

Adrian A. Wackett, M.Sc.

Ph.D. Student • NSF GRFP Fellow • Earth and Planetary Sciences • Stanford University • awackett@stanford.edu

RESEARCH INTERESTS

geomorphology, biogeochemistry, pedology, soil formation, cosmogenic nuclides, soil carbon, disturbances, fallout radionuclides, landscape evolution, isotope geochemistry, critical zone dynamics, Arctic & alpine ecosystems

EDUCATION

Ph.D., Stanford University, Geological Sciences (4.21 GPA), 2022-2027 (*expected*)

Dissertation (*tentative title*): ***A Song of Fires, Worms, and Storms: Tracing Critical Zone Dynamics and Disturbances with Cosmogenic and Fallout Radionuclides***

Committee: Jane K. Willenbring (*Ph.D. advisor*), Mathieu G. A. Lapôtre, Alison M. Hoyt, Jef K. Caers

M.Sc., University of Minnesota, Land and Atmospheric Sciences (4.00 GPA), 2016-2018

Thesis: ***Arctic W'orming: Human-Facilitated Earthworm Invasion Transforms Soil Organic Matter Budgets and Pools in Fennoscandian Forests***

Committee: Kyungsoo Yoo (*advisor*), Jonatan Klaminder (*advisor*), Nic A. Jelinski, Brandy M. Toner, Lee E. Frelich
Extended research/coursework at **Umeå University (Sweden) & University of Helsinki (Finland)**, 2016-2017

B.S., Trinity University (Texas), Chemistry and Geosciences (3.82 GPA, with honors), 2010-2014

Thesis: ***Petrology and Geochemistry of the Crawfish Inlet and Krestof Island Plutons, Baranof Island, Alaska***

Coursework at **Lancaster University (United Kingdom)**, 2012

FELLOWSHIPS, HONORS & AWARDS

National & External

2023 Awardee, Geological Society of America – Peter Birkeland Research Award in Soil Geomorphology (\$2,500)

2023 Awardee, Geological Society of America – Quaternary Geology & Geochronology Travel Grant (\$2,000)

2022 Fellow, National Science Foundation (NSF) – Graduate Research Fellowship Program (\$159,000 over 3 years)

2021 Awardee, Fulbright U.S. Student Program (IIE) – New Zealand, Lincoln University (*declined*, NZ\$35,000)

2020 Fellow, American Scandinavian Foundation – Climate Impacts Research Centre, Abisko, Sweden (\$23,000)

2019 Awardee, 3rd place – Grad Student Oral Presentation Comp., Soil Chemistry Div., SSSA Nat. Meeting (\$50)

2018 Awardee, Wilford Gardner Fellowship – Soil Science Society of America (SSSA) Travel Grant (\$1,500)

2013 Awardee, KECK Geology Consortium – NSF Research Experiences for Undergraduates (\$2,400 + travel funds)

University-Wide

2023 Awardee, Stanford Doerr School of Sustainability – McGee/Levorsen Research Grant (\$1,998)

2016 Awardee, University of Minnesota – Allmaras/Howe Graduate Research Fellowship (\$22,079 + tuition costs)

2010 Fellow, Trinity University (Texas) – Semmes Distinguished Science Fellowship (\$178,060 for tuition over 4 years)

Department-Wide

2016 Awardee, Dr. C. William Zanner Travel Fellowship, University of Minnesota, (\$1,446)

2014 Awardee, Trinity University – William C. McGavock Award, Outstanding Senior in Chemistry (\$1,500)

2014 Awardee, Trinity University – Geoscience Department Outstanding Senior Student Award (\$1,500)

PUBLICATIONS

(*under review*) **Wackett, A. A.**, Jelinski, N. A., Fisher, B. A., and Yoo, K. Climate, topography, and the mineral surface area of hillslope soils. *Earth Surface Processes and Landforms*.

(*under review*) Lohese, E. A., **Wackett, A. A.**, Margenot, A. J., and Jelinski, N. A. Soil properties and classification across a climate and vegetation gradient in Sankuru Province, Central Democratic Republic of Congo (DRC). *Soil Science Society of America Journal*.

(*under review*) Jonsson, H., Blume-Werry, G., **Wackett, A. A.**, Olofsson, J., Arvidsson, E., Sparrman, T., and Klaminder, J. Non-native earthworms alter carbon sequestration in sub-arctic tundra ecosystems. *Soil Biology and Biochemistry*.

(9) **Wackett, A. A.**, Smith, D. R., Davidson, C., and Garver, J. I. (2024). New geochemical and geochronological insights

- on forearc magmatism across the Sanak-Baranof belt, southern Alaska: A tale of two belts. *Geosphere*.
<https://doi.org/10.1130/GES02642.1>.
- (8) Roering, J. J., Hunter, B. D., Ferrier, K. L., Chadwick, O. A., Yoo, K., **Wackett, A. A.**, Almond, P. C., Silva, L., and Jellinek, A. M. (2023). Quantifying erosion rates and weathering pathways that maximize soil organic carbon storage. *Biogeochemistry*, 164: 319–333. <https://doi.org/10.1007/s10533-023-01054-7>.
- (7) Keen, S. C., **Wackett, A. A.**, Willenbring, J. K., Yoo, K., Jonsson, H., Clow, T., and Klaminder, J. (2022). Non-native species change the tune of tundra soils: Novel access to soundscapes of the Arctic earthworm invasion. *Science of The Total Environment*, 838: 155976. <https://doi.org/10.1016/j.scitotenv.2022.155976>.
- (6) Wang, X., **Wackett, A. A.**, Toner, B. M., and Yoo, K. (2022). Consistent mineral-associated organic carbon chemistry with variable erosion rates in a mountainous landscape. *Geoderma*, 405: 115448. <https://doi.org/10.1016/j.geoderma.2021.115448>.
- (5) Phillips, H. R. P., Guerra, C. A., Bartz, M. L. C., Briones, M. J. I., [...] **Wackett, A. A.**, et al. (2021). Global data on earthworm abundance, biomass, diversity, and corresponding environmental properties. *Scientific Data*, 8(1): 136. <https://doi.org/10.1038/s41597-021-00912-z>.
- (4) Phillips, H. R. P., Guerra, C. A., Bartz, M. L. C., Briones, M. J. I., [...] **Wackett, A. A.**, et al. (2019). Global distribution of earthworm diversity. *Science*, 366(6464): 480–485. <https://doi.org/10.1126/science.aax4851>.
- (3) **Wackett, A. A.**, Yoo, K., Amundson, R., Heimsath, A. M., and Jelinski, N. A. (2018). Climate controls on coupled processes of chemical weathering, bioturbation, and sediment transport across hillslopes. *Earth Surface Processes and Landforms*, 43(8): 1575–1590. <https://doi.org/10.1002/esp.4337>.
- (2) **Wackett, A. A.**, Yoo, K., Olofsson, J., and Klaminder, J. (2018). Human-mediated introduction of geoengineering earthworms in the Fennoscandian arctic. *Biological Invasions*, 20(6): 1377–1386. <https://doi.org/10.1007/s10530-017-1642-7>.
- (1) Wang, X., Yoo, K., **Wackett, A. A.**, Gutknecht, J., Amundson, R., and Heimsath, A. M. (2018). Soil organic carbon and mineral interactions on climatically different hillslopes. *Geoderma*, 322: 71–80. <https://doi.org/10.1016/j.geoderma.2018.02.021>.

Select Popular Media & Outreach Publications/Appearances

- 2023 Van Deelen, G. *Quartz-gobbling worms are weathering Earth's soils*. *Eos*, 104. <https://doi.org/10.1029/2023EO230426>. Published 14 Dec 2023.
- 2023 Derouin, S. *The Earthworm Effect: Unraveling Soil Weathering Dynamics*. *GSA Press Release No. 23-42*, <https://www.geosociety.org/GSA/News/pr/2023/23-42.aspx>. Published 17 Oct 2023.
- 2020 Weston, P. *'The aliens to watch': how the humble earthworm is altering the Arctic*. *The Guardian*, https://www.theguardian.com/environment/2020/aug/25/the-aliens-to-watch-how-the-humble-earthworm-is-altering-the-arctic-aoe?CMP=share_btn_url. Published 25 Aug 2020.
- 2020 Toner, M. *In the same boat: As concerns about climate change intensify, international collaboration on research is providing new insights—and hope for solutions*. *National Association for Foreign Student Affairs (NAFSA) magazine*, <https://www.nafsa.org/ic-magazine/2020/2/1/same-boat>. Published 1 Feb 2020.
- 2020 Wackett, A. A. *Twelve Days of Christmas at Sea, Part II*. *Hot2cold research cruise blog: Sylvan Geomicrobiology Lab*, <https://www.sylvangeomicrobiology.wordpress.com/2020/01/06/twelve-days-of-christmas-at-sea-part-ii/#more-1231>. Published 6 Jan 2020.
- 2019 Wackett, A. A. *Twelve Days of Christmas at Sea, Part I*. *Hot2cold research cruise blog: Sylvan Geomicrobiology Lab*, <https://www.sylvangeomicrobiology.wordpress.com/2019/12/24/twelve-days-of-christmas-part-i/#more-1129>. Published 24 Dec 2019.
- 2019 Morrison, D. *Earthworm Study Opens New Dimension in Climate Science*. *University of Minnesota Research Newsletter*, <https://www.research.umn.edu/news/earthworm-study-opens-new-dimension-climate-science>. Published 24 Oct 2019.
- 2019 Mitchell, A. *'Earthworm Dilemma' Has Climate Scientists Racing to Keep Up*. *The New York Times*, <https://www.nytimes.com/2019/05/20/science/earthworms-soil-climate.html>. Published 20 May 2019.
- 2019 Bowser, M. L. *Kenai National Wildlife Refuge Notebook: An earthworm quandary*. *Kenai Peninsula Clarion*, <https://www.peninsulaclarion.com/sports/refuge-notebook-an-earthworm-quandary/>. Published 28 Feb 2019.
- 2018 Söderbergh, I. *Sweden may need to revise approach to the spread of earthworms*. *Phys.org*, <https://phys.org/news/2018-02-sweden-approach-earthworms.html>. Published 16 Feb 2018.
- 2017 MinuteEarth Team. *'Invasion of the earthworms!'* *YouTube*, (>1.15 million views), <https://www.youtube.com/watch?v=icGV8bJRkkg>. Published 12 Jul 2017.

ACADEMIC RESEARCH EXPERIENCE

Ph.D. Student – Stanford University, Department of Geological Sciences (*Sept 2022 – present*)

Project – Dissertation Research – A Song of Fires, Worms, and Storms: Tracing Critical Zone Dynamics and Disturbances with Cosmogenic and Fallout Radionuclides

Advisor – Jane K. Willenbring, Associate Professor (Stanford University)

Collaborators – Alan J. Hidy (Lawrence Livermore National Laboratory); Kimber C. Moreland (USDA Agricultural Research Station); Aaron T. Steelquist (Stanford University); Emma J. Harrison (Dalhousie University); Gilles Y. Brocard (Université de Lyon); Kyungsoo Yoo (UMN – Twin Cities); Jonatan Klaminder (Umeå University)

Research Description – My dissertation integrates a diverse array of TCNs (^3He , ^{10}Be , ^{14}C , and ^{21}Ne) and shorter-lived FRNs (^7Be , ^{137}Cs , and ^{210}Pb) to explore critical zone processes and dynamics in response to disturbance(s) across a range of timescales, from years to millennia.

Researcher – Umeå University / Climate Impacts Research Centre: Umeå / Abisko, Sweden, (*Aug 2020 – Jun 2022*)

Project – American Scandinavian Foundation Fellowship – Assessing Invasive Earthworm Impacts on Arctic Soils

Advisor – Jonatan Klaminder, Professor (Umeå University / Climate Impacts Research Centre)

Collaborators – Jane K. Willenbring (Stanford University); Sara C. Keen (Stanford University); Johan Olofsson (Umeå University); Eveline J. Krab (Swedish Agricultural University – Uppsala); Kyungsoo Yoo (UMN – Twin Cities); Hanna Jonsson (Umeå University)

Research Description – I assessed the impacts of invasive earthworms on the temperature sensitivity of soil carbon stored in boreal/arctic ecosystems. I also explored the use of novel acoustic techniques to monitor earthworm bioturbation rates and soil ‘soundscapes’.

Researcher – University of Minnesota, Department of Soil, Water, and Climate (*Oct 2019 – Aug 2020*)

Project – NASA Astrobiology Inst. – Exploring Ocean Worlds: Ocean System Science to Support the Search for Life

Advisor – Brandy M. Toner, Professor (University of Minnesota – Twin Cities)

Collaborators – Christopher R. German (Woods Hole Oceanographic Institute, WHOI); Everett Shock (Arizona State); Peter Girguis (Harvard College); Kevin Hand (NASA Jet Propulsion Laboratory); Julie Huber (WHOI)

Research Description – Mineral synthesis and characterization of experimental hydrothermal vent plume particles and their alteration products using X-ray diffraction (XRD), spectroscopic (XANES, EXAFS) and microscopic (STXM, SEM/EDS, TEM) approaches.

Researcher – University of Minnesota, Department of Soil, Water, and Climate (*Jul 2019 – Oct 2019*)

Project – NSF RAPID – Invasion of Geoenvironmental Earthworms in Alaska: Extents, Mechanisms, and Impacts

Collaborators – Kyungsoo Yoo (UMN – Twin Cities); Stephen C. Brown (University of Alaska – Fairbanks Extension, Palmer, AK); John M. Morton (Kenai National Wildlife Refuge, KNWR); Matthew L. Bowser (KNWR); Darren Snyder (University of Alaska – Fairbanks SE campus, Juneau, AK)

Research Description – I organized and led an extended two-month field campaign to document the distributions and impacts of invasive earthworms across Alaska, and collaborated with University of Alaska–Fairbanks extension agents on developing a citizen science monitoring network to document incipient earthworm invasions in Alaska.

Master’s Student (M.Sc.) – University of Minnesota, Land and Atmospheric Sciences (*Jan 2016 – Dec 2018*)

Project – MS Thesis Research – Arctic Worming: Human-Facilitated Earthworm Invasion Transforms Soil Organic Matter Budgets and Pools in Fennoscandian Forests

Advisors – Kyungsoo Yoo, Professor (UMN – Twin Cities); Jonatan Klaminder (Umeå University, Sweden)

Research Description – I established that European earthworms are invasive in the Fennoscandian Arctic (Wackett *et al.*, 2018) and coupled ^{210}Pb and soil carbon measurements with a mass flux model to examine earthworm impacts on carbon cycling and soil mixing in Arctic/boreal soils of Fennoscandia.

Research Technician – University of Minnesota, Department of Soil, Water, and Climate (*Sept 2014 – 2015*)

Project – NSF CAREER – Geochemical Weathering and Carbon-Mineral Dynamics on Australian Hillslopes

Advisor – Kyungsoo Yoo, Professor (UMN – Twin Cities)

Research Description – I used a geochemical mass balance approach to quantify the extent of soil chemical weathering across two well-studied hillslopes in SE Australia and coupled these results with measurements of cosmogenic nuclides (^{10}Be), soil mineralogy, reactive mineral surface area, and soil organic matter.

Undergraduate Researcher – Trinity University (Texas), Department of Geosciences (*Jun 2013 – Apr 2014*)
Project – BS Thesis Research – Petrology and Geochemistry of the Crawfish Inlet and Krestof Island Plutons, Baranof Island, Alaska

Advisors – Diane R. Smith (Trinity University); Cam Davidson (Carleton College); John I. Garver (Union College)
Research Description – I explored the trace element and Sr-Nd isotope geochemistry of magmas emplaced in the Crawfish Inlet and Krestof Island plutons in SE Alaska to shed light on the dynamics of an enigmatic ridge subduction event along the North American Cordilleran margin during Paleocene-Eocene time.

Undergraduate Researcher – Trinity University (Texas), Department of Geosciences (*Jan 2013 – Aug 2013*)
Project – Herndon Project – Petrologic Characterization of Volcanic Glasses from Mount St. Helens

Advisor – Diane R. Smith, Professor (Trinity University)
Research Description – I analyzed volcanic glass chemistry and coexisting Fe-Ti oxides for use as a geothermobarometer in a unique set of tephra from the now-collapsed north slope of Mount St. Helens.

Undergraduate Researcher – Trinity University (Texas), Department of Chemistry (*Jun 2012 – Aug 2012*)
Project – NSF – Synthesis, Isolation, Characterization, and Reactivity of Peptide-Host Supramolecular Complexes

Advisor – Adam R. Urbach, Professor (Trinity University)
Research Description – I synthesized a large library of synthetic peptides and scanned their affinity for various derivatized cucurbituril-methyl viologen complexes.

UNIVERSITY TEACHING EXPERIENCE

Teaching Assistant

GEOLSCI 1 (*Stanford University*) – Introduction to Geology (*Spring 2023*)
ESPM 1011 (*University of Minnesota*) – Issues in the Environment (*Spring 2018*)
SOIL 2125 (*University of Minnesota*) – Basic Soil Science (*Fall 2017*)
SOIL 4511 (*University of Minnesota*) – Field Study of Soils (*Spring 2016, 2018*)

Guest Lecturer

LAAS 5311 (*University of Minnesota*) – Soil Chemistry and Mineralogy (*Spring 2020 – 2024*)
SOIL 2601 (*University of Minnesota*) – The Social Life of Soil (*Spring 2020*)
FW 2003 (*University of Minnesota*) – Introduction to Marine Biology (*Spring 2020*)
ESPM 1011 (*University of Minnesota*) – Issues in the Environment (*Fall 2019*)
SOIL 8510 (*University of Minnesota*) – Clay Mineralogy (*Fall 2019*)

UNDERGRADUATE TRAINING & MENTORING

Karen Aw Liu, Stanford University (*bedrock nitrogen in California*) 2023 – 2024
Isabel Sofia Vila, Stanford University (*worm weathering in Puerto Rico*) 2023
Tyler Baumann, University of Minnesota (*earthworm invasions in Alaska*) 2019 – 2020

PRESENTATIONS

First-Authored Oral Presentations

2023 **Wackett, A. A.**, Harrison, E. J., Brocard, G. Y., Vila, I. S., Yoo, K., Klaminder, J., and Willenbring, J. K.
Are Earthworms Engines of Silicate Weathering in Soils?
(Presented at American Geophysical Union 2023 Fall Meeting in San Francisco, CA, USA, Dec 2023)

2023 **Wackett, A. A.**, Harrison, E. J., Brocard, G. Y., Vila, I. S., Yoo, K., Klaminder, J., and Willenbring, J. K.
Exploring whether worms weather silicates in soils. Geological Society of America Abstracts with Programs, 55(6).
(Presented at the Geological Society of America 2023 Annual Meeting in Pittsburgh, PA, USA, Oct 2023)

2022 **Wackett, A. A.**, Yoo, K., Cameron, E. K., Jelinski, N. A., Looker, N., Olid, C., Jonsson, H., Rodríguez-Martínez, S., Frelich, L. E., and Klaminder, J. *Soil fauna and the fate of soil organic carbon in northern forests.*
<https://doi.org/10.46427/gold2022.12592>.
(Presented at the Goldschmidt 2022 Geochemical Conference in Honolulu, HI, USA, Jul 2022)

2020 **Wackett, A. A.**, Breier Jr., J. A., Cron, B. R., Dick, G., Dunshee, A., Gartman, A., German, C. R., Tamura, N., and Toner, B. M. *From hot to cold: Assessing the mineralogical diversity of hydrothermal vent plume particles on Earth with an eye towards hydrothermally active icy ocean worlds.*
(Virtual presentation at the American Geophysical Union 2020 Fall Meeting, Dec 2020)

- 2019 **Wackett, A. A.**, Yoo, K., Cameron, E. K., Jelinski, N. A., Olid, C., and Klaminder, J. *Mor(e) or mull: a transformation of soil carbon following earthworm invasion.*
(Presented at the Soil Science Society of America Annual Soils Meeting in San Diego, CA, USA, Jan 2019).
- 2016 **Wackett, A. A.**, Yoo, K., Cameron, E. K., and Klaminder, J. *'Global worming': The distribution and impacts of invasive earthworms on Fennoscandian forest soils.*
(Presented at Climate Impacts Research Centre Annual Autumn Symposium in Abisko, Sweden, Oct 2016)
- 2014 **Wackett, A. A.**, Smith, D. R., Davidson, C., Garver, and J. I. *Petrology and geochemistry of the Crawfish Inlet and Krestof Island plutons, Baranof Island, Alaska.*
(Presented at the KECK Geology Consortium Research Symposium in Mt. Holyoke, MA, USA, Apr 2014)

First-Authored Poster Presentations

- 2018 **Wackett, A. A.**, Yoo, K., and Jelinski, N. A. *Vegetation produces but bioturbation decides where carbon is allocated in soils: Assessing O and A horizon thicknesses across the forest-prairie biome transition in Minnesota, USA.*
(Presented at the 21st World Congress of Soil Science in Rio de Janeiro, Brazil, Aug 2018)
- 2017 **Wackett, A. A.**, Yoo, K., Cameron, E. K., Olid, C., and Klaminder, J. *Global w'orming and Darwin re-visited: Quantifying soil-mixing rates by non-native earthworms in Fennoscandian boreal and arctic ecosystems.*
(Presented at the American Geophysical Union 2017 Fall Meeting in New Orleans, LA, USA, Dec 2017)
- 2017 **Wackett, A. A.**, Yoo, K., Cameron, E. K., and Klaminder, J. *Earthworm impacts on organo-mineral interactions and soil carbon inventories in Fennoscandian boreal and subarctic landscapes.*
(Presented at the EGU General Assembly 2017 in Vienna, Austria, v.19: EGU2017-9808, Apr 2017)
- 2014 **Wackett, A. A.**, Smith, D. R., Roig, C. I., Casovie, A. J., Davidson, C., Garver, J. I., and Valley, J. W. *Geochemistry and geochronology of the Crawfish Inlet Pluton, Baranof Island, Alaska.*
(Presented at the 2014 Cordilleran Tectonics Workshop in Kelowna, British Columbia, Canada, Feb 2014)
- 2013 **Wackett, A. A.**, and Smith, D. R. *Microanalytical evidence for magma mingling at Mount St. Helens.*
(Presented at the Geological Society of America Annual Meeting in Denver, CO, USA, Oct 2013)
- 2013 **Wackett, A. A.**, and Urbach, A. R. *Peptide modification mediated by a synthetic host.*
(Presented at the American Chemical Society Annual Meeting in New Orleans, LA, USA, Apr 2013)

Invited Guest Lectures & Workshop Presentations

- Forthcoming* **Wackett, A. A.**, Hidy, A. J., Moreland, K. C., Steelquist, A. T., and Willenbring, J. K. *From ashes to atoms: assessing meteoric ¹⁰Be retention before and after wildfire.*
(To be presented at the 6th workshop on cosmogenic nuclides—cosmo2024—in Cologne, Germany, May 2024)
- 2023 **Wackett, A. A.**, Yoo, K., Cameron, E. K., Jelinski, N. A., Looker, N., Olid, C., Jonsson, H., Rodríguez-Martínez, S., Frelich, L. E., Klaminder, J., and Willenbring, J. K. *Unraveling the 'earthworm dilemma'.*
(Presented at the International Soil Radiocarbon Database (ISRaD) workshop, Stanford, CA, USA Dec 2023)

Additional Conference Presentations

- 2023 Stewart, B. D., **Wackett, A. A.**, Ely, T., and Toner, B. M. *Elucidating hydrothermal vent particulate contributions to global marine iron cycling using a multi-modal XAS and XRF approach.* <https://doi.org/10.7185/gold2023.18807>.
(Presented at the Goldschmidt 2023 Geochemical Conference in Lyon, France, Jul 2023)
- 2023 Ely, T., **Wackett, A. A.**, Matzen, S. L., Stewart, B. D., and Toner, B. M. *Precipitation During Hydrothermal Plume Formation; The Dominance of Pyrite.* <https://doi.org/10.7185/gold2023.20306>.
(Presented at the Goldschmidt 2023 Geochemical Conference in Lyon, France, Jul 2023)
- 2023 Jonsson, H., Blume-Werry, G., **Wackett, A. A.**, Arvidsson, E., Lundgren, O., and Klaminder, J. *Increased tundra root biomass offsets invasive earthworm effects on SOC decomposition.* <https://doi.org/10.5194/egusphere-egu23-14905>.
(Presented at the EGU General Assembly 2023 in Vienna, Austria, EGU23-14905, 24 – 28 Apr 2023)
- 2022 Ely, T., **Wackett, A. A.**, Matzen, S. L., and Toner, B. M. *Why is Pyrite Always Present in Hydrothermal Vent Plumes?*
(Presented at the American Geophysical Union 2022 Fall Meeting in Chicago, IL, USA, Dec 2022)
- 2022 Roering, J. J., Hunter, B. D., Chadwick, O. A., Yoo, K., **Wackett, A. A.**, Almond, P. C., Jelinek, A. M., and Silva, L. *Quantifying the optimal erosion rate for weathering pathways that facilitate soil organic carbon storage.*
(Presented at the American Geophysical Union 2022 Fall Meeting in Chicago, IL, USA, B15D-03, Dec 2022)
- 2022 Toner, B. M., **Wackett, A. A.**, Kamermans, B. R., Matzen, S. L., Ely, T., Achterberg, E. P., and German, C. R. *Characteristics of hydrothermally derived particles from globally distributed deep-sea vent fields.* <https://doi.org/10.46427/gold2022.9810>.
(Presented at the Goldschmidt 2022 Geochemical Conference in Honolulu, HI, USA, Jul 2022)

- 2022 Toner, B. M., Matzen, S. L., Kamermans, B. R., **Wackett, A. A.**, Ely, T., German, C. R., and Achterberg, E. P. *Characteristics of hydrothermally derived particles from globally distributed deep-sea vent fields in Earth's oceans.*
(Presented at the Astrobiology Science Conference (AbSciCon) 2022 in Atlanta, GA, USA, 15–20 May 2022)
- 2022 Matzen, S. L., Bramble, M., Ely, T., **Wackett, A. A.**, Pacheco, M., German, C. R., Gartman, A, Hand, K. P., Toner, B. M., and Gainsforth, Z. *Pyrite nanoparticles as biogeochemical tracers of hydrothermal activity on icy ocean moons.*
(Presented at the Astrobiology Science Conference (AbSciCon) 2022 in Atlanta, GA, USA, 15–20 May 2022)
- 2021 Keen, S. C., **Wackett, A. A.**, Clow, T., Harrison, E. J., Klaminder, J., Yoo, K., and Willenbring, J. K. *An ear to the ground: Soundscapes as a novel methodology for soil research and public engagement with science.*
(Presented at the Society for Social Studies of Science (4S) Annual Meeting, Toronto, Canada, Oct 2021)
- 2021 Matzen, S. L., Pacheco, M., Ely, T., **Wackett, A. A.**, Gartman, A., German, C. R., and Toner, B. M. *Pyrite nanoparticles as biogeochemical tracers: constraining the effect of ocean chemistry on particle chemical and morphological evolution.*
(Presented at the American Geophysical Union 2021 Fall Meeting in New Orleans, LA, USA, Dec 2021)
- 2021 Matzen, S. L., Ely, T., **Wackett, A. A.**, Gartman, A., German, C. R., and Toner, B. M. *Effects of ocean chemistry on the chemical and morphological evolution of iron sulfide nanoparticles.*
<https://doi.org/10.7185/gold2021.6471>.
(Virtual presentation at the Goldschmidt 2021 Geochemical Conference, Jul 2021)
- 2021 Matzen, S. L., **Wackett, A. A.**, Jelinski, N. A., German, C. R., and Toner, B. M. *Iron nanoparticle oxidation and aggregation behavior informs the fate of hydrothermal iron exported to oceans on Earth and beyond.*
(Virtual presentation at the American Geophysical Union 2020 Fall Meeting, Dec 2020)
- 2020 Yoo, K., **Wackett, A. A.**, Baumann, T., Frelich, L. E., Sikes, D. S., Bowser, M. L., Brown, S. C., Ihl, C., Zhang, M., Riley, J., and Klaminder, J. *Nonlinear soil change by exotic earthworms: Organisms as a soil-forming factor.*
<https://doi.org/10.46427/gold2020.3035>.
(Virtual presentation at the Goldschmidt 2020 Geochemical Conference, Jun 2020)
- 2019 Yoo, K., **Wackett, A. A.**, Baumann, T., Sikes, D. S., Bowser, M. L., Morton, J. M., Brown, S. C., Frelich, L. E., Bauer, S., Andrews, R., Ihl, C., Zhang, M., Riley, J., and Klaminder, J. *Boreal W'o'rm'ing: Mechanisms and limiting factors of earthworm invasion in Arctic and subarctic ecosystems.*
(Presented at the American Geophysical Union 2019 Fall Meeting in San Francisco, CA, USA, Dec 2019)
- 2017 Wang, X., Yoo, K., **Wackett, A. A.**, Gutknecht, J., Amundson, R., and Heimsath, A. M. *Soil organic carbon and its interaction with minerals on two hillslopes with different climates and erosion processes.*
(Presented at the American Geophysical Union 2017 Fall Meeting in New Orleans, LA, USA, Dec 2017)
- 2015 Yoo, K., **Wackett, A. A.**, Amundson, R., and Heimsath, A. M. *Physical vs. chemical weathering controls of soils' capacity to store carbon: Hillslope transects under different climatic conditions.*
(Presented at the American Geophysical Union 2015 Fall Meeting in San Francisco, CA, USA, Dec 2015)
- 2015 Yoo, K., **Wackett, A. A.**, Amundson, R., and Heimsath, A. M. *Weathering control of mineral-carbon sorption at hillslopes under different climates.*
(Invited presentation at the Goldschmidt 2015 Geochemical Conference in Prague, Czechia, Aug 2015)
- 2014 Garver, J. I., Davidson, C. M., Frett, B. K., Kaminski, K., Rick, B. J., Riehl, M., Roig, C. I., **Wackett, A. A.** *Tectonic evolution of the Chugach-Prince William terrane, Alaska: Constraints from Seward and Baranof Island.*
(Presented at the KECK Geology Consortium Research Symposium in Mt. Holyoke, MA, USA, Apr 2014)

PROFESSIONAL SERVICE

Manuscript Review (Journal Articles)

Applied Soil Ecology

Biodiversity Data Journal

Biogeochemistry

Catena

Permafrost and Periglacial Processes

Stanford University, Dept. of Earth & Planetary Sciences

2023-2024 Department Wellness Liaison (Stanford Doerr School of Sustainability)

2022-2024 Department Seminar/Colloquium Coordinator

University of Minnesota, Dept. of Soil, Water, & Climate

2017-2018 Diversity, Equity, and Inclusion (DEI) Committee

2016-2018 Graduate Student Social Committee Coordinator

PROFESSIONAL AFFILIATIONS

Geochemical Society (2022-present)
Soil Science Society of America (2019, 2023-present)
American Geophysical Union (2016-2018, 2022-present)
Geological Society of America (2013-2015, 2022-present)

INTERNATIONAL WORK EXPERIENCE

Research Projects: Sweden, Finland, Am. Samoa, Democratic Republic of Congo, Australia, New Zealand, Puerto Rico
NGO Volunteer Work: Nicaragua, Guatemala, Tanzania

LANGUAGES

Fluent: English Advanced Proficiency: Spanish Intermediate : Swedish Elementary: Danish

PUBLIC SERVICE, OUTREACH & VOLUNTEERING

Stanford Future Advancers of Science & Technology, San José, California, USA 2022-2024
Student Mentor & Workshops Coordinator (Andrew P. Hill High School)

University of Minnesota, Saint Paul, Minnesota, USA 2017-2020
Guest Teacher & Panelist for InSciEd (Twin Cities German Immersion School, Como Park Elementary)

University of Helsinki, Helsinki, Finland 2016-2017
Citizen Science Outreach Initiative (Collaboration with Dr. Erin K. Cameron)

House of Teens, San Antonio, Texas, USA 2010-2012
Homework Tutor & Volunteer

Project Minnesota/León, León, Nicaragua *Summers 2007-2009, 2011, 2015*
Translator & English Teacher (Primaria La Asunción)

OTHER WORK EXPERIENCE

Concordia Language Villages, Bemidji, Minnesota, USA *Summer 2022*
Business Manager, Skovsøen Danish Language Camp
Waterfront Manager & Lifeguard, Skovsøen Danish Language Camp

YMCA Camp Widjiwagan, Ely, Minnesota, USA *Summers 2011, 2014-2015*
Wilderness Trail Guide (Canoeing & Backpacking Programs)

Saint Paul Parks & Recreation, Saint Paul, Minnesota, USA *Winters 2009-2010, 2015*
Ski & Snowboard Instructor

Trinity University, San Antonio, Texas, USA *Academic Year 2010-2014*
Outdoor Recreation Program Trip Leader

TECHNICAL SKILLS & EXPERIENCE

Instrumentation & Analytical Techniques

Gamma & Alpha-Particle Spectrometry (measuring ⁷Be, ¹³⁷Cs, and ²¹⁰Pb)
Soil & Sediment Grain Size Analyses via Laser Particle Size Analyzer (LPSA), CAMSIZER, and Hydrometer Methods
Mineral Specific Surface Area (SSA) Measurements via Brunauer-Emmett-Teller (BET) Method
Inductively-Coupled Plasma Mass Spectrometry (ICP-MS) & Optical Emission Spectrometry (ICP-OES)
Elemental Analysis of Carbon/Nitrogen & Stable Isotopes ($\delta^{13}\text{C}$, $\delta^{15}\text{N}$) by Isotope Ratio Mass Spectrometry (EA-IRMS)
X-Ray Fluorescence Spectrometry (XRF) of Soil, Sediment, and Bedrock Samples
Scanning Electron Microscopy & Energy Dispersive X-Ray Spectroscopy (SEM-EDS)
X-Ray Diffraction (XRD)
Clay Mineral Separation & Identification (by XRD)
Soil Carbon Density Fractionations

Mineral Separations (Preparation of Clean Quartz & Zircon for cosmogenic nuclide & thermochronometric analyses)
Selective Extraction & Dissolution of Soil/Sediment Samples

(Geo-)Statistics

Linear Regression (LR) & Multiple Linear Regression Models (MLR)
Linear Mixed Models (LMM)
Generalized Linear Mixed Models (GLMM)
Generalized Additive Mixed Models (GAMM)
Power Analysis
Principle Component Analysis (PCA)
Non-Metric Multidimensional Scaling (NMDS)
Factor Analysis (FA)
Structural Equation Models (SEM)
Isometric Log-Ratio Transformations & Compositional Data (CoDa) Analysis
Kriging, Spatial Interpolation, & Variograms
Extreme Value Statistics
Markov Chain Monte Carlo (MCMC) Simulations
Analysis of Variance (ANOVA) & Analysis of Covariance (ANCOVA)

Software & Computing

R Statistical Environment (dplyr, tidyverse, lme4, nlme, glmmTMB, vegan (PCA), lavaan (SEM), mgcv (GAMMs), ggplot2)
Python (NumPy, Pandas, Sciplot, Matplotlib, Scikit-learn, Seaborn, SQLAlchemy)
CoDaPack Software for Compositional Data Analysis
ArcGIS & QGIS Geospatial Interfaces
MDI-JADE & Match! Software for Analysis of X-Ray Diffraction Spectra
X-Ray Microdiffraction Analysis Software (XMAS) for Analysis of Synchrotron-Based X-Ray Microdiffraction Patterns
Adobe Creative Suite (Adobe Illustrator, Photoshop, Lightroom)

REFERENCES

Jane K. Willenbring, Associate Professor

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