

Martin A. Harris

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Research Interests

I study the physical properties of lava, focusing on how lava viscosity evolves during effusive eruptions as a function of phase proportions (crystals and bubbles), temperature, and oxygen fugacity. My approach combines laboratory experiments on remelted lavas with in situ field measurements of active flows made with custom built field instruments.

My expertise spans physical and petrochemical volcanology, volcanic mapping, and forensic analysis of pyroclastic, phreatic, and effusive deposits. I am experienced in identifying glaciovolcanic landforms and integrating major, minor, and isotope geochemical data for petrologic sourcing. I also am experienced with applying radiometric geochronology and paleomagnetic data to constrain eruption timescales and deposit ages.

Education

Ph.D. in Geological Sciences, University at Buffalo — 2025

Dissertation: The Multiphase Rheology of Natural Lava

Advisors: Dr. Stephan Kolzenburg; Dr. Oryaelle Chevrel (*Université Clermont Auvergne*)

M.Sc. in Geological Sciences, University of British Columbia — 2021

Thesis: Physical and Chemical Evolution of Cracked Mountain Glaciovolcano, SW British Columbia

Advisor: Dr. James Kelly Russell

B.S. (Honors) in Geological Sciences, University of Oregon — 2017

Thesis: Late-Miocene to Early-Pleistocene Volcanism in the Parker Mountain Quadrangle, Southern Oregon

Advisors: Dr. Paul Wallace; Dr. Jad D’Allura (*Emeritus-Southern Oregon University*)

Study Abroad: Geoscience in the Himalaya, Nepal (School for International Training) — Summer 2016

Fellowships & Awards (~US \$40,200 total)

- Presidential Fellowship, University at Buffalo (\$30,000), 2022–2025
- Student Academic Excellence Showcase, University at Buffalo, 2025

- Solène Pouget Memorial Award for Scientific Contributions to Society, 2024 & 2025
 - Department of Geology Award, University at Buffalo (\$2,000)
 - Jack Kleinman Memorial Grant for Volcano Research (\$5,000), 2024
 - Center for Geological & Climate Hazards Award (\$2,500), 2023
 - Walter Youngquist Fellowship Award, University of Oregon (\$700), 2016
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Appointments & Positions

- Postdoctoral Research Associate, University at Buffalo (2025–Present)
 - Invited Graduate Student Researcher, Hawaiian Volcano Observatory (2024)
 - Invited Graduate Student Researcher, Observatoire Volcanologique du Piton de la Fournaise (2024)
 - Graduate Research Assistant, University at Buffalo (2023–2025)
 - Graduate Teaching Assistant, University at Buffalo (2022–2023)
 - Graduate Teaching Assistant, University of British Columbia (2019–2021)
 - GIS & Field Research Assistant, Natural Resources Canada (2019–2021)
 - Research Assistant, Dartmouth College (2019)
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PEER-REVIEWED PUBLICATIONS

Under Review

Harris, M.A., Kolzenburg, S., & Chevrel, M.O. (2025). *The viscosity of multiphase lava: New insights from integrating laboratory and field measurements*. *Earth and Planetary Science Letters* (under review).

Saucier, É., **Harris, M.A.**, & Kolzenburg, S. (2025). *Shear induced permeability heterogeneity of dome lavas: A mechanism for cyclic explosive gas venting*. *Geophysical Research Letters* (under review).

Published

Harris, M.A., Chevrel, M.O., Parsons, J.T., Latchimy, T., Thordarson, T., Höskuldsson, A., Moreland, W.M., Payet–Clerc, M., & Kolzenburg, S. (2024). Real-time, *in situ* viscosity mapping of active lava. *Geology*, 53(2), 181–185. <https://doi.org/10.1130/G52558.1>

Harris, M.A., Kolzenburg, S., Sonder, I., & Chevrel, M.O. (2024). A new portable penetrometer for measuring the viscosity of active lava. *Review of Scientific Instruments*. <https://doi.org/10.1063/5.0206776>

Chevrel, M.O., Latchimy, T., Batier, L., Delpoux, R., **Harris, M.A.**, & Kolzenburg, S. (2023). A new portable field rotational viscometer for high-temperature melts. *Review of Scientific Instruments*, 94. <https://doi.org/10.1063/5.0160247>

Harris, M.A., Russell, J.K., Wilson, A., & Jicha, B. (2023). A 500 ka record of volcanism and paleoenvironment in the northern Garibaldi Volcanic Belt, British Columbia. *Canadian Journal of Earth Sciences*, 60(4), 401–421. <https://doi.org/10.1139/cjes-2022-0101>

Harris, M.A., & Russell, J.K. (2022). Polymagmatic glaciovolcanism: Cracked Mountain Tuya, Canadian Cascades. *Frontiers in Earth Science*, 10. <https://doi.org/10.3389/feart.2022.859794>

Harris, M.A., Russell, J.K., Barendregt, R., Porritt, L.A., & Wilson, A. (2022). Explosive glaciovolcanism at Cracked Mountain Volcano, Garibaldi Volcanic Belt, Canada. *Journal of Volcanology and Geothermal Research*, 423.

OTHER PUBLICATIONS

Wilson, A.M., Russell, J.K., & **Harris, M.A.** (2024). Glaciovolcanism in the Garibaldi volcanic belt: Nine geological maps from southwestern British Columbia, Canada. *British Columbia Ministry of Mining and Critical Minerals, British Columbia Geological Survey Open File 2024-10*, 64 p.

Harris, M.A., Russell, J.K., Muhammad, M., & Williams-Jones, G. (2022). Mount Meager volcanic complex, Garibaldi Volcanic Belt, British Columbia: Expanded bedrock map including Cracked Mountain, north Lillooet Ridge, and west Mount Meager. *Geological Survey of Canada, Open File 8881*, 1 Sheet. <https://doi.org/10.4095/329886>

Harris, M.A., & Russell, J.K. (2021). Bedrock mapping results for the Mount Meager geothermal research initiative. *Geoscience BC*, 7–34.

Harris, M.A., Muhammad, M., Williams-Jones, G., & Russell, J.K. (2020). Bedrock mapping for Mount Meager Geothermal Research Initiative, Garibaldi Geothermal Energy Project, Mount Meager 2019 - Field Report. *Geoscience BC*, 2, 1–29.

Conference Proceedings

Harris, M.A., Kolzenburg, S., Chevrel, M.O. (2025). TM7: New Advancements in Techniques for Investigating Lava Rheology. Session: Techniques and Methods: Rheometry, Tribometry, Spectroscopy and Microscopy, Society of Rheology. **(Invited)**

Kolzenburg, S., **Harris, M.A.,** Chevrel, M.O. (2025). A new generation of field rheometers and their potential for improving near real-time lava flow monitoring and hazard assessment. *Volcanology in Practice*.

Harris, M.A., Chevrel, M.O., Kolzenburg, S. (2024). In-situ parameterization of the pāhoehoe-‘ā‘ā transition of the 2023 Litli Hrófur lavas, Iceland. AGU Fall Meeting Abstracts, V51C-309.

Saucier, E., Kolzenburg, S., **Harris, M.A.** (2024). Permeability anisotropy of dome lavas constrained by in-situ field measurements. AGU Fall Meeting Abstracts, V13E-3309.

Kolzenburg, S., **Harris, M.A.**, Chevrel, M.O. (2024). The effect of oxygen fugacity on the rheology and texture of basaltic melts at thermal equilibrium. AGU Fall Meeting Abstracts, V51C-3096.

Harris, M.A., Kolzenburg, S., Chevrel, M.O., Parsons, J.T., Sonder, I. (2023). A new portable penetrometer for measuring the viscosity of active lava. Geological Society of America Abstracts with Programs, Vol. 55. <https://doi.org/10.1130/abs/2023AM-393560>.

Harris, M.A., Russell, K., Wilson, A., Jicha, B. (2022). A 500 ka record of glaciovolcanism in the Mount Meager volcanic complex, northern Garibaldi Volcanic Belt, Canada. AGU Fall Meeting Abstracts, A15H-1328.

Harris, M.A., Russell, J.K. (2021). The magmatic origins for Cracked Mountain, SW British Columbia: Evidence for cryptic tapping of two magma chambers during a monogenetic eruption. American Geophysical Union, Fall Meeting, V31A-05.

Harris, M.A., Russell, J.K., Barendregt, R., Porritt, L.A., Wilson, A.M. (2021). Explosive glaciovolcanism at Cracked Mountain Volcano, Canada. Geological Association of Canada, Special Session 19 Volcanism.

Research Experience

Experimental Volcanology & Petrology Laboratory (LAVAPUB), University at Buffalo (2022–Present)

- Designed and calibrated portable field rheometers, developed custom software and electronics
- Deployed field rheometers to active eruptions and conducted *in-situ* measurements of lava viscosity
- Synthesized volcanic glass in high-temperature furnaces; prepared drill cores and polished sections
- Measured silicate melt viscosity under varying thermal conditions; operated concentric-cylinder and micropenetration viscometers
- Used scanning electron microscopy and software to conduct petrographic analyses
- Synthesized data into informative graphics and authored peer-reviewed publications

Volcanology & Petrology Laboratory, University of British Columbia (2019–2022)

- Led field campaigns, collected samples, generated regional bedrock maps, and used GIS to generate digital maps of the geology
- Prepared thin sections and prepared rocks for geochemical and geochronological analyses

- Conducted petrographic microscopy, electron microprobe work
- Synthesized data into informative graphics and authored peer-reviewed publications

Radiogenic Isotope Geochemistry Lab, Dartmouth College (2019)

- Learned clean-lab procedures; prepared standards and sample blanks for Thermal Ionization Mass Spectrometry (TIMS) analysis

Teaching Experience

University at Buffalo

- *Geology for Engineers (GLY 103, 2023)*: Designed exercises and quizzes, managed Canvas platform, graded assignments, and held office hours
- *Earth Materials (GLY 205, 2022)*: Conducted mineral identification labs, set up materials, graded, managed Blackboard platform, held office hours

University of British Columbia

- *Introduction to Field Methods (EOSC 223, 2020–2021)*: Supervised mapping labs, managed Canvas grading and assignments
- *Structural Geology (EOSC 323, 2019–2021)*: Led labs on structural techniques; facilitated grading and course administration

Petpittayakom School, Thailand (2017–2018)

- Taught English conversation and Earth, Environmental, Biological, and Health sciences to grades 6–12
- Created lesson plans, weekly assignments, quizzes, exams, and graded all coursework

Field Skills

- Experience working around active lava: measuring viscosity, temperature, and collecting molten samples
 - Proficient with protective gear, gas sensors, and field safety protocols
 - Advanced geological mapping in rugged terrain with GPS, field drills, stratigraphic profiling, and permeability measurements in situ
 - Helicopter-supported wilderness campaigns: field camp setup, cooking, bear safety
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Laboratory Skills

- Expertise in high-temperature melting, glass synthesis, and sample processing (cores, thin sections, polished sections)
 - Electrical engineering for microcontroller sensors and single-board computers (Raspberry Pi)
 - Petrographic analysis of minerals and vesicles; compositional analyses
 - Proficient in GIS mapping, SEM, and electron microprobe operation
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Software Skills

- **ArcGIS:** Geological mapping and spatial interpolation
- **MATLAB:** Figure creation, statistical and petrochemical modeling
- **Python (including CircuitPython):** Data analysis, visualization, microcontroller programming
- **ImageJ:** Textural and image analyses
- **Microsoft Office:** Word, Excel, PowerPoint for data management and presentations
- **Adobe Creative Suite:** Illustrator, Photoshop for figure production and visual communication