MORGAN D. SANGER

Curriculum Vitae

Doctoral Candidate
Dept. of Civil & Environmental Engineering
University of Washington
3760 E Stevens Way NE, Seattle, WA 98195

+1(206)743-1587
sangermd@uw.edu
https://sangermd.github.io/website

EDUCATION

Doctor of Philosophy, Civil Engineering
University of Washington, 2022 – Present (expected Summer 2026)
Advisor: Professor Brett W. Maurer
Certificate in Data Science

Master of Science, Geological Engineering
University of Wisconsin-Madison, 2019
Advisor: Professor Matthew Ginder-Vogel

Bachelor of Science, Geological Engineering, Geology & Geophysics
University of Wisconsin-Madison, 2017
Certificate in Engineering for Energy Sustainability
Certificate in Environmental Studies

PROFESSIONAL EXPERIENCE

Research & Teaching Assistant
Dept. of Civil & Environmental Engineering, University of Washington, 2022 – Present
Dissertation: AI-driven and near-real-time modeling of natural hazards

Visiting Scholar
Norwegian Geotechnical Institute, 2024 – 2025

Geotechnical Engineer
Shannon & Wilson, Inc., Seattle, WA, 2019 – 2023

Research & Teaching Assistant
Dept. of Civil & Environmental Engineering, University of Wisconsin-Madison, 2018 – 2019
Thesis: Chemistry of recycled concrete aggregate leachate in pavement base course applications
Courses: CIVENGR330: Soil Mechanics (3 semesters);
CIVENGR291: Problem Solving with Computer Tools (1 semester)

PROFESSIONAL CREDENTIALS

Professional Engineer-Civil, AK, CE 199699, 2022
Professional Engineer-Civil, CA, C 94186, 2022
Professional Engineer-Civil, WA, 22021354, 2022
FAA-certified Remote Pilot, 4445843, 2021
Geologist-in-Training, WA, 20120256, 2020
LEED AP BD+C, 0011101313, 2020

HONORS & AWARDS

Learning from Earthquakes Travel Study, *Earthquake Engineering Research Institute*, 2025
NextProf Nexus Workshop, Selected Participant, *University of California-Berkeley, Berkeley, CA*, 2025
2024-2025 EERI/FEMA NEHRP Graduate Fellowship, *Earthquake Engineering Research Institute*, 2024
Earthquake Spectra 2023 Outstanding Paper Award, *Earthquake Engineering Research Institute*, 2024
3rd Place, *ASCE Geo-Congress National Poster Competition, Vancouver, BC,* 2024
Herbold Data Science Fellow, *University of Washington College of Engineering*, 2023-2024
1st Place, *National Highway Geology Symposium Poster Competition, Tacoma, WA,* 2023
Thomas Wysockey Civil Engineering Scholar, *Deep Foundations Institute*, 2023
Shannon Memorial Fellow, *University of Washington Dept. of Civil & Environmental Engineering*, 2023
Industry Advancement Scholar, *International Association of Foundation Drilling*, 2023
Osberg Recruited Fellow, *University of Washington College of Engineering*, 2022-2023
Early Excellence in Teaching Award, *University of Wisconsin-Madison*, 2019
Haimson Outstanding Graduate Student, *University of Wisconsin-Madison Dept. of Geol. Engineering*, 2018
1st Place, *University of Wisconsin-Madison Bryson Poster Competition, Madison, WI,* 2018
1st Place, *University of Wisconsin-Madison Bryson Poster Competition, Madison, WI,* 2017
John Dickinson Award, *Barr Engineering, Inc., Minneapolis, MN*, 2017
1st Place, *Institute on Lake Superior Geology Student Poster Competition, Wawa, ON*, 2017
Wisconsin Idea Fellow, *University of Wisconsin-Madison Morgridge Center for Public Service*, 2016-2017
Wisconsin Idea Fellow, *University of Wisconsin-Madison Morgridge Center for Public Service*, 2015-2016
Severson Undergraduate Student Award, *University of Wisconsin-Madison Dept. of Geol. Engineering,* 2016
Outstanding Sophomore Award, *University of Wisconsin-Madison Dept. of Geoscience*, 2015
Thermo Fisher Scientific STEM Scholar, *Thermo Fisher Scientific, Madison, WI*, 2013-2017
Wisconsin Academic Excellence Scholar, *Wisconsin Higher Educational Aid Board*, 2013-2017

PUBLICATIONS

JOURNAL ARTICLES

Sanger, M.D., Carlton, B., Liu, Z., Vanneste, M., Griffiths, L., & Maurer, B.W. (In Review). Towards AI-driven seismic velocity modelling in the North Sea: Using onshore data to predict offshore conditions. *GeoRisk*. *(Journal Paper)*

Sanger, M.D. & Maurer, B.W. (In Review). Geospatial AI for liquefaction hazard and impact forecasting: a demonstrative study in the U.S. Pacific Northwest. *Geodata and AI*. *(Journal Paper)*

Sanger, M.D., Geyin, M., & Maurer, B.W. (2025). Mechanics-informed machine learning for geospatial modeling of soil liquefaction: global and national surrogate models for simulation and near-real-time response. *Journal of Geotechnical and Geoenv. Eng.*, *151*(11): 04025126. *(Journal Paper)*

Maurer, B.W., & **Sanger, M.D.** (2023). Why "AI" models for predicting soil liquefaction have been ignored, plus some that shouldn't be. *Earthquake Spectra*, 87552930231173711. *(Journal Paper; 2023 Earthquake Spectra Outstanding Paper)*

Sanger, M.D., Madras Natarajan, B., Wang, B., Edil, T.B., & Ginder-Vogel, M. (2020). Recycled concrete aggregate in base course applications: Review of field and laboratory investigations of leachate pH. *Journal of Hazardous Materials*, *385*(2020): 121562. *(Journal Paper)*

Chen, J., **Sanger, M.D.,** Ritchey, R., Edil, T.B., & Ginder-Vogel, M. (2020). Neutralization of high pH and alkalinity effluent from recycled concrete aggregate by common subgrade soil. *Journal of Environmental Quality*, *49*(1): 172-183. *(Journal Paper)*

Madras Natarajan, B., Kanavas, Z., **Sanger, M.D.,** Rudolph, J., Chen, J., Edil, T.B., & Ginder-Vogel M. (2019). Characterization of recycled concrete aggregate after eight years of field deployment. *Journal of Materials in Civil Eng.*, *31*(6): 04019070. *(Journal Paper)*

CONFERENCE CONTRIBUTIONS

Sanger, M.D., Acosta, A.A., Buyco, K., Ibrahim, M.S., & Ramos, P.S. (2026). 2025 EERI LFE Travel Study – Mexico: Lessons in soft soils, subsidence, and site effects, *13th National Conference on Earthquake Engineering (13NCEE)*, Portland, Oregon. In Review. *(Conference Paper)*

Sanger, M.D. & Maurer, B.W. (2026). Parametric modeling of shear wave velocity profiles for the conterminous U.S. *13NCEE*, Portland, Oregon. In Review. *(Conference Paper)*

Sanger, M.D., Carlton, B., Liu, Z., & Maurer, B.W. (2025). AI-driven seismic velocity modelling in the North Sea: using onshore data to predict offshore conditions *Proc. of the 9th International Symposium for Geotechnical Safety and Risk*, Oslo, Norway. *(Conference Paper)*

Maurer, B.W. & **Sanger, M.D.** (2024). On the underutilization of artificial intelligence models in geotechnical practice. *American Society of Civil Engineers Geocongress 2024: Geotechnical Data Analysis and Computation*, *Geotechnical Special Publication, 352,* 396-405. *(Conference Paper)*

Klink, T., **Sanger, M.D.**, Olley, R., Pakes, A., Edil, T.B., & Klinzing, S. (2020). Early introduction of STEM through sustainable engineering. *Proc. of the 2nd International Conference on Env. Geotechnology, Recycled Waste Materials & Sustainable Eng.*, Chicago, IL. *(Conference Paper)*

Sanger, M.D. & Ginder-Vogel, M. (2019). Fate and transport of recycled concrete aggregate leachate. *43rd Annual Meeting of the Wisconsin Section of the American Water Resources Association (AWRA).* Delavan, WI. *(Conference Abstract)*

Sanger, M.D., Campagnola, G., Ritchey, R., Edil, T.B., & Ginder-Vogel, M. (2019). Assessing the impact of contact time on leachate chemistry from recycled concrete aggregate. *Proc. of the TRB Annual Meeting*, Washington, D.C., 19-03633. *(Conference Paper)*

Pakes, A., Edil, T.B., **Sanger, M.D.,** Olley, R., & Klink T. (2018). Environmental benefits of cold-in-place recycling, *TRB Annual Meeting*, Washington, D.C., 18-04381. *(Conference Paper)*

Sanger, M.D., Kingsbury Stewart, E., & Grauch, V.J.S. (2017). Seismic interpretation of the 1.1 Ga Midcontinent Rift volcanic interval beneath Lake Superior. *Institute on Lake Superior Geology Program and Abstracts*, v. 63, p. 79-80. *(Conference Abstract)*

Grauch, V.J.S., **Sanger, M.D.,** Anderson, E.D., and Kingsbury Stewart, E. (2017). Revisiting geophysical interpretations of the Midcontinent Rift below Lake Superior. *Institute on Lake Superior Geology Program and Abstracts*, v. 63, p. 36–37. (Conference Abstract)

DATASETS & CODE REPOSITORIES

Sanger, M.D. & Maurer, B.W. (2025). *A database of shear wave velocity tests from North America.* DesignSafe-CI. *(Dataset)*

Sanger, M.D., Geyin, M., Shin, A., Perez, M., & Maurer, B.W. (2025). *A database of cone penetration tests from North America (version 2).* DesignSafe-CI. *(Dataset)*

Sanger, M.D. & Maurer, B.W. (2025). *Pacific Northwest liquefaction hazard simulations.* DesignSafe-CI. (Dataset)

Sanger, M.D., Geyin, M., & Maurer, B.W. (2024). *Mechanics-informed machine learning for geospatial modeling of soil liquefaction: example model implementation in Jupyter Notebook and Matlab.* DesignSafe-CI. (*Code Repository*)

Sanger, M.D., Geyin, M., & Maurer, B.W. (2024). *Mechanics-informed machine learning for geospatial modeling of soil liquefaction: global model map products for LPI, LPI_{ISH}, and LSN.* DesignSafe-CI. (*Dataset*)

Sanger, M.D., Geyin, M., & Maurer, B.W. (2024). *Mechanics-informed machine learning for geospatial modeling of soil liquefaction: New Zealand model map products for LPI, LPI_{ISH}, and LSN.* DesignSafe-CI. (*Dataset*)

Agyekum, A., Ghavidel, A., Gomez Fuentes, M., Roy, A., **Sanger, M.D.,** & Zhao, J. (2024). *Transportation infrastructure performance under seismic hazards with SimCenter Tools.* DesignSafe-CI. (*Code Repository*)

Sanger, M.D., Geyin, M., Shin, A., & Maurer, B.W. (2024). *A database of cone penetration tests from North America*. DesignSafe-CI. (*Dataset*)

Rasanen, R., Geyin, M., **Sanger, M.D.,** & Maurer, B.W. (2024). *A database of cone penetration tests from the Cascadia Subduction Zone*. DesignSafe-CI. (*Dataset*)

OTHER PUBLICATIONS

Sanger, M.D. & Maurer, B.W. (2025). Informing predictions from above with data from below: a hierarchical geospatial liquefaction model for rapid response and simulation. *U.S. Geological Survey Final Technical Report G23AP00017*. *(Technical Report)*

Sanger, M.D., & Maurer, B.W. (2023). Meet Geo P. Tech, AI Chatbot Geotechnical Engineer: How AI Language Models Like "ChatGPT" Could Change the Profession, *Geostrata 27*(3): 54-61. *(Editorial)*

Sanger, M.D. (2019). Chemistry of recycled concrete aggregate leachate in pavement base course applications. Thesis (MS) University of Wisconsin-Madison. *(Thesis)*

Sanger, M.D., Olley, R., Pakes, A., Edil, T.B., Baker, A., & Elliott E. (2017). Environmental benefits of cold-in-place recycling*, Recycled Materials Resource Center Final Technical Report*. *(Technical Report)*

PRESENTATIONS

Sanger, M.D. & Maurer, B.W. (2025). Liquefaction impacts on PacTrans mobility: Mechanics-informed AI modeling for simulation, disaster equity, and near-real-time response. PacTrans Annual Meeting, Portland, Oregon. *(Conference Podium Presentation)*

Acosta, A., Buyco, K., Ibrahim, M., Ramos, S., & **Sanger, M.D.** (2025). *Lessons in geotechnical earthquake engineering from large-magnitude earthquakes in Mexico.* Presentation to the 40th Mexico City Earthquake Anniversary Symposium, Mexico City, Mexico. *(Conference Podium Presentation)*

Sanger, M.D., Carlton, B., Liu, Z., & Maurer, B.W. (2025). *AI-driven seismic velocity modeling in the North Sea: using onshore data to predict offshore conditions.* 9th International Symposium for Geotechnical Safety and Risk, Oslo, Norway. *(Conference Podium Presentation)*

Sanger, M.D., Carlton, B., Liu, Z., Vanneste, M., Griffiths, L., & Maurer, B.W. (2025). *Integrating public and proprietary geotechnical data sources for improved parameter mapping.* Norwegian Geotechnical Institute, Oslo, Norway. *(Podium Presentation)*

Maurer, B.W. & **Sanger, M.D.** (2025). *Lessons from the graveyard: resurrecting AI for geohazard prediction in a riskier world.* CS4 the Environment Spring Symposium, Seattle, Washington. *(Podium Presentation)*

Sanger, M.D. & Maurer, B.W. (2025). *Mechanics-informed machine learning for geospatial modeling of liquefaction: global and national surrogate models for simulation and near-real-time response*. Annual Meeting of the Pacific Earthquake Engineering Research (PEER) Center, Berkeley, California. (*Podium Presentation*)

Maurer, B.W. & **Sanger, M.D.** (2025). *Why most AI models are ignored and why some probably shouldn't be + geotechnical trends: Musings on education, research, and the future.* Shannon & Wilson, Inc. Bi-annual Corporate Winter Conference, SeaTac, WA. (*Podium Presentation*)

Sanger, M.D. Geyin, M., & Maurer, B.W. (2024). *Mechanics-informed machine learning for regional geohazard modeling*. Swedish Geotechnical Institute, Linkoping, Sweden. *(Podium Presentation)*

Sanger, M.D. Geyin, M., & Maurer, B.W. (2024). *Application of AI/ML to large geospatial and geotechnical data sets for improved natural hazard modeling*. Norwegian Geotechnical Institute, Oslo, Norway. *(Podium Presentation)*

Maurer, B.W. & **Sanger, M.D.** (2024). *Why most "AI" models are ignored, plus some that probably shouldn't be.* New Zealand QuakeCoRE Annual Meeting, Napier, New Zealand. (*Podium Presentation*)

Sanger, M.D. Geyin, M., & Maurer, B.W. (2024). *A mechanics-informed machine learning model for regional liquefaction hazard planning and response.* Earthquake Engineering Research Institute (EERI) Annual Meeting, Seattle, WA. *(Conference Podium Presentation)*

Sanger, M.D., Geyin, M., & Maurer, B.W. (2024). *Rapid Map: A mechanics-informed machine learning model for regional liquefaction hazard planning and response.* EERI Annual Meeting, Seattle, WA. *(Conference Poster Presentation)*

Sanger, M.D. (2024). *AI in geotechnical engineering practice*. Shannon & Wilson, Inc., Seattle, WA. *(Podium Presentation)*

Sanger, M.D. Geyin, M., & Maurer, B.W. (2024). *Mechanics-informed, geospatial machine learning for natural hazard planning and response*. University of Washington Data Science Seminar (CHEM E 599), Seattle, WA. *(Podium Presentation)*

Sanger, M.D., Geyin, M., & Maurer, B.W. (2024). *Geosp-AI-tial liquefaction: mechanics-informed AI and geospatial data from liquefaction hazard planning and response*. ASCE Geocongress National Poster Competition, Vancouver, Canada. *(Conference Poster Presentation, 3rd place)*

Sanger, M.D. (2023). *Introduction to generative AI and large language models*. Shannon & Wilson, Inc., Seattle, WA. *(Podium Presentation)*

Sanger, M.D., Geyin, M., & Maurer, B.W. (2023). *Navigating geohazards: AI-driven, near-real-time liquefaction predictions and insights for transportation networks.* Highway Geology Symposium Poster Competition. *(Conference Poster Presentation, 1st place)*

Dafni, J.D., **Sanger**, **M.D.,** & Kindberg, C. (2022). *Drone usage*. Shannon & Wilson, Inc. Bi-annual Corporate Winter Conference, SeaTac, WA. *(Podium Presentation)*

Keatts, T., & **Sanger**, **M.D.** (2022). *Geotechnical field investigation methods.* Shannon & Wilson, Inc. Bi-annual Corporate Winter Conference, SeaTac, WA. *(Podium Presentation)*

Sanger, M.D. (2019). *Chemistry of recycled concrete aggregate leachate in pavement base course applications*. University of Wisconsin-Madison, Madison, WI. *(Thesis Defense)*

Sanger, M.D., Ritchey, R., Campagnola, G., Edil, T.B., & Ginder-Vogel, M. (2019). *Fate and transport of recycled concrete aggregate leachate.* 43rd Annual Meeting of the Wisconsin Section of the AWRA. Delavan, WI. *(Conference Podium Presentation)*

Sanger, M.D., Campagnola, G., Ritchey, R., Edil, T.B., & Ginder-Vogel, M. (2019). *Assessing the impact of*

contact time on leachate chemistry from recycled concrete aggregate. TRB Annual Meeting, Washington, D.C., 19-03633. *(Conference Podium Presentation)*

Sanger, M.D. (2019). *Chemistry of recycled concrete aggregate leachate in pavement base course applications.* Wisconsin Department of Transportation, Madison, WI. *(Podium Presentation)*

Sanger, M.D. (2018). *Eva the Engineer: encouraging young women at the intersection of engineering and sustainability*. Bryson Scholarship Poster Competition, Madison, WI. *(Poster Presentation, 1st place)*

Sanger, M.D., R. Olley, T. Klink (2018). *Eva the Engineer: encouraging young women at the intersection of engineering and sustainability*. Research in the Rotunda of the Wisconsin State Capitol, Madison, WI. *(Poster Presentation)*

Sanger, M.D., Pakes, A. Edil, T.B., Olley, R., & Klink, T. (2017). *Environmental benefits of cold-in-place recycling*. Bryson Scholarship Poster Competition, Madison, WI. *(Poster Presentation, 1st place)*

Sanger, M.D., Pakes, A. Edil, T.B., Olley, R., & Klink, T. (2017). *Environmental benefits of cold-in-place recycling*. Wisconsin Department of Transportation, Madison, WI. *(Podium Presentation)*

Sanger, M.D., Kingsbury Stewart, E., & Grauch, V.J.S. (2017). *Seismic interpretation of the 1.1 Ga Midcontinent Rift volcanic interval beneath Lake Superior*. Institute on Lake Superior Geology Student Poster Competition, Wawa, Canada. *(Conference Poster Presentation, 1st Place)*

Grauch, V.J.S., **Sanger, M.D.,** Anderson, E.D., and Kingsbury Stewart, E. (2017). *Revisiting geophysical interpretations of the Midcontinent Rift below Lake Superior*. Institute on Lake Superior Geology, Wawa, Canada. (Conference Podium Presentation)

GRANTS & FUNDED RESEARCH

2025 Learning from Earthquakes Travel Study Travel Grant. *$2,000*

2025 University of Washington Graduate Student Conference Presentation Travel Grant. *$500*

2024-2025 EERI/FEMA NEHRP Graduate Fellowship in Earthquake Hazard Reduction. *$12,000*

2024-2025 Valle Scandinavian Research Exchange Fellow. *$111,000*

2024 ASCE Geo-Institute Travel Grant, National Student Poster Competition, Vancouver, BC. *$500*

2023-2024 Herbold Data Science Fellow. *$10,000*

2022-2023 Osberg Recruited Fellow. *$100,000*

2015-2017 Wisconsin Idea Fellow. *$14,000*

2013-2017 Thermo Fisher Scientific STEM Scholar. *$20,000*

SERVICE & LEADERSHIP

Journal Peer Reviewer: ASCE Journal of Geotechnical and Geoenv. Eng.; Earthquake Spectra; DFI Journal.

Conference Peer Reviewer: 2025 Geo-Extreme; 2025 NHERI GSC Mini-Conference; 2025 DFI 50th Annual Conference on Deep Foundations; 2025 International Symposium for Geotechnical Safety and Risk; 2025 Geotechnical Frontiers; 2024 NHERI GSC Mini-Conference; 2022 Geo-Congress; 2022 DFI 47th Annual Conference on Deep Foundations.

AI in the STEM Workforce Panelist, Seattle University, Seattle, WA, 2025

INSIGHT High School STEAM Outreach, Seattle, WA, 2024

Orcas Elementary School Geology Outreach, Seattle, WA, 2024

University Outreach Coordinator, EERI Student Leadership Committee, 2023 – 2024

EERI Student Chapter President, University of Washington, 2023 – 2024

College of Engineering Student Council, University of Washington, 2023 – Present

Geo-Institute Graduate Student Society (GIGSS) President, University of Washington 2023 – 2024

Engineering Discovery Days K-12 Outreach, Seattle, WA, 2023

GIGGS Board Member, University of Washington, 2022 – Present

Eva the Engineer K-12 Outreach Coordinator, Madison, WI, 2015 – 2017

Younger Member's Forum Board Member, ASCE Seattle Section, 2020 – 2022

Sustainability Committee Chair, ASCE Seattle Section, 2020 – 2022

Entry-Level Civil Engineering Workforce Panelist, University of Washington, Seattle, WA, 2019

GIGSS Board Member, University of Wisconsin-Madison, 2018 – 2019

Eva the Engineer K-12 Outreach Coordinator and Instructor, Madison, WI, 2015 – 2017

Wisconsin Rocks K-12 Outreach Coordinator and Instructor, Madison, WI, 2015 – 2016

PROFESSIONAL DEVELOPMENT

Learning from Earthquakes Travel Study, *Earthquake Engineering Research Institute*, 2025

NextProf Nexus Workshop, *University of California-Berkeley, University of Michigan, Georgia Tech*, 2025

Preparing Future Faculty 2025 Workshop, *Auburn University*, 2025

AI+Teaching: Using AI to Advance Learning, *University of Washington*, 2025

Teaching@UW: Strategies for Teaching Assistants, *University of Washington*, 2025

NASA Earth Sciences & UW Hackweek, *University of Washington*, 2024

NHERI and AI Computational Academy, *Texas Advanced Computing Center*, 2024

AI, Disruptive Technology, & the Future of Engineering, *American Council of Engineering Companies*, 2023

GeoSMART Hackweek, *University of Washington*, 2023

Deep Learning in Python, *University of North Carolina at Chapel Hill*, 2023

Data Science Conference, *Women in Data Science Puget Sound*, 2023

Rock Blasting and Overbreak Control, *Konya Industries,* 2022

Seepage Through Embankment Dams, *Association of State Dam Safety Officials*, 2021

Making the Case for Sustainable Infrastructure, *American Society of Civil Engineers*, 2020

Morgridge Entrepreneurial Bootcamp, *University of Wisconsin-Madison*, 2018

PROFESSIONAL AFFILIATIONS

Member, American Society of Civil Engineers (ASCE)

Member, Association of Engineering Geologists (AEG)

Member, Deep Foundations Institute (DFI)

Member, Earthquake Engineering Research Institute (EERI)