

# Steven E. Gaurin

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## EDUCATION:

- Ph.D. ABD, Geosciences, University of Massachusetts, expected 2011
  - dissertation: *Investigating Late Holocene North Atlantic Climate Variability through Speleothem Paleoproxy and Historical Weather Data from Bermuda*
- M.Phil., Earth and Environmental Sciences, Columbia University, 2003
  - graduate project: *Simulating global tropical sea surface temperature: re-parameterization, investigation, and validation of a linear shallow water ocean model with an unconditionally stable numerical scheme*
- M.S., Environmental Science, Florida Institute of Technology, 1995
  - thesis: *A simplified, coupled hydrodynamics, floodplains processes, and dissolved oxygen river model*
- B.S., Applied Mathematics, Towson State University, 1991

## AREAS OF INTEREST AND EXPERTISE:

- Holocene paleoclimate, stable isotopes in the hydrologic cycle, North Atlantic climate variability
- teaching college-level earth science lectures and geologic/oceanographic/environmental labs
- physical and chemical oceanography, climate dynamics, ocean/climate modeling
- varied geologic field research and oceanic research cruises, large and small projects
- geochemical laboratory analysis techniques
- data analysis and computer modeling of environmental systems
- applied mathematics including advanced calculus, statistics, and computer programming

## CAREER EXPERIENCE:

- Ph.D. ABD, advisors Dr. Stephen Burns and Dr. Robert DeConto, University of Massachusetts, Department of Geosciences, *January 2004 – present*.
- laboratory instructor and lecturer, Smith College, Department of Geology, introductory oceanography and geology courses with labs, *July 2003 – June 2009*.
- adjunct professor, College of the Holy Cross, Environmental Studies Program, introductory course in Global Climate Change, *Spring 2009*.
- adjunct professor, Springfield College, World Regional Geography course for teacher pre-certification program, *Summer 2005*.
- freelance lecturer, Five College Public School Partnership, Springfield Teachers Professional Development, *August 2005*.
- freelance lecturer, Five College Public School Partnership, The Interconnected World Summer Institute – Teaching World History and Geography in the Middle Grades, *June, October 2004*.
- graduate research assistant faculty fellow, advisor Dr. Mark Cane, Columbia University's Lamont Doherty Earth Observatory (LDEO), Department of Ocean and Climate Physics, *2001–2003*.
- senior faculty research assistant for Dr. Louis Codispoti, University of Maryland's Horn Point Laboratory (HPL), *1998–2000*.
- associate scientist (master's level research technician) for Dr. Louis Codispoti, Old Dominion University's Center for Coastal Physical Oceanography (CCPO), *1996–1998*.
- programmer/analyst level III, Versar, Inc. in Columbia, MD, *1995–1996*.
- faculty research assistant for Dr. Michael Kemp, University of Maryland's Horn Point Laboratory (HPL), *1994 – 1995*.

## **DETAILED CAREER EXPERIENCE:**

### ➤ **Laboratory Instructor and Lecturer, Dept. of Geology, Smith College (July 2003 – June 2009):**

- ❖ *Lecturer and Laboratory Instructor for Geo 108 – Introduction to Oceanography (4 credits, 20-30 students), Spring semesters 2004-2008.*
  - Deliver three one-hour class lectures per week, on basic oceanography, in the geological, physical, chemical, and biological realms.
  - Create, prepare, and lead weekly 3-hour long indoor laboratory exercises involving experiments, observation, and data analysis.
  - Lead two field trips during the class, one a short educational sampling cruise on Long Island Sound with Project Oceanology or the *R/V Connecticut*, and the other a tour of Plum Island.
  - Lead technical writing lessons and assignments for first-year students fulfilling their writing intensive requirement in this course.
  - Create and administer online quizzes, posting course materials, and maintaining online grades with Internet Blackboard and Moodle services.
  - Redesign, maintain, and update course website (NOTE: discontinued after Spring 2007 but can be accessed at <http://www.science.smith.edu/departments/Geology/Ocean/default.html>).
- ❖ *Laboratory Instructor for Geo 111 – Introduction to Earth Processes and History (4 credits, 20-25 students), Fall semesters 2003-2008.*
  - Prepare and lead weekly 3-hour long field trips to local geologically important sites.
  - Grade laboratory projects and field notebooks.
  - Create and maintain an online photo-journal of photographs taken on field trips.
- ❖ *Instructor for Geo 161 – Exploring the Local Geologic Landscape (2 credits, 10-20 students), Fall 2007, Spring 2008, Fall 2008, Spring 2009.*
  - Prepare and lead weekly 3-hour long field trips and/or indoor lab activities.
  - Create and administer quizzes with online Moodle service, based on weekly readings.
  - Grade laboratory projects and field notebooks.
  - Create and maintain an online photo-journal of photographs taken on field trips.

### ➤ **Adjunct Professor, Center for Interdisciplinary and Special Studies, College of the Holy Cross (Spring 2009):**

- ❖ *Lecturer for ENVS 199 – Global Climate Change (3 credits, 31 students).*
  - Prepare and administer lectures, activities, assignments, and exams.
  - Maintain course gradebook, assignments, and online communications through Moodle service.

### ➤ **Adjunct Professor, School of Human Services, Springfield College (Summer 2005):**

- ❖ *Instructor for World Regional Geography (7 students), a required class for adult students enrolled in the teacher pre-certification program.*
  - Prepared and administered lectures, activities, and assignments on World Regional Geography for four eight-hour class sessions, one Saturday per month.
  - Prepared and graded weekly quizzes, writing assignments, and final papers/presentations.
  - Maintained course gradebook, assignments, and online communications through Manhattan Virtual Classroom system.

### ➤ **Freelance lecturer, Five College Public School Partnership (2004, 2005):**

- ❖ *The Interconnected World Summer Institute 2004 - Teaching World History and Geography in the Middle Grades series (approx. 35 attendees).*
  - Prepared and delivered two two-hour lectures on the physical and political geography of Africa, June 2004.
  - Prepared and delivered one three-hour lecture on the physical, historical, social, and political geography of the Middle East, October 2004.

## **DETAILED CAREER EXPERIENCE (continued):**

- ❖ *Springfield Teachers Professional Development series 2005 (approx. 30 attendees).*
  - Prepared and delivered two two-hour lectures on the physical, historical, social, and political geography of the Middle East, August 2005.
- **Graduate Research Assistant “Faculty Fellow,” Lamont Doherty Earth Observatory (LDEO), Department of Ocean and Climate Physics, Columbia University (January 2001 – July 2003).**
  - ❖ *Research – analysis and re-parameterization of coupled ocean/atmosphere computer model*
    - Re-parameterized ocean model scheme for determining temperature of upwelled water
    - Introduced flexibility in implementing different parameterizations for different ocean basins
    - Performed basic sensitivity analysis and validation exercises on re-parameterized model
    - Analyzed results (thermocline depth, sea surface temperature) of expanding model domain to global tropical strip
  - ❖ *Teaching Assistant for EESC 1053 – Planet Earth (approx. 30 students, Spring 2002) and EESC 4925 – Introduction to Physical Oceanography (5 students, Fall 2002)*
    - In-class duties included formulating and administering weekly quizzes; aiding students individually and in small groups during weekly activity sessions; devising and leading several Earth Science class activities; delivering occasional lectures on my research
    - Other duties included holding weekly review periods; grading quizzes and activities; maintaining grades in online gradebook; updating class websites
  - ❖ *Physical oceanography seminar organizer, Spring 2003 semester*
    - Organized weekly seminar series
    - Contacted and arranged logistics for speakers, a diverse group of people from research institutions and universities from around the country
- **Associate Scientist (M.S.-level research technician) for Dr. Louis Codispoti at Old Dominion University's Center for Coastal Physical Oceanography (December 1996 – June 1998), and at the University of Maryland's Horn Point Laboratory (June 1998 – August 2000):**
  - ❖ *Arctic environmental observatory in Bering Strait*
    - Performed computer interface support for in-situ nitrate analyzers as part of establishment of an Environmental Observatory on sparsely-populated Little Diomedede Island, Alaska, in the middle of the Bering Strait, August 2000
    - Worked with indigenous residents on setting up the observatory in the most non-intrusive manner possible and on educating villagers as to the purpose and direction of the project
    - Assisted other members of the research team in the modification/construction of small buildings to house scientific instruments, computers, etc. and in the deployment of pumping system to supply periodic water samples
  - ❖ *Joint Global Ocean Flux Study (JGOFS): Arabian Sea Process Study and Antarctic Environment Southern Ocean Process Study*
    - Assisted Dr. Codispoti in preparing hydrographic data for submission to the JGOFS database; developed automated data processing system of computer programs to check, calculate, and format data; responsible for ultimate submission of data in finalized form
    - Responsible for honoring data requests from scientific investigators, sometimes involving generation of new data sets from existing data. Generated data, figures, some text for several manuscripts on the hydrographic data collected during the JGOFS Arabian Sea Process Study cruises
    - Participated in R/V Roger Revelle Process I cruise in the Southern Ocean from November 1997 - January 1998; responsible for performing dissolved oxygen analysis by automated Winkler titration; provided deck support during equipment deployment and retrieval; responsible for hydrographic data organization and control; provided computer support
    - Worked on papers with colleagues at the National Institute of Oceanography in Goa, India, December 1998

## **DETAILED CAREER EXPERIENCE (continued):**

- ❖ *Measuring denitrification rates in the Arabian Sea*
  - Assisted colleagues at the New York State Department of Health with specialized, modified niskin bottle designed to perform in-situ denitrification incubation
  - Tested and modified niskin bottle on research cruise in the Arabian Sea aboard the R/V Sagar Kanya with colleagues from the University of Washington and the National Institute of Oceanography in Goa, India, December 1998
- ❖ *Arctic System Sciences/Ocean-Atmosphere-Ice Interactions: Science Management Office*
  - Responsible for overall maintenance of ARCSS/OAII website
  - Assisted Dr. Codispoti in organizing and hosting bi-annual ARCSS/OAII all-hands meetings and planning workshops in Virginia Beach, VA, in May 1997 and in October 1999
- ❖ *In-situ nutrient analyzer*
  - Assisted Dr. Codispoti in researching in-situ nutrient analyzer; provided computer support to get analyzer communication software operational
  - Assisted Dr. Codispoti's graduate student, Vincent Kelly, in calibration exercises using Mr. Kelly's flow-injection analyzer
- **Programmer/Analyst III at Versar, Inc. in Columbia, MD (November 1995 - November 1996):**
  - ❖ *Alaska groundfish fisheries*
    - Created a Fortran90 program for two-stage statistical analysis of Alaska Groundfish fishery data, to determine total catch estimates and prohibited species estimates
    - Generated varied statistical output, including total catch estimates based on observer data and on official reported catch, coefficients of variation resulting from different sampling and estimation schemes, age distribution and sex composition of catch data per haul
  - ❖ *Power plant transmission line mapping and assessment*
    - Modified an existing program to add spectral images of ecological sensitivity indices for determination of minimal impact for future transmission line locations
    - Created a Fortran90 program to calculate the ecological cost of a proposed transmission line joining any series of points on the spectral image map
  - ❖ *Power plant discharge studies, mixing zone CORMIX model application*
    - Evaluated CORMIX mixing-zone model in terms of its applicability to study involving GIS-formatted output
  - ❖ *Environmental Protection Agency NEMERL-GED coastal resources study*
    - Developed a program to analyze the effects of different sampling schemes on results for a Eutrophication Index (EI)
    - Applied program to Index data gathered from MERL mesocosms at University of Rhode Island
- **Faculty Research Assistant for Dr. Michael Kemp at the University of Maryland's Horn Point Environmental Laboratory (November 1994 - November 1995).**
  - ❖ *Environmental Protection Agency Multiscale Experimental Ecosystem Research Center (MEERC)*
    - Lab technician for the fall 1994 MEERC experiment; duties included collecting and preparing water samples for periodic analysis, gathering and analyzing dissolved oxygen / system metabolism data, assisting in maintenance of MEERC lab
    - Converted the existing MEERC model, written in Stella, to C++
  - ❖ *Land Margin Ecosystem Research Project (LMER) and Sea Grant project 1995 (SG95)*
    - Research assistant on the projects; duties included working on several short research cruises on the Chesapeake Bay, collecting and analyzing water samples and benthic samples for chlorophyll, production, and system metabolism.
    - Formulated simple, theoretical computer models of system processes in the Bay

### **DETAILED CAREER EXPERIENCE (continued):**

#### ➤ **Graduate Student, Department of Oceanography, Ocean Engineering, & Environmental Science, Florida Institute of Technology (January 1992 – May 1994):**

- ❖ *Teaching Assistant for Water Analysis Laboratory (several classes, approx. 5-20 students per class), Air Pollution Laboratory (approx. 10 students), and Marine and Environmental Chemistry (approx. 15 students)*
  - Primarily responsible for preparing and running laboratory experiments, including conductivity and solids; salinity; pH/alkalinity; water hardness; dissolved oxygen and biochemical oxygen demand; chlorine; orthophosphorus and soluble reactive phosphate; ammonium and nitrogen; chemical oxygen demand and total organic carbon; air pollution instrument calibration, use of wet test meters; high volume sampling; sulfur dioxide analysis
  - Duties included preparing lab materials; giving lab lectures; leading lab activities; grading lab write-ups, formulating and grading quizzes and exams; maintaining the lab and facilities
  - Lead field trips to nearby facilities for water treatment, lead analysis, and gas chromatography / mass spectroscopy demonstration
- ❖ *NASA Bionetics Corporation and BHS Scientific Systems.*
  - Manipulated and graphically analyzed spectral remote sensing data on scrub vegetation around Cape Canaveral, Florida
  - Generated reflectance graphs to be used in final report submitted to NASA in conjunction with the Bionetics Corporation
- ❖ *South Florida Water Management District Kissimmee River Restoration Project.*
  - Compiled and summarized historical data from various sources on water quality constituents in the Kissimmee River system in Central Florida, for reports submitted to the SFWMD
  - Participated in on-site surveillance activities
  - Performed laboratory analysis of field samples for biochemical oxygen demand, ammonia, color, and turbidity

### **SUMMARY OF FIELD WORK EXPERIENCE:**

- Bermuda (Jul. 2005, Mar. 2006, Mar. 2007, Jun. 2008, Jan. 2009, Oct. 2009) – worked with Bermuda government, scientists, and local cave owners to arrange and perform speleothem collection; designed cave dripwater collection scheme and organized local cavers to carry it out.
- Little Diomed Island, Alaska (August 2000) – helped house, install, and calibrate in-situ nitrate analyzers as part of establishment of a prolonged environmental observatory on remote island.
- Arabian Sea (December 1998) – assisted in design of modified niskin bottle to perform in-situ denitrification measurement; tested modified niskin bottle aboard *R/V Sagar Kanya*.
- Southern Ocean / Ross Sea (November 1997 – January 1998) – performed automated dissolved oxygen analysis; provided deck support; organized hydrographic data aboard *R/V Roger Revelle*.
- Chesapeake Bay (various dates in 1994, 1995, 1999, 2000) – collected and analyzed samples for nutrients, chlorophyll, and system metabolism aboard *R/V Cape Henlopen* and *R/V Ferrell*.

### **SPECIALIZED TRAINING / WORKSHOPS:**

- “Teaching the Ocean System Using New Research Techniques: Data, Models, and Visualizations,” National Association of Geoscience Teachers (NAGT), U. of Washington, August 2005.
- “Introduction to ArcGIS I” Smith College Interterm course, January 2004.
- “Preparing for an Academic Career: A Workshop for Graduate Students and Post-Doctoral Fellows,” NAGT *On the Cutting Edge* Professional Development Program, Stanford U., August 2003.
- “International Scientific Symposium on Biogeochemistry of the Arabian Sea: Synthesis and Modeling and Training Course on Biogeochemical Modeling of the Ocean” Bangalore, India, January 1999.

## **HONORS / APPOINTMENTS / MEMBERSHIPS:**

- Elinor I. Fierman Memorial Prize, UMass Dept. of Geosciences - 2006, 2007
- Leo M. Hall Memorial Prize, UMass Dept. of Geosciences - 2005
- Sigma Xi member since 2004
- American Geophysical Union member since 1998
- Mary Hudson Scarborough Award for Excellence in Mathematics, Towson State U., 1991
- Joyce C. Neubert Award for Outstanding Junior Mathematics Major, Towson State U., 1990
- Omicron Delta Kappa National Leadership Honor Society member since 1990

## **PUBLICATIONS:**

- O'Connor, M.P., F. Juanes, K. McGarigal, and S. Gaurin (submitted). *Longterm Effects of Local Hydrology and Regional Climate on the Hudson River Estuarine Fish Assemblage*.
- Devol, A. H., A.G. Uhlenhopp, S.W.A. Naqvi, J.A. Brandes, D.A. Jayakumar, H. Naik, S. Gaurin, L.A. Codispoti, and T. Yoshinari, 2006. *Denitrification rates and excess nitrogen gas concentrations in the Arabian Sea oxygen deficient zone*. Deep-Sea Research I, 53(9): 1533-1547.
- Morrison, J.M., S. Gaurin, L.A. Codispoti, T. Takahashi, F.J. Millero, W.D. Gardner, and M.J. Richardson, 2001. *Seasonal evolution of the hydrographic properties in the Antarctic Circumpolar Current at 170° W during 1997-1998*. Deep-Sea Research II, 48: 3943-3972.
- Morrison, J.M., L.A. Codispoti, K. Wishner, C. Flagg, W.D. Gardner, S. Gaurin, S.W.A. Naqvi, V. Manghnani, L. Prosperie, and J.S. Gundersen, 1999. *The oxygen minimum zone in the Arabian Sea during 1995*. Deep-Sea Research, 46:1903-1931.
- Morrison, J.M., L.A. Codispoti, S. Gaurin, B. Jones, V. Manghnani and Z. Zheng, 1998. *Seasonal variation of hydrographic and nutrient fields during the U.S. JGOFS Arabian Sea Process Study*. Deep-Sea Research II 45(10-11): 2053-2101.
- Vølstad, J.H., W.R. Richkus, S. Gaurin, and R. Easton. 1997. *Analytical and Statistical Review of Procedures for Collection and Analysis of Commercial Data Used for Management and Assessment of Groundfish Stocks in the U.S. Exclusive Economic Zone off Alaska*. U.S. Dept. of Commerce, National Marine Fisheries Service, Alaska Fisheries Science Center, Seattle, WA. 172 pp.

## **PROFESSIONAL PRESENTATIONS:**

### ➤ talks:

- Gaurin, S.E., S.J. Burns, L. Edwards, H. Cheng. *Bermuda Speleothems and North Atlantic Climate: Reconstructing low-frequency modes of North Atlantic climate variability through the Holocene*. Given at Geological Society of America Joint Annual Meeting, Houston, TX, October 2008.
- Gaurin, S.E. *North Atlantic Climate Variability over the Late Holocene, A View from Bermuda: Analysis of Historical Weather Data and Stable Isotope Time Series from Cave Dripwater and Holocene-Age Stalagmites*. Given at American Mathematical Society Spring Eastern Section Meeting, Worcester, MA, April 2009.
- Gaurin, S.E. *North Atlantic Climate Variability over the Late Holocene, A View from Bermuda: Statistical Analysis of Historical Weather Data, Cave Dripwater Dynamics, and Stalagmite Stable Isotopes*. Given at Bermuda Institute for Ocean Sciences, St. Georges, Bermuda, October 2009.

### ➤ posters:

- Gaurin, S.E., S.J. Burns, R.L. Edwards, H. Cheng, M. Woodworth, and J. Wood. *North Atlantic Climate Variability: Preliminary Analysis of Historical Weather Data and Stable Isotope Time Series from Cave Dripwater and a Holocene-Age Stalagmite from Bermuda*. Presented at American Geophysical Union Fall Meeting, San Francisco, CA, December 2008.
- Gaurin, S., L.A. Codispoti, L.I. Gordon, and J.M. Morrison. *Curious Relationships Between Nitrite and Ammonium Concentrations in the Ross Sea*. Presented at American Geophysical Union Ocean Sciences conference, San Antonio, TX, January 2000.
- Codispoti, L.A., G.F. Cota, and S. Gaurin. *Implications of N\* Distributions for Sedimentary Denitrification Rates in Antarctica and the Arctic*. Presented at American Geophysical Union Ocean Sciences conference, San Antonio, TX, January 2000.