

LAURA K. MEREDITHlaurameredith@arizona.edu | www.laurameredith.com**CHRONOLOGY OF EDUCATION**

- 2013 **Ph.D. Climate Physics and Chemistry**, Massachusetts Institute of Technology (MIT), Cambridge, MA. Dissertation thesis: "Field measurement of the fate of atmospheric H₂ in a forest from canopy to soil". Advisor: Ronald G. Prinn.
- 2005 **B.S. Chemistry**, Summa Cum Laude, California Polytechnic State University, San Luis Obispo, CA.

CHRONOLOGY OF EMPLOYMENT

- 2023– **Associate Professor**, School of Natural Resources and the Environment (SNRE), University of Arizona. Affiliated Faculty in the Hydrology and Atmospheric Sciences and Environmental Sciences Departments, Genetics & Global Change Graduate Interdisciplinary Programs, and BIO5 Institute
- 2018–2021 **Director**, Biosphere 2 - Tropical Rainforest, University of Arizona, Tucson, AZ.
- 2017–2023 **Assistant Professor**, SNRE, University of Arizona.
- 2016 **Research Associate**, with Dr. Scott Saleska, Ecology and Evolutionary Biology, University of Arizona.
- 2014–2015 **Postdoctoral Fellow**, with Dr. Paula Welander, Environmental Earth System Science, Stanford University, Stanford, CA.
- 2006–2013 **Research and Teaching Assistant**, with Dr. Ronald Prinn, Massachusetts Institute of Technology, Cambridge, MA.

HONORS AND AWARDS

- 2024 **SCIENCE Visiting Scholar**, University of Copenhagen.
- 2023 **Faculty Affiliate and Visiting Scholar**, Lawrence Berkeley National Lab.
- 2023 **Excellence in Postdoctoral Mentoring Award**, University of Arizona
- 2022 **Thomas Hilker Early Career Award for Excellence in Biogeosciences**, American Geophysical Union
- 2021–2026 **NSF CAREER Award**, Atmospheric Chemistry and Ecosystem Science Programs
- 2021 **Outstanding Faculty Mentor Award**, Undergraduate Biology Research Program, University of Arizona.
- 2021 **Research Faculty of the Year Award**, Division of Agriculture, Life and Veterinary Sciences, and Cooperative Extension, University of Arizona.
- 2021 **International Collaboration Award**, School of Natural Resources and the Environment, University of Arizona.
- 2020 **University of Arizona Team Award for Excellence**, Leader of Biosphere 2 – Water, Atmosphere and Life Dynamics team.
- 2019, 2020 **Campus RainWorks Challenge**, 2nd place national competition, Environmental Protection Agency.
- 2014–2015 **NSF Atmospheric and Geospace Sciences Postdoctoral Fellowship**, Stanford.
- 2013 **Outstanding PhD Thesis Award**, Carl-Gustaf Rossby Prize, Massachusetts Institute of Technology
- 2008 **Excellence in Teaching Award**, Massachusetts Institute of Technology
- 2006–2008 **NSF Graduate Research Fellowship**, Massachusetts Institute of Technology.

PUBLICATIONS

° Undergraduate and graduate student advisee or postdoctoral and staff mentee.

† Significant research product of Meredith lab. ^ Co-first authorship. * Based on graduate work.

1. Crocker°, L., Guo, J., U'Ren, J. M., Pugliese°, G., Ladd, S. N., Werner, C., **Meredith†, L. K.** (2025; in press). Volatile organic compound (VOC) exchange in tropical leaf litter in response to wetting: an automated scheme for classification of flux pulse dynamics. *JGR: Biogeosciences*. doi: 10.1029/2025JG008774 [Document online](#)
2. Ledford°, S. M., Geffre°, P. N., Marschmann, G. L., Karaoz, U., Brodie, E. L., and **Meredith†, L. K.** (2025) Volatile traits expand the microbial playbook. *Trends in Microbiology*. doi: 10.1016/j.tim.2025.08.00. [Document online](#)
3. Ledford°, S.M. and **Meredith, L.K.** (2024) Volatile Organic Compound Metabolism on Early Earth. *Journal of Molecular Evolution*. doi:10.1007/s00239-024-10184-x. [Document online](#)
4. Huang, J., Ladd, S.N., Ingrisich, J., Kübert, A., **Meredith, L.K.**, van Haren, J., Bamberger, I., Daber, E., Bailey, K., Hu, J., Fudyma, J., Shi, L., Dippold, M., Meeran, K., Miller°, L., O'Brien, M.J., Yang, H., Herrera-Ramírez, D., Hartmann, H., Trumbore, S., Bahn, M., Werner, C., and Lehmann, M.M. (2024) The mobilization and transport of newly-fixed carbon are driven by plant water-use in an experimental rainforest under drought. *Journal of Experimental Biology*. 75(8) doi: 10.1093/jxb/erae030. [Document online](#)
5. **Meredith, L.K.**, Ledford°, S.M., Riemer, K., Geffre°, P., Graves°, K., Honeker°, L.K., LeBauer, D., Tfaily, M.M., Krechmer, J. (2023) Automating methods for estimating metabolite volatility. *Frontiers in Microbiology*. doi: 10.3389/fmicb.2023.1267234. [Document online.](#)
6. Ladd, S.N., Daber, L.E., Bamberger, I., Kübert, A., Kreuzwieser, J., Purser, G., Ingrisich, J., Deleeuw°, J., van Haren, J., **Meredith, L.K.**, and Werner, C. (2023) Leaf-level metabolic changes in response to drought affect daytime CO₂ emission and isoprenoid synthesis. *Tree Physiology*, doi: 10.1093/treephys/tpad094. [Document online.](#)
7. Honeker°, L.K., Pugliese°, G., Ingrisich, J., Fudyma, J., Gil-Loaiza°, J., Carpenter, E., Singer, E., Hildebrand, G., Shi, L., Hoyt, D.W., Krechmer., J.E., Ayala-Ortiz, C., Freier-Zapata, V., Daber, L.E., Dippold, M., Kreuzwieser, J., Ladd, S.N., Werner, C., Tfaily, M.M., and **Meredith†, L.K.** (2023) Drought induced soil emissions of microbial volatile metabolites in an artificial tropical rainforest. *Nature Microbiology*, 1480–1494. doi: 10.1038/s41564-023-01432-9 [Document online.](#)
8. Pugliese°, G., Ingrisich, J., **Meredith, L.K.**, Pfannerstill, E.Y., Meeran, K., Byron, J., Purser, G., Gil-Loaiza°, J., van Haren, J., Kreuzwieser, J., Ladd, S.N., Werner, C., and Williams, J. (2023) The effect of prolonged drought and recovery on VOC soil fluxes in an enclosed tropical rainforest. *Nature Communications*, 14, 5064, doi: 10.1038/s41467-023-40661-8. [Document online.](#)
9. Hildebrand^, G. A., Honeker^°, L. K., Fudyma, J., Daber, L. E., AminiTabrizi, R., Ayala-Ortiz, C., Freier-Zapata, V., Chu, R., Toyoda, J., Flowers, S., Hoyt, D., Hamdan, R., Gil-Loaiza°, J., Shi, L., Dippold, M., Ladd, S. N., Werner, C., **Meredith, L. K.**, Tfaily, M. M. (2023) Uncovering the dominant role of root metabolism in shaping rhizosphere metabolome under drought in tropical rainforest plants. *Science of The Total Environment*, p.165689,doi: 10.1016/j.scitotenv.2023.165689. [Document online](#)
10. Kühnhammer, K., van Haren, J., Kübert, A., Bailey, B., Dubbert, M., Hu, J., Ladd, S.N., **Meredith, L.K.**, Werner, C., and Beyer, M. (2023) Deep roots mitigate drought impacts on tropical trees despite limited quantitative contribution to transpiration. *Science of The Total Environment*, p.164763, doi: 10.1016/j.scitotenv.2023.164763. [Document online](#)
11. Kübert, A., Dubbert, M., Bamberger, I., Kühnhammer, K., Beyer, M., van Haren, J., Bailey, K., Hu, J., **Meredith, L. K.**, Ladd, S. N., Werner, C. (2023) Tracing plant source water

- dynamics during drought by continuous transpiration measurements: an in-situ stable isotope approach. *Plant, Cell & Environment*. doi: 10.1111/pce.14475. [Document online](#)
12. Byron, J., Kreuzwieser, J., Purser, G., van Haren, J., Ladd, S.N., **Meredith, L.K.**, Werner, C., and Williams, J. (2022) Chiral monoterpenes reveal forest emission mechanisms and drought responses. *Nature*, 609, doi: 10.1038/s41586-022-05020-5. [Document online](#)
 13. **Meredith, L.K.** and Tfaily, M.T. (2022) The case for representing volatile metabolites in microbial metabolomics. *Trends in Microbiology*. doi: 10.1016/j.tim.2021.12.004. [Document online](#)
 14. Buzzard[°], V., Thorne[°], D., Gil-Loaiza[°], J., Cueva[°], A. and **Meredith†, L.K.** (2022) Sensitivity of soil hydrogen uptake to natural and managed moisture dynamics in a semiarid urban ecosystem. *PeerJ*. 10:e12966, doi: 10.7717/peerj.12966. [Document online](#)
 15. Honeker[^], L.K., Hildebrand[^], G.A., Fudyma, J.D., Daber, L.E., Hoyt, D., Flowers, S.E., Gil-Loaiza[°], J., Kübert, A., Bamberger, I., Anderton, C.R. and Cliff, J., Leichty, S., AminiTabrizi, R., Kreuzwieser, J., Shi, L., Bai, X., Velickovic, D., Dippold, M.A., Ladd, S.N., Werner, C., **Meredith†, L.K.**, and Tfaily, M.T. (2022) Elucidating drought tolerance mechanisms in plant roots through ¹H-NMR metabolomics and MALDI-MS and NanoSIMS imaging techniques. *Environmental Science and Technology*, doi: 10.1021/acs.est.1c06772. [Document online](#)
 16. Gil-Loaiza[°], J., Roscioli, J.R., Shorter, J.H., Volkmann, T.H., Ng, W.R., Krechmer, J.E. and **Meredith†, L.K.** (2022) Versatile soil gas concentration and isotope monitoring: optimization and integration of novel soil gas probes with online trace gas detection. *Biogeosciences*, 19, doi: 10.5194/bg-19-165-2022. [Document online](#)
 17. Dwivedi, D., Santos, A.L.D., Barnard, M.A., Crimmins, T.M., Malhotra, A., Rod, K.A., Aho, K.S., Bell, S.M., Bomfim, B., Brearley, F.Q. and Cadillo-Quiroz, H., Chen, J., Gough, C.M., Graham, E.B., Hakkenberg, C.R., Haygood, L., Koren, G., Lilleskov, E., **Meredith, L.K.**, Naeher, S., Nickerson, Z., Pourret, O., Song, H.-S., Stahl, M., Taş, N., Vargas, R., and Weintraub-Leff, S. (2022) Biogeosciences Perspectives on Integrated, Coordinated, Open, Networked (ICON) Science. *Earth and Space Sciences*. e2021EA002119, doi: 10.1029/2021EA002119. [Document online](#)
 18. Werner[^], C., Meredith[^], L.K., Ladd[^], S.N., Ingrisich, J., Kübert, A., van Haren, J., Bahn, M., Bailey, K., Bamberger, I., Beyer, M., Blomdahl, D., Byron, J., Daber, E., Deleeuw[°], J., Dippold, M.A., Fudyma, J., Gil-Loaiza[°], J., Honeker[°], L.K., Hu, J., Huang, J., Klüpfel, T., Krechmer, J., Kreuzwieser, J., Kühnhammer, K., Lehmann, M.M., Meeran, K., Misztal, P.K., Ng, W.R., Pfannerstill, E., Pugliese[°], G., Purser, G., Roscioli, J., Shi, L., Tfaily, M., Williams, J. (2021) Ecosystem fluxes during drought and recovery in an experimental forest. *Science*, 374(6574), doi: 10.1126/science.abj6789. [Document online](#)
 19. Sengupta, A., Volkmann, T.H., Danczak, R.E., Stegen, J.C., Dontsova, K., Abramson, N., Bugaj, A.S., Volk, M.J., Matos, K.A., Meira-Neto, A.A. and Barberán, A., Neilson, J.W., Maier, R.M., Chorover, J., Troch, P.A., **Meredith†, L.K.** (2021) Contrasting community assembly forces drive microbial structural and functional responses to precipitation in an incipient soil system. *Frontiers in Microbiology*, 12, doi: 10.3389/fmicb.2021.754698. [Document online](#)
 20. Buzzard[°], V., Gil-Loaiza[°], J., Grachet, N.G., Talkington[°], H., Youngerman[°], C., Tfaily, M.M. and **Meredith†, L.K.** (2021) Green infrastructure influences soil health: biological divergence one year after installation. *Science of the Total Environment*. 801, doi: 10.1016/j.scitotenv.2021.149644. [Document online.](#)
 21. Honeker[°], L.K., Graves[°], K.R., Tfaily, M.M., Krechmer, J.E. and **Meredith†, L.K.** (2021) The volatilome: a vital piece of the complete soil metabolome. *Frontiers in Environmental Science*. 9, doi: 10.3389/fenvs.2021.649905. [Document online.](#)

22. Roscioli[^], J.R., **Meredith[^], L.K.**, Shorter, J.H., Gil-Loaiza[°], J. and Volkmann, T.H. (2021) Soil gas probes for monitoring trace gas messengers of microbial activity. *Scientific Reports*. 11, doi: 10.1038/s41598-021-86930-8. [Document online.](#)
23. Kooijmans, L.M., Cho, A., Ma, J., Kaushik, A., Haynes, K.D., Baker, I., Lujikx, I.T., Groenink, M., Peters, W., Miller, J.B., Berry, J.A., Ogée, J., **Meredith, L.K.**, Sun, W., Kohonen, K.-M., Vesala, T., Mammarella, I., Chen, H., Spielmann, F. M., Wohlfahrt, G., Berkelhammer, M., Whelan, M. E., Maseyk, K., Seibt, U., Commane, R., Wehr, R., Krol, M. (2021) Evaluation of carbonyl sulfide biosphere exchange in the Simple Biosphere Model (SiB4). *Biogeosciences*, 8, doi: 10.5194/bg-18-6547-2021. [Document online.](#)
24. Jordaan, K., Lappan, R., Dong, X., Aitkenhead, I.J., Bay, S.K., Chiri, E., Wieler, N., **Meredith, L.K.**, Cowan, D.A., Chown, S.L. and Greening, C. (2020) Hydrogen-oxidizing bacteria are abundant in desert soils and strongly stimulated by hydration. *mSystems*, 5:e01131-20, doi: 10.1128/mSystems.01131-20. [Document online.](#)
25. Kroeger, M.E., **Meredith, L.K.**, Meyer, K.M., Webster[°], K.D., de Camargo, P.B., de Souza, L.F., Tsai, S.M., van Haren, J., Saleska, S., Bohannan, B.J., Rodrigues, J.L.M., and Nüsslein, K. (2020) Rainforest-to-pasture conversion stimulates soil methanogenesis across the Brazilian Amazon. *The ISME Journal*, 15(3), doi: 10.1038/s41396-020-00804-x. [Document online.](#)
26. Meyer, K.M., Morris, A.H., Webster[°], K., Klein, A.M., Kroeger, M.E., **Meredith, L.K.**, Brændholt[°], A., Nakamura, F., Venturini, A., de Souza, L.F., Danielson, R., van Haren, J., Barbosa de Camargo, P., Mui Tsai, S., Dini-Andreote, F., de Mauro, J.M.S., Nüsslein, K., Saleska, S., Rodrigues, J.L.M., and Bohannan, B.J.M. (2020) Belowground changes to community structure alter methane-cycling dynamics in Amazonia. *Environment International*, 145, doi: 10.1016/j.envint.2020.106131. [Document online.](#)
27. Martínez-Sosa[°], P., Tierney, J.E., **Meredith, L. K.** (2020) Controlled lacustrine microcosms show a brGDGT response to environmental perturbations. *Organic Geochemistry*, 145, doi: 10.1016/j.orggeochem.2020.104041. [Document online.](#)
28. **Meredith, L.K.**, Boye, K., Savage, K. and Vargas, R. (2020) Formation and Fluxes of Soil Trace Gases. *Soil Systems*, 4(22), doi: 10.3390/soilsystems4020022. [Document online.](#)
29. Nishisaka[°], C.S., Youngerman[°], C., **Meredith, L.K.**, do Carmo, J.B. and Navarrete, A.A. (2019) Seasonality increases N₂O emissions and denitrification gene abundance through soil and plant residue characteristics in citrus and eucalyptus plantations. *Frontiers in Environmental Science*, 7(11), doi: 10.3389/fenvs.2019.00011. [Document online.](#)
30. Cueva[°], A., Volkmann, T.H., van Haren, J., Troch, P.A. and **Meredith[†], L.K.** Variability and environmental controls of negative soil CO₂ fluxes: insights from a large-scale experimental hillslope. (2019) *Soil Systems*, 3(1), doi: 10.3390/soilsystems3010010. [Document online.](#)
31. **Meredith, L.K.**, Boye, K., Youngerman[°], C., Whelan, M., Ogée, J., Sauze, J. and Wingate, L. (2018a) Coupled biological and abiotic mechanisms driving carbonyl sulfide production in soils. *Soil Systems*, 2(3), doi: 10.3390/soilsystems2030037. [Document online.](#)
32. **Meredith, L.K.**, Ogée, J., Boye, K., Singer, E., Wingate, L., von Sperber, C., Sengupta, A., Whelan, M., Pang[°], E., Keiluweit, M. and Brüggemann, N., Berry, J.A., Welander, P.V. (2018b) Soil exchange rates of COS and CO¹⁸O shift with the diversity of microbial communities and their carbonic anhydrase enzymes, *The ISME Journal*, 13(2), doi: 10.1038/s41396-018-0270-2. [Document online.](#)
33. Volkmann, T. H. M., Sengupta, S., Pangle, L.A., Dontsova, K., Barron-Gafford, G. A., Harman, C. J., Niu, G.-Y., **Meredith, L. K.**, Abramson, N., Meira Neto, A. A., Wang, Y., Adams, J. R., Breshears, D. D., Bugaj, A., Chorover, J., Cueva[°], A., DeLong, S. B., Durcik, M., Ferre, T. P. A., Hunt, E. A., Huxman, T. E., Kim, M., Maier, R. M., Monson, R. K., Pelletier, J. D., Pohlmann, M., Rasmussen, C., Ruiz, J., Saleska, S. R., Schaap, M. G., Sibayan, M., Tuller, M., van Haren, J. L. M., Zeng, X., and Troch, P. A. (2018) Controlled Experiments of Hillslope Coevolution at the Biosphere 2 Landscape Evolution Observatory:

- Toward Prediction of Coupled Hydrological, Biogeochemical, and Ecological Change. *In* Jiu-Fu Liu and Wei-Zu Gu (Ed.), *Hydrology of Artificial and Controlled Experiments*, IntechOpen, doi: 10.5772/intechopen.72325. [Document online.](#)
34. Whelan, M. E., Lennartz, S. T., Gimeno, T. E., Wehr, R., Wohlfahrt, G., Wang, Y., Kooijmans, L. M. J., Hilton, T. W., Belviso, S., Peylin, P., Commane, R., Sun, W., Chen, H., Kuai, L., Mammarella, I., Maseyk, K., Berkelhammer, M., Li, K.-F., Yakir, D., Zumkehr, A., Katayama, Y., Ogée, J., Spielmann, F. M., Kitz, F., Rastogi, B., Kesselmeier, J., Marshall, J., Erkkilä, K.-M., Wingate, L., **Meredith, L. K.**, He, W., Bunk, R., Launois, T., Vesala, T., Schmidt, J. A., Fichot, C. G., Seibt, U., Saleska, S., Saltzman, E. S., Montzka, S. A., Berry, J. A., and Campbell, J. E. (2018) Reviews and Syntheses: Carbonyl Sulfide as a Multi-scale Tracer for Carbon and Water Cycles. *Biogeosciences*, 15, doi: 10.5194/bg-15-3625-2018. [Document online.](#)
 35. Wilson, R.M., Tfaily, M.M., Rich, V.I., Keller, J.K., Bridgham, S.D., Zalman, C.M., **Meredith, L.K.**, Hanson, P.J., Hines, M., Pfeifer-Meister, L. and Saleska, S.R. (2017) Hydrogenation of Organic Matter as a Terminal Electron Sink Sustains High CO₂:CH₄ Production Ratios During Anaerobic Decomposition. *Organic Geochemistry*, 112, doi: 10.1016/j.orggeochem.2017.06.011. [Document online.](#)
 36. **Meredith, L.K.**, Commane, R., Keenan, T.F., Klosterman, S.T., Munger, J.W., Templer, P.H., Tang, J., Wofsy, S.C. and Prinn, R.G. (2016) *Ecosystem fluxes of hydrogen in a mid-latitude forest driven by soil microbes and plants. *Global Change Biology*, 23(2), doi: 10.1111/gcb.13463. [Document online.](#)
 37. Khdhiri, M., Hesse, L., Popa, M.E., Quiza, L., Lalonde, I., **Meredith, L.K.**, Röckmann, T. and Constant, P. (2015) Soil Carbon Content and Relative Abundance of High Affinity H₂-Oxidizing Bacteria Predict Atmospheric H₂ Soil Uptake Activity Better than Soil Microbial Community Composition. *Soil Biology and Biochemistry*, 85, doi: 10.1016/j.soilbio.2015.02.030. [Document online.](#)
 38. Commane, R., **Meredith, L.K.**, Baker, I.T., Berry, J.A., Munger, J.W., Montzka, S.A., Templer, P.H., Juice, S.M., Zahniser, M.S. and Wofsy, S.C. (2015) *Seasonal fluxes of carbonyl sulfide in a mid-latitude forest. *PNAS*, 112(46), doi: 10.1073/pnas.1504131112. [Document online.](#)
 39. **Meredith, L. K.**, Commane, R., Munger, J. W., Dunn, A., Tang, J., Wofsy, S. C., & Prinn, R. G. (2014a) *Ecosystem fluxes of hydrogen: a comparison of flux-gradient methods. *Atmospheric Measurement Techniques*, 7, doi: 10.5194/amt-7-2787-2014. [Document online.](#)
 40. **Meredith, L.K.**, Rao°, D., Bosak, T., Klepac-Ceraj, V., Tada, K.R., Hansel, C.M., Ono, S. and Prinn, R.G (2014b) *Consumption of atmospheric H₂ during the life cycle of soil-dwelling actinobacteria. *Environmental Microbiology Reports*, 6(3), doi: 10.1111/1758-2229.12116. [Document online.](#)
 41. Ganesan, A.L., Chatterjee, A., Prinn, R.G., Harth, C.M., Salameh, P.K., Manning, A.J., Hall, B.D., Mühle, J., **Meredith, L.K.**, Weiss, R.F., O'Doherty, S., and Young, D. (2013) *The variability of methane, nitrous oxide and sulfur hexafluoride in Northeast India. *Atmospheric Chemistry and Physics*, 13, doi: 10.5194/acp-13-10633-2013. [Document online.](#)

EXTRAMURAL GRANTS

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- PI **National Science Foundation Atmospheric and Geospace Sciences (AGS) and Division of Environmental Biology (DEB).** “The future of the atmospheric hydrogen soil sink: is adaptation enough?” (\$1,72,000 Total Costs; \$451,524 Indirect Costs; \$1,268,476 Direct Costs; 7.51% effort; 2025)
- PI **Department of Energy Biological and Environmental Research Systems Biology.** “A volatile environment: How volatile mediated plant and microbial interactions extend the rhizosphere and enhance soil carbon storage” (\$3,424,395 Total Costs)

- PI **National Science Foundation CAREER Atmospheric and Geospace Sciences (AGS) and Division of Environmental Biology (DEB) #2045332:** “*CAREER: Unearthing the role of belowground biology in biosphere-atmosphere VOC exchange.*” (\$757,945 Total Costs; UA 9/1/21-8/31/26)
- PI **National Science Foundation (NSF) Division of Environmental Biology (DEB) #2034192:** “*SitS: Sniffing the Soil Volatilome: Decoding Microbial Interactions in Soil Systems using Subsurface Sensors.*” Co-PIs: J. Krechmer, D. Hagan, M. Tfaily (\$531,236 Total Costs; 1/1/21-12/31/23). Includes a FY22 REU Supplement.
- PI **National Science Foundation (NSF) Atmospheric and Geospace Sciences (AGS) #1933280:** “*Advancing OCS as an independent atmospheric tracer for global photosynthesis through quantification of microbial-mediated sources and sinks in soils.*” Co-PIs: J. U’Ren, R. Commane, I. Baker (\$748,914 Total Costs; 1/15/20-12/31/22). Includes a FY22 REU Supplement.
- PI **Department of Energy (DOE) Facilities Integrating Collaborations for User Science #60045:** “*Belowground genotype-phenotype controls on nitrogen use efficiency of a sorghum bioenergy crop.*” Co-PIs: M. Tfaily, J. R. Roscioli, D. Pauli, J. Shorter, J. Krechmer, A. E. Arnold (\$142,546-value user facility award, Joint Genome Institute and Environmental Molecular Sciences Laboratory core facility use; 10/1/21-10/1/22)
- PI **DOE Joint Genome Institute Community Science Program Small Scale Sequencing Award #502880:** “*Life on LEO - spatiotemporal characterization of the diversity and metabolism of incipient microbial life on the Landscape Evolution Observatory.*” Co-PIs: A. Sengupta, T. Volkman, P. Troch. (\$0, sequencing award; 2017-2019).
- Co-PI **National Science Foundation Signals in the Soil.** “*SitS: Spatial and Temporal Mapping of Dissolved Organic Matter Transformations in the Rhizosphere Using Subsurface Gas and Aqueous Phase Probe Networks*” PI: J. Robert Roscioli, Aerodyne Research, Inc. (\$1,199,958)
- Co-PI **Department of Energy Office of Biological and Environmental Research (BER) Environmental Systems Science DE-SC0022135:** “*Trees as conduits for connecting belowground microbial processes to aboveground CH₄ emissions at the Terrestrial-Aquatic Interface*”. PI: Scott Saleska (\$999,260 Total Costs; 09/01/2021-08/31/2023)
- Co-PI **Department of Energy (DOE) Office of Biological and Environmental Research (BER) Small Business Innovation Research (SBIR) Phase II DE-SC0018459:** “*Spatially-Resolved Microbial Activity Probe Using Infrared Measurements of Nitrous Oxide and Methane Isotopes in Soil.*” Lead PI: Rob Roscioli, Aerodyne Research, Inc., Billerica, MA. (\$1,500,000 Full Award; \$554,098 Total Costs; 5/28/19-5/27/22)
- Co-PI **DOE Office of Biological and Environmental Research (BER) Small Business Innovation Research (SBIR) Phase I DE-SC0018459:** “*Spatially-Resolved Microbial Activity Probe Using Infrared Measurements of Nitrous Oxide and Methane Isotopes in Soil.*” Lead PI: Rob Roscioli, Aerodyne Research, Inc., Billerica, MA. (\$225,000 Full Award; 5/3/18-1/8/19)
- Co-PI **Department of Energy (DOE) Facilities Integrating Collaborations for User Science #50971:** “*Rhizosphere effects on soil organic matter decomposition and microbial activity in a tropical rainforest under drought: unearthing aggregate- to ecosystem-scale contributions to carbon cycling through whole-ecosystem stable isotope labeling.*” PI M. Tfaily, Co-PIs: L. Meredith, J. U’Ren, B. Hurwitz, C. Werner, M. Dippold (\$88,000-value user facility award, Joint Genome Institute and Environmental Molecular Sciences Laboratory core facility use; 0% effort 9/1/19-9/1/21)
- SP **National Science Foundation Research Traineeship** Understanding Rules of Life #2022055: “*BRIDGES - Building Resources for InterDisciplinary training*”. PI: Scott Saleska (\$2,999,859 Total Costs; 09/01/2020-08/31/2025)

PATENTS

2021 **Meredith, L.K.**, Moma^o, P., and Volkmann, T.H.M. Patent application No. 63/187527 and Patent No. PCT/US22/28964 "IN SITU SOIL GAS PROBES AND SAMPLING SYTEMS" filed 12 May 2021.

TEACHING, ADVISING, AND MENTORSHIP**Teaching**

- 2026 **Atmospheric and Ecosystem Measurements** (RNR 497/597), 3-unit, upper division. *New course* supported by NSF CAREER
- 2025 **Sustainable Earth** (RNR150), 3-unit, undergraduate general education.
2022– **Vertically Integrated Program (VIP) on the Microbial Volatilome.** Multidisciplinary, team-based learning model that engages undergraduates (10 thus far) in faculty-led research supported by NSF CAREER.
- 2020-2022 **Teaching Fellow**, Biosphere 2 Innovative Faculty Teaching
2018, 2021 **Ecosystem Genomics Seminar** (RNR696/496-005), 2-unit, upper division undergraduate/graduate course. *New course*
- 2020, 21, 22 **Ecosystem Ecology** (RNR458/558), 3-unit, upper division undergraduate/graduate course using already developed materials.
- 2019 **Ecology of Water Harvesting** (RNR696-004/496-002), 1-unit, upper and lower division collaborative course on the integration of ecological and aesthetic principles in landscape design. *New course* supported by **Teaching Innovation Grant**.
- 2019 **Atmosphere-Biosphere Interactions** (RNR 555), 3-unit, graduate course. *Adapted to existing syllabus, developed all new course materials*
- 2018 **Instructor** (RNR 322), SNRE field course, soil and microbial dynamics.
2016 **Short Course Instructor**, Biodiversity and conservation in the tropics: a molecular approach, Universidade de So Paulo (USP) CENA. (1 month before faculty position in Fall 2016)
- 2019 **Participant**, National Ecological Observatory Network (NEON) Faculty Mentoring Network.

Advising and Mentorship:

- **Masters theses advised:**
 - Phoenix Spivey (advisor, SNRE, Fall 2022-current).
 - Meara Clark (advisor, SNRE, Fall 2021-current).
 - Peter Moma (advisor, SNRE, Fall 2018-Spring 2021).
- **Doctoral theses advised:**
 - C. Allison Newton (advisor, SNRE, Summer 2020-current).
 - S. Marshall Ledford (advisor, Genetics, Fall 2021-current).
 - Parker Geffre (advisor, ENVS, Fall 2024-current).
- **Graduate students advised, not as primary advisor:**
 - Harrison Friedmen (SNRE, MS Fall 2021-Fall 2023)
 - Lia Crocker (advised on volatile organic compound measurements and interpretation, primary advisor Dr. Jana U'Ren, Biosystems Engineering, MS Spring 2020-Fall 2021).
 - Pablo Martinez Sosa (advised on microbiology, primary advisor Dr. Jessica Tierney, Geoscience, MS Spring 2017-Spring 2018, PhD Fall 2018-Spring 2022).

- I have advised over 70 individuals at UA including 4 research specialists, 6 postdocs, 8 graduate students, 42 undergraduates, and 10 high school students.

CONFERENCES AND SCHOLARLY PRESENTATIONS (last 3 years)

Invited seminars

1. Oregon State University. "Beneath the Surface: volatile organic compound exchange of the soil and rhizosphere." Host Kimberly Halsey (July 2025)
2. CSIRO Future Science Platform on 'Microbiomes for One System Health' InterActive Biomes Initiative, online webinar, "A volatile environment: on the unique and widespread roles of microbial volatiles below ground". Host Gupta Vadakattu (September 2024)
3. University of East Anglia, Norwich, UK, "Sensitivity of soil microbial volatile organic compound metabolism to drought and rewet". Host Marcela Hernández (May 2024)
4. Cambridge University, Cambridge, UK, "Soil uptake of molecular H₂ in natural, urban and experimental systems". Host Nicola Warwick (May 2024)
5. University of Copenhagen, Denmark, "Microbial VOC cycling along the soil-plant-atmosphere continuum". Host Riikka Rinnan (April 2024)
6. Scripps Institute of Oceanography, "Microbial imprint on the atmosphere: Unearthing the microbial drivers of soil trace gas cycling". Host Christopher Charles (April 2023)
7. Bioscience Division, Los Alamos National Laboratory, "Green Infrastructure Impacts on Soil Health." Host Marie Kroeger (June 2022).
8. Earth System Science, Stanford University, "Sensitivity of soil microbial volatile organic compound metabolism to drought and rewet." Host Morgan O'Neill (June 2022)
9. Department of Geosciences, Princeton University, "Sniffing the soil: what subsurface soil gas and isotope measurements reveal about plant-microbe interactions, nitrogen cycling, and soil N₂O and NO emissions." Host Linta Reji (March 2022).
10. Department of Ecology, Lawrence Berkeley National Lab, "Revealing ecosystem interactions through novel whole-ecosystem online stable isotope labeling and measurement approaches. Host Eoin Brodie (April 2021).
11. Ecology and Evolutionary Biology, Institut de Biologie de l'École Normale Supérieure, "Linking microbial genes to emergent outcomes in soil systems." Host Regis Ferrière (May 2019).

Invited Presentations at Conferences and Symposia

1. American Geophysical Union (AGU) Fall Meeting, New Orleans, LA. **Meredith, L. K.** "Soils as Engines of Volatile Exchange: Linking Belowground Processes to Atmospheric Chemistry" (December 2025)
2. American Society of Plant Biologists 2025: Global. **Meredith, L.K.** "Fate of Root-Derived Volatiles in Soil: Transport, Transformations, and Stabilization. (August 2025)
3. Biogenic Hydrocarbons and the Atmosphere Gordon Research Conference, Barcelona, Spain. **Meredith, L.K.** "Beneath the Surface: BVOC Exchange of the Soil and Rhizosphere" (June 2024)
4. European Geophysical Union General Assembly session on Eco-Omics: Harnessing meta-omics to understand the biogeosciences across scales: from the cell to Earth system. **Meredith, L.K.** Integrating multi-omic and isotopic approaches to identify plant-microbe interactions driving N₂O emissions from agricultural soil" (April 2024)
5. Microbes Persist: Soil Microbiome Science Focus Area Meeting, invited plenary talk, Livermore, CA. **Meredith, L.K.** "A volatile environment: integrating volatiles and 'omics to investigate soil microbiomes and their function". (January 2024)
6. DOE Genomic Science Program Annual PI Meeting. **Meredith, L.K.** "Volatile Mediated Plant and Microbial Interactions and Their Potential to Extend the Rhizosphere and Enhance Soil Carbon Storage". (April 2024)

7. *Microbial Cycling of Volatile Organic Compounds, Microbiological Society, Norwich, UK. **Meredith, L.K.**, Honeker^o, L.K. (*presenting author*), Pugliese^o, G., Friere Zapata, V.E., Ayala-Ortiz, C.O., Ingrisch, J., Tfaily, M., Williams, J., Werner, C., Ladd, S.N., and the B2 WALD Team “Sensitivity of soil microbial VOC metabolism to drought and rewet”. (May 2022)
8. *American Geophysical Union (AGU) Fall Meeting, New Orleans, LA. **Meredith, L. K.**, Werner, C., Ladd, N. S., Pugliese^o, G., Honeker^o, L. Ingrisch, J., van Haren, J., Tfaily, M., Williams, J., The WALD Team. “Soil-microbe-plant feedbacks to ecosystem drought in a model tropical rainforest ecosystem” (December 2021).
9. *American Geophysical Union (AGU) Fall Meeting, New Orleans, LA. **Meredith, L. K.**, Roscioli, J. R., Shorter, J., Krechmer, J., Gil-Loiaza^o, J., Lunny, E., Clark^o, M., Grigory^o, J., Pauli, D., Demieville, J., Werner, C., Ladd, N. S., The B2 WALD Team. “Subsurface stable isotope approaches for resolving nitrogen transformations in the critical zone” (December 2021).
10. *Integrated Land Ecosystem Atmosphere Processes Study (iLEAPS) Conference, Session on the role of soil and microorganism in affecting the global carbon and water cycles. **Meredith, L. K.** “Belowground perspective on soil microbial volatile cycling” (18 March 2021)
11. *American Geophysical Union (AGU) Fall Meeting, San Francisco, CA. **Meredith, L.K.**, Gil-Loaiza^o, J., Roscioli, J.R., Shorter, J.H., Krechmer, J.E. “Integrating Soil Genomics into the Study of Biosphere-Atmosphere Trace Gas Fluxes.” (December 2019)

SYNERGISTIC ACTIVITIES AND SERVICE

- 2023– **Associate Editor**, Global Biogeochemical Cycles (AGU)
- 2020–2023 **Chair/Member, AGU Fall Meeting Planning Committee**, Biogeosciences Section
- 2021 **AGU Fall Meeting Convener**, “Microbial sources and sinks of volatile organic compounds (VOCs)”
- 2020 **Panelist**, BIO5 Inspiring Women in STEM, UA.
- 2019 **AGU Fall Meeting Convener**, “Ecosystem-scale interactions using large-scale stable isotope labeling”
- 2019 **Participant**, EMSL Ecotron workshop, DOE Pacific Northwest National Lab, Richland, WA.
- 2017 **AGU Fall Meeting Convener**, “Advancing Understanding of Hydrological and Biogeochemical Interactions in Terrestrial Ecosystems Through Large-Scale Model Systems”

LEADERSHIP

2019- **Co-Lead of International Research Campaign**, Dr. Meredith led the Biosphere 2 Water, Atmosphere, and Life Dynamics Campaign (B2WALD) with Drs. Christiane Werner and Nemiah Ladd of University of Freiburg. The 5-month campaign applied ecosystem-scale isotope labeling across drought in Tropical Rainforest biome, involving >90 participants, 14 institutions, 5 countries, \$5M in instrumentation, >25 media events. With the first paper published last year in *Science* (Werner, Meredith, Ladd, et al., 2021).

PEER REVIEWER

Funding agency panels

2018-2023 DOE, NSF, NASA

Journals (34 journals, ca. 9 manuscripts/year)

Journals: Agronomy, Applied and Environmental Microbiology, Applied Soil Ecology, Atmospheric Chemistry and Physics, Atmospheric Pollution Research, Biogeosciences, Biology and Fertility of Soils, Elementa, Environmental Microbiology, Environmental Science and Technology, FEMS Microbiology Letters, Frontiers in Microbiology, Functional Ecology, JGR Biogeosciences, Geoderma, Geoscientific Model Development, Global Biogeochemical Cycles, Global Change Biology, Microbial Ecology, Molecules, Nature Communications, Nature Reviews Chemistry, New Phytologist, npj Climate and Atmospheric Science, PeerJ, Science of the Total Environment, Scientific Reports, Soil Biology and Biochemistry, Soil Ecology, Soil Science Society of America Journal, Soil Systems, Soils, The ISME Journal, Trends in Microbiology. **Book chapters:** American Society of Agronomy (ASA), Crop Science Society of America (CSSA), and Soil Science Society of America (SSSA). **Books:** n/a.

SELECTED MEDIA COVERAGE OF RESEARCH

- 2024 Office of Science, During Droughts, Soil Microbes Produce Volatile Carbon Metabolites. <https://www.energy.gov/science/ber/articles/during-droughts-soil-microbes-produce-volatile-carbon-metabolites>
- 2024 DOE Office of Science, Three Techniques, Three Species, Different Ways to Fight Drought <https://www.energy.gov/science/ber/articles/three-techniques-three-species-different-ways-fight-drought>
- 2022 University of Arizona News, How a forest's smell could help scientists sniff out drought stress (21 September 2022). <https://news.arizona.edu/story/how-forests-smell-could-help-scientists-sniff-out-drought-stress>
- 2022 Arizona Public Radio, Arizona's glassed-in rainforest offers unique chance to study how plants endure during drought (17 January 2022). <https://www.knau.org/knau-and-arizona-news/2022-01-17/arizonas-glassed-in-rainforest-offers-unique-chance-to-study-how-plants-endure-during-drought>
- 2021 Science Magazine, Ecosystem effects of environmental extremes: A large-scale experimental facility reveals tropical rainforest responses to drought, doi: 10.1126/science.abn1406 (17 December 2021). <https://www.science.org/doi/10.1126/science.abn1406>
- 2020 NPR Science Friday, Studying Drought, Under Glass (10 January 2020). <https://www.sciencefriday.com/segments/state-of-science-biosphere-drought/>
- 2019 Science Magazine, Unprecedented drought in an artificial ecosystem may reveal how rainforests will cope with climate change, doi:10.1126/science.aaz8799 (17 October 2019). <https://www.sciencemag.org/news/2019/10/putting-artificial-ecosystem-drought-could-reveal-how-rainforests-will-cope-climate>
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