

CURRICULUM VITAE

Emily R. Estes

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International Ocean Discovery Program
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Education

- Massachusetts Institute of Technology/Woods Hole Oceanographic Institution Joint Program in Oceanography, Chemical Oceanography (*Woods Hole, MA*): PhD 2012-January 2017. Dissertation: **Geochemical parameters controlling the distribution and composition of biogenic and sedimentary carbon**
- Harvard University (*Cambridge, MA*): PhD student 2011-2012 *transferred*.
- Wellesley College (*Wellesley, MA*): B.A., Graduated May 2010.
Major with honors in Geosciences, minor in Environmental Studies.
Honors: Cum laude, Phi Beta Kappa Society, Sigma Xi Society

Research interests/keywords

Biom mineralization, geomicrobiology, deep subsurface, sediment geochemistry, carbon cycling, hydrothermal vents, metal fate and transport, environmental applications of synchrotron-based X-ray techniques, carbon spectromicroscopy

Professional Experience

Expedition Manager/Staff Scientist, June 2019—present.

International Ocean Discovery Program, Texas A&M University,

Postdoctoral scientist, 2017—2019

University of Delaware College of Earth, Ocean, and Environment. Advisor: Dr. George Luther

Graduate Student, 2011—2017

Harvard University, Earth and Planetary Sciences.

MIT-WHOI Joint Program, Chemical Oceanography. Advisor: Dr. Colleen Hansel

Research Assistant, 2010-2011.

Harvard School of Public Health, Department of Environmental Health, Wellesley College.

Advisors: Dr. James Shine, Dr. Daniel Brabander

Teaching Assistant, Spring 2010

Wellesley College, *GEOS 201: Methods and Problems in Environmental Science*.

Course instructor: Dr. Daniel Brabander

Research Assistant, 2008-2010.

Wellesley College, Department of Geosciences. Advisor: Dr. Daniel Brabander

Publications

- Estes, E.R.**, Berti, D., Coffey, N.R., Hochella Jr., M.F., Wozniak, A.W., and Luther III, G.W. (2019) Abiotic synthesis of graphite in hydrothermal vents. (*In review: Nature Communications*).
- Orcutt, B., Bradley, J., Brazelton, W.J., **Estes, E.R.**, Goordial, J.M., Huber, J.A., Jones, R.M., Mahmoudi, N., Marlow, J.J., Murdock, S., and Pachiadaki, M. (2019). Impacts of deep-sea mining on microbial ecosystem services. (*In review: Limnology and Oceanography*).
- Vuillemin, A., Wankel, S.D., Coskun, Ö.K., Magritsch, T., Vargas, S., **Estes, E.R.**, Spivack, A.J., Smith, D.C., Pockalny, R., Murray, R.W., D'Hondt, S., and Orsi, W.D. (2019). Archaea dominate oxic subseafloor communities over multimillion-year time scales. *Science Advances* 5 pp. xx-yy.
- Hudson, J.M., MacDonald, D.J., **Estes, E.R.**, and Luther III, G.W. (2019). A durable and inexpensive pump profiler to monitor stratified water columns with high vertical resolution. *Talanta* 199 pp. 415-424.

- Findlay, A.J., **Estes, E.R.**, Gartman, A., Yücel, M., Kamyshny Jr., A., and Luther III, G.W. (2019). Iron and sulfide nanoparticle formation and transport in nascent hydrothermal vent plumes. *Nature Communications* 10 pp. xx-yy.
- Estes, E.R.**, Pockalny, R., D'Hondt, S., Inagaki, F., Morono, Y., Murray, R.W., Nordlund, D., Spivack, A.J., Wankel, S.D., Xiao, N., and Hansel, C.M. (2019). Persistent organic matter in oxic seafloor sediment. *Nature Geoscience* 12, pp. 126-131.
- Buchwald, C., Homola, K., Spivack, A.J., **Estes, E.R.**, Murray, R.W., and Wankel, S.D. (2018). Isotopic constraints on nitrogen transformation rates in the deep sedimentary marine biosphere. *Global Biogeochemical Cycles* 32 pp. 1688-1702.
- Luther III, G.W., Thibault de Chanvalon, A., Oldham, V.E., **Estes, E.R.**, Tebo, B.M., and Madison, A.S. (2018). Reduction of manganese oxides: Thermodynamic, kinetic, and mechanistic considerations for one-versus two-electron transfer steps. *Aquatic Geochemistry* 24 pp. 257-277.
- Estes, E.R.**, Andeer, P.F., Nordlund, D., Wankel, S.W., and Hansel, C.M. (2017) Biogenic manganese oxides as reservoirs of carbon and proteins in terrestrial and marine environments. *Geobiology* 15(1) pp. 158-172.
- Schneider, L.A., Senn, D.B., **Estes, E.R.**, Brabander, D.J., and Shine, J.P. (2014) Sources and fates of heavy metals in a mining impacted stream: Temporal variability and the role of iron oxides. *Science of the Total Environment* 490 pp. 456-466.
- Tang, Y., Webb, S.M., **Estes, E.R.**, and Hansel, C.M. (2014) Chromium(III) oxidation by biogenic manganese oxides of varying structural ripening. *Environmental Science: Processes and Impacts* 16(9) pp. 2027-2136.

Invited Talks

- Estes, E.R.**, Berti, D., Findlay, A.J., Gartman, A., Hochella Jr., M.F., Yücel, M., and Luther, G.W. (2018). Tracking the formation of (nano)particulate mineral phases in hydrothermal vent mixing zones. *Nanoscience in the Earth and Environmental Sciences—From Theory to Practice*, Goldschmidt 2018 pre-meeting workshop, Boston, MA.
- Estes, E.R.** (2017). Carbon preservation in carbon-limited environments. *C-DEBI Networked Speaker Series*.
- Estes, E.R.** (2017) Life in the slow lane: Organic carbon limitation in pelagic sediments. *Lehigh University Department of Earth and Environmental Sciences*, Bethlehem, PA.
- Estes, E.R.** (2016). Investigating manganese oxide-inorganic carbon interactions via novel spectroscopic techniques. *University of Delaware, College of Earth, Ocean, and Environment*, Lewes, DE.
- Estes, E.R.** (2014). What do minerals have to do with it? Novel spectroscopic techniques for understanding sequestration of organic carbon in sediments. *Wellesley College REU seminar*, Wellesley, MA.

Posters and Oral Presentations

- Estes, E.R.** (2018). Dilution to extinction? Persistent organic carbon in the deep subsurface and implications for heterotrophic life. *Deep Carbon Observatory Deep Life Community Meeting*, Shanghai, China.
- Estes, E.R.**, Berti, D., Findlay, A.J., Gartman, A., Hochella Jr., M.F., Yücel, M., and Luther, G.W. (2018). Nanoparticulate reverse weathering products in focused and diffuse hydrothermal flow. *Goldschmidt Meeting*, Boston, MA.
- Estes, E.R.**, Findlay, A.J., Franc, M.R., Gartman, A., and Luther, G.W. (2018). (Nano)mineralogy of mixing zones: Nanoparticulate iron phases in hydrothermal vent fluids. *Ocean Sciences Meeting*, Portland, OR. (*Oral presentation*)
- Estes, E.R.** and Hansel, C.M. (2017). Dilution to extinction: Quantifying heterogeneity in the spatial distribution and chemical composition of sedimentary organic carbon. *C-DEBI Annual Meeting*, Marina, CA. (*Oral presentation*)
- Estes, E.R.**, Findlay, A.J., Franc, M.R., Gartman, A., and Luther, G.W. (2017). Chemistry of nanoparticulate and (sub)micron sized particles emanating from hydrothermal vents. *Synchrotron Environmental Science Symposium*, Brookhaven National Lab, Shirley, NY.
- Estes, E.R.**, Findlay, A.J., Franc, M.R., Gartman, A., and Luther, G.W. (2017). Geochemical controls on nanoparticulate iron minerals in hydrothermal vent fluids. *Gordon Research Conference in Chemical Oceanography*, New London, NH.
- Estes, E.R.**, Orsi, W., Hansel, C.M., Anderson, C.A., Murray, R.W., Nordlund, D., Wankel, S.W., Johnson, D.B., Spivack, A.J., Pockalny, R., Sauvage, J., McKinley, C.C., Homola, K.L., Present, T.M., Pockalny, R., and D'Hondt S. (2016). Insight into metabolic potential of carbon-poor pelagic sediments derived from the abundance and composition of organic carbon. *Ocean Sciences Meeting*, New Orleans, LA.
- Estes, E.R.**, Hansel, C.M., Anderson, C.A., Murray, R.W., Dyar, M.D., Nordlund, D., Wankel, S.W., Johnson, D.B., Spivack, A.J., Pockalny, R., Sauvage, J., McKinley, C.C., Homola, K.L., Present, T.M., Pockalny, R., and D'Hondt S. (2015). Elucidating geochemical controls on the concentration and composition of organic carbon in deep pelagic sediments. *American Geophysical Union*, San Francisco, CA.

- Estes, E.R.**, Anderson, C.A., Dunlea, A.G., and McKinley, C.C. (2015) Geochemistry and Microbiology of Oxidic and Suboxic Deep Sea Pelagic Sediments. *American Geophysical Union*, San Francisco, CA. *Session convener and chair*.
- Estes, E.R.**, Nordlund, D., Wankel, S.D., and Hansel, C.M. (2014). Evolution of mineral-organic matter associations in sediments: From (bio)mineralization to burial. *American Geophysical Union*, San Francisco, CA.
- Estes, E.R.**, Learman, D., Andeer, P.F., Zhang, T. and Hansel, C.M. (2014). Biogenic Mn oxide formation via enzymatic production and consumption of reactive oxygen species. *American Chemical Society*, Dallas, TX. (*Oral presentation*)
- Estes, E.R.**, Andeer, P.F., Boiteau, R.M., Repeta, D.J., Nordlund, D., and Hansel, C.M. (2013). Extracellular biomolecules facilitate the formation of manganese oxides in two marine alphaproteobacteria. *Stanford Synchrotron Radiation Lightsource User's Conference*, Menlo Park, CA.
- Estes, E.R.**, Shen, Y., Dyar, M.D., Brabander, D.J., and Shine, J.P. (2012). Influence of ion coprecipitation and adsorption on iron (hydr)oxide structure and aggregate morphology. *Goldschmidt Conference*, Montreal, Canada. (*Oral presentation*)
- **Estes, E.R.**, Schaidler, L.A., Shine, J.P., and Brabander, D.J. (2010). Effect of transport and aging processes on metal speciation in iron oxyhydroxide aggregates, Tar Creek Superfund Site, Oklahoma. *American Geophysical Union*, San Francisco, CA.
- Estes, E.R.**, Carter-Thomas, M.R., and Brabander, D.J. (2010). Deposition of particulate matter as a mechanism for trace metal contamination of urban gardens. *Geological Society of American, National Meeting*, Denver, CO. (*Oral presentation*)

Professional Activities

- Session organizer and co-convener:
 - Estes, E.R.**, Trembath-Reichert, E., and Beckmann, S. (2018) Picky Eating in the Deep Subsurface? *American Geophysical Union*, Washington DC.
- Goldschmidt pre-meeting workshop presenter and participant (2018), *Nanoscience in the Earth and Environmental Sciences—From Theory to Practice*
- C-DEBI workshop on Organic carbon and Microbes in the Deep Subsurface, participant, Knoxville, TN (2018).
- Society for Women in Marine Science (SWMS), University of Delaware chapter, founder and co-chair.
- IODP Early Career Researcher Workshop (2017)
- completed [MIT Kaufman Teaching Certificate](#) (2016)
- Session organizer and co-convener:
 - Estes, E.R.**, Anderson, C.A., Dunlea, A.G., and McKinley, C.C. (2015) Geochemistry and Microbiology of Oxidic and Suboxic Deep Sea Pelagic Sediments. *American Geophysical Union*, San Francisco, CA.
- UNOLS Chief Scientist Training Cruise (2013)
- Stanford Synchrotron Radiation Lightsource User's Conference workshop participant, *Integrating Synchrotron Techniques into Environmental Carbon Science* (2013).

Cruises and Field Experience

- Chesapeake Bay redox gradients,
 - R/V Hugh R. Sharp*, Co-chief scientist with Bradley M. Tebo, Lewes, DE, Jul 2018
- Chesapeake Bay redox gradients,
 - R/V Hugh R. Sharp*, Chief Scientist: George W. Luther, Lewes, DE, Aug 2017
- 9° East Pacific Rise hydrothermal vents,
 - R/V Atlantis, DSV Alvin*, Chief Scientist: George W. Luther, Manzanillo, Mexico, Mar-Apr 2017
- TORCH (Transient oxygen radicals in the cycling of Hg),
 - R/V Endeavor*, Chief Scientist: Colleen M. Hansel, Narragansett, RI, Sept 2016
- Lau Basin vent life expedition,
 - R/V Falkor, ROV ROPOS*, Chief Scientist: Charles Fisher, Suva, Fiji, Apr-May 2016
- North Atlantic long coring expedition,
 - R/V Knorr*, Chief Scientist: Richard Murray, Woods Hole, MA, Oct-Dec 2014
- Tennessee/Virginia, karstic epigenetic cave systems, June 2014
- 2013 Chief Scientist Training Cruise,
 - R/V Endeavor*, Narragansett, RI 20-28 Oct 2013
- CMORE HOE DYLAN 5 occupation of station ALOHA,

R/V Kilo Moana, Chief Scientist: Samuel Wilson, Jul 2012
-Tar Creek, Oklahoma, USA, Tar Creek Superfund Site, four trips between 2009-2011

Grants and Awards

-C-DEBI Graduate Fellowship 2016-2017
-WHOI Ocean Ventures Fund grant recipient 2016
-C-DEBI Research Grant 2015-2016 *Assisted in writing*
-WHOI Coastal Oceans Institute Research Grant 2013-2015
-NSF Graduate Research Fellowship Program, Recipient 2013
-NSF Graduate Research Fellowship Program Honorable Mention 2011
-Brachmann-Hoffman Post-Baccalaureate Fellow, Wellesley College 2010-2011
-Sara F. Langer Award in Geosciences, Wellesley College, 2010
-American Institute of Professional Geologists, Northeast Section, Angelo Tagliacozzo Memorial Scholarship Recipient, 2008-2009

Student Mentoring Experience

-Nicole Coffey (2017-2019, University of Delaware B.S. and M.S. student)
-Jennifer Necker (summer 2018, University of Delaware REU student)
-Marina Franc (summer 2017, University of Delaware REU student)
-Dana Johnson (summer 2015, WHOI Summer Student Fellow)
-Katie Rempfert (summer 2013, WHOI Summer Student Fellow)

Teaching, Outreach, and Science Communication

Winter 2018: [STEM Fellowship Big Data Challenge](#), *Think Local and Act Global with Big Data*, reviewer
Winter 2018: [Chesapeake Bay Ocean Sciences Bowl](#), Team Challenge Question grader
2017-2018: [Letters to a Pre-Scientist](#) participant
March 2016: contributed article to *Oceanus Magazine*, <http://www.whoi.edu/oceanus/feature/minerals-made-by-microbes>
Winter 2015: Judged high school science fair projects at Falmouth Academy and Falmouth High School
Summer 2014: Helped teach introductory Microsoft Office Excel and data processing skills to undergraduate research assistants in the Partnership Education Program, WHOI
2013-2015: Coordinator of the Biogeochemistry Seminar Series at WHOI
2013-2014: Student representative, Chemical Oceanography, MIT-WHOI Joint Program