Anand Gnanadesikan

Curriculum Vitae

Education

AB, Physics Princeton University
Ph.D., Oceanography, MIT/Woods Hole Oceanographic Institution Joint Program in Oceanography

Professional Experience

1988-1991: ONR Graduate Fellow, MIT/WHOI Joint Program.
1991-1994: Research Assistant, Dept. of Physical Oceanography, WHOI.
1994-1995: Postdoctoral Investigator, WHOI.
1995-1997: Visiting Research Staff, AOS Program, Princeton University.
1997-2001: Research Staff, AOS Program, Princeton University
1998,2002: Visiting Lecturer, Dept of Geosciences, Princeton University.
2001-2002: Research Oceanographer, AOS Program, Princeton University
2002-2010: Oceanographer ZP-04, NOAA Geophysical Fluid Dynamics Laboratory
2003-present: Lecturer with rank of Assistant Professor, AOS Program, Princeton University.
(Anticipated) 2011-: Associate Professor, Department of Earth and Planetary Sciences, The Johns Hopkins University

Honors and awards

1988: High honors in physics, Kusaka Memorial Prize in Physics, Princeton University.
1988: Awarded ONR Graduate Fellowship. Awarded but did not accept National Science Foundation fellowship and Hertz Fellowship.
1999: Outstanding Scientific Paper Award, NOAA Environmental Research Labs.
2003,2004: Outstanding performance award, NOAA.
2009: Department of Commerce Bronze Medal (for work on the Sant Ocean Hall)

Teaching and advising

Spring 1998: Co-organized and co-taught AOS 580: Southern Ocean Oceanography.
Fall 1998, 2005-2008: Taught Geosciences/MAE 425, Introductory Physical Oceanography.
Spring 1999,2000: Co-taught MAE 554, Greenhouse problems and hydrogen solutions.
Spring 2002: Taught Geosciences 220, Weather and Climate
Spring 2004: Reading course in Waves and Instabilities, AOS 572

Graduate Work Committee, AOS Program: Sep 2003-Jan 2004, Sept. 2006- Aug. 2008.

Director of Graduate Studies, AOS Program: Jan, 2004-Sept. 2006
CICS Executive Committee: Aug. 2008-present

Postdoctoral supervisor: Whit Anderson
Doctoral advisor/co-advisor: Irina Marinov (Ph.D., 2005), Christopher Little (Ph.D., 2010), Arno Hammann
Thesis committees: Brian Mignone (Ph.D. 2006), Marian Westley (Ph.D. Hawaii,2006) Patrick Schultz (Ph.D., 2008), Anita Adhitya (Ph.D., 2008), Neven Fuckar (Ph.D., 2010), Yuanyuan

Fang (Ph.D.,2010), Yves Plancherel, Kelly Kearney (Geosciences), Ian Lloyd, Daniele Bianchi (AOS), Dmitri Gurkhine (MS, MAE, 2007)
External examiner: Synte Peacock (Columbia, 2001),Stephanie Downes (U. Tasmania, 2009)
Generals Committees: Erica Staehling, Peng Xie, John-Paul Reid (AOS), Kendra Cofield (MAE)
Undergraduate Senior Theses: Ryan Truchelet (Geosciences, 2008), Nick Burroughs (Physics, 2008)
Undergraduate Junior Papers: Ryan Truchelet (Geosciences, 2007) Cristian Proistocescu (Physics, 2008)

Co-coordinator: GFDL Summer Student Program, 2003-2005.

Service

Editorial Board: Ocean Modelling 1999- present
Panels: NOAA OGP, DOE, NSF
Reviewer: NSF, ONR, NOAA, DOE, Deep Sea Res., Dyn. Atmos. Oceans, Geophys. Res. Lett., Global Biogeochem. Cycles, J. Atmos. Oceanic, Tech., J. Climate, J. Geophys. Res. Oceans, J. Mar. Res., J. Physical Oceanography, Mon. Wea. Rev., Ocean Modelling, Ocean Science, Biogeosciences, National Res. Council of Norway, National Environment Res. Council (UK), IPCC WG I, II and III.

Co-chair: GFDL Ocean Model Development Team, May 2002-Sept. 2005
Member: GFDL Lab Council, May 2002-Sep. 2005.
Member: NOAA Carbon Program Advisory Panel, April, 2003-December 2004.
Member: GFDL EEO Committee, Sept. 2002-Dec. 2006, Acting Chair, Oct. 2004- Dec. 2006

Contributor: *AMS Glossary of Meteorology*
Contributor: *Faculty of 1000 Biology*

Museum outreach: NOAA Ocean Hall, National Museum of Natural History, Washington,DC
Changing Earth Exhibit, Franklin Institute, Philadelphia, PA

Schools outreach: Science Olympiad Event coach- Community Middle School, Plainsboro, NJ, 2003-2007, State Champion 2004-2007; National Champion 2005,2007; event coach, High School North, Plainsboro NJ, 2007-2010, State Champion, 2008; Workshop organizer, state event supervisor for Dynamic Planet high school division, 2004-2007, middle school division, 2007-2010, organizing committee- Princeton Regional Tournament, 2007-present, National Coordinator, Oceanography B event, 2008.

Publications in refereed journals or books

1. Cook, K.H. and A. Gnanadesikan, Effects of saturated and dry land surfaces on the tropical circulation and precipitation in a general circulation model . *J. Climate* 4:873-889, 1991.

2. Gnanadesikan, A., Comment on "Report on statistics and physical oceanography" *Statistical Science*, 9:208-212, 1994.

3. Park, Y.G., J.A. Whitehead, and A. Gnanadesikan, Turbulent mixing in stratified fluids: Layer formation and energetics , *J. Fluid. Mech.*, 279:279-311, 1994.

4. Gnanadesikan, A. and R.A. Weller, Structure and variability of the Ekman spiral in the presence of surface gravity waves , *J. Phys. Oceanogr.* 25:3148-3171, 1995.

5. Gnanadesikan, A., Modelling the diurnal cycle of carbon monoxide: Sensitivity to physics,chemistry, biology and optics , *J. Geophys. Res.*,101:12177-12191, 1996.

6. Gnanadesikan, A., Mixing driven by vertically variable forcing: An application to the case of Langmuir circulation , *J. Fluid Mech.*, 322,81-107,1996.

7. Plueddemann, A.J., J.A. Smith, D.M. Farmer, R.A. Weller, W.R. Crawford, R. Pinkel, S. Vagle, and A. Gnanadesikan, Structure and variability of Langmuir circulation during the Surface Waves Processes Program , *J. Geophys. Res.*, 101:3525-3543, 1996.

8. Holt, B., A.K. Liu, H.S. Chen, A. Gnanadesikan, and D.W. Wang, Tracking storm-generated waves in the Northeast Pacific Ocean with ERS-1 Synthetic Aperture Radar imagery and buoys, *J. Geophys. Res*. , 103(C4): 7917-7929, 1998.

9. Griffies, S.M., A. Gnanadesikan, R.C. Pacanowski, V.D. Larichev, J.K. Dukowicz, and R. D. Smith, Isoneutral diffusion in a z-coordinate ocean model, *J. Phys. Oceanogr.*, 28:805-830, 1998.

10. Winton, M., R.W. Hallberg, and A. Gnanadesikan, Simulation of density- driven downslope flow in z-coordinate ocean models, *J. Phys. Oceanogr*. , 28:2163-2174, 1998.

11. Pacanowski, R.C. , and A. Gnanadesikan, Transient response in a z-level ocean model with bottom topography resolved using the method of partial cells , *Month. Wea. Rev.* , 104 (12):3248-3270, 1998.

12. Gnanadesikan, A., A global model of silicon cycling : Sensitivity to eddy parameterization and dissolution , *Global Biogeochemical Cycles* ,13: 199-220, 1999.

13. Gnanadesikan, A., A simple predictive model for the structure of the oceanic pycnocline, *Science.*, 283:2077-2079, 1999.

14. Gnanadesikan, A. and J.R. Toggweiler, Constraints placed by silicon cycling on vertical exchange in general circulation models, *Geophys. Res. Lett.* , 26:1865-1868, 1999.

15. Gnanadesikan, A., Numerical issues for coupling biological models with isopycnal mixing schemes , *Ocean Modelling* , 1:1-15, 1999.

16. Gnanadesikan, A., and R.W. Hallberg, On the relationship of the Circumpolar Current to Southern Hemisphere winds in large-scale ocean models, *J. Phys. Oceanogr*., 30:2013-2034, 2000.

17. Hallberg, R.W. and A. Gnanadesikan, An exploration of the role of transient eddies in determining the transport of a zonally re-entrant current, *J. Phys. Oceanogr*., 31: 3312-3330, 2001.

18. Gnanadesikan, A., R.D. Slater, N. Gruber and J.L. Sarmiento, Oceanic vertical exchange and new production: A comparison of models and data, *Deep Sea Res. II.*, 49: 363-401, 2002.

19. Gnanadesikan, A. and R.W. Hallberg, Physical oceanography- Thermal structure and general circulation, *Encyclopedia of Physical Sciences and Technology, 12:*189-210, 2002.

20. Sarmiento, J.L., J.P. Dunne, A. Gnanadesikan, R.M. Key, K. Matsumoto and R.D. Slater, A new estimate of the $CaCO_3$:C_{org} export ratio, *Global Biogeochemical Cycles*, 16(4),1107,doi:10.1029/2002GB001919,2002.

21. Toggweiler, J.R., A. Gnanadesikan, R.J. Murnane, S.C. Carson and J.L. Sarmiento, The strengths of carbon pumps in box models, GCMs and the real world: Part I- The solubility pump, *Global Biogeochem. Cycles*, 17(1), 1026, doi:10.1029/2001GB001401, 2003.

22. Toggweiler, J.R., R.J. Murnane, S.C. Carson, A. Gnanadesikan and J.L. Sarmiento, The strengths of carbon pumps in box models, GCMs and the real world: Part II- The biological pump, *Global Biogeochem. Cycles*, 17(1),1027, doi:10.1029/2001GB001841, 2003.

23. Gnanadesikan, A., R.D. Slater and J.L. Sarmiento, Effects of patchy ocean fertilization on atmospheric carbon dioxide and biological production, *Global Biogeochem. Cycles*, 17(2),1050,doi:10.1029/2002GB001940, 2003.

24. Watson, A.and J.C. Orr, with O. Aumont, K. G. Caldeira, J.-M. Campin, S. C. Doney, H. Drange, M. J. Follows, Y. Gao, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, R. M. Key, K. Lindsay, F. Louanchi, E. Maier-Reimer, R. J. Matear, P. Monfray, A. Mouchet, R. G. Najjar, G.-K. Plattner, C. L. Sabine, J. L. Sarmiento, R. Schlitzer, R.D. Slater, I. Totterdell, M.-F. Weirig, M. E. Wickett, Y. Yamanaka, and A. Yool, Carbon dioxide fluxes in the global ocean, in Ocean Biogeochemistry: The role of the ocean carbon cycle in climate change, M.J.R Fasham, ed. Springer-Verlag, pp. 123-144, 2003.

25. Gnanadesikan,A., R.D. Slater and B.L. Samuels, Sensitivity of ocean heat transport to subgridscale parameterizations in coarse-resolution ocean models, *Geophys. Res. Lett.*, 30(18), 1967, doi:10.1029/2003GL018036, 2003.

26. Matsumoto, K., J.L. Sarmiento, R.M. Key, J.L. Bullister, K. G. Caldeira, J.-M. Campin, S. C. Doney, H. Drange, M. J. Follows, Y. Gao, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, R. M. Key, K. Lindsay, F. Louanchi, E. Maier-Reimer, R. J. Matear, P. Monfray, A. Mouchet, R. G. Najjar, J.C. Orr, G.-K. Plattner, C. L. Sabine, J. L. Sarmiento, R. Schlitzer, R.D. Slater, P.S. Swathi, I. Totterdell, M.-F. Weirig, M. E. Wickett, Y. Yamanaka, and A. Yool, Evaluation of ocean carbon cycle models with data-based metrics, *Geophys. Res. Lett.*, 31, L07303, doi:10.1029/2003GL018970, 2004.

27. Mignone, B., J.L. Sarmiento, R.D. Slater and A. Gnanadesikan, Sensitivity of sequestration efficiency to mixing processes in the global ocean, *Energy*, 29, 1467-1478, 2004.

28. Doney, S.C., K. Lindsay, K. Caldeira, J.M. Campin, H. Drange, J.C. Dutay, M. Follows, Y. Gao, A. Gnanadesikan, N. Gruber, A. Ishida, F. Joos, G. Madec, E.Maier-Reimer, J.C. Marshall, R.J. Matear, P. Monfray, R. Najjar, J.C. Orr, G.K. Plattner, J. Sarmiento, R. Schlitzer, I.J. Totterdell, M.F. Weirig, Y. Yamanaka, A. Yool, Evaluating global ocean

carbon models: The importance of realistic physics, *Global Biogeochem. Cycles*, 18, GB3017, doi:10.1029/2003GB002150, 2004.

29. Gnanadesikan, A., J.P. Dunne, R.M. Key, K. Matsumoto, J.L. Sarmiento, R.D. Slater and P.S. Swathi, Oceanic ventilation and biogeochemical cycling: Understanding the physical mechanisms that produce realistic distributions of tracers and productivity, *Global Biogeochem. Cycles*, GB4010, doi:10.1029/2003GB002097, 2004.

30. Sweeney, C., A. Gnanadesikan, S.M. Griffies, M.J. Harrison, A. Rosati, and B.L. Samuels, Impacts of shortwave penetration depth on large-scale ocean-circulation and heat transport, *J. Phys. Oceanogr.*, 35(6), 1103-1119, 2005.

31. Gnanadesikan, A., R.D. Slater, P.S. Swathi and G.K. Vallis, The energetics of ocean heat transport, *J. Climate.*, 18, 2604-2616, 2005.

32. Griffies, S.M., A. Gnanadesikan, K.W. Dixon, J. P. Dunne, R. Gerdes, M.J. Harrison, A. Rosati, J.L. Russell, B.L. Samuels, M.J. Spelman, J. Russell, M. Winton, R. Zhang, Formulation of an ocean model for global climate simulations, *Ocean Science*, 1, 45-79, 2005.

33. Orr,.J.C., O. Aumont, L. Bopp, S.C. Doney, V.J. Fabry, R.M. Feely, M. Follows, A. Gnanadesikan, A. Ishida, F. Joos, R.M. Key, K. Lindsay, E. Maier-Reimer, R. Matear, P. Monfray, A. Mouchet, R.G. Najjar, G.K. Plattner, C.L. Sabine, J.L. Sarmiento, R. Schlitzer, R.D. Slater, I. Totterdell, M.F. Weirig, Y. Yamanaka, A. Yool, Anthropogenic ocean acidification over the 21st century and its impact on marine calcifying organisms, *Nature*, 437, 681-686,2005.

34. Dunne, J.P., R.A. Armstrong, A. Gnanadesikan, and J.L. Sarmiento, Empirical and mechanistic models of particle export, *Global Biogeochem. Cycle*s. 19, GB4026, doi:10.1029/2004GB002390, 2005.

35. Mignone, B.K., A. Gnanadesikan, J.L. Sarmiento, and R.D. Slater, Central role of Southern Hemisphere winds and eddies in modulating oceanic uptake of anthropogenic carbon dioxide, *Geophys. Research Letters*.33, L01604, doi:10.1029/2005GL024464, 2006.

36. Delworth, T.L., A.J. Broccoli, A. Rosati, R.J. Stouffer, V. Balaji, J.A. Beesley, W.F. Cooke, K.W. Dixon, J. Dunne, K.A. Dunne, J.W. Durachta, K.L. Findell, P. Ginoux, A. Gnanadesikan, C.T. Gordon, S.M. Griffies, R. Gudgel, M.J. Harrison, I.M Held, R.S. Hemler, L.W. Horowitz, S.A. Klein, T.R. Knutson, P.J. Kushner, A. R. Langenhorst, H.-C. Lee, S.-J. Lin, J. Lu, S.L. Malyshev, P.C.D. Milly, V. Ramaswamy, J.Russell, M.D. Schwartzkopf, E. Shevliakova, J.J. Sirutis, M.J. Spelman, W.F. Stern, M. Winton, A.T. Wittenberg, B. Wyman, F. Zeng, R. Zhang., GFDL's CM2 global coupled climate models: Part 1- Formulation and simulation characteristics, *J. Climate*, 19, 643-674, 2006.

37. Gnanadesikan, A., K.W. Dixon, S.M. Griffies, V. Balaji, M. Barreiro, J. A. Beesley, W.F. Cooke, T.L. Delworth, R. Gerdes, M.J. Harrison, I.M. Held., W. J. Hurlin, H.C. Lee, Z. Liang, G. Nong, R.C. Pacanowski, A. Rosati, J.L. Russell, M. Spelman, B. L. Samuels, Q. Song, M.J. Spelman, R. J. Stouffer, C. Sweeney, G. Vecchi, M. Winton, A. Wittenberg, F. Zeng, R. Zhang, and J.P. Dunne, GFDL's CM2 global coupled climate

models-Part 2: The baseline ocean simulation, *J. Climate*, 19, 675-697, 2006.

38. Marinov, I., A. Gnanadesikan, J.R. Toggweiler and J.L. Sarmiento, The Southern Ocean biogeochemical divide, *Nature*, 441, 964-967, 2006.

39. Gnanadesikan, A., and R.J. Stouffer, Diagnosing atmosphere-ocean general circulation model errors relevant to the terrestrial biosphere using the Köppen climate classification, *Geophys. Res. Lett*, 33, L22701, doi:10.1029/2006GL028098, 2006.

40. Russell, J.L., K. W. Dixon, A. Gnanadesikan, R.J. Stouffer and J.R. Toggweiler, Southern Ocean westerlies in a warming world: Keeping open the door to the deep ocean, *J. Climate*, 19, 6382-6390, 2006.

41. Hallberg, R.W., and A. Gnanadesikan, The role of eddies in determining the structure and response of the wind-driven Southern Hemisphere overturning: Results from the Modeling Eddies in the Southern Ocean Project, *J. Phys. Oceanogr*., 36, 2232-2252, 2006.

42. Gnanadesikan, A., S.M. Griffies and B.L. Samuels, Effects in a climate model of slope tapering in neutral physics schemes, *Ocean Modelling*, doi:10.1016/ j.ocemod.2006.06.004, 16, 1-16, 2007.

43. Gnanadesikan, A., J.L.Russell, and F. Zeng, How does ocean ventilation change under global warming? *Ocean Science*,3, 43-53 2007.

44. Sarmiento, J.L., J. Simeon, A. Gnanadesikan, N. Gruber, R.M.Key and R. Schlitzer, Deep ocean biogeochemistry of silicic acid and nitrate, *Global Biogeochem. Cycles*, 21, GB1S90, doi:10.1029/2006GB002720, 2007.

45. Anderson, W., A. Gnanadesikan, R.W. Hallberg, J.P. Dunne and B.L. Samuels, Impact of ocean color on the maintenance of the Pacific Cold Tongue, *Geophys. Res. Lett*., 34, L11609, doi:10.1029/2007GL030100, 2007.

46. Gnanadesikan, A., A. deBoer . and B.K. Mignone. A simple model of the oceanic pycnocline revisited, *Past and Future changes of the Ocean's Meridional Overturning Circulation: Mechanisms and Impacts*, Schmittner, Chiang and Hemming (eds.), Geophysical Monograph Series 173, 19-32, doi:10.1029/173GM04, 2007.

47. Dunne, J.P., J.L. Sarmiento, and A. Gnanadesikan, A synthesis of global particle export from the surface ocean and cycling through the ocean interior and on the sea floor, *Global Biogeochemical Cycles*, 21, GB4006, doi:10.1029/2006GB002907, 2007.

48. Marinov, I., M. Follows, A. Gnanadesikan, J.L. Sarmiento and R.D. Slater, How does ocean biology affect atmospheric pCO_2?: theory and models, *JGR-Oceans*, 113, C07032, doi:10.1029/2007JC004598, 2008.

49. Marinov, I., A. Gnanadesikan, B.K. Mignone, J.R. Toggweiler, J.L. Sarmiento and R.D. Slater, Impact of oceanic circulation on biological carbon storage in the ocean and atmospheric CO2, in press, *Global Biogeochem. Cycles*, 22, GB3007, doi:10.1029/2007GB002958, 2008.

50. Gnanadesikan, A and I. Marinov, Export is not enough:Nutrient cycling and iron fertilization, *Mar. Ecol. Prog. Ser*., 364, 289-294, 2008.

51. Little, C.M., A. Gnanadesikan and R.W. Hallberg, Large-scale oceanographic constraints on the distribution of melting and freezing under ice shelves, *J. Phys. Oceanogr.*, 38, 2242-2255, 2008.

52. Gnanadesikan, A. and W.G. Anderson, Ocean water clarity and the ocean general circulation in a coupled climate model, *J. Phys. Oceanogr*., 39, 314-332, 2009.

53. Anderson, W.G., A. Gnanadesikan and A. Wittenberg, Regional impacts of ocean color on tropical Pacific variability, *Ocean Science*, 5,313-327, 2009.

54. Rodgers, K., R.M. Key, A. Gnanadesikan, J.L. Sarmiento, O. Aumont, L. Bopp, A. Ishida, M. Ishii, E. Maier-Reimer, N. Metzl, F. Perez, R. Wanninkhof, P. Wetzel, C.D. Winn and Y. Yamanaka, Altimetry helps explain patchy variability in hydrographic carbon measurements, *J. Geophys. Res.-Oceans.*, 114, C09013, doi:10.1029/2008JC005183, 2009.

55. Fang, Y., A.M. Fiore, L.W. Horowitz, A. Gnanadesikan, H. M. Levy II, Y. Hu and A.G. Russell, Estimating the contribution from strong daily export events to total pollutant export from the United States in summer, *J. Geophys. Res.-Atmospheres*, 114, D23302, doi:10.1029/2008JC010946, 2009.

56. Little, C.M., A. Gnanadesikan and M. Oppenheimer, Ice shelf morphology and the efficiency of basal melting, *J. Geophys. Res.-Oceans.*, C12007, doi:10.1029/2008JC005197, 2009.

57. de Boer, A., A. Gnanadesikan. N.E. Edwards and A. J. Watson, Meridional density gradients do not control the Atlantic Overturning Circulation, *J. Phys. Oceanogr.*,40, 368-380, doi: 10.1175/2009JPO4200.1, 2010.

58. Griffies, S.M., A.J. Adcroft, A. Gnanadesikan, R.W. Hallberg, M.J. Harrison, S.A. Legg, C.M. Little, M. Nikurashin, A. Pirani, B.L. Samuels, J.R. Toggweiler, G.K. Vallis, L. White, H. Banks, C., Boening, C.; Chassignet, E., Danabasoglu, G., Danilov, S., Deleersnijder, E., Drange, H., England, M., Fox-Kemper, B., Gerdes, R., Greatbatch, R., Hanert, E., Madec, G., Marsland, S., Simmons, H., Schroter, J., Treguier, A.-M. and Tsujino, H, Problems and prospects in large-scale ocean circulation models, in J. Hall, D.E. Harrison and D.Stammer, eds. *Proceedings of OceanObs'09: Sustained Ocean Observations and Information for Society,(Vol. 1)*.Venice, Italy, 21-25 September, 2009, ESA Publication WPP-306, 2010., http://www.oceanobs09.net/blog/?p=88

59. Galbraith, E.D., A. Gnanadesikan, J.P. Dunne and M.R. Hiscock, Regional impacts of iron-light colimitation in a biogeochemical model, *Biogeosciences*, 7, 1043-1064, 2010.

60. Sarmiento, J.L., A. Gnanadesikan, I. Marinov and R.D. Slater, The role of marine biota in the CO_2 balance of the ocean-atmosphere system, in press in C.M. Duarte (Ed.). *The Role of Marine Biota in the Functioning of the Biosphere*. Fundación BBVA, Madrid., pp. 73-108, 2010

61. Bianchi, D., J.L. Sarmiento, A. Gnanadesikan, R.M. Key, P. Schlosser, R. M. Newton,

Simulations of oceanic He-3 suggest slow mantle degassing, *Earth Plan. Sci. Lett.*, 297, 379-386, doi:/10.1016/j.epsl.2010.06.037, 2010.

62. Gnanadesikan A., K. Emanuel, G.A. Vecchi, W.G. Anderson and R. Hallberg, How ocean color steers Pacific tropical cyclones, *Geophys. Res. Lett.* 37, L18802, doi:10.1029/2010GL044514, 2010.

63. Palter, J., Sarmiento, J.L., A. Gnanadesikan, J. Simeon, and R.D. Slater, Fueling primary productivity: Nutrient return pathways from the deep ocean and their dependence on the meridional overturning circulation, *Biogeosciences*, 7, 3540-3568, 2010.

64. Sarmiento, J.L., R.D. Slater, J.P. Dunne, A. Gnanadesikan, and M.R. Hiscock, Small-scale carbon mitigation by patch iron fertilization, *Biogeosciences*, 7, 3593-3636, 2010.

Other publications (selected)

Gnanadesikan, A., Dynamics of Langmuir Circulation in oceanic surface layers , Ph.D. Dissertation, MIT/WHOI Joint Program in Physical Oceanography, WHOI Tech. Rep. 94-23, 354pp, 1994.

Galbraith, N.R., A. Gnanadesikan, W.M. Ostrom, E.A. Terray, B.S. Way, N.J. Williams, S.H. Hill, and E. Terrill,Meteorological and oceanographic data during the ASREX III Field Experiment: Cruise and Data Report , Woods Hole Oceanographic Inst. Tech. Rep 96-10, Woods Hole, MA, 247 pp., 1996.

Gnanadesikan, A. and R.C. Pacanowski, 1997: Improved representation of flow around topography in the GFDL Modular Ocean Model, MOM 2, *International WOCE Newsletter* , 27:23-25.

Gnanadesikan, A. 1999: Connecting the Southern Ocean with the Rest of the world: Results from large-scale ocean models, *International WOCE Newsletter* , 35 :30-31.

Gnanadesikan, A., J.L. Sarmiento, and R.D. Slater, Ocean fertilization and biological productivity, Proceedings, *1st National Conference on Carbon Sequestration,* Paper 6B-3, 10 pp, 2001.

Gnanadesikan, A., J.L. Sarmiento, and R.D. Slater, Efficiency and effects of carbon sequestration through ocean fertilization, *Proceedings, 6th International Conference on Greenhouse Gas Control Technologies*, Paper I3-5, 2002.

Papers submitted to refereed journals or books

1. Downes, S., A. Gnanadesikan, S.M. Griffies and J.L. Sarmiento, Water mass exchange in the Southern Ocean in coupled climate models, subm. *J. Phys. Oceanogr*.

2. Galbraith, E.D., E.Y. Kwon, A. Gnanadesikan, K.B. Rodgers, S.M. Griffies, J.P. Dunne, J.L. Sarmiento, D. Bianchi, J. Simeon, A. T. Wittenberg, M. J. Harrison, I. Held and R.D. Slater, The impact of climate variability on the distribution of radiocarbon in CM2Mc- a new earth system model,, subm. *J. Climate*

3. Gnanadesikan, A., J.P. Dunne and J. John, What ocean biogeochemical models can tell us about bottom-up control of ecosystem variability, in rev. for *ICES J. Mar. Sci*.

4. Griffies, S.M., M. Winton, L.J. Donner, S. Downes, R. Farneti, A. Gnanadesikan, L. Horowitz, W. Hurlin, H.-C. Lee, Z. Liang, J.B. Palter, B.L. Samuels, A. Wittenberg, B. Wyman, J.Lin, and N. Zadeh, GFDL's CM3 coupled climate model: Characteristics of the ocean and sea ice simulations, subm. *J. Climate*

5. Hammann, A. and A. Gnanadesikan, What should a subgridscale parameterization look like?, in prep. for *Ocean Modelling*, subm. int. rev.

6. Marinov, I. and A. Gnanadesikan, Changes in ocean circulation and carbon storage are decoupled from air-sea CO2 fluxes, subm. *Biogeosciences*., discussion paper, *Biogeosciences Discsussions*, 7, 7985-8000, 2010.

7. Rodgers, K.B., S. Mikaloff-Fletcher, C. Beaulieu, D. Bianchi, E.D. Galbraith, A. Gnanadesikan, A.G Hogg, D. Iudicone, B. Lintner, T. Naegler, P. Reimer, J.L. Sarmiento and R.D. Slater, Atmospheric radiocarbon as a tracer of natural variability of Southern Ocean winds, in rev. for *Climate of the Past*.

Papers in preparation

1. Dunne, J.P., E.D. Galbraith, A. Gnanadesikan, J. John, J.L. Sarmiento, R.D. Slater, and S.M Griffies, Implications of elemental coupling in a global ocean biogeochemistry/general circulation model, in prep. for Biogeosciences.

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