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EDUCATION

2012: Ph.D. Earth and Planetary Science, *University of California, Berkeley, CA*
Dissertation Advisor: Donald J. DePaolo
2006: M.S. Department of Hydrology and Water Resources, *University of Arizona, Tucson, AZ*
2003: B.S. Environmental Sciences, *University of North Carolina, Asheville, NC*

APPOINTMENTS

2022-present: Associate Professor, Department of Geology, University of Illinois Urbana Champaign
2019-present: Professeure Associée (Associate Professor), Institut de Physique du Globe de Paris, Université Paris Cité
2015-2021: Assistant Professor, Department of Geology, University of Illinois Urbana Champaign
2017, 2018 & 2019: Invited Professor, Institut de Physique du Globe de Paris
2014 – 2015: Postdoctoral Fellow, Stanford University
2012 – 2014: National Science Foundation Postdoctoral Fellow, Stanford University
2008 – 2012: Graduate Student Researcher, Earth Sciences Division, Lawrence Berkeley National Laboratory, Berkeley, CA
2007: Graduate Student Internship, Pacific Northwest National Laboratory, Richmond, WA
2004 – 2006: Graduate Student Researcher, Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA), National Science Foundation Science & Technology Center

AWARDS AND SCHOLARSHIPS

2021: College of Liberal Arts and Sciences Helen Corley Petit Scholar
2020: National Science Foundation, Division of Earth Sciences Early Career Award
2020: UIUC Teachers Ranked as Excellent by their Students: GEOL 470 Hydrogeology
2019: UIUC Teachers Ranked as Excellent by their Students: GEOL 470 Hydrogeology
2017: R&D 100 Award, CrunchFlow Reactive Transport Software
2017: UIUC Teachers Ranked as Excellent by their Students: GEOL 560 Aqueous Geochemistry
2016: Editors Citation for Excellence in Refereeing, Water Resources Research
2013: Award for Best Contribution: EnviroMetal Isotopes Workshop, Ascona, Switzerland
2012: National Science Foundation, Division of Earth Sciences Postdoctoral Research Fellowship
2011: Outstanding Student Paper Award, American Geophysical Union, Hydrology Section
2010: Outstanding Student Paper Award, American Geophysical Union, Biogeosciences Section
2009: Department of Energy, Subsurface Biological Research PI Meeting Student Fellowship

2007: Outstanding Student Paper Award, American Geophysical Union, Hydrology Section

PROFESSIONAL ACTIVITIES

2022

Secretary Elect American Geophysical Union Hydrology Section

Chair, American Geophysical Union Groundwater Technical Committee

Associate Editor, Water Resources Research

NSF Low-Temperature Biogeochemistry proposal review panel member

Workshop Organizer: NSF-RCN “Teaching Reactive Transport” Golden, Colorado.

Oliver Lecturer, Jackson School of Geosciences, University of Texas at Austin

Invited Talks: “Mineral-water interactions over multiple scales – Connections between laboratory and field scale observations” session, American Chemical Society Spring Meeting

Invited Seminars: Texas A&M University, University of Massachusetts Amherst

2021

Chair, American Geophysical Union Groundwater Technical Committee

Associate Editor, Water Resources Research

NSF Low-Temperature Biogeochemistry proposal review panel member

Workshop Organizer: NSF-RCN “Teaching Reactive Transport” Goldschmidt Conference.

Invited Seminars: Cambridge University

2020

Vice Chair, American Geophysical Union Groundwater Technical Committee

Associate Editor, Water Resources Research

Session Organizer: Goldschmidt Conference; American Geophysical Union Fall Meeting

Member: NSF Geochemical Data Workshop

Invited Talks: CUAHSI Critical Zone Cyberseminar Series; NSF Geochemical Data Workshop; “The Role of Plants in Critical Zone Biogeochemistry” session, Goldschmidt Conference; “Geochemical Signatures of Fluid-Rock Interaction: Earth Surface Weathering to Hydrothermal Systems” session, Geological Society of America Annual Meeting.

Invited Seminars: Indiana University Purdue University Indianapolis; Princeton University

2019

Vice Chair, American Geophysical Union Groundwater Technical Committee

Editor, Mineralogical Society of America Reviews in Mineralogy and Geochemistry, special volume on “Reactive Transport in Natural and Engineered Systems”

Associate Editor, Water Resources Research

Workshop Organizer: MSA RiMG Volume 85 release in conjunction with the Goldschmidt Conference, Barcelona, Spain.

Session Organizer: American Geophysical Union Fall Meeting

Invited Talks: Soil Sciences Society of America, San Diego, CA; Water Rock Interactions and Applied Isotope Geochemistry, Tomsk, Russia; International Symposium on Environmental Geochemistry, Peking University, China; “Geobiological controls on critical zone evolution and weathering, past, present and future” session, Goldschmidt

Conference; Early Career AGU/CZO Workshop; “Characterizing Spatial and Temporal Variability of Hydrological and Biogeochemical Processes Across Scales” session, American Geophysical Union Fall Meeting; “Controls, Dynamics, and Responses of Deep-Soil Carbon to Land Use and Climate Change” session, American Geophysical Union Fall Meeting;

Invited Seminars: Princeton University, University of Texas El Paso, Colorado School of Mines, University of Illinois Chicago

2018

Member, American Geophysical Union Groundwater Technical Committee

Associate Editor, Water Resources Research

Instructor, 2-day short course on reactive transport modeling using CrunchFlow/CrunchTope, Cargèse Summer School in Reactive Transport, Corsica, France

Co-Instructor, 2-day short course on reactive transport modeling using The Geochemist’s Workbench with Craig Bethke, Goldschmidt Conference, Boston, MA

Session Organizer: American Geophysical Union Fall Meeting; Computational Methods in Water Resources Meeting

Member, USGS Powell Center Working Group on Soil Carbon (year 3)

Keynote Speaker: Metal Stable Isotope Geochemistry International Conference and Final ITN IsoNose Workshop

Invited Talks: Gordon Research Conference in Geobiology, Galveston, TX; Cargèse Summer School in Reactive Transport, Corsica, France; “Processes and Feedbacks in the Critical Zone” session, Geological Society of America Annual Meeting;

Invited Seminars: Ecole Polytechnique Federale de Lausanne, University of Arizona, University of Texas at Austin. University of Wisconsin at Madison

2017

Member, American Geophysical Union Groundwater Technical Committee

Associate Editor, Water Resources Research

Instructor, 2-day short course on reactive transport modeling using CrunchFlow/CrunchTope, Institut de Physique du Globe de Paris, France

Co-Instructor, 2-day short course on reactive transport modeling using The Geochemist’s Workbench with Craig Bethke, Goldschmidt Conference, Paris, France

Session Organizer: American Geophysical Union Fall Meeting

Member, National Science Foundation Review Panel, EAR Geobiology and Low-Temperature Geochemistry Postdoctoral Fellowship

Invited Talks: “Isotope Biosignatures” session, American Geophysical Union Fall Meeting; “Shale: From Fracking to Forest” session, American Geophysical Union Fall Meeting; Geochemistry of the Earth Surface 11; “Metal isotope redox indicators: Toward mechanistic understanding and predictive power” session, Goldschmidt Conference; “Advancing proxies in the critical zone for deciphering time-dependent processes in weathering profile and natural and anthropogenic fingerprinting of water” session, European Geophysical Union Annual Meeting; Department of Energy GSCO2 Annual Review Meeting

Invited Seminars: Cambridge University; University of Strasbourg; University of Rennes; The French Geological Survey (BRGM); Pennsylvania State University, The Ohio State University

2016

Member, American Geophysical Union Groundwater Technical Committee

Co-Instructor, 2-day short courses on reactive transport modeling using

CrunchFlow/CrunchTope with Carl Steefel, Goldschmidt Conference, Yokohama, Japan; University of Illinois Urbana Champaign; Imperial College London

Invited Talks: “Modeling the Critical Zone: Integrating Processes and Data across Disciplines and Scales” session, American Geophysical Union Fall Meeting; Uranium Recovery Workshop; Eel River Critical Zone Annual review

Invited Seminars: Cambridge University; Imperial College London

2015

Instructor, 2-day short courses on reactive transport modeling using CrunchFlow/CrunchTope, GFZ Potsdam, Germany

Co-Instructor, 2-day short course on reactive transport modeling using The Geochemist’s Workbench with Craig Bethke, Goldschmidt Conference, Prague, Czech Republic

Co-Instructor, 2-day short courses on reactive transport modeling using

CrunchFlow/CrunchTope with Carl Steefel, Goldschmidt Conference, Prague, Czech Republic

Session Organizer: Goldschmidt Conference, Prague, Czech Republic

Invited Talks: “Bridging Microbial Ecology to Geochemistry: Insight from Environmental and Experimental Studies” session, American Geophysical Union Fall Meeting; “Multiple Isotopic Proxies for Weathering Processes and Mechanisms in the Critical Zone” session, Goldschmidt Conference

Invited Seminars: University of Indiana Bloomington; Vanderbilt University; Wayne State University; Illinois State Geological Survey; Northwestern University

2014

Co-Instructor, 2-day short course on reactive transport modeling using The Geochemist’s Workbench with Craig Bethke and Kate Maher, Stanford University

Co-Instructor, Stanford Reactive Transport (START) Summer School, Stanford, CA

Co-Instructor, 2-day short courses on reactive transport modeling using

CrunchFlow/CrunchTope with Carl Steefel, Goldschmidt Conference, Sacramento, CA

Invited Talks: “Deciphering Isotope Signatures of Earth Surface and Critical Zone Processes” session, American Geophysical Union Fall Meeting; Geochemistry of the Earth Surface

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Invited Seminars: University of Illinois Urbana Champaign, Rice University

2013

Invited Talk: “Evolution and Interpretation of Contaminant Isotopic Data from Physical and Reactive Transport Processes: Experiments & Models” session, Goldschmidt Conference

Invited Seminars: University of California Berkeley; University of Oregon

Other affiliations and appointments

Member, American Geophysical Union

Member, Geological Society of American

Member, Geochemical Society

Member, Mineralogical Society of America

Reviewer for Geology, Environmental Science & Technology, *Geochimica et Cosmochimica*

Acta, Geology, Hydrogeology Journal, Journal of Geophysical Research - Biogeosciences,

Advances in Water Research, Chemical Geology, Journal of Hydrology, Journal of Contaminant Hydrology, Minerals, Water Resources Research

DEPARTMENT AND UNIVERSITY SERVICE

(all activities are ongoing unless otherwise noted)

NSF Major Instrumentation Program pre-proposal campus review committee (Fall 2022)

Fulbright Campus Interview Committee (Fall 2022)

Search Committee: Geology Research Specialist Geochemistry Laboratory Complex

Search Committee: SESE Associate Director for Financial and Business Operations

Member: Geology Courses and Curriculum Committee

Member: Geology Admissions Committee

Member: Geology Colloquium Committee (Chair 2016 – 2017; 2021 - present)

PEER-REVIEWED PUBLICATIONS [61]

(Authors underlined are graduate student and postdoctoral scholars I directly supervised)

Golla, J. K., Bouchez, J., Kuessner, M. L., Rempe, D. M., & Druhan, J. L. (2022). Subsurface weathering signatures in stream chemistry during an intense storm. *Earth and Planetary Science Letters*, 595, 117773.

Fernandez, N. M., Bouchez, J., Derry, L. A., Chorover, J., Gaillardet, J., Giesbrecht, I., ... & Druhan, J. L. (2022). Resiliency of silica export signatures when low order streams are subject to storm events. *Journal of Geophysical Research: Biogeosciences*, 127(5), e2021JG006660.

Winnick, M. J., Druhan, J. L., & Maher, K. (2022). Weathering intensity and lithium isotopes: A reactive transport perspective. *American Journal of Science*, 322(5), 647-682.

Esteves, B. F., Spielman-Sun, E., Li, Q., Jew, A. D., Bargar, J. R., & Druhan, J. L. (2022). Geochemical Modeling of Celestite (SrSO₄) Precipitation and Reactive Transport in Shales. *Environmental Science & Technology*, 56(7), 4336-4344.

Roque-Malo, S., Druhan, J. L., & Kumar, P. (2022). REWTCrunch: A Modeling Framework for Vegetation Induced Reactive Zone Processes in the Critical Zone. *Journal of Geophysical Research: Biogeosciences*, 127(2), e2021JG006562.

Jew, A. D., Druhan, J. L., Ihme, M., Kovscek, A. R., Battiato, I., Kaszuba, J. P., ... & Brown Jr, G. E. (2022). Chemical and Reactive Transport Processes Associated with Hydraulic Fracturing of Unconventional Oil/Gas Shales. *Chemical Reviews*, 122(9), 9198-9263.

Druhan, J. L., & Turchyn, A. V. (2022). A reactive transport framework describing covariation in the isotopic ratios of multiple elements in natural systems. *Isotopic Constraints on Earth System Processes*, 285-300.

- Turchyn, A. V., & Druhan, J. L. (2022). The effects of reactive transport on sulfur isotopic compositions in natural environments. *Isotopic Constraints on Earth System Processes*, 271-284.
- Johnson, T. M., Druhan, J. L., Basu, A., Jemison, N. E., Wang, X., Schilling, K., & Wasserman, N. L. (2022). A Review of the Development of Cr, Se, U, Sb, and Te Isotopes as Indicators of Redox Reactions, Contaminant Fate, and Contaminant Transport in Aqueous Systems. *Isotopic Constraints on Earth System Processes*, 237-269.
- Cullen, C., Anders, A. M., Lai, J., & Druhan, J. L. (2022). Numerical modeling of groundwater-driven stream network evolution in low-relief post-glacial landscapes. *Earth Surface Processes and Landforms*, 47(2), 658-671.
- Roque-Malo, S., Yan, Q., Woo, D. K., Druhan, J. L., & Kumar, P. (2022). Advances in biogeochemical modeling for intensively managed landscapes. In *Biogeochemistry of the Critical Zone* (pp. 145-169). Springer, Cham.
- Khan, H. J., Ross, C. M., & Druhan, J. L. (2022). Impact of Concurrent Solubilization and Fines Migration on Fracture Aperture Growth in Shales during Acidized Brine Injection. *Energy & Fuels*.
- Li, Q., Druhan, J. L., & Bargar, J. R. (2022). Influence of sequential stimulation practices on geochemical alteration of shale. *Frontiers in Water*, 4.
- Druhan, J. L., Lawrence, C. R., Covey, A. K., Giannetta, M. G., & Oster, J. L. (2021). A reactive transport approach to modeling cave seepage water chemistry I: Carbon isotope transformations. *Geochimica et Cosmochimica Acta*, 311, 374-400.
- Oster, J. L., Covey, A. K., Lawrence, C. R., Giannetta, M. G., & Druhan, J. L. (2021). A reactive transport approach to modeling cave seepage water chemistry II: Elemental signatures. *Geochimica et Cosmochimica Acta*, 311, 353-373.
- Druhan, J. L., & Lawrence, C. R. (2021). Development of soil radiocarbon profiles in a reactive transport framework. *Geochimica et Cosmochimica Acta*, 306, 63-83.
- Golla, J. K., Kuessner, M. L., Henehan, M. J., Bouchez, J., Rempe, D. M., & Druhan, J. L. (2021). The evolution of lithium isotope signatures in fluids draining actively weathering hillslopes. *Earth and Planetary Science Letters*, 567, 116988.
- Guinoiseau, D., Fekiacova, Z., Allard, T., Druhan, J. L., Balan, E., & Bouchez, J. (2021). Tropical weathering history recorded in the silicon isotopes of lateritic weathering profiles. *Geophysical Research Letters*, 48(19), e2021GL092957.
- Bradbury, H. J., Turchyn, A. V., Bateson, A., Antler, G., Fotherby, A., Druhan, J. L., Greaves, M., Sevilgen, D.S., Hodell, D. A. (2021). The carbon-sulfur link in the remineralization of organic carbon in surface sediments. *Frontiers in Earth Science*, 9, 301.
- Lincker, M., Druhan, J. L., Guillon, S., & Lagneau, V. (2021). Thermodynamic and kinetic constants for isotopic fractionation modeling with or without major isotope hypothesis. *Chemical Geology*, 120143.
- Fernandez, N. M., Perez-Fodich, A., Derry, L. A., & Druhan, J. L. (2021). A first look at Ge/Si partitioning during amorphous silica precipitation: Implications for Ge/Si as a tracer of fluid-silicate interactions. *Geochimica et Cosmochimica Acta*, 297, 158-178.

- Khan, H. J., Spielman-Sun, E., Jew, A. D., Bargar, J., Kavscek, A., & Druhan, J. L. (2021). A Critical Review of the Physicochemical Impacts of Water Chemistry on Shale in Hydraulic Fracturing Systems. *Environmental Science & Technology*, 55(3), 1377-1394.
- Ling, B., Khan, H. J., Druhan, J. L., & Battiato, I. (2021). Multi-Scale Microfluidics for Transport in Shale Fabric. *Energies*, 14(1), 21.
- Cheng, Y., Arora, B., Şengör, S. S., Druhan, J. L., Wanner, C., van Breukelen, B. M., & Steefel, C. I. (2021). Microbially mediated kinetic sulfur isotope fractionation: reactive transport modeling benchmark. *Computational geosciences*, 25(4), 1379-1391.
- Fotherby, A., Bradbury, H. J., Antler, G., Sun, X., Druhan, J. L., & Turchyn, A. V. (2021). Modelling the effects of non-steady state transport dynamics on the sulfur and oxygen isotope composition of sulfate in sedimentary pore fluids. *Frontiers in Earth Science*, 8, 587085.
- Tune, A. K., Druhan, J. L., Wang, J., Bennett, P. C., & Rempe, D. M. (2020). Carbon Dioxide Production in Bedrock Beneath Soils Substantially Contributes to Forest Carbon Cycling. *Journal of Geophysical Research: Biogeosciences*, 125(12), e2020JG005795.
- Akono, A. T., Dávila, G., Druhan, J., Shi, Z., Jessen, K., & Tsotsis, T. (2020). Influence of geochemical reactions on the creep behavior of Mt. Simon sandstone. *International Journal of Greenhouse Gas Control*, 103, 103183.
- Winnick, M.; Lawrence, C.; McCormick, M.; Druhan, J.L.; Maher, K. (2020) Soil respiration response to rainfall modulated by plant phenology in a montane meadow, East River, Colorado, USA. *Journal of Geophysical Research: Biogeosciences*, 125(10), e2020JG005924.
- Druhan, J.L.; Guillon, S., Lincker, M.; Arora, B. (2020) Stable and radioactive carbon isotope partitioning in soils and saturated systems: A reactive transport modeling benchmark study. *Computational Geosciences*, pp. 1-11.
- Druhan, J.L.; Lammers, L., Fantle, M.S. (2020) On the utility of quantitative modeling to the interpretation of Ca isotopes. *Chemical Geology*, 119469.
- Dávila, G.; Dalton, L.; Crandall, D.M.; Garing, C.; Werth, C.J.; Druhan, J.L. (2020) Reactive alteration of a Mt. Simon sandstone due to CO₂-rich brine displacement. *Geochimica et Cosmochimica Acta*, 271, 227 - 247.
- Jemison, N.E.; Bizjack, M.T.; Johnson, T.M.; Druhan, J.L. (2020) Influence of physical and chemical hydrology on bioremediation of a U-contaminated aquifer informed by reactive transport modeling incorporating 238U/235U ratios. *Geochimica et Cosmochimica Acta*, 269, 303 - 328.
- Druhan, J.L.; Winnick, M.J., Thullner, M. (2019) Partitioning and tracing stable isotopes through reactive transport systems. *Reviews in Mineralogy and Geochemistry vol. 85*, 239-264.
- Fernandez, N.M.; Zhang, X.; Druhan, J.L. (2019) Silicon isotopic re-equilibration during amorphous silica precipitation and implications for isotopic signatures in geochemical proxies. *Geochimica et Cosmochimica Acta*, 262, 104 - 127.
- Druhan, J.L.; Winnick, M.J. (2019) Reactive transport of stable isotopes. *Elements Magazine*, 15, 107 - 110.

- Giannetta, M.G.; Sanford, R.A.; Druhan, J.L. (2019) A revised Monod-Type rate law predicting variable sulfur isotope fractionation factors as a function of sulfate reduction rate. *Geochimica et Cosmochimica Acta*, 258, 174 – 194.
- Liu, Y.; Winnick, M.J.; Hsu, H.T.; Lawrence, C.; Maher, K.; Druhan, J.L. (2019) A reactive transport framework for soil moisture limitations on microbial carbon respiration. *JGR-Biogeosciences*, 124, 2222 – 2247.
- Akono, A.T.; Druhan, J.L.; Davila, G.; Tsotsis, T.; Jessen, K.; Fuchs, S.; Crandall, D.; Shi, Z.; Dalton, L.; Tkach, M.K.; Soodman, A.L.; Frailey, S.; Werth, C.J. (2019) A review of geo-chemical-mechanical impacts in geological carbon storage reservoirs, *Greenhouse Gases: Science and Technology*.
- Blankinship, J.C.; Crow, S.E., Berhe, A.A., Druhan, J.L.; Heckman, K.A.; Keiluweit, M.; Lawrence, C.R.; Spiotta, E.M.; Plante, A.F.; Rasmussen, C.; Schädel, C.; Schimel, J.P.; Sierra, C.A.; Thompson, A.; Wayai, R.; Wieder, W.R. (2018). Improving understanding of soil organic matter dynamics by triangulating theories, measurements and models. *Biogeochemistry*, 140(1), 1-13.
- Rasmussen, C.; Heckman, K.; Wieder, W.; Keiluweit, M.; Berhe, A.A.; Blankinship, J.; Crow, S. Druhan, J.L.; Hicks Pries, C.; Marin-Spiotta, E.; Lawrence, C.; Plante, A.; Schadel, C.; Schimel, J.; Sierra, C.; Thompson, A.; Wagai, R. (2018). Beyond Clay: Towards an improved set of variables for predicting soil organic matter content. *Biogeochemistry*, 137(3), 297 - 306.
- Druhan, J.L.; Maher, K. (2017) The influence of mixing on stable isotope ratios in porous media: A revised Rayleigh model. *Water Resources Research*, 53, 1101-1124.
- Huber, C.; Druhan, J.L.; Fantle, M.S. (2017) Perspectives on geochemical proxies: The impact of model and parameter selection on the quantification of carbonate recrystallization rates. *Geochimica et Cosmochimica Acta*, 217C, 171-192.
- Li, L.; Maher, K.; Navarre-Sitchler, A.; Druhan, J.L.; Meile, C.; Lawrence, C.; Moore, J.; Perdrial, J.; Sullivan, P.; Thompson, A.; Jin, L.; Bolton, E.W.; Brantley, S.L.; Dietrich, W.; Mayer, K.U.; Steefel, C.I.; Valocchi, A.; Zachara, J.; Kocar, B.; Mcintoch, J.; Tutolo, B.M.; Kumar, M.; Sonnenthal, E.; Bao, C.; Beisman, J. (2017) Expanding the Role of Reactive Transport Models in Critical Zone Processes. *Earth Science Reviews*, 165, 280-301.
- Pini, R.; Vandehey, N.T.; Druhan, J.L.; O’Neil, J.P.; Benson, S.M. (2016) Quantifying solute spreading and mixing in reservoir rocks using 3-D PET imaging. *Journal of Fluid Mechanics*, 796, 558 – 587.
- Vialle, S.; Druhan, J.L.; Maher, K. (2016) Multi-phase flow simulation of CO₂ leakage through a fractured caprock in response to mitigation strategies, *International Journal of Greenhouse Gas Control*, 44, 11-25.
- Druhan, J.L.; Brown, S.T.; Huber, C. (2015) Isotopic gradients across fluid-mineral boundaries. *Reviews in Mineralogy and Geochemistry vol. 80: Pore-scale geochemical processes*, 355-391.
- Wanner, C.; Druhan, J.L.; Amos, R.T.; Alt-Epping, P.; Steefel, C.I. (2015) Benchmarking the simulation of Cr isotopes. *Computational Geosciences*, 19(3), 497-521.

- Druhan, J.L.; Vialle, S.; Maher, K., Benson, S. (2015) Numerical simulation of reactive barrier emplacement to control CO₂ migration, in *Carbon Dioxide Capture for Storage in Deep Geologic Formations – Results from the CO₂Capture Project*, Vol. 4, Karl F. Gerdes (editor), CPL Press.
- 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.
- Druhan, J.L.; Conrad, M.E.; Bill, M.; Lim, H.C.; Wu, C.; Williams, K.H.; DePaolo, D.J.; Brodie, E.L. (2014) A large column analog experiment of stable isotope variations during reactive transport: II. Carbon mass balance, microbial community structure and predation. *Geochimica et Cosmochimica Acta*, 124, 394 - 409.
- Hubbard C.G.; Cheng, Y.; Engelbrekston, A.; Druhan, J.L.; Li, L.; Ajo-Franklin, J.; Coates, J.D.; Conrad, M.E. (2014) Isotopic insights into microbial sulfur cycling in oil reservoirs, *Frontiers in Microbiology*, 5, 1 – 12.
- Druhan, J.L.; Steefel, C.I.; Williams, K.H.; DePaolo, D.J. (2013) Calcium isotope fractionation in groundwater: Molecular scale processes influencing field scale variability. *Geochimica et Cosmochimica Acta*, 119, 93 - 116.
- Vandehey, N.T.; O’Neil, J.P.; Boutchko, R.; Druhan, J.L.; Moses, W.W.; Nico, P.S. (2012) Monitoring Tc dynamics in a bioreduced sediment: An investigation with gamma camera imaging of ^(99m)Tc-pertechnetate and ^(99m)Tc-DTPA. *Environmental Science & Technology*, 46(22), pp. 12583 – 12590.
- Druhan, J.L.; Steefel, C.I.; Molins, S.; Williams, K.H.; Conrad, M.E.; DePaolo, D.J. (2012) Timing the onset of sulfate reduction over multiple subsurface acetate amendments by measurement and modeling of sulfur isotope fractionation. *Environmental Science & Technology* 46(16) pp. 8895 - 8902.
- Boutchko, R.; Rayz, V.L.; Vandehey, N.T.; O’Neil, J.P., Budinger, T.F.; Nico, P.S.; Druhan, J.L.; Saloner, D.A.; Gullberg, G.T.; Moses, W.W. (2011) Imaging and modeling of flow in porous media using clinical nuclear emission tomography and computational fluid dynamics. *Journal of Applied Geophysics* 76, pp. 74 – 81.
- Nielsen, L.C., Druhan, J.L., Brown, S.T., Yang, W., DePaolo, D.J. (2011) Chapter 9: Calcium isotopes as tracers of biogeochemical processes. In: *Handbook of Environmental Isotope Geochemistry*, Baskaran, M. (ed.) first edition, Springer.
- Williams, K.H., N’Guessan, A.L., Druhan, J.L., Long, P.E., Hubbard, S.S., Lovely, D.R., Banfield, J.F., (2010) Electrode voltages accompanying stimulated bioremediation of a uranium-contaminated aquifer. *Journal of Geophysical Research – Biogeosciences* v. 115, pp. G00G05.
- Williams, K.H., Kemna, A., Wilkins, M.J., Druhan, J.L., Arntzen, E., N’Guessan, A.L., Long, P.E., Hubbard, S.S., Banfield, J.F. (2009) Geophysical monitoring of coupled microbial and geochemical processes during stimulated subsurface bioremediation. *Environmental Science & Technology*, v. 43(17) pp. 6717-6723.

- Druhan, J.L., Conrad, M.E., Williams, K.H., N'Guessan, L., Long, P.E., Hubbard, S.S., (2008) Sulfur isotopes as indicators of amended bacterial sulfate reduction processes influencing field scale uranium bioremediation. *Environmental Science & Technology*, v. 42(21), pp. 7842-7849.
- Druhan, J.L., Hogan, J.F., Eastoe, C.J., Hibbs, B.J., Hutchison, W.R., (2008) Hydrogeologic controls on groundwater recharge and salinization: A geochemical analysis of the northern Hueco Bolson aquifer, Texas, USA. *Hydrogeology Journal*, v. 16(2), pp. 281-296.
- Maas, R.P., Patch S.C., Pandolfo, T.J., Druhan, J.L., Gandy N.F., (2005) Lead content and exposure from children's and adult's jewelry products. *Bulletin of Environmental Contamination and Toxicology*, v. 74(3) pp. 437-444.

OTHER PUBLICATIONS

(These include non-peer reviewed publications and peer-reviewed extended abstracts)

- Spielman-Sun, E., Jew, A. D., Druhan, J. L., & Bargar, J. R. (2021, July). Controlling strontium scaling in the Permian Basin through manipulation of base fluid chemistry and additives. In *SPE/AAPG/SEG Unconventional Resources Technology Conference*. OnePetro.
- Gundogar, A. S., Druhan, J. L., Ross, C. M., Jew, A. D., Bargar, J. R., & Kavscek, A. R. (2021, July). Core-flood effluent and shale surface chemistries in predicting interaction between shale, brine, and reactive fluid. In *SPE/AAPG/SEG Unconventional Resources Technology Conference*. OnePetro.
- Noël, V., Spielman-Sun, E., Druhan, J. L., Fan, W., Jew, A. D., Kavscek, A. R., Brown, G.E., Bargar, J. R. (2020, December). Synchrotron X-ray Imaging of Element Transport Resulting from Unconventional Stimulation. In *Unconventional Resources Technology Conference, 20–22 July 2020* (pp. 1363-1382). Unconventional Resources Technology Conference (URTeC).
- Druhan, J.L.; Fernandez, N.; Wang, J.; Dietrich, W.E.; Rempe, D. (2017) Seasonal shifts in the solute ion ratios of vadose zone rock moisture from the Eel River Critical Zone Observatory. *Acta Geochimica*, 36(3), 385 - 388.
- Liu, Y.; Oster, J.L.; Druhan, J.L. (2017) The hydrologic record of karst systems: Linking soil moisture to the carbon isotope signature of soils above the Blue Spring cave system. *Acta Geochimica*, 36(3), 392 - 395.
- Druhan, J.L.; Maher, K. (2014) A model linking stable isotope fractionation to water flux and transit times in heterogeneous porous media, *Procedia Earth and Planetary Science*, 10, 179 – 188.
- Steeffel, C.I.; Druhan, J.L.; Maher, K. (2014) Modeling coupled chemical and isotopic equilibration rates, *Procedia Earth and Planetary Science*, 10, 208 – 217.
- Maher, K.; Druhan, J.L. (2014) Relationships between the transit time of water and the fluxes of weathered elements through the critical zone, *Procedia Earth and Planetary Science*, 10, 16 – 22.

Druhan, J.L.; Vialle, S.; Maher, K.; Benson, S. (2014) A reactive transport model for geochemical mitigation of CO₂ leaking into a confined aquifer, GHGT-12 Conference Proceedings, *Energy Procedia*, 63, 4620 – 4629.

Druhan J.L. and Maher K. (2013) A reactive transport model for geochemical mitigation of CO₂ leaking into a confined aquifer. In *Assessment of Leakage Detection and Intervention Scenarios for CO₂ Sequestration, CCP3 (CO₂ Capture Project 3) Contingency Planning Final Report* (eds. Benson S., Harris, J., Maher, K., Zoback, M. *et al.*), p 192.

Vialle S., Druhan, J.L, Maher, K. (2013) Geochemical evolution of a fractured system in the context of underground carbon storage using reactive transport modeling. In *Assessment of Leakage Detection and Intervention Scenarios for CO₂ Sequestration, CCP3 (CO₂ Capture Project 3) Contingency Planning Final Report* (eds. Benson S., Harris, J., Maher, K., Zoback, M. *et al.*), p 192.

ADVISEES AND POSTDOCTORAL SCHOLARS

Current Postdoctoral Fellows:

Bryan Xavier Medina Rodriguez

Current Graduate Students and Track:

Celia Aranda Reina, PhD student (Illinois Distinguished Fellow)

Andrew Silverman Guertin, PhD student

Jinyu Wang, PhD student

Jon Golla, PhD student (NSF GRFP recipient)

Former Postdoctoral Fellows:

Barbara De Farias Esteves (private company, Rio de Janeiro, Brazil)

Hasan Khan (Assistant Professor, King Fahd University of Petroleum and Minerals)

Gabriela Davila (Experimental Scientist, Lawrence Livermore National Laboratory)

Former Graduate Students:

Yuchen Liu, PhD student (2020)

Nicole Fernandez, PhD student (2020, NSF GRFP recipient)

Jia Wang, MS student (2019)

Cecilia Cullen, MS student (co-advised with Alison Anders; 2019)

Noah Jemison, PhD student (co-advised with Tom Johnson; 2019)

Max Giannetta, MS student (2018)

Matt Bizjack, MS student (2016)

Undergraduate Advisees:

Valerie Smykalov, Senior Thesis (in progress)

David Raynes, Senior Thesis (2019)

Jia Wang, Senior Thesis (2017)

Joanna Kruger, Senior Thesis (2017)

Jacob Gorz, Research Assistant (2017)

Laura Schmitt, Honors credit project (2016)

PRIMARY COURSES TAUGHT

2022: GEOL 571: Introduction to Reactive Transport Modeling (Fall)
2022: GEOL 470: Introduction to Hydrogeology (Fall)
2021: GEOL 560: Aqueous Geochemistry (Fall)
2021: GEOL 470: Introduction to Hydrogeology (Fall)
2020: GEOL 571: Introduction to Reactive Transport Modeling (Fall)
2020: GEOL 470: Introduction to Hydrogeology (Fall)
2019: GEOL 560: Aqueous Geochemistry (Fall)
2019: GEOL 470: Introduction to Hydrogeology (Fall)
2018: GEOL 571: Introduction to Reactive Transport Modeling (Fall)
2018: GEOL 470: Introduction to Hydrogeology (Fall)
2017: GEOL 560: Aqueous Geochemistry (Fall)
2017: GEOL 470: Introduction to Hydrogeology (Spring)
2016: GEOL 470: Introduction to Hydrogeology (Fall)

FUNDING HISTORY

Collaborative Research: Concentration – Ratio – Discharge (C-R-Q) relationships of transient water-age distributions. NSF 1/14/2022 – 1/13/2025. \$273,286 to Druhan (PI) over five years

CAREER: Isotope-enabled reactive transport modeling of weathering signatures in hillslopes. NSF 6/1/2021 – 5/31/2026. \$516,262 to Druhan (PI) over five years

US Department of Energy: Office of Fossil Energy; administered through SLAC / Stanford University: Basin-specific geochemistry to promote unconventional efficiency; 05/01/2020 – 04/30/2022. FWP 100211. \$279,550 to Druhan (subcontract) over two years

RCN: Community-based educational infrastructure for numerical simulation in the Earth Sciences: A reactive transport case use. NSF 9/15/2019 – 8/31/2024. EAR-1935321. \$103,130 to Druhan (co-PI) over four years

Center for mechanistic control of water-hydrocarbon-rock interactions in unconventional and tight oil formations, an Energy Frontier Research Center; DOE-EFRC; 01/01/2019 – 07/31/2022. DE-SC0019165. \$542,000 to Druhan (co-PI) over three years

A radioisotope enabled reactive transport model for deep vadose zone carbon. DOE-SBR; 09/15/2018 – 09/14/2020: \$200,000 to Druhan (PI) over two years

Development of a molecularly informed biogeochemical framework for reactive transport modeling of subsurface carbon inventories, transformations and fluxes. DOE-SBR; 09/01/2017 – 08/31/2020: \$209,955 to Druhan (co-PI) over three years

Center of Geological Storage of CO₂, an Energy Frontier Research Center; DOE-EFRC; 08/01/2016 – 07/31/2018. DE-FC26-05NT42588. \$250,836 to Druhan (co-PI) over two years

EAGER: Development of an isotope-enabled reactive transport tool to simulate carbon transformations in karst environments. NSF 01/01/2016 – 12/31/2016. EAR-1600931. \$45,288 to Druhan (PI) over one year.

A multiscale approach to modeling carbon and nitrogen cycling within a high elevation watershed. DOE-SBR; 08/01/2015 – 07/31/2018. DE-SC0014556: \$90,000 to Druhan (co-PI) over two years.