BURKE HALES

OREGON STATE UNIVERSITY
COLLEGE of EARTH, OCEAN AND ATMOSPHERIC SCIENCES

CURRICULUM VITAE—FEBRUARY 2019

PROFESSIONAL EXPERIENCE

Professor, 2012-present: College of Earth, Oceanic and Atmospheric Sciences, Oregon State University

CEO, 2015-present: Dakunalytics, LLC.

Chief Scientist, PacWave wave-energy testing facility, 2017-present.

Associate Professor, 2004-2012: College of Oceanographic and Atmospheric Sciences, Oregon State University

Assistant Professor, 1998-2004: College of Oceanographic and Atmospheric Sciences, Oregon State University

Adjunct Associate Research Scientist, 1998-present: Lamont-Doherty Earth Observatory of Columbia University

Associate Research Scientist, 1997-1998: Lamont-Doherty Earth Observatory of Columbia University

Postdoctoral Research Fellow, 1995-1997: Lamont-Doherty Earth Observatory of Columbia University (Postdoctoral Advisor: Dr. Taro Takahashi)

EDUCATION

Ph.D. Chemical Oceanography, 1995
University of Washington School of Oceanography
Dissertation Title: Calcite Dissolution on the Sea Floor: An *In Situ* Study
Dissertation Advisor: Dr. Steven R. Emerson

M.S. Chemical Oceanography, 1992
University of Washington School of Oceanography

B.S. Chemical Engineering, 1988
University of Washington College of Engineering

RESEARCH INTERESTS

Ocean-Margin Carbon Cycling: Study of the processes impacting the state of aqueous carbonate chemistry in estuarine and coastal waters, and effects on ocean acidification and hypoxia.

Coastal Oceanography: Analysis and synthesis of the physics, biology, and chemistry of the coastal ocean, using observations collected with high-speed sampling and analysis systems.

Mesoscale Surface Ocean Processes: Study of the physics, biology, and chemistry of the surface ocean, using observations collected with high-speed sampling and analysis systems.

Analytical Environmental Chemistry: Development of sensors and systems for high-speed and robust measurement of ocean chemistry.

Ocean Observational Technology: Development and application of automated, autonomous, in-water and remote approaches for enhanced extraction of oceanographic information.

Benthic Biogeochemistry: *In situ* field measurements of sediment pore water chemistry and numerical models of transport and chemical kinetics in sediments.

HONORS and AWARDS

Pattullo Award for Excellence in Teaching, College of Earth Ocean and Atmospheric Sciences, Oregon State University, 2012.

Ocean Carbon and Biogeochemistry Workshop Invited Plenary Speaker, 2005.

Chemical Oceanography Gordon Research Conference Invited Speaker, 2005.

State of the Carbon Cycle Report Invited Lead Author, 2005.

Department of Energy Global Change Research Program Distinguished Postdoctoral Fellow, 1995

PROFESSIONAL MEMBERSHIPS

Oregon State University Marine Studies Initiative, Affiliated Faculty.

Oregon State University Environmental Arts and Humanities Initiative, Affiliated Faculty.

American Geophysical Union

American Society of Limnology and Oceanography

FUNDED RESEARCH PROJECTS

Summary: over 30 funded research projects, including over 10 as lead PI, for over $20M in research funds awarded to OSU, since 1998.

*Testing Micro-Grids at PacWave North. USN NavFac. Co-I Andy Stewart, UW-APL. 1March 2019 – 28 Feb 2022. $1,800,000 (Hales part)

*Ocean Sentinel Development for Persistent PacWave North Operations. Co-I Rick Driscoll, NREL. DOE National Renewable Energy Laboratory. 1 March 2019 – 29 Feb 2020. $500,000.

*Development of a combined CO_2 analyzer. Sub-award from Humboldt State University, $65,000, 1 December 2017 – 30 November 2019.

Late Season Productivity, Carbon, and Nutrient Dynamics in a Changing Arctic. NSF Polar Programs. CO-Is Juranek and Goni. 1 July 2015 – 30 June 2018. $333,000 (Hales part).

*Support of Oregon Shellfish Producers. 1 July 2013 – 30 June 2019. State of Oregon. $510,000.

Turning the headlights on high: Improving an ocean acidification observation system in support of Pacific coast shellfish growers. Multiple Co-Is from multiple institutions. NOAA. 1 October 2014 – 30 September 2018. Hales OSU part, $378,000.

*Shellfish-hatchery Ocean Acidification Monitoring. NOAA. 1 July 2013 – 30 June 2014. $199907.

Developing realistic metrics of acidification stress for commercially important bivalves in variable habitats. Co-PI George Waldbusser, OSU. Oregon SeaGrant, $180,000, 1 Jan 2012 – 31 Dec 2013.

Collaborative Research: Modeling coastal oxygen production and carbon sequestration. Co-PI Roger Samelson, OSU. National Science Foundation, $700,000, 1 January 2012 – 31 Dec 2015.

*Ocean Acidification Monitoring and Prediction in Oregon Coastal waters. Co-PI Jack Barth, OSU. CIMRS subaward from NOAA-PMEL, $228548, 1 July 2010-30 June 2013.

Ocean Acidification Category 1: A mechanistic understanding of the impacts of ocean acidification on the early life stages of marine bivalves. National Science foundation, $1,997,000, 1 October 2010 – 30 September, 2015.

*Arctic Ocean Acidification: Bering Strait Time Series. NSF. $308915 Co-PI F. Prahl, COAS. 8/15/2010-8/14/2012.

Biological and physical factors controlling the formation of hypoxic and corrosive conditions along the Cascadia Margin. NOAA. $316044 (Hales' part of multi-institution proposal). 1 May 2010 – 30 April 2013.

*Development of a multiple-application tool for quantification of carbonate chemistry. Sub-award from UCSB, $15424, 1 May 2010 – 30 April 2011.

*Validation of new measurement techniques for coastal pCO_2. Sub-award from Alliance for Coastal Technologies, $16790, 1 October 2009 – 31 December 2009.

Merging general circulation models and empirical algorithms for satellite-based prediction of surface ocean CO_2 fluxes. NASA, via sub-contract from Princeton Univ. $68650, 1 Jan. 2009 – 31 Dec. 2011

Estuarine air-sea CO_2 fluxes: evaluating the impact of climatological drivers spanning multiple temporal scales using ships-of-opportunity and remote sensing. Co-PIs M. Wetz, Texas A&M, and H. Paerl, University of North Carolina. NSF. $69900 (Hales' part), 4/1/08 – 3/31/11.

Improved Observations and Understanding of Northeast Pacific Coastal CO_2 Fluxes. Co-PI Pete Strutton, OSU. NSF. $292423. 4/1/08 – 3/31/11.

Remote sensing of Southern Ocean air-sea CO_2 fluxes. Co-PI Pete Strutton, OSU. NASA. $440058. 9/1/07-8/31/10.

Autonomous *p*H and alkalinity sensors: in situ testing and carbon cycle research. Lead PI Mike DeGrandpre, University of Montana; CO-PI, Chris Langdon, University of Miami. $135,000 (OSU part), 10/1/07 – 9/30/11.

A multi-parameter inorganic carbon measurement system. Co-PIs M. DeGrandpre, University of Montana; J. Beck, Sunburst Sensors LLC. NOAA-SBIR Phase-II, $78236 (Hales' part), 9/1/07-8/31/09.

* Closing the carbon budget in the mixed layer during Southern Ocean GasEx. Co-PIs P. Strutton (OSU) and D. Hebert (URI). $425,686 (OSU part), 5/1/07 – 4/30/11.

* Net carbon transport and reaction in the bottom boundary layer of an upwelling margin. Multiple PIs from OSU, University of Chicago, University of Washington, and University of Hawaii. $2.8M (1.9M OSU part)

Science And Technology University Research Network (SATURN). Multiple co-PIs. NSF-STC. $525,000 (Hales' part), 07/01/06-06/30/11.

A multi-parameter inorganic carbon measurement system. Co-PIs M. DeGrandpre, University of Montana; J. Beck, Sunburst Sensors LLC. NOAA-SBIR, $20000 (OSU part) 7/1/06 – 6/30/07.

Coastal Carbon Flux Studies in Support of GOES-R Risk Reduction Activities. Multiple co-PIs. NOAA-CIOSS. $720,570 (Strutton, Letelier, Hales part), 07/01/06-06/30/09.

*Development of algorithms for prediction of coastal CO_2 air-sea fluxes. Co-PIs R. Letelier, P. Strutton (OSU-COAS), and R. Feely and C. Sabine (NOAA-PMEL). NASA, $976,000; 05/01/05-4/30/08.

Coastal CO_2 Measurements and Databases for the North American Carbon Program. Multiple Co-PIs from NOAA-PMEL, NOAA-AOML, LDEO, and UGa. NOAA, $313,382 (OSU part); 04/01/05-03/31/08.

*North American Continental Margins: A Synthesis and Planning Workshop. Co-PIs WJ Cai (UGA) O Schofield (IMCS) and BG Mitchell (SIO). NASA, $100,000 (awarded to UCAR); 10/01/04-09/30/05.

Coastal Ocean Advances in Shelf Transport (COAST; Collaboration with 15 Co-PIs from OSU, UNC, and LDEO). National Science Foundation. $852,137 (Hales' subcomponent); $8.7M (OSU part); 1/1/00 – 12/31/05

Southern Ocean Iron Experiment (SOFeX; Collaboration with 8 Co-PIs from MLML, OSU, LDEO, NOAA-AOML, U. Miami, MBARI, and Rutgers U.). National Science Foundation. $298,996 (OSU part); 9/1/00-8/31/02.

A Lagrangian seasoar study of the coupling of circulation mixing, and productivity at a shelfbreak front (DIPS; Collaboration with 5 Co-PIs from LDEO and URI-GSO). National Science Foundation. $355,945 (OSU part); 01/09/00 – 31/08/04.

*Pumping SeaSoar Upgrade and Engineering. Sub-Award from Lamont-Doherty Earth Observatory. $225,000, 01/09/01 – 01/09/02.

*Calcite diagenesis: Seafloor studies. National Science Foundation, $196,000, 9/15/98 - 9/14/00.

TECHNICAL INNOVATION

Developer of the 'Burke-o-Lator' combined pCO_2/TCO_2 analyzer system, licensed to DaKunalytics, LLC. 2015.

SERVICE ACTIVITIES

Summary: Membership and leadership in over 70 international, national, state, university, and college service activities; dozens of outreach activities with media and local community.

International:

Trainer, Latin American and Caribbean Ocean Acidification training workshop, 2018-2019.

Panelist, Updates from Test Sites, International Conference on Ocean Energy, June 2018.

Member, Judging Panel of the Wendy Schmidt Ocean Health XPRIZE competition for developing pH measurement technology for ocean acidification monitoring, 2014-2016.

Participant and rapporteur, Second International Ocean Acidification Observation Network Planning Workshop, St. Andrews, Scotland, July 2013.

Co-Editor in Chief, *Carbon Balance and Management*, October 2012—2014.

Participant, PICES section on carbon and climate working group meeting, Hiroshima, Japan, October 2012.

Participant, SOCAT coastal data QC workshop, Seattle, WA, October 2012.

Participant and rapporteur, International Ocean Acidification Observation Network Planning Workshop, Seattle, WA, June 2012.

PICES Section on Carbon and Climate (S-CC) working group member, 2011—.

SOCAT coastal region group leader (joint with W-J. Cai and S. Alin). 2011—.

LOICZ/IMBER 'Continental Margins' task team member.

Participant in COST Action 735 workshop, "Coastal CO_2, CH_4 and N_2O dynamics", Kiel, Germany, 13-14 January 2009.

Associate editor, *Progress in Oceanography*, 2005-2010.

National:

Testimony to House Subcommittee on Science regarding commercial innovation derived from basic research, June 2017.

Member, Jet Propulsion Laboratory's A-Team study to identify high-priority science questions for study by remote sensing in coastal and inland waters. September 2015

Member, West Coast Ocean Acidification and Hypoxia Panel, 2013-present.

Participant, Alliance for Coastal Technologies Science Assessment of Chesapeake Bay Acidification, March 2014, Smithsonian Environmental Research Center, Edgewater, MD.

Participant, Alliance for Coastal Technologies pH Measurement Intercomparison Planning program; Laboratory Intercomparison Synthesis, June 2013, Ann Arbor, MI.

Participant in California Coastal Acidification Network (CCAN) workshop, August 2012, San Diego, CA.

Participant, Alliance for Coastal Technologies pH Measurement Intercomparison Planning Workshop, Ann Arbor, MI, June 2012.

Participant, Ocean Acidification Data Management Workshop, March, 2012, University of Washington, Seattle, WA, March 2012.

California Coastal Acidification Network (CCAN) sub-committee memberships: Carbon chemistry (Chair); Data QA/QC; Ancillary parameter measurement approaches

Speaker and participant in California Coastal Acidification Network (CCAN) workshop, July 2011, Costa Mesa, CA.

Speaker and participant in NASA Ocean Deoxygenation Workshop, March-April 2010, NASA Ames Research Center, Mountain View, CA.

Member, Alliance for Coastal Technologies pCO_2 Technical Advisory Committee, 2010-.

Participant, ACT pCO_2 Technical Advisory Committee, 2011-

Panelist, Ocean Acidification forum at Pacific Coast Shellfish Growers Association annual meeting, Portland, OR, September, 2009.

Participant in technical meeting for the Willapa Seed Crisis project, Portland, OR, 18 March, 2009.

Participant in Lamont Climate Center Mini Workshop, "Carbon productivity responses to increased dissolved inorganic carbon concentrations in surface ocean: Exploring the feasibility of an *in situ* mesoscale carbon addition experiment", Lamont Doherty Earth Observatory, Palisades, NY, 23-24 March, 2009.

Data Manager, SO-GasEx cruise, 2008-.

Member, Ocean Acidification Workshop steering committee, 2007.

Member, US NACP Steering Committee, 2007-2009.

Member, NACP Continental Synthesis Task Force, 2006-

Member, Ocean Carbon and Biogeochemistry Scientific Steering Committee, 2007-2009.

Chair, planning committee for "North American Continental Margins: A Synthesis and Planning Workshop." 2005-2006.

Participant in "Ocean Carbon and Biogeochemistry Scoping Workshop on Terrestrial and Coastal Carbon Fluxes in the Gulf of Mexico", St. Petersburg, FL, May, 2008.

Participant in ACT Towed Underwater Vehicles Workshop, Monterey, CA, February, 2007.

Participant in "GEOSECS-II" Planning workshop, held in Toulouse, France, April 2003.

Participant in "NSF Workshop to Address Future Scientific Needs in Oceanography in the Context of Academic Fleet Capabilities" held in Corvallis, Oregon, at the College of Oceanic & Atmospheric Sciences (COAS), Oregon State University, August, 2000.

Participant in "OCTET: Ocean Carbon Transport, Exchanges and Transformations" Planning Workshop, 7-10 March, 2000 Warrenton VA.

Organizer of The Calcite Symposium, a one-day series of talks on 11 June, 1997 sponsored by the Lamont-Doherty Earth Observatory Climate Center focusing on the role calcite dissolution and preservation plays in determining glacial/interglacial ocean chemistry and atmospheric CO_2.

Reviewer of papers for journals including *Geochimica et Cosmochimica Acta, Journal of Geophysical Research, Journal of Marine Research, Deep Sea Research, Nature, Science, Global Biogeochemical Cycles, Marine Chemistry, Marine Geology, Analytica Chimica Acta, Paleoceanography, Progress in Oceanography, Proceedings of the National Academy of Sciences, Limnology and Oceanography, Estuarine and Continental Shelf Science*, and *Journal of Phycology*.

Reviewer of proposals for the Department of Energy, California SeaGrant, National Science Foundation, NASA, and NOAA's Office of Global Programs.

Participant in proposal review panels for NSF, NASA, and NOAA.

Reviewer of the National Research Council's report "Ocean Acidification: A National Strategy to Meet the Challenges of a Changing Ocean", National Academies Press, 2010.

Technical reviewer of Ocean Observatories Initiative report on moored chemical sensors, 2010.

State:

Presenter, 'Carbon 101' presentation to State of Oregon Energy Committee legislators, September 2018.

Panelist, Oregon Coastal Economic Summit, August, 2018

Presenter, Ocean Policy Advisory Council, Florence, OR, June 2014.

Panelist, Oregon Coastal Economic Summit, Florence, OR, August 2013.

Member, Science/technology committee for the Oregon Global Warming Commission, 2008—.

Member, Oregon Climate Change Research Institute Science Advisory Board, 2009—.

Oregon State University:

Member, Search Committee for joint CEOAS/COS opportunity hire in Microbiology. Feb-Mar 2016.

Member, Search committee for CEOAS Interim Dean, September 2015.

Member, Marine Science Initiative Outreach, Extension, and Partnerships Working Group, October 2014-July 2015.

Chair, Department of Horticulture Undergraduate Academic Program Review Team, 2006.

Chair, Department of Foreign Languages and Literature Undergraduate Academic Program Review Team, 2005.

University Curriculum Council, 2003-2006.

College of Oceanic and Atmospheric Sciences:

Chair, Promotion and Tenure Committee, 2017-2018.

Chair, tracer oceanographer search committee, 2015.

Member, Promotion and Tenure committee; 2013-2014, 2014-2015, 2015-2016.

Chair, Machine Shop Manager search committee, 2012.

Member, Marine Technician Supervisor search committee, 2012.

Member, Peer Review of Teaching, 2011-2012.

Member, Wecoma Master search committee, 2011.

Member, Emily Shroyer opportunity hire committee, 2011.

Member, Lauren Juranek opportunity hire committee, 2011.

College Merger Strategic Planning Group, 2010-2011

Ship Operations Committee, 2010-2013

Graduate Admissions Committee, 2009-2015

Core Curriculum Planning Group, 2008-2009.

Faculty Hiring Consultative Committee III, 2007-2009.

Scientific Facilities Committee, 2006-2009.

Member, task force to prepare for UNOLS new ship competition, 2006.

Chair, Safety Committee, 2004-2006.

Ship Operations Committee, 2004-2007.

Marine Superintendent Position Search Committee, 2004.

Chair, Marine Biogeochemist Position Search Committee, 2003-2004.

Safety Committee, 2003-3004.

Instructional Programs Committee, 2003-2004.

Peer Review of Teaching Committee, 2003-2004.

Radiosiotope Chemist Position Search Committee, 2002-2003.

Scientific Facilities Committee, 2001-2003.

Promotion and Tenure Committee, 2001-2002.

Faculty Advisory Committee, 2000-2002.

Graduate Admissions Committee, 2000-2001.

Library Committee, 1999-2000.

Promotion and Tenure Committee, 1998-1999.

Outreach:

Yachats Academy, Testing Wave Energy on the Oregon Coast, Yachats, Oregon, January 2019.

Science on Tap, Wave Energy on the Oregon Coast. Newport, Oregon, October 2018

Surfrider Newport Chapter meeting: PacWave—Testing Wave Energy for the Future. July 2018

Interview on Wave Energy with Oregon Public Broadcasting's Think Out Loud, May 2018. https://www.opb.org/radio/programs/thinkoutloud/segment/gorge-recovery-wave-energy-foster-care/

Panelist, Beneath the Waves Film Festival, Linfield College, March 2016.

Interviewee, Think Progress, August, 2015.

Interviewee, KGW news, April 2015.

Presenter, Douglas County Global Warming Coalition's Climate Change and the Health of the Ocean Earth Day Symposium, Roseburg, OR, April 2015.

Interviewee, Public Broadcasting, Nova, Netarts, OR, April 2013.

Interviewee, Mother Jones Magazine, March 2013.

Interviewee, USA Today, March, 2013.

Panelist, Public Interest Environmental Law Consortium Ocean Acidification Panel, Eugene, OR, March 2013.

Speaker and panelist, Ocean acidification and hypoxia demystified. Tillamook Bay Community College, October 2012, Tillamook, OR.

Speaker, National Ocean Sciences Bowl Oregon State University competition: "Ocean Acidification and the Pacific Northwest", March 2012, Corvallis, OR.

Participant, COMPASS field trip with Oregon legislators to discuss ocean acidification and hypoxia, August 2011, Netarts, OR

Presenter and participant in Song for the Blue Ocean: Science, Arts, and Ethics, Corvallis, OR, February 2011

Speaker and panelist, Siuslaw Watershed Council meeting, March 2011, Florence, OR

Speaker and Panelist, Pacific Coast Shellfish Growers Association annual meeting, September 2010, Tacoma, WA.

Plenary speaker, Northwest Aquatic and Marine Educators conference, Florence, OR, July 2010.

Interview with Keely Chalmers, KGW Channel 8 News, for story on river and estuarine impacts on coastal-ocean CO_2 chemistry, August, 2010.

Why Does Seawater Sink? Outreach lab demonstration at Oak Grove Elementary School, Albany, OR, June 2010.

Good Morning America, interview regarding ocean acidification, aired 22 April 2010. http://abcnews.go.com/GMA/Eco/ocean-acidification-hits-northwest-oyster-farms/story?id=10425738

Friends of Bob Straub Environmental Lecture Series, "Oregon's coastal carbon cycle: The good, the bad, and the acidic", 22 April, 2010.

Salem Progressive Film Series, presentation on and discussion of ocean acidification following screening of "A Sea Change", 11 February 2010.

Oregon Eco-Justice Team annual "Soup Salad and Speakers" event, presented seminar and participated in discussion, 31 January, 2010.

Interview with Keely Chalmers, KGW Channel 8 News, for story on ocean acidification's impacts on coastal oyster industry, November, 2009.

Panel discussion member Coastal and Estuarine Research Federation Chatauqua Session, CERF meeting, Portland, OR, November 2009.

Panel discussion member for World Affairs Council of Oregon screening of "A Sea Change", Portland, OR, 13 October 2009.

Panel discussion member at Pacific Coast Shellfish Growers Association, Portland, OR, September 2009.

Interviewee for OPB's Denmark Project series, August 2009; http://news.opb.org/denmark/.

Interviewee for OPB Oregon Field Guide episode on ocean acidification and impacts to shellfish industry, June 2009; episode aired February 2010; http://www.opb.org/programs/ofg/segments/view/1742?q=ocean+acid.

Acids and bases in ocean waters, Outreach lecture at Fir Grove Elementary, Albany, OR, June 2009.

Invited speaker and panelist for "Ocean Acidification: Cause, Effect, and Response" panel, at Public Interest Environmental Law Council, Eugene OR, February, 2009.

Invited speaker at Heceta Head Coastal Conference, Florence, Oregon, October 2008.

Ocean Acidification and the Global Carbon Cycle. Lecture to the Science and Engineering PartnershipS (SEPS) Carbon Workshop, Oregon State University, 19 August 2008.

Panel discussion member in "Our Acidic Ocean" on Oregon Public Broadcasting's Think Out Loud, 27 May, 2008.

Interviewee for KUOW (Seattle NPR affiliate) regarding coastal ocean acidification, 27 May, 2008.

The Southern Ocean Gas Exchange Experiment. Outreach lecture at Ione School, Ione, OR, February 2008.

The Southern Ocean Gas Exchange Experiment. Outreach lecture at Fir Grove Elementary School, Albany, OR, February 2008.

Why is there Salt in the Sea? Outreach lecture at Ione School, Ione, OR, December 2006.

Science Judge, CWOSE Science Fair, Monmouth, OR, February 2006.

Participant in the Saturday Academy's Apprenticeships in Science and Engineering event held at OSU, 2004.

Regular participant in National Ocean Sciences Bowl Oregon State competition, 1999-2015.

EDUCATIONAL ACTIVITIES

Summary: three postdoctoral scholars, 32 graduate students, and 7 undergraduates advised; 23 courses taught.

Post Doctoral Scholars Advised:

Cheryl Harrison, College of Earth Ocean and Atmospheric Sciences, co-advised with R. Samelson, 2012-2015.

Mariona Segura-Noguera: College of Oceanic and Atmospheric Sciences; primary advisor, 2009-2010.

Andrea van der Woude: College of Oceanic and Atmospheric Sciences; co-advisor with P. Strutton, 2008-2010.

Graduate Students Advised:

Will Fairchild, College of Earth, Ocean and Atmospheric Sciences MS student; thesis advisor 2017-present.

Michael Moses, College of Earth, Ocean and Atmospheric Sciences MS student; thesis advisor 2017-present.

Peter Chace, College of Earth, Ocean and Atmospheric Sciences PhD student; thesis committee member 2016-present.

J. Andrew Menking, College of Earth, Ocean and Atmospheric Sciences PhD student; thesis committee member 2016 – present.

Iria Gimenez-Calvado, College of Earth, Ocean and Atmospheric Sciences PhD student; thesis committee member 2013—2018. Degree awarded December 2018.

Steve Pacella, College of Earth, Ocean and Atmospheric Sciences PhD student; thesis committee member 2016-2018. Degree awarded November 2018.

Brian Erickson, College of Earth, Ocean and Atmospheric Sciences MS student; thesis committee member 2016-2018. Degree awarded June 2018.

Nancy Williams, College of Earth, Ocean and Atmospheric Sciences PhD student; thesis committee member 2015—2018. Degree awarded February 2018.

Rosie Gradoville; College of Oceanic and Atmospheric Sciences PhD student; thesis committee member, 2013—2017. Degree awarded June 2017.

Aaron Jones, College of Earth, Ocean and Atmospheric Sciences MS student; thesis advisor 2016-2017.

Cameron Allen, College of Earth, Ocean and Atmospheric Sciences PhD student; thesis committee member 2015—2018.

Stephanie Smith, College of Earth, Ocean and Atmospheric Sciences MS student; thesis committee member 2013—2016. Degree awarded May 2016.

Colleen Wall; College of Oceanic and Atmospheric Sciences MS student; thesis advisor, 2011-2014; degree awarded January 2014.

Elizabeth Brunner, College of Earth, Ocean and Atmospheric Sciences MS student; thesis committee member 2012—2013; degree awarded October 2013.

Rosie Gradoville; College of Oceanic and Atmospheric Sciences MS student; thesis committee member, 2011-2013; degree awarded June 2013.

Matthew Gray; Oregon State University Department of Fisheries and Wildlife PhD student; thesis committee member, 2011-2013.

Maria Kavanaugh; College of Oceanic and Atmospheric Sciences PhD student; thesis committee member, 2010-2012. Degree awarded October, 2012.

Jesse Vance; College of Oceanic and Atmospheric Sciences MS student; thesis advisor, 2010-2012; degree awarded June 2012.

Katherine Harris, University of Montana Department of Chemistry, PhD student; thesis committee member, 2010-2014; degree awarded January 2014.

Joey Crosswell; University of North Carolina Institute of Marine Science PhD student; thesis committee member, 2010-; Co-I on project funding student research, provider of core measurement technology for project; 2008-2013; degree awarded 2013.

Wiley Evans: College of Oceanic and Atmospheric Sciences PhD student; co-Advisor with P. Strutton, 2006-2011; degree awarded June, 2011.

Samantha Siedlecki, University of Chicago PhD student; Co-I on project funding student research; supervisor on two research cruises. Degree awarded 2010.

Elizabeth Lakin; College of Oceanic and Atmospheric Sciences MS student; thesis committee member, 2008-2010. Degree awarded April, 2010.

Rachel Holser: College of Oceanic and Atmospheric Sciences MS student; thesis committee member, 2007-2010. Degree awarded March, 2010.

Matt Alkire, College of Oceanic and Atmospheric Sciences PhD candidate; PhD exam committee chair, 2006.

Chris Holm: College of Oceanic and Atmospheric Sciences MS student; thesis committee member, 2005-2006. Degree awarded December, 2006.

Mike Wetz: College of Oceanic and Atmospheric Sciences PhD student; thesis committee member, 2003-2006. Degree awarded August, 2006.

Octavio Cruz-Uribe: Chemical Engineering PhD student; thesis committee member, 2004-2008; degree defended, 2008.

Leah Bandstra: College of Oceanic and Atmospheric Sciences MS student; thesis advisor, 2001-2004; Degree awarded June, 2004.

Paul Covert: College of Oceanic and Atmospheric Sciences PhD student; thesis advisor, 2002-2004.

Woody Moses: College of Oceanic and Atmospheric Sciences MS student; thesis committee member, 2001; Degree awarded August, 2001.

Brian Haley: College of Oceanic and Atmospheric Sciences PhD candidate; PhD exam committee member, 2000.

Undergraduate students advised:

Selina Lambert, Oregon State University, 2016-2018.

Zoe Kilmer, Oregon State University, 2016-2018.

Carrie Weekes, Oregon State University, 2014-2017.

Wiley Wolfe, Oregon State University, 2014-2016.

Michael Bloom, Oregon State University, 2013-2014

Ann Swanson, Oregon State University, 2011-2013.

Victoria Klein, Oregon State University Honors College, 2012-2013.

Courses Taught and Developed:

* Oceanography 522: Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling. Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Winter Quarter 2018.

* Oceanography 522: Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling. Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Spring Quarter 2017.

* Oceanography 522: Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling. Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Spring Quarter 2016.

Oceanography 450: Chemical Oceanography. Required course for Oceanography-minor undergraduates in Earth and Environmental Sciences; elective for students in Environmental sciences and engineering. Winter Quarter 2016.

* Oceanography 522: Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling. Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Spring Quarter 2015.

Oceanography 407/507: CEOAS Graduate student seminar. Spring quarter 2015. Co-Taught by Y. Spitz.

* Oceanography 522 (formerly OC599-1): Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling. Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Spring Quarter 2014.

*Oceanography 599-1: Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling.

Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Co-taught and developed with M. Goni. Spring Quarter 2013.

*Oceanography 599-1: Ocean Biogeochemical Dynamics. Tier-II core course for all Ocean Ecology and Biogeochemistry students, covering ocean and global elemental cycling. Course text, Sarmiento and Gruber's Ocean Biogeochemical dynamics. Co-taught and developed with M. Goni. Spring Quarter 2012.

*Oceanography 669: Ocean Carbon Cycles. Course covering the natural ocean carbon cycle in the context of anthropogenic perturbations. Course materials drawn from Sarmiento and Gruber's Ocean Biogeochemical Dynamics; SOCCR and NACM reports; scientific literature and online databases. Winter Quarter 2011.

*Oceanography 651: Advanced Chemical Oceanography. Biogeochemical Recipes: Using mass, energy and momentum balances to interpret biogeochemical data. Winter quarter, 2010.

*Oceanography 669: Ocean Carbon Cycles. New course covering the natural ocean carbon cycle in the context of anthropogenic perturbations. Course materials drawn from Sarmiento and Gruber's Ocean Biogeochemical Dynamics; SOCCR and NACM reports; scientific literature and online databases. Developed and taught with R. Collier, Winter Quarter 2009.

Oceanography 652: Chemical Oceanography Laboratory. Carbonate chemistry section of this course in Fall quarter 2008.

Oceanography 652: Chemical Oceanography Laboratory. Carbonate chemistry section of this course in Spring quarter 2006.

*Oceanography 651: Advanced Chemical Oceanography. Biogeochemical Recipes: Using mass, energy and momentum balances to interpret biogeochemical data. Spring quarter, 2004. I developed this course, which covered the fundamentals of mass, energy, and momentum balances, including introduction to basic representations of physical transport and introductory chemical kinetics; derivation and classification of basic continuity equations; introduction to analytical and numerical solutions to continuity equations; identification of proper solution approaches to special cases; and application to solution of oceanographic problems. Course materials were drawn from classical engineering, mathematics, and chemistry textbooks, and chemical oceanographic literature.

Oceanography 507 (Biogeochemical Oceanography Seminar Series; Fall quarter 2001-Spring Quarter 2005). Series of outside-of-COAS speakers addressing the Biological, Geological, and Chemical Oceanography faculty and students in the Fall quarters of these years, and of COAS and other local faculty and students in other quarters of 2003. Students were encouraged to interact with speakers, and course was synchronized with OC550 Chemical Oceanography Core Course. Notable visiting speakers included David Archer, the late John Hedges, Rick Jahnke, Steve Emerson, Paul Quay, Taro Takahashi, John Marra, Bob Anderson, Dick Feely, Chris Sabine, Flip Froelich, Craig Carlson, Niki Gruber, Jess Adkins, Ellery Ingall, David Ho, Jean Lynch, and others.

Oceanography 652: Chemical Oceanography Laboratory. Field-sampling, carbonate chemistry and nutrient chemistry sections of this course in Spring quarter 2003.

Oceanography 550: Chemical Oceanography (core course). Fall quarter, 2000.

Oceanography 331: Introduction to Oceanography, Distance Education Version. Videotaped set of lectures covering introductory chemical oceanography for undergraduates for Spring quarter 2000.

Oceanography 550: Chemical Oceanography (core course). Fall quarter, 1999.

Oceanography 331: Introduction to Oceanography. I taught the chemical and physical oceanography sections of this course in Spring quarter 1999, in coordination with Professor R. Duncan and Crystal T. Sigmon who taught, respectively, the geological and biological oceanography sections.

Oceanography 652: Chemical Oceanography Laboratory. Carbonate chemistry section of this course in Spring quarter, 1999.

*Hales developed or co-developed curriculum for these courses.

Guest Lectures

Thermodynamics II—non-ideal solutions. Delivered to Laurie Juranek's Ocean Biogeochemical Dynamics class, Winter 2018.

"A global problem with local impacts: Ocean Acidification in Cascadian Margin waters in the context of the IPCC report." Delivered to Phil Mote's Intergovernmental Panel on Climate Change Seminar Series (OC407/507), Winter 2016.

"Calcite Diagenesis and the Lysocline, past and present." Delivered to Brian Haley and Joe Stoner's Marine Sedimentology (OC562) course, Winter 2016.

"Ocean Acidification: Is there an issue in a variable world?", delivered to Lorenzo Cianelli's Biological Oceanography (OC440) course, May, 2014.

"Environmental variability in ocean acidification stress, and mechanisms for biological response. Is there an issue in a variable world?", delivered to Yvette Spitz' Biological Oceanography (OC440) course, May, 2013.

"Ocean Acidification and its Effects on Marine Biota", delivered to Lorenzo Cianelli's Biological Oceanography (OC440) course, May, 2012.

"Ocean Acidification and the Pacific Northwest", delivered to Marla Chaney's Fisheries Technology course, Mount Hood Community College, February, 2012.

"Ocean Acidification and the Pacific Northwest", delivered to Ted Strub's OC331 course, "Man's Impact on Climate", November, 2011.

"Ocean Acidification and Climate Change", delivered to Christoph Thomas' ATS320 course, "Man's Impact on Climate", October, 2010.

"Ocean Acidification and its Effects on Marine Biota", delivered to Lorenzo Cianelli's Biological Oceanography (OC440) course, May, 2010.

"Carbon Cycling in Eastern Boundary Upwelling Systems", delivered to Ted Strub's Special Topics course on eastern boundary currents, May, 2009.

"Climate Change and Ocean Acidification", delivered to Beverly Law's Forestry course "Global Change and the Earth System", April, 2008.

External Courses

The Ocean Foundation's Latin America and Caribbean Ocean Acidification Workshop, Santa Marta, Colombia, January 2019.

Schmidt Ocean Health Ocean Acidification Workshop, Newport, OR, August 2018.

PICES Summer School, "Ocean Observing Systems and Ecosystem Monitoring". One-week field and lab course for international students from Pacific nations. Hatfield Marine Science Center, Newport, OR, August 2013.

Center for Ocean Sciences Education Excellence (COSEE) summer workshop for community college instructors, July, 2010; One-day course "Carbon Cycling and Climate Change" consisting of five lectures, three lab modules, and two web modules.

FIELD EXPERIENCE

Summary: Over 575 days at sea on 15 different vessels with over two dozen different ports of call.

RV Sikuliaq, July-August 2017 (24 days). Study of late season productivity and export in an ice-free Arctic. Seward, AK – Nome, AK.

**RV Oceanus*, June 2017 (4 days). State-funded student-cruise studying Ocean Acidification and Hypoxia on the Oregon Coast. Newport, OR – Newport, OR.

RV Sikuliaq, September 2016 (27 days). Study of late season productivity and export in an ice-free Arctic. Nome, AK – Nome, AK.

RV Oceanus, October 2014 (2 days). Deployment of new OA buoy "FLOATer" at NH10. Newport, OR – Newport, OR.

**RV Oceanus*, July 2012 (6 days). Mid-season surveying of OA-relevant carbon-system dynamics. Newport, OR – Newport, OR.

**RV Wecoma*, September 2011 (5 days). Late-season surveying of OA-relevant carbon-system dynamics. Newport, OR – Newport, OR.

**RV Wecoma*, May 2011 (5 days). Early-season surveying of OA-relevant carbon-system dynamics. Newport, OR – Newport, OR.

RV Elakha, December 2010 (1 day). Shelf-break mooring recovery. Newport, OR – Newport, OR.

RV Wecoma, August 2010 (8 days). Columbia River estuary and plume experiment. Astoria, OR – Newport, OR.

RV Wecoma, October 2009 (1 day). Shelf-break mooring deployment. Newport, OR – Newport, OR.

**RV Wecoma*, July-August 2009 (14 days). Seasonal Upwelling and Coastal Carbon Export and Sequestration (SUCCES) shelf-edge study. Newport, OR – Newport, OR.

**RV Wecoma*, May-June 2009 (14 days). Seasonal Upwelling and Coastal Carbon Export and Sequestration (SUCCES) shelf-edge study. Newport, OR – Newport, OR.

**RV Wecoma*, September 2008 (5 days). Seasonal Upwelling and Coastal Carbon Export and Sequestration (SUCCES) pilot study. Newport, OR – Newport, OR.

RV Ron Brown, February-April 2008 (44 days). Southern Ocean Gas Exchange eXperiment (SO-GasEX) studying the effects of gas exchange in high wind and sea-state conditions. Punta Arenas, Chile – Montevideo, Uruguay.

RV John Martin, September 2006 (4 days). Field study in support of GOES-R remote sensing validation. Moss Landing, CA.

RV Roger Revelle, January-February 2003 (23 days). Third field-study of the COAST program studying the wind-driven upwelling environment of the Oregon Coast. San Diego, CA – Newport, OR.

RV Endeavor, August 2002 (11 days). Third cruise (in a series of three) studying biogeochemical cycling in a buoyancy driven front on the shelf-break on the Mid-Atlantic Bight. Narragansett, RI – Narragansett, RI

RV Endeavor, June 2002 (11 days). Second cruise (in a series of three) studying biogeochemical cycling in a buoyancy driven front on the shelf-break on the Mid-Atlantic Bight. Narragansett, RI – Narragansett, RI

RV Roger Revelle, Jan-Feb 2002 (42 days). SOFeX. Cruise studying the biogeochemical response to surface ocean iron fertilization. Lyttleton, NZ – Lyttleton, NZ.

RV Thomas G. Thompson, August 2001 (19 days). Second field-study of the COAST program studying the wind-driven upwelling environment of the Oregon Coast. Newport, OR – Newport, OR.

RV Endeavor, July 2001 (10 days). First cruise (in a series of three) studying biogeochemical cycling in a buoyancy-driven front on the shelf-break on the Mid-Atlantic Bight. Narragansett, RI – Narragansett, RI.

RV Thomas G. Thompson, May 2001 (17 days). First field-study of the COAST program studying the wind-driven upwelling environment of the Oregon Coast. Newport, OR – Newport, OR.

RV Thomas G. Thompson, March 2001 (7 days). Engineering/Testing cruise for SuperSucker winch-controlled undulating/sampling system in the Puget Sound and Strait of Juan de Fuca, Seattle, WA – Seattle, WA.

**RV Endeavor*, July 2000 (13 days). *In situ* microsensor measurements of porewater O_2 and pH in sediments of the Cape Hatteras Rise, off the east coast of the US, Narragansett, RI – Narragansett, RI.

RV Knorr, November-December, 1998 (35 days). *In situ* microsensor measurements of porewater O_2 and pH in sediments of the Sierra Leone Rise, eastern tropical Atlantic, Recife, Brazil to Sal, Cape Verde Islands.

RVIB Nathaniel B Palmer, November-December, 1997 (43 days). Pumping SeaSoar surveys in the Ross Sea polynya, Lyttleton, New Zealand to McMurdo Station, Antarctica

RV Thomas G. Thompson, July, 1996 (16 days) Pumping SeaSoar field trials, San Diego, CA to Seattle, WA.

RV Thomas G. Thompson, September-October, 1995 (23 days). SeaSoar leg of the Indian Ocean JGOFS program. Muscat, Oman – Muscat, Oman

RV Knorr, February-March, 1994 (35 days). *In situ* microsensor measurements of porewater O_2, pH, and CO_2 in sediments of the Ceara Rise, western tropical Atlantic. Woods Hole, MA- Barbados – Recife, Brazil.

RV Cape Hatteras, July 1993 (7 days). *In situ* microsensor measurements of porewater O_2, *p*H, and CO_2 in sediments of the Georgia Bight, western North Atlantic. Beaufort, NC – Beaufort, NC

RV Moana Wave, June-July 1991 (35 days). *In situ* microelectrode measurements of porewater O_2 and pH in sediments of the Ontong-Java Plateau, western equatorial Pacific. Lae, Papua New Guinea – Tarawa, Kiribati

RV Oceanus, September, 1989 (15 days). *In situ* microelectrode measurements of porewater O_2, and pH in sediments between Woods Hole and Bermuda, western North Atlantic. Woods Hole, MA - Bermuda

RV Atlantis II, October-November 1988 (15 days). Shipboard measurements of hydrogen sulfide in sediments near a whale carcass, Catalina Basin, California Borderlands, eastern North Pacific. San Diego, CA – San Diego, CA

RV New Horizon, June-July 1988 (35 days). Shipboard measurements of sulfate reduction rates in slope and shelf sediments, Washington shelf, eastern North Pacific. Westport, WA – Grays Harbor, WA

*Chief scientist on these cruises

PUBLICATIONS and PRESENTATIONS THROUGH FEBRUARY 2019

Summary: over 90 peer-reviewed articles and reports; over 40 advisee- or first-authored; (over 30, with 10 advisee*- and first-authored, in last five years)*

h index: 39 (28 in last five years); i10 index: 67 (56 in last five years)

Refereed Journal Articles and Reports

1. *Pacella, S., C. Brown, R. G. Labiosa, B. Hales, T. C. Mochon Collura, and G. G. Waldbusser, 2019. Quantifying seasonal interactions between local metabolism and ocean acidification in productive estuarine habitats. *Limnology and Oceanography*, submitted.
2. Barth, J., S E Allen, E P Dever, R K Dewey, W Evans, R A Feely, Jennifer L Fisher, Jonathan P Fram, Burke R Hales, Debby Ianson, Jennifer Jackson, S K Juniper, O Kawka, D Kelley, J M Klymak, J Konovsky, M Kosro, A Kurapov, E Mayorga, P MacCready, J A Newton, R I Perry, C Miller Risien, M Robert, T Ross, R K Shearman, J Schumacker, S Siedlecki, V L Trainer, S Waterman, C E Wingard, 2019. Better regional ocean observing through cross-national cooperation: A case study from the Northeast Pacific. *Frontiers in Marine Science*, revision submitted.
3. *Gimenez, I., B. Hales, and G. Waldbusser, 2019. The Dynamic Ocean Acidification Manipulation Experimental System (DOAMES): Separating carbonate variables and simulating natural variability in laboratory flow-through experiments. *Limnol. Ocean.: Methods*., accepted.
4. Evans, W., K. Pocock, A. Hare, C. Weekes, B. Hales, J. Jackson, H. Gurney-Smith, J. T. Mathis, S. R. Alin, and R. A. Feely, 2019. Marine CO_2 patterns in the northern Salish Sea. *Frontiers in Marine Science*, https://doi.org/10.3389/fmars.2018.00536
5. *Pacella, S., C. Brown, G. G. Waldbusser, R. G. Labiosa, and B. Hales, 2018. Seagrass community metabolism increases short-term extremes and long-term offset of CO_2 under future ocean acidification. *Proc. Nat. Acad. Sci.*, 115 (15) 3870-3875 doi.org/10.1073/pnas.1703445115.
6. Haley, B., B. Hales, K. Kovalchik, E. L. Brunner and G. G. Waldbusser, 2018. Mechanisms to Explain the Elemental Composition of the Initial Aragonite Shell of Larval Oysters. *Geochem., Geophys., Geosyst.*, doi.org/10.1002/2017GC007133
7. *Williams, N., L. Juranek, R. Feely., K. Johnson, J. Russell and B. Hales, 2018. Assessment of the carbonate chemistry seasonal cycles in the Southern Ocean from persistent observational platforms, J. of Geophys. Res. – Oceans, doi.org/10.1029/2017JC012917
8. *Gimenez, I., G. G. Waldbusser, and B. Hales, 2018. Ocean Acidification Stress Index for Shellfish (OASIS): Linking Pacific oyster larval survival and carbonate chemistry organismal exposures. *Elem Sci Anth*, 6, 51 DOI: http://doi.org/10.1525/elementa.306.
9. Turk D, Bednaršek N, Evans W, García-Ibáñez MI, Hales B, Cross J., 2017. Role of Technology in Ocean Acidification: Monitoring, Water-Quality Impairments, CO_2 Mitigation, and Machine Learning. In *Encycl, of Sust. Technol.*, Ed. M. Abraham.
10. Gray, M. W., C. J. Langdon, G. G. Waldbusser, B. Hales, and S. Kramer, 2017. Mechanistic understanding of ocean acidification impacts on the feeding physiology and larval energy budgets of the mussel M. californianus. *Marine Ecology Progress Series* 563, 81-94.

11. Hales, B., A. Suhrbier, G. G. Waldbusser, R. A. Feely, and J. Newton, 2017. The carbonate Chemistry of the 'fattening line' Willapa Bay, 2011-2014. *Estuaries and Coasts*, DOI: 10.1007/s12237-016-0136-7
12. Brunner, E. L., F. G. Prahl, B. Hales, and G. G. Waldbusser, 2016. A longitudinal study of Pacific oyster (Crassostrea gigas) larval development: isotope shifts during early shell formation reveal sub-lethal energetic stress. *Marine Ecology Progress Series* 555, 109-123.
13. Feely, R. A., S. Alin, B. Carter, N. Bednarsek, B. Hales, F. Chan, T. Hill, B. Gaylord, E. Sanford, R. H. Byrne, C. Sabine, D. Greeley, and L. Juranek, 2016. Chemical and biological impacts of ocean acidification along the west coast of North America. *Estuarine, Coastal, and Shelf Res.* 183, 260-270. https://doi.org/10.1016/j.ecss.2016.08.043
14. Weisberg, S., N. Bednarsek, R. A. Feely, F. Chan, T. S. Fleming, A. B. Boehm, M. Sutula, J. L. Ruesink, B. Hales, J. L. Largier, and J. A. Newton, 2016. Water quality criteria for an acidifying ocean: Challenges and opportunities, *Environmental Science and Policy*, DOI: http://dx.doi.org/10.1016/j.ocecoaman.2016.03.010.
15. *Harrison, C. S., B. Hales, S. Siedlecki, and R. Samelson, 2016. Potential and timescales for oxygen depletion in coastal upwelling systems: Idealized model analysis. *J. Geophys Res.*, DOI: 10.1002/2015JC011328.
16. Waldbusser, G. G., M. W. Gray, B. Hales, C. J. Langdon, B. A. Haley, I. Gimenez, S. Smith, E. L. Brunner, G. Hutchinson, 2016. Slow shell building, a trait for resistance to acute ocean acidification impacts, *Limnology and Oceanography*, 10.1002/lno.10348.
17. Pfeiffer-Hebert, A., F. Prahl, B. Hales, J. Lerczak, S. Pierce, M. Levine, 2016. High-resolution sampling of methane transport in the Columbia River nearfield plume: Implications for sources and sinks in a river-dominated estuary. *Limnol. Oceanogr.* 10.1002/lno.10221
18. Waldbusser, G. G., B. Hales, and B. A. Haley, 2015. Calcium carbonate saturation state: On myths and this or that stories *ICES J. Mar. Sci.*, DOI: 10.1093/icesjms/fsv174.
19. Fuchsman, K, A. Devol, Z. Chase, C. Reimers, and B. Hales, 2015. Benthic fluxes on the Oregon shelf. *Estuarine, Coastal and Shelf Science* 163, 156-166.
20. Waldbusser, G. G., B. Hales, M. Gray, C. J. Langdon, B. Haley, and E. Brunner, 2015. Fast shells and slow shells: Ocean acidification and seashells in bivalve larvae. *J. Shellfish Res.* 34, 687-687.
21. Waldbusser, G. G., B. Hales, C. J. Langdon, B. A. Haley, P. Schrader, E. L. Brunner, M. W. Gray, C. A. Miller, I. Gimenez, and G. Hutchinson, 2015. Ocean acidification has multiple modes of action on bivalve larvae. *PLOS ONE* 10(6): e0128376. doi:10.1371/journal.pone.0128376 .
22. Salisbury, J., B. Jonsson, W. Balch, S. Chakraborty, B. Chapron, B. Hales, S. Lohrenz, A. Mannino, J. Mathis, N. Reul, S. Signorini, D. Vandemark, R. Wanninkhof, and K. Yates, 2015. The role of present and future satellite data for ocean acidification science. *Oceanography* 28(2):108–121, http://dx.doi.org/10.5670/oceanog.2015.35.
23. Barton, A., G. G. Waldbusser, R. A. Feely, S. B. Weisberg, J. A. Newton, B. Hales, S. Cudd, B. Eudeline, C. Langdon, I. Jefferds, T. King, and K. Mclaughlin, 2015. Impacts of coastal

acidification on the Pacific Northwest shellfish industry and adaptation strategies implemented in response. *Oceanography* 28(2):146–159, http://dx.doi.org/10.5670/oceanog.2015.38

24. *Evans, W., B. Hales, P. Strutton, K. Shearman, and J. Barth, 2015. Failure to bloom: Intense upwelling results in negligible phytoplankton response and prolonged CO_2 outgassing over the Oregon Shelf. *J. Geophys. Res.*, doi: 10.1002/2014JC010580.
25. Reum, J., S. Alin, N. Bednarsek, R. A. Feely, B. Hales, W. Evans, and P. McElhany, 2015. Temperature-pCO_2 covariability in upwelling systems and the design of ocean acidification experiments. *Global Change Biology*, doi: 10.1093/icesjms/fsu231.
26. Waldbusser, G. G., B. Hales, C. J. Langdon, B. A. Haley, P. Schrader, E. L. Brunner, M. W. Gray, C. A. Miller, and I. Gimenez, 2015. Experimental Evidence for Saturation State Impacts on Early Larval Bivalves. *Nature Climate Change*, DOI: 10.1038/NCLIMATE2479
27. Bakker, D.C.E. et al., 2014. An update to the surface ocean CO_2 atlas (SOCAT version 2). *Earth Syst. Sci. Data*, *6*, 69–90, doi: 10.5194/essd-6-69-2014.
28. Bednarsek, N., R. A. Feely, J. Reum, W. Peterson, J. Menkel, S. Alin, and B. Hales, 2014. Limacina Helicina shell dissolution indicates habitat decline due to ocean acidification in the California Current Ecosystem. *Proc. Royal Sci.*, Proc. B 2014 281, 20140123.
29. *Kavanaugh , M. T., S. Emerson, B. Hales, R. Letelier, D. Lockwood, and P. Quay, 2014. Spatial variability of controls on primary and net community production across North-East Pacific seascapes. *Limnol. Oceanogr.* 59, 2013–2027, doi:10.4319/lo.2014.59.6.2013.
30. *Crosswell, J. R., M. Wetz, B. Hales, and H. Paerl, 2014. Globally-significant CO_2 emissions from shallow coastal waters during hurricane passage. *Limnology and Oceanography* 59, 2014, 1651–1665 doi:10.4319/lo.2014.59.5.1651
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32. Bakker, D. E. et al. (Hales is 31st of 78 co-authors), 2013. An update to the Surface Ocean CO_2 Atlas (SOCAT version 2). *Earth System Science Data Discussions*, 6, 465-512, doi:10.5194/essdd-6-465-2013.
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34. *Harris, K.E., M.D. DeGrandpre, and B. Hales, 2013. Aragonite saturation states in a coastal upwelling zone, *Geophy. Res. Lett.,* DOI: 10.1002/grl.50460.
35. *Evans, W., B. Hales, and P. Strutton, 2013. Air-water CO_2 fluxes in the Columbia River estuary and plume. *Estuarine Coastal and Shelf Science* 117 260-272 doi: 10.1016/j.ecss.2012.12.003.

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37. Pfeil et al., 2013. A uniform, quality controlled surface ocean CO_2 atlas (SOCAT). *Earth Syst. Sci. Data*, *5*, 125–143, doi: 10.5194/essd-5-125-2013.

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Harrison, D.E. and Stammer, D. (eds.) *Proceedings of OceanObs'09: Sustained Ocean Observations and Information for Society, Vol. 2. OceanObs'09: Sustained Ocean Observations and Information for Society* Noordwijk, The Netherlands, European Space Agency, 67-88. (ESA Special Publication WPP-306). (doi:10.5270/OceanObs09.cwp.07).

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Invited Seminars (in the last five years)

SWFSC Tipping Points Workshop, La Jolla, CA, December 2015: "Are tipping points indicated in larval oyster recruitment in Willapa Bay, Washington?"

Lamont-Doherty Earth Observatory Special Seminar, July 2015: "OMEGA bottlenecks for marine calcifiers: The importance of carbonate system in ocean margin waters"

Seminar de Mar, Universidad de Santo Tomas, October 2014. "Impacto de la Acidificación sobre los Ecosistemas Costeros y Recursos Marinos."

Ocean Policy Advisory Council, Florence, OR, June 2014. "The recent science of Ocean Acidification and Hypoxia on Oregon's continental shelf ." (Joint with F. Chan, OSU).