

MARC J. ALPERIN

Business Address:

Department of Marine Sciences
4202B Venable Hall
University of North Carolina
Chapel Hill, North Carolina 27599-3300
Tel: (919) 962-5184
Fax: (919) 962-1254

Home Address:

501 Landerwood Lane
Chapel Hill, North Carolina 27514
(919) 942-2607

E-mail Address: alperin@email.unc.edu

Personal History

Born: San Luis Obispo, California
Date of Birth: 10 September 1957

Educational Background

1988 Ph.D. in Chemical Oceanography, University of Alaska, Fairbanks, Alaska
1979 B.A. in Chemistry, Colby College, Waterville, Maine

Professional Experience

Fall 2016 Interim Assistant Dean for First Year Seminars
2013 – present Associate Chair, Department of Marine Sciences
2000 – present Associate Professor, Department of Marine Sciences, University of North Carolina at Chapel Hill
1994 – 2000 Assistant Professor, Department of Marine Sciences, University of North Carolina at Chapel Hill
1990 – 1994 Research Assistant Professor, Curriculum in Marine Sciences, University of North Carolina at Chapel Hill
1987 – 1989 Post-Doctoral Fellow, Curriculum in Marine Sciences, University of North Carolina at Chapel Hill
1979 – 1987 Graduate Research Assistant, Institute of Marine Science, University of Alaska, Fairbanks

Publications

Steen, A.D., R. T. Kevorkian, J. T. Bird, N. Dombrowski, B. J. Baker, S. M. Hagen, K. H. Mulligan, J. M. Schmidt, A. T. Webber, and M. J. Alperin. Nature and Activities of extracellular peptidases in subsurface sediments of the White Oak River estuary, NC, suggest community adaptation to degraded organic matter (in revision).

- Langerhuus, A. T., M. J. Alperin, J. Niggemann, B. B. Jørgensen, and B. Aa. Lomstein. Modeling microbial carbon cycling in deep sub-seafloor sediment off Chile (in revision).
- Masterson, A. L., M. J. Alperin, W. Berelson, and D. T. Johnston. 2017. Multiple sulfur and sulfate oxygen isotopic insights into sulfur cycling within the anoxic California-Mexican margin basins. *American Journal of Science* (in review).
- Masterson, A. L., M. J. Alperin, W. Berelson, and D. T. Johnston. 2017. Understanding the isotopic composition of sedimentary sulfide: A multiple isotope diagenetic model for Aarhus Bay. *Geobiology* (in review).
- Hoehler, T. M. and M. J. Alperin. 2014. Methane minimalism. *Nature* (News and Views), DOI:10.1038/nature13215.
- DelVechia, A. G., J. F. Bruno, L. Benninger, M. Alperin, O. Banerjee, and J. de Dios Morales. 2014. Organic carbon inventories in natural and restored Ecuadorian mangrove forests. *PeerJ*, 2:e388; DOI 10.7717/peerj.388.
- Lloyd, K. G., M. J. Alperin, and A. Teske. 2011. Environmental evidence for net methane production and oxidation in putative ANaerobic MEthanotrophic (ANME) archaea. *Environmental Microbiology*, 13: 2548-2564.
- Alperin, M. and T. Hoehler. 2010. The ongoing mystery of seafloor methane, *Science*, 329:288-289 (Perspective).
- Lever, M. A., Heuer, V. B., Morono, Y., Morono, Y., Masui, N., Schmidt, F., Alperin, M. J., Inagaki, F. Hinrichs, K.-U., and Teske, A. 2010. Acetogenesis in deep subseafloor sediments of the Juan de Fuca Ridge flank: A synthesis of geochemical, thermodynamic, and gene-based evidence, *Geomicrobiology Journal*, 27: 183-211.
- Alperin, M. J., and T. M. Hoehler. 2009a. Anaerobic methane oxidation by archaea/sulfate-reducing bacteria aggregates: 1. Thermodynamic and physical constraints, *American Journal of Science*, 309: 869-957.
- Alperin, M. J., and T. M. Hoehler. 2009b. Anaerobic methane oxidation by archaea/sulfate-reducing bacteria aggregates: 2. Isotopic constraints, *American Journal of Science*, 309: 958-984.
- Dale, A. W., V. Brüchert, M. Alperin, and P. Regneir. 2009. An integrated sulfur isotope model for Namibian shelf sediments. *Geochimica et Cosmochimica Acta*, 73: 1924-1944.
- Lapham, L. L., M. Alperin, J. Chanton, and C. Martens. 2008. Upward advection rates and methane fluxes, oxidation, and sources at two Gulf of Mexico brine seeps, *Marine Chemistry*, 112: 65-71.
- Whelan, S. C., M. J. Alperin, Y. Nie, and E. N. Fisher. 2008. Denitrification in the mainstem Neuse River and tributaries, USA. *Archiv für Hydrobiologie*, 171/3: 249-261.
- Lever, M. L., M. Alperin, B. Engelen, F. Inagaki, S. Nakagawa, B. O. Steinsbu, and A. Teske. 2006. Trends in basalt and sediment core contamination during IODP Expedition 301. *Geomicrobiology Journal*, 23: 517-530.

- Heilskov, A. C., M. Alperin, and M. Holmer. 2006. Benthic fauna bio-irrigation effects on nutrient regeneration in fish farm sediments. *Journal of Experimental Marine Biology and Ecology*, 339: 204-225.
- Benninger, L. K., M. J. Alperin, J. T. Wells, P. Muñoz, Y. Nie, B. Mislowak, and S. Lafond. 2004. Impact of Hurricane Floyd on sediment deposition, erosion, and benthic nutrient fluxes in Pamlico Sound, North Carolina. Water Resources Research Institute Report.
- Hoehler, T. M., D. B. Albert, M. J. Alperin, B. M. Bebout, C. S. Martens, and D. J. Des Marais. 2002. Comparative ecology of H₂ cycling in organotrophic and phototrophic ecosystems. *Antonie van Leeuwenhoek*, 81: 575-585.
- Alperin, M. J., I. B. Suayah, L. K. Benninger, and C. S. Martens. 2002. Modern organic carbon burial fluxes, recent sedimentation rates, and particle mixing rates from the upper continental slope near Cape Hatteras, North Carolina (USA). *Deep-Sea Research II*, 49: 4645-4665.
- Thomas, C. J., N. E. Blair, M. J. Alperin, D. J. DeMaster, R. A. Jahnke, C. S. Martens, and L. Mayer. 2002. Organic carbon deposition on the North Carolina continental slope off Cape Hatteras (USA). *Deep-Sea Research II*, 49: 4687-4709.
- Avery, G. B., Jr., R. D. Shannon, J. R. White, C. S. Martens, and M. J. Alperin. 2002. Controls on methane production in a tidal freshwater estuary and a peatland: Methane production via acetate fermentation and CO₂ reduction. *Biogeochemistry*, 62: 19-37.
- Hee, C. A., T. K. Pease, M. J. Alperin, and C. S. Martens. 2001. Dissolved organic carbon production and consumption in anoxic marine sediments: A pulsed-tracer experiment. *Limnology and Oceanography*, 46: 1908-1920.
- Hoehler, T. M., M. J. Alperin, D. B. Albert, and C. S. Martens. 2001. Apparent minimum free energy requirements for methanogenic Archaea and sulfate-reducing bacteria in an anoxic marine sediment. *FEMS Microbial Ecology*, 38: 33-41.
- Nie, Y., I. B. Suayah, L. K. Benninger, and M. J. Alperin. 2001. Modeling detailed sedimentary ²¹⁰Pb and fallout ^{239,240}Pu profiles to allow episodic events: an application in Chesapeake Bay. *Limnology and Oceanography*, 46: 1425-1437.
- Alperin, M. J., E. J. Clesceri, J. T. Wells, D. B. Albert, J. E. McNinch, and C. S. Martens. 2000. Sedimentary processes and benthic-pelagic coupling. In: *Neuse River Estuary Modeling and Monitoring Project: Final Report—Monitoring Phase*, R. A. Luettich, Jr. (Editor), Water Resources Research Institute Report, 63-105.
- Hoehler, T. M., W. S. Borowski, M. J. Alperin, N. M. Rodriguez, and C. K. Paull. 1999. Model, stable isotope, and radiotracer characterization of anaerobic methane oxidation in gas hydrate-bearing sediments of the Blake Ridge. *Proceedings of the Ocean Drilling Program, Scientific Results*, 164: 79-85.
- Borowski, W. S., T. M. Hoehler, M. J. Alperin, N. M. Rodriguez, and C. K. Paull. 1999. Significance of anaerobic methane oxidation in methane-rich sediments overlying the Blake Ridge gas hydrates. *Proceedings of the Ocean Drilling Program, Scientific Results*, 164: 87-99.

- Alperin, M. J., C. S. Martens, D. B. Albert, I. B. Suayah, L. K. Benninger, N. E. Blair, and R. A. Jahnke. 1999. Benthic fluxes and porewater concentration profiles of dissolved organic carbon in sediments from the North Carolina continental slope. *Geochimica et Cosmochimica Acta*, 63: 427-448.
- Hoehler, T. M., D. B. Albert, M. J. Alperin, and C. S. Martens. 1999. Acetogenesis from CO₂ in an anoxic marine sediment. *Limnology and Oceanography*, 44: 662-667.
- Avery, G. B., Jr., R. D. Shannon, J. R. White, C. S. Martens, and M. J. Alperin. 1999. Effect of seasonal changes in the pathways of methanogenesis on the $\delta^{13}\text{C}$ values of pore water methane in a Michigan peatland. *Global Biogeochemical Cycles*, 13: 475-484.
- Martens, C. S., D. B. Albert, and M. J. Alperin. 1999. Stable isotope tracing of anaerobic methane oxidation in the gassy sediments of Eckernförde Bay, German Baltic Sea. *American Journal of Science*, 299: 589-610.
- Martens, C. S., D. B. Albert, and M. J. Alperin. 1998. Biogeochemical processes controlling methane in gassy coastal sediments 1. A model coupling organic matter flux to gas production, oxidation and transport. *Continental Shelf Research*, 18: 1741-1770.
- Albert, D. B., C. S. Martens, and M. J. Alperin. 1998. Biogeochemical processes controlling methane in gassy coastal sediments 2. Groundwater flow control of acoustic turbidity in Eckernförde Bay sediments. *Continental Shelf Research*, 18: 1771-1793.
- Hoehler, T. M., M. J. Alperin, D. B. Albert, and C. S. Martens. 1998. Thermodynamic control on hydrogen concentrations in anoxic marine sediments. *Geochimica et Cosmochimica Acta*, 62: 1745-1756.
- Hoehler, T. M. and M. J. Alperin. 1996. Anaerobic methane oxidation by a methanogen-sulfate reducer consortium: geochemical evidence and biochemical considerations. In: *Microbial Growth on C-I Compounds*, M. E. Lidstrom and F. R. Tabita (Editors), Kluwer Academic, 326-333.
- Alperin, M. J., J. Balesdent, R. H. Benner, N. V. Blough, R. F. Christman, E. R. M. Druffel, F. H. Frimmel, G. Guggenberger, D. J. Repeta, H. H. Richnow, R. S. Swift. 1995. How can we best characterize and quantify pools and fluxes of NLOM? In: *The Role of Nonliving Organic Matter in the Earth's Carbon Cycle*, R. G. Zepp and Ch. Sonntag (Editors), John Wiley and Sons, 67-80.
- Alperin, M. J., D. B. Albert and C. S. Martens. 1994. Seasonal variations in production and consumption rates of dissolved organic carbon in an organic-rich coastal sediment. *Geochimica et Cosmochimica Acta*, 58: 4909-4930.
- Hoehler, T. M., M. J. Alperin, D. B. Albert and C. S. Martens. 1994. Field and laboratory studies of methane oxidation in an anoxic marine sediment: Evidence for a methanogen-sulfate reducer consortium. *Global Biogeochemical Cycles*, 8: 451-463.
- Sugai, S. F., M. J. Alperin and W. S. Reeburgh. 1994. Episodic deposition and ¹³⁷Cs immobility in Skan Bay sediments: a ten-year ²¹⁰Pb and ¹³⁷Cs time series. *Marine Geology*, 116: 351-372.

- Alperin, M. J. and C. S. Martens. 1993. Dissolved organic carbon in marine pore waters: a comparison of three oxidation methods. *Marine Chemistry*, 41: 135-143.
- Alperin, M. J., N. E. Blair, D. B. Albert and T. H. Hoehler. 1993. The carbon isotope biogeochemistry of methane production in anoxic sediments: 2. A laboratory experiment. In: *Biogeochemistry of Global Change: Radiatively Active Trace Gases*, R. S. Oremland (Editor), Chapman and Hall, New York, N.Y., pp. 594-605.
- Reeburgh, W. S., S. C. Whalen and M. J. Alperin. 1993. The role of methylotrophy in the global methane budget. In: *Microbial Growth on C-1 Compounds*, J. C. Murrell and H. Dalton (Editors), American Society for Microbiology, Washington, D.C., pp. 1-14.
- Sharp, J. H., E. T. Peltzer, M. J. Alperin, G. Cauwet, J. W. Farrington, B. Fry, D. M. Karl, J. H. Martin, A. Spitzzy, S. Togrul, and C. A. Carlson. 1993. Procedures subgroup report. *Marine Chemistry*, 41: 37-49.
- Alperin, M. J., N. E. Blair, D. B. Albert, T. H. Hoehler and C. S. Martens. 1992. Factors that control the stable carbon isotopic composition of methane produced in an anoxic marine sediment. *Global Biogeochemical Cycles*, 6: 271-291.
- Alperin, M. J., W. S. Reeburgh and A. H. Devol. 1992. Organic carbon remineralization and preservation in sediments of Skan Bay, Alaska. In: *Productivity, Accumulation, and Preservation of Organic Matter: Recent and Ancient Sediments*, J. K. Whelan and J. W. Farrington (Editors), Columbia University Press, New York, N.Y., pp. 99-122.
- Burdige, D. J., M. J. Alperin, J. Homstead and C. S. Martens. 1992. The role of benthic fluxes of dissolved organic carbon in oceanic and sedimentary carbon cycling. *Geophysical Research Letters*, 19: 1851-1854.
- Roulet, N., W. Reeburgh, M. Alperin, R. Desjardin, V. Galchenko, W. Glooschenko, R. Lassiter, K. Lassey, T. Moore, H. Schiff, B. H. Svensson, M. Wahlen, and G. Zarvarzin. 1992. High latitude ecosystems: sources and sinks of trace gases. *Ecological Bulletins*, 42: 86-97.
- Alperin, M. J., W. S. Reeburgh and M. J. Whiticar. 1988. Carbon and hydrogen isotope fractionation resulting from anaerobic methane oxidation. *Global Biogeochemical Cycles*, 2:279-288.
- Reeburgh, W. S. and M. J. Alperin. 1988. Studies on anaerobic methane oxidation. In: *Transport of Carbon and Minerals in Major World Rivers, Lakes and Estuaries*, part 5, E. T. Degens, S. Kempe and A. S. Naidu (Editors), SCOPE/UNEP, Hamburg, FRG, pp. 367-375.
- Alperin, M. J. and W. S. Reeburgh. 1985. Inhibition experiments on anaerobic methane oxidation. *Applied and Environmental Microbiology*, 50:940-945.
- Alperin, M. J. and W. S. Reeburgh. 1984. Geochemical observations supporting anaerobic methane oxidation. In: *Microbial Growth on C-1 Compounds*, R. Crawford and R. Hanson (Editors), American Society for Microbiology, Washington, D.C., pp. 282-289.

Shaw, D. G., M. J. Alperin, W. S. Reeburgh and D. J. McIntosh. 1984. Biogeochemistry of acetate in anoxic sediments of Skan Bay, Alaska. *Geochimica et Cosmochimica Acta*, 48:1819-1825.

Book Reviews

Tracers in the Ocean by H. Charnock, J. E. Lovelock, P. S. Liss and M. Whitfield (Editors), *American Scientist*, 79:459 (1991).

Climate Change and its Biological Consequences by D. M. Gates, *American Scientist*, 82:282 (1994).

Dissertation

Alperin, M. J. 1988. The carbon cycle in an anoxic marine sediment: concentrations, rates, isotope ratios, and diagenetic models. University of Alaska, Fairbanks, Alaska.

Grants Received

“Falls Lake Sediment Evaluation”, Upper Neuse River Basin Association, 2015, \$21,235.

“Quantifying the Habitability of Low-Temperature Serpentinizing Systems”, NASA Exobiology Program, 2008-2012, \$146,194.

“The Sulfate Problem: Anaerobic Sulfide Oxidation in Continental Margin Sediments”, University Research Council, 2006-2008, \$3800.

“Controls on Seafloor Methane Release: A Geomicrobiological Model of Anaerobic Methane Oxidation”, Fulbright Scholar Program, 2005, € 6,000.

“Sources, Transport and Fate of Sediment and Nutrients from a Redeveloping Watershed: Hydrology of the Central UNC Campus”, Water Resources Research Institute, 2003-2004, \$3000 pilot project. (Co-PI with L. Band, M. Doyle, S. Reice, R. Wetzel, and S. Whalen; total award: \$20,000.)

“Cultural Eutrophication and Environmental Management Practices in Estuaries”, University Center for International Studies, Faculty Curriculum Development Grant, 2003, \$3000.

“Impact of Hurricane Floyd on Sediment Deposition, Erosion, and Benthic Nutrient Fluxes in Pamlico Sound, North Carolina”, North Carolina Department of Environment and Natural Resources, 2000-2001, \$20,086. (Co-PI with L. K. Benninger and J. T. Wells; total award: \$74,794.)

“Biogeochemical Cycling in the Organic-Rich Coastal Environment”, National Science Foundation, Ocean Sciences Division, 2000-2003, \$162,657. (Co-PI with C. S. Martens and D. B. Albert; total award: \$630,000.)

“Development of a Surface Water Object-Oriented Modeling System (SWOOMS) for the Neuse River Estuary, North Carolina”, Environmental Protection Agency, 1999-2002, \$179,741. (Co-PI with R. A. Luettich, Jr., J. Bowen, C. Buzzelli, H. Jeffries, H. Paerl, and D. Stotts; total award: \$987,859.)

- “The Role of Sediment-Water Column Biogeochemical Feedback in Eutrophication Dynamics of the Neuse River Estuary, NC”, National Science Foundation, Environmental Geochemistry and Biogeochemistry Program, 2000-2003, \$145,701. (Co-PI with H. W. Paerl and C. S. Martens; total award: \$475,000.)
- “Impact of Sediment Processes on Water Quality in the Neuse River Estuary”, Water Resources Research Institute, 1999-2000, \$40,500.
- “Neuse River Estuary Modeling and Monitoring Project: Phase II Monitoring”, Water Resources Research Institute, 1999-2000, \$61,501. (Co-PI with R. A. Luetlich, Jr., H. W. Paerl, C. P. Buzzelli, T. L. Richardson, and C. S. Martens; total award: \$294,181.)
- “Denitrification and Sediment-Water Nutrient Exchange in the Upper Neuse River”, Water Resources Research Institute, 1999-2000, \$17,419. (Co-PI with S. C. Whalen; total award: \$40,000.)
- “Is Nitrogen Nitrogen? Ecosystem Impacts of Anthropogenic N Sources on Algal Blooms, Hypoxia, and Biogeochemical Cycling in the Neuse River estuary, NC”, National Science Foundation, Division of Environmental Biology, 1999-2002, \$199,445. (Co-PI with H. W. Paerl; total award: \$561,354.)
- “Neuse River Modeling and Monitoring”, North Carolina Department of Environment, Health, and Natural Resources, 1997-1998, \$36,000.
- “Nutrient Exchange at the Sediment-Water Interface: A Numerical Model for the Neuse River Estuary”, Junior Faculty Development Grant (University of North Carolina at Chapel Hill), 1997, \$5000.
- “Biogeochemical Cycling in the Organic-Rich Coastal Environment”, National Science Foundation, Ocean Sciences Division, 1996-1999, \$125,935. (Co-PI with C. S. Martens and D. B. Albert; total award: \$525,000).
- “Deposition and Fate of Modern Organic Carbon in Shelf/Upper Slope Sediments near Cape Hatteras, North Carolina”, Department of Energy, 1995-1998, \$81,143. (Co-PI with C. S. Martens, D. B. Albert, D. J. DeMaster, and N. E. Blair; total award: \$904,525.)
- “Dissolved Organic Nitrogen and Carbon in Atmospheric Precipitation: Effect on a Coastal Ecosystem”, Carolina Federation of Environmental Programs, 1995-1996, \$10,000.
- “Biogeochemical Cycling in the Organic-Rich Coastal Environment”, National Science Foundation, Ocean Sciences Division, 1993-1996, \$83,831. (Co-PI with C. S. Martens and D. B. Albert; total award: \$562,667.)
- “Dissolved Organic Carbon Analysis by Sealed Tube Combustion”, National Science Foundation, Ocean Sciences Division, 1992-1993, \$42,800.
- “Continued Studies of Methane Oxidation in Anoxic Freshwater, Estuarine and Coastal Sediments”, Environmental Protection Agency, 1990-1991, \$20,000.
- “Concentration Profiles of Dissolved Organic Carbon in Cyanobacterial Mat Communities”, University Research Council, 1990-1991, \$1350.

Invited Seminars

- “Demographics of Chilean Sediment Microbes: Lifestyles, Longevity, Legacy.” Aarhus University, Denmark, 27 June 2014.
- “Demographics of Chilean Sediment Microbes: Lifestyles, Longevity, Legacy.” Woods Hole Oceanographic Institution, 26 July 2013.
- “The sulfate problem: Anaerobic sulfide oxidation in continental margin sediments.” Aarhus University, Denmark, 19 June 2009.
- “Energetics of life: Physical and thermodynamic constraints.” Symposium on the Energetics of Life, International GeoBiology Summer Course, 20 June, 2008.
- “Anaerobic sulfide oxidation: Carbon-Sulfur-Metal interactions in anoxic marine sediments.” University of Utrecht, The Netherlands, 7 June 2005.
- “Isotopic fractionation during methane production and oxidation: implications for sources of highly ^{13}C -depleted carbon in archaea/sulfate-reducing bacteria aggregates.” University of California at Irvine, 2 July 2004.
- “Anaerobic methane oxidation by archaea/sulfate-reducing bacteria aggregates: Thermodynamic, physical, and isotopic constraints.” University of Southern Denmark, Odense, Denmark, 17 June 2004.
- “Anaerobic methane oxidation by archaea/sulfate-reducing bacteria aggregates: Thermodynamic, physical, and isotopic constraints.” Netherlands Institute of Ecology, Yerseke, The Netherlands, 26 May 2004.
- “A micro-scale reaction-transport model of archaea/sulfate-reducing bacteria aggregates.” Max Planck Institute for Marine Microbiology, Bremen, FRG, 24 May 2004.
- “Anaerobic methane oxidation by archaea/sulfate-reducing bacteria aggregates: Thermodynamic, physical, and isotopic constraints.” University of Utrecht, The Netherlands, 26 January 2004.
- “Impact of hurricane flooding on sediment deposition, erosion, and benthic processes in a large, lagoonal estuary.” University of Utrecht, The Netherlands, 8 August 2002.
- “Impact of sediment processes on water quality in the Neuse River Estuary.” Old Dominion University, Norfolk, Virginia, 21 September 2000.
- “Impact of sediment processes on water quality in the Neuse River Estuary.” Water Resources Seminar, Raleigh, North Carolina, 16 April 2000.
- “Organic matter decomposition in coastal sediments: The role of organic matter source in controlling reactivity.” University of North Carolina, Chapel Hill, North Carolina, 20 October 1993.
- “Processes that control organic matter decomposition in anoxic marine sediments: Production and consumption of dissolved organic carbon.” University of Texas, Port Aransas, Texas, April 1993.
- “Production and consumption of dissolved organic carbon in organic-rich sediments.” University of Alaska, Fairbanks, Alaska, 7 July 1993.

- “Episodic deposition and ^{137}Cs immobility in Skan Bay sediments: A ten-year ^{210}Pb and ^{137}Cs time series.” University of North Carolina, Chapel Hill, North Carolina, 9 September 1992.
- “Dissolved organic carbon in the ocean: A status report.” University of North Carolina, Chapel Hill, North Carolina, October 1991.
- “What’s up DOC?: Biogeochemistry of dissolved organic carbon in organic-rich coastal sediments.” University of North Carolina, Chapel Hill, North Carolina, 20 September 1989.
- “Carbon cycling in the sediments of Skan Bay, Alaska.” University of North Carolina, Chapel Hill, North Carolina, 19 March 1986.
- “In search of the elusive anaerobic methane oxidizing bacteria.” University of Alaska, Fairbanks, Alaska, March, 1984.

Invited Talks at Professional Meetings

- “Sediments as a source of nutrients (N & P) to Falls Lake algal production.” Upper Neuse River Basin Association (UNRBA) Path Forward Committee Meeting, Butner, North Carolina, 26 October 2016.
- “Methane biogeochemistry in anoxic marine sediments: insights from reaction-transport models applied to $\delta^{13}\text{C}\text{-CH}_4$ and $\delta^{13}\text{C}\text{-}\Sigma\text{CO}_2$ depth distributions.” Goldschmidt Conference, Montreal, Canada, 24-29 June 2012.
- “Porewater DOC dynamics and organic matter remineralization, transformations, and preservation in coastal marine sediments” (plenary talk). American Chemical Society National Meeting, Boston, Massachusetts, 19-23 August 2007.
- “A proposed mechanism for anaerobic methane oxidation in Cape Lookout Bight.” 8th International C_1 Symposium, San Diego, California, 27 August - 1 September 1995 (presented by Tori Hoehler).
- “Seasonal variability in dissolved organic carbon production rates in an anoxic marine sediment.” Ocean Sciences Meeting, American Geophysical Union, New Orleans, Louisiana, 27-31 January 1992.
- “The seasonal cycle of dissolved organic carbon in an anoxic coastal sediment.” Symposium on Biogeochemical Processes in Estuaries, American Chemical Society National Meeting, Boston, Massachusetts, 23-25 April 1990.
- “Carbon isotope fractionation by anaerobic methane oxidation.” Symposium on Atmospheric Methane, American Chemical Society National Meeting, Denver, Colorado, 5-10 April 1987.
- “Isotope budgets and rate measurements in Skan Bay sediments.” Fourth International Symposium on Microbial Growth on C_1 Compounds, Minneapolis, Minnesota, 6-10 September 1983.

Oral Presentations at Professional Meetings

- “Modeling microbial life under extreme energy limitation.” 2nd International Workshop on Microbial Life under Extreme Energy Limitation, Aarhus, Denmark, 7-9 May 2012.
- “Mapping the environmental boundaries for methanogenesis in serpentinizing systems using a cell-scale numerical model.” Meeting of the American Geophysical Union, San Francisco, California, 5-9 December 2011.
- “ ‘Classical’ vs. ‘Nouveau’ AMO: Routes, rates, reactions, and reservoirs.” Ocean Sciences Meeting (AGU/ASLO), Portland, Oregon, 22-26 February 2010.
- “Bioenergetics in archaea/sulfate-reducing bacteria aggregates.” Goldschmidt Conference, Davos, Switzerland, 21-26 June 2009.
- “Impact of bottom currents on benthic fluxes and sediment processes in a shallow, eutrophic estuary.” American Society of Limnology and Oceanography, summer meeting, Santiago de Compostela, Spain, 19-24 June 2005.
- “A micro-scale geomicrobiological model of anaerobic methane oxidation by archaea/sulfate-reducing bacteria aggregates.” Ocean Sciences Meeting (AGU/ASLO), Honolulu, Hawaii, 15-20 February 2004.
- “Metabolic pathways within archaea/sulfate-reducing bacteria aggregates: Isotopic constraints.” International Workshop on Geomicrobiology, Aarhus, Denmark, 28-31 January 2004.
- “Sediment-water column interactions in a shallow, eutrophic estuary: A multi-species reaction-transport model for sediment and the lower benthic boundary layer.” Aquatic Sciences Meeting (ASLO), Salt Lake City, Utah, 8-14 February 2003.
- “Controls on the benthic oxygen flux in estuarine sediments: Impact of macrobenthic organisms during a long-term laboratory experiment.” Ocean Sciences Meeting (AGU/ASLO), Honolulu, Hawaii, 11-15 February 2002.
- “Sedimentation rates, particle mixing rates, and organic carbon burial fluxes from the North Carolina continental slope.” Aquatic Sciences Meeting (ASLO), Albuquerque, New Mexico, 12-16 February 2001.
- “A coupled, multi-component diagenetic model for sediments dominated by sulfate reduction and methanogenesis: model evaluation and numerical experiments.” 2000 Ocean Sciences Meeting, San Antonio, Texas, 24-28 January 2000.
- “A comparison of fallout plutonium and cesium in sediments from the North Carolina continental slope.” Aquatic Sciences Meeting (ASLO), Santa Fe, New Mexico, 1-5 February 1999.
- “Sediment biogeochemistry of the Neuse River Estuary.” Neuse River Estuary MODMON Workshop, Chapel Hill, North Carolina, 29 April 1998.
- “Factors controlling organic carbon burial efficiency in sediments from the North Carolina continental slope.” Ocean Sciences Meeting (AGU), San Diego, California, 9-13 February 1998.

- “Biogeochemical processes controlling methane in gassy coastal sediments: A model for predicting the distribution of gaseous methane.” Aquatic Sciences Meeting (ASLO), Santa Fe, New Mexico, 10-14 February 1997.
- “Effect of porewater DOC on organic carbon preservation.” Symposium on Organic Matter Preservation in Soils and Sediments, American Chemical Society National Meeting, Orlando, Florida, 27-28 August 1996.
- “Dissolved organic carbon in sediments from the North Carolina continental slope.” Fall Meeting of the American Geophysical Union, San Francisco, California, 5-9 December 1994.
- “Biogeochemical controls on the carbon isotopic composition of methane produced in anoxic marine sediment.” 10th International Symposium on Environmental Biogeochemistry, San Francisco, California, 19-23 August 1991.
- “Diagenetic fractionation of carbon isotopes in particulate and dissolved organic matter in sediments from Skan Bay, Alaska.” Symposium on Marine Organic Chemistry, American Chemical Society National Meeting, Atlanta, Georgia, 14-19 April 1991.
- “The seasonal cycle of dissolved organic carbon in an anoxic coastal sediment.” Symposium on Biogeochemical Processes in Estuaries, American Chemical Society National Meeting, Boston, Massachusetts, 22-27 April 1990.

Poster Presentations at Professional Meetings

- “On the reversibility of methane production from CO₂ and H₂: Revisited”. 2nd International Workshop on Microbial Life under Extreme Energy Limitation, Aarhus, Denmark, 7-9 May 2012
- “Anaerobic methane oxidation by archaea/sulfate-reducing bacteria consortia: Thermodynamic and physical constraints.” Gordon Research Conference, Oxford, England, 11-15 August 2002.
- “Patterns in sedimentation rates in the Neuse River estuary.” 2002 Annual North Carolina Water Resources Research Conference, Raleigh, North Carolina, 9 April 2002.
- “A coupled water column-sediment biogeochemistry and hydrodynamic model for the Neuse River Estuary”. 2001 Annual North Carolina Water Resources Research Conference, Raleigh, North Carolina, 29 March 2001.
- “Stable- and radio-carbon isotopic composition of porewater DOC in an organic-rich marine sediment”. Fall Meeting of the American Geophysical Union, San Francisco, California, 15-19 December 2000.
- “Controls on estuarine sediment oxygen demand: Impact of bottom current and oxygen transport through the diffusive boundary layer.” 2000 Annual North Carolina Water Resources Research Conference, Raleigh, North Carolina, 30 March 2000.
- “Benthic fluxes and porewater concentration profiles of dissolved organic carbon in sediments from the North Carolina continental slope.” Gordon Conference on Chemical Oceanography, Meridan, New Hampshire, 10-15 August 1997.

- “Carbon storage in ocean margins: the role of porewater DOC in enhancing organic matter preservation.” Department of Energy’s Ocean Margins Program Initial Synthesis Meeting, Savannah, Georgia, 26-29 January 1997.
- “Pore water concentration profiles as indicators of enhanced organic matter remineralization in sediments from the North Carolina continental slope.” Fall Meeting of the Department of Energy’s Ocean Margins Program, Savannah, Georgia, 25-27 September 1995.
- “Syntrophic and competitive interactions among fermentative, sulfate-reducing, and methanogenic bacteria in anoxic marine sediments.” 8th International C₁ Symposium, San Diego, California, 27 August - 1 September 1995.
- “Interactions between fermenting, sulfate-reducing, and methanogenic bacteria in sediments from Cape Lookout Bight, North Carolina.” Ocean Sciences Meeting, San Diego, California, 21-25 February 1994.
- “Methane oxidation in anoxic coastal and estuarine sediments.” Workshop on Trace Gas Exchange in a Global Perspective, Sigtuna, Sweden, 19-23 February 1990.
- “The seasonal cycle of dissolved organic carbon in anoxic sediments of Cape Lookout Bight, NC.” Gordon Conference on Chemical Oceanography, Meridan, New Hampshire, 14-18 August 1989.
- “A stable carbon isotope budget for anoxic sediments of Skan Bay, Alaska.” Annual Meeting of Geological Society of America, Denver, Colorado, 31 October to 3 November 1988.
- “Processes leading to ‘anomalous’ sulfate profiles in anoxic marine sediment.” Gordon Conference on Chemical Oceanography, Meridan, New Hampshire, 17-21 August 1987.
- “Stable carbon isotope budget for Skan Bay, Alaska.” 12th International Meeting on Organic Geochemistry, Julich, Germany, 16-20 September 1985.
- “Inhibition experiments on anoxic marine sediments suggest methane is not directly oxidized by sulfate reducing bacteria”. International Symposium on Environmental Biogeochemistry, Rome, Italy, 9-13 September 1985.

Invited Workshop Participant

- Agouron Sulfur Cycle symposium, Palos Verdes, California, 26-30 October 2014.
- Workshop on Gassy Sediments, Bay St. Louis, Mississippi, 25-27 April 2005.
- METROL (Methane fluxes in ocean margin sediments: microbiological and geochemical control) Workshop, Utrecht, The Netherlands, 3-4 June 2004.
- Dahlem Workshop on the Role of Non-living Organic Matter in the Earth's Carbon Cycle (Rapporteur), Berlin, FRG, 12-17 September 1993.
- Workshop on the Measurement of Dissolved Organic Carbon and Nitrogen in Natural Waters, Seattle, Washington, 14-19 July 1991.

SCOPE/IGBP International Workshop on Trace Gas Exchange in a Global Perspective, Sigtuna, Sweden, 19-23 February 1990.

Environmental Protection Agency Workshop on Radiatively Important Trace Gases, Athens, Georgia, 29-30 November 1990.

Teaching Experience

Graduate level course in *Chemical Oceanography*: 1990-1994, 1996, 1998, 2000, 2002, 2005, 2006, 2008, 2009, 2011, 2013, 2015-2017.

Developed and taught undergraduate/graduate course in *Estuarine and Coastal Marine Science*: 2000-2004, 2008-2016.

Developed and taught undergraduate Maymester course in *North Caroline Estuaries: Processes and Problems*: 2008-2016.

Developed and taught *Our Changing Planet: Science, Social Impacts, Solutions*: 2009, 2011-2017.

Developed and taught undergraduate course in the *Science of Global Environmental Change*: 1996, 1997, 1999, 2001.

Developed and taught first-year seminar on *Global Warming: Serious Threat or Hot Air*: Spring 2003, 2004, 2005, 2006, 2007.

Developed and taught graduate course in *Modeling Diagenetic Processes*: 1997, 1999, 2004.

Developed and co-taught graduate level course in *Marine Systems Modeling*: 1995.

Undergraduate course in *Oceanography*: 1994, 1995, 1995, 1997, 1999.

Undergraduate course in *The Marine Environment*: 2007, 2010, 2012, 2014.

Graduate course in *Seminar in Oceanography*: Fall 1997, 1999.

Short course on *Selected Applications of Isotope Methods in Marine Geochemistry and Biogeochemistry*. Netherlands Research School of Sedimentary Geology, Utrecht University, 10-14 May 2004.

Short course on *Isotope Reaction-Transport Models in Marine Sediment Biogeochemistry*. Netherlands Research School of Sedimentary Geology, Utrecht University, 9-13 May 2005.

Workshop on *Reaction-Transport Models in Geomicrobiology*, Center for Geomicrobiology, Department of Biological Sciences, Aarhus University, 4 July 2014.

Guest lecturer in graduate course in *Carbonate Environments*: 1993, 1995, 2001.

Guest lecturer in undergraduate course in *Ocean Processes in Environmental Systems*: 2000, 2002, 2003, 2004.

Guest lecturer in *Environmental Ethics*: 2008, 2009.

Guest lecturer in graduate course in *Sources, Transport, and Fate of Environmentally Important Materials* (Oceanography component): 2000.

Guest lecturer in International Geobiology Course, Agouron Institute, Catalina, California, 4-11 July 2004.

Other Work-Related Activities

Proposal reviews for National Science Foundation; Department of Energy; Environmental Protection Agency; Council for International Exchange of Scholars (Fulbright Scholar Program); National Oceanic and Atmospheric Administration; National Undersea Research Council; Hudson River Foundation; Netherlands Geosciences Foundation; Water Resources Research Institute; National Sea Grant College Program; Natural Environment Research Council (UK); Petroleum Research Fund; U.S. Civilian Research and Development Foundation; Netherlands Organization for Scientific Research; Maine Marine Research Fund.

Manuscript reviews for *Analytical Chemistry*; *American Journal of Science*; *Applied Geochemistry*; *Archiv für Hydrobiologie*; *Astrobiology*; *Biogeochemistry*; *Biogeosciences*; *Deep-Sea Research*; *Earth and Planetary Science Letters*; *Environmental Science and Technology*; *Estuarine, Coastal and Shelf Science*; *FEMS*; *Geobiology*; *Geochemistry*; *Geophysics*; *Geosystems*; *Geochimica et Cosmochimica Acta*; *Geological Society of America Bulletin*; *Geology*; *Geophysical Research Letters*; *Global Biogeochemical Cycles*; *Journal of Marine and Petroleum Geology*; *Journal of Geophysical Research*; *Journal of Sea Research*; *Limnology and Oceanography*; *Marine Chemistry*; *Microbiology Ecology*; *Nature*; *Nature Geosciences*; *Organic Geochemistry*; *Proceedings of the National Academy of Sciences*; *Progress in Oceanography*; *Regional Environmental Change*; *Water Resources Research Institute*; *Water Resources Research*.

Proposal review panels for National Science Foundation (1995, 1996, 1997, 2003), Environmental Protection Agency STAR Fellowship Program (1997, 2000, 2002, 2005, 2006, 2015), North Atlantic-Great Lakes National Underwater Research Center (1996), South East Regional Center of the National Institute for Global Environmental Change (1995), West Coast National Underwater Research Center (1995), Fulbright Peer Review Panel (2009-2011).

Served on CoOP (Coastal Ocean Processes) Steering Committee: 2000 to 2002.

Duke/UNC Oceanographic Consortium Program Advisory Committee: 1995 to 1998.

Served on Environmental Curriculum Committee for the Carolina Environmental Program: 2001 to 2006.

Served on Graduate School Fellowship Committee, Society of Fellows Faculty Board: 2001 to 2005.

Served on Faculty Council: 2004 to 2007.

Director of Undergraduate Studies: 1995 to present.

Director of Graduate Admissions: 2004 to present.

Supervisor to undergraduate students involved in Directed Research Course work: Spring 1989 to 1992, Spring 1995, Fall 2003, Spring 2004.

Scientific Mentor for undergraduate recipient of a Science Opportunity Fellowship: Summer 1995, Summer 1999.

Scientific Mentor for visiting graduate student from Aarhus University: Fall 2009.

Scientific Mentor for visiting graduate student from Harvard University: Summer 2015.

Participant in Pre-college Research Experience in Mathematics, Science, and Technology Program: Summer 1999.

Faculty Advisor: Focus the Nation (Fall 2007 to Spring 2008); Epsilon Eta Environmental Honors Fraternity (Fall 2009).

Awards and Honors

Aarhus University Guest Researcher, Jun 19 to Jul 19, 2014.

Class of 1996 Excellence in Advising Award, 2008.

Fulbright Scholar, The Netherlands, 2005.

Brandes Course Development Award, University of North Carolina, Chapel Hill, 1995.

Award for Outstanding Student in Marine Science and Limnology, University of Alaska, Fairbanks, 1986.

American Chemical Society Accreditation, Colby College, 1979.

Chi Epsilon Mu Prize in Chemistry, Colby College, 1976.