VITA

CRAIG M. BETHKE

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Hydrogeologist, specializing in mathematical modeling of subsurface and surficial processes, including fluid migration within sedimentary basins, chemical interactions between fluids and sediments, environmental aspects of aqueous geochemistry, and geomicrobiology. Background in transport theory, study of multicomponent chemical reactions, microbial geochemistry, isotopes, clay mineralogy and shale petrology, and optical phenomena.

Education

University of Illinois, 9/82–1/85, Ph.D. Geology.
The Pennsylvania State University, 9/80–6/82, Geosciences.
Dartmouth College, 9/75–12/79, A.B. Earth Sciences, with Distinction.

Professional Experience

CEO, Aqueous Solutions LLC, 8/11–present.
Professor Emeritus, University of Illinois, 7/12–present.
Specially Appointed Professor, Hokkaido University, 9/15–present.
Consulting Professor, Stanford University, 7/12–7/15.
Ralph E. Grim Professor, University of Illinois, 8/07–6/12.
Visiting Professor, Geological and Environmental Sciences, Stanford University, 8/10–7/12.
Visiting Professor, Centre for Water Research, Univ. of Western Australia, Perth, 6/05–1/06.
Professor, *Académie des Sciences*, Paris, 9/94–8/95.
Professor of Geology, University of Illinois, 8/92–6/12.
Associate Professor of Geology, University of Illinois, 8/87–8/92.
Visiting Professor, *Ecole Nationale Supérieure des Mines de Paris*, Fontainebleau, France, 9/90–8/91.
Adjunct Professor, National Center for Supercomputing Applications, 11/86–8/02.
Assistant Professor of Geology, University of Illinois, 1/85–7/87.
Lecturer, University of Illinois, 8/84–1/85.
Geologist, ARCO Oil and Gas Co., Summer 1983.
Geologist, Exxon Production Research Co. and Exxon Minerals Co., Summers 1980 and 1981.

Awards and Honors

National and International

M. King Hubbert Award, National Ground Water Association, 2011.
Cox Fellowship, Stanford University, 2010–2011, 2011–2012.
Environmental Geoscience Research Award, American Assoc. Petroleum Geologists, 2006.
Gledden Fellowship, University of Western Australia, 2005.
Fellow, American Association for the Advancement of Science, 2003.
Professorship, *Académie des Sciences,* Paris, 1994.
Fellow, Geological Society of America, 1993.

O.E. Meinzer Award, Geological Society of America, 1992.
Waldemar Lindgren Award, Society of Economic Geologists, 1987.
Presidential Young Investigator Award, White House, 1986.
Shell Faculty Career Fellow, 1986–89.
Best Student Paper Award, Clay Minerals Society, 1984.
National Science Foundation Graduate Fellow, 1980–83.

Campus

Cited for Excellence in Teaching, University of Illinois, 1985; 1987; 1993; 1994; 1996; 1998; 1999; 2000; 2001; 2002; 2003; 2004; 2005; 2006; 2007; 2008; 2009; 2010, 2011.
Richard and Margaret Romano Professorial Scholar, 2005–2008.
Fellow, Faculty Study in a Second Discipline (Microbiology), 1999.
Fellow, Center for Advanced Study, 1998.
Beckman Associate, Center for Advanced Study, 1988–89.
Elected to Phi Kappa Phi, 1983; Sigma Xi, 1984.
Upham Prize for undergraduate research, Dartmouth College, 1979.

Supervision

M.S. students (did not continue for Ph.D.): Melinda Ylagan (née Legg), Theresa Fritzel (née Beckman), Kurt Larson, Melinda Tidrick, Matthew Kirk, Brent Olson, Peter Berger, Man Jae Kwon, Meng Lei, Dong Ding, Derik Strattan, Matt Kyrias, Brian Farrell.

Doctoral students: Thomas Corbet, Ming-Kuo Lee, Daniel O. Hayba, Amy Berger, Jungho Park, Qusheng Jin, George Roadcap, Ted Flynn.

Postdoctoral scholars: Hernán Quinodoz, Annette Fugl, Changlin Huang, Valentin Vangelov, Xiang Zhao, Xinong Xie.

Undergraduate interns (paid positions only): Jason Dotterer, Arkady Epshteyn, Andrew Rassi, Rachel Rassi, Tamar Shinar, David Solt, Pavel Yusim, Sasanka Chalivendra, Kevin Gorczowski, Daniel Saalfeld, Jesse Luehrs, Beth Luber, Bryan Plummer.

Professional staff (Academic Professional only): Thomas Dirks, Jeffrey Biesiadecki, Walter Kreiling, Gordon Madise, David Solt, Tren Haselton, Pilar Manzano, Ester Soriano, Corey Steffen, Jane Xu, Rick Hedin, Lalita Kalita, Peter Berger, Sharon Yeakel, Philip Parker, Daniel Saalfeld, Jesse Luehrs.

Patents

Bethke, C.M. and D. Saalfeld, 2013, System and method for reactive transport modeling, Pending, U.S.

Bethke, C.M., 2006, *In situ* treatment process to remove metal contamination from groundwater. U.S. 7,141,173, South Africa 2006/04727, European Union 04702906.1, Canada 2,550,328, Mexico 260804, Australia 2004314102. [pdf]

Publications

Books

Bethke, C.M., 2008, *Geochemical and Biogeochemical Reaction Modeling*. Cambridge University Press, 547 pp. [info] [reviews] [book cover]

Bethke, C.M., 1996, *Geochemical Reaction Modeling, Concepts and Applications*. Oxford University Press, New York, 397 pp. [info] [reviews]

Journal Articles

Bethke, C.M. and R.A. Sanford, 2018, Subsurface microbial activity: Beyond the thermodynamic ladder. *Journal of the Japan Society of Soil Physics*, **138**, 27–35. [pdf]

Flynn, T.M., R.A. Sanford, H. Ryu, C.M. Bethke, A.D. Levine, N.J. Ashbolt and J.W. Santo Domingo, 2013, Functional microbial diversity explains groundwater chemistry in a pristine aquifer. *BMC Microbiology*, **13**, doi:10.1186/1471-2180-13-146. [pdf]

Flynn, T.M., R.A. Sanford and C.M. Bethke, 2012, The active bacterial community in a pristine confined aquifer. *Water Resources Research*, **48**, doi: 10.1029/2011WR011568. [pdf]

Bethke, C.M., R.A. Sanford, M.F. Kirk, Q. Jin and T.M. Flynn, 2011, The thermodynamic ladder in geomicrobiology. *American Journal of Science*, **311**, 183–210. [pdf]

Jin, Q. and C.M. Bethke, 2009, Cellular energy conservation and the rate of microbial sulfate reduction. *Geology*, **37**, 1027–1030. [pdf]

Park, J., R.A. Sanford, and C.M. Bethke, 2009, Microbial activity and chemical weathering in the Middendorf Aquifer, South Carolina. *Chemical Geology,* **258**, 232–241. [pdf]

Jin, Q. and C.M. Bethke, 2008, Reply to comment: The thermodynamics and kinetics of microbial metabolism by John Walther. *American Journal of Science*, **308**, 1117–1118. [pdf]

Bethke, C.M., D. Ding, Q. Jin and R.A. Sanford, 2008, Origin of microbiological zoning in groundwater flows. *Geology*, **36**, 739–742. [pdf]

Flynn, T.M., R.A. Sanford and C.M. Bethke, 2008, Attached and suspended microbial communities in a pristine confined aquifer. *Water Resources Research*, **44**, W07425. [pdf]

Kwon, M.J., R.A. Sanford, J. Park, M.F. Kirk and C.M. Bethke, 2008, Microbiological response to well pumping, *Ground Water*, **46**, 286–294. [pdf]

Bethke, C.M. and T.M. Johnson, 2008, Groundwater age and groundwater age dating. *Annual Review of Earth and Planetary Sciences,* **36**, 121–152. [pdf]

Jin, Q. and C.M. Bethke, 2007, The thermodynamics and kinetics of microbial metabolism. *American Journal of Science*, **307**, 643–677. [pdf]

Kieffer, S.W., X. Lu, C.M. Bethke, J.R. Spencer, S. Marshak and A. Navrotsky, 2006, A clathrate reservoir hypothesis for Enceladus' south polar plume. *Science*, **314**, 1764–1766. [pdf] [more]

Roadcap, G.S., R.A. Sanford, Q. Jin, J.R. Pardinas and C.M. Bethke, 2006, Extremely alkaline (pH > 12) ground water hosts diverse microbial community. *Ground Water*, **44**, 511–517. [pdf]

Park, J., R.A. Sanford, and C.M. Bethke, 2006, Geochemical and microbiological zonation of the Middendorf Aquifer, South Carolina. *Chemical Geology*, **230**, 88–104. [pdf]

Roadcap, G.S., W.R. Kelly, and C.M. Bethke, 2005, Geochemistry of extremely alkaline (pH > 12) ground water in slag-fill aquifers. *Ground Water*, **43**, 806–816. [pdf]

Jin, Q. and C.M. Bethke, 2005, Predicting the rate of microbial respiration in geochemical environments. *Geochimica et Cosmochimica Acta*, **69**, 1133–1143. [pdf]

Kirk, M.F., T.R. Holm, J. Park, Q. Jin, R.A. Sanford, B.W. Fouke, and C.M. Bethke, 2004, Bacterial sulfate reduction limits natural arsenic contamination of groundwater. *Geology*, **32**, 953–956. [pdf] [more]

Jin, Q. and C.M. Bethke, 2003, A new rate law describing microbial respiration. *Applied and Environmental Microbiology*, **69**, 2340–2348. [pdf]

Jin, Q. and C.M. Bethke, 2002, Kinetics of electron transfer through the respiratory chain. *Biophysical Journal*, **83**, 1797–1808. [pdf]

Bethke, C.M. and T.M. Johnson, 2002, Ground water age. *Ground Water*, **40**, 337–339. [pdf]

Park, J., C.M. Bethke, T. Torgersen and T.M. Johnson, 2002, Transport modeling applied to the interpretation of groundwater ^{36}Cl age. *Water Resources Research*, **38**, 1–15. [pdf]

Bethke, C.M. and T.M. Johnson, 2002, Paradox of groundwater age. *Geology*, **30**, 385–388. [pdf]

Xie, X., C.M. Bethke, S. Li, X. Liu and H. Zheng, 2001, Overpressures and petroleum generation and accumulation in the Dongying depression of the Bohaiwan basin, China. *Geofluids*, **1**, 257–271. [pdf]

Bethke, C.M., T. Torgersen, J. Park, 2000, The "age" of very old groundwater: Insights from reactive transport models, *Journal of Geochemical Exploration*, **69–70**, 1–4. [pdf]

Bethke, C.M. and P.V. Brady, 2000, How the K_d approach undermines groundwater cleanup. *Ground Water*, **38**, 435–443. [pdf]

Berger, A. and C.M. Bethke, 2000, A process model of natural attenuation at a historic mining district. *Applied Geochemistry*, **15**, 655–666. [pdf]

Bethke, C.M., X. Zhao and T. Torgersen, 1999, Groundwater flow and the ^{4}He distribution in the Great Artesian Basin of Australia. *Journal of Geophysical Research*, **104**, 12,999–13,011. [pdf] [data]

Zhao, X., T.L.B. Fritzel, H.A.M. Quinodoz, C.M. Bethke and T. Torgersen, 1998, Controls on the distribution and isotopic composition of helium in deep ground-water flows. *Geology*, **26**, 291–294. [pdf]

Bethke, C.M., 1997, Modelling transport in reacting geochemical systems (invited paper). *Comptes Rendus de l'Académie des Sciences*, **324**, 513–528. (Reprinted in J.-P. Poirier, ed., *Le Point Sur... Sciences de la Terre VI, Géochimie*, Editions Elsevier, Paris, 2001.) [pdf]

Rowan, E.L., J. Thibiéroz, C.M. Bethke, and G. de Marsily, 1996, Geochemical and hydrologic conditions for fluorite mineralization in regions of continental extension: an example from the Albigeois district, France. In Carbonate-hosted lead-zinc deposits, D.F. Sangster, ed., *Soc. Econ. Geol., Spec. Pub. No. 4*, p. 00–00.

Lee, M.-K. and C.M. Bethke, 1996, A model of the fractionation of stable isotopes in reacting geochemical systems. *American Journal of Science*, **296**, 965–988. [pdf]

Hayba, D.O. and C.M. Bethke, 1995, Timing and velocity of petroleum migration in the Los Angeles basin. *Journal of Geology*, **103**, 33–49. [pdf]

Lee, M.-K. and C.M. Bethke, 1994, Groundwater flow, late cementation, and petroleum accumulation in the Permian Lyons sandstone, Denver basin. *American Association of Petroleum Geologists Bulletin*, **78**, 217–237. [pdf]

Bethke, C.M., 1992, The question of uniqueness in geochemical modeling. *Geochimica et Cosmochimica Acta*, **56**, 4315–4320. [pdf]

Corbet, T.F. and C.M. Bethke, 1992, Disequilibrium fluid pressures and groundwater flow in the Western Canada sedimentary basin. *Journal of Geophysical Research*, **97**, 7203–7217. [pdf]

Bethke, C.M., J.D. Reed and D.F. Oltz, 1991, Long-range petroleum migration in the Illinois Basin. *American Association Petroleum Geologists Bulletin*, **75**, 925–945. [pdf]

Bethke, C.M. and S. Marshak, 1990, Brine migrations across North America — The plate tectonics of groundwater. *Annual Review Earth and Planetary Sciences*, **18**, 287–315 (invited paper). (Reprinted in W.E. Dietrich and G. Sposito, eds., (1997) *Hydrologic Processes from Catchment to Continental Scales*, Annual Reviews, Inc., 336 p.) [pdf]

Bethke, C.M., 1989, Modeling subsurface flow in sedimentary basins. *Geologische Rundschau*, **78**, 129–154 (invited paper). [pdf]

Altaner, S.P. and C.M. Bethke, 1988, Interlayer order in illite/smectite. *American Mineralogist*, **73**, 766–774. [pdf]

Bethke, C.M., 1988, Reply to a comment by V.V. Palciauskas on "A numerical model of compaction driven groundwater flow and its application to the paleohydrology of intracratonic sedimentary basins." *Journal of Geophysical Research*, **93**, 3500–3504. [pdf]

Bethke, C.M. and T. Corbet, 1988, Linear and non-linear solutions for one-dimensional compaction flow in sedimentary basins. *Water Resources Research*, **24**, 461–467. [pdf]

Bethke, C.M., W.J. Harrison, C. Upson and S.P. Altaner, 1988, Supercomputer analysis of sedimentary basins. *Science*, **239**, 261–267. [pdf]

Bethke, C.M., 1986, Inverse hydrologic analysis of the distribution and origin of Gulf Coast-type geopressured zones. *Journal of Geophysical Research*, **91**, 6535–6545 [pdf] (also **93**, 9211 [pdf]).

Bethke, C.M. and S.P. Altaner, 1986, Layer-by-layer mechanism of smectite illitization and application to a new rate law. *Clays and Clay Minerals*, **34**, 136–145. [pdf]

Bethke, C.M., N. Vergo and S.P. Altaner, 1986, Pathways of smectite illitization. *Clays and Clay Minerals*, **34**, 125–135. [pdf]

Bethke, C.M., 1986, Hydrologic constraints on genesis of the Upper Mississippi Valley Mineral District from Illinois Basin brines. *Economic Geology*, **81**, 233–249. [pdf]

Bethke, C.M. and R.C. Reynolds, 1986, Recursive method for determining frequency factors in interstratified clay diffraction calculations. *Clays and Clay Minerals*, **34**, 224–226. [pdf]

Bethke, C.M., 1985, A numerical model of compaction-driven groundwater flow and heat transfer and its application to the paleohydrology of intracratonic sedimentary basins. *Journal of Geophysical Research*, **90**, 6817–6828. [pdf]

Brindley, G.W., P.E. Zalba and C.M. Bethke, 1983, Hydrobiotite, a regular 1:1 interstratification of biotite and vermiculite layers. *American Mineralogist*, **68**, 420–425. [pdf]

Bethke, C.M., and R.W. Birnie, 1980, Computer synthesis of optical interference figures. *American Mineralogist*, **65**, 1294–1301. [pdf]

Book Chapters

Lovelace, K., S. Walker, R. Wilhelm, R. Puls, R.G. Ford, R.T. Wilkin, S. Acree, S. Mangion, P.V. Brady and C. Bethke, 2007, Conceptual Background for Monitored Natural Attenuation. In R.G. Ford, R.T. Wilkin and R.W. Puls (eds.), *Monitored Natural Attenuation of Inorganic Contaminants in Ground Water*, U.S. Environmental Protection Agency, 1–23.

Wilkin, R.T., S. Acree, S. Mangion, P.V. Brady, R.G. Ford, R.W. Puls, P.M. Bertsch, D.B. Kent, A. Azadpour-Keeley, J.E. Amonette, and C. Bethke, 2007, Technical Basis for Natural Attenuation in Ground Water. In R.G. Ford, R.T. Wilkin and R.W. Puls (eds.), *Monitored Natural Attenuation of Inorganic Contaminants in Ground Water*, U.S. Environmental Protection Agency, 25–42.

Bethke, C.M., J. van der Lee and J.-M. Schmitt, 1999, The chemistry beneath our feet — Modeling reacting flow in the Earth's crust. In C. Jablon, ed., *Scientific Bridges for 2000 and Beyond*, Académie des Sciences, Paris, 1–11. [pdf]

Bethke, C.M., M.-K. Lee and R.W. Wendlandt, 1992, Mass transport and chemical reaction in sedimentary basins: Natural and artificial diagenesis. In N. Afgan (ed.), *Heat and Mass Transfer in Porous Media*, Elsevier.

Bethke, C.M., J.D. Reed and D.F. Oltz, 1991, Long-range petroleum migration in the Illinois Basin. In M. W. Leighton (ed.), *Interior Cratonic Sag Basins*, Petroleum Basins Series, American Association of Petroleum Geologists, Tulsa, 455–472. [pdf]

Commentary

Brady, P.V. and C.M. Bethke, 2000, Beyond the K_d approach (Editorial). *Ground Water*, **38**, 321–322. [pdf]

Published Software Documentation (latest versions only)

Bethke, C.M. and S. Yeakel, 2016, *The Geochemist's Workbench®, Release 11: GWB Essentials Guide*. Aqueous Solutions LLC, Champaign, Illinois, 151 p. [pdf]

Bethke, C.M. and S. Yeakel, 2016, *The Geochemist's Workbench®, Release 11: Reaction Modeling Guide*. Aqueous Solutions LLC, Champaign, Illinois, 98 p. [pdf]

Bethke, C.M. and S. Yeakel, 2016, *The Geochemist's Workbench®, Release 11: Reactive Transport Modeling Guide*. Aqueous Solutions LLC, Champaign, Illinois, 118 p. [pdf]

Bethke, C.M. and S. Yeakel, 2016, *The Geochemist's Workbench®, Release 11: Reference Manual*. Aqueous Solutions LLC, Champaign, Illinois, 446 p. [pdf]

Bethke, C.M., 2016, ChemPlugin™ User's Guide, Aqueous Solutions LLC, Champaign, Illinois, 312 p. [pdf]

Bethke, C.M., M.-K. Lee and J. Park, 2002, *Basin Modeling with Basin2 Release 5, A Guide to Using the Basin2 Software Package*. University of Illinois, Urbana, 210 p.

Professional Service

Organizer and Co-convener (with Denis Norton), *National Workshop on Computational Geoscience*, Urbana, Illinois, April 26–28, 1987.

Keynote speaker and Co-moderator (with Deiter Marsal), Symposium on "Fluid migration," 78th Annual Meeting of the Geological Society (Germany): Evolution of Sedimentary Basins, Julich, West Germany, February 24–26, 1988.

Convener and Co-instructor (with Wendy Harrison), *Applied Reaction Path Modeling*, Short course, Urbana, Illinois, April 19–21, 1988.

Keynote speaker and Panelist, Symposium on "Modelling geochemical transport in deep groundwaters," European Union of Geosciences meeting, Strasbourg, France, March 20–29, 1989.

Convener and Co-instructor (with Wendy Harrison), *Modeling the Paleohydrology of Sedimentary Basins*, Short course, Urbana, Illinois, May 2–4, 1989.

Co-convener (with David Gubbins), Symposium on "The use of super-computers in the geological sciences," 28th International Geological Congress, Washington, DC, July 9–19, 1989.

Instructor, *Understanding fluid migration in sedimentary basins*, 5-day lecture series, Chiba-Shi, Japan, October 23–27, 1989.

Convener and Instructor, *Modeling the Chemistry of Rock-Fluid Interactions*, Short course, Urbana, Illinois, April 17–19, 1990.

Instructor, Workshops on *Fluid Migration and Sediment Diagenesis*, Canberra and Sydney, Australia, May 16 and 22, 1990. Sponsored by Bureau of Mineral Resources and The Earth Resources Foundation of the University of Sydney.

Convener and Co-instructor (with Ming-Kuo Lee, Kurt Larson, Charles Norris, Jeff Biesiadecki, and Walter Kreiling), *Groundwater Flow, Mass Transport, and Sediment Diagenesis*, Short course, Urbana, Illinois, June 17–19, 1991.

Convener and Co-instructor (with Ming-Kuo Lee), *Geochemical Reaction Modeling*, Short course, Urbana, Illinois, June 2–4, 1992.

Convener and Co-instructor (with Hernán Quinodoz, Ming-Kuo Lee, Amy Berger, and Melinda Legg), *Basin Modeling with Basin2*, Short course, Urbana, Illinois, June 8–10, 1993.

Convener and Co-instructor (with Amy Berger and Melinda Legg), *Reaction Modeling in Petroleum Geology and Environmental Geochemistry*, Short course, Urbana, Illinois, May 17–19, 1994.

Co-instructor (with Jean-Michel Schmitt and Anne Bariteau), *Modélisations Géochimiques Appliquées aux Problèmes d'Environnement et de Qualité des Eaux*, Short course, Fontainebleau, France, March 27–29, 1995 (repeated July 5–7).

Co-instructor (with Annette Fugl, Xiang Zhao, and Thomas Torgersen), *Reactive Transport and Basin Modeling*, Short course, Urbana, Illinois, May 29–31, 1996.

Co-instructor (with Amy Berger, Jungho Park, Melinda Tidrick), *Modeling Reactions and Reactive Transport in Geochemical Systems*, Short course, Urbana, Illinois, August 26–28, 1997.

Associate Editor, *Geological Society of America Bulletin*, 1997–2000.

Co-instructor (with Amy Berger), *Problem Solving with The Geochemist's Workbench,* Denver, CO, June 17–18, 1999.

Steering committee, NSF workshop "Directions and Priorities in Low-Temperature Geochemistry for the Year 2000 and the Next Decade", and co-author of resulting report "Research Opportunities in Low-Temperature and Environmental Geochemistry", 1999.

Instructor, *Reaction and Reactive Transport Modeling*, Menlo Park, CA, May 17–18, 2000.

Associate Editor (founding), *Geofluids*, 2000–2009.

Instructor, *Problem Solving with The Geochemist's Workbench*, May 17–18, 2001, Denver, CO.

Subject Matter Expert, Yucca Mountain Project peer review panel (wrote final report to Congress), 2000–2002.

Instructor, *Problem Solving with The Geochemist's Workbench and Xt*, October 30–31, 2002, Denver, CO.

Panelist, USEPA committee on "Monitored Natural Attenuation for Inorganics in Groundwater" (writing standards for applying MNA), 2001–2004.

Clarke Medal Committee, Geochemical Society, 2001–2003 (committee chair, 2003).

Instructor, *Problem Solving with The Geochemist's Workbench*, Seattle, WA, November 1–2, 2003.

Panelist, National Academy of Sciences Committee on "Novel Approaches to the Management of Greenhouse Gases from Energy Systems," 2003.

Instructor (with Yitian Xiao), Problem Solving with The Geochemist's Workbench, Houston, Texas, January 12–13, 2004.

Instructor, *Aqueous Geochemical Modeling*, Goldschmidt Conference, Copenhagen, Denmark, June 3–4, 2004.

Instructor (with Yitian Xiao), Problem Solving with The Geochemist's Workbench, Houston, Texas, January 15–16, 2006.

Review Panelist, Environmental Remediation Sciences Division, Department of Energy, Washington DC, July 17–18, 2007.

Instructor (with Yitian Xiao), Solving Science and Engineering Problems Using The Geochemist's Workbench, Houston, Texas, January 29–30, 2008.

Review Panelist, Sustainable Science Focus Area, Lawrence Berkeley National Laboratory, May 19–21, 2010.

Instructor (with Kate Maher), Reactive Transport Modeling, Stanford University, September 25–26, 2010.

Science Advisory Committee, Sustainable Science Focus Area, Lawrence Berkeley National Laboratory, 2010–2013.

Instructor (with Brian Farrell), Reactive Transport Modeling short course, Melbourne, NSW and Perth, Western Australia, September 10–14, 2012.

Instructor (with Brian Farrell), Reactive Transport Modeling short course, Redmond, WA, November 27–30, 2012.

Instructor (with Kate Maher, Brian Farrell), Reactive Transport Modeling in Geochemical Systems, Goldschmidt 2013 conference, Florence, Italy, August 24-25, 2013.

Instructor (with Brian Farrell, James Davis), Geochemical Reaction Modeling, Geological Society of America 2013 Annual Meeting, Denver, Colorado, October 25-26, 2013.

Instructor (with Kate Maher, Jenny Druhan, Brian Farrell), Reactive Transport Modeling in Geochemical Systems, Goldschmidt 2014 conference, Sacramento, CA, June 7-8, 2014.

Instructor (with Tsutomu Sato, Brian Farrell), Reactive Transport Modeling in Geochemical Systems, AOGS 2014 conference, Sapporo, Japan, July 25-26, 2014.

Instructor (with Brian Farrell, Katelyn Zatwarnicki), Geochemical Reaction Modeling, Geological Society of America 2014 Annual Meeting, Vancouver, Canada, October 17-18, 2014.

Keynote speaker, International Symposium on Multidisciplinary Sciences, Tokyo, Japan, November 18, 2014.

Keynote speaker, Biogeochemical and Isotopic Characterization and Modeling of Biologically Mediated Processes Across Scales, American Geophysical Union Annual Meeting, San Francisco, California, December 18, 2014.

Instructor (with Jenny Druhan, Brian Farrell, Katelyn Zatwarnicki), Reactive Transport Modeling in Geochemical Systems, Goldschmidt 2015 conference, Prague, Czech Republic, August 15-16, 2015.