Duke | NICHOLAS SCHOOL of the ENVIRONMENT

Gordon Williams
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EDUCATION

Duke University 2020 – present
PhD Candidate, Earth and Climate Sciences
Advisor: Avner Vengosh

University of California, Santa Barbara 2015 – 2019
B.S. Earth Science, Emphasis in Geohydrology

PUBLICATIONS

(*co-first author, †undergraduate mentee)
Google Scholar Profile

In Preparation (In Manuscript Form)

[4] †Schaffer, A.; **Williams, G.D.Z.**; Dwyer, G.S.; Hyland, E.G.; Kipp, M.A., Environmental and vital effects on lithium isotopes and trace element ratios in biogenic carbonates: Insights from an estuarine salinity gradient

[3] †Hall, G.A.; **Williams, G.D.Z.**; Vengosh, A., The Potential Water Quality Impacts of Mining Critical Raw Materials: Comparative Analysis of Simulated Leachates of Sulphide and Laterite Ores

[2] Nativ, P.; **Williams, G.D.Z.**; Vengosh, A., From pond to process: a reliable method for pH measurements in hypersaline solutions

[1] Wudke, H.; **Williams, G.D.Z.**; Vengosh, A., Assessing the baseline water quality of drinking water in indigenous communities prior to lithium mining at the Salar de Uyuni, Bolivia

Submitted or In-Review

[2] **Williams, G.D.Z.**; Barre, J.; Louvat, P.; Bérail, S.; Millot, R.; Vengosh, A., *In-Review at Earth and Planetary Science Letters*. Geochemical controls on the formation of lithium brines in closed-basins of the Lithium Triangle

[1] Nativ, P.; **Williams, G.D.Z.**; Vengosh, A. *In-Review at Environmental Science & Technology Letters.* Discrepances Between pH and Corrosive Indexes of Hypersaline Effluents

Published

[13] **Williams, G.D.Z.**; Petrović, M.; Hill, R.C.; †Hall, G.A.; Vengosh, A., 2025. The Water Quality Impacts of Legacy Hard-Rock Lithium Mining and Processing. *Environmental Science & Technology*. https://doi.org/10.1021/acs.est.5c13682

[12] *†Hall, G.A.; ***Williams, G.D.Z.**; Sirbescu, M.L.C.; Lu, P.L.; Dwyer, G.S.; Richter, D.D.; Vengosh, A., 2025. Strontium isotopes and Rb/Sr tracers in surface soils for locating subsurface lithium pegmatites. *Applied Geochemistry* 195, 106631. https://doi.org/10.1016/j.apgeochem.2025.106631

[11] Hill, R.C.; Wang, Z.; Hu, J.; **Williams, G.D.Z.**; Vengosh, A., 2025. Radionuclides and the uranium isotope fingerprint of globally produced phosphate rocks, mineral fertilizers, and phosphogypsum waste and its potential effect on the environment. *Journal of Hazardous Materials* 499, 140033. https://doi.org/10.1016/j.jhazmat.2025.140033

[10] Lopez, R.F.; Huayta, J.; **Williams, G.D.Z.**; Seay, S.A.; Lalwani, P.D.; Bacot, S.; Vengosh, A.;, Meyer, J., 2025. Lithium Nickel Manganese Cobalt Oxide Particles Cause Developmental Neurotoxicity in *Caenorhabditis elegans*. *Environmental Science: Advances*. https://doi.org/10.1039/D5VA00103J

[9] **Williams, G.D.Z.**; Nativ, P.; Vengosh, A., 2025. The role of boron in controlling the pH of lithium brines. *Science Advances* 11, eadw3268. *https://doi.org/10.1126/sciadv.adw3268*

[8] **Williams, G.D.Z.**; Vengosh, A., 2025. Quality of Wastewater from Lithium-Brine Mining. *Environmental Science & Technology Letters* 12, 151–157. https://doi.org/10.1021/acs.estlett.4c01124

[7] **Williams, G.D.Z.**; Saltman, S.; Wang, Z.; Warren, D.M.; Hill, R.C.; Vengosh, A., 2024. The potential water quality impacts of hard-rock lithium mining: Insights from a legacy pegmatite mine in North Carolina, USA. *Science of The Total Environment* 956, 177281. https://doi.org/10.1016/j.scitotenv.2024.177281

[6] Hill, R.C.; Wang, Z.; **Williams, G.D.Z.**; Polyak, V.; Singh, A.; Kipp, M.A.; Asmerom, Y.; Vengosh, A., 2024. Reconstructing the depositional environment and diagenetic modification of global phosphate deposits through integration of uranium and strontium isotopes. *Chemical Geology* 662, 122214. https://doi.org/10.1016/j.chemgeo.2024.122214

[5] Hill, R.C.; **Williams, G.D.Z.**; Wang, Z.; Hu, J.; El-Hasan, T.; Duckworth, O.W.; Schnug, E.; Bol, R.; Singh, A.; Vengosh, A., 2024. Tracing the Environmental Effects of Mineral Fertilizer Application with Trace Elements and Strontium Isotope Variations. *Environmental Science & Technology Letters* 11, 604-610 https://doi.org/10.1021/acs.estlett.4c00170

[4] Hu, J.; Wang, Z.; **Williams, G.D.Z.**; Dwyer, G.S.; Gatiboni, L.; Duckworth, O.W.; Vengosh, A., 2024. Evidence for the accumulation of toxic metal(loid)s in agricultural soils impacted from long-term application of phosphate fertilizer. *Science of The Total Environment* 907, 167863. https://doi.org/10.1016/j.scitotenv.2023.167863

[3] Wang, Z.; Hill, R.; **Williams, G**.; Dwyer, G.S.; Hu, J.; Schnug, E.; Bol, R.; Sun, Y.; Coleman, D.S.; Liu, X.-M.; Sandstrom, M.R.; Vengosh, A., 2023. Lead isotopes and rare earth elements geochemistry of global phosphate rocks: Insights into depositional conditions and environmental tracing. Chemical Geology 639, 121715. https://doi.org/10.1016/j.chemgeo.2023.121715

[2] Vengosh, A.; Wang, Z.; **Williams, G**.; Hill, R.; M. Coyte, R.; Dwyer, G. S., 2022. The Strontium Isotope Fingerprint of Phosphate Rocks Mining. *Science of The Total Environment*, *850*, 157971. https://doi.org/10.1016/j.scitotenv.2022.157971.

[1] Wang, K.; Ellsworth, W. L.; Beroza, G. C.; **Williams, G**.; Zhang, M.; Schroeder, D.; Rubinstein, J., 2018, Seismology with Dark Data: Image-Based Processing of Analog Records Using Machine Learning for the Rangely Earthquake Control Experiment. *Seismological Research Letters*, *90* (2A), 553–562. https://doi.org/10.1785/0220180298.

INVITED PRESENTATIONS

Indiana University Bloomington, Seminar on Critical Minerals and Climate Change Mitigation, December 2025, *Lithium Mining, Processing, and Environmental Impacts*

Goldschmidt Conference Session on Lithium Resources for the Energy Transition, July 2025, *The Many Roles of Boron in Controlling Lithium-Brine Geochemistry*. Abstract by Williams, G.D.Z. & Vengosh A.

CONFERENCE PRESENTATIONS & ABSTRACTS

Williams, GDZ.; Vengosh, A. (2025) [oral] The Role of Boron in Controlling the pH of Lithium Brines. The 3rd International Association of Geochemistry Conference.

Williams, GDZ.; Hall, GA.; Hill, RC.; Petrović, M.; Louvat, P.; Berail, S.; Barre, J.; Millot, R.; Warner, NR.; Baker, P.; Vengosh, A. (2025) [oral] The Origin of Lithium at the Salar de Uyuni: A multi-isotope and elemental approach. The 3rd International Association of Geochemistry Conference.

Williams, GDZ.; Vengosh, A. (2025) [oral] The role of boron in controlling the pH of evaporated lithium brines. AEESP Conference

Williams, GDZ.; Hill, RC.; Wang, Z.; Kipp, MA.; Vengosh, A. (2024) [poster] Searching for Alternative Critical Mineral Sources. Symposium on Critical Resources, Minerals, and Materials Joint Efforts

Williams, GDZ.; Hall, G.; Petrović, M.; Hill, RC.; Dwyer, G.; Vengosh, A. (2024) [oral] Water quality in a legacy lithium mining district of North Carolina. Goldschmidt Conference

Williams, GDZ. (2024) [oral] Geology and Production of Latin American Lithium Deposits. North Carolina Conference on Latin American Studies

Williams, G.; Wang, Z.; Hill, R.; Vengosh, A. (2023) [oral] Potential Water Quality Impacts of Hard-Rock Lithium Mining. AGU Fall Meeting

Williams, G.; Wang, Z.; Hill, R.; Vengosh, A. (2023) [poster] Water Quality and Legacy Lithium Mining in North Carolina: Insights on the Impacts of Future Lithium Mining. Goldschmidt Conference

Williams, G.; Vengosh, A.; Wang, Z.; Hill, R. (2022) [oral] Elemental Fluxes in Global Phosphate Ores: Evaluation of a Potential Resource for Critical Elements. GSA Connects

Williams, G.; Hill, R.; Wang, Z.; Vengosh, A. (2022) [poster] Multiple Isotopes as Potential Tracers for Contaminants Derived from Lithium Mine Wastes. GSA Connects

Williams, G.; Hill, R.; Wang, Z.; Whittaker, M.; Stringfellow, W.; Vengosh, A. (2022) [poster] Strontium Isotope Geochemistry as a Potential Tracer for Contaminants Derived from Lithium Mine Wastes. Goldschmidt Conference

ACADEMIC SERVICE & EXPERIENCE

Duke University, Earth & Climate Science Department Seminar Organizer & Discussion Leader, 2022-2024

Conference Sessions

Session Co-Chair

- 2025, The 3rd International Association of Geochemistry Conference, Cagliari, Italy, E Sacchi, **GDZ Williams** – *Isotopic Tools and Applications for Sustainable Water Management, Mining-Related Settings, Environmental Sciences, and the Energy Transition*

Reviewer: Applied Geochemistry

Society Affiliations: Geochemical Society, International Association of Geochemistry, American Geophysical Union, Geological Society of America

GRANTS & AWARDS

Global Student Research Fund, Duke Office of Global Affairs **($2,145)**, 2025

Fall Tuition Scholarship, Duke Graduate School **($5,215)**, 2025

Summer Research Fellowship, Duke Graduate School **($14,850)**, 2025

Chateaubriand Fellowship, French Embassy to the USA **(€7,967)**, to conduct lithium isotope work in Pau, France at UPPA, 2024

Dissertation Research Travel Award: International, Duke Graduate School **($5,000)**, 2023-2024

Dissertation Research Travel Award: Domestic, Duke Graduate School **($4,000)**, 2023-2024

Potential Impacts of Lithium Mining on Water Quality in North Carolina, NC Water Resources Research Institute **($120,000 *direct*)**, PI Avner Vengosh (written with Gordon Williams), 2023-2025

The Potential Environmental Effects of Lithium Mining and Extraction, Albemarle Corporation **($396,230 *direct*)**, G. Williams, A. Vengosh, D. Shindell, 2023-2024

Graduate Student Research Grant, Geological Society of America **($1,749)**, 2022

Student Travel Grant, Geological Society of America, 2022

TEACHING & MENTORING

Graduate Teaching Assistant

EOS 101 Dynamic Earth with Dr. Emily Klein, Fall 2020
EOS 101 Dynamic Earth with Dr. Alex Glass, Spring 2021
EOS 220 Water Sciences with Dr. Avner Vengosh, Fall 2021
EOS 524 Water Quality and Health with Dr. Avner Vengosh, Spring 2022
ECS 401 Geology of North Carolina (with multi-day field trips) with Dr. Alex Glass, Fall 2022
ECS 201L Earth Materials with Dr. Adam Curry, Spring 2023
ECS 410 Senior Capstone Experience, The Geology of Ireland (with 10-day field trip) with Dr. Gary Dwyer, Spring 2023 & Spring 2025

Guest Lectures & Field Trip Demonstrations/Presentations

ECS 524, Water Quality and Health
ECS 201L, Earth Materials
ECS 210S, Exploring Earth Science: Field and Laboratory Investigations
ECS 226S, Field Methods in Earth and Environmental Sciences

Mentored Master's Student Research

1. Sam Saltman, 2022-2023, Investigating the potential environmental impact of lithium mining in North Carolina
2. Ryan Parks, 2022-2023, Investigating the current and historical groundwater quality at the Maplewood Cemetery and Pauli Murray Center

Mentored Undergraduate Research

1. Alexandra Schaffer, 2025-present. project: Understanding the lithium isotope and trace metal geochemistry of oyster shells
2. Grace Hall, 2023-2025. thesis: "The Potential Water Quality Impacts of Mining Critical Raw Materials: Comparative Analysis of Simulated Leachates of Sulphide and Laterite Ores"
3. Tiana Dinham, 2023, project: Investigating the water quality impacts of hard-rock lithium mining in North Carolina
4. Carsten Pran, B.S. (2022), thesis: "An Interdisciplinary Approach to Understanding Duke University's Relationship with the Durham County Water System"
5. Bass Connections Project (2021) with an undergraduate team of 5 students: "Inspecting the Taps: Radium, Groundwater, and Public Health in the Heart of Texas"

PREVIOUS RESEARCH EXPERIENCE

Research Assistant in Professor Tiziana Vanorio's group, Department of Geophysics, Stanford University, January 2020 – April 2020 (ended due to COVID)
Research Assistant in Professor Tiziana Vanorio's group, Department of Geophysics, Stanford University, June 2019 – August 2019 (Summer Internship)
Independent Research Assistant in Professor Matthew Jackson's group, Department of Earth Sciences, University of California, Santa Barbara, February 2019 – June 2019
Research Assistant in Professor William Ellsworth's group, Department of Geophysics, Stanford University, June 2018 – August 2018 (Summer Internship)

PROFESSIONAL REFERENCES

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