

JEREMY R. PATTERSON

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

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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

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

University of Wisconsin–Madison 2018–2019

Head 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

Grants

3. **Patterson, J.R.**, Mead, R. (2026-2027). *Challenging the Conservative Solute Assumption: Laboratory Constraints on PFMOAA and GenX Partitioning in Saturated Porous Media*. **UNCW Charles L. Cahill Grant for Faculty Scholarship**. (\$6,000)
2. **Patterson, J.R.** (2022-2024). *Dynamic flow channeling through complex fracture networks under multi-frequency oscillatory flow conditions: A fully-coupled hydromechanical approach*. **National Science Foundation, Division of Earth Sciences Postdoctoral Fellowship**. (\$180,000)
1. **Patterson, J.R.**, Cardiff, M., Zahasky, C. (2022). *Hosting ADVANCEGeo workshop to improve workplace climate by creating active bystanders* **University of Wisconsin-Madison, Department of Geoscience Katharine Fowler-Billings Exercise**. (\$1750)

Peer-Reviewed Publications (*student author)

11. Ma, Y., Ajo-Franklin, J., Chamarczuk, M., Zhu, X.*, **Patterson, J.R.**, Rodriguez, I.V., Podrasky, D., Coleman, T., Maldaner, T., Finnilla, A. (2026). Geothermal Reservoir Characterization at Utah FORGE Using DAS Microseismic Imaging. *Journal of Geophysical Research: Solid Earth*, 131(1), e2025JB032603. <https://doi.org/10.1029/2025JB032603>
10. Shadoan, T.A.*, Ajo-Franklin, J.B., **Patterson, J.R.**, Zhu, T. (2026). Active-Seismic Monitoring of Reservoir Pressure Changes in an Analog Reservoir. *Geophysics*, 91(1), M1-M13. <https://doi.org/10.1190/GEO-2024-0471>
9. **Patterson, J.R.**, Cardiff, M. (2025). Multi-Frequency Oscillatory Hydraulic Tomography Improves Heterogeneity Imaging and Resolution and Reduces Uncertainty. *Water Resources Research*, 61(5), e2024WR039606. <https://doi.org/10.1029/2024WR039606>
8. Chamarczuk, M., Ajo-Franklin, J., Sobolevskaia, 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>

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 (*student author)

19. **Patterson, J.R.**, Cardiff, M. (2025). *Is One Frequency Enough? Multi-Frequency Oscillatory Hydraulic Tomography Improves Multi-Scale Aquifer Heterogeneity Imaging* American Geophysical Union Fall Meeting, New Orleans, LA.
18. Zhu, R.*, Ajo-Franklin, J.B., **Patterson, J.R.**, Sobolevskaya, V., Ma, Y., Shi, Q. (2025). *Assessing Aquifer Permeability Using Tube Wave Attenuation in Groundwater Monitoring Wells: Insights from a DAS Field Survey and Slug Tests*, American Geophysical Union Fall Meeting, New Orleans, LA.

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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.
 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.

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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

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*.

Awards and Achievements

UW-Madison Dept of Geoscience Distinguished Graduate Student Award	2022
UW-Madison Dept of Geoscience Outstanding Paper Award	2022
UW-Madison Graduate School Student Research Conference Presentation Grant	2022
UW-Madison Dept of Geoscience Jay C. Nania Graduate Research Fellowship	2021
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

Hydrogeology of States Series: North Carolina	2025
Distributed Acoustic Sensing in Earth Science: Novice to Cutting Edge	2021
Application of Python and FloPy to Groundwater Flow Modeling	2018

TEACHING

Courses Taught

University of North Carolina-Wilmington

GLY 226 - Fundamentals of Hydrology
 GLY 101 - Earth Revealed
 GLY 125 - Natural Hazards
 GLY 125 - Natural Hazards-Honors Section
 GLY 426 / 526 - Geohydrology (cross-listed graduate and undergraduate)

University of Wisconsin-Madison

GEOSCI 106 - Environmental Geology (Instructor of record)
 GEOSCI 106 - Environmental Geology (GTA)
 GEOSCI 627 - Hydrogeology (GTA)

Colorado State University

GEO 101 - Introductory Geology (UGTA)

Graduate Students Advised

Ifetayo Olubena	2025–2027
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Graduate Student Committee Membership

Steven Anderson	2025–2026
Jonathan Vasquez	2025–2026

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 Groundwater Technical Committee Member	2022–present
AGU Hydrogeophysics Technical Committee Member	2021–present
AGU Hydrogeophysics Technical Committee Chair	2025–2027
AGU Hydrology Section Fall Meeting OSPA Judge	2023–2024
AGU Hydrology Section Student Subcommittee Member	2022–2024
AGU Hydrology Section Student Subcommittee Treasurer	2023
Journal peer review ($n=16$):	
<i>Water Resources Research</i> (2), <i>Journal of Hydrology</i> (1), <i>Scientific Reports</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

UNCW Department of Earth and Ocean Sciences	
Graduate Advisory Committee Member	2025–present

Tenure-track Faculty Search Committee Member	2025–2026
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UW-Madison Department of Geoscience

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

CSU Department of Geosciences

Warner College of Natural Resources College Council	2012–2015
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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

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