

JEREMY R. PATTERSON

Earth, Environmental & Planetary Science • Rice University

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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

6. **Patterson, J.R.**, Cardiff, M. 2023. Can Simple Analytical Models Capture Complex Fracture Hydraulics? Oscillatory Flow Tests Suggest Not. *Groundwater*, <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), <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, <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, <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), <https://doi.org/10.1190/tle36121024a1.1>

Seminars

1. INTERA Inc - September 2023

Conference Presentations (*graduate student)

1. 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.
2. **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.
3. **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**
4. **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.
5. **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.
7. **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.
8. **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.
9. **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.
10. 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.
11. **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

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| UW-Madison Dept of Geoscience Distinguished Graduate Student Award | 2022 |
| Hanks Graduate Student Award in Geophysics | 2021 |
| 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

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

TEACHING

Courses Taught

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| 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

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

Professional Development

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| 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

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| AGU Hydrology Section Student Subcommittee Treasurer | 2023-present |
| AGU Hydrology Section Student Subcommittee Member | 2022-present |
| AGU Groundwater Technical Committee Member | 2022-present |
| Peer review activity: | |
| <i>Water Resources Research</i> (2), <i>Journal of Hydrology</i> (1) | 2023 |
| <i>Journal of Hydrology</i> (1), <i>Water Resources Research</i> (1) | 2022 |
| <i>Nature: Scientific Reports</i> (1), <i>Lithosphere</i> (1) | 2021 |
| <i>Water Resources Research</i> (1), <i>Hydrogeology Journal</i> (1), <i>Hydrologic Processes</i> (1) | 2020 |
| <i>Water Resources Research</i> (1), <i>Hydrogeology Journal</i> (1) | 2018 |

Departmental

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| 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

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| 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

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| 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 Geophysical Union
Geological Society of America
National Groundwater Association
Society of Exploration Geophysicists