

Li Li, Ph.D

Associate Professor

Department of Civil & Environmental Engineering

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Email: lili@engr.psu.edu; Website: <http://lili.ems.psu.edu>**EDUCATION**

Princeton University	Environmental Engineering & Water Resources	Ph.D.	2005
Nanjing University (PRC)	Environmental Chemistry	M.S.	1999
Nanjing University (PRC)	Environmental Chemistry	B.S.	1996

PROFESSIONAL EXPERIENCE

8/2016 -	Associate Professor, Dept. Civil & Environmental Engr., Penn State University
7/2015- 8/2016	Associate Professor, Dept. Energy & Mineral Engr., Penn State University
9/2009-05/2015	Assistant Professor, Dept. Energy & Mineral Engr., Penn State University
9/2007-9/2009	Research Scientist Lawrence Berkeley National Laboratory (LBNL), Earth Sciences Division (ESD)
9/2005-8/2007	Geological Postdoctoral Fellow, LBNL, ESD

RESEARCH INTERESTS

My group works at the interface of hydrology, biogeochemistry, and environmental engineering. In particular, I am interested in understanding complex interactions between flow, transport, and multi-component biogeochemical reactions in natural systems. We are particularly interested in 1) understanding general principles that govern complex process coupling from scales as small as the pore scale to as large as the watershed scale; 2) developing process-based modeling tools for predictions and for solutions to water and energy related problems. We have worked on multiple topics at the nexus of water, energy, and environment, including, for example, enhanced hydrocarbon and geothermal energy recovery, contaminant reactive transport and bioremediation, geological carbon sequestration, and water and biogeochemical cycles at the watershed scale.

RECENT HONORS, AWARDS, AND RECOGNITIONS

1. Commission for Woman Achieving Women Award (Faculty category), Penn State University, 2017
2. Invited participant for the US Frontiers of Engineering Symposium, National Academy of Engineering, 2015
3. Wilson award for excellence in teaching, Penn State University, 2015
4. Wilson initiation award, Penn State University, 2010

AWARDS TO ADVISEES

1. Wei Zhi, Best poster award to in the "Minerals/Gas/Fracking" categories on Energy Days, May 2017
2. Michael Cavazza, 3rd place winner in the Society of Petroleum Engineers (SPE) student paper contest on September 28, 2016, at the SPE Annual Technical Conference and Exhibition in Dubai, United Arab Emirates
3. Miguel Santana and Cintia Vasquez, 1st place winner in research presentation competition in the Summer Experience in EMS (SEEMS) as part of the Upward Bound Math and Science (UBMS) Summer Residential Program. Miguel Santana and Cintia Vasquez are high school students working in the Li reactive transport lab under the guidance of graduate student Zhang Cai in June - July 2016.
4. Hang Wen, Best poster award to in the "Minerals/Gas/Fracking" categories on Energy Days, May 2016
5. Michael Cavazza, 1st place winner in the SPE Northeastern region student paper contest, April, 2016
6. Gregory Kojadinovich, 3rd place winner in the Penn State SPE student paper contest, March, 2016
7. Michael Cavazza, 1st place winner in the Penn State SPE student paper contest, March, 2016
8. Michael Cavazza, 1st place winner in the Grundy Haven Student Paper Contest, February, 2016

9. Michael Cavazza, 2nd place winner in the SPE Northeastern region student paper contest, April, 2015
10. Michael Cavazza, Undergraduate Merit Award (1 out of 200 students), Dept. Energy & Mineral Engineering, Penn State, April, 2015
11. Li Wang, student Travel Award from the DOE office of sciences Subsurface Biogeochemical Research (SBR) PI meeting in May 6-7, 2014
12. Chen Bao, Centennial Research Travel Award, College of the Earth and Mineral Sciences, Penn State, May 2014
13. Chen Bao, Graduate Merit award, Dept. Energy & Mineral Engineering, Penn State, May 2014
14. Peyman Heidari, Charles B. Darrow award, Dept. Energy & Mineral Engineering, Penn State, May 2013
15. Peilin Cao, 1st place in poster presentation competition in the Energy and Engineering category, Carbon Conference of CarbonEARTH, February, 2012
16. Evan Frye, Geological Society of America (GSA) Research Grant, 2010

PUBLICATIONS (Google scholar: >1,200, h-index: 18,
https://scholar.google.com/citations?user=DJvp_4EAAAAJ&hl=en)

*Indicates student and postdoc advisees

A. Peer-reviewed journal publications - published:

2017

1. **Li, L.**, K. Maher, A. Navarre-Sitchler, J. Druhan, C. Meile, C. Lawrence, J. Moore, J. Perdrial, P. Sullivan, A. Thompson, L. Jin, E. W. Bolton, S. Brantley, W. Dietrich, K. U. Mayer, C. I. Steefel, A. Valocchi, J. Zachara, B. Kocar, J. Mcintosh, B. M. Tutolo, M. Kumar, E. Sonnenthal, C. Bao, J. Beisman. 2017. Expanding the Role of Reactive Transport Models in Earth Surface Processes. *Earth Science Reviews*. doi: 10.1016/j.earscirev.2016.09.001
2. *Bao, C., **L. Li**, Y. Shi, C. Duffy. 2017. Understanding hydrogeochemical processes at the watershed scale: 1. Development of RT-Flux-PIHM. *Water Resources Research*. doi: 10.1002/2016WR018934
3. **L. Li**, *C. Bao, Y. Shi, P. L. Sullivan, S. Brantley, C. Duffy. 2017. Understanding hydrogeochemical processes at the watershed scale: 2. Concentration-discharge relationships of chloride and magnesium. *Water Resources Research*. doi:10.1002/2016WR018935
4. *Wen, H., and **L. Li**. 2017. An upscaled rate law for magnesite dissolution in heterogeneous porous media. *Geochimica Et Cosmochimica Acta*. doi: 10.1016/j.gca.2017.04.019
5. Cheng, Y., C. G. Hubbard, L. Zhang, B. Arora, **L. Li**, J. B. Ajo-Franklin, and N. Bouskill. 2017. Next Generation Modeling of Microbial Souring – Parameterization through Genomic Information. *International Biodeterioration & Biodegradation*. doi.org/10.1016/j.ibiod.2017.06.014
6. *Heidari, P., **L. Li**, L. Jin, S. L. Brantley. 2017. A Reactive Transport Model for Marcellus Shale Weathering. Submitted to *Geochimica Et Cosmochimica Acta* (in press)

2016

7. *Zhang, C. and **L. Li**. 2016. How long do natural waters “remember” release incidents of Marcellus Shale waters: a first order approximation using reactive transport modeling. *Geochemical Transactions*. 17: 6. doi:10.1186/s12932-016-0038-4
8. Cheng, Y., C. G. Hubbard, **L. Li**, N. Bouskill, S. Molins, L. Zhang, E. Sonnenthal, A. Engelbrekton, J. D. Coates, and J. B. Ajo-Franklin. 2016. Understanding Microbial Reservoir Souring and Remediation: A Reactive Transport Model of Sulfur Cycling as Impacted by Nitrate and Perchlorate Treatments. *Environmental Science & Technology*. 50(13), 7010-7018. doi: 10.1021/acs.est.6b00081
9. *Cao, P., Z. T. Karpyn, **L. Li**. 2016. The role of host rock properties in determining potential CO₂ migration pathways. *International Journal of Greenhouse Gas Control* 45: 18-26. doi: 10.1016/j.ijggc.2015.12.002

10. *Brunet, J. L., **L. Li**, Z. T. Karpyn, N. J. Huerta. 2016. Fracture opening or self-sealing: Critical residence time as a unifying parameter for diverging cement fracture evolution during CO₂-cement-brine interactions. International Journal of Greenhouse Gas Control. 47: 25–37. doi:10.1016/j.ijggc.2016.01.024
11. *Qiao, C., R. Johns, **L. Li**. 2016. Modeling low salinity flooding in mineralogically different carbonate reservoirs. Energy & Fuels, 30 (2), pp 884–895. doi: 10.1021/acs.energyfuels.5b02456
12. Carroll, S., J. W. Carey, D. Dzombak, N. J. Huerta, **L. Li**, T. Richard, W. Um, S. D.C. Walsh, L. Zhang. 2016 Review: Role of Chemistry, Mechanics, and Transport on Well Integrity in CO₂ Storage Environments. International Journal of Greenhouse Gas Control. 49 (2016): 149–160. doi: http://dx.doi.org/10.1016/j.ijggc.2016.01.010
13. *Wen, H., **L. Li**, D. Crandall, A. Hakala. 2016. Where Lower Calcite Abundance Creates More Alteration: Enhanced Rock Matrix Diffusivity Induced by Preferential Dissolution. Energy & Fuels. doi: 10.1021/acs.energyfuels.5b02932

2015

14. *Cao, P., Z. T. Karpyn, **L. Li**. 2015. Self-healing of cement fractures under dynamic flow of CO₂-rich brine. Water Resources Research, 51, 4684–4701, doi:10.1002/2014WR016162.
15. *Qiao, C., **L. Li**, R.T. Johns, and J. Xu. 2015. Compositional modeling of reaction-induced injectivity alteration during CO₂ flooding in carbonate reservoirs. SPE Journal. doi: 10.2118/170930-PA
16. *Qiao, C., **L. Li**, R.T. Johns, J. Xu. 2015. A mechanistic model for wettability alteration by chemically tuned water flooding in carbonate reservoirs. SPE Journal. doi: 10.2118/170966-PA
17. *Salehikhoo, F., **L. Li**. 2015. The role of mineral spatial patterns in determining magnesite dissolution rates: when does it matter? Geochimica Et Cosmochimica Acta. doi; 10.1016/j.gca.2015.01.035.
18. *Wang, L. and **L. Li**. 2015. Illite spatial distribution patterns regulate Cr(VI) sorption macrocapacity and macrokinetics. Environmental Science & Technology. 49: 1374-1383, doi: 10.1021/es503230f

2014

19. *Zhang, L., D. Li, **L. Li**, D. Lu. 2014. Development of a new compositional model with multi-component sorption isotherm and slip flow in tight gas reservoirs. Journal of Natural Science & Engineering. 21: 1061–1072. doi:10.1016/j.jngse.2014.10.029
20. *Heidari, P., and **L. Li**. Solute transport in low heterogeneous sandboxes: the role of correlation length and permeability variance. Water Resources Research. doi:10.1002/2013WR014654
21. Hubbard, C. G., Cheng, Y., Engelbrektsen, A., Druhan, J. L., **Li, L.**, Ajo-Franklin, J. B., John D Coates, J. D., Conrad, M. E., 2014. Isotopic insights into microbial sulfur cycling in oil reservoirs. Frontiers in Microbiology. doi: 10.3389/fmicb.2014.00480
22. *Bao, C., *Wu, H., **Li, L.**, Williams, K. H., Long, P., and Newcomer, D., 2014. Uranium bioreduction rates across scales: biogeochemical hot moments and hot spots during a field biostimulation experiment at Rifle, Colorado. Environmental Science & Technology 48(17): 10116 - 10127. doi: 10.1021/es501060d.
23. **Li, L.**, *Salehikhoo, F., Brantley, S. L., *Heidari, P. 2014. Spatial zonation limits magnesite dissolution in porous media. Geochimica Et Cosmochimica Acta. 10.1016/j.gca.2013.10.051
24. Wu, Y., *Surasani, V. K., **Li, L.**, Hubbard, S. S. 2014. Geophysical monitoring and reactive transport simulations of bioclogging processes induced by *leuconostoc mesenteroides*. Geophysics. 79(1), E61–E73. doi: 10.1190/geo2013-0121.1

2013

25. *Surasani, V.K., **Li, L.**, Ajo-Franklin, J. B., Hubbard, C., Hubbard, S. S., and Wu, Y. 2013. Controls of selective bioclogging by *L. mesenteroides*: a reactive transport modeling study in a sandstone reservoir. Energy & Fuels. doi: 10.1021/ef401446f

26. Zhang, L., Dzombak, D., Nakles, D., *Brunet, J., **Li, L.** 2013. "Reactive transport modeling of interactions between acid gas (CO₂ + H₂S) and pozzolan-amended wellbore cement under geologic carbon sequestration conditions." Energy & Fuels. doi: 10.1021/ef401749x
27. *Vilcáez, J., **Li, L.**, Hubbard, S. S. 2013. A new model for the biodegradation kinetics of dispersed oil droplets: Application to marine oil spills. Geochemical Transactions. 14:4. doi: 10.1186/10.1186/1467-4866-14-4.
28. *Brunet, J. L., **Li, L.**, Karpyn, Z. T., Kutchko, B. G., Strazisar, B., Bromhal, G. 2013. Dynamic evolution of compositional and transport properties under conditions relevant to geological carbon sequestration. Energy & Fuels. 27(8), pp 4208–4220. doi: 10.1021/ef302023v.
29. *Cao, P., Karpyn, Z. T., **Li, L.** 2013. Dynamic changes in wellbore cement integrity due to geochemical reactions in CO₂-rich environments. Water Resources Research. 49(7): 4465-4475. doi: 10.1002/wrcr.20340.
30. *Vilcaez, J., **Li, L.**, Wu, D., and S. S. Hubbard. 2013. Reactive transport modeling of induced selective plugging by *L. Mesenteroides* in carbonate formations. Geomicrobiology Journal 30, 813–828, doi: 10.1080/01490451.2013.774074
31. *Salehikhoo, F., **Li, L.**, Brantley, S. L. 2013. Magnesite dissolution rates at different spatial scales: effects of mineral spatial distribution and flow velocity. Geochimica Et Cosmochimica Acta. 108: 91-106.

2012

32. *Frye, E., Bao, C., **Li, L.**, Blumsack, S. 2012. Environmental controls of cadmium desorption during CO₂ leakage. Environmental Science & Technology. 46(8): 4388–4395. doi: 10.1021/es3005199

2011

33. **Li, L.**, *Gawande, N., Kowalsky, M. B., Steefel, C. I., and Hubbard, S. S. 2011. Physicochemical heterogeneity controls of uranium, bioreduction rates at the field scale. Environmental Science & Technology. 45 (23): 9959–9966. doi: 10.1021/es201111y.
34. Singha, K., **Li, L.**, Day-Lewis, F. D., and Regberg, A. B. 2010. Quantifying solute transport processes: are chemically "conservative" tracers electrically conservative? Geophysics. 76: F53-F63. doi: 10.1190/1.3511356.

2010

35. **Li, L.**, Steefel, C. I., Kowalsky, M. B., Englert, A., and Hubbard, S. S. 2010. Effects of physical and geochemical heterogeneities on mineral transformation and biomass accumulation during a biostimulation experiment at Rifle, Colorado. Journal of Contaminant Hydrology. 112: 45-63. doi: 10.1016/j.jconhyd.2009.10.006

2009

36. **Li, L.**, Steefel, C. I., Williams, K. H., Wilkins, M. J., and Hubbard, S. S. 2009. Mineral transformation and biomass accumulation during uranium bioremediation at Rifle, Colorado. Environmental Science & Technology. 43(14): 5429–5435. doi: 10.1021/es900016v.
37. Englert, A., Hubbard, S. S., Williams, K. H., **Li, L.**, Steefel, C. I. 2009. Feedbacks Between Hydrological Heterogeneity and Bioremediation Induced Biogeochemical Transformations. Environmental Science & Technology. 43 (14): 5197–5204 doi: 10.1021/es803367n.
38. Chen, J. S., Hubbard, S. S., Williams, K. H., Pride, S., **Li, L.**, Steefel, C., Slater, L. 2009. A state-space Bayesian framework for estimating biogeochemical transformations using time-lapse geophysical data. Water Resources Research. 45, W08420. doi: 10.1029/2008WR007698

2008

39. **Li, L.**, Steefel, C. I., and Yang, L. 2008. Scale dependence of mineral dissolution kinetics within single pores and fractures. Geochimica Et Cosmochimica Acta. 72: 360-377, doi:10.1016/j.gca.2007.10.027.

2007

40. Li, L., Peters, C. A., and Celia, M. A. 2007. Effects of mineral spatial distributions on reaction rates in porous media. Water Resources Research, 43, W01419, doi:10.1029/2005WR004848.
41. Li, L., Peters, C. A., and Celia, M. A. 2007. Applicability of averaged concentrations in determining reaction rates in heterogeneous porous media. American Journal of Science, 307: 1146-1166, doi: 10.2475/10.2007.02.
42. Li, L., Peters, C. A., and Celia, M. A. 2007. Reply to "comments on upscaling geochemical reaction rates using pore-scale network modeling" by Peter C. Lichtner and Qingjun Kang. Advances in Water Resources, 30: 691-695.

2006

43. Li, L., Peters, C. A., and Celia, M. A. 2006. Upscaling geochemical reaction rates using pore-scale network modeling. Advances in Water Resources 29: 1351—1370

2005 and earlier

44. Xu, S., Li, L., Tan, Y., Feng, J., Wei, Z., and Wang, L. 2000. Prediction and QSAR analysis of toxicity to *Photobacterium phosphoreum* for a group of heterocyclic nitrogen compounds. Bulletin of Environmental Contamination and Toxicology, 64(3): 316--322.
45. Li, L., Yang, H., Ding, Y., and Wang, L. 1999. Prediction of log K_w using MCIs and LSER methods for heterocyclic nitrogen compounds. Journal of Liquid Chromatography & Related Technologies, 22(6): 897--907.
46. Li, L., Wang, L., Han, S., and Zhang, Z. 1999. Comparison of four methods of predicting newly measured octanol/water coefficients (log K_{ow}) for heterocyclic nitrogen compounds and the partition mechanism. Environmental Toxicology & Chemistry, 18(12): 2723--2728.

B. Papers in the pipeline

47. *Qiao, C., R. Johns, and L. Li. 2017. Understanding the Chemical Mechanisms for Low Salinity Waterflooding in Carbonates. Journal of Petroleum Science & Engineering (in revision)
48. *Wang, L., H. Wen, and L. Li. 2017. Connectivity controls of chromium sorption in heterogeneous media. Journal of Contaminant Hydrology. Submitted on Feb. 28, 2017
49. *Wen, H., L. Li. 2017. Magnesite dissolution across scales: the role of spatial heterogeneity, equilibrium length, the relative time scales. Geochimica Et Cosmochimica Acta. Submitted on July 15, 2017

C. Conference Papers

1. Qiao, C., Johns, R. T., Li, L., Xu, J. 2015. Modeling Low Salinity Waterflooding in Mineralogically Different Carbonates. 2015. SPE Annual Technical Conference and Exhibition, Houston, Texas, USA.
2. Li, L., K. Maher, and A. Navarre-Sitchler. 2014. Expanding the Role of Reactive Transport Modeling in Biogeochemical Sciences. Eos Transactions, American Geophysical Union. 95(35): 316-316.
3. Duffy, C., Y. Shi, K. Davis, R. Slingerland, L. Li, P. L. Sullivan, Y. Godd eris, S. L. Brantley. 2014. Designing a System of Models to Understand the Critical Zone. Procedia in Earth and Planetary Sciences. August 18-22, 2014 Coll ge des Bernardins, Paris 5th, France.
4. Qiao, C., L. Li, R.T. Johns, and J. Xu. 2014. Compositional modeling of reaction-induced injectivity alteration during CO₂ Flooding in carbonate reservoirs. SPE Annual Technical Conference and Exhibition, Amsterdam, The Netherlands, 27–29 October 2014. SPE 170930.
5. Qiao, C., L. Li, R.T. Johns, J. Xu. 2014. A mechanistic model for wettability alteration by chemically tuned water flooding in carbonate reservoirs. SPE Annual Technical Conference and Exhibition, Amsterdam, The Netherlands, 27–29 October 2014. SPE 170966.
6. Crandall, D., Wen, H., Li, L., and Hakala, A. 2014. Reactive geochemical flow modeling with scanned rock fractures. Proceedings of the ASME 2014 4th Joint US-European Fluids Engineering Division Summer Meeting and 11th

International Conference on Nanochannels, Microchannels, and Minichannels. FEDSM2014-21579, August 3-7, 2014, Chicago, Illinois, USA

7. Deng H., J.P. Fitts, C.A. Peters, L. Li, D. Crandall, G.S. Bromhal. 2013. Experimental study of reactive flow in an Eau Claire fracture exposed to CO₂-rich brine. *American Rock Mechanics Association*, paper 13-592.
8. Binning, P.J., Celia, C.A., and Li, L. 2006. Pseudokinetics arising from the upscaling of equilibrium. In *proceedings of the XVI International Conferences on Computational Methods in Water Resources*, edited by P.J. Binning, P.K.Engesgaard, H.K. Dhale, G.F. Pinder, and W.G. Gray, Copenhagen, Denmark.
9. Peters, C.A., Lewandowski, J.A., Maier, M.L., Celia, C.A., and Li, L. 2006. Mineral grain spatial patterns and reaction rate up-scaling. In *Proceedings of the XVI International Conferences on Computational Methods in Water Resources*, edited by P.J. Binning, P.K.Engesgaard, H.K. Dhale, G.F. Pinder, and W.G. Gray, Copenhagen, Denmark.
10. Li, L., Peters, C.A., and Celia, M.A. 2004. Upscaling calcite dissolution rates using network model simulations. (Peer Reviewed). In *Water-rock Interactions: Proceedings of the Eleventh International Symposium on Water-rock Interactions*, edited by R. B. Wanty and R.R. Seal II, p961-965.

ADVISEES:

Completed: (current position in parenthesis)

Postdocs:

1. Nitin Gawande 2011 (research scientist, Pacific Northwestern National Laboratory)
2. Javier Vilcaez 2011 (assistant professor, Oklahoma State University)
3. Hongfei Wu 2012 (engineer at Halliburton, Houston)
4. Vikranth K. Surasani 2013 (assistant professor, Birla Institute of Science and Technology, India)

PhD students:

5. Peilin Cao 2014 (engineer, Chevron)
6. Fatemeh Salehikhoo 2014 (postdoc, University of Wyoming)
7. Peyman Heidari 2014 (assistant professor, Missouri University of Science & Technology)
8. Li Wang 2015 (assistant professor, Xi'an Jiaotong University, China)
9. Changhe Qiao 2015 (Quantitative research associate, Susquehanna International Group)
10. Chen Bao 2015 (engineer, Shell)

Msc students:

11. Rebecca Fogarty 2014 (engineer, Baker Hughes)
12. Mariya Skocik 2014 (engineer, Chevron)
13. Jessie Tse-Hua Chao 2014 (research assistant, University of British Columbia)
14. Evan Frye 2011 (U.S. Energy Information Administration (EIA))

Undergraduate students with honors thesis:

15. Robert Follet 2012 (engineer, Chevron)
16. Michael Cavazza 2016 (engineer, Shell)
17. Sruthi Kakuturu 2017 (scientist, ASC)

In progress:

PhD students:

18. Jean-Patrick Leopold Brunet (expected 2017)
19. Hang Wen (expected 2017)
20. Zhang Cai (expected 2017)
21. Dacheng Xiao (expected 2019)
22. Wei Zhi (expected 2019)

M.Sc. students:

23. Jancoba Dorley (expected 2018)
24. Gregory Kojadinovich (expected 2018)

Undergraduates for Research Experience:

25. Christian Alvarado
26. Megan Smajda
27. Kriston Ramdass
28. Bryn Stewart
29. Elizabeth Basista

SERVICE TO THE DISCIPLINE AND PROFESSION

1. Associate Editor, Water Resources Research (2017 – 2020)
2. Committees: 2015 – present, PSU representative, Consortium of Universities for the Advancement of Hydrologic Science, Inc. (CUAHSI)
3. Workshop and conference session organizer:
 - 1) NSF workshop “Expanding the role of reactive transport modeling in biogeochemical sciences.” (with Kate Maher and Alexis Navarre-Sitchler. Washington, DC, April 13 – 15, 2014
 - 2) Computational Methods in Water Resources (CMWR) session organizer (with Christof Meile), “Modeling hydrobiogeochemical processes across scales”, June 20 – 24, Toronto, Canada
 - 3) AGU Fall meeting session “Modeling the Critical Zone: Integrating Processes and Data across Disciplines and Scales”,
 - With Harry Vereecken, Praveen Kumar, and Bhavna Arora, Dec. 11-15, 2017, New Orleans, LA
 - with Sally Thompson, Harry Vereecken, and Lejo Flores, Dec. 12 – 16, 2016, San Francisco, CA
 - with Pamela Sullivan, Tom Meixner, Hari Rajaram, Dec. 14 – 18, 2015, San Francisco, CA
 - 4) AGU session “Bioreductive immobilization of Trace Metals and Radionuclides: Mechanisms, Models, and Sustainability”, with Peter Jaffe, Phil Long, and Lucie N'Guessan, December 11 – 15, San Francisco, CA
4. Proposal review panel:
 - 1) NSF, Environmental Engineering, March 7 - 8, 2017
 - 2) NSF, Low temperature geochemistry and geobiology, April 27 – 29, 2015
 - 3) DOE, SBR, Oak Ridge National Laboratory scientific focus area on Mercury Biogeochemistry by SBR, DOE, April 17, 2015; SLAC SFA, May 18, 2017
5. Journal Reviewer:

Advances in Water Resources, Chemical Geology, Critical Reviews in Environmental Science & Technology, Energy & Fuels, Environmental Science & Technology, Fuel Processing Technology, Geochimica Et Cosmochimica Acta, Geofluids, Industrial & Engineering Chemistry Research, Journal of Contaminant Hydrology, Journal of Hydrology, Journal of Natural Gas Science & Engineering, Journal of Petroleum Exploration and Production Technology, Journal of Petroleum Science and Engineering, Mathematical Geosciences, Science of the Total Environment, Scientific Reports, Water Resources Research, Vadose Zone Journal
6. Proposal Reviewer:

NSF, Division of Earth Sciences (Hydrology, Geobiology and low-temperature geochemistry, Marine geosciences), DOE (Basic Energy Sciences, Subsurface Biogeochemical Research (SBR), Office of Sciences), US-Israel Binational Foundation, Stanford Synchrotron beamline, Consortium for Clean Coal Utilization (CCCU), Canadian Research Councils (the Social Sciences and Humanities Research Council (SSHRC), the Natural Sciences and Engineering Research Council (NSERC), the Canadian Institutes of Health Research (CIHR), Geological Survey Ireland, ETH Zurich Research Commission

INVITED SEMINARS AND PRESENTATIONS**2017**

1. “Metal export in a mining-impacted watershed,” Coal Creek Watershed Coalition, Sept. 5, 2017

2. "Ecohydrological drivers of biogeochemical processes at the watershed scale", biennial reactive transport workshop, Amboise, France, Oct. 2, 2017
3. "Biogeochemical reactive transport across scales," University of Minnesota, Nov. 9, 2017

2016

4. "Synchronized hydrogeochemical processes drive chemostatic behavior," AGU fall session, Dec. 12 – 16, 2016
5. "Understanding hydrogeochemical processes at the watershed scale", University of Tübingen, Tübingen, October 13, 2016
6. "Bridging computational bridges between biogeochemistry, hydrology, and climate sciences", Advances in Mathematical and Computational Climate Modeling Workshop, aka: AXICCS workshop, Rockville, MD, September 12-13, 2016
7. "Biogeochemical interactions across scales", Jilin University, Jilin, July 25, 2016

2015

8. "Predictive Understanding of Biogeochemical Reactions in Heterogeneous Porous Media." Annual meeting of Geological Society of America, Baltimore, Maryland, November 1-4, 2015.
9. "Reactive transport modeling as a powerful tool for understanding and predicting transport and fate of contaminants in natural waters", Penn State Water Resources Webinar, October 28, 2015.
10. "RT-Flux-PIHM: A Coupled Hydrological, Land Surface, and Reactive Transport Model for Hydrogeochemical Processes at the Watershed Scale.", Peking University, July 20, 2015
11. "Controls of biogeochemical processes across scales." Tsinghua University, July 17, 2015
12. "Controls of biogeochemical processes across scales and across disciplines", China University of Geosciences, July 15, 2015
13. "Nature is an artist: why and how does it relate to water and energy?" Today at Millennium Café. Penn State University, Feb. 17, 2015

2014

14. "When water meets rock: controls of spatial heterogeneities across scales", Dept. Energy and Mineral Engineering, Penn State University, University Park, Sept 18, 2014.
15. "When water meets rock: controls of spatial heterogeneities across scales", Dept. Energy, Environmental, and Chemical Engineering, departmental colloquium, Washington University at St. Louis, Sept 5, 2014.
16. "When water meets rock: chemical weathering across scales." 4th CUAHSI Biennial Colloquium on Hydrologic Science and Engineering, Shepherdstown, WV, July 28 -30, 2014.
17. "Unravelling Controls on Marcellus Shale Weathering", session 16e, Goldschmidt conference, Sacramento, June 6 - 11, 2014.
18. "Expanding the role of reactive transport modeling in biogeochemical sciences." DOE Office of Sciences TES-SBR joint PI meeting, Washington, DC, May 6-7, 2014.

2013

19. "Heterogeneity controls of water-rock interactions." Dept. Civil & Environmental Engineering, University of Illinois at Urbana-Champaign, July 17, 2013.
20. "Cement-CO₂ interactions: chemistry-induced porosity and permeability evolution." NETL Reduced Order Models (ROM) workshop, Carnegie Mellon University, June 7th, 2013.
21. "Geologic Carbon Sequestration: Possibility and Impacts of CO₂ Leakage." Saint Francis University, Feb. 1st, 2013.

2012

22. "Water-rock interaction: what is the role of geochemical hot spots?" PSU water talks, University Park, PA, Nov. 5, 2012.
23. "Reactive transport modeling: an integration tool for understanding subsurface geochemical processes." Geochemistry workshop, National Energy and Technology Laboratory, Pittsburgh, PA, June 18, 2012.

24. "Microbe-Enhanced hydrocarbon recovery and Marcellus related water issues", Department of Energy Office of Sciences Subsurface Biogeochemistry Research Program PI meeting breakout session on "Subsurface Biogeochemical Processes Associated with Energy Production, Usage, and Storage", Washington, D. C., April 30 – May 2, 2012.
25. "Cement degradation under conditions relevant to geological carbon sequestration." graduate seminar, Dept. Civil and Environmental Engineering, Geotechnical program, Penn State University, State College, PA, April 27, 2012.
26. "Understanding controls of physicochemical heterogeneity on field scale U(VI) bioreduction rates: challenges and future directions." Lawrence Berkley National Laboratory Scientific Focus Area (SFA) All Hands meeting, Berkeley, CA, Jan. 12-13, 2012.

2011

27. "Geologic carbon sequestration: possibility and environmental impacts of CO₂ leakage." graduate seminar, Dept. Civil and Environmental Engineering, Penn State University, State College, PA, November 9, 2011.
28. "Environmental Impacts of Geological Carbon Sequestration." Penn State - Peking University Multi-workshops on PKU-Penn State University Academic Exchange Day, Peking, China, May 18, 2011.
29. "The Issue of Scaling in Understanding Reactive Transport Processes in Subsurface." DOE Office of Science Subsurface Biogeochemistry Research (SBR) PI meeting, Washington DC, April 26-28, 2011.

2010

30. "When is Small Scale Information Important in Determining Large Scale Mineral Dissolution Rates?", Abstract H44A-07 presented at 2010 Fall Meeting, AGU, San Francisco, Calif., 13-17 Dec. 2010.
31. "Geological carbon sequestration research at Penn State." Penn State Energy Day, Washington, DC, Nov. 19, 2010.
32. "Effects of physical and chemical heterogeneities on biogeochemical processes associated with uranium bioremediation at Rifle, Colorado." DOE Office of Science Environmental Remediation Science Program (ERSP) PI meeting, Washington DC, March 29-31, 2010.

2009

33. "Reactive transport processes in natural porous media: research opportunities and applications." EME 590 colloquium, October 15, 2009.
34. "Effects of physical and geochemical heterogeneities in biogeochemical processes and implications for uranium bioremediation." CEKA All Hands meeting, October 1, 2009.
35. "Mineral Reaction Kinetics in Heterogeneous Porous Media during Geologic CO₂ Sequestration." Dept. Energy and Mineral Engineering, Penn State University, April 27, 2009.

2008

36. "Effects of physical and chemical heterogeneities on biogeochemical processes associated with uranium bioremediation at Rifle, Colorado." American Geophysical Union 2008 Fall Meeting, San Francisco, December 15 -19, 2008.
37. "Geochemical reaction kinetics under conditions relevant to geological carbon sequestration. " Dept. Geosciences, Penn State University, May 1st, 2008.
38. "Uranium bioremediation and biogeochemical reaction rates in heterogeneous porous media. " University of Iowa, March 11, 2008.

2007

39. "Biogeochemical reaction rates in heterogeneous porous media at multiple spatial scales." Lehigh University, March 27, 2007.
40. "Biogeochemical reaction rates in heterogeneous porous media at multiple spatial scales." Harvard University, March 12, 2007.

2005

41. "Scaling of geochemical reaction kinetics using pore-scale network modeling." University of California, Davis, October 24, 2005.
42. "Scaling of geochemical reaction kinetics using pore-scale network modeling." Penn State University, Center of Environmental Kinetic Analysis (CEKA) All Hands meeting, September 14, 2005.
43. "Scaling of geochemical reaction kinetics using pore-scale network modeling." Lawrence Berkeley National Lab, Earth Sciences Division, May 9, 2005.

INVITED WORKSHOP AND PANEL PARTICIPATION

1. Advances in Mathematical and Computational Climate Modeling Workshop, aka: AXICCS workshop, Washington, DC, September 12-13, 2016
2. Invited participant, U.S. Department of Energy's (DOE) Office of Biological and Environmental Research (BER) workshop on "Multiscale Computation: Needs and Opportunities for BER Science", Washington, D.C., August 26, 2014
3. Invited participant, presenter, and session summary writer for the breakout session on "Building better models for model practitioners", DOE Office of Sciences TES-SBR joint PI meeting, Washington, DC, May 6-7, 2014.
4. Invited panelist, plenary session titled "Fossil Fuel Microbiology/Souring, The Energy Bioscience Institute (EBI) Retreat Planning Committee (ERPC), University of Illinois at Urbana Champaign, July 15 – 17, 2013.
5. Invited participant, National Science Foundation (NSF): An Earth Cube Domain Workshop integrating the inland-waters geochemistry, biogeochemistry and fluvial sedimentology communities. Boulder, Colorado, April 24-26, 2013.
6. Invited participant, Community Surface Dynamics Modeling Systems (CSDMS) 2.0: moving forward. Boulder, Colorado, March 23 – 25, 2013.
7. Invited panelist, Department of Energy Office of Sciences Subsurface Biogeochemistry Research Program PI meeting breakout session on "Subsurface Biogeochemical Processes Associated with Energy Production, Usage, and Storage", Washington, D. C., April 30 – May 2, 2012.
8. National Science Foundation (NSF) Science, Engineering, and Education for Sustainability (SEES) Workshop: Natural and Engineered Carbon Sequestration. Minneapolis, Minnesota, Oct. 7-8, 2011.
9. Department of Energy Office of Sciences Subsurface Biogeochemical Research (SBR) workshop on data management, Washington, D. C., April 28-29, 2011.
10. Department of Energy joint workshop on carbon sequestration and geothermal energy science ("To identify key issues common to carbon sequestration and geothermal energy"), Maryland, June 15-17, 2010.

COMPLETED AND CURRENT PROJECTS (my share totals \$2,995,034, out of approximately \$8,000, 000)

	Project Description (In progress)	Role	Period	Amount
1.	Li, Kaye, Shi. "Understanding Ecohydrological Controls of Biogeochemical Reactions and Fluxes at the Watershed Scale", DOE Subsurface Biogeochemistry Research (SBR)	PI	09/01/16 – 08/30/18	\$180,000
2.	Li, L. "Redefining Reactive Surface Area: Understanding Reactive Interfaces in Heterogeneous Porous Media", National Science Foundation (NSF)	PI	07/01/15 - 06/30/18	\$193,050
3.	Brantley et al. "Using the Susquehanna - Shale Hills CZO to Project from the Geological Past to the Anthropocene Future." National Science Foundation (NSF)	Co-PI	10/01/13 – 9/30/18	\$700,000 out of 5,000,000

4.	Li, L. Collaborative Research: Combining complex systems tools, process-based modelling and experiments to bridge scales in low temperature geochemistry. National Science Foundation.	PI	01/01/18 – 12/31/ 20	\$173,352
Project Description (Completed)				
5.	Silva et al., "Understanding characteristics of hyper saline waters from deep aquifers for geological carbon sequestration."	Co-PI	09/01/15 – 02/28/17	\$99,825
6.	Liu et al., "3D Data Acquisition and 3D Printing to Construct "Digital Twins", PSIEE seed grant	co-PI	03/15/15 – 06/30/16	\$8,000 out of \$25,000
7.	Li, L. "Understanding, predicting, and preventing reservoir souring." BP, subcontract through Energy Biosciences Institute (EBI) at UC Berkeley.	PI	01/01/14 – 12/31/15	\$95,000
8.	Li, L. "Geochemical transformations caused by CO ₂ injection or leakage." Department of Energy National Energy Technology Laboratory (NETL).	PI	01/01/11 – 12/31/11	\$38,038
9.	Li, L., Russel Johns. "Development of a coupled compositional and reactive transport model for gas flooding reservoir applications." Gas Flooding Joint Industry Project.	Co-PI	08/01/11 – 05/31/15	\$108,894
10.	Li, L, Maher K., and Navarre-Sitchler, A. "Expanding the role of Reactive Transport Modeling (RTM) within the Biogeochemical Sciences." National Science Foundation.	PI	02/01/14 – 02/28/15	\$50,000
11.	Li, L. "Scaling effects of Cr(VI) reduction kinetics: the role of geochemical heterogeneities", Department of Energy Subsurface Biogeochemical Research Program (DOE SBR).	PI	9/01/11 – 5/31/15	\$150,000
12.	Li, L. "Develop a General Quantitative Framework to Understand, Quantify, and Predict the Evolution of Single Fracture Properties and to Accommodate the Opposing Observations on "Fracture Opening"", Department of Energy National Energy and Technology Laboratory (NETL)	PI	10/23/2013 - 06/30/2014	\$70,000
13.	Li, L. "NRAP 3rd Generation ROM Release and Transport Through Wells." Department of Energy National Energy and Technology Laboratory (NETL)	PI	11/15/2013 - 11/14/2014	\$89,277
14.	Li, L. "Integration of Multiple Natural Tracer Signals in Reactive Transport Modeling." Department of Energy National Energy and Technology Laboratory (NETL)	PI	11/15/2013 - 11/14/2014	\$63,000
15.	Li, L. "Optimizing parameters for predicting the geochemical behavior and performance of discrete fracture networks in geothermal systems ", U.S. Department of Energy Efficiency and Renewable Energy Golden Field Office (DOE EERE)	co-PI	06/01/12 – 11/15/14	\$149,628 Out of \$1,050,000

16.	Li, L. "Reactive Transport Processes in Microbe-Enhanced Hydrocarbon Recovery (MEHR): Process Understanding and Optimization." BP, subcontract through Energy Biosciences Institute (EBI) at UC Berkeley.	PI	01/01/2012 – 12/31/2013	\$175,000
17.	Li, L. "Geochemical modeling integration of isotope signatures." Department of Energy National Energy and Technology Laboratory (NETL)	PI	11/15/12 – 09/30/13	\$66,040
18.	Li, L. "Development of reactive transport models for CO ₂ leakage", Department of Energy National Energy and Technology Laboratory (NETL)	PI	10/01/11 – 6/30/13	\$180,000
19.	Li, L. "Clogging process during field scale biostimulation." Department of Energy Office of Sciences Subsurface Biogeochemical Research (SBR). Subcontract through Lawrence Berkeley National Laboratory (LBNL).	PI	12/11/09 – 09/30/13	\$279,414
20.	Li, L. and Brantley, S. L. "Development of a Subsurface Reactive Transport Model for Predicting Potential Water Quality Problems at Marcellus Shale." The Pennsylvania Water Resources Research Center (PA-WRRC).	PI	03/01/11 – 05/31/13	\$9,000 out of \$18,000
21.	Li, L. "Multiphase Reactive Transport Processes Associated with Wellbore Cement Degradation during CO ₂ Leakage." Department of Energy National Energy Technology Laboratory (NETL).	PI	01/01/11 – 02/29/12	\$62,100
22.	Blumsack, S., Li, L., Nieto, A., and Riggs, R. J. "Risk-informed Site Assessment and Selection for the Long-term Geologic Disposal of CO ₂ ." Department of Energy National Energy Technology Laboratory (NETL).	Co-PI	01/01/11 – 02/29/12	\$18,389 out of \$73,436
23.	Li, L. "Quantifying the environmental impacts of carbon leakage on water quality." College of Earth and Mineral Sciences, Wilson Initiation research grant	PI	07/01/10 – 06/31/11	\$10,000
24.	Li, L. "Reactive transport processes associated with microbe-enhanced oil recovery." BP, subcontract through Energy Biosciences Institute (EBI) at UC Berkeley.	PI	12/11/09 – 08/14/11	\$59,771
25.	Li, L. "Biodegradation of oil spill and their environmental impacts." BP, subcontract through Energy Biosciences Institute (EBI) through UC Berkeley.	PI	12/11/09 – 12/31/11	\$99,771
Total of my share of completed and current funding				\$2,995,034

COURSES in Civil & Environmental Engineering

1. CE 370: Introduction to Environmental Engineering (SP17)
2. CE 475: Water Quality Chemistry (SP18)
3. CE 574: Reactive Transport Processes (SP17, SP18)
4. CE 592: Special topics in Environmental Engineering (FA 16)

5. CE 591: Kappe Seminar series (FA 17)

COURSES in Energy & Mineral Engineering

1. PNG 410: Applied reservoir engineering (SP10, SP11, SP12, SP13, SP14, SP15)
2. PNG 420: Reservoir analysis and secondary recovery (FA10, FA11, FA12, FA13, FA14, FA15)
3. PNG 411: Introduction to oil and gas extraction (FA 12, FA13, FA14, FA15)
4. PNG 550: Reactive transport in subsurface (FA 10, FA11, FA12, SP26)

SERVICE TO THE DEPARTMENT, COLLEGE, AND UNIVERSITY

1. Record of committee work at campus, college, department, and university levels
 - 1) CEE watershed research faculty search (Spring 2017 --)
 - 2) CEE Teaching Performance and Review Committee (Fall 2016 – Spring 2017)
 - 3) CEE Geotechnical engineering faculty search committee (Fall 2016 – Spring 2017)
 - 4) Earth system modelling faculty search committee (Fall 2016)
 - 5) EME faculty activity evaluation committee (Spring 2015)
 - 6) EME faculty search committee member in CEE (InGaR position) (Fall 2014 - 2015)
 - 7) EME faculty search committee member in PNGE (InGaR position) (Fall 2014 - 2015)
 - 8) Rotating member of the SSHCZO executive committee (Fall 2014 – 2015)
 - 9) Data management contact for SSHCZO (Spring 2014 –)
 - 10) Chair for SSHCZO seed grant proposals (Fall 2013 – Summer 2014)
 - 11) Host for Darcy Lecturer, Dorthe Wildenschild (Oct. 1-2, 2014)
 - 12) Member, 2013 Faculty Activity Analysis Committee for EME, April 2014
 - 13) Reviewer for PSIEE seed grant (Spring 2014)
 - 14) EME departmental representative of the EMS Diversity council (Fall 2013 – Spring 2016)
 - 15) EME Leone Chair search committee (Spring 2013)
 - 16) EME energy engineering faculty search committee (Spring 2013)
 - 17) Member, 2013 Faculty Activity Analysis Committee for Department of Energy and Mineral Engineering, 2013
 - 18) Member, 2012 Faculty Activity Analysis Committee for Department of Energy and Mineral Engineering, 2013
 - 19) Member, PSIEE water series committee, August 2012 – May 2013
 - 20) Member, 2011 Faculty Activity Analysis Committee for Department of Energy and Mineral Engineering, 2012
 - 21) Member, PSIEE competitive postdoc committee, May – December 2012
 - 22) Member on PhD Candidacy exam committees for 30 students
 - 23) PNGE senior faculty search committee (Fall 2009 – Spring 2010)
 - 24) Member, Earth and Environmental Systems Institute (EESI) committee on annual workshop series, 2010
2. Record of contribution to the University's programs to enhance equal opportunity and cultural diversity
 - 1) In summer 2016, my group, together with Roman Dibiase's group, hosted two students supported by Research Experience for Undergraduates (REU): Perri Hannah Silverhart and Martin Connor. Perry presented her work at the annual meeting of Geological Society of America (GSA), 2016.
 - 2) In summer 2016, my group hosted a high school student team from underrepresented group in my laboratory (Miguel Santana and Cintia Vasquez), as part of the 2016 Summer Experience in the Earth and Mineral Sciences (SEEMS) program within the Penn State Upward Bound Math and Science (UBMS) Summer Academy for UBMS scholars. The goal of this activity is to enhance education opportunities for underrepresented high school students. One of my graduate students, Zhang Cai, led this activity. In the final research presentation competition, our team won the first place within all SEEMS teams, and won first place in all SEEMS and SEECos (College of Science) teams.
 - 3) In summer 2012, my group hosted a high school student team from underrepresented group in my laboratory (Sierra Anderson, Chris Zurita, Fonseca, and Jermayne Jones), as part of the 2012 Summer Experience in the

Earth and Mineral Sciences (SEEMS) program within the Penn State Upward Bound Math and Science (UBMS) Summer Academy for UBMS scholars. The goal of this activity is to enhance education opportunities for underrepresented high school students. One of my graduate student, Jessie Chao, led this activity. In the final research presentation competition, our team won the first place within all SEEMS teams, and won third place in all SEEMS and SEECoS (College of Science) teams.

- 4) I mentored 3 undergrads from underrepresented groups, including 2 females. Among these, Stephanie Troutman is the first 3+2 student from Fort Valley State University, a Historically Black College in Georgia. Stephanie is the first African American female FVSU student graduated with an Engineering degree from PSU.

3. Assistance to student organizations

- 1) Judge for student presentation in the 19th Annual Environmental Chemistry and Microbiology Student Symposium, April, 2016.
- 2) Judge for student presentation in the 18th Annual Environmental Chemistry and Microbiology Student Symposium, March, 2015.
- 3) Judge for student presentation in the 17th Annual Environmental Chemistry and Microbiology Student Symposium, March 29, 2014.
- 4) Judge for EMS Annual Graduate Student Poster Exhibition, September 29, 2011.
- 5) Judge for 27th Graduate Exhibition, March 23 -25, 2012
- 6) Judge for 2012 Undergraduate Exhibition, April 11, 2012
- 7) Shell Robert Camp, faculty coordinator, 2010 and 2012.
Shell camp is an Engineering training at Shell's Robert training center. Penn State students from geosciences, petroleum and natural gas, chemical, and mechanical engineering receive training in petroleum production operations, drilling techniques, and state-of-the-art subsea technologies in Robert, Louisiana. I was the faculty coordinator for Shell camp in May 9-14, 2010 and May 13-17, 2012. Forty four participated in 2010 and Twenty five participated in 2012. My role in the Shell camp include setting up information session, coordinating with the Shell staff to arrange the travel with the students to the camp.

SERVICE TO THE SOCIETY

- 1) Critical Zone concept exhibition, Shaver's Creek Nature's Center, May 27, 2016
- 2) "Climate change and why it is a global problem?", Radio Park Elementary School, 2nd grade classroom (Ms. Mary Robert), State College, March 2016
- 3) "Climate change and why it is a global problem?", Radio Park Elementary School, 4th grade classroom (Ms. Julie Jobe), State College, March 2016
- 4) Science demonstration on "Water" for kindergarteners at Bennett Center, PSU, May, 2012, 2014
- 5) Science demonstration on "Water" for 3rd graders at Radio Park Elementary school, State College, December, 2014

CONFERENCE PRESENTATIONS: > 90