

ZOEY WERBIN

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EDUCATION

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| Boston University
<i>PhD in Biology, Certificate in Biogeoscience</i>
· Advisors: Jennifer Bhatnagar and Michael Dietze | September 2018 - August 2024
<i>Boston, MA</i> |
| Swarthmore College
<i>BA in Biology, Minor in Environmental Studies</i> | September 2013 - May 2017
<i>Swarthmore, PA</i> |

RESEARCH EXPERIENCE

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| Boston University, Department of Biology
<i>Graduate Research Assistant, PI: Jennifer Bhatnagar</i>
· Developing iterative spatial and temporal forecasts of soil microbial communities and ecosystem function, using Bayesian hierarchical modeling and genome-scale metabolic modeling
· Investigating the limits of predictability and sources of uncertainty in the soil microbiome | September 2018 - Present
<i>Boston, MA</i> |
| Swarthmore College, Department of Mathematics and Statistics
<i>Project Scientist, PI: Steve Wang</i>
· Analyzed patterns of age selectivity in extinctions throughout the Phanerozoic
· Used logistic regression and cluster analyses to demonstrate that age selectivity trends in modern extinctions are more similar to severe mass extinctions than to background extinctions. | June 2018 - August 2018
<i>Swarthmore, PA</i> |
| Oak Ridge National Laboratory, Distributed Active Archive Center for Biogeochemical Dynamics
<i>Post-Bachelors Research Intern, Mentor: Dr. Alison Boyer.</i>
· Conducted quality assurance for NASA atmospheric chemistry data
· Developed interactive data visualization tools for the Atmospheric Carbon and Transport - America (ACT-America) project using Shiny, a web framework for R
· Developed R package for processing ICARTT (atmospheric chemistry) data files | September 2017 - May 2018
<i>Oak Ridge, TN</i> |
| Florida State University, Department of Earth, Ocean, and Atmospheric Science
<i>Research Assistant, PI: Olivia Mason</i>
· Developed new metagenomics data processing workflows using Python and BLAST command line tools
· Used Circos with metatranscriptomic data to visualize potential carbon-cycling pathways in ocean microbial communities | June 2017 - August 2017
<i>Tallahassee, FL</i> |
| Swarthmore College, Department of Biology
<i>Research Assistant, PI: Elizabeth Nichols</i>
· Conducted dung beetle dissections, identified intestinal nematodes, and developed parasite identification guide at the University of Sao Paulo, Brazil
· Quantified infection intensity and conducted spatial analysis using R and QGIS | January 2016 - August 2016
<i>Swarthmore, PA</i> |
| Academy of Natural Sciences of Drexel University
<i>Research Assistant, PI: Jason Downs</i> | May 2015 - August 2015
<i>Swarthmore, PA</i> |

- Assisted with field material collection in fossil sites in the Catskill Formation
- Collected morphometric data on Bothriolepis (armored fish) fossils
- Characterized allometric growth patterns of adult specimens in R, and developed decision trees to diagnose the species of juvenile specimens

PUBLICATIONS

- “Soil microbiome predictability increases with spatial and taxonomic scale.” C. Averill, Zoey Werbin, K.F. Atherton, J.M. Bhatnagar and M.C. Dietze. *Nat Ecol Evol* 5, 747756 (2021).
- “The National Ecological Observatory Networks soil metagenomes: assembly and basic analysis” Zoey Werbin, B. Hackos, M. Dietze, J.M. Bhatnagar. *F1000 Research* 10:299 (2021).
- “From DNA sequences to microbial ecology: Wrangling NEON soil microbe data with the *neonMicrobe R package*” . C. Qin, R. Bartelme, Y. Chung, D. Fairbanks, Y. Lin, D. Liptzin, C. Muscarella, K. Naithani, K. Peay, P. Pellitier, A. St. Rose, L. Stanish, **Z. Werbin**, K. Zhu
- “A tree-planting decision support tool for urban heat island mitigation.” Zoey Werbin, L. Heidari, P. Brochu, S. Buckley, L. Butler, C. Connolly, L. Houttuijn Bloemendaal, T. McCabe, T. Miller, L. Hutyra. *PloS one*, 15(10), e0224959.

PRESENTATIONS

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| Ecological Society of America
<i>Contributed talk - presenting author</i> | 2023 Annual Meeting
<i>Portland, Oregon, USA</i> |
| · “Forecasting the soil microbiome across the United States.” Zoey Werbin, C. Averill, M.C. Dietze, & J.M. Bhatnagar. | |
| Ecological Society of America
<i>Invited talk - presenting author</i> | 2022 Annual Meeting
<i>Montreal, Quebec, CA</i> |
| · “Predicting soil microbiome structure and function using genome-scale metabolic modeling.” Zoey Werbin, M.C. Dietze, & J.M. Bhatnagar. | |
| American Geophysical Union
<i>Contributed talk - presenting author</i> | 2021 Fall Meeting
<i>Virtual</i> |
| · “From Bacterial Genomes to Biogeochemical Fluxes: Metabolic Modeling of the Soil Nitrogen Cycle.” Zoey Werbin, J. Lopez-Nava, M.C. Dietze, & J.M. Bhatnagar. | |
| Ecological Society of America
<i>Contributed talk - presenting author</i> | 2021 Annual Meeting
<i>Virtual</i> |
| · “Drivers of seasonal and interannual change in the soil microbiome.” Zoey Werbin, M.C. Dietze, & J.M. Bhatnagar. | |
| British Ecological Society
<i>Invited talk - presenting author</i> | 2020 Annual Meeting
<i>Virtual</i> |
| · “Forecasting the soil microbiome using microbial networks” Zoey Werbin, M.C. Dietze, & J.M. Bhatnagar. | |
| Ecological Society of America
<i>Contributed talk - presenting author</i> | 2020 Annual Meeting
<i>Virtual</i> |
| · “Partitioning spatio-temporal variability in the soil microbiome.” Zoey Werbin, C. Averill, M.C. Dietze, & J.M. Bhatnagar. | |

American Geophysical Union*Contributed talk - presenting author*

2019 Fall Meeting

San Francisco, CA

- “Forecasting the Soil Microbiome.” Zoey Werbin, C. Averill, M.C. Dietze, & J.M. Bhatnagar.

American Geophysical Union*Contributed poster*

2019 Fall Meeting

San Francisco, CA

- “Airborne Data Visualizer: A Generalizable Web Application for Visual Exploration Of Greenhouse And Trace Gas Concentrations Observed From Aircraft” J.J. McNelis, A. Boyer, B.E. Wilson, Zoey Werbin, D. Wright, Y. Wei, & R. Shrestha

Ecological Society of America*Contributed talk - presenting author*

2019 Fall Meeting

Louisville, KY

- “Ecological forecasting of soil bacteria: predicting taxonomic and functional groups across the United States.” Zoey Werbin, C. Averill, M.C. Dietze, & J.M. Bhatnagar.

Ecological Society of America*Contributed talk*

2019 Fall Meeting

Louisville, KY

- “Prediction and scale of the temperate forest mycobiome.” C. Averill, J.M. Bhatnagar, M.C. Dietze, & Zoey Werbin.

Ecological Society of America*Contributed talk*

2019 Fall Meeting

Louisville, KY

- “Forecasting the forest mycobiome.” C. Averill, J.M. Bhatnagar, M.C. Dietze, A. Raiho, & Zoey Werbin.

Ecological Society of America*Contributed talk*

2019 Fall Meeting

Louisville, KY

- “Linking iterative forecasting to hypothesis testing: a case study for how to do this in practice.” M.C. Dietze, K.I. Wheeler, C. Averill, J.M. Bhatnagar, J.R. Foster, S.L. LaDeau, K. Weathers, Zoey Werbin, & K.A. Zarada.

Boston University Bioinformatics Student-Organized Symposium*Lightning talk*

Jun 5 2019

Boston, MA

- “Spatial forecasting of the soil microbiome.”

NSF Macrosystems PI Meeting*Contributed poster - presenting author*

May 15 2019

Boulder, CO

- “The Near Term Ecological Forecasting Initiative: Microbial Diversity and Function.” J.M. Bhatnagar, C. Averill, Zoey Werbin, M. Dietze, K.I. Wheeler, K.A. Zarada, S.L. Ladeau, J.R. Foster, K. Weathers, J. Brentrup.

Royal Society - The past is a foreign country: how much can the fossil record actually inform conservation?*Contributed poster - presenting author*

2019 Discussion Meeting

London, UK

- “Comparing the age selectivity of modern extinctions with Phanerozoic background and mass extinctions.” Zoey Werbin, J.D. Wojciehowski, H. Wang, C.E. Habermeier, N.A. Heim, S. Finnegan, J.L. Payne, E. Nichols, & S.C. Wang.

American Geophysical Union*Contributed poster*

2018 Fall Meeting

Washington, DC

- “Predictability and scale of the Earth microbiome” C. Averill, Zoey Werbin, M. Dietze, & J. Bhatnagar.

American Geophysical Union*Contributed poster*

2018 Fall Meeting

Washington, DC

- “The persistence of root carbon in soil: data and modeling gaps.” A. Malhotra, R.Z. Abramoff, P.J. Hanson, J.W. Harden, C. Hicks Pries, R.B. Jackson, M.L. McCormack, R.J. Norby, D. Sihi, B.N. Sulman, P.E. Thornton, S.J. Tumber-Davila, A. Walker, Zoey Werbin & C.M. Iversen.

Geological Society of America*Contributed poster*

2018 Annual Meeting

Indianapolis, IN

- “Are we entering a sixth mass extinction? Age selectivity of modern extinctions.” H. Wang, C.E. Habermeier, Zoey Werbin, J.D. Wojciehowski, N.A. Heim, S. Finnegan, J.L. Payne, & S.C. Wang. DOI: 10.1130/abs/2018AM-323991

Geological Society of America*Contributed talk*

2018 Annual Meeting

Indianapolis, IN

- “Comparing the age selectivity of modern extinctions with Phanerozoic background and mass extinctions.” S.C. Wang, Zoey Werbin, J.D. Wojciehowski, H. Wang, C.E. Habermeier, N.A. Heim, S. Finnegan & J.L. Payne. DOI: 10.1130/abs/2018AM-324110

Climate Change Science Institute (CCSI) Lunch and Learn Seminar*Seminar talk*

Apr 10 2018

Oak Ridge, TN

- “Interactive Data Exploration Using R Shiny.”

Geological Society of America*Contributed poster - presenting author*

2016 Annual Meeting

Denver, CO

- “Taxon age selectivity in modern extinctions.” Zoey Werbin, S.C. Wang, S. Finnegan, J.L. Payne. DOI: 10.1130/abs/2016AM-286536

AWARDS AND FELLOWSHIPS

Graduate Research Fellowship*National Science Foundation*

Fall 2021-Spring 2024

- Five-year research fellowship, including three years of stipend funding and cost-of-education allowance (approx. \$138,000 total)

Travel Award*Research Experience in Microbiomes Network*

Summer 2023

- Funding for attendance at ESA Annual Meeting, Aug 2023 (\$1800)

Travel Award*Boston University Graduate Student Organization*

Summer 2020

- Funding for attendance at ESA Annual Meeting, Aug 3-8 2020 (\$500)

Graduate Student Travel Awards*Boston University Department of Biology*

Fall 2019, Spring 2020, Spring 2022, Spring 2023

\$200-\$1000

- Funding for conference attendance

Biogeoscience Student Awards*Boston University Biogeoscience Program*

Spring 2019, Spring 2020, Fall 2021

\$290-\$500

- Funding for conference attendance

Microbiome Fellowship*Boston University Microbiome Initiative*

Spring and Fall 2020

- One-year stipend to fund microbiome research that transcends the disciplinary boundaries of biology, physics, and mathematics. Founded biweekly Microbiome Initiative journal club. (approx. \$34,000)

Graduate Student Travel Award Fall 2019
Boston University Department of Biology

- Funding for attendance at AGU Fall Meeting in San Francisco, CA, Dec 9-13 2019 (\$200)

Biogeoscience Student Award Spring 2019
Boston University Biogeoscience Program

- Funding for attendance at ESA Fall Meeting in Louisville, KY, Aug 11-16 2019 (\$480)

ESA+USSEE Annual Meeting Travel Award Spring 2019
Ecological Society of America (ESA)

- Funding for attendance at ESA Fall Meeting in Louisville, KY, Aug 11-16 2019 (\$500)

Graduate Student Travel Award Spring 2019
Boston University Department of Biology

- Funding for attendance at ESA Fall Meeting in Louisville, KY, Aug 11-16 2019 (\$200)

Dean's Fellowship Fall 2018
Boston University Graduate School of Arts & Sciences

- Fall and Spring semester stipend (\$28,325)

NSF Sedimentary Geology and Paleobiology Award #1760634 2018-2019
"RUI: Comparing age selectivity in modern extinctions and the fossil record."

- Co-authored proposal, carried out analyses, mentored two undergraduate students, and created outreach activities (total budget: \$54,059). PI: Steve Wang (Swarthmore).

Professional Opportunities Fund Travel Grant Fall 2016
Swarthmore College, Provosts Office

- Funding for attendance at Geological Society of America Fall Meeting 2016 (\$807)

Peter and Aleck Karis Fellowship in Environmental Studies Summer 2016

- Research stipend to explore host-parasite response to landscape scale forest cover (\$4350). PI: Elizabeth Nichols (Swarthmore).

SERVICE, TEACHING AND OUTREACH

Peer Review

- Referee for publications including Global Change Biology, Fungal Ecology, Science Advances, Scientific Reports, Journal of Ecology, Soil Biology and Biochemistry, mBio, mSystems, Journal of Applied Ecology.

Prospective Scholars Mentor Apr 2021 - Present
Boston University

- Mentoring prospective students in the Masters/PhD application and interview process.

Graduate Women in Science and Engineering (GWISE) Mentor September 2018 - Present
Boston University

- Mentoring undergraduate BU students in STEM fields.

Ecological Forecasting Summer Course July 2019 - July 2020
Boston University *Boston, MA*

- Teaching assistant for annual workshop on forecasting natural phenomena (additional description below).

Peripeteia Planning Committee Member (STEM Liaison)

September 2015 - May 2017

Swarthmore College, Provost's Office

- Planned interdisciplinary panel discussions and organized annual weekend of informal classes taught by community members.

Science Associate

January 2015 - May 2016

Swarthmore College, Department of Biology

- Led discussion groups for Organismal and Population Biology courses, and attended weekly seminars on pedagogy.

Intern

June 2014 - August 2014

Florida Department of Environmental Protection

- Assisted in regulatory visits to businesses and factories in the FL DEP Southeast District.
- Gained practical understanding of how environmental policy translates to action.

Green Advisor

January 2014 - May 2014

Swarthmore College

- Managed student-led composting program within a dormitory, and educated peers about campus sustainability initiatives.

WORKSHOPS AND TRAININGS

Explore NEON Graduate Student Workshop

November 2018

National Ecological Observatory Network (NEON) Headquarters

Boulder, CO

- Workshop on NEON data collection and quality assurance, API usage, R packages, and biorepository. Met with NEON researchers to discuss microbial data availability and research plans. One of ten students selected for attendance and funding.

Ecological Forecasting Summer Course

July 2018

Boston University

Boston, MA

- Workshop on forecasting natural phenomena. Topics included Bayesian statistics, partitioning forecast uncertainty, data assimilation, machine learning, and decision science. One of fifteen early-career scientists, agency scientists, and graduate students selected for attendance and funding.

Introduction to Deep Learning Workshop

February 2018

Oak Ridge National Laboratory

Oak Ridge, TN

- Workshop on deep learning and neural networks, led by the NVIDIA Deep Learning Institute (DLI).

Institute for Emerging Sustainability Leaders

July 2015

Amazon Center for Environmental Education and Research

Lima, Peru

- Lectures and workshops throughout Peru to address success and shortcomings of climate change policies. Met with researchers, cultural groups affected by climate change, and policymakers in Peru.

SKILLS

Languages

R, Bash shell scripting, Python, LaTeX, basic HTML5/CSS

Software

Git/Github, Circos, ArcMap, QGIS, JAGS, NIMBLE