

Elizabeth J. Olson

CURRICULUM VITAE

Department of Biology, Geology and Environmental Sciences

University of Tennessee Chattanooga, Chattanooga, TN

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RESEARCH INTERESTS

Geochemistry, paleoclimate, hydrology, and aerosol chemistry. My research investigates critical zone processes of environmental change through stalagmites and tree-ring geochemistry. This includes understanding spatial and temporal variability of modern atmospheric and hydrologic environments using various elemental and isotopic tracers. All aspects of my research focus on determining environmental and/or climatic change impacts over time.

EDUCATION

2018 Ph.D., Geology and Environmental Geosciences

Northern Illinois University, DeKalb, Illinois

Advisor: J.P. Dodd

Dissertation: Hydrogen, carbon and oxygen isotopes in *Prosopis* sp. trees: a new climate proxy for Holocene paleoclimate in the Atacama Desert, Chile

2012 M.S., Quaternary and Climate Studies

University of Maine, Orono, Maine

Advisor: D. Sandweiss

Thesis: Climate, Environment, Geomorphology and Settlement during the Preceramic Period at the Salinas de Chao, North Coast of Peru

2010 B.A., Geology and Anthropology, *summa cum laude*

University of Florida; Gainesville, Florida (2010)

Advisors: K. Emery and J. Krigbaum

Thesis: Zoometric Breed Analysis and Isotopic Paleodietary Reconstruction of the Maya Dog

POSITIONS HELD

2025 Assistant Professor, University of Tennessee Chattanooga

2025-2022 Postdoctoral researcher, Union College

2022-2019 Postdoctoral researcher, Purdue University

2018 Lecturer, Triton College

2018 Lecturer, Harold Washington College

2017 Intern at the National Center for Ecological Analysis and Synthesis

2016 Intern at Argonne National Laboratory Center for Energy, Environmental, and Economic Systems Analysis (CEESA)

2017–2013 Teaching Assistant/Lecturer, Northern Illinois University

2012–2010 Research Assistant, University of Maine

2010–2007 Assistant Curator, Florida Museum of Natural History

PUBLICATIONS

**denotes undergraduate student co-author *graduate student co-author

2026 Olson, E.J., Parmenter, D., Gillikin, D.P., *Piccirillo, L., Verheyden, A., Edwards, R.L., Rodbell, D.T., The South American Monsoon over the past 450 ka years, *Nature*, in review submitted August 2025, revisions submitted December 2025

2025

Brenner, L., **Mahar, I., **Olson, E.**, Gillikin, D.P., Haynes, L., Curtin, L., He, M.Z. and Kahn, B., Eastern Oyster (*Crassostrea virginica*) shell geochemistry archives geographically unique multi-metal fingerprints at known contaminated sites. *Marine Pollution Bulletin*, 221, p.118553.

2024

Olson, E., Gillikin, D.P., *Piccirillo, L., Verheyden, A., **Forsyth, A., **Litchfield, K., **Stoltenberg, H., **Clavel, A., **Ramjohn, M., **Nazir, S., Tapia, P.M., *Parmenter, D., and Rodbell, D., Cave monitoring in the Peruvian Andes reveals monsoon climate preserved in speleothem calcite; *Chemical Geology*, 667, p.122315.

Olson, E.J., Welp, L.R., Frisbee, M.D., Medina, S.A.Z., Alvarez, C.O., **Quispe, W.R.R., **Carrion, M.A., **Mamani, C.I.S., Rodriguez, J.D., Jara, J.M., Ccanccapa-Cartagena, A., and Jafvert, C.T., Spatially-heterogeneous discharge of glacial meltwater to drainages surrounding the ablating Coropuna ice cap, Peruvian Andes; *Hydrologic Sciences Journal*, 69(8), 1113–1129.

2022

Welp, L. R., **Olson, E. J.**, Valdivia, A. L., Larico, J. R., **Arhuire, E. P., Paredes, L. M., **DeGraw, J., and Michalski, G. M. 2022, Reinterpreting Precipitation Stable Water Isotope Variability in the Andean Western Cordillera Due To Sub-Seasonal Moisture Source Changes and Sub-Cloud Evaporation. *Geophysical Research Letters*, 49(18), e99876.

Alvarez, O., **Olson, E.J.**, Frisbee, M.D., Medina, S.A.Z., **Quispe, W.R.R., **Carrion, M.A., **Mamani, C.I.S., Rodriguez, J.D., Ccanccapa-Cartagena, A.D., Jafvert, C.T., and Welp, L.R., 2022, Evidence for high-elevation salar recharge and interbasin groundwater flow in the Western Cordillera of the Peruvian Andes; *Hydrology and Earth System Sciences*. 1-35

Michalski, G., Valdivia, A. L., **Olson, E.**, Reyes, J. L., *Li, J., *Fang, H., and Welp, L. 2022, Identifying NOx sources in Arequipa, Peru using nitrogen isotopes in particulate nitrate. *Frontiers in Environmental Science*, 864.

2021

Olson, E.J., Michalski, G., Welp, L., Larrea, A.V., Reyes, J., *Peña., J.S., *Fang, H., Gomex, K. M., and *Li, J. 2021, Mineral dust and fossil fuel combustion dominate sources of aerosol sulfate in urban Peru identified by sulfur stable isotopes and water-soluble ions; *Atmospheric Environment*, 260, 118482

Li, J., Michalski, G., **Olson E.J.**, Welp, L.R., Larrea Valdivia, A.E., Larico, J.R., Zapata, F.A., Paredes, L.M. 2021, Geochemical Characterization and Heavy Metal Sources in PM₁₀ in Arequipa, Peru; *Atmosphere*, 12(5):641.

Ccanccapa-Cartagena, A., Paredes, B., Vera, C., Chavez-Gonzales, F. D., **Olson, E. J.**, Welp, L. R., Zyaykina, N.N., Filley, T. R., Warsinger, D. M., Jafvert, C. T., 2021, Occurrence and probabilistic health risk assessment (PRA) of dissolved metals in surface water sources in Southern Peru. *Environmental Advances*, 100102.

2020 **Olson, E. J.**, Dodd, J. P., & Rivera, M. A., 2020, Prosopis sp. tree-ring oxygen and carbon isotope record of regional-scale hydroclimate variability during the last 9500 years in the Atacama Desert; *Palaeogeography, Palaeoclimatology, Palaeoecology*, 529, 109408

2016 Jayne, R.S., Pollyea, R.M, Dodd, J.P., **Olson, E.J.**, and Swanson, S.K.,2016, Regional-scale groundwater flow in the Pampa del Tamarugal Basin, Atacama Desert, Chile; *Hydrogeology Journal*, 24 (8), 1921–1937.

- 2013 deFrance, S. and **Olson, E.**, 2013, Late Prehispanic Coquina Quarrying and Tomb Construction in Coastal Southern Peru; *Journal of Island & Coastal Archaeology*, 8(1), 3-16.

Manuscripts in Preparation

Olson, E.J., Gillikin, D.P., *Piccirillo, L., Verheyden, A., **Litchfield, K., Parmenter, D., Edwards, R.L., Rodbell, D.T., Rainwater isotopes reflect water availability in the Peruvian Andes over the past 200 years, *Communications Earth & Environment*

Olson, E.J., Basu, S., Wassenburg, J., Gillikin, D.P., *Piccirillo, L., Verheyden, A., **Forsyth, A., Parmenter, D., Edwards, R.L., Rodbell, D.T., Reconstructing changes in atmospheric lapse-rate over the Holocene in the Andes, *Proceedings of the National Academy*

FUNDING & AWARDS

Proposals in Review

ORAU Ralph E. Powe Junior Faculty Enhancement Award- \$5,000- Partitioning Groundwater Recharge and Storage in the Obar Springs Karst Watershed Through Surface–Subsurface Monitoring and Modeling. *Principal* Investigator: Olson, E.

NASA ROSES - \$750,000- *Nutrient Loading on Tennessee Waterways using Remote Sensing driven AI models*. Co-Principal Investigator: Olson, E., *Principal* Investigator: Hossain, A. – UTC, Co-Principal Investigators from other institutions: Cochran, R. and Radler, J. – TDEC, Xiabao, C. – University of Mississippi, and Hong, Q. – Old Dominion University

Proposals in Preparation

NSF EAGER - \$100,000 – Deciphering the Role of Moisture versus Temperature Changes in Andean Climate Variability over Glacial Terminations with co-located Speleothem Fluid Inclusions and Lake Carbonate Clumped Isotopes. Principal Investigator: Olson, E. Co-Principal Investigator from other institutions: Rodbell, D. and Gillikin, D. – Union College, Levin, N. and Pasey, B. – University of Michigan

NSF CAREER- \$700,000 – Combining speleothem, lake, and tree-ring proxies to understand the role of ENSO on Andean hydroclimate over the Holocene, Principal Investigator: Olson, E., Co-Principal Investigators from other institutions : Rodbell, D. and Gillikin, D. – Union College, Dodd, J.- Texas A&M University

Research Grants

- 2017 Marie Morisawa Award Quaternary Geology and Geomorphology Division of the Geological Society of America (\$5,000)
- 2017 National Geographic Waitt Grant with Dr. Susan deFrance at University of Florida (\$17,750.00)
- 2016 NSF Inter-university Training for Continental-scale Ecology Research in Residence Grant with Dr. Chris Still at Oregon State University (\$5,000)
- 2016 Lewis and Clark Exploration Grant American Philosophical Society (\$5,000)
- 2015 Student Travel Grant from Graduate School, Northern Illinois University (\$2,000)
- 2014 Student Research Grant from the Geological Society of America (\$2,500)
- 2014 Goldich Fund Student Research Grant from the Department of Geology Northern Illinois University (\$1,500)
- 2014 Tilford Field Studies Scholarship from the Association of Environmental and Engineering Geologists (\$2,000)
- 2011 Dan and Betty Churchill Exploration Fund from the Climate Change Institute at University of Maine (\$500)
- 2009 University Scholars Research Award, University of Florida (\$2,000)

Academic Awards

- 2021 Purdue Climate Change Research Center Video Competition, First place postdoctoral category, <https://youtu.be/6WnvnBvetTo>
- 2017 Dissertation Completion Scholarship Graduate School Northern Illinois University
- 2016 Carla Montgomery Scholarship Department of Geology Northern Illinois University

- 2016 Outstanding Graduate Student of the Year Department of Geology Northern Illinois University
- 2016 Scholarship to LacCore Drilling and Coring Summer Institute, University of Minnesota Short course
- 2016 Scholarship to SIMS (Secondary Ion Mass Spectrometry) Short Course, Arizona State University Short course
- 2015 Scholarship to SPATIAL (Spatio-temporal Isotope Analytics Lab) Short Course, University of Utah Short course
- 2006 Florida Bright Futures Academic Scholarship

TEACHING EXPERIENCE

Instructor of Record

- 2026 Applied Environmental Geochemistry, University of Tennessee Chattanooga, GEOL4470/5470
- 2025 Hydrology, University of Tennessee Chattanooga, GEOL4450
- 2021 The Dynamic Earth, Purdue University, EAPS109
- 2018 Physical Geology, Triton College, GOL101
- 2018 Astronomy of the Solar System, Triton College, AST101
- 2018 General Course Physical Science, Harold Washington College, PHYS101
- 2017 Introduction to Geology Honors, Northern Illinois University, GEOL120
- 2016 Introduction to Geology, Northern Illinois University, GEOL120

Teaching Assistant

- 2013 Introduction to Geology Lab, Northern Illinois University, GEOL121

2013 Laboratory Techniques in Archaeology, Contisuyo Archaeological Field School, The Field Museum of Natural History and University of Illinois at Chicago, ANT 426

SELECT PRESENTATIONS

- 2024 **Olson, E.J.**, Parmenter, D., Gillikin, D.P., Piccirillo, L., Forsyth, A., Litchfield, K., Verheyden, A., Edwards, R.L., Rodbell, D.T., Stalagmite Records of Hydroclimate from the Peruvian Andes During the Last Deglaciation, American Geophysical Union Conference. Washington, DC
- 2023 **Olson, E.J.**, Parmenter, D., Gillikin, D.P., Stoltenberg, H., Clavel, A., Piccirillo, L., Verheyden, A., Edwards, R.L., Rodbell, D.T., Middle Pleistocene hydroclimate changes in the Tropical Andes inferred from carbon and oxygen isotope records of speleothems from Huagapo Cave, Peru, Geologic Society of America Conference. Pittsburg, PA
- Forsyth, A., Litchfield, K., **Olson, E.J.**, Gillikin, D.P., Stoltenberg, H., Ramjohn, M., Parmenter, D., Stoltenberg, H., Clavel, A., Piccirillo, L., Verheyden, A., Edwards, R.L., Gillikin, D.P., Rodbell, D.T., Karst hydrologic control on oxygen isotope variability of cave drip water: A regional cave monitoring study from the Peruvian Andes, Geologic Society of America Conference. Pittsburg, PA
- Parmenter, D., **Olson, E.**, Valasquez, K. Stoltenberg, H., Clavel, A., Piccirillo, L., Verheyden, A., Gillikin, D.P., Rodbell, D.T., Edwards, R.L., A multi-proxy speleothem approach to understanding the South American Monsoon System during the Last Glacial Cycle, American Geophysical Union Conference. San Francisco, CA
- 2022 **Olson, E.J.**, Gillikin, D.P., Clavel, A., Piccirillo, L., Nazir, S., Snider, N., Verheyden, A., Parmenter, D., Edwards, R.L., Rodbell, D.T., Determining the source of speleothem $\delta^{18}\text{O}$ variability from in situ measurements of seasonal and inter-annual isotope trends in precipitation, cave drip water and modern calcite from sites in the Central Peruvian Andes, American Geophysical Union Conference. Chicago, IL
- 2021 **Olson, E.J.**, Michalski, G., Welp, L.R., Frisbee, M.D., V. Larrera, A., L. Reyes, J., Isotopic evidence for fog-fed groundwater recharge near lomas forests along the arid Atacama-Sechura coastal desert, American Geophysical Union Conference. New Orleans, LA- virtual attendance
- 2020 **Olson, E.J.**, Welp, L.R., Frisbee, M.D., Alvarez, O., Medina, S.A.Z., Quispe, W.R.R., Carrion, M.A., Mamani, C.I.S. and Rodriguez, J.D., Tracing the impact of glacial melt

- on the hydrology of the Andean Nevado Coropuna glacier and adjacent drainages. American Geophysical Union Conference. San Francisco, CA- virtual attendance
- 2019 **Olson, E.**, Michalski, G., V. Larrera, A., L. Reyes, J., and Welp, L., Sulfur Isotope Constraints on PM_{2.5} Sulfate Aerosol Sources in Arequipa, Peru, American Geophysical Union Conference. San Francisco, CA
- 2019 **Olson, E.**, Welp, L., DeGraw, J., V. Larrera, A., L. Reyes, J. and Michalski, G., 2019 Stable isotope variations in monsoon precipitation related to atmospheric moisture transport in southern Peru, CLIVAR Water Isotopes and Climate Workshop. Boulder, CO.
- 2018 **Olson, E.**, Dodd, J., and Rivera, M., South American Monsoon Variability Over the Holocene Recorded in High-Resolution Tree Ring Oxygen Isotope Series from the Atacama Desert, American Geophysical Union Conference, Washington, D.C.
- 2018 **Olson, E.**, Dodd, J., and Rivera, M., Isotopic disequilibrium in Prosopis tree cellulose as an indicator of water stress and hydroclimate variability, Midwest Geobiology Conference, Evanston, IL
- 2017 **Olson, E.**, Dodd, J., and Rivera, M., Climate variability over the Holocene in the Atacama Desert of Chile as reconstructed from tree ring isotope series, European Geosciences Union General Assembly, Vienna, Austria
- 2016 **Olson, E.**, Dodd, J., and Rivera, M., Examining Basin-Scale Water and Climate Relations across the Pampa del Tamarugal, Atacama Desert through Spatial Analysis of Hydrogen, Carbon and Oxygen Isotopes in Tree Rings, American Geophysical Union Conference, San Francisco, CA
- 2016 **Olson, E.** Dodd, J., Diefendorf, A., and Freimuth, E., Reconstructing $\delta^{18}\text{O}$ in groundwater from tree-ring cellulose in arid regions, Midwest Geobiology Conference, Cincinnati, OH
- 2015 **Olson, E.** and Dodd, J, Spatial and temporal variation in tree-ring α -cellulose oxygen and hydrogen isotope values as a record of water availability in the Atacama Desert, American Geophysical Union Conference, San Francisco, CA
- 2015 **Olson, E.**, Dodd, J., and Rivera, M., Tree Ring Isotope Record of Climate Change at the site of Ramaditas in the Atacama Desert of Northern Chile, Society of American Archaeology Conference, San Francisco, CA

RELATED PROFESSIONAL EXPERIENCE / SERVICE

2025	Reviewer for journal <i>Scientific Reports, Paleoceanography, and Quaternary Science Reviews, and NSF</i>
2024	Reviewer for journal <i>Environmental Pollution</i>
2023	Reviewer for journal <i>WIREs Water</i>
2022	Session Chair American Geophysical Union Conference Session: Stable Isotopes in the Critical Zone: Methods, Applications, and Process Interpretations. H11
2021	Session Chair American Geophysical Union Conference Session: Stable Isotopes in the Critical Zone: Methods, Applications, and Process Interpretations #120034
	Review Camp Participant for National Association of Geoscience Teachers seventh annual Earth Educators' Rendezvous
	Reviewer for journal <i>Palaeogeography, Palaeoclimatology, Palaeoecology</i>
2020	Reviewer for Environmental Protection Agency publication "Stable Isotopes in Tree Rings: Inferring Physiological, Climatic and Environmental Responses" R. Siegwolf, J. R. Brooks, J. Roden, and M. Saurer, editors.
2019	Session Chair American Geophysical Union Conference Session: Aerosols and Air Quality in South America Posters #83396
2016–2017	Search Committee for the Vice President for Research and Innovation Partnerships, Northern Illinois University
2014–2016	College of Liberal Arts Graduate Student Advisory Committee Northern Illinois University
2014–2015	Sigma Gamma Epsilon Earth Science Honors Society Local Chapter President
2011–2012	Graduate Student Representative–Graduate Senate University of Maine
2009–2010	Lambda Alpha Anthropology Honors Society Local Chapter President

PROFESSIONAL ORGANIZATIONS

American Geophysical Union

Earth Science Women's Network

National Association of Geoscience Teachers

Phi Kappa Phi Honors Society