

Zach Perzan

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EDUCATION

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| Ph.D. Earth System Science, Stanford University
Gerald J. Lieberman Fellow
NSF Graduate Research Fellow
<i>Advisor: Kate Maher</i> | Expected 2023 |
| B.A. Geology (Honors), Middlebury College
<i>Summa Cum Laude</i> | 2015 |

RESEARCH EXPERIENCE

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|---|-------------|
| On-farm recharge in the Central Valley of California , Doctoral Researcher
<i>With R. Knight and K. Maher (Stanford)</i> <ul style="list-style-type: none">- Collaborative project with Stanford geophysicists and a local water district- Assimilated novel geophysical data into a massively parallel hydrologic model- Performed 500,000+ core-hours of hydrologic simulations | 2021 – |
| Floodplain groundwater quality modeling , Doctoral Researcher
<i>SLAC Floodplain Hydro-Biogeochemistry SFA</i> <ul style="list-style-type: none">- Designed and built a network of water quality sensors at remote field sites, including a data assimilation and modeling workflow- Built a machine learning model for groundwater quality forecasting | 2018 – |
| Novel biosensors for trace groundwater contaminants , Researcher
<i>With S. Cookson and M. Ferry (Quantitative Biosciences, Inc)</i> <ul style="list-style-type: none">- Developed a field-deployable sensor unit that uses customized biosensor strains to measure trace groundwater contaminants (U, Mo, As, etc) | 2019 – |
| Using data science to understand the Flint water crisis , Doctoral Researcher
<i>With N. Ajami (NSF-ReNUWIt) and K. Maher (Stanford)</i> <ul style="list-style-type: none">- Project examining consumer spending data to analyze Americans' distrust of tap water following the Flint water crisis- Used modern data science tools to map increases in bottled water spending following Flint and quantify the associated financial cost | 2019 – |
| Lake circulation and water quality , Research Technician
<i>With T. Manley and P. Manley (Middlebury College)</i> <ul style="list-style-type: none">- NSF EPSCoR project deploying sensor networks around Lake Champlain to identify the triggers of harmful algal blooms- Assimilated 9M sensor observations into a lake circulation model | 2013 – 2015 |

PUBLICATIONS

Peer-Reviewed Journals

- Perzan, Z.**, Osterman, G. and Maher, K., Vadose zone trapping of water during managed aquifer recharge through a heterogeneous vadose zone (*in prep*)
- Perzan, Z.**, and Chapin, T., 2022, WellSTIC: A cost-effective sensor for performing point dilution tests to measure groundwater velocity in shallow aquifers. (*in review*, [Water Resources Research](#))
- Babey, T., Boye, K., Tolar, B., Engel, M., Noel, V., **Perzan, Z.**, et al., 2022, Simulation of anoxic lenses as exporters of reactivity in alluvial aquifer sediments. [Geochimica et Cosmochimica Acta](#), 334, pp. 119-134.
- Perzan, Z.**, Babey, T., Caers, J., Bargar, J.R. and Maher, K., 2021, Local and Global Sensitivity Analysis of a Reactive Transport Model Simulating Floodplain Redox Cycling. [Water Resources Research](#), 57 (12).
- Li, Q., Wang, L., **Perzan, Z.**, Caers, J., Brown, G.E., Bargar, J.R., and Maher, K., 2021, Global Sensitivity Analysis of a Reactive Transport Model for Mineral Scale Formation During Hydraulic Fracturing. [Environmental Engineering Science](#), 38 (3).
- Damerow, J., Varadharajan, C., Boye, K., et al., 2021, Sample Identifiers and Metadata to Support Data Management and Reuse in Multidisciplinary Ecosystem Sciences. [Data Science Journal](#), 20 (11), pp. 1-19.
- Munroe, J., **Perzan, Z.**, and Amidon, W., 2016. Cave sediments constrain the latest Pleistocene advance of the Laurentide ice sheet in the Champlain Valley, Vermont, USA. [Journal of Quaternary Science](#), 31 (8), pp. 893-904.
- Schroth, A., Giles, C., Isles, P., Xu, Y., **Perzan, Z.**, and Druschel, G., 2015. Dynamic coupling of iron, manganese, and phosphorous behavior in water and sediment of shallow ice-covered eutrophic lakes. [Environmental Science and Technology](#), 49 (16), pp. 9758-9767.

GRANTS & FELLOWSHIPS

Stanford SPICE Grant (\$1,075)	2021
- Funding to develop a new Indigenous Environmental Justice course	
Gerald J. Lieberman Fellowship (\$95,549)	2021
- Highly competitive fellowship, awarded for service to the University	
McGee-Levorsen Research Grant (\$3,705)	2021
Shell Foundation Student Grant (\$1,500)	2018
NSF Graduate Research Fellowship (GRFP) (\$138,000)	2017
Vermont Geological Society Research Grant (\$400)	2013
Middlebury Undergraduate Research Grant (\$1,000)	2013

HONORS & AWARDS

Outstanding Poster, Computational Methods in Water Resources XXIII	2020
Outstanding Poster, Stanford Deep Learning Symposium	2019
U.S. Congress “Posters on the Hill” Presenter	2015
- One of 60 students invited to showcase research before Congress	
National GeoCUR Award for Excellence in Student Research	2015
- National award recognizing research impact as an undergraduate	
John M. White Award for Outstanding Work in Geology (\$800)	2015
Outstanding Student Research Paper, Vermont Geological Society	2014

TEACHING

Instructor of Record

Indigenous Environmental Justice	2022
ESS226, Stanford University	
- Designed a popular new course on Indigenous Environmental Justice	
- Broad swath of students, including undergraduates, law students, medical students, earth scientists, and environmental engineering MS students	

Teaching Assistant

Contaminant Hydrogeology	2019 – 2022
CEE261, Stanford University	
- Graduate-level course for 15-20 MS and PhD students	
- Designed new course material, including both problem sets and lectures	
- Delivered 1-2 lectures each quarter	

PEDAGOGICAL TRAINING

Preparing Future Professors Program	Winter 2022
- Shadowed a faculty member for 3 months at the University of San Francisco	
- Included guest lectures, faculty meetings, field trips, curriculum planning	
Designing a Learning-centered Syllabus	2022
Accessibility in Action: Designing for Universal Learning	2022
National Environmental Justice Education and Teaching Workshop	2021
Setting the Foundation: Starting with Learning and Working Backwards	2021

MENTORSHIP

Community College, Undergraduate and Graduate Student Mentees

Graduate

- Ziyang Wu: Preparing manuscript as part of ongoing research project. Recently graduated with MS degree and applying to PhD programs (since 2019)

Undergraduate (4 yr)

- Timothy Dai: Computer science student working on ML emulators (since 2022)
- Marc Berghouse: Now pursuing MS and PhD at the University of Nevada, Reno. Co-author on multiple conference presentations (since 2018)
- Diana Velazquez: Summer Undergraduate Research in Geoscience and Engineering (SURGE; now an REU). Currently PhD student at U. Michigan (2019)

Community College

- Bailey Lewis: Now pursuing BS in Earth Science at UC Berkeley (2019-2020)
- Cassie Weed: Field intern in Wyoming. Now at Bureau of Land Management (2019)
- George Sims: Presented work at the Wyoming Undergraduate Research Day (2018)
- Dustin Proctor: Field intern in Wyoming, co-advised with Callum Bobb. (2018)

SERVICE AND OUTREACH

Graduate Teaching Mentor

2021 –

School of Earth, Stanford University

- Facilitated pedagogy workshops for Stanford faculty, instructors and teaching assistants

Faculty Search Committee Student Representative

2021

School of Earth, Stanford University

- Faculty search focused on candidates with strong DEI proposals

Northern Arapaho Environmental Meeting

2018

Northern Arapaho Tribe, Wind River Reservation

- Outreach event on the Wind River Indian Reservation designed to introduce Middle and High School students to research in Environmental Science

Small Business Innovation and Research Advisor

2019 –

Quantitative BioSciences, Inc

- Helped biotech startup secure three DOE small business research grants
- Provided expertise in making new sensor tech field-deployable

Data Manager and Archivist

2019 –

SLAC-SFA, SLAC National Accelerator Lab

- Developed GitHub data management and archiving platform for large research program across multiple institutions

Lab Safety Coordinator

2019 –

School of Earth, Stanford University

- Manage lab safety training and assessments on behalf of other students

Graduate Student Mentor

2018 – 2020

Earth System Science, Stanford University

- Mentor incoming Earth Science graduate students over their first year

Data Archiving Standard Development

2018 – 2019

ESS-DIVE, Lawrence Berkeley National Lab

- Helped test and create data archiving and sample naming standards used by all DOE Biological and Environmental Research (BER) research programs

Invited Speaker

2019

Stanford Earth Young Investigators, Stanford University

- Discuss graduate school and career path with high school summer interns interested in Earth Science research

Reviewer for: Journal of Hydrology (6), Water Resources Research (2), Environmental Science & Technology, Hydrological Processes, American Geophysical Union Books, Petroleum Research

CONFERENCE PRESENTATIONS

Perzan, Z., Osterman, G., Knight, R., and Maher, K., 2022, A geostatistical workflow for evaluating flood-MAR sites using geophysical data. [The 11th International Symposium on Managed Aquifer Recharge](#), Long Beach, CA.

Perzan, Z., 2022, Groundwater modeling in the face of uncertainty. [ISMARx](#), Long Beach, CA.

Wang, L., **Perzan, Z.,** Babey, T., et al., 2021, Uncertainty quantification of water exchanges due to beaver-induced inundation. [American Geophysical Union Annual Meeting](#).

Babey, T., **Perzan, Z.,** Rogers, D.B., Wang, L., Pierce, S., Bargar, J. and Maher, K., 2021, Hydrobiogeochemical response of oxic-anoxic interfaces to beaver dam construction in a simulated floodplain aquifer. [American Geophysical Union Annual Meeting](#).

Perzan, Z., Babey, T., and Maher, K., 2020, Interpreting Parameter Interactions using Global Sensitivity Analysis on a Hillslope-scale Reactive Transport Model. [American Geophysical Union Annual Meeting](#).

Perzan, Z., Babey, T., and Maher, K., 2020, Short-term water quality forecasting with continuous-time recurrent neural networks. [Computational Methods in Water Resources XXIII](#).

Babey, T., Boye, K., **Perzan, Z.,** Bargar, J.R., and Maher, K., 2020, Simulation of biogeochemical cycling in a synthetic alluvial aquifer. [Computational Methods in Water Resources XXIII](#).

Perzan, Z., Boye, K., Berghouse, M., Fendorf, S., Bargar, J.R., and Maher, K., 2019, Seasonal nutrient cycling between the saturated and unsaturated zones in a contaminated floodplain. [American Geophysical Union Annual Meeting](#), San Francisco, CA.

Perzan, Z., 2019, Forecasting groundwater quality using continuous-time recurrent neural networks. [Stanford Deep Learning Symposium](#), Stanford, CA.

Babey, T., **Perzan, Z.,** Boye, K., Bobb, C., Bargar, J.R., and Maher, K., 2019, Modeling of biogeochemical responses to hydrologic transitions in floodplain aquifers. [American Geophysical Union Annual Meeting](#), San Francisco, CA.

Roycroft, S., Boye, K., **Perzan, Z.,** Johnson, R., Dam, W., Noel, V., Fendorf, S., Bargar, J.R., 2019, Uranium mobilization across saturated-unsaturated interfaces. [Goldschmidt2019](#), Barcelona, Spain.

- Bargar, J.R., Noel, V., **Perzan, Z.**, Boye, K., Janot, N., Williams, K.H., 2019, Hydrological-Biogeochemical controls over uranium redox rates. [SSSA International Soils Meeting](#), San Diego, CA.
- Manley, T.O., **Perzan, Z.**, Herdman, L., and Chen, T., 2018, Circulation dynamics of Missisquoi Bay: A new look at the question of water quality and causeways. [Geological Society of America](#) – Northeastern Section Meeting, Burlington, VT
- Perzan, Z.**, Manley, P.L., Manley, T.O., Manary, T., Kraft, M., Juteau, J-P., and Singer, J., 2016, Sediment transport dynamics of a shallow bay: Missisquoi Bay, Lake Champlain, VT. [Association for the Sciences of Limnology and Oceanography \(ASLO\) Meeting](#), Santa Fe, NM
- Perzan, Z.**, Munroe, J., and Amidon, W., 2015, A potential long-term climate record from Weybridge Cave, Vermont, USA. [U.S. Congress: “Posters on the Hill”](#), Washington, D.C.
- Perzan, Z.**, Amidon, W., and Munroe, J., 2014, Investigation of last interglacial sediment in Weybridge Cave, Vermont. [Geological Society of America \(GSA\) Annual Meeting](#), Vancouver, Canada
- Perzan, Z.**, Amidon, W., and Munroe, J., 2014, A potential pre-Wisconsinan paleoenvironmental record from Weybridge Cave, VT. [Vermont Geological Society Meeting](#), Middlebury, VT
- Perzan, Z.**, Munroe, J., and Amidon, W., 2014, Origin and significance of clastic sediments within Weybridge Cave, VT. [Geological Society of America – Southeastern Section Meeting](#), Blacksburg, VA