

Courtney L. Wagner

Peter Buck Postdoctoral Fellow, Smithsonian Institution NMNH

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Education:

- Ph.D. in Geology, University of Utah, Salt Lake City, UT May 2021
Adviser: Dr. Peter C. Lippert
- B.S. in Geobiology, University of Rochester, Rochester, NY 2015
Adviser: Dr. John A. Tarduno
- *first-generation student

Positions Held:

- Peter Buck Postdoctoral Fellow at the Smithsonian Institution NMNH 2021 – present
Ironing out the role of magnetofossils in the iron cycle over Oceanic Anoxic Event 2 of the Cretaceous (Mentor: Dr. Ioan Lascu)
- Visiting Scientist in the Department of Materials Science and Engineering in the Whiting School of Engineering at The Johns Hopkins University 2021 – 2022
- Graduate Student Researcher at the University of Utah 2015 – 2021
Morphological variation of magnetofossils from the Paleocene-Eocene Thermal Maximum: Measurement and paleoenvironmental implications (Mentor: Dr. Peter C. Lippert)
- Schlanger Ocean Drilling Fellow through the U.S. Science Advisory Committee 2020 – 2021
Quantifying magnetofossil assemblages: Implications for paleoecology, diagenesis, and past, present, and future global change
- Robert Hevey Fellow at the Smithsonian Institution NMNH 2019
Magnetofossils of the Paleocene-Eocene Thermal Maximum (Mentor: Dr. Ioan Lascu)
- Science Communication Fellow through the Natural History Museum of Utah 2018 – 2019
- NSF EAPSI Fellow at the Institute for Geology and Geophysics 2017
Testing biomineralization by magnetotactic bacteria in differing magnetic field strengths and the ability of magnetic measurements to determine magnetotactic bacteria diversity. (Mentors: Dr. Yongxin Pan and Dr. Wei Lin)
- Visiting Scientist at the Institute for Rock Magnetism 2016
- Undergraduate Student Researcher at the University of Rochester 2014 – 2015
Characterizing modern magnetotactic bacteria in western New York State, USA. (Mentors: Dr. John A. Tarduno and Dr. Rory D. Cottrell)
- Undergraduate Research Assistant at the University of Rochester 2013 – 2015
Paleomagnetic records of the South Atlantic Anomaly. (Mentors: Dr. John A. Tarduno and Dr. Rory D. Cottrell)
- NSF REU Fellow at the University of Rochester 2014
Mentor: Dr. John A. Tarduno

Publications (*undergraduate mentee):

Accepted:

- Wagner, C. L.**, Lascu, I., Lippert, P. C., Egli, R., Livi, K. J. T., & Sears, H. B. * Diversification of iron-biomineralizing organisms during the Paleocene-Eocene Thermal Maximum: Evidence from quantitative unmixing of magnetic signatures of conventional and giant

magnetofossils. *Paleoceanography and Paleoclimatology*, 36, 1-25 e2021PA004225.
<https://doi.org/10.1029/2021PA004225>.

Wagner, C. L., Egli, R., Lascu, I., Lippert, P. C., Livi, K. J. T., & Sears, H. B.* (2021). In situ magnetic identification of giant, needle-shaped magnetofossils in Paleocene-Eocene Thermal Maximum sediments. *Proceedings of the National Academy of Sciences of the United States of America*, 118(6), 1-44 e2018169118.

<https://doi.org/10.1073/pnas.2018169118>.

Rea-Downing, G., B. Quirk, **C. L. Wagner**, P.C. Lippert, 2020. Evergreen needle magnetization as a proxy for particulate matter pollution in urban environments. *GeoHealth*, doi.org/10.1029/2020GH000286.

Tarduno, J., M. Watkeys, T. Huffman, R. Cottrell, E. Blackman, A. Wendt, C. Scribner, and **C. Wagner**, 2015. Antiquity of the South Atlantic Anomaly and evidence for top-down control on the geodynamo. *Nature Communications*, 6, 1-6, doi:10.1038/ncomms8865.

Presentations (*undergraduate mentee):

At these meetings I met some of my current collaborators and was able to discuss my research with professionals in my field, thereby improving my research. I participated in the presentations which I am not first-author as either an equal contributor or as an undergraduate mentor.

Wagner, C.L. P.C. Lippert, I. Lascu, P. Parlanti, R. Polson, Y.P. Yu, K. Livi. *Promise and progress with in situ visualization of magnetofossils in marine sediment chips*. American Geophysical Union Fall Meeting, December 2021. Talk.

Wagner, C.L., I. Lascu, P.C. Lippert, R. Egli, K. Livi, H. Sears, P. Stassen, E. Thomas. *Linking quantitative unmixing of magnetic signatures of conventional and giant magnetofossils with environmental change 56 million years ago*. American Geophysical Union Fall Meeting, December 2021. Invited eLightning.

Wagner, C.L. *Navigating through environmental disasters with magnetofossils*. Geological Society of Washington Virtual Meeting, October 13, 2021. Invited Talk.

Wagner, C.L. *Quantifying magnetofossil assemblages: Implications for paleoecology, diagenesis, and past, present, and future global change*. U.S. Advisory Committee for Scientific Ocean Drilling Virtual Meeting, August 2021. Virtual Talk.

Wagner, C.L., P.C. Lippert, I. Lascu, P. Parlanti, R. Polson. *Searching for magnetic needles in marine haystacks: Promise and progress with in situ visualization of magnetofossils in marine sediment chips*. 13th Annual FIB SEM Meeting, April 29th, 2021. Virtual Talk.

Wagner, C. L., I. Lascu, P.C. Lippert, R. Egli, K. Livi, H. Sears*. *Diversification of iron-biomineralizing organisms during the Paleocene-Eocene Thermal Maximum: Evidence from quantitative unmixing of magnetic signatures of conventional and giant magnetofossils*. Global Change and Sustainability Center Symposium, March 2021. Virtual Poster.

Wagner, C. L. *Morphological variation of magnetofossils from the Paleocene-Eocene Thermal Maximum: Measurement and paleoenvironmental implications*. February 5th, 2021. PhD Thesis Defense (Public Talk via Zoom). [Recording available upon request](#).

Wagner, C.L., R. Egli, I. Lascu, P.C. Lippert, K. Livi, H. Sears*. *Searching for magnetic needles in marine haystacks*. 2021 Virtual MagIC Workshop and Meeting. Invited Talk. https://www.youtube.com/watch?v=I91V0N_mWW4

Wagner, C. L., I. Lascu, P.C. Lippert, K. Livi, H. Sears*, R. Egli. *Magnetic unmixing of*

- conventional and giant coastal marine magnetofossils during the Paleocene-Eocene Thermal Maximum*. American Geophysical Union Fall Meeting, December 2020. Virtual Talk.
- Lippert, P.C., **C. L. Wagner**, R. Egli, I. Lasca, K. Livi, H. Sears*. *In situ magnetic identification of giant, needle-shaped magnetofossils in Paleocene-Eocene Thermal Maximum sediments using high-resolution, low-noise FORC measurements*. American Geophysical Union Fall Meeting, December 2020. Virtual Talk.
- Rea-Downing, G., B. Quirk, **C. Wagner**, P.C. Lippert, B. Olds, K. Kelly. *Evergreen needle magnetization as a proxy for particulate matter pollution in Salt Lake City, UT: spatial and temporal trends*. American Geophysical Union Fall Meeting, December 2020. Virtual Poster.
- Kowalski, J., P.C. Lippert, B.J. Tipple, **C. Wagner**. *High-resolution environmental magnetism record or dynamics in bottom water redox conditions across the Paleocene-Eocene Thermal Maximum: Zumaia, Spain*. American Geophysical Union Fall Meeting, December 2020. Virtual Poster.
- Wagner, C.**, P.C. Lippert, I. Lasca, P. Parlanti, R. Polson, B. Andrews. *Searching for Magnetic Needles in Marine Haystacks: Promise and Progress with in situ Visualization of Magnetofossils in Marine Sediment Chips*. 2020 MagIC Workshop and Meeting. Invited Talk. *cancelled because of COVID-19
- Sears, H.*, I. Lasca, **C. Wagner**. *A Survey of Magnetotactic Bacteria in the Potomac River Area of the Chesapeake Bay Watershed*. Geological Society of America Joint 69th Annual Southeastern/55th Annual Northeastern Section Meeting, 2020. Poster. *cancelled because of COVID-19
- Wagner, C. L.**, I. Lasca, P.C. Lippert. *FORC-PCA on Paleocene-Eocene Thermal Maximum Sediments from Wilson Lake, New Jersey*. Global Change and Sustainability Center Symposium, February 2020. Poster.
- Wagner, C.** *Magnetotactic Bacteria as Biomarkers*. National Museum of Natural History Department of Mineral Sciences, August 2019. Talk.
- Wagner, C.**, I. Lasca, and P.C. Lippert. *Preliminary FORC-PCA on Paleocene-Eocene Thermal Maximum Sediments from Wilson Lake, New Jersey*. Institute for Rock Magnetism Santa Fe, June 2019. Poster.
- Rea-Downing, G., P.C. Lippert, B. Quirk, **C. Wagner**. *Winter Wonderland? What can Pine Needles Tell us about Particulate Matter During SLC Temperature Inversions: Implications for Air Quality and Urban Health*. University of Utah Geology and Geophysics Poster Session, April 2019. Poster.
- Finley, H.*, **C. Wagner**, and P.C. Lippert. *Magnetic Measurements of Environmental Change Across the Paleocene-Eocene Thermal Maximum at Bass River, New Jersey*. University of Utah Geology and Geophysics Poster Session, April 2019. Poster.
- Wagner, C.**, P. C. Lippert, P. Stassen, R. Speijer, E. Thomas. *Magnetofossil, Magnetic Particle, and Microfossil Assemblages in a Subtropical Coastal Environment: Environmental Change Across the Paleocene-Eocene Thermal Maximum*. University of Utah Geology and Geophysics Poster Session, April 2019. Poster.
- Rea-Downing, G., P.C. Lippert, B. Quirk, **C. Wagner**. *Further Development of the Magnetization of Evergreen Needles as a Proxy for Air Quality in Salt Lake City*. Global Change and Sustainability Center Symposium, February 2019. Poster.
- Wagner, C.**, P. C. Lippert, P. Stassen, R. Speijer, E. Thomas. *Magnetofossil, Magnetic Particle,*

- and Microfossil Assemblages in a Subtropical Coastal Environment: Environmental Change Across the Paleocene-Eocene Thermal Maximum.* Global Change and Sustainability Center Symposium, February 2019. Poster.
- Wagner, C.,** P. C. Lippert, P. Stassen, R. Speijer, E. Thomas. *Magnetofossil, Magnetic Particle, and Microfossil Assemblages in a Subtropical Coastal Environment: Environmental Change Across the Paleocene-Eocene Thermal Maximum.* International Meeting on Magnetotactic Bacteria, September 2018. Poster.
- Rea-Downing, G., B. Quirk, **C. Wagner.** *Spatial Distribution of Particulate Matter on Pine Needles from North Campus Drive, University of Utah: Developing a Magnetic Proxy for Air Quality.* Global Change and Sustainability Center Symposium, February 2018. Poster.
- Wagner, C.** *Magnetotactic Bacteria: Journey from the Modern into the Past.* Utah Friends of Paleontology monthly meeting. Invited Talk.
- Wagner, C.** *Magnetotactic Bacteria: Using Magnetoreception to Survive Microenvironmental Disasters.* Society for Advancement of Chicanos/Hispanics and Native Americans in Science meeting, October 2017. Invited Talk.
- Wagner, C.** and P. Lippert. *Environmental Change in a Neritic Setting Before, During, and After the Paleocene-Eocene Thermal Maximum: Insights from Magnetofossil and Microfossil Assemblages,* Climatic and Biotic Events of the Paleogene conference, September 2017. Poster.
- Wagner, C.,** G. Patterson, T. Zhang, W. Lin, Y. Pan. *The Effect of Magnetic Field Strength on Biomineralization by Magnetotactic Bacteria, and Observing Magnetotactic Bacteria Diversity Using Magnetic Measurements,* NSF EAPSI Young Scientist Forum (Beijing, China), August 2017. Talk.
- Wagner, C.** and P. Lippert. *Environmental Change in a Neritic Setting Before, During, and After the Paleocene-Eocene Thermal Maximum: Insights from Magnetofossils and Microfossil Assemblages,* Institute of Geology and Geophysics (Beijing, China), July 2017. Invited talk.
- Wagner, C.** and P. Lippert. *Environmental Change in a Neritic Setting Before, During, and After the Paleocene-Eocene Thermal Maximum: Insights from Magnetofossils and Microfossil Assemblages,* Peking University, (Beijing, China), July 2017. Invited talk.
- Wagner, C.** and P. Lippert. *Relating Magnetotactic Bacteria and Microfossil Assemblages in Coastal Environments to Environmental Change Before, During, and After an Abrupt Global Warming Event,* Department of Geology and Geophysics Student Poster Session, May 2017. Poster.
- Wagner, C.** and P. Lippert. *Relating Magnetotactic Bacteria and Microfossil Assemblages in Coastal Environments to Environmental Change Before, During, and After an Abrupt Global Warming Event,* Rocky Mountain GeoBiology Symposium, April 2017. Poster.
- Wagner, C.** and P. Lippert. *Relating Magnetotactic Bacteria and Microfossil Assemblages in Coastal Environments to Environmental Change Before, During, and After an Abrupt Global Warming Event,* Global Change and Sustainability Center Symposium, February 2017. Poster.
- Lippert, P., V. Taylor, S. Bohaty, **C. Wagner,** C. Xuan, and P. Wilson. *The demise of a diverse magnetofossil assemblage across the Eocene-Oligocene Transition in a Northwest Atlantic sediment drift,* American Geophysical Union Fall Meeting, December 2016. Invited Talk.

- Wagner, C.,** J. Tarduno, A. Stein, and E. Sia. *Characterization of a Magnetotactic Bacterial Species from Devil's Bathtub, Mendon Ponds Park, Honeoye Falls, NY*, American Geophysical Union Fall Meeting, December 2015. Talk.
- Wagner, C.,** J. Tarduno, A. Stein, and E. Sia. *Characterization of a Single Magnetotactic Bacterial Species from Devil's Bathtub, Mendon Ponds Park, Honeoye Falls, NY*, Undergraduate Research Exposition, University of Rochester, May 2015. Talk.
- Wagner, C.** and B. McIntyre. *Electron Microscope Viewing of Magnetotactic Bacteria*, University of Rochester, May 2015. Poster.

Honors and Awards:

Over the course of my Ph.D. (marked with an *) I secured a variety of grants, fellowships, and awards to support my graduate career and which I managed the individual budgets (totaling \$83,275).

Geomagnetism, Paleomagnetism, and Electromagnetism post-doc grant	2021	American Geophysical Union Fall Meeting	2021
Peter Buck Postdoctoral Fellowship at the Smithsonian Institution	2021	NMNH	2021
*Outstanding Ph.D. Student, Department of Geology and Geophysics, University of Utah	2021		
*Association of Women Geoscientists (AWG) Salt Lake Chapter Most Outstanding Female Graduate Geoscientist	2021		
*Outstanding Student Presentation Award	2020	American Geophysical Union Fall Meeting	2020
*Global Change and Sustainability Center Professional Development Award	2020		
*PEO Scholars Award	2020		
*AAAS CASE Workshop through the Paleontological Society	2020		
*cancelled because of COVID-19	2020		
*Schlanger Ocean Drilling Fellowship through the U.S. Science Support Program	2020		
*Geological Society of America Research Grant	2019		
*N. Gary Lane Student Research Award through the Paleontological Society	2019		
*Evolving Earth Foundation Research Grant	2019		
*Robert Hevey and Constance M. Filling Graduate Student Fellowship in Mineral Sciences at the Smithsonian Institution	2019		
*Santa Fe Conference on Rock Magnetism Travel Grant	2019		
*Associated Students of the University of Utah Travel Award	2018		
*Chapman Fund, University of Utah	2018		
*Global Change and Sustainability Center Travel Award	2018		
*Science Communication Fellows Program, Natural History Museum of Utah	2018		
*NSF East Asia and Pacific Summer Institutes Fellowship in Beijing, China	2017		
*Global Change and Sustainability Center Research Grant	2017		
*Global Change and Sustainability Center Travel Award	2016		
*Visiting Fellowship to the Institute of Rock Magnetism, University of Minnesota	2016		
*Summer School in Rock Magnetism Scholarship, University of Minnesota	2016		
*Chapman Fund, University of Utah	2016		
*Graduate Student Travel Assistance Award, University of Utah	2015		
Second Place Geologist at the University of Buffalo's field camp	2015		
Sigma Gamma Epsilon, Zeta Phi chapter	since 2015		
Angelo Taglicozzo Memorial Geological Scholarship, NE-AIPG	2015		

Earth and Environmental Sciences Lattimore Prize Scholarship	2015
NSF Research Experiences for Undergraduates	2014

Teaching Experience:

Through the course of my graduate career at the University of Utah I served as a teaching assistant for a variety of upper-level geology classes in the Department of Geology and Geophysics. One of which, Field Methods, is an intensive field and writing capstone course. During my time as a teaching assistant I lead field trips, supervised students in the classroom and lab while mapping outcrops, was the primary grader for technical reports, facilitated weekly reading discussions, and developed a two-day special lecture on paleoclimatology (not required) that I updated the following year based on students' questions and new research findings.

Teaching Assistant Field Methods, University of Utah (with Dr. David Dinter)	2019 – 2020
Teaching Assistant Geology of Utah, University of Utah (with Dr. David Dinter)	2018 – 2019
Teaching Assistant the Water Planet, University of Utah (with Dr. Kip Solomon)	2018
Teaching Assistant Earth Materials II, University of Utah (with Dr. Michael Stearns and Dr. Amir Allam)	2016 – 2017

Mentoring Experience:

In 2019 I became a certified mentor through the Undergraduate Research Mentoring Development Program at the University of Utah (<https://our.utah.edu/mentoring/>). We had five weeks of modules, meetings, and workshops which we discussed effective strategies for mentoring and developed official mentoring statements. Here is a list of my past and current mentees:

Helen Sears (summer 2019 – present): I began mentoring Helen during her summer research project where she was collecting bacteria and water samples from a nearby waterway. She was supposed to present her work as a regional GSA meeting, but this was cancelled due to COVID-19. I am currently advising Helen while she prepares graduate school applications and develops her scientific writing skills.

Mack Tawa (fall 2019 – fall 2020): Mack originally started working with me on one of my projects involving the Great Salt Lake. Due to COVID-19 his work became remote and he worked on literature reviews in preparation for a review paper. Mack was awarded two Undergraduate Research Opportunities Program awards (<https://our.utah.edu/urop/>) while we were working together. Mack is considering applying to graduate programs through the Computer Science department at the University of Utah.

Hannah Finley (spring 2019): Hannah worked with me on marine sediments from Bass River, New Jersey, performed magnetic measurements, interpretations, and made figures. She presented her work at our department's end-of-the-year poster session. Hannah is currently pursuing a Master's degree in the Department of Geology and Geophysics at the University of Utah.

Science Communication and Outreach:

In 2018 I completed the Science Communication fellowship at the Natural History Museum of Utah. I also received formal science communication training during a fellowship at the National Museum of Natural History in 2019. Besides these formal trainings I have had the opportunity to practice my science outreach skills during the following events:

COMPASS-Smithsonian NMNH Virtual Science Communication Workshop	2021
2021 AAAS Virtual CASE Workshop	2021
PEO Video Recording for Annual Utah State Convention	2021
Department of Geology and Geophysics Open House	2019
College of Mines and Earth Science's U Rock the Earth	2019
The Expert Is In, Smithsonian Museum of Natural History	twice in 2019
Scientist in the Spotlight, Natural History Museum of Utah	three times in 2019
Podcast interview for "Thesis Schmesis" at the University of Utah	2017
Volunteer for the Utah Geological Survey's Earth Science Week	2015 and 2016

Science Articles and Blog Posts:

In addition to more hands-on science outreach events, I also enjoy communicating science through non-technical writing. Here are a few examples of writing pieces, available online, that I either collaborated with science writers or prepared as first-author:

New Way to Study Magnetic Fossils Could Help Unearth Their Origins:

<https://www.smithsonianmag.com/blogs/national-museum-of-natural-history/2021/02/01/new-way-study-magnetic-fossils-could-help-unearth-their-origins/> 2021

Mysterious magnetic fossils offer past climate clues

<https://attheu.utah.edu/uncategorized/magnetofossils/> 2021

Little rock nuggets record climate <https://courtneywagner.org/2021/05/18/little-rock-nuggets-record-climate/> 2021

What is biodiversity? <https://courtneywagner.org/2020/08/24/what-is-biodiversity/> 2018

Diversity, Equity, and Inclusion Training or Relevant Experience:

I am committed to making the world around me a better place, which requires making it more diverse, equitable, and inclusive. As such, I am actively seeking ways that I can better learn how to do this in both my personal and work life. I look forward to being in a position where I can receive more formal training and start implementing the tools I have been developing.

Lead a 2-hr workshop covering barriers to conducting geological field work	2021
Inclusion, Diversity, Equity, and Access in Museums Symposium, Natural History Museum of Utah	2021
Being Human in STEM Symposium and Workshop	2021
First-Gen Voices in College of Mines and Earth Sciences	2021
Center for Teaching & Learning Excellence Spring Workshop Series (attended 3)	2021
Designed lecture covering issues related to conducting geological field work	2020
Undergraduate Research Mentoring Development Program	2019
ACCESS Program for Women in STEM Panel	2018

Field Work:

University of Utah: Field assistant collecting carbonate nodules in Axe Handle and Nine Mile Canyon, Utah (several times between 2016 – 2020); Lead collection of water-sediment samples containing magnetotactic bacteria within the Great Salt Lake, Utah (several times between 2017 – 2019); Collected evergreen needle samples in Salt Lake City, Utah (several times between 2017 – 2018).

Smithsonian Institution: Field assistant collecting water-sediment samples containing magnetotactic bacteria in Washington, D.C. (2019).

Institute of Geology and Geophysics: Field assistant collecting water-sediment samples containing magnetotactic bacteria in Wuhan, China (2017).

University of Rochester: Lead collection of water-sediment samples containing magnetotactic bacteria in Rochester, New York (2014 – 2015); Undergraduate field assistant collecting paleomagnetic samples in Southern Africa (2014).

Relevant Coursework (*field work or sample collection involved):

University of Utah: IsoCamp Shortcourse*, The Magnetic Earth, Depositional Systems*, Scanning Electron Microscopy, Transmission Electron Microscopy, Biomineralization and the Birth of Carbonates, Biostatistics

University of Minnesota: Summer School in Rock Magnetism*

University of Buffalo: Field Camp*

University of Rochester: Scanning Electron Microscopy, Principles of Paleontology, Marine Geology, Sedimentology and Stratigraphy*, Geomorphology*, Structural Geology*, Evolution of the Earth, Seminar in Paleomagnetism, Paleomagnetism and Global Plate Tectonics, Environmental Law and Policy, Planetary Science and Geological Evolution

Professional and Departmental Service:

AGU-Biogeosciences Peer Mentoring program	<i>since 2021</i>
Session co-convenor for American Geophysical Union Fall Meeting	2021
Reviewer for Earth and Planetary Science Letters	<i>since 2021</i>
Reviewer for Science Advances	<i>since 2021</i>
Faculty Search Committee, University of Utah	2021
NSF GRFP Review Panel for student proposals, University of Utah	2017
Student Activities Committee graduate leader, University of Utah	2016 – 2017
Paleontological Society Member	<i>since 2019</i>
Geological Society of America Member	<i>since 2013</i>
American Geophysical Union Member	<i>since 2013</i>
Northeast Section of the American Institute of Professional Geologists Member	<i>since 2013</i>
Sigma Gamma Epsilon, Zeta Phi Chapter: honorary society for the Earth Sciences Member	<i>since 2013</i>

Technical Experience:

Proficient in paleo- and rock magnetic instrumentation including but not limited to vibrating sample magnetometers, alternating gradient magnetometers, cryogenic rock magnetometers, thermal and field demagnetizers, and kappabridge systems. Proficient in light microscopy and experienced in scanning and transmission electron microscopy. Familiar with DNA preparation, genomic analysis, and atomic force microscopy.

Computer and Language Experience:

Computer: IGORPro (FORCinel), ORS Dragonfly, R, ImageJ, Microsoft (Excel, Word, Powerpoint), Adobe (Dreamweaver, Illustrator, Photoshop), WordPress, PAST, and Octave (iso2mesh)

Foreign Language: basic Spanish