

CONTACT
INFORMATION

Department of Earth, Atmospheric, and Planetary Sciences
Massachusetts Institute of Technology
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EDUCATION

MIT/WHOI Joint Program in Oceanography, Cambridge, Massachusetts USA
July 2017 – April 2022

PhD Candidate, Department of Earth, Atmospheric, and Planetary Sciences

Research interests: Characterizing iceberg size and sediment load during Heinrich Events; Quantifying past climate change at high latitudes; Impacts of warming on interglacial permafrost; Climate dynamics during periods of abrupt climate change; Paleohydrology and paleoclimate of the Southwestern United States; Environmental controls of shoreline deposit morphologies; Computational methods in the Earth Sciences.

Advisors: David McGee (MIT), Alan Condron (WHOI).

Thesis Committee: Kristin Bergmann (MIT), Andrew Ashton (WHOI), Carrie Morrill (NOAA).

Wellesley College, Wellesley, Massachusetts USA

B.A., Geosciences, B.A., Astronomy, May, 2015 (*Cum Laude*)

PUBLICATIONS

Fendrock, M., Condron, A., and McGee, D.: “A Model for the Effect of Partitioning Sediments in Icebergs on Heinrich Layer Extents”, 2023. (in prep)

Fendrock, M., Condron, A., and McGee, D.: “Modeling Iceberg Longevity and Distribution During Heinrich Events”, 2022. (accepted, *Paleoceanography and Paleoclimatology*)

Fendrock, M., Chen, C.Y., Olson, K.J., Lowenstein, T.K., and McGee, D.: “A Computer Vision Algorithm for Interpreting Lacustrine Carbonate Textures at Searles Valley, USA”, 2022. (accepted, *Computers and Geosciences*)

Torres, A. D., Keppel-Aleks, G., Doney, S.C., **Fendrock, M.**, Luis, K., De Mazire, M., Hase, F., Petri, C., Pollard, D.F., Roehl, C.M., Sussmann, R., Velazco, V.A., Warneke, T., and Wunch, D.: “A geostatistical framework for quantifying the imprint of mesoscale atmospheric transport on satellite trace gas retrievals”, *JGR: Atmospheres.*, 2018.

Jenkins, W. J., Doney, S. C., **Fendrock, M.**, Fine, R., Gamo, T., Jean-Baptiste, ., Key, R., Klein, B., Lupton, J. E., Rhein, M., Roether, W., Sano, Y., chlitzer, R., Schlosser, P., and Swift, J.: “A comprehensive global oceanic dataset of helium isotope and tritium measurements”, *Earth Syst. Sci. Data discuss.*, <https://doi.org/10.5194/essd-2018-136>, 2018.

Watters, Wesley A., Geiger, L., **Fendrock, M.**, Gibson, R., & Hundal, C. “The role of strength defects in shaping impact crater planforms.” *Icarus* (2016).

Watters, Wesley A., Geiger, L., **Fendrock, M.**, & Gibson, R. “Morphometry of small recent impact craters on Mars: size and terrain dependence, shortterm modification.” *Journal of Geophysical Research: Planets* (2015).

CONFERENCE
ABSTRACTS

Fendrock, M., Condron, A., and McGee, D. “Modeling Iceberg Tracks and IRD Extents During Heinrich Events.” *AGU Fall Meeting 2021* (2021).

Fendrock, M., Condron, A. “Modeling Sediment Transport and Deposition During Heinrich Events.” *Comer Climate Conference* (2020).

Fendrock, M., and Thompson, M.D. “Mapping and geochronology of contact zone of Paleozoic Cape Ann Pluton, Salem Neck, MA.” *Geologic Society of America Northeastern Section Meeting*. Vol. 47. 2015.

Watters, W. A., Geiger, L., **Fendrock, M.**, & Gibson, R. “Morphometry of Recent Simple Impact Craters on Mars: Size and Terrain Dependence.” *Lunar and Planetary Science Conference*. Vol. 46. 2015.

Watters, W. A., L. Geiger, and **M. Fendrock**. “Shape distribution of fresh Martian impact craters from high-resolution DEMs.” *Lunar and Planetary Institute Science Conference Abstracts*. Vol. 44. 2013.

WORK EXPERIENCE

Research Assistant II – Woods Hole Oceanographic Institution

July 2015 – July 2017

Responsibilities included assisting technical staff members and others in the analysis and visualization of ocean biogeochemical field data, remote sensing imagery, and numerical models, as well as occasional field work and sample processing. Projects included modeling of spatial and temporal distributions of tritium in the ocean and atmosphere, and using satellite data to constrain atmospheric transport influences on carbon fluxes. In the Computational Biogeochemistry group at Woods Hole Oceanographic Institution (P.I. Scott Doney).

MENTORING AND
TEACHING

Teaching Certifications (through the MIT Teaching and Learning Lab)

- Subject Design (June 2020)
- Teaching Practice (July 2020)

Massachusetts Institute of Technology

- Co-led 12.s597: Seminar on Teaching in Earth Science. Designed syllabus and led classroom discussions and activities on effective, research-based teaching practice (co-led with D. McGee).
- EAPS Teaching Development Fellow: responsible for organizing workshops and communities in the department to develop thoughtful teaching practices among graduate students and faculty (2021-2022).
- Teaching assistant for 12.000: Solving Complex Problems (Fall 2019 - present).
- Mentored undergrad researcher Anna Meurer, working on metrics for measuring the success of computer vision algorithms on tufa textures (Summer 2020).
- Mentored undergrad researcher Pratistha Timilsina, cataloging and measuring preserved spits in Bonneville Basin (Spring and Summer 2021).

Woods Hole Oceanographic Institution

- Managed undergraduate summer students on occasional field trips.
- Advised Falmouth Academy student Charlie Fenske in producing climatologies and time series of nutrient and physical data collected at the Waquoit Bay National Estuarine Reserve since the early 2000’s, introducing him to Python programming and data visualization concepts (2016).

Wellesley College

- Tutor for CS 111: Computer Programming and Problem Solving, including grading problem sets, assisting in lab, and holding drop-in hours for student questions.

HONORS AND AWARDS

MIT School of Science Spot Award, given for “...exceptional contributions of individuals and teams, large or small, to the School of Science community”, in recognition as work as EAPS Mentoring Co-czar (nominated by peers).

MIT/WHOI Joint Program Ocean Ventures Fund Award for field work in Bonneville Basin, Utah (October 2021).

MIT/WHOI Joint Program Ocean Ventures Fund Award for field work in Searles Valley (October 2018).

WHOI Department of Marine Chemistry and Geochemistry Whelan Grant for attendance of the 2016 Ocean Sciences Conference.

Sigma Xi, nominated for associate membership in May 2015.

Margaret D. Thompson Award for scholarship in the geosciences (2015).

Daniels Fellowship, awarded to four Wellesley seniors for “a work of imagination as well as intellect, a worthy and vivid dream project that explores who she is as well as what she knows” towards geosciences independent study of mapping and geochronology of Salem Neck, MA, 2014 – 2015.

Sarah F. Langer Memorial Award, given by Wellesley Geosciences Department for “eager curiosity in the field of geology, a dedication to excellence inside and outside the classroom, and a generosity of spirit in her day-to-day contributions to the College”, 2014.

Annie Jump Cannon Research Fellowship from the Wellesley College Astronomy Department, 2013 (first awarded).

RELEVANT COURSEWORK

MIT/WHOI

12.708 (Paleoclimate Seminar)

12.009 (Nonlinear Dynamics in the Natural Environment)

12.708 (Paleoclimate Seminar)

12.707 (The History of Earth’s Climate)

12.717 (Coastal Geomorphology, Listener)

12.710 (Marine Geology & Geophysics I)

12.487 (Field Geobiology)

6.036 (Introduction to Machine Learning, Listener)

12.091 (Seminar in Long Term Climate Variations)

STS.454 (Science and Technology in the Museum Environment)

Wellesley College

PHYS 107 (Classical Mechanics)

MATH 215 (Differential equations and linear algebra)

CHEM 105 (Introductory inorganic chemistry)

ASTR/GEOS 223 (Planetary Climates)

GEOS 200 (Earth History)

GEOS 238 (Regional Geology of the Southwestern United States, Field Course)

GEOS 203 (Earth Materials)

GEOS 302 (Marine Geosciences)

PHYS 108 (Electricity and Magnetism)

PHYS 216 (Continuing differential equations and multivariable calculus)

CHEM 205 (Continuing inorganic chemistry)

ASTR/GEOS 303 (Planetary Geology)

GEOS 208 (Geomorphology)

GEOS 220 (Volcanoes and Volcanism)

GEOS 304 (Sedimentology)

GEOS 316 (Paleoseismology)

COMPUTER SKILLS

- Languages: Python, Matlab, Java, Bash, Fortran.
- Operating Systems: Linux, Mac, Windows.
- Microsoft Suite.

SERVICE

Massachusetts Institute of Technology

- EAPS Student Advisory Council
 - Public Outreach Co-Chair (2018-2020)
 - Mentoring Czar (2020-2021)

- Liaison to the Undergraduate Council (2020-Present)
- EAPS Diversity Equity and Inclusion Committee, mentoring working group (2020-Present)
- Co-organizer of Racism, Colonialism, and Extraction in the Geosciences reading series (Spring 2021)
- Invited talk at Lincoln-Sudbury Regional High School Celebrate the Sciences Day: “Learning about Ancient Lakes with Rocks and Computers”.
- Graduate Climate Conference 2019 Executive Committee

Woods Hole Oceanographic Institution

- Women’s Committee (elected January 2016)

Wellesley College

- Astronomy Club (president 2012-2013)
- Geology Club (president 2014-2015)
- Shafer Hall House Council

EXTRA-
CURRICULARS

- EAPS intramural softball captain and starting pitcher 2017 and 2018 seasons
- MIT Cycling
 - Racing member Fall 2019 - 2021.
 - Secretary 2020 - 2021.
- Member in good standing, Boston Cyclists Union (February 2020 - Present)