BRAD ERIK ROSENHEIM

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Positions Held

2008-present | Tulane University | New Orleans, Louisiana

Assistant Professor

- Department of Earth and Environmental Science
- Director, Stable Isotope Laboratory at Tulane University

2005-2007 | Woods Hole Oceanographic Institution | Woods Hole, Massachusetts

Postdoctoral Investigator

- Project: "A Continuous Flow Accelerator Mass Spectrometer." I was involved building a CO_2- gas accepting accelerator mass spectrometer for ^{14}C measurement, a first of its kind. This instrument will be coupled to various peripheral instruments including GC, LC, automated carbonate preparation, and laser ablation. My work was specifically aimed at adapting the system for rapid analysis of carbonates by laser decomposition. This type of advance will enable easy and rapid assessment of the age models of deep sea corals, zooxanthellate corals, sclerosponges and mollusks for use in marine paleoclimate studies.

Education, Honors and Awards

1999-2005 | University of Miami | Miami, Florida

Ph.D., Marine Geology and Geophysics.

- Thesis: "An Investigation of the Use of Sclerosponges as High-Resolution Proxy Indicators of the Marine Paleoclimate." I worked validating the use of high-resolution geochemical proxies in the aragonite skeletons of sclerosponges to infer past salinities and temperatures of both surface and subsurface water masses in the Atlantic. This project incurred extensive laboratory work, field work, and modeling, and thus far has resulted in 4 (3 first author) publications and numerous abstracts. Two more first author manuscripts are in preparation.
- Outstanding Student of the Year, Marine Geology and Geophysics, 2000.
- Who's Who Among Students in American Universities and Colleges, 2004

1995-1999 | University of Vermont | Burlington, Vermont

B.S., Environmental Science, Honors Distinction.

- Thesis: "Freshwater Dilution Observed in the Stable Oxygen Isotope Record of the Scleractinian Coral *Montastraea annularis*: Roatan, Honduras." I used three lagoonal coral colonies adjacent to three different coastal land use zones and analyzed a short stable isotope record to ascertain the effects of land use on isotopic records in corals. The results of this project were published as an undergraduate honors thesis. One first author manuscript is in preparation and pending more data.
- Magna Cum Laude, 1999.
- Phi Beta Kappa, Alpha Chapter of Vermont, inducted 1999.
- John Dewey Scholar, 1997-1999.
- Charles C. Doll Award, 1998.
- Beard Family Scholarship, College of Arts and Sciences, 1995.

Related Work Experience

1997-1999 Severn Trent Laboratories Colchester, Vermont

Environmental Chemist

Responsible for testing 14 different environmental parameters in an EPA-approved laboratory. I also participated in a screening test for high grade explosives in soil and groundwater from the vicinity of an army base. This position afforded experience with ICP-AES, various wet chemical/ spectrophotometric techniques, cold vapor atomic absorption (Hg), and HPLC techniques. Tested samples from across the U.S.A. in accordance with EPA policies.

Publications (Peer Reviewed)

- Swart, P.K..; Greer, L.; **Rosenheim B.E.**; Moses, C.S.; Waite, A.J.; Winter, A.; Dodge, R.; Helmle, K. (in review). "^{13}C Suess effect in scleractinian corals mirror changes in the anthropogenic CO2 inventory of the surface oceans." Geology.

- **Rosenheim, B.E.**; Swart, P.K.; Willenz, Ph. (2009). "Calibration of sclerosponge oxygen isotope records to temperature using high-resolution $\delta^{18}O$ data." Geochimica et Cosmochimica Acta. v.73. p. 5308-5319.

- Bracco, A.; Kucharski, F.; **Rosenheim, B.E.**; (2008 – in press). "Commentary: Challenges in the Tropical Atlantic: Understanding its interannual to decadal variability." in The Atlantic Ocean: New Oceanographic Research. Nova Publishers, Hauppauge, NY.

- **Rosenheim, B.E.**; Thorrold, S.R.; Roberts, M.L. (2008). "Accelerator mass spectrometer ^{14}C determination in CO_2 produced from laser decomposition of aragonite." Rapid Communications in Mass Spectrometry.

- **Rosenheim, B.E.**; Day, M.B.; Domack, E.W.; Schrum, H.; Benthien, A;. Hayes, J.M. (2008). "Antarctic sediment chronology by programmed temperature pyrolysis: methodology and data treatment" Geochemistry Geophysics Geosystems. v.9.

- **Rosenheim, B.E.**; Swart, P.K.; Eisenhauer, A. (2007). "Constraining Initial 230Th Activity in Incrementally-Deposited, Biogenic Aragonite from the Bahamas" Geochimica et Cosmochimica Acta. v. 71. pp. 4025-4035.

- **Rosenheim, B.E.**; Swart, P.K. (2007). "Caribbean sclerosponge radiocarbon measurements re-interpreted in terms of U/Th age models." Nuclear Instruments and Methods in Physics Research B. v. 259. pp. 474-478. DOI 10.1016/j.nim.b2007.01.235.

- Moses, C.S.; **Rosenheim, B.E.**; Swart, P.K. (2006). "Evidence of multi-decadal salinity variability in the eastern tropical North Atlantic" Paleoceanography. v. 21, PA3010. DOI: 10.1029/ 2006PA001257.

- **Rosenheim, B.E.**; Swart, P.K.; Thorrold, S.R. (2005). "Minor and trace elements in sclerosponge *Ceratoporella nicholsoni*: Biogenic aragonite near the inorganic endmember?" Palaeogeography Palaeoclimatology Palaeoecology. v. 228, n. 1-2. pp. 109-129. DOI 10.1016/j.palaeo.2005.03.055.

- **Rosenheim, B.E.**; Swart, P.K.; Thorrold, S.R.; Willenz, P. (2005). "Salinity change in the subtropical Atlantic: Secular increase and teleconnections to the North Atlantic Oscillation." Geophysical Research Letters. v. 32, n. L02603. DOI: 10.1029/2004GL021499.

Publications (Peer Reviewed, cont'd)

- **Rosenheim, B.E**.; Swart, P.K.; Thorrold, S.R.; Willenz, P.; Berry, L.; Latcozky, C. (2004). "High-resolution Sr/Ca records in sclerosponges calibrated to temperature in situ." Geology, v.32, n.2. p. 145-148. DOI 10.1130/G20117.1
- Swart, P.K.: Thorrold, S.; Rubenstone, J.; **Rosenheim, B.**; Harrison, C.G.A.; Grammer, M.; Latkoczy, C. (2002). "Intra-annual variation in stable oxygen and carbon and trace element composition of sclerosponges." Paleoceanography, v.17. 12p. doi:10.1029/2000PA000622
- Mehrtens, C.; **Rosenheim, B.E.**; Modley, M.; Young, R. (2001). "Reef morphology and sediment attributes, Roatan, Bay Islands, Honduras." Carbonates and Evaporites, v.16, n.2. p. 131-140.

Published Abstracts and Conference Presentations

- **Rosenheim, B.E.**, Domack, E.W., Roe, K., Adamic, J. (2008). "Ramped pyrolysis radiocarbon dating of Antarctic sediments." Eos Transactions, AGU, v. 89(52), Fall Meeting Supplement, Abs. PP53A-05.
- **Rosenheim, B.E.**, Villinski, J.C., Domack, E.W., Hayes, J.M., Dunbar, R. (2008). "Ross Sea core chronology using ramped pyrolysis radiocarbon dating." GSA Annual Meeting, Houston, TX.
- **Rosenheim, B.E.**, Swart, P.K. (2007). "The challenges of using sessile proxies for oceanography work." Eos Transactions, AGU, v. 88(52), Fall Meeting Supplement, Abs. PP23D-06
- Roberts, M.L., **Rosenheim, B.E.**, von Reden, K.F., Han, B.X., Elder, K.L., Longworth, B.E., Jenkins, W.J., Schneider, R.J. (2007). "An accelerator mass spectrometry system for the analysis of ^{14}C in a continuously flowing stream of gas." 9th European Conference on Accelerators in Applied Research and Technology, Florence, Italy, 3-7 September 2007.
- von Reden, K.F., Roberts, M.L., Jenkins, W.J., **Rosenheim, B.E.**, McNichol, A.P., Schnieder, R.J. "Software development for continuous-gas-flow AMS: toward in-vivo analysis?" 9th European Conference on Accelerators in Applied Research and Technology, Florence, Italy, 3-7 September 2007.
- **Rosenheim, B.E.**, Swart, P.K.; Eisenhauer, A. (2006). "Realistic age models from Bahamas sclerosponges indicate elevated initial Th-230." Eos Transactions, AGU, v. 87(52), Fall Meeting Supplement, Abs. PP13D-03.
- McNichol, A.P.; **Rosenheim, B.E.**; Gerlach, D.S.; Hayes J.M. (2006). "The stable and radio-carbon isotopic content of labile and refractory carbon in atmospheric particulate matter." Eos Transactions, AGU, v. 87(52), Fall Meeting Supplement, Abs. A12C-02.
- McNichol, A.P.; **Rosenheim, B.E.**; Gerlach, D.S.; Edgerton, E.S.; Hayes, J.M. (2006), "Measuring the radiocarbon content of labile and refractory carbon in the same sample to constrain the natural carbon cycle." 19th International Radiocarbon Conference, Oxford, United Kingdom. 3-7April 2006.
- McNichol, A.P.; Gerlach, D.S.; Edgerton, E.S.; **Rosenheim, B.E.**; Hayes, J.M. (2006). "Directly measuring the radiocarbon content of organic and black carbon in atmospheric and marine samples." Eos Transactions, AGU, v.87(36), Ocean Science Meeting Supplement, Abs. OS12K-01.

Published Abstracts and Conference Presentations (cont'd)

- **Rosenheim, B.E.**; Moses, C.S;. Swart, P.K. (2005). "Decadal scale variation in the subtropical N. Atlantic Shallow thermohaline circulation." Eos Transactions, AGU, v.86(52), Fall Meeting Supplement, Abs. PP54A-02 Invited.
- **Rosenheim, B.E.**; Swart, P.K. (2005). "Shallow subsurface marine radiocarbon records from Bahamas sclerosponge skeletons." Eos Transactions, AGU, v.86(52), Fall Meeting Supplement, Abs. PP31B-1531
- **Rosenheim, B.E.**; Swart, P.K.; Thorrold, S.R. (2004). "N. Atlantic salinity change during the last century: Surface forcing at the salinity maximum propagated to the central Caribbean by subsurface waters." Eos Transactions, AGU, v. 85(46), Fall Meeting Supplement, Abs. PP51C-1346.
- Moses, C.S.; Swart, P.K.; **Rosenheim, B.E.**; Thorrold, S.; Zhang, D. (2004). "Centennial-scale changes in tropical North Atlantic Salinity inferred from scleractinian corals." Eos Transactions, AGU, v. 85(46), Fall Meeting Supplement, Abs. PP51C-1347.
- **Rosenheim, B.E.**; Swart, P.K.; Thorrold, S.R.; Latkoczy, C.; Eisenhauer, A. (2004). "Significant changes in temperature and salinity of the Caribbean Sea indicated by Sr/ca ratios and $\delta^{18}O$ in the aragonite skeletons of sclerosponges." Eos Transactions, AGU, v. 84(52), Ocean Science Meeting Supplement, Abs. OS51I-03.
- Swart, P.K.; Dodge, R.E.; Quinn, T.; Moses, C.; **Rosenheim, B.E.**; Helmle, K.; Mackenzie, G.; Clement, A. (2004). "A long term history of salinity changes in the Caribbean using stable isotopes in coral skeletons." Eos Transctions, AGU, v. 84(52), Ocean Science Meeting Supplement, Abs. OS41A-04.
- **Rosenheim, B.E.**; Swart, P.K.; Willenz, P.; Thorrold, S.; Eisenhauer, A. (2002). "Calibration of Caribbean sclerosponges to their ambient environment: Indirect and direct methods." Eos Transactions, AGU, v. 83(47), Fall Meeting Supplement, Abs. PP52B-06.
- Swart, P.K.; **Rosenheim, B.;** Thorrold, S.; Eisenhauer, T. (2002). "Uranium, barium, lead, and lead isotopes in sclerosponges: New proxies in sclerosponges." Eos Transactions, AGU, v. 83(47), Fall Meeting Supplement, Abs. PP51A-0286.
- Swart, P.K.; **Rosenheim, B.**; Thorrold, S.; Rubenstone, J. (2001). "Annual variation in the chemical composition of sclerosponges." Eos Transactions, AGU, v. 82(47), Fall Meeting Supplement, Abs. OS31C-0446.
- **Rosenheim, B.E.**; Swart, P.K.; Thorrold, S.R. (2001). "Calibration of Sr/Ca with temperature in sclerosponges." Eos Transactions, AGU, v. 82(47), Fall Meeting Supplement, Abs. OS31C-0447.
- **Rosenheim, B.**; Swart, P.; Thorrold, S.; Rubenstone, J. (2001). "Annual cylicity in high resolution Sr records from sclerosponges." Geological Society of America Abstracts with Programs, v. 33.
- Mehrtens, C.; Modley, M.; **Rosenheim, B.E.**; Newberry, R.; Young, R.S. (2000). "Sedimentation and water quality: Mesoamerican reef, Roatan, Honduras." Geological Society of America Abstracts with Programs, v. 32(7).
- **Rosenheim, B.E.,** Lini, A.; Mehrtens, C.; Young, R.S. (1999). Freshwater Dilution Observed in the Stable Oxygen Isotope Record of the Scleractinian Coral *Montastrea annularis*: Roatan, Honduras. Geological Society of America Abstracts with Programs, v. 31(2).

- Mehrtens, C.; Young, R.; Modley, M.; **Rosenheim, B.**; Duni, M.; Barnett, E.; Winchester, A. (1999). "Land use variation reflected in nearshore sediment: Roatan, Bay Islands, Honduras." AGU Spring Meeting. Eos Transactions, AGU, 80:S186.

Current and Pending Funding

- **NSF SGER Geomorphology Program** "Fate and Transport of Carbon and Sediment during a Mississippi River High Water Event," June 1, 2008 to May 31, 2009. (EAR-0832754, $29,658)
- **NSF Paleoperspectives in Climate Change** "Assessing Wind-driven Circulation Variability in the Subtropical N. Atlantic Using an Array of Archived Radiocarbon Records," June 1, 2009 to May 31, 2011. (OCE-0902980 $255,073, current)
- **Louisiana Board of Regents** " Determining the Distribution of Ages in Sedimentary Organic Material Carried and Deposited by Mississippi River," June 1, 2009 to May 31, 2012. ($189,066, Current)
- **NSF Geosciences Instrumentation and Facilities** "Development of a Programmed-temperature Pyrolysis/Combustion Reactor System for Radiocarbon Applications," September 15, 2009 – August 31, 2011. (EAR – 0929752 $215,153, current)

Invited Talks

- **Secrets in Secretions**, Louisiana Universities Marine Consortium, 4Dec2008
- **Burn, Baby, Burn! Pyrolysis Radiocarbon Dating applied to Questions of Chronology and Carbon Cycling**, Louisiana State University, Wilbur Lecture series (co-hosted by Geology and Oceanography Departments), Baton Rouge, Louisiana, September 18, 2008
- **Climate Change, Carbon, and Chronology**, University of Vermont, Department of Geology Seminar Series, Burlington, Vermont, October 8, 2007
- **The Burning Question of Antarctic Sediment Chronology**, Brown University, Providence, Rhode Island, February 26, 2007
- **Revealing the spectrum of ages in bulk-dated organic material from Antarctic Penninsula sediment cores using programmed temperature pyrolysis**, University of Miami (RSMAS), Division of Marine Geology and Geophysics Geotopics Series, February 13, 2007

Laboratory Experience and Supervision

- **Laser Ablation/Decomposition**. I have used laser ablation as a fine scale subsampling tool for paleoceanographic studies. I am currently developing a technique to use CO_2 generated from laser decomposition of carbonate mineral surfaces for direct AMS determination of ^{14}C.
- **Organic Chemistry**. I am currently building a Programmed Temperature Combustion system. I have implemented a similar system during my postdoctoral investigatorship and I will continue to use this system for radiocarbon dating applied to questions of chronology and carbon cycling.
- **Isotope Ratio Mass Spectrometry**. I have experience using state of the art IRMS technology. I have used systems from VG Isogas, Thermo-Finnigan (Delta Plus), Finnigan MAT (251), Europa Geo (20/20) to analyze carbonates and waters. I have developed standardized laboratory computation programs for correction of isotope data and I have performed standardization of the Thermo-Finnigan Delta Plus with Kiel III carbonate device to overcome heterogeneities associated with small sample size capabilities. I am currently managing a laboratory housing an Elementar Isoprime system with Dual Inlet and Multi-Prep system.
- **Minor and Trace Element Spectrometry and Spectroscopy**. I experienced in operation of an Inductively Coupled Plasma spectroscope. I have used ICP-AE and OE spectrometers in both industry and academia. Most recently, I was responsible for standardizing a newly acquired Varian Vista Pro ICP-OES axial spectrometer to analyze large carbonate samples for trace elements and small carbonate samples for minor elements. I have performed standardization with seawater samples of various strengths. I have experience with ICP-MS, especially interfaced with a laser micro-sampling device.

Laboratory Experience and Supervision

- **Microscopy.** I operated both epifluorescence and scanning electron microscopes for minor parts of my Ph.D. dissertation. I am familiar with the principles of these technologies and able to use them autonomously.

Courses Taught

2008-present — Tulane University — New Orleans, Louisiana

- **EENS/EBIO 608: Stable Isotopes in the Environment**. This course is designed to familiarize upper level majors and graduate students with the theories and applications of stable isotope measurement in natural levels found in the environment. Half of the class involves lectures and problem sets, while the second half involves performing laboratory analyses for a final class project.
- **EENS/EBIO 223: Introductory Oceanography**. This course is aimed at science majors, but accessible to non-majors as well. It involves 3 lectures per week, plus a field trip to LUMCON to perform oceanographic measurements aboard a coastal research vessel.

2001-2005 — University of Miami — Miami, Florida

- **MSC 101: Introduction to Oceanography, Non-Science Majors**. This course gave me the opportunity to teach lectures on topics as broad as wave physics to coral physiology in a delivery suitable for all backgrounds. I have received excellent reviews from students in these classes and have succeeded in presenting both traditional blackboard lectures and multi-media presentations.

Field work experience

2008-present — Tulane Universiity — New Orleans, Louisiana

- April-June 2008: Small boat surveying and sampling of Mississippi River (lower reaches) during high water event of spring 2008. The research was carried out under an NSF SGER grant for sampling of suspended sediment and new sedimentation. The goal is to characterize this sediment in terms of the spectra of radiocarbon ages present both before and after deposition. Ultimately, these data will be compared to normal and low flow stages.
- August, 2008 - current: Sedimentation and reef survey, Lana'i, Hawaii. These research involves pilot funds from Tulane University (post Hurricane Katrina research enhancement funds) to commence a research collaboration in Hawai'i involving characterization of erosional processes in terms of land use change and climate change. Sedimentation and carbon transport from the ridges of the volcanoes to the reefs is the goal of measurement and quantification.

2005-2007 — Woods Hole Oceanographic Institution — Woods Hole, Massachusetts

- June, 2007: Submersible research cruise, Key West to Fort Lauderdale, Florida, in collaboration with the University of Miami and Harbor Branch Oceanographic Institution. Several submersible dives were made for collection of marine species living at depths less than 990m and of interest in paleoceanographic studies and pharmaceutical research.

1999-2005 — University of Miami — Miami, Florida

- May-Jun., 2003: Exploration of French Antilles for scuba-accessible sclerosponge specimens. Three week scuba exploration of all areas of the coast with either submarine grottoes or steep walls, both conducive to cryptic sclerosponge habitat.
- Oct.-Nov., 2002: Caribbean Atlantic Salinity Experiment (CASE-02) Cruise aboard the R/V Suncoaster. I participated in both legs of a month-long coral core collection expedition spanning the Bahamas to the St. Vincent Grenadines. Responsible for drilling corals by scuba using a hydraulic drill tethered to a small dinghy launched from the main vessel. Corals located using physical

geography and existing literature to explore each island by snorkel.

Field work experience (cont'd)

- Aug., 2002: Sequence Stratigraphy of the Madison formation. Field Assistant for the Comparative Sedimentology Laboratory of the U. of Miami. Measured stratigraphic section of the Madison formation outcropping in Montana.
- May, 2002: Stage II of NSF-funded Sclerosponge Calibration Project, Discovery Bay, Jamaica. Sclerosponges were sampled after an incubation period of nearly 3 years. Other sclerosponges were re-stained with Calcein and thermistors were swapped and re-calibrated. Corals were also sampled to compare with proximal sclerosponge records.
- Sep., 2001: Geochemical Classification of Bahamas Bank Sediment cruise, R/V Bellows. This cruise gridded the NW Great Bahamas Bank, sampling sediment and water every 10km. Analysis for salinity, grain type, and skeletal makeup of waters and sediment performed on-board.
- May, 2001: Carbonate petrography class trip to Andros Island in the Bahamas. Studied Aeolian and shallow water carbonate deposits from the Pleistocene and Holocene as a class project. I took part in explorations of the supratidal mud flats of western Andros Island and sampled dolomite crusts forming in these unique environments.
- August, 2000: Exploration of the Commonwealth of Dominica for mature coral colonies. Explored the leeward coast of Dominica for large heads of *Siderastraea sideraea* suitable for climate records and potential sclerosponge environments by scuba. Several *S. Sideraea* colonies were drilled pneumatically and brought back to Miami. No sclerosponges were found. Also assisted in surveying reef to quantify and monitor corals with known diseases.
- Aug. 1999: Initiation of NSF funded Sclerosponge Calibration Project, Discovery Bay, Jamaica. Installed and calibrated temperature thermistors in submarine reef enclosure and stained sclerosponge surfaces using Calcein, a fluorochrome. Operations performed by scuba.

1998-1999 University of Vermont Burlington, Vermont

- Jun.-Jul. 2000: Relocation of sediment traps and levels, Roatan, Honduras. I took part in the final part of an abiotic reef survey, relocating sediment measuring devices and recording reef transects for changes since the project was started.
- Jul., 1999: Post-Hurricane Mitch abiotic reef assessment, Roatan, Honduras. This trip was planned to assess catastrophic changes to sections of reef due to the passing of Hurricane Mitch the previous year. Sedimentation measuring devices and coral transects were located by snorkel and scuba.
- Jul., 1998: Sampling of *Montastraea annularis* for my undergraduate honors thesis, Roatan, Honduras. Land use patterns of the island were assessed and corals were sampled from long-disturbed area, recently-disturbed area, and pristine offshore control site.

Synergistic Activities

- DOE Proposal Review, NICCR Coastal Division
- NSF Proposal Review, OCE Marine Geology and Geophysics
- Peer Review Journal Referee
  - Crystal Structure
  - Marine Chemistry
  - Palaeogeography, Palaeoclimatology, Palaeoecology
  - Paleoceanography
  - Earth and Planetary Review Letters
  - Coral Reefs
  - Geochemistry, Geophysics, Geosystems
  - AGU Books
  - International Coral Reef Symposium
- Workshop Attendance

Synergistic Activities

IODP Caribbean Gateway Workshop, Austin, Texas, 2006
CLIVAR Salinity Workshop, Woods Hole, Massachusetts, 2006

- Professional Memberships
  New Orleans Geologic Society
  International Coral Reef Society
  American Geophysical Union
  Geologic Society of America