

CURRICULUM VITAE - CHRISTOPHER LEE SABINE

Address: NOAA/PMEL
7600 Sand Point Way, NE
Seattle, WA 98115-6349
phone: [206] 526-6800
FAX: [206] 526-4576
email: chris.sabine@noaa.gov

Research 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 CO₂ 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 CO₂ 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.

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 5th 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 CO₂ 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 CO₂. *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 CO₂ on the CaCO₃ 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 CO₂ 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

- 2013-present member of NOAA Libraries Advisory Committee
- 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
- 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/CO₂ 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

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

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

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

1/89- 13 cruises to: Hawaii Ocean Time-series Station

9/91 ALOHA; sponsored by JGOFS/WOCE

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

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

11/12/87- R/V Townsend Cromwell; to: Penguin Bank, Hawaii;
11/20/87 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 (current PhD student, Univ. of Washington); Laurie Juraneck (NRC postdoc, 2011-2012); Adrienne Sutton (NRC postdoc, 2012).

Recent Significant Abstracts, Presentations and Workshop Activities

Fassbender, A. J.; **Sabine, C. L.**; Meinig, C.; Lawrence-Slavas, N. (2014) Autonomous Ocean Carbon Monitoring With A Moored DIC Sensor, *2014 Ocean Sciences Meeting*, poster.

Rhein, M.; Feely, R. A.; Masson-Delmotte, V.; **Sabine, C.**; Rintoul, S. (2014) Understanding The IPCC WG1 Fifth Assessment Report: Ocean And Carbon In Past, Present, And Future, *2014 Ocean Sciences Meeting*, talk given by Rhein.

Sutton, A. J.; Feely, R. A.; **Sabine, C. L.**; McPhaden, M. J.; Takahashi, T. (2014) Natural And Anthropogenic Change Since 1997: A Synthesis Of Equatorial Pacific Surface Ocean PCO₂ Observations On The TAO Array, *2014 Ocean Sciences Meeting*, talk given by Sutton.

Noh, J. H.; Sutton, A.; Lee, C. M.; **Sabine, C.**; Lee, K. (2014) Ocean Acidification Monitoring In Tropical Lagoon Waters Of Chuuk, FSM, *2014 Ocean Sciences Meeting*, poster.

Salisbury, J.; Vandemark, D.; Hunt, C. W.; **Sabine, C.** (2014) Musielewicz, S. (2014) Factors Contributing To Variability In PCO₂ And Calcite Mineral Saturation State In A Sensitive Coastal Ecosystem, *2014 Ocean Sciences Meeting*, talk given by Salisbury.

Williams, N. L.; Feely, R. A.; **Sabine, C. L.** (2014) Quantifying Anthropogenic Carbon Inventory Changes In The Southern Ocean, *2014 Ocean Sciences Meeting*, talk given by Williams.

Diggs, S. C.; Sloyan, B.; Sabine, C.; Swift, J.; Kramp, M. (2014) Go-Ship: Building A Global Time Series Of A Suite Of Ocean Properties, *2014 Ocean Sciences Meeting*, poster.

Ciais, P, and **Sabine, C** (2013) Carbon cycle and climate change, a tale of increasing emissions and uncertain future sinks, *AGU Fall Meeting 2013*, invited talk.

Sabine, C, Bakker, D C E, Hankin, S, Olsen, A, Pfeil, B, Smith, K, Alin, S R, Cosca, C, Hales, B, Harasawa, S, Kozyr, A, Nojiri, Y, O'Brien, K, Schuster, U, Telszewski, M, Tilbrook, B, Wada, C, and all other SOCAT contributors (2013) An update to the Surface Ocean CO₂ Atlas (SOCAT), *AGU Fall Meeting 2013*, poster.

Refereed Publications

- 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 pCO₂ 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 CO₂ 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. Peregon, 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. Luysaert, 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.
- Bakker, D.C.E., B. Pfeil, K. Smith, S. Hankin, A. Olsen, S.R. Alin, C. Cosca, S. Harasawa, A. Kozyr, Y. Nojiri, K.M. O'Brien, U. Schuster, M. Telszewski, B. Tilbrook, C. Wada, J. Akl, L. Barbero, N. Bates, J. Boutin, W.-J. Cai, R.D. Castle, F.P. Chavez, L. Chen, M. Chierici, K. Currie, H.J.W. de Baar, W. Evans, R.A. Feely, A. Fransson, Z. Gao, B. Hales, N. Hardman-Mountford, M. Hoppema, W.-J. Huang, C.W. Hunt, B. Huss, T. Ichikawa, T. Johannessen, E.M. Jones, S.D. Jones, S. Jutterström, V. Kitidis, A. Körtzinger, P. Landschützer, S.K. Lauvset, N. Lefèvre, A.B. Manke, J.T. Mathis, L. Merlivat, N. Metzl, A. Murata, T. Newberger, T. Ono, G.-H. Park, K. Paterson, D. Pierrot, A.F. Ríos, **C.L. Sabine**, S. Saito, J. Salisbury, V.V.S.S. Sarma, R. Schlitzer, R. Sieger, I. Skjelvan, T. Steinhoff, K. Sullivan, H. Sun, A.J. Sutton, T. Suzuki, C. Sweeney, T. Takahashi, J. Tjiputra, N. Tsurushima, S.M.A.C. van Heuven, D. Vandemark, P. Vlahos, D.W.R. Wallace, R. Wanninkhof, and A.J. Watson (2014): An update to the surface ocean CO₂ atlas (SOCAT version 2). *Earth Syst. Sci. Data*, 6, doi: 10.5194/essd-6-69-2014, 69–90.
- Sutton, A.J., R.A. Feely, **C.L. Sabine**, M.J. McPhaden, T. Takahashi, F.P. Chavez, G.E. Friederich, and J.T. Mathis (2014): Natural variability and anthropogenic change in equatorial Pacific surface ocean pCO₂ and pH. *Global Biogeochem. Cycles*, 28(2), doi: 10.1002/2013GB004679, 131–145
- Ciais, P., **C. Sabine**, G. Bala, L. Bopp, V. Brovkin, J. Canadell, A. Chhabra, R. DeFries, J. Galloway, M. Heimann, C. Jones, C. Le Quéré, R.B. Myneni, S. Piao and P. Thornton, 2013: Carbon and Other Biogeochemical Cycles. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.

- Stocker, T.F., D. Qin, G.-K. Plattner, L.V. Alexander, S.K. Allen, N.L. Bindoff, F.-M. Bréon, J.A. Church, U. Cubasch, S. Emori, P. Forster, P. Friedlingstein, N. Gillett, J.M. Gregory, D.L. Hartmann, E. Jansen, B. Kirtman, R. Knutti, K. Krishna Kumar, P. Lemke, J. Marotzke, V. Masson-Delmotte, G.A. Meehl, I.I. Mokhov, S. Piao, V. Ramaswamy, D. Randall, M. Rhein, M. Rojas, **C. Sabine**, D. Shindell, L.D. Talley, D.G. Vaughan and S.-P. Xie, 2013: Technical Summary. In: *Climate Change 2013: The Physical Science Basis. Contribution of Working Group I to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change* [Stocker, T.F., D. Qin, G.-K. Plattner, M. Tignor, S.K. Allen, J. Boschung, A. Nauels, Y. Xia, V. Bex and P.M. Midgley (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA.
- Sabine, C.L.**, S. Hankin, H. Koyuk, D.C.E. Bakker, B. Pfeil, A. Olsen, N. Metzl, A. Kozyr, A. Fassbender, A. Manke, J. Malczyk, J. Akl, S.R. Alin, R.G.J. Bellerby, A. Borges, J. Boutin, P.J. Brown, W.-J. Cai, F.P. Chavez, A. Chen, C. Cosca, R.A. Feely, M. González-Dávila, C. Goyet, N. Hardman-Mountford, C. Heinze, M. Hoppema, C.W. Hunt, D. Hydes, M. Ishii, T. Johannessen, R.M. Key, A. Körtzinger, P. Landschützer, S.K. Lauvset, N. Lefèvre, A. Lenton, A. Lourantou, L. Merlivat, T. Midorikawa, L. Mintrop, C. Miyazaki, A. Murata, A. Nakadate, Y. Nakano, S. Nakaoka, Y. Nojiri, A.M. Omar, X.A. Padin, G.-H. Park, K. Paterson, F.F. Perez, D. Pierrot, A. Poisson, A.F. Ríos, J. Salisbury, J.M. Santana-Casiano, V.V.S.S. Sarma, R. Schlitzer, B. Schneider, U. Schuster, R. Sieger, I. Skjelvan, T. Steinhoff, T. Suzuki, T. Takahashi, K. Tedesco, M. Telszewski, H. Thomas, B. Tilbrook, D. Vandemark, T. Veness, A.J. Watson, R. Weiss, C.S. Wong, and H. Yoshikawa-Inoue (2013): Surface ocean CO₂ atlas (SOCAT) gridded data products. *Earth Syst. Sci. Data*, 5, doi: 10.5194/essd-5-145-2013, 145–153.
- Pfeil, B., A. Olsen, D.C.E. Bakker, S. Hankin, H. Koyuk, A. Kozyr, J. Malczyk, A. Manke, N. Metzl, **C.L. Sabine**, J. Akl, S.R. Alin, N. Bates, R.G.J. Bellerby, A. Borges, J. Boutin, P.J. Brown, W.-J. Cai, F.P. Chavez, A. Chen, C. Cosca, A.J. Fassbender, R.A. Feely, M. González-Dávila, C. Goyet, B. Hales, N. Hardman-Mountford, C. Heinze, M. Hood, M. Hoppema, C.W. Hunt, D. Hydes, M. Ishii, T. Johannessen, S.D. Jones, R.M. Key, A. Körtzinger, P. Landschützer, S.K. Lauvset, N. Lefèvre, A. Lenton, A. Lourantou, L. Merlivat, T. Midorikawa, L. Mintrop, C. Miyazaki, A. Murata, A. Nakadate, Y. Nakano, S. Nakaoka, Y. Nojiri, A.M. Omar, X.A. Padin, G.-H. Park, K. Paterson, F.F. Perez, D. Pierrot, A. Poisson, A.F. Ríos, J. Salisbury, J.M. Santana-Casiano, V.V.S.S. Sarma, R. Schlitzer, B. Schneider, U. Schuster, R. Sieger, I. Skjelvan, T. Steinhoff, T. Suzuki, T. Takahashi, K. Tedesco, M. Telszewski, H. Thomas, B. Tilbrook, J. Tjiputra, D. Vandemark, T. Veness, R. Wanninkhof, A.J. Watson, R. Weiss, C.S. Wong, and H. Yoshikawa-Inoue (2013): A uniform, quality controlled surface ocean CO₂ atlas (SOCAT). *Earth Syst. Sci. Data*, 5, doi: 10.5194/essd-5-125-2013, 125–143.
- Rödenbeck, C., R.F. Keeling, D.C.E. Bakker, N. Metzl, A. Olsen, **C. Sabine**, and M. Heimann (2013): Global surface-ocean pCO₂ and sea–air CO₂ flux variability from an observation-driven ocean mixed-layer scheme. *Ocean Sci.*, 9, doi: 10.5194/os-9-193-2013, 193–216.
- Khatiwala, S., T. Tanhua, S. Mikaloff Fletcher, M. Gerber, S.C. Doney, H.D. Graven, N. Gruber, G.A. McKinley, A. Murata, A.F. Ríos, and **C.L. Sabine** (2013): Global ocean storage of anthropogenic carbon. *Biogeosciences*, 10, doi: 10.5194/bg-10-2169-2013, 2169–2191.
- Ohman, M.D., D.L. Rudnick, A. Chekalyuk, R.E. Davis, R.A. Feely, M. Kahru, H.-J. Kim, M.R. Landry, T.R. Martz, **C.L. Sabine**, and U. Send (2013): Autonomous ocean measurements in the California Current Ecosystem. *Oceanography*, 26(3), 18–25.
- De Carlo, E.H., R.S. Arvidson, L. Chou, **C.L. Sabine**, and G.W. Luther (2013): Fred T. Mackenzie: Gentleman, scholar, mountaineer and model colleague. *Aquat. Geochem.*, 19(5–6), doi: 10.1007/s10498-013-9221-8, 347–351.
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