

DANIEL CUSWORTH

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EDUCATION

Harvard University *June 2018*
Ph.D: Atmospheric Chemistry, minor in Computer Science
S.M: Applied Mathematics

University of California, Los Angeles *March 2012*
B.S: Mathematics and Atmospheric & Oceanic Sciences

RESEARCH EXPERIENCE

Carbon Mapper, Inc. *Pasadena, CA*
Project Scientist *2021 - Present*

NASA Jet Propulsion Laboratory *Pasadena, CA*
Affiliate Scientist *2023 - Present*
Data Scientist *2020 - 2021*
JPL Postdoctoral Scholar *2018 - 2020*
DEVELOP Researcher *2012*

University of Arizona *Tucson, AZ*
Affiliate Scientist *2023 - Present*
Research Scientist *2021 - 2023*

Harvard Department of Earth & Planetary Sciences *Cambridge, MA*
Graduate Student Research Fellow *2013 - 2018*

The Cadmus Group, Inc. *Waltham, MA*
Research Analyst *2012 - 2013*

**UCLA Joint Institute for Regional Earth System
Science and Engineering (JIFRESSE)** *Los Angeles, CA*
Research Assistant *2011 - 2012*

AWARDS

- Principal Investigator, *Continued Advances in CH₄&CO₂ Point-Source Monitoring*, NASA Carbon Monitoring System
- Principal Investigator, *Space-based Detection and Quantification of CO₂ Point Sources*, NASA Orbiting Carbon Observatory Science Team
- Co-Investigator, *Methane and Carbon Dioxide Point Source Emissions Validation and Analysis*, NASA EMIT Science Team
- Co-Investigator, *Next-Generation Landfill Monitoring: A Multi-Scale Approach to Measuring Emissions for Evaluating and Financing Interventions*, EPA STAR Grant
- Co-Investigator, *Multi-tiered Carbon Monitoring System*, NASA Carbon Monitoring System
- Co-Investigator, *Multi-scale Methane Analytic Framework (M²AF)*, NASA Advanced Information Systems Technology
- Participant, ACCESS XVI Chemistry Colloquium for Emerging Senior Scientists, Brookhaven National Laboratory
- Honorable Mention, NSF Graduate Research Fellowship Program, 2015
- Alan Howard Foundation Graduate Fellowship, 2013

ACTIVITIES

- Member, American Geophysical Union; European Geophysical Union
- Reviewer, Journal of Geophysical Research: Atmospheres; Atmospheric Chemistry and Physics; Scientific Reports; Remote Sensing; Remote Sensing of the Environment; Environmental Research Letters; Journal of Climate; Communications Earth & Environment; Atmosphere; Atmospheric Measurement Techniques; Nature Scientific Reports
- Curriculum Development, NASA Applied Remote Sensing Training Program (ARSET), *Atmospheric CO₂ and CH₄ Budgets to Support the Global Stocktake*

PUBLICATIONS

Cusworth, D. H., Duren, R.M., Ayasse, A.K., Jiorle, R., Howell, K., Aubrey, A., Green, R.O., Eastwood, M.L., Chapman, J.W., Thorpe, A.K., Heckler, J., Asner, G.P., Smith, M.L., Thoma, E., Krause, M.J., Heins, D., and S. Thorneloe (2023). Quantifying Methane Emissions from United States Landfills. *Science*

Sherwin, E., Rutherford, J., Zhang, Z., Chen, Y., Wetherley, E., Yakovlev, P., Berman, E., Thorpe, A.K., Ayasse, A.K., Duren R.M., Brandt, A., and **D.H. Cusworth** (2023). Quantifying oil and natural gas system emissions using one million aerial site measurements. *Nature*

Thorpe, A.K., Green, R.O., Thompson, D.R., Brodrick, P.G., Chapman, J.W., Elder, C.D., Irakulis-Loitxate, I., **Cusworth, D.H.**, Ayasse, A.K., Duren, R.M., Frankenberg, C., Guanter, L., Worden, J.R., Dennison, P.E., Roberts, D.A., Chadwick, K.D., Eastwood, M.L., Fahlen, J., and C.E. Miller (2023). Attribution of individual methane and carbon dioxide emission sources using EMIT observations from space. *Science Advances*.

Zhang, Z., **Cusworth, D.H.**, Ayasse, A.K., Sherwin, E.D., and A.R. Brandt (2023). Carbon dioxide emissions detection and quantification from liquefied natural gas terminals with imaging spectroscopy. *Geophysical Research Letters*

Ayasse, A.K., **Cusworth, D.H.**, O'Neill, K., Fisk, J., Thorpe, A.K., and R.M. Duren (2023). Performance and sensitivity of column-wise and pixel-wise methane retrievals for imaging spectrometers. *Atmospheric Measurement Techniques*

Worden, J.R., Pandey, S., Zhang, Y., **Cusworth, D.H.**, Qu, Z., Bloom, A.A., Ma, S., Maasackers, J.D., Byrne, B., Duren, R.M., Crisp, D., Gordon, D., and D.J Jacob (2023). Verifying Methane Inventories and Trends With Atmospheric Methane Data. *AGU Advances*

Cusworth, D. H., Thorpe, A.K., Miller, C.E., Ayasse, A.K., Jiorle, R., Duren, R.M., Nassar, R., Mastrogiacomo, J.P., and R.R. Nelson (2023). Two years of satellite-based carbon dioxide emission quantification at the world's largest coal-fired power plants. *Atmospheric Chemistry & Physics*

Schuit B.J., Maasackers, J.D., Bijl, P., Mahapatra, G., Van de Berg, A., Pandey, S., Lorente, A., Borsdoff, T., Houweling, S., Varon, D.J., McKeever, J., Jarvis, D., Girard, M., Irakulis-Loitxate, I., Gorrone, J., Guanter, L., **Cusworth, D. H.**, and I. Aben (2023). Automated detection and monitoring of methane super-emitters using satellite data, *Atmospheric Chemistry & Physics*

Hmiel, B., Lyon, D.R., Warren, J.D, Yu, J., **Cusworth, D. H.**, Duren R.M., and S.P. Hamburg (2023). Empirical quantification of methane emission intensity from oil and gas producers in the Permian basin, *Environmental Research Letters*

Yadav, V., Verhulst, K., Duren, R.M., Thorpe, A.K., Kim, J., Keeling, R., Weiss, R., **Cusworth, D. H.**, Mountain, M., Miller, C.E., and J. Whetsone (2023). A declining trend of methane emissions in the Los Angeles basin from 2015 to 2020, *Environmental Research Letters*

Thorpe A.K., Kort E.A., **Cusworth, D. H.**, Ayasse, A.K., Bue, B.D., Yadav, V., Thompson D.R., Frankenberg, C., Herner, J., Falk, M., Green, R.O., Miller C.E., and R.M. Duren (2023). Methane emis-

sions decline from reduced oil, natural gas, and refinery production during COVID-19, *Environmental Research Communications*

Yu, J., Hmiel, B., Lyon, D.R., Warren, J., **Cusworth, D. H.**, Duren, R.M., Chen, Y., Murphy, E.C., and A.R. Brandt (2022). Methane Emissions from Natural Gas Gathering Pipelines in the Permian Basin, *Environmental Science & Technology Letters*

Cusworth, D. H., Thorpe, A.K., Ayasse, A.K., Stepp, D., Heckler, J., Asner, G.P., Miller, C.E., Eastwood, M.L., Green, R.O., Hmiel, B., Lyon, D., and R.M. Duren (2022). Strong methane point sources contribute a disproportionate fraction of total emissions across multiple basins in the U.S., *Proceedings of the National Academy of Sciences (PNAS)*

Ayasse, A.K., Thorpe, A.K., **Cusworth, D.H.**, Kort, E.A., Gorchov Negron, A., Heckler, J., Asner, G.P., and R.M. Duren (2022). Methane remote sensing and emission quantification of offshore shallow water oil and gas platforms in the Gulf of Mexico, *Environmental Research Letters*

Jacob, D.J., Varon, D.J., **Cusworth, D. H.**, Dennison, P.E., Frankenberg, C., Gautam, R., Guanter, L., Kelley, J., McKeever, J., Poulter, B., Qu, Z., Thorpe, A.K., Worden, J.R., and R.M. Duren (2022). Quantifying methane emissions from the global scale down to point sources using satellite observations of atmospheric methane, *Atmospheric Chemistry & Physics*

Worden, J., **Cusworth, D. H.**, Qu, Z., Yin, Y., Zhang, Y., Bloom, A. A., Ma, S., Byrne, B., Scarpelli, T., Maasackers, J.D., Crisp, D., Duren, R.M., and D.J. Jacob (2021). The 2019 Methane Budget And Uncertainties At 1 Degree Resolution And Each Country Through Bayesian Integration Of GOSAT Total Column Methane Data And A Priori Inventory Estimates, *Atmospheric Chemistry & Physics*

Cusworth, D. H., Bloom, A. A., Ma, S., Miller, C.E., Bowman, K., Yin, Y., Maasackers, J.D., Zhang, Y., Scarpelli, T., Jacob, D.J., and J.R. Worden (2021). A Bayesian framework for deriving sector-based methane emissions from top-down fluxes, *Nature Communications Earth & Environment*

Ma, S., Worden, J., Bloom, A.A., Zhang, Y., Poulter, B., **Cusworth, D.H.**, Yin, Y., Pandey, S., Maasackers, J.D., Lu, X., Shen, L., Sheng, J.S., Frankenberg, C., Miller, C.E., and D.J. Jacob (2021). Satellite constraints on the latitudinal distribution and temperature sensitivity of wetland methane emissions, *AGU Advances*

Lauvaux, T., Giron, C., Mazzolini, M., d'Aspremont, A., Duren, R., **Cusworth, D.H.**, Shindell, D., and P. Ciais (2021). Global Assessment of Oil and Gas Methane Ultra-Emitters, *Science*

Guanter, L., Irakulis-Loitxate, I., Gorrone, J., Sanchez-Garcia, E., **Cusworth, D.H.**, Varon, D.J., Cogliati, S., and R. Colombo (2021). Mapping methane point emissions with the PRISMA spaceborne imaging spectrometer, *Remote Sensing of the Environment*

Foote, M. D., Dennison, P. E., Sullivan, P. R., O'Neill, K. B., Thorpe, A. K., Thompson, D. R., **Cusworth, D. H.**, Duren, R. M., and S.C. Joshi (2021). Impact of scene-specific absorption spectra on matched filter greenhouse gas retrievals from imaging spectroscopy, *Remote Sensing of the Environment*

Cusworth, D. H., Duren, R. M., Thorpe, Olson-Duvall, W., Heckler, J., Chapman, J.W., Eastwood, M.L., Helmlinger, M.C., Green, R.O., Asner, G.P., Dennison, P.E., and C.E. Miller (2021). Intermittency of large methane emitters in the Permian Basin, *Environmental Science & Technology Letters*

Irakulis-Loitxate, I., Guanter, L., Liu, Y.N., Varon, D.J., Maasackers, J.D., Zhang, Y., Chulakadabba, A., Wofsy, S.C., Thorpe, A.K., Duren, R.M., Frankenberg, C., Lyon, D., Hmiel, B., **Cusworth, D.H.**, Zhang, Y., Segl, K., Gorrone, J., Sanchez-Garcia, E., Sulprizio, M.P., Cao, K., Zhu, H., Liang, J., Li, X., Aben, I., and D.J. Jacob (2021), Satellite-based Survey of Extreme Methane Emissions in the Permian Basin, *Science Advances*

Cusworth, D. H., Duren, R. M., Thorpe, Dennison, P.E., Frankenberg, C., and C.E. Miller (2021). Quantifying Global Power Plant Carbon Dioxide Emissions With Imaging Spectroscopy, *AGU Advances*

Cusworth, D. H., Duren, R. M., Thorpe, A. K., Pandey, S., Maasackers, J. D., Aben, I., Jarvis, D., Varon, D.J., Jacob, D.J., Randles, C.A., Gautam, R., Omara, M., Schade, G.W., Dennison, P.E., Frankenberg, C., Gordon, D., Lopinto, E., and C.E. Miller (2021). Multisatellite imaging of a gas well blowout enables quantification of total methane emissions, *Geophysical Research Letters*

Cusworth, D. H., Duren, R. M., Yadav V., Thorpe, A. K., Verhulst K., Sander S., Hopkins, F., Rafiq, T., and C.E. Miller (2020), Synthesis of methane observations across scales: Strategies for deploying a multi-tiered observing network., *Geophysical Research Letters*

Guha, A., Newman, S., Fairley, D., Dinh, T., Duca, L., Conley, S., Smith, M., Thorpe, A. K., Duren, R. M., **Cusworth, D. H.**, Foster, K. T., Fischer, M., Jeong, S., Yesiller, N., Hanson, J., and P. Martien (2020), Assessment of Regional Methane Emissions Inventories through Airborne Quantification in the San Francisco Bay Area, *Environmental Science & Technology*

Cusworth, D. H., Duren, R. M., Thorpe, A. K., Tseng, E., Thompson, D., Guha, A., Newman, S., and C.E. Miller (2020), Using remote sensing to detect, validate, and quantify methane emissions from California solid waste operations., *Environmental Research Letters*

Cusworth, D. H., Jacob, D. J., Varon, D. J., Chan Miller, C., Liu, X., Chance, K., Thorpe, A. K., Duren, R. M., Miller, C. E., Thompson, D. R., Frankenberg, C., Guanter, L., and C.A. Randles (2019), Potential of next-generation imaging spectrometers to detect and quantify methane point sources from space, *Atmos. Meas. Tech.*

Cusworth, D. H., Jacob, D. J., Sheng, J.-X., Benmergui, J., Turner, A. J., Brandman, J., White, L., and C.A. Randles (2018), Detecting high-emitting methane sources in oil/gas fields using satellite observations, *Atmos. Chem. Phys.*

Cusworth, D.H., Mickley, L.J., Sulprizio, M.P., Liu, T., Marlier, M.E., and R.S. DeFries (2018), Quantifying the influence of agricultural fires in northwest India on urban air pollution in Delhi, India, *Environ. Res. Lett.*

Liu, T., Marlier, M.E., DeFries, R.S., Westervelt, D.M., Xia, K.R., Fiore, A.M., Mickley, L.J., **Cusworth, D.H.**, and G. Milley (2018), Contributions of agricultural burning to air pollution in three Indian cities: Delhi, Bengaluru, and Pune, *Atmos. Environ.*

Cusworth, D.H., L.J. Mickley, E.M. Leibensperger, and M.J. Iacono (2017), Aerosol trends as a potential driver of regional climate in the central United States: Evidence from observations, *Atmos. Chem. Phys.*