Sarah Maureen Hickernell

smhick@uw.edu
sarahhickernell.com
sarah.hickernell@gmail.com

Postdoctoral Scholar, University of Washington — January 2026 – present
Advisor: Dr. Cailey Condit

Conducting diffusion experiments on epidote to develop a technique for estimating the timescales of seismic cycles and dehydration reactions along the subduction interface using diffusion chronometry.

Education

Stanford University, Stanford, CA — January 2026
Advisor: Dr. Ayla Pamukçu

PhD Research: *Storage & Eruption of Silicic Magmas: Insights from the Searchlight Magmatic System*
Combining field work, laboratory analyses, and a range of petrologic tools to characterize high-silica and intermediate composition volcanic deposits in the Highland Range to determine the conditions and timescales of events that led to silicic volcanic eruptions from the Searchlight Magmatic System, NV.

Union College, Schenectady, NY — June 2018
Bachelor of Science, *magna cum laude.* Geology Major, Environmental Science & Policy Minor

Research Experiences

Research Assistant, SHRIMP-RG Laboratory, Stanford University. — Jan 2022 – September 2024

- Assisting outside users and Stanford affiliates with geochemical analyses on the SHRIMP-RG. Tasks include sample preparation, pre-analysis imaging, and general laboratory upkeep.

Collaborative Research, *University of Wyoming* — April 2023 – present

- Investigating the generation and eruption of silicic magmas in the Stillwater Range, NV to identify the conditions and timescales leading to a series of Oligocene-age super-eruptions using zircon trace elements (SHRIMP-RG) from intrusive and extrusive magmas.

Collaborative Research, *Union College* — October 2024 – present

- Utilizing zircon geochronology and trace element geochemistry (SHRIMP-RG) to characterize magmatic arc plumbing system and tempo of volcanic eruptions in Dominica, Lesser Antilles.

Collaborative Research, *CIDER Summer Workshop 2023* — June 2023 – present

- Investigating the links between subducting slab topography revealed by geodynamic models and arc volcanism expression at the surface.

Collaborative Research, *Vanderbilt University* — Sept 2023 – Jan 2025

- Investigating whether the mafic enclaves observed in the 2011-12 eruption of Cordon Caulle, Chile are representative of the rhyolites' parental magma, and the magmatic processes that allowed for this compositional shift through Rhyolite-MELTS thermodynamic modelling and geophysical and field observations.

Research Mentor, SURGE Program, Stanford University — June 2022-May 2023

- Created summer research project for a 1st generation, Latinx female graduate student as part of NSF REU program (Stanford Undergraduate Research in Geoscience and Engineering) on campus. Culminated in her presenting her research at GSA Cordilleran Section Meeting, May 2023.

Undergraduate Honors Thesis Research: *Magma Mixing: Magmatic Enclaves in Morne Micotrin, Dominica* July 2017 – June 2018

- Participated in Keck Geology Consortium summer research, an NSF REU project involving four weeks of senior thesis research development with advisor Prof. Holli Frey.

Laboratory Assistant, Union College Jan 2017-June 2017

- Conducted Raman spectroscopy analyses of radiation-damaged zircons and digitally-filtered Raman peak data under direction of Prof. John Garver.

Independent Research, Union College Jan 2016-June 2016

- Used heating experiments and CR-39 to study the radioactivity of plutonic zircons from Maine linked to lung cancer clusters under direction of Prof. John Garver.

Awards & Honors

Stanford-USGS Fellowship 2024-2025
Centennial Teaching Assistant Award, Stanford University 2024
GSA Lipman Research Award 2023
GSA Graduate Student Research Award 2023
GSA Cordilleran Section Meeting Graduate Student Poster Award – 2nd Runner Up 2023
Stanford Doerr School of Sustainability McGee/Levorsen Research Grant 2023
Harriet Benson Fellowship Award, Stanford University 2022-2023
Union College Sigma Xi Research Prize May 2018
Best research presentation as judged by STEM faculty at Union College's Steinmetz Symposium.
Sigma Xi Honor Society Associate Member May 2018
Geology Departmental Honors June 2018
Wold Geology Scholar Sept 2017 – June 2018
Recipient of geology scholarship and appointment as departmental tutor.
Union College Dean's List 2014-2018
Union College Scholar's Program 2014-2018

Teaching Experience

Teaching Assistant, Geochemical Instrumentation, Stanford University Fall 2023

- Instructed undergraduate and graduate students in best practices for selecting analytical methods and understanding geochemical data collection and analysis.
- Assisted in developing problem sets and organized hands-on weekly laboratory activities in Stanford analytical facilities. Received Centennial TA Award for teaching at end of academic year.

Volcanology Instructor, Wrigley Field Program in Hawaii, Stanford University Oct 2022

- Instructed undergraduates in week-long introductory geology and volcanology field course as part of a 12 week interdisciplinary program.
- Created course materials and lectured students on topics in geology and volcanology followed by planned field excursions & activities across the Big Island and within Hawaii Volcanoes National Park.

Research Mentor, SURGE Program, Stanford University June 2022-May 2023

- Instructed summer intern on igneous petrology data analysis and interpretation as well as scientific paper reading and communication. Culminated in her presenting her research at GSA Cordilleran Section Meeting, May 2023.

Teaching Assistant, Chemistry of the Earth & Planets, Stanford University Fall 2020

- Instructed and assisted undergraduate students in introductory geochemistry course.

- Developed and organized laboratory activities to demonstrate scientific concepts in a remote learning environment.

Geology Department Tutor, Union College Sept 2017-June 2018

- Assisted in introductory and upper-level geology courses by establishing study plans and developing independent study skills for struggling students. Instructed peers on the use of department instrumentation, including petrographic microscopes and SEM imaging techniques.

Publications

Pamukçu, A.S., **Hickernell, S.M.**, Schoene, B., Steiner-Leach, T., Eddy, M. P., 2025. "*Geology constrains the diffusivity of Ti in quartz and crystallization timescales of high-silica magmas in the Searchlight Magmatic System (NV, USA) "* Earth & Planetary Science Letters, 666, 119437. https://doi.org/10.1016/j.epsl.2025.119437

Ruefer, A., Kelly, L., Gualda, G., Carrillo, E., **Hickernell, S. M.**, Ward, S., Winslow, H., Ruprecht, R, 2025. "*In one step: Insights into shallow differentiation from basalt to rhyolite at Cordon Caulle from rhyolite-MELTS simulations*." Journal of Volcanology and Geothermal Research, 462, 108305. https://doi.org/10.1016/j.jvolgeores.2025.108305

Hickernell, S. M., Pamukçu, A. S., Monteleone, B. "*Reliability of quartz-hosted melt inclusions and discrete rhyolite reservoirs revealed by H isotopes, trace elements and volatiles" Under review*, Science Advances. Manuscript available upon request.

Hickernell, S. M., Pamukçu, A. S., Schoene, B., Steiner-Leach, T., Eddy, M. P. "*Storage Depths of Eruptible Rhyolites in the Searchlight Magmatic System."* In prep., manuscript available upon request. Planned submission to Journal of Petrology January 2026.

Hickernell, S. M., Pamukçu, A. S., Schoene, B., Steiner-Leach, T., Eddy, M. P. "*The Life and Times of Eruptible Searchlight Silicic Magmas: Perspectives from Diffusion Chronometry,"* In prep. Planned submission April 2026.

Frey, H.M., Manon, M.R., Brehm, S.K., **Hickernell, S.** "*U-Th ages and compositions of zircons in Dominica: constraints on a magma plumbing system*." In prep.

Lewis, M. J., Eddy, M.P., **Hickernell, S. M.**, Pamukçu, A. S., DesOrmeau, J., Ickert, R. "*Rapid thermal and volatile evolution of magmas associated with a large ignimbrite eruption: Poco Canyon Caldera System, Nevada*" In prep.

Goltz, A., Fildes, R. A., **Hickernell, S. M.**, Lewis, M. J., Burkett, E. M. "*Connect Four: The link between primitive magma geochemistry, volcanic spacing, edifice volume, and slab topography along magmatic arcs*." In prep.

Invited Talks & Lectures

Seminar speaker, San Jose State University October 2024

Invited Lecturer, Igneous & Metamorphic Petrology course, Stanford University. May 2024

Invited Talk, IAVCEI Scientific Assembly 2025, Geneva, Switzerland. June 2025

Abstracts

Hickernell, S., Pamukçu, A., Chiaro, G., Weaver, K. (2025). *Geometrically complex magmatic plumbing system revealed by high-silica rhyolite glasses from the Highland Range Volcanic Sequence (NV, USA*). Invited talk**,** International Association for Volcanology and Chemistry of the Earth's Interior (IAVCEI) Scientific Assembly 2025.

Ruefer, A., Kelly, L., Gualda, G.A.R., Carrillo, E., **Hickernell, S**., Ward, S., Winslow, H. Ruprecht, P. (2025). *In one step: Insights into shallow differentiation from basalt to rhyolite at Cordon Caulle from rhyolite-MELTS simulations.* Invited talk, Americal Geophysical Union Fall Meeting.

Pamukçu, A., **Hickernell, S**., Eddy, M.P., Schoene, B., Steiner-Leach, T. (2025) *Geological constraints on the crystallization timescales of high-silica magmas and the diffusivity of Ti in quartz in the Searchlight Magmatic System (NV, USA*). Poster presentation at IAVCEI Scientific Assembly 2025.

Kelly, L.J., Ruefer, A., Carrillo, E. L., **Hickernell, S**., Ward, S., Gualda, G.A.R., Winslow, H., Ruprecht, P. (2025). *One small step in the crust, one giant leap for magma: Insights into magma differentiation from basalt to rhyolite at Cordon Caulle derived from rhyolite-MELTS simulations*. Poster presentation at IAVCEI Scientific Assembly 2025.

Frey, H.M., Manon, M.R., Brehm, S.K., **Hickernell, S.** (2025) *U-Th ages and compositions of zircons in Dominca: constraints on a magma plumbing system*. Poster presentation at IAVCEI Scientific Assembly 2025.

Hickernell, S., Pamukçu, A., Monteleone, B. (2024). *Quartz-hosted melt inclusions reveal complex pre-eruptive rhyolite storage in the Miocene Highland Range Volcanic Sequence, NV. Oral p*resentation at the American Geophysical Union Fall Meeting.

Hickernell, S. (2024) *Building a Volcanic Eruption: Pre-eruptive Volatiles in Quartz-Hosted Melt Inclusions.* Oral presentation at Stanford Doerr School of Sustainability Research Review 2024.

Hickernell, S., Pamukçu, A., Schoene, B., Eddy, M., Steiner-Leach, T. (2023). *Storage and Longevity of Eruptible Rhyolitic Magma Bodies: Searchlight Magmatic System, NV.* Poster presented at the American Geophysical Union Fall Meeting.

Goltz, A., Biasi, J., Burkett, E., Fildes, R., **Hickernell, S.**, Lewis, M. (2023). *Connect Four: The link between primitive magma geochemistry, volcanic spacing, edifice volume, and slab topography along magmatic arcs*. Poster presented at American Geophysical Union Fall Meeting.

Hickernell, S., Pamukçu, A., Schoene, B., Eddy, M., Miller, C., Guzman, D., Steiner-Leach, T. (2023). *Conditions and Timescales of Rhyolite Storage in the Miocene Searchlight Magmatic System, NV.* Poster presented at the GSA Cordilleran Section 2023 Meeting.

Guzman, D., **Hickernell, S**., Pamukçu, A. (2023). *Crystal Records of Evolving Silicic Magma: Intermediate Volcanics of the Highland Range, NV*. Poster presented at the GSA Cordilleran Section 2023 Meeting.

Hickernell, S., Pamukçu, A., Schoene, B., Eddy, M., Miller, C., Guzman, D., Steiner-Leach, T. (2023). *Conditions and Timescales of Rhyolite Storage in the Miocene Searchlight Magmatic System, NV.* Poster presented at CIDER Workshop (Berkeley, CA) 2023.

Hickernell, S. (2018). *Magma Mixing: Magmatic Enclaves in Morne Micotrin, Dominica.* Union College Honors Theses. 1619. https://digitalworks.union.edu/theses/1619

Hickernell, S.M. (2018). Magmatic Enclaves and Magma Mixing in Morne Micotrin, Dominica. Oral presentation at Union College Steinmetz Symposium 2018.

Hickernell, S. M., Frey, H. M., Waters, L. E., Manon, M.R.F (2017). *Magma Mixing: Magmatic Enclaves in Morne Micotrin, Dominica*. Poster presented at American Geophysical Union Fall Meeting.

Hickernell, S. M., Frey, H. M., and Manon, M.R.F. (2018) *Enclave Characterization and Relationships with Host Andesite in Morne Micotrin, Dominica, Lesser Antilles*. Poster presented at the GSA Northeastern Section 2018 Meeting.

Chormann, A. G., O'Hora, H. E., Bennett, H. I., Been, A. F., Gallego, A., Williams, S. K., Herbert, J. N., Barnes, H. F., Maung, J. N., McReynolds, A. C., Pagano, A. E., **Hickernell, S. M.**, Ludlam, A. P., Pope, M., Verheyden, A., and Gillikin, D (2018) *Lateral Exchange of Mangrove Sediment Porewater Dissolved Inorganic Carbon to Coral Reef Ecosystems*. Poster presented at the GSA Northeastern Section 2018 Meeting.

Hickernell, S. (2016). *Radon Emanation from High-Damage Zircons from Granites from Downeast Maine*. Poster presented at Union College Steinmetz Symposium 2016.

Community Involvement & Service

Volunteer, Garden Gate Elementary School April 2025

- Visited three fourth-grade classrooms to teach students about the rock cycle and volcanism using a variety of rock and mineral samples and activities.

Faculty Search Committee, Earth & Planetary Sciences Dept., Stanford University Winter 2024

- Served as graduate student representative in departmental faculty search. Organized student panel interviews with candidates, compiled and presented student feedback, and participated in search committee discussions.

Volunteer, SLAC Regional Science Bowl Feb 2024

- Assisted in running regional science quiz competition for middle school students at SLAC facility. Kept track of team scores, assisted in moderating competition rules, and supported participating students and families.

SHRIMP-RG Laboratory Tour Leader March 2023

- Led laboratory tour for group of ~20 San Francisco high school students from disadvantaged socioeconomic backgrounds through SHRIMP-RG laboratory as part of Stanford Pertenecer program.

Graduate Student Advisory Council, SDSS, Stanford University Sept 2020-Aug 2022

- Worked with graduate students and Geological Sciences department leadership to advocate for student needs and opportunities at the department and school level. Communicated concerns and issues experienced by students to leadership to facilitate productive community involvement.

Research Review Organizer, SDSS, Stanford University March 2022-May 2022

- Organized annual research symposium across the departments within the School of Earth (now SDSS) for graduate students and postdocs to share their research and interests with their community.
- Solicited abstracts, coordinated with vendors, contacted faculty judges, and determined awards for presenters as part of a four-person team, culminating with Research Review on May 20, 2022.

Volunteer, Bay Area Science Festival April 2022

- Assisted in geology-themed walking tour of Stanford campus catering towards elementary school-age children.

Volunteer, U-Sustain, Union College April 2015-June 2018

- Participated in sustainability club at Union College, helping to plan and execute environmental events including trash clean-up and recycling sorting for admissions days and campus-wide events.

Relevant Skills

- Scanning electron microscopy - SE, BSE, and CL imaging; EDS quantitative analyses.
- Electron microprobe - WDS & EDS quantitative analyses and CL imaging.
- Raman spectroscopy – mineral provenance (zircon radiation damage), CO_2 density (melt inclusions).
- SIMS instrumentation - measurements of melt inclusion and matrix glass volatiles and trace elements, zircon and quartz trace elements. *SHRIMP-RG laboratory, WHOI NENIMF laboratory*
- LA-ICP-MS – measurements of trace elements in glasses and minerals.
- Computed tomography – experience at Advanced Photon Source, Argonne National Laboratory.
- Experimental petrology techniques – mineral-hosted melt inclusion homogenization in TZM vessels and cold seals.
- Computational Modelling: Examples: Diffusion chronometry modelling, MELTS thermodynamic modelling, volatile degassing and diffusive exchange models.
- Working experience with Matlab, Python.
- Grain mount sample preparation (epoxy, indium).
- CR-39 fission track analysis.
- YSI PRO and ODO water sampling, filtration, and titrations.
- Proficient in Microsoft Excel working with large quantitative geochemical data sets.
- Adobe Suite (Illustrator, Photoshop).

Field Experiences

Research

Stillwater and Highland Ranges, NV Sept-Oct 2021, Nov 2022

- Conducted field work as part of a team of researchers from Stanford, Purdue, and Vanderbilt Universities investigating connections between silicic plutons and volcanic eruptions exposed at the surface due to extensional faulting in the Basin and Range.

Bocas del Toro, Panama Dec 2017

- Conducted independent research project as part of a Biogeochemistry term-long course. Studied a previously unmapped canal in Bocas del Toro to determine localized carbon flux.

Dominica, Lesser Antilles June 2016, 2017

- Participated in Geology Department field trip in 2016 to Dominica to assist thesis students conduct research concerned with meteoric and spring water chemistry. Utilized various water testing equipment in the field, requiring entering streams and challenging hikes.
- Returned to Dominica the following summer as part of the Keck Geology Consortium to perform independent petrological research. Required collecting rock samples in the field at Morne Micotrin as well as assisting other students in collecting rock and water samples across the island.

Teaching

Big Island, HI Oct 2022

- Co-taught Stanford's Wrigley Field Program volcanology module. Instructed undergraduates on field skills and note taking while leading students through field activities across a variety of volcanic landscapes.

California, USA 2022

- Led several stops on "Evolution of the Laurentian Margin" 5-day field trip, including at volcanic features near Bishop, CA, and within Yosemite National Park. Researched potential field stops in advance and explained interpretations of landforms to peers.

Coursework

California, USA 2022

- *Sonoma Volcanic Field, Lassen National Park* - Participated in weekend field trips to regional volcanic fields as part of Magmatic & Eruptive Processes course to identify and discuss a range of volcanic landforms.
- *Bishop, CA* – Participated in field course led by Vanderbilt University, "Magmas and Eruptions," investigating field exposures of the Bishop Tuff supereruption and nearby magmatic features.
- *Evolution of the Laurentian Margin Field trip* – Participated in field trip with field stop discussions including Great Valley Sequence stratigraphy, Sierra Nevada granites and contact metamorphism, and Coast Range tectonism.

Brisbane, Australia Aug-Nov 2016

- Participated in term abroad in Brisbane, Australia. Participated in four weeks of ecology field courses in a variety of settings including Stradbroke Island (coastal and estuarine systems), Girraween National Park ("outback"), Lamington National Park (rainforest), Heron Island (Great Barrier Reef).
- Conducted ecological research at each field location, involving hiking, taking detailed field notes and sketches, and performing biodiversity surveys.

Capital Region, New York State Aug-Nov 2016

- Conducted field work within ~2 hr radius of Schenectady, NY as part of field work in geology courses. Field work involved taking detailed field notes, sketching and modeling various outcrops, performing seismic surveys to determine water table depth, soil classifications, and rock and water sampling.

Workshops

SIMS Workshop, Arizona State University Jan 2-5, 2024

- Attended hands-on workshop focusing on using secondary ion mass spectrometry techniques for measurements of volatiles in geologic materials.

CIDER Workshop, UC Berkeley June – July 2023

- Attended interdisciplinary workshop focusing on the causes and consequences of fluid migration at subduction zones. Included two weeks of lectures followed by two weeks of conducting research in interdisciplinary teams.

Diffusion Workshop, Goldschmidt Conference Dec 2020

- Attended virtual workshop on diffusion chronometry focused on setting up diffusion calculations based on different initial profile geometries within MATlab interface.