

# Geoffrey J. Gilleaudeau

Assistant Professor  
George Mason University  
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## EDUCATION

### **Ph.D. in Earth and Planetary Sciences** (August 2013)

University of Tennessee at Knoxville (GPA: 3.92/4.00)

DISSERTATION TITLE: Stratigraphic and geochemical investigation of the Mesoproterozoic Atar and El Mreiti groups, Mauritania: insights into carbon cycling and ocean redox stratification in a low oxygen world

PRIMARY ADVISOR: Linda C. Kah

### **B.A. in Geosciences** (May 2007)

State University of New York at Binghamton

THESIS TITLE: Sodium-magnesium variability in triple-chain silicates

PRIMARY ADVISOR: David M. Jenkins

## EMPLOYMENT

### **Assistant Professor** (August 2018-present)

George Mason University

### **Research Scientist** (March 2018-July 2018)

University of New Mexico

PRIMARY COLLABORATOR: Maya B. Elrick

### **NASA Astrobiology Postdoctoral Fellow** (February 2016-February 2018)

Arizona State University

PROPOSAL TITLE: The cycling of nitrogen and transition metals in low oxygen greenhouse oceans: evidence from redox proxies, metal abundances, and molybdenum/nitrogen isotopes

RESEARCH ADVISOR: Ariel D. Anbar

### **Carlsberg Foundation Postdoctoral Fellow** (March 2014-January 2016)

University of Copenhagen, Denmark

PROPOSAL TITLE: Chromium isotopes in Mesoproterozoic carbonates: a novel proxy for assessing the history of Earth surface oxygenation

RESEARCH ADVISOR: Robert Frei

### **Visiting Assistant Professor** (August 2013-December 2013)

Bucknell University

### **Graduate Research Assistant** (August 2012-May 2013)

University of Tennessee at Knoxville

### **Graduate Teaching Assistant** (August 2008-May 2012)

University of Tennessee at Knoxville

### **National Science Foundation (NSF) GK-12 Fellow** (August 2007-May 2008)

University of Tennessee at Knoxville

## PUBLICATIONS

30. Remírez, M.N., **Gilleaudeau, G.J.**, Elrick, M., McLaughlin, P., Willette, D.C., Algeo, T.J., *in preparation (to be submitted April 2022)*. Sedimentological, stratigraphic, and geochemical evolution of a mud-dominated epicontinental sea: New constraints from the Upper Devonian Illinois Basin, North America. **Sedimentology**.
29. **Gilleaudeau, G.J.**, Kah, L.C., Junium, C.K., Anbar, A.D., *in preparation (to be submitted March 2022)*. No evidence for alternative nitrogenase expression during the Mesoproterozoic Era. **Geochemical Perspectives Letters**.
28. Kulenguski, J.T., **Gilleaudeau, G.J.**, Pitts, A.D., Pierantoni, P., Kaufman, A.J., Elrick M., *in preparation (to be submitted March 2022)*. Uranium isotopes in platform carbonates record a major expansion of global ocean euxinia across Cretaceous OAE 2. **Geology**.
27. **Gilleaudeau, G.J.**, Wei, W., Remírez, M.N., Song, Y., Lyons, T.W., Bates, S., Anbar, A.D., Algeo, T.J., *in preparation (to be submitted February 2022)*. Spatiotemporal watermass evolution of the Late Devonian Appalachian Seaway: Exploring the link between sedimentation, redox, and salinity. **Earth-Science Reviews**.
26. Cherry, L.B., **Gilleaudeau, G.J.**, Grazhdankin, D.V., Romaniello, S.J., Kaufman, A.J., *in preparation (to be submitted January 2021)*. A diverse Ediacara assemblage survived under anoxic conditions. **Nature Communications**.
25. Zheng, W., **Gilleaudeau, G.J.**, Zhang, Y., Song, Y., Algeo, T.J., Sahoo, S.K., Anbar, A.D., Chen, J., *in review*. Mercury isotope evidence for recurrent photic zone euxinia stimulated by terrestrial nutrient inputs during the Late Devonian mass extinction. **Science Advances**.
24. Sahoo, S.K.\*, **Gilleaudeau, G.J.\***, Wilson, K., Hart, B., Faison, T., Bowman, A., Larsen, T., Kaufman, A.J.\*, *in review*. Eustasy, euxinia, and extinction: Global reorganization across the Devonian-Carboniferous transition. **Nature**. (\*These authors contributed equally to this work)
23. Elrick, M., **Gilleaudeau G.J.**, Romaniello, S.J., Algeo T.J., Morford, J.L., Sabbatino, M., Goepfert, T.J., Chernyavskiy, P., Cleal, C., Cascales-Miñana, B., *in review*. Major Early-Middle Devonian oceanic oxygenation linked to early land plant evolution detected using high-resolution U isotopes of marine limestones. **Earth and Planetary Science Letters**.
22. Bruggmann, S., **Gilleaudeau G.J.**, Romaniello, S.J., Severmann, S., Canfield, D.E., Anbar, A.D., Scholz, F., Frei, R., 2021. Uranium isotope cycling on the highly productive Peruvian margin. **Chemical Geology** 120705.
21. Farrell, U.C., Samawi, R., Anjanappa, S., Klykov, R., Adeboye, O.E., Agic, H., Ahm, A-S.C., Boag, T.H., Bowyer, F., Brocks, J.J., Brunoir, T.N., Canfield, D.E., Chen, X., Cheng, M., Clarkson, M.O., Cole, D.B., Cordie D.R., Crockford, P.W., Cui, H., Dahl, T.W., Mouro, L.D., Dewing, K., Dornbos, S.Q., Drabon, N., Dumoulin, J.A., Emmings, J.F., Endriga, C.R., Fraser, T.A., Gaines, R.R., Gaschnig, R.M., Gibson, T.M., **Gilleaudeau, G.J.**, Gill, B.C., Goldberg, K., Guilbaud, R., Halverson, G.P., Hammarlund, E.U., Hantsoo, K.G., Henderson, M.A., Hodgskiss, M.S.W., Horner, T.J., Husson, J.M., Johnson, B., Kabanov, P., Keller, C.B., Kimmig, J., Kipp, M.A., Knoll, A.H., Kreitsmann, T., Kunzmann, M., Kurzweil, F., LeRoy, M.A., Li, C., Lipp, A.G., Loydell, D.K., Lu, X., Macdonald, F.A., Magnall, J.M., Mänd, K., Mehra, A., Melchin, M.J., Miller, A.J., Mills, N.T., Mwinde, C.N., O'Connell, B., Och, L.M., Ossa, F.O., Pagès, A., Paiste, K., Partin, C.A., Peters, S.E., Petrov, P., Playter, T.L., Plaza-Torres, S., Porter, S.M., Poulton, S.W., Pruss, S.B., Richoz, S., Ritzer, S.R., Rooney, A.D., Sahoo, S.K., Schoepfer, S.D., Sclafani, J.A., Shen, Y., Shorttle, O., Slotznick, S.P., Smith, E.F., Spinks, S., Stockey, R.G., Strauss, J.V., Stüeken, E.E., Tecklenburg, S., Thomson, D., Tosca, N.J., Uhlein, G.J., Vizcaíno, M.N., Wang, H., White, T., Wilby, P.R., Woltz, C.R., Wood, R.A., Xiang, L., Yurchenko, I.A., Zhang, T., Planavsky,

- N.J., Lau, K.V., Johnston, D.T., Sperling, E.A., 2021. The Sedimentary Geochemistry and Paleoenvironments Project. **Geobiology** 19, 545-556.
20. Mehra, A., Keller, C.B., Zhang, T., Tosca, N.J., McLennan, S.M., Sperling, E., Farrell, U., Brocks, J., Canfield D., Cole, D., Crockford, P., Cui, H., Dahl, T.W., Dewing, K., Emmings, J.F., Gaines, R.R., Gibson, T., **Gilleaudeau, G.J.**, Guilbaud, R., Hodgskiss, M., Jarrett, A., Kabanov, P., Kunzmann, M., Li, C., Loydell, D.K., Lu, X., Miller, A., Mills, N.T., Mouro, L.D., O'Connell, B., Peters, S.E., Poulton, S., Ritzer, S.R., Smith, E., Wilby, P., Woltz, C., Strauss, J.V., 2021. Curation and analysis of global sedimentary geochemical data to inform Earth history. **GSA Today** 31, 4-10.
  19. **Gilleaudeau, G.J.**, Algeo, T.J., Lyons, T.W., Bates, S., Anbar, A.D., 2021. Novel watermass reconstruction in the Early Mississippian Appalachian Seaway based on integrated proxy records of redox and salinity. **Earth and Planetary Science Letters** 558, 116746.
  18. Song, Y., **Gilleaudeau, G.J.**, Algeo, T.J., Over, D.J., Lyons, T.W., Anbar, A.D., Xie, S., 2021. Biomarker evidence of algal-microbial community changes linked to redox and salinity variation, Upper Devonian Chattanooga Shale (Tennessee, U.S.A.). **Geological Society of America Bulletin** 133, 409-424.
  17. **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.
  16. Wei, W., Frei, R., **Gilleaudeau, G.J.**, Li, D., Wei, G.Y., Ling, H.F., 2020. Variations of redox conditions in the atmosphere and Yangtze Platform across the Ediacaran-Cambrian transition: Constraints from Cr isotopes and Ce anomalies. **Palaeogeography, Palaeoclimatology, Palaeoecology** 543, 109598.
  15. **Gilleaudeau, G.J.**, Romaniello, S.J., Luo, G., Kaufman, A.J., Zhang, F., Kläbe, R.M., Kah, L.C., Azmy, K., Bartley, J.K., Zheng, W., Knoll, A.H., Anbar, A.D., 2019. Uranium isotope evidence for limited euxinia in mid-Proterozoic oceans. **Earth and Planetary Science Letters** 521, 150-157.
  14. Over, D.J., Hauf, E., Wallace, J., Chiarello, J., Over, J.S., **Gilleaudeau, G.J.**, Song, Y., Algeo, T.J., 2019. Conodont biostratigraphy and magnetic susceptibility of Upper Devonian Chattanooga Shale, eastern United States: Evidence for episodic deposition and disconformities. **Palaeogeography, Palaeoclimatology, Palaeoecology** 524, 137-149.
  13. Zheng, W., **Gilleaudeau, G.J.**, Kah, L.C., Anbar, A.D., 2018. Mercury isotope signatures record photic zone euxinia in the Mesoproterozoic ocean. **Proceedings of the National Academy of Sciences, USA** 115, 10594-10599.
  12. Wei, W., Frei, R., **Gilleaudeau, G.J.**, Li, D., Wei, G.Y., Chen, X., Ling, H.F., 2018. Oxygenation variations in the atmosphere and shallow seawaters of the Yangtze Platform during the Ediacaran Period: Clues from Cr-isotope and Ce-anomaly in carbonates. **Precambrian Research** 313, 78-90.
  11. **Gilleaudeau, G.J.**, Voegelin, A.R., Thibault, N., Moreau, J., Ullmann, C.V., Kläbe, R.M., Korte, C., Frei, R., 2018. Stable isotope records across the Cretaceous-Paleogene transition, Stevns Klint, Denmark: new insights from the chromium isotope system. **Geochimica et Cosmochimica Acta** 235, 305-332.
  10. Zhang, F., Xiao, S., Kendall, B., Romaniello, S.J., Cui, H., Meyer, M., **Gilleaudeau, G.J.**, Kaufman, A.J., Anbar, A.D., 2018. Extensive marine anoxia during the terminal Ediacaran Period. **Science Advances** 4, eaan 8983.
  9. Yingst, R.A., Bartley, J., Chidsey, T., Cohen, B.A., **Gilleaudeau, G.J.**, Hynek, B.M., Kah, L.C., Minnitti, M.E., Williams, R.M.E., Black, S., Gemperline, J., Schaufler, R., Thomas, R.J.,

2018. Testing the efficiency of rover science protocols for robotic sample selection: A GeoHeuristic Operational Strategies Test. **Acta Astronautica** 146, 300-315.
8. **Gilleaudeau, G.J.**, Sahoo, S.K., Kah, L.C., Henderson, M.A., Kaufman, A.J., 2018. Proterozoic carbonates of the Vindhyan Basin, India: Chemostratigraphy and diagenesis. **Gondwana Research** 57, 10-25.
  7. D'Arcy, J., **Gilleaudeau, G.J.**, Peralta, S., Gaucher, C., Frei, R., 2017. Redox fluctuations in the Early Ordovician oceans: An insight from chromium stable isotopes. **Chemical Geology** 448, 1-12.
  6. Paulukat, C., **Gilleaudeau, G.J.**, Chernyavskiy, P., Frei, R., 2016. The Cr-isotope signature of surface seawater—a global perspective. **Chemical Geology** 444, 101-109.
  5. **Gilleaudeau, G.J.**, Frei, R., Kaufman, A.J., Kah, L.C., Azmy, K., Bartley, J.K., Chernyavskiy, P., Knoll, A.H., 2016. Oxygenation of the mid-Proterozoic atmosphere: Clues from chromium isotopes in carbonates. **Geochemical Perspectives Letters** 2, 178-187.
  4. **Gilleaudeau, G.J.**, Kah, L.C., 2015. Heterogeneous redox conditions and a shallow chemocline in the Mesoproterozoic ocean: Evidence from carbon-sulfur-iron relationships. **Precambrian Research** 257, 94-108.
  3. **Gilleaudeau, G.J.**, Kah, L.C., 2013. Oceanic molybdenum drawdown by epeiric sea expansion in the Mesoproterozoic. **Chemical Geology** 356, 21-37.
  2. **Gilleaudeau, G.J.**, Kah, L.C., 2013. Carbon isotope records in a Mesoproterozoic epicratonic sea: Carbon cycling in a low-oxygen world. **Precambrian Research** 228, 85-101.
  1. Jenkins, D.M., **Gilleaudeau, G.J.**, Kawa, C., Dibiase, J.M., Fokin, M., 2012. Compositional limits and analogs of monoclinic triple-chain silicates. **Contributions to Mineralogy and Petrology** 164, 229-244.

## GRANTS AND AWARDS

**Co-I on NASA Exobiology Grant** (January 2022-December 2023): \$747,383 total (\$183,001 to GMU)

PROPOSAL TITLE: Refining the geochemical toolkit for paleoredox reconstruction: uranium isotope behavior under suboxic, anoxic, and iron-rich conditions

**Co-I on American Geophysical Union Bridge Program Grant** (awarded December 2020)

**PI on National Science Foundation Geobiology and Low-Temperature Geochemistry Grant** (August 2020-July 2023): \$662,760 total (\$361,062 to GMU) over three years

PROPOSAL TITLE: Collaborative Research: The rise and fall of the Neoproterozoic Era in Siberia: connections between tectonics, ocean chemistry, and biologic innovation

**PI on American Chemical Society Petroleum Research Fund Grant** (September 2020-August 2022): \$55,000

PROPOSAL TITLE: Redox gradients in Lower Mississippian black shales of North America: a test case for uranium isotope behavior

**GMU College of Science Postdoctoral Fellowship** (February 2020-February 2021): ~\$60,000

PROPOSAL TITLE: Reconstructing deep ocean circulation in a warmer world

**PI on GMU College of Science Seed Grant** (May 2019-April 2021): \$26,150

PROPOSAL TITLE: Did ocean oxygenation trigger the Cambrian Explosion of animals?

**NASA Postdoctoral Program Fellowship** (February 2016-February 2018): ~\$140,000

**Carlsberg Foundation Postdoctoral Fellowship** (March 2015-January 2016): 1.1 million Danish kroner

**Young Alumnus Award**, University of Tennessee, Department of Earth and Planetary Sciences (September 2021)

Graduate Student Research Grants (2007-2009): > \$10,000

- Society for Sedimentary Geology (SEPM)
- Geological Society of America (GSA)
- American Association of Petroleum Geologists (AAPG)
- Evolving Earth Foundation
- Barringer Family Fund for Meteorite Impact Research

Student Awards (2007-2011)

- Best Student Presentation in Earth and Planetary Sciences
- Graduate Student Teaching Award
- Professional Promise Award in Earth and Planetary Sciences
- Best Student Proposal, GSA Sedimentary Geology Division
- Glenn G. Bartle Undergraduate Award in Geology

## TEACHING

**Geological Field Techniques** (GEOL 404), George Mason University/University of Camerino (Summer 2022 and beyond)

**Environmental Geology** (GEOL 305), George Mason University (Spring 2020, Spring 2021, Spring 2022, and beyond)

**Sedimentary Geology** (GEOL 304/504), George Mason University (Fall 2019, Fall 2020, Fall 2021, and beyond)

**Historical Geology** (GEOL 102), George Mason University (Fall 2019, Spring 2020, Fall 2020, Fall 2021, Spring 2022, and beyond)

**Great Events in Earth History** (GEOL 441/541), George Mason University (Spring 2019, Spring 2021, and beyond)

**Isotopes** (GLG 494/581), Arizona State University: Guest lecture (September 2016)

**Core to Crust**, University of Copenhagen: Guest lectures (December 2015)

**Principles of Geochemistry**, University of Copenhagen: Guest lectures (December 2015)

**Evolution of the Earth** (GEOL 104), Bucknell University: Lectures, labs, and 14 field trips (Fall 2013)

**Sedimentology and Stratigraphy** (GEOL 340), University of Tennessee at Knoxville: Guest lectures, labs, and field trips (3 semesters from 2011-2012)

**Earth, Life, and Time** (GEOL 102), University of Tennessee at Knoxville: Guest lectures and labs (4 semesters from 2009-2012)

**Structural Geology** (GEOL 370), University of Tennessee at Knoxville: Labs and grading (Fall 2008)

Heritage Middle School (**NSF GK-12 Program**): Seventh grade classroom scientist

## INVITED LECTURES

**United States Geological Survey**, November 2021 (virtual)

LECTURE TITLE: Watermass reconstruction in Devonian-Carboniferous epicratonic seas of North America

**University of Tennessee**, September 2021 (Knoxville, Tennessee, USA)

LECTURE TITLE: Watermass reconstruction in Devonian-Carboniferous epicratonic seas of North America

**Geological Society of America Conference**, October 2020 (virtual)

SESSION TITLE: Co-evolution of Earth surface environment and life history from the mid-Proterozoic to Early Paleozoic

LECTURE TITLE: Watermass reconstruction in the Early Mississippian Appalachian Seaway based on redox and salinity proxy variation

**Iowa State University**, November 2019 (Ames, Iowa, USA)

LECTURE TITLE: Tracing the oxygenation history of the Proterozoic and Paleozoic oceans: Lessons from uranium isotope geochemistry

**Carnegie Institution for Science**, October 2018 (Washington D.C., USA)

LECTURE TITLE: Probing the Proterozoic and Paleozoic record of Earth surface oxygenation: Lessons from metal isotope geochemistry

**Goldschmidt Conference**, August 2017 (Paris, France)

SESSION TITLE: What do Precambrian minerals record about Hadean to Proterozoic lithosphere-hydrosphere evolution?

LECTURE TITLE: Deciphering the carbonate record of Mesoproterozoic biospheric oxygenation: Insights from chromium and uranium isotopes

**Chinese Academy of Geological Sciences**, July 2016 (Beijing, China)

LECTURE TITLE: Chemical state of the ancient ocean/atmosphere system—what can Cr-isotopes in carbonates tell us?

**East Tennessee Geological Society**, May 2011 (Knoxville, Tennessee, USA)

LECTURE TITLE: Carbon, sulfur, and iron in the Mesoproterozoic Tourist Formation, Mauritania: Implications for environmental redox

**Wintershall Holding GmbH**, Taoudeni Basin workshop, September 2010 (Kassel, Germany)

LECTURE TITLE: Using carbon isotopes to refine intrabasinal correlations: Results from the Taoudeni Basin, northwest Africa

## CONTRIBUTED ABSTRACTS

49. 2022, **Gilleaudeau, G.J.**, Wei, W., Remírez, M.N., Lyons, T.W., Bates, S., Anbar, A.D., Algeo, T.J. Watermass reconstruction in ancient epeiric seas: Redox and salinity analysis of Devonian-Mississippian black shales of the Appalachian Basin, North America. Geological Society of America Sectional Meeting (Cincinnati, Ohio, USA) (oral presentation).
48. 2022, Rutledge, R.L., **Gilleaudeau, G.J.**, Remírez, M.N., Sahoo, S.K., Algeo, T.J. Redox gradients recorded in Lower Mississippian black shales of the Appalachian and Williston basins, North America: A test case for uranium isotope behavior. Geological Society of America Sectional Meeting (Cincinnati, Ohio, USA) (poster).
47. 2022, Remírez, M.N., **Gilleaudeau, G.J.**, Elrick, M., Algeo, T.J. Temporal and spatial watermass evolution during deposition of Middle to Upper Devonian organic-rich shales of the Illinois Basin, North America. Geological Society of America Sectional Meeting (Cincinnati, Ohio, USA) (oral presentation).
46. 2022, Tagle, N.B., Remírez, M.N., Cherry, L.B., Kaufman, A.J., Burls, N.J., **Gilleaudeau, G.J.** Nitrogen isotope constraints on redox conditions in the North Pacific Ocean during the warm Pliocene Epoch. Geological Society of America Sectional Meeting (Cincinnati, Ohio, USA) (poster).

45. 2022, Lau, C.H., Remírez, M.N., Algeo, T.J., Cherry, L.B., Kaufman, A.J., **Gilleaudeau, G.J.** Carbon cycle perturbation at the Frasnian-Famennian boundary in the Illinois Basin, USA. Geological Society of America Sectional Meeting (Cincinnati, Ohio, USA) (oral presentation).
44. 2021, Remírez, M., Shen, J., Algeo, T.J., Wei, W., **Gilleaudeau, G.J.** Elemental paleosalinity proxies demonstrate freshwater conditions in Triassic-Jurassic boundary strata previously assumed to be marine (Arroyo Malo Formation, Argentina). Geological Society of America Conference (Portland, Oregon, USA) (oral presentation).
43. 2021, Kulenguski, J.T., **Gilleaudeau, G.J.**, Pitts, A.D., Pierantoni, P., Kaufman, A.J., Elrick, M. Uranium isotopes in platform carbonates record a major expansion of global ocean euxinia across Cretaceous OAE 2. Geological Society of America Conference (Portland, Oregon, USA) (poster).
42. 2021, Kaufman, A.J., **Gilleaudeau, G.J.**, Cherry, L.B., Kulenguski, J.T., Elrick, M. Uranium isotope evidence for redox coupling of the carbon cycle. Geological Society of America Conference (Portland, Oregon, USA) (oral presentation).
41. 2021, **Gilleaudeau G.J.**, Algeo, T.J., Song, Y., Lyons, T.W., Bates, S., Anbar, A.D. Lateral watermass gradients recorded in organic-rich facies of the Late Devonian Appalachian and Illinois basins, USA. Geological Society of America Conference (Portland, Oregon, USA) (oral presentation).
40. 2021, Cherry, L.B., **Gilleaudeau, G.J.**, Grazhdankin, D.V., Romaniello, S.J., Kaufman, A.J. A diverse Ediacara assemblage survived under anoxic conditions. Geological Society of America Conference (Portland, Oregon, USA) (oral presentation).
39. 2021, Boyle, A.E., **Gilleaudeau, G.J.**, Cherry, L.B., Evans, M.N., Kaufman, A.J. A new record of the Klonk positive carbon isotope excursion across the Silurian-Devonian boundary, West Virginia, USA. Geological Society of America Conference (Portland, Oregon, USA) (poster).
38. 2021, Sahoo, S.K., **Gilleaudeau, G.J.**, Kaufman, A.J. Eustasy, euxinia, and extinction: Global reorganization across the Devonian-Carboniferous transition. Geological Society of America Conference (Portland, Oregon, USA) (oral presentation).
37. 2021, Kaufman, A.J., Cherry, L.B., **Gilleaudeau, G.J.**, Romaniello, S.J., Grazhdankin, D.V. The redox landscape of Ediacaran and Cambrian evolutionary events in arctic Siberia. 7<sup>th</sup> Russian Conference for Problems in Precambrian Geology (St. Petersburg, Russia) (oral presentation).
36. 2021, Lu, X., **Gilleaudeau, G.J.**, Kendall, B. An episode of progressively oxygenated Katian ocean during the Taconic orogeny: Evidence from uranium isotope compositions of organic-rich sedimentary rocks in southern Ontario, Canada. Geological Association of Canada and Mineralogical Association of Canada Joint Annual Meeting (London, Ontario, Canada) (oral presentation).
35. 2020, **Gilleaudeau, G.J.**, Algeo, T.J., Lyons, T.W., Bates, S., Anbar, A.D. Watermass reconstruction in the Early Mississippian Appalachian Seaway based on redox and salinity proxy variation. Geological Society of America Conference (virtual) (oral presentation).
34. 2020, Algeo, T.J., Wei, W., **Gilleaudeau, G.J.**, Song, Y., Remirez, M. Elemental proxies for salinity analysis of ancient shales and mudstones: Update and case studies. Geological Society of America Conference (virtual) (oral presentation).
33. 2020, Cherry, L.B., **Gilleaudeau, G.J.**, Grazhdankin, D.V., Romaniello, S.J., Kaufman, A.J. Redox landscape of Ediacaran and Cambrian evolutionary events. Geological Society of America Conference (virtual) (oral presentation).

32. 2020, Sahoo, S.K., Kaufman, A.J., **Gilleaudeau, G.J.**, Bowman, A., Hlava, K. Hallem, V., Hart, B. Redox changes across the Hangenberg Event (Devonian-Carboniferous boundary), Bakken Formation, North Dakota, USA. Goldschmidt Conference (virtual meeting due to COVID-19).
31. 2020, Persinger, D., **Gilleaudeau, G.J.**, Thibault, N., Moreau, J., Kaufman, A.J. Stable isotopes record paleoclimatic changes across the latest Maastrichtian Chalk Group, northern Jutland, Denmark. Regional Geological Society of America Conference (Reston, Virginia, USA) (meeting canceled due to COVID-19).
30. 2019, Elrick, M., **Gilleaudeau, G.J.**, Romaniello, S.J., Ostrander, C.M., Algeo, T.J., Morford, J.L. Middle Paleozoic global-ocean redox trends based on carbonate uranium isotopes and their relationship to paleobiologic, carbon-cycle, and climatic changes. American Geophysical Union Conference (San Francisco, California, USA) (poster).
29. 2019, Cui, H., Kaufman, A.J., Xiao, S., Grazhdankin, D.V., Peek, S., Martin, A.J., Bykova, N.V., Rogov, V.I., Liu, X.M., Zhang, F., Romaniello, S.J., Anbar, A.D., Peng, Y., Cai, Y., Schiffbauer, J.D., Meyer, M., **Gilleaudeau, G.J.**, Plummer, R.E., Sievers, N.E., Goderis, S., Claeys, P. Recent advances in understanding the terminal Ediacaran Earth-life system in South China and Arctic Siberia. IMECT Conference (Guadalupe, Spain) (oral presentation).
28. 2019, Severmann, S., Bruggmann, S., Kuzminov, A.M., Slomp, C.P., **Gilleaudeau, G.J.**, Romaniello, S.J., Frei, R., Anbar, A.D., Scholz, F. Controls on sediment U isotope composition under variable depositional conditions. Chemical Oceanography Gordon Research Conference (Holderness, New Hampshire, USA) (poster).
27. 2019, **Gilleaudeau, G.J.**, Sahoo, S.K., Ostrander, C.M., Owens, J.D., Poulton, S.W., Lyons, T.W., Anbar, A.D. Molybdenum isotope and trace metal signals in an iron-rich Mesoproterozoic ocean: a snapshot from the Vindhyan Basin, India. Geological Society of America Conference (Phoenix, Arizona, USA) (poster).
26. 2019, **Gilleaudeau, G.J.**, Algeo, T.J., Lyons, T.W., Bates, S., Anbar, A.D. Redox gradients in the Early Mississippian Appalachian Basin: evidence from iron speciation and trace metal abundances. Goldschmidt Conference (Barcelona, Spain) (oral presentation).
25. 2018, **Gilleaudeau, G.J.**, Elrick, M., Romaniello, S.J., Morford, J., Cheng, K., Algeo, T.J. Onset of major ocean oxygenation during the early Middle Devonian Period recorded by uranium isotopes in marine limestones from the western USA. Geological Society of America Conference (Indianapolis, Indiana, USA) (oral presentation).
24. 2018, Charles, M.P., **Gilleaudeau, G.J.**, Elrick, M. Teaching the NGSS and combining real-world Earth science concepts that can result in a new mindset for the next generation of scientists. Geological Society of America Conference (Indianapolis, Indiana, USA) (poster).
23. 2018, Cheng, K., Elrick, M., Romaniello, S.J., **Gilleaudeau, G.J.**, Jiang, G. Early Mississippian ocean anoxia driving climate cooling and increased glaciation: testing the hypothesis using uranium isotopes in marine carbonates. Geological Society of America Conference (Indianapolis, Indiana, USA) (poster).
22. 2018, Song, Y., **Gilleaudeau, G.J.**, Algeo, T.J., Over, D.J., Anbar, A.D., Xie, S. Biomarker evidence of Late Devonian marine algal-microbial community changes driven by riverine nutrient inputs (Chattanooga Shale, Tennessee, USA). Geological Society of America Conference (Indianapolis, Indiana, USA) (poster).
21. 2017, **Gilleaudeau, G.J.**, Kaufman, A.J., Luo, G., Romaniello, S.J., Zhang, F., Kah, L.C., Azmy, K., Bartley, J.K., Sahoo, S.K., Knoll, A.H., Anbar, A.D. Constraining the redox landscape of the mid-Proterozoic oceans: new insights from the carbonate uranium isotope record. American Geophysical Union Conference (New Orleans, Louisiana, USA).



20. 2017, Zheng, W., **Gilleaudeau, G.J.**, Kah, L.C., Anbar, A.D. Mercury stable isotopes as a novel proxy for photic zone euxinia. Geological Society of America Conference (Seattle, Washington, USA) (oral presentation).
19. 2017, **Gilleaudeau, G.J.**, Junium, C.K., Kah, L.C., Zolotova, N., Anbar, A.D. No evidence for alternative nitrogenase expression in a Mesoproterozoic molybdenum-limited environment: constraints from nitrogen isotopes at 1.1 Ga. Geological Society of America Conference (Seattle, Washington, USA) (oral presentation).
18. 2017, **Gilleaudeau, G.J.**, Frei, R., Kaufman, A.J., Luo, G., Romaniello, S.J., Zhang, F., Klæbe, R.M., Sahoo, S.K., Kah, L.C., Azmy, K., Bartley, J.K., Chernyavskiy, P., Knoll, A.H., Anbar, A.D. Deciphering the carbonate record of Mesoproterozoic biospheric oxygenation: insights from chromium and uranium isotopes. Goldschmidt Conference (Paris, France) (oral presentation).
17. 2017, Sahoo, S.K., **Gilleaudeau, G.J.**, Owens, J.D., Poulton, S.W., Lyons, T.W. Iron-rich conditions and molybdenum enrichment in a Mesoproterozoic shelf setting: a snapshot from the Vindhyan Basin, India. Goldschmidt Conference (Paris, France) (poster).
16. 2017, Yingst, R.A., Bartley, J., Chidsey, T., Cohen, B.A., **Gilleaudeau, G.J.**, Hynek, B.M., Kah, L.C., Minniti, M.E., Williams, R.M.E., Black, S., Gemperline, J., Schaufler, R., Thomas, R.J. Determining efficient rover science protocols for robotic sample selection: a geoheuristic operational strategies test in greater Canyonlands, Utah, US. Geological Society of America Conference (Honolulu, Hawaii, USA) (oral presentation).
15. 2017, **Gilleaudeau, G.J.**, Kah, L.C., Anbar, A.D. Constraints on the Mesoproterozoic nitrogen cycle from nitrogen isotopes in 1.1 billion-year-old black shale. Southern California Geobiology Symposium (Los Angeles, California, USA) (poster).
14. 2017, Yingst, R.A., Bartley, J., Chidsey, T., Cohen, B.A., **Gilleaudeau, G.J.**, Hynek, B.M., Kah, L.C., Minniti, M.E., Williams, R.M.E., Black, S., Gemperline, J., Helsius, R., Schaufler, R. Determining efficient rover science protocols for robotic sample selection. Lunar and Planetary Science Conference (Houston, Texas, USA) (oral presentation).
13. 2016, **Gilleaudeau, G.J.**, Voegelin, A.R., Thibault, B., Moreau, J., Ullmann, C.V., Korte, C., Frei, R. Oceanographic change in the late Cretaceous Chalk Sea (Denmark): clues from chromium isotopes. Goldschmidt Conference (Yokohama, Japan) (oral presentation).
12. 2015, **Gilleaudeau, G.J.**, Frei, R., Kaufman, A.J., Kah, L.C., Azmy, K., Bartley, J.K., Chernyavskiy, P., Knoll, A.H. Chromium isotopes in carbonate rocks: new insights into Proterozoic atmospheric oxygenation. American Geophysical Union Conference (San Francisco, California, USA) (poster).
11. 2015, **Gilleaudeau, G.J.**, Frei, R., Kaufman, A.J., Kah, L.C., Azmy, K., Bartley, J.K., Knoll, A.H. Chromium isotopes in carbonates constrain Mesoproterozoic atmospheric  $pO_2$  levels. Goldschmidt Conference (Prague, Czech Republic) (oral presentation).
10. 2015, D'Arcy, J.M., Frei, R., **Gilleaudeau, G.J.**, Peralta, S., Kah, L.C., Gaucher, C. The chromium isotopic composition of an Early to Middle Ordovician marine carbonate platform, eastern Precordillera, San Juan, Argentina. Goldschmidt Conference (Prague, Czech Republic) (poster).
9. 2014, **Gilleaudeau, G.J.**, Sahoo, S.K., Kah, L.C., Henderson, M.A., Frei, R., Kaufman, A.J. Integrated chemostratigraphy of Upper Vindhyan Sequence carbonates, central India: implications for depositional age and global correlations. Geological Society of America Conference (Vancouver, Canada) (oral presentation).
8. 2013, **Gilleaudeau, G.J.**, Kah, L.C. Tracking the chemocline in ancient oceans: an example from the Mesoproterozoic of Mauritania. Geological Society of America Conference (Denver, Colorado, USA) (oral presentation).

7. 2013, Pewitt, M.L., Kah, L.C., **Gilleaudeau, G.J.** Redox structure of Mesoproterozoic shale derived from sulfide minerals and mineral texture. Geological Society of America Conference (Denver, Colorado, USA) (poster).
6. 2012, **Gilleaudeau, G.J.**, Kah, L.C. Influence of global sea level on the Proterozoic oceanic molybdenum inventory. Geological Society of America Conference (Charlotte, North Carolina, USA) (oral presentation).
5. 2011, **Gilleaudeau, G.J.**, Kah, L.C. Considerations on the use of iron, carbon, and sulfur paleoredox proxies in low sulfate Proterozoic oceans: an example from the Mesoproterozoic Tourist Formation, Mauritania. Geological Society of America Conference (Minneapolis, Minnesota, USA) (oral presentation).
4. 2010, **Gilleaudeau, G.J.**, Kah, L.C. Molar-tooth crack formation and the Proterozoic marine substrate: insights from the Belt Supergroup, Montana and the Atar Group, Mauritania. Geological Society of America Conference (Denver, Colorado, USA) (oral presentation).
3. 2010, Aden, D.J., Milam, K.A., Kah, L.C., **Gilleaudeau, G.J.** Determining a formational mechanism for a Mauritanian Mesoproterozoic (1.1 Ga) breccia. Geological Society of America Conference (Branson, Missouri, USA) (oral presentation).
2. 2009, Aden, D.J., Milam, K.A., Kah, L.C., **Gilleaudeau, G.J.** An anomalous breccia in the Mesoproterozoic (~1.1 Ga) Atar Group, Mauritania: potential evidence for an impact-generated tsunami. Lunar and Planetary Science Conference (Houston, Texas, USA) (poster).
1. 2008, **Gilleaudeau, G.J.**, Demicco, R.V., Chernyavskiy, P. Carbonate shrubs in travertines of Tivoli, Italy: can morphology be used to distinguish between biotic and abiotic precipitates? Geological Society of America Sectional Meeting (Charlotte, North Carolina, USA) (poster).

## STUDENTS ADVISED

**Mariano Remírez** (primary postdoctoral advisor, Summer 2021-present)

RESEARCH FOCUS: Paleoredox and paleosalinity analysis across Earth history

**Ana Shirley** (primary advisor for Earth Systems Science MS degree, Fall 2021-present)

RESEARCH FOCUS: Ocean redox change across the Mesoproterozoic-Neoproterozoic transition in arctic Siberia

**Randolph Rutledge** (primary advisor for Earth Systems Science MS degree, Fall 2020-present)

RESEARCH FOCUS: Uranium isotope geochemistry of Early Mississippian black shales of North America

**Natasha Tagle** (primary advisor for OSCAR undergraduate research fellowship, Fall 2021-present)

RESEARCH FOCUS: Nitrogen isotopes as a tracer of Pliocene Pacific Ocean ventilation

**Catherine Lau** (primary advisor for OSCAR undergraduate research fellowship, Fall 2021-present)

RESEARCH FOCUS: Organic carbon isotope records across the Frasnian-Famennian boundary in the Illinois Basin, USA

**Rocio Caballero-Gill** (primary advisor for GMU College of Science postdoctoral fellowship, Spring 2020-Fall 2020)

RESEARCH FOCUS: Reconstructing deep ocean circulation during the warmer Pliocene Epoch

**Alexandra Boyle** (primary advisor for OSCAR undergraduate research fellowship, Spring 2020-Summer 2021)

RESEARCH FOCUS: Carbon isotope stratigraphy of the Silurian-Devonian boundary in the Helderberg Group, central Appalachian Basin, USA

**Lucas Cherry** (primary advisor for Earth Systems Science MS degree, Fall 2019-Spring 2021)

COMPLETED THESIS TITLE: Redox landscape of Ediacaran and Cambrian evolutionary events

**Joseph Kulenguski** (primary advisor for Earth Systems Science MS degree, Fall 2019-Summer 2021)

COMPLETED THESIS TITLE: Uranium isotopes and ocean anoxia during Cretaceous Ocean Anoxic Event 2

**Dylan Persinger** (primary advisor for undergraduate research project, Fall 2018-Spring 2020)

RESEARCH FOCUS: End-Maastrichtian climate variability recorded in the Chalk Group, northern Jutland, Denmark

**Margot Nelson** (committee member for Earth Systems Science MS degree, completed Spring 2019; committee member for Environmental Science and Policy PhD degree, Fall 2019-present; primary advisor: Mark Uhen)

RESEARCH FOCUS: Revision of the Squalodontidae into a taxonomically and phylogenetically meaningful clade

**Austin Matthews** (committee member for Earth Systems Science MS degree, Spring 2021-present; primary advisor: Paul Betka)

RESEARCH FOCUS: Forearc deformation within the Indo-Burman fold-thrust belt: Constraining the transition from EW shortening to dextral shear near the Churachandpur-Mao fault

**Andrew Levy** (committee member for Earth Systems Science MS degree, Fall 2021-present; primary advisor: Mark Uhen)

RESEARCH FOCUS: Cenozoic evolution of marine mammals

**Joao Silveira-Meyers** (committee member for Earth Systems Science MS degree, Spring 2021-present; primary advisor: Linda Hinnov)

RESEARCH FOCUS: Assessment of underground hydrogen storage in siliciclastic formations in the Illinois Basin

## FIELD WORK AND SAMPLE COLLECTION

- Woodford Shale (Late Devonian-Early Mississippian): University of Texas, Permian Basin and Fasken Oil and Ranch, Ltd., **Odessa, Texas, USA** (December 2021)
- New Albany Shale (Late Devonian-Early Mississippian): geological surveys of **Illinois and Indiana, USA** (August 2021)
- Riddlesburg Shale Member (Early Mississippian): **Sideling Hill, Maryland** and the **Pennsylvania Geological Survey, USA** (September-November 2020)
- Tonoloway Limestone and Helderberg Group limestone (Silurian-Devonian boundary): **Corridor H, West Virginia, USA** (February 2020)
- Bakken Shale (Late Devonian-Early Mississippian): Equinor ASA core facility, **Houston, Texas, USA** (March 2019)
- Devonian limestone of the Great Basin: **Antelope Range, Nevada, USA** (June 2018)
- Canyon Lake (modern ferruginous lake): **Upper Peninsula, Michigan, USA** (May 2018)
- Joana Limestone and Limestone X (Early Mississippian): **south-central Nevada, USA** (March 2018)
- Bylot Supergroup (late Mesoproterozoic): **Baffin Island, arctic Canada** (July 2017)
- Jixian Group (early Mesoproterozoic): **north China** (July 2016)
- Cleveland, Sunbury, and Chattanooga shales (Late Devonian-Early Mississippian): geological surveys of **Ohio, Kentucky, and Tennessee, USA** (May 2016)
- NASA GHOST terrestrial analogue research team: **Canyonlands, Utah, USA** (April 2016)

- Paleoproterozoic and Mesoproterozoic carbonate rocks: Botanical Museum collections, **Harvard University** (January 2014, March 2016)
- Chalk Group (Cretaceous-Paleogene): **Stevns Klint, Denmark** (March 2015) and Hunstrup, **northern Jutland, Denmark** (October 2015)
- Vindhyan Supergroup (Mesoproterozoic): **north-central India** (January 2012)
- Holston Limestone (Ordovician): **east Tennessee, USA** (October 2010)
- Atar Group, Mauritania (late Mesoproterozoic): Repsol S.A. core facility, **Daganzo de Arriba, Spain** (May 2010)
- El Mreiti Group, Mauritania (late Mesoproterozoic): Wintershall Holding GmbH core facility, **Barnstorf, Germany** (January 2010)
- Alamo impact breccia (Late Devonian): **south-central Nevada, USA** (March 2009)
- Indiana University field mapping course (IUGFS): **western Montana, USA** (July-August 2008)
- La Silla and San Juan formations (Ordovician) and Laguna Negra (high-altitude hypersaline lake): **high Andes, Argentina** (May 2008)

## LABORATORY AND ANALYTICAL EXPERIENCE

- X-ray diffraction and electron microprobe
- High temperature-pressure gas and cold seal vessels
- Sedimentary petrography (plane light, cross-polarized light, and cathodoluminescence)
- Trace metal clean laboratory protocols
- Chemical separation techniques for: **carbon, oxygen, and nitrogen isotopes; iron speciation** (sequential extraction); **pyrite sulfur isotopes** (chromium reduction); **major, trace, and rare-earth element concentrations** (leaching or total acid digestion); **chromium and uranium isotopes** (ion exchange chromatography)
- Inductively coupled plasma optical emission and mass spectrometry (ICP-OES and ICP-MS)
- Thermal ionization mass spectrometry (TIMS)
- Neptune Plus multi-collector ICP-MS

## SERVICE

2021-present: **External committee member**, Ph.D. dissertation of Alex Kunert (advisor: Brian Kendall), University of Waterloo. Title: Determining early animal life's relationship with Earth's oxygenation history using redox-sensitive metal isotopes in Proterozoic black shale deposits of Canada and Australia.

Fall 2021-Spring 2022: **Search Committee Chair**, Low-Temperature Geochemistry Position, George Mason University

2021-present: **Curriculum Committee Member**, College of Science, George Mason University

December 2020: **Invited reviewer**, National Science Foundation, Geobiology and Low-Temperature Geochemistry grant

Fall 2020: **Search Committee Member**, Academic Administrative Specialist, George Mason University

September 2019: **Session Chair**, GSA Annual Meeting: Iron formations, ferruginous sediments, and redox through time and space

June 2019: Completed **Annual Academic Assessments** for writing-intensive GEOL 317

2018-present: **Curriculum Committee Member**, Department of Atmospheric, Oceanic, and Earth Sciences, George Mason University

2018-present: **Geology Graduate Coordinator**, Department of Atmospheric, Oceanic, and Earth Sciences, George Mason University

2018-present: **Faculty Advisor for the George Mason University Sigma Gamma Epsilon Chapter**, The National Honor Society for the Earth Sciences

2018-present: **Faculty Advisor for the George Mason University Geology Club**

Fall 2018: **Search Committee Member**, Structural Geology Position, George Mason University

November 2018: **Session Chair**, GSA Annual Meeting: Evolving perspectives of the Precambrian world: using combined theoretical and applied approaches to tackle problems at the intersection of geology, geobiology, and geochemistry

2013-present: **Frequent journal referee**: Geology; Nature Scientific Reports; Proceedings of the National Academy of Sciences, USA; Geochimica et Cosmochimica Acta; Precambrian Research; Paleogeography, Paleoclimatology, Paleoecology; Science Advances; Nature Geoscience; Chemical Geology; American Journal of Science; Geochemical Perspectives Letters; GSA Bulletin; Geoscience Frontiers; Earth and Planetary Science Letters; Nature Communications; Global and Planetary Change; Geobiology

May 2018: **External examiner**, Ph.D. dissertation of Timothy M. Gibson (advisor: Galen P. Halverson), McGill University. Title: Characterizing eukaryotic evolutionary environments across the Mesoproterozoic-Neoproterozoic boundary.

May 2018: **Invited reviewer**, Lewis and Clark Fund in Astrobiology program

September 2017: **External examiner**, MSc thesis of Alexander Charest Bisnaire (advisor: Karem Azmy), Memorial University of Newfoundland. Title: Oceanic redox conditions across the Cambrian-Ordovician boundary.

August 2017: **Session Chair**, Goldschmidt Conference: The not so boring billion—emerging insights into life and the Earth system in the Mesoproterozoic

March 2016: **Invited judge**, NASA Astrobiology Speech Competition

February 2016: **Executive Secretary**, NASA PSTAR proposal panel review (Glendale, Arizona, USA)

October 2013: **Invited Session Chair**, GSA Annual Meeting: Precambrian geology

October 2010: **Invited Session Chair**, GSA Annual Meeting: Carbonate sediments—from microbes to sequences, insights into processes governing carbonate deposition

## **OUTREACH**

January 2021: Presentation to two high school honors Geosystems classes, McLean High School, McLean, Virginia, USA (virtual)

May 2019: Appeared in **PBS Catalyst** series video on Earth's Oxidation Event

April 2019: High school STEM event volunteer, George Mason University

April 2019: Siblings and Kids Weekend volunteer, George Mason University

March 2019: Wakefield Forest Elementary School STEM Fair volunteer, Fairfax, Virginia, USA

November 2018/2019 and April 2019: Middle school scouting event instructor, George Mason University

November 2018/2019: Gem, Mineral, and Fossil Show volunteer, George Mason University

September 2018: DC Rocks Program volunteer, Washington D.C., USA

February 2011: Science outreach volunteer, Walland Elementary School, east Tennessee, USA

2008-2009: Teaching volunteer, McClung Museum, University of Tennessee at Knoxville

October 2008: Invited research outreach presentation, O'Conner Senior Center, Knoxville, Tennessee, USA

August 2007-May 2008: 15 hours/week hands-on science activities with seventh grade students, Heritage Middle School, east Tennessee, USA (**NSF GK-12 Program**)

## **PROFESSIONAL AFFILIATIONS**

- Geological Society of America
- European Association of Geochemistry
- American Geophysical Union