

Seth M. Bushinsky

Current position: Assistant Professor, Department of Oceanography
University of Hawai'i at Mānoa
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EDUCATION

Ph.D., Oceanography, October 2015

University of Washington, Seattle, WA

Advised by Dr. Steven Emerson

Dissertation: Improved estimates of air-sea oxygen fluxes and biological carbon export through the use of self-calibrating Argo oxygen floats in the Pacific.

M.S., Oceanography, August 2011

University of Washington, Seattle, WA

Advised by Dr. Steven Emerson

B.S. with Honors in Biological Sciences, June 2006

Concentration in Marine Biology

Stanford University, Stanford, CA

Thesis: A high resolution satellite-based model of Southern Ocean primary production.

Advised by: Dr. Kevin Arrigo and Dr. Fiorenza Micheli

RESEARCH INTERESTS

- Biogeochemical cycles, with a focus on the processes that control the transfer of oxygen and carbon across the air-sea interface
- Interpretation of data from autonomous vehicles to understand the biological carbon cycle
- Air-sea gas exchange, in situ calibration of oxygen sensors
- Southern Ocean processes controlling air-sea oxygen and carbon fluxes and nutrient export

PROFESSIONAL EXPERIENCE

Assistant Professor, Department of Oceanography, *University of Hawai'i at Mānoa*, Honolulu, HI. 2019-present.

Associate Research Scholar, Program in Atmospheric and Oceanic Sciences, *Princeton University*, Princeton, NJ. 2018-2019.

Postdoctoral Research Associate with Dr. Jorge Sarmiento, Program in Atmos. and Oceanic Sciences, *Princeton University*, Princeton, NJ. 2015-2018.

Research Technician for Dr. Francisco Chavez, Biological Oceanography Group. *Monterey Bay Aquarium Res. Institute*, Moss Landing, CA. 2006-2008.

16. **Bushinsky, SM**, P Landschützer, C Rödenbeck, AR Gray, D Baker, MR Mazloff, L Resplandy, KS Johnson, JL Sarmiento (2019). Reassessing Southern Ocean air-sea CO₂ flux estimates with the addition of biogeochemical float observations. *Global Biogeochemical Cycles*, 33. doi: 10.1029/2019GB006176.
15. Arteaga, LA, M Pahlow, **SM Bushinsky**, JL Sarmiento (2019). Nutrient controls on export production in the Southern Ocean. *Global Biogeochemical Cycles*, 33(8), 942-956. doi: 10.1029/2019GB006236
14. **Bushinsky, SM**, Y Takeshita, NL Williams (2019). Observing changes in ocean carbonate chemistry: Our autonomous future. *Current Climate Change Reports*. doi: 10.1007/s40641-019-00129-8.
13. **Bushinsky, SM**, and SR Emerson (2018). Biological and physical controls on the oxygen cycle in the Kuroshio Extension from an array of profiling floats. *Deep-Sea Research Part I*, 141: 51-70. doi: 10.1016/j.dsr.2018.09.005.
12. Gray, AR, KS Johnson, **SM Bushinsky**, SC Riser, J Russell, LD Talley, R Wanninkhof, NL Williams, JL Sarmiento (2018). Autonomous biogeochemical floats detect significant carbon dioxide outgassing in the high-latitude Southern Ocean. *Geophysical Research Letters*, 45. doi: 10.1029/2018GL078013.
11. **Bushinsky, SM**, AR Gray, KS Johnson, JL Sarmiento (2017). Oxygen in the Southern Ocean from Argo floats: determination of processes driving air-sea fluxes. *Journal of Geophysical Research: Oceans*, 122(11): 8661-8682. doi: 10.1002/2017JC012923.
10. Yang, B, SR Emerson, **SM Bushinsky** (2017). Annual net community production in the subtropical Pacific Ocean from *in-situ* oxygen measurements on profiling floats. *Global Biogeochemical Cycles*, 31, 728-744. doi: 10.1002/2016GB005545.
9. Newsom, ER, AJ Fassbender, AE Maloney, **SM Bushinsky** (2016). Increasing the usability of climate science in political decision-making. *Elementa Sci Anth*, 4: 000127. doi: 10.12952/journal.elementa.000127.
8. Emerson, SR and **S Bushinsky** (2016). The role of bubbles during air-sea gas exchange. *Journal of Geophysical Research, Oceans*, 121(6): 4360-4376. doi: 10.1002/2016JC011744.
7. **Bushinsky, SM**, SR Emerson, SC Riser, DD Swift (2016). Accurate oxygen on Argo floats using on-going in-situ air calibrations. *Limnology and Oceanography: Methods*, 14(8): 491-505. doi:10.1002/lom3.10107.
6. **Bushinsky, SM**, and S. Emerson (2015). Marine biological production from in situ oxygen measurements on a profiling float in the subarctic Pacific

Ocean. *Global Biogeochemical Cycles*, 29. doi:10.1002/2015GB005251.

5. Emerson, SR and **S Bushinsky** (2014). Oxygen concentrations and biological fluxes in the open ocean. *Oceanography*, 27(1): 168-171. doi.org/10.5670/oceanog.2014.20.
4. **Bushinsky, SM** and S Emerson (2013). A method for in-situ calibration of Aanderaa oxygen sensors on surface moorings. *Marine Chemistry*, 155: 22-28. doi:10.1016/j.marchem.2013.05.001
3. Howard, E, S Emerson, **S Bushinsky**, C Stump (2010). The role of net community production in air-sea carbon fluxes at the North Pacific subarctic-subtropical boundary region. *Limnology and Oceanography*, 55(6): 2585-2596. doi:10.4319/lo.2010.55.6.2585.
2. Arrigo, KR, GL van Dijken, and **S Bushinsky** (2008). Primary production in the Southern Ocean, 1997-2006. *Journal of Geophysical Research*, 113, C08004. doi:10.1029/2007JC004551.
1. Micheli F, AO Shelton, **SM Bushinsky**, AL Chiu, AJ Haupt, KW Heiman, CV Kappel, MC Lynch, RG Martone, J Watanabe (2008). Persistence of depleted abalones in marine reserves of central California. *Biological Conservation*, 141(4):1078-1090. doi:10.1016/j.biocon.2008.01.014.

MANUSCRIPTS IN PREPARATION

Bushinsky, SM, U Basu, JL Sarmiento. Air-sea gas exchange through fractional sea ice from under ice biogeochemical profiling floats

Bushinsky, SM, JL Sarmiento, and others. Southern Ocean annual net community production using oxygen and nitrate mass balances from biogeochemical profiling floats.

WHITE PAPERS

Bushinsky, SM, RC Hamme, DP Nicholson, KS Johnson (2017). Oxygen measurements from autonomous vehicles: applications and challenges. *Autonomous and Lagrangian Platforms and Sensors II*.

Wanninkhof, R, K Johnson, N Williams, J Sarmiento, S Riser, E Briggs, **S Bushinsky**, B Carter, A Dickson, R Feely, A Gray, L Juranek, R Key, L Talley, J Russel, A Verdy (2016). An evaluation of pH and NO₃ sensor data from SOCCOM floats and their utilization to develop ocean inorganic carbon products. *Southern Ocean Carbon and Climate Observations and Modeling Carbon Working Group*.

CONFERENCE/MEETING PARTICIPATION

The 3rd Joint Institute of Marine and Atmospheric Research Symposium, “New Technologies Driving Ocean Science Breakthroughs”, Honolulu, HI, November 2019 (Invited Talk).

International Union of Geodesy and Geophysics 27th General Assembly,

Montreal, CA, July 2019 (Talk).

SOCOCOM Annual Meeting, Princeton, NJ, May 2019 (Talk).

American Geophysical Union Fall Meeting, Washington DC, December 2018 (Talk).

Princeton Environmental Geology & Geochemistry Seminar, Princeton NJ, October 2018 (Invited talk).

Ocean Carbon & Biogeochemistry Biogeochemical Profiling Float Workshop, Seattle, WA, July 2018 (Invited talk).

SOCOCOM Annual Meeting, Princeton, NJ, June 2018 (Talk).

Lamont-Doherty Earth Observatory Invited Geochemistry Seminar, Palisades, NY, March 2018 (Invited talk).

Ocean Sciences Meeting, Portland, OR, February 2018 (Poster).

Ocean Carbon Hot Spots Workshop, Moss Landing, CA, September 2017 (Talk).

Gordon Research Conference in Chemical Oceanography, New London, NH, July 2017 (Poster).

SOCOCOM Annual Meeting, Princeton, NJ, May 2017 (Talk).

University of Washington Chemical Oceanography Seminar, Seattle, WA, January 2017 (Talk).

ORCAS Science Workshop, Boulder, CO, September 2016 (Talk).

Ocean Carbon and Biogeochemistry Workshop, Woods Hole, MA, July 2016 (Poster).

SOCOCOM Annual Meeting, San Diego, CA, May 2016 (Talk).

Ocean Sciences Meeting, New Orleans, LA, February 2016 (Talk).

SOCOCOM Annual Meeting, Princeton, NJ, May 2015 (Poster).

Dissertations Symposium in Chemical Oceanography XXIV, Kaua'i, HI, October 2014 (Talk).

Ocean Carbon and Biogeochemistry Workshop, Woods Hole, MA, July 2014 (Poster).

7th Line P Workshop, Sidney, BC, March 2014 (Talk).

Scientific Committee on Oceanic Research (SCOR) Workgroup 142, Honolulu, HI, March 2014 (Talk).

University of Hawai'i Biogeochemistry Brown Bag Seminar, Honolulu, HI, March 2014 (Talk).

Ocean Sciences Meeting, Honolulu, HI, February 2014 (Talk).

Gordon Research Conference in Chemical Oceanography, Biddeford, ME, August 2013 (Poster).

Station Papa "Holistic" Ocean Balances Science Workshop, NOAA-PMEL, Seattle, WA, April 2013 (Talk).

6th Graduate Climate Conference, Pack Forest, WA, October 2012 (Poster).

Ocean Sciences Meeting, Salt Lake City, UT, February 2012 (Poster).

Station P Science Workshop, NOAA-PMEL, Seattle, WA, April 2012 (Talk).

Gordon Research Conference in Chemical Oceanography, Andover, NH, August 2011 (Poster).

Argo-oxygen Meeting, Brest, France, May 2011 (Talk).

4th Line P Workshop, Sidney, BC, March 2011 (Talk).

4th Graduate Climate Conference, Pack Forest, WA, October 2010 (Talk).

SUCCESSFUL PROPOSALS

NOAA Cooperative Institute proposal between Princeton University and the Geophysical Fluid Dynamics Laboratory, January 2018. Ocean Biogeochemistry section Co-lead author.

NASA Carbon Cycle Science, January 2017. Co-Investigator on project to link in situ estimates of net community production to satellite derived primary production and explain processes using simple models.

Princeton Environmental Institute Grand Challenges Program, May 2016. Co-author of proposal to fund summer students.

TEACHING

Lead Instructor. OCN 623: Chemical Oceanography, Spring 2020.

Supervision of a summer Princeton Environmental Institute summer research intern. Project to investigate air-sea gas fluxes through fractional sea ice using biogeochemical Argo floats. Summer 2018.

Supervision of a summer Princeton Environmental Institute summer research

intern. Project to understand the impact of bubble injection in air-sea exchange through global climate models. Summer 2017.

Problem Set Teacher/Grader, Princeton University. AOS 578: Introduction to Chemical Oceanography. Fall 2016.

Guest Lectures, Nitrogen Cycle, University of Washington. Ocean 520: Marine Chemistry, Fall 2014.

Guest Lecture, Ocean Acidification, Osher Lifelong Learning Institute course on ocean change, Spring 2014.

Teaching Assistant, University of Washington. Ocean 210: Ocean Circulation, Fall 2010.

FELLOWSHIPS

National Science Foundation IGERT Program on Ocean Change Fellow, 2012-2015

National Science Foundation Graduate Research Fellow, 2009-2012

Achievement Rewards for College Scientists (ARCS) Graduate Fellow, 2008-2011

SIGNIFICANT OCEANOGRAPHIC CRUISES

R/V Thomas G. Thompson, October 2013. 3 days.

Deployment of mooring-based oxygen calibration system on Che'ba mooring.

CCGS John P. Tully, June 2013. 19 days.

Calibration, deployment, and recovery of oxygen, nitrogen, and pH sensors at Ocean Station Papa.

R/V Melville, February-March 2013. 21 days.

Calibration and deployment of 10 SOS-Argo floats in the Kuroshio Extension.

CCGS John P. Tully, June 2012. 19 days.

Calibration, deployment, and recovery of oxygen, nitrogen, and pH sensors at Ocean Station Papa. Deployment of initial test SOS-Argo float.

USNS Safeguard, November 2011. 7 days.

Calibration, deployment, and recovery of oxygen, nitrogen, and pH sensors at Kuroshio Extension Observatory.

CCGS John P. Tully, June 2011. 19 days.

Calibration, deployment, and recovery of oxygen, nitrogen, and pH sensors at Ocean Station Papa.

CCGS John P. Tully, June 2010. 19 days.

Calibration, deployment, and recovery of oxygen, nitrogen, and pH sensors at

Ocean Station Papa.

CCGS John P. Tully, June 2009. 19 days.

Calibration, deployment, and recovery of oxygen, nitrogen, and pH sensors at Ocean Station Papa. Deployment and recovery of Sea Gliders with oxygen sensors.

R/V Thomas G. Thompson, August 2008. 23 days.

Synthesis and analysis of underway data, sample collection.

**PROFESSIONAL AND
COMMUNITY SERVICE**

Peer reviewer for:

Biogeosciences

Deep Sea Research Part I

Geophysical Research Letters (x2)

Geosciences

Global Biogeochemical Cycles (x2)

*Journal of Atmospheric and Oceanic
Technology*

Journal of Geophysical Research

(*JGR*): *Atmosphere*

JGR: *Oceans* (x3)

Journal of Sea Research

Limnology and Oceanography:

Methods (x3)

Marine Chemistry

Methods in Oceanography

Nature Reviews Earth and Environment

Ocean Science Discussions

Polar Research

Progress in Oceanography

Proposal reviewer, National Science Foundation (Chemical Oceanography, Physical Oceanography, Ocean technology, Polar Programs), National Ocean Partnership Program.

Ocean Carbon and Biogeochemistry Scientific Steering Committee early career member, 2020-2022

Chair, 4th Graduate Climate Conference, October 2009 - October 2010. Led the planning committee in organizing, funding, and choosing applicants for a graduate student only meeting on climate science. Accepted ~80 students from the U.S. and abroad.

Graduate Student Representative to Faculty Council, University of Washington, 2011-2012.

Volunteer diver for Marine Advanced Technology Education ROV competition, 2012, 2013.

Mentor, Student Oceanography Club, Monterey Bay Aquarium. Taught middle school students about the ocean and led field experiences, 2006-2008.