

## CURRICULUM VITAE - CHRISTOPHER LEE SABINE

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### Research and Administrative Interests

My research addresses the role of the ocean in the global carbon cycle. In particular, my work centers on interpreting ocean inorganic carbon measurements and understanding ocean acidification. This includes understanding the air-sea exchange of CO<sub>2</sub> at the ocean surface, examining the basin-scale distributions of both natural and anthropogenic carbon in the ocean's interior, understanding multiple tracer relationships (e.g. anthropogenic CO<sub>2</sub> and dissolved oxygen), evaluating ocean carbon cycle GCMs with data-based global carbon distributions, and examining carbonate and organic matter re-mineralization within the open ocean and in coastal environments. My administrative interests are grounded in a desire to help advance science more effectively at the national and international levels. I enjoy working with a broad scope of researchers to develop a "big picture" view of the current state of ocean science and contribute to the development of research directions that will help both the ocean and society to prosper.

### Education

1992 Ph.D. in Oceanography, University of Hawaii at Manoa, Honolulu, HI 96822 (Fred T. Mackenzie, Advisor).  
1986 B.S. in Marine Science, Texas A&M University at Galveston, Galveston, TX 77553.

### Professional History

2011-Present Director, NOAA Pacific Marine Environmental Laboratory  
2007-Present Affiliate Full Professor, Department of Oceanography, University of Washington  
2004-Present Senior Fellow, University of Washington Joint Institute for the Study of the Atmosphere and Ocean  
2008-2011 Supervisory Oceanographer, NOAA Pacific Marine Environmental Laboratory  
2002-2008 Oceanographer, NOAA Pacific Marine Environmental Laboratory  
1999-2007 Affiliate Associate Professor, Department of Oceanography, University of Washington  
1999-2002 Research Scientist, Joint Institute for the Study of the Atmosphere and the Ocean, University of Washington/NOAA Pacific Marine Environmental Laboratory.  
1994-1999 Research Staff, Program in Atmospheric and Ocean Sciences, Department of Geosciences, Princeton University.  
1992-1994 Research Associate, Program in Atmospheric and Ocean Sciences, Department of Geological and Geophysical Sciences, Princeton University.  
1987-1992 Graduate Research Assistant, Hawaii Institute of Geophysics, University of Hawaii at Manoa.  
1986-1987 Research Technician, University of Texas Medical Branch, Department of Microbiology  
1985 Summer Intern, Harbor Branch Foundation Inc., Marine Geology Department, Ft. Pierce, FL (C. Hoskin, Advisor)

### Scholarships and Awards

2014 NOAA Administrator's Award for scientific expertise, leadership and outstanding contributions to the IPCC 5<sup>th</sup> Assessment Report  
2013 AGU Fellow  
2012 Honorary Doctor of Science Degree from Gustavus Adolphus College  
2011 NOAA Technology Transfer Award  
2010 Seattle Federal Executive Board's 2010 Public Service Award for Space Needle CO<sub>2</sub> sensor outreach project with the Pacific Science Center  
2009 NOAA Research Employee of the Year (leadership)

- 2009 NASA Group Achievement Award for outstanding accomplishments and interagency collaboration in the Southern Ocean Gas Exchange Experiment 2008.
- 2009 American Geophysical Union Editor's Citation for Excellence in Refereeing from Geophysical Research Letters
- 2009 OAR Outstanding Scientific Paper Award "Feely, R.A., C.L. Sabine, J.M. Hernandez-Ayon, D. Ianson, and B. Hales (2008): Evidence for upwelling of corrosive "acidified" water onto the Continental Shelf. *Science*, 320(5882), doi: 10.1126/science.1155676, 1490–1492."
- 2008 PMEL Outstanding Scientific Paper Award "Sabine, C.L., and R.A. Feely (2007): The oceanic sink for carbon dioxide. In *Greenhouse Gas Sinks*, D. Reay, N. Hewitt, J. Grace, and K. Smith (eds.), CABI Publishing, Oxfordshire, UK, 31–49."
- 2008 NOAA/OAR Special Act Award
- 2007 Special recognition from IPCC for contributing to the 2007 Nobel Peace Prize.
- 2007 NOAA employee of the month for October 2007.
- 2006 Department of Commerce Gold Medal Award for pioneering research leading to the discovery of increased acidification in the world's oceans due to the absorption of carbon dioxide.
- 2005 PMEL Outstanding Scientific Paper Award "Sabine, C.L., R.A. Feely, N. Gruber, R.M. Key, K. Lee, J.L. Bullister, R. Wanninkhof, C.S. Wong, D.W.R. Wallace, B. Tilbrook, F.J. Millero, T.-H. Peng, A. Kozyr, T. Ono, and A.F. Rios (2004): The oceanic sink for anthropogenic CO<sub>2</sub>. *Science*, 305(5682), 367-371."
- 2005 NOAA Outstanding Scientific Paper Award "Feely, R.A., C.L. Sabine, K. Lee, W. Berelson, J. Kleypas, V.J. Fabry, and F.J. Millero (2004): Impact of anthropogenic CO<sub>2</sub> on the CaCO<sub>3</sub> system in the oceans. *Science*, 305(5682), 362-366."
- 2005 NOAA/OAR Significant Achievement Award
- 2004 NOAA/OAR Significant Achievement Award
- 2004 NOAA/OAR Special Act Award
- 2003 NOAA/OAR Significant Achievement Award
- 2002 NOAA Outstanding Scientific Paper Award "Feely, R.A., C.L. Sabine, T. Takahashi, and R. Wanninkhof (2001): Uptake and storage of carbon dioxide in the oceans: The global CO<sub>2</sub> survey. *Oceanography*, 14(4), 18–32."
- 1999 Technical Communications Merit Award, Society for Technical Communication, for technical report "Surface water and atmospheric underway carbon data obtained during the World Ocean Circulation Experiment Indian Ocean cruises (R/V Knorr, December 1994-January 1996), NDP64."
- 1989 ARCS Scholarship Award, Achievement Rewards for College Scientists Foundation Inc.
- 1986 C. D. Mickey Award for excellence in marine chemistry, Texas A&M University at Galveston.
- 1986 Full scholarship to attend summer course in Sediment-Organism Relationships, Bermuda Biological Station (F. T. Mackenzie, Professor).
- 1985, 1986 Troy Sweatnam Memorial Scholarship, Texas A&M University at Galveston.

### Professional Societies

American Geophysical Union  
The Oceanography Society

### Synergistic Activities

- 2017-present co-chair of NOAA's Western Regional Coordination Team (NOAA West)
- 2016-present member of OAR Performance Management and Awards Committee (PMAC)
- 2013-present member of Joint Institute for the Study of the Atmosphere and the Ocean (JISAO) Executive Board
- 2013-present member of Joint Institute for Marine and Atmospheric Research (JIMAR) Executive Board
- 2011-present member of Cooperative Institute for Alaska Research (CIFAR) Executive Board
- 2011-present member of Cooperative Institute for Marine Resources Studies (CIMRS) Executive Board
- 2011-present member of NOAA Senior Research Council
- 2010-present member of Interagency Working Group on Ocean Acidification chartered under JSOST
- 2013-2016 member of NOAA Libraries Advisory Committee

2009-2014 co-chair of the Global Ocean Ship-based Hydrographic Investigations Panel (GO-SHIP)  
 2010-2013 Coordinating Lead Author for IPCC Working Group 1 Chapter 6  
 2010-2011 ex-officio SSC member for U.S. Ocean Carbon and Biogeochemistry Program  
 2006-2011 member of Ocean Carbon and Biogeochemistry Time-Series Advisory Committee  
 2005-2011 member of PICES section on Carbon and Climate  
 2003-2011 Member of the US CLIVAR/CO<sub>2</sub> Repeat Hydrography Oversight Committee  
 2008-2011 co-chair of the Carbon Cycle Science Working Group (develop a new US CCS Plan)  
 2004-2011 Chair of IOC/SCOR International Ocean Carbon Coordination Project (IOCCP)  
 2007-2010 member of International Repeat Hydrography Advisory Group  
 2008-2010 advisory group for the *Ronald H. Brown*  
 2005-2009 Scientific Steering Committee member for U.S. Ocean Carbon and Climate Change Program  
 2005-2009 Scientific Steering Committee member for U.S. Ocean Carbon and Biogeochemistry Program  
 2004-2008 Scientific Steering Committee member for U.S. North American Carbon Program  
 2004-2006 Contributing author to IPCC Fourth Assessment Report  
 2001-2006 Scientific Steering Committee member for IGBP/IHDP/WCRP Global Carbon Project  
 2003-2005 Lead author for IPCC Special Report on carbon dioxide capture and storage  
 2002-2005 Member of PICES Working Group 17: Biogeochemical Data Integration and Synthesis  
 2001-2005 Member of International CLIVAR/CLIC Southern Ocean panel  
 2001-2004 Working Group for the Implementation of the North American Carbon Program (NACP)  
 2002-2004 Working Group for the Implementation of Ocean Carbon and Climate Change (OCCC) Program  
 2001-2004 Member of US CLIVAR Southern Ocean panel  
 2000-2003 Member of IGBP Integrated Global Carbon Observing (IGCO) theme team  
 1998-2003 Member of CARbon dioxide IN the Atlantic (CARINA)

### **Cruise Experience**

5/14/15- R/V Kilo Moana Wendy Schmidt Ocean Health X-Prize Sea Trials  
 5/19/15 sponsored by X-Prize Foundation (co-chief scientist)

2/29/08- Ronald H. Brown Southern Ocean Gasex  
 4/12/08 sponsored by NOAA (chief scientist)

5/11/07- R/V Wecoma NACP West Coast Cruise  
 6/14/07 sponsored by NOAA (chief scientist)

2/13/06- R/V Thomas G. Thompson Carbon/CLIVAR P16N  
 3/3/06 sponsored by NSF&NOAA (chief scientist)

1/9/05- R/V Revelle Carbon/CLIVAR P16S  
 2/20/05 sponsored by NSF&NOAA COSP

10/23/03- R/V Knorr Carbon/CLIVAR A22  
 11/14/03 sponsored by NSF&NOAA COSP

2/2/01- Ronald H. Brown GASEX – 2001  
 3/8/01 sponsored by NOAA/OGP

7/16/97- R/V Knorr, WOCE leg A20  
 8/11/97 sponsored by WOCE/DOE

11/1/95- R/V Knorr; WOCE leg I10  
 11/28/95 sponsored by WOCE/DOE

1/24/95- R/V Knorr; WOCE leg I9N  
 3/5/95 sponsored by WOCE/DOE

10/5/93-11/10/93 R/V Thomas G. Thompson; WOCE leg P10 sponsored by WOCE/DOE

10/6/92-11/26/92 R/V Knorr; WOCE legs P16S/P17A sponsored by WOCE/DOE

4/1/90-5/1/90 R/V Endeavor; to: Bermuda Atlantic Time-series Station; sponsored by University of South Florida

1/89-9/91 13 cruises to: Hawaii Ocean Time-series Station ALOHA; sponsored by JGOFS/WOCE

12/6/88-12/12/88 R/V Townsend Cromwell; to: Penguin Bank, Hawaii; sponsored by NMFS/University of Hawaii (co-chief scientist)

5/26/88-6/26/88 R/V Townsend Cromwell; to Northwestern Hawaiian Islands; sponsored by NMFS/University of Hawaii (co-chief scientist)

11/12/87-11/20/87 R/V Townsend Cromwell; to: Penguin Bank, Hawaii; sponsored by NMFS/University of Hawaii

#### Collaborators

D. Bakker (UEA-UK); J. Bullister (PMEL); R.H. Byrne (USF); K. Cadeira (Lawrence Livermore Nat'l. Lab.); M. Cronin (PMEL); P. Ciais (LSCE-France); E. DeCarlo (UH); A. Dickson (Scripps); S. Diggs (Scripps); S. Doney (WHOI); S. Emerson (Univ. of Wash); A. Fassbender (UW); R.A. Feely (PMEL); B. Hales (OSU); M. Ishii (MRI-Japan); G. Johnson (PMEL); R. Key (Princeton); A. Kozyr (CDIAC); M. Kramp (IOC-UNESCO - France); C. Lee (KIOST-S. Korea); K. Lee (Pohang Univ.- S. Korea); F. Mackenzie (Univ. of Hawaii); M. McPhaden (PMEL); C. Meinig (PMEL); N. Metzl (IPSL-France); J. Newton (UW); J.H. Noh (KIOST-South Korea); A. Olsen (Bjerknes Center-Norway); B. Pfeil (Bjerknes Center-Norway); M. Rhein (U. Bremen-Germany); S. Rintoul (CSIRO-Australia); C. Rödenbeck (BGC-Jena-Germany); J. Reum (UW); J. Salisbury (UNH); J. Sarmiento (Princeton); U. Send (Scripps); B. Sloyan (CSIRO-Australia); A. Sutton (PMEL); J. Swift (Scripps); T. Takahashi (LDEO); B. Tilbrook (CSIRO-Australia); D. Vandemark (UNH); R. Wanninkhof (AOML)

#### Thesis Advisor (4 total) and Postgraduate-Scholar Sponsor (2 total)

Katherine Fagan (PhD 2011, Univ. of Washington); Andrea Fassbender (masters 2010, PhD. 2014, Univ. of Washington); Nancy Williams (masters 2014, Univ. of Washington); Gwenn Hennon (PhD 2015, Univ. of Washington); Laurie Juranek (NRC postdoc, 2011-2012); Adrienne Sutton (NRC postdoc, 2012).

#### Recent Significant Abstracts, Presentations and Workshop Activities

Sanborn-Marsh, C, A. Sutton, **C. L. Sabine**, N. Lawrence-Salvas, C. Dietrich (2016) Evaluation of a Prototype pCO<sub>2</sub> Optical Sensor, *2016 Fall AGU Meeting*, poster.

Sutton, A. J., **C. L. Sabine**, R. A. Feely, R. H. Wanninkhof (2016) Comparison of Sea-Air CO<sub>2</sub> Flux Estimates Using Satellite-Based Versus Mooring Wind Speed Data, *2016 Fall AGU Meeting*, talk given by A. Sutton.

**Sabine**, C, A. Fassbender, A. Sutton, and M. Cronin (2016) Mixed Layer Controls on Ocean Carbon Cycling and Ocean Acidification, *2016 JpGU Meeting*, invited talk given by C. Sabine.

Shadwick, E, T. Trull, B. Tilbrook, A. Sutton, and **C. Sabine** (2016) Seasonality of biological and physical controls on surface ocean CO<sub>2</sub> from hourly observations at the Southern Ocean Time Series site south of Australia, *2016 Ocean Sciences Meeting*, talk given by E. Shadwick.

Sutton, A, **C. Sabine**, and R. Feely (2016) Using present day observations to detect when ocean acidification exceeds natural variability of surface seawater Ω<sub>aragonite</sub>, *2016 Ocean Sciences Meeting*, talk given by A. Sutton.

- Rutkowski, M, J. Murray, M. Miller, A. Sutton, and **C. Sabine** (2016) High pCO<sub>2</sub> conditions in San Francisco Bay originate from coastal upwelling from the California Undercurrent, *2016 Ocean Sciences Meeting*, poster.
- McCabe, K., S. Maenner, and **C. Sabine** (2016) Evaluation of the Carbon Wave Glider as a Tool for Scientific Studies, *2016 Ocean Sciences Meeting*, poster.
- Sabine, C.**, M. Miller, S. Maenner, and A. Sutton (2016) Promoting climate, ocean and data literacy by hosting a CO<sub>2</sub> buoy from NOAA's Pacific Marine Environmental Lab at the Exploratorium, *2016 Ocean Sciences Meeting*, poster.
- Reimer, J, W.-J. Cai, S. Noakes, X. Hu, B. Chen, A. Wang, L. Jiang, J. Salisbury, R. Wanninkhof, L. Barbero, R. Feely, A. Sutton, J. Mathis, and **C. Sabine** (2016) pCO<sub>2</sub> time series ground truthing and internal consistency at the Gray's Reef mooring (NDBC-41008) in the South Atlantic Bight, *2016 Ocean Sciences Meeting*, talk given by J. Reimer.
- Okazaki, R, A. Sutton, R. Feely, A. Dickson, S. Alin, **C. Sabine**, P. Bunje, J. Virmani (2016) Experimental Design Considerations in Measuring pH for the Wendy Schmidt Ocean Health XPRIZE Competition to Improve pH-sensing Technologies, *2016 Ocean Sciences Meeting*, talk given by R. Okazaki.

### Refereed Publications

- Sutton, A.J., **C.L. Sabine**, R.A. Feely, W.-J. Cai, M.F. Cronin, M.J. McPhaden, J.M. Morell, J.A. Newton, J.-H. Noh, S.R. Ólafsdóttir, J.E. Salisbury, U. Send, D. Vandemark, and R.A. Weller (2016): Using present-day observations to detect when anthropogenic change forces surface ocean carbonate chemistry outside preindustrial bounds. *Biogeosciences*, 13(17), 5065–5083, doi: 10.5194/bg-2016-104.
- Feely, R.A., R. Wanninkhof, B.R. Carter, J.N. Cross, J.T. Mathis, **C.L. Sabine**, C.E. Cosca, and J.A. Tirnanes (2016): Global ocean carbon cycle. In *State of the Climate in 2015, Global Oceans. Bull. Am. Meteorol. Soc.*, 97(8), S89–S92.
- Feely, R.A., S. Alin, B. Carter, N. Bednaršek, B. Hales, F. Chan, T.M. Hill, B. Gaylord, E. Sanford, R.H. Byrne, **C.L. Sabine**, D. Greeley, and L. Juranek (2016): Chemical and biological impacts of ocean acidification along the west coast of North America. *Estuar. Coast. Shelf Sci.*, 183(A), 260–270, doi: 10.1016/j.ecss.2016.08.043.
- Fassbender, A.J., **C.L. Sabine**, and K.M. Feifel (2016): Consideration of coastal carbonate chemistry in understanding biological calcification. *Geophys. Res. Lett.*, 43, 4467–4476, doi: 10.1002/2016GL068860.
- Fassbender, A.J., **C.L. Sabine**, and M.F. Cronin (2016): Net community production and calcification from 7 years of NOAA Station Papa Mooring measurements. *Global Biogeochem. Cycles*, 30, 250–267, doi: 10.1002/2015GB005205.
- Courtney, T.A., A.J. Andersson, N.R. Bates, A. Collins, T. Cyronak, S.J. de Putron, B.D. Eyre, R. Garley, E.J. Hochberg, R. Johnson, S. Musielewicz, T.J. Noyes, **C.L. Sabine**, A.J. Sutton, J. Toncin, and A. Tribollet (2016): Comparing chemistry and census-based estimates of net ecosystem calcification on a rim reef in Bermuda. *Front. Mar. Sci.*, 3, 181, doi: 10.3389/fmars.2016.00181.
- Brévière, E.H.G., D.C.E. Bakker, H.W. Bange, T.S. Bates, T.G. Bell, P.W. Boyd, R.A. Duce, V. Garçon, M.T. Johnson, C.S. Law, C.A. Marandino, A. Olsen, B. Quack, P.K. Quinn, **C.L. Sabine**, and E.S. Saltzman (2015): Surface ocean-lower atmosphere study: Scientific synthesis and contribution to Earth system science. *Anthropocene*, 121, 54–68, doi: 10.1016/j.ancene.2015.11.001.
- Monteiro, P.M.S., L. Gregor, M. Lévy, S. Maenner, **C.L. Sabine**, and S. Swart (2015): Intraseasonal variability linked to sampling alias in air-sea CO<sub>2</sub> fluxes in the Southern Ocean. *Geophys. Res. Lett.*, 42(20), 8507–8514, doi: 10.1002/2015GL066009.
- Talley, L.D., R.A. Feely, B.M. Sloyan, R. Wanninkhof, M.O. Baringer, J.L. Bullister, C.A. Carlson, S.C. Doney, R.A. Fine, E. Firing, N. Gruber, D.A. Hansell, M. Ishii, G.C. Johnson, K. Katsumata, R.M. Key, M. Kramp, C. Langdon, A.M. Macdonald, J.T. Mathis, E.L. McDonagh, S. Mecking, F.J. Millero, C.W. Mordy, T. Nakano, **C.L. Sabine**, W.M. Smethie, J.H. Swift, T. Tanhua, A.M. Thurnherr, M.J. Warner, and J.-Z. Zhang (2016): Changes in ocean heat, carbon content, and ventilation: A review of the first decade of GO-SHIP global repeat hydrography. *Annu. Rev. Mar. Sci.*, 8(1), 185–215, doi: 10.1146/annurev-marine-052915-100829.

- Xue, L., W.-J. Cai, X. Hu, **C.L. Sabine**, S. Jones, A.J. Sutton, L.-Q. Jiang, and J.J. Reimer (2016): Sea surface carbon dioxide at the Georgia time series site (2006-2007): Air-sea flux and controlling processes. *Prog. Oceanogr.*, 140, 14–26, doi: 10.1016/j.pocean.2015.09.008.
- Williams, N.L., R.A. Feely, **C.L. Sabine**, A.G. Dickson, J.H. Swift, L.D. Talley, and J.L. Russell (2015): Quantifying anthropogenic carbon inventory changes in the Pacific sector of the Southern Ocean. *Mar. Chem.*, 174, 147–160, doi: 10.1016/j.marchem.2015.06.015.
- Shadwick, E.H., T.W. Trull, B. Tilbrook, A.J. Sutton, E. Schulz, and **C.L. Sabine** (2015): Seasonality of biological and physical controls on surface ocean CO<sub>2</sub> from hourly observations at the Southern Ocean Time Series site south of Australia. *Global Biogeochem. Cycles*, 29(2), 223–238, doi: 10.1002/2014GB004906.
- Monteiro, P.M.S., L. Gregor, M. Lévy, S. Maenner, **C.L. Sabine**, and S. Swart (2015): Intraseasonal variability linked to sampling alias in air-sea CO<sub>2</sub> fluxes in the Southern Ocean. *Geophys. Res. Lett.*, 42(20), 8507–8514, doi: 10.1002/2015GL066009.
- Feely, R.A., R. Wanninkhof, B. Carter, J.T. Mathis, and **C.L. Sabine** (2015): Global ocean carbon cycle. In *State of the Climate in 2014, Global Oceans. Bull. Am. Meteorol. Soc.*, 96(7), S87–S90.
- Fassbender, A.J., **C.L. Sabine**, N. Lawrence-Slavas, E.H. De Carlo, C. Meinig, and S. Maenner Jones (2015): Robust sensor for extended autonomous measurements of surface ocean dissolved inorganic carbon. *Environ. Sci. Tech.*, doi: 10.1021/es5047183.
- Reum, J.C.P., S.R. Alin, C.J. Harvey, N. Bednaršek, W. Evans, R.A. Feely, B. Hales, N. Lucey, J.T. Mathis, P. McElhany, J. Newton, and **C.L. Sabine** (2015): Interpretation and design of ocean acidification experiments in upwelling systems in the context of carbonate chemistry co-variation with temperature and oxygen. Published online, *ICES J. Mar. Sci.*, doi: 10.1093/icesjms/fsu231.
- Sutton, A.J., **C.L. Sabine**, S. Maenner-Jones, N. Lawrence-Slavas, C. Meinig, R.A. Feely, J.T. Mathis, S. Musielewicz, R. Bott, P.D. McLain, J. Fought, and A. Kozyr (2014): A high-frequency atmospheric and seawater pCO<sub>2</sub> data set from 14 open ocean sites using a moored autonomous system. Open access, *Earth Sys. Sci. Data*, 6, doi: 10.5194/essd-6-353-2014, 353–366.
- Sutton, A., A. Jeffries, A. Devol, A. Cox, B. Tyler, B. Roman, B. Bill, B. Murphie, C. Maloy, C. Rice, C. Greengrove, C. Scholin, C. Preston, C. Krembs, **C.L. Sabine**, C.R. Elliser, C. Hard, C. Herrmann, C. Greene, D. Mora, D. Sargeant, E. Grossman, G. Hannach, J. Birch, J. Newton, J. Runyan, J. Mathis, J. Borchert, J. Thomson, J. Thompson, J. Mickett, J. Evanson, J. Bos, J. Ruffner, J. Masura, K. Bumbaco, K. Welch, K. Dzinbal, K. Yamahara, K. Stark, L. Friedenbergl, L. Wigand, L. Robinson, L. Lahner, L. Rhodes, M. Dutch, M. Alford, M. Keyzers, P. Hodum, R.A. Feely, R. Marin, S. Weakland, S. Grossman, S. Jensen, S. Mickelson, S. Pearson, S. Veirs, S.R. Alin, S. Albertson, S. Moore, S. Hallam, S. Thomas, S. Pool, S. Musielwicz, T. King, T. Good, T. Cyra, V. Partridge, V. Trainer, W. Ruef, W. Eash-Loucks, and W. Nilsson (2014): *Puget Sound Marine Waters: 2013 Overview*. Moore, S.K., K. Stark, J. Bos, P. Williams, J. Newton, and K. Dzinbal (eds.), NOAA Northwest Fisheries Science Center for the Puget Sound Ecosystem Monitoring Program's (PSEMP) Marine Waters Workgroup, Published online, 60 pp.
- Sabine, C.L.** (2014): Global Carbon Cycle. In *Encyclopedia of Life Sciences*, John Wiley & Sons, Ltd, Chichester, doi:10.1002/9780470015902.a0003489.pub2.
- Rödenbeck, C., D.C.E. Bakker, N. Metzl, A. Olsen, **C. Sabine**, N. Cassar, F. Reum, R.F. Keeling, and M. Heimann (2014): Interannual sea–air CO<sub>2</sub> flux variability from an observation-driven ocean mixed-layer scheme. *Biogeosciences*, 11, doi: 10.5194/bg-11-4599-2014, 4599–4613.
- Feely, R.A., R. Wanninkhof, **C.L. Sabine**, J.T. Mathis, T. Takahashi, and S. Khatiwala (2014): Global ocean carbon cycle. In *State of the Climate in 2013, Global Oceans. Bull. Am. Meteorol. Soc.*, 95(7), S73–S80.
- Ciais, P., A.J. Dolman, A. Bombelli, R. Duren, A. Peregón, P.J. Rayner, C. Miller, N. Gobron, G. Kinderman, G. Marland, N. Gruber, F. Chevallier, R.J. Andres, G. Balsamo, L. Bopp, F.-M. Bréon, G. Broquet, R. Dargaville, T.J. Battin, A. Borges, H. Bovensmann, M. Buchwitz, J. Butler, J.G. Canadell, R.B. Cook, R. DeFries, R. Engelen, K.R. Gurney, C. Heinze, M. Heimann, A. Held, M. Henry, B. Law, S. Luyssaert, J. Miller, T. Moriyama, C. Moulin, R.B. Myneni, C. Nussli, M. Obersteiner, D. Ojima, Y. Pan, J.-D. Paris, S. L. Piao, B. Poulter, S. Plummer, S. Quegan, P. Raymond, M. Reichstein, L. Rivier, **C. Sabine**, D. Schimel, O. Tarasova, R. Valentini, G. van der Werf, R. Wang, D. Wickland, M. Williams, and C. Zehner (2014): Current systematic carbon-cycle observations and the need for implementing a policy-relevant carbon observing system. *Biogeosciences*, 11, doi: 10.5194/bg-11-3547-2014, 3547–3602.

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