Emily C. First | Curriculum Vitae

Assistant Professor of Geology
Macalester College, Saint Paul, MN 55105
(651) 696-6415 | efirst@macalester.edu
emilyfirst.com

Education

2017 Ph.D., University of Hawai‘i at Mānoa, Geology & Geophysics Department
"Magmatic environments and timescales: Experimental studies on martian basalt and terrestrial dacite" – advisor Julia Hammer

2015 M.S. en route, University of Hawai‘i at Mānoa, Geology & Geophysics Dept

2011 B.S., *summa cum laude*, University of Georgia, Geology Department

2011 A.B., *summa cum laude*, University of Georgia, French Department

Professional Appointments

Dec 2022 – present	Assistant Professor Macalester College, Geology Department
Nov 2020 – Nov 2022	51 Pegasi b Postdoctoral Fellow Cornell University, Earth & Atmospheric Sciences Department – advisor Esteban Gazel
Apr 2018 – Nov 2020	Postdoctoral Research Associate Brown University, Dept. Earth, Environ. & Planetary Sciences – advisor Malcolm Rutherford
Jan 2018 – Mar 2018	Postdoctoral Fellow University of Hawai‘i at Mānoa, Geology & Geophysics Dept – advisor Julia Hammer

Peer-Reviewed Publications

* Indicates student

12. Vira, A.*, Burgess, K., **First, E.**, Tian, M., Eames, K., Trivedi, R., Dotson, G., Kim, D., Farr, T., Lisabeth, H., Tamura, N., Livernois, E., Jones, B., Orlando, T., Jiang, Z., First, P. (in press). Trivalent Titanium in High-Titanium Lunar Ilmenite. *Nature Communications*.

11. First, E. C., Mishra, I., Gazel, E., Lewis, N. K., Letai, J.*, Hanssen, L. (2024). Potential for observing geological diversity from mid-infrared spectra of rocky exoplanets. *Nature Astronomy.* DOI: 10.1038/s41550-024-02412-7

10. First, E. C., Kremer, C., Telus, M. & Trang, D. (2023). Galaxy of Green. *Elements* **19**, 173–179. DOI: 10.2138/gselements.19.3.173

9. Welsch, B., **First, E. C.**, Ruprecht, P. & Jollands, M. C. (2023). Olivine—The Little Green Science Machine. *Elements* **19**, 138–143. DOI: 10.2138/gselements.19.3.138

8. Welsch, B., Faure, F. & **First, E. C.** (2023). Reappraising Crystallization Kinetics with Overgrowth Chronometry: an *in Situ* Study of Olivine Growth Velocities. *Journal of Petrology* **64**, egad055. DOI: 10.1093/petrology/egad055

7. Pineda, C., Hammer, J., **First, E.** & Morata, D. (2021). Storage conditions of a caldera-forming volcanic eruption: Insights from the Pudahuel rhyolitic ignimbrite in central Chile (32° 10′S). *Lithos* **400–401**, 106382. DOI: 10.1016/j.lithos.2021.106382

6. First, E. C., Hammer, J. E., Ruprecht, P. & Rutherford, M. (2021). Experimental Constraints on Dacite Magma Storage beneath Volcán Quizapu, Chile. *Journal of Petrology* **62**, egab027. DOI: 10.1093/petrology/egab027

5. First, E. C., Leonhardi, T. C.* & Hammer, J. E. (2020). Effects of superheating magnitude on olivine growth. *Contributions to Mineralogy and Petrology* **175**, 13. DOI: 10.1007/s00410-019-1638-7

4. Shea, T., Hammer, J. E., Hellebrand, E., Mourey, A. J., Costa, F., **First, E. C.**, Lynn, K. J. & Melnik, O. (2019). Phosphorus and aluminum zoning in olivine: contrasting behavior of two nominally incompatible trace elements. *Contributions to Mineralogy and Petrology* **174**, 85. DOI: 10.1007/s00410-019-1618-y

3. First, E. & Hammer, J. (2016). Igneous cooling history of olivine-phyric shergottite Yamato 980459 constrained by dynamic crystallization experiments. *Meteoritics & Planetary Science* **51**, 1233–1255. DOI: 10.1111/maps.12659

2. Brachfeld, S., Shah, D., **First, E.**, Hammer, J. & Bowles, J. (2015). Influence of redox conditions on the intensity of Mars crustal magnetic anomalies. *Meteoritics & Planetary Science* **50**, 1703–1717. DOI: 10.1111/maps.12505

1. Shea, T., Hammer, J. & **First, E.** (2013). Magma balloons or bombs? *Nature Geoscience* **6**, 802–803. DOI: 10.1038/ngeo1971

Grants, Fellowships, and Awards

2023 – present	PI of Heising-Simons Foundation grant 2023-4485 "Shooting for the Moon: Undergraduate Research and Professional Development" ($125,000)
2019 – 2024	Co-I of NSF grant EAR 2316451 "Experimental Study of Clinopyroxene Growth and Sector Zoning" (PI Benoit Welsch) ($379,864)
2020 – 2022	51 Pegasi b Fellowship in Planetary Astronomy, "Solid Ground: Developing a Spectral Database for Exoplanet Research" ($375,000)
2017	Lipman Research Award from the GSA ($2,650)
2017	GSA MGPV Division Student Award ($2,000)
2016	ARCS Scholar - Toby Lee award in Geology & Geophysics ($5,000)
2015	Achievement award, Univ. of Hawai'i Geology & Geophysics Dept.
2013	ARCS Scholar ($5,000)
2011– 2013	Fred M. Bullard Graduate Fellowship, Univ. of Hawai'i
2011	Undergraduate Student of the Year, Univ. of Georgia Geology Dept.
2010	Vernon Hurst Undergraduate Research Award, University of Georgia Geology Department

Courses Taught

at Macalester College unless otherwise indicated

2025, 2024	Dynamic Earth and Global Change (GEOL/ENVI 160)
2025, 2024	Petrology + lab (GEOL 302)
2025	Volcanoes (GEOL 106)
2024, 2023	Volcanoes (GEOL 194)

2025, 2024, 2023 (x2) Mineralogy + lab (GEOL 250)

Undergraduate Students Mentored

2025 Henna Schecter (Macalester – ongoing Kīlauea eruption) *current senior*

2024–2025 Alex Parr (Macalester – Icelandic volcanism) *now Mac Geo postbac*

2024–2025 Gustavo Marchant-Allende (Macalester – lherzolite xenoliths) *now a PhD student at Purdue University*

2023–2025 Matthew Flowers (Macalester – anorthosite coloring near Duluth, MN)

2023 Gustavo Marchant-Allende (Macalester – Apollo 17 orange glass deposit)

2022 Jonathan Letai (Cornell University) *now a PhD student at Northeastern*

2021 Julia Gustafson (Cornell University)

2016 Dr. Diamond Tachera (University of Hawai‘i) *now NCAR project scientist*

2015 Tanis Leonhardi (University of Hawai‘i)

Teaching and Mentoring Leadership and Development

2025 “Sustainable Strategies for Supporting Well-Being and Academic Engagement for Faculty and Students” workshop participant, ACM

2023 Pedagogies of Hope workshop, Macalester College

2023 Early Career Geoscience Faculty workshop participant, SERC / NSF

2021 Course Design workshop series participant, Cornell University

2021 Essentials of Teaching workshop series participant, Cornell University

2021 Building Mentorship Skills for Academic Careers, Cornell University

2018 – 2021 Coordinator, Science-Teaching and Education Program (STEP), Brown U.

2018 Certificate I, Sheridan Center for Teaching and Learning, Brown University

2017 Co-leader, GSA Cordilleran section field trip to Kīlauea Volcano

2015 Facilitator, mini-workshop on MELTS modeling, Univ. of Hawai‘i at Mānoa

2011 Fall TA, Introductory Geology Lab, University of Hawai‘i at Mānoa

2011 Sumr TA, Interdisciplinary Field Program (Western USA), University of Georgia

2011 Sumr TA, Field School (based in Cañon City, CO), University of Georgia

Additional Research and Field Experience

2026	One of the faculty leaders for GEOL 201 field course in Argentina
2023–present	Planned and led course field trips (St. Cloud, MN; North Shore)
2024–2025	Analyzed lunar olivine at UMN electron microprobe (total ~2 weeks)
2019	Measured volatiles in glass at WHOI ion microprobe (2 visits)
2012–2017	Research Assistant, University of Hawai‘i at Mānoa (Julia Hammer)
2017	Cruise aboard R.V. Kilo Moana; mapping, dredging off Molokai
2016	Mapped eruption from Halema’uma’u Crater, Kīlauea, with USGS
2016	Field campaign in Maule region of Chile
2014	Goldschmidt conference field trip to Yosemite National Park
2011–2014	Volcanology/petrology class research in Hawai‘i and New Zealand
2009	UGA Field School student (6-weeks of mapping in CO and UT)
2008	UGA Interdisciplinary Field Program student (8 weeks of geology, anthropology, and ecology across the country)

Conference Abstracts

* Indicates student mentee

18. Parr, A.*, **First E.C.** (2025) Change is Bubbling Up: How Vesicles in the 1973 Eldfell (Iceland) Tephra Record Syn-Eruptive Style Changes and Long-Term System Evolution. *GSA Connects 2025*, abstract#75-26. POSTER.
17. **First, E.C.**, Welsch, B.T., Mitchell, J.T., Rutherford, M.J. (2025) Widespread Ti zoning in Apollo 17 olivine. *LPSC 2025*, abstract#2873. POSTER.
16. **First, E.C.**, Gazel, E., Mishra, I., Lewis, N.K., Letai, J.*, Hanssen, L. (2024) Mid-infrared spectra of natural basalts applied to rocky exoplanets. *AGU 2024,* abstract# P23F-06. TALK.
15. Marchant-Allende, G.*, **First, E.C.**, Welsch, B. (2023) Orange glass from the Moon: new perspectives on olivine crystallization from Ti-rich magma. *NDiSTEM 2023*. POSTER.

14. **First, E.C.**, Rutherford, M., Welsch, B. (2023) Apollo 17 orange glass magma: olivine reveals complex magmatic history. *LPSC 2023*, abstract#2372.

13. **First, E.C.**, Gazel, E., Mishra, I., Lewis, N.K., Letai, J.*, Gustafson, J.* (2022). What's in a (rock) name? Infrared laboratory spectra of terrestrial "basalts" can inform interpretations of rocky exoplanet surfaces. *LPSC 2022*, abstract#2879. POSTER.

12. **First, E.**, Rutherford, M. (2019) Immiscibility in evolved lunar magmas. *LPSC 2019*, abstract#2117. TALK.

11. **First, E.**, Rutherford, M. (2018) Phase equilibria and conditions of silicate liquid immiscibility in silicic lunar magmas at mid-lower crustal pressures and various H_2O contents. *AGU 2018*, abstract#P23E-3494. POSTER.

10. **First, E.**, Hammer, J., Shea, T., Hellebrand, E., Tachera, D.* (2018) Magnesium diffusion in labradorite at hydrous magmatic conditions. *Goldschmidt 2018*, abstract#2018003038. TALK.

9. Hammer, J., **First, E.**, Shea, T., Leonhardi, T.*, Brachfeld, S. (2018) Nucleation: an existential problem in an extreme environment. *Goldschmidt 2018*, abstract. TALK.

8. Shea, T., Hammer, J., Hellebrand, E., Mourey, A., **First, E.**, Lynn, K., Costa, F. (2018) Phosphorous and aluminum partitioning during olivine growth: both sides of the story. *Goldschmidt 2018*, abstract. POSTER.

7. **First, E.**, Hammer, J., Ruprecht, P. (2017) Experimental constraints on dacite magma storage beneath Volcán Quizapu, Chile. *IAVCEI Scientific Assembly 2017*, abstract #917. TALK.

6. Brachfeld, S., **First, E.**, Hammer, J., Stewart, S., Hankin, M., Spaulding, D., Bowles, J., Strauss, E., Withers, A., Feinberg, J. (2016) Magnetic properties of synthetic Gusev Crater basalts: Implications for remanence acquisition and impact demagnetization of the martian crust. *AGU 2016*, abstract# GP13A04. TALK.

5. Leonhardi, T.*, Hammer, J., **First, E.** (2015) Effect of superheating on olivine nucleation and growth in a silica-undersaturated melt: An experimental study. *AGU 2015*, abstract #V41B-3071. POSTER.

4. **First, E.**, Hammer, J. (2014) Extrusive history of martian meteorite Yamato 980459: An experimental study. *Goldschmidt 2014*, abstract #698. POSTER.

3. **First, E.**, Hammer, J., Welsch, B. (2013) Thermal history of Yamato 980459-Constraints from mineralogy, crystal morphology, and dynamic cooling experiments. *LPSC XLIV*, abstract #2943. TALK.

2. **First, E.**, Hammer, J. (2012) Laboratory studies of crystallization kinetics in magma-Elucidating the crystallization history of a martian meteorite. *10th International Symposium on Crystallization in Glasses and Liquids*. POSTER.

1. **First, E.**, Summerlin, E.S., Patiño Douce, A., Roden, M.F. (2011) Mineral probes of magmatic processes at Valles caldera, northern New Mexico. *GSA Southeastern Section 60th Annual Meeting*, abstract #184984. POSTER.

Invited Talks

2025 Hope College: Geological and Environmental Sciences Department seminar *Crystal clues: How the shape and chemistry of igneous minerals record magmatic processes*

2025 University of Minnesota: Department of Earth & Environmental Sciences Seminar Series *Fractal facets and chemical correlations: How crystals record magmatic processes on Earth and beyond*

2025 Macalester College: CAST Lightning Round Scholarship Share

2024 Winona State University: Earth Talks *From Earth to exoplanets: Using terrestrial basalts to decode the geology of distant worlds*

2024 University of Minnesota: Hard Rock Lunch *Pumpkin-orange glass and crystal skeletons: Revisiting the petrology of an Apollo 17 pyroclastic deposit*

2024 University of Minnesota Duluth: Colloquium *Making magmas: Experimental insights on magma depth and temperature beneath Volcán Quizapu, Chile*

2024 Carleton College: Geology Seminar *Making magmas: Experimental insights on magma depth and temperature beneath Volcán Quizapu, Chile*

2023 Geological Society of Minnesota *Making Magmas*

2022 Cornell University: Earth Science Seminar *Mid-infrared spectroscopy of basalts applied to rocky exoplanets*

2021 Macalester College: Geology Seminar *Fresh from the oven: Exploring volcanoes with high-temperature experiments*

2021 Cornell University: ANDES Seminar *Experimental constraints on dacite magma storage at Volcán Quizapu, Chile*

2020 Furman University: Earth & Environmental Sciences seminar *Volcanic plumbing systems at Volcán Quizapu (Chile) and beyond*

2020 Brown University: GMP Lunch Bunch Talk *Hidden gems: New petrologic possibilities for the Apollo 17 orange glass magma*

2019 Woods Hole Oceanographic Institute: Geochemistry & Geophysics seminar *Silicate liquid immiscibility in evolved lunar magmas*

2018 Brown University: GMP Lunch Bunch Talk *Silicate liquid immiscibility in evolved lunar magmas: Preliminary experimental findings and relevance to red spots*

2017 Honolulu ARCS Foundation: Pau Hana Talk *Cooking magma*

2017 University of Hawai'i: REU Seminar Series *Between a rock and a hot place*

2013 University of Hawai'i: HIGP Seminar *Methods in the Madness*

2013 University of Hawai'i: Bullard Fellowship Talk *Petrology of martian meteorite Yamato 980459: Mineralogy, crystal morphology, and laboratory experiments*

Service

2026, 2024	Served on a NASA proposal review panel
2025	Served on an NSF proposal review panel
2023–present	Macalester College Entertainment Committee
2019–present	Reviewer for journals including: *JGR Solid Earth; Journal of Petrology; Lithos; Contributions to Mineralogy and Petrology*
2023	Guest Editor of *Elements* Olivine issue
2022, 2019	Dwornik Award judge for LPSC meeting
2021	Lab tour and Q&A session for incoming Cornell University undergraduates from historically underrepresented groups
2020	Brought in a speaker for Diversity Working Group (Brown)
2019	Planned and facilitated departmental visit from a *Nature Communications* editor (Brown University)
2018	Outstanding Student Presenter Award judge for AGU
2018	Proposal reviewer for NSF EAR division
2012–2016	Ran weekly reading/discussion group for VGP (U. Hawai‘i)
2016, 2012	Head of graduate student welcoming committee (U. Hawai‘i)

Outreach and Advocacy

2025	Designed and ran a short course on rocks and minerals for the MMEW (Minnesota Minerals Education Workshop), aimed at K-12 teachers
2018–2021	Coordinator for Science-Teaching and Education Program (Brown)
2021	Skype-a-Scientist with Minnesota middle school science classes
2021	Skype-a-Scientist with New York high school science classes
2021	Skype-a-Scientist with Connecticut and Iowa elementary school classes
2020	Drafted and sent a letter to department higher-ups on behalf of graduate students concerned about infringements on their rights to protest
2020	Helped craft a letter from DEEPS to Brown University re: social justice
2020, 2019	Geosciences Congressional Visit Day (Geo-CVD) / Virtual CVD (2020)
2019, 2018	Skype-a-Scientist with New Jersey 4th grade class

2011–2017	Open House explosive eruptions demonstration for schools and public
2014–2016	Reviewer of mini-grant proposals for K-12 teachers in Hawai‘i
2014–2015	Traveling seismic lab activity at local Hawaii middle schools
2014	Day of mineralogy experiments with local 6th graders
2014	Think Tech Hawaii “Petrological Puzzles” interview hour
2014, 2013	Middle School Research Conference at University of Hawai‘i
2013	Hawaii Ocean Science Bowl volunteer
2012	Ocean and Earth Science Day at University of Hawai‘i
2012	Ocean Science Career Night at Kailua Intermediate School
2010–2011	Outreach Coordinator for Geology Club at University of Georgia
2008–2009	Homework Helpers program volunteer, Clarke County (GA) Libraries
2007–2008	Clarke County (GA) Mentor Program mentor for middle schooler

Professional Society Memberships

AGU	*American Geophysical Union*
GSA	*Geological Society of America*
IAVCEI	*International Association of Volcanology and Chemistry of the Earth’s Interior*
MSA	*Mineralogical Society of America*
NAGT	*National Association of Geoscience Teachers*
SACNAS	*Society for Advancement of Chicanos/Hispanics and Native Americans in Science*

Languages

English	Native speaker
French	Proficient reading, writing, and oral communication