

Chris Mead

Assistant Research Professor,
School of Earth and Space Exploration, Arizona State University, Tempe, AZ
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Education/Employment

- 2022–Present Assistant Research Professor
- 2017–2022 Assistant Research Scientist
- 2015–2017 Research Specialist Sr.
School of Earth and Space Exploration
Center for Education Through Exploration
Arizona State University
- 2014–2015 Post-Doctoral Research Associate
Advisor: Leilani Arthurs
University of Nebraska
- 2008–2014 Ph.D. in Geological Sciences
Dissertation: Biogeochemistry Science and Education Part One: Using Non-
Traditional Stable Isotopes as Environmental Tracers Part Two: Identifying
and Measuring Undergraduate Misconceptions in Biogeochemistry
Advisors: Ariel D. Anbar, Steven Semken
Arizona State University
- 2006–2008 M.S. in Geology
Thesis: Mercury Isotope Analysis by Double Spike
Advisor: Thomas M. Johnson
University of Illinois
- 2001–2005 B.S. in Geology
University of Illinois

Peer-Reviewed Publications

22. Chambers, L. , Connolly, R., Kirk, M. S., Fischer, H., Aranda, A., Bowden, M. L., Cass, M., Cominsky, L. R., Czajkowski, K. P., Edson, L. B., Gardner-Vandy, K., Higdon, R., Holland, A., Keller, J. M., Kohl, H., Leavell, C., MacDonald, E., McCarthy, C., Mead, C., Ogiemwonyi, L., Schwerin, T., Sellers, V., Semper, R., Severino, M., Swann, J. L., Udomprasert, P., White, C., & White, V. (accepted). Uniting Under the Eclipse: A Mega-Collaboration to Activate Science Learning Across the Penumbra and Beyond. Bulletin of the AAS. <https://baas.aas.org/pub/dpq77a0p>.
21. Farrar, V., Medinaceli, M. V., Young, N. T., Bonem, E., Mead, C., Matz, R. L., & Caporale, N. (2025). Grade Disparities Associated with Student Demographics in Upper-division Biology Courses Across Multiple Institutions. CBE–LSE, 24(3). doi: 10.1187/cbe.24-02-0075.
20. Mead, C., Buxner, S., Fischer, H., Manning, C., Severino, M., Shaner, A., Storksdieck, M., Swann, J. L., & Udomprasert, P. (2025). Attitudes about public outreach among NASA

- scientists and engineers. *Communicating Astronomy with the Public*, 19(2). doi: 10.5281/zenodo.16939219.
19. Swann, J., Severino, M., Perrett, K., Kline, T., Mead, C., & Anbar, A. (2025). Enhancing Eclipse Education: A Universal Design Approach to Comprehensive, Ready-to-Use Curricula for Diverse Classrooms. *Bulletin of the AAS*, 56(9). doi: 10.3847/25c2feb.cbe8687f.
 18. Denaro, K., Molinaro, M., Fiorini, S., Matz, R. L., Mead, C., Motika, M., Tarchinski, N., Medinaceli, M. V., Byrd, W. C., Koester, B., Lee, H. R., McKay, T., & Sato, B. K. (2024). A multi-institutional cluster analysis to identify groups of courses with exemplary opportunity gaps for undergraduate students in the biological sciences. *CBE—Life Science Education*. 23(4), ar53. doi: 10.1187/cbe.24-02-0051.
 17. Archer, H. N., Simon, M. N., Mead, C., Prather, E. E., Brunkhorst, M., & Hunsley, D. (2024). Bringing Lecture-Tutorials Online: An Analysis of A New Strategy to Teach Planet Formation in the Undergraduate Classroom. *Astronomy Education Journal*. doi: 10.32374/AEJ.2024.4.1.090ra.
 16. Castle, S. D., Byrd, W. C., Koester, B. P., Pearson, M. I., Bonem, E., Caporale, N., Cwik, S., Denaro, K., Fiorini, S., Li, Y., Mead, C., Rypkema, H., Sweeder, R. D., Valdivia Medinaceli, M. B., Whitcomb, K. M., Brownell, S. E., Levesque-Bristol, C., Molinaro, M., Singh, C., McKay, T. A., & Matz, B. (2024). Systemic Advantage Has a Meaningful Impact on Student Outcomes in Introductory STEM Courses at Six Research Universities. *International Journal of STEM Education*, 11(1), 1–20. doi: 10.1186/s40594-024-00474-7.
 15. Hewitt, H. B., Simon, M. N., Mead, C., Grayson, S., Beall, G. L., Zellem, R. T., Tock, K., & Pearson, K. A. (2023). Development and Assessment of a Course-Based Undergraduate Research Experience (CURE) for Online Astronomy Majors. *Physical Review Physics Education Research*, 19(2), 020156. doi: 10.1103/PhysRevPhysEducRes.19.020156.
 14. Mead, C., Price, C., Gin, L. E., Anbar, A. D., Collins, J. P., Lepore, P., & Brownell, S. E. (2023). A comparative case study of the accommodation of students with disabilities in online and in-person degree programs. *PLOS ONE*, 18(10), e0288748. doi: 10.1371/journal.pone.0288748.
 13. Ruberto, T., J., Mead, C., Anbar, A. D., Semken, S. (2023). Comparison of in-person and virtual Grand Canyon undergraduate field trip learning outcomes. *Journal of Geoscience Education*, 71(4), 445–461. doi: 10.1080/10899995.2023.2186067.
 12. Fischer, C., Witherspoon, E., Nguyen, H., Feng, Y., Fiorini, S., Vincent-Ruz, P., Mead, C., Bork, W., Matz, R. L., Schunn, C. (2023). Advanced Placement Course Credit and Undergraduate Student Success in Science Gateway Courses. *Journal of Research in Science Teaching*, 60(2), 304–329. doi: 10.1002/tea.21799.
 11. Mead, C., Bruce, G., Taylor, W., Buxner, S., & Anbar, A. D. (2022). Gamifying virtual exploration of the past 350 million years of vertebrate evolution. *Frontiers in Education*, 7, 836783. doi: 10.3389/educ.2022.836783.
 10. Supriya, K.¹ Mead, C.¹, Anbar, A. D., Caulkins, J. L., Collins, J. P., Cooper, K. M., LePore, P. C., Lewis, T., Pate, A., Scott, R. A., & Brownell, S. E. (2021). Undergraduate biology students received higher grades during COVID-19 but perceived negative effects on learnings. *Frontiers in Education*, 6, 759624. doi: 10.3389/educ.2021.759624.

¹Denotes co-first authorship

9. Perera, V., Mead, C., van der Hoeven Kraft, K. J., Stanley, S., Angappan, R., MacKenzie, S., Barik, A. & Buxner, S. (2021). Considering Intergroup Emotions to Improve Diversity and Inclusion in the Geosciences. *Journal of Geoscience Education*, doi: 10.1080/10899995.2021.1881863.
8. Mead, C.¹, Supriya, K.¹, Zheng, Y., Anbar, A. D., Collins, J. P., LePore, P., & Brownell, S. E. (2020). Online biology degree program broadens access for women, first-generation to college, and low-income students, but grade disparities remain. *PLOS ONE*, 15, e0243916, doi: 10.1371/journal.pone.0243916.
7. Nawaz, S., Kennedy, G., Mead, C., & Bailey, J. (2020). Moments of confusion in simulation-based learning environments. *Journal of Learning Analytics*, 7, 118–137, doi: url{10.18608/jla.2020.73.9}.
6. Mead, C.², Bruce, G., Semken, S., Buxner, S., & Anbar, A. D. (2019). Immersive, interactive virtual field trips promote learning. *Journal of Geoscience Education*, 67, 131–142, doi: 10.1080/10899995.2019.1565285.
5. Horodyskyj, L. B., Mead, C., Belinson, Z., Buxner, S., Semken, S., & Anbar, A. D. (2018). Habitable Worlds: Delivering on the Promises of Online Education. *Astrobiology*, 18, 86–99, doi: 10.1089/ast.2016.1550.
4. Perera, V., Mead, C., Buxner, S., Horodyskyj, L., Semken, S., Lopatto, D., & Anbar, A. D. (2017). Students in fully online programs report more positive attitudes toward science than students in traditional, in-person programs. *CBE—Life Sciences Education*, 16, ar60, doi: 10.1187/cbe.16-11-0316.
3. Mead, C., Herckes, P., Majestic, B. J., & Anbar, A. D. (2013). Source apportionment of aerosol iron in the marine environment using iron isotope analysis. *Geophysical Research Letters*, 40, 5722–5727, doi: 10.1002/2013GL057713.
2. Mead, C., Lyons, J. R., Johnson, T. M., & Anbar, A. D. (2013). Unique Hg stable isotope signatures of compact fluorescent lamp-sourced Hg. *Environmental Science & Technology*, 47, 2542–2547, doi: 10.1021/es303940p.
1. Mead, C. & Johnson, T. M. (2010). Hg stable isotope analysis by the double spike method. *Analytical and Bioanalytical Chemistry*, 397, 1529–1538, doi: 10.1007/s00216-010-3701-0.

Manuscripts in Peer-Review

1. Beall, G. L., Simon, M. N., Mead, C., & Anbar, A. D. (in review). Assessment of students' quantitative literacy in online astronomy courses. *Physical Review Physics Education Research*.

Other Publications

3. Semken, S., Mead, C., Foley, K., Ruberto, T., Bruce, G., & Anbar, A. D. (2025) Research on teaching geoscience with virtual field experiences. *Annual Review of Earth and Planetary Sciences*. 53, 17.1–17.18. doi: 10.1146/annurev-earth-060923-115406.
2. Mead, C., Anbar, A. D., Horodyskyj, L., & Bratton, D. (2020). Education through exploration: A model for using adaptive learning to teach laboratory science online. In C.

²Journal of Geoscience Education's 2020 Outstanding Paper of the Year

Impey & M. Wenger (Eds.), *Astronomy Education Volume 2: Best Practices for Online Learning Environments* (pp. 7-1 – 7-21). Bristol, England: IOP Publishing.

1. Nawaz, S., Kennedy, G., Bailey, J., Mead, C., & Horodyskyj, L. (2018). Struggle town? Developing profiles of student confusion in simulation-based learning environments. In *Proceedings ASCILITE2018: 35th International Conference on Innovation, Practice and Research in the Use of Educational Technologies in Tertiary Education*.

First Author Conference Presentations

- Mead, C., Kassis, S., Doud, N., Brownell, S., Luke, C., Hall, S. J., & Disbrow, C. (2025, December). Comparative effectiveness of virtual and in-person field experiences in teaching observation skills in ecology. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.
- Mead, C., Buxner, S., Fischer, H., Manning, C., Severino, M., Shaner, A., Storksdieck, M., Swann, J. L., & Udomprasert, P. (2024, December). Attitudes about public outreach among NASA scientists and engineers. Oral presentation at the American Geophysical Union annual meeting in Washington, DC.
- Mead, C., Simon, M., Knierman, K., & Monkiewicz, J. (2024, December). A preliminary study of student impacts from a fully online astronomy degree program. Poster presentation at the American Geophysical Union annual meeting in Washington, DC.
- Mead, C. & Larson, K. (2024, July). REAL Explorations in chemistry. Oral presentation at the International Consortium for Innovation and Collaboration in Learning Engineering (ICICLE) conference in Tempe, AZ.
- [Invited] Mead, C., LePore, P., Collins, J. P., Anbar, A. D., & Brownell, S. E. (2023, December). Which undergraduates stay or leave the natural sciences: An investigation of differences for online and in person programs. Oral presentation at the American Geophysical Union annual meeting in San Francisco, CA.
- Mead, C., Price, C., Anbar, A. D., Collins, J. P., LePore, P., Brownell, S. E. (2022, December). How are students with disabilities accommodated in a fully online degree program? Poster presentation at the American Geophysical Union annual meeting in Chicago, IL.
- Mead, C., Bruce, G., Taylor, W., Buxner, S. & Anbar, A. D. (2021, December). Gamifying virtual exploration of the past 350 million years of vertebrate evolution: Presenting effectiveness data from *Surviving Extinction*. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.
- Mead, C., Ruberto, T. J., Bruce, G., Semken, S., Aggarwal, R., & Anbar, A. D. (2021, August). Evolving concepts in virtual field trips: New capabilities and democratizing VFT creation. Invited oral presentation at the Ecological Society of America meeting held virtually.
- Mead, C. & Anbar, A. D. (2019, December). Using computer learning analytics to support learning design, evaluation, and teaching. Oral presentation at the American Geophysical Union annual meeting in San Francisco, CA.
- Mead, C., Brownell, S. E., Collins, J. P., LePore, P., & Anbar, A. D. (2019, December). Using Institutional Analysis of Grades to Assess Equity of Outcomes in Online and In-Person Science Courses. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.

- Mead, C., Brownell, S. E., Collins, J. P., LePore, P., & Anbar, A. D. (2019, September). Using institutional analysis of grades to assess equity of outcomes in online and in-person science courses. Oral presentation at the Geological Society of America Annual Meeting in Phoenix, AZ.
- Mead, C., Landrum, A., Kahan, D., & Anbar, A. D. (2018, December). Science curiosity can predict success in science courses. Poster presented at the American Geophysical Union annual meeting in Washington, DC.
- Mead, C., Davis, H. B., Swann, J. L., & Anbar, A. D. (2018, December). What kinds of digital learning experiences do educators want? Poster presented at the American Geophysical Union annual meeting in Washington, DC.
- Mead, C., Horodyskyj, L., Buxner, S., Semken, S., & Anbar, A. (2017, April). Advances in Assessments of Astrobiology Learning Outcomes and Data-Driven Student Support. Oral presentation at the Astrobiology Science Conference in Mesa, AZ.
- Mead, C., Horodyskyj, L., Buxner, S., Semken, S., & Anbar, A. D. (2016, December). Measuring scientific reasoning through behavioral analysis in a computer-based problem solving exercise. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Mead, C., Horodyskyj, L., Buxner, S., Semken, S., & Anbar, A. D. (2016, December). Different behavioral patterns of success for men and women in an online introductory science course: Addressing the course grade gender gap. Oral presentation at the American Geophysical Union annual meeting in San Francisco, CA.
- Mead, C. & Arthurs, L. (2014, October). Learning Strategies and Attitudes in Introductory-Level Geoscience Courses: Preliminary Findings of a Departmental Self-Study. Oral presentation at the Geological Society of America annual meeting in Vancouver, Canada.
- Mead, C., Semken, S., & Anbar, A. D. (2014, October). The Development of a Valid and Reliable Biogeochemistry Concept Inventory. Poster presentation at the Geological Society of America annual meeting in Vancouver, Canada.
- Mead, C., Herckes, P., Majestic, B. J., & Anbar, A. D. (2012, December). Quantifying anthropogenic Fe in marine aerosols using Fe stable isotope analysis. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Mead, C., Gordon, G. W., & Anbar, A. D. (2012, September). Non-traditional stable isotopes: Ecological and environmental applications. Invited talk at the Long Term Ecological Research Network All Scientists Meeting in Estes Park, CO.
- Mead, C., Semken, S., & Anbar, A. D. (2011, October). Identifying misconceptions about biogeochemistry among undergraduates. Oral presentation at the Geological Society of America annual meeting in Minneapolis, MN.
- Mead, C., Anbar, A. D., Lyons, J. R., & Johnson, T. M. (2010, December). Mass-independent fractionation of mercury isotopes in compact fluorescent light bulbs. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Mead, C., Anbar, A., & Johnson, T. (2010, June). Mass-independent fractionation of Hg isotopes resulting from photochemical self-shielding. Oral presentation at the Goldschmidt conference in Knoxville, TN.

Other Conference Presentations

2026

Doud, N., Mead, C., Kassis, S., Luke, C., Brownell, S.E., Disbrow, C., & Hall, S.J. (2026, January). Comparative effectiveness of virtual and in-person field experiences in learning observation skills in ecology. Presentation at SABER West in Irvine, CA.

2025

Backman, D. E., Clark, C., Harman, P. K., Tamer, A. J. J., Anbar, A. D., & Mead, C. (2025, December). STEM Immersion and Virtual Field Trips to Astronomical Observatories: Bringing Authentic Science Learning Experiences to Teachers, Students, and the Public. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.

Godin, E., Mead, C., Narish, M., Swann, J. L., Hunsley, D., Kirk, S., Tamer, A. J. J., Davey, B., Bruce, G., & Anbar, A. D. (2025, December). Navigating New Terrain: Exploring Educator Perspectives on Virtual Field Trip Training through TPACK. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.

Oehmke, T. B., Simon, J. S., Tamer, A. J. J., Spence, H. E., Irelan, R., Skoglund, H., Hahn-Lowry, A., Vazquez-Lopez, V., Mead, C., Bruce, G., Kirk, M., Steel, S., & Anbar, A. D. (2025, December). Space Turbulence: Demonstrating the importance of turbulence in our daily lives through NASA Missions and SciAct team collaborations. Oral presentation at the American Astronomical Society Meeting in Anchorage, AK.

Washington, M., Mead, C., Buxner, S., & Wadhwa, M. (2025, December). The Hidden Work of Translation: What NASA SciAct Reveals About the Nature of Subject Matter Expert Engagement in Outreach. Oral presentation at the American Astronomical Society Meeting in Anchorage, AK.

Washington, M., Mead, C., Buxner, S., & Wadhwa, M. (2025, June). Not Just a Guest Speaker: How NASA SciAct Teams Are Redefining Scientist Engagement. Oral presentation at the American Astronomical Society Meeting in Anchorage, AK.

2024

Aranda, A., Swann, J. L., Williams, D. A., Mead, C., & Wadhwa, M. (2024, December). NASA SCoPE: Liaisons Between NASA Scientists and NASA Science Activation. Poster presentation at the American Geophysical Union meeting in Washington, DC.

Brunkhorst, M., Narish, M., Swann, J. L., Mead, C., Hunsley, D., & Anbar, A. D. (2024, December). Milanko-What-Now? Designing a Digital Lesson to Demystify Earth's Climate Cycles. Oral presentation at the American Geophysical Union meeting in Washington, DC.

Hasty, B., Hunsley, D., Teece, B., Bruce, G., Mead, C., & Anbar, A. D. (2024, December). Designing Digital Education Outreach for Astrobiology: You Are Not Alone. Poster presentation at the American Geophysical Union meeting in Washington, DC.

Huntzinger, D. N., Mead, C., Bruce, G., Schaefer, K. M., Mack, M. C., Taylor, W., Thompson, L., Logan, R., Leshyk, V. O., & Anbar, A. D. (2024, December). Polar Explorer: A place-based virtual learning environment for STEM undergraduate education. Oral presentation at the American Geophysical Union annual meeting in Washington, DC.

Swann, J. L., Narish, M., Kirk, S., Tamer, A. J. J., Anbar, A. D., & Mead, C. (2024, December). Modular Training in Different Modalities May Increase Use of Digital Learning

Tools by Educators. Poster presentation at the American Geophysical Union meeting in Washington, DC.

Tremblay, C., Mead, C., Simon, M., & Anbar, A. D. (2024, December). Validation of a Novel Scientific Reasoning Assessment Instrument for Theory Revision Abilities. Oral presentation at the American Geophysical Union meeting in Washington, DC.

Williams, D., A., Swann, J. L., Aranda, A., Mead, C., & Wadhwa, M. (2024, December). How SCoPE brings diverse Subject Matter Experts to the NASA Science Activation Program. Poster presentation at the American Geophysical Union meeting in Washington, DC.

2023

Brunkhorst, M., Narish, M., Andert, C., Hunsley, D., Sackey, S., Swann, J. L., Mead, C., Tamer, A. J. J., & Anbar, A. D. (2023, December). Integrating Chemistry and Earth Science: Teaching Ocean Acidification Using NASA data. Poster presentation at the American Geophysical Union annual meeting in San Francisco, CA.

Bruce, G., Swann, J. L., Kirk, S., Narish, M., Hunsley, D., Tamer, A. J. J., Rauscher, T., Stummer, C., Mead, C., & Anbar, A. D. (2023, December). Tour It: Empowering educators with a new user-friendly storytelling medium to create their own virtual field trips. Poster presentation at the American Geophysical Union annual meeting in San Francisco, CA.

Huntzinger, D. N., Mead, C., Bruce, G., Schaefer, K. M., Mack, M. C., Taylor, W., Thompson, L., Leshyk, V. O., & Anbar, A. D. (2023, December). Polar Explorer: A place-based virtual learning environment for STEM undergraduate education. Oral presentation at the American Geophysical Union annual meeting in San Francisco, CA.

Tremblay, C., Mead, C., Simon, M. N., & Anbar, A. D. (2023, December). Quantifying theory revision capabilities as a part of the scientific reasoning process. Oral presentation at the American Physical Union annual meeting in San Francisco, CA.

Hewitt, H., Simon, M., Mead, C., Haverstock, G., & Anbar, A. (2023, January). Bringing exoplanet research to the online astronomy classroom. Oral presentation at the American Astronomical Society meeting in Seattle, WA.

2022

Huntzinger, D., Mead, C., Thompson, L., Bruce, G., Anbar, A., Mack, M., Schaefer, K., Leshyk, V., & Taylor, W. (2022, December). Polar Explorer: An interactive virtual field trip-based exploration of Alaska and the changing Arctic. Poster presentation at the American Geophysical Union annual meeting in Chicago, IL.

Swann, J., Manfredi, L., Sackey, S., Brunkhorst, M., Hunsley, D., Mead, C., Anbar, A. D., & Tamer, A. J. (2022, December). Fate of the Plates: A virtual exploration of the dynamics of Earth's interior and plate tectonics. Oral presentation at the American Geophysical Union annual meeting in Chicago, IL.

Narish, M., Kirk, S., Swann, J., Bruce, G., Hunsley, D., Raucher, T., Stummer, C., Mead, C., & Anbar, A. D. (2022, December). Tour It: Empowering educators with a new user-friendly storytelling medium to create their own virtual field trips. Oral presentation at the American Geophysical Union annual meeting in Chicago, IL.

Tamer, A. J., Barcase, K., Narish, M., Mead, C., & Anbar, A. D. (2022, December). Learning from the co-development of Earth & Space Science place-based, immersive experiences with

native Hawaiian educators. Oral presentation at the American Geophysical Union annual meeting in Chicago, IL.

Wadhwa, M., Swann, J., Williams, D., & Mead, C. (2022, December). NASA SCoPE: Future plans for enhancing engagement with NASA missions, broadening participation, and strengthening collaborations in SciAct. Presentation at the American Geophysical Union annual meeting in Chicago, IL.

Buxner, S., Mead, C., & Shaner, A. (2022, October). Results of an Assessment of Planetary Scientists' Perceptions Related to Outreach. Presentation at the American Astronomical Society Division of Planetary Science meeting in London, Ontario, Canada.

Thompson, L., Mead, C., Huntzinger, D., Bruce, G., Anbar, A., Mack, M., Schaefer, K., Leshyk, V., & Taylor, W. (2022, October). Polar Explorer - An Immersive Virtual Learning Environment to Educate Students about the Impacts of Thawing Permafrost, Poster Presentation, Geological Society America Annual meeting, Denver, CO.

Sweeder, R., Castle, S., Koester, B., Byrd, C., Pearson, M., Bonem, E., Caporale, N., Cwik, S., Denaro, K., Fiorini, S., Levesque-Bristol, C., Matz, R., Mead, C., Brownell, S., Molinaro, M., Singh, C., & McKay, T. (2022, April). Exposing inequity: A multi-institutional analysis of systematic advantages in introductory STEM courses, American Chemical Society Spring 2022 National Meeting, San Diego, CA.

2021

Anbar, A., Swann, J., Mead, C., Hunsley, D., Bratton, D., & Tamer, J. (2021, December). The Infiniscope Initiative: Transforming ESS Education through Advances in Digital Learning Design. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.

Narish, M., Swann, J. L., Bruce, G., Tamer, A. J., Rauscher, T., Stummer, C., Mead, C., & Anbar, A. D. (2021, December). Tour It: Empowering educators to create their own virtual field trips with user-friendly technology. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.

Huntzinger, D., Mead, C., Thompson, L., Anbar, A., Mack, M., Schaefer, K., & Leshyk, V. (2021, October). Polar Explorer - An Immersive Virtual Learning Environment that Teaches Students about the Impacts of Thawing Permafrost on Society, Oral Presentation, Regional Conference on Permafrost, Virtual.

Anbar, A., Swann, J., Mead, C., Hunsley, D., Bratton, D., & Tamer, J. (2021, October). The Infiniscope Initiative: Transforming ESS Education Through Advances In Digital Learning Design. Presentation at the Geological Society of America annual meeting in Portland, OR.

Wadhwa, M., Williams, D. A., Swann, J. L., Anbar, A. D., Mead, C. J., Tamer, A. J., Bell III, J. F., Asner, G. P., Bossert, K., & Shkolnik, E. L. (2021, March). The NASA SMD Community of Practice for Education (SCoPE): A New Science Activation Program Integration Project to Connect SMEs with NASA SCIACT. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.

Wadhwa, M., Williams, D. A., Swann, J. L., Anbar, A. D., Mead, C. J., Tamer, A. J., Bell III, J. F., Asner, G. P., Bossert, K., & Shkolnik, E. L. (2021, March). The NASA SMD Community of Practice for Education (SCoPE): A New Science Activation Program

Integration Project to Connect SMEs with NASA SCIACT. Presentation at the Lunar and Planetary Science Conference [held virtually].

2020

- Bratton, D., Anbar, A. D., Renfry, M., Bodin, M., Swann, J., & Mead, C. (2020, December). Using an Interactive, 3D Visualization to Teach Phases of the Moon. Presentation at the American Geophysical Union annual meeting in San Francisco, CA [held virtually].
- Bruce, G., Mead, C., Taylor, W., & Anbar, A. D. (2020, December). Gamifying virtual exploration of the past 350 million years of vertebrate evolution. Presentation at the American Geophysical Union annual meeting in San Francisco, CA [held virtually].
- Ruberto, T., Mead, C., Aggarwal, R., Semken, S., Tamer, A. J., & Anbar, A. D. (2020, December). Democratizing Virtual Field Trips: Teaching Learners to Create Their Own Virtual Field Trips for Earth and Space Science and Sustainability. Presentation at the American Geophysical Union annual meeting in San Francisco, CA [held virtually].
- Swann, J., Kirk, S., Mead, C., & Anbar, A. D. (2020, December). Teacher Professional Development to Support Transition to Online. Presentation at the American Geophysical Union annual meeting in San Francisco, CA [held virtually].

2019

- Bratton, D., Renfry, M., Fogelson, K., Mead, C., & Anbar, A. D. (2019, December). Combining Eyes on the Solar System, a rich narrative, and adaptive feedback to teach Solar and Lunar eclipses. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Bruce, G., Oliver, C., Taylor, W. L., Mead, C., Semken, S., Summons, R. E., Buxner, S., & Anbar, A. D. (2019, September). Advancing 25 years of digital innovation - exploring the evolution of 360° virtual field trips from apple's human interface group to modern gamification and beyond. Oral presentation at the Geological Society of America Annual Meeting in Phoenix, AZ.
- Bruce, G., Taylor, W. L., Mead, C., Buxner, S., & Anbar, A. D. (2019, September). Digital innovations in gamification, adaptivity, and rich learning design to virtually explore the past 350 million years. Oral presentation at the Geological Society of America Annual Meeting in Phoenix, AZ.
- Bruce, G., Taylor, W., Mead, C., Buxner, S., Semken, S., & Anbar, A. D. (2019, December). Gamifying Virtual Exploration of the Past 350 Million Years of Vertebrate Evolution. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Horodyskyj, L., Mead, C., Oliver, C., & Anbar, A. D. (2019, September). Teaching real science: a novel approach to teaching students the scientific process. Oral presentation at the Geological Society of America Annual Meeting in Phoenix, AZ.
- Ruberto, T., Semken, S., Mead, C., Bruce, G., Buxner, S., & Anbar, A. D. (2019, September). Mixed-methods research on the implications of learning outcomes for in-situ and virtual geological field trips. Oral presentation at the Geological Society of America Annual Meeting in Phoenix, AZ.
- Semken, S., Bruce, G., Ruberto, T., Mead, C., Buxner, S., Anbar, A. D., Crossey, L. J., & Karlstrom, K. E. (2019, September). The future of geoscience education at grand canyon:

more—and more diverse—learners will experience it by place-based and digital means. Oral presentation at the Geological Society of America Annual Meeting in Phoenix, AZ.

Swann, J. L., Mead, C., & Anbar, A. D. (2019, December). Consumers to creators: Reducing the barrier of entry for educators to customize digital learning experiences. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.

Tamer, A. J. J., Ruberto, T., Mead, C., Bruce, G., Semken, S., Anbar, A. D., & Aggarwal, R. (2019, December). Teaching and learning about Earth science and sustainability with student-created virtual field trips. Oral presentation at the American Geophysical Union annual meeting in San Francisco, CA.

2018

Horodyskyj, L., Bruce, G., Bratton III, D., Mead, C., Ruberto, T., Semken, S., & Anbar, A. D. (2018, November). Education Through Exploration: Lessons from Active Learning at Scale. Poster presented at the Geological Society of America meeting in Indianapolis, IN.

Horodyskyj, L., Mead, C., & Lennon, T. (2018, November). Build a Catastrophe: Using Digital World and Policy Models to Engage Political Science Students with Climate Change. Oral presentation at the Geological Society of America meeting in Indianapolis, IN.

Horodyskyj, L., Mead, C., Pardos, Z., & Anbar, A. D. (2018, December). Improving Student Outcomes Through Informed Use of Learning Analytics. Poster presented at the American Geophysical Union annual meeting in Washington, DC.

Swann J. L., Mead, C., Hunsley, D., & Anbar, A. D. (2018, December). Training educators to build and modify adaptive digital learning experiences. Poster presented at the American Geophysical Union annual meeting in Washington, DC.

2017

Anbar, A., Ben-Naim, D., & Mead, C. (2017, April). Digital Teaching Networks Inspired by Astrobiology: Adaptive Scaling of High-Quality Learning Resources. Presentation at the Astrobiology Science Conference in Mesa, AZ.

Anbar, A. D., Mead, C., Bratton III, D., Horodyskyj, L., Hayes, J., Schonstein, D., Watt, S., Watt, K., Ben-Naim, D., & Leon, A. (2017, December). Demonstrating the Value of Education Through Exploration as a Theory of Digital Design. Poster presented at the American Geophysical Union annual meeting in New Orleans, LA.

Bratton III, D., Hayes, J., Sarno, D., Bruce, G., Horodyskyj, L., Mead, C., Ben-Naim, D., & Anbar, A. D. (2017, April). Bringing Active Field-Based Learning to Scale in Astrobiology: Virtual Field Trips and Adaptive Courseware. Presentation at the Astrobiology Science Conference in Mesa, AZ.

Horodyskyj, L., Lennon, T., Mead, C., & Anbar, A. D. (2017, December). Build a Catastrophe: Using Digital World and Policy Models to Engage Political Science Students with Climate Change. Poster presented at the American Geophysical Union annual meeting in New Orleans, LA.

Horodyskyj, L., Mead, C., & Anbar, A. (2017, April). Teaching Assumptions: The Missing Component of the Scientific Process. Presentation at the Astrobiology Science Conference in Mesa, AZ.

- Horodyskyj, L., Mead, C., & Anbar, A. D. (2017, December). Finding actionable data to support student success in introductory science courses. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.
- Perera, V., Mead, C., Buxner, S., Horodyskyj, L., Semken, S., Lopatto, D., & Anbar, A. (2017, April). Gauging Students' Attitudes Towards Science to Improve Science Pedagogy. Presentation at the Astrobiology Science Conference in Mesa, AZ.
- Semken, S., Ruberto, T., Bruce, G., Buxner, S., & Anbar, A. D. (2017, December). Learning outcomes of in-person and virtual field-based geoscience instruction at Grand Canyon National Park: complementary mixed-methods analyses. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.
- Swann, J. L., Elkins-Tanton, L. T., Anbar, A. D., Boonstra, S. K., Tamer, A. J., Mead, C., & Hunsley, D. (2017, December). Exploring the story, science, and adventure of small worlds. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.
- Tamer, A. J. J., Anbar, A. D., Elkins-Tanton, L. T., Boonstra, S. K., Mead, C., Swann, J. L., & Hunsley, D. (2017, December). Building effective learning experiences around visualizations: NASA Eyes on the Solar System and Infiniscope. Oral presentation at the American Geophysical Union annual meeting in New Orleans, LA.

2016

- Bratton III., D., Mead, C., Horodyskyj, L., & Anbar, A. D. (2016, December). Development and Evaluation of a Fully-Online Introductory Biology Course With an Emphasis on the Possibility of Life Beyond Earth. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Bruce, G., Mead, C., Buxner, S., Taylor, W., Semken, S., Anbar, A. D., & Sundstrom, J. (2016, December). Immersive, interactive virtual field trips promote learning. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Bruce, G., Taylor, W., Anbar, A. D., Semken, S., Buxner, S., Mead, C., El-Moujaber, E., Summons, R. E., & Oliver, C. (2016, December). Linking Immersive Virtual Field Trips with an Adaptive Learning Platform. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Horodyskyj, L., Mead, C., & Anbar, A. D. (2016, December). I Assumed You Knew: Teaching Assumptions as Co-Equal to Observations in Scientific Work. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Horodyskyj, L., Mead, C., Buxner, S., Semken, S., & Anbar, A. D. (2016, December). Assessing Complex Learning Objectives through Analytics. Oral presentation at the American Geophysical Union annual meeting in San Francisco, CA.
- Perera, V., Mead, C., Buxner, S., Horodyskyj, L., Semken, S., Lopatto, D., & Anbar, A. D. (2016, December). Assessing Student Attitudes Towards Science in an Adaptive Online Astrobiology Course: Comparing Online and On-Campus Undergraduates. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.
- Semken, S., Ruberto, T., Mead, C., Bruce, G., Buxner, S., & Anbar, A. D. (2016, December). Complementary Research on Student Geoscience Learning at Grand Canyon by Means of In-situ and Virtual Modalities. Poster presented at the American Geophysical Union annual meeting in San Francisco, CA.

Mentorship

Graduate Students Supervised

4. Emily Godin, Ph.D., Geological Sciences, 2023–present.
3. Catherine Gross (Tremblay)³, Ph.D., Geological Sciences, 2023–present.
2. Heather Hewitt⁴, Ph.D., Astrophysics, 2021–present.
1. Grace Beall (Haverstock)⁴, M.S., Astrophysics, Thesis: “An Investigation of Students’ Quantitative Literacy in Online Astronomy Courses: Does Intelligent Tutoring Bridge the Gap?”, 2022–2024.

Graduate Students as Committee Member

2. Nolina Doud, Ph.D., History and Philosophy of Science, 2024–present.
1. Roni Sims, Ph.D., Astrophysics, 2023–present.

Undergraduate Thesis Students Mentored

2. Asher Hahn-Lowry, B.S., Biological Sciences, Thesis: “Seeing is Believing: The Power of Relatable Scientists in Shaping Student Futures”. 2025–present.
1. Sneha Yadav, B.S., Computer Information Systems, Thesis: “The Impacts of Interactive Learning Experiences with Various Levels of Immersivity on Students”, 2023–2024.

Post-Doctoral Scholars Mentored

1. Dr. Michole Washington. 2025.

Funded or Pending Grant Proposals

11. Pending—PI: NSF RITEL (\$877,624, 2026–2029) “Authentic Geoscience for All: Enhancing Adaptive Virtual Field Experiences using AI Translation Layers”
10. Pending—PI: ASU Woman & Philanthropy Grant Program (\$47,840, 2026) “Authentic Geoscience for All: Transforming General Education Geoscience Labs”
9. Pending—PI: Spencer Foundation Vision Grant (\$70,763.50, 2026–2027) “Using virtual experiences to bring in-person and online science students into the heart of research and academic life at research universities”
8. Pending—Co-PI: NSF IUSE:EDU (\$747,643, 2026–2028) “Investigating Scalable Research Elements in Undergraduate Astronomy Courses”
7. Funded—PI: ASU Learning Engineering Principled Innovation Grant Program (\$8000, 2026–2027) “Making simulation-based active learning accessible through computer vision”
6. Funded—PI: NSF IUSE HSI Award 2421374 (\$995,511 to ASU, 2024–2027) “Collaborative Research: HSI Implementation and Evaluation Project: Expanding access to high impact practices at HSIs: Using The Virtual Field to teach foundational STEM skills”
5. Funded—Co-PI: NSF RCN-UBE Award 2316453 (\$499,981, 2023–2027) “Undergraduate Virtual Experiences as Recruitment Tool for Underrepresented Students in STEM”

³co-supervised with Prof. Ariel Anbar

⁴co-supervised with Prof. Molly Simon

4. Funded—Co-PI (ASU PI): NSF IUSE Award 2110775 (\$934,478 to ASU, 2021–2026) “EHR-Polar DCL: Collaborative Research: Polar Explorer - A Virtual Learning Environment for Polar Science Education”
3. Funded—Co-PI: NSF IUSE Award 2121225 (\$299,840 to ASU, 2022–2024) “Bringing authentic research to the remote classroom: The first fully online Course-based Undergraduate Research Experience (CURE) for Astronomy majors”
2. Funded—Co-PI/Evaluator: NASA ROSES (\$4,984,729 to ASU, 2021–2025) “NASA SMD Community of Practice for Education (SCoPE)”
1. Funded—Evaluator: NASA (\$10,780,742 to ASU, 2021–2025, Renewal) “NASA SMD Exploration Connection”

Not Funded Grant Proposals

13. Not Funded—Co-PI: NSF DRK12 (\$466,373 to ASU, 2025–2028) “Collaborative Research: Finding a Place in a Virtual Space”
12. Not Funded—Co-PI: NSF DRK12 (\$1,324,486 to ASU, 2025–2028) “Supporting Data Literacy and Online Sensemaking of the Socioscientific Issue of Climate Change”
11. Not Funded—Co-PI: NSF IUSE (\$508,748 to ASU, 2025–2028) “Collaborative Proposal: Bright Spots: Identifying instructor, department, and institution-level factors that promote equitable STEM student success”
10. Not Funded—Co-PI: Women and Philanthropy (\$49,909, 2023–2024) “Examining the Social and Academic Barriers to Success for Female Military-Connected Students at ASU”
9. Not Funded—Co-PI: NSF IUSE (\$534,782 to ASU, 2024–2026) “Citizen Science as a Tool to Increase Data Literacy in the Undergraduate Astronomy Classroom”
8. Not Funded—Co-PI: NSF IUSE (\$141,148 to ASU, 2024–2027) “Collaborative Proposal: Bright Spots: A multi-institution collaboration to identify faculty and institutional characteristics for promoting equitable STEM student success”
7. Not Funded—Co-PI: NSF BII (\$3,022,801 to ASU, 2023–2029) “BII: Institute for Molecular Evolution and Extreme Environments (IME3)”
6. Not Funded—Co-PI: NSF IUSE (\$599,387 to ASU, 2023–2025) “Citizen Science as a Tool to Increase Data Literacy in the Undergraduate Classroom”
5. Not Funded—PI: NSF ITEST (\$1,375,797 to ASU, 2022–2024) “DTI: Student-Produced Virtual Field Trips: Democratizing Development of Digital Learning Experiences in the Earth, Environmental, And Sustainability Sciences”
4. Not Funded—Co-PI/Evaluator: NASA (\$301,237 to ASU, 2022–2025) “Enabling Exploration through the Planetary Science Outreach and Engagement Academy”
3. Not Funded—Co-PI: NSF HDR (\$15,977,157, 2021–2026) “HDR Institute: Data-Intensive Transformation of the Science of Learning”
2. Not Funded—Senior Personnel: NSF (\$1,747,453, 2020–2025) “The Human Artificial Intelligence for Learning Institute (HAIL.I): A proposal to NSF for a Research Institute on AI applied to Education”
1. Not Funded—Co-PI: Department of Education IES (\$558,088, \$39,713 to ASU, 2020–2022) “Using Computational Linguistics to Model 21st Century Competencies in Digitally-Mediated Collaborative Interactions”

Project Evaluation Experience

5. “The NASA Exploration Connection”, PI: Ariel Anbar (ASU), NASA (\$10,200,000, 2016–2025). Co-evaluator with Dr. Hilarie Davis.
4. “NASA SMD Community of Practice for Education (SCoPE)”, PI: Meenakshi Wadhwa (ASU), NASA (\$4,984,729, 2021–2025). Co-evaluator with Dr. Sanlyn Buxner.
3. “Consortium for Open Active Pathways (COAP)”, PI: Ariel Anbar (ASU), Department of Education (\$2,495,936, 2019–2022).
2. “Workshop on the Substance of STEM Education: Addressing the Gap Between Foundational, Meta, and Humanistic Knowledge”, PI: Ariel Anbar (ASU), NSF (\$98,874, 2020–2021).
1. “The SDG Experience - Student Immersion in SDG Solutions Through Virtual Field Trips”, PI: Rimjhim Aggarwal (ASU), Bill & Melinda Gates Foundation (\$100,000, 2019–2020).

Teaching and Course/Lesson Development Experience

Spring 2026	AST 112	Introduction to Stars, Galaxies, and Cosmology
2024–Present	NSF Grant	Led development of virtual field experiences for introductory biology and ecology courses
2021–Present	NSF Grant	Co-led development of virtual field experiences related to permafrost and climate change
Summer 2015	Geo 100/101	Introduction to Geology (Instructor)
Fall 2012	GLG 106	Worked with Prof. Ariel Anbar to develop an online, inquiry-driven course for non-science majors called “Habitable Worlds”
Spring 2010		
Fall 2009	CHM 302	Environmental Chemistry (Grader/Office hours)
Spring 2009	GLG 481	Geochemistry (Grader/Office hours)
Fall 2008	GLG 103	Introductory Geology (Lab)
Spring 2008	Geol 440	Sedimentology and Stratigraphy (Lab)
Fall 2007	Geol 143	History of Life (Lab, Head TA)
Spring 2007	Geol 100	Introductory Geology (Lab)
Spring 2007	Geol 118	Natural Disasters (Grader/Office hours)
Fall 2006	Geol 143	History of Life (Lab)

Recognition and Awards

2024	Journal of Geoscience Education Outstanding Reviewer Award
2021–2023	Member of steering committee for NSF award #2120709 entitled “RCN-UBE Incubator: U2-SAFE: Unifying Undergraduate Student Access to Field Experiences using The Virtual Field Platform”
2020	First author of the Journal of Geoscience Education’s 2020 Outstanding Paper of the Year for “Immersive, interactive virtual field trips promote learning”
2015	Selected as participant in NSF-funded ENGAGE (Encouraging Networks between Geoscience and Geoscience Education) workshop
2014	University of Nebraska Post-Doctoral Travel Grant
2011	GSA Student Travel Grant
2011	GSA Geoscience Education Division Student Travel Grant

2011	NSF Integrative Graduate Education and Research Traineeship (IGERT) Fellow
2010	Goldschmidt Student Travel Grant
2010	SESE Graduate Student Research Award
2008–2010	NSF IGERT Associate
2008	University of Illinois Geology department outstanding TA award

Professional Service

Ongoing	Reviewer for Journal of Geoscience Education, Computers & Education, International Journal of STEM Education, IEEE Transactions on Learning Technologies, Astrobiology
2025–	Associate Editor, Journal of Geoscience Education
2024–2025	Past President, NAGT Geoscience Education Research Division
2023–2024	President, NAGT Geoscience Education Research Division
2022–2023	Vice President, NAGT Geoscience Education Research Division
2022	NSF proposal reviewer

Professional Affiliations

National Association of Geoscience Teachers
American Geophysical Union
The Geological Society of America