

MICHAEL A. KIPP

Division of Earth and Climate Sciences | Nicholas School of the Environment | Duke University
Grainger Hall | 9 Circuit Drive, Box 90328 | Durham, NC, USA 27708
michael.kipp@duke.edu | www.gaiialab.earth | [Google Scholar](https://scholar.google.com/citations?user=KippMichael) | [@kippmichael](https://twitter.com/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:	
	Postdoctoral Fellowship in Geobiology, Agouron Institute (PI; \$152K)	2019
	Graduate Research Fellowship, National Science Foundation (PI; \$138K)	2015
	Minor funding & internal grants:	
	Early Career Collaboration Award, NASA Astrobiology Institute (\$5K)	2023
	Seed Grant, Center for Evolutionary Science, California Institute of Technology (\$20K)	2021
	Lewis & Clark Fund for Exploration in Astrobiology, American Philosophical Society (\$4.6K)	2019
	Student Research Grant, Geological Society of America (\$1.8K)	2019
	Harrison Scholarship, Tobacco Root Geological Society (\$500)	2019
	Endowed Graduate Support Fund, UW Earth & Space Sciences (\$2.5K)	2018
	Ellis L. Yochelson Award, Paleontological Society Student Research Grant (\$1.2K)	2018
	NSF Graduate Research Opportunities Worldwide Award (\$5K)	2017
	Goldschmidt Conference Student Travel Grant, Geochemical Society (\$650)	2016
	“Inquisitive Graduate Student” Award, UW Earth & Space Sciences (\$2K)	2016
	George E. Goodspeed Geology Scholarship, University of Washington (\$1.5K)	2015
	Summer Environmental Research Fellowship, University of Notre Dame (\$8.5K)	2013
Undergraduate Research Comprehensive Summer Grant, University of Notre Dame (\$2K)	2013	

TEACHING	University of Washington		Caltech	
	Undergraduate Research Mentor	2017–2019	Undergraduate Research Mentor	2021–2023
	Preliminary Exam Committee Member	2018	Graduate Research Mentor	2019–2023
	ESS 213, Evolution of the Earth	2017	Certificate in University Teaching	2019–2020
	ESS 101, Introduction to Geology	2015		

INTERESTS isotope biogeochemistry, Earth history, astrobiology, metallomics

-
- PUBLICATIONS
24. **Kipp MA**, Stüeken EE, Strömberg CAE, Brightly WH, Arbour V, Erdei B, Hill RS, Johnson K, Kvaček J, McElwain JC, Miller IM, Slodownik M, Vajda V, Buick R. (2023). Nitrogen isotopes reveal independent origins of N₂-fixing symbiosis in extant cycad lineages. *Nature Ecology & Evolution*. doi:10.1038/s41559-023-02251-1
 23. **Kipp MA**. 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 JW, 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**. A double-edged sword: The role of sulfate in anoxic marine phosphorus cycling through Earth history. (2022). *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). ²³⁸U, ²³⁵U and ²³⁴U 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. Shock history and unique evidence of aqueous alteration in the Kakowa (L6) ordinary chondrite. (2022). *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

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	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
	Geoscience Australia, Canberra, ACT, Australia (1 week), drillcore sampling	2018
	US Geological Survey, CO, USA (1 week), drillcore sampling	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: <i>American Journal of Science</i> <i>Biogeosciences</i> <i>Chemical Geology</i> <i>Communications Earth & Environment</i> <i>Current Biology</i> <i>Earth & Planetary Science Letters</i> <i>Earth Science Reviews</i> <i>Frontiers in Earth Science</i> <i>Geobiology</i> <i>Geophysical Research Letters</i> <i>Geochimica et Cosmochimica Acta</i> <i>Geology</i> <i>Nature</i> <i>Nature Geoscience</i> <i>Precambrian Research</i> <i>Proceedings of the National Academy of Sciences (USA)</i> <i>Science Advances</i>

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

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) | Organizer & 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)