

**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

**SOCIETIES**

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

**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

**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

## 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-	Director, NOAA/Princeton Cooperative Institute on Climate Science
2006-	Director, Atmospheric and Oceanic Sciences Program

## **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	Present Affiliation
Frank Bryan	Sept. 1981	Jan. 1986	Ph.D.	NCAR
Mitsuhiro Kawase	Sept. 1981	Jan. 1986	Ph.D.	U. Washington
D. Papademetriou	Sept. 1983	June 1986	Masters	
Raymond Najjar	Sept. 1985	Jan. 1990	Ph.D.	Penn. State
Tracey K. Tromp	Sept. 1987	June 1992	Ph.D.	Cal. Tech.
Larry Anderson	Sept. 1988	June 1993	Ph.D.	WHOI
P. Suntharalingam	Sept. 1991	Jan. 1997	Ph.D.	U. East Anglia
David Baker	Sept. 1994	Jan. 2001	Ph.D.	NCAR
Curtis Deutsch	Sept. 1997	Sept. 2003	Ph.D.	UCLA
Irina Marinov	Sept. 1998	Jan. 2005	Ph.D.	WHOI
Bryan Mignone	Sept. 2000	June 2006	Ph.D.	Brookings Institute
Patrick Schultz	Sept. 2003	Jan. 2009	Ph.D.	McKinzey & Co.
Yves Plancherel	July 2005			
Daniele Bianchi	Aug. 2005			
Kelly Kearney	Aug. 2006			
Andrew Babbin	Aug. 2008			

## POST-DOCS AND RESEARCH STAFF

Name	Date Arrived	Date Departed	Present Affiliation
R.M. Key	Sept. 1980		Princeton Univ.
J.R. Toggweiler	Oct. 1982	May. 1987	GFDL/NOAA
S. Clegg	July 1986	July 1987	Univ. of East Anglia
G. Thiele	Jan. 1986	Oct. 1987	Germany Astronaut Program
T. Herbert	Jan. 1988	July 1988	Brown University
R. Murnane	Nov. 1987	July 1993	BBSR
S. Rintoul	Nov. 1988	May 1990	CSIRO Marine Research
J. Orr	July 1990	Sept. 1992	LSCE, France
H. Figueroa	Sept. 1991	May 1995	Private industry, Argentina
C. Sabine	May 1992	July 1999	PMEL/NOAA
P. Rayner	July 1992	June 1994	LSCE, France
R. Armstrong	May 1994	Jan. 2000	SUNY Stonybrook
S.-M. Fan	July 1995	Aug. 2002	GFDL/NOAA
M. Gloor	Dec. 1995	Sept. 1999	Max-Planck Institute, Jena
	Sept. 2003	Sept. 2006	University of Leeds
T.M.C. Hughes	Jan. 1996	Nov. 1998	Deceased
N. Gruber	Aug. 1997	Aug. 1999	ETH Zürich
A. Gnanadesikan	Sept. 1997	Jan. 2002	GFDL/NOAA
M. Staid	Feb. 1999	July 2000	Vine View Imaging, LLC.
Y. Gao	June 2000	Aug. 2003	Rutgers Univ., Newark
K. Matsumoto	July 2000	March 2003	University of Minnesota
B. McNeil	May 2001	Nov. 2003	Univ. of New South Wales, Australia
J. Dunne	June 2001	Dec. 2002	GFDL/NOAA

A. Jacobson	June 2001	Jan. 2006	ESRL/NOAA
J. Greenblatt	July 2001	Feb. 2004	Google.org
C. Sweeney	April 2002	Mar. 2005	ESRL/NOAA
B. Arbic	Mar. 2003	Sept. 2005	University of Texas, Austin
G. McKinley	Sept. 2003	Aug. 2004	University of Wisconsin
C. Crevoisier	Nov. 2004	Sept. 2007	Ecole Polytechnique, Paliseau, France
M. Hiscock	Sept. 2004		
K. Rodgers	June 2005		
S. Mikaloff- Fletcher	Feb. 2006	Jan. 2009	National Institute for Water & Air Research, New Zealand
E. Galbraith	Mar. 2006		
S. Henson	Jan. 2008		
E. Y. Kwon	Apr. 2008		
J. Palter	Sep. 2008		
C. Beaulieu	Mar. 2009		
S. Downes	Mar. 2009		

### **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, and 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 Journal Articles

1. Broecker, W.S., J. Goddard, and J.L. Sarmiento, 1976. The distribution of  $^{226}\text{Ra}$  in the Atlantic Ocean. *Earth Planet. Sci. Lett.*, 32, 220-235.
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.
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.
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.
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.
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.
7. Roether, W., K.-O. Munnich, B. Rabbat, and J.L. Sarmiento, 1980. A trans Atlantic  $^{14}\text{C}$ -Section near  $40^\circ\text{N}$ . "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.
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.
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.
11. Sarmiento, J.L., 1983. A tritium box model of the North Atlantic thermocline. *J. Phys. Oceanogr.*, 13, 1269-1274.
12. Sarmiento, J.L., 1983. A simulation of bomb tritium entry into the Atlantic Ocean. *J. Phys. Oceanogr.*, 13, 1924-1939.

13. Sarmiento, J.L., and J.R. Toggweiler, 1984. A new model for the role of the oceans in determining atmospheric pCO<sub>2</sub>. *Nature*, 308, 621-624.
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.
15. Moore, W.S., R.M. Key, and J.L. Sarmiento, 1985. Techniques for precise mapping of <sup>226</sup>Ra and <sup>228</sup>Ra in the ocean. *J. Geophys. Res.*, 90, 6983-6994.
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.
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.
18. Kawase, M., and J. L. Sarmiento, 1985. Nutrients in the Atlantic Thermocline. *J. Geophys. Res.*, 90, 8961-8979.
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<sub>2</sub>: Natural Variations Archean to Present, edited by E. Sundquist and W. Broecker, Geophys. Monograph 32, AGU, Washington, D.C., pp. 163-184.
20. Moore, W.S., J.L. Sarmiento, and R.M. Key, 1986. Tracing the Amazon component of surface Atlantic water using Ra-228, salinity, and silica. *J. Geophys. Res.*, Vol. 91, C2, 2574-2580.
21. Sarmiento, J.L., and P.E. Biscaye, 1986. Radon-222 in the benthic boundary layer. *J. Geophys. Res.*, 91, 833-844.
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.
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. Nutrients in mid-depth Atlantic waters. *J. Geophys. Res.*, 91, 9749-9770.
25. Sarmiento, J.L., 1986. On the North and Tropical Atlantic heat balance. *J. Geophys. Res.*, 91, 11677-11689.
26. Sarmiento, J.L., 1986. Three-dimensional ocean models for predicting the distribution of CO<sub>2</sub> 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.
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.
  28. Sarmiento, J.L., and J.R. Toggweiler, 1986. A preliminary model of the role of upper ocean chemical dynamics in determining oceanic O<sub>2</sub> and atmospheric CO<sub>2</sub> 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.
  29. Sarmiento, J.L., 1987. Tracers and Modeling. *Rev. Geophys. Phys.*, 25, 1417-1420.
  30. Sarmiento, J.L., J.R. Toggweiler, R. Najjar, 1988. Ocean carbon cycle dynamics and atmospheric pCO<sub>2</sub>. *Phil. Trans. R. Soc., A* 325, 3-21.
  31. Sarmiento, J.L., T. Herbert, and J.R. Toggweiler, 1988. Causes of anoxia in the World Ocean. *Global Biogeochem. Cycles*, 2: 115-128.
  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.
  33. Sarmiento, J.L., T. Herbert, and J.R. Toggweiler, 1988. Mediterranean nutrient balance and episodes of anoxia. *Global Biogeochem. Cycles*, 2: 427-444.
  34. Clegg, S.L., and J.L. Sarmiento, 1989. The hydrolytic scavenging of metal ions by marine particulate matter. *Prog. Oceanogr.*, 23: 1-21.
  35. Thiele, G., and J.L. Sarmiento, 1990. Tracer dating and ocean ventilation. *J. Geophys. Res.*, 95: 9377-9391.
  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.
  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.
  38. Joos, F., J. L. Sarmiento, and U. Siegenthaler, 1991. Estimates of the effect of Southern Ocean iron fertilization on atmospheric CO<sub>2</sub> concentrations. *Nature*, 349: 772-774.
  39. Sarmiento, J.L., 1991. Slowing the buildup of fossil CO<sub>2</sub> in the atmosphere by iron fertilization: a comment. *Global Biogeochem. Cycles*, 5: 1-2.

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.
41. Joos, F., U. Siegenthaler, and J. L. Sarmiento, 1991. Possible effects of iron fertilization in the Southern Ocean on atmospheric CO<sub>2</sub> concentration. *Global Biogeochem. Cycles*, 5: 135-150.
42. Sarmiento, J. L., 1991. Oceanic uptake of anthropogenic CO<sub>2</sub>: the major uncertainties. *Global Biogeochem. Cycles*, 5: 309-313.
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.
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<sub>2</sub> and ocean chemistry. *Limnol. Oceanogr.*, 36: 1928-1950.
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.
46. Sarmiento, J. L., J. C. Orr, and U. Siegenthaler, 1992. A perturbation simulation of CO<sub>2</sub> uptake in an ocean general circulation model. *J. Geophys. Res.*, 97: 3621-3645.
47. Sarmiento, J. L., and E. Sundquist, 1992. Oceanic uptake of anthropogenic CO<sub>2</sub>: a new budget. *Nature*, 356: 589-593.
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
49. Orr, J. C., and J. L. Sarmiento, 1992. Potential of marine macroalgae as a sink for CO<sub>2</sub>: constraints from a 3-D general circulation model of the global ocean. *Water, Air & Soil Pollution*, 64: 405-421.
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. *Chemical and Engineering News*, 71: 30-43.
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.

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.
54. Siegenthaler, U., and J. L. Sarmiento, 1993. Atmospheric carbon dioxide and the ocean. *Nature*, 365: 119-125.
55. Sarmiento, J. L., 1993. Atmospheric CO<sub>2</sub> stalled. *Nature*, 365: 697-698.
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.
58. Anderson, L. A., and J. L. Sarmiento, 1994. Redfield ratios of remineralization determined by nutrient data analysis. *Global Biogeochem. Cycles*, 8: 65-80.
59. Sarmiento, J. L., and M. Bender, 1994. Carbon biogeochemistry and climate change. *Photosynthesis Res.*, 39: 209-234.
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.
62. Sarmiento, J. L., C. Le Quéré, and S. W. Pacala, 1995. Limiting future atmospheric carbon dioxide. *Global Biogeochem. Cycles*, 9: 121-137.
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.
64. Joos, F., and J. L. Sarmiento, 1995. Der Anstieg des atmosphärischen Kohlendioxids. *Phys. Bl.*, 51: 405-411.
65. Sarmiento, J. L., R. Murnane, and C. Le Quéré, 1995. Air-sea CO<sub>2</sub> transfer and the carbon budget of the North Atlantic. *Phil. Trans. R. Soc., B*, 348: 211-219.
66. Anderson, L., and J. L. Sarmiento, 1995. Global ocean phosphate and oxygen simulations. *Global Biogeochem. Cycles*, 9: 621-636.

67. Joos, F., M. Bruno, R. Fink, U. Siegenthaler, T. F. Stocker, C. Le Quéré, and J. L. Sarmiento, 1996. An efficient and accurate representation of complex oceanic and biospheric models of anthropogenic carbon uptake. *Tellus*, 48B: 397-417.
68. Gruber, N, J. L. Sarmiento, and T. F. Stocker, 1996. An improved method for detecting anthropogenic CO<sub>2</sub> in the oceans. *Global Biogeochem. Cycles*, 10: 809-837.
69. Sarmiento, J. L., and C. Le Quéré, 1996. Oceanic CO<sub>2</sub> uptake in a model of century-scale global warming. *Science*, 274: 1346-1350.
70. Michaels, A. F., D. Olson, J. L. Sarmiento, J. W. Ammerman, K. Fanning, R. Jahnke, A. H. Knap, F. Lipschultz, J. M. Prospero, 1996. Inputs, losses and transformations of nitrogen and phosphorus in the pelagic North Atlantic Ocean. *Biogeochemistry*, 35: 181-226
71. Gruber, N., and J. L. Sarmiento, 1997. Global patterns of marine nitrogen fixation and denitrification. *Global Biogeochem. Cycles*, 11: 235-266.
72. Sarmiento, J. L., T. M. C. Hughes, R. J. Stouffer, S. Manabe, 1998. Simulated response of the ocean carbon cycle to anthropogenic climate warming. *Nature*, 393: 245-249.
73. Fan, S.-M. M. Gloor, J. Mahlman, S. Pacala, J. L. Sarmiento, T. Takahashi, and P. Tans, 1998. A Large Terrestrial Carbon Sink in North America Implied by Atmospheric and Oceanic CO<sub>2</sub> Data and Models, *Science*, 282: 442-446.
74. Sabine, C. L., R. M. Key, K. M. Johnson, F. J. Millero, A. Poisson, J. L. Sarmiento, D. W. R. Wallace, and C. D. Winn, 1999. Anthropogenic CO<sub>2</sub> inventory of the Indian Ocean, *Global Biogeochem. Cycles*, 13, 179-198.
75. Fan, S., M. Gloor, J. Mahlman, S. Pacala, J. Sarmiento, T. Takahashi, and P. Tans, 1999. North American carbon sink, *Science*, 283, 1815 (summary). Full text at [www.sciencemag.org/cgi/content/full/283/5409/1815a](http://www.sciencemag.org/cgi/content/full/283/5409/1815a).
76. Murnane, R. J., J. L. Sarmiento, and C. Le Quéré, 1999. Spatial distribution of air-sea CO<sub>2</sub> fluxes and the interhemispheric transport of carbon by the oceans. *Global Biogeochemical Cycles*, 13; 287-305
77. Sarmiento, J. L., and T.M.C. Hughes, 1999. Anthropogenic CO<sub>2</sub> Uptake in a Warming Ocean *Tellus*, 51B: 560-561.
78. Gloor, M., S.-M. Fan, S. Pacala, J. Sarmiento, and M. Ramonet, 1999. A model-based evaluation of inversions of atmospheric transport, using annual mean mixing ratios, as a tool to monitor fluxes of nonreactive trace substances like CO<sub>2</sub> on a continental scale. *J. Geophys. Res.*, 104: 14,245-14,260.
79. Fan, S.-M., J.L. Sarmiento, M. Gloor, and S. W. Pacala, 1999. On the use of regularization techniques in the inverse modeling of atmospheric carbon dioxide. *J. Geophys. Res.*, 104: 21,503-21,512.

80. Fan, S.-M., T. L. Blaine, and J. L. Sarmiento, 1999. Terrestrial carbon sink in the Northern Hemisphere estimated from atmospheric CO<sub>2</sub> difference between Mauna Loa and South Pole since 1959. *Tellus*, 51B: 863-870.
81. Murnane, R. J., and J. L. Sarmiento, 2000. Roles of biology and gas exchange in determining the  $\delta^{13}\text{C}$  distribution in the ocean and the preindustrial gradient in atmospheric  $\delta^{13}\text{C}$ . *Global Biogeochem. Cycles*, 14: 389-405
82. Gloor, M., S.-M. Fan, S. Pacala, and J. L. Sarmiento, 2000. Optimal sampling of the atmosphere for purpose of inverse modeling : A model study. *Global Biogeochem. Cycles*, 14: 407-428.
83. Suntharalingam, P., and J. L. Sarmiento, 2000. Factors governing the oceanic nitrous oxide distribution: Simulations with an ocean general circulation model. *Global Biogeochem. Cycles*, 14: 429-454.
84. Sarmiento, J. L., 2000. That sinking feeling. *Nature*, 408: 155-156.
85. Sarmiento, J.L. P. Monfray, E. Maier-Reimer, O. Aumont, R. Murnane, and J. Orr, 2000. Air-sea CO<sub>2</sub> Fluxes and carbon transport: a comparison of three ocean general circulation models . *Global Biogeochem. Cycles*, 14: 1267-1281
86. Suntharalingam, P., J.L. Sarmiento and J.R. Toggweiler, 2000. Global significance of nitrous oxide production and transport from oceanic low oxygen zones: A modeling study. *Global Biogeochem. Cycles*, 14: 1153-1370.
87. Orr, J. C., E. Maier-Reimer, U. Mikolajewicz, P. Monfray, J. L. Sarmiento, J. R. Toggweiler, N. K. Taylor, J. Palmer, N. Gruber, C. L. Sabine, C. Le Quéré, R. M. Key, and J. Boutin, 2001. Estimates of anthropogenic carbon uptake from four three-dimensional global ocean models . *Global Biogeochem. Cycles*, 15: 443-60.
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