

Emily C. First

Postdoctoral Associate

Department of Earth & Atmospheric Sciences (EAS)
Cornell University - Ithaca, NY

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)

Positions Held

- 12/2020 – present **51 Pegasi b Postdoctoral Fellow**
Cornell University Dept. of Earth & Atmospheric Sciences
Faculty mentor – Esteban Gazel
— spectroscopy and textural analysis of a wide swath of igneous materials, to create a database relevant to exoplanet research
- 04/2018 – 11/2020 **Postdoctoral Research Associate**
Brown University Dept. of 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. of 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. of 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. of 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. of 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. of 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

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

- | | |
|------|---|
| 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> |

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

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)

Additional Teaching and Public Outreach Activities

2020, 2019	Geosciences Congressional Visit Day (Geo-CVD) / Virtual CVD (2020) — 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 4 th 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 6 th 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

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)

Service Activities

2020, 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)