

Matthew L. Allen, PhD

The University of Toledo
Department of Environmental Sciences
matthew.allen3@utoledo.edu

CURRENT POSITION	<i>Postdoctoral Associate</i> Department of Environmental Sciences, The University of Toledo, Toledo, OH Advisor: Inke Forbrich	September 1, 2026–Present
EXPERTISE	Stable Isotope Geochemistry; Aqueous Geochemistry; Ecohydrology; Biogeochemistry; Paleoenvironmental Reconstruction; Stratigraphy and Sedimentology; Petroleum Exploration Geology	
ACADEMIC BACKGROUND	<i>Ph.D. Geology</i> , University of Kansas, Lawrence, KS Advisor: Marina B. Suarez Dissertation: <i>Geochemical Approaches to Paleoecology and Paleoclimatology of the Cretaceous Cloverly Formation</i>	2024
	<i>M.Sc. Geology</i> , University of Texas at San Antonio, TX Advisor: Lance L. Lambert Thesis: <i>New Permian Ammonoid Localities at Sibley's Last Chance Ranch, Delaware Mountains, Culberson County, TX</i>	2016
	<i>B.S. Geology</i> , University of Alabama, Tuscaloosa, AL	2013
GRANTS AND FELLOWSHIPS	<i>NSF-EAR Postdoctoral Fellowship (EAR-PF)</i> , National Science Foundation 31, 2026 Project: Applying triple oxygen isotopes across the Paleocene–Eocene Thermal Maximum in the Bighorn Basin, Wyoming.	2024–July
	<i>Student Research Grant</i> , SEPM Foundation Project: Evaluation of a possible major unconformity in fluvial deposits of the Early Cretaceous Cloverly Formation, Wyoming.	2024
RESEARCH EXPERIENCE	<i>Postdoctoral Associate</i> , The University of Toledo, Toledo, OH Use stable isotope tracers ($\delta^{18}\text{O}$, $\delta^2\text{H}$, and $\Delta^{17}\text{O}$) to partition evapotranspiration into evaporation and transpiration in coastal marshes at the Plum Island Ecosystems LTER, in collaboration with the Marine Biological Laboratory, Woods Hole. Lead field sampling and isotope analyses with Inke Forbrich (CMarsh project) to improve ecosystem-scale flux estimates and understand how plant water use drives ecosystem–atmosphere carbon exchange.	September 1, 2026–Present
	<i>NSF-EAR Postdoctoral Fellow</i> , University of Michigan, Ann Arbor, MI Conduct independent research on hydroclimate change across the Paleocene–Eocene Thermal Maximum using triple oxygen isotopes from mammal fossils and pedogenic carbonates in the Bighorn Basin. Operate and maintain stable	2024–July 31, 2026

isotope mass spectrometers and supervise data quality in high-precision isotope analyses. Mentor undergraduate and graduate students in laboratory methods and research design.

Graduate Research Assistant, University of Kansas, Lawrence, KS 2022–2024
Investigated paleoclimate and paleoecology of the Cretaceous Cloverly Formation primarily using stable isotope geochemistry and related methods. Developed datasets that contributed to peer-reviewed manuscripts on isotope paleoecology, chemostratigraphy, and mid-Cretaceous climate variability. Supervised undergraduate researchers in sampling, lab preparation, and data analysis.

Undergraduate Research Assistant, University of Alabama, Tuscaloosa, AL 2011–2012
Contributed to stable isotope analyses of invertebrate biapatite through microsampling and thin section preparation.

TEACHING EXPERIENCE

Graduate Teaching Assistant 2020–2021
University of Kansas, Lawrence, KS
Lead instructor for introductory geology; taught paleontology lab; administered intro geology labs.

Graduate Teaching Assistant 2013–2015
University of Texas at San Antonio, TX
Taught sedimentology/stratigraphy and paleontology labs; assisted with intro geology labs.

PEDAGOGICAL TRAINING

Postdoctoral Short Course on College Teaching in STEM (Certificate) 2026
Center for Research on Learning and Teaching, University of Michigan
10-week structured program covering evidence-based teaching, course design, equity-focused pedagogy, active learning, lesson planning, and practice teaching.

INDUSTRY EXPERIENCE

Senior Geologist 2019–2020
Zachry Exploration LLC., San Antonio, TX
Developed exploration campaigns using logs, production data, and 3D seismic; oversaw wireline well-logging at drill sites.

Geologist 2015–2019
Zachry Exploration LLC., San Antonio, TX
Characterized basin- and reservoir-scale geology; evaluated prospect proposals; supervised wireline logging.

PUBLICATIONS

Peer-Reviewed Articles

- (1) Allen, M.L., Suarez, M.B., Adams, T.L., and Suarez, C.A., 2025. Ecohydrology and paleoenvironment of the Cretaceous (Albian) Cloverly Formation: insights from multi-taxon oxygen isotope analysis of vertebrate phosphates. *Frontiers in Earth Science* **13**:1497416. doi:10.3389/feart.2025.1497416

- (2) Allen, M.L., Fekete, J., Kalu, Q., Sharman, G., Suarez, M.B., Suarez, C.A., and Crowley, J. L. (accepted pending revisions). Widespread carbon cycle event recorded in mid-Albian (Cretaceous) terrestrial strata of Wyoming (USA). *Geochemistry, Geophysics, Geosystems*.

Book Chapters

- (1) Korasidis, V.A., Allen, M.L., Foreman, B.Z., Frieling, J., Hood, A.v.S., Hupp, B.N., Rush, W., and Weaver, L.N. (accepted 2026). Global changes during the Paleocene-Eocene Thermal Maximum: A review. Invited chapter on Hothouse Climates. In: *Encyclopedia of Climate System Science*. Elsevier.

Manuscripts in Preparation (selected)

- (1) Allen, M.L., Wisniewski, A., Unruh-Friesen, E.G., Newman, W.M., Weaver, L.N., and Passey, B.H. Paired clumped and triple oxygen isotope records reveal terrestrial temperature and hydroclimate across the Late Paleocene–Early Eocene. Target journal: *Paleoceanography and Paleoclimatology*.
- (2) Allen, M.L., Suarez, M.B., Kalu, Q., Suarez, C., and Hyland, E. Multi-Proxy Paleoenvironmental Reconstruction of the Aptian-Albian (Cretaceous) Cloverly Formation, Wyoming, USA. Target journal: *Climate of the Past*.

Published Abstracts

Kalu, Q.A., Suarez, C.A., Sharman, G., Suarez, M.B., Allen, M., and D’Emic, M. (2023). pCO₂ calculations from Cloverly Formation in northern Wyoming using pedogenic carbonate nodules. *Anatomical Record*, 306(S1): 154–156. Special Issue: 14th Symposium on Mesozoic Terrestrial Ecosystems and Biota, June 2023.

Radermacher, V.J., Makovicky, P., Suarez, C.A., Suarez, M.B., and Allen, M. (2023). Nodosaur track (*Tetrapodosaurus*) from the Early Cretaceous Sykes Mountain Formation of Wyoming. *Journal of Vertebrate Paleontology, Program and Abstracts*, 2023.

INVITED PRESENTATIONS

Allen, M.L. (January 2026). *Bridging Realms: Mid-Cretaceous Climate, Life, and Tectonics on Land and at Sea*. Invited talk, South Texas Geological Society luncheon, San Antonio, TX.

CONFERENCE PRESENTATIONS

Lead / Presenting Author

Allen, M.L., Wisniewski, A., Unruh-Friesen, E.G., Passey, B.H., and Newman, W.M., 2026. Hot Before the Hyperthermal: New Terrestrial Temperature Constraints Across the Late Paleocene–PETM Transition. *Climatic and Biotic Events of the Paleogene 2026*.

Allen, M.L., Levin, N.E., Passey, B.H., Snell, K.E., and Havranek, R.E., 2025. Triple oxygen isotope compositions of paleosol carbonates spanning the PETM in Wyoming. *GSA Connects 2025 Abstracts with Programs*.

- Allen, M.L., and Suarez, M.B., 2022. Niche partitioning and paleohydrology: multi-taxa oxygen isotopic analysis of vertebrate phosphates, Cretaceous Cloverly Formation, Montana, USA. *GSA Abstracts with Programs* **54**(5). <https://doi.org/10.1130/abs/2022AM-382377>.
- Allen, M.L., Coombs, N.J., Makovicky, P.J., and Suarez, M.B., 2022. Faunal comparison of Aptian–Albian continental vertebrates, North American WIB: biostratigraphic and biogeographic context. *GSA Abstracts with Programs* **54**(5). <https://doi.org/10.1130/abs/2022AM-383041>.
- Allen, M.L., and Lambert, L.L., 2019. New morphometric methods to quantify complex ammonoid sutures. *GSA Abstracts with Programs* **51**(5). <https://doi.org/10.1130/abs/2019AM-337565>.
- Allen, M.L., and Lambert, L.L., 2017. The continuing significance of Sibley Ranch localities (Culberson County, Texas) to Guadalupian (Middle Permian Series) ammonoid research. *GSA Abstracts with Programs* **49**(6). <https://doi.org/10.1130/abs/2017AM-308319>.
- Allen, M.L., and Lambert, L.L., 2014. Sequence stratigraphic and biostratigraphic correlation of the North American Atokan/Desmoinesian boundary to the Donets Basin, Ukraine. *Proceedings, College of Science Research Conference*, University of Texas at San Antonio, p. 109.

Co-author

- Unruh-Friesen, E.G., Allen, M.L., Newman, W.M., Weaver, L.N., and Passey, B.H., 2026. Evaluating the water balance thermo-physiology of late Miocene equids using triple oxygen isotopes of fossil tooth enamel. *Society of Vertebrate Paleontology Annual Meeting Abstracts*.
- Wolf, A., Cole, J.E., Allen, M.L., Geng, J., Langston, J., Passey, B.H., Patterson, E.W., Baker, J.L., Johnson, K.R., McGee, D., and Griffiths, M., 2025. Quantifying cave-internal alterations in speleothems using triple oxygen isotopes. *GSA Abstracts with Programs*, Session: Caves and Karst Through Space and Time.
- Suarez, M.B., Allen, M.L., and Suarez, C.A. (2025). Multi-taxon oxygen isotope analysis of bioapatites from the Cloverly Formation, Wyoming. Geological Society of America Section Meeting, Spokane, WA, May 2025.
- Fekete, J., Sharman, G., Suarez, C., Suarez, M.B., Zanno, L.E., Tucker, R.T., Lupia, R., Makovicky, P.J., Crowley, J.L., Forster, C., Kalu, Q., Allen, M.L., and Biebesheimer, E. (2025). Refined geochronologic framework of the Early Cretaceous nonmarine Western Interior Basin. Geological Society of America Section Meeting, Provo, UT, May 2025.
- Lambert, L. L., Vote, J. J., Allen, M.L. and Lewis, D., 2018, Old localities and new specimens—Family Cyclolobidae (Middle and Late Permian) are more complex and diverse than thought. In: A. El Hassani, R. T. Becker, S. Hartenfels, and F. Luddecke (eds.), *10th International Symposium “Cephalopods – Present and*

Past”, Program and Abstracts, Munstersche Forschungen zur Geologie und Palaontologie, 110:70.

PROFESSIONAL SERVICE Co-chair, topical session *Cephalopods Through Time: Insights into Evolution, Ecology, and Environmental Reconstruction*, Geological Society of America Annual Meeting (GSA Connects 2025), San Antonio, TX, October 2025.

Manuscript reviewer for *Journal of Paleontology* (2025)

Manuscript reviewer for *Geological Society of America Bulletin* (2025)

Co-founder, Board Member, KU Geology Graduate Student Organization 2022–2023

Vice President, South Texas Geological Society 2019–2020

PROFESSIONAL MEMBERSHIPS Geological Society of America (GSA) 2016–present

American Geophysical Union (AGU) 2024–present

American Association of Petroleum Geologists (AAPG) 2014–2019

OUTREACH AND COMMUNITY ENGAGEMENT *Science Communication Fellow*, University of Michigan 2025
Completed NSF-supported Portal to the Public program; participated in five professional development workshops on public engagement; developed inquiry-based activities; and presented research at two community outreach events.

Invited Presenter, Perry School Science Festival, Ann Arbor, MI Spring 2025
Presented an interactive demonstration on isotope research and paleoclimate.

Coach, Middle School Science Olympiad, Ann Arbor, MI Fall 2025

Presenter, Museum ID Day, U-M Museum of Natural History 2025

Organizer and Presenter, KU Geology Open House, Lawrence, KS 2023
Coordinated department-wide outreach event for families and school children; led activities on fossils and Earth history.

Presenter, Girls Inc. RockIT Science Festival, San Antonio, TX 2019–2020
Designed and led interactive STEM exhibits for middle school girls.

Classroom Presenter, Northeast ISD, San Antonio, TX 2016–2019
Introduced students to fossils and Earth history through interactive lessons.

COMMUNITY SERVICE AND LEADERSHIP Vice President, Boerne Chapter, Native Plant Society of Texas 2019–2020

Area Chief Volunteer, Texas Parks and Wildlife 2016–2019

Texas State Coordinator, Fishing’s Future 2016–2019

Chairman, Boerne Chapter, Ducks Unlimited	2016–2018
Founder, President, University of Alabama Fly Fishing Club	2012–2013