

## Curriculum Vitae for *CARL I. STEEFEL*

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### EDUCATION:

Princeton University  
1974 Washington University - B.A. English Literature  
1982 University of Colorado, Boulder - M.S. Geology.  
1987 Yale University - M.Phil. Geology  
1992 Yale University - Ph.D Geochemistry, May 1992.

### EXPERIENCE:

2012-present Senior Scientist, Earth Sciences Division, Lawrence Berkeley National Lab  
2004-2012 Staff Scientist, Earth Sciences Division, Lawrence Berkeley National Lab  
1998- 2004 Staff Scientist, Environmental Science Division, Lawrence Livermore National Laboratory  
1995- 1998 Assistant Professor of Geology, University of South Florida  
1995 Senior Research Scientist, Interfacial Geochemistry Group, Battelle Pacific Northwest Laboratories  
1993-1995 Research Scientist, Interfacial Geochemistry Group, Battelle Pacific Northwest Laboratories  
1991-1992 Post-doctoral Associate, Mineralogisch-Petrographisches Institut, Universitat Bern, Switzerland  
1985-1991 Teaching and research fellowships, Yale University Department of Geology  
1985 Project geologist, Anaconda Minerals,  
1983-1985 Staff geologist, Anaconda Minerals  
1981-1983 Geologist, Anaconda Minerals  
1979-1980 Temporary geologist, Anaconda Minerals  
1978 Geological assistant, U.S.G.S. Branch of Exploration Research  
1976 Manuscripts librarian, Huntington Library, San Marino, California

### RESEARCH INTERESTS:

*Reactive contaminant transport:* Contaminant migration in groundwater and the vadose zone  
*Chemical weathering:* Developing quantitative reactive transport models for rock weathering  
*Reactive transport modeling:* Approaches to numerical modeling of reactive contaminant transport and water-rock interaction  
*Mineral-water kinetics:* Mineral dissolution and precipitation kinetics  
*Biogeochemistry:* Biogeochemical reactions in groundwater and estuaries  
*Hydrothermal systems:* Mineral-water reactions and transport in mid-ocean ridge and off-axis hydrothermal systems

### AWARDS & RECOGNITION:

2007 Award for outstanding contributions to basic research in the geosciences, Geosciences Research Program, Division of Chemical Sciences, Geosciences, and Biosciences, U.S. Department of Energy, May 2007.

- 1990 Philip M. Orville Prize for outstanding research and scholarship, Dept. of Geology and Geophysics, Yale University
- 1990 Best Student Contribution, 2nd International Symposium on the Geochemistry of the Earth's Surface and of Mineral Formation, Aix-en-Provence, France (with P. Van Cappellen, K.L. Nagy, and A.C. Lasaga)
- 1989 Outstanding Mention, GSA Research Proposal
- 1974 Phi Beta Kappa, Washington University

**KEYNOTE AND INVITED PRESENTATIONS:**

- 2014 “The GEWaSC Framework: Multiscale Modeling of Coupled Biogeochemical, Microbiological, and Hydrological Processes” at 2014 Goldschmidt Conference, Sacramento, CA, June 13, 2014
- 2014 “What is the State of the Art in Reactive Transport Modeling”, presented at an NSF workshop on Expanding the role of Reactive Transport Modeling (RTM) within the Biogeochemical Sciences, Arlington, VA, April 14, 2014
- 2014 “Genome-Enabled Watershed Simulation Capability (GEWaSC)”, presented at Terrestrial Ecosystem and Subsurface Biogeochemical Research meeting, Potomac, MD, May 6, 2014
- 2014 “Reactive Transport Models (RTM): Pores to Plots to Watersheds” presented at DOE Workshop on Computational Challenges for Mechanistic Modeling of Terrestrial Environments, Gaithersburg, MD, March 26, 2014.
- 2013 “What are the Time Scales for Carbonate Mineral Sequestration in the Subsurface?” presented at the 2013 Fall American Geophysical Union meeting, San Francisco, CA, Dec. 11, 2013.
- 2013 “Intercomparison of Reactive Transport Models” at 2013 SIAM meeting, Padova, Italy, June 19, 2013.
- 2013 “Approaches for Assessing Time Scales for Carbonate Mineral Sequestration” at Helmholtz-Zentrum für Umweltforschung (UFZ), Potsdam, Germany, May 13, 2013.
- 2013 “Reaction Fronts: Microscopic and Macroscopic” at Kongsberg Seminar, Kongsberg, Norway, May 9, 2013.
- 2013 “Time Scales for Carbonate Mineral Sequestration” at Washington University, May 1, 2013.
- 2013 “What are the time Scales for Carbonate Mineral Sequestration of CO<sub>2</sub> in the Subsurface”, Yale University Department of Geology, February 14, 2013.
- 2013 “Experimental and Modeling Studies to Determine Time Scales for Carbonate Mineral Sequestration” at Le Studium Conference, Orleans, France, February 25, 2013.
- 2012 “Pore to Flood Plain Scale Modeling of Reactive Transport” at 2012 Fall AGU Meeting, San Francisco, Ca, December 4, 2012.
- 2012 “Characterization and Modeling of Reactivity in a Sandstone containing Internal Diffusion-Controlled Zones” at BES Geosciences Workshop on Reaction and Transport within Internal Domains of Porous Medium, December 2, 2012.
- 2012 “What are the time Scales for Carbonate Mineral Sequestration of CO<sub>2</sub> in the Subsurface”, Colorado School of Mines, November 15, 2012.
- 2012 “What are the time Scales for Carbonate Mineral Sequestration of CO<sub>2</sub> in the Subsurface”, University of Missouri, Kansas City, November 7, 2012.
- 2012 “New Directions in Reactive Transport Modeling” at Subsurface Simulation Benchmark Workshop, National Central University, Taiwan, November 29, 2012.
- 2012 “What are the time Scales for Carbonate Mineral Sequestration of CO<sub>2</sub> in the Subsurface”, UCLA Department of Earth and Planetary Sciences, October 4, 2012.
- 2012 “Diffusion versus Surface Reaction Control of Mineral Precipitation and Dissolution Kinetics at the Pore Scale” at Goldschmidt 2012, Montreal, Canada, June 27, 2012.
- 2011 Invited speaker, Upscaling Carbonate Precipitation Associated with CO<sub>2</sub> Sequestration, American Geophysical Union Fall Meeting
- 2011 Invited speaker, Pore Scale Modeling of Mixing-Induced Carbonate Precipitation, American Geophysical Union Fall Meeting

- 2011 Keynote speaker, American Chemical Society symposium *Multiscale Spatiotemporal Complexity in Geologic Carbon Sequestration: Linking Experimentation and Modeling*, August 2011.
- 2011 Invited speaker, Stanford University Geochemistry Colloquium.
- 2011 Invited speaker at Geochemical Transport in Compacted Clays, Bern, Switzerland.
- 2011 Invited speaker at workshop on Glass Corrosion, Manchester, England.
- 2010 Invited speaker, American Geophysical Union symposium *CO<sub>2</sub> Sequestration Inside Pores: From Molecules to Microbes*, December, 2010.
- 2010 Invited speaker at Department of Geological Sciences, University of Oregon.
- 2009 Invited speaker, Modeling Waste Form Performance in the Near-Field Environment, *Waste Form Performance and Technology*, U.S. National Academy of Sciences, November 4, 2009.
- 2008 Keynote speaker, 2008 Goldschmidt Conference, *Modeling of Thermodynamic and Kinetic Controls on Complex Biogeochemical Reaction Networks*.
- 2007 Keynote speaker, 2007 Goldschmidt Conference, *Interpreting Reaction Rates at the Field Scale*.
- 2006 Keynote speaker, American Chemical Society symposium *Understanding Radionuclide Transport in the Environment: Remediation, Nuclear Waste Disposal, and Long-Term Stewardship*, March 2007.
- 2005 Keynote speaker, Geochemical and Transport Modeling, *10<sup>th</sup> International Conference on Migration of Behaviour of Actinides and Fission Products in the Geosphere*, Migration 2005 Avignon, France, September, 2005.
- 2005 Invited speaker, Conceptualizing Subsurface Biogeochemical Processes, *2005 International Symposium for Subsurface Microbiology, Jackson, Wyoming, August, 2005*.
- 2004 Invited speaker, Quantifying Rates in Biogeochemical Reaction Networks, *2004 Goldschmidt Conference*, June 2004.
- 2004 Keynote speaker, Reactive transport modeling of multicomponent cation exchange at the laboratory and field scale, *Workshop on Conceptual Model Development for Subsurface Reactive Transport Modeling of Inorganic Contaminants, Radionuclides, and Nutrients*, April 20-22, 2004, Albuquerque, New Mexico.
- 2003 Keynote speaker, *International Conference on Gas-Water-Rock Interaction with Application to CO<sub>2</sub> Sequestration and Petroleum Migration*, Institut Francaise du Petrole, Rueuil-Malmaison, France, Nov. 20-22, 2003.
- 2001 Invited speaker, DOE NABIR Workshop on Biogeochemical Modeling, October 21-22, 2001 at Pennsylvania State University.
- 2001 Invited speaker, 2001 Goldschmidt Meeting, Session on *Metals in the Weathering Environment*
- 2000 Plenary session speaker, *Computational Methods in Water Resources XIII*, June 25-29, 2000, Calgary, Canada.
- 2001 Invited speaker, AGU special session *Coupled Biogeochemical Processes Affecting the Transport of Contaminants in the Subsurface*, spring 2000
- 1999 University of Waterloo, Waterloo, Canada, a seminar entitled *Comparing Laboratory and Field Reaction/Weathering Rates: Is There a Discrepancy?*, April 27, 1999.
- 1999 Woods Hole Oceanographic Institute, a seminar on *Reactive Transport in Discrete Fractures: The role of Chemical Kinetics and Permeability Change*, April 15, 1999.
- 1999 University of Oregon Department of Geology, a seminar on *Reactive Transport in Discrete Fractures: A Case Study from Maqarin, Jordan*, March 12, Eugene, Oregon.
- 1999 Oregon State University Department of Geology, a seminar on *Reactive Transport in Discrete Fractures: A Case Study from Maqarin, Jordan*, March 11, Corvallis, Oregon.
- 1998 *Geochemical Kinetics: From the Laboratory to the Field*, presented at the European Research Conference on *Geochemistry of Crustal Fluids: Characterization of Reactive Transport in Natural Systems*. May 22-27, Heraklion, Crete.

- 1997 *Overview of Modeling of Coupled Reactive Transport Processes* presented at the Alternative Models and Interpretations for the Near-Field Altered Zone Coupled Effects Expert Elicitation Workshop, Dec. 3-4, 1997, Las Vegas, Nevada.
- 1997 *Incorporating Intra-Aqueous Kinetics into Reactive Transport Models* presented at a Workshop on Modeling Reactive Transport held at Battelle PNNL, Nov. 28-Dec.2, 1997.
- 1996 Geological Society of America Symposium on *Application of Reactive Transport Modeling to Natural Systems*, October 28.
- 1996 Approaches to Modeling Reactive Transport, presented at the Mineralogical Society of America Short Course on *Reactive Transport in Porous Media*, October 25-27, Golden, Colorado.
- 1995 Keynote Speaker, European Research Conference on *Natural Waters and Water Technologies*, November 3-8, Lenggries, Germany.
- 1995 Departmental colloquium, University of Idaho, March 10, Moscow, Idaho.
- 1994 Keynote Speaker, Chapman Conference on "Hydrogeologic Processes: Building and Testing Atomistic to Basin-Scale Models", June 6-9, 1994, Lincoln, New Hampshire
- 1992 Departmental colloquium, Johns Hopkins University.
- 1990 V.M. Goldschmidt Conference, May, 1990

### **PROFESSIONAL ACTIVITIES:**

Lead Instructor, CrunchFlow Short Course, August 24-25, 2013 Goldschmidt Conference, Florence, Italy.

Organizing committee, ASCR-BER Co-Development for Terrestrial Science Modeling

Organizer and Co-Editor, Workshops (Berkeley, Taiwan, Leipzig) and Special Issue of *Computational Geoscience* on **Subsurface Environmental Benchmark Modeling**

Associate Editor, *Geochimica et Cosmochimica Acta*, June 2011-present

*Journal of Contaminant Hydrology*, Associate Editor 2005-present

Principal developer of CrunchFlow Reactive Transport software package

Participant for 2011 Goldschmidt theme *Frontiers in Computational Geochemistry*.

Co-chair for 2009 Goldschmidt Theme *Frontiers in Computational Geochemistry*.

Berkeley Lab representative on panel to assess the state of flow and transport modeling at the Hanford Site, November 2005.

Associate editor, *Journal of Contaminant Hydrology* (2005-present)

Lead instructor for short course in Reactive Transport Modeling, University of Bern (4 times), LBNL, Penn State, Shell Oil, Heriot-Watt University, University of Minnesota

Yucca Mountain Unsaturated Zone/Radionuclide Transport Model Peer Review Panel, member, January-July, 1999.

*Journal of Hydrology*, Associate Editor (2002-2007)

*American Journal of Science*, Associate Editor (2002-2004)

*Geofluids*, Associate Editor

*Reviews in Mineralogy* Volume 34, Reactive Transport in Porous Media, Co-Editor

Member: American Geophysical Union, Geochemical Society

## PUBLICATIONS:

### Articles

- Steefel, C.I., S. Emmanuel, L. Anovitz (2015) Pore-Scale Geochemical Processes—Preface. *Reviews in Mineralogy and Geochemistry* 80: iii-iv.
- Tournassat, C., I.C. Bourg, C.I. Steefel, F. Bergaya (2015) Surface properties of clay minerals. In *Natural and Clay Barriers* (eds. C. Tournassat, C.I. Steefel, I.C. Bourg, and F. Bergaya): 5-31, Elsevier.
- Steefel, C.I., L. Beckingham, G. Landrot (2015) Micro-continuum approaches for modeling pore-scale geochemical processes. *Reviews in Mineralogy and Geochemistry* 80: 217-246.
- Tournassat, C., C.I. Steefel (2015) Ionic transport in nano-porous clays with consideration of electrostatic effects. *Reviews in Mineralogy and Geochemistry* 80: 287-329.
- Steefel, C.I., S.B. Yabusaki, K.U. Mayer (2015) Reactive transport benchmarks for subsurface environmental simulation. *Computational Geosciences* 19: 439-443. DOI: 10.1007/s10596-015-9499-2.
- Chagneau, A., C. Tournassat, C.I. Steefel, I.C. Bourg, S. Gaboreau, I. Esteve, T. Kupcik, F. Claret, T. Schäfer (2015) Complete restriction of  $^{36}\text{Cl}^-$  diffusion by celestite precipitation in densely compacted illite. *Environmental Science and Technology Letters* 2 (5), 139-143. DOI: 10.1021/acs.estlett.5b00080
- Icenhower, J., C.I. Steefel (2015) Dissolution rate of borosilicate glass SON68: A method of quantification based upon interferometry and implications for experimental and natural weathering rates of glass. *Geochimica et Cosmochimica Acta* 157: 147-163.
- Beisman, J., Maxwell, R., Navarre-Sitchler, A., Steefel, C.I. (2015) ParCrunchFlow: An efficient, parallel reactive transport simulation tool for chemically and physically heterogeneous subsurface environments. *Computational Geosciences* 19: 403-422. DOI: 10.1007/s10596-015-9475-x.
- Bazilevskaya, E., G. Rother, D.F.R. Mildner, M. Pavich, D. Cole, M.P. Bhatt, L. Jin, C.I. Steefel, S.L. Brantley (2015) How oxidation and dissolution in diabase and granite control porosity during weathering. *Soil Science Society of America Journal* 79, no. 1: 55-73.
- Rasouli, P., C.I. Steefel, K.U. Mayer, M. Rolle (2015) Benchmarks for multicomponent diffusion and electrochemical migration. *Computational Geosciences* 19: 523-533. DOI: 10.1007/s10596-015-9481-z.
- Mayer, K.U., P. Alt-Epping, D. Jacques, B. Arora and C.I. Steefel (2015) Benchmark problems for reactive transport modeling of the generation and attenuation of acid rock drainage. *Computational Geosciences* 19: 599-611. DOI: 10.1007/s10596-015-9476-9.
- Marty, N.C.M., Blanc, P., Bildstein, O., Claret, F., Cochepin, B., Danyang, S., Gaucher, E., Jacques, D., Lartigue, J-E., Mayer, K.U., Meeussen, J.C.L., Munier, I., Pointeau, I., Sanheng, L., Steefel, C.I. (2015) Benchmarks for multicomponent reactive transport across a cement/clay interface. *Computational Geosciences* 19: 635-653. DOI 10.1007/s10596-014-9463-6
- Xie, M., Mayer, K.U., Claret, F., Alt-Epping, P., Diederik, J., Steefel, C.I., Chiaberge, C., Simunek, J. (2015) Implementation and evaluation of permeability-porosity and tortuosity-porosity relationships linked to mineral dissolution-precipitation. *Computational Geosciences* 19: 655-671. DOI 10.1007/s10596-014-9458-3
- Zhang, S., Yang, L., DePaolo, D.J., Steefel, C.I. (2015) Chemical affinity and pH effects on chlorite on chlorite dissolution kinetics under geological  $\text{CO}_2$  sequestration conditions. *Chemical Geology* 396: 208-217.
- Perdrial, N., Thompson, A., Steefel, C.I., O'Day, P.A., Chorover, J. (2014) Mineral transformation controls speciation and pore-fluid transmission of contaminants in waste-weathered Hanford sediments. *Geochimica et Cosmochimica Acta* 141: 4870-507.
- Alt-Epping, P., Tournassat, C., Rasouli, P., Steefel, C.I., Mayer, K.U., Jenni, A., Mäder, U., Sengor, S., Fernandez, R. (2015) Benchmark reactive transport simulations of a column experiment in compacted bentonite with multi-species diffusion and explicit treatment of

- electrostatic effects. *Computational Geosciences* 19: 535-550. DOI 10.1007/s10596-014-9451-x
- Arora, B., Sengor, S.S., Spycher, N., Steefel, C.I. (2015) A reactive transport benchmark on heavy metal cycling in lake sediments. *Computational Geosciences* 19: 613-633. DOI: 10.1007/s10596-014-9445-8
- Steefel, C.I., Appelo, C.A.J., Arora, B., Jacques, D., Kalbacher, T., Kolditz, O., Lagneau, V., Lichtner, P.C., Mayer, K.U., Meeussen, J.C.L., Molins, S., Moulton, D., Shao, H., Šimůnek, J., Spycher, N., Yabusaki, S.B., Yeh, G.T. (2015) Reactive transport codes for subsurface environmental simulation, *Computational Geosciences* 19: 445-478. DOI: 10.1007/s10596-014-9443-x
- Beller, H.R., Yang, L., Varadharajan, C., Han, R., Lim, H.C., Karaoz, U., Molins, S., Marcus, M.A., Brodie, E.L., Steefel, C.I., Nico, P. (2014) Divergent aquifer biogeochemical systems converge on similar and unexpected Cr(VI) reduction products. *Environmental Science and Technology*, DOI: 10.1021/es5016982
- Wanner, C., Druhan, J.L., Amos, R.T., Alt-Epping, P., Steefel, C.I. (2015) Benchmarking the simulation of Cr isotope fractionation. *Computational Geosciences* 19: 497-521. DOI 10.1007/s10596-014-9436-9.
- Lawrence, C., Steefel, C., Maher, K. (2014), Abiotic/biotic coupling in the rhizosphere. *Procedia Earth and Planetary Science* 10: 104-108.
- Steefel, C.I., Druhan, J.L., Maher, K. (2014), Modeling coupled chemical and isotopic equilibration rates. *Procedia Earth and Planetary Science* 10: 208-217.
- Trebotich, D.P., Adams, M.F., Molins, S., Steefel, C.I., Shen, C. (2014) High resolution simulation of pore scale reactive transport processes associated with carbon sequestration, *Computing in Science and Engineering*, 10.1109/MCSE.2014.77
- Molins, S., Trebotich, D., Yang, L., Ajo-Franklin, J.B., Ligoeki, T.J., Shen, C., Steefel, C.I. (2014) Pore-scale controls on calcite dissolution rates from flow-through laboratory and numerical experiments. *Environmental Science and Technology*, DOI: 10.1021/es5013438.
- Druhan, J.L., Steefel, C.I., Conrad, M.E., DePaolo, D.J. (2014) A large column analog experiment of stable isotope variations during reactive transport: I. A comprehensive model of sulfur cycling and  $\delta^{34}\text{S}$  fractionation, *Geochimica et Cosmochimica Acta* **124**: 366-393.
- Steefel, C.I., Molins, S., and Trebotich, D. (2013) Pore scale processes associated with subsurface  $\text{CO}_2$  injection and sequestration. *Reviews in Mineralogy and Geochemistry* **77**: 259-303.
- Gin, S., Abdelouas, A., L.J. Criscenti, W.L. Ebert, K. Ferrand, T. Geisler, M.T. Harrison, Y. Inagaki, S. Mitsui, K.T. Mueller, J.C. Marra, C.G. Pantano, E.M. Pierce, J.V. Ryan, J.M. Schofield, C.I. Steefel and J.D. Vienna (2013) An international initiative on long-term behavior of high-level nuclear waste glass. *Materials Today* **16** (6):243-248.
- Bracco, J.N., A.G. Stack, C.I. Steefel (2013) Upscaling calcite growth rates from the meso- to the macro-scale. *Environmental Science & Technology*, **47** (13), 7555–7562.
- Icenhower, J.P., C.I. Steefel (2013) Experimentally determined dissolution kinetics of SON68 glass at 90°C over a silica saturation interval: Evidence against a linear rate law. *Journal of Nuclear Materials* **439**, 137-147.
- Druhan, J.L., C.I. Steefel, K.H. Williams, L. Nielsen, D.J. DePaolo (2013) Calcium isotope fractionation in groundwater: Molecular scale processes influencing field scale behavior. *Geochimica et Cosmochimica Acta* **119**: 93-116.
- Handley, K.M., N.C. VerBerkmoes, C.I. Steefel, K.H. Williams, I. Sharon, C.S. Miller, K.R. Frischkorn, K. Khourey, B.C. Thomas, M.B. Shah, P.E. Long, R.L. Hettich, J.F. Banfield (2013) Biostimulation induces syntrophic interactions that impact C, S, N cycling in a sediment microbial community. *The ISME Journal* **7**, 800-816.
- Druhan, J.L., C.I. Steefel, S. Molins, K.H. Williams, M.E. Conrad, D.J. DePaolo (2012) Timing the onset of sulfate reduction over multiple subsurface acetate amendments by measurement and modeling of sulfur isotope fraction. *Environmental Science and Technology* **46** (18): 8895-8902.
- Bourg, I.C. and C.I. Steefel (2012) Molecular dynamics simulations of water structure and diffusion in silica nanopores. *J. Phys. Chem. C* **116**: 11556-11564.

- Landrot, G., J. Ajo-Franklin, L. Yang, S. Cabrini, C.I. Steefel (2012) Measurement of accessible reactive surface area in a sandstone, with application to CO<sub>2</sub> mineralization. *Chemical Geology* **318-319**: 113-125.
- Noiriel, C., C.I. Steefel, L. Yang, A. Ajo-Franklin (2012) Upscaling calcite precipitation rate from pore to continuum scale. *Chemical Geology* **318-319**: 60-74.
- Molins, S., D. Trebotich, C. I. Steefel, and C. Shen (2012) An investigation of the effect of pore scale flow on average geochemical reaction rates using direct numerical simulation. *Water Resources Research* **48**, W03527, doi:10.1029/2011WR011404.
- Kowalsky, M. B., S. Finsterle, K. H. Williams, C. Murray, M. Commer, D. Newcomer, A. Englert, C. I. Steefel, and S. S. Hubbard (2012), On parameterization of the inverse problem for estimating aquifer properties using tracer data. *Water Resources Research* **48**, W06535, doi:10.1029/2011WR01120.
- Li, L., N. Gawande, M.B. Kowalsky, C. Steefel, and S.S. Hubbard (2011), Physicochemical heterogeneity controls on uranium bioreduction rates at the field scale. *Environmental Science and Technology* **45** (23): 9959–9966; DOI: 10.1021/es201111y.
- Chang, H, W. Um, K. Rod, R.J. Serne, A. Thompson, N. Perdrial, C.I. Steefel, J. Chorover, Release mechanisms for strontium and cesium from a weathered Hanford sediment under unsaturated conditions, *Environmental Science & Technology* **45** (19): 8313-8320.
- Navarre-Sitchler, A., C.I. Steefel, P.B. Sak, S.L. Brantley, 2011, A reactive transport model for weathering rind formation on basalt, *Geochimica Cosmochimica Acta* **75**: 7644-7667.
- Williams, K.H., Philip E. Long, James A. Davis, Michael J. Wilkins, A. Lucie N'Guessan, Carl I. Steefel, Li Yang, Darrell Newcomer, Frank A. Spane, Lee J. Kerkhof, Lora McGuinness, Richard Dayvault & Derek R. Lovley (2011): Acetate availability and its influence on sustainable bioremediation of uranium-contaminated groundwater, *Geomicrobiology Journal*, **28**:5-6, 519-539.
- Yang, L, C.I. Steefel, M.A. Marcus, J.R. Bargar, 2010, Kinetics of Fe(II)-catalyzed transformation of 6-line ferrihydrite under anaerobic flow conditions. *Environmental Science & Technology* **44** (14), 5469–5475.
- Thompson, A, C.I. Steefel, N. Perdrial, and J. Chorover, 2010, Contaminant desorption during long-term leaching of hydroxide-weathered Hanford sediments. *Environmental Science & Technology* **44** (6), 1992-1997.
- Li, L., C.I. Steefel, M.B. Kowalsky, A. Englert, S.S. Hubbard, 2010, Effects of physical and geochemical heterogeneities on mineral transformation and biomass accumulation during uranium bioremediation at Rifle, Colorado, *Journal of Contaminant Hydrology* **11**, 45-63.
- Dontsova, K., Steefel, C. I., Desilets, S., Thompson, A., and Chorover, J., 2009, Solid phase evolution in the Biosphere 2 hillslope experiment as predicted by modeling of hydrologic and geochemical fluxes, *Hydrol. Earth Syst. Sci.*, **13**, 2273-2286.
- Zhang, G, N. Spycher, EL Sonnenthal, CI Steefel, 2009, Modeling acid gas generation from boiling chloride brines, *Geochemical Transactions* **10**:11, doi:10.1186/1467-4866-10-11.
- Chen, J., S. S. Hubbard, K. H. Williams, S. Pride, L. Li, and C.I. Steefel, L. Slater. 2009. A state-space Bayesian framework for estimating biogeochemical transformations using time-lapse geophysical data. *Water Resources Research*. doi:10.1029/2008WR007698.
- Englert, A., S. S. Hubbard, K. H. Williams, Li, L., C. I. Steefel. 2009. Spatiotemporal distribution of bromide, electron donor and reaction products associated with sequential field scale biostimulation experiments. *Environmental Science & Technology*. doi: 10.1021/es803367n.
- Li, L., C.I. Steefel, K.H. Williams, M.J. Wilkins, S.S. Hubbard, 2009, Mineral transformation and biomass accumulation during uranium bioremediation, Rifle, Colorado, *Environmental Science and Technology* **43(14)**, 5429-5435, DOI: 10.1021/es9000016v.
- Steefel, C.I., K. Maher, 2009, Fluid-rock interaction: A reactive transport approach. *Reviews in Mineralogy and Geochemistry* **70**: 485-532, DOI: 10.2138/rmg.2009.70.11.
- Gu, C., F. Maggi, W.J. Riley, G.M. Hornberger, T. Xu, C.M. Oldenburg, N. Spycher, N.L. Miller, R.T. Ventura, and C. Steefel, 2009, Aqueous and gaseous nitrogen losses induced

- by fertilizer application. LBNL-1689E. *Journal of Geophysical Research—Biogeosciences*, **114**, G01006, doi:10.1029/2008JG000788.
- Navarre-Sitchler, A., C.I. Steefel, L. Yang, L. Tomutsa, S.A. Brantley, 2009, Evolution of porosity and diffusivity associated with chemical weathering of a basalt clast. *Journal of Geophysical Research* **114**, doi:10.1029/2008JF001060.
- Wan, J., Y. Kim, T.K. Tokunaga, Z. Wang, S. Dixit, C.I. Steefel, E. Saiz, M. Kunz, N. Tamura, in press, 2009, Spatially resolved U(VI) partitioning and speciation: Implications for plume scale behavior of contaminant U in the Hanford vadose zone. *Environmental Science & Technology* **43**(7), 2247-2253.
- Maher, K., C.I. Steefel, A.F. White, and D.A. Stonestrom, 2009, The role of reaction affinity and secondary minerals in regulating chemical weathering rates at the Santa Cruz Soil Chronosequence, California, *Geochim. Cosmochim. Acta*, **73**, 2804–2831.
- Zhang, G., N. Spycher, E. Sonnenthal, C.I. Steefel, and T. Xu, 2008, Modeling reactive multiphase flow and transport of concentrated solutions. *Nuclear Technology* **14**: 180-195.
- Cochevin, B., L. Trotignon, O. Bildstein, C. Steefel, V. Lagneau, J. Van Der Lee, 2008, Intercomparison of predictions on a 2-D cementation experiment in porous medium. *Advances in Water Resources*, **31**(12): 1540-1551.
- Maggi, F., C. Gu, W. J. Riley, G. M. Hornberger, R. T. Venterea, T. Xu, N. Spycher, C. Steefel, N. L. Miller, and C. M Oldenburg, 2008, A mechanistic treatment of the dominant soil nitrogen cycling processes: Model development, testing, and application, *J. Geophysical Research*, **113**, G02016, doi:10.1029/2007JG000578.
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