JORGE LOUIS SARMIENTO Updated September 2019

EDUCATION

B.A. in Chemistry, Swarthmore College, 1968
M.A. in Geology, Columbia University, 1974
M.Ph. in Geology, Columbia University, 1976
Ph.D. in Geology, Columbia University, 1978

CAREER HISTORY

1973-1978	Graduate Research Assistant, Columbia University
1978-1980	Research Associate in Atmospheric and Oceanic Sciences Program, Princeton University
1980-1986	Assistant Professor in Department of Geosciences, Atmospheric and Oceanic Sciences Program, Princeton University
1986-1991	Associate Professor in Department of Geosciences, Atmospheric and Oceanic Sciences Program, Princeton University
1991-present	Professor in Department of Geosciences, Atmospheric and Oceanic Sciences Program, Princeton University
1995-present	Associated Faculty in Department of Civil and Environmental Engineering, Princeton University
1996-present	Associated Faculty in Princeton Environmental Institute, Princeton University
2012-present	Associated Faculty in Andlinger Center for Energy and The Environment, Princeton University

SOCIETIES

American Association for the Advancement of Science
American Geophysical Union
American Meteorological Society
American Society of Limnology and Oceanography
Oceanography Society

HONORS

Summer 1993	H. Burr Steinbach Visiting Scholar, Woods Hole Oceanographic Institution
1994-1995	Visiting Professor, Physikalisches Institut, Universität Bern, Bern, Switzerland
1998-1999	Bourse a haut-Niveau from the French Minister of Science
2003	Fellow of the American Geophysical Union
2004	Fellow of the American Association for the Advancement of Science
2009	Roger Revelle Medal of the American Geophysical Union
2009	named George J. Magee Professor of Geoscience and Geological Engineering, Professor of Geosciences

PROFESSIONAL ACTIVITIES

1979-1984	Member - Transient Tracers in the Oceans (TTO) North Atlantic Study Scientific Advisory Committee
1981-1986	Member - SCOR Working Group 68 on North Atlantic Circulation
1981-1984	Member - TTO Steering Committee
1981-1985	Coordinator - TTO Tropical Atlantic Study
1981-1990	Member representative for Princeton University, University Corporation for Atmospheric Research
1983-1996	Member - World Ocean Circulation Experiment, (WOCE) Numerical Experimentation Group

1985-1988 Member - Global Ocean Flux Study (GOFS) Scientific Advisory Committee
1985-1990 Editorial Board - Journal of Marine Research
1986-1994 Editorial Board - Climate Dynamics
1986-1988 Chairman - GOFS, Modeling Working Group
1986-1989 Chairman - WOCE, Working Group for Geochemistry
1987-1991 Member - NSF Advisory Committee for Ocean Sciences
1987-1990 Member - NRC Climate Research Committee
1987-1989 Member - WOCE, International Steering Group.
1992-1998 Member - Global Analysis, Interpretation, and Modelling Core Project Planning Committee, IGBP.
1992-1995 Member - NRC Committee on Oceanic Carbon
1992-1995 Member - International JGOFS, Global Synthesis and Modelling Task Team
1992-1995 Member - U.S. JGOFS Executive and Steering Committees
1993-1998 Member - Visiting Committee, Department of Earth and Planetary Sciences, Harvard College
1993-1995 Editorial Board - Global Biogeochemical Cycles
1995-1998 Editor-Global Biogeochemical Cycles
1995-2003 Member U.S. JGOFS ExecPlus Committee
1995-2004 Co-Chairman U.S. JGOFS Synthesis and Modeling Project
1998-1999 Co-Chairman U.S. Carbon and Climate Planning Group
2000-2007 Ex-officio Member-Carbon Scientific Steering Group
2006-2008 Member, Modeling and Analysis Steering Team, Integrated Ocean Observing System
2009-2011 Member, NRC ad hoc committee to assess requirements for sustained ocean color research and operations

UNIVERSITY ACTIVITIES

1980-1990 Director, Atmospheric and Oceanic Sciences Program
1980-1990 Member - Faculty Committee of the Graduate School
1982-1984 Chairman - University Resources Committee
1983-1986 Member - Faculty Equal Employment Opportunity Committee
1987-1992 Member - Council on Energy and Environmental Studies
1993-1994 Member - Council of the Princeton University Community
1995-1998 Departmental Representative
2003-2018 Director, NOAA/Princeton Cooperative Institute on Climate Science
2006-2015 Director, Atmospheric and Oceanic Sciences Program
2010-2013 Member, Executive Committee, Andlinger Center for Energy & the Environment
2018 - Director, NOAA/Princeton Cooperative Institute for Modeling the Earth System

FIELD WORK

R/V OCEANUS cruise 31, August 1977, radon-222 measurements in the Hatteras Abyssal Plain and Blake-Bahama Outer Ridge.
R/V KNORR cruise 89, April-May, 1981, trace chemistry and hydrography of Bermuda Triangle, Kingston to Bermuda (Chief Scientist).
R/V KNORR cruise 99, December, 1982, trace chemistry and hydrography of tropical Atlantic and Amazon River, San Juan to Belem (Chief Scientist).

GRADUATE STUDENTS

Name	Date Arrived	Date Departed	Degree	Current Affiliation
1. Frank Bryan	Sept. 1981	Jan. 1986	Ph.D.	NCAR
2. Mitsuhiro Kawase	Sept. 1981	Jan. 1986	Ph.D.	U. Washington
3. D. Papademetriou	Sept. 1983	June 1986	Masters	
4. Raymond Najjar	Sept. 1985	Jan. 1990	Ph.D.	Penn. State
5. Tracey K. Tromp	Sept. 1987	June 1992	Ph.D.	
6. Larry Anderson	Sept. 1988	June 1993	Ph.D.	Sandwich High School
7. P. Suntharalingam	Sept. 1991	Jan. 1997	Ph.D.	U. East Anglia
8. David Baker	Sept. 1994	Jan. 2001	Ph.D.	Colorado State University
9. Curtis Deutsch	Sept. 1997	Sept. 2003	Ph.D.	University of Washington
10. Irina Marinov	Sept. 1998	Jan. 2005	Ph.D.	University of Pennsylvania
11. Bryan Mignone	Sept. 2000	June 2006	Ph.D.	Exxon Mobil
12. Patrick Schultz	Sept. 2003	Jan. 2009	Ph.D.	Veolia Water
13. Yves Plancherel	July 2005	Dec. 2011	Ph.D.	Grantham Institute London
14. Daniele Bianchi	Aug. 2005	Oct. 2011	Ph.D.	UCLA
15. Kelly Kearney	Aug. 2006	Oct. 2013	Ph.D.	University of Washington/JISAO
16. Joe Majkut	Aug. 2009	Sep. 2014	Ph.D.	Niskanen Center, Washington, DC
17. Hannah Zannowski	Sept. 2011	2016	Ph.D.	U. Washington
18. Sarah Schlunegger	Jun. 2014	May 2019	Ph.D.	Princeton University

POST-DOCS AND RESEARCH STAFF

Name	Date Arrived	Date Departed	Current Affiliation
1. R.M. Key	Sept. 1980		Princeton Univ.
2. J.R. Toggweiler	Oct. 1982	May. 1987	Geophysical Fluid Dynamics Lab/NOAA
3. G. Thiele	Jan. 1986	Oct. 1987	German Astronaut Program
4. S. Clegg	July 1986	July 1987	Univ. of East Anglia
5. R. Murnane	Nov. 1987	July 1993	World Bank, Washington, DC
6. T. Herbert	Jan. 1988	July 1988	Brown University
7. S. Rintoul	Nov. 1988	May 1990	CSIRO Marine Research, Tasmania
8. J. Orr	July 1990	Sept. 1992	LSCE, France
9. H. Figueroa	Sept. 1991	May 1995	Private industry, Argentina
10. C. Sabine	May 1992	July 1999	University of Hawaii, Manoa
11. P. Rayner	July 1992	June 1994	University of Melbourne, Australia
12. R. Armstrong	May 1994	Jan. 2000	SUNY Stonybrook
13. S.-M. Fan	July 1995	Aug. 2002	Geophysical Fluid Dynamics Lab/NOAA
14. M. Gloor	Dec. 1995	Sept. 1999	
	Sept. 2003	Sept. 2006	University of Leeds
15. T.M.C. Hughes	Jan. 1996	Nov. 1998	Deceased
16. N. Gruber	Aug. 1997	Aug. 1999	ETH Zürich
17. A. Gnanadesikan	Sept. 1997	Jan. 2002	Johns Hopkins University
18. M. Staid	Feb. 1999	July 2000	Vine View Imaging, LLC.
19. Y. Gao	June 2000	Aug. 2003	Rutgers Univ., Newark
20. K. Matsumoto	July 2000	March 2003	University of Minnesota
21. B. McNeil	May 2001	Nov. 2003	Univ. of New South Wales, Australia
22. J. Dunne	June 2001	Dec. 2002	Geophysical Fluid Dynamics Lab/NOAA

23. A. Jacobson	June 2001	Jan. 2006	CIRES, University of Colorado-Boulder at ESRL
24. J. Greenblatt	July 2001	Feb. 2004	Lawrence Berkeley National Laboratory
25. C. Sweeney	Apr. 2002	Mar. 2005	CIRES, University of Colorado-Boulder at ESRL
26. B. Arbic	Mar. 2003	Sept. 2005	University of Michigan
27. G. McKinley	Sept. 2003	Aug. 2004	Columbia University
28. M. Hiscock	Sept. 2004	Dec. 2009	Environmental Protection Agency
29. C. Crevoisier	Nov. 2004	Sept. 2007	Ecole Polytechnique, Paliseau, France
30. K. Rodgers	June 2005		Princeton University
31. S. Mikaloff-Fletcher	Feb. 2006	Jan. 2009	National Institute for Water & Air Research, New Zealand
32. E. Galbraith	Mar. 2006	Jun. 2009	ICREA at Universitat Autonoma de Barcelona
33. S. Henson	Jan. 2008	Oct. 2009	National Oceanography Centre, Southampton
34. E. Y. Kwon	Apr. 2008	Oct. 2011	Seoul National University, South Korea
35. J. Palter	Sep. 2008	Dec. 2010	University of Rhode Island
36. C. Beaulieu	Mar. 2009	Apr. 2013	University of California, Santa Cruz
37. S. Downes	Mar. 2009	Oct. 2011	Office of Environment and Heritage in Sydney
38. A. Smith	July 2010	Jul. 2014	University of Washington
39. T. Frölicher	Sep. 2010	Apr. 2013	ETH Zurich
40. B. Carter	July 2011	Aug. 2014	University of Washington/JISAO
41. J. Watson	Sep. 2011	Dec. 2013	Oregon State University
42. R. Rykaczewski	Nov. 2011	Aug. 2012	University of South Carolina
43. G. de Souza	Apr. 2012	Jan. 2015	ETH Zurich
44. I. Frenger	Jan. 2014	Aug. 2015	GEOMAR, Kiel
45. C. Dufour	Oct. 2012	May 2017	McGill University
46. R. Asch	Sep. 2013	Sep. 2016	East Carolina University
47. A. Morrison	Oct. 2013	Aug. 2016	Australian National University
48. A. Gray	Nov. 2014	June 2017	University of Washington
49. N. Henschke	June 2015	Jan. 2017	University of British Columbia
50. H. Chen	Aug. 2015		
51. C. Petrik	Aug. 2015	Aug. 2017	Texas A&M
52. C. Kremer	Oct. 2015	Sep. 2016	Yale University
53. S. Bushinsky	Nov. 2015	July 2019	University of Hawaii
54. L. Arteaga	Nov. 2015		
55. F. Gonzalez-Taboada	Nov. 2017		
56. F. A. Haumann	Jan. 2018		
57. K. Tanaka	June 2018	Aug. 2019	Monterey Bay Aquarium
58. G. MacGilchrist	Sept. 2018		
59. S. Schlunegger	June 2019		

VISITING LECTURER APPOINTMENTS

Taught classes as a visiting lecturer at the University of Washington, Cornell University, as the H. Burr Steinbach Visiting Scholar at Woods Hole Oceanographic Institution, at the University of Bern, University of Gothenburg, and the Universidad de Concepción in Chile.

PUBLICATIONS
JORGE L. SARMIENTO

Books

Sarmiento, J. L., and N. Gruber, 2006. Ocean Biogeochemical Dynamics, Princeton University Press, Princeton. 503 pp.

Refereed Articles

1. Broecker, W.S., J. Goddard, and J.L. Sarmiento, 1976. The distribution of ^{226}Ra in the Atlantic Ocean. Earth Planet. Sci. Lett., 32, 220-235. https://doi.org/10.1016/0012-821X(76)90063-7
2. Sarmiento, J.L., H.W. Feely, W.S. Moore, A.E. Bainbridge, and W.S. Broecker, 1976. The relationship between vertical eddy diffusion and buoyancy gradient in the deep sea. Earth Planet. Sci. Lett., 32, 357-370. https://doi.org/10.1016/0012-821X(76)90076-5
3. Sarmiento, J.L., D.E. Hammond, and W.S. Broecker, 1976. The calculation of the statistical counting error for radon-222 scintillation counting. Earth Planet. Sci. Lett., 32, 351-356. https://doi.org/10.1016/0012-821X(76)90075-3
4. Sarmiento, J.L., W.S. Broecker, and P.E. Biscaye, 1978. Excess bottom radon-222 distribution in deep ocean passages. J. Geophys. Res., 83, 5068-5076. https://doi.org/10.1029/JC083iC10p05068
5. Sarmiento, J.L., and W.S. Broecker, 1980. Ocean Floor radon-222 standing crop in the Atlantic and Pacific Oceans. Earth Planet. Sci. Lett., 49 (2), 341-350. https://doi.org/10.1016/0012-821X(80)90077-1
6. Sarmiento, J.L., and C.G. Rooth, 1980. A comparison of vertical and isopycnal mixing models in the deep sea based on radon-222 measurements. J. Geophys. Res., 85, 1515-1518. https://doi.org/10.1029/JC085iC03p01515
7. Roether, W., K.-O, Munnich, B. Rabbat, and J.L. Sarmiento, 1980. A transatlantic ^{14}C-Section near 40°N. "Meteor" Forsch.-Ergebn., Reihe A, No. 21, 57-69.
8. Sarmiento, J.L., and K. Bryan, 1982. An ocean transport model for the North Atlantic. J. Geophys. Res., 87, 394-408. https://doi.org/10.1029/JC087iC01p00394
9. Sarmiento, J.L., C.G.H. Rooth, and W. Roether, 1982. The North Atlantic tritium distribution in 1972. J. Geophys. Res., 87, 8047-8056. https://doi.org/10.1029/JC087iC10p08047
10. Sarmiento, J.L., C.G.H. Rooth, and W.S. Broecker, 1982. Radium-228 as a tracer of basin wide processes in the abyssal ocean. J. Geophys. Res., 87, 9694-9698. https://doi.org/10.1029/JC087iC12p09694
11. Sarmiento, J.L., 1983. A tritium box model of the North Atlantic thermocline. J. Phys. Oceanogr., 13, 1269-1274. PDF
12. Sarmiento, J.L., 1983. A simulation of bomb tritium entry into the Atlantic Ocean. J. Phys. Oceanogr., 13, 1924-1939. PDF
13. Sarmiento, J.L., and J.R. Toggweiler, 1984. A new model for the role of the oceans in determining atmospheric pCO_2. Nature, 308, 621-624. https://doi.org/10.1038/308621a0
14. Bryan, K., and J.L. Sarmiento, 1985. Modeling Ocean Circulation, In: Advances in Geophysics, 28A, Climate Dynamics, B. Saltzman (ed.), Academic Press, New York, pp. 433-459. doi: 10.1016/S0065-2687(08)60232-0
15. Moore, W.S., R.M. Key, and J.L. Sarmiento, 1985. Techniques for precise mapping of ^{226}Ra and ^{228}Ra in the ocean. J. Geophys. Res., 90, 6983-6994. https://doi.org/10.1029/JC090iC04p06983
16. Key, R.M., R. Stallard, W.S. Moore, J.L. Sarmiento, 1985. Distribution and flux of radium-226 and radium-228 in the Amazon River Estuary. J. Geophys. Res., 90, 6995-7004. https://doi.org/10.1029/JC090iC04p06995
17. Brewer, P.G., J.L. Sarmiento, W.M. Smethie, 1985. The Transient Tracers in the Ocean (TTO)

Program. The North Atlantic Study: 1981, the Tropical Atlantic Study: 1983. J. Geophys. Res., 90, 6903-6906. https://doi.org/10.1029/JC090iC04p06903
18. Kawase, M., and J. L. Sarmiento, 1985. Nutrients in the Atlantic Thermocline. J. Geophys. Res., 90, 8961-8979. https://doi.org/10.1029/JC090iC05p08961
19. Toggweiler, J.R., and J.L. Sarmiento, 1985. Glacial to interglacial changes in atmospheric carbon dioxide: the critical role of ocean surface water in high latitudes, In: The Carbon Cycle and Atmospheric CO_2: Natural Variations Archean to Present, edited by E. Sundquist and W. Broecker, Geophys. Monograph 32, AGU, Washington, D.C., pp. 163-184. Abstract PDF
20. Moore, W.S., J.L. Sarmiento, and R.M. Key, l986. Tracing the Amazon component of surface Atlantic water using Ra-228, salinity, and silica. J. Geophys. Res., Vol. 91, C2, 2574-2580. https://doi.org/10.1029/JC091iC02p02574
21. Sarmiento, J.L., and P.E. Biscaye, 1986. Radon-222 in the benthic boundary layer. J. Geophys. Res., 91, 833-844. https://doi.org/10.1029/JC091iC01p00833
22. Olson, D.B., G.H. Ostlund, and J.L. Sarmiento, 1986. The Western Boundary Undercurrent off the Bahamas. J. Phys. Oceanogr., 16, 233-240. https://doi.org/10.1175/1520-0485(1986)016<0233:TWBUOT>2.0.CO;2
23. Sarmiento, J.L., and E. Gwinn, 1986. Sr-90 fallout prediction. J. Geophys. Res., 91, 7631-7646.
24. Kawase, M., and J.L. Sarmiento, 1986. Circulation and nutrients in mid-depth Atlantic waters. J. Geophys. Res., 91, 9749-9770. https://doi.org/10.1029/JC091iC08p09749
25. Sarmiento, J.L., 1986. On the North and Tropical Atlantic heat balance. J. Geophys. Res., 91,11677-11689. https://doi.org/10.1029/JC091iC10p11677
26. Sarmiento, J.L., 1986. Three-dimensional ocean models for predicting the distribution of CO_2 between the ocean and atmosphere. In: The Changing Carbon Cycle: A Global Analysis, J.R. Trabalka and D. Reichle, eds., Springer-Verlag Publishers, New York, pp. 279-294. Abstract PDF
27. Sarmiento, J.L., 1986. Modeling oceanic transport of dissolved constituents. In: The Role of Air-Sea Exchange in Geochemical Cycling, P. Buat-Menard, editor. D. Reidel Publishing, pp. 65-82. https://doi.org/10.1007/978-94-009-4738-2_3
28. Sarmiento, J.L., and J.R. Toggweiler, 1986. A preliminary model of the role of upper ocean chemical dynamics in determining oceanic O_2 and atmospheric CO_2 levels. In: Dynamic Processes in the Chemistry of the Upper Ocean, J.D. Burton, P.G. Brewer, and R. Chesselet editors. NATO Conference Series, Series IV, Volume 17, Plenum Press, New York, pp. 233-240. https://doi.org/10.1007/978-1-4684-5215-0_18
29. Sarmiento, J.L., 1987. Tracers and Modeling. Rev. Geophys. Phys., 25, 1417-1420. https://doi.org/10.1029/RG025i006p01417
30. Sarmiento, J.L., J.R. Toggweiler, R. Najjar, 1988. Ocean carbon cycle dynamics and atmospheric pCO_2. Phil. Trans. R. Soc., A 325, 3-21. doi:10.1098/rsta.1988.0039
31. Sarmiento, J.L., T. Herbert, and J.R. Toggweiler, 1988. Causes of anoxia in the World Ocean. Global Biogeochem. Cycles, 2: 115-128. https://doi.org/10.1029/GB002i002p00115
32. Wroblewski, J.S., J.L. Sarmiento, and G.R. Flierl, 1988. An ocean basin scale model of plankton dynamics in the North Atlantic, 1, Solutions for the climatological oceanographic conditions in May. Global Biogeochem. Cycles, 2: 199-218. https://doi.org/10.1029/GB002i004p00427
33. Sarmiento, J.L., T. Herbert, and J.R. Toggweiler, 1988. Mediterranean nutrient balance and episodes of anoxia. Global Biogeochem. Cycles, 2:427-444 https://doi.org/10.1029/GB002i004p00427
34. Clegg, S.L., and J.L. Sarmiento, 1989. The hydrolytic scavenging of metal ions by marine particulate matter. Prog. Oceanogr., 23: 1-21. https://doi.org/10.1016/0079-6611(89)90023-2
35. Thiele, G., and J.L. Sarmiento, 1990. Tracer dating and ocean ventilation. J. Geophys Res., 95: 9377-9391. https://doi.org/10.1029/JC095iC06p09377
36. Murnane, R.J., J.L. Sarmiento, and M.P. Bacon, 1990. Thorium isotopes, particle cycling models, and inverse calculations of model rate constants. J. Geophys. Res., 95: 16195-16206. https://doi.org/10.1029/JC095iC09p16195

37. Sarmiento, J.L., G. Thiele, R.M. Key, and W. S. Moore, 1990. Oxygen and nitrate new production and remineralization in the North Atlantic subtropical gyre. J. Geophys. Res., 95: 18303-18315. https://doi.org/10.1029/JC095iC10p18303
38. Joos, F., J. L. Sarmiento, and U. Siegenthaler, 1991. Estimates of the effect of Southern Ocean iron fertilization on atmospheric CO_2 concentrations. Nature, 349: 772-774. doi:10.1038/349772a0.
39. Sarmiento, J.L., 1991. Slowing the buildup of fossil CO_2 in the atmosphere by iron fertilization: a comment. Global Biogeochem. Cycles, 5: 1-2, https://doi.org/10.1029/91GB00276
40. Nuttle, W. K., J. S. Wroblewski, and J. L. Sarmiento, 1991. Advances in modeling ocean primary production and its role in the global carbon cycle. Adv. Space Res., 11: (3)67-(3)76, doi:10.1016/0273/-1177(91)90405-9
41. Joos, F., U. Siegenthaler, and J. L. Sarmiento, 1991. Possible effects of iron fertilization in the Southern Ocean on atmospheric CO_2 concentration. Global Biogeochem. Cycles, 5: 135-150, https://doi.org/10.1029/91GB00878.
42. Sarmiento, J. L., 1991. Oceanic uptake of anthropogenic CO_2: the major uncertainties. Global Biogeochem. Cycles, 5: 309-313, https://doi.org/10.1029/91GBO2705
43. Herbert, T. D., and J. L. Sarmiento, 1991. Ocean nutrient distribution and oxygenation: limits on the formation of warm saline bottom water in the oceans over the past 90 MA. Geology, 19: 702-705, https://doi.org/10.1130/0091-7613(1991)019<0702:ONDAOL>2.3.CO;2
44. Sarmiento, J. L., and J. C. Orr, 1991. Three dimensional ocean model simulations of the impact of Southern Ocean nutrient depletion on atmospheric CO_2 and ocean chemistry. Limnol. Oceanogr., 36: 1928-1950, https://doi.org/10.4319/lo.1991.36.8.1928
45. Najjar, R. G., J. L. Sarmiento, and J. R. Toggweiler, 1992. Downward transport and fate of organic matter in the ocean: simulations with a general circulation model. Global Biogeochem. Cycles, 6: 45-76, https://doi.org/10.1029/91GB02718
46. Sarmiento, J. L., J. C. Orr, and U. Siegenthaler, 1992. A perturbation simulation of CO_2 uptake in an ocean general circulation model. J. Geophys. Res., 97: 3621-3645, https://doi.org/10.1029/91JC02849
47. Sarmiento, J. L., and E. Sundquist, 1992. Revised budget for the oceanic uptake of anthropogenic CO_2. Nature, 356: 589-593, doi:10.1038/356589a0
48. Sarmiento, J. L., and U. Siegenthaler, 1992. New production and the global carbon cycle. In: Primary Productivity and Biogeochemical Cycles in the Sea, P. Falkowski, ed., Plenum Press, New York., pp. 317-332, https://doi.org/10.1007/978-1-4899-0762-2_18
49. Orr, J. C., and J. L. Sarmiento, 1992. Potential of marine macroalgae as a sink for CO_2: constraints from a 3-D general circulation model of the global ocean. Water, Air & Soil Pollution, 64: 405-421, https://doi.org/10.1007/BF00477113
50. Sarmiento, J. L., 1992. Biogeochemical ocean models. In: Climate Systems Modeling, ed., K. Trenberth., Cambridge University Press, Cambridge, pp. 519-551.
51. Sarmiento, J. L., 1993. Ocean carbon cycle. Chem. Eng. News, 71, 22: 30-43, doi:10.1021/cen-v07n022.p030
52. Sarmiento, J. L., R. D. Slater, M. J. R. Fasham, H. W. Ducklow, J. R. Toggweiler, and G. T. Evans, 1993. A seasonal three-dimensional ecosystem model of nitrogen cycling in the North Atlantic euphotic zone. Global Biogeochem. Cycles, 7: 417-450, https://doi.org/10.1029/93GB00375
53. Fasham, M. J. R., J. L. Sarmiento, R. D. Slater, H. Ducklow, and R. Williams, 1993. Ecosystem Behavior at Bermuda Station "S" and OWS "India": a GCM model and observational analysis. Global Biogeochem. Cycles, 7: 379-416, https://doi.org/10.1029/92GB02784
54. Siegenthaler, U., and J. L. Sarmiento, 1993. Atmospheric carbon dioxide and the ocean. Nature, 365: 119-125, doi:10.1038/365119a0
55. Sarmiento, J. L., 1993. Atmospheric CO_2 stalled. Nature, 365: 697-698, doi:10.1038/365697a0
56. Slater, R. D., J. L. Sarmiento, and M. J. R. Fasham, 1993 Some parametric and structural simulations with a three dimensional ecosystem model of nitrogen cycling in the North Atlantic

euphotic zone. In: Towards a Model of Ocean Biogeochemical Processes, edited by G. T. Evans and M. J. R. Fasham, NATO ASI Series, Vol. I 10, Springer-Verla, Publishers, New York, pp. 261-294.
57. Murnane, R. J., J. K. Cochran, and J. L. Sarmiento, 1994. Estimates of particle- and thorium-cycling rates in the northwest Atlantic Ocean. J. Geophys. Res., 99: 3373-3392, https://doi.org/10.1029/93JC02378
58. Anderson, L. A., and J. L. Sarmiento, 1994. Redfield ratios of remineralization determined by nutrient data analysis. Global Biogeochem. Cycles, 8: 65-80, https://doi.org/10.1029/93GB03318
59. Sarmiento, J. L., and M. Bender, 1994. Carbon biogeochemistry and climate change. Photosynthesis Res., 39: 209-234. https://doi.org/10.1007/BF00014585
60. Sarmiento, J. L., 1994. The carbon cycle and the role of the ocean in climate. In: Ecological and Social Dimensions of Global Change, edited by D. D. Caron, F.S Chapin III, J. Donoghue, M. Firestone, J. Harte, L. E. Wells, and R. Stewardson, Institute of International Studies, University of California, Berkeley, California, pp. 5-41.
61. Shaffer, G., and J. L. Sarmiento, 1995. Biogeochemical cycling in the global ocean 1. A new, analytical model with continuous vertical resolution and high latitude dynamics. J. Geophys. Res., 100: 2659-2672, https://doi.org/10.1029/94JC01167
62. Sarmiento, J. L., C. Le Quéré, and S. W. Pacala, 1995. Limiting future atmospheric carbon dioxide. Global Biogeochem. Cycles, 9: 121-137, https://doi.org/10.1029/94GB01779
63. Armstrong, R. A., J. L. Sarmiento, and R. Slater, 1995. Monitoring ocean productivity by assimilating satellite chlorophyll into ecosystem models. In: Ecological Time Series, edited by T. M. Powell and J. H. Steele, Chapman and Hall, New York, pp. 371-390, https://doi.org/10.1007/978-1-4615-1769-6_17
64. Joos, F., and J. L. Sarmiento, 1995. Der Anstieg des atmosphärischen Kohlendioxids. Phys. Bl., 51 (5): 405-411. https://doi.org/10.1002/phbl.19950510511
65. Sarmiento, J. L., R. Murnane, and C. Le Quéré, 1995. Air-sea CO_2 transfer and the carbon budget of the North Atlantic. Phil. Trans. R. Soc., B, 348 (1324): 211-219. doi: 10.1098/rstb.1995.0063 retrieved from http://rstb.royalcocietypublishing.org
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