

MICHAEL ROBERT HISCOCK

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EDUCATION

- 1998-2004 *Ph.D., Environment*, Duke University Nicholas School of the Environment and Earth Sciences, Beaufort, NC.
1992-1996 *B.S. Biology*, Duke University, Durham, NC, *magna cum laude*, Phi Beta Kappa

CAREER HISTORY

- 1996 – 1998 Research Technician, Duke University, Antarctica
1998 – 1999 American Meteorological Society/NASA graduate fellowship, Duke University
1999 – 2004 Graduate Research/Teaching Assistant, Duke University
2004 – 2004 Senior Research Assistant, Program in Atmospheric and Oceanic Sciences, Princeton University
2004 – 2006 Post-Doctoral Research Associate, Program in Atmospheric and Oceanic Sciences, Princeton University
2006 – 2006 Lecturer, Program in Atmospheric and Oceanic Sciences, Princeton University
2006 – present Associate Research Scholar, Program in Atmospheric and Oceanic Sciences, Princeton University

RESEARCH FOCUS

My graduate research at the Duke University Nicholas School of the Environment and Earth Sciences focused on the global carbon cycle, natural climate variability and human impacts on climate. I sought to understand the role of the Southern Ocean in the global carbon cycle, particularly what regulates the oceanic drawdown of carbon dioxide from the atmosphere. I participated in a large-scale iron fertilization experiment that sought to test the ocean's potential for carbon sequestration. My experimental expertise is in algae growth and photosynthetic efficiency.

As a research scholar at Princeton University I have worked with global atmospheric and oceanic climate simulation models. We study natural and human-induced climate variability and make predictions on how the Earth's climate will change in the next 50 to 100 years given various greenhouse gas emission scenarios.

RELATED ENVIRONMENTAL SUSTAINABILITY EXPERIENCE

Ewing Township, New Jersey, Environmental Commission Chairperson – Elected and serving as chairperson, July 1, 2007 – June 30, 2008 and vice chairperson, July 1, 2008 – present. Exploring opportunities for more sustainable and cost-effective practices including purchasing hybrid cars, utilizing wind and solar power, installing motion-enabled lighting, investigating more intelligent heating and cooler, creating pedestrian and biker friendly thoroughfares, and implementing LEED building practices for renovation and new construction.

Ewing Township, New Jersey, Environmental Commission – Appointed to Environmental Commission for Ewing Township, Mercer County, New Jersey by Ewing Township Mayor Jack Ball. January 1, 2007 – present.

Green Building Design Committee – Graduate student representative, Nicholas School of the Environment and Earth Sciences Marine Laboratory, Duke University, Beaufort, North Carolina, USA. Served on planning committee for design of the Ocean Sciences Teaching Center, Duke Marine Lab's first "green" building. Spring, 2004.

PUBLICATIONS (Peer-Reviewed)

Hiscock, M.R., Lance, V.P., Apprill, A., Bidigare, R.R., Johnson, Z.I., Mitchell, B.G., Smith, Jr., W. O., Barber, R.T., (2008). Photosynthetic maximum quantum yield increases are an essential component of the Southern Ocean phytoplankton response to iron. *Proceedings of the National Academy of Science*, 105, 4775-4780.

Lance, V.P., Hiscock, M.R., Hilting, A.K., Stuebe, D.A., Bidigare, R.R., Smith, J., W. O., Barber, R.T., (2007). Primary productivity, differential size fraction and pigment composition responses in two Southern Ocean in situ iron enrichments. *Deep-Sea Research I*, 10.1016/j.dsr.2007.1002.1008.

Barber, R.T., and Hiscock, M.R., (2006), A rising tide lifts all phytoplankton: Growth response of other phytoplankton taxa in diatom-dominated blooms, *Global Biogeochemical Cycles*, 20, GB4S03, doi:10.1029/2006GB002726.

Coale, K.H., Johnson, K.S., Chavez, F.P., Buesseler, K.O., Barber, R.T., Brzezinski, M.A., Cochlan, W.P., Millero, F.J., Falkowski, P.G., Bauer, J.E., Wanninkhof, R.H., Kudela, R.M., Altabet, M.A., Hales, B.E., Takahashi, T., Landry, M.L., Bidigare, R.R., Chase, Z., Strutton, P.G., Friederich, G.E., Gorbunov, M.Y., Lance, V.P., Hilting, A.K., Hiscock, M.R., Demerest, M., Hiscock, W.T., Sullivan, K.A., Tanner, S.J., Gordon, R.M., Hunter, C.L., Elrod, V.A., Fitzwater, S.E., Tozzi, S., Koblizek, M., Roberts, A.E., Herndon, J., Timothy, D., Brown, S.L., Selph, K.E., Sheridan, C.C., Twining, B.S., Johnson, Z.I., (2004). Southern ocean iron enrichment experiment: Carbon cycling in high- and low-Si waters. *Science* 304, 408-414.

Hiscock, M.R., (2004). Regulation of Primary Productivity in the Southern Ocean. Ph.D. thesis, Duke University, pp. 174.

Hiscock, M.R., Marra, J., Smith, W.O., Jr., Goericke, R., Measures, C., Vink, S., Olson, R.J., Sosik, H.M., Barber, R.T., (2003). Primary productivity and its regulation in the Pacific Sector of the Southern Ocean. *Deep-Sea Research II* 50, 533-558.

Buesseler, K.O., Barber, R.T., Dickson, M.-L., Hiscock, M.R., Moore, J.K., Sambrotto, R., (2003). The effect of marginal ice-edge dynamics on production and export in the Southern Ocean along 170°W. *Deep-Sea Research II* 50, 579-603.

Nelson, D.M., Anderson, R.F., Barber, R.T., Brzezinski, M.A., Buesseler, K.O., Chase, Z., Collier, R.W., Dickson, M.-L., François, R., Hiscock, M.R., Honjo, S., Marra, J., Martin, W.R., Sambrotto, R.N.,

Sayles, F.L., Sigmon, D.E., (2002). Vertical budgets for organic carbon and biogenic silica in the Pacific sector of the Southern Ocean, 1996-1998. *Deep-Sea Research II* 49, 1645-1674.

Smith, W.O., Jr., Marra, J., Hiscock, M.R., Barber, R.T., (2000). The seasonal cycle of phytoplankton biomass and primary productivity in the Ross Sea, Antarctica. *Deep-Sea Research II* 47, 3119-3140.

Robertson, J.D., Bonaventura, J., Kohm, A., Hiscat, M., (1996). Nitric oxide is necessary for visual learning in *Octopus vulgaris*. *Proceedings of the Royal Society of London Series B* 263, 1739-1743.

PUBLICATIONS (Pending)

Johnson, Z.I., Hiscock, M.R., Barber, R.T., (Journal of Phycology, in review). An analytical theory and evidence of the iron regulation of marine phytoplankton.

Schultz, P., Behrenfeld, M.J., Dunne, J.P., Hiscock, M.R., Maritoréna, S., Siegel, D.A., Sarmiento, J.L., (in prep). Seasonal Plankton Cycles in the Subarctic North Pacific and Atlantic Revisited.

Sarmiento, J.L., Slater, R.D., Hiscock, M.R., Dunne, J., Gnanadesikan, A. (in prep). Small scale carbon mitigation by patch iron fertilization.

Hiscock, M.R., Sarmiento, J.L., Sweeney, C., (in prep). The relative importance of iron and light on primary production and nutrient utilization in the high-nutrient low-chlorophyll Southern Ocean.

Hiscock, M.R., Smith, W.O., Jr., Dinniman, M.S., Bidigare, R.R., Hales, B., Mitchell, B.G., Barber, R.T., (in prep). The influence of Modified Circumpolar Deep Water on phytoplankton photosynthesis in the Ross Sea, *Global Biogeochemical Cycles*.

SELECTED CONFERENCE ORAL PRESENTATIONS AND INVITED TALKS

Sep 2008 Palisades, New York, USA, Lamont-Doherty Earth Observatory, Columbia University, "Regulation of Southern Ocean Production"

Apr 2008 Adelphi, Maryland, USA, NASA Modeling, Analysis and Prediction Meeting, "Biomes in satellite ocean color data"

Jun 2006 Vancouver, British Columbia, Canada, Fisheries Centre, Aquatic Ecosystems Research Laboratory, University of British Columbia, "Estimating primary production and export production from space"

May 2006 Boston, Massachusetts, USA, Massachusetts Institute of Technology, MIT, "Regulation of primary production in the Southern Ocean"

May 2006 Woods Hole, Massachusetts, USA, Swope Center, Marine Biological Laboratory, "Primary production in the ocean surrounding Antarctica: penguins, whales, and diatoms, oh, my!"

Feb 2006 Honolulu, Hawaii, USA, American Society of Limnology and Oceanography / The Oceanography Society Ocean Research Conference / American Geophysical Union Ocean Sciences Meeting, "Modeling a Basin Scale Iron Addition in the Southern Ocean"

- Dec 2005 Mobile, Alabama, USA, Dauphin Island Sea Lab, Dissertations Initiative for the Advancement of Limnology and Oceanography International symposium, "From Southern Ocean microscopy to global models: the education and future direction of a Biological Oceanographer"
- Oct 2005 Venice, Italy, Scuola Grande di San Giovanni Evangelista, 3rd International Conference on the Oceanography of the Ross Sea Antarctica, "Modified Circumpolar Deep Water Regulates Primary Productivity Variability in the Ross Sea" & "Iron fertilization in the Southern Ocean"
- Jun 2005 Santiago de Compostela, Spain, ASLO (Advancing the science of limnology and oceanography) Summer Meeting, "Light and iron limitation in the Southern Ocean"
- Jul 2004 Bremen, Germany, Scientific Committee on Antarctic Research Open Science Conference: Antarctica and the Southern Ocean in the Global System, "Regulation of primary production in the Southern Ocean: the fight against an alternate reality"
- Feb 2004 Honolulu, Hawaii, USA, American Society of Limnology and Oceanography / The Oceanography Society Ocean Research Conference, "Iron boosts photosynthetic competency of most, but not all, phytoplankton"
- Sep 2003 Paros, Greece, American Geophysical Union Chapman Conference, "Two-path hypothesis & why do we care so much about diatoms in ocean ecosystems?"
- Jul 2003 Corsica, France, International Surface Ocean Lower Atmosphere Study Summer School, "Iron and marine productivity"
- Jul 2000 Brest, France, Southern Ocean Symposium, "The regulation of primary production in the Pacific Sector of the Southern Ocean"

GRANTS AND PROPOSALS

Title: Application of Novel Satellite Carbon Biomass to Develop Ecosystem Models Capable of Predicting Climate Change

Hiscock's Role: Co-Investigator

Principal Investigator: Jorge L. Sarmiento

Supporting Agency: NASA

Amount: \$979,369

Duration: Current (5/1/06-4/30/09)

Title: Cooperative studies of Southern Ocean biogeochemistry

Hiscock's Role: Co-Principal Investigator

Principal Investigator: Michael L. Bender

Supporting Agency: National Science Foundation

Amount: \$676,544

Duration: Current (7/1/07-6/30/10)

Title: Collaborative Research: Modified Circumpolar Deep Water intrusions as an iron source to the summer Ross Sea ecosystem

Principal Investigator: Michael R. Hiscock

Supporting Agency: National Science Foundation

Amount: \$386,828

Duration: Pending

TEACHING EXPERIENCE

Princeton University

- Spring 2007, 2005 - Guest lecturer for GEO 202A "Oceanography: An Introduction to the World's Oceans" with Jorge Sarmiento. An interdisciplinary introduction to oceanography, including biological, chemical, geological, and physical processes. Covers topics such as origins and structure of planet Earth and its oceans; plate tectonics, liquid water and the hydrologic cycle, salinity and elemental cycles, ocean circulation; waves and tides; primary production and nutrient cycles, marine ecosystems; life on the sea floor, near shore and estuarine communities, potential environmental issues for the world's oceans.
- Spring 2006, 2008 - Co-taught (2006) and guest lecturer (2008) for GEO 428 "Biological Oceanography" with Professor Bess B. Ward. Fundamentals of Biological Oceanography, with an emphasis on the ecosystem level. The course examines organisms in the context of their chemical and physical environment; properties of seawater and atmosphere that affect life in the ocean; primary production and marine food webs; and global cycles of carbon and other elements.

Duke University

- Guest lecturer for ENVIRON 293/123 "Analysis of Ocean Ecosystems" with Professor Richard T. Barber. The history, utility, and heuristic value of the ecosystem; ocean systems in the context of Odum's ecosystem concept; structure and function of the earth's major ecosystems.
- Teaching Assistant and Lab Instructor
 - Conservation Biology
 - Biological Oceanography
 - Marine Ecology
 - Invertebrate Zoology and Writing
 - Physics

MENTORING

Princeton University Graduate School	Patrick Schultz, Ph.D. 2008 Kelly Kearney, Ph.D. 2010
Swarthmore College Extern Program	Julia Cohen, January 2005 Emily Brown, January 2007 Michelle Tomasik, January 2007

SOCIETIES

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

SELECTED PROJECTS & RESEARCH EXPERIENCE

Dissertations Initiative for the Advancement of Limnology and Oceanography (DIALOG VII) International symposium, Dauphin Island Sea Lab, Mobile, Alabama, USA

December 3 – 10, 2005

Invited and supported to attend DIALOG VII – symposium designed to foster interdisciplinary understanding, communication, career-development and networking between recent limnology and oceanography Ph.D. graduates. Organized by Susan Weiler.

Surface Ocean Lower Atmosphere Study (SOLAS) International Summer School, Corsica, France

June 30 – July 11, 2003

Invited and supported to attend the International SOLAS summer school – a cross-fertilization of 100 students and scientists spanning oceanographic and atmospheric disciplines. Organized by Corinne Le Quéré.

Southern Ocean Iron Experiment, Christchurch, New Zealand to Southern Ocean, Antarctica

January 11 - March 10, 2002

Led a five-person research team measuring primary production and photosynthetic efficiency in an open ocean iron enrichment south of New Zealand. The project included 76 scientists and three research vessels.

International Scientific Symposium and Training Course, Bangalore, India

January 18-29, 1999

Invited and supported to attend the symposium “Biogeochemistry of the Arabian Sea: Synthesis and Modelling” and the training course “Biogeochemical Modelling of the Ocean.” Organized by Trevor Platt and Shubha Sathyendranath.

American Meteorological Society/NASA's Mission to Planet Earth Graduate Fellowship

August 1998 – August 1999

Duke University Research Technician, Antarctica

May 1996 - August 1998

Research technician. Based out of Christchurch, New Zealand and McMurdo Base, Antarctica, I measured primary production and photosynthetic efficiency parameters in the Southern Ocean as part of JGOFS's mission to improve our knowledge of the processes controlling carbon fluxes between the atmosphere and the ocean.

R/V Endeavor - Coring samples in the North Atlantic Ocean

March 24-29, 1996

Technician in Bruce Corliss's lab. I helped deploy a coring device for collecting sediment in 3000m deep water and did preliminary analysis of samples.

Joint Global Ocean Flux Study (JGOFS) Arabian Sea Process Study II, Muscat, Oman

February-March 1995

Technician, John Marra's lab, Research Vessel Thomas G. Thompson. I measured *in situ* primary productivity and photosynthetic efficiency in the Arabian Sea as part of the JGOFS field study.

MEDIA AND PUBLIC OUTREACH

- May 2008 "Adding iron only boosts phytoplankton growth under low light", Environmental Research Web. Article in environmental online magazine highlighting results from Hiscock et al, PNAS, 2008. Written by Belle Dumé.
- Oct 2005 Church of the Epiphany, Allendale, New Jersey, Adult Education - Creation Month - Lecture and Discussion, "Ocean: Past, Present and Future Regulator of Climate"
- Sep 2005 "Global warming lecture marks Creation Season", Town Journal, New Jersey, p17.
- Fall 2004 Dukenvironment Magazine, "The iron experiments: Richard Barber's team goes to the end of the Earth to see if dust once played a role in climate change." By Monte Basgall.
- Dec 2003 Global Change News Letter No. 56, p 2-6, "What regulates the efficiency of the biological pump in the Southern Ocean?" By Robert Anderson.
- Mar 2003 U.S. JGOFS News, Vol 12, Number 2, p 1-4, "What regulates the efficiency of the biological pump in the Southern Ocean?" By Robert F. Anderson.

HONORS

- 2005 Scholarship to attend Dissertations Initiative for the Advancement of Limnology and Oceanography International symposium
- 2004 Robert Safrit Fellowship
- 2003 Scholarship to attend the International Surface Ocean Lower Atmosphere Study Summer School
- 2002 Duke Marine Lab Teaching Assistantship, Harvey Smith Fellowship
- 2001 Harvey W. Smith Fellowship
- 2001 Rachel Carson Fellowship
- 2000 Harvey Smith Fellowship
- 2000 Antarctic Service Medal of the United States of America, presented by the National Science Foundation in recognition of valuable contributions to exploration and scientific achievement under the U.S. Antarctic Research Program
- 1999 Scholarship to attend Biogeochemistry of Arabian Sea symposium and training course
- 1998 Elected Member of American Meteorological Society
- 1998 American Meteorological Society/ NASA's Mission to Planet Earth Graduate Fellowship
- 1996 Phi Beta Kappa, Dean's List, *magna cum laude*
- 1995 Sigma Gamma Delta National Honor Society
- 1994 Dean's List, Dean's List with Distinction, Golden Key National Honor Society
- 1993 Dean's List, Dean's List with Distinction, Phi Eta Sigma-Freshman Honor's Society