Michael A. Kipp

Division of Earth and Climate Sciences, Nicholas School of the Environment, Duke University
308 Research Drive, LSRC Room A319, Durham, NC, USA 27708
michael.kipp@duke.edu | www.gaialab.earth | Google Scholar | @kippmichael

POSITIONS

Assistant Professor, Division of Earth and Climate Sciences, Duke University	2024–
Postdoctoral Scholar, Division of Geological and Planetary Sciences, Caltech	2019–2023
Visiting Researcher, Research School of Earth Sciences, Australian National University	2018

EDUCATION

Ph.D., Earth & Space Sciences and Astrobiology, University of Washington	2019
B.S., Biological Sciences, University of Notre Dame	2014
B.A., Classics (Latin concentration), University of Notre Dame	2014

AWARDS

Johnston Award (highest research honor in Earth & Space Sciences), University of Washington	2019
Astrobiology Fellowship, University of Washington	2014

FUNDING

Major external funding (*$1,657,633 total to-date; $1,174,883 external awards to Duke*)

Exobiology, NASA (Co-I; $725,955 total; $149,430 to Duke)	2026–2028
CAREER Award, National Science Foundation (PI; $915,453)	2025–2030
Doctoral New Investigator Award, American Chemical Society (PI; $110,000)	2024–2026
Postdoctoral Fellowship in Geobiology, Agouron Institute (PI; $152,000)	2019–2021
Graduate Research Fellowship, National Science Foundation (PI; $138,000)	2015–2019

Minor funding & internal grants

Dean's Venture Award, Nicholas School of the Environment, Duke University ($140,000)	2024–2025
Early Career Collaboration Award, NASA Astrobiology Institute ($5,000)	2023
Seed Grant, Center for Evolutionary Science, California Institute of Technology ($20,000)	2021
Lewis & Clark Fund for Exploration in Astrobiology, American Philosophical Society ($4,600)	2019
Student Research Grant, Geological Society of America ($1,800)	2019
Harrison Scholarship, Tobacco Root Geological Society ($500)	2019
Ellis L. Yochelson Award, Paleontological Society Student Research Grant ($1,200)	2018
NSF Graduate Research Opportunities Worldwide Award ($5,000)	2017
"Inquisitive Graduate Student" Award, UW Earth & Space Sciences ($2,000)	2016
George E. Goodspeed Geology Scholarship, University of Washington ($1,500)	2015
Summer Environmental Research Fellowship, University of Notre Dame ($8,500)	2013
Undergraduate Research Comprehensive Summer Grant, University of Notre Dame ($2,000)	2013

TEACHING

University of Washington

ESS 213, Evolution of the Earth	2017
ESS 101, Introduction to Geology	2015

Duke

ECS 509, Paleoclimate	2024–
ECS 508, Isotope Geochemistry	2025–

MENTORING

PhD Advisor

Laura Piccirillo (2024–) | Grace Hall (2025–)

Postdoc Advisor

Chenyi Tu (2025–)

Senior Thesis Advisor

Maya Khodabakchian (2025)

PhD Committee

Robert Hill (expected graduation 2026)
Tian Xu (expected graduation 2027)
Louis Lu (expected graduation 2028)
Yanan Cheng, UNC (expected graduation 2029)

PUBLICATIONS (GAIA Lab members: *PhD student, **undergraduate, †postdoc, ‡researcher)

Submitted

*. Farrell UC, (99 authors including **Kipp MA**), Planavsky NJ, Lau KV, Johnston DT, Sperling EA. The Sedimentary Geochemistry and Paleoenvironments Project Phase 2 Data Release: An open data resource for the study of Earth's environmental history. Submitted to *Chemical Geology*.

*. Becker-Kerber B, Brocks JJ , Archilha N, Rodella C, Petkov V, Azevêdo E, Pimentel T, Garcia R, Petts D, Czas J, Ardakani O, Chappaz A, Albuquerque A, Ortega-Hernández J, Lerosey-Aubril R, **Kipp MA**, Johnson BW, Thoury M, Oliveira C, Pimentel H, Freitas R, Vicentim F, Borges L, Almer J, Park JS, Polo C, Kerber G, Mouro L, Figueiredo M, Prado G, Ahmed S, Basei M. The rise of lichens during the colonization of terrestrial environments. In revision at *Science Advances*.

Published

36. **Kipp MA** and Alcott LJ. "The Archean phosphorus cycle." In: *The Archean Earth*. In press.

35. Bubphamanee K, **Kipp MA**, Meixnerova J, Stüeken EE, Ivany LC, Bartholomew A, Algeo TJ, Brocks JJ, Dahl TW, Kinsley J, Tissot FLH, Buick R. (2025). Mid-Devonian ocean oxygenation enabled the expansion of animals into deeper-water habitats. *Proceedings of the National Academy of Sciences*. 122, e2501342122. doi:10.1073/pnas.2501342122

34. **Kipp MA**, *Piccirillo L, Peters D. (2025). High precision selenium isotope analysis using a Nu Sapphire collision-reaction cell MC-ICP-MS. *Journal of Analytical Atomic Spectrometry*. In press. doi:10.1039/D5JA00247H

33. Saper L, Liu Y, **Kipp MA**, Burney D, Ma C, Tissot FLH, Young E, Farley KA, Eiler JM. (2025). Chemical, isotopic (O, He, U), and petrological characteristics of a slowly cooled enriched gabbroic shergottite, Northwest Africa 13134. *Meteoritics and Planetary Science*. 60, 1119-1150. doi:10.1111/maps.14345

32. **Kipp MA**, Gao A, Adkins JF, Tissot FLH. (2024). $^{238}U/^{235}U$ in deep-sea corals reflects limited expansion of seafloor anoxia in last ice age. *Geochemical Perspectives Letters*. 33, 32-37. doi:10.7185/geochemlet.2449

31. Tissot FLH, Cleveland D, Grigoryan R, **Kipp MA**, Shafiee RT, Miaou E, Chunduri R, Melton H, Tacail T, Razionale D. (2024). Magnitude and timescales of Ca isotope variability in human urine: Implications for bone mass balance monitoring. *Metallomics*. doi:10.1093/mtomcs/mfae050

30. Sosa ES, Bucholz CE, Hernandez-Montenegro JD, Rodriguez-Vargas A, **Kipp MA**, Tissot FLH. (2024). Garnet clinopyroxenite formation via amphibole-dehydration in continental arcs: Evidence from Fe isotopes. *Earth and Planetary Science Letters*. 648, 119050. doi:10.1016/j.epsl.2024.119050

29. Hernandez-Montenegro JD, Bucholz CE, Sosa ES, **Kipp MA**, Tissot FLH. (2024). Iron isotope geochemistry during partial melting of metapelites and the generation of strongly peraluminous granites: A case study of the Neoarchean Ghost Lake batholith. *Geochimica et Cosmochimica Acta*. 380, 112-130. doi:10.1016/j.gca.2024.07.016

28. Remirez MN, Gilleaudeau GJ, Gan T, **Kipp MA**, Tissot FLH, Kaufman AJ, Parente M. (2024). Carbonate uranium isotopes record global expansion of marine anoxia during the Toarcian Ocean Anoxic Event. *Proceedings of the National Academy of Sciences*. 121, e2406032121. doi:10.1073/pnas.2406032121

27. Hill RC, Wang Z, Williams GDZ, Polyak V, **Kipp MA**, Asmerom Y, Vengosh A. (2024). Reconstructing the depositional environment and diagenetic modification of global phosphate deposits through integration of uranium and strontium isotopes. *Chemical Geology*. 662, 122214. doi:10.1016/j.chemgeo.2024.122214

26. Sosa ES, Bucholz CE, Hernandez-Montenegro JD, **Kipp MA**, Tissot FLH, Jackson JM, Ratschbacher BC, Mahlburg Kay S, Kay RW. (2024). Lower crustal control in the iron isotope systematics of plutonic xenoliths from Adak Island, Central Aleutians, with implications for arc magma geochemistry. *Geochimica et Cosmochimica Acta*. 377, 1-18. doi:10.1016/j.gca.2024.05.026

25. Li H, **Kipp MA**, Kim SL, Kast ER, Eberle JJ, Tissot FLH. (2024). Exploring uranium isotopes in shark teeth as a paleo-redox proxy. *Geochimica et Cosmochimica Acta*. 365, 158-173. doi:10.1016/j.gca.2023.11.034

24. **Kipp MA**, Stüeken EE, Strömberg CAE, Brightly WH, Arbour VM, Erdei B, Hill RS, Johnson K, Kvaček J, McElwain JC, Miller IM, Slodownik M, Vajda V, Buick R. (2024). Nitrogen isotopes reveal independent origins of N_2-fixing symbiosis in extant cycad lineages. *Nature Ecology & Evolution*. 8, 57-69. doi:10.1038/s41559-023-02251-1

23. **Kipp MA**. (2023). Carbon cycling: How much life has ever existed on Earth? *Current Biology*. 33, R1153-R1155. doi:10.1016/j.cub.2023.09.041

22. Bowyer FT, Krause AJ, Song Y, Huang KJ, Fu Y, Shen B, Zhu XK, **Kipp MA**, van Maldegem LM, Brocks JJ, Shields GA, Mills BJW, Poulton SW. (2023). Biological diversification linked to environmental stabilization following the Sturtian Snowball glaciation. *Science Advances*. 9, eadf9999. doi:10.1126/sciadv.adf9999

21. Kulenguski JT, Gilleaudeau GJ, Kaufman AJ, Goepfert TJ, **Kipp MA**, Tissot FLH, Pitts AD, Pierantoni P, Evans MN, Elrick M. (2023). Carbonate uranium isotopes across Cretaceous OAE 2 in southern Mexico: New constraints on the global spread of marine anoxia and organic carbon burial. *Palaeogeography, Palaeoclimatology, Palaeoecology*. 111756. doi:10.1016/j.palaeo.2023.111756

20. **Kipp MA**. (2022). A double-edged sword: The role of sulfate in anoxic marine phosphorus cycling through Earth history. *Geophysical Research Letters*. 49, e2022GL099817. doi:10.1029/2022GL099817

19. **Kipp MA**, Li H, Ellwood M, John S, Middag R, Adkins J, Tissot FLH. (2022). ^{238}U, ^{235}U and ^{234}U in seawater and deep-sea corals: A high-precision reappraisal. *Geochimica et Cosmochimica Acta*. 336, 231-248. doi:10.1016/j.gca.2022.09.018

18. Baziotis I, Ma C, Guan Y, Ferriere L, Xydous S, Hu J, **Kipp MA**, Tissot FLH, Asimow P. (2022). Shock history and unique evidence of aqueous alteration in the Kakowa (L6) ordinary chondrite. *Scientific Reports*. 12, 5520. doi:10.1038/s41598-022-09465-6

17. **Kipp MA** and Tissot FLH. (2022). Inverse methods for consistent quantification of seafloor anoxia using uranium isotope data from marine sediments. *Earth and Planetary Science Letters*. 577, 117240. doi:10.1016/j.epsl.2021.117240 | code: github.com/m-kipp/d238U-inverse-model

16. Meixnerova J, Blum JD, Johnson MW, Stüeken EE, **Kipp MA**, Anbar AD, Buick R. (2021). Mercury abundance and isotopic composition indicate subaerial volcanism prior to the end-Archean "whiff" of oxygen. *Proceedings of the National Academy of Sciences*. 118, e2107511118. doi:10.1073/pnas.2107511118

15. Farrell UC, (99 authors including **Kipp MA**), Planavsky NJ, Lau KV, Johnston DT, Sperling EA. (2021). The Sedimentary Geochemistry and Paleoenvironments Project. *Geobiology*. 19, 545–556. doi:10.1111/gbi.12462

14. Aubineau J, El Albani A, Chi Fru E, **Kipp MA**, Ikouanga JN, Bekker A. (2021). Benthic redox conditions and nutrient dynamics in the 2.1 Ga Franceville Sub-basin. *Precambrian Research*. 360, 106234. doi:10.1016/j.precamres.2021.106234

13. Krissansen-Totton J, **Kipp MA**, Catling DC. (2021). Carbon cycle inverse modeling suggests large changes in fractional organic burial are consistent with the carbon isotope record and may have contributed to the rise of oxygen. *Geobiology*. 19, 342–363. doi:10.1111/gbi.12440

12. **Kipp MA**, Krissansen-Totton J, Catling DC. (2021). High organic burial efficiency is required to explain mass balance in Earth's early carbon cycle. *Global Biogeochemical Cycles*. 35, e2020GB006707. doi:10.1029/2020GB006707

11. Stüeken EE and **Kipp MA**. (2020). *Selenium Isotope Paleobiogeochemistry* (Elements in Geochemical Tracers in Earth System Science). Cambridge University Press. doi:10.1017/9781108782203.

10. **Kipp MA**, Lepland A, Buick R. (2020). Redox fluctuations, trace metal enrichment and phosphogenesis in the ~2.0 Ga Zaonega Formation. *Precambrian Research*. 343, 105716. doi:10.1016/j.precamres.2020.105716

9. **Kipp MA**, Algeo TJ, Stüeken EE, Buick R. (2020). Basinal hydrographic and redox controls on selenium enrichment and isotopic fractionation in Paleozoic black shales. *Geochimica et Cosmochimica Acta*. 287, 229–250. doi:10.1016/j.gca.2019.12.016

8. **Kipp MA**, Stüeken EE, Gehringer MM, Sterelny K, Scott JK, Forster PI, Strömberg CAE, Buick R. (2020). Exploring cycad foliage as an archive of the isotopic composition of atmospheric nitrogen. *Geobiology*. 18, 152–166. doi:10.1111/gbi.12374

7. **Kipp MA**, Stüeken EE, Yun M, Bekker A, Buick R. (2018). Pervasive aerobic nitrogen cycling in the surface ocean across the Paleoproterozoic Era. *Earth and Planetary Science Letters*. 500, 117–126. doi:10.1016/j.epsl.2018.08.007

6. Koehler MC, Buick R, **Kipp MA**, Stüeken EE, Zaloumis J. (2018). Transient surface ocean oxygenation recorded in the ~2.66-Ga Jeerinah Formation, Australia. *Proceedings of the National Academy of Sciences*. 115, 7711–7716. doi:10.1073/pnas.1720820115

5. **Kipp MA** and Stüeken EE. (2017). Biomass recycling and Earth's early phosphorus cycle. *Science Advances*. 3, eaao4795. doi:10.1126/sciadv.aao4795

4. Koehler MC, Stüeken EE, **Kipp MA**, Buick R, Knoll AH. (2017). Spatial and temporal trends in Precambrian nitrogen cycling: A Mesoproterozoic offshore nitrate minimum. *Geochimica et Cosmochimica Acta*. 198, 315–337. doi:10.1016/j.gca.2016.10.050

3. **Kipp MA**, Stüeken EE, Bekker A, Buick R. (2017). Selenium isotopes record extensive marine suboxia during the Great Oxidation Event. *Proceedings of the National Academy of Sciences*. 114, 875–880. doi:10.1073/pnas.1615867114

2. Stüeken EE, **Kipp MA**, Koehler MC, Schwieterman E., Johnson B., Buick R. (2016). Modeling pN_2 through geologic time: Implications for planetary climates and atmospheric biosignatures. *Astrobiology*. 16, 949–963. doi:10.1089/ast.2016.1537

1. Stüeken EE, **Kipp MA**, Koehler MC, Buick R. (2016). The evolution of Earth's biogeochemical nitrogen cycle. *Earth Science Reviews*. 160, 220–239. doi:10.1016/j.earscirev.2016.07.007

FIRST-AUTHOR CONFERENCE ABSTRACTS

22. **Kipp MA**, Hall G, Khodabakchian M, Carvalho M, Grajales A, Johnson BW, Purcell A, Purdue C. (2025). Isotopic Insights into the Evolution of Plant-Microbial Nitrogen-Fixing Symbioses. GSA Connects. *Invited Talk*.

21. **Kipp MA**, Piccirillo L, Peters D. (2025). Selenium isotope analysis using a Nu Sapphire collision cell MC-ICP-MS. Goldschmidt. *Poster*.

20. **Kipp MA**. (2024). A double-edged sword: The role of sulfate in anoxic marine phosphorus cycling through Earth history. Goldschmidt. *Invited Talk*.

19. **Kipp MA**, Stüeken EE, Strömberg CAE, Brightly WH, Arbour VM, Erdei B, Hill RS, Johnson K, Kvaček J, McElwain JC, Miller IM, Slodownik M, Vajda V, Buick R. (2024). Nitrogen isotopes in fossil organic matter as a proxy for symbiotic nitrogen fixation. International Organization of Palaeobotany Congress. *Talk*.

18. **Kipp MA**, Stüeken EE, Strömberg CAE, Buick R. (2022). Nitrogen isotopes in fossilized foliage: A new tool in terrestrial paleoecology. Gordon Research Conference – Geobiology. *Invited Poster*.

17. **Kipp MA**, Stüeken EE, Algeo TJ, Brocks J, Dahl TW, Kinsley J, Tissot FLH, Buick R. (2022). A shale-hosted selenium isotope record of Paleozoic ocean oxygenation. Goldschmidt. *Talk*.

16. **Kipp MA** and Tissot FLH. (2021). Robustly quantifying marine anoxia using uranium isotope data from ancient marine sediments. Goldschmidt (Virtual). *Talk*.

15. **Kipp MA**, Krissansen-Totton J, Catling DC. (2020). The early Earth productivity paradox. AGU Fall Meeting (Virtual). *Talk*.

14. **Kipp MA**, Lepland A, Buick R. (2020). Phosphorites as fingerprints of Earth system oxygenation: A Paleoproterozoic case study. Goldschmidt (Virtual). *Invited Talk*.

13. **Kipp MA**, Buick R, Lepland A. (2020). A multi-proxy perspective on Earth's early phosphorus cycle. International Geological Congress. *Talk*. [Conference cancelled]

12. **Kipp MA**, Algeo TJ, Buick R. (2019). Patterns of selenium isotope variability within and among Phanerozoic black shales. Goldschmidt. *Poster*.

11. **Kipp MA**. (2019). Electron acceptors, nutrient recycling and biological productivity prior to the Great Oxidation Event. Astrobiology Science Conference. *Poster*.
10. **Kipp MA**. (2019). Causes and consequences of high burial efficiency in the Archean ocean. Geobiology Conference. *Poster*.
9. **Kipp MA**, Koehler MC, Buick R. (2018). Deciphering controls on C/N ratios in ancient marine sedimentary rocks. AGU Fall Meeting. *Poster*.
8. **Kipp MA** and Stüeken EE. (2018). The role of remineralization in Archean phosphorus limitation. Goldschmidt. *Talk*.
7. **Kipp MA**, Buick R, Lepland A. (2017). Marine redox structure at the culmination of the Great Oxidation Event: Insights from the Zaonega Formation, Russia. AGU Fall Meeting. *Poster*.
6. **Kipp MA**, Stüeken EE, Buick R, Bekker A. (2017). Redox landscape of the Paleoproterozoic oceans: Implications for early eukaryotic evolution. GSA Annual Meeting. *Talk*.
5. **Kipp MA**, Stüeken EE, Buick R, Bekker A. (2017). A quantitative framework for the interpretation of nitrogen isotope data in ancient marine sedimentary rocks. Astrobiology Science Conference. *Talk*.
4. **Kipp MA**, Stüeken EE, Buick R, Strömberg CAE, Sterelny K. (2016). Nitrogen isotopes in modern and fossilized cycad leaves: Evolutionary & geological implications. GSA Annual Meeting. *Poster*.
3. **Kipp MA**, Stüeken EE, Bekker A, Buick R. (2016). Selenium isotopes as a proxy for deep-ocean redox state during the Paleoproterozoic Lomagundi Event. Goldschmidt. *Talk*.
2. **Kipp MA**, Stüeken EE, Koehler MC, Buick R. (2015). Evolution of the nitrogen biogeochemical cycle on Earth: Implications for other planets. Astrobiology Science Conference. *Poster*.
1. **Kipp MA**, West WE, Jones SE. (2013). Positive feedbacks in global biogeochemistry: Methane emissions from freshwater lakes. GSA Annual Meeting. *Talk*.

INVITED SEMINARS

PAGES Past Ocean Oxygen Workshop	2025
NASA LIFE Seminar Series	2025
University of Maryland, Department of Geology	2025
University of North Carolina, Department of Earth, Marine and Environmental Sciences	2025
Elemental Scientific Inc., Goldschmidt Conference Workshop	2025
NC State University, Department of Marine, Earth and Atmospheric Sciences	2024
University of Wisconsin – Madison, Department of Geoscience	2024
Duke University, Integrated Toxicology & Environmental Health Program	2024
University of Notre Dame, Department of Biological Sciences	2023
University of Texas at Austin, Jackson School of Geosciences	2023
Tulane University, Department of Earth and Environmental Sciences	2023
Duke University, Division of Earth and Climate Sciences	2023
Rice University, Department of Earth, Environmental and Planetary Sciences	2023
UNLV, Department of Geoscience	2023
UCLA, Department of Earth, Planetary & Space Sciences	2022
UC – Riverside, Astrobiology Program	2022
Pal(a)eoPERCS (Paleo Early Career Seminar series)	2022
Virtual Seminars in Precambrian Geology	2021
University of Utah, Department of Geology & Geophysics	2021
California Institute of Technology, GeoClub	2021
UC – Riverside, Department of Earth and Planetary Sciences	2020
University of Washington, Astrobiology Program	2019
Australian National University, Paleobiogeochemistry research group	2018
University of Washington, Paleo Lunch	2018
Northwest Geological Society	2017
NASA Astrobiology Institute, Alternative Earths Team	2017

FIELDWORK

Kingston Range, CA, USA (1 week), stromatolitic carbonates & glacial diamictites	2018
Phosphoria Formation, ID & WY, USA (2 weeks), phosphatic shales	2017
Paleoproterozoic Onega Basin, Karelia, Russia (2 weeks), various sed. & igneous rocks	2017
Norwegian Geological Survey, Trondheim, Norway (1 week), drillcore sampling	2016
National Bison Range, MT, USA (5 weeks, 9 weeks), terrestrial ecology	2012/2014
Notre Dame Environmental Research Center, WI, USA (10 weeks), aquatic ecology	2013
UNESCO World Heritage Site Butrint, Albania (7 weeks), archaeological excavation	2012

COMMUNITY ACTIVITIES

Peer Review

Journals: *American Journal of Science* | *Biogeosciences* | *Chemical Geology* | *Communications Earth & Environment* | *Current Biology* | *Earth & Planetary Science Letters* | *Earth Science Reviews* | *Frontiers in Earth Science* | *Geobiology* | *Geochimica et Cosmochimica Acta* | *Geology* | *Geophysical Research Letters* | *Global and Planetary Change* | *GSA Bulletin* | *Nature* | *Nature Communications* | *Nature Ecology & Evolution* | *Nature Geoscience* | *New Phytologist* | *Paleoceanography and Paleoclimatology* | *Precambrian Research* | *Proceedings of the National Academy of Sciences (USA)* | *Science Advances*

Proposals: NSF Earth Sciences (EAR) | NSF Ocean Sciences (OCE) | ACS Petroleum Research Fund Israel Science Foundation (ISF) | NASA FINESST

Session Convener

Astrobiology Science Conference (2019) | Geobiology Conference (2019) | Goldschmidt (2018–2021, 2023) Gordon Geobiology (2022) | Geological Society of America (2017)

Outreach

Summer Research Mentor, Caltech SURF Fellows Program (2023) | Summer Research Mentor, Caltech WAVE Fellows Program (2022) | Summer Research Mentor, Caltech Summer Research Connection (2022) Guest Lecture, Muir High School Environmental Science Academy (2022) | Summer Research Mentor, i-STEM Scholars (2021) | Public Lecture, *Explore Caltech* (2020) | Lab Demonstrator, Astrobiology Primer, AbSciCon (2019) | Public Lecture, *Astronomy on Tap*, Seattle (2018) | Astrobiology Curriculum Advisor, Everett Public Schools (2018) | Guest Lecture, Lakewood High School Astrobiology Field Trip (2016) | Course Designer & Saturday Program Instructor, UW Robinson Center for Young Scholars (2014)