

EDUCATION

University of Washington Seattle, WA
Ph.D., Geomicrobiology 2008 – 2014

University of Rochester Rochester, NY
B.S. Environmental Science, Minor in Chemistry 2004 – 2008

**RESEARCH &
TECHNICAL
POSITIONS**

Desert Research Institute, Reno Reno, NV
Postdoctoral Researcher June 2017 – **Present**

- Nanomotion detection research and development on prototype technology for life detection applications

University of Nevada, Las Vegas Las Vegas, NV
Postdoctoral Researcher, Microbe-mineral interactions Jan 2016 – May 2017

- Snow algae – microbe – mineral investigations with special focus on the ability for snow microbiome to extract and utilize mineral-bound iron.

Green Power Institute Denver, CO / Berkeley, CA
Scientist Contractor 2005 – 2008, July 2015 – May 2017

- Review and evaluate rulemaking proceedings for electric utility compliance with CA GHG reduction and renewable energy integration goals
- Identify loopholes in rulemaking process

Montana State University Bozeman, MT
Postdoctoral Researcher 2014 – 2015

- Conducted laboratory and field-based investigations of biogeochemical and geochemical processes occurring in subglacial, microbe-water-rock systems
- Wrote successful funding applications for metagenomic analyses
- Conducted and lead remote fieldwork in Alberta, Canada, the Beartooth Mts. and on Mt Rainier

University of Washington Seattle, WA
Research Assistant/Fellow 2010 – 2014

- Laboratory and field based studies of microbe-mineral systems
- Developed thermodynamic and chemical models to describe surface reactivity (i.e. adsorption), chemical speciation and mineral dissolution rate
- Remote fieldwork in Greenland, researching subglacial geomicrobiology
- Wrote successful grant and fellowship applications including NSF Graduate Research Fellowship and ATR-FTIR purchase award

University of Rochester Rochester, NY
Technical Lab Assistant 2005 – 2008

- Researched trace metal loads and sources in water, soil and bone
- Operated and maintained an ICP-MS and rare gas mass spectrometer

US Forest Service/GSA Geo corps Durango, CO
Field Hydrologist Intern May – Aug. 2008

- Surveyed spring locations and flow specifications for USFS water rights claims
- Experience with landscape interpretation and remote off-trail navigation

**TEACHING
POSITIONS**

Montana State University	Bozeman, MT
Research Mentor	2014 – 2015
<ul style="list-style-type: none">• Directed 3 students in safe and successful laboratory research.• Developed written laboratory procedures	
University of Washington	Seattle, WA
Research Mentor	2009-2014
<ul style="list-style-type: none">• Directed 12 students in safe and successful laboratory research, including data collection, interpretation and dissemination• Developed written laboratory procedures	
University of Washington	Seattle, WA
Teaching Assistant	2008-2010, Fall 2013
<ul style="list-style-type: none">• Developed materials and guided laboratories for three courses: <i>Intro. to Geology</i>, <i>Minerals and Gems</i>, and <i>Geomicrobiology</i>	
Colorado College	Colorado Springs, CO
Teaching Fellow	Winter 2012
<ul style="list-style-type: none">• Co-taught <i>Human Impacts on Biogeochemical Cycles</i>• Developed new course materials and guided learning through lectures, discussions, and critical thinking	
University of Rochester	Rochester, NY
Teaching Assistant	Spring 2006, Fall 2007
<ul style="list-style-type: none">• Guided review session and office hours for <i>Chemistry of Global Change</i> and <i>Introduction to Environmental Science</i>	

**FUNDING,
FELLOWSHIPS
& AWARDS**

Nevada Space Grant Consortium Informal Education Program (\$ 22,300)	2016
Nevada Space Grant Consortium Curriculum Development (\$ 45,000)	2016
National Center for Genome Resources award for metagenomics (\$ 11,500)	2014
UW Student Tech Fund Award for an ATR-FTIR (UW, \$ 42,879)	2013
David A. Johnston Award for Research Excellence (UW, \$ 5,000)	2013
Inquisitive Student Support Fund (UW, \$ 1,000)	2012
Colorado College Co-teaching Fellow	2012
Exxon Mobile Research Award, (UW, \$ 1,000)	2011
Dorothy G. Stephens Graduate Research Award (UW, \$ 2,125)	2009
NSF Graduate Research Fellow	2009
UW Top Scholar Award and Scholarship	2008
Honor Society for Earth Scientists, Zeta Phi chapter of the Sigma Gamma Epsilon	2008
Graduated with High Distinction and High Honors in Research in Environmental Science at the University of Rochester, Rochester, NY	2008

PUBLICATIONS

- Harrold, Z. R.**, Skidmore, M.L., Hamilton, T.L., Amada, K, Roden, E.E., and Boyd, E.S. (2016) Aerobic and Anaerobic Thiosulfate Oxidation by a Cold-Adapted Chemoautotroph. *Applied and Environmental Microbiology*
- Harrold, Z.** and Gorman-Lewis, D. (*In Prep*) Microbially enhanced forsterite dissolution through non-metabolic surface reactivity
- Harrold, Z. R.** and Gorman-Lewis, D., (2013) Thermodynamic analysis of *Bacillus subtilis* endospore protonation using isothermal titration calorimetry, *Geochimica et Cosmochimica Acta*, **109**, 296-3
- Gorman-Lewis, D., Jensen, M. P., **Harrold, Z. R.**, and Hertel, M. R., (2013) Complexation of neptunium(V) with *Bacillus subtilis* endospore surfaces and their exudates. *Chemical Geology* **341**, 75-83.
- Harrold, Z. R.**, Hertel, M. R., and Gorman-Lewis, D., (2011) Optimizing *Bacillus subtilis* spore isolation and quantifying spore harvest purity. *J. of Microbiol. Methods* **87**, 325-329.

PRESENTATIONS

- Harrold Z.**, Hausrath E., Tschauner O., Murray A., Marcus M., Lanzirotti A., Newville M., Garcia A., Bartlett C., Raymond J. (2016) Snow algae-microbe-mineral interaction and implications for snow algae growth. Abstract #MR13A-2394 presented at 2016 Fall Meeting, AGU, San Francisco, Calif., 12-16 Dec.
- Harrold Z.**, Hausrath E., Murray A., Tschauner O., Garcia A., Lanzirotti A., Marcus M., Newville M., Bartlett C., Raymond J. Iron-Bearing Minerals as a Trace Nutrient Source for Snow Algae Communities and Implications for Mineral Biosignature Formation. Abstract #3495 presented at 2017 Astrobiology Science Conference, April 26., 2017 Mesa, AZ
- Invited talk University of Nevada, Las Vegas. Snow algae-microbe-mineral interactions and their implications for Earth and Mars systems. November 30th, 2016.
- Harrold Z.**, Hausrath E., Bartlett C., Garcia A., Tschauner O., Murray A., Raymond J., Bioavailability of mineral bound iron to a snow algae community. Nevada EPSCoR Meeting, Reno, NV, April 29, 2016
- Harrold, Z.**, Hausrath, E. M., Bartlett, C. L., Garcia, A.H., Tschauner, O., Murray, A.E., Raymond, J. Bioavailability of mineral-bound iron to a snow algae community and implications for life in extreme environments. Abstract #2720. 47th Lunar and Planetary Science Conference, March 2016.
- Harrold Z.**, Hamilton T., Roden E., Skidmore M., Boyd E. Pyrite Supported Subglacial Ecosystems. Abstract # 7213, Astrobiology Science Conference, Chicago, IL, 2015
- Invited talk Montana State University Thermobiology Institute Seminar. Aerobic and Anaerobic Thiosulfate Oxidation by a Cold-Adapted Chemoautotroph. May 4th, 2015.
- Invited talk Dartmouth College, Department of Earth Science. Between a rock and a cold place: Investigating microbe-mineral interactions in two distinct subglacial systems. January 15th 2015
- Harrold, Z. R.** and Gorman-Lewis, D. (2013) Effects of *Bacillus subtilis* endospore surface reactivity on the forsterite dissolution, Abstract B23E-0589 presented at Fall Meeting, AGU, San Francisco, CA
- Harrold, Z. R.**, Hertel, M. R., and Gorman-Lewis, D. (2012) Investigating the

thermodynamic stability of *Bacillus subtilis* spore-uranium(VI) adsorption through surface complexation modeling, Abstract H43E-1394, 2012 Fall Meeting, AGU, San Francisco, CA

Carey, A., **Harrold, Z.**, Darrah, T., and Poreda, R. (2006) The Effects of Coal-Fired Power Plant Emissions on a Regional Watershed. Geological Society of America *Abstracts with Programs*, Vol. 38, No. 7, p. 95

SERVICE ACTIVITIES

Student outreach – Rocky Mountain Museum, Bozeman, MT	2014
Rockin' Out Science Education/Outreach volunteer, Seattle, WA	2012 – 2014
Graduate representative to the faculty, Seattle, WA	2011 – 2013
Graduate student seminar coordinator, Seattle, WA	2010 – 2011
Created and coordinated the UW ESS pint glass tradition. Seattle, WA	2009 – 2010
Graduate student organizer for the UW ESS prospective student visitations. Seattle, WA	2008
Co-Founder and Coordinator of Freshman Orientation Outing Treks, Rochester, NY	2005 – 2007

ANALYTICAL & PROFESSIONAL SKILLS

- **Computing:** MATLAB, FITEQL, Excel, Microsoft Office; Basic understanding of R, PHREEQC and MINEQL+
- **Laboratory:** UV-Vis spectrophotometry, Ion Chromatography, acid-base titrations, isothermal titration calorimetry, redox sensitive iron analyses, general wet chemistry, microscopy, anaerobic chamber operation, aerobic and anaerobic microbial culturing, Basic experience with ICP-MS/OES, ATR-FTIR, SEM, 16S DNA extraction/amplification
- Adept at learning new instrument operation and analytical principles
- Versed in graphical data representation, presentation development, public speaking and academic publication preparation
- Fieldwork experience in Greenland, Canada, Colorado, Mt Rainier and the Beartooth Mts.
- Certified Wilderness First Responder and CPR (2009 – 2016)

**PROFESSIONAL
REFERENCES**

1. Drew Gorman-Lewis, Ph.D.

Associate Professor
University of Washington
Earth and Space Science Dept.
Johnson Hall 70, Box 351310
4000 15th Avenue NE
Seattle, WA 98195-1310
dgormanl@uw.edu
(206) 543-3541

2. Elisabeth Hausrath, Ph.D.

Assistant Professor
University of Nevada, Las Vegas
Department of Geoscience
4505 S. Maryland Parkway
Las Vegas, NV 89154
elisabeth.hausrath@unlv.edu
(702) 895-1134

2. Bruce Nelson, Ph.D.

Professor
University of Washington
Earth and Space Science Dept.
Johnson Hall 70, Box 351310
4000 15th Avenue NE
Seattle, WA 98195-1310
bnelson@uw.edu
(206) 543-4434, 206-543-9187

3. Ronald Sletten, Ph.D.

Associate Professor
University of Washington
Earth and Space Science Dept.
Johnson Hall 70, Box 351310
4000 15th Avenue NE
Seattle, WA 98195-1310
sletten@ess.washington.edu
(206) 543-0571

5. Gregg Morris, Ph.D.

Director
Green Power Institute
2039 Shattuck Ave.,
Suite 402
Berkeley, CA 94704
gmorris@emf.net
(510) 418-6759

6. John Baross, Ph.D.

Professor
University of Washington
School of Oceanography
Box 357940
Seattle, WA 98195-7940
jbaross@u.washington.edu
(206) 543-0833