

## **Chadlin M. Ostrander**

Frederick Albert Sutton Building  
115 S 1460 E, Room 383  
Salt Lake City, UT 84112-0102

chadlin.ostrander@utah.edu  
<https://chadlinm.wixsite.com/ostrander-lab>

### **EDUCATION**

---

2016 – 2020 **Ph.D.**, Geological Sciences, Arizona State University (ASU), Tempe, Arizona  
2012 – 2016 **B.S.**, Earth and Space Exploration (Geological Sciences), ASU, Tempe, Arizona

### **MENTORS**

---

Postdoctoral: Colleen M. Hansel and Sune G. Nielsen  
Graduate: Ariel D. Anbar  
Undergraduate: Ariel D. Anbar and Gwyneth W. Gordon

### **PROFESSIONAL EXPERIENCE IN ACADEMIA**

---

#### **University of Utah**

2023 – Assistant Professor, Department of Geology & Geophysics  
2023 – Affiliated Faculty, Global Change & Sustainability Center  
2022 – 2023 Adjunct Assistant Professor, Department of Geology & Geophysics

#### **Woods Hole Oceanographic Institution**

2023 – Guest Investigator, Marine Chemistry & Geochemistry  
2021 – 2023 Postdoctoral Investigator, Marine Chemistry & Geochemistry  
2020 – 2021 Postdoctoral Scholar, Marine Chemistry & Geochemistry  
2017 Guest Student, Geology & Geophysics  
2015 Summer Student Fellow, Geology & Geophysics

#### **Arizona State University**

2019 – 2020 Graduate Research Associate, School of Earth and Space Exploration  
2016 – 2019 Graduate Research Assistant, School of Earth and Space Exploration  
2014 – 2016 NASA Space Grant Intern, School of Earth and Space Exploration  
2012 – 2016 Undergraduate Research Assistant, School of Earth and Space Exploration

#### **University of Arizona**

2018 – 2020 Instructional Specialist, Sky School

### **PERSONAL AWARDS AND HONORS**

---

*Sum of monetary awards: ~\$324,000*

2020 – 2021 Postdoctoral Scholarship, Woods Hole Oceanographic Institution (\$140,000)

- 2019 – 2020 Graduate College Completion Fellowship, Arizona State University (\$18,000)  
2018 Astrobiology Grand Tour Scholarship, Australian Centre for Astrobiology (\$350)  
2018 Josep Comas i Solá International Summer School in Astrobiology (\$2,000)  
2017 Annual GSA Conference “On to the Future” Travel Award (\$500)  
2017 Annual Goldschmidt Conference Merit Travel Grant, NSF (\$1,250)  
2017 – 2018 Graduate Excellence Fellowship for First Generation Students, ASU (\$5,000)  
2016 – 2020 NSF Graduate Research Fellowship (\$140,000)  
2016 NASA Earth and Space Science Fellowship (declined in lieu of NSF Fellowship)  
2015 Academic Programs Office Travel Grant, WHOI (\$1,100)  
2015 Summer Student Fellowship, Woods Hole Oceanographic Institution (\$7,000)  
2014 – 2016 Arizona NASA Space Grant Undergraduate Fellowship (x2; \$6,400)  
2014 Ravi DeFilippo Geology Field Scholarship, Arizona State University (\$1,000)

## GRANTS

---

*Sum of awards to home institution: \$1,593,597*

- 2022 – 2025 *Source of support: NASA Exobiology*  
*Principal Investigator: C.M. Ostrander (Utah)*  
*Co-Investigators: A.W. Heard (WHOI), S.G. Nielsen (WHOI)*  
*Project Title: Elucidating marine redox conditions across the GOE using Tl and V isotopes*  
*Award Amount: \$876,694*
- 2022 *Source of support: WHOI Research Opportunities Initiative*  
*Principal Investigator: C.M. Hansel (WHOI)*  
*Co-Investigators: C.M. Ostrander, S.D. Wankel, J.A. Huber, M.H. Long, S.G. Nielsen, T.J. Horner, A.M. Seltzer, B.A.S. Van Mooy, V.P. Edgcomb, J.E. Rheuban, M.A. Charette (all affiliated with WHOI)*  
*Project Title: Catalyzing collaborative research in stratified coastal systems via a multi-sensor platform*  
*Award Amount: \$105,818*
- 2021 – 2024 *Source of support: NSF Geobiology and Low-Temperature Geochemistry*  
*Principal Investigator: C.M. Ostrander (WHOI)*  
*Co-Investigators: C.M. Hansel (WHOI), S.G. Nielsen (WHOI), E.D. Swanner (Iowa State)*  
*Project Title: Collaborative research: Towards a better understanding of Tl isotope cycling under different redox conditions*  
*Award Amount: \$664,644 (\$611,085 to WHOI)*

## REFEREED PUBLICATIONS

---

*First-authored contributions: 11*

Google Scholar statistics: total citations = 568, h-index = 11, i10-index = 12

† = co-first authors

22. Phillips, R.F., Wang, Y., Klein, F., Farfan, G., **Ostrander, C.M.**, Gadol, H., Hansel, C.M., Nielsen, S.G. (2023) The role of manganese oxide mineralogy in thallium isotopic fractionation upon sorption. *Geochimica et Cosmochimica Acta* 356, 83-92.
21. Zheng, W., Zhou, A., Sahoo, S., Nolan, M., **Ostrander, C.M.**, Anbar, A.D., Xiao, S., Chen, J. (2023) Recurrent photic zone euxinia limited ocean oxygenation and animal evolution during the Ediacaran. *Nature Communications* 14, 3920.
20. Gadol, H.J., **Ostrander, C.M.**, Villarroel, L., Taenzer, L., Wankel, S.D., Oldham, V.E., Hansel, C.M. (2023) Particle- and light-mediated processes control seasonal manganese oxide cycling in a meromictic pond. *ACS Earth and Space Chemistry* 7, 1181-1194.
19. **Ostrander, C.M.** (2023) Mulling and nulling the coeval rise of Ediacaran oxygen and animals. *Earth and Planetary Science Letters* 614, 118187.
18. **Ostrander, C.M.**, Bjerrum, C.J., Ahm, A.-S.C., Stenger, S.R., Bergmann, K.D., El-Ghali, M.A.K., Harthi, A.R., Aisri, Z., Nielsen, S.G. (2023) Widespread seafloor anoxia during generation of the Ediacaran shuram carbon isotope excursion. *Geobiology* 21, 556-570.
17. Anbar, A.D., Buick, R., Gordon, G.W., Johnson, A.C., Kendall, B., Lyons, T.W., **Ostrander, C.M.**, Planavsky, N.J., Reinhard, C.T., Stüeken, E.E. (2023) Technical comment on “Reexamination of 2.5-Ga “whiff” of oxygen interval points to anoxic ocean before GOE”. *Science Advances* 9, eabq3736.
16. **Ostrander, C.M.**, Nielsen, S.G., Gadol, H.J., Villarroel, L., Wankel, S.D., Horner, T.J., Blusztajn, J., Hansel, C.M. (2023) Thallium isotope cycling between waters, particles, and sediments across a redox gradient. *Geochimica et Cosmochimica Acta* 348, 397-409.
15. Heard, A.W., Wang, Y., **Ostrander, C.M.**, Auro, M., Canfield, D.E., Zhang, S., Wang, H., Wang, X., Nielsen, S.G. (2023) Coupled vanadium and thallium isotope constraints on Mesoproterozoic ocean oxygenation around 1.38-1.39 Ga. *Earth and Planetary Science Letters* 610, 118127.
14. **Ostrander, C.M.**, Kendall, B., Gordon, G.W., Nielsen, S.G., Zheng, W., Anbar, A.D. (2022) Shale heavy metal isotope records of low environmental O<sub>2</sub> between two Archean Oxidation Events. *Frontiers in Earth Science* 10, 833609.
13. **Ostrander, C.M.**, Severmann, S., Gordon, G.W., Kendall, B., Lyons, T.W., Zheng, W., Roy, M., Anbar, A.D. (2022) Significance of <sup>56</sup>Fe depletions in late-Archean shales and pyrite. *Geochimica et Cosmochimica Acta* 316, 87-104.
12. Johnson, A. C., **Ostrander, C.M.**, Romaniello, S. J., Reinhard, C. T., Greaney, A.T., Lyons, T.W., Anbar, A.D. (2021) Reconciling evidence of oxidative weathering and atmospheric anoxia on Archean Earth. *Science Advances* 7, eabj0108.
11. **Ostrander, C.M.**, Johnson, A.C., Anbar, A.D. (2021) Earth’s First Redox Revolution. *Annual Review of Earth and Planetary Sciences* 49, 337-366.

10. Fan, H., **Ostrander, C.M.**, Auro, M., Wen, H., Nielsen, S.G. (2021) Vanadium isotope evidence for expansive ocean euxinia during the appearance of early Ediacara Biota. *Earth and Planetary Science Letters* 567, 117007.
9. **Ostrander, C.M.**, Owens, J.D., Nielsen, S.G., Lyons, T.W., Shu, Y., Chen, X., Sperling, E.A., Jiang, G., Johnston, D.T., Sahoo, S.K., Anbar, A.D. (2020) Thallium isotope ratios in shales from South China and northwestern Canada suggest widespread O<sub>2</sub> accumulation in marine bottom waters was a very uncommon occurrence during the Ediacaran Period. *Chemical Geology* 557, 119856.
8. Gilleaudeau, G.J., Sahoo, S.K., **Ostrander, C.M.**, Owens, J.D., Poulton, S.W., Lyons, T.W., Anbar, A.D. (2020) Molybdenum isotope and trace metal signals in an iron-rich Mesoproterozoic ocean: A snapshot from the Vindhyan Basin, India. *Precambrian Research* 343, 105718.
7. **Ostrander, C.M.**, Kendall, B., Olson, S.L., Gordon, G.W., Romaniello, S.J., Lyons, T.W., Zheng, W., Roy, M., Reinhard, C.T., Anbar, A.D. (2020) An expanded shale  $\delta^{98}\text{Mo}$  record permits recurrent shallow marine oxygenation during the Neoproterozoic. *Chemical Geology* 532, 119391.
6. **Ostrander, C.M.**, Sahoo, S.K., Kendall, B., Jiang, G., Planavsky, N.J., Lyons, T.W., Nielsen, S.G., Owens, J.D., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2019) Multiple negative molybdenum isotope excursions in the Doushantuo Formation (South China) fingerprint complex redox-related processes in the Ediacaran Nanhua Basin. *Geochimica et Cosmochimica Acta* 261, 191-209.
5. **Ostrander, C.M.**, Nielsen, S.G., Owens, J.D., Kendall, B., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2019) Fully oxygenated water columns over continental shelves before the Great Oxidation Event. *Nature Geoscience* 12, 186-191.
4. Olson, S.L., **Ostrander, C.M.**, Gregory, D.D., Roy, M., Anbar, A.D., Lyons, T.W. (2019) Volcanically modulated pyrite burial and ocean-atmosphere oxidation. *Earth and Planetary Science Letters* 506, 417-427.
3. Blusztajn, J., Nielsen, S.G., Marshall, H., Shu, Y., **Ostrander, C.M.**, Hanyu, T. (2018) Thallium isotope systematics in volcanic rocks from St. Helena – Constraints on the origin of the HIMU reservoir. *Chemical Geology* 476, 292-301.
2. **Ostrander, C.M.**, Owens, J.D., Nielsen, S.G. (2017) Constraining the rate of oceanic deoxygenation leading up to a Cretaceous Oceanic Anoxic Event (OAE-2: ~94 Ma). *Science Advances* 3, e1701020.
1. Owens, J.D., Nielsen, S.G., Horner, T.J., **Ostrander, C.M.**, Peterson, L. (2017) Thallium-isotopic compositions of euxinic sediments as a proxy for global manganese-oxide burial. *Geochimica et Cosmochimica Acta* 213, 291-307.

## CONFERENCE ABSTRACTS

---

*First author totals:* talks = 16 (3 invited), posters = 11

*Conferences presented at:* (alphabetical) American Geophysical Union Fall Meeting (x6), Arizona NASA Space Grant Symposium (x2), Astrobiology Science Conference (x2), Geobiology Gordon Research Conference (x2), Geobiology Gordon Research Symposium, Geological Society of America Annual Meeting (x3),

Goldschmidt Conference (x6), Northeast Geobiology Symposium, Southern California Geobiology Symposium (x2)

60. Nielsen, S.G., Auro, M., Heard, A., Le Roux, V., Rheuban, J., Tegler, L., **Ostrander, C.M.**, Blusztajn, J. (2024) Development of a method to measure seven stable isotope systems from a single 40-milligram chip of carbonaceous chondrite. Lunar Planetary Science Conference, The Woodlands, Texas, 11-15 March. [submitted]
59. **Ostrander, C.M.**, Shu, Y., Nielsen, S.G., Dellwig, O., Schulz-Vogt, H.N., Voss, M., Hansel, C.M. (2023) Anthropogenic forcing of the Baltic Sea thallium cycle since ~1950. Geobiology Gordon Research Conference, Galveston, Texas, 14-19 Jan. [poster]
58. Webb, L.C., **Ostrander, C.M.**, Nielsen, S.G., Halverson, G.P., Sperling, E.A. (2023) Thallium isotopic constraints on global marine oxygenation during the early Neoproterozoic from the Reefal Assemblage in Yukon, Canada. GSA Meeting, Pittsburgh, Pennsylvania, 15-18 Oct. [talk]
57. Doerrier, A., Gilleaudeau, G.J., **Ostrander, C.M.**, Shu, Y., Nagovitsin, K.E., Dantes, O.V., Vasilyev, A.E., Grazhdankin, D.V., Kaufman, A.J. (2023) Redox conditions of terminal Ediacaran and early Cambrian *Lagerstätten* in Russia. GSA Meeting, Pittsburgh, Pennsylvania, 15-18 Oct. [poster]
56. **Ostrander, C.M.**, Heard, A.W., Bekker, A., Poulton, S.W., Shu, Y., Olesen, K.P., Nielsen, S.G. (2023) Congruent fluctuations in atmospheric and oceanic oxygenation across the GOE. 33<sup>rd</sup> V. M. Goldschmidt Conference, Lyon, France, 9-14 July. [invited talk]
55. Anbar, A.D., Buick, R., Gordon, G.W., Johnson, A.C., Kendall, B., Lyons, T.W., **Ostrander, C.M.**, Planavsky, N.J., Reinhard, C.T., Stüeken, E.E. (2023) Progressive planetary oxygenation: multiple lines of evidence confirm an Archean Oxidation Event at 2.5 Ga. 33<sup>rd</sup> V. M. Goldschmidt Conference, Lyon, France, 9-14 July. [talk]
54. Olesen, K.P., **Ostrander, C.M.**, Nielsen, S.G., Ungerhofer, K., Kraal, P., Canfield, D.E. (2023) Driving mechanisms of correlated thallium isotopic compositions and oxygen penetration depth in modern marine sediments. 33<sup>rd</sup> V. M. Goldschmidt Conference, Lyon, France, 9-14 July. [poster]
53. Heard, A.W., Nielsen, S.G., Blusztajn, J.S., **Ostrander, C.M.**, Swanner, E.D., Tivey, M.K. (2023) Constraining triple Fe isotopic behavior in an expanded array of modern aqueous environments. 33<sup>rd</sup> V. M. Goldschmidt Conference, Lyon, France, 9-14 July. [talk]
52. Webb, L., **Ostrander, C.M.**, Nielsen, S.G., Halverson, G., Sperling, E. (2023) Thallium isotopic constraints on global marine oxygenation during the early Neoproterozoic from the Reefal Assemblage in Yukon, Canada. Northern California Geobiology Symposium, Palo Alto, California, 15 April. [poster]
51. **Ostrander, C.M.**, Nielsen, S.G., Swanner, E.D., Gadol, H.J., Villarroel, L., Wankel, S.D., Heard, A.W., Shu, Y., Schulz-Vogt, H.N., Voss, M., Horner, T.J., Hansel, C.M. (2022) Towards a better understanding of thallium isotope cycling in modern redox-stratified settings. AGU Fall Meeting, Chicago, Illinois, 12-16 Dec. [talk]

50. Clemente, J.N.R., **Ostrander, C.M.**, Nielsen, S.G., Stockey, R.G., Strauss, J.V., Sperling, E.A. (2022) Timing Phanerozoic deep marine oxygenation using thallium isotopes. AGU Fall Meeting, Chicago, Illinois, 12-16 Dec. [poster]
49. Edmans, E., **Ostrander, C.M.**, Johnson, A., Anbar, A.D. (2022) Extending molybdenum adsorption experiments to simulated Archean seawater: the effects of silica saturation. AGU Fall Meeting, Chicago, Illinois, 12-16 Dec. [poster]
48. **Ostrander, C.M.**, Bjerrum, C.J., Ahm, A.C., Stenger, S.R., Bergmann, K.D., El-Ghali, M., Harthi, A.R., Aisri, Z., Nielsen, S.G. (2022) Widespread marine anoxia during generation of the Ediacaran Shuram Excursion. GSA Meeting, Denver, Colorado, 9-12 Oct. [talk]
47. Oleson, K.P., Nielsen, S.G., **Ostrander, C.M.**, Canfield, D.E. (2022) Early diagenetic cycling of thallium and its isotopes across a Skagerrak biogeochemical transect – possible implications for the marine Tl mass-balance. Geochemistry of the Earth's Surface 12<sup>th</sup> International Symposium, ETH Zurich, Switzerland, 24-29 July. [poster]
46. Heard, A.W., Wang, Y., **Ostrander, C.M.**, Auro, M., Canfield, D., Zhang, S., Wang, H., Wang, X., Nielsen, S.G. (2022) Vanadium and thallium isotope constraints on the global ocean redox state approximately 1.4 billion years ago. 32<sup>nd</sup> V. M. Goldschmidt Conference, Honolulu, Hawaii, 10-15 July. [talk]
45. Anbar, A.D., Lyons, T.W., Buick, R., Kendall, B., Johnson, A.C., **Ostrander, C.M.**, Stüeken, E.E., Reinhard, C.T., Planavsky, N.J. (2022) Whither the whiff? Reviewing and reassessing evidence of an Archean Oxidation Event at 2.5 Ga. Astrobiology Science Conference, Atlanta, Georgia, 15-20 May. [talk]
44. **Ostrander, C.M.**, Bjerrum, C.J., Ahm, A.C., Stenger, S.R., Butterfield, N.J., Grotzinger, J.P., El-Ghali, M., Nielsen, S.G. (2022) Rise of animals in a low-O<sub>2</sub> Ediacaran ocean. Northeast Geobiology Symposium, Cambridge, Massachusetts, 16 April. [poster]
43. Heard, A., Wang, Y., **Ostrander, C.M.**, Auro, M., Canfield, D., Zhang, S., Wang, H., Wang, X., Nielsen, S. (2022) Vanadium and thallium isotope constraints on the global ocean redox state approximately 1.4 billion years ago. Northeast Geobiology Symposium, Cambridge, Massachusetts, 16 April. [poster]
42. Phillips, R.F., Wang, Y., Nielsen, S.G., Hansel, C.M., **Ostrander, C.M.**, Gadol, H.J. (2021) Effect of mineralogy on thallium isotope fractionation during sorption to manganese oxides. AGU/ASLO/TOS Ocean Sciences Meeting, Honolulu, Hawaii, 27 Feb – 4 March. [virtual talk]
41. **Ostrander, C.M.**, Bjerrum, C.J., Ahm, A.C., Stenger, S., Butterfield, N.J., Grotzinger, J.P., El-Ghali, M., Nielsen, S.G. (2021) Rise of animals in a low-O<sub>2</sub> ocean. WHOI Postdoc Symposium, Woods Hole, Massachusetts, 3-4 Nov. [virtual talk]
40. **Ostrander, C.M.**, Nielsen, S.G., Gadol, H.J., Horner, T.J., Hansel, C.M. (2021) Thallium isotope cycling in a brackish and redox-stratified pond on Cape Cod. 31<sup>st</sup> V. M. Goldschmidt Conference, Lyon, France, 4-9 July. [virtual talk]
39. Gadol, H.J., **Ostrander, C.M.**, Taenzer, L., Oldham, V.E., Villarroel, L., Wankel, S.D., Hansel, C.M. (2021) Seasonality and sunlight dependency of manganese oxide formation and cycling in surface waters of a meromictic pond. 31<sup>st</sup> V. M. Goldschmidt Conference, Lyon, France, 4-9 July. [virtual talk]

38. Tegler, L.A., **Ostrander, C.M.**, Anbar, A.D., Kendall, B., Owens, J.D., Peterson, L.C., Scholz, F., Nielsen, S.G., Horner, T.J. (2021) Cadmium isotopes in organic-rich sediments: productivity or redox? 31<sup>st</sup> V. M. Goldschmidt Conference, Lyon, France, 4-9 July. [virtual flash talk]
37. Zhou, A., Nolan, M., Sahoo, S., **Ostrander, C.M.**, Anbar, A.D., Jones, D.S., Xiao, S., Chen, J., Zheng, W. (2021) Recurrent photic zone euxinia in Ediacaran South China basin revealed by mercury enrichment and isotope compositions. 31<sup>st</sup> V. M. Goldschmidt Conference, Lyon, France, 4-9 July. [virtual talk]
36. **Ostrander, C.M.**, Lyons, T.W., Kendall, B., Severmann, S., Romaniello, S.J., Zheng, W., Anbar, A.D. (2020) New Fe isotope insights into the oxidation history of a Neoproterozoic Earth. AGU Fall Meeting, San Francisco, California, 7-11 Dec. [virtual poster]
35. Anbar, A.D., **Ostrander, C.M.**, Johnson, A.C., Catling, D.C. (2020) Redox revolutions on Earth and beyond: Implications for life detection on extrasolar worlds. AGU Fall Meeting, San Francisco, California, 7-11 Dec. [virtual poster]
34. **Ostrander, C.M.** (2020) Thallium isotopes: an emerging paleoceanographic tool. WHOI Postdoc Symposium, Woods Hole, Massachusetts, 21-22 Oct. [virtual talk]
33. Tegler, L.A., **Ostrander, C.M.**, Anbar, A.D., Kendall, B., Nielsen, S.G., Horner, T.J. (2020) Cadmium isotopic constancy during an early “whiff” of O<sub>2</sub>. 30<sup>th</sup> V. M. Goldschmidt Conference, Honolulu, Hawaii, 21-26 June.
32. Rader, S.T., Gaschnig, R.M., Bebout, G.E., Romaniello, S.J., **Ostrander, C.M.**, Anbar, A.D. (2020) Molybdenum behavior during high-pressure metamorphism. 30<sup>th</sup> V. M. Goldschmidt Conference, Honolulu, Hawaii, 21-26 June.
31. **Ostrander, C.M.**, Owens, J.D., Nielsen, S.G., Shu, Y., Chen, X., Lyons, T.W., Jiang, G., Johnston, D.T., Sperling, E.A., Anbar, A.D. (2020) Differentiating local from global ocean oxygenation during the rise of animals. Geobiology Gordon Research Conference, Galveston, Texas, 12-17 Jan. [poster]
30. **Ostrander, C.M.**, Owens, J.D., Nielsen, S.G., Shu, Y., Chen, X., Lyons, T.W., Jiang, G., Johnston, D.T., Sperling, E.A., Anbar, A.D. (2020) Differentiating local from global ocean oxygenation during the rise of animals. Geobiology Gordon Research Seminar, Galveston, Texas, 11-12 Jan. [talk and poster]
29. **Ostrander, C.M.**, Owens, J.D., Nielsen, S.G., Anbar, A.D. (2019) Tracking Earth’s ocean oxygenation history during the late-Archean using thallium and molybdenum isotopes. AGU Fall Meeting, San Francisco, California, 9-13 Dec. [invited talk]
28. Elrick, M., Gilleaudeau, G.J., Romaniello, S.J., **Ostrander, C.M.**, Algeo, T.J., Morford, J.L. (2019) Middle Paleozoic global-ocean redox trends based on uranium isotopes from marine limestones and their relationship to paleobiologic, carbon-cycle, and climatic changes. AGU Fall Meeting, San Francisco, California, 9-13 Dec. [poster]
27. **Ostrander, C.M.**, Sahoo, S.K., Kendall, B., Jiang, G., Planavsky, N.J., Lyons, T.W., Nielsen, S.G., Owens, J.D., Romaniello, S.J., Anbar, A.D. (2019) Multiple negative molybdenum isotope excursions in the Doushantuo Formation (South China) fingerprint complex redox-related processes in the Ediacaran Nanhua Basin. GSA Meeting, Phoenix, Arizona, 22-25 Sept. [talk]

26. Johnson, A.C., Romaniello, S.J. **Ostrander, C.M.**, Reinhard, C.T., Lyons, T.W., Anbar, A.D. (2019) Assessing the bioavailability of Mo in Archean oceans. GSA Meeting, Phoenix, Arizona, 22-25 Sept. [talk]
25. Gilleaudeau, G.J., Sahoo, S.K., **Ostrander, C.M.**, Owens, J.D., Poulton, S.W., Lyons, T.W., Anbar, A.D. (2019) Molybdenum isotope and trace metal signals in an iron-rich Mesoproterozoic ocean: a snapshot from the 1.2 Ga Vindhyan Basin, India. GSA Meeting, Phoenix, Arizona, 22-25 Sept. [poster]
24. Tegler, L.A., **Ostrander, C.M.**, Anbar, A.D., Nielsen, S.G., Horner, T.J. (2019) Exploring cadmium as a proxy for primary productivity before the Great Oxidation Event. GSA Meeting, Phoenix, Arizona, 22-25 Sept. [poster]
23. **Ostrander, C.M.**, Anbar, A.D. (2019) New insights after a good long sniff of the “whiff”. 29<sup>th</sup> V. M. Goldschmidt Conference, Barcelona, Spain, 18-23 August. [invited talk]
22. **Ostrander, C.M.**, Nielsen, S.G., Owens, J.D., Kendall, B., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2019) Fully oxygenated water columns over continental shelves before the Great Oxidation Event. Astrobiology Science Conference, Seattle, Washington, 24-28 June. [talk given by Ariel D. Anbar]
21. Romaniello, S.J., Johnson, A.C., **Ostrander, C.M.**, Anbar, A.D. (2018) How low can you Mo?: Reevaluating molybdenum limitation in Precambrian oceans. AGU Fall Meeting, Washington D.C., 10-14 Dec. [poster]
20. **Ostrander, C.M.**, Nielsen, S.G., Owens, J.D., Kendall, B., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2018) Oxygen oases were persistent and widespread before the GOE. 28<sup>th</sup> V. M. Goldschmidt Conference, Boston, Massachusetts, 12-17 August. [poster]
19. Hartnett, H., Till, C., Anbar, A.D., Glaser, D., Guild, M., Iacovino, K., Johnson, A., Leong, J., **Ostrander, C.M.** (2018) Solid-Earth processes are key drivers in the evolution of Earth’s redox state and set the stage for the Great Oxidation Event. 28<sup>th</sup> V. M. Goldschmidt Conference, Boston, Massachusetts, 12-17 August. [talk]
18. **Ostrander, C.M.**, Nielsen, S.G., Owens, J.D., Kendall, B., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2018) Oxygen oases were persistent and widespread before the Great Oxidation Event. 16<sup>th</sup> Annual Southern California Geobiology Symposium, University of California, Riverside, 21 April [poster]
17. **Ostrander, C.M.**, Nielsen, S.G., Owens, J.D., Jiang, G., Planavsky, N.J., Sahoo, S.K., Zhang, F., Lyons, T.W., Anbar, A.D. (2017) Thallium isotopes track fluctuations in global manganese oxide burial during the Ediacaran Period. AGU Fall Meeting, New Orleans, Louisiana, 11-15 Dec. [poster]
16. Holdaway, B., Owens, J.D., Anbar, A.D., **Ostrander, C.M.**, Nielsen, S.G. (2017) Using thallium isotopes in the ~2.63 Ga Jeerinah Formation from Hamersley Basin, Western Australia, to constrain ancient seafloor oxygenation. AGU Fall Meeting, New Orleans, Louisiana, 11-15 Dec. [poster]
15. **Ostrander, C.M.**, Kendall, B., Romaniello, S.J., Gordon, G.W., Olson, S.L., Lyons, T.W., Nielsen, S.G., Zheng, W., Anbar, A.D. (2017) Constraining the molybdenum isotope budget of 2.63 – 2.50 Ga oceans. GSA Meeting, Seattle, Washington, 22-25 Oct. [talk]



14. **Ostrander, C.M.**, Kendall, B., Romaniello, S.J., Owens, J.D., Nielsen, S.G., Gordon, G.W., Anbar, A.D. (2017) Mo isotope evidence for an expansion in marine euxinia ~2.5 billion years ago. 27<sup>th</sup> V. M. Goldschmidt Conference, Paris, France, 13-18 August. [poster]
13. **Ostrander, C.M.**, Kendall, B., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2017) The “whiff” of oxygen 2.5 billion years ago: global or local? 2017 Astrobiology Science Conference, Mesa, Arizona, 24-28 April. [talk]
12. **Ostrander, C.M.**, Kendall, B., Roy, M., Romaniello, S.J., Nunn, S.J., Gordon, G.W., Olson, S.L., Lyons, T.W., Zheng, W., Anbar, A.D. (2016) Re-assessing the molybdenum isotope composition of pre-GOE seawater: evidence for dynamic ocean redox. AGU Fall Meeting, San Francisco, California, 12-16 Dec. [talk]
11. Romaniello, S.J., **Ostrander, C.M.**, Johnson, A.C., Planavsky, N.J., Anbar, A.D. (2016) What the flux? Deriving direct data-driven estimates of riverine Mo fluxes over Earth history. 2016 AGU Fall Meeting, San Francisco, California, 12-16 Dec. [poster]
10. Owens, J.D., **Ostrander, C.M.**, Nelson, S.G., Reinhard, C.T., Gill, B.C., Lowery, C.M., Love, G.D., Rohrssen, M., Hardisty, D.S., Lu, Z., Jenkyns, H.C., Lyons T.W. (2016) The stepwise evolution of marine de-oxygenation during a Cretaceous OAE. GSA Meeting, Denver, Colorado, 25-28 Sept. [talk]
9. **Ostrander, C.M.**, Roy, M., Gordon, G.W., Romaniello, S.J., Olson, S.L., Lyons, T.W., Anbar, A.D. (2016) Molybdenum isotope analysis of the ~2.7 Ga Roy Hill Shale – more evidence for Archean oxygen? 26<sup>th</sup> V. M. Goldschmidt Conference, Yokohama, Japan, 26 June-1 July. [talk]
8. Nielsen, S.G., **Ostrander, C.M.**, Owens, J.D. (2016) Ocean oxygenation across global climate perturbations recorded by thallium isotopes. 26<sup>th</sup> V. M. Goldschmidt Conference, Yokohama, Japan, 26 June – 1 July. [keynote talk]
7. **Ostrander, C.M.**, Roy, M., Gordon, G.W., Romaniello, S.J., Olson, S.L., Lyons, T.W., Anbar, A.D. (2016) Mo isotope evidence for mild oxygenation in the 2.7-2.6 Ga Roy Hill Shale from the Pilbara Craton, Western Australia? 13<sup>th</sup> Annual Southern California Geobiology Symposium, California Institute of Technology, 7 May [poster]
6. **Ostrander, C.M.**, Roy, M., Gordon, G.W., Romaniello, S.J., Anbar, A.D. (2016) Molybdenum isotope evidence for mild oxygenation ~2.7 billion years ago. Arizona NASA Space Grant Symposium, Tucson, Arizona, 16 April. [talk]
5. **Ostrander, C.M.**, Owens, J.D., Nielsen, S.G. (2015) Thallium isotopes tracking Mn-oxide burial – a proxy for deoxygenation during Oceanic Anoxic Event 2. AGU Fall Meeting, San Francisco, California, 14-18 Dec. [poster]
4. Owens, J.D., Nielsen, S.G., **Ostrander, C.M.**, Peterson, L., Anbar, A.D. (2015) Development and applications of thallium isotopes: a new proxy tracking the extent of manganese oxide burial. AGU Fall Meeting, San Francisco, California, 14-18 Dec. [invited talk]
3. **Ostrander, C.M.**, Roy, M., Anbar, A.D. (2015) The search for atmospheric oxygenation prior to the Great Oxidation Event. Arizona NASA Space Grant Symposium, Tempe, Arizona, 18 April. [talk]

2. Olson, S.L., Roy, M., Lyons, T.W., **Ostrander, C.M.**, Anbar, A.D. (2015) Inorganic hints of Archean oxygenation in the ~2.7 Ga Roy Hill Shale. 25<sup>th</sup> V. M. Goldschmidt Conference, Prague, Czech Republic, 16-21 August. [poster]
1. Roy, M., **Ostrander, C.M.**, Lyons, T.W., Olson, S.L., Buick, R., Anbar, A.D. (2014) Preliminary results from the AIDP-2 and AIDP-3 drill cores hint at systematic Mo enrichments. AGU Fall Meeting, San Francisco, California, 15-19 Dec. [poster]

## SEMINARS AND COLLOQUIA

---

12. *Ancient oxygen, more or less.* Stanford Earth and Planetary Sciences Department Seminar, Stanford, CA, November 2023.
11. *Tracking marine O<sub>2</sub> in deep time with Tl isotopes.* Woods Hole Oceanographic Institution Marine Chemistry & Geochemistry Seminar Series, Woods Hole, MA, May 2022.
10. *An introduction to heavy metal isotopes and ancient Earth.* Itasca Biological Field Station Field Biology Seminar, Itasca State Park, MN, May 2022.
9. *Development and application of the thallium isotope paleoredox proxy.* University of California, Riverside Hewett Club Lecture Series, Riverside, CA, April 2022 (remote presentation).
8. *Heavy metal tracers of Earth's O<sub>2</sub> history.* University of Utah Department of Geology and Geophysics Seminar, Salt Lake City, UT, March 2022 (remote presentation).
7. *Heavy metal isotopes, old rocks, and oxygen.* Mississippi State University Department of Geosciences Seminar, Starkville, MS, February 2022.
6. *Isotopes, old rocks, and oxygen.* University of Houston Department of Earth and Atmospheric Sciences Seminar, Houston, TX, November 2020 (remote presentation).
5. *Reconstructing the history of O<sub>2</sub> on Earth using heavy metal isotopes.* Woods Hole Oceanographic Institution Marine Chemistry & Geochemistry Seminar Series, Woods Hole, MA, August 2020 (remote presentation).
4. *Non-traditional tracers of Earth's O<sub>2</sub> history.* Pennsylvania State University Department of Geosciences Colloquium, State College, PA, October 2019.
3. *Tracking the oxygenation history of Earth's oceans using Tl and Mo isotopes.* Arizona State University School of Earth and Space Exploration Colloquium, Tempe, AZ, October 2019.
2. *Tracking progressive oxygen loss in ancient oceans.* OneNOAA Science Seminar Series, Washington D.C., November 2017 (remote presentation).
1. *Thallium isotopes tracking Mn oxide burial – a proxy for deoxygenation during Oceanic Anoxic Event 2.* Woods Hole Oceanographic Institution Geology & Geophysics Climate and Paleo Lunch Seminar Series, Woods Hole, MA, August 2015.

## MENTORING EXPERIENCE

---

### Graduate Committees

Samuel Lopez, Ph.D., University of Utah (2024 –)

Sandra Ramirezgarcia, Ph.D., University of Utah (2023 –)

Ashley Prow, Ph.D., Syracuse University (2021 –)

Jay Merrill, MSSST, University of Utah (2023)

Shannon Heiner, MSSST, University of Utah (2023)

### **Undergraduate Students**

Jean Clemente, WHOI Summer Student Fellow (2022)

Brittney Monus, ASU Sundial Project (2015)

### **High School Students**

Skyler Nunn, Pinhead Institute Internship Program (2016)

### **Other mentorship experience**

Goldschmidt Conference Mentor Program (2021)

MIT EAPS Peer Mentoring Program (2020 – 2021)

ASU NSF GRFP Advising Initiative (2018 – 2019)

## **COURSES TAUGHT**

---

(enrollment in parentheses)

\*Co-instructed course

2024 Spring **GEO 3800, The Oceans\***, University of Utah (43)

2023 Fall **GEO 1120, Introduction to Earth System Science**, University of Utah (34)

As Teaching Assistant:

2020 Spring **Sky School**, University of Arizona (<https://skyschool.arizona.edu>)

2019 Fall **GLG 494/581, Isotope Geochemistry**, Arizona State University

2019 Fall **Sky School**, University of Arizona

2019 Spring **Sky School**, University of Arizona

2018 Fall **Sky School**, University of Arizona

2015 Fall **SES 191, Exploring SESE**, Arizona State University

2015 Spring **GLG 451, Field Geology I**, Arizona State University

2014 Fall **SES 191, Exploring SESE**, Arizona State University

2013 Fall **SES 191, Exploring SESE**, Arizona State University

## **SERVICE**

---

To Profession:

2019 – Proposal reviewer for: Future Investigators in NASA Earth and Space Science and Technology (FINESST); NSF Faculty Early Career Development Program (CAREER); NSF Frontier Research in Earth Sciences (FRES); NSF Geobiology and Low-Temperature Geochemistry; NSF Petrology and Geochemistry

- 2018 – Manuscript reviewer for: Canadian Mineralogist; Earth and Planetary Science Letters; Geochimica et Cosmochimica Acta; Geobiology; Geological Society of America Bulletin; Geology; Journal of Hazardous Materials; Marine and Petroleum Geology; Nature Communications; Paleogeography, Paleoclimatology, and Paleoecology; Precambrian Research
- 2016 – Session Convener for: 2022 Annual Goldschmidt Conference, Honolulu, HI; 2021 Annual Goldschmidt Conference, Lyon, France; 2017 AGU Fall Meeting, New Orleans, LA; 2016 AGU Fall Meeting, San Francisco, CA
- 2022 Judge for AGU Outstanding Student Presentation Awards
- 2022 Script reviewer for Nova PBS/BBC “Earth” series
- 2017 Student Volunteer for Annual Goldschmidt Conference, Paris, France

To Department:

- 2023 – Search Committee for Isotope Geochemistry
- 2023 – Curriculum Assessment Committee
- 2023 – Undergraduate Research Committee

### **FIELD WORK AND CRUISE EXPERIENCE**

---

- 2022 – Deming and Steel lakes, Minnesota, USA
- 2020 – Siders Pond, Falmouth, Massachusetts, USA
- 2021 Baltic Sea (via Germany), R/V Elisabeth Mann Borgese
- 2018 Astrobiology Grand Tour, Pilbara Craton, Western Australia
- 2013 Yellowstone National Park, Wyoming and Montana, USA

### **RELATED PROFESSIONAL SKILLS**

---

- 2014 – Thermo Neptune MC-ICPMS for measurement of Fe, Mo, Tl, and U
- 2013 – Thermo ICAP-Q ICPMS for measurement of major and trace elements
- 2013 – Ion exchange chromatography for the purification of Fe, Mo, Tl, and U
- 2012 – Experience in Class 1,000 (ISO 6) geochemical clean rooms
- 2013 – 2020 Drill core curation

### **PROFESSIONAL SOCIETIES**

---

- 2017 – Geological Society of America
- 2016 – Geochemical Society
- 2014 – American Geophysical Union

### **SELECTED PRESS AND MEDIA COVERAGE**

---

- 2020 “Geological sciences PhD grad driven by desire to continue learning”

- <https://asunow.asu.edu/20200430-geological-sciences-phd-grad-driven-desire-continue-learning>
- 2019 “4 awesome discoveries you probably didn’t hear about this week”  
[https://www.youtube.com/watch?v=DOrP\\_Fs7Eek&feature=youtu.be](https://www.youtube.com/watch?v=DOrP_Fs7Eek&feature=youtu.be)
- 2018 “Will oxygen in the ocean continue to decline?”  
<https://www.whoi.edu/oceanus/feature/will-oxygen-in-the-ocean-continue-to-decline>
- 2017 “New technique offers clues to measure ocean deoxygenation”  
<https://www.whoi.edu/news-release/deoxygenation-ocean>
- 2016 “Focusing on the future of Earth”  
<https://asunow.asu.edu/20160505-focusing-future-earth>

### **PROFESSIONAL EXPERIENCE OUTSIDE ACADEMIA**

---

- 2007 – 2012 United States Marine, Marine Corps Logistics Base Barstow, CA  
*Military Occupational Specialty (MOS):* 0651, Data Network Specialist  
*Alternate MOS:* 0933, Combat Marksmanship Coach  
*Ranks held:* Private – Sergeant (E1 – E5)  
*Deployments:* Al Udeid AFB, Doha, Qatar, Operation Enduring Freedom (OEF)  
*Personal awards:* Navy and Marine Corps Achievement Medal (x2); Marine Corps Good Conduct Medal, Outstanding Volunteer Service Medal
- 2007 Dock Hand, Xanterra Parks and Resorts, Crater Lake National Park, OR
- 2006 – 2007 Old West Re-enactor, OK Corral and Helldorado Town, Tombstone, AZ
- 2006 – 2007 Pipe Layer, Don Kelly Construction, Tucson, AZ
- 2005 – 2006 Courtesy Clerk, Albertsons, Klamath Falls, OR