Carla E. Rosenfeld

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Research Interests

Microbe-metal interactions, biominerals, weathering, redox, trace metal biogeochemistry, spectroscopy, contaminant fate and transport, bioremediation, microbiome

Education

2013	Ph.D.	**Pennsylvania State University** Ph.D. in Soil Science and Biogeochemistry
2007	M.E.M.	**Duke University** Masters in Environmental Management, focus environmental health and safety
2005	B.Sc.	**McGill University** B.S. *with distinction,* major: Chemistry

Professional Experience

2018-present	**Resident Research Associate,** Argonne National Laboratory
2017-present	**Research Associate,** University of Minnesota
2015-2017	**NSF Postdoctoral Fellow,** University of Minnesota
2014-2015	**Smithsonian Postdoctoral Fellow**, National Museum of Natural History
2011-2013	**Graduate Fellow,** CarbonEARTH NSF GK-12 Graduate Fellowship, Pennsylvania State University
2008-2011	**Graduate Teaching Assistant,** Pennsylvania State University
2007-2008	**Ecological Risk Assessor and Environmental Consultant,** ARCADIS
2006-2007	**Research Assistant,** USGS
2006	**Research Fellow,** USEPA National Network for Environmental Management Studies Fellowship, USEPA

Peer-Reviewed Publications

Rosenfeld, C.E James, B.R., Santelli, C.M. (2018) Selenium in reclaimed mine soils alters fungal and bacterial community structure and diversity. 84(16): e01394-18 doi:10.1128/AEM.01394-18

Rosenfeld, C.E., Chaney, R.L. and Martínez, C.E. (2018) Soil geochemical factors regulate Cd uptake by metal hyperaccumulator *Noccaea caerulescens* (J. Presl & C. Presl) F.K. Mey in field-contaminated soils. *Science of the Total Environment* **616-617**:279-287 doi: 10.1016/j.scitotenv.2017.11.016

Rosenfeld, C.E., Kenyon, J., James, B.R., Santelli, C.M. (2017) Selenium (IV, VI) reduction and tolerance by fungi in an oxic environment. *Geobiology*, 15(3): 441–452. doi:10.1111/gbi.12224.

Rosenfeld, C.E., Chaney, R.L., Tappero, R.V. and Martínez, C.E. (2017) Micro-scale investigations on soil heterogeneity: Impacts on Zn retention and uptake in Zn contaminated soils. *Journal of Environmental Quality,* 46(2): 373-383 doi:10.2134/jeq2016.05.0184

Rosenfeld, C.E. and Martínez, C.E. (2015) Dissolution of mixed amorphous-crystalline Cd-containing Fe coprecipitates in the presence of common organic ligands. *Environmental Chemistry*. **12**(6): 739-747. http://dx.doi.org/10.1071/EN14223

Rosenfeld, C.E., McCormack, M.L. and Martínez, C.E. (2014) A novel approach to study composition of *in situ* produced root- derived dissolved organic matter. *Soil Biology and Biochemistry* **76**:1-4 doi:10.1016/j.soilbio.2014.04.026

In Preparation

Hinkle, M.A.G., **Rosenfeld, C.E,** Post, J.A., and Santelli, C.M., Structural changes to mycogenic managanese oxides upon trace metal binding and incorporation. *In prep*

Ng, G.-H. Crystal, **Rosenfeld, C.E.,** Torgeson, J., O'Hara, P., C.M. Santelli Linking sulfur cycling and hyporheic exchange in riparian wetlands in northern Minnesota. *In prep*

McDonald, E.A., **Rosenfeld, C.E.,** Santelli, C.M., Isolation of novel Se-transforming bacteria and fungi from reclaimed mine soils. *In prep*

Rosenfeld, C.E, Hinkle, M.A.G., Santelli, C.M., Ascomycete fungi mediate multiple simultaneous redox transformations in oxic systems. *In preparation*

Santelli, C.M., Sabuda M.C., **Rosenfeld, C.E**., Torgeson, J., Time-dependent aerobic Se reduction by two Ascomycete fungi. *In prep*

Grants & Fellowships

2016 **University of Minnesota Institute on the Environment Mini-grant, co-PI** *Early-career cross-disciplinary science communication group* ($3,000)

2015 **NSF EAR Postdoctoral Fellowship** *Linking geomicrobiology and geochemistry in seleniferous soils* ($172,000)

2015 **Smithsonian Institution Competitive "Pell" Grants for Science, co-PI** (primary author) *Geomicrobiology of Se-contaminated soils* ($55,000)

2013 **Smithsonian Institution Postdoctoral Fellowship** *Investigating the role of fungi in selenium biogeochemistry in natural environments* ($95,000)

2011 **CarbonEARTH, NSF GK-12 Graduate Fellowship,** Pennsylvania State University ($60,000)

National Laboratory Instrument Use

2017 **Argonne National Laboratory Advanced Photon Source Synchrotron Beamline 12-BM** *Effects of dual biomineralization processes on resulting biogenic mineral chemistry*

2016 **Argonne National Laboratory Advanced Photon Source Synchrotron Beamline 12-BM** *Microbial Impacts on Se biogeochemistry: Measuring solid-phase Se speciation in real and model soil systems*

2012 **Argonne National Laboratory Advanced Photon Source Synchrotron Beamline 13-ID** Synchrotron microprobe studies of *Thlaspi caerulescens* grown in Cd contaminated rhizosphere

Awards

2017, 2018	Molecular plant and genomics institute (MPGI) Travel Grant, UMN
2015	BioTechnology Institute Early Career Travel Grant, UMN
2012, 2013	Student Travel Grant, Goldschmidt Conference
2011	Outstanding Student Paper Award, American Geophysical Union
2011	Competitive Grant Award, College of Agriculture, PSU
2011	Outstanding Student Service, Department of Crop and Soil Science, PSU
2010	Research Award, Center for Environmental Chemistry and Geochemistry, PSU
2006	EPA National Network for Environmental Management Studies (NNEMS) Fellow
2005	Duke Energy Climate Change Policy Partnership Fellow, Duke University

Teaching & Educational Outreach

Undergraduate Courses

2016, 2017	Guest Lecturer, Geomicrobiology, UMN, ESCI 4801
2011	Guest Lecturer, Chemistry of the Environment, PSU, SOILS 397A
2009, 2010	Teaching Assistant, Introductory Soil Science, PSU, SOILS 101
2009, 2010	Instructor, Introductory Soil Science Laboratory, PSU, SOILS 101
2004	Instructor, Organic Chemistry Laboratory, McGill University, CHEM 212
2004	Tutor, Organic Chemistry, McGill University, CHEM 211

Public Outreach

2018	Volunteer, Minneapolis Public Schools STEM Expo, Minneapolis, MN
2016	Presenter, STEAM camp, Bell Museum of Natural History, Minneapolis, MN
2015-2016	Curriculum development, STEAM (science, technology, engineering, art, and math) camp, Bell Museum of Natural History, Minneapolis, MN
2013-2015	Presenter, Q?rius science education center, NMNH, Washington, DC
2014	Panelist, Tri Region Science and Engineering Fair, Washington, DC
2013	Presenter, Science Night at the Alexandria Public Library, Alexandria, VA
2012-2013	Scientist in the Classroom, Philipsburg Osceola Junior High, Philipsburg, PA
2011-2012	Scientist in the Classroom, Rowland Middle School, Harrisburg, PA
2009-2012	Presentor, MathOptions program, Penn State DuBois, DuBois, PA
2011	Judge, PA Junior Academy of Sciences Competition, State College, PA
2009	Presentor, "Introduction to Soil Science" Jr. MANNRS (Minorities in Agriculture, Natural Resources and Related Sciences) workshop, PSU, State College, PA

Mentoring Experience

2017-present	Mary Sabuda, graduate student (Ph.D.), UMN
2017-2018	Christine Hitomi, undergraduate honors thesis, UMN
2016-present	Josh Torgeson, graduate student (Masters), UMN
2016-2018	Liz MacDonald, undergraduate researcher, UMN
2017	Elizabeth Carlson, undergraduate researcher, UMN
2014	Jennifer Kenyon, NSF REU undergraduate researcher, Smithsonian
2010	Mary Susan Sherman, undergraduate teaching assistant, PSU
2009	Khanh Nguyen, undergraduate teaching assistant, PSU

Presentations

Invited Seminars

2018 Microbes and metal(loid)s: Combining field and experimental systems to understand contaminant biogeochemistry. Savannah River Ecology Laboratory, University of Georgia, Aiken, SC

2017 Microbes and metal(loid)s: Combining field and experimental systems to understand contaminant biogeochemistry and improve environmental quality. Department of Soil and Water Sciences, University of Florida, Gainesville, FL

2015 Selenium biogeochemistry: fungal and abiotic controls on Se redox and implications for contaminated soils. Department of Civil and Environmental Engineering, University of Wisconsin, Madison, WI

2015 Fungal and abiotic controls on selenium redox and implications for contaminated soils. Department of Soil Water and Climate, University of Minnesota, St. Paul, MN

2014 Contaminant biogeochemistry: Trace element dynamics at the plant-soil interface. Bromery Lecture, Johns Hopkins University, Baltimore, MD

2013 Bridging chemistry and ecology: Using advanced spectroscopic techniques to study ecological questions. China Ecological Forum. Institute of Geographic Sciences and Natural Resources Research, Chinese Academy of Sciences, Beijing, China, 2013

*Conference Presentations (*indicates invited presentation)*

2018

Hinkle, M.A.G., Rosenfeld, C.E., Post, J.A., and C.M. Santelli, Mycogenic Manganese Oxic Structural Changes and Nickel Incorporation with Aging. Goldschmidt, Boston, MA

Rosenfeld, C.E., Hinkle, M.A.G., and C.M. Santelli. Mycogenic biogeochemistry: Simultaneous manganese oxidation and selenium reduction in oxic systems. Goldschmidt, Boston, MA

Sabuda, M., Rosenfeld, C.E., Torgeson, J., and C.M. Santelli, Time-resolved biogeochemical insights to fungal redox transformations of selenium, the essential toxin. Goldschmidt, Boston, MA

Santelli, C.M., Hinkle, M.A.G., Rosenfeld, C.E., Roepke, E, and D.L. Chaput, Biogenic Mn oxide influences on metal(loid) contaminants. Goldschmidt, Boston, MA

Sabuda, M., Rosenfeld, C.E., Torgeson, J., C.M. Santelli, Biogeochemical transformations of selenium by common saprotrophic soil fungi under atmospheric conditions. Midwest Geobiology, Evanston, IL

Torgeson, J., O'Hara, P., Rosenfeld, C.E., Yourd, A., Roepke, E., Duhn, K., Ng, G.-H. Crystal, and C.M. Santelli, Biogeochemical Interactions and Cycling of Sulfur, Iron, and Carbon in the Sulfate-Impacted Riparian Wetland, Second Creek. American Geophysical Union, Washington, DC

2017

Ng, G.-H. Crystal, O'Hara, P., Santelli, C.M., Rosenfeld, C.E., and A. Yourd, Evaluating the role of sulfur and hyporheic exchange in biogeochemical cycling in riparian wetlands. American Geophysical Union, New Orleans, LA

* Rosenfeld, C.E., MacDonald, E.A., James, B.R., and C.M. Santelli. Biogeochemistry of seleniferous mine soils: Metal(loid) impacts on microbial community ecology. Society of Environmental Toxicology and Chemistry, Minneapolis, MN

* Rosenfeld, C.E., Hinkle, M.A.G., James, B.R., and C.M. Santelli. Mycogenic minerals – Impacts of multi-metal systems on fungal mineral production and metal sequestration. Soil Science Society of America, Tampa, FL

Hinkle, M.A.G., Rosenfeld, C.E., Santelli, C.M., Post, J.A. Changes in Ni binding to and uptake by mycogenic Mn oxides with aging. Soil Science Society of America, Tampa, FL

MacDonald, E.A., Rosenfeld, C.E., and C.M. Santelli. Identification of 22 selenium-tolerant bacteria and 4 selenium-tolerant fungi. Midwest Geobiolgy, Indianapolis, IN

Torgeson, J.M., Rosenfeld, C.E., and C.M. Santelli. Considerations for aerobic bioremediation of selenite and selenate. Midwest Geobiolgy, Indianapolis, IN

Santelli, C.M., Rosenfeld, C.E., Torgeson, J.M. and L. Cousins. Fungi-mediated redox transformations of selenium. Goldschmidt Conference, Paris

Rosenfeld, C.E., MacDonald, E.A., James, B.R., C.M. Santelli. Microbial ecology of seleniferous reclaimed mine soils. Goldschmidt Conference, Paris

*Rosenfeld, C.E., Hinkle, M.A.G., James, B.R., and C.M. Santelli. Fungal-selenium interactions in experimental and field systems. American Chemical Society, San Francisco, CA

2016

Rosenfeld, C.E., James, B.R., and C.M. Santelli. Tracing biogeochemical Se cycling in seleniferous reclaimed mine soils. American Geophysical Union, San Francisco, CA. 2016

Torgeson, J., Rosenfeld C.E., and C.M. Santelli. Considerations for aerobic bioremediation of selenite and selenate. Frontiers in Mine Water Remediation, UMN - Twin Cities, Minneapolis, MN

* Rosenfeld, C.E., James, B.R., and C.M. Santelli. Understanding Se biogeochemistry in seleniferous reclaimed mine soils American Chemical Society, San Diego, CA

2015

* Rosenfeld, C.E. and C.E. Martínez. Biological weathering in metal-contaminated soils: Influence of biologically derived dissolved organic compounds on mineral dissolution. Soil Science Society of America, Minneapolis, MN

Rosenfeld, C.E., James, B.R., and C.M. Santelli. Fungal and abiotic controls on selenium redox and implications for remediation of contaminated soils. Soil Science Society of America, Minneapolis, MN

Santelli, C.M., Rosenfeld, C.E., and B.R. James. Environmental impact of fungi-mediated redox transformations of selenium. Geological Society of America, Washington, DC

2014

Kenyon, J.A., Rosenfeld, C.E., and C.M. Santelli. Investigating the effects of selenium on fungal growth and mineral production (poster). Goldschmidt Conference, Prague, CZ

Rosenfeld, C.E., James, B.R. and C.M. Santelli. Selenium in the environment: Biotic and abiotic controls on Se redox. Goldschmidt Conference, Prague, CZ

Rosenfeld, C.E., Kenyon, J.A., James, B.R. and C.M. Santelli. Environmental selenium transformations: Biotic factors influencing Se redox transformations (poster). American Geophysical Union, San Francisco, CA

Kenyon, J.A., Rosenfeld, C.E., and C.M. Santelli. Investigating the effects of selenium on fungal growth and mineral production (poster). LSU Undergraduate Research Conference, Baton Rouge, LA

**Winner, 1st place Math and Physical Sciences division.*

2013

Rosenfeld, C.E., Chaney, R.L., Lanzirotti, A. and C.E. Martínez. Linking nutrient and contaminant dynamics in rhizospheres of hyperaccumulators (poster). Goldschmidt Conference, Florence, Italy

2012

Rosenfeld, C.E. and C.E. Martínez. Identifying root exudates in field contaminated soil systems (poster). American Geophysical Union, San Francisco, CA

Rosenfeld, C.E., Chaney, R.L., Lanzirotti, A. and C.E. Martínez. Trace metals and soil solids: Effects of soil heterogeneity on Zn mobility. Goldschmidt Conference, Montreal, Canada

Rosenfeld, C.E., Chaney, R.L., Lanzirotti, A. and C.E. Martínez. Heavy metal contamination in soils: Role of soil solids on metal mobility. Environmental Chemistry Student Symposium, University Park, PA

2011

Rosenfeld, C.E. and C.E.Martínez. Role of root exudates in dissolution of Cd containing iron oxides. American Geophysical Union, San Francisco, CA
**Winner, Outstanding Student Paper Award (OSPA), Biogeosciences Division*

Rosenfeld, C.E. and C.E.Martínez. Role of dissolved organic matter in Cd-goethite dissolution (poster). American Chemical Society, Anaheim, CA

Organized Symposia

2018	Redox transitions and impacts on biogeochemical cycling of carbon, nutrients, and contaminants, Goldschmidt Conference, Boston, MA
2017	Geomicrobiology, Biogeochemistry and Environmental Impact Studies of Trace Elements and Metals in Earth Surface Environments. Goldschmidt Conference, Paris, France
2013	Biogeochemical cycles in the rhizosphere: examining carbon, trace and heavy metal cycling at the plant-soil interface. Goldschmidt Conference, Florence, Italy
2012	Investigating ecosystem-scale metal dynamics using micro-scale techniques. Goldschmidt Conference, Montreal, Canada

Additional Training & Skills

Workshops

2016	Focused Discussion on Mine Water Bioremediation – Frontiers in Mine Water Remediation, UMN
2016	R Workshop for Microbial Ecologists – Pat Schloss, University of Michigan
2016	Active Learning in Life Sciences Classrooms– Department of Biological Teaching and Learning, UMN
2012	Course in College Teaching – Schreyer Institute for Teaching Excellence, PSU
2010	Advanced Techniques in Environmental Biogeochemistry –Tübingen, Germany

Professional and Community Service

Manuscript Reviewer

Applied and Environmental Microbiology, ACS Earth and Space Chemistry, ACS Environmental Science and Technology, Environmental Engineering Science, Geobiology, Geochimica et Cosmochimica Acta, Geoderma, Journal of Environmental Quality, Plant and Soil, Science of the Total Environment, Soil Systems, Tree Physiology, Vadose Zone Journal

Proposal Reviewer
Stanford Synchrotron Light Source Beamline Proposals, 2017-present

Organizer

2018-2019	Graduate student presentation awards, Soil Science Society of America
2017	Early career writing workshop, University of Minnesota
2009-2011	Environmental Chemistry Student Symposium. PSU
2010, 2011	Undergrad Research Proposal Review Committee. College of Agricultural Sciences, PSU

Member/Participant

2012	Congressional Visit Day, Soil Science Society of America
2009-2012	Core Constituent Science Team, Soil Science Society of America
2010-2011	College of Agricultural Sciences Grad Student Advisory Council. PSU
2010-2012	Faculty, Staff and Student Affairs Committee, Crop and Soil Sciences. PSU

Professional Society Membership
American Chemical Society
American Geophysical Union
Geochemical Society
Soil Science Society of America