SARA BETH LEACH CEBRY

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EDUCATION

Ph.D., Civil Engineering June 2018 - December 2023
Cornell University, Ithaca, NY, USA

M.Eng., Structural Mechanics and Materials August 2017 - May 2018
Cornell University, Ithaca, NY, USA

B.S., Civil Engineering, Structural Concentration August 2011 - May 2015
Worcester Polytechnic Institute (WPI), Worcester, MA, USA

RESEARCH EXPERIENCE

Mendenhall Postdoctoral Fellow June 2024 – Present
U. S. Geological Survey (USGS)

Explored mechanisms that drive earthquakes utilizing laboratory and observational seismology techniques with the goals of reducing uncertainty, mitigating seismic hazard, and improving energy practices. Contributed to the long term success of the USGS Rock Mechanics Laboratory by developing new laboratory procedures and designing a new experimental apparatus. Current projects include:

- Analyzing observational data from southern Kansas, USA for repeating earthquakes to understand the mechanisms that control the occurrence of induced seismicity.
- Evaluating the failure processes that control formation of new faults across stepovers.
- Designing a new large-scale biaxial loading apparatus capable of testing rock and analog samples with a 2.8-4 m long fault at stresses over 50 MPa.
- Developing a procedure for using a 2 m biaxial loading apparatus in a new laboratory space while adding fluid injection capabilities.
- Developing a procedure to use concrete as a rock analog.

Postdoctoral Researcher January 2024 - May 2024
Cornell University

Examined the effect of fault geometry on peak ground accelerations (PGA) to improve earthquake hazard identification. Utilized compliant and high attenuation rock analog samples to vary fault geometry and measure rupture front behavior.

Graduate Research Assistant June 2018 – December 2023
Cornell University

Investigated the effects of fault frictional, material, and stress heterogeneities on seismicity through laboratory experiments with a goal of understanding seismic hazard and reducing public risk. Collected and analyzed data from experiments focused on heterogeneities due to direct fluid injection, fault geometry, and gouge powder on a 0.76 m PMMA and a 3 m granite laboratory fault. Developed fluid diffusion models to match experimental data.

MEng Independent Study August 2017 – May 2018
Cornell University

Conducted experiments to investigate the effect of fluid injection along a stressed fault line to increase feasibility of industrial fluid injection practices. Analyzed the effect of normal force, shear force, time delays, and fluid pressure on the initiation of slip along the fault line. Modeled the effects of fluid injection on a seismic fault using Abaqus FEA analysis software and compared results to the experimental data.

PEER REVIEWED JOURNAL PUBLICATIONS

* indicates co-first authors
× indicates undergraduate mentee

Song, J.-Y.*, **Cebry, S. B. L.***, & McLaskey, G. C. (in prep). Free surface boundary conditions and decreased aspect ratio of rectangular laboratory rupture patches promotes unstable events. *Journal of Geophysical Research: Solid Earth.*

Cebry, S. B. L., Cochran, E., Rubinstein, J. & Kaven, J. O. (submitted). Induced Repeating Earthquakes due to Fluid Injection in Southern Kansas, USA. *Journal of Geophysical Research: Solid Earth.*

Cebry, S. B. L. & McLaskey, G. C. (2024). Heterogeneous high frequency seismic radiation from complex ruptures. *Seismica*, 3(2). doi: 10.26443/seismica.v3i2.1351.

Cebry, S. B. L., Sorhaindo, K.×, & McLaskey, G. C. (2023). Laboratory earthquake rupture interactions with a high normal stress bump. *Journal of Geophysical Research: Solid Earth*, 128. doi: 10.1029/2023JB027297.

Cebry, S. B. L.*, Ke, C.-Y.*, Shreedharan, S., Marone, C., Kammer, D., & McLaskey, G. (2022). Creep fronts and complexity in laboratory earthquake sequences illuminate delayed earthquake triggering. *Nature Communications*, 13(6839). doi: 10.1038/s41467-022-34397-0.

Cebry, S. B. L., Ke, C.-Y., & McLaskey, G., C. (2022). The role of background stress state in fluid-induced aseismic slip and dynamic rupture on a 3-m laboratory fault, *Journal Geophysical Research: Solid Earth*, 127. doi: 101029/2022JB024371.

Cebry, S. B. L. & McLaskey, G. C. (2021). Seismic swarms produced by rapid fluid injection into a low permeability laboratory fault, *Earth and Planetary Sciences Letters*, 557(116726). doi: 10.1016/j.epsl.2020.116726.

CONFERENCE AND OTHER PUBLICATIONS

Cebry, S. B. L. & McLaskey, G. C. (2019) "Laboratory Stick-Slip Events Due to Direct Fluid Injection" American Rock Mechanics Association, New York, NY #ARMA 19-248.

Charest, A., & **Leach, S. B.**, (2015) "Cost Comparison: SIPs vs. Traditional Construction" Architectural Products Magazine.

INVITED TALKS

State-wide California Earthquake Center, Annual Meeting, September 2025, recorded
European Geosciences Union, General Assembly, April 2025
U. C. Santa Cruz, Institute for Geophysics and Planetary Physics Seminars, November 2024
USGS, ESC Seminar, September 2024
European Research Council TECTONIC/FEAR Seminars, June 2024, recorded
American Geophysical Union, Fall Meeting, December 2023
Penn State University, Geodynamics Seminar, October 2023
European Geosciences Union, General Assembly, April 2023

American Geophysical Union, Fall Meeting, December 2022
ETH Zurich, D-ERDW and SED seminar, July 2022

GRANTS

USGS Mendenhall Fellowship, April 2023, $112,200
Cornell University Travel Grant, March 2023 and September 2023, $700 each

TEACHING EXPERIENCE

Teaching Assistant various
Department of Civil Engineering, Cornell University

Taught lab/discussion sections, lead office hours, created and graded assignments, and organized, managed, and mentored a team of undergrad graders and assistants.

Design of Concrete Structures (CEE 4730/6730) Fall 2017, Fall 2023
Concrete Materials and Construction (CEE 4750/6750) Spring 2018
Advanced Structural Concrete (CEE 7740) Spring 2018
Climate Change and You, the Engineer (CEE 1165) Fall 2019
Introduction to the Behavior of Metal Structures (CEE 4740) Spring 2021, Spring 2022

Teaching Practicum: Interactive Qualifying Project August 2013 - December 2013
WPI & Doherty Memorial High School, Worcester, MA, USA

Served as a student teacher at Doherty Memorial High School. Planned lessons, assignments and tests, taught, and evaluated Advanced Algebra and Pre-Calculus Honors for students in grades 9-12. Demonstrated competence in the five Professional Standards for Massachusetts educators.

INDUSTRY EXPERIENCE

Engineer I June 2015-June 2017
CB&I Federal Services, Canton, MA, USA

Designed and analyzed steel, concrete, masonry, and wooden structures for USA national, state, and local government projects to meet national energy demand and improve infrastructure. Utilized finite-element software and developed methodologies to streamline analyses. Featured projects included Mixed-Oxide Fuel Fabrication Facility (U. S. Department of Energy nuclear facility), SuperPlug (Massachusetts Department of Transportation), and Ruggles Station (Massachusetts Bay Area Transit).

CERTIFICATIONS

Engineer in Training, Massachusetts, July 2016

REVIEWER ACTIVITIES

Journal reviewer for:

Journal of Geophysical Research: Solid Earth
Geophysical Research Letters
Earth and Planetary Science Letters
Geophysical Journal International

VOLUNTEER ACTIVITIES

Teach Me Tutoring: Weekly tutoring for grades 2-5, San Jose, CA, 2024-present

YWIB Explore STEM: Earth Science & Engineering in Action! Outreach event for grades 6-12, Palo Alto, CA, Sep. 2025

Engineering Your Horizons: STEM activities for middle school girls, Ithaca, NY, 2023

REFERENCES

Dr. Gregory McLaskey, gcm8@cornell.edu
Dr. David Lockner, dlockner@usgs.gov
Dr. Nicholas Beeler, nbeeler@usgs.gov

CONFERENCE PRESENTATIONS: (PRESENTING AUTHOR ONLY)

* indicates invited talk

*Cebry, S. B. L. & McLaskey, G. (2025). *Heterogeneous high frequency seismic radiation from rupture interactions with a normal stress bump* [Conference presentation]. State-wide California Earthquake Center, Annual Meeting, Palm Springs, CA, United States.

*Cebry, S. B. & McLaskey, G. (2025). *Heterogeneous high frequency seismic radiation from complex ruptures* [Conference presentation, No. EGU25-3342]. European Geosciences Union General Assembly 2025, Vienna, Austria.

Cebry, S. B. L., Kaven, O., Cochran, E., Rubinstein, J., Jeppson, T., Burdette, E., & Kilgore, B. (2024). *Induced Repeating Earthquakes due to Fluid Injection in Kansas, USA* [Conference presentation, Abstract S53F-05]. Americal Geophysical Union (AGU) 2024 Fall Meeting, Washington, DC, United States.

Cebry, S. B. L., Song, J. Y., & McLaskey, G. C. (2024). *Laboratory study of dynamic rupture confinement and shape in 1D and 2D: comparison to slider-block model and the effects of stress drop and rupture shape* [Conference presentation]. Rock Deformation Gordon Research Conference 2024, Lewistown, ME, United States.

Cebry, S. B. L. & McLaskey, G. C. (2024). *Variable high frequency radiation from complex laboratory ruptures due to a normal stress bump* [Conference presentation]. Seismological Society of America (SSA) 2024 Annual Meeting, Anchorage, AK, United States.

Cebry, S. B. L., Sorhaindo, K., & McLaskey, G. C. (2023). *Complex, multi-phase ruptures with heterogeneous high frequency ground motions due to interactions with a normal stress bump* [Conference presentation, Abstract T53A-07]. AGU 2023 Fall Meeting, San Francisco, CA, United States.

Cebry, S. B. L. & McLaskey, G. C. (2023). *Complex, multi-phase ruptures with heterogeneous high frequency ground motions due to interactions with a normal stress bump* [Conference presentation]. European Research Council Tectonics 2023 Meeting, Rome, Italy.

*Cebry, S. B., Ke, C. Y., Shreedharan, S., Marone, C., Kammer, D., & McLaskey, G. (2023). *Complex laboratory earthquake sequences show asperity interactions through creep fronts and illuminate the mechanics of delayed earthquake triggering* [Conference presentation, No. EGU23-10664]. European Geosciences Union 2023 General Assembly, Vienna, Austria.

*Cebry, S. B. L., & McLaskey, G. C. (2022). *Fluid-triggered Aseismic Slip and Dynamic Rupture from Rapid Fluid Injection into Large, Low Permeability Laboratory Faults* [Conference presentation]. AGU 2022 Fall Meeting, Chicago, IL, United States.

Cebry, S. B. L., Ke, C.-Y., & McLaskey, G. C. (2021). *Role of background stress state in fluid induced aseismic slip and dynamic rupture on a 3 meter laboratory fault* [Conference presentation, #S42A-03]. AGU 2021 Fall Meeting, New Orleans, LA, United States.

Cebry, S. B. L., Ke, C.-Y., & McLaskey, G. C. (2021). *Role of background stress state in fluid induced aseismic slip and dynamic rupture on a 3 meter laboratory fault* [Conference presentation]. Southern California Earthquake Center 2021 Annual Meeting, online.

Cebry, S. B. L. & McLaskey, G. C. (2021). *Rapid Fluid Injection into a Low Permeability Laboratory Fault Promotes Seismic Swarms* [Conference presentation]. SSA 2021 Annual Meeting, online.

Cebry, S. B. L. & McLaskey, G. C. (2020). *Rapid Fluid Injection into a Low Permeability Laboratory Fault Promotes Seismic Swarms* [Conference presentation, abstract #MR030-01]. AGU 2020 Fall Meeting, online .

Cebry, S. B. L. & McLaskey, G. C. (2020). *Rapid fluid injection into a low permeability laboratory fault promotes seismic swarms* [Conference presentation, Session 8, Abstract 8]. Eastern Section of the SSA, 2020 Annual Meeting, online.

Cebry, S. B. L., Ke, C.-Y., Shreedharan, S., Marone, C., Kammer, D. S., & McLaskey, G. C. (2019). *Laboratory observations of frictional stability and fault zone evolution under heterogeneous friction, rheology, and stress conditions* [Conference presentation, abstract #MR31A-05]. AGU 2019 Fall Meeting, San Francisco, CA, United States.

Cebry, S. B. L. & McLaskey, G. C. (2019). *Laboratory Stick-Slip Events Due to Direct Fluid Injection* [Conference Presentation, #ARMA 19-248]. American Rock Mechanics Association, 53rd Symposium, New York, NY, United States.