

**Colleen A. Durkin, PhD**

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**RESEARCH INTERESTS**

Particle export from the surface ocean, phytoplankton physiology, molecular mechanisms of biomineralization, evolution of phytoplankton physiological responses, environmental genetics, particle and cell imaging methods.

**EDUCATION**

- PhD Oceanography, 2012, University of Washington; Advisor: E. Virginia Armbrust  
*Dissertation Title:* Environmentally induced changes to the diatom cell wall and the implications of these changes on biogeochemical cycles
- M.S. Oceanography, 2008, University of Washington; Advisor: E. Virginia Armbrust  
*Presentation and Paper Title:* Chitin in diatoms and its association with the cell wall
- B.S. Biology and Oceanography, 2004, University of Washington; Magna cum laudae

**PROFESSIONAL EXPERIENCE**

Research Faculty	Moss Landing Marine Laboratories	2015-present
Postdoctoral Scholar	Woods Hole Oceanographic Institution	2012-2015
Citizen Science Coordinator	Woods Hole Oceanographic Institution	2014-2015
Science Filmmaker	COSEE, Woods Hole, MA	2013
Graduate Research Assistant	University of Washington	2005-2012
Research Intern	EAWAG, Switzerland	2004
Undergraduate Researcher	NOAA Northwest Fisheries Science Center	2003-2004
Research Apprentice	Friday Harbor Laboratories	2003
Undergraduate Researcher	University of Washington, Botany	2002-2003

**TEACHING EXPERIENCE**

- Course instructor *MS274: Phytoplankton Taxonomy and Ecology*  
MLML; instructor and course designer (2018)  
*Design of Oceanographic Field Experiments*,  
University of Washington; teaching assistant (2010)  
*Advanced Field Oceanography*  
University of Washington; teaching assistant (2010)  
*Biological Oceanography*  
University of Washington; teaching assistant (2006)
- Guest Lecturer *Data Analysis*, MLML (2016, 2017, 2018)

*Biological Oceanography*, MLML (2016)  
*Biological Oceanography*, University of Washington (2011)  
*Communicating Ocean Science*; 1st grade classroom, University of  
Washington; (2008)

Mentor                      Masters student thesis advisor, MLML; 2 students  
Masters thesis committee member, MLML & SFSU; 8 students  
PhD thesis committee member, UCSC; 1 student  
Summer student researcher advisor, MLML; 3 students  
CSU Monterey Bay Research Experience for Undergraduates; 1 student  
University of Washington undergraduate researchers; 4 students

## PEER-REVIEWED PUBLICATIONS

### In preparation

**Durkin, C.A.**, K.O. Buesseler, I. Cetinić, M. Estapa, M. Omand. (in prep) Observed variation in export pathways of the biological pump across ocean basins, depth, and time.

### In review

Huffard, C., **C.A. Durkin**, S. Wilson, P. McGill, R. Henthorn, K.L Smith Jr. 2019. Hourly to seasonal variability of particle flux to abyssal depths. *Deep Sea Research II in review*

Preston, C., **C.A. Durkin**, K. Yamahara. 2019. DNA metabarcoding reveals organisms contributing to particulate matter flux to abyssal depths in the North East Pacific Ocean. *Deep Sea Research II in review*

### Published

Howard E.M., **C.A. Durkin**, G.M.M. Hennon, F. Ribalet, R.H.R. Stanley. 2017. Biological production, export efficiency, and phytoplankton communities across 8000 km of the South Atlantic: Basin scale similarity with mesoscale variability. *Global Biogeochem. Cycles*, 31, 1066–1088

Estapa, M., **C. A. Durkin**, K. O. Buesseler, R. Johnson, M. Feen. 2017. Carbon flux from bio-optical profiling floats: calibrating transmissometers for use as optical sediment traps. *Deep Sea Research I*. 120:100-111

**Durkin, C. A.**, J. A. Koester, S. J. Bender, E. V. Armbrust. 2016. The evolution of silicon transporters in diatoms. *Journal of Phycology* 52:716-731

**Durkin, C. A.**, B. A. S. Van Mooy, S. T. Dyrman, K. O. Buesseler. 2016. Sinking phytoplankton associated with carbon flux in the Atlantic Ocean. *Limnology and Oceanography* 61: 1172-1187

**Durkin, C. A.,** Estapa, M. L., K. O. Buesseler. 2015. Observations of carbon export by small sinking particles in the upper mesopelagic. *Marine Chemistry*.175: 72-81

Bender, S.J., **C.A. Durkin,** C.T. Berthiaume, R.L. Morales, E.V. Armbrust. 2014. Transcriptional responses of three model diatoms to nitrate limitation of growth. *Frontiers in Marine Science*, 1: 1-15. doi: 10.3389/fmars.2014.00003

**Durkin, C.A,** S.J. Bender, K.Y.K. Chan, K. Gaessner, D. Grunbaum, E.V. Armbrust. 2013. Silicic acid supplied to coastal diatom communities influences cellular silicification and the potential export of carbon. *Limnology and Oceanography*. 58: 1707-1726.

**Durkin, C.A.,** A. Marchetti, S.J. Bender, T. Truong, R. Morales, and E.V. Armbrust. 2012. Frustule-related gene transcription and the influence of diatom community composition on silica precipitation in an iron-limited environment. *Limnology and Oceanography* 57: 1619-1633.

Marchetti, A.M., D.M. Schruth, **C.A. Durkin,** M.S. Parker, R. Kodner, C.T. Berthiaume, R. Morales, A.E. Allen, and E.V. Armbrust. 2012. Comparative metatranscriptomics identifies molecular bases for the physiological responses of phytoplankton to varying iron availability. *PNAS*. 109: E317-E325

Rhodes, L.D., C.A. Rice, C.M. Greene, D.J. Teel, S.L. Nance, P. Moran, **C.A. Durkin,** and S.B. Gezhagne. 2011. Nearshore ecosystem predictors of a bacterial infection in juvenile Chinook salmon. *Marine Ecology Progress Series* 432: 161-172

Ribalet, F., A. Marchetti, K.A. Hubbard, K. Brown, **C.A. Durkin,** R. Morales, M. Robert, J.E. Swalwell, P.D. Tortell, and E.V. Armbrust. 2010. Unveiling a phytoplankton hotspot at a narrow boundary between coastal and offshore waters. *PNAS*. 107: 16571-16576.

**Durkin, C.A,** T. Mock, and E.V. Armbrust. 2009. Chitin in diatoms and its association with the cell wall. *Eukaryotic Cell*. 8: 1038-1050.

Mock, T., M. P. Samanta, V. Iverson, C. Berthiaume, M. Robison, K. Holtermann, **C. Durkin,** S.S. BonDurant, K. Richmond, M. Rodesch, T. Kallas, E. L. Huttlin, F. Cerrina, M. R. Sussmann, and E. V. Armbrust. 2008. Whole-genome expression profiling of the marine diatom *Thalassiosira pseudonana* identifies genes involved in silicon bioprocesses. *PNAS* 105:1579-1584.

Bowler, C., and others. 2008. The *Phaeodactylum* genome reveals the evolutionary history of diatom genomes. *Nature* 456: 239-244.

Rhodes, L.D., **C.A. Durkin,** S.L. Nance, C.A. Rice. 2006. Prevalence and analysis of *Renibacterium salmoninarum* infection among juvenile Chinook salmon *Oncorhynchus tshawytscha* in North Puget Sound. *Diseases of Aquatic Organisms* 71: 179–190.

## **ADDITIONAL TRAINING**

Phytoplankton Taxonomy	International Marine Phytoplankton Identification Workshop Sir Alister Hardy Foundation, Marine Biological Association, Plymouth, UK (2014)
Science Filmmaking	ScienceFilm Workshop, Friday Harbor Laboratory (2011)
Science Communication	Science Communication Fellow, Pacific Science Center, Seattle, Washington (2011) Gears for Scientific Success workshop, COSEE (2014) SUBMERGE! Marine Science Festival, New York, NY (2014)
Biogeochemistry	Surface Ocean Lower Atmosphere Studies Summer School, Cargese, Corsica (2011)

## HONORS

- 2017 Luigi Provasoli Award for Outstanding paper of 2016, Phycological Society of America
- 2012 Devonshire Postdoctoral Scholar, Woods Hole Oceanographic Institution
- 2012 Dissertation Symposium in Chemical Oceanography (DiSCO) selectee

## FUNDED AWARDS

- NASA Linking sinking particle chemistry and biology with changes in the magnitude and efficiency of carbon export into the deep ocean (\$318,213; 8/2017 – 7/2020)  
co-PIs: Margaret Estapa (Skidmore), Melissa Omand (URI), Ken Buesseler (WHOI)
- CA Sea Grant New Faculty Award: How does climate change affect the export of phytoplankton to the seafloor? (\$59,608; 2/2017 – 1/2018)  
co-PI: Ken Smith (MBARI)
- NSF Collaborative Research: EAGER: Particle-specific DNA sequencing to directly observe ecological mechanisms of the biological pump (\$162,417; 12/2016 - 11/2018)  
co-PIs: Margaret Estapa (Skidmore), Melissa Omand (URI)
- OCB 2019 Travel Award to Summer Workshop (\$400)  
2016 Travel Award to Summer Workshop (\$500)
- WHOI Postdoctoral scholarship (18 months; 2012-2014)  
Postdoctoral fellowship to coordinating and manage the citizen science “Our Radioactive Ocean” (6 months; 2016)

## SERVICE

Reviewer	NASA, NSF, BMC, Frontiers, Algal Research, Deep Sea Research II, Diatom Research, Environmental Microbiology, European Journal of Phycology, MEPS, Molecular Ecology, Nature, New Phytologist, Progress in Oceanography
Thesis committees	MLML, San Francisco State University, UC Santa Cruz Masters and PhD student thesis committee member
Workshop	Contributing member of NSF sponsored Biology of the Biological Pump workshop (2015)
Service committees	Online Media Library committee, Association for the Science of Limnology and Oceanography (ASLO) (2016-present) Woods Hole Oceanographic Institution Postdoctoral Association (2013 -2014) MLML scholarship selection committee (2016) Hiring search committee, University of Washington School of Oceanography (2011)

#### **FIELD EXPERIENCE** (200+ days at sea)

Santa Barbara Basin, CA (upcoming)	R/V Sally Ride, 5 days, Dec. 2019 Educational cruise with UC Santa Barbara collaborators, test new trap arrays and sampling methods
Subarctic North Atlantic (upcoming)	R/V Atlantis, 55 days, April 2020 NASA EXPORTS process cruise (Porcupine Abyssal Plain). Deploy & recover sediment traps to capture particles.
Subarctic North Pacific	R/V Revelle, 33 days, Aug 2018 NASA EXPORTS process cruise (Station P). Deployed and recovered sediment traps to capture sinking particles.
Monterey Bay	R/V John Martin, 4 days, July 2018 Testing new neutrally-buoyant sediment traps
California Current	R/V Western Flyer, 7 days, March 2017 Recover and re-deploy deep-ocean, time-series sediment traps at long-term observing location Station M. Explore abyssal environment and collect samples with Doc Ricketts ROV.
Hawaii to Oregon	R/V Falkor, 26 days, Jan-Feb 2017 Transect to measure sinking particles and plankton across changing surface ocean environments, collect particles for DNA sequencing.
Monterey Bay	R/V Rachel Carson, 2 days, June 2016

	Deployment and recovery of a bottom-moored sequencing sediment trap in Monterey Bay.
New England shelf break	R/V Endeavor, 5 days, Nov 2015 Pilot cruise at the Rhode Island shelf break to test the deployment of complimentary platforms that observe particle flux.
Guam to Marshall Islands	M/Y Alucia, 1 week, Dec 2014 Transect approaching Bikini Atoll to measure radionuclides remaining in the water column as a result of nuclear weapons testing
Sargasso Sea	R/V Atlantic Explorer, 1 week, June 2013 Bermuda Atlantic Time Series cruise to deployed neutrally-buoyant sediment traps and optical sensor to measure particle flux
Uruguay to Barbados	R/V Knorr, 45 days, March 2013 Transect across the South Atlantic to identify and quantify sinking particles using sediment traps
Puget Sound, WA	R/V Thomas G. Thompson, 2 days, Nov 2010 Education and research cruise with undergraduates
Washington coast	R/V Wecoma, 1 week, Sept 2010 Coastal transects to survey the influence of nutrient input by the Columbia River on phytoplankton communities
Barkley Sound, Canada	M/V Alta and Barkley Star, 1 week, March 2010 Survey of Barkley Sound, British Columbia with undergraduate students conducting senior thesis projects
Puget Sound, WA	R/V Thomas G. Thompson, 2 days, Oct 2009 Puget Sound education and research cruise with undergraduates
Washington coast	R/V New Horizon, 2 weeks, Sept 2009 Coastal transects to survey the influence of nutrient input by the Columbia River on phytoplankton communities
Washington coast	R/V New Horizon, 2 weeks, May 2009 Coastal transects to survey the influence of nutrient input by the Columbia River on phytoplankton communities
Subarctic North Pacific	CCGS John P. Tully, 3 weeks, May 2008 Long-term timeseries transect to Station P to characterize the molecular and cellular response of diatoms to low iron

## **PUBLIC OUTREACH**

Science blog	<a href="https://www.mlml.calstate.edu/cdurkin/blog/">https://www.mlml.calstate.edu/cdurkin/blog/</a>
Science films	<a href="http://www.youtube.com/durkinca">www.youtube.com/durkinca</a> Titles: Sediment trap tests in Monterey Bay, Identifying the Sponge Signature on Coral Reefs; The Biological Pump; Ocean Particles Big and Small; DeepDOM set up; Whale Talk; Team SeaFlow: 100 years at the microscope; The CTD Rosette; How to tie a bowline; Neptune's Realm; Finding good and evil in the marsh; Jellyfish: A lifetime of observation
Public Open House	Annual public talks and interactive exhibits at Moss Landing Marine Labs
Citizen Science	Our Radioactive Ocean program coordinator (2014)
Exhibit design	SUBMERGE! Ocean Science Festival, New York City, NY interactive phytoplankton and the biological pump exhibit (2014) Seattle Pacific Science Center: diatom diversity, silica, and sinking (2012)
Art&Science	Diatoms: Science and Ceramic Art, Falmouth High School art class (2014)
Science Café	Public presentation: "Broadening the Impacts of Your Research", Woods Hole, MA, November 2014

## **INVITED TALKS**

- "Tracking ecological mechanisms of the biological pump through DNA sequencing and imaging of sinking particles"  
*Scripps Institute of Oceanography*  
(upcoming) November 2019
- "Linking surface phytoplankton with carbon export to mesopelagic and abyssal ocean depths"  
*San Francisco State University, Estuary and Ocean Science Center*  
April 2018
- "Linking phytoplankton with sinking particles and carbon export"  
*University of California Santa Cruz, Ocean Sciences*  
May 2017
- "Linking phytoplankton with sinking particles and carbon export"  
*University of California Santa Barbara, Marine Science*  
May 2017
- "Resolving the biology of sinking particles and cells"  
*Monterey Bay Aquarium Research Institute*  
March 2016
- "Linking phytoplankton with carbon export out of the surface ocean"  
*Moss Landing Marine Laboratories*  
October 2015
- "Observations of sinking phytoplankton and other small particles",

*Woods Hole Oceanographic Institution, Biology*

December 2014

"Linking species diversity, genetics, and physiology with global biogeochemistry"

*Woods Hole Oceanographic Institution, Marine Chemistry and Geochemistry*

January 2013

**MEETING PRESENTATIONS** (underlined = student from Durkin lab)

- 2019 A visual tour of carbon export by sinking particles across ocean basins, depth, and time  
Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole, MA  
**Durkin, C.A.**, K. Buesseler, I. Cetinic, M. Estapa, C. Huffard, M. Omand, J. Sheu, K. Smith, S. Wilson

Automated identification of sinking marine particle images using transfer learning  
Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole, MA  
J. Sheu, **C.A. Durkin**

Effects of phytoplankton composition and biominerals on the episodic pulses of  
particulate organic carbon to abyssal depths  
Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole, MA  
C.A. Michaud, K.L. Smith, Jr., C.L. Huffard, **C.A. Durkin**

Carbon export pathways quantified by sediment trap gel layers  
EXPORTS Science Meeting, Williamsburg, VA  
**Durkin, C.A.**, M. Estapa, M. Omand, K. Buesseler

- 2018 Quantifying the biology of sinking particles across diverse ocean regions using  
polyacrylamide gel sediment traps  
AGU/ASLO Ocean Science Meeting, Portland, OR  
**Durkin, C.A.**, M. Estapa, M. Omand, I. Cetinic

Organismal contents of sinking particles identify biological source and ecological  
interactions that lead to carbon export  
Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole, MA  
**Durkin, C.A.**, M. Estapa, M. Omand, I. Cetinic

- 2017 Linking surface phytoplankton with sinking particles at coastal boundaries  
Ocean Carbon Hot Spots Workshop, Moss Landing, CA  
**Durkin, C.A.**, M. Estapa, M. Omand, Z. Ljubetic, S. Bosak, K. Carlson, I. Cetinic

Phytoplankton transport to the abyssal seafloor in the California Current observed over  
30 years.  
Eastern Pacific Ocean Conference, Fallen Leaf Lake, South Lake Tahoe, CA  
**Durkin, C.A.**, C. Huffard, C. Preston, K.L. Smith

Linking surface phytoplankton with sinking particles



- Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole, MA  
**Durkin, C.A.**, M. Estapa, M. Omand, Z. Ljubesic, S. Bosak, K. Carlson, I. Cetinic
- 2016 Identifying mechanisms of the biological pump through high resolution observations of surface ocean properties and sinking particles  
 Ocean Carbon and Biogeochemistry (OCB) Summer Workshop, Woods Hole, MA  
**Durkin, C.A.**, M. Omand, M. Estapa
- 2015 What is the Si-uptake with diatoms?  
 The Molecular Life of Diatoms, Seattle, WA  
 Koester, J.A., **C.A. Durkin**, S.J. Bender, E.V. Armbrust
- 2014 Influence of individual phytoplankton cells and their physiology on particle export in the South Atlantic Ocean  
 AGU/ASLO Ocean Science Meeting, Honolulu, Hawaii  
**Durkin, C.A.**, K. Chan, H. Alexander, B. Van Mooy, S. Dyhrman, M. Estapa, K.E. Buesseler
- 2012 Uptake limitation of silicic acid in coastal diatoms controls cellular silicification  
 AGU/ASLO Ocean Science Meeting, Salt Lake City, Utah  
**Durkin, C.A.**, S.J. Bender, K. Gaessner, E.V. Armbrust
- 2012 Environmentally induced changes to the diatom cell wall and the implications of these changes on biogeochemical cycles  
 Dissertations in Chemical Oceanography (DisCO), Lihue, Hawaii  
**Durkin, C.A.**
- 2011 Excessive silicic acid supply leads to increased silicification in coastal diatoms  
 Eastern Pacific Ocean Conference, Fallen Leaf Lake, South Lake Tahoe, CA  
**Durkin, C.A.**, S.J. Bender, K. Gaessner, E.V. Armbrust
- 2011 Diversity in iron-limited diatoms has varied effects on silicon cycling  
 PSA Annual Meeting, Seattle, Washington  
**Durkin, C.A.**, A. Marchetti, S.J. Bender, T. Truong, R. Morales, E.V. Armbrust
- 2010 Common cell wall related genes in diatoms and their potential use as biological indicators in changing ocean environments  
 AGU/ASLO Ocean Science Meeting, Portland, Oregon  
**Durkin, C.A.**, S.J. Bender, T. Truong, A. Marchetti, E.V. Armbrust
- 2009 Contribution of different diatom genera to total community silicification in a coastal to open ocean transect and in response to iron fertilization.  
 ASLO Aquatic Science Meeting, Nice, France  
**Durkin, CA**, A Marchetti, R Morales, EV Armbrust

- 2009 Biogeochemical implications of diatom growth, silicification, and species composition in iron limited environments.  
Graduate Climate Conference, Pack Forest, Washington  
**Durkin C.A.**, A. Marchetti, R. Morales, E.V. Armbrust
- 2008 Chitin as a component of the diatom cell wall.  
AGU/ASLO Ocean Science Meeting, Orlando, Florida  
**Durkin, CA**, T. Mock, R. Marohl, E.V. Armbrust
- 2007 Unexpected presence, diversity, and expression of chitin synthase genes in diatoms.  
ASLO Aquatic Sciences Meeting, Santa Fe, New Mexico  
**Durkin, C. A.**, T. Mock, E.V. Armbrust