

## ***Curriculum vitae***

**Dr. Elizabeth D. Swanner**

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### **EDUCATION**

University of Colorado, Boulder; PhD from the Department of Geological Sciences, CU-Boulder; July 2011. Specialty: Geomicrobiology; Advisor: Prof. Dr. Alexis S. Templeton.

Teaching Certificate, Graduate Teacher Program, CU-Boulder. 2012.

Astrobiology Certificate, Center for Astrobiology, CU-Boulder. 2011.

Mount Holyoke College, South Hadley, MA; Bachelor of Arts with High Honors in Biochemistry; May 2003. Major: Biochemistry; Minor: English.

### **EMPLOYMENT**

Associate Professor, Department of Geological & Atmospheric Sciences, Iowa State University, Ames, IA. Aug. 2020-present.

Assistant Professor, Department of Geological & Atmospheric Sciences, Iowa State University, Ames, IA. Aug. 2015-2020.

Carl Zeiss Stiftung Postdoctoral Fellow, Department of Geoscience, University of Tübingen, Germany. 2014-2015. Advisors: Ronny Schoenberg & Andreas Kappler.

Postdoctoral Researcher, Department of Geoscience, University of Tübingen, Germany. 2013-2014. Advisors: Ronny Schoenberg & Andreas Kappler.

NSF Postdoctoral Fellow, Department of Geoscience, University of Tübingen, Germany. 2011-2013. Advisors: Andreas Kappler & Martin Obst.

### **GRANTS**

#### *Funded at ISU*

33. National Aeronautics and Space Administration, Exobiology, "Refining the geochemical toolkit for paleoredox reconstruction." PI: A. Anbar, Co-I: G Gilleaudeau, E. Swanner. 2022-2025.

32. National Science Foundation, Geobiology and Low-temperature Geochemistry, "Collaborative Research: Towards a Better Understanding of Tl Isotope Cycling under Different Redox Conditions." PI: C. Ostrander, Co-PI: C. Hansel, S. Nielsen, E. Swanner. 2021-2024.
31. National Aeronautics and Space Administration, Interdisciplinary Consortium on Astrobiology Research (ICAR), "What Life Wants: Exploring the Natural Selection of Elements." PI: B. Kacar, Co-PI: A. Anbar, Co-I: E. Swanner and many others. 2021-2026.
30. Faculty Professional Development Appointment (i.e., sabbatical), Iowa State University, Fall semester 2021.
29. Advanced Photon Source, General User Proposal, "Tracking aquatic redox conditions and biogeochemistry through Fe, Mn and S mineral (trans)formations." PI: E Swanner. 2020.
28. National Science Foundation, Geobiology and Low-temperature Geochemistry, "CAREER: Quantifying the extent and biogeochemical impact of modern ferruginous lakes." PI: E. Swanner. 2020-2025.
27. Center for Health Effects of Environmental Contamination (CHEEC), "Degradation of 2,4-D by Fe(II)-oxidizing bacteria in Iowa's surface and groundwater." PI: E. Swanner. 2020-2022.
26. Leopold Center for Sustainable Agriculture, "Degradation of herbicides by Fe(II)-oxidizing bacteria in Iowa's surface and groundwater." PI: E. Swanner. 2019.
25. Advanced Photon Source, General User Proposal, "Down-core mapping of sedimentary diagenesis within anoxic lake sediments." PI: E. Swanner. 2019.
24. Hach, Request for DR 1900 spectrophotometer. PI: E Swanner. 2019 (in-kind donation; list price \$5,324).
23. Leopold Center for Sustainable Agriculture, "The history of biological activity and climate records in Loess Hills pedogenic carbonates." PI: E. Swanner. 2019-2022.
22. Petroleum Research Fund, Doctoral New Investigator (American Chemical Society), "Determining the mechanism(s) of sedimentary pyrite formation from anoxic (pore)waters." PI: E. Swanner. 2019- 2020.
21. Iowa Space Grant, Early Career Investigator Research Program (ECIRP), "Earth analogues for sedimentary manganese enrichments observed in a Martian paleolake." PI: E. Swanner. October 2018- June 2019.
20. Huron Mountain Wildlife Foundation, "Microbial pathways of iron and methane cycling in ferruginous Canyon Lake." PI: E. Swanner, Co-PI: C. Wittkop, S. Katsev, and C. Sheik. 2018.
19. Hach, Request for DR 1900 spectrophotometer. PI: E. Swanner. 2017.
18. Environmental Protection Agency, EPA-G2017-STAR-A1, Freshwater Harmful Algal Blooms: "A systems approach for understanding, predicting, and managing harmful algal blooms in Midwestern lakes." PI: A. Howe, Co-PI: K. Ikuma, E. Swanner, & J. Choi. 2018-2020.
17. Huron Mountain Wildlife Foundation, "Microbial pathways of iron and methane cycling in ferruginous Canyon Lake." PI: E. Swanner, C. Wittkop, S. Katsev, and C. Sheik. 2017.

16. National Science Foundation, Geobiology and Low-temperature Geochemistry, “Collaborative Research: Biosignatures of coupled iron and carbon cycling in ferruginous lakes.” PI: E. Swanner, Co-PI: C. Wittkop & S. Katsev. 2017-2020.
15. Iowa Water Center, “The role of iron mobility from anoxic sediments in stimulating harmful algal blooms.” PI: E. Swanner. 2017-2018.
14. Foreign Travel Grant, ISU, Goldschmidt Geochemistry Conference, Yokohoma, Japan. Oct. 2016.
13. Huron Mountain Wildlife Foundation, “Constraining pathways of methane, nutrient, and iron cycling in ferruginous Canyon Lake.” PI: C. Wittkop, S. Katsev, and E. Swanner. 2016.
12. Iowa Water Center, “The role of iron mobility from anoxic sediments in stimulating harmful algal blooms.” PI: E. Swanner. 2016-2017.

*Funded prior to ISU*

11. European Synchrotron Radiation Facility (ESRF), Beamtime granted for “Development of a carbonate proxy for the Fe(II) concentration and Fe isotope composition of ancient seawater.” S. Eroglu and E. Swanner. 2015.
10. NachwuchswissenschaftlerInnen, grant for young researchers from the University of Tübingen, “Development of a carbonate proxy for the Fe concentration, Fe isotope composition, and oxygen concentration of ancient seawater.” PI: E. Swanner. 2014-2015.
9. Carl Zeiss Stiftung, Postdoctoral Fellowship, “Rusty fingerprints of early cyanobacteria: the fate of Fe(II) during oxygenic photosynthesis.” PI: E Swanner. August 2014-July 2016.
8. Deutsche Forschungsgemeinschaft Schwerpunktprogram, “Building a Habitable Earth”. Helped to write the Geobiology section, program funded March 2014.
7. Stanford Synchrotron Radiation Lightsource (SSRL), Active beamtime proposal for “Fate of Co during diagenetic pyrite formation.” E. Swanner, M. Obst and A. Kappler. 2013-2016.
6. Deutsche Forschungsgemeinschaft Project Grant, “Microbial and diagenetic origins for BIFs mineralogy.” A. Kappler, M. Obst and E. Swanner\* (\*primary author). 2011-2014.
5. National Science Foundation (NSF) International Research Fellowship Program, “Constraining the role of photosynthetic organisms in deposition of Banded Iron Formations (BIF) on early Earth.” PI: E. Swanner. 2011-2013.
4. National Aeronautics and Space Administration (NASA) Astrobiology Institute, grant to host the Astrobiology Graduate Conference (AbGradCon). 2011.
3. National Science Foundation (NSF) East Asia and Pacific Summer Institutes, Geomicrobiology at Japan Agency for Marine Earth Science and Technology. PI: E. Swanner. 2007.
2. Mentorship Grant, Department of Geological Sciences, CU-Boulder. 2010.
1. Geological Society of America (GSA), Graduate Student Research Grant. 2010.

## AWARDS

11. Iowa State University, College of Liberal Arts & Sciences (LAS) Early Achievement in Research Award, 2020.
10. Geological Society of America (GSA) Geobiology and Geomicrobiology (GBGM) Division Pre-tenure Award, 2019.
9. Best Student Talk, Hydrogeology Symposium, CU-Boulder. 2011.
8. Nordic-NASA Astrobiology, summer school on “Water, Ice and the Origin of Life in the Universe” in Iceland, accepted in 2009 (declined).
7. NASA Astrobiology Institute, International Summer School of Astrobiology, Santander, Spain, accepted in 2009.
6. Colorado Scientific Society, Invited talk on student night; 3<sup>rd</sup> Prize. 2009.
5. "Best Should Teach" Silver Award, CU-Boulder. 2008 & 2009.
4. Mary Lyon Scholar, Mount Holyoke College. 2003.
3. Louisa Stone Stevenson Prize, Mount Holyoke College. 2002.
2. National Scholar-Athlete, Collegiate Rowing Coaches Association. 2001 & 2002.
1. NEWMAC Academic All-Conference. 2001.

## SCHOLARSHIP

### Publications

Google Scholar h-index: 22; 2044 citations (April 2023)

\*Denotes student or postdoc author supervised by Swanner

### ***Submitted***

Grengs A, \*Ledesma G, Xiong Y, Katsev S, Poulton S, Swanner E, and C Wittkop. “Direct precipitation of siderite in ferruginous environments.”

\*Stevenson Z, \*Tong H, and ED Swanner. “Insights on biotic and abiotic 2,4-D degradation by anaerobic Fe-cycling bacteria.”

Swanner ED, Harding C, Akam S, Lascu I, \*Ledesma G, \*Poudel P, \*Sun H, \*Duncanson S, \*Bandy K, \*Branham A, \*Bryant-Tapper L, \*Conwell T, \*Jamison O, and LE \*Netz. “Four meromictic (?) lakes in Itasca State Park, Minnesota, U.S.A.” published in EarthArXiv: <https://doi.org/10.31223/X5DW84>; Dataset: <https://doi.org/10.6073/pasta/a0fef2010734ea5f77ac7f2cf8ad1729>)

Gasda P, et al. “Manganese-rich sandstones as an indicator of ancient oxic lake water conditions in Gale crater, Mars.”

### **2023**

43. \*Leung T and E Swanner. "Statewide lake assessment reveals spatiotemporal variability of iron in Iowa lakes." In press in *Journal of Contemporary Water Research & Education*.

42. Robbins LJ, Fahkree M, Smith AJB, Bishop BA, Swanner ED, Peacock C, Planavsky NJ, Reinhard CT, Crowe SA, and Lyons TW. "Manganese oxides, Earth surface oxygenation, and the rise of oxygenic photosynthesis." (2023) *Earth-Science Reviews*, 239.

41. \*Ledesma G, \*Islam R, and ED Swanner. "Evaluation of preservation protocols for oxygen-sensitive minerals within laminated aquatic sediments." (2023) *Limnology & Oceanography Methods*. (published in EarthArXiv: <https://doi.org/10.31223/X5M068>; Dataset: <https://doi.org/10.6073/pasta/68b50baa0a767ab33f2b7dd91948036e>)

## **2022**

40. \*Kasiviswanathan P, Swanner ED, Halverson LJ, and P Vijayapalani. "Farming on Mars: Treatment of Basaltic Regolith Soil and Briny Water Simulants Sustains Plant Growth." (2022) *PLoS One*.

39. Swanner ED, \*Wüstner M, \*Leung T, Pust J, \*Fatka M, \*Lambrecht N, Chmiel H, and H Strauss. "Seasonal phytoplankton and geochemical shifts in the subsurface chlorophyll maximum layer of a dimictic ferruginous lake: the Grosses Heiliges Meer in Germany." (2022) *Microbiology Open*. Dataset: <https://doi.org/10.25380/iastate.14394455.v1>)

(Dataset) Swanner ED, Lascu I, \*Ledesma G, \*Leung T, \*Akam S. "Water properties of Arco Lake, Budd Lake, Deming Lake, and Josephine Lake in Itasca State Park from 2006-2009 and 2019-2021 ver. 1." (2022) Environmental Data Initiative.

## **2021**

(Dataset) Swanner ED, \*Lambrecht N, Wittkop C, Katsev S, \*Ledesma G, and \*T Leung. "Water properties of Brownie Lake, MN and Canyon Lake, MI from 2015-2019 ver 1." (2021) Environmental Data Initiative.

38. Schad M, \*Halama M, Robbins LJ, Warchola TJ, Tejada J, Kirchhof R, Lalonde SV, Swanner ED, Planavsky NJ, Thorwarth H, Mansor M, Konhauser KO, and A Kappler. "Phosphate Remobilization from Banded Iron Formations during metamorphic Mineral Transformations." (2021) *Chemical Geology*, 584, 120489.

37. \*Lambrecht N, \*Stevenson Z, Sheik CS, \*Pronschinske MA, \*Tong H, and ED Swanner. "'*Candidatus Chlorobium masyteum*', a novel photoferrothrophic green sulfur bacterium enriched from a ferruginous meromictic lake." (2021) *Frontiers in Microbiology*.

36. \*Leung T, Wilkinson G, and ED Swanner. "The role of iron availability during cyanobacteria dominance of algal blooms, as monitored by chlorophyll fluorescence." *Inland Waters*, 1-13. (Dataset: <https://doi.org/10.25380/iastate.14394443.v1>)

35. Erickson ML, Swanner ED, Ziegler BA, and JR Havig. "Months-long spike in aqueous As following domestic well installation and disinfection: short- and long-term drinking water quality implications." *Journal of Hazardous Materials*, 414: 125409.

34. Tong H, Li B, Swanner E, Liu C, Chen MJ, Xia Y, Liu Y, Ning Z, Li F, and X Feng. "Microaerophilic oxidation of Fe(II) coupled with simultaneous carbon fixation and As(III) oxidation and sequestration in karstic paddy soil." (2021) *Environmental Science & Technology*.

33. Kappler A, Bryce C, Mansor M, Byrne JM, Swanner ED, and U Lueder. "An evolving view on biogeochemical cycling of iron." *Nature Reviews Microbiology*.

## **2020**

32. Swanner ED, \*Lambrecht N, Wittkop C, Harding C, Katsev S, Torgeson J, and SW Poulton. "The biogeochemistry of ferruginous lakes and past ferruginous oceans." (2020) *Earth-Science Reviews*.

31. Cole DB, Planavsky NJ, Longley M, Böning P, Wilkes D, Wang X, Swanner ED, Wittkop C, Busigny V, Knudsen A, and EA Sperling. "Uranium isotope fractionation in anoxic settings and the global uranium isotope mass balance." (2020) *Global Biogeochemical Cycles*, 34(8).

30. Lee J, Choi J, \*Fatka M, Swanner ED, Ikuma K, Liang X, \*Leung T, and A Howe. "Improved detection of *mcyA* genes and their phylogenetic origins in harmful algal blooms." (2020) *Water Research*, 176(115730).

29. Wittkop C, Swanner ED, \*Lambrecht N, Myrbo A, Grengs A, Torgeson J, and S Katsev. "Manganese carbonates signal suboxic methanotrophy in ferruginous environments." *Earth & Planetary Science Letters*.

28. \*Lambrecht NL, Wittkop C, Katsev S, Sheik C, Fakhraee M, Hall SJ, and ED Swanner. "Biogeochemical and physical controls on methane fluxes from two meromictic ferruginous lakes." (2020) *Geobiology*, 18(1):54-69. Dataset: <https://doi.org/10.6073/pasta/58e69641730756555069631ebc687a61>. Dataset accessed 1/07/2020

## **2019**

27. \*Tong H, Hao L, Chen MJ, Li F, Liu C, Swanner E, Xia Y, Liu Y, and Y Liu. "Biological Fe(II) and Arsenic Oxidation for Arsenic Immobilization in Microaerophilic Environments." (2019) *Geochimica et Cosmochimica Acta*, 265: 96-108.

26. Swanner ED, Webb SM, and A Kappler. "Fate of cobalt and nickel in mackinawite during diagenetic pyrite formation." (2019) *American Mineralogist*, 104: 917-928.

25. Babechuk M, Weimar N, Kleinhanns I, \*Eroglu S, Swanner ED, Kenny G, Kamber B, and R Schoenberg. "Pervasively anoxic surface conditions at the onset of the Great Oxidation Event: new multi-proxy constraints from the Cooper Lake paleosol." (2019) *Precambrian Research*, 323: 126-163.

## **2018**

24. \*Lambrecht N, Wittkop C, Katsev S, Fakhraee M, and ED Swanner. "Geochemical characterization of two ferruginous meromictic lakes in the Upper Midwest, U.S.A." (2018) *JGR Biogeosciences*, 123(10): 3403-3422.

23. \*Eroglu S, Schoenberg R, Pascarelli S, Beukes N, Kleinmanns I, and E Swanner. "Iron speciation and isotope systematics of the Neoproterozoic Campbellrand-Malmani carbonate platform, South Africa." (2018) *American Journal of Science*, 318(4):367-408.

22. Swanner ED, \*Wu W, \*Maisch M, and A Kappler. "Oxic Fe(III) reduction could have generated Fe(II) in the photic zone of Precambrian seawater." (2018) *Scientific Reports*, 8(1):4238.

21. Konhauser KO, Robbins LJ, Alessi DS, Flynn SL, Gingras MK, Martinez RE, Kappler A, Swanner ED, Li Y-L, Crowe SA, and SV Lalonde. "Phytoplankton contributions to the trace element composition of Precambrian banded iron formation." (2018) *GSA Bulletin*.

### **2017**

20. Eroglu S, van Zuilen M, Taubald H, Drost K, Wille M, Swanner E, Beukes N, and R Schoenberg. "Continuously increasing oxidation state by organic burial on shallow marine shelves during the Neoproterozoic." (2017) *Precambrian Research*, 302:122-139.

19. \*Wu W, Swanner ED, Kleinmanns IC, Schoenberg R, Pan Y, and A Kappler. "Fe isotope fractionation during Fe(II) oxidation by the marine photoferrotroph *Rhodovulum iodolum* in the presence of Si – Implications for Precambrian iron formation deposition." (2017) *Geochimica et Cosmochimica Acta*, 211: 307-321.

18. Swanner ED, \*Bayer T, \*Wu W, Hao L, Obst M, Sundman A, Byrne JM, Michel FM, Kappler A, and R Schoenberg. "Iron isotope fractionation during Fe(II) oxidation mediated by the oxygen-producing marine cyanobacterium *Synechococcus* PCC 7002." (2017) *Environmental Science & Technology*, 51(9): 4897-4906.

### **2016**

17. \*Maisch, M, Wu, W, Kappler, A and ED Swanner. "Laboratory simulation of an iron(II)-rich Precambrian marine upwelling system to explore the growth of photosynthetic bacteria." (2016) *Journal of Visualized Experiments*, 113:e54251.

16. \*Halama M, Swanner ED, Konhauser KO, and A Kappler. "Evaluation of siderite and magnetite formation in BIFs by pressure-temperature experiments of Fe(III) minerals and microbial biomass." (2016) *Earth and Planetary Science Letters*, 450:243-253.

15. Hao L, Guo Y, Byrne JM, Zeitvogel F, Schmid G, Ingino P, Li J, Neu TR, Swanner ED, Kappler A, and M Obst. "Binding of heavy metal ions in aggregates of microbial cells, EPS and biogenic iron minerals measured in-situ using metal- and glycoconjugates-specific fluorophores." (2016) *Geochimica et Cosmochimica Acta*, 180:66-96.

### **2015**

14. Swanner ED, Wu W, Hao L, \*Wuestner ML, Obst M, Moran DM, McIlvin M, Saito M and A Kappler. "Physiology, Fe(II) oxidation, and Fe mineral formation by a marine planktonic cyanobacterium grown under ferruginous conditions." (2015) *Frontiers in Earth Science*, 3.

**2015 and earlier (prior to ISU start)**

13. Swanner ED, \*Wu W, Schoenberg R, Byrne J, Michel FM, Pan Y and A Kappler. "Fractionation of Fe isotopes during Fe(II) oxidation by a marine photoferrotroph is controlled by the formation of organic Fe-complexes and colloidal Fe fractions." (2015) *Geochimica et Cosmochimica Acta*, 165:44-61.
12. \*Robbins LJ, Swanner ED, Lalonde SV, Eickhoff M, Paranich ML, Reinhard CT, Peacock CL, Kappler A and KO Konhauser. "Limited Zn and Ni mobility during simulated Iron Formation diagenesis." (2015) *Chemical Geology*, 402:30-39.
11. Swanner ED, Mloszewska AM, Cirpka OA, Schoenberg R, Konhauser KO and A Kappler. "Modulation of oxygen production in Archean oceans by episodes of Fe(II) toxicity." (2015) *Nature Geoscience*. 8(2):126-130.
10. Melton ED, Swanner ED, Behrens S, Schmidt C and A Kappler. "The Interplay of Microbially Mediated and Abiotic Reactions in the Biogeochemical Fe Cycle." (2014) *Nature Reviews Microbiology*. 12:797-808.
9. \*Wu W, Swanner ED, Hao L, Zeitvogel F, Obst M, Pan Y and A Kappler. "Characterization of the physiology and cell-mineral interactions of the marine anoxygenic phototrophic Fe(II)-oxidizer *Rhodovulum iodolum* - implications for Precambrian Fe(II) oxidation." (2014) *FEMS Microbiology Ecology*. 88:503-515.
8. Swanner ED, Planavsky NP, Lalonde SV, Robbins LJ, Bekker A, Rouxel OJ, Kappler A, Mojzsis SJ and KO Konhauser. "Cobalt and marine redox evolution." (2014) *Earth & Planetary Science Letters*. 390:253-263.
7. Swanner ED, Cates N, Pecoits E, Bekker A, Konhauser KO and SJ Mojzsis. "Geochemistry of pyrite from diamictites of the Boolgeeda Iron Formation, Western Australia with implications for the GOE and Paleoproterozoic ice ages." (2013) *Chemical Geology*. 362:131-142
6. Posth NR, Köhler I, Swanner ED, Schröder C, Wellman E, Binder B, Konhauser KO, Neumann U, Berthold C, Nowak M and A Kappler. "Simulating Precambrian banded iron formation diagenesis." (2013) *Chemical Geology*. 362:66-73.
5. Swanner ED and AS Templeton. "Potential for nitrogen fixation and nitrification in the granite-hosted subsurface at Henderson Mine, CO." (2011) *Frontiers in Extreme Microbiology*. 2, doi: 10.3389/fmicb.2011.00254.
4. Swanner ED, Nell RM, and AS Templeton. "*Ralstonia* species mediate Fe-oxidation in circumneutral, metal-rich subsurface fluids of Henderson Mine, CO." (2011) *Chemical Geology*. 284: 339-350.
3. Benardini J, Vaishampayan P, Schwendner P, Swanner E, Fukui Y, Osman S, Satomi M and K Venkateswaran. "*Paenibacillus phoenicis* sp. nov. a spore forming bacterium isolated from the Phoenix Lander assembly facility." (2010) *Int. J. Syst. Env. Microbiol.* 61(6):1338-43.
2. Mayhew LE, Swanner ED, Templeton AS, Martin AP. (2008) "Phylogenetic relationships and functional genes: distribution of a manganese-oxidizing gene (mnxG) in *Bacillus* species." *Applied & Environmental Microbiology*. 74(23): 7265-7271.
1. Sahl JW, Schmidt R, Swanner ED, Mandernack KW, Templeton AS, Kieft TL, Smith RL, Sanford WE, Callaghan RL, Mitton JB, Spear JR. (2008) "Subsurface Microbial Diversity in Deep-Granitic-Fracture Water in Colorado." *Applied & Environmental Microbiology*. 74(1): 143-152.



## **Invited Presentations**

### **2023**

47. Swanner ED. "Iron Cycling on Earth Earth – Lessons from Lakes." Department of Geology & Environmental Earth Science, Miami University (Virtual). April 17, 2023.

### **2022**

46. Swanner ED. "Hidden resources within Minnesota's lakes." Natural Resource Research Institute. July 29, 2022.

45. Swanner ED. "How does sedimentary pyrite form?" Agouron International Geobiology Course Symposium, Caltech. July 6, 2022.

44. \*Islam R and ED Swanner (presenting author). "How does sedimentary pyrite form?" American Chemical Society, San Diego, CA. March 20-24, 2022.

43. Swanner ED. "Toto – I've a feeling we're not in the Archean anymore: using analogs to explore past biogeochemistry." NASA ICAR Metal Utilization and Selection Across Eons Team Meeting (Virtual). March 11, 2022.

42. Swanner ED. "How does sedimentary pyrite form?" Interface Geochemistry Seminar Series, Deutsches GeoForschungsZentrum, Potsdam (Virtual). February 17, 2022.

### **2021**

41. Swanner ED. "The hidden wonders of Minnesota's meromictic and ferruginous lakes". University of Minnesota-Duluth, Water Resources Graduate Seminar (Virtual). October 11, 2021.

40. Swanner ED. "How environment influences life: stratification, primary production, and metal availability." NASA ICAR Metal Utilization and Selection Across Eons Workshop (Virtual). September 10, 2021.

39. Swanner ED. "Sedimentary Geochemistry of Mn: formation pathways from aquatic systems and relationship to P." Groken Interest Group, Mars Science Laboratory (Virtual). August 17, 2021.

38. Swanner ED. "The hidden role of iron in primary productivity in some Midwest glacial lakes." Midwest Glacial Lakes Partnership (Virtual). May 4, 2021.

37. Swanner ED. "How the geochemistry of sediments can inform our understanding of the habitability of past Earth and planetary environments." ISU Inorganic Chemistry seminar series (Virtual). January 29, 2021.

### **2020**

36. Swanner ED. "The big impact of small ferruginous lakes on global elemental cycles." Bristol Geobiology Seminar (Virtual). Nov. 24, 2020.

35. Swanner ED. "Updates and insights from monitoring CyanoHABs in Iowa's lakes with multi-wavelength fluorescence." EPA Great Plains and Midwest Harmful Algal Blooms Conference. Feb. 5, 2020.

## **2019**

34. Swanner ED. "The story of iron in Iowa's lakes and why it matters." Seminar at University of Iowa, Civil and Environmental Engineering. November 15, 2019.

33. Swanner ED, Wittkop C, Lambrecht N, Katsev S, and A Picard. "Records of life in a ferruginous ocean: lessons from meromictic lakes". Geological Society of America Meeting, Phoenix, AZ. September 22-25, 2019.

32. Swanner ED. "How iron cycling in lakes informs our understanding of the greater terrestrial iron cycle." Institute of Geochemistry, Chinese Academy of Sciences, Guiyang, Guizhou, China. July 25, 2019.

31. Swanner ED. "How iron cycling in lakes informs our understanding of the greater terrestrial iron cycle." Guangdong Institute of Eco-environmental Science & Technology, Guangzhou, Guangdong, China. July 22, 2019.

30. Swanner ED. "Tracking cyanoHABs with chlorophyll fluorescence." Environmental Protection Agency, Region 7 office. May 9, 2019.

## **2018**

29. Swanner ED. "The importance of ferruginous systems on Earth – past and present." Seminar at University of Cologne, Germany. December 5, 2018.

28. Swanner ED, Lambrecht N, Wittkop C, Katsev S, Fakraee M, and C Sheik. "The biogeochemistry of ferruginous lakes and past ferruginous oceans. Keynote presented at Geological Society of America Meeting, Indianapolis, IN. November 4-7, 2018.

27. Swanner ED. "Photosynthesis under the anoxic and iron-rich conditions of Early Earth." Seminar at University of Minnesota, Plant and Microbial Biology. October 17, 2018.

26. Swanner ED, \*Lambrecht N, Fakraee N, Sheik C, Katsev S, and C Wittkop. "Microbes and minerals from two ferruginous lakes on a spectrum of anthropogenic impacts." Keynote presented at Goldschmidt Geochemistry Conference, Boston, MA. August 12-17, 2018.

25. Swanner ED. "Relevance of stratified Midwestern lakes to past, present, and future microbial biogeochemistry." American Chemical Society, New Orleans, LA. March 18-21, 2018.

24. Swanner, ED. "Chemically-stratified Midwestern lakes are relevant to Precambrian AND modern global biogeochemistry." University of Michigan, Department of Earth and Environmental Sciences, John A. Dorr Memorial Lecture, March 9, 2018.

### **2017**

23. "Micronutrients matter: the role of iron in harmful algal blooms", Friends of Lakeside, Lakeside Laboratory, Milford, IA. Aug. 15, 2017.

### **2016**

22. "Establishment of early ocean analogs in Midwestern ferruginous lakes: keys to the evolution of biogeochemical Fe cycling", Geological Society of America, Denver, CO. Sept. 26, 2016.

21. "The role of ferrous iron in oxidation of Earth's atmosphere and oceans", University of Minnesota, Department of Earth Sciences. May 5, 2016.

20. Gordon Geobiology Conference, Invited chair of "Metals as biogeochemical proxies" session, Galveston, TX. Feb. 2016.

19. "The role of ferrous iron in oxidation of Earth's atmosphere and oceans", Northwestern University, Department of Earth & Planetary Sciences. Jan. 8, 2016.

### **2015**

18. "The role of ferrous iron in oxidation of Earth's atmosphere and oceans", University of Iowa, Department of Earth & Environmental Sciences. Nov. 6, 2015.

17. "The role of ferrous iron in oxidation of Earth's atmosphere and oceans", Indiana University-Purdue University, Indianapolis, Department of Earth Sciences, Oct. 12, 2015.

### **2015 and earlier (prior to ISU start)**

16. "Iron isotopes as tracers of microbial and redox processes", University of Tübingen, Zentrum für Angewandte Geowissenschaften Seminar, June 12, 2015.

15. "The role of Fe in modulating Earth's oxygenation", Origin of Life Symposium, University of Göttingen. Oct. 17, 2014.

14. "Toxic levels of Fe(II) in Archean seawater delayed the Great Oxidation Event", Goldschmidt Geochemical Conference, Sacramento, CA. June 13, 2014.

13. "The trace element composition of anoxic oceans and their effect of on biogeochemical cycles", Biosignatures 2014 Conference, University of Bergen, Norway. May 21, 2014.

12. "Did Archean environmental conditions limit oxygen production by early cyanobacteria?", University of New Mexico, Department of Earth and Planetary Sciences. March 2014.

11. "Did Archean environmental conditions limit oxygen production by early cyanobacteria?", University of California, Los Angeles, Department of Earth, Planetary and Space Sciences. Feb. 2014.

10. "Did Archean environmental conditions limit oxygen production by early cyanobacteria?", Dartmouth College, Department of Earth Sciences. Jan. 2014.
9. "Did Archean environmental conditions limit oxygen production by early cyanobacteria?", Mount Holyoke College, Department of Geology and Program in Biochemistry. Jan. 2014.
8. "Did Archean environmental conditions limit oxygen production by early cyanobacteria?", Iowa State University, Department of Geological and Atmospheric Sciences. Jan. 2014.
7. "How we can use modern bacteria to understand ancient environments", Roundtable discussion for Priority Program on Early Earth (DFG SPP), University of Cologne, Germany. July 2013.
6. "Examining the relationship between oxygenic photosynthesis and Fe(II) oxidation", University Pierre & Marie Curie-IMPIC, Paris, France. March 2013.
5. "Examining the relationship of oxygenic photosynthesis to iron oxidation," Gordon Research Seminar in Geobiology, Ventura, CA. Jan. 2013.
4. "Microbially-mediated geochemical cycling of iron and nitrogen within the granite- hosted subsurface of Henderson Mine, CO", Colorado School of Mines, Golden, CO. Jan. 2013.
3. "Co-evolution of the microbial biosphere and geosphere: evidence from sediments, microbes and simulations", University of Delaware, Department of Geological Sciences. Nov. 2012.
2. "Investigation of a Terrestrial Subsurface Biosphere at Henderson Mine, CO", Florissant Scientific Society, Boulder, CO. 2010.
1. "Effective lesson planning for teaching assistants", Graduate Teacher Program Intensive, University of Colorado. 2009.

#### **TEACHING EXPERIENCE**

- GEOL 406/506, Geology Field Trip, Spring 2022.
- GEOL 100, The Earth, ISU, Spring 2019 and 2023 (in-person) and Spring 2021 (online).
- GEOL 490ES, Independent Study in Geochemistry, ISU, 2 students in Spring 2021.
- MICRO 490ES, Independent Study in Microbial Ecology, ISU, 2 students in Spring 2018.
- ENSCI 483/583, Environmental Biogeochemistry, ISU, co-taught with Prof. Steven Hall, Spring 2017, 2019, 2021, 2023.
- BIOL 487/EEOB 587, Microbial Ecology, ISU, Fall 2016-2020, 2022.
- GEOL 419/519, Aqueous and Environmental Geochemistry, ISU, Spring 2016, 2018, 2020, 2022.
- Project supervisor, Geomicrobiology Lab Course, University of Tübingen, Oct. 2013.

Teaching Geology Workshops, Presenter and Facilitator. 2008 & 2009.

Geology Lead Graduate Teacher, Graduate Teacher Program, CU-Boulder. 2008-2010.

Teaching Assistant, Introduction to Geology Laboratory, Department of Geological Sciences, CU-Boulder. 2007-2008.

Field Instructor, The Women's Wilderness Institute, Boulder, CO. 2005.

Field Instructor, Four Corners School of Outdoor Education, Monticello, UT. 2003.

Field Instructor, Outward Bound West, UT and CO. 2003-2005.

### **STUDENTS AND TRAINEES**

#### *Current*

Dr. Katy Rico, Postdoctoral Researcher, co-advised with Dr. Ariel Anbar, Arizona State University, 2022-present.

Michelle Chamberlain, PhD student in Interdepartmental Microbiology Program, ISU, 2022-present.

Dr. Sajjad Akam, Postdoctoral Researcher, Department of Geological & Atmospheric Sciences, ISU, 2021-present.

Zackry Stevenson, PhD student in Interdepartmental Microbiology Program, ISU, 2020-present.

#### *Completed*

Kaleigh Block, MS student in Geology Program and Environmental Sciences Graduate Program, ISU, 2020-2022.

Raisa Islam, MS student in Geology Program and Environmental Sciences Graduate Program, ISU, 2019-2021.

Tania Leung, PhD in Geology Program and Environmental Sciences Graduate Program, ISU, 2016-2021.

Dr. Hui Tong, Visiting Scholar (China Scholarship Council) in Dept. of Geological & Atmospheric Sciences, ISU, 2018-2020.

Micah Fatka, MS in Geology Program and Environmental Sciences Graduate Program, ISU, 2018-2021.

Nick Lambrecht, postdoc, ISU, 2019-2020; PhD in Interdepartmental Microbiology Program, ISU, 2016-2019.

ISU Undergraduates: Cristina Santana (2015-2016), William McNamara (2016), Megan Greenlee (First year honors project; 2016), Erin Atchison (Iowa Space Grant Scholarship mentor; 2017-2018), Raisa Islam (Mt. Holyoke summer intern, 2017), Matthew Pronschinske (Honors thesis mentor; 2017-2018),

Anna Drahos (2018), Micah Fatka (490: 2018), Danika Nolte (490: 2018), Anthony Davis (2018), Garrett Crews (490 with Beth Caissie: 2018), Gabbie Ledesma (LAS Dean's High Impact Award, Iowa Space Grant Scholarship mentor; 2018-2020), Jazlyn Beeck (First year honors project, LAS Dean's High Impact Award, Honors thesis mentor; 2019-2022), Brinlee Geyer (2019), Tamara McConnell (2020-present), William Manriquez (McNair Scholar; 2020), Mia Riddley (McNair Scholar, 2021-present).

## **SERVICE & LEADERSHIP ACTIVITIES**

### **Journal Reviews**

*For: American Mineralogist, Applied Geochemistry, Astrobiology, Biogeochemistry, Chemical Geology, Economic Geology, Environmental Pollution, Environmental Science & Technology, Frontiers, Geobiology, Geochemistry: Exploration, Environment, Analysis, Geochimica et Cosmochimica Acta, Geology, International Society of Microbial Ecology, Journal of Environmental Monitoring, Journal of Geophysical Research: Planets, Microbes and Environments; Nature Communications, Nature Geoscience, Science, Scientific Reports.*

Verified reviews since ISU start (Aug. 2015): 58

<https://www.webofscience.com/wos/author/record/1350877>

### **Proposal Reviewer or Panelist**

American Chemical Society-Petroleum Research Fund, Fonds de Recherche du Quebec, Iowa Space Grant, the National Aeronautics and Space Administration (NASA) Solar Systems, the National Science Foundation (NSF) Antarctic Organisms and Ecosystems, NSF Geochemistry and Low-Temperature Geobiology, NSF Marine Chemistry and Geochemistry, the Natural Sciences and Engineering Research Council (NSERC – Canada), the Research Institute of the University of Bucharest, the Stanford Synchrotron Radiation Lightsource.

### **Conference Organization and Session Convener**

Co-convener, Session on aquatic methane biogeochemistry, Goldschmidt Geochemistry Conference, July 2022.

Co-convener, Session on microbes, North Central Geological Society of America Meeting (virtual), May 2020.

Organizer, Great Plains Limnology Conference, October 2019.

Co-convener, Session on biology of modern analogues, Goldschmidt Geochemistry Conference, August 2018.

Co-convener, Biogeochemistry session, North Central Geological Society of America Meeting, April 2018.

Exhibits Chair, 2018 North Central Geological Society of America Meeting, April 2018.

Co-convener, Session on Biogeochemical cycling of iron, manganese, sulfur, and chromium for Goldschmidt Geochemistry Conference, June 2016.

Co-convener, Session on early Earth analogues for Goldschmidt Geochemistry Conference, August 2015.

Co-convener, Session on microbe-mineral interactions for German Mineralogical Society, September 2013.

Co-convener, Session on ferruginous settings for Goldschmidt Geochemistry Conference, August 2013.

Co-convener, Session on Early Earth for European Geosciences Union, April 2013.

Chairperson & Education and Public Outreach Coordinator, Astrobiology Graduate Conference, Montana State University, Bozeman. 2009-2011.

Organizer, Geology Graduate Student Poster Session, CU-Boulder, CO. 2010.

### **Outreach**

“The Precambrian! It’s too old... but why do we still care about it?” with Dr. Ben Johnson on “The Changing Earth: A Talk Show on Earth Science” hosted by Dr. Sajjad Akam, KURE (88.5FM), aired November 4, 2022.

WikiEdu Course Instructor: Microbiology Wikipedia pages written by Microbial Ecology 487/587: 20 in Fall 2020 and 19 in Fall 2022; “Deming Lake” Wikipedia page written by GEOL 406/506, Spring 2022.

“5 Facts in 5 Minutes” stand with student in NSF CAREER-sponsored field course, Mississippi Headwaters, Minnesota Department of Natural Resources, May 2022.

Environmental Science workshops for middle schoolers, Unitarian Universalist Fellowship of Ames religious education program, October 2021.

Brownie Lake Science Walk and Talk with Neighborhood Associations, Summer 2021.

Workshop Leader, ISU Program for Women in Science in Engineering (PWISE), October 2016-2021.

Co-wrote “Brownie Lake” Wikipedia entry, October 2018.

Established “Ferruginous Lakes” YouTube channel with videos about research, October 2018. Updated with student videos from NSF CAREER-sponsored field course, May 2022.

Advisor of award-winning Astrobiology project for Iowa Junior Academy of Science and State Science & Technology Fair of Iowa, 2018.

Workshop Organizer, ISU Youth 4H conference, June 2016-2019.

Mentor, Goldschmidt Geochemistry Conference, June 2014.

Blogger, European Association of Geochemistry, 2013-2015.

Instructor, Children's University: Microbiology, University of Tuebingen, July 2013.

Scientific Writing & Illustrator Workshops, University of Tuebingen. 2012 & 2013.

Invited Representative, University of Tuebingen's application for Excellence Funding. 2012.

"A metabolically-versatile bacterium thrives in granitic rock of the deep subsurface." Dance Your PhD Contest Entry, Sponsored by Science/AAAS. 2010.

Field Trip Leader, Geology Summer Field Series, CU-Boulder, CO. 2010.

Editor, Matriculation Guide for Incoming Graduate Students, Department of Geological Sciences, CU-Boulder, CO. 2010.

Compiler, Online Resources for TAs of Geology 1030, Department of Geological Sciences, CU-Boulder, CO. 2009.