





Katie Biegel, Ph.D.

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PROFESSIONAL APPOINTMENTS

- **Postdoctoral Scholar** Eugene, Oregon & Davis, California, USA
Department of Earth and Planetary Sciences, University of California Davis  March 2025 - Present
Department of Earth Sciences, University of Oregon  Aug. 2024 - Feb. 2025
 - **Supervisor:** Dr. Amanda Thomas
 - **Research Topics:** Debris flow seismology and modeling, Adaptation of laboratory models to real data including the USGS Experimental Debris-Flow Test Flume, Mt. Rainier, and Mt. St. Helens
- **Alberta Innovates Graduate Fellow** Calgary, Alberta, Canada
Department of Earth, Energy, and Environment, University of Calgary  May 2018 - May 2023
 - **Supervisor:** Dr. Jan Dettmer
 - **Research Topics:** Open-source scientific software development for earthquake relocation; earthquake source studies; induced and industrial seismicity; activated fault and fracture mapping in 3D
- **Natural Hazards Research Intern - Landslides** Golden, Colorado, USA
Geologic Hazards Science Center, United States Geological Survey (USGS)  June 2016 - Aug. 2017
 - **Supervisor:** Dr. Kate Allstadt
 - **Research Topics:** Software testing for earthquake-induced ground failure (landslide and liquefaction) estimation; Compilation and organization of metadata for global earthquake-induced landslide database

RESEARCH INTERESTS

- Natural Hazard Modeling
- Environmental Seismology
- Climate Impacts on Natural Hazards and Cascading Hazard
- Surface Processes and Geomorphological Impacts on Hazard
- Induced and Industrial Seismicity
- Earthquake Source Studies and Fault Imaging

EDUCATION

- **PhD in Geoscience** Calgary, Alberta, Canada
University of Calgary Nov. 2024
 - **Supervisor:** Dr. Jan Dettmer
 - **Dissertation Title:** Double-Difference Seismic Event Relocation: A Study of the Applications and Limitations of the Relocation Problem
- **BSc in Geophysical Engineering** Golden, Colorado, USA
Colorado School of Mines May 2017
 - Magna Cum Laude, Honors Minor in Public Affairs

PUBLICATIONS

Journal Articles

- [1] **Biegel, K.M.**, Dettmer, J., Igonin, N., and D. Eaton, 2024, Double-pair information improves depth relocation precision and highlights detailed 3D fault geometry for induced seismicity in Alberta, Canada, *Seismological Research Letters*, doi: [10.1785/0220240194](https://doi.org/10.1785/0220240194).
- [2] Gosselin, J., **Biegel, K.M.**, Dettmer, J., Gilbert, H., Colpron, M., and E. Enkelmann, 2024, Crustal stress in southwestern Yukon from probabilistic earthquake focal mechanisms, *Canadian Journal for Earth Sciences*, doi: [10.1139/cjes-2024-0095](https://doi.org/10.1139/cjes-2024-0095).
- [3] **Biegel, K.M.**, Gosselin, J., Dettmer, J., Colpron, M., Enkelmann, E., and J.S. Caine, 2024, Regional active deformation on discrete shallow faults throughout Southeast Alaska and Southwest Yukon, *Tectonic*, 43, e2023TC008140, doi: [10.1029/2023TC008140](https://doi.org/10.1029/2023TC008140).
- [4] Vasyura-Bathke, H., Dettmer, J., **Biegel, K.M.**, Salvage, R.O., Eaton, D., Ackerley, N., and S. Samsonov, 2023, Bayesian inference elucidates fault-system anatomy and resurgent earthquakes induced by continuing saltwater disposal, *Communications Earth and Environment*, 4, 407, doi: [10.1038/s43247-023-01064-1](https://doi.org/10.1038/s43247-023-01064-1)

Reviewed Government Reports

- [1] Han, J., Dettmer, J., Gosselin, J., Gilbert, H., **Biegel, K.**, and S. Kim, 2024, Seismicity near the eastern Denali fault from a temporary seismic deployment, in: *Yukon Exploration and Geology 2023*, L.H. Weston and Purple Rock Inc. (ed.), Yukon Geological Survey.
- [2] **Biegel, K.**, Gosselin, J., and J. Dettmer, 2023, Preliminary double-difference relocation earthquake catalogue for southwestern Yukon centred along the Denali fault zone, in: *Yukon Exploration and Geology 2022*, K.E. MacFarlane (ed.), Yukon Geological Survey.
- [3] Gosselin, J., **Biegel, K.**, Hamidbeygi, M., and J. Dettmer, 2023, Improvements in the regional earthquake focal mechanism catalogue for southwestern Yukon, in: *Yukon Exploration and Geology 2022*, K.E. MacFarlane (ed.), Yukon Geological Survey.
- [4] Schmitt, R.G., Tanyas, Hakan, Nowicki Jesse, M.A., Zhu, Jing, **Biegel, K.M.**, Allstadt, K.E., Jibson, R.W., Thompson, E.M., van Westen, C.J., Sato, H.P., Wald, D.J., Godt, J.W., Gorum, Tolga, Xu, Chong, Rathje, E.M., Knudsen, K.L., 2017, An Open Repository of Earthquake-Triggered Ground-Failure Inventories: *U.S. Geological Survey Data Series 1064*, 17 p. doi: [10.3133/ds1064](https://doi.org/10.3133/ds1064).
- [5] Schmitt, R.G., Tanyas, Hakan, Nowicki Jesse, M.A., Zhu, Jing, **Biegel, K.M.**, Allstadt, K.E., Jibson, R.W., Thompson, E.M., van Westen, C.J., Sato, H.P., Wald, D.J., Godt, J.W., Gorum, Tolga, Xu, Chong, Rathje, E.M., Knudsen, K.L., 2017, An Open Repository of Earthquake-Triggered Ground-Failure Inventories: *U.S. Geological Survey data release collection*, doi: [10.5066/F7H70DB4](https://doi.org/10.5066/F7H70DB4).

Code and Software Releases

- [1] **Biegel, K.M.**, and J. Dettmer, 2024, relocDD-py (v1.0) Zenodo. doi: [10.5281/zenodo.10607406](https://doi.org/10.5281/zenodo.10607406).
- [2] Allstadt, K. E., Thompson, E. M., Hearne, M., and **Biegel, K.M.**, 2018, groundfailure, USGS software release. doi: [10.5066/P91G4NS4](https://doi.org/10.5066/P91G4NS4).
- [3] **Biegel, K.M.** and Allstadt, K.E., 2017, landslides-metadata version 1.0.0: USGS Software Release, doi: [10.5066/F7DN43Z6](https://doi.org/10.5066/F7DN43Z6).

TEACHING

- **Sessional Instructor** Calgary, Alberta, Canada
University of Calgary Jan. - Apr. 2024
 - **GOPH 375** - Natural Disasters and Critical Earth Phenomena - *Winter 2024 Term*
- **Graduate Teaching Assistant** Calgary, Alberta, Canada
University of Calgary Sept. 2017 - Apr. 2024
 - **GLGY 297** - Sciences of Climate Change - *Winter 2024, Winter 2023, Winter 2022 Terms*
 - **SCIE 699** - Communication and Effectiveness for Graduate Students - *Fall 2022 Term*
 - **GLGY 705** - Graduate Skills in Science - *Fall 2018 Term*
 - **GOPH 419/619** - Advanced Computational Methods for Geophysicists - *Winter 2018 Term*
 - **GOPH 371** - Introduction to Geophysics - *Fall 2017 Term*

FIELD EXPERIENCE

- **Geophysical Instrumentation at Mt. Meager, BC** Pemberton, BC, Canada
University of Calgary Sept. 2019
 - **Purpose:** Monitoring of environmental seismicity, including glacial movement, slope stability, and potential hydrothermal events at the Mt. Meager massif in BC
 - **Equipment Installation:** 7 km of DAS fiber optic cable including partial installation on glacier; movement of generator and fuel supply to the mountain top; installation of nodal seismometers; installation of broadband seismometer and solar panel
- **Nodal Seismometer Installation CaMI Monitoring Site, Alberta** Brooks, Alberta, Canada
University of Calgary Feb. 2019
 - **Purpose:** Installation of nodal seismometers for ambient noise monitoring at the Containment and Monitoring Institute (CaMI) carbon storage experimental site
 - **Equipment Installation:** Installation of nodal seismometer array

FUNDING AND AWARDS

Funding and Scholarship Awards

- **2022, 2021** - Society of Exploration Geophysicists (SEG) Scholarship Award 2 years; total 20,000 USD
- **2022** - Robert T.D. Wickenden Memorial Scholarship 1,900 CAD
- **2021 - 2018** - Alberta Innovates Technology Graduate Fellowship 4 years; total 124,000 CAD
- **2020** - SEG/EAGE/Thomsen/BP Scholarship (Joint SEG and EAGE Award) 6,000 USD
- **2019 - 2017** - SEG Scholarship Award 3 years; total 22,000 USD
- **2018** - Faculty of Graduate Studies Scholarship declined for another award; 10,000 CAD
- **2017 - 2013** - Harvey Scholarship full tuition; 5 years; 120,000 USD
- **2016** - Newmont Mining Scholarship 10,000 USD

Teaching Awards

- **2021** - University of Calgary Jim and Josie Gray Award - *Best Geoscience Teaching Assistant*

Conference Awards

- **2024** - Seismological Society of America - *Student Presentation Award*

Travel Grants

- **2019** - University of Calgary Graduate Student Travel Award to AGU 2019
- **2018** - EAGE Student Travel Grant to EAGE 2018 Conference in Copenhagen
- **2018** - CSEG Travel Grant to EAGE 2018 Conference in Copenhagen

SKILLS

- **Programming Languages:** Python, Fortran, Bash, R, C, Matlab, C++, Java
- **Software Proficiency:** Latex, GIS (QGIS & ArcGIS), GMT, Madagascar
- **Data Processing & Software Development** MPI (mpi4py and in C), GPU Parallelization (numba, jax, python cuda, cuda fortran), Machine Learning and Neural Networks (tensorflow, keras, theano), git, inverse methods (LSQR, SVD, nonlinear Bayesian methods including transdimensional Bayesian methods)
- **Geophysical Data Analysis:** Seismic (Broadband & Nodal), DAS, DTS, LiDAR, INSAR, GPS, Satellite Imagery
- **Geophysical Instrumentation:** DGPS, CG-5 Gravimeters, EM-31 and EM-63, DC Resistivity, Self-Potential, Hammer Seismic, Seismometers (Inova HAWK, SmartSolo, Nanometrics Trilliums, Raspberry Shakes),
- **Languages:** English (Native), Spanish (Professional Working Proficiency)
- **Certifications:** University Teaching and Learning (University of Calgary), Helicopter Safety Training and Hazardous Material Transport (USGS)
- **Professional Organization Memberships:** AGU, SSA, CGU, SEG, AWG

PROFESSIONAL SERVICE

Committee Service

- **Equity, Diversity, and Inclusion (EDI) Committee** Department of Geoscience, University of Calgary
Graduate Student Representative and Chair 2020-2022
- **Geoscience Research Exchange Organizing Committee** Department of Geoscience, University of Calgary
Committee President and Fundraising Director 2021
Communications Director 2019-2020
- **Hazards Equity Working Group (HEWG)** American Geophysical Union (AGU)
Science Communication and Outreach Subcommittee Chair 2020
- **Gender and Sexuality Alliance Committee (GSA²)** Graduate Student Union, University of Calgary
Faculty of Science Graduate Student Representative 2018-2020

Other Volunteer

- **Geosciences Education & Mentoring Support (GEMS)** 2024
Mentor to two undergraduate students
- **Unlearning Racism in Geosciences (URGE)** 2023
Working Group Leader

PRESENTATIONS

Invited Talks

- [1] **Biegel, K.** and S. Fasola, 2025, Addressing Geologic Hazards and Planning for the Future in the Pacific Northwest, LCC Science Seminar, *Lane Community College*.
- [2] **Biegel, K.**, 2024, Whose Fault? Source Studies of Induced Seismicity in Western Canada, Earth Sciences Department Seminar, *University of Oregon*.
- [3] **Biegel, K.**, 2024, RelocDD-py: A Python Tool for Precision Double-Difference Relocations for Small to Medium-sized Datasets, Seminar on Small Earthquake Location, *Korea University*.

Conference Presentations

- [1] **Biegel, K.**, Dettmer, J., Igonin, N. and D. Eaton, 2024, Double-pair double-difference relocation for dense network improves depth precision of induced seismicity, leading to a detailed 3D fault geometry model, Seismological Society of America Meeting 2024, Anchorage, Alaska. *Oral Presentation*.
- [2] **Biegel, K.**, Gosselin, J., Dettmer, J., Colpron, M., Enkelmann, E., and J. Caine, 2024, Refining the nature of distributed and localized slip-partitioning of the Totschunda-Fairweather to Denali Corridor Using Earthquake Relocations and Focal Mechanisms, Seismological Society of America Meeting 2024, Anchorage, Alaska. *Poster Presentation*.
- [3] **Biegel, K.**, Gosselin, J., and J. Dettmer, 2023, Studying catalogue completeness and earthquake relocations to understand tectonic deformation in Southwest Yukon, Canadian Geophysical Union Meeting 2023, Banff, Alberta. *Poster Presentation*.
- [4] **Biegel, K.**, Gosselin, J., and J. Dettmer, 2023, Interpretation of tectonic deformation in SW Yukon from relocation of earthquakes, Cordilleran Tectonics Workshop 2023, Whitehorse, Yukon. *Poster Presentation*.
- [5] **Biegel, K.M.** and Dettmer, J., 2019, Location uncertainty for induced events: A comparison of fully nonlinear Bayesian estimates to double-pair double difference relocations for large datasets, American Geophysical Union Fall Meeting 2019. *Oral Presentation*.
- [6] **Biegel, K.M.**, Dettmer, J., and Igonin, N., 2019, Double-Pair Double Difference Location of Microseismicity with Dense-Station Microseismic Arrays, International Union of Geodesy and Geophysics (IUGG) General Conference 2019. *Oral Presentation*.