

Emily M. Lacroix

emily.m.lacroix@dartmouth.edu | Earth Sciences | Dartmouth College, Hanover, NH 03755

ACADEMIC APPOINTMENTS

Assistant Professor, Department of Earth Sciences, Dartmouth College 2025-present

Première Assistante, Institute of Earth Surface Dynamics, Université de Lausanne 2023-present

RESEARCH INTERESTS

soil carbon cycling; soil biogeochemistry; redox heterogeneity; anoxic microsites; soils and climate change; agriculture; rhizosphere dynamics

EDUCATION

Ph.D. Earth System Science, Stanford University 2022
NSF Graduate Research Fellow
Advisor: Scott Fendorf

B.A. Chemistry modified with Environmental Studies, Dartmouth College 2015
Honors: Phi Beta Kappa, *magna cum laude*

PUBLICATIONS

Lacroix, E.M.; Frei, J.; van der Loo, E.; Kocsis, L.; Keiluweit, M. 2025. Root exudation and fine texture interact to form anoxic microsites in rhizosphere. *Soil Biology and Biochemistry*. 211: 109974.

Bölscher, T.; Cardon, Z.; Garcia Arredondo, M.; Grand, S.; Griffen, G.; Hestrin, R.; Imboden, J.; Jamoteau, F.; **Lacroix, E.M.;** Pérez Castro, S.; Persson, P.; Riley, W.J.; Keiluweit, M. 2025. Vulnerability of mineral-organic associations in the rhizosphere. *Nature Communications*. 16: 5527.

Lacroix, E.M.; Gomes, A.; Honeyman, A.S.; Huy, K.R.; Fendorf, S.; Noël, V.; Aeppli, M. 2025. Soil carbon concentration drives anoxic microsites across horizons, textures, and aggregate position in a California grassland. *Geoderma*. 454: 117165.

Lacroix, E.M.; Gomes, A.; Barratt Heitmann, G.; Schuler, D.; Dekas, A.; Liptzin, D.; Aberle, E.; Watts, D.B.; Nelson, K.A.; Culman, S.; Fendorf, S. 2024. Microbial proxies for anoxic microsites vary with management and partially explain soil carbon concentration. *Environmental Science & Technology*. 58: 11459-11469.

Noël, V.; Boye, K.; Naughton, H.; **Lacroix, E.M.;** Aeppli, M.; Kumar, N.; Fendorf, S.; Webb, S. 2024. X-ray chemical imaging for assessing redox microsites within soils and sediments. *Frontiers in Environmental Chemistry*. 5:1329887.

Lacroix, E.M.; Aeppli, M.; Boye, K.; Brodie, E.; Fendorf, S.; Keiluweit, M.; Naughton, H.R.; Noël, V.; Sihi, D. 2023. Consider the anoxic microsite: acknowledging and appreciating spatiotemporal redox heterogeneity in soils and sediments. *ACS Earth & Space Chemistry*. 7: 1592 – 1609.

Lacroix, E.M.; Mendillo, M.; Gomes, A.; Fendorf, S. 2022. Contributions of anoxic microsites to soil carbon protection across soil textures. *Geoderma*. 425: 116050.

Lacroix, E.M.; Masue-Slowey, Y.; Dlott, G.; Keiluweit, M.; Chadwick, O.; Fendorf, S. 2022. Mineral Protection and Resource Limitations Combine to Explain Profile-Scale Soil Carbon Persistence. *JGR Biogeosciences*. 127 (4): 1-14.

Aeppli, M.; Babey, T.; Engel, M.; **Lacroix, E.M.;** Tolar, B.; Fendorf, S.; Bargar, J.; Boye, K. 2022. Export of organic carbon from reduced fine-grained zones governs biogeochemical reactivity in simulated aquifer. *Environmental Science & Technology*. 56 (4): 2738-2746.

Lacroix, E.M.; Rossi, R.J.; Fendorf, S.; Bossio, D. 2021. Effects of moisture and physical disturbance on pore-scale oxygen content and anaerobic metabolisms in upland soils. *Science of the Total Environment*. 780: 146572.

Lacroix, E.M.; Petrenko, C.L.; Friedland, A.J. 2016. Evidence for Losses from Strongly Bound SOM Pools After Clear Cutting in a Northern Hardwood Forest. *Soil Science*. 181(5): 202-207.

Petrenko, C.L.; Bradley-Cook, J.; **Lacroix, E.M.;** Friedland, A.J.; Virginia, R.A. 2016. Comparison of carbon and nitrogen storage in mineral soils of graminoid and shrub tundra sites, Western Greenland. *Arctic Science*. 2(4): 165-182.

GRANTS & FELLOWSHIPS

Matterhorn Grant (Université de Lausanne, ~\$10,000)*	2023
Precourt Insitute for Energy Seed Grant (\$150,000)*	2020
A.W. Mellon Foundation/Jasper Ridge Biological Preserve Grant (\$5000+)	2019
NSF Graduate Research Fellowship (GRFP)	2017
McGee-Levorsen Research Grant (\$3000)	2017

*Co-authored proposal

HONORS & AWARDS

Centennial Teaching Assistant Award <i>Stanford University, Department of Earth System Science</i>	2021
Stanford Energy Distinguished Student Lecturer <i>Precourt Energy Institute</i>	2021
Special Service Award for Diversity, Equity & Inclusion <i>Stanford Earth DEI Office</i>	2021
Best Poster, Precourt Seed Projects Annual Symposium <i>Precourt Energy Institute</i>	2020
Certificate for Outstanding Achievement in Mentorship <i>Stanford School of Earth, Energy, and Environmental Sciences</i>	2019-2020

TEACHING

University Courses

Mitigating Climate Change through Soil Management (Stanford) Lead Instructor	2021, 2022
--	------------

- Designed and taught flipped-classroom style course, exploring the mechanisms and management practices that influence soil carbon storage
- Overall quality of instruction rated as 5/5 (median)

Science of Soils (Stanford)

2019-2021

Teaching Assistant

- Guest lecturer for soil carbon dynamics week
- Re-designed course for online format
- Overall efficacy of instruction rated 4.82/5

Other

Intro to ggplot workshop

August 2021

Intro to RMarkdown workshop

October 2019

Writing coach & chemistry tutor

2016-2019

Galin Education, Middleton, WI

- Designed and taught SAT Chemistry subject test review course
- Provided one-on-one tutoring for SAT and ACT test preparation and AP Chemistry
- Coached students on essay style, editing for clarity, concision, grammar, and structure

Massive Open Online Course Developer

2014

DartmouthX, Hanover, NH

- Co-designed Introduction to Environmental Science course for EdX

MENTORSHIP

Research

Stanford Earth Summer Undergraduate Research 2021
Gabby Barratt Heitmann, Class of 2024

Stanford Woods, Mentoring Undergraduates in Interdisciplinary Research 2021
Dylan Schuler, Class of 2023.

Stanford Earth Summer Undergraduate Research 2019
Janica Mendillo, Class of 2022

Stanford Earth Summer Undergraduate Research 2019
Cole Shepherd, Class of 2020

Other

Mentor in Teaching, Dept. Earth System Science 2018-2021
facilitated workshops, advised department TAs

Peer Graduate Mentor, Dept. Earth System Science 2018-2020
mentor to incoming graduate student in department

SERVICE & OUTREACH

REVIEWER FOR: Geoderma, Geoderma Regional, Environmental Science & Technology, Communications Earth & Environment, Biology and Fertility of Soils, Soil Biology & Biochemistry, Geochimica et Cosmochimica Acta

CONFERENCE SESSIONS CONVENED:

European Geosciences Union (2025). *Exploring soil biogeochemical processes that shape the interactions between carbon, nutrients, contaminants, minerals, and metal species, and the role of soil heterogeneity across scales.*

European Geosciences Union (2024). *Soil heterogeneity and its role in biogeochemical processes across scales.*

OTHER:

American Geophysical Union (AGU). Outstanding Student Presentation Awards. Reviewer. 2024

Unlearning Racism in the Geosciences (URGE). Pod leader. 2021
Developed anti-racist policy recommendations for Stanford University.

Goggles Optional (podcast). Host & writer. 2017-2020

Mountain View High School. Guest Lecturer. 2019
Presentation on the role of soils in climate change for 10th grade Biology.

Science Night! Volunteer Educator. 2019
Center for Educational Research at Stanford; community engagement night

STEMTaught. Contributing Author. 2018
Article for 5th grade curriculum on “What Plants Need to Grow”

GeoKids. Volunteer 2017
Conducted earth science activities for 3rd grade field trip program to Stanford University.

Science Penpals. Penpal. 2017-2018
Corresponded with interested in the sciences from an underserved high school.

PRESENTATIONS

Lacroix, E.M. E. van der Loo, L. Kocsis, M. Keiluweit. 2025. *Interactive effect of root exudation and texture on anoxic microsite dynamics in the rhizosphere.* European Geosciences Union, Spring Meeting, Vienna Austria.

***Lacroix, E.M.** , M. Keiluweit. 2024. *Integrating Anoxic Microsites into Frameworks of Soil Organic Matter Persistence.* American Geophysical Union, Fall Meeting, Washington, D.C..

Lacroix, E.M. G. Ceriotti, D. Garrido Sanz, S.M. Borisov, J.S. Berg, C. Keel, P. de Anna, M. Keiluweit. 2024. *Why, where, and when are there anoxic microsites in the rhizosphere – a microfluidic approach.* European Geosciences Union, Spring Meeting, Vienna, Austria.

Lacroix, E.M. A. Gomes, G. Barratt Heitmann, D. Schuler, A. Dekas, D. Liptzin, E. Aberle, D.B. Watts, K.A. Nelson, S. Culman, S. Fendorf. 2023. *Anoxic microsites enhance soil carbon storage and respond to management.* Goldschmidt, Lyon, France.

Noël, V. K. Boye, **E.M. Lacroix**, S. Fendorf, S. Webb. 2023. *Laboratory for Observing Anoxic Microsites in Soils (LOAMS)*. Goldschmidt, Lyon, France.

Lacroix, E.M. A. Gomes, G. Barratt Heitmann, D. Schuler, A. Dekas, D. Liptzin, E. Aberle, D.B. Watts, K.A. Nelson, S. Culman, S. Fendorf. 2022. *Anoxic Microsites and Soil Carbon Preservation in Agricultural Soils*. ASA, CSSA, SSSA International Annual Meeting, Baltimore, MD.

Lacroix, E.M. J.M. Mendillo, C. Shepherd, R.J. Rossi, S.E. Fendorf. 2020. *Quantifying Soil Carbon Protection by Anaerobic Microsites*. American Geophysical Union, Fall Meeting. Virtual.

Lacroix, E.M. J.M. Mendillo, C. Shepherd, R.J. Rossi, S.E. Fendorf. 2020. *Defining and Quantifying Soil Carbon Protection by Anaerobic Microsites*. ASA, CSSA, SSSA International Annual Meeting. Virtual.

Rossi, R.J. **E.M. Lacroix**, D.A. Bossio, S.E. Fendorf. 2019. *Differences in Pore-Scale Oxygen Content and Anaerobic Metabolisms at Varying Moisture Contents in Upland Soils*. American Geophysical Union, Fall Meeting, San Francisco, CA.

Lacroix, E.M. R.J. Rossi, Mendillo, J.M., Shepherd, C.M., S.E. Fendorf. 2019. *Quantifying soil carbon protection by anoxic microsites in soils*. American Geophysical Union, Fall Meeting, San Francisco, CA.

Lacroix, E.M. R.J. Rossi, D.A. Bossio, S.E. Fendorf. 2019. *Crop Management Influences on Pore-Scale Oxygen Content in Upland Soils*. ASA, CSSA, SSSA International Annual Meeting.

Do, H. R.J. Rossi, **E.M. Lacroix**, D.A. Bossio, S.E. Fendorf. 2019. *Sequential Soil Pore Water Extractions with Tempe Cell Soil Water Extractors: A Novel Method to Measure Pore-Scale Oxygen Content*. American Geophysical Union, Fall Meeting, San Francisco, CA.

Rossi, R.J. **E.M. Lacroix**, D.A. Bossio, S.E. Fendorf. 2019. *Quantifying Land Management Impacts on Anaerobic Metabolisms in Upland Soils*. ASA, CSSA, SSSA International Annual Meeting, San Antonio, TX.

Rossi, R.J. **E.M. Lacroix**, D.A. Bossio, S.E. Fendorf. 2018. *Quantifying Anaerobic Volumes in Upland Soils: Impacts of Land Management*. American Geophysical Union, Fall Meeting, Washington, D.C.

***Invited talks**