Emma McCully

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Experience

Research Assistant *(Boise State University)* January 2018-Present

- I utilize a broad variety of petrologic tools to investigate the geochemistry of submarine volcanic systems. I'm broadly interested in Mid Ocean Ridge magmatism both on and off-axis.
- I utilize a variety of analytical techniques including EPMA, ICP-MS, TIMS, and FTIR. I also utilize modeling programs to quantify magmatic processes like mixing, crystallization, and partial melting such as MELTS, Petrolog, VolatileCalc. I also create my own models, primarily using Matlab.

Teaching Assistant *(Boise State University)* January 2018 - Present

- Deliver and create labs for 1-2 classes per semester, for classes of 5 to 30 students. Develop lecture materials, grade, provide feedback, and communicate with a diverse student body in a broad variety of subjects. Additional responsibilities have included mentoring both class and research projects.
- Courses taught: Igneous Petrology, Earth Materials, Global Environmental Science, Communications in Earth Science, Climate Change, Introduction to Research Development, (Un)Natural Disasters, and Geoscience and Society. I have also served as the lab coordinator for Global Environmental Science and Physical Geology.
- Guest Lecturer: Geology 101, Geoscience and Society, Curriculum Development
- Curriculum Development: Igneous Petrology, Earth Materials, Geoscience and Society, Curriculum Development

Research Assistant *(Woods Hole Oceanographic Institution)* November 2016 - December 2017

- Analyzed the geomorphology of a chain of off-axis seamounts in the Eastern Equatorial Pacific Ocean. Calculated volumes of seamounts as well as individual eruptive constructs to better understand their eruptive histories and compare them to other known submarine eruptions globally.
- Advised by Dr. Daniel Fornari and presented findings at the International Association of Volcanologists and Chemists of the Earth's Interior meeting (IAVCEI) in 2017 and the AGU fall meeting (2017).

Research Assistant *(Skidmore College)* May 2015 - May 2016

- This undergraduate research project involved benchtop experiments that examined how different size fractions of iron-bearing minerals (i.e pyrite and hematite) were refracted by optical backscattering sensors. The motivation of this work was to develop a method for using in-situ optical backscattering measurements to quantify iron contribution from seafloor hydrothermal vents.
- Method developed under the guidance Dr. Meg Estapa (now UMaine) and was presented at AGU Ocean Sciences, the Skidmore Science Symposium, and orally defended to the department and public.

Education

PhD in Geoscience (Boise State University) August 2020 - Present

I am a PhD candidate in the Department of Geosciences. My main research focus uses petrologic tools to investigate magmatic processes at mid ocean ridges. I use geochemistry and petrologic modeling to investigate geochemical variability at both fast and slow MOR systems. My first chapter investigates mantle heterogeneity and

magmatic plumbing at the slow spreading Mid Atlantic Ridge (14°N). My second chapter uses olivine-hosted melt inclusions to investigate the petrogenesis of an off-axis seamount chain at the fast-spreading EPR (8°20 N). My third chapter focuses on the field of Geoscience education and examines the roles and responsibilities of geoscience graduate teaching assistants from both the faculty and student perspective using a mixed methods approach of both qualitative and quantitative data.

Masters in Geoscience (Boise State University) January 2018 - July 2020

My thesis focused on the geochemical diversity and magma generation and transport at 14°N of the Mid Atlantic Ridge. During this time period I expanded upon my geoscience background (See: relevant coursework) and developed expertise in various analytical and modeling techniques (see: Skills).

BA in Geosciences (Skidmore College) September 2012 - August 2016

Graduated with honors in Geosciences. Senior thesis, "Determining Hydrothermal Vent Composition and Concentration of Iron-Bearing Minerals Using Optical Backscattering Sensors." Received the Roy T Abbott Memorial III award, which is presenting to one graduating Geoscience student who has shown the most growth.

Skills

Laboratory & Field Skills: Electron Microprobe (EPMA) analyses for basaltic glass and melt inclusions. Sample preparation for both laser and solution-based inductively coupled plasma mass spectrometry (ICP-MS) including mount-making, glass chipping, sonicating, and picking. Dissolution process for solution-based ICP-MS. Thermal Ionization Mass Spectrometry (TIMS) for tracer isotopes (prepping samples, dissolution, Pb column chemistry, primary cation separation, loading samples on the turret, and running samples). Fourier Transform Infrared Spectroscopy (FRIR) to analyze volatile content of olivine hosted melt inclusions (double polishing, running FTIR, processing data). Ship-based skills: Experience diving in HOV *Alvin*, preparing and classifying rock samples, dredge deployment and recovery, working with high resolution bathymetry from AUV *Sentry*, classifying geologic and biologic features in deep sea imagery and video, editing multibeam data, XBT deployment, magnetometer deployment and recovery.

Research and Computing Skills: Modeling in programs such as MELTS, Petrolog, and creating models in Matlab. Experience with Matlab, R, GMT, ArcGIS, Fledermaus, GeoMap App, Premiere Pro, Affinity, and all Microsoft Office suites. Professional development (teaching workshops through the CTL).

Relevant Coursework

Graduate: Advanced Igneous Petrology, MOR Processes, Isotopes and Computation, Whole Earth Geochemistry, Radiogenic Isotopes, Computation in the Geosciences, Data Analysis and GeoStatistics, Plate Tectonics, Geoscience Education Seminars, Mantle Plume Seminar, Physics and Chemistry of Mountain Building, Topics in Volcanology- Iceland, Curriculum Development, Continental Lithosphere Seminar, Fluvial

Stratigraphy, Selected Topics in Volcanology, Community Outreach, Exploration of Pedagogy, Race and Racism in Earth and Environmental Science, Technical Writing Seminar

Undergraduate: Earth Systems Science, Oceanography, Hydrogeology, Climatology, Paleoclimatology, Biology, Chemistry, Geomorphology, Plate Tectonics, Calculus I, Calculus II, Earth Materials, Sedimentology, Biogeochemical Cycles, Coastal Oceanography, Remote Sensing

Publications, Presentations, and Invited Talks

- Earth Educators' Rendezvous (NAGT) (2024) "The roles and responsibilities of graduate teaching assistants: a mixed-method study of faculty and teaching assistant perspectives"
- Invited lecture: Geology 101 (BSU)- "Volcanoes and Eruption Styles" (2024)
- AGU Fall Meeting (2023) "Using olivine-hosted melt inclusions to investigate the magmatic plumbing system at the 8°20'N Seamount Chain"
- Invited lecture: Geoscience and Society (BSU)- "Earth's Radiation Budget" (2023)
- Invited lecture: TA Development class (BSU)- "Accessibility and Equity in Fieldwork" (2022)
- AGU Fall Meeting (2022) "Examining Variability Along a Single Segment of the Mid-Atlantic Ridge at 14°N Using Geochemistry, Petrologic Modeling, & Cluster Analysis"
- AGU Fall Meeting (2020) "Magma Transport Along a Single Slow-Spreading Segment of the Mid-Atlantic Ridge at 14°N"
- AGU Fall Meeting (2019) "Geochemical Diversity Along a Segment of the MAR 14°N: Insights into Magma Transport"
- Invited Talk: Skidmore College First Year Seminar "Explorations of the Seafloor" and Alumni STEM Panel for incoming students (2019)
- Boise State Graduate Showcase (2019) "Investigating Geochemical Diversity Along a Slow-Spreading Axis: Mid-Atlantic Ridge 14°N"
- Anderson, M., Wanless, V. D., Schwartz, D. M., **McCully, E.,** Fornari, D. J., Jones, M. R., & Soule, S. A. (2018). Submarine deep-water lava flows at the base of the western Galápagos Platform. Geochemistry, Geophysics, Geosystems, 19, 3945–3961. https://doi.org/10.1029/2018GC007632
- AGU Fall Meeting (2018) "Investigating Geochemical Diversity Along a Slow-Spreading Axis: Insights into the Popping Rocks Region"
- Boise State Graduate Showcase (2018) "Geomorphological Analyses of the 8°20'N Seamount Chain: Studies of Off-Axis Volcanism"
- AGU Fall Meeting (2017) "Geomorphological Analyses of the 8°20'N Seamount Chain: Studies of Off-Axis Volcanism"
- Invited talk: Wolf Conservation Center (South Salem, NY)- "Under the Sea. Conservation from the Ocean Floor to the Shore" (2017)
- IAVCEI (2017) "Geomorphological and Geochemical Analyses of the 8°20'N Seamount Chain: Studies of Off-Axis Volcanism"
- AGU Ocean Sciences Meeting (2016) "Determining Hydrothermal Vent Composition and Concentration of Iron-Bearing Minerals Using Optical Backscattering Sensors"
- Skidmore College Science Symposium (2016) "Determining Hydrothermal Vent Composition and Concentration of Iron-Bearing Minerals Using Optical Backscattering Sensors"

Awards & Grants

Academic Career Preparation Award: 2024 (NAGT, National Association of Geoscience Teachers)
Geosciences Graduate Student Conference Travel: 2023 (BSU)
Outstanding Teaching Assistant Award: 2023 (NAGT)
Will and Rose Burnham Research Grant: 2023 (BSU)
Geosciences Graduate Student Conference Travel: 2022 (BSU)
Will and Rose Burnham Research Grant: 2022 (BSU)
Outstanding Graduate Student Award: 2022 (BSU)
Roy T Abbott Memorial III Award: 2016 (Skidmore College)
Student Conference Travel Fund: 2015 (Skidmore College)

Teaching Experience

TA: Earth Materials, Igneous and Metamorphic Petrology, Geosciences 101, Geoscience & Society, Communications in Earth Science, (Un)Natural Disasters, Climate Change, and Introduction to Research Development

Guest Lecture: Geology 101, Geoscience and Society, Curriculum Development

Curriculum Development: Igneous Petrology, Earth Materials, Geoscience and Society

Undergraduate research project mentoring: Genesee Lucia, Courtney Rundhaug (PhD, University of Copenhagen), Alex Schweitzer (MS, Miami University)

Workshops, Panels, & Professional Development

2024

- NAGT Preparing for an Academic Career Workshop (Participant)
- EPMA Webinar: Acquiring accurate X-Ray Data on Probe for EPMA (Participant)
- Classroom Observation Protocol for Undergraduate STEM (COPUS) (Conducted weekly classroom observations for Geology 101)
- Accessibility and Inclusivity in Open Educational Resources (Participant)

2023

- NAGT Research Design Mentoring Panel (Participant)
- IAVCEI Committee for Submarine Volcanism: Early Career Research Symposium (Organizer)

2022

- NSF GeoPrisms Volatiles: Source to Surface Workshop (Participant)

- UNAVCO short course: Coaching your TAs to use effective teaching strategies in introductory earth sciences course. Emphasis on InTegrate and GETSI modules (Panelist)
- IAVCEI Committee for Submarine Volcanism: Early Career Research Symposium (Organizer)
- AERA Webinar: Qualitative methods (Participant)

2019

- Deep Submergence Facility: New Users workshop (Participant)
- Boise State Geosciences TA orientation panel: teaching lab courses (Panelist)
- Skidmore College Alumni Panel: majoring in STEM (Panelist)