JEREMY R. PATTERSON

Rice University • Earth, Environmental & Planetary Science
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PROFESSIONAL PREPARATION

Education

University of Wisconsin - Madison 2018 - 2022
Ph.D. Hydrogeology
Dissertation: *Characterizing Bedrock Fracture Flow Properties Through Multi-Frequency Oscillatory Flow Interference Testing*
Primary Advisor: Michael Cardiff

University of Wisconsin - Madison 2016 - 2018
M.S. Hydrogeology
Thesis: *Understanding Constraints on Geothermal Sustainability Through Reservoir Characterization at Brady Geothermal Field, Nevada*
Primary Advisor: Michael Cardiff

Colorado State University 2012 - 2015
B.S. Geology
Concentration: Hydrogeology
Minor: Mathematics

Appointments

Rice University 2022 - 2024
NSF Postdoctoral Research Fellow

University of Wisconsin - Madison 2016 - 2022
Graduate Research/Teaching Assistant

USGS-NAGT Internship Program 2016
Undergraduate Research Assistant
Project Title: *Hydraulic Tomography: 3D Hydraulic Conductivity, Fracture Network, and Connectivity in Mudstone*
PIs: Claire Tiedeman and Warren Barrash

Colorado State University 2014 - 2015
Undergraduate Teaching Assistant

U.S. Army 2004 - 2011
Team Member, Team Leader, First-Line Supervisor, Personnel Supervisor

RESEARCH

Peer-Reviewed Publications

7. **Patterson, J.R.**, Cardiff, M. (2023). Stiff, Solid, and Smooth? Complex Fracture Hydraulics Revealed through Oscillatory Flow Interference Testing. *Water Resources Research*, 59(11), e2023WR034621. https://doi.org/10.1029/2023WR034621.

6. **Patterson, J.R.**, Cardiff, M. (2023). Can Simple Analytical Models Capture Complex Fracture Hydraulics? Oscillatory Flow Tests Suggest Not. *Groundwater*, 61(6), 816-833. https://doi.org/10.1111/gwat.13297

5. **Patterson, J.R.**, Cardiff, M. (2022). Aquifer Characterization and Uncertainty in Multi-Frequency Oscillatory Flow Tests: Approaches and Insights, *Groundwater*, 60(2), 180-191. https://doi.org/10.1111/gwat.13134

4. **Patterson, J.R.**, Cardiff M., Feigl K.L. (2020). Optimizing geothermal production in fractured rock reservoirs under uncertainty, *Geothermics*, 88, 101906. https://doi.org/10.1016/j.geothermics.2020.101906

3. Miller, D.E., Coleman T., Zeng X., **J.R. Patterson**, Reinisch E.C., Cardiff M., Wang H.F., Fratta D., Trainor-Guitton W., Thurber C.H., Robertson M., Feigl K.L. (2018). DAS and DTS at Brady Hot Springs: Observations about Coupling and Coupled Interpretations, *Proceedings of the Forty-Third Workshop on Geothermal Engineering, Stanford, California* https://pangea.stanford.edu/ERE/pdf/IGAstandard/SGW/2018/Miller.pdf

2. Cardiff, M., Lim D., **Patterson J.R.**, Akerley J., Spielman P., Lopeman J., Walsh P., Singh A., Foxall W., Wang H.F., Lord N.E., Thurber C.H., Fratta D., Mellors R.J., Davatzes N.C., Feigl K.L. (2018). Geothermal Production and Reduced Seismicity: Correlation and Proposed Mechanism, *Earth and Planetary Science Letters*, 482, 470-476. https://doi.org/10.1016/j.epsl.2017.11.037

1. **Patterson, J.R.**, Cardiff M., Coleman T., Wang H.F., Feigl K.L., Akerley J., Spielman P. (2017). Geothermal Reservoir Characterization Using Distributed Temperature Sensing at Brady Geothermal Field, Nevada, *The Leading Edge*, 36(12), 1024a1-1024a7. https://doi.org/10.1190/tle36121024a1.1

In Review

1. Chamarczuk, M., Ajo-Franklin, J., Sobolevskaia, V., **Patterson, J.R.** Tidally Modulated Seismic Velocity Changes Observed Using Submarine Dark Fiber and Virtual-Source Method. *Under review for Geophysics.*

Publications in Preparation

1. **Patterson, J.R.**, Cardiff, M. Spectral Hydrology: Improved Resolution and Reduced Uncertainty with Oscillatory Hydraulic Tomography. *Anticipated Submission to Water Resources Research Feb 2024.*

Invited Seminars

1. INTERA Inc - September 2023

Conference Presentations (*graduate student)

12. **Patterson, J.R.**, Ajo-Franklin, J.B., Becker, M.W. (2023). *A Hydromechanical Approach to Characterizing Fractured Bedrock Using Periodic Hydraulic Testing*, American Geophysical Union Fall Meeting, San Francisco, CA.

11. Shadoan, T.*, Ajo-Franklin, J., **Patterson, J.R.**, Zhu, T. (2023). *Active Seismic Monitoring of Pore Pressure Changes in an Analog Reservoir*, International Meeting for Applied Geoscience and Energy, Houston, TX.

10. **Patterson, J.R.**, Cardiff, M. (2022). *Rigid, Smooth, and Impermeable? Complex Fracture Hydraulics Revealed by Oscillatory Flow Interference Testing*, American Geophysical Union Fall Meeting, Chicago, IL.

9. **Patterson, J.R.**, Cardiff, M. (2022). *Spectral Hydrology: Resolution and Uncertainty in Multi-Frequency Oscillatory Hydraulic Tomography*, Aug 2022, International Meeting for Applied Geoscience and Energy, Houston, TX. **Invited**

8. **Patterson, J.R.**, Cardiff, M. (2022). *Reducing Aquifer Flow Parameter Uncertainty Through Multi-Frequency Oscillatory Flow Interference Testing*, American Water Resources Association - WI Section. Virtual.

7. **Patterson, J.R.**, Cardiff, M. (2021). *Period Dependence in Flow Properties of a Fractured Bedrock Aquifer: Investigating Heterogeneity, Fluid Exchange, and Poroelasticity as Potential Sources*, American Geophysical Union Fall Meeting, New Orleans, LA.

6. **Patterson, J.R.**, Cardiff, M. (2020). *Period Dependence in Flow Properties of a Fractured Bedrock Aquifer: Investigating Heterogeneity and Fluid Exchange as Potential Sources*, American Geophysical Union Fall Meeting, Virtual.

5. **Patterson, J.R.**, Cardiff, M. (2020). *Towards Understanding Period Dependence in Flow Properties of a Fractured Bedrock Aquifer*, Geological Society of America North-Central Section Meeting. Virtual.

4. **Patterson, J.R.**, Cardiff, M., Zhou Y.Q. (2019). *Investigating Subsurface Heterogeneity as a Source of Period Dependent Aquifer Parameter Estimates*, American Geophysical Union Fall Meeting, San Francisco, CA.

3. **Patterson, J.R.**, Cardiff M., Wang H.F., Feigl K.L. (2018). *Thermal Energy Extraction from a Geothermal Reservoir: Numerical and Analytical Modeling Analysis*, 52nd Geological Society of America North-Central Section Meeting. Ames, IA.

2. Barrash, W., Tiedeman, C.R., Thrash, C., **Patterson, J.R.**, Johnson, C.D. (2018). *Hydraulic Tomography: 3D Hydraulic Conductivity and Fracture Network Connectivity in a Contaminated Mudstone Aquifer*, Battelle Chlorinated Conference. Palm Springs, CA.

1. **Patterson, J.R.**, Cardiff M., Lim D., Coleman T., Wang H.F., Feigl K.L. (2017). *Characterization of Thermal and Hydraulic Properties at Brady Geothermal Field, NV*, American Geophysical Union Fall Meeting, New Orleans, LA.

Conference Sessions Convened

1. Mangel, A.R., **Patterson, J.R.**, Emerson, H., Hoagland, B. (2020). "Interdisciplinary Advances in Subsurface Characterization Using Geophysical, Geochemical, and Hydrogeological Methods I Posters." In *American Geophysical Union Fall Meeting*.
2. **Patterson, J.R.**, Fischer, P., Neupauer, R., Jardani, A. (2019). "Periodic Subsurface Flows Across Scales." In *American Geophysical Union Fall Meeting*.

Fellowships and Grants

- NSF Earth Sciences Postdoctoral Fellowship 2022
  Dynamic flow channeling through complex fracture networks under multi-frequency oscillatory flow conditions: A fully-coupled hydromechanical approach
- Student Research Conference Presentation Grant 2022
  Graduate School, University of Wisconsin-Madison
- Katharine-Fowler Billings Exercise 2022
  Hosting ADVANCEGeo workshop to improve workplace climate by creating active bystanders
  Department of Geoscience, University of Wisconsin-Madison
- Jay C. Nania Graduate Research Fellowship 2021
  Department of Geoscience, University of Wisconsin-Madison

Awards and Achievements

UW-Madison Dept of Geoscience Distinguished Graduate Student Award 2022
UW-Madison Dept of Geoscience Outstanding Paper Award 2022
Hanks Graduate Student Award in Geophysics 2021
UW-Madison Dept of Geoscience Outstanding Paper Award 2021
UW-Madison Dept of Geoscience Outstanding Paper Award 2018
Warner College of Natural Resources Explorationist Scholarship 2015
D.R. and Virginia Pulliam Scholarship 2015
Rocky Mountain Association of Geologists Neal J. Harr Outstanding Student Award 2015
Phillip A. Connolly Memorial Scholarship 2014
Warner College of Natural Resources Explorationist Scholarship 2014
Myron B. Ludlow Scholarship 2013

Professional Development

Distributed Acoustic Sensing in Earth Science: Novice to Cutting Edge	2021
Application of Python and FloPy to Groundwater Flow Modeling	2018

TEACHING

Courses Taught

Primary Instructor - Environmental Geology (GEOSCI 106)	Summer 2021
Head Teaching Assistant - UW Department of Geoscience	2018 - 2019
Graduate Teaching Assistant - Environmental Geology (GEOSCI 106)	Spring 2017
Graduate Teaching Assistant - Hydrogeology (GEOSCI 627)	Fall 2016
Undergraduate Teaching Assistant - Introductory Geology (GEO 101)	2014 - 2015

Awards

Stanley A. Tyler Excellence in Teaching Award	2018
Thomas E. Berg Excellence in Teaching Award	2017

Professional Development

Advancing Learning Through Evidenced-Based STEM Teaching (CIRTL MOOC)	2023
DELTA Inclusive Teaching Workshop	2022
Bring an Inclusive Mindset to Your Teaching (CIRTL Workshop)	2021
Exploring Diversity in Implicit Leadership Theories and Their Role in Inclusive Teaching and Learning (CIRTL Workshop)	2021
UW-Madison Graduate Assistant Equity Workshop	2016

SERVICE

Professional

AGU Hydrology Section Fall Meeting OSPA Judge	2023
AGU Hydrology Section Student Subcommittee Member	2022-present
AGU Hydrology Section Student Subcommittee Treasurer	2023-2024
AGU Groundwater Technical Committee Member	2022-present
Peer review activity:	
Water Resources Research (2), *Journal of Hydrology* (1)	2023
Journal of Hydrology (1), *Water Resources Research* (1)	2022
Nature: Scientific Reports (1), *Lithosphere* (1)	2021

Water Resources Research (1), *Hydrogeology Journal* (1), *Hydrologic Processes* (1)	2020
Water Resources Research (1), *Hydrogeology Journal* (1)	2018

Departmental

Diversity & Inclusion Committee Member	2020-2022
Student Member Faculty Search Committee	2021-2022
Student Member Faculty Search Committee	2019-2020
Geoscience Graduate Student Association Vice President	2019-2020
Geoscience Graduate Student Association Faculty Liaison	2017-2019
Warner College of Natural Resources College Council	2012-2015

Community Outreach

Letters to a Pre-Scientist Penpal	2020-present
Geoscience Education & Mentorship Support (GEMS) Mentor	2022-present
Girl Scout Climate Challenge Event Volunteer	2022, 2023
UW-Madison Geology Museum Open House Volunteer	2019, 2022
Wisconsin Science Festival Volunteer	2017, 2021
Wisconsin Discovery Institute Saturday Science Volunteer	2019
Wisconsin Discovery Institute Afterschool Expeditions Volunteer	2019

Professional Development

NSF Aspire Alliance Equity in Action Workshop Series	2021
Improving Workplace Climate: Empowering Individuals to Become Active Bystanders	2021
WISELI Searching for Excellence & Diversity: A Guide for Search Committees	2019

PROFESSIONAL MEMBERSHIPS

American Geophyiscal Union
Geological Society of America
National Groundwater Association
Society of Exploration Geophysicists