

Emily C. First

Postdoctoral research associate

Department of Earth, Environmental and Planetary Sciences (DEEPS)
Brown University, Providence, RI 02912

Education

- 2017 PhD in Geology & Geophysics, University of Hawai'i at Mānoa
 TITLE: Magmatic environments and timescales: Experimental studies on
 martian basalt and terrestrial dacite. **COMMITTEE:** Julia Hammer (chair),
 Bruce Houghton, Jeff Taylor, Thomas Shea, John Allen
- 2015 M.S.-en-route in Geology & Geophysics, University of Hawai'i at Mānoa
- 2011 B.A. in French, University of Georgia
 B.S. in Geology, University of Georgia
 — *summa cum laude* with highest honors
- 2010 Exchange semester at Institut d'études politiques de Paris (SciencesPo)

Coursework Highlights

- Graduate Theoretical Petrology (Julia Hammer)
- Graduate Explosive Volcanism (Bruce Houghton)
- Graduate Volcanology (Bruce Houghton)
- Graduate Petrology of the Moon and Mars (Jeff Taylor)
- Graduate Hawaiian Geology (John Sinton)
- Graduate Numerical Methods (Robert Dunn)
- Graduate Mechanics of Fluids (John Allen)
- Graduate Geomathematics (Janet Becker)
- Undergraduate Advanced Igneous & Metamorphic Petrology (Mike Roden, Alberto Patiño-Douce)
- Undergraduate Geology Field School (Mike Roden, Doug Crowe)

Academic Positions Held

- 12/2020 accepted **51 Pegasi b Postdoctoral Fellow**
 Cornell University Dept. Earth & Atmospheric Sciences
 Faculty mentor – Esteban Gazel
- 04/2018 – present **Postdoctoral research associate**
 Brown University Dept. Earth, Environ. & Planet. Sciences
 Supervisor – Malcolm Rutherford
 — experimental lab work: TZM, capsule welding, thin section prep
 — analytical work: EDS and WDS spot analyses and imaging (EPMA),

- SIMS volatile analyses, MATLAB modeling
 - data analysis and interpretation
 - manuscript and proposal drafting (writing, editing, preparing figures in Photoshop and Illustrator)

- 10/2018 – present **Coordinator, Science Teaching and Education Program (volunteer)**
Brown University Dept. Earth, Environ. & Planet. Sciences
Program head – Olga Prilipko Huber
 - conceiving, writing, and implementing inquiry-based, quarter-long science modules from scratch for elementary school teachers in Providence, RI with a core group of coordinators
 - grades 2, 3, and 4 finished or in process so far
 - Earth changes over time (gr2); weather and climate (gr3); erosion and natural hazards (gr4)
 - classroom teaching (the first time a lesson is brought to the classroom)
 - teacher support (after lesson has been taught at least once)

- 01/2018 – 02/2018 **Postdoctoral fellow**
University of Hawaii Dept. Geology & Geophysics (now Earth Sciences)
Supervisor – Julia Hammer
 - data analysis and interpretation
 - manuscript drafting (writing, editing, preparing figures in Illustrator)

- 01/2012 – 12/2017 **Research Assistant**
University of Hawaii Dept. Geology & Geophysics (now Earth Sciences)
Supervisor – Julia Hammer
 - experimental lab work: 1-atm gas-mixing furnace (CO₂+H₂), water-medium cold-seal pressure line, thin section preparation, capsule welding
 - analytical work: EDS and WDS spot analyses and maps (on SEM and EPMA), electron backscatter diffraction, MATLAB coding
 - data analysis and interpretation
 - manuscript drafting (writing, editing, preparing figures in Illustrator)

- 08/2011 – 12/2011 **Teaching Assistant**
University of Hawaii Dept. Geology & Geophysics (now Earth Sciences)
Supervisor – Scott Rowland
 - taught 2 sections of introductory Geology lab, including pre-labs, in-class activities, local field trips, developing rubrics, and grading assignments

- 07/2011 – 08/2011 **Teaching Assistant**
University of Georgia Dept. Geology Honors Interdisciplinary Field Program
Supervisor – Paul Schroeder
 - helped teach latter half of an 8-week field program in Geology, Anthropology, and Ecology, while camping across the country, including

- short lectures, grading, aid with field-based research projects
- locations included Mount St. Helens, Medicine Lake, Glacier NP, Dinosaur NM, Valles Caldera, Snake River Plain, Yellowstone
- drove daily and helped manage task rotations

05/2011 – 06/2011 **Teaching Assistant**

University of Georgia Dept. Geology Field School

Supervisor – Doug Crowe

- helped teach 6-week capstone field course for Geology majors, based in Cañon City, CO, including assistance in the field, short lectures, grading maps and written assignments, GIS work
- managed daily scheduling, shopping, driving, assigned tasks, organized week-long field excursions
- in charge of budget, cash, bookkeeping for the group of ~50 people

Additional Teaching and Public Outreach Activities

- 2019 Geosciences Congressional Visit Day (Geo-CVD)
— selected as a Geo-CVD participant to represent AGU on Capitol Hill
— workshop on communication; met with Congressional offices to advocate for STEM education, funding, and bills supporting diversity in science
- 2018 Completed Certificate I course through Sheridan Center at Brown University
— semester-long; prepares early career academics for college teaching
— topics included reflective teaching, inclusive classrooms, backward design
- 2018 Skype-a-Scientist participant for New Jersey 4th grade class
- 2017 Guest lectured for Geology101 class at U. Hawaii
- 2017 Co-leader of GSA Cordilleran section field trip to Kilauea Volcano
— covered historical and active flows, explosive deposits, caldera history
- 2012-2016 Ran a weekly reading/discussion group for Volcanology, Geochemistry & Petrology (VGP) group at U. Hawaii
- 2017,-15, -13, -11 2-day Open House explosive eruptions demonstration for schools and public
- 2014-2016 Reviewer of mini-grant proposals for K-12 teachers in Hawaii
- 2014-2015 Traveling seismic lab activity at local Hawaii middle schools
- 2015 Taught mini-workshop on using the MELTS and alphaMELTS programs
- 2014 Day of mineralogy experiments with local 6th graders
- 2014 Think Tech Hawaii “Petrological Puzzles” interview hour
- 2014, 2013 Middle School Research Conference at U. Hawaii
- 2012 Guest lectured for a week, plus designed and taught an in-class lab on viscosity for Volcanology undergraduate course at U. Hawaii
- 2013 Hawaii Ocean Science Bowl volunteer
- 2012 Ocean and Earth Science Day at U. Hawaii
- 2012 Ocean Science Career Night at Kailua Intermediate School (HI)
- 2010-2011 Outreach Coordinator for Geology Club at U. Georgia

2008-2009 Homework Helpers program volunteer, Clarke County (GA) Libraries
2007-2008 Clarke County (GA) Mentor Program mentor for middle schooler

Additional Field Experience

2017 Research cruise aboard R.V. Kilo Moana; mapping, dredging east of Molokai

2016 Mapped a recent explosive deposit on the rim of Halema'uma'u Crater, Kilauea Volcano, with a group from U. Hawaii and USGS HVO

2016 Field campaign in Maule region of Chile, to sample dacite lava flows of Volcán Quizapu, along with geology of nearby mafic volcanic centers

2014 Participant in Goldschmidt conference field trip around Yosemite National Park – pluton emplacement, recrystallization features, megacryst formation

2011-2014 Volcanology/petrology activities and classwork research in Hawaii – Ko'olau, Wai'anae, Kilauea, West Maui, Haleakala; and New Zealand – Ruapehu, Ngauruhoe, Tongariro, Taupo, White Island

2009 UGA Field School student participant
— Six-week field camp for geology majors, based in Cañon City, CO with trips to Utah and southern Colorado; four mapping projects; GIS short course; other field work in the Uinta and Paradise basins, Great Sand Dunes NP, Summitville Mine Superfund site, Valles caldera

2008 UGA Honors Interdisciplinary Field Program student participant
— Summer program of coursework in geology, anthropology, and ecology while camping across the country; locations include Sapelo Island, Mesa Verde, Crater Lake, Mount St. Helens, Yellowstone, Grand Tetons, Denver ice core lab; activities include geologic mapping, soil coring, assessment of stream remediation, research papers

Honors and Awards

2020 51 Pegasi b Postdoctoral Fellowship

2016 ARCS Honolulu Scholar - Toby Lee award in Geology & Geophysics

2015 U. Hawaii Geology & Geophysics achievement award

2013 ARCS Honolulu Scholar

2011-2013 Fred M. Bullard Graduate Fellowship, U. Hawaii Geology & Geophysics

2011-present Member of Phi Beta Kappa

2011 U. Georgia First Honor Graduate, a distinction for graduates with 4.00 GPA

2011	U. Georgia Honors Program Joy P. Williams Science Award
2011	Undergraduate Student of the Year, U. Georgia Geology
2010	Vernon Hurst Undergraduate Research Award, U. Georgia Geology
2009	Field School Student of the Year, U. Georgia Geology
2007-2011	Honors Program student at U. Georgia
2007-2011	HOPE scholarship, a state of Georgia merit-based scholarship
2007-2011	National Merit Scholarship

Peer-Reviewed Publications

* indicates undergraduate mentee of E. First

First, E., Leonhardi, T.*, Hammer, J. (2020) Effects of superheating magnitude on olivine growth. *Contributions to Mineralogy and Petrology*, 175: 13.

Shea, T., Hammer, J., Hellebrand, E., Mourey, A., Costa, F., **First, E.**, Lynn, K., Melnik, O. (2019) Phosphorous and aluminum zoning in olivine: Contrasting behavior of two nominally incompatible trace elements. *Contributions to Mineralogy and Petrology*, 174: 85.

First, E., Hammer, J. (2016) Igneous cooling history of olivine-phyric shergottite Yamato 980459 constrained by dynamic crystallization experiments. *Meteoritics and Planetary Science*, 51, 1233-1255.

Brachfeld, S., Shah, D., **First, E.**, Hammer, J., Bowles, J. (2015) Influence of redox conditions on the intensity of Mars crustal magnetic anomalies. *Meteoritics and Planetary Science*, 50, 1703-1717.

Shea, T., Hammer, J., **First, E.** (2013) Magma balloons or bombs? *Nature Geoscience*, 6, 802–803.

Conference Abstracts

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

First, E., Rutherford, M. (2018) Phase equilibria and conditions of silicate liquid immiscibility in silicic lunar magmas at mid-lower crustal pressures and various H₂O contents. *AGU 2018*, abstract#P23E-3494. POSTER.

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

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

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.

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

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# GP13A-04. TALK.

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.

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

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.

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.

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

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| 2019 | Geochemistry & Geophysics seminar (Woods Hole Oceanographic Institution): <i>Silicate liquid immiscibility in evolved lunar magmas</i> |
| 2018 | GMP Lunch Bunch Talk (Brown): <i>Silicate liquid immiscibility in evolved lunar magmas: Preliminary experimental findings and relevance to red spots</i> |
| 2017 | ARCS Foundation public pau hana (Honolulu, HI): <i>Cooking magma: Research in the experimental petrology lab and beyond</i> |
| 2017 | REU Seminar Series (U. Hawaii): <i>Between a rock and a hot place: Phase equilibrium experiments on a dacite magma from the southern Andes</i> |
| 2013 | HIGP Seminar (U. Hawaii): <i>Methods in the Madness</i> (experimental/methodological conundrums and study of martian meteorite Y-980459) |
| 2013 | TGIF Bullard Fellowship Talk (U. Hawaii): <i>Petrology of martian meteorite Yamato 980459: Mineralogy, crystal morphology, and laboratory experiments</i> |

Funding

2020 <i>proposed</i>	PI of NASA proposed research “Apollo 17 picritic magmas: New perspectives on crystallization and ascent processes”
2019 awarded	Co-I of NSF grant entitled “Experimental Study of Clinopyroxene Growth and Sector Zoning” (PI Benoit Welsch - \$379,864)
2017 awarded	Lipman Research Award from the GSA (\$2650)
2017 awarded	GSA MGPV Division Student Award (\$2000)
2017 awarded	UH Graduate Student Organization Travel Grant (\$732.40)

Service Activities

2019	Reviewer for <i>Journal of Petrology</i>
2019	Reviewer for <i>JGR: Solid Earth</i>
2019	Dwornik Award judge for LPSC meeting
2018	Outstanding Student Presenter Award judge for AGU Fall Meeting
2018	Proposal reviewer for NSF EAR division
2016, 2012	Head of new graduate student welcoming committee

Professional Society Memberships

2017-present	Internat’l Assoc. of Volcanology and Chem. of the Earth’s Interior (IAVCEI)
2013-present	American Geophysical Union (AGU)
2013-present	Geological Society of America (GSA)
2013-present	Mineralogical Society of America (MSA)

Additional Skills

MATLAB
Adobe Photoshop
Adobe Illustrator
ImageJ
French (proficient reading, writing, and oral communication)