James Atterholt

Mendenhall Postdoctoral Fellow, U.S. Geological Survey

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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 and Honors

2024	**Mendenhall Postdoctoral Fellowship**, USGS $193,000 in support over 2 years
2024	**GPS Award for Academic Excellence in Research**, Caltech

2024	**AGU Annual Meeting Outstanding Student Presentation Award**
2023	**SSA Annual Meeting Student Presentation Award**
2020	**NSF Graduate Research Fellowship**
	$138,000 in support over 3 years
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

Journal Publications

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[14] 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. (*in review*). Constraining Dike Opening Models with Seismic Velocity Changes Associated with the 2023-2024 Eruption Sequence on the Reykjanes Peninsula.

[13] **Atterholt, J.**, Wilding, J.D., Ross, Z.E. (*in review*). The Evolution of Fault Orientation in the 2019 Ridgecrest Earthquake Sequence with a New Long-Term Catalog of Seismicity and Moment Tensors.

[12] **Atterholt, J.**, Zhan, Z. (2024). Fine Scale Southern California Moho Structure Uncovered with Distributed Acoustic Sensing. *Science Advances*, doi: 10.1126/sciadv.adr3327

[11] Zhai, Q., Yin, J., Yang, Y., **Atterholt, J.**, Li, J., Husker, A., Zhan, Z. (*in review*). Comprehensive Evaluation of DAS Amplitude and Its Implications for Earthquake Early Warning and Ambient Noise Interferometry.

[10] 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.

[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., and 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., and **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.** and 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., and 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., and 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

2022-present	**Manuscript Reviewer**, *Seismological Research Letters, Journal of Geophysical Research – Solid Earth, Communications Earth & Environment, Scientific Reports, Seismica, Bulletin of the Seismological Society of America*
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**, *IU Journal of Undergraduate Research*

Seminars

[5] **Geologic Hazards Science Center (USGS)**, Weekly Seminar, 2024
Title: The Top-to-Bottom Structure of the Garlock Fault with Fiber Seismology

[4] **Indiana University Department of Earth and Atmospheric Sciences**, Invited Talk, 2024
Title: Investigating Fault Structure and Moho Topography with a Fiber Array

[3] **John Wesley Powell Center for Analysis and Synthesis**, Invited Talk, 2024
Title: Fault Zone Imaging with DAS: A Case Study at the Garlock Fault

[2] **California Institute of Technology**, Brown Bag Seminar, 2024
Title: Exploring Fine-Scale Crustal Structure with Fiber Optic Seismology

[1] **Lawrence Livermore National Laboratory**, GMP Guest Seminar, 2023
Title: Illuminating the Multiscale Structure of the Garlock Fault Zone with Distributed Acoustic Sensing

Select Oral Presentations

[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., and 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., and Zhu, W. (2022) Imaging the Garlock Fault Zone using distributed acoustic sensing. AGU Fall Meeting, Chicago.

[1] **Atterholt, J.** and 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 (*in review*) – Journal publication [11] (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 DASPy Toolbox.

Accompanying paper: Atterholt et al. (2021) – Journal publication [3] (above)
Accompanying link: https://github.com/atterholt/curvelet-denoising

Select Poster Presentations

[10] Bird, E., **Atterholt, J.**, Yang, Y., Biondi E., and Zhan, Z. (2023). Joint Inversion for Shallow Subsurface Velocity Structure near Bishop, CA. AGU Fall Meeting, San Francisco.

[9] Barbour, A., McGuire, J., and **Atterholt, J.** (2023) Site effects at the meter scale from fiber optic and nodal seismic sensing. AGU Fall Meeting, San Francisco.

[8] **Atterholt, J.** and Ross, Z.E. (2023). Finite Source Properties of Large Strike-Slip Earthquakes. SSA Annual Meeting, Puerto Rico.

[7] **Atterholt, J.** and Ross, Z.E. (2021). Bayesian framework for inversion of second-order stress glut moments: application to the 2019 Ridgecrest sequence mainshock. AGU Fall Meeting, New Orleans.

[6] **Atterholt, J.**, and Zhan, Z. (2021). Fault zone mapping at intermediate scales using scattered waves recorded by distributed acoustic sensing. AGU Fall Meeting, New Orleans.

[5] Yang, Y., **Atterholt, J.**, Shen, Z., Muir, J.B., Williams, E.F., and Zhan, Z. (2021). Urban seismic hazard mapping with distributed acoustic sensing. AGU Fall Meeting, New Orleans.

[4] **Atterholt, J.**, Zhan, Z., Shen, Z., and Li, Z. (2020). A unified wavefield partitioning approach for distributed acoustic sensing. AGU Fall Meeting, Online.

[3] Williams, E.F., Martins, H.F., Fernandez-Ruiz, M.R., **Atterholt, J.**, Shen, Z., Martin-Lopez, S., Gonzalez-Herraez, M., Callies, J., and Zhan, Z. (2020). Ocean surface gravity wave interferometry with seafloor DAS. AGU Fall Meeting, Online.

[2] **Atterholt, J.** and Pavlis, G.L. (2018). Measurements of P wave anisotropy using active source seismic data in the Homestake Mine. GSA Annual Meeting, Indianapolis.

[1] **Atterholt, J.**, Chen, T., Snelson, and C.M., Mellors, R.J. (2017). Attenuation model using the large-N array from the Source Physics Experiment. AGU Fall Meeting, New Orleans.

Field Experience

2023	**Nodal deployment in Los Angeles County**, Contributor, Caltech
2022	**Seismic survey across Garlock Fault**, Designer and organizer, 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