

## Martin A. Harris

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### Research Interests

I study the physical properties of lava, focusing on rheology—how viscosity evolves during effusive eruptions based on phase proportions (crystals, bubbles), temperature, and oxygen fugacity. I combine laboratory experiments on remelted lava and in-situ field measurements of active flows. My expertise includes physical and petrochemical volcanology, volcanic mapping, forensic analysis of pyroclastic, phreatic, and effusive deposits, and identifying glaciovulcanic landforms. I also have experience using major, minor, and isotope geochemistry for petrological sourcing, and in geochronology and paleomagnetism to determine eruption timescales.

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### Education

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

*Dissertation:* The Multiphase Rheology of Natural Lava

*Advisors:* Dr. Stephan Kolzenburg; Dr. Oryaelle Chevrel

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

*Thesis:* Physical and Chemical Evolution of Cracked Mountain Glaciovulcano, 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. Jad D’Allura; Dr. Paul Wallace

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

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### 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. (2022). 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.

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## 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.

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## 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 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.

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## 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
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## **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
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## **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