

# JEREMY R. PATTERSON

University of North Carolina-Wilmington • Department of Earth and Ocean Sciences

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## PROFESSIONAL PREPARATION

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### 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

**University of North Carolina - Wilmington**

Assistant Professor 2025 - present

**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

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Colorado State University  
Undergraduate Teaching Assistant

2014 - 2015

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

2004 - 2011

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## RESEARCH

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### Peer-Reviewed Publications

8. Chamarczuk, M., Ajo-Franklin, J., Sobolevskaya, V., **Patterson, J.R.** (2024). Tidally Modulated Seismic Velocity Changes Observed Using Submarine Dark Fiber and Virtual-Source Method. *Geophysics*, 89(5), L33-L48.  
<https://doi.org/10.1190/geo2023-0641.1>
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>

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## Invited Seminars

3. University of North Carolina - Wilmington Randall-Zullo Seminar Series - February 2024
2. Montana State University Earth Science Seminar Series - February 2024
1. INTERA Inc - September 2023

## Conference Presentations (\*graduate student)

17. Ma, Y., Ajo-Franklin, J.B., Chamarczuk, M., **Patterson, J.R.**, Zhu, R.\*, Rodriguez, I.V., Podrasky, D., Coleman, T. (2025). *Illuminating Geothermal Reservoir Structure: DAS Microseismic Reflection Imaging at Utah FORGE*, Stanford Geothermal Workshop, Stanford, CA.
16. **Patterson, J.R.**, Ajo-Franklin, J.B., Becker, M.W. (2024). *Hydromechanical Framework for Fracture Characterization Under Uncertainty Using Periodic Hydraulic Testing*, American Geophysical Union Fall Meeting, Washington D.C.
15. Yin, F.\*, Kim, J.\*, Miranda, B.\*, Ma, Y., **Patterson, J.R.**, Zhu, R.\*, Ajo-Franklin, J.B., Mismanos, J. (2024). *High-resolution Shallow Structure Imaging Using Ambient Noise and a Dense Nodal Array at the Utah FORGE Geothermal Site*, American Geophysical Union Fall Meeting, Washington, D.C.
14. Ma, Y., Ajo-Franklin, J.B., Chamarczuk, M., **Patterson, J.R.**, Rodriguez, I.V., Podrasky, D., Coleman, T., Maldaner, C. (2024). *Illuminating Geothermal Reservoir Structure: DAS Microseismic Imaging at Utah FORGE*, International Meeting for Applied Geoscience and Energy, Houston, TX.
13. Cardiff, M., **Patterson, J.R.** (2024). *Testing Fractured Rock Across Scales Using Oscillatory Hydraulic Tomography (OHT)*, AGU Water Science Conference, St. Paul, MN.
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.

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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*, 52<sup>nd</sup> 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

3. Ellis, E.A., Peterson, D.M., Nell, C., Jha, A., **Patterson, J.R.** (2024). “Thinking Outside the Boxplot: Communicating Science Beyond the Paper.” In *American Geophysical Union Fall Meeting*.
2. 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*.
1. **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*

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- 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<br>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

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### Courses Taught

|   |             |
|---|-------------|
| GLY 226 - Fundamentals of Hydrology, UNCW             | Fall 2025   |
| GLY 125 - Natural Hazards, UNCW                       | Fall 2025   |
| GLY 125 - Natural Hazards-Honors Section, UNCW        | Spring 2025 |
| GLY 426 / 526 - Geohydrology, UNCW                    | Spring 2025 |
| GEOSCI 106 - Environmental Geology (PI), UW           | Summer 2021 |
| Head Teaching Assistant - UW Department of Geoscience | 2018 - 2019 |
| GEOSCI 106 - Environmental Geology (GTA), UW          | Spring 2017 |
| GEOSCI 627 - Hydrogeology (GTA), UW                   | Fall 2016   |

## 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

|  |              |
|--|--------------|
| AGU Hydrology Section Fall Meeting OSPA Judge  | 2023-2024    |
| AGU Hydrology Section Student Subcommittee Member  | 2022-2024    |
| AGU Hydrology Section Student Subcommittee Treasurer   | 2023         |
| AGU Groundwater Technical Committee Member   | 2022-present |
| Journal peer review ( $n=16$ ):  |              |
| <i>Water Resources Research</i> (1)  | 2025         |
| <i>Water Resources Research</i> (3), <i>Journal of Hydrology</i> (1), <i>Journal of Hydrologic Engineering</i> (1) | 2024         |
| <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         |
| Research proposal peer review ( $n=2$ ):   |              |
| <i>National Science Foundation</i> (2)   | 2024         |

### Departmental

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|---|-----------|
| Diversity & Inclusion Committee Member  | 2020-2022 |
| Student Member Faculty Search Committee | 2021-2022 |

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| 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<br>Become Active Bystanders | 2021 |
| WISELI Searching for Excellence & Diversity: A Guide for Search Committees         | 2019 |

## PROFESSIONAL MEMBERSHIPS

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|                                      |              |
|--------------------------------------|--------------|
| National Groundwater Association     | 2016-present |
| Society of Exploration Geophysicists | 2016-present |
| American Geophysical Union           | 2014-present |
| Geological Society of America        | 2014-present |