

Education

- Ph.D. **University of California Berkeley**, Department of Earth and Planetary Science
Research adviser: Donald J. DePaolo 2007 – 2012
- M.S. **University of Arizona**, Department of Hydrology and Water Resources
Research adviser: James Hogan 2004 - 2006
- B.S. **University of North Carolina – Asheville**, Department of Environmental Sciences
Research adviser: Richard Maas 1999 - 2003

Professional Appointments

- Assistant Professor, University of Illinois Urbana-Champaign, Department of Geology August, 2015 - present
- Invited Professor, Institut de Physique du Globe de Paris January - March 2017
- Postdoctoral Fellow, Stanford University Department of Geological & Environmental Sciences September 2014 –July 2015
- NSF EAR Postdoctoral Fellowship, Stanford University Department of Geological & Environmental Sciences September 2012 – August 2014
- Graduate Student Researcher, Center for Isotope Geochemistry, University of California Berkeley & Lawrence Berkeley National Laboratory 2008 –2012
- Graduate Student Intern, Pacific Northwest National Laboratory 2007
- Graduate Student Researcher, Sustainability of semi-Arid Hydrology and Riparian Areas (SAHRA), NSF Science Center 2004 - 2006
- Undergraduate Student Researcher, Environmental Quality Institute University of North Carolina 2002-2003

Courses Taught

- GEOL 571: Introduction to Reactive Transport Modeling (UIUC) Fall 2016
- GEOL 470: Introduction to Hydrogeology (UIUC) Spring 2016, 2017
- GES 224: Modeling Transport and Transformations in the Environment (Stanford) Winter 2013
- CrunchFlow Reactive Transport Modeling Workshop Goldschmidt 2014
- The Geochemist's Workbench Reactive Transport Modeling Workshop Stanford 2014
- CrunchFlow Reactive Transport Modeling Workshop GFZ Potsdam, 2015
- The Geochemist's Workbench Reactive Transport Modeling Goldschmidt 2015

Workshop

- CrunchFlow Reactive Transport Modeling Workshop Imperial College London
2016
- CrunchFlow Reactive Transport Modeling Workshop University of Illinois Urbana
Champaign 2016
- CrunchFlow Reactive Transport Modeling Workshop Goldschmidt 2016
- CrunchFlow Reactive Transport Modeling Workshop Institut de Physique du
Globe de Paris, 2017

Professional Activity

- Associate Editor, Water Resources Research 2017 - Present
- Member, AGU Groundwater Technical Committee 2016 - Present
- Member, Geochemical Society 2009 - Present
- Member, American Geophysical Union 2006 - Present
- Manuscript Reviewer: Advances in Water Research, Chemical
Geology, Environmental Science & Technology, Geochimica et
Cosmochimica Acta, Hydrogeology Journal, Journal of Geophysical
Research - Biogeosciences, Journal of Hydrology, Journal of
Contaminant Hydrology, Minerals, Water Resources Research

Honors and Awards

- Editors Citation for Excellence in Refereeing, Water Resources
Research 2016
- Award for Best Contribution, EnviroMetal Isotopes Workshop,
Ascona, Switzerland, August 18 – 23 2013
- NSF EAR Postdoctoral Research Fellowship 2012
- Outstanding Student Paper Award, AGU Fall Meeting
Hydrology Section 2011
- Outstanding Student Paper Award, AGU Fall Meeting
Biogeosciences Section 2010
- DOE SBR PI Meeting Student Travel Fellowship 2009
- Outstanding Student Paper Award, AGU Fall Meeting
Hydrology Section 2007

Publications

- Huber, C.; **Druhan, J.L.**; Fantle, M.S.. Perspectives on geochemical proxies: The impact of model and parameter selection on the quantification of carbonate recrystallization rates. *In Review*.
- 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. Improving understanding of soil organic matter dynamics by triangulating theories, measurements and models. *In Review*.
- 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.
- 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*, in press.
- 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*, in press.
- 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 CO₂ Capture Project*, 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.

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.

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.

Non-Peer-Reviewed Publications

2013 Assessment of Leakage Detection and Intervention Scenarios for CO₂ Sequestration. Stanford Center for Carbon Storage, CO₂ Capture Project Phase 3 white paper, 78 p.

Conference Presentations

Geochemistry of the Earth Surface 11 (2017): *Invited Talk*: Druhan, J.L., Fernandez, N.; Wang, J.; Dietrich, W.E.; Rempe, D. Seasonal shifts in the solute ion ratios of vadose zone rock moisture from the Eel River Critical Zone Observatory. Guiyang, China, 11 – 16 June.

EGU General Assembly (2017): *Invited Talk*: Druhan, J.L., Lawrence, C.; Oster, J.; Rempe, D.; Dietrich, W.E. From the surface to the deep critical zone: Linking soil carbon, fluid saturation and weathering rate. Abstract 13803 presented at the 2017 EGU General Assembly, Vienna, Austria, 23-28 April.

GSCO2 Annual Review Meeting (2017): *Invited Talk*: Druhan, J.L. Direct imaging of transport property evolution in Mt. Simon sandstone via positron emission tomography. University of Illinois Urbana Champaign, March 29.

AGU Fall Meeting (2016): *Invited Talk*: Druhan, J.L., Liu, Y.; Fernandez, N.; Rempe, D.; Lawrence, C.; Winnick, M.J.; Maher, K.; Dietrich, W.E.. The hydrologic interface between soil carbon and subsurface weathering: Insights from the East River Scientific Focus Area and Eel River Critical Zone Observatory, Abstract H51N-01 presented at the 2016 Fall Meeting, AGU, San Francisco, California, 12-16 Dec.

Goldschmidt (2016): Druhan, J.L., Maher, K. A new Rayleigh model for fractionation in subsurface flow. June 26 – July 1, Yokohama, Japan.

AGU Fall Meeting (2015): *Invited Talk*: Druhan, J.L., Lawrence, C. A reactive transport model for the distribution and age of carbon in soils and sediments through direct simulation of the stable and radioactive isotopologues, Abstract B23I-06 presented at the 2015 Fall Meeting, AGU, San Francisco, California, 14-18 Dec.

Goldschmidt Conference (2015): *Invited Talk*: Druhan, J.L.; Maher, K.; Steefel, C.I. A model for the isotope partitioning of weathering reactions in catchments. August 16 - 21, Prague, Czech Republic.

AGU Fall Meeting (2014): *Invited Talk*: Druhan, J.L., Bill, M., Lim, H.C., Wu, C., Conrad, M.E., Williams, K.H., DePaolo, D.J., Brodie, E. Evidence of a dynamic microbial community structure and predation through combined microbiological and stable isotope characterization, Abstract B42B-02 presented at the 2014 Fall Meeting, AGU, San Francisco, California, 15-19 Dec.

AGU Fall Meeting (2014): Druhan, J.L., Huber, C., Parmigiani, A. A pore scale description of calcium isotope exchange and equilibrium with calcite. Abstract H53A-0831 presented at the 2014 Fall Meeting, AGU, San Francisco, California, 15-19 Dec.

AGU Fall Meeting (2014): Druhan, J.L., Maher, K. Fractionation, concentration and flow: A model coupling stable isotope ratios to fluid travel time and chemical reactivity. Abstract EP14A-07 presented at the 2014 Fall Meeting, AGU, San Francisco, California, 15-19 Dec.

Geochemistry of the Earth's Surface (GES-10) (2014): *Invited Talk*: Druhan, J.L.; Maher, K. A model linking stable isotope fractionation to water flux and transit times in heterogeneous porous media. August 18 - 22, Paris, France.

Goldschmidt Conference (2014): Druhan, J.L.; Steefel, C.I.; Maher, K. Choosing a model for isotope fractionation in complex systems. June 8 - 13, Sacramento, California, USA.

AGU Fall Meeting (2013): Druhan, J.L., Maher, K. Stable isotope fractionation in response to variable fluid residence time distributions, Abstract H53F-1489 presented at the 2013 Fall Meeting, AGU, San Francisco, California, 9-13 Dec.

AGU Fall Meeting (2013): Druhan, J.L., Huber, C., Parmigiani, A., Shafei, B., Maher, K. A pore scale modeling approach to isotopic fractionation during reactive transport through porous media, Abstract H42D-02 presented at the 2013 Fall Meeting, AGU, San Francisco, California, 9-13 Dec.

AGU Fall Meeting (2013): Druhan, J.L., Maher, K., Vialle, S., Benson, S., Agarwal, A. A reactive transport model for the geochemical response, detection and potential mitigation of CO₂ leakage into a confined aquifer, Abstract V34A-05 presented at the 2013 Fall Meeting, AGU, San Francisco, California, 9-13 Dec.

Goldschmidt Conference (2013): *Invited Talk*: Druhan, J.L.; Maher, K.; Weaver, K.; McClain, C. The influence of flow field heterogeneity on the observed $\delta^{53}\text{Cr}$ fractionation factor during abiotic chromate reduction. August 25 - 30, Florence, Italy.

EnvironMetal Isotopes (EMI) Conference (2013): Druhan, J.L., Steefel, C.I., DePaolo, D.J. Calcium isotope fractionation in groundwater. August 18 - 23, Ascona, Switzerland.

AGU Fall Meeting (2012): Druhan, J.L., Finsterle, S.; Vandehey, N.T.; Bouchko, R.; O'Neil, J.P.; Moses, W.W.; Nico, P.S. Direct observations of flow path evolution during reactive transport in porous media using clinical nuclear imaging tomography, Abstract H24E-05 presented at the 2012 Fall Meeting, AGU, San Francisco, California, 3-7 Dec.

Goldschmidt Conference (2012): Druhan, J.L.; Steefel, C.I.; Williams, K.H.; Nielsen, L.C.; DePaolo, D.J. Calcium isotope fractionation as a function of solution stoichiometry in groundwater. June 24-29, Montreal, Canada.

AGU Fall Meeting (2011): Druhan, J.L.; Vandehey, N.T.; Buchko, R.; O'Neil, J.P.; Moses, W.W.; Finsterle, S.; Steefel, C.; Nico, P.S. Observing the coupled behavior of geochemistry and flow path evolution during bioreduction using clinical nuclear imaging tomography. Abstract H24A-07 presented at the 2011 Fall Meeting, AGU, San Francisco, California, 5-9 Dec.

Goldschmidt Conference (2011): Druhan, J.L.; Steefel, C.I.; Conrad, M.E.; DePaolo, D.J., A meso-scale laboratory study of stable isotope variations during uranium bioremediation. *Mineralogical Magazine*, August 14-19, Prague, Czech Republic.

DOE Subsurface Biogeochemical Research Contractor-Grantee Workshop (2011) *Invited talk*: Mechanisms for stable isotope variation during bioremediation. Washington D.C., 26-28 April.

Rifle Integrated Field Research Challenge (IFRC) Planning Meeting (2011): Isotopic systematics for biostimulated subsurface systems. Carmel-by-the-Sea, CA. 8-11 March.

AGU Fall Meeting (2010): Druhan, J.L., Conrad, M.E., Williams, K.H., Steefel, C.I., DePaolo, D.J. Sulfur isotope fractionation as an early indicator of microbial sulfate reduction under conditions of stimulated subsurface bioremediation. Abstract B54A-04 presented at the 2010 Fall Meeting, AGU, San Francisco, CA., 12-17 Dec.

Goldschmidt Conference (2010): Druhan, J.L., Conrad, M.E. Williams, K.H., DePaolo, D.J., 2010 Permeability reduction, calcium and sulfur isotope fractionation during uranium bioremediation. *Geochimica et Cosmochimica Acta*, v. 74(12) pp. A247.

Goldschmidt Conference (2009): Druhan, J.L., Conrad, M.E., Williams, K.H., Sonnenthal, E.L., DePaolo, D.J., 2009 Isotopic signatures for key mineralogical reactions accompanying biostimulated uranium reduction. *Geochimica et Cosmochimica Acta* v. 73(13) pp. A305..

AGU Fall Meeting (2008): Druhan, J.L., Dietrich, W.E., Conrad, M.E., Dawson, T.E., Fung, I., DePaolo, D.J. Geochemical characterization of moisture sources supplying a forested ecosystem in an unchanneled hillslope in the Northern California coast range. *Eos Trans. AGU*, 89(53), Fall Meet. Suppl. Abstract H21F-0901.

AGU Fall Meeting (2007): Druhan, J.L., Conrad, M.E., Williams, K.H., N'Guessan, L., Long, P.E., Hubbard, S.S. Sulfur isotopes as indicators of bacterial sulfate reduction processes influencing field scale uranium bioremediation, *Eos Trans. AGU*, 88(52), Fall Meet. Suppl. Abstract H13G-1668.

Grants Received

Jennifer Druhan (co-PI); Department of Energy; GSCO₂ EFRC; 08/01/2016 – 07/31/2018; \$250,836 to UIUC Geology Department (Druhan) over two years

Kate Maher (lead-PI); Jennifer Druhan (co-PI); Corey Lawrence (co-PI); US Department of Energy; 08/01/2015 – 07/31/2018; \$90,000 to UIUC Geology Department (Druhan) over two years

Jennifer Druhan (co-lead PI); Jessica Oster (co-lead PI); National Science Foundation; EAGER 01/01/2016 – 12/31/2016; \$45,288 to UIUC Geology Department (Druhan) over one year