

KEVIN D. WEBSTER

<https://websterkgd.com>

EDUCATION

Indiana University, Bloomington

Ph.D. *Geology*. February 2017. Advisor: Arndt Schimmelmann. Dissertation: The Sources and Sinks of Methane in Caves. Minor: *Ecology and Evolution*

M.Sc. *Geology*. May 2013. Advisor: Lisa M. Pratt. Thesis: Methane dynamics associated with a small arctic lake, southwest Greenland.

University of Colorado at Boulder

BA: *Ecology and Evolutionary Biology and Geology*. May 2010.

Honors Thesis (*Summa cum Laude*): The preservation of fossil arthropods in the Middle Miocene Barstow Formation, southern California. Advisor: Dena M. Smith

EMPLOYMENT

2020 – Current: *Assistant Professor*, Diné College, Department of STEM

2018 – Current: *Associate Research Scientist*, Planetary Science Institute

2018 – 2019: *Senior Research Associate*, University of Arizona, Department of Soil, Water, and Environmental Science

2017: *Post-Doctoral Research Associate*, University of Arizona, Department of Ecology & Evolutionary Biology

PROFESSIONAL CERTIFICATIONS AND COMPLETED SHORT COURSES

Diné Educational Philosophy Certification, 2023

Online Teaching Certification, Quality Matters, 2021

Data Science Certification, Springboard, 2020

MEMBERSHIPS IN PROFESSIONAL ORGANIZATIONS

National Speleological Society (2012 -)

Geological Society of America (2013 -)

American Geophysical Union (2014 -)

PEER-REVIEWED PUBLICATIONS

15. Spitale JN, Tigges MD, Rhoden A, Hurford TA, **Webster KD** (2025). Curtain-based maps of eruptive activity in Enceladus' south-polar terrain at fifteen Cassini epochs. *Planetary Science Journal*, 6(3), 67. <https://doi.org/10.3847/PSJ/adb7d7>

14. **Webster KD**, Lennon JT (2025). Dormancy in the origin, evolution, and persistence of life on Earth. *Proceedings of the Royal Society B: Biological Sciences*, 292, 20242035. <https://doi.org/10.1098/rspb.2024.2035>

13. **Webster KD**, Schimmelmann A, Drobniak A, Mastalerz M, Rosales Lagarde L, Boston PJ, Lennon JT (2022). Diversity and function of methanotroph communities in caves. *Microbiology Spectrum*, e01566-21. <https://doi.org/10.1128/spectrum.01566-21>

12. **Webster KD**, Webster S, Rhodes SM (2021). Registration attendants show poor readiness to handle advanced care planning discussions. *Palliative Medicine Reports*, 2(1), 340-348. <https://doi.org/10.1089/pmr.2021.0006>
11. Kroeger ME, Meredith LK, Meyer KM, **Webster KD**, Barbosa de Camargo P, Fonseca de Souza L, Tsai SM, van Haren J, Saleska SR, Bohannon BJM, Rodrigues JLM, Nüsslein K (2021). Rainforest to pasture conversion stimulates soil methanogenesis across the Brazilian Amazon. *The ISME Journal*, 15, 658-672. <https://doi.org/10.1038/s41396-020-00804-x>
10. Meyer KM, Morris AH, **Webster KD**, Klein AM, Kroeger ME, Meredith LK, Brændholt A, Nakamura F, Venturini A, Fonseca de Souza L, Shek KL, Danielson R, van Haren J, Barbosa de Camargo B, Tsai SM, Dini-Andreote F, de Mauro JMS, Barlow J, Nüsslein K, Saleska SR, Rodrigues JLM, Bohannon BJM (2020). Belowground changes to community structure alter methane-cycling dynamics in Amazonia. *Environment International*, 145, 206131. <https://doi.org/10.1016/j.envint.2020.106131>
9. Rodriguez JAP, Dobrea EN, Kargel J, Baker VR, Crown D, **Webster KD**, Berman D, Wilhelm MB, Buckner D (2020). The oldest highlands of Mars reveal evidence of a possible muddy rain origin. *Scientific Reports*, 10, 10347. <https://doi.org/10.1038/s41598-020-64676-z>
8. Carrier BL, ... **Webster KD**, ... et. al. (2020). Mars extant life: What's next? Conference report. *Astrobiology*, 20(6), 785-814. <https://doi.org/10.1089/ast.2020.2237>
7. Rodriguez JAP, Leonard GJ, Domingue DL, Berman DC, Banks M, Zarroca M, Rogelio Linares R, Marchi S, Kargel JS, Baker VR, **Webster KD**, Sykes M (2020). The chaotic terrains of Mercury reveal a history of planetary volatile retention in the innermost solar system. *Scientific Reports*, 10(1), 1-14. <https://doi.org/10.1038/s41598-020-59885-5>
6. **Webster KD**, Drobniak A, Etiope G, Mastalerz M, Sauer PE, Schimmelmann A (2018). Subterranean karst environments as a global sink for atmospheric methane. *Earth and Planetary Science Letters*, 485, 9-18. <https://doi.org/10.1016/j.epsl.2017.12.025>
5. Stelmach KB, Neveu M, Vick-Majors T, Mickol R, Chou L, **Webster KD**, Tilley M, Zacchei F, Escudero C, Flores Martinez C, Labrado A, Fernández E (2018). Secondary electrons as an energy source for life. *Astrobiology*, 18(1), 1-13. <https://doi.org/10.1089/ast.2016.1510>
4. **Webster KD**, Rosales Lagarde L, Sauer PE, Schimmelmann A, Lennon JT, Boston PJ (2017). Isotopic evidence for the migration of thermogenic methane into a sulfidic cave, *Cueva de Villa Luz*, Tabasco, Mexico. *Journal of Cave and Karst Studies*, 79(1), 24-34. <https://doi.org/10.4311/2016ES0125>
3. Lennon JT, Nguyễn-Thùy D, Phạm TM, Drobniak A, Tạ PH, Pham NĐ, Streil T, **Webster KD**, Schimmelmann A (2017). Microbial contributions to subterranean methane sinks. *Geobiology*, 15(2), 254-258. <https://doi.org/10.1111/gbi.12214>
2. **Webster KD**, Mirza A, Deli JM, Sauer PE, Schimmelmann A (2016). Consumption of atmospheric methane in a limestone cave in Indiana, USA. *Chemical Geology*, 443, 1-9. <https://doi.org/10.1016/j.chemgeo.2016.09.020>

1. **Webster KD**, White JR, Pratt LM (2015). Use of open-path laser spectroscopy to evaluate atmospheric methane concentrations, Southwest Greenland. *Arctic, Antarctic, and Alpine Research*, 47(4), 599-609.
<https://doi.org/10.1657/AAAR0014-051>

PREPRINT, IN PREP., OR SUBMITTED PUBLICATIONS

1. **Webster KD**, Locey KJ, Pelletier JD, Credo J, Ingram, JC, Klein BA (2023). Uranium in waters of the southern Colorado Plateau: Implications for the Navajo Nation. *Preprints*, 2022080077. <https://doi.org/10.20944/preprints202208.0077.v3>

BOOK REVIEWS

Webster KD (2024). [Review of *Carbon Sovereignty: Coal Development and Energy Transition in the Navajo Nation* by A. Curley]. *Tribal College: Journal of American Indian Higher Education*, 36(2), 59.
<https://tribalcollegejournal.org/carbon-sovereignty-coal-development-and-energy-transition-in-the-navajo-nation/>

INVITED TALKS

Energy and Earth Systems. *Chae Jeong-Potter BEST JEDI Technical Seminar Series*, National Renewable Energy Laboratory, June 2024
Methane, microbes, and caves. *Department of Biological Sciences Weekly Seminar*, Marquette University, March 2024
Teaching and practicing geology at a Tribal College: Diné College, Navajo Nation. *Department of Earth and Atmospheric Sciences Weekly Seminar*, Indiana University, October 2023
Genomic insights into methanotrophy in caves. *Society for Industrial Microbiology and Biotechnology Conference*, 2023
Cave air, isotopes, microbes, and extraterrestrials. *Department of Geosciences Weekly Seminar*, University of Georgia, March 2020
Cave air and the search for extraterrestrial life. *Diné College Seminar*, 2020
An overview of methane in cave air. *Geological Society of America Conference*, 2019
Caves as a global methane sink. *Empa: Emissions and Isotopes Group*, Switzerland, 2019
Let's go to Mars: A historical overview of humanity's interest in Mars, what's happening today, and what might happen next. *Science Café*, Bloomington Indiana, 2013

PUBLISHED ABSTRACTS AND CONFERENCE PAPERS (* = Mentee)

Heitmann E, Huntington KW, Cassel EJ, Douglass J, Kukla T, Gootee B, **Webster KD**, Schauer AJ, Fischer L, Jorgensen A, Mat SA, Ravi V (2024). Rise of the Colorado Plateau: Leveraging climate models, stratigraphy, and carbonate clumped isotope thermometry to disentangle tectonic and climatic signals from the Miocene Bidahochi Formation, Navajo Nation, AZ, USA. *Geological Society of America Abstracts with Programs*, 222-5.
<https://gsa.confex.com/gsa/2024AM/meetingapp.cgi/Paper/401603>
Webster KD, Schimmelmann A, Lennon JT (2023). Genomic insights into methanotrophy in caves. *Society for Industrial Microbiology and Biotechnology Conference*. Invited Talk

- Craig B*, Begay J*, Klein BA, Beelen D, Foster D, Donelick R, **Webster KD** (2023). AFT dating of clinker on Black Mesa, Navajo Nation. *Thermo 2023*.
- White K, Craig B*, Begay J*, Kline BA, Foster D, Donelick R, **Webster KD** (2023). Cooling history of Navajo volcanic dike intrusion for junior high school science project. *Thermo 2023*.
- Webster KD** (2019). An overview of methane in cave air. *Geological Society of America Conference*. Invited Talk
- Webster KD**, Schimmelmman A, Drobniak A, Mastalerz, M (2019). Differential trace gas concentrations in cave air compared to the atmosphere. *Geological Society of America Conference*. Poster
- Truebe SA, **Webster KD** (2019). High-resolution measurements of cave air pCO₂ in the context of 30 years of cave air carbon dioxide data. *National Cave and Karst Management Symposium*.
- Webster KD** (2019). Developing cave air as a biosignature. *Mars Extant Life: What's Next?* Talk.
- Webster KD**, Jarnot AW, Blake DR, Drobniak A, Schimmelmman A, Mastalerz M, Barberán A (2018). Consumption of volatile organic compounds in caves. *American Geophysical Union Fall Meeting*, Poster.
- Webster KD**, Meredith LK, Piccini W, Pedrinho A, Nüsslein, K, van Haren J, Camargo PB, Mui TS, Saleska SR (2017). Recovery of methane consumption by secondary forest soils in the Amazon River Basin. *American Geophysical Union Fall Meeting*, Poster.
- Webster KD**, Schimmelmman A, Lennon JT (2016). Diversity and function of methanotrophic bacteria in caves. *American Geophysical Union Fall Meeting*, Talk.
- Schimmelmman A, Lennon JT, Nguyen-Thuy D, Hoa PT, Drobniak A, **Webster KD**, Schimmelmman M (2016). Vietnam's tropical karst is a sink for atmospheric methane greenhouse gas. *5th International Conference on Earth Science & Climate Change*.
- Webster KD**, Schimmelmman A, Sauer PE (2015). Seasonal fluctuations in the methane concentration of cave air. *Geological Society of America Annual Meeting* Paper No. 15-6. Talk.
<https://gsa.confex.com/gsa/2015AM/webprogram/Paper264539.html>
- Webster KD**, Drobniak A, Sauer PE, Mastalerz, M, Schimmelmman A (2015). Cave air as a biosignature. *2nd International Planetary Caves Conference* October 20–23, 2015. Talk. <http://www.hou.usra.edu/meetings/2ndcaves2015/>
- Webster KD**, Rosales Lagarde L, Sauer PE, Schimmelmman A, Lennon JT, Boston PJ (2014). Hydrogen and carbon stable isotopic compositions and concentrations of methane in cave air of Cueva de Villa Luz, Tabasco, Mexico. *American Geophysical Union Fall Meeting*, B31B-0010. Poster.
<http://abstractsearch.agu.org/meetings/2014/FM/B31B-0010.html>
- Webster KD**, Schimmelman A, Drobniak A, Mastalerz M, Etiope G, Sauer PE, Lennon JT (2013). Methane dynamics in limestone caves. *Geological Society of America Abstracts with Programs* 45(7). Talk.

- Webster KD**, White JR, Cadieux SB, Young SA, Pratt LM (2013). Methane dynamics associated with a small, arctic lake southwest Greenland: Implications for Mars. *Indiana University Crossroads*. Poster.
- White JR, **Webster KD**, Pratt LM (2013). Methane concentration gradients associated with a small thermokarst lake on the ice-free margin of western Greenland. *LPSC XLIV*, Abstract # 3105.
- Webster KD**, White JR, Young SA, Pratt LM (2012). Methane gradients associated with a small, deep lake on the ice-free margin of western Greenland. *AGU Abstracts* B31D-0446. Poster.
- Broemsen EL, **Webster KD**, Dierker M, Pratt LM, Christner BC (2012). Analysis of methanogenic and methanotrophic activity at the western margin of the Greenland Ice Sheet. *AGU Abstracts* C13B-0624.
- Webster KD**, Etiope G, Drobniak A, Schimmelmann A, Pratt LM (2012). Measurement of terrestrial methane concentrations comparable to proposed methane concentrations on Mars. *IWIPM* Abstract #1009. Poster.
- Webster KD**, Rebholz JA, White JR, Douglas BJ, Pratt LM (2012). Using open-path laser measurement of atmospheric methane concentration along a major shear zone in western Greenland as an analogue for exploration on Mars. *LPSC XLIII* Abstract #1514. Poster.
- Webster KD**, Smith DM (2009). Preservation of fossil arthropods in the Middle Miocene Barstow Formation, southern California. *Geological Society of America Abstracts with Programs* 41(7), 630. Poster.
- Hollis KA, **Webster KD**, Smith DM (2008). Using taphonomic disparity to understand preservation biases in the Western Interior Seaway: An example from the Pierre Shale (Upper Cretaceous). *Geological Society of America Abstracts with Programs*.

GRANTS AWARDED

- Student Travel Grant, Indiana University Department of Geological Sciences, 2016. \$300.
- Student Travel Grant, Indiana University Department of Geological Sciences, 2015. \$300.
- Geological Society of America Student Travel Grant, Annual Meeting, 2015, \$100.
- Mars Student Travel Grant. NASA International Planetary Caves Conference, 2015, \$800.
- NASA Astrobiology Institute Santander Summer School Scholar, 2014, \$1,785
- Methane dynamics of caves, 2014. Funded by The National Speleological Society Veshlage Grant, 2014, \$1,577. PI- KD Webster
- Methane cycling in caves as an analog for methane cycling on Mars. Funded by The National Speleological Society Research Grant, 2013, \$700. PI- KD Webster, CO PI- A Schimmelmann
- Methane cycling in caves as an analog for methane cycling on Mars. Funded by Indiana University Department of Geological Sciences Grant in Aid, 2013. \$900. PI – KD Webster
- Chevron Fellow, IU Bloomington 2011-2012, \$20,000

Preservation of fossil arthropods in the Middle Miocene Barstow Formation, southern California. Funded by Geology Mentorship Program, 2008, Undergraduate Research Opportunities Program (UROP), \$2,000. 2009 (University of Colorado).
 Using Taphonomic Disparity to Understand Preservation Biases in the Western Interior Seaway: An Example from the Pierre Shale (Upper Cretaceous).
 UROP, 2007. \$800. (University of Colorado).

TEACHING EXPERIENCE

| Listing | Title | Position | Dates |
|---------|---------------------------------------|----------------------|--|
| BIO 326 | Ecology | Instructor | F. 2025 |
| ENV 105 | Climate Change for Tribal Peoples | Instructor | Sp. 2022, Sp. 2023, Sp. 2024, Sp. 2025 |
| BIO 351 | Developmental Biology | Instructor | Sp. 2022, Sp. 2023, Sp. 2024 |
| BIO 385 | Invertebrate Biology | Instructor | F. 2021, F. 2024 |
| AGR 363 | Soils, Hydrology, and Crops | Instructor | F. 2021, Sp. 2023, F. 2023, F. 2024, F. 2025 |
| ENV 230 | Environmental Sampling and Monitoring | Instructor | Sp. 2021, Sp. 2023 |
| ENV 123 | Introduction to Hydrology | Instructor | Sp. 2021, F. 2021, Sp. 2023, Sp. 2024, Sp. 2025 |
| GLG 102 | Historical Geology | Instructor | Sp. 2021, Su. 2021, Sp. 2022, Sp. 2024, Sp. 2025 |
| BIO 365 | Writing in the Sciences | Instructor | F. 2020, F. 2022, F. 2023, F. 2024, F. 2025 |
| GLG 101 | Physical Geology | Instructor | F. 2020, Su. 2021, F. 2021, F. 2022, F. 2023, F. 2024, F. 2025 |
| L 113 | Introduction to Biology | Associate Instructor | F. 2016 |
| G 104 | Evolution of the Earth | Associate Instructor | S. 2014 |
| G 131 | Oceans & Our Global Env. | Associate Instructor | F. 2013 |
| G 406 | Intro. to Geochemistry | Associate Instructor | Sp. 2013, F. 2013 |

PROFESSIONAL SERVICE

| Activity | Year |
|--|----------|
| Proposal Reviewer: Deutsche Forschungsgemeinschaft (German Research Foundation) | N.A. |
| Peer Reviewer: <i>Environmental Microbiology</i> , <i>Environmental Reviews</i> , <i>Science of the Total Environment</i> , <i>FEMS Microbial Ecology</i> , <i>The Journal of Cave and Karst Studies</i> | N.A. |
| Diné College: Academic Program Review: Environmental Sciences | Sp. 2025 |

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|---|------------------------|
| Diné College: Catalog Committee | 2023-2025 |
| Diné College: Distance Education Committee | 2022-2025 |
| Diné College: Academic Program Review GIS Certification | Sp. 2022 |
| Diné College: Developmental Committee Master's in Biological Sciences | Sp. 21, 22, 23 |
| Diné College: Developmental Committee Bachelor's in Environmental Sciences | Sp. 21, 22, 23, 24, 25 |
| Primary Session Convener: Advances in origin of life research. AGU Conference | 2017 |

PROFESSIONAL OUTREACH (SELECTED)

Volunteer at the Tucson Book Festival: 2017-2019.

Public Webinar: Cave Air and Life on Mars. November, 2018.

Expert Science Guest in the Sexy Beasts Podcast: Live at Science Gallery Dublin. 2018.

<https://audioboom.com/posts/6949781-sexy-beasts-live-aliens>

Public Lecture: The Chemical Composition of Cave Air and its Astrobiological Significance. Cochise Country Cavers Meeting. July, 2018

Public Lecture: The Sources and Sinks of Methane in Caves. ARA Winter Technical. January 2018

ACADEMIC HONORS

NASA Astrobiology Institute Santander Summer School Scholar 2014

Nat. Sci. Foundation Graduate Research Fellowship Honorable Mention 2013

Chevron Fellow, IU Bloomington 2011-2012

Member of ΦBK (Phi Beta Kappa)

CU Boulder Graduate with Distinction, May 2010

CU Boulder Dean's List: Spring 2010; Fall 2009; Fall 2007

OTHER

1st and 2nd Team All-Conference Water Polo Goalie, Rocky Mountain Division (2007, 2009)

Captain of *University of Colorado Men's Club Water Polo* team (2009)

REFERENCES

Dr. Demetra Skaltsas, Assistant Professor, Department of STEM, Diné College

Dr. Arndt Schimmelmann, Senior Scientist, Earth and Atmospheric Sciences, Indiana University

Dr. Albert Barberán, Assistant Professor, Department of Environmental Science, University of Arizona

Dr. Peter E. Sauer, Director of the Stable Isotope Research Facility, Earth and Atmospheric Sciences, Indiana University

Dr. Jay T. Lennon, Professor, Biology, Indiana University