Zoe Kanavas

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Water Resources Engineering Ph.D. Candidate with computing, statistical analysis, and machine learning expertise. Excels in leadership, collaboration, and innovation. Advocate for Diversity, Equity, and Inclusion. Champion for science in policy to combat climate change and environmental injustice.

Education

	University of California, Davis
2018 - *2023*	*Ph.D. Candidate, Water Resources Engineering*
2018 - 2021	MSc, Water Resources Engineering
	University of Wisconsin, Madison
2014-2018	BSc, Geological Engineering
	BSc, Geophysics

Technical Skills

Python: SciPy, NumPy, Pandas, NetworkX, Matplotlib, Plotly
Graph Theory: Shortest path analysis, Assortativity, Percolation, Centrality
Statistical Analysis: Generalized linear models, Regression, Statistical distance, Correlation
Machine Learning: Metaheuristic optimization, Supervised, Unsupervised, Reinforcement
Image Processing & Analysis: Skeletonization, *FIJI* software
Numerical Modeling: Finite Volume Methods, *GeoDict* software
Computing: Fortran, MATLAB, Javascript, R, HTML/CSS, Git, C, C++
Spatial Mapping & Analysis: *ArcGIS* software

Research Experience

2018 - Present

Morales Lab | Davis, CA
Graduate Student Researcher

- Completing *Effects of uniform erosion on flow and transport* project; the goal is to determine how maintaining the topology with changing geometry affects the resulting flow and transport through a porous system.
  - Performed numerical simulations to solve the Eulerian and Lagrangian flow fields.
  - Analyzed anomalous particle transport phenomenon using Breakthrough Curves and Mean Squared Displacement Curves.
  - Analyzed pore-space structure via image processing and graph theory concepts.
- Completed *Flow heterogeneity impact on dissolution reaction behavior in geologic porous media* project; the goal was to determine the controls on dissolution behavior and aims to combine flow, transport, and reaction metrics to predict dissolution behavior.
  - Compiled data from existing pore-scale dissolution research publications.
  - Developed novel dimensionless and quantitative flow heterogeneity metric.
  - Employed supervised machine learning with regression and classification algorithms via Support Vector Machines.
- Completed *Flow path resistance in heterogeneous porous media recast into a graph-theory problem* project; the goal was to understand how preferential pathways are controlled by structural complexities of the pore space and found a great dependence on high velocity regions with channel length, pore throat size, and adjacent channel similarity.
  - Conceptualized porous media as a pore network, employing efficient graph theory algorithms and representations.
  - Incorporated modern algorithm design into existing programs.
  - Employed supervised machine learning with evolutionary algorithms.

Research Experience

2016-2018   **Water, Science, and Engineering Laboratory** | Madison, WI
Research Assistant
- Completed *Effects of Intermittent Saturation on Recycled Concrete Aggregate (RCA) Leachate Chemistry* project; the goal was to explain the high pH leachate associated with RCA and found that extensive carbonation during field deployment increased the acid neutralization capacity of the material.
  - Analyzed chemical characteristics using ICP-OES, pH tests, and alkalinity titration.
  - Identified physical characteristics using sieve analysis, compaction tests, and X-Ray Diffraction.

Engineering Experience

2018   **Dane County Public Works - Solid Waste Division** | Madison, WI
Engineering Intern
- Reviewed plans and submittals for code compliance to obtain necessary permits.
- Performed quality assurance control, engineering design, estimated project costs, and conducted field inspections and land surveys.

Science Policy Experience

2022 - Present   **Local Science Partners** | Yolo County, CA
American Geophysical Union
- Engage monthly with Rep Garamendi (2022) and Rep Kiley (2023) offices to advocate for AGU's policy agenda
- Contribute to quarterly training on science policy and communication skills

SciPol Scholars | Remote
National Science Policy Network
- Engaged in a six week education bootcamp to learn about science policy career paths and network with professionals in the field
- Composed policy analysis of existing and pending legislation in California responding to extreme heat events
- Mentored by a senior water & climate scientist at the Union of Concerned Scientists
  - Performing a systematic analysis of the Groundwater Sustainability Plans submitted under the Sustainable Groundwater Management Act of 2014

2022   **Early Career Science Policy Accelerator** | Remote
Federation of American Scientists and *National Science Policy Network*
- Attained skills in researching policy landscapes, leveraging legislation, and policy diagnostics, framing, socialization, and implementation
- Generated action-ready policy proposal promoting groundwater conservation driven by farmers drawing from the Ogallala Aquifer

Leadership Experience

2022 - Present   **Justice, Equity, Diversity, and Inclusion (JEDI) Committee**, *Committee Liaison,* AGU
- Convene American Geophysical Union (AGU) Hydrology Section members and leaders to make actionable changes toward a more equitable, diverse, inclusive, and just community
- Coordinate the committee members to accomplish the short-term goals laid out in the Strategic Plan
- Facilitate cross-committee communication with the Hydrology Section Student Subcommittee JEDI group

Leadership Experience

2022 - Present

National Science Policy Network (NSPN), *Western Hub Onboarding Chair*
- Onboard new members of NSPN in the Western Hub
  - Volunteered to onboard international members for the 2022-2023 term
  - Covered Southern Hub onboarding to relieve the chair for her maternity leave
- Host NSPN information and networking sessions at conferences relevant to potential NSPN members
- Conceptualized the 2023 Western Hub retreat
  - In-person component for Western Hub chapter leaders
  - Virtual skills building open to all NSPN members

Science Says - Science Policy Group, *Co-Founder*, UC Davis
- Initiated two policy research initiatives covering PFAS regulation and carless transit
- Established a series of science policy and diplomacy introductory workshops to establish a science policy curriculum at UC Davis

2021 - 2022

Hydrology Section Student Subcommittee (H3S), *Treasurer* and *JEDI Co-Chair*, AGU
- Integrated regular quarterly workshops on diversity, equity, and inclusion issues
- Pioneered initiatives to improve the diversity of new membership applicants
- Established and promoted the JEDI Resource Database
- Organized community-specific programming for international students and Pacific Islanders
- Developed poster and panel session to highlight completed and ongoing diversity, equity, and inclusion initiatives led by early career researchers

2018 - 2022

Society of Water & Environmental Graduate Students (SWEGS), *President*, UC Davis
- Founded and since expanded SWEGS to ten officers with variable subcommittees
- Established annual department research showcase
- Invited seminar speakers to the department's seminar series
- Organized social events to strengthen our graduate student community

Academic Publications

2023

Z. Kanavas, L. Ray, V. L. Morales. Effects of uniform erosion on flow and transport: a case study. Transport in Porous Media. [In Preparation].

Z. Kanavas, J. Weldon, J. Jimenez-Martinez, J. Nimmo, V. L. Morales. Flow heterogeneity impact on dissolution reaction behavior in porous media. Proceedings of the National Academy of Sciences. [In Preparation].

J.P. Ortiz Partida, A.S. Fernandez-Bou, M. Maskey, J.M. Rodríguez-Flores, J. Medellín-Azuara, S. Sandoval-Solis, T. Ermolieva, **Z. Kanavas**, R.K. Sahu, Y. Wada, T. Kahil. Hydro-economic modeling of water resources management challenges: current applications and future directions. Water Economics and Policy. **DOI**.

2021

Z. Kanavas, F. Perez-Reche, V. L. Morales. Flow path resistance in heterogeneous porous media recast into a graph-theory problem. Transport in Porous Media. **DOI**.

2018

B. Madras Natarajan, **Z. Kanavas,** M. Sanger, J. Rudolph, J. Chen, R. Edil, M. Ginder-Vogel, Characterization of Recycled Concrete Aggregate After Eight Years of Field Deployment. Journal of Materials in Civil Engineering. **DOI**.

Science Policy Publications

2023   M. Contursi, O. Goswami, S. Hang, R.A. Rahim, R. Tran, **Z. Kanavas.** A Downtown Identity: Expanding Carless Transit in Downtown Davis. SciTech Forefront. **URL**.

2022   **Z.Kanavas**. Reduce, Repurpose, Recharge: Establishing a Collaborative Doctrine of Groundwater Management in the Ogallala Aquifer. Day One Project - Federation of American Scientists. **URL**.
Z. Kanavas. Mitigating Extreme Heat Health Impacts in Vulnerable Urban Communities in California. National Science Policy Network. **URL**.
O. Goswami, A.L. Johnson, R.A. Rahim, R. Tran, **Z. Kanavas**. UCAAP: A Framework for Systematic PFAS Regulation in California's Impacted Communities. SciTech Forefront. **URL**.

Academic Presentations

2023   **[Invited] Flow Phenomena under Pore-Scale Spatial Heterogeneity in Geologic Media.** Porous Media Tea Time Talk with the International Society for Porous Media.

2022   **Flow Heterogeneity Impact on Dissolution Reactions in Geologic Porous Media.** Oral presentation at hybrid Interpore2022 conference.
Flow Heterogeneity Impact on Dissolution Reactions in Geologic Porous Media. Poster at AGU Frontiers in Hydrology Meeting held in San Juan, Puerto Rico.
Flow Heterogeneity Impact on Dissolution Reactions in Geologic Porous Media. Oral presentation at hybrid Computation Methods in Water Resources conference.

2021   **Flow Heterogeneity Impact on Dissolution Reactions in Geologic Porous Media.** Oral presentation at AGU Fall Meeting held in New Orleans, LA.
Resolving Flow Heterogeneity as a Graph-Theory Problem. Poster at virtual InterPore2021 conference.
Flow Path Resistance in Heterogeneous Porous Media Recast into a Graph-Theory Problem. Poster at virtual ARCS Scholar Symposium.

2020   **Flow Path Resistance in Heterogeneous Porous Media Recast into a Graph-Theory Problem.** Oral presentation at virtual AGU Fall Meeting.
Predicting Distribution of Primary Flow Paths from Pore-Network Structure in Heterogeneous Media. Poster at Mixing in Porous Media Workshop in the Netherlands.

Science Policy Presentations

2022   **UCAAP: A Framework for Systematic PFAS Regulation in California's Impacted Communities.** Oral presentation at virtual NSPN Western Hub Showcase.
Reduce, Repurpose, Recharge: Establishing a Collaborative Doctrine of Groundwater Management in the Ogallala Aquifer. Poster at the Science Ethics and Policy Symposium held in Berkeley, CA.

Awards

2022   **Takashi Asano Fellowship**, UC Davis Civil & Environmental Engineering Department

2021   **Leaders for the Future Fellowship,** UC Davis Graduate Studies
- Developed professional skills in communication, networking, and negotiation

NSF INTERN (Supplemental funding for non-academic research internships)**,** National Science Foundation
- Collaborated with a non-academic scientist to compose a research proposal and negotiate an IP agreement

Graduate Student Service & Leadership Award, UC Davis College of Engineering
ARCS Scholar, Achievement Rewards for College Scientists (ARCS) Foundation
Johannes "Joe" DeVries Graduate Student Award, UC Davis Civil & Environmental Engineering Department

2020   **Dennis L Salisbury and Patricia K. Salisbury Award,** UC Davis Civil & Environmental Engineering Department

Outreach

2023   **Groundwater Demonstration with MESA**
- The Mathematics, Engineering, Science Achievement (MESA) program is a college and career prep engine that propels student diversity and achievement in science, technology, engineering and math.
- Facilitated a hands-on activity designed to teach students (grades 6-12) about the fundamentals of groundwater science

Mental Health Legislation Advocacy Postcarding
- Handwrote postcards to federal representatives to express support for specific mental health-related legislation through the NSPN Advocacy Committee

2022   **Reclaim Our Vote Postcarding**
- Handwrote and addressed 300 postcards to infrequent Black voters through the Center for Common Ground

2021   **High School Visit Day**
- Demonstrated lab experiment to a group of high school sophomores and juniors

2020   **MESA Virtual Lab Demonstrations**
- Oversaw the recording, distribution, and presentation of lab demonstrations to MESA school programs' meetings

2019   **MESA Science Bowl**
- Facilitated a groundwater flow module for middle and high schoolers

MESA Programming Course
- Initiated, developed, and facilitated an Introduction to Python course for high school students and teachers

Project Aspire
- Educated grade-school girls on the fundamentals of watershed science

Womxn in STEM Week
- Guided lab tour for UC Davis STEM students with marginalized gender identities

2018   **MESA Day**
- Guided lab tour for prospective college students in the MESA program