

# Andrea M. Erhardt

Associate Professor  
Director- Kentucky Stable Isotope Geochemistry Laboratory  
Department of Earth & Environmental Sciences  
University of Kentucky  
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## EDUCATION

### Doctor of Philosophy, June 2013

**Stanford University**, Department of Geological and Environmental Sciences  
*Dissertation Title:* Application of elemental and isotopic proxies to reconstruct Pacific Ocean circulation and productivity during periods of climate change  
*Advisor:* Dr. Adina Paytan

### Master of Science, December 2005

**Colorado School of Mines**, Department of Geology  
*Thesis Title:* Relative Contributions of Climate and Tectonics on Fluvial Sedimentation on the Wasatch Formation of Western Colorado

### Bachelor of Science, June 2001

**Northwestern University**, Department of Environmental Engineering  
*Second Major:* Geological Sciences

## PROFESSIONAL APPOINTMENTS

*August 2022 – 2024* **Anna Boyksen Fellow**, Technical University of Munich, Germany  
*July 2022 – Present* **Associate Professor**, University of Kentucky, Lexington, KY  
*August 2016 – July 2022* **Assistant Professor**, University of Kentucky, Lexington, KY  
*July 2015 – July 2016* **Postdoctoral Research Associate**, University of Cambridge, UK  
*Advisor:* Dr. Sasha Turchyn  
*March 2014 – July 2016* **Postdoctoral Research Associate**, Magdalene College, University of Cambridge  
*July 2013 – July 2015* **CIFAR (Canadian Institute for Advanced Research) Postdoctoral Research Fellow**, University of Cambridge, UK

## RESEARCH INTERESTS

- Understanding the role of diagenesis in carbonate formation
- Quantifying the effects of rapid climate change on ocean chemistry
- Reconstructing paleoclimates using isotopic proxies
- Developing methods for non-traditional isotope analysis on novel substrates
- Applying isotope proxies to understand environmental change
- Promoting justice, equity, diversity, and inclusion in the earth sciences

## RELEVANT WORK EXPERIENCE

*Sept. 2001 – Sept 2002* **Environmental Engineer**, Geochemistry Group, Camp Dresser & McKee, Denver, CO  
*Sept 1998 – Dec 2000* **Environmental Engineering Co-op**, Water Resources Group, Camp Dresser & McKee, Chicago, IL

## PUBLICATIONS

### \*Advisee

- \*Avery, E., Samonina, O., Kryshchuk, L., Vyshenska, I., Fryar, A.E., **Erhardt, A.M.**, Accepted for Publication. Precipitation patterns in Ukraine as derived for water isotope analysis. *Isotopes in Environmental and Health Studies*.
- \*Wilson, J.W., **Erhardt, A.M.** and Tobin, B.W., (2022). Using  $\delta^{13}\text{C}$  of dissolved inorganic carbon and dissolved organic carbon as tracers to characterize karst spring systems of the Shivwits Plateau at Grand Canyon National Park. *Hydrogeology Journal*, <https://doi.org/10.1007/s10040-022-02450-3>
- Erhardt, A.M.**, Douglas, G., Jacobson, A.D., Wimpenny, J., Yin, Q-Z., Paytan, A. (2021). Assessing sedimentary detrital Pb isotopes as a dust tracer in the Pacific Ocean. *Paleoceanography and Paleoclimatology*, 36 (4), e2020PA004144. DOI: 10.1029/2020PA004144
- Yao, W., Markovic, S., Paytan, A., **Erhardt, A.M.**, Wortmann, U.G. (2021). Oxidation of sedimentary sulfides as a negative feedback to ice-sheet expansion. *Earth and Planetary Science Letters*, 568, 117015. DOI: 10.1016/j.epsl.2021.117015
- Bonzani R.M., Alexander, K.V., Metz, A., Munizzi, J.S., Manzano, B.L., Davidson, M.J., Farish, G., **Erhardt, A.M.** (2021). Deer management strategies and hypothesis testing to explain the increase in prehistoric human maize consumption in the eastern woodlands of the United States: an investigation of the stable carbon isotopic evidence. *Environmental Archaeology*. DOI: 10.1080/14614103.2021.1921674
- de Wet, C.B., **Erhardt, A.M.**, Sharp, W.D., Marks, N.E., Bradbury, H.J., Alexandra V. Turchyn, A.V., Xu, Y., Oster, J.L., (2021). Semi-quantitative estimates of rainfall variability during the 8.2kyr event in California using speleothem calcium isotope ratios. *Geophysical Research Letters*. e2020GL089154 DOI: 10.1029/2020GL089154
- \*Fichtner, V., Lange, S.M., Krause, S., Borca, C.N., Huthwelker, T., Schurr, S., Immenhauser, A., **Erhardt, A.M.**, Treude, T., Pederson, C., Strauss, H., (2021). Microbial activity affects sulfur in biogenic aragonite. *Depositional Record*, 00, 1-21. DOI: 10.1002/dep2.133
- \*Wilson J, Munizzi J, **Erhardt A.M.** (2020). Preservation methods for the isotopic composition of dissolved carbon species in non-ideal conditions. *Rapid Communications in Mass Spectrometry* 34, 8903. <https://doi.org/10.1002/rcm.8903>
- \*Lyon, E., McGlue, M.M., **Erhardt, A.M.**, Kim, S., Stone, J., Zimmerman, S., (2020). Late Holocene hydroclimate changes in the eastern Sierra Nevada revealed by a 4600-year paleoproduction record from June Lake, CA. *Quaternary Science Reviews*, 242, 106432.
- Erhardt, A.M.**, Turchyn, A.V., Dickson, J.A.D., Sadekov, A.Y., Taylor, P.D., Wilson, M.A., Schrag, D.P. (2020). Carbonate hardgrounds suggest persistence of low Mg/Ca oceans over the Phanerozoic, *Geochemistry, Geophysics, Geosystems*, 21, e2019GC008448.
- Erhardt, A.M.**, Turchyn, A.V., Bradbury, H.J., Dickson, J.A.D. (2020). The calcium isotopic composition of carbonate cements: A record of sedimentary carbonate precipitation and ocean chemistry? *Chemical Geology*, 540, 119490. <https://doi.org/10.1016/j.chemgeo.2020.119490>

- Ford, W.I., Fox J.F., Mahoney, T., DeGraves, G., **Erhardt, A.M.**, Yost, S. (2020). Backwater Confluences of the Ohio River: Organic and Inorganic Fingerprints Explain Sediment Dynamics in Wetlands and Marinas, *Journal of the American Water Resources Association*, 56, 692-711. <https://doi.org/10.1111/1752-1688.12850>
- \*Reis, A., **Erhardt, A.M.**, McGlue, M.M., Waite, L. (2019). Evaluating the Effects of Post-Depositional Alteration of Carbonates on the Interpretation of  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{18}\text{O}_{\text{carb}}$  in a Mud-Rich Depositional Environment: A Case Study from the Midland Basin, USA. *Chemical Geology*, 524, 196-212. [doi.org/10.1016/j.chemgeo.2019.06.021](https://doi.org/10.1016/j.chemgeo.2019.06.021)
- Magiera, M., Lechleitner, F.A., **Erhardt, A.M.**, Hartland, A., Kwiecien, O., Cheng, H., Bradbury, H., Turchyn, A.V., Riechelmann, S., Edwards, L., Immenhauser A., F.M. Breitenbach, S.F.M. (2019). Local and regional Indian Summer Monsoon precipitation dynamics during Termination II and the Last Interglacial, *Geophysical Research Letters*, 46, 12454-12463. [doi.org/10.1029/2019GL083721](https://doi.org/10.1029/2019GL083721)
- \*Lyon, E., Freeman, R., Bathon, J., Fryar, A., McGlue., MM, **Erhardt, A.M.**, Rosen, A., Sampson, S., Nelson, A., Parsons, J. (2019). Attitudinal impediments to geoscience major recruitment among ninth graders at a STEAM high school. *Journal of Geoscience Education*. [doi.org/10.1080/10899995.2019.1700593](https://doi.org/10.1080/10899995.2019.1700593)
- Erhardt, A.M.**, (2017). Paleooceanography: Tropical Ties. *Nature Geoscience*, 10, 714-715. Editorial.
- Robinson, R.S., T.C. Moore, **A.M. Erhardt**, and H. Scher, (2015). A transient peak in regenerated production during the Eocene Oligocene Transition. *Paleoceanography*, 30(7). DOI:10.1002/2015PA002777
- Moore, T.C. Jr., S. Kamikuri, **A.M. Erhardt**, J. Baldauf, H.K. Coxall, and T. Westerhold (2015). Radiolarian Stratigraphy near the Eocene-Oligocene Boundary. *Marine Micropaleontology*, 116, 50-62. Doi:10.1016/j.marmicro.2015.02.002
- Erhardt, A.M.**, C.E. Reimers, D. Kadko, and A. Paytan, (2014). Records of trace metals in sediments from the Oregon hypoxic zone: Investigating the occurrence of hypoxia in the past hundreds to thousands of years. *Chemical Geology*, 382 32-43. DOI: 10.1016/j.chemgeo.2014.05.029
- Moore, T.C. B.S. Wade, T. Westerfold, **A.M. Erhardt**, H.K. Coxall, J. Baldauf, and M. Wagner (2014). Equatorial Pacific productivity changes near the Eocene-Oligocene Boundary, *Paleoceanography* 29, 825–844, doi:10.1002/2014PA002656.
- Erhardt, A.M.**, H. Pälike, and A. Paytan, (2013). High-resolution record of export production in the eastern equatorial Pacific across the Eocene-Oligocene transition and relationships to global climatic records. *Paleoceanography* 28 1-13. doi:10.1029/2012PA002347.
- Paytan, A, E T Gray, Z. Ma, **A. Erhardt** and K. Faul, (2011). Application of Sulphur Isotopes for Stratigraphic Correlation. *Isotopes in Environmental and Health Studies*, 1-12. DOI:10.1080/10256016.2011.625423.
- Griffith, E., M. Calhoun, E. Thomas, K. Averyt, **A. Erhardt**, T. Bralower, M. Lyle, A. Olivarez-Lyle, and A. Paytan, (2010). Export Productivity and Carbonate Accumulation in the Pacific Basin at the Transition from a Greenhouse to Icehouse Climate (Late Eocene to Early Oligocene). *Paleoceanography* 25, PA3212
- Mackey, K. R. M., G. L. van Dijken, S. Mazloom, **A. M. Erhardt**, J. Ryan, K. R. Arrigo, and A. Paytan. (2010). Influence of atmospheric nutrients on primary productivity in a coastal upwelling region. *Global Biogeochemical Cycles* 24, GB4027.

## In Review and Revision

\*Avery, E., Samonina, O., Vyshenska, I., Fryar, A.E., **Erhardt, A.M.** Variation of tap-water isotope ratios and municipal water sources across Kyiv city, Ukraine. Under review at *Discover Water*.

\*Reis, A., Fichtner, V., **Erhardt, A.M.** Changing Sub-Surface Chemistry Resulting from a 26-Million-Year Unconformity: Porewater Chemistry from IODP Site 378 in the South Pacific. Submitted to *Paleoceanography and Paleoclimatology*.

Foreman B.Z., Maxbauer, D.P., Lesko, A.K., **Erhardt, A.M.**, Rasmussen, D.M., Lalor, E.F. Floodplain evolution during the early Paleogene within the Piceance Creek Basin, northwest Colorado, U.S.A. In review after revision at the *Journal of Sedimentary Environments*.

## RESEARCH GRANTS

Understanding Institutional Roadblocks to Women and Minority Advancement- Testing Effectiveness of a Multi-Prong Intervention Program, Anna Boyksen Fellowship, Institute for Advanced Studies, Technical University Munich	€70,000
Global Visiting Professor, Department of Chemistry, Technical University Munich	€7,680
Using Deer Stable Isotope Data to Test A Niche Construction Hypothesis for an Increase In Prehistoric Human Maize Consumption and Its Relationship to Present Day Deer Management Practices in the Eastern Woodlands of the United States, (2021) Food Connection, Co-PI's Bonzani, Manzano, Davidson, Erhardt	\$9,700
IODP Postcruise Research Support, Expedition 378, Alex Reis (2020)	\$17,996
IODP Expedition Support 378, Alex Reis (2020)	\$9,691
Examining hydrologic connections at Fern Cave, Alabama and implications of stream connectivity on biological diversity and isolation (2019) USFWS Co-PI's Miller, Tobin, Niemiller, Erhardt	\$14,999
Causes and extent of elevated groundwater methane concentrations in Eastern Kentucky, Kentucky Water Resources Research Institute (2018) PI- Erhardt, Co-I Parris	\$16,971
Liquid Water Isotope Analyzer (VPR Instrumentation Grant) (2018) PI-Erhardt, Co-I Fryar	\$79,816
Isotopic and geochemical analysis of fluid flow in a paleokarst system, San Andres Formation, West Texas (Pioneer Natural Resources) (2017-2020) PI- Erhardt	\$600,000
Stable isotope analysis and paleoceanographic study of Wolfcamp Formation, West Texas (Pioneer Natural Resources) (2017-2019) PI- Erhardt, Co-I McGlue	\$240,000
Biogeochemical characterization of backwater wetlands for improving water quality in disturbed Appalachian watersheds on the Ohio river. (2017-2018) Co-PI's Erhardt and Ford	\$25,000

### *Postdoctoral and Graduate Student Awards*

Canadian Institute for Advanced Research Postdoctoral Fellow (July 2013- 2015)	\$100,000
Schlanger Ocean Drilling Fellowship (2008-2009)	\$30,000
Stanford University McGee Fellowship (2006, 2007)	\$4,000
American Association of Petroleum Geologists Grant-in Aid (2003)	\$2,500
Geological Society of America Research Grant (2004)	\$1,500

## HONORS

### - *Outstanding Graduate Student Mentor Award, University of Kentucky College of Arts and Sciences (2020)*

*“Andrea Erhardt has made inclusion and diversity a fundamental ethos in her graduate student recruiting and mentoring. Her concerted effort to recruit underrepresented and minority students into the geological sciences, one in which by all measures has been the least diverse of any science (<10% of degrees awarded to minority students), allows our entire department to share and benefit from the diverse cultures joining her research group. Prof. Erhardt has also shown the remarkable ability to individualize advising needs and meet students where they are in the academic arc, thus maximizing their potential for successful outcomes both as scholars and human beings.”*

- Teachers Who Make a Difference (2017)
- Outstanding Student Presentation, International Conference for Paleoceanography (September 2013)
- Shore-Based Scientist IODP Leg 320 (2009)
- University of California at Santa Cruz Research Fellow (Sept. 2007- 2015)
- Association of Women Geoscientists – Outstanding Graduate Student Award (2005)
- Association of Geoscience Students – Best Teaching Assistant (2004)

## SCHOLARSHIPS, AWARDS

Returning Carers Grant, University of Cambridge (December 2013)	~\$13,000
Student Travel Grant Recipient, Goldschmidt Geochemistry Conference (2010, 2013)	\$4,000
Student Travel Grant Recipient, Int. Conf. for Paleoceanography (2007, 2010, 2013)	~\$2,500
Shell Foundation Travel Grant (2006, 2007, 2008, 2009, 2010, 2011)	\$2,500
Women’s Forum of Colorado Scholarship (2004)	~\$1,000
Rocky Mountain Association of Geologists Graduate Scholarship (2003)	~\$500
John and Lois Haun Fellowship (2003)	~\$2,000
Robert L. Burch Family Scholarship (2003)	~\$3,000
Timothy Bartshe Scholarship (2003, 2004)	~\$5,000
Farley Family Scholarship for Cooperative Education (2001)	\$1,000
Environmental Engineering and Water Resources Group of ASCE Scholarship (2000)	\$2,000

## INVITED SEMINARS

### 2022

*George Mason University* Isotopes as tracers for sulfur cycling: examples from modern groundwater, ancient porewater, and future directions

### 2021

*Oklahoma State University* Differing impacts of meteoric diagenesis in the Permian San Andres Formation  
*University of Kentucky* Unlearning Racism in the Geosciences (URGE): Preliminary suggestions for change in Earth and Environmental Sciences

### 2020

*Miami University* The geochemistry of carbonate hardground cements as potential recorders of past seawater chemistry

*Colorado College* The geochemistry of carbonate rocks- Indicators of primary seawater or diagenesis?

### 2019

*Indiana State University* Evaluating the Effects of Post-Depositional Alteration of Carbonates on  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{18}\text{O}_{\text{carb}}$  in a Mud-Rich Depositional Environment: A Case Study from the Midland Basin, USA

*Southern Illinois University* Evaluating the Effects of Post-Depositional Alteration of Carbonates on  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{18}\text{O}_{\text{carb}}$  in a Mud-Rich Depositional Environment: A Case Study from the Midland Basin, USA

### 2018

*Appalachian State University* Isotope tracers of pore water geochemistry variability across a backwater wetland- a case study from the Fourpole Creek Watershed, Huntington, WV

### 2017

*Vanderbilt University* Can authigenic carbonate in carbonate hardgrounds allow us to reconstruct the evolution of pore water chemistry?

### 2016

University of Alabama Carbonate hardground cements- using geochemical tools to reconstruct Phanerozoic ocean chemistry

### STAFF SUPERVISED

- 1) Rich Dabundo, laboratory manager. November 2016- October 2017
- 2) Dr. Jordon Munizzi, research facility manager. January 2018-April 2021
- 3) Dr. Aaron Shultis, research facility manager. June 2022-Present

### POSTDOCTORAL RESEARCHERS SUPERVISED

- 1) **Dr. Maggie Sanders**, postdoctoral researcher. October 2017 – October 2018. Co-advised with Dr. Mike McGlue. Funded on a UK Diversity Vice President for Research Postdoctoral Fellowship. Now at USGS.
- 2) **Dr. Vanessa Fichtner**, postdoctoral researcher. April 2018-April 2020. Funded through Pioneer Resources San Andres Grant. Now at the University of Freiburg, Germany.

### STUDENTS SUPERVISED

#### *Ph.D. Students Supervised*

- 1) **Lyon, Eva**. University of Kentucky, Department of Earth and Environmental Sciences. Co-supervised with Dr. Michael McGlue. *A multi-method investigation of the modern sedimentation and Late Holocene paleolimnology of June Lake (Mono County, CA) and a survey-based analysis of ninth graders' attitudes towards Geology*. March 2020. Now Visiting Assistant Professor, Washington and Lee.
- 2) **Avery, Elizabeth**. University of Kentucky, Department of Earth and Environmental Sciences. Co-supervised with Dr. Alan Fryar. *Hyporheic zone restoration of a stream on the University of Kentucky Campus*. Expected Completion, Spring 2022.
- 3) **Reis, Alex**. University of Kentucky, Department of Earth and Environmental Sciences. *An investigation of High-Latitude Marine Sediment Diagenesis using Non-traditional Stable Isotope Systems during Global Scale Climate Transitions*. Expected Completion, Summer 2022.

#### *M.S. Students Supervised*

- 1) **Reis, Alex**. University of Kentucky, Department of Earth and Environmental Sciences. *A Multi-Indicator Approach to Understanding the Diagenesis of Carbonates in Pennsylvanian Mudrocks of the Midland Basin*. May 2018. Now PhD Candidate.
- 2) **Tamakloe, Frank**. University of Kentucky, Department of Earth and Environmental Sciences. *High Resolution Chemostratigraphy of the Wolfcamp-D in the Midland Basin*. June 2019. Now at Chevron Research Laboratories.
- 3) **Alvarez Villa, Christopher**. Co-supervised with Dr. Alan Fryar. University of Kentucky, Department of Earth and Environmental Sciences. *Identification of the causes and extent of elevated methane concentrations in the groundwater of Eastern Kentucky*. October 2020. Now an analytical chemist at Cana Technology.
- 4) **Wilson, Jonathan**. Co-supervised with Dr. Ben Tobin. University of Kentucky, Department of Earth and Environmental Sciences. *Isotopic and chemical tracers of groundwater flow in Grand Canyon National Park*. November 2020. Now at USGS.

#### *Undergraduate Research Projects Supervised*

- 1) **Young, Holly**. University of Kentucky, Department of Earth and Environmental Sciences. *Pore water geochemistry variability across a backwater wetland- a case study from the Fourpole Creek Watershed, Huntington, WV*. 2018.
- 2) **Betchol, Cailey; Wilson, Jonathan**. University of Kentucky, Department of Earth and Environmental Sciences. *Changes in Kentucky's Licking River effect on isotopes of freshwater mussel shells*. 2018.
- 3) **McQueen, Bronson**. University of Kentucky, Department of Earth and Environmental Sciences. *Using geochemical methods to trace groundwater/surface water interaction*. 2019.

- 4) **Collins, April; Shirkey, Felicity; Steiner, Lucy; Whitney, Jennifer.** University of Kentucky, Department of Earth and Environmental Sciences. *Tap water isotopes across Lexington and their relationship to a new local meteoric water line.* 2020.

*Undergraduate Student Workers*

- 1) Thompson, James. March 2017 – August 2017 Now at Eastern Kentucky University
- 2) Morrison, Bailee. August 2017- Dec 2019 Now at NV5 GeoSpatial
- 3) Rich, Rowan. August 2017- Dec 2019 Now at Thoroughbred Engineering
- 4) Young, Holly. August 2017 - May 2018 Now graduate student at Virginia Tech
- 5) Betchol, Cailey. January 2018 - May 2018 Now at Ayres Associates
- 6) Wilson, Jonathan. January 2018 - August 2018 Completed MS, now at USGS
- 7) Collins, April. August 2018 - present
- 8) Al Riyami, Riyam. September 2018 - May 2019 Now at ESBAAR in Oman
- 9) Varias, Madoline. January 2019 - May 2019 Still undergraduate at UK
- 10) McQueen, Bronson. May 2019 - May 2021 Now MS student at UW Madison
- 11) Steiner, Lucy. October 2019 - October 2020 Still undergraduate at UK
- 12) Whitney, Jennifer. October 2019 - May 2021 Now Environmental Lab Analyst at Eurofins
- 13) Shirkey, Felicity. October 2019 - June 2021 Still undergraduate at UK
- 14) Lynch, Kelly. January 2020 - June 2020 Now at NASA
- 15) Aleman, Blanca. September 2020 - present
- 16) McHugh, Michele, December 2020 – June 2021 Still undergraduate at UK

*High school instructor intern*

- 1) Doughty, David. July – August 2017

**STUDENT COMMITTEES**

External Examiner, PhD

Rebecca Parker, University of Exeter, United Kingdom  
 Atena Amirsoleimani, Department of Civil Engineering, University of Kentucky  
 Tasnuba Jerin, Department of Geography, University of Kentucky

Active PhD Committee, University of Kentucky

Edward Lo, Department of Earth and Environmental Sciences  
 Ashley Witten, Department of Anthropology and Archeology  
 Leandro Domingos-Luz, Department of Earth and Environmental Sciences  
 Shishir Sarker, Department of Earth and Environmental Sciences  
 Samuel Whitehead, Department of Earth and Environmental Sciences  
 Travis Banet, Department of Plant and Soil Sciences  
 Sarah Arpin, Department of Earth and Environmental Sciences

Successful Masters Thesis Examination Committee Member, University of Kentucky

Amanda Sherman, Department of Earth and Environmental Sciences  
 Kim Schindler, Department of Earth and Environmental Sciences  
 William Bond, Department of Earth and Environmental Sciences  
 Josh Barna, Department of Earth and Environmental Sciences  
 Anik Mahmud, Department of Plant and Soil Sciences

Active Masters Committee, University of Kentucky

Ryan Dapkus, Department of Earth and Environmental Sciences  
 Sierra Heimel, Department of Earth and Environmental Sciences  
 Antonia Bottoms, Department of Earth and Environmental Sciences  
 Alexandria Thomas, Department of Earth and Environmental Sciences

## SUPERVISED STUDENT SCHOLARSHIPS AND AWARDS

*Avery, Elizabeth (PhD): Fulbright Scholar (2019); Geological Society of America On to the Future Travel Grant, \$550 (2018); Southeast Section Geological Society of America Research Grant, \$900 (2018); National Science Foundation Stipend for 4th Cargese Summer School, \$3,500 (2018)*

*Lyon, Eva (PhD): GSA Student Research Grant (2017); Paclim student travel support (2017, 2019); IPA-IAL student travel support (2018)*

*Reis, Alex (MS and PhD): Staff Scientist appointment on IODP Expedition 378- 3 months' salary & a maximum of \$19,000 in research support following the expedition (2020); NSF full support for attendance at Urbino Paleooceanography Summer School, \$3000 (2019), US Science Support Program Travel grant for IODP PSS- \$2000 (2018); SMART Scholarship for Service Semi-finalist (2018 & 2019); GSA Student Grant- \$1550 (2017); AAPG Grants-in-Aid- \$2500 (2017); International Association of Sedimentologists Travel Grant for Flügel Course, €280 (2018)*

*Tamakloe, Frank (MS): IAS Travel Grant (Jan 2018); GSA Graduate Student Research Grant (April 2018); NSF-SEPM ISC Travel Grant (July 2018); Full-Time Offer Chevron (September 2018)*

*Alvarez-Villa, Cristopher (MS): AAPG Student Grant in Aid (2019)*

*Wilson, Jonathan (MS): GSA John W. Hess Research Grant- \$1530 (2019)*

## TEACHING

### University of Kentucky

Course	Semester	Students				Quality of Teaching (5-point scale)		Value of Course (5-point scale)	
		Total	UG	MS	PhD	Erhardt	College	Erhardt	College
Low Temperature Geochemistry (EES 530)	F 2021	9	5	2	2	4.9	4.3	4.9	4.0
	F 2020	14	9	2	3	4.9	4.2	4.7	4.0
	F 2019	7	5	1	1	N/A- reporting threshold not met			
	F 2018	7	4	1	2	4.9	4.2	4.9	4.0
	F 2017	14	7	5	2	4.6	4.2	4.6	4.0
	F 2016	6	2	3	1	N/A- reporting threshold not met			
Isotopes in the Environment (EES 645/ 630)	S 2022	10	1	4	5	5.0	4.1	5.0	4.3
	S 2021	6		3	3	N/A- reporting threshold not met			
	S 2019	8		4	4	4.9	4.2	5.0	4.0
	S 2018	12		10	2	4.9	4.2	4.6	4.0
	S 2017*	14		12	2	4.3	4.1	3.2	4.0
*Course Team Taught in 2017 only									
Endangered Planet (EES 110) *UK Core/General Education Class	S 2022	77	77			4.3	4.1	4.5	4.3
	F 2021	65	65			4.6	4.3	4.5	4.0
	S 2019	76	76			4.5	4.2	4.1	4.0

### University of Cambridge

- Guest Lecturer, Teaching Methods in the Geological Sciences
- Small Group Instruction, Hydrosphere, Sedimentology, Climate, and Paleoecology
- Laboratory Instructor, Hydrosphere, Geochemistry

### Stanford University

- Instructor and Course Design, Mentoring in Research
- Instructor and Course Design, Professional Development in Geoscience Education



- Teaching Instructor, California Gold Rush scientific writing course
- Teaching Assistant, Paleoceanography, Introduction to Geological Sciences, How to Critically Read and Interpret Scientific Papers

**University of California- Santa Cruz**

- Teaching Assistant and Exercise Design: Environmental Geology

**Colorado School of Mines**

- Laboratory Instructor and Exercise Design: Sedimentary Geology, Petroleum Geology
- Instructor, Geology Field Camp for Petroleum Engineers

**ACADEMIC SERVICE**

**Service to Profession**

- Proposal reviewer for: NSF Marine Geology and Geochemistry program, NSF Paleo Perspectives on Climate Change, NSF Major Research Instrumentation Grants, National Environmental Research Council United Kingdom (NERC), ERC DFG German Research Foundation, Chilean National Science and Technology Commission, Petroleum Research Fund of the American Chemical Society
- Manuscript Reviewer for: *Nature Geoscience; Geology; Geochimica et Cosmochimica Acta; Earth and Planetary Science Letters; Geophysical Research Letters; Palaeogeography, Palaeoclimatology, Palaeoecology; Paleoceanography and Paleoclimatology; Marine Chemistry; Chemical Geology; Marine Geology; Geochemistry, Geophysics, Geosystems; Journal of Archeological Science; Journal of Great Lakes Research; Minerals Magazine, Journal of Quaternary Science*
- Textbook Review: Introduction to Geochemistry, Day and Kastner
- American Geophysical Union Outstanding Student Presentation Advisory Board (2021)
- American Geophysical Union Outstanding Student Presentation Award Coordinator, Paleoceanography and Paleoclimatology Section (2017-2020)
- Session Co-chair Geochemical Indicators of Past Climate and Environmental Change, Goldschmidt Geochemistry Conference (August 2020)
- Session Co-chair Dynamics of the Global Weathering Feedback and its Impact on the Exchange of Carbon and Oxygen with the Atmosphere Goldschmidt Geochemistry Conference (August 2017)
- Session Co-chair Low Temperature Geochemistry Session Goldschmidt Geochemistry Conference (June 2014)
- Mentor, Goldschmidt Geochemistry Conference
- Panelist, Dual Career Geoscientists, Goldschmidt 2018

**Service to University**

- Unlearning Racism in the Geosciences (URGE) Pod Leader- I organized 26 geologists from undergraduate to full professor to complete and discuss readings over the 16-week program. I managed the deliverables and lead a department seminar to discuss DEI issues in the department and larger geoscience community.
- Facilitator, Picture a Scientist Discussion, Kentucky Geological Survey
- Search Committee, Carbonate Geologist, Kentucky Geologic Survey
- Recruiting, Alumni, Diversity, Equity, and Inclusion Committee, Department of Earth and Environmental Sciences
- Personnel and Budget Committee, Department of Earth and Environmental Sciences
- Chair Search Committee, Department of Earth and Environmental Sciences
- Committee Member- Athena Swan Gender Equality Scheme, University of Cambridge

**Service to University- Kentucky Stable Isotope Geochemistry Laboratory**

I serve as the Director of Kentucky Stable Isotope Geochemistry Laboratory (KSI GL). Under my direction, the stable isotope lab has become fully operational with expanded capabilities. Most of the instrumentation

below has been modified and/or restored to achieve full functionality. KSIIGL has supported over 340 projects since Fall 2018 from researchers across the University and country. Each analytical run is supported by ~50% additional standards and duplicates, with the below precision obtained through blind standards. More information on the laboratory can be found at isotopes.as.uky.edu.

Equipment	Analyses Performed	Analytical Precision	Unique Samples Run Since Fall 2018
<i>Thermo Finnigan DELTA<sup>plus</sup> XP – “Zenyatta”</i>			
Costech ECS 4010 EA, Conflo IV	$\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ on soils, sediments, bone collagen, plant material, etc.	<0.2‰	10,700
<i>Thermo Finnigan DELTA<sup>plus</sup> XP – “Aristides”</i>			
Thermo Finnigan GasBench II	$\delta^{13}\text{C}$ and $\delta^{18}\text{O}$ of carbonate; $\delta^{13}\text{C}$ of DIC and DOC	<0.2‰	2,500
TC/EA, Conflo III	$\delta^{18}\text{O}$ sulfate	0.2‰	300
<i>Thermo MAT 253 – “Longtail”</i>			
*Thermo EA Isolink CN with ramped GC column, Conflo IV	$\delta^{34}\text{S}$ sulfate extracted from porewater, carbonate, gypsum/anhydrite, and converted from sulfides; $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$ of small samples	0.2‰	750
Trace GC Isolink (CNH)	$\delta^{13}\text{C}$ and $\delta\text{D}$ of Methane	0.6‰ ( $\delta^{13}\text{C}$ ) 2.0‰ ( $\delta\text{D}$ )	200
<i>*Los Gatos Research T-LWLA-45-EP – “Limestone”</i>			
	$\delta^{18}\text{O}$ , $\Delta^{17}\text{O}$ , and $\delta\text{D}$ of water	<0.2‰	1,800
<i>Picarro G1101-i</i>			
	$\delta^{13}\text{C}$ CO <sub>2</sub>	Used for outreach (breath CO <sub>2</sub> )	
<i>* Purchased through grant funds</i>			

### Service to Community

- Hosted 5 high school students in the Stable Isotope Lab through a partnership with the STEAM Academy of Lexington
- Mentor, post-secondary school teacher through U Kentucky School of Education
- Panelist, Science Speaks
- Water Professionals Student Chapter guest speaker
- Facilitator, Discussion between UCLA and Kentucky students post-election, 2016
- Co-Organizer, Women in Geoscience, University of Kentucky
- Classroom teaching via coursework in Communicating Ocean Sciences to the public
- Community outreach activities, including Sally Ride Festival, Geokids, and presentations at local schools

### ANALYTICAL SKILLS

- Preparation, measurement, and interpretation of H, C, N, O, and S isotopes in a wide range of compounds
- Electron microprobe microanalysis (EPMA) of carbonates
- Sr and Ca isotope analysis on a Thermal Ionization Mass Spectrometer (TIMS)
- Measurement of Pb, Mo, and Nd isotopes on a Neptune MC-ICP-MS
- Measurement of cation and anion concentrations using the Dionex Ion Chromograph
- Trace metal chemistry, including column chemistry for Sr, Ca, Pb, Mo, and Nd isotopes

- Measurement of trace metals on an Element ICP-MS
- Bulk sediment digestion and measurement of trace metal ratios
- Measurement of metal ratios and isotopes for novel media, including ferromanganese coatings, detrital fractions, corals, porewater and seawater
- Separation of mineral fractions, particularly marine barite

#### FIELD EXPERIENCES

- Shipboard Scientist, R/V Wecoma; March, 2008; August, 2008
- Field Researcher, Slope and Basin Consortium; Summer 2002, 2003, 2004

#### CONFERENCE PRESENTATIONS (As Faculty at the University of Kentucky)

All presentations given by first author

\**Graduate or Postdoctoral Advisee*

\**Undergraduate Advisee*

#### 2022

\**Reis, A.J., Fichtner, V., Erhardt, A.M.*, Investigating the Potential for Sulfate Reduction Driving Dolomitization at IODP Site 378-U1553. American Geophysical Union, **Poster Presentation.**

DeWet, C., Griffith, E.M., **Erhardt, A.M.**, Bradbury, H., Turchyn, A.V., Oster, J. (2022). A Comparative study of drip water and modern calcite Ca Isotope ratios with Rainfall, C Isotope ratios, and trace element data from three US cave systems. Geological Society of America, *Poster Presentation.*

\**Lyon, E.C., Erhardt, A.M., McGlue, M., Lopera Congote, L., Stone, J.R., Yeager, K.*, (2022). Gull Lake, CA: A new sedimentary archive of historical climate change in the Eastern Sierra Nevada. Geological Society of America, *Poster Presentation.*

\**Reis, A.J., Fichtner, V., Erhardt, A.M.*, (2022). Insights into Sulfate Reduction and Carbonate Diagenesis on the Southern Campbell Plateau. International Conference on Paleooceanography. *Poster Presentation.*

DeWet, C., Griffith, E.M., **Erhardt, A.M.**, Bradbury, H., Turchyn, A.V., Oster, J. (2022). A Comparative study of drip water and modern calcite Ca Isotope ratios with Rainfall, C Isotope ratios, and trace element data from three US cave systems. The Karst Record, *Poster Presentation.*

**Erhardt, A.M.**, \**Alvarez Villa, C., Fichtner, V., Fryar, A., Parris, T.M., Zhu, J., Webb, S.E., Munizzi, J.S.*, (2021). Using sulfate and methane isotopes to track methane sources in Eastern Kentucky groundwater. Southeast Geological Society of America. **Oral Presentation.**

\**Avery, E., Samonina, O., Kryshopt, L., Vyshenska, I., Fryar, A.E., Erhardt, A.M.*, (2022). Use of Isotopes in Examining Precipitation patterns in North-Central Ukraine. European Geophysical Union. *Poster Presentation.*

#### 2021

**Erhardt, A.M.**, \**Alvarez Villa, C., Fichtner, V., Fryar, A., Parris, T.M., Zhu, J., Webb, S.E., Munizzi, J.S.*, (2021). Using sulfate and methane isotopes to track methane sources in Eastern Kentucky groundwater. American Geophysical Union. **Oral Presentation.**

\**Reis, A., Erhardt, A.M., Fichtner, V., Roehl, U., Thomas, D., Childress, L.*, and IODP Expedition 378 Science Party. Insights into sulfate reduction and carbonate diagenesis on the Southern Campbell Plateau. American Geophysical Union. *Poster Presentation.*

Yao, W., Markovic, S., Paytan, A., **Erhardt, A.M.**, Wortmann, U., (2021). Does shelf sediment erosion act as negative feedback to atmospheric pCO<sub>2</sub> during glaciations? A case study of the Eocene-Oligocene transition. American Geophysical Union. *Poster Presentation.*

Tobin, B., Niemiller, M., Miller, B., **Erhardt, A.M.**, (2021). Coupling population genetics and tracer hydrology to characterize flow-path dynamics in a karst system. Geological Society of America. *Oral Presentation.*

2020

- \*Reis, A., \*Fichtner, V., **Erhardt, A.M.**, Roehl, U., Thomas, D.J., Childress, L.B., and Expedition 378 Scientific Party, (2020). Carbonate recrystallization on the Campbell Plateau: Preliminary results from IODP Site 378-U1553. American Geophysical Union. *Poster Presentation.*
- \*Avery, E., Samonia, O., Kryshchuk, L., Vyshenska, I., Fryar, A., **Erhardt, A.M.**, (2020). Utilizing stable isotopes of water to investigate climate change in North-Central Ukraine. American Geophysical Union. *Poster Presentation.*
- Stewardt, A., Ronay, E., **Erhardt, A.M.**, Oster, J.L., (2020). Calcium isotopes in stalagmites as a quantitative precipitation proxy for comparison of instrumental records. American Geophysical Union. *Poster Presentation.*
- Erhardt, A.M.**, \*Fichtner, V., (2020). Differing impacts of meteoric diagenesis in the Permian San Andres Formation. Geological Society of America. **Invited Oral Presentation.**
- Erhardt, A.M.**, \*Tamakloe, F., McGlue, M., (2020). Using  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{34}\text{S}$  as indicators of diagenesis in an interbedded shale and carbonate system. Goldschmidt Geochemistry Conference, *Virtual Hybrid Presentation.*
- \*Alvarez Villa, C., **Erhardt, A.M.**, Fryar, A., Parris, T.M., Zhu, J., Webb, S.E., (2020). Geochemical analysis of groundwater methane occurrence in areas of fossil fuel development, Eastern Kentucky. Kentucky Geological Survey Annual Meeting. *Oral Presentation.*

2019

- de Wet, C.B., **Erhardt, A.M.**, Marks N., Sharp, W.D., Oster, J.L., Xu Y., (2019). Toward quantitative records of rainfall using speleothem Ca and Sr isotopes. American Geophysical Union. **Oral Presentation.**
- \*Fichtner, V., Tobin, B.W., \*Wilson, J., **Erhardt, A.M.**, (2019).  $\delta^{34}\text{S}$  of dissolved sulfate uncovers groundwater dynamics in Grand Canyon karst systems. American Geophysical Union. *Poster Presentation.*
- \*Reis, A.J., Griffith, E.M., **Erhardt, A.M.** (2019). Constraining Sediment Diagenesis in the South Pacific using Non-traditional Stable Isotope Analyses. International Conference on Paleooceanography, Sydney, Australia. *Poster Presentation.*
- Erhardt, A.M.**, \*Fichtner, V., (2019). Using multi-phase sulfur isotopes to differentiate between primary and diagenetic Permian carbonates. International Conference on Paleooceanography, Sydney, Australia. *Poster Presentation.*
- \*Fichtner V., **Erhardt, A.M.**, (2019). Sulfur tracks diagenetic processes in Permian San Andres Formation. *Goldschmidt Abstracts*, 987. **Oral Presentation.**
- \*Alvarez Villa, C., **Erhardt, A.M.**, Fryar, A., Parris, T.M., Zhu, J., Webb, S.E., (2019). Identification of the causes and extent of elevated methane concentrations in the groundwater of Eastern Kentucky, Geological Society of America Annual Meeting. *Poster Presentation.*
- \*Wilson, J.W., **Erhardt, A.M.** Tobin, B.W., (2019). Using  $\delta^{13}\text{C}$  of dissolved inorganic carbon and dissolved organic carbon as tracers to characterize karst spring systems of the Shivwits Plateau at Grand Canyon National Park. Geological Society of America Annual Meeting. *Poster Presentation.*
- \*McQueen, B., \*Avery, E.A., Zhu, J., Fryar, A., **Erhardt, A.M.**, (2019). Using geochemical methods to trace groundwater/surface water interaction. Geological Society of America Annual Meeting. *Poster Presentation.*
- \*Lyon, E., McGlue, M.M., **Erhardt, A.M.**, (2019). Late Holocene hydrologic changes in the Eastern Sierra Nevada based on an analysis of high resolution geochemical data from June Lake (CA). Geological Society of America Annual Meeting. *Poster Presentation.*
- \*Alvarez Villa, C., **Erhardt, A.M.**, Fryar, A., Parris, T.M., Zhu, J., Webb, S.E., (2019). Identification of the causes and extent of elevated methane concentrations in the groundwater of Eastern Kentucky, Eastern Section American Association of Petroleum Geologists. *Poster Presentation.*
- \*Tamakloe, F., **Erhardt, A.M.**, McGlue, M.M., Waite, L., (2019). High-resolution chemostratigraphic Analysis of Wolfcamp D Shale-Unit in Upton and Midland Counties – Is it possible to

identify stratigraphically significant surfaces using  $\delta^{13}\text{C}_{\text{carb}}$ ? American Association of Petroleum Geologists Southwest Chapter Meeting. *Poster Presentation*.

Cameron B. de Wet, C.B., Sharp, W.D., **Erhardt, A.**, Oster, J.L., (2019). Application of the speleothem calcium isotope paleo-rainfall proxy to the 8.2 ka event in coastal California. PACLIM, Pacific Climate Workshop. *Poster Presentation*.

\*Lyon, E., McGlue, M.M., **Erhardt, A.**, Kim, S., Zimmerman, S., (2019). A 4500 year paleoproductivity record from June Lake, eastern Sierra Nevada (CA). PACLIM, Pacific Climate Workshop. *Poster Presentation*.

2018

**Erhardt, A.M.**, \*Reis, A., McGlue, M., Waite, L., (2018). Evaluating the effects of post-depositional alteration of carbonates on  $\delta^{13}\text{C}_{\text{carb}}$  and  $\delta^{18}\text{O}_{\text{carb}}$  in a mud-rich depositional environment: A Case Study from the Midland Basin, USA. American Geophysical Union. **Oral Presentation**

\*Fichtner, V., **Erhardt, A.M.**, (2018). Sulfur isotopes in pyrite, anhydrite, elemental sulfur and carbonate associated sulfate as recorders of diagenesis in the San Andres Formation, West Texas. American Geophysical Union. **Oral Presentation**

De Wet, C., **Erhardt, A.**, Sharp, W., Oster, J., (2018). Application of the speleothem calcium isotope paleo-rainfall proxy to the 8.2 ka event in coastal California. American Geophysical Union. *Poster Presentation*

**Erhardt, A.M.**, Ford, W.A., (2018). Geochemical characterization of hyporheic zone geochemistry in a backwater system: a case study from Fourpole Creek, Huntington, WV. Geological Society of America Annual Meeting. **Oral Presentation**.

\*Wilson, J., Haag, W., Weisrock, D., Price, S., **Erhardt, A.M.**, (2018). Variation in stable isotopes of freshwater mussel shells in the Licking River of Kentucky. Geological Society of America. *Poster Presentation*.

\*Avery, E., **Erhardt, A.M.**, (2018). Effects of injected waste water on a heterogeneous system. Geological Society of America. *Poster Presentation*.

**Erhardt, A.M.**, \*Young, H.A., Ford, W.I., (2018). Isotope tracers of pore water geochemistry variability across a backwater wetland- a case study from the Fourpole Creek Watershed, Huntington, WV. American Society of Agricultural and Biosystems Engineers Annual Meeting. **Invited Keynote Presentation**

\*Reis, A.J., McGlue, M.M., Waite, L., **Erhardt, A.M.**, (2018). A multi-indicator approach to understanding carbonate diagenesis in Pennsylvanian mudrocks in the Midland Basin. IODP Petrophysics Summer School.

\*Avery, E., **Erhardt, A.M.**, (2018). The role of dolomitization on fluid flow in a paleokarst system. Fluid Flow Through Porous Media Symposium.

\*Bechtol, C., Haag, W., Price, S., Weisrock, D., **Erhardt, A.M.**, (2018). Changes in Kentucky's Licking River effect on isotopes of freshwater mussel shells. Southeast Geological Society of America. *Poster Presentation*

\*Young, H.A., Ford, W.I., **Erhardt, A.M.**, (2018). Pore water geochemistry variability across a backwater wetland- a case study from the Fourpole Creek Watershed, Huntington, WV. Southeast Geological Society of America. *Poster Presentation*

Roney, E., Oster, J., Sharp, W., Marks, N., **Erhardt, A.**, Breitenbach, S., (2018). Calibrating multiple isotopic proxies in a modern aragonite speleothem from Northeast India. European Geophysical Union.

Manzano, B.L., Pollack, D., Henderson, A.G., **Erhardt, A.**, Munizzi, J., (2018). Fox Farm, a large Fort Ancient village in Mason County, Kentucky: Evidence of turkey (*Meleagris gallopavo*) management? Society of American Archaeology.

2017

\*Reis, A.J., McGlue, M.M., Waite, L., **Erhardt, A.M.**, (2017). A multi-proxy approach to understanding the diagenesis of carbonates in Pennsylvanian mudrocks. American Geophysical Union. *Poster Presentation*.

- Erhardt, A.M.,** Weisrock, D., Price, S., Haag, W., (2017). Variation in stable isotopes of freshwater mussel shells in a Kentucky river system. American Geophysical Union. *Poster Presentation.*
- Roney, E., Oster, J., Sharp, W., Marks, N., **Erhardt, A.,** Breitenbach, S., (2018). Calibrating multiple isotopic proxies in a modern aragonite speleothem from Northeast India. American Geophysical Union. *Poster Presentation.*
- Magiera, M., **Erhardt, A.M.,** Hartland, A., Kwiecien, O., Cheng, H., Immenhauser, A., Turchyn, A., Breitenbach, S., (2017). Indian summer monsoon dynamics during Termination II and MIS 5e. European Geophysical Union.

**2016**

- Erhardt, A.M.,** Sadekov, A., Turchyn, A.V., (2016). Can carbonate hardground cements allow us to reconstruct the evolution of pore water chemistry? American Geophysical Union. *Poster Presentation.*