

## Eric A. Davidson

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### EMPLOYMENT

**Appalachian Laboratory, University of Maryland Center for Environmental Science**, Director (2015-2021), Professor (2015-present).  
**Spark Climate Solutions**, Principal Scientist, (2022 – present)  
**The Woods Hole Research Center**: President and Executive Director (2011-2013); Senior Scientist (1999-2014); Associate Scientist (1994-1998); Assistant Scientist (1991-1993).  
**National Research Council Associate**: Ecosystem Science and Technology Branch of the NASA Ames Research Center (1989-1991).  
**Post-Doctorate Research Associate and Lecturer in Soil Microbiology**: Dept. of Plant and Soil Biology, University of California, Berkeley (1986-1989).  
**Peace Corps Volunteer**: Public health project in Zaire (1979-1981).

### EDUCATION

Ph.D. 1986. Department of Forestry, North Carolina State University.  
*Graduate Honors*: National Science Foundation Graduate Fellowship; National Science  
A.B. 1978. Oberlin College. Biology major.  
*Undergraduate Honors*: Highest Honors in Biology; Phi Beta Kappa

### HONORS

Fulbright-Nehru Scholar, 2024-2025  
Jefferson Science Fellow, National Academy of Sciences, U.S. Dept. of State, 2021-2022.  
Fellow, American Geophysical Union, 2019.  
Fellow, American Association for the Advancement of Science, 2010.  
ISI/Clarivate/Publons Highly Cited Researcher, 2007, 2015-2022.

### PROFESSIONAL ACTIVITIES

President (2017-2018) & President-Elect (2015-2016), American Geophysical Union (AGU).  
President & President-Elect, Biogeosciences section of the American Geophysical Union, 2011-2014.  
AGU Ethics Chair, 2021 - present.  
North American Center Director, International Nitrogen Initiative, 2010 - 2014.  
Senior Editor, *AGU Advances*, 2019 - present.  
Senior Editor, *Global Biogeochemical Cycles*, 2014.  
Senior Subject Editor, *Global Change Biology*, 2001 - 2011.  
Large Scale Biosphere-Atmosphere Experiment in Amazonia (LBA), Science Steering Committee Member (1996 - 2011), NASA Project Scientist (2008 - 2011).

### CITATION STATISTICS

Web of Science: <https://www.webofscience.com/wos/author/record/K-4984-2013>  
Total Citations: 43,041; H-Index: 100; updated Nov. 14, 2024  
Google Scholar: <https://scholar.google.com/citations?user=Frt0qscAAAAJ&hl=en&oi=ao>  
Total Citations: 74555; H-Index: 121; updated Nov 14, 2024

## MEMBERSHIP IN PROFESSIONAL SOCIETIES

American Geophysical Union  
Ecological Society of America

American Association for the Advancement of Science  
Soil Science Society of America

## LIST OF PUBLICATIONS

### BOOKS and BOOKLETS:

- Davidson, E., B. Gu, and D. Kanter. 2024. Implementing Nitrous Oxide Abatement Measures. pp. 133-169 In: United Nations Environment Programme, & Food and Agriculture Organization of the United Nations (2024). Global Nitrous Oxide Assessment. <https://wedocs.unep.org/20.500.11822/46562>.
- Davidson, E.A. 2022. Science for a Green New Deal: Connecting Climate, Economics, and Social Justice, Johns Hopkins University Press, Baltimore, Maryland, USA.
- Luterbacher, J. et al. 2021. United in Science 2021, A Multi-Organization High-Level Compilation of the Latest Climate Science Information. World Meteorological Organization, [public.wmo.int/en/resources/united\\_in\\_science](http://public.wmo.int/en/resources/united_in_science).
- Davidson, E.A., D. Kanter, E.C. Suddick and P. Syntharalingham (2013). Chapter 3: N<sub>2</sub>O: Sources, Inventories, Projections. In J. Alcamo, S.A. Leonard, A.R. Ravishankara, and M. A. Sutton (eds.). *Drawing Down N<sub>2</sub>O to Protect Climate and the Ozone Layer*. A UNEP Synthesis Report. United Nations Environment Programme (UNEP), Nairobi, Kenya, ISBN: 978-92-807-3358-7 DEW/1748/NA.
- Sutton M.A., Bleeker A., Howard C.M., Bekunda M., Grizzetti B., de Vries W., van Grinsven H.J.M., Abrol Y.P., Adhya T.K., Billen G., Davidson E.A, Datta A., Diaz R., Erisman J.W., Liu X.J., Oenema O., Palm C., Raghuram N., Reis S., Scholz R.W., Sims T., Westhoek H. & Zhang F.S. 2013. *Our Nutrient World: The challenge to produce more food and energy with less pollution*. Centre for Ecology and Hydrology, Edinburgh. [www.unep.org](http://www.unep.org).
- Suddick, E.C., and E.A. Davidson. 2012. The Role of Nitrogen in Climate Change and the Impacts of Nitrogen-Climate Interactions on Terrestrial and Aquatic Ecosystems, Agriculture, and Human Health in the United States: A Technical Report Submitted to the US National Climate Assessment. North American Nitrogen Center of the International Nitrogen Initiative (NANC-INI). Woods Hole Research Center, Falmouth, MA.
- WHRC and UNEP. 2007. Reactive Nitrogen in the Environment: Too Much or Too Little of a Good Thing. Eric A. Davidson, Charles Arden-Clarke, and Elizabeth Braun (eds.). The United Nations Environment Programme. Paris, France.
- Davidson, E.A. 2000. You Can't Eat GNP. Perseus Publishing, Cambridge, MA, 247pp.
- Adams, M.B., E.A. Davidson, and K. Ramakrishna (eds.) 1998. The Contribution of Soil Science to the Development and Implementation of Criteria and Indicators of Sustainable Forest Management. Soil Science Society of America Special Publication No. 53, Madison, WI, 156pp.

### JOURNALS AND BOOK CHAPTERS:

- Davidson, E.A., D.R. Monteverde, and J.D. Semrau 2024. Viability of enhancing methanotrophy in terrestrial ecosystems exposed to low concentrations of methane. *Communications Earth & Environment*, 10.1038/s43247-024-01656-5.
- Zhang, X., R. Sabo, L. Rosa, H. Niazi, P. Kyle, J.S. Byun, Y. Wang, X. Yan, B. Gu, and E.A. Davidson. 2024. Nitrogen management during decarbonization. *Nature Reviews Earth & Environment*, <https://doi.org/10.1038/s43017-024-00586-2>.

- Zhu, Q., E.A. Davidson, J.G. Hagedorn, M.S. Castro, T.R. Fisher, R.J. Fox, S.E. Brown, J.W. Lewis. 2024. Evaluation of impacts of biosolids application and drainage water management on soil N<sub>2</sub>O and CH<sub>4</sub> emissions using the flux gradient method. *Agriculture, Ecosystems and Environment*, 377, 109273.
- Tian, H. et al. (57 co-authors). 2024. Global nitrous oxide budget 1980-2020. *Earth System Science Data*, <https://doi.org/10.5194/essd-16-2543-2024>.
- Zhang, L. et al. (14 co-authors). 2024. Global nitrous oxide emissions from livestock manure during 1890–2020: An IPCC Tier 2 inventory. *Global Change Biology*, 30, e17303, <https://onlinelibrary.wiley.com/doi/10.1111/gcb.17303>.
- Cui, X., Y. Bo, W. Adalibieke, W. Winiwarter, X. Zhang, E.A. Davidson, Z. Sun, H. Tian, P. Smith, and F. Zhou. 2024. The global potential for mitigating nitrous oxide emissions from croplands. *One Earth*, 7, <https://doi.org/10.1016/j.oneear.2024.01.005>.
- Zou, T., E.A. Davidson, R.D. Sabo, G.K. MacDonald, and X. Zhang. 2024. Disparities in nitrogen and phosphorus management across time and space: a case study of the Chesapeake Bay using the CAFE framework. *Environmental Research Letters*, 19, 114016, DOI 10.1088/1748-9326/ad786c.
- AGU Editorial Network (2024). Challenges facing scientific publishing in the field of Earth & space sciences. *AGU Advances*, 5, e2024AV001334. <https://doi.org/10.1029/2024AV001334>.
- Noh, N.J. et al. (12 coauthors). 2024. Reconciling top-down and bottom-up estimates of ecosystem respiration in a mature eucalypt forest. *Journal of Geophysical Research: Biogeosciences*, 129, e2024JG008064. <https://doi.org/10.1029/2024JG008064>.
- Davidson, E.A. and W. Winiwarter. 2023. Urgent abatement of industrial sources of nitrous oxide. *Nature Climate Change*, 13:599–601, <https://doi.org/10.1038/s41558-023-01723-3>.
- Davidson, E.A., J.D. Semrau, and N.K. Nguyen. 2023. Improved scientific knowledge of methanogenesis and methanotrophy needed to slow climate change during the next 30 years. *mBio*, 10.1128/mbio.02059-23.
- Zhu, Q., E.A. Davidson, J.G. Hagedorn, M.S. Castro, T.R. Fisher, R.J. Fox, S.E. Brown, and J.W. Lewis. 2023. Quantification of soil N<sub>2</sub>O and CH<sub>4</sub> fluxes using the flux gradient method on a drainage water managed farm on the eastern shore of Maryland. *Agricultural and Forest Meteorology* 343, 109762, <https://doi.org/10.1016/j.agrformet.2023.109762>.
- Grosz B. et al. (24 coauthors). 2023. Modeling denitrification: can we report what we don't know? *AGU Advances*, e2023AV000990. <https://doi.org/10.1029/2023AV000990>
- Li, T., X. Zhang, Y. Zhong, E.A. Davidson, Z. Dou, W. Zhang, P.S. Pavinato, L.A. Martinelli, D.R. Kanter, J. Liu, and F. Zhang. 2022. A hierarchical framework for unpacking the nitrogen challenge. *Earth's Future*, 10, e2022EF002870. <https://doi.org/10.1029/2022EF002870>.
- Zou, T., X. Zhang, and E.A. Davidson. 2022. Global trends of cropland phosphorus use and sustainability challenges. *Nature*, <https://doi.org/10.1038/s41586-022-05220-z>.
- Davidson, E.A. 2022. Is the transactional carbon credit tail wagging the virtuous soil organic matter dog? *Biogeochemistry*, <https://doi.org/10.1007/s10533-022-00969-x>.
- Zhang, X., Y. Wang, L. Schulte-Uebbing, W. de Vries, T. Zou, and E. Davidson. 2022. The sustainable nitrogen management index (SNMI): definition, global assessment, and potential improvements. *Frontiers of Agricultural Science and Engineering*. <https://doi.org/10.15302/J-FASE-2022458>.
- Hagedorn, J.G., E.A. Davidson, T.R. Fisher, R.J. Fox, Q. Zhu, A.B. Gustafson, E. Koontz, M.S. Castro, and J. Lewis. 2022. Effects of drainage water management in a corn–soy rotation on soil N<sub>2</sub>O and CH<sub>4</sub> fluxes. *Nitrogen* 3, 128–148. <https://doi.org/10.3390/nitrogen3010010>.
- Saifuddin, M., R.Z. Abramoff, E.A. Davidson, M.C. Dietze, and A.C. Finzi. 2021. Identifying data needed to reduce parameter uncertainty in a coupled microbial soil C and N decomposition model. *Journal of Geophysical Research: Biogeosciences*, 126, e2021JG006593, <https://doi.org/10.1029/2021JG006593>.
- Xu, R. et al. (29 coauthors). 2021. Magnitude and uncertainty of nitrous oxide emissions from North America based on bottom-up and top-down approaches: informing future research and national inventories. *Geophysical Research Letters*, 48, e2021GL095264. <https://doi.org/10.1029/2021GL095264>.

- Kanter, D. et al. (14 coauthors). 2021. Improving the social cost of nitrous oxide. *Nature Climate Change*, <https://doi.org/10.1038/s41558-021-01226-z>.
- Cui, X. et al. (18 coauthors). 2021. Global mapping of crop-specific emission factors highlights hotspots of nitrous oxide mitigation. *Nature Food* 2:886–893, <https://doi.org/10.1038/s43016-021-00384-9>.
- Zhang, X. et al. (18 coauthors). 2021. Quantitative assessment of agricultural sustainability reveals divergent priorities among nations. *One Earth* 4, 1262–1277, <https://doi.org/10.1016/j.oneear.2021.08.015>.
- Yao, G., X. Zhang, E.A. Davidson, and F. Taheripour. 2021. The increasing global environmental consequences of a weakening US-China crop trade relationship. *Nature Food*, 2:578–586m <https://doi.org/10.1038/s43016-021-00338-1>.
- Zhang, X. et al. (26 coauthors). 2021. Quantification of global and national nitrogen budgets for crop production. *Nature Food*, 2:529–540, <https://doi.org/10.1038/s43016-021-00318-5>.
- Hollinger, D.Y., E. A. Davidson, S. Fraver, H. Hughes J. T. Lee, A. D. Richardson, K. Savage, D. Sihi, and A. Teets, 2021. Multi-decadal carbon cycle measurements indicate resistance to external drivers of change at the Howland forest AmeriFlux site. *Journal of Geophysical Research: Biogeosciences*, 126, e2021JG006276. <https://doi.org/10.1029/2021JG006276>.
- Harris, L.A., et al., (18 coauthors). 2021. Equitable exchange: A framework for diversity and inclusion in the geosciences. *AGU Advances* 2, e2020AV000359. <https://doi.org/10.1029/2020AV000359>.
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- Renchon, A.A., (9 couthors), 2021. Concurrent measurements of soil and ecosystem respiration in a mature Eucalypt woodland: advantages lessons, and questions, *JGR Biogeosciences*, 126, e2020JG006221. <https://doi.org/10.1029/2020JG006221>.
- Tian, H. et al. (49 coauthors). 2020. A comprehensive quantification of global nitrous oxide sources and sinks. *Nature*, 586:248-256. <https://doi.org/10.1038/s41586-020-2780-0>.
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- Finzi, A. et al. (25 coauthors). 2020. The carbon budget of the Harvard Forest long-term ecological research sites: Patterns, processes, and responses to global change. *Ecological Monographs*, 90(4), e01423.
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- Davidson, E. 2019. Lessons from President George H. W. Bush for the present political environment, *Eos*, 100, <https://doi.org/10.1029/2019EO115193>.
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- Tian, H., J. Yang, R. Xu, C. Lu, J.G. Canadell, E.A. Davidson, R.B. Jackson, A. Arneeth, J. Chang, P. Ciais, S. Gerber, A. Ito, F. Joos, S. Lienert, P. Messina, S. Olin, S. Pan, C. Peng, E. Saikawa, R.L. Thompson, N. Vuichard, W. Winiwarter, S. Zaehle, B. Zhang. 2019. Global soil nitrous oxide emissions since the preindustrial era estimated by an ensemble of terrestrial biosphere models: Magnitude, attribution, and uncertainty, *Glob Change Biol*. 25:640–659. <https://doi.org/10.1111/gcb.14514>
- Richardson, A.D., D.Y. Hollinger, J.K. Shoemaker, H. Hughes, K. Savage, and E.A. Davidson. 2019. Six years of ecosystem-atmosphere greenhouse gas fluxes measured in a sub-boreal forest. *Scientific Data* 6:117, <https://doi.org/10.1038/s41597-019-0119-1>.
- Davidson, E.A., D. Markewitz, R d O. Figueiredo, and P.B. d Camargo. 2018 Nitrogen fixation inputs in pasture and early successional forest in the Brazilian Amazon region: evidence from a claybox mesocosm study. *Journal of Geophysical Research: Biogeosciences*, 123, 712-721. <https://doi.org/10.1002/2017JG004103>.
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#### POST-DOCTORAL ADVISEES

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Rachel L. Nifong, University of Maryland Center for Environmental Science  
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Louis Verchot, Woods Hole Research Center  
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#### GRADUATE STUDENT ADVISEES (serving as major advisor)

Jacob Hagedorn, Ph.D., University of Maryland Center for Environmental Science, 2022  
Qiurui Zhu, Ph.D. University of Maryland Center for Environmental Science, 2022

GRADUATE STUDENT ADVISEES (serving on graduate committees or as mentor)

Bradley Kennedy, University of Maryland College Park, present  
Graham A. Stewart, University of Maryland College Park, present  
Tan Zou, Ph.D., University of Maryland Center for Environmental Science, 2023  
Joel Bostic, Ph.D., University of Maryland Center for Environmental Science, 2022  
Srishti Vishwakarma, Ph.D., University of Maryland Center for Environmental Science, 2022  
Stephanie Siemek, Ph.D., University of Maryland Center for Environmental Science, 2021  
Rita de Cássia Silva von Randow, Ph.D. Wageningen University, 2020  
Yixin Guo, Ph.D., Princeton University, 2019  
Robert Sabo, Ph.D., University of Maryland Center for Environmental Science, 2019  
Allison Gill, Ph.D., Boston University, 2016  
William C. Eddy, Ph.D., University of Minnesota, 2016  
Adelaine Michela e Silva Figueira, Ph.D., Universidade Federal de São Paulo, Piracicaba. 2013.  
Katherine Potter, Ph.D., Massachusetts Institute of Technology, 2011.  
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UNDERGRADUATE ADVISING

Harvard Forest: Mentored 14 REU students as summer interns between 1994 and 2007.  
Howland Forest: Mentored 5 DOE-SURE students as summer interns between 2003 and 2007.  
Woods Hole Research Center and Marine Biological Lab: Mentored 3 REU students as summer interns between 2003 and 2007.

RESEARCH FUNDING

Current:

NSF: Global Centers Track 1: Global Nitrogen Innovation Center for Clean Energy and Environment (NICCEE), \$5,000,000, 2024-2028, co-PI with Xin Zhang, UMCES.

DOE: A tale of two extremes: temperature sensitivity of carbon loss from cool and hot soils. \$29,994, 2024-2025. CoI with Debjani Sihi. Emory University.

NSF: INFEWS: US-China: Managing Agricultural Nitrogen to Achieve Sustainable Food-Energy-Water Nexus in China and the U.S., \$500,000, 2021-2024, CoI with Xin Zhang.

Australian Research Council: Deepening understanding of soil-atmosphere greenhouse gas exchange in a warming, drying climate, 2022-2024 (unfunded collaborator). CoI with Elise Pendell.

Past (since 2015):

Hughes Center for Agro-ecology: A Science and Technology Based Approach (STBA) to Minimize Climate Vulnerability and Achieve Sustainable and Resilient Food Production Systems (SRFP) in Maryland, \$15,41, 2023-2024.

Belmont Forum (through NSF): Guiding the pursuit for sustainability by co-developing a Sustainable Agriculture Matrix, \$70,000, 2021-2023, CoI with Xin Zhang.

NSF: CC\* Regional: Advancing Maryland Research and Education Network for Under-Resourced Institutions Through a Science DMZ and 10Gbps Upgrade, \$795,789, 2020-2023, CoI with Ray Barghi.

DOE: Using probability distribution function as a scaling approach to incorporate soil heterogeneity into biogeochemical models for greenhouse gas predictions, \$23,997, 2022-2023. CoI with Debjani Sihi.

MD-DNR: Eutrophication study of Maryland State lakes, \$69,015, 2021-2023, CoI with Jerry Frank.

USDA: On-Farm Research on Drainage Water Management to Reduce Nitrogen and Phosphorus Leaching: Trade-Offs with N<sub>2</sub>O and CH<sub>4</sub> Emissions, \$499,950, 2016-2020, PI.

NPS-CESU: Collaboration and Support for the Host University, \$41,500, 2016-2021, PI.

NSF: RCN: Reactive Nitrogen in the Biosphere, \$500,000, 2015-2018, PI

NSF: OPUS: Biogeochemistry of Amazonian Terrestrial Ecosystems, \$196,822, 2015-2018, PI.

USDA: Integrated Belowground Greenhouse Gas Flux Measurements and Modeling, \$982,000, 2014-2018, PI.

MDSG: Hagedorn Fellowship: Potential Pollution Trade-Offs for Sustainable Coastal Agricultural Management, \$44,918, 2016-2018, PI.

Australian Research Council: Temperature sensitivity of soil respiration and its components, \$0, 2017-2020. CoI.