

# Sarrah M. Dunham-Cheatham

sarrahdc.com

sdunhamcheatham@unr.edu

219-476-6977

## EDUCATION

2013	Ph.D.	Geochemistry	U. of Notre Dame	Jeremy Fein
2007	B.S.	Natural Resources & Environmental Science (foci: soil science, hydrology)	Purdue University	John Graveel

Ph.D. Dissertation Title: *Biomineralization and biosorption involving bacteria: Metal phosphate precipitation and mercury adsorption experiments*

## PROFESSIONAL EXPERIENCE

9/2020 – present	Director, Nevada Agricultural Experiment Station / USDA Agricultural Research Service Core Analytical Laboratory, University of Nevada, Reno
9/2020 – present	Research Assistant Professor, College of Agriculture, Biotechnology & Natural Resources, University of Nevada, Reno
5/2016 – 8/2020	Postdoctoral Scholar, Department of Natural Resources and Environmental Science, University of Nevada, Reno (mentors: Mae S. Gustin, Benjamin Sullivan, Yu Yang, Elizabeth Leger)
8/2014 – 5/2016	Lecturer, Department of Earth and Planetary Sciences, Washington University in St. Louis (supervisor: Jeff Catalano)
8/2012 – 5/2014	Instructor of Environmental Science and Chemistry, Department of Physical & Environmental Sciences, Colorado Mesa University (supervisor: Russ Walker)
8/2011 – 12/2011	Life Science Research Assistant & Field Site Manager, Stanford Synchrotron Radiation Lightsource, Stanford Linear Accelerator Center National Laboratory (advisor: John Bargar)
Fall 2010	Instructor, Department of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame
6/2007 – 7/2012	Graduate Research Assistant, Department of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame (advisor: Jeremy Fein)
8/2007 – 8/2011	Graduate Teaching Assistant, Department of Civil & Environmental Engineering & Earth Sciences, University of Notre Dame (supervisors: Jeremy Fein, Jeffrey Talley, Patricia Maurice, Clive Neal)

## CURRENT PROJECTS

Refining and testing methods for identifying and quantifying gaseous oxidized mercury in air (NSF)  
Collaborators: M.S. Gustin, S. Lyman

Algae from waste waters as a sustainable protein source: Fate of heavy metals (USDA)  
Collaborators: M.S. Gustin, S.R. Hiibel

Study of the biochemical mechanisms by which mercury is sequestered in plants (UNR HATCH)  
Collaborators: M.S. Gustin, W-G. Choi, J. Harper

Pet food mercury and genetics experiment at UNR (donor/crowd-funded, [naes.unr.edu/petfoodmercury](http://naes.unr.edu/petfoodmercury))  
Collaborators: M.S. Gustin, M. Teglas, M. Peacock, K. Klingler

Assessment of the variation in tree ring mercury concentrations between co-located tree species (NSF EPSCoR, undergraduate award)  
Collaborators: M.S. Gustin

**PEER-REVIEWED PUBLICATIONS & BOOK CHAPTERS**

- S.M. Dunham-Cheatham, S. Lyman, M.S. Gustin. 2020. Evaluation of sorption surface materials for reactive mercury compounds. *Atmospheric Environment*, 242:1, doi: <https://doi.org/10.1016/j.atmosenv.2020.117836>.
- S. Lyman, L. Gratz, S.M. Dunham-Cheatham, M.S. Gustin, A. Luippold. 2020. Improvements to the accuracy of atmospheric oxidized mercury measurements. *Environmental Science & Technology*, in press.
- S.M. Dunham-Cheatham, Q. Zhao, D. Obrist, Y. Yang. 2020. Unexpected mechanism for glucose-primed soil organic carbon mineralization under an anaerobic-aerobic transition. *Geoderma*, doi: <https://doi.org/10.1016/j.geoderma.2020.114535>
- A. Luippold, M.S. Gustin, S.M. Dunham-Cheatham, M. Castro, W. Luke, S. Lyman, L. Zhang. 2020. Use of multiple lines of evidence to understand reactive mercury concentrations and chemistry in Hawaii, Nevada, Maryland, and Utah, USA. *Environmental Science & Technology*, doi: <https://doi.org/10.1021/acs.est.0c02283>
- A. Luippold, M.S. Gustin, S.M. Dunham-Cheatham, L. Zhang. 2020. Improvement of quantification and identification of atmospheric reactive mercury. *Atmospheric Environment*, doi: <https://doi.org/10.1016/j.atmosenv.2020.117307>
- S.M. Dunham-Cheatham, S. Freund, S. Uselman, E. Leger, B. Sullivan. 2020. Persistent agricultural legacy in soil influences plant restoration success in a Great Basin salt desert ecosystem. *Ecological Restoration*, 38:1.
- Q. Zhao, S.M. Dunham-Cheatham, D. Adhikari, C. Chen, A. Patel, S. Poulson, P. Verburg, X. Wang, E. Roden, A. Thompson, Y. Yang. 2020. Oxidation of soil organic carbon during an anoxic-oxic transition. *Geoderma*, doi: [doi.org/10.1016/j.geoderma.2020.114584](https://doi.org/10.1016/j.geoderma.2020.114584)
- M.S. Gustin, S.M. Dunham-Cheatham, L. Zhang. 2019. Comparison of 4 methods for measurement of reactive, gaseous oxidized, and particulate bound mercury. *Environmental Science & Technology*, doi: [doi.org/10.1021/acs.est.9b04648](https://doi.org/10.1021/acs.est.9b04648)
- S.M. Dunham-Cheatham, K. Klingler, M. Peacock, M. Teglas, M.S. Gustin. 2019. What is in commercial cat and dog food? The case for mercury and ingredient testing. *Science of the Total Environment*, 684, 276-280.
- M. Miller, S. Dunham-Cheatham, M. Gustin, G. Edwards. 2019. Evaluation of cation exchange membrane performance under exposure to high  $\text{Hg}^0$  and  $\text{HgBr}_2$  concentrations. *Atmospheric Measurement Techniques* 12: 1207-1217.
- D. Wordofa, D. Adhikari, S. Dunham-Cheatham, Q. Zhao, S. Poulson, Y. Tang, Y. Yang. 2019. Biogeochemical fate of ferrihydrite-model organic compound complexes during anaerobic microbial reduction. *Science of the Total Environment*, 668: 216-223.
- S. Dunham-Cheatham, Y. You. 2019. General Techniques in Geochemistry and Microbiology, In: *Analytical Geomicrobiology: A Handbook of Instrumental Techniques*. Ed. J.P.L. Kenney, H. Veeramani, D.S. Alessi. Cambridge University Press, Cambridge.
- D. Adhikari, S. Dunham-Cheatham, D. Wordofa, P. Verburg, S. Poulson, Y. Yang. 2019. Aerobic respiration of mineral-bound organic carbon in a soil. *Science of the Total Environment* 651: 1253-1260.
- S. Dunham-Cheatham, B. Mishra, S. Myneni, J. Fein. 2015. The effect of natural organic matter on the adsorption of mercury to bacterial cells. *Geochimica et Cosmochimica Acta* 150: 1-10.
- S. Dunham-Cheatham, B. Farrell, B. Mishra, S. Myneni, J. Fein. 2014. The effect of chloride on the adsorption of Hg onto three bacterial species. *Chemical Geology* 373: 106-114.

- X. Rui, M.J. Kwon, E. O'Loughlin, S. Dunham-Cheatham, J. Fein, B. Bunker, K. Kemner, M. Boyanov. 2013. Bioreduction of hydrogen uranyl phosphate: mechanisms and U(IV) products. *Environmental Science & Technology* 47: 5668-5678.
- S. Dunham-Cheatham, X. Rui, B. Bunker, N. Menguy, R. Hellmann, J. Fein. 2011. The effects of non-metabolizing bacterial cells on the precipitation of U, Pb and Ca phosphates. *Geochimica et Cosmochimica Acta* 75: 2828-2847.

### **PUBLICATIONS IN REVIEW & IN PREPARATION**

- M.S. Gustin, S.M. Dunham-Cheatham, L. Zhang, S. Lyman, N. Choma, M. Castro. Use of membranes and detailed HYSPLIT analyses to understand particulate, gaseous oxidized, and reactive mercury chemistry. Submitted.
- S.M. Dunham-Cheatham, M.S. Gustin, S. Lyman. Comparison of GOM behavior under different permeation system configurations. In preparation.
- S.M. Dunham-Cheatham, K.B. Klingler, M. Vargas Estrada, M.S. Gustin. Using molecular genetic techniques to determine sources of mercury and methylmercury contamination in commercial pet diets. In preparation.
- S. Osterwalder, S.M. Dunham-Cheatham, B. Ferreira Araujo, O. Magand, J. Thomas, K. Aspmo Pfaffhuber, A. Dommergue, J. Sonke, M.S. Gustin. Critical observations of atmospheric mercury concentrations using manual and automated methods at Zeppelin, Ny-Alesund. In preparation.
- S.M. Dunham-Cheatham, C. Reed, S. Castle, D. Vuono, B. Sullivan. The influence of Fe on C mineralization following rewetting of degraded meadow soils in the Sierra Nevadas. In preparation.

### **PROFESSIONAL & INVITED PRESENTATIONS**

- Guest Speaker – NRES 765 Biogeochemical Cycles, University of Nevada, Reno. (2018)
- Presenter – Desert Research Institute Colloquium. “Biogeochemistry & Soils: Lab and Field Studies.” (2017)
- Presenter – Department of Civil & Environmental Engineering Seminar Series. “Biotic controls on geochemistry: C, Hg, & U case studies.” (2017)
- Presenter – American Chemical Society National Conference. “Glucose-Primed Respiration of organic carbon during anaerobic-aerobic transitions.” (2017)
- Participant – iTeach Faculty Symposium, Teaching Center, Washington University in St. Louis. (2016)
- Panelist – Sustainability Council Faculty Discussion, Colorado Mesa University. (2013)
- Presenter – Goldschmidt Conference. (2010)
- Presenter – Toward Regulation of Nanomaterials Conference: Conversations between academia, industry, law, and government. John J. Reilly Center for Science, Technology, and Values, University of Notre Dame. (2010)
- Presenter – Goldschmidt Conference. (2009)
- Presenter – Brownfields Annual Convention. (2006)
- Presenter – Undergraduate Research & Poster Symposium. Purdue University. (2006)

### **CONFERENCE ABSTRACTS & POSTERS** (first author is presenter unless otherwise noted by \*)

- M.S. Gustin, S.M. Dunham-Cheatham, S. Lyman, S. Osterwalder, J. Huang, L. Zhang. 2020. Active and passive systems for measurement of gaseous oxidized, particulate bound, and reactive mercury. National Atmospheric Deposition Program Fall Meeting.

- S.M. Dunham-Cheatham, S. Lyman, M.S. Gustin. 2019. Comparison of reactive mercury measurements from multiple co-located active systems. Society of Environmental Toxicology and Chemistry SciCon2, 41<sup>st</sup> Annual North America Meeting.
- M.S. Gustin, S.M. Dunham-Cheatham, W-G. Choi, J. Harper, J.D. Blum. 2019. Development of an understanding of the biochemical mechanisms driving mercury uptake, translocation, and storage in aspen trees. Society of Environmental Toxicology and Chemistry SciCon2, 41<sup>st</sup> Annual North America Meeting.
- B. Ingle, S.M. Dunham-Cheatham, M.S. Gustin. 2019. Assessment of the variation in tree ring mercury concentrations between co-located tree species. Society of Environmental Toxicology and Chemistry SciCon2, 41<sup>st</sup> Annual North America Meeting.
- S.M. Dunham-Cheatham, S. Osterwalder, O. Magand, A. Dommergue, M.S. Gustin. 2019. Applying new technologies to Arctic mercury monitoring. National Atmospheric Deposition Program Fall Meeting.
- S. Lyman, T. Elgiar, T. O'Neil, M.S. Gustin, A. Luippold, S.M. Dunham-Cheatham, L. Gratz. 2019. A quantitative system for measurement of oxidized mercury. National Atmospheric Deposition Program Fall Meeting.
- S.M. Dunham-Cheatham, M.S. Gustin. 2019. Testing methods for quantification and identification of reactive mercury compounds. International Conference on Mercury as a Global Pollutant.
- S.M. Dunham-Cheatham, M. Vargas Estrada, A. Luippold, M.S. Gustin. 2019. Mercury is a global contaminant in commercial cat and dog foods. International Conference on Mercury as a Global Pollutant. (poster)
- M.S. Gustin, S.M. Dunham-Cheatham, A. Luippold. 2019. Development of an automated method for measurement of gaseous oxidized mercury. International Conference on Mercury as a Global Pollutant.
- A. Luippold, M.S. Gustin, S.M. Dunham-Cheatham. 2019. Measurement and understanding GOM concentrations and chemistry from sites in Utah, Hawaii, Maryland, and Nevada, USA. International Conference on Mercury as a Global Pollutant.
- A. Luippold, M.S. Gustin, S.M. Dunham-Cheatham. 2019. Introducing UNR-RMAS 2.0: Improvements for quantification and identification of atmospheric reactive mercury. International Conference on Mercury as a Global Pollutant. (poster)
- S. Lyman, T. Elgiar, T. O'Neil, M.S. Gustin, A. Luippold, S.M. Dunham-Cheatham. 2019. An integrated system for accurate, independently verified measurements of oxidized mercury. International Conference on Mercury as a Global Pollutant.
- T. Elgiar, S. Lyman, M.S. Gustin, A. Luippold, S.M. Dunham-Cheatham. 2019. Ozone may not be an important oxidant of atmospheric mercury. International Conference on Mercury as a Global Pollutant. (poster)
- S. Osterwalder, S.M. Dunham-Cheatham, B. Ferrera, O. Magnan, J. Thomas, J. Sonke, A. Dommergue, M.S. Gustin. 2019. Reactive mercury speciation and dry deposition during AMDEs in the Arctic. International Conference on Mercury as a Global Pollutant.
- B. Sullivan, C. Reed, S. Dunham-Cheatham, S. Castle, D. Vuono. 2018. The influence of Fe on C mineralization following rewetting of degraded meadow soils in the Sierra Nevada. American Geophysical Union Fall Meeting. (poster)
- D. Adhikari, Q. Zhao, S. Dunham-Cheatham, K. Das, C. Chen, M. Tfaily, R. Kukkadapu, A. Thompson, D. Obrist, N. Hess, E. Roden, Y. Yang\*. 2018. Anaerobic-aerobic transition sequesters organic carbon. Gordon Research Conference – Environmental Sciences: Water Session. (poster)

- D. Adhikari, D. Wordofa, S. Dunham-Cheatham, S. Poulson, E. Roden, Y. Yang. 2018. Aerobic microbial respiration of mineral-bound organic carbon. American Chemical Society Annual Meeting; U.S. Department of Energy Environmental System Science PI Meeting. (poster)
- D. Adhikari, Q. Zhao, S. Dunham-Cheatham, K. Das, J. Mejia, R. Huang, X. Wang, S. Poulson, Y. Tang, D. Obrist, R. Roden, Y. Yang. 2017. Biogeochemical stability and reactions of iron-organic carbon complexes. American Geophysical Union Meeting. (poster)
- D. Adhikari, D. Wordofa, Q. Zhao, S. Dunham-Cheatham, K. Das, R. Huang, J. Mejia, S. Poulson, X. Wang, Y. Tang, E. Roden, Y. Yang. 2017. Biogeochemical fate and stability of iron oxide-organic carbon complexes. Soil Science Society of America Annual Meeting. (poster)
- S. Freund, S. Dunham-Cheatham, S. Uselman, E. Leger, B. Sullivan. 2017. Comparison of plant-soil relationships between native salt desert shrub communities and a restored agricultural field. Ecological Society of America Meeting.
- S. Dunham-Cheatham, Q. Zhao, S. Poulson, Y. Yang\*. 2017. Glucose-primed anaerobic respiration of organic carbon. U.S. Department of Energy Environmental System Science PI Meeting. (poster)
- D. Adhikari, D. Wordofa, S. Dunham-Cheatham, S. Poulson, Y. Tang, Y. Yang\*. 2017. Biogeochemical reactions for ferrihydrite-model organic carbon complexes during microbial reduction. U.S. Department of Energy Environmental System Science PI Meeting.
- Q. Zhao, D. Adhikari, S. Dunham-Cheatham, D. Wordofa, J. Mejia, C. Chen, A. Patel, S. Poulson, M. Tfaily, Y. Tang, A. Thompson, X. Wang, A. Kerting, B. Gu, D. Obrist, E. Roden, Y. Yang\*. 2017. Processes for iron-bound organic carbon in redox reactions: natural soils and model complexes. U.S. Department of Energy Environmental System Science PI Meeting. (poster)
- S. Dunham-Cheatham, Q. Zhao, D. Obrist, Y. Yang. 2017. Biogeochemical controls on the stability of iron-bound soil organic carbon. American Chemical Society National Meeting.
- N. Janot, J. Lezama-Pacheco, S. Dunham-Cheatham, D. Pham, K. Williams, P. Long, D. Alessi, R. Bernier-Latmani, L. Yang, J. Davis. 2013. Biogeochemical cycling of uranium in a reduced aquifer. American Chemical Society Meeting.
- S. Dunham-Cheatham, J. Fein. 2010. Passive cell wall biomineralization: A universal phenomenon? *Geochimica et Cosmochimica Acta* 74:12. A251. (poster)
- S. Dunham-Cheatham, X. Rui, B. Bunker, R. Hellmann, N. Menguy, J. Fein. 2009. The effects of bacterial cell walls on precipitation of uranyl phosphates. *Geochimica et Cosmochimica Acta*, (2009) 73:13. A313. (poster)
- X. Rui, B. Bunker, S. Dunham-Cheatham, J. Fein. 2009. X-ray absorption fine structure investigation of uranyl-phosphate biomineralization. *Geochimica et Cosmochimica Acta*, (2009) 73:13. A1131. (poster)

### FEATURED RESEARCH

- S. Dunham-Cheatham. 2018. Mercury in your pet food. Animal Radio, episode 988.
- S. Dunham-Cheatham, A. Luippold. 2018. How much mercury is in popular dog and cat foods? The numbers are surprising. NSights at the University of Nevada, Reno.
- D. Venton. 2016. Natural organic matter fails to make more mercury cling to bacteria. *Advanced Photon Source Science* 2015, ISSN 1931-5007.

### COURSES OFFERED

Spring 2020, University of Nevada, Reno, College of Agriculture, Biotechnology & Natural Resources  
NRES 322 Soils (offered as a 2-week intensive to BLM)

AY 2014 – 2016, Washington University in St. Louis, Department of Earth and Planetary Sciences

EnSt 110	Environmental Issues
EPSc 219	Energy & the Environment
EPSc 323/590	Biogeochemistry
EPSc 409(L)	Surface Processes (lecture, lab)
EPSc 413	Soil Science
EPSc 422(L)	Sedimentary Geology (lecture, lab)
EPSc 429	Environmental Hydrogeology

AY 2012 – 2014, Colorado Mesa University, Departments of Chemistry and Physical & Environmental Sciences

CHEM 121(L)	Principles of Chemistry (lecture, lab)
CHEM 131L	General Chemistry (lab)
ENVS 101	Introduction to Environmental Sciences
ENVS 105	Readings in Environmental Sciences
ENVS 204L	Introduction to Ecosystem Management (lab)
ENVS 312(L)	Soil Science & Sustainability (lecture, lab)
ENVS 396	Soil Chemistry
ENVS 413	Contaminant Fate & Transport

Fall 2010, University of Notre Dame, Department of Civil & Environmental Engineering & Earth Sciences (course instructor)

ENVG 30320	Introduction to Soil Science
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AY 2007 – 2011, University of Notre Dame, Department of Civil & Environmental Engineering & Earth Sciences (teaching assistant)

CE 20500	Engineering Geology
CE 30300	Introduction to Environmental Engineering & Science
CE 30320	Water Chemistry & Treatment
CE 40300	Environmental Geochemistry

## MENTORING

- 2019 – 2020 Project mentor, Ben Ingle, Nevada Nexus NSF EPSCoR and Nevada Undergraduate Research Award, University of Nevada, Reno, “Assessment of the variation in tree ring mercury concentrations between co-located tree species”
- 2019 – 2020 Project mentor, Margarita Vargas Estrada, Nevada Undergraduate Research Award, University of Nevada, Reno, “Using molecular genetic techniques to assess adulteration of commercial pet foods”
- 2015 – 2016 Committee Member, Molly Chaney, Honors Senior Thesis, Washington University in St. Louis
- 2015 Faculty Advisor, Reed Kalash, U.S. Public Interest Research Group, Washington University in St. Louis
- 2014 Faculty Advisor, Sustainability Council, Colorado Mesa University
- 2014 Board of Directors, CMU/WCCC Composting Facility, Colorado Mesa University

**PROFESSIONAL SERVICES**

Reviewer – *Atmospheric Environment; Biogeosciences; Environmental Science: Processes & Impacts; Geochimica et Cosmochimica Acta; Geoderma; Geomicrobiology J.; J. of Environmental Chemical Engineering; J. of Environmental Quality; J. of Environmental Radioactivity; J. of Hazardous Materials; Science of the Total Environment*

Reviewer – UNR Nevada Undergraduate Research Award review panel (2020)

Judge – UNR Graduate Student Association Poster Symposium (2018)

Judge – Academy of Science St. Louis Science Fair – Honors Division (2016)

Judge – Academy of Science St. Louis Science Fair (2015)

Judge – Colorado Science Fair (2013, 2014)

Judge – Indiana Science Fair – Environmental Sciences (2009, 2010)

**PROFESSIONAL AFFILIATIONS**

American Association for the Advancement of Science, American Chemical Society, Earth Science Women's Network, International Association of Geochemistry, National Postdoctoral Association, National Center for Faculty Development & Diversity

**TRAININGS & CERTIFICATES**

2016 Associate Certificate, Center for the Integration of Research, Teaching, and Learning (CIRTL), Teaching Center, Washington University in St. Louis

2006 – 2017 Trainings: Environmental health and safety, biological safety HAZWOPER Technician (OSHA), Cryogenic and oxygen deficiency safety, Radiological worker I & II, Hazardous waste management, HIPAA, Defensive driving, Introduction to FEMA, Introduction to NIMS

**RELEVANT ADDITIONAL EXPERIENCE**

2014 – 2016 Science educator, St. Louis Science Center

2012 Web content manager, Colorado Parks & Wildlife

2008 – 2011 Chair, Publicity and Procedures, Graduate Student Union, University of Notre Dame

2006 – 2007 Mentor, Science Honors Learning & Leadership Community, Purdue University

2006 – 2007 Intern, Curriculum design of the EPA's "Our Town" Project for 4-H Extension Outreach, Purdue University (advisor: Daniel Somerville)

2006 Intern, Environmental leaching properties of Class F coal fly ash-based geopolymer concrete, Purdue University (advisors: Linda Lee, Tom Seager, Jennifer Siehling)

2005 Intern, Marine geophysics – Tectonic dynamics of the English Channel, Purdue University (advisor: Eric Calais)

2005 Experimental chemistry assistant, Gifted Education Research Institute, Purdue University

2004, 2005 ScienceScape camp counselor, Science Diversity Programs, Purdue University

2004 Intern, Effects of urban sprawl on historic streamflow, Purdue University (advisors: Jon Harbor, Carrie Davis)

2003 Mentee, Women in Science Learning Community, Purdue University

**AWARDS & HONORS**

2006 – 2007 Outstanding Senior, Department of Natural Resources & Environmental Sciences, Purdue University

2006 Summer Undergraduate Research Fellowship Recipient, Purdue University

2006 First Place for “Design of Social Science”, College of Science Research Symposium,  
Purdue University

**PROFESSIONAL DEVELOPMENT**

2017 Course: Graduate Environmental Statistics (audit), University of Nevada, Reno

2015 Course: The Age of Sustainable Development (MOOC), Columbia University

2015 Course: Emerging Trends & Technologies in the Virtual Classroom (MOOC), University  
of California, Irvine

2015 Course: Introduction to GIS (audit), Washington University in St. Louis