

James Atterholt

Mendenhall Postdoctoral Fellow

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Education

- 2019-2024 **PhD**, Geophysics
California Institute of Technology (Caltech)
Advised by Zhongwen Zhan & Zachary E. Ross
Thesis: Fault Zone Structure and Rupture Behavior with Fiber-Optic Sensing and Second Moments
- 2015-2019 **Bachelor of Science**, Mathematics & Geological Sciences
Indiana University (IU)
Advised by Gary L. Pavlis
Thesis: Measurements of P-wave anisotropy in the Homestake Mine

Appointments

- 2024-present **Mendenhall Postdoctoral Fellow**, U.S. Geological Survey (USGS)
- 2024-present **Visiting Faculty**, Colorado School of Mines
- 2019-2024 **Graduate Student Researcher**, Caltech Seismological Laboratory
- 2019 **NAGT Summer Intern**, USGS
- 2015-2019 **STARS Research Assistant**, IU Geophysics Laboratory
- 2017 **IRIS Intern**, Los Alamos National Laboratory

Awards

- 2024 **GPS Award for Academic Excellence in Research**, Caltech
- 2024 **AGU Annual Meeting Outstanding Student Presentation Award**
- 2023 **SSA Annual Meeting Student Presentation Award**

2019	Faculty Senior Award , IU Geological Sciences
2019	Cora B. Hennel Memorial Scholarship , IU Mathematics
2019	Margaret Russell Edmondson Award , IU Phi Beta Kappa Chapter
2017	Undergraduate Prize , Mineralogical Society of America

Grants and Fellowships

2024	Mendenhall Postdoctoral Fellowship , USGS \$193,000 in salary over 2 years and \$32,500 in research funds
2020	NSF Graduate Research Fellowship \$138,000 in support over 3 years

Journal Publications

- [21] **Atterholt, J.**, McGuire, J.J., Barbour, A.J., Moschetti, M.P. (*in review*). Investigating Wavefield Complexity at the Basin Edge with Distributed Acoustic Sensing.
- [20] Kehoe, H.L., Boyd, O.S., **Atterholt, J.**, Moschetti, M.P., Bozdağ, E., Caylor, E.A. (*in review*). Geologic controls on seismic hazard across the continental United States using horizontal-to-vertical spectral ratios.
- [19] **Atterholt, J.**, McGuire, J.J., Barbour, A.J., Moschetti, M.P. (*in review*). Sharp Structural Variability of the Gorda Slab Imaged by a Fiber Array.
- [18] Bird, E., **Atterholt, J.**, Biondi, E., Yang, Y., Zhan, Z. (*in review*). Imaging the North Bishop Block with Converted Phases Observed through Fiber-Optic Seismology.
- [17] McGuire, J.J., Barbour, A.J., Spica, Z.J., Rodríguez Tribaldos, V., Zhan, Z., Lipovsky, B.P., Mellors, R.J., Biondi, E., Yoon, C., Karrenbach, M., Ringler, A.T., **Atterholt, J.**, Nayak, A., Sawi, T., Viens, L., Martin, E.R., Husker, A.L., Bodin, P., Moschetti, M.P., Shi, Q., Miller, N.C., Puri, P. (2025). Fiber Optic Sensing for Earthquake Hazards Research, Monitoring and Early Warning. *Seismological Research Letters*. doi: 10.1785/0220250067
- [16] Goldberg, D.E., Yeck, W.L., Hanagan, C., **Atterholt, J.**, Kehoe, H.L., Reitman, N.G., Barnhardt, W.D., Shelly, D.R., Hatem, A.E., Wald, D., Earle, P.S. (2025) Ultralong, Supershear Rupture of the 2025 Myanmar Earthquake Reveals Unaccounted Hazard. *Science*. doi: 10.1126/science.ady3581
- [15] Skoumal, R.J., **Atterholt, J.**, Barbour, A.J., Hardebeck, J.L. (2025). S/P Amplitude Ratios with Distributed Acoustic Sensing and Application to Earthquake Focal Mechanisms. *Geophysical Research Letters*. doi: 10.1029/2025GL116373
- [14] **Atterholt, J.**, McGuire, J.J., Barbour, A.J., Stewart, C., Moschetti, M. M. (2025). Fiber-Imaged Supershear Dynamics in the 2024 Mw7 Mendocino Fault Earthquake. *Science*, doi: 10.1126/science.adx6858

- [13] Zhai, Q., Yin, J., Yang, Y., **Atterholt, J.**, Li, J., Husker, A., Zhan, Z. (2025). Comprehensive Evaluation of DAS Amplitude and Its Implications for Earthquake Early Warning and Ambient Noise Interferometry. *Journal of Geophysical Research: Solid Earth*, doi: 10.1029/2024JB030288
- [12] Bird, E.J., **Atterholt, J.**, Li, J., Biondi, E., Zhai, Q., Yang, Y., Fang, J., Wei, X., Hjörleifsdóttir, V., Klesh, A., Kamalov, V., Gunnarsson, T., Zhan, Z. (2025). Constraining Dike Opening Models with Seismic Velocity Changes Associated with the 2023-2024 Eruption Sequence on the Reykjanes Peninsula. *AGU Advances*. doi: 10.1029/2024AV001516
- [11] **Atterholt, J.**, Wilding, J.D., Ross, Z.E. (2025). The Evolution of Fault Orientation in the 2019 Ridgecrest Earthquake Sequence with a New Long-Term Catalog of Seismicity and Moment Tensors. *Geophysical Journal International*, doi: 10.1093/gji/ggaf001
- [10] **Atterholt, J.**, Zhan, Z. (2024). Fine Scale Southern California Moho Structure Uncovered with Distributed Acoustic Sensing. *Science Advances*, doi: 10.1126/sciadv.adr3327
- [9] **Atterholt, J.**, Zhan, Z., Yang, Y., Zhu, W. (2024). Imaging the Garlock Fault Zone with a Fiber: A Missing Damage Zone and Hidden Bimaterial Contrast. *Journal of Geophysical Research: Solid Earth*, doi: 10.1029/2024JB028900
- [8] Guo, H., **Atterholt, J.**, McGuire, J.J., Thurber, C. (2024). Evidence for low effective stress within the crust of the subducted Gorda plate from the 2022 December M_w 6.4 Ferndale Earthquake Sequence. *Seismological Research Letters*, doi: 10.1785/0220240078
- [7] **Atterholt, J.**, Ross, Z.E. (2023). Finite Source Properties of Large Strike-Slip Earthquakes. *Geophysical Journal International*, doi: 10.1093/gji/ggad459
- [6] **Atterholt, J.**, Zhan, Z., Yang, Y. (2022). Fault zone imaging with distributed acoustic sensing: body-to-surface wave scattering. *Journal of Geophysical Research: Solid Earth*, doi: 10.1029/2022JB025052
- [5] Yang, Y., Zhan, Z., Shen, Z., **Atterholt, J.** (2022). Fault zone imaging with distributed acoustic sensing: surface-to-surface wave scattering. *Journal of Geophysical Research: Solid Earth*, doi: 10.1029/2022JB024329.
- [4] **Atterholt, J.**, Ross, Z. E. (2022) Bayesian framework for inversion of second-order stress glut moments: application to the 2019 Ridgecrest sequence mainshock. *Journal of Geophysical Research: Solid Earth*, doi: 10.1029/2021JB023780
- [3] **Atterholt, J.**, Zhan, Z., Shen, Z., Li, Z. (2021) A unified wavefield partitioning approach for distributed acoustic sensing. *Geophysical Journal International*, doi: 10.1093/gji/ggab407
- [2] Yang Y., **Atterholt, J.**, Shen, Z., Muir, J.B., Williams, W.F., Zhan, Z. (2021) Sub-kilometer correlation between near-surface structure and ground motion measured with distributed acoustic sensing. *Geophysical Research Letters*, doi: 10.1029/2021GL096503

- [1] **Atterholt, J.**, Brownlee, S.J., Pavlis, G.L. (2021). Direct P-wave anisotropy measurements at Homestake Mine: implications for wave propagation in the continental crust. *Geophysical Journal International*, doi: 10.1093/gji/ggaa416

Teaching Experience

2022-2023	Caltech EQ Fellows Program , Instructor/Mentor
2023	Plate Tectonics , Teaching Assistant, Caltech
2022	Geophysical Data Analysis , Teaching Assistant, Caltech
2021	Seismology , Teaching Assistant, Caltech

Service

2025-present	Representative , Subduction Zone Science Working Group, USGS
2022-present	Manuscript Reviewer , <i>Seismological Research Letters</i> , <i>Journal of Geophysical Research – Solid Earth</i> , <i>Communications Earth & Environment</i> , <i>Scientific Reports</i> , <i>Seismica</i> , <i>Bulletin of the Seismological Society of America</i> , <i>Tectonophysics</i> , <i>Nature Geoscience</i> , <i>Geophysical Research Letters</i> , <i>Science</i>
2023-2024	Project Mentor , High School Student Researchers, Caltech
2022-2023	Curriculum Developer / Instructor , Caltech EQ Fellows Program
2021-2022	Organizer , Caltech Seismological Laboratory Seminar
2016-2019	Editorial Board Member , <i>IU Journal of Undergraduate Research</i>

Invited Seminars

- [16] **University of Arizona, Geosciences**, Special Seminar, 2026
- [15] **MIT, Earth, Atmospheric, & Planetary Sciences**, Special Seminar, 2026
- [14] **Rice University, Earth, Environmental, & Planetary Sciences**, Special Seminar, 2026
- [13] **Lehigh University, Earth & Environmental Sciences**, Special Seminar, 2026
- [12] **University of Wyoming, Geology & Geophysics**, Special Seminar, 2026
- [11] **University of Illinois, Earth & Environmental Change**, Special Seminar, 2025
- [10] **University of Hawai'i, SOEST**, Special Seminar, 2025
- [9] **Rutgers University, Earth & Planetary Sciences**, Special Seminar, 2025
- [8] **University of Colorado, Boulder, Geological Sciences**, Weekly Seminar, 2025
- [7] **Earthquake Science Center (USGS)**, Weekly Seminar, 2025
- [6] **Berkeley Seismology Laboratory**, Department Seminar, 2025

- [5] **Geologic Hazards Science Center (USGS)**, Weekly Seminar, 2024
- [4] **Indiana University, Earth and Atmospheric Sciences**, Invited Talk, 2024
- [3] **John Wesley Powell Center for Analysis and Synthesis**, Invited Talk, 2024
- [2] **Caltech Seismological Laboratory**, Brown Bag Seminar, 2024
- [1] **Lawrence Livermore National Laboratory**, GMP Guest Seminar, 2023

Select Oral Presentations

- [9] **Atterholt, J.**, McGuire, J.J., Barbour, A.J., Stewart, C., Moschetti, M.M. (2025) Fiber-Imaged Supershear Dynamics in the 2024 Mw7 Mendocino Fault Earthquake. AGU Fall Meeting, New Orleans. **Invited.**
- [8] **Atterholt, J.**, McGuire, J.J., Barbour, A.J., Moschetti, M.M. (2025) Sharp Structural Variability of the Gorda Slab Imaged by a Fiber Array. AGU Fall Meeting, New Orleans
- [7] **Atterholt, J.**, Zhan, Z. (2024) Fine Scale Southern California Moho Structure Uncovered with Distributed Acoustic Sensing. AGU Fall Meeting, Washington DC.
- [6] **Atterholt, J.**, Wilding, J.D., Ross, Z.E. (2024). The Evolution of Fault Orientation in the 2019 Ridgecrest Earthquake Sequence with a New Long-Term Catalog of Seismicity and Moment Tensors. AGU Fall Meeting, Washington DC.
- [5] **Atterholt, J.**, Zhan, Z. (2023) Illuminating Moho Variability Across the Garlock Fault with Distributed Acoustic Sensing. AGU Fall Meeting, San Francisco.
- [4] **Atterholt, J.**, Zhan, Z., Yang, Y., Zhu, W. (2023) The Top-to-Bottom Structure of the Garlock Fault Zone Uncovered with Fiber Sensing. AGU Fall Meeting, San Francisco.
- [3] **Atterholt, J.**, Zhan, Z., Yang, Y., Zhu, W. (2023) High-Resolution Fault Zone Imaging with Distributed Acoustic Sensing. SSA Annual Meeting, Puerto Rico. **Invited.**
- [2] **Atterholt, J.**, Zhan, Z., Yang, Y., Zhu, W. (2022) Imaging the Garlock Fault Zone using distributed acoustic sensing. AGU Fall Meeting, Chicago.
- [1] **Atterholt, J.**, Ross, Z.E. (2022). Global evaluation of large strike-slip ruptures using a Bayesian estimation of stress glut second moments. AGU Fall Meeting, Chicago.

Software Libraries

- [2] **Strain to Particle Motion Conversion Library** – Collection of functions for a regularized conversion from strain (measured by a dense array) to ground motion. Accompanying paper: Zhai et al (2025) – Journal publication [13] (above)
Accompanying link: <https://github.com/atterholt/DAS-unit-conversion>

- [1] **Curvelet Denoising Library** – Collection of functions for and an example of the wavefield partitioning and denoising framework for distributed acoustic sensing. This library has been ported into Python for inclusion in the DASPpy Toolbox.
Accompanying paper: Atterholt et al. (2021) – Journal publication [3] (above)
Accompanying link: <https://github.com/atterholt/curvelet-denoising>

Select Datasets

- [2] **Atterholt, J., Wilding, J. D., Ross, Z. E. (2025).** 2019 Ridgecrest Earthquake Sequence Long-Term Hypocenter and Moment Tensor Catalog (Version 2) [Data set]. CaltechDATA. doi: 10.22002/5af05-cah73
- [1] **Atterholt, J., Zhan, Z. (2024).** Catalog of Events with PmP Phase [Data set]. CaltechDATA. doi: 10.22002/hhg7x-hgm42

Field Experience

2025	Field data collection of ongoing mass-wasting event , Lead, USGS
2025	Fiber deployment in southern Cascadia , Contributor, USGS
2023	Nodal deployment in Los Angeles County , Contributor, Caltech
2022	Seismic survey across Garlock Fault , Lead, Caltech
2019	Seismic survey across Seattle Fault , Contributor, USGS
2019	Seismic survey in Wabash Valley Fault Zone , Contributor, USGS
2018	Field mapping in the Tobacco Root Mountains , Student, IU

Media

- “Telecom Cables Measured an Earthquake in Incredible Detail.” Scientific American. December 2025. [Link](#)
- “Lasers, fiber optics and tiny vibrations tease a way to warn about earthquakes.” NBC News. September 2025. [Link](#)
- “Calif. could detect massive earthquakes with internet cables. Here's how.” SFGate. September 2025. [Link](#)
- “Fiber Optic Cables Could Revolutionize Earthquake Detection and Monitoring.” KQED (NPR). September 2025. [Link](#)
- “How buried cables are revealing Earth’s interior in incredible detail.” New Scientist. May 2025. [Link](#)
- “New Technique to Look Deep Within Tectonic Plates.” Caltech News. November 2024. [Link](#)