors course (Martz, SIO)
- Internat'l bgc sensors course joint with IOCCP (Sweden)
- Cornell remote sensing course (2013, 2014)
- Univ. Maine Calibration & Validation for Ocean Color Remote Sensing (2013, 2015)
- Second IOCCG Summer Lecture Series (2014)
- IMBER ClimECO4 (2014)
- SOLAS summer school (2013)

