David R. Lyon, Ph.D.

Environmental Defense Fund
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EDUCATION

University of Arkansas, Fayetteville, AR
Ph.D. in Environmental Dynamics (May 2016)
- Dissertation: *Quantifying, Assessing, and Mitigating Methane Emissions from Super-emitters in the Oil and Gas Supply Chain*
- Honors: 4.0 GPA; Doctoral Academy Fellowship

University of Kentucky, Lexington, KY
M.S. in Forestry (May 2004)
- Thesis: *Persistent Effects of Eastern Redcedar on Calcareous Glade Soils and Plant Community*
- Honors: 4.0 GPA; Garden Club of America 2003 Fellowship in Ecological Restoration

Hendrix College, Conway, AR
B.A. in Biology with Chemistry Minor (June 2002)
- Honors: 3.95 GPA; Summa Cum Laude with Distinction; Phi Beta Kappa

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WORK EXPERIENCE

Environmental Defense Fund, Austin, TX
Senior Scientist (May 2021 – present)
- Lead EDF's Permian Methane Analysis project using multiple measurement approaches to quantify oil and gas methane emissions and rapidly publish data online
- Provide thought leadership on technologies and policies to detect, quantify, and mitigate oil and gas methane emissions
- Supervise scientific staff

Environmental Defense Fund, Austin, TX
Scientist (March 2014 – April 2021)
- Contribute to the design, planning, execution, and analysis of EDF-sponsored research studies on quantifying methane emissions from the oil and gas supply chain

- Advise internal and external projects on innovative approaches for leak detection and mitigation
- Prepare and review manuscripts for submission to peer-reviewed journals
- Communicate science and advocacy through presentations, briefings, and media interviews
- Provide scientific expertise to other EDF programs and external groups

Environmental Defense Fund, Austin, TX
Research Analyst (June 2012 – March 2014)
- Research, analyze, synthesize, and interpret data related to oil and gas methane emissions
- Analyze, interpret, and communicate data to policymakers, industry, the scientific community, and other stakeholders in support of EDF advocacy on environmental policy
- Write reports, blogs, and other communication materials for general audiences

University of Arkansas at Little Rock, Little Rock, AR
Part-time Lecturer (January 2012 – May 2012)
- Taught senior-level environmental science course *Fundamentals of Air Pollution*

Arkansas Department of Environmental Quality, North Little Rock, AR
Environmental Program Coordinator (January 2009 – May 2012)
- Obtained EPA funding, managed project, and authored report on a study to develop an emissions inventory and monitor air quality impacts of natural gas development in the Fayetteville Shale
- Managed $500,000 project to develop and implement a web-based emissions inventory reporting system for a multi-state consortium of environmental agencies
- Led the state's air pollution emissions inventory program, which included approximately 175 regulated facilities and several nonpoint emission source categories
- Analyzed emissions data and produced reports for the agency and public
- Analyzed current and proposed federal air regulations to assist agency planning
- Supervised up to four staff

University of Arkansas, Fayetteville, AR
Graduate Assistant (August 2004 – December 2008)
- Performed research on the effects of nutrient enrichment on stream carbon cycling
- Assisted students in general ecology laboratory

University of Kentucky, Lexington, KY
Graduate Assistant (June 2002 – June 2004)
- Performed research in restoration ecology and soil biogeochemistry of calcareous glades
- Taught dendrology and tree species identification to undergraduate students

PUBLICATIONS

Lyon, D. R., Hmiel, B., Gautam, R., Omara, M., Roberts, K. A., Barkley, Z. R., ... & Hamburg, S. P. (2021). Concurrent variation in oil and gas methane emissions and oil price during the COVID-19 pandemic. Atmospheric Chemistry and Physics, 21(9), 6605-6626.

Lyon, D. R. (2016). Methane emissions from the natural gas supply chain. In: Kaden, D.A. and Rose, T.L. eds. *Environmental and Health Issues in Unconventional Oil and Gas Development*. Elsevier. pp. 33-48.

Lyon, D. R., Alvarez, R. A., Zavala-Araiza, D., Brandt, A. R., Jackson, R. B., & Hamburg, S. P. (2016). Aerial surveys of elevated hydrocarbon emissions from oil and gas production sites. Environmental Science & Technology, 50 (9), pp 4877–4886, DOI: 10.1021/acs.est.6b00705.

Lyon, D. R., Zavala-Araiza, D., Alvarez, R. A., Harriss, R., Palacios, V., Lan, X., ... & Herndon, S. C. (2015). Constructing a spatially resolved methane emission inventory for the Barnett Shale region. Environmental science & technology, 49(13), 8147-8157.

Omara, M., Zavala-Araiza, D., Lyon, D.R., Hmiel, B., Roberts, K.A. and Hamburg, S.P., 2022. Methane emissions from US low production oil and natural gas well sites. Nature communications, 13(1), pp.1-10.

Irakulis-Loitxate, I., Guanter, L., Liu, Y.N., Varon, D.J., Maasakkers, J.D., Zhang, Y., Chulakadabba, A., Wofsy, S.C., Thorpe, A.K., Duren, R.M. and Frankenberg, C., 2021. Satellite-based survey of extreme methane emissions in the Permian basin. Science Advances, 7(27), p.eabf4507.

Zhou, X., Peng, X., Montazeri, A., McHale, L.E., Gaßner, S., Lyon, D.R., Yalin, A.P. and Albertson, J.D., 2020. Mobile measurement system for the rapid and cost-effective surveillance of methane and volatile organic compound emissions from oil and gas production sites. Environmental Science & Technology, 55(1), pp.581-592.

Rutherford, J.S., Sherwin, E.D., Ravikumar, A.P., Heath, G.A., Englander, J., Cooley, D., Lyon, D., Omara, M., Langfitt, Q. and Brandt, A.R., 2021. Closing the methane gap in US oil and natural gas production emissions inventories. Nature communications, 12(1), pp.1-12.

Robertson, A.M., Edie, R., Field, R.A., Lyon, D., McVay, R., Omara, M., Zavala-Araiza, D. and Murphy, S.M., 2020. New Mexico Permian Basin measured well pad methane emissions are a factor of 5–9 times higher than US EPA estimates. Environmental Science & Technology, 54(21), pp.13926-13934.

Zhang, Y., Gautam, R., Pandey, S., Omara, M., Maasakkers, J.D., Sadavarte, P., Lyon, D., Nesser, H., Sulprizio, M.P., Varon, D.J. and Zhang, R., 2020. Quantifying methane emissions from the largest oil-producing basin in the United States from space. Science advances, 6(17), p.eaaz5120.

Ravikumar, A.P., Sreedhara, S., Wang, J., Englander, J., Roda-Stuart, D., Bell, C., Zimmerle, D., Lyon, D., Mogstad, I., Ratner, B. and Brandt, A.R. (2019). Single-blind inter-comparison of methane detection technologies–results from the Stanford/EDF Mobile Monitoring Challenge. Elementa, 7(1).

Fox, T.A., Ravikumar, A.P., Hugenholtz, C.H., Zimmerle, D., Barchyn, T.E., Johnson, M., Lyon, D. and Taylor, T. (2019.) A methane emissions reduction equivalence framework for alternative leak detection and repair programs. Elementa, 7(1).

Hajny, K., Salmon, O.E., Rudek, J., Lyon, D.R., Stuff, A.A., Stirm, B.H., Kaeser, R., Floerchinger, C., Conley, S.A., Smith, M.L. and Shepson, P.B. (2019). Observations of Methane Emissions from Natural Gas-Fired Power Plants. Environmental Science & Technology, 53 (15), 8976-8984.

Alvarez, R. A., Zavala-Araiza, D., Lyon, D. R., Allen, D. T., Barkley, Z. R., Brandt, A. R., ... & Kort, E. A. (2018). Assessment of methane emissions from the US oil and gas supply chain. Science, eaar7204.

Englander, J. G., Brandt, A. R., Conley, S., Lyon, D. R., & Jackson, R. B. (2018). Aerial Interyear Comparison and Quantification of Methane Emissions Persistence in the Bakken Formation of North Dakota, USA. Environmental science & technology, 52(15), 8947-8953.

Lavoie, T. N., Shepson, P. B., Cambaliza, M. O., Stirm, B. H., Conley, S., Mehrotra, S., ... & Lyon, D. (2017). Spatiotemporal variability of methane emissions at oil and natural gas operations in the Eagle Ford Basin. Environmental science & technology, 51(14), 8001-8009.

Lavoie, T. N., Shepson, P. B., Gore, C. A., Stirm, B. H., Kaeser, R., Wulle, B., Lyon, D. & Rudek, J. (2017). Assessing the methane emissions from natural gas-fired power plants and oil refineries. Environmental science & technology, 51(6), 3373-3381.

Zavala-Araiza, D., Alvarez, R. A., Lyon, D. R., Allen, D. T., Marchese, A. J., Zimmerle, D. J., & Hamburg, S. P. (2017). Super-emitters in natural gas infrastructure are caused by abnormal process conditions. Nature communications, 8, 14012.

Alvarez, R. A., Lyon, D. R., Marchese, A. J., Robinson, A. L., & Hamburg, S. P. (2016). Possible malfunction in widely used methane sampler deserves attention but poses limited implications for supply chain emission estimates. Elementa, 4.

Marrero, J. E., Townsend-Small, A., Lyon, D. R., Tsai, T. R., Meinardi, S., & Blake, D. R. (2016). Estimating Emissions of Toxic Hydrocarbons from Natural Gas Production Sites in the Barnett Shale Region of Northern Texas. Environmental Science & Technology, 50(19), 10756-10764.

Lamb, B. K., Cambaliza, M. O., Davis, K. J., Edburg, S. L., Ferrara, T. W., Floerchinger, C., ... & Lyon, D. R. (2016). Direct and indirect measurements and modeling of methane emissions in Indianapolis, Indiana. Environmental Science & Technology, 50(16), 8910-8917.

Townsend-Small, A., Ferrara, T. W., Lyon, D. R., Fries, A. E., & Lamb, B. K. (2016). Emissions of coalbed and natural gas methane from abandoned oil and gas wells in the United States. Geophysical Research Letters, 43(5), 2283-2290, DOI: 10.1002/2015GL067623.

Zavala-Araiza, D., Lyon, D. R., Alvarez, R. A., Davis, K. J., Harriss, R., Herndon, S. C., ... & Marchese, A. J. (2015). Reconciling divergent estimates of oil and gas methane emissions. Proceedings of the National Academy of Sciences, 112(51), 15597-15602, DOI: 10.1073/pnas.1522126112

Zavala-Araiza, D.; Lyon, D. R.; Alvarez, R. A.; Palacios, V.; Harriss, R.; Lan, X.; Talbot, R.; Hamburg, S. P. (2015). Towards a Functional Definition of Methane Super-Emitters: Application to Natural Gas Production Sites. Environmental Science & Technology, 49, DOI: 10.1021/ acs.est.5b00133.

Karion, A.; Sweeney, C.; Kort, E. A.; Shepson, P. B.; Brewer, A.; Cambaliza, M. O. L.; Conley, S.; Davis, K. J.; Deng, A.; Hardesty, M.; Herndon, S. C.; Lauvaux, T.; Lavoie, T.; Lyon, D. R.; Newberger, T.; Petron, G.; Rella, C.; Smith, M.; Wolter, S.; Yacovitch, T.; Tans, P. (2015). Aircraft-based estimate of total methane emissions from the Barnett Shale region. Environmental Science & Technology, 49, DOI: 10.1021/acs.est.5b00217.

Yacovitch, T. I.; Herndon, S. C.; Pétron, G.; Kofler, J.; Lyon, D. R. ; Zahniser, M. S.; Kolb, C. E. (2015). Mobile Laboratory Observations of Methane Emissions in the Barnett. Environmental Science & Technology, 49, DOI: 10.1021/es506352j.

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Harriss, R.; Alvarez, R. A.; Lyon, D. R.; Zavala-Araiza, D.; Nelson, D.; Hamburg, S. P. (2015). Using Multi-Scale Measurements to Improve Methane Emission Estimates from Oil and Gas Operations in the Barnett Shale Region, Texas. Environmental Science & Technology, 49, DOI: 10.1021/acs.est.5b02305.