Michelle Muth

Smithsonian Institution
National Museum of Natural History
Department of Mineral Sciences
100 Madison Ave., Washington DC 20560
Phone: 215 206 3605 Email: muthm@si.edu

EDUCATION

2021	*Ph.D. Earth Science*, University of Oregon, Eugene, OR Research advisor: Paul Wallace Thesis: Sulfur Cycling in the Southern Cascade Arc: Implications for the Sulfur Content, Metal Content, and Oxidation State of Arc Magmas
2015	*B.S. Earth Science*, Rice University, Houston, TX Research advisor: Rajdeep Dasgupta Distinction in Research and Creative Work Thesis: The effect of variable Na/K on CO_2 solubility in slab-derived rhyolitic melts

PROFESSIONAL EXPERIENCE

2021- present	*Peter Buck Postdoctoral Fellow*, Smithsonian National Museum of Natural History
2016- 2021	*Graduate Researcher*, University of Oregon
2020	*GRIP Fellow,* Smithsonian National Museum of Natural History
2019	*Lead Instructor*, Sternberg Museum of Natural History Science Camps
2015- 2016	*Geoscientist*, AECOM, Philadelphia Area Remediation Services Group
2013- 2015	*Undergraduate Researcher*, Rice University Experimental Petrology Group
2013	*NSF-REU Intern*, University of Minnesota Institute for Rock Magnetism

PUBLICATIONS

In Preparation	**Muth, M.J.,** Wallace, P.J. The influence of slab-derived sulfur on the metal contents of magmas in the southern Cascade arc. *Journal of Petrology.*
In Preparation	**Muth, M.J.,** Rasumussen, D. J., Wallace, P.J., Andrys, J., Plank, T., Cottrell, E., in prep. Best practices for measurings sulfur in silicate glasses via EPMA. *American Mineralogist.*

Submitted	**Muth, M.J.,** Wallace, P.J. Sulfur recycling in subduction zones and the oxygen fugacity of mafic arc magmas. *Earth and Planetary Science Letters.*
2021	Lerner, A.H., **Muth, M.J.,** Wallace, P.J., Lanzirotti, A., Newville, M., Gaetani, G. A., Chowdhury, P., Dasgupta, R. Improving the reliability of Fe- and S-XANES measurements in silicate glasses: correcting beam damage and identifying Fe-oxide nanolites in hydrous and anhydrous melt inclusions. *Chemical Geology.*
2021	**Muth, M.J.**, Wallace, P. J. Slab-derived sulfate generates oxidized basaltic magmas in the southern Cascade arc (California, USA). *Geology.*
2021	Rose-Koga, E.F., Bouvier, A.-S., Gaetani, G.A., Wallace, P.J., Allison, C.M., Andrys, J.A., Angeles de la Torre, C.A., Barth, A., Bodnar, R.J., Bracco Gartner, A.J.J., Butters, D., Castillejo, A., Chilson-Parks, B., Choudhary, B.R., Cluzel, N., Cole, M., Cottrell, E., Daly, A., Danyushevsky, L.V., DeVitre, C.L., Drignon, M.J., France, L., Gaborieau, M., Garcia, M.O. , Gatti, E., Genske, F.S., Hartley, M.E., Hughes, E.C., Iveson, A.A., Johnson, E.R., Jones, M., Kagoshima, T., Katzir, Y., Kawaguchi, M., Kawamoto, T., Kelley, K.A., Koornneef, J.M., Kurz, M.D., Laubier, M., Layne, G.D., Lerner, A., Lin, K.-Y., Liu, P.-P., Lorenzo-Merino, A., Luciani, N., Magalhães, N., Marschall, H.R., Michael, P.J., Monteleone, B.D., Moore, L.R., Moussallam, Y., **Muth, M.,** Myers, M.L., Narváez, D.F., Navon, O., Newcombe, M.E., Nichols, A.R.L., Nielsen, R.L., Pamukcu, A., Plank, T., Rasmussen, D.J., Roberge, J., Schiavi, F., Schwartz D., Shimizu, K., Shimizu, K., Shimizu, N., Thomas, J.B., Thompson, G.T., Tucker, J.M., Ustunisik, G., Waelkens, C., Zhang, Y., Zhou, T. Silicate melt inclusions in the new millennium: A review of recommended practices for preparation, analysis, and data presentation. *Chemical Geology*, 570, 120145.
2020	**Muth, M.**, Duncan M. S., Dasgupta, R. The Effect of Variable Na/K on CO_2 Solubility in Slab-Derived Rhyolitic Melts. *Carbon in Earth's Interior AGU Monograph,* 195-208*.*
2014	Frahm, E., Feinberg, J. M., Schmidt-Magee, B. A., Wilkinson, K., Gasparyan, B., Yeritsyan, B., Karapetian, S., Meliksetian, K., **Muth, M.,** and Adler D. S. Sourcing geochemically identical obsidian: multiscalar magnetic variations in the Gutansar volcanic complex and implications for Palaeolithic research in Armenia, *Journal of Archaeological Science,* 47, 164-178.

GRANTS AND FELLOWSHIPS

2021	User Beamtime Award*, Argonne National Laboratory*
2020	Graduate Research Intern Program Award, *National Science Foundation*
2019	User Beamtime Award, *Argonne National Laboratory*
2018	Graduate Research Fellowship, *National Science Foundation*

2016	First Year Graduate Student Fellowship, *University of Oregon*

HONORS

2021	Research Recognition Award, *University of Oregon*
2021	Smith Scholarship, *University of Oregon*
2019	Warren DuPre Smith Research Award, *University of Oregon*
2018	Geology Emeritus Research Award, *University of Oregon*
2015	Torkild Rieber Award in Earth Science, *Rice University*
2013	Eugen Merten Memorial Prize in Geology and Geophysics, *Rice University*
2013	Chevron Earth Science Minority Scholarship, *Rice University*

INVITED SEMINAR PRESENTATIONS

2021	University of Pittsburgh
2020	Carnegie Science Earth and Planets Laboratory
2020	Smithsonian National Museum of Natural History, Dept. of Mineral Sciences
2020	International Volcanology Seminar *(Collaborative Virtual Seminar Series)*

CONFERENCE PRESENTATIONS

2021	**Muth, M.**, Wallace, P.J. The Influence of Slab-Derived Sulfur on the Metal Contents of Arc Magmas in the Southern Cascades. *AGU 2021 Fall Meeting, New Orleans, 13-17 December.*
2021	**Muth, M.**, Wallace, P.J. Slab-Derived Sulfate and Oxidized Magmas in the Southern Cascade Arc. *AGU 2021 Fall Meeting, New Orleans, 13-17 December.*
2020	**Muth, M.**, Wallace, P.J. Insights into global sulfur cycling from the melt inclusion record. *AGU 2020 Fall Meeting, Virtual, 1-17 December.* **(*invited*).**
2020	**Muth, M.**, Wallace, P.J. The influence of slab-derived sulfur on the sulfur content and oxidation state of arc magmas in the Southern Cascades. *AGU 2020 Fall Meeting, Virtual, 1-17 December.*
2020	Lerner, A., **Muth, M.**, Wallace, P. J., Lanzirotti A., Newville, M., Gaetani, G., Chowdhury, P., Dasgupta, R. Correcting Fe- and S-XANES Beam Damage and

Recognizing Rapid Redox Equilibration of Olivine-Hosted Melt Inclusions. *Goldschmidt Conference, Virtual, 21-26 June.*

2020 **Muth, M.**, Wallace, P. J. Tracking Slab-Derived Sulfur and its Effect on Magma Oxidation State in the Southern Cascades. *Goldschmidt Conference, Virtual, 21-26 June.*

2019 **Muth, M.**, Wallace, P. J., Gaetani, G. A. Drawing connections between slab-derived sulfur, mantle melting, and arc magma oxidation state: A case study in the southern Cascades. *AGU 2019 Fall Meeting, Washington D. C., 9-13 December.*

2019 **Muth, M.,** Wallace, P. J. How does slab-derived sulfur affect magma redox in the southern Cascades? Insights from the melt inclusion record. *Cordilleran Section-115th Annual Meeting, 15-17 May.*

2018 **Muth, M.**, Wallace, P. J. Insights into Arc Magma Volatile Cycling and Oxidation State from Global Sulfur Trends. *AGU 2018 Fall Meeting, Washington D. C., 10-14 December.*

2017 **Muth, M.**, Wallace, P. J., Walowski, K. J. The Role of Hydrous Slab Melts in the Sulfur Content, Metal Content, and Oxidation State of Primitive Arc Magmas in the Southern Cascades. *AGU 2017 Fall Meeting, New Orleans, LA.*

2017 Harvey, K. M., Perry-Houts J., Domino J., **Muth M**., Carruthers S., Kotowski A. J., DeGrandpre K., Faul, U., Kent, A. J., Abers, G. A., Krawczynksi, M. The ins and outs of mélange diapirs: a multidisciplinary approach to formation, ascent, and observation. *AGU 2017 Fall Meeting, New Orleans, LA, 11-15 December.*

2014 **Muth, M.**, Duncan, M. S., Dasgupta, R. Effect of variable Na/K ratio on CO_2 solubility in slab-derived rhyolitic melts- An experimental study. *AGU 2014 Fall Meeting, San Francisco, CA, 15-19 December.*

FIELD EXPERIENCE

2019 *Lassen Volcanic Area, CA*
Field sampling of tephra deposits with high school students during a two-week volcanology field course.

2018 *Trinity Ophiolite, CA*
Field trip with the University of Delaware Mantle Processes group for 3 days in the Trinity Ophiolite.

2018 *Santorini, Greece*
Field trip focusing on the volcanic deposits on the island of Santorini and deformation structures associated with the neotectonics of the surrounding region.

2017	*Lassen Volcanic Area, CA* Sample collection of tephra deposits at selected cinder cones, targeting deposits likely to contain rapidly quenched primitive melt inclusions.
2017	*Long Valley Caldera, CA* Sample collection of inter-layered ignimbrite and fall deposits.

TEACHING EXPERIENCE

2019	*Lead Instructor, Fort Hays State University Museum of Natural History* Designed the curriculum for a newly introduced two-week field volcanology course for high school summer course in the Pacific Northwest. Lead instructor for the field course, assisted by an undergraduate student TA.
2017-2018	*Teaching Assistant, University of Oregon* GEOL 202: Earth Surface and Environment Primary responsibilities included facilitating lab section activities, grading lab section homework assignments and quizzes. GEOL 331: Mineralogy Primary responsibilities included teaching and facilitating lab section, grading, and designing laboratory section midterm and final exams.

RESEARCH TECHNIQUES

Fourier Transform Infrared Spectroscopy (FTIR)
Electron Microprobe (EPMA)
X-Ray Absorption Near Edge Structure (XANES)
Laser Ablation ICP-MS
Secondary Ion Mass Spectrometry (SIMS)
End-loaded Piston Cylinder Apparatus
MATLAB, Python
Melt inclusion preparation and analysis

PROFESSIONAL ACTIVITIES

2019	GeoPrisms Synthesis and Integration Theoretical and Experimental Institute *San Antonio, TX*
2018	Thermodynamic modeling with alphaMELTS and other MELTS software Workshop *Caltech, CA*
2018	Annual Workshop in Secondary Ion Mass Spectrometry *University of Arizona, AZ*
2018	Mineral-Hosted Melt Inclusions Workshop

Woods Hole Oceanographic Institution, MA

2017 CIDER (Cooperative Institute for Dynamic Earth Research) Summer Program
University of California Berkeley, CA
Participated in collaborative research effort: "The ins and outs of mélange diapirs: a multidisciplinary approach to formation, ascent, and observation". Presented results at 2017 AGU Fall meeting.

OUTREACH ACTIVITIES

2020 *"Expert Is In", Smithsonian National Museum of Natural History*
Led a 2-hour interactive public discussion on museum floor around the theme "The Many Faces of Sulfur".

2016-2019 *"Mad Duck" Science Outreach Program, University of Oregon*
Organized and lead several 4-hour long science outreach modules for local middle school students through NSF-funded 'Mad Duck' program. Facilitated module design collaborations between Mad Duck and other graduate student organizations. Module design for Oregon paleontology is still in use.

PROFESSIONAL SERVICE

2020 *Session Convener, AGU Fall Meeting*
"Constraining Petrological and Geochemical Variations in Magmas to Capture the Evolution of Volcanoes over Space and Time"

2019 *Session Convener, Cordilleran Section GSA Annual Meeting*
"Crystal Windows into Igneous Processes"

2017-2021 *Board Member, CMiS (Community for Minorities in STEM)*
University of Oregon
UO CMiS is a graduate student organization dedicated to helping minority graduate students in STEM succeed through professional workshops, social and networking events, and community building activities. Elected Social and Outreach Chair 2017-2018, Seminar Chair 2018-2019 and Vice President 2019-2021.

2018-2021 *Organizing Team, IgDEAS (Inclusivity and Gender Diversity in Earth and Atmospheric Science)*
University of Oregon
The mission of IgDEAS is to provide geoscience-specific professional and social support to women and non-binary researchers and students at the University of Oregon. Co-founded in 2018.

Volunteer Reviewer for manuscript contributions to *Geology, American Mineralogist*