

Thomas Lauvaux

GSMA, UMR CNRS 7331, University of Reims Champagne Ardenne
U.F.R. Sciences Exactes et Naturelles
Moulin de la Housse B.P. 1039, 51687 Reims Cedex 2
Email: thomas.lauvaux@univ-reims.fr

Experience

- Professor (Junior Chair)** **2022-present**
GSMA laboratory - University of Reims Champagne Ardenne (URCA)
PennState University Affiliate (Adjunct Faculty)
- Research consultant** **2021-2022**
Research consulting for Kayrros Inc., and Origins.Earth (Suez)
- Research Scientist – French Presidential MOPGA Fellowship** **2018-2021**
Laboratoire des Sciences du Climat et de l'Environnement, IPSL, France
PennState University Affiliate (Adjunct Faculty)
- Associate Research Professor** **2015-2018**
Member of the Graduate Faculty, Department of Meteorology and Atmospheric Science of the Pennsylvania State University
- Research Scientist III** **2014-2015**
NASA Jet Propulsion Laboratory - California Institute of Technology
- Research Associate** **2011-2014**
Member of the Graduate Faculty (2012-2014), Department of Meteorology and Atmospheric Science of the Pennsylvania State University
- Postdoctoral Researcher** **2009-2011**
Department of Meteorology and Atmospheric Science of the Pennsylvania State University

Education

- H.D.R. - Climate Sciences and Meteorology, University of Versailles (UVSQ), France** **January 2022**
Assimilation Systems for Atmospheric Greenhouse Gas Measurements from Continental to Urban Scales, president of the jury: Pr. Hervé Le Treut.
- Ph.D. - Climate Sciences and Meteorology, University of Versailles (UVSQ), France** **2005-2008**
Mesoscale inversion of carbon sources and sinks, jointly at **Laboratory of Climate Sciences and Environment** (LSCE, France) and **Meteo France** (National Weather Service, France), with **Prof. Peter J. Rayner** and **Dr. Joël Noilhan**. University of Versailles ranked 40th in Earth Science, Shanghai 2017 Ranking.
- M.S. - Oceans, Atmosphere and Continental Surfaces, University of Toulouse, France** **2004-2005**
Climatology of water vapor using zenithal delays from GPS measurements at **Meteo France** and the Earth Science Department of the **University of Montpellier**, France, with Dr. Véronique Ducrocq and Prof. Frederic Masson.

Teaching and Supervision

Post-doctoral Researchers and Research Associates (Current)

Dr. Alohotsy Rafalimanana (GSMA, Postdoctoral Researcher, 2024-present)
 Dr. Ke Che (LSCE-GSMA, Postdoctoral Researcher, 2023-present)
 Dr. Charu Bhardwaj (GSMA, Postdoctoral Researcher, 2023-present)
 Dr. David Rueda (GSMA, Postdoctoral Researcher, 2023-present)
 Dr. Varunika Jain (GSMA, Postdoctoral Researcher, 2022-present)
 Dr. Subodh Kumar (GSMA, Postdoctoral Researcher, 2022-present)
 Dr. Rakesh Yuvaraj (LSCE-GSMA, Postdoctoral Researcher, 2022-present)
 Dr. Yathin Kudupaje (LSCE, Postdoctoral Researcher, 2022-present)
 Dr. Jinghui Lian (Origins.Earth, Research Scientist, 2019-present)

Post-doctoral Researchers and Research Associates (Past)

Dr. Charbel Abdallah (GSMA, Postdoctoral Researcher, 2019-2023)
 Dr. Ioannis Cheliotis (LSCE, Postdoctoral Researcher, 2021-2023) - Now Self-Employed
 Dr. Pramod Kumar (LSCE, Postdoctoral Researcher, 2018-2022) - Now at LSCE
 Dr. Nalini Krishnankutty (Postdoctoral Researcher, 2020-2021) - Now at NILU
 Dr. Ruixue Lei (Postdoctoral Researcher, 2018-2021) - Now at Johns Hopkins University (postdoc)
 Dr. Martha Butler (Research Associate, 2013-2018) - Retired
 Dr. Sha Feng (Research Associate, 2015-2018) - Now Research Scientist at PNNL
 Mr. Zachary Barkley (Research Associate, 2016-2018) - Now Research Associate at PennState University
 Dr. Brian Nathan (Post-doctoral Researcher, 2015-2017) - Now scientist at SRON, Netherlands (researcher)
 Dr. Xinxin Ye (Post-doctoral Researcher, 2015-2018) - Now postdoc at UCLA (Research Associate)

Graduate Students (Current)

Carla D'Angeli (PhD student, main advisor, GSMA, 2023-present)
 Félix Langot (PhD student, co-advisor, LMD Polytechnique, 2021-present)
 Jade Guisano (PhD student, co-advisor, ISEP, 2021-present)
 Ivonne Albarus (Ph.D. student, main advisor, Suez fellowship, 2021-present)
 Ngoc Minh Hoang (Ph.D. student, co-advisor, TotalEnergies fellowship, 2023-present)
 Aldjia Ibhegouchene (Master student, computer science, 2024)

Graduate Students (Past)

Elyes Ouerghi (Ph.D. student, ENS Paris-Saclay, co-advisor, 2020-2024)
 Yang Xu (Ph.D student, co-advisor, ANR project with Mexico City, 2019-2023)
 Ke Che (visiting scholar, Academy of Beijing, co-advisor, 2022-2023)
 Yannis Ondar (Master in Computer Science, URCA, main advisor, 2023)
 Alexandre Danjou (Ph.D. student, LSCE, main advisor, CEA fellowship, 2019 - 2022)
 Ali Ousmane Mahamat (Master student, URCA, main advisor, 2022)
 Arkayan Samaddar (PennState Ph.D. student, co-chair, 2015 - 2021)
 Daniel Wesloh (PennState Ph.D. student, co-chair, 2015 - 2022)
 Tom Gagnebet (Master Year 1, Centrale SupElec, main advisor, 2020)
 Hans Chen (Ph.D. student, co-chair, graduated Aug. 2018) - Now at Univ. of Lund, Sweden
 Kai Wu (PennState Ph.D. student, co-chair with Prof. Kenneth Davis, 2013 - 2020) - Now at Univ. of Edinburgh, UK
 Dandan Wei (Ph.D. student, chair committee member, 2016 - 2018) - Now at University of Michigan, MI
 Caroline Normile (Ph.D. student, co-advisor, graduated in August 2017) - AAAS Fellow Washington D.C.
 Liza E. Diaz-Isaac (Ph.D. student, co-advisor, graduated April 2017) - Now at the Lawrence Livermore National Laboratory, San Francisco
 Zachary Barkley (M.S. student, graduated May 2016) - Now at PennState Univ.
 Yanni Cao (M.S. student, co-advisor, graduated May 2016) - Now at Picarro, LLC
 Laura McGowan (M.S. student, co-chair, graduated May 2013) - Now at UC Davis

Undergraduate Students (Past)

Tyler Leicht (2017 - Convective mass fluxes coupled to atmospheric CO₂ mixing ratios)
 Adam Sokol (2016 - Flux measurements of CH₄ from manure)
 Michael Stewart (2015 - CH₄ modeling)
 Brandon Clark (2014 - Geology of CH₄ seepage)
 Kathryn Wheeler (2014 - CH₄ emission field experiment)
 Rémi Dulac (2008 - Instrumentation of tethered balloon)

Teaching

Applied Mathematics (differential equations, linear algebra, derivation, integrals) - 1st and 2nd year undergraduate (Physics major) - 48 hours - lecture and laboratory - University of Reims, 2022-2024

Ecological culture - Climate scientists and climate policies - 1st year undergraduate - 8 hours - Institut des Sciences Politiques de Reims

Remote Sensing for climate sciences - Measuring greenhouse gases from space: applications to cities and natural gas emissions - Master degree - 3 hours - International Space University (Strasbourg, France)

Summer Course on Atmospheric Inversions: Introduction to Inversion Modeling Techniques, Mesoscale Modeling, Adjoint Transport Simulations, and Lagrangian Dispersion Modeling, June 30 - July 4, 2014, Yonsei University, Seoul, South Korea, with Prof. Jinkyu Hong

Awards

French President's Fellowship "Make Our Planet Great Again" (2018), 1M€ grant over 3 years, Project CIUDAD "Carbon emissions Informed by Urban Dynamics and Atmospheric Data", hosted by Laboratoire des Sciences du Climat et de l'Environnement, Paris-Saclay, France. *[Accepted]*

AXA Research Professor Fellowship (2022), 1M€ grant over 5 years, "Carbon emissions Monitoring for Green Finance", hosted by Laboratoire de Météorologie Dynamique, Ecole Polytechnique, France. *[Declined]*

Research Grants

Horizon Europe CATRINE project - (2024-2026: 300k euros for GSMA)

Co-Investigator (WP leader): Large Eddy Simulations (WRF) to quantify urban emissions from space

ADEME AQACIA project - (2023-2026: 20k euros for GSMA)

Co-Investigator: Carbon emissions and Air Quality over Paris, joint assimilation with TROPOMI

CNES - ADEME AEROLAB-Space - (2023-2025: 150k euros for GSMA)

Co-Investigator: Monitoring of CO₂ emissions over Eastern France (Grand Est)

Chair Fellowship French Ministry of Research CASAL - (2022-2026: 500k euros for GSMA)

Principal Investigator: Carbon Assimilation for urban and regional applications

ESA MethaneWatch - (2021-2024: 450k euros for GSMA)

Co-Investigator: Methane emissions from satellite imagery of the Sentinel missions

EU H2020 Green Deal project PAUL - (2021-2025: 4M euros for LSCE)

Co-Coordinator: Carbon and Air Quality Emission monitoring over Paris, Munich and Zurich

CNES TOSCA project Altitude-controlled Balloon for GHG measurements - (2020-2021: 17k euros)

Co-Investigator: Campaign planning and atmospheric modeling of convective events

CNES TOSCA project GES OCO-3 City - (2020-2022: 27k euros for LSCE)

Co-Investigator: OCO-3 data analysis in preparation of the MicroCARB satellite mission

EU H2020 project EMME-CARE - (2019-2026: 2M euros for LSCE)

Co-Investigator: Emission monitoring over the EMME region (tower and satellite data)

PhD fellowship CEA - Urban emissions from space (OCO-3) (2019-2021: 130k euros)

Principal Investigator: City emission monitoring over fast-developing cities (OCO-3)

ANR Fellowship "MOPGA" - CIUDAD project (2018-2021: \$1M)

PI: Urban emissions over metropolitan areas, from urban to global scales

NASA EVS - ACT-America project (2015-2020: ~\$30M)

Deputy-PI: Responsible for modeling activities and development of assimilation system
Project Manager

NASA OCO-2 (2) - Urban emissions from space using OCO-2 data (2018-2021: ~\$155K)

Institutional PI: Urban high-resolution CO₂ inversions over the globe

NASA OCO-2 (1) - Urban emissions from space using OCO-2 data (2015-2018: ~\$185K)

Institutional PI: Development of assimilation system for remote sensing data

DOE/NETL - Marcellus Shale CH₄ emissions (2013-2017: ~\$1.8M)

PI: Deployment of four CH₄/¹³CH₄ instrumented towers together with aircraft field campaign in conjunction with NOAA Global Monitoring Division (Dr. Colm Sweeney, ESRL/CU Boulder, Colorado)
Project Manager

NASA CMS - Error assessment of CMS Flux inversion system (2013-2017: ~\$490K)

PI: Evaluation of transport model errors - GOSAT satellite data - Project Management

NOAA - Multi-Specie measurements for urban sector emissions (2013-2017: ~\$190K)

Institutional PI: Assimilation of NOAA standard flask trace gases for urban emissions

NASA T.E. - Carbon Balance of Southeastern US (2011-2014: ~\$470K)

Co-PI: Inversion Modeling activities - Support for tower deployment

NIST - Indianapolis Flux Experiment (2010-2017: ~\$4M)

Co-PI: Development of assimilation system over urban areas for in situ and column data - Project Management

Publications

[108] Che, K., T. Lauvaux, N. Taquet, W. Stremme, Y. Xu, C. Alberti, M. Lopez, A. García-Reynoso, P. Ciais, Y. Liu, M. Ramonet, and M. Grutter: CO₂ emissions estimate from Mexico City using ground- and space-based remote sensing, submitted to *JGR-Atmosphere*

[107] Che, K., T. Lauvaux, N. Taquet, W. Stremme, Y. Xu, C. Alberti, M. Lopez, A. García-Reynoso, P. Ciais, Y. Liu, M. Ramonet, and M. Grutter: Urban XCO₂ gradients from a dense network of solar absorption spectrometers and OCO-3 over Mexico City, *Journal of Geophysical Research: Atmospheres*, 129, e2023JD040063. <https://doi.org/10.1029/2023JD040063>.

[106] Taquet, N., W. Stremme, E. González del Castillo, A. Bezanilla, V. Almanza, O. Laurent, C. Alberti, F. Hase, M. Ramonet, T. Lauvaux, K. Che, and M. Grutter: CO₂ and CO temporal variability over Mexico City from ground-based total column and surface measurements, submitted to *Atmos. Chem. and Phys. Discuss.*, <https://doi.org/10.5194/egusphere-2024-512>, 2024

[105] Valet, L., Abdallah, C., Lauvaux, T., Joly, L., Ramonet, M., Ciais, P., and Mouillot, F.: High soil smoldering combustion revealed by flux tower CO/CO₂ ratio increases fire carbon emissions for French temperate forests during the 2022 fire season, *Biogeosciences*, in review.

[104] Danjou, A., Broquet, G., Schuh, A., Bréon, F.-M., and T. Lauvaux: Optimal selection of satellite XCO₂ images over cities for urban CO₂ emission monitoring using a global adaptive-mesh model, *Atmospheric Measurement Techniques*, in review.

[103] Baier, B. C., Miller, J. B., Sweeney, C., Lehman, S., Wolak, C., DiGangi, J. P., Davis, K. J., Barkely, Z. R., Feng, S., Lauvaux, T., and Y. Choi: Continental carbon dioxide source partitioning informed by radiocarbon: evaluation and applications, submitted to *JGR-Atmos.*

[102] Guisiano, J.E., Moulines, E., Lauvaux, T., and Sublime, J.: Enhanced Oil and Gas Infrastructure Mapping: Leveraging High-Resolution Satellite Imagery through fine-tuning of pre-trained object detection models, 2023 International Conference on Neural Information Processing (ICONIP2023), Changsha, Nov. 2023.

[101] Lian, J., Lauvaux, T., Utard, H., Bréon, F.-M., Broquet, G., Ramonet, M., Laurent, O., Albarus, I., Chariot, M., Kotthaus, S., Haeffelin, M., Sanchez, O., Perrussel, O., Denier van der Gon, H. A., Dellaert, S. N. C., and Ciais, P.: Can we use atmospheric CO₂ measurements to verify emission trends reported by cities? Lessons from a six-year atmospheric inversion over Paris, *EGUsphere*, <https://doi.org/10.5194/egusphere-2023-401>, 2023.

[100] Wesloh, D., Keller, K., Feng, S., Lauvaux, T., & Davis, K. J.: Temporal error correlations in a terrestrial carbon cycle model derived by comparison to carbon dioxide eddy covariance flux tower measurements. *Journal of Geophysical Research: Biogeosciences*, 129, e2023JG007526. <https://doi.org/10.1029/2023JG007526>, 2024.

- [99] Chulakadabba, A., Sargent, M., Lauvaux, T., Benmergui, J. S., Franklin, J. E., Chan Miller, C., Wilzewski, J. S., Roche, S., Conway, E., Souril, A. H., Sun, K., Luo, B., Hawthorne, J., Samra, J., Daube, B. C., Liu, X., Chance, K. V., Li, Y., Gautam, R., Omara, M., Rutherford, J. S., Sherwin, E. D., Brandt, A., and Wofsy, S. C.: Methane Point Source Quantification Using MethaneAIR: A New Airborne Imaging Spectrometer, *EGUsphere* [preprint], <https://doi.org/10.5194/egusphere-2023-822>, 2023.
- [98] Ouerghi, E., Ehret, T., de Franchis, C., Facciolo, G., Lauvaux, T., Meinhardt, E., and Morel, J.-M.: Automatic detection of methane point emissions on PRISMA images with a matched filter variant and deep learning, *EarthVision* 2023.
- [97] Peng, S., Giron, C., Liu, G., d'Aspremont, A., Benoit, A., Lauvaux, T., Lin, X., de Almeida Rodrigues, H., Saunois, M., and P. Ciais: High resolution assessment of coal mining methane emissions by satellite in Shanxi, China, *iScience*, in review.
- [96] Walley, S., Pal, S., Campbell, J. F., Dobler, J., Bell, E., Weir, B., et al. (2022). Airborne lidar measurements of XCO₂ in a synoptically-active environment and associated comparisons with numerical simulations. *Journal of Geophysical Research: Atmospheres*, 127, e2021JD035664. <https://doi.org/10.1029/2021JD035664>
- [95] Dumont Le Brazidec, J., Vanderbecken, P., Farchi, A., Bocquet, M., Lian, J., Broquet, G., Kuhlmann, G., Danjou, A., and Lauvaux, T.: Segmentation of XCO₂ images with deep learning: application to synthetic plumes from cities and power plants, *Geosci. Model Dev.*, 16, 3997–4016, <https://doi.org/10.5194/gmd-16-3997-2023>, 2023.
- [94] Chen, H. W., Zhang, F., Lauvaux, T., Scholze, M., Davis, K. J., & Alley, R. B. (2023). Regional CO₂ inversion through ensemble-based simultaneous state and parameter estimation: TRACE framework and controlled experiments. *Journal of Advances in Modeling Earth Systems*, 15, e2022MS003208. <https://doi.org/10.1029/2022MS003208>
- [93] Groshenry, A., Giron, C., Lauvaux, T., d'Aspremont, A., and Ehret, T.: Detecting Methane Plumes using PRISMA: Deep Learning Model and Data Augmentation, *Tackling Climate Change with Machine Learning at NeurIPS 2022*.
- [92] Bruley E, Mouillot F, Lauvaux T, Rambal S. Enhanced spring warming in a Mediterranean mountain by atmospheric circulation. *Sci Rep*. 2022 May 11;12(1):7721. doi: 10.1038/s41598-022-11837-x. PMID: 35545646; PMCID: PMC9095602.
- [91] Barkley, Z., Davis, K., Miles, N., Richardson, S., Deng, A., Hmiel, B., Lyon, D., and Lauvaux, T.: Quantification of oil and gas methane emissions in the Delaware and Marcellus basins using a network of continuous tower-based measurements, *Atmos. Chem. Phys.*, 23, 6127–6144, <https://doi.org/10.5194/acp-23-6127-2023>, 2023.
- [90] Ouerghi, E., Ehret, T., de Franchis, C., Facciolo, G., Lauvaux, T., Meinhardt, E., and Morel, J.-M.: Automatic methane plumes detection in time series of sentinel-5p l1b images, *Annals act as proceedings of the 2022 edition of the XXIVth ISPRS Congress*, accepted.
- [89] Wu, K., Davis, K. J., Miles, N. L., Richardson, S. J., Lauvaux, T., Sarmiento, D. P., Balashov, N. V., Keller, K., Turnbull, J., Gurney, K. R., Liang, J., & Roest, G.: Source decomposition of eddy-covariance CO₂ flux measurements for evaluating a high-resolution urban CO₂ emissions inventory. *Environmental Research Letters*, 17(7), 074035. <https://doi.org/10.1088/1748-9326/ac7c29>, 2022.

- [88] Lauvaux, T., Giron, C., Mazzolini, M., d'Aspremont, A., Duren, R., Cusworth, D., Shindell, D., and P. Ciais: Global assessment of oil and gas methane ultra-emitters, *Science*, 375 (6580), 557-561, 10.1126/science.abj4351, <https://www.science.org/doi/abs/10.1126/science.abj4351>, 2022.
- [87] Lei, R., S. Feng, A. Danjou, G. Broquet, D. Wu, J. C. Lin, C. W. O'Dell, and T. Lauvaux: Fossil fuel CO₂ emissions over metropolitan areas from space: A multi-model analysis of OCO-2 data over Lahore, Pakistan, *Remote Sensing of Environment*, 264, 112625, ISSN 0034-4257, <https://doi.org/10.1016/j.rse.2021.112625>, 2021.
- [86] Danjou, A., Broquet, G., Lian, J., Bréon, F.-M., and T. Lauvaux: Evaluation of light atmospheric plume inversion methods using synthetic XCO₂ satellite images to compute Paris CO₂ emissions, *Atmos. Chem. Phys.*, accepted with minor revisions.
- [85] Ehret, T., De Truchis, A., Mazzolini, M., Morel, J.-M., d'Aspremont, A., Lauvaux, T., and G. Facciolo: Global tracking and quantification of oil and gas methane leaks from recurrent Sentinel-2 imagery, *Environmental Science & Technology*, DOI: 10.1021/acs.est.1c08575, 2022.
- [84] Lei, R., Feng, S., Mueller, K., Karion, A., Garcia Renoso, J. A., Grutter, M., Ramonet, M., and T. Lauvaux: Reconciliation of asynchronous satellite based NO₂ and XCO₂ enhancements with mesoscale modeling over two urban landscapes, *Remote Sensing of Environment*, <https://doi.org/10.1016/j.rse.2022.113241>, 2022.
- [83] Abdallah, C., Lauvaux, T., Gros, V., Lian, J., Bréon, F.-M., Ramonet, M., Laurent, O., Ciais, P., Denier van der Gon, H. A.C., Perrussel, O., Baudic, A., Utard, H., and Lian, J.: A gradient-descent optimization of CO₂-CO-NO_x emissions over the Paris Megacity – The case of the first SARS-COV2 lockdown, *Environmental Science & Technology*, in review.
- [82] Krishnankutty, N., Lauvaux, T., Abdallah, C., Lian, J., Ciais, P., Utard, H., Laurent, O., and M. Ramonet: High-resolution Lagrangian inverse modelling of CO₂ emissions over the Paris region during the first 2020 lockdown period, *Journal of Geophysical Research: Atmospheres*, 127, e2021JD036032, <https://doi.org/10.1029/2021JD036032>.
- [81] Deng, Z., Ciais, P., Tzompa-Sosa, Z. A., Saunois, M., Qiu, C., Tan, C., Sun, T., Ke, P., Cui, Y., Tanaka, K., Lin, X., Thompson, R. L., Tian, H., Yao, Y., Huang, Y., Lauerwald, R., Jain, A. K., Xu, X., Bastos, A., Sitch, S., Palmer, P. I., Lauvaux, T., d'Aspremont, A., Giron, C., Benoit, A., Poulter, B., Chang, J., Petrescu, A. M. R., Davis, S. J., Liu, Z., Grassi, G., Albergel, C., and Chevallier, F.: Comparing national greenhouse gas budgets reported in UNFCCC inventories against atmospheric inversions, *Earth Syst. Sci. Data Discuss.*, <https://doi.org/10.5194/essd-2021-235>, 2022.
- [80] Lian, J., Lauvaux, T., Utard, H., Breon, F. M., Broquet, G., Ramonet, M., Laurent, O., Albarus, I., Cucchi, K., and Ciais, P.: Assessing the effectiveness of an urban CO₂ monitoring network over the Paris region through the COVID-19 lockdown natural experiment, *Environmental Science & Technology*, 56 (4), 2153–2162, <https://doi.org/10.1021/acs.est.1c04973>, 2022.
- [79] Gerken, T., Feng, S., Keller, K., Lauvaux, T., DiGangi, J. P., Choi, Y., et al.: Examining CO₂ model observation residuals using ACT-America data. *Journal of Geophysical Research: Atmospheres*, 126, e2020JD034481. <https://doi.org/10.1029/2020JD034481>, 2021.
- [78] Lian, J., Bréon, F.-M., Broquet, G., Lauvaux, T., Zheng, B., Ramonet, M., Xueref-Remy, I., Kotthaus, S., Haeffelin, M., and Ciais, P.: Sensitivity to the sources of uncertainties in the modeling of atmospheric

CO₂ concentration within and in the vicinity of Paris, *Atmos. Chem. Phys.*, 21, 10707–10726, <https://doi.org/10.5194/acp-21-10707-2021>, 2021.

[77] Ouerghi, E., Ehret, T., de Franchis, C., Facciolo, G., Lauvaux, T., Meinhardt, E., and Morel, J.-M.: Detection of methane plumes in hyperspectral images from Sentinel-5P by coupling anomaly detection and pattern recognition, *ISPRS Ann. Photogramm. Remote Sens. Spatial Inf. Sci.*, V-3-2021, 81–87, <https://doi.org/10.5194/isprs-annals-V-3-2021-81-2021>, 2021.

[76] Feng, S., Lauvaux, T., Zhou, Y., Williams, C. A., et al.: Joint CO₂ Mole Fraction and Flux Analysis Confirms Missing Processes in CASA Terrestrial Carbon Uptake over North America, GBC21157, DOI:10.1029/2020GB006914, *Global Biogeochemical Cycles*, 2021.

[75] Schuh, A. E., Otte, M., Lauvaux, T., and Oda, T.: Far-field biogenic and anthropogenic emissions as a dominant source of variability in local urban carbon budgets: a global high-resolution model study with implications for satellite remote sensing, 262, 112473, ISSN 0034-4257, *Remote Sensing of Environment*, <https://doi.org/10.1016/j.rse.2021.112473>, 2021.

[74] Davis, K. J., Browell, E. V., Feng, S., Lauvaux, T., Obland, M. D., Pal, S., Baier, B. C., Baker, D. F., Baker, I. T., Barkley, Z. R., Bowman, K. W., Cui, Y. Y., Denning, A. S., DiGangi, J. P., Dobler, J. T., Fried, A., Gerken, T., Keller, K., Lin, B., Nehrir, A. R., Normile, C. P., O'Dell, C. W., Ott, L. E., Roiger, A., Schuh, A. E., Sweeney, C., Wei, Y., Weir, B., Xue, M., & Williams, C. A. (2021). The Atmospheric Carbon and Transport (ACT) - America Mission, *Bulletin of the American Meteorological Society* <https://journals.ametsoc.org/view/journals/bams/aop/BAMS-D-20-0300.1/BAMS-D-20-0300.1.xml>

[73] Gaudet, B. J., Davis, K. J., Pal, S., Jacobson, A.R., Schuh, A. E., Lauvaux, T., Feng, S., and E.V. Browell: Regional-scale, sector-specific evaluation of global CO₂ inversion models using aircraft data from the ACT-America project, *Journal of Geophysical Research: Atmospheres*, 126, e2020JD033623. <https://doi.org/10.1029/2020JD033623>, 2021.

[72] Wei, Y., Shrestha, R., Pal, S., Gerken, T., Feng, S., McNelis, J., et al. (2021). Atmospheric Carbon and Transport - America (ACT-America) data sets: Description, management, and delivery. *Earth and Space Science*, 8, e2020EA001634. <https://doi.org/10.1029/2020EA001634>

[71] Kiel, M., Eldering, A., Roten, D. D., Lin, J. C., Feng, S., Lei, R., Lauvaux, T., Oda, T., Roehl, C. M., Blavier, J-F, and L. T. Iraci: Urban-focused satellite CO₂ observations from the Orbiting Carbon Observatory-3: a first look at the Los Angeles Megacity, *Remote Sensing of Environment*, 258, 112314, 0034-4257, <https://doi.org/10.1016/j.rse.2021.112314>, 2021.

[70] Lei, R., Feng, S., and Lauvaux, T.: Country-scale trends in air pollution and fossil fuel CO₂ emissions during 2001-2018: confronting the roles of national policies and economic growth, *Environmental Research Letters*, 16, 014006, <https://doi.org/10.1088/1748-9326/abc9e1>, 2021.

[69] Kumar, P., Broquet, G., Yver-Kwok, C., Laurent, O., Gichuki, S., Caldow, C., Cropley, F., Lauvaux, T., Ramonet, M., Berthe, G., Martin, F., Duclaux, O., Juery, C., Bouchet, C., and Ciais, P.: Mobile atmospheric measurements and local-scale inverse estimation of the location and rates of brief CH₄ and CO₂ releases from point sources, *Atmos. Meas. Tech.*, 14, 5987–6003, <https://doi.org/10.5194/amt-14-5987-2021>, 2021.

[68] Mueller, K.L., T. Lauvaux, K. Gurney, P. DeCola, S. Gourdjji, G. Roest, and J. Whetstone: An emerging GHG estimation approach can help cities achieve their climate and sustainability goals, *Environmental Research Letters*, <https://doi.org/10.1088/1748-9326/ac0f25>, 2021.

- [67] Gurney, K. R., J. Liang, G. Roest, Y. Song, K. Mueller, and T. Lauvaux: Under-reporting of greenhouse gas emissions in U.S. cities, *Nature Communications*, 12, 553, <https://doi.org/10.1038/s41467-020-20871-0>, 2021.
- [66] Zhou, Y., Williams, C. A., Lauvaux, T., Davis, K. J., Feng, S., Baker, I., et al. (2020). A multiyear gridded data ensemble of surface biogenic carbon fluxes for North America: Evaluation and analysis of results. *Journal of Geophysical Research: Biogeosciences*, 125, e2019JG005314. <https://doi.org/10.1029/2019JG005314>
- [65] Miles, N. L., Davis, K. J., Richardson, S. J., Lauvaux, T., Martins, D. K., Deng, A.J., Balashov, N., Gurney, K. R., Liang, J., Roest, G., Wang, J.A., and Turnbull, J. C.: The influence of near-field fluxes on seasonal carbon dioxide enhancements: Results from the Indianapolis Flux Experiment (INFLUX), *Carbon Balance Management*, 16, 4, <https://doi.org/10.1186/s13021-020-00166-z>, 2021.
- [64] Lauvaux, T., Gurney, K. R., Miles, N. L., Davis, K. J., Richardson, S. J., Deng, A., Nathan, B., Oda, T., Wang, J., Hutyla, L., and J. Turnbull: Policy-relevant assessment of urban greenhouse gas emissions, *Environ. Sci. Technol.*, 54, 16, 10237–10245, <https://doi.org/10.1021/acs.est.0c00343>, 2020.
- [63] Yang, E. G., Kort, E. A., Wu, D., Lin, J. C., Oda, T., Ye, X., & Lauvaux, T. (2020). Using space-based observations and Lagrangian modeling to evaluate urban carbon dioxide emissions in the Middle East. *Journal of Geophysical Research: Atmospheres*, 125, e2019JD031922. <https://doi.org/10.1029/2019JD031922>
- [62] Samaddar, A., Feng, S., Lauvaux, T., Barkley, Z. R., Pal, S., & Davis, K. J.: Carbon dioxide distribution, origins, and transport along a frontal boundary during summer in mid-latitudes. *Journal of Geophysical Research: Atmospheres*, 126, e2020JD033118, <https://doi.org/10.1029/2020JD033118>, 2021.
- [61] Wesloh, D., Lauvaux, T., & Davis, K. J. (2020). Development of a mesoscale inversion system for estimating continental-scale CO₂ fluxes. *Journal of Advances in Modeling Earth Systems*, 12, e2019MS001818. <https://doi.org/10.1029/2019MS001818>
- [60] Baier, B. C., Sweeney, C., Choi, Y., Davis, K. J., DiGangi, J. P., Feng, S., Fried, A., Halliday, H., Higgs, J., Lauvaux, T., Miller, B., et al (2019). Multispecies assessment of factors influencing regional CO₂ and CH₄ enhancements during the winter 2017 ACT-America campaign. *Journal of Geophysical Research: Atmospheres*, 124. <https://doi.org/10.1029/2019JD031339>.
- [59] Feng, S., Lauvaux, T., Davis, K. J., Keller, K., Zhou, Y., Williams, C., et al. (2019). Seasonal characteristics of model uncertainties from biogenic fluxes, transport, and large-scale boundary inflow in atmospheric CO₂ simulations over North America. *Journal of Geophysical Research: Atmospheres*, 2019; 124: 14325– 14346. <https://doi.org/10.1029/2019JD031165>
- [58] Feng, S., Lauvaux, T., Keller, K., Davis, K. J., Rayner, P., Oda, T., & Gurney, K. R. (2019). A road map for improving the treatment of uncertainties in high-resolution regional carbon flux inverse estimates. *Geophysical Research Letters*, 46. <https://doi.org/10.1029/2019GL082987>.
- [57] Chen, H. W., Zhang, L. N., Zhang, F., Davis, K. J., Lauvaux, T., Pal, S., et al.: Evaluation of regional CO₂ mole fractions in the ECMWF CAMS real-time atmospheric analysis and NOAA CarbonTracker Near-Real Time reanalysis with airborne observations from ACT-America field campaigns. *Journal of Geophysical Research: Atmospheres*, 124. <https://doi.org/10.1029/2018JD029992>, 2019.

- [56] Butler, M. P., Lauvaux, T., Feng, S., Liu, J., Bowman, K. W., and Davis, K. J.: Atmospheric Simulations of Total Column CO₂ Mole Fractions from Global to Mesoscale within the Carbon Monitoring System Flux Inversion Framework, *Atmosphere*, 11(8), 787, <https://doi.org/10.3390/atmos11080787>, 2020.
- [55] Oda, T., Bun, R., Kinakh, V., Topylko, P., Halushchak, M., Marland, G., Lauvaux, T., Jonas, M., Maksyutov, S., Nahorski, Z., Lesiv, M. Danylo, O., and Horabik-Pyzel, J.: Errors and uncertainties in a global, gridded, fossil-fuel, carbon dioxide (CO₂), emission inventory, *Mitig Adapt Strateg Glob Change* (2019) 24: 1007, <https://doi.org/10.1007/s11027-019-09877-2>.
- [54] Pal, S., Davis, K. J., Lauvaux, T., Browell, E. V., Gaudet, B. J., Stauffer, D. R., et al. (2020). Observations of greenhouse gas changes across summer frontal boundaries in the eastern United States. *Journal of Geophysical Research: Atmospheres*, 125, e2019JD030526, <https://doi.org/10.1029/2019JD030526>
- [53] Chen, H. W., Zhang, F., Lauvaux, T., Davis, K. J., Feng, S., Butler, M. P., & Alley, R. B.: Characterization of regional-scale CO₂ transport uncertainties in an ensemble with flow-dependent transport errors. *Geophysical Research Letters*, 46, 4049–4058. <https://doi.org/10.1029/2018GL081341>, 2019.
- [52] Balashov, N. V., Davis, K. J., Miles, N. L., Lauvaux, T., Richardson, S. J., Barkley, Z. R., and Bonin, T. A.: Background heterogeneity and other uncertainties in estimating urban methane flux: results from the Indianapolis Flux Experiment (INFLUX), *Atmos. Chem. Phys.*, 20, 4545–4559, <https://doi.org/10.5194/acp-20-4545-2020>, 2020.
- [51] Lauvaux, T., Díaz-Isaac, L. I., Bocquet, M., and Bousserez, N.: Diagnosing spatial error structures in CO₂ mole fractions and XCO₂ column mole fractions from atmospheric transport, *Atmos. Chem. Phys.*, 19, 12007–12024, <https://doi.org/10.5194/acp-19-12007-2019>, 2019.
- [50] Barkley, Z. R., Lauvaux, T., Davis, K. J., Deng, A., Fried, A., Weibring, P., et al.: Estimating methane emissions from underground coal and natural gas production in southwestern Pennsylvania. *Geophysical Research Letters*, 46. <https://doi.org/10.1029/2019GL082131>, 2019.
- [49] Díaz-Isaac, L. I., Lauvaux, T., Bocquet, M., and Davis, K. J.: Calibration of a multi-physics ensemble for estimating the uncertainty of a greenhouse gas atmospheric transport model, *Atmos. Chem. Phys.*, 19, 5695–5718, <https://doi.org/10.5194/acp-19-5695-2019>, 2019.
- [48] Karion, A., Lauvaux, T., Lopez Coto, I., Sweeney, C., Mueller, K., Gourdj, S., Angevine, W., Barkley, Z., Deng, A., Andrews, A., Stein, A., and Whetstone, J.: Intercomparison of atmospheric trace gas dispersion models: Barnett Shale case study, *Atmos. Chem. Phys.*, 19, 2561–2576, <https://doi.org/10.5194/acp-19-2561-2019>, 2019.
- [47] Turnbull, J., Karion, A., Davis, K. J., Lauvaux, T., Miles, N.L., Richardson, S. R., Sweeney, C., McKain, K., Lehman, S., Gurney, K.R., Patarasuk, R., Liang, J., Shepson, P., Heimburger, A., Harvey, R., and Whetstone, J.: Synthesis of urban CO₂ emission estimates from multiple methods from the Indianapolis Flux Project (INFLUX), *Environmental Science & Technology*, 53 (1), 287–295, DOI: 10.1021/acs.est.8b05552, 2019
- [46] Nathan, B., Lauvaux, T., Turnbull, J., Richardson, S. R., Miles, N.L., and Gurney, K.R: Source Sector Attribution of CO₂ Emissions Using an Urban CO/CO₂ Bayesian Inversion System, *Journal of*

Geophysical Research: Atmospheres, 123, 13,611– 13,621. <https://doi.org/10.1029/2018JD029231>, 2018.

[45] Wu, D., Lin, J. C., Fasoli, B., Oda, T., Ye, X., Lauvaux, T., Yang, E. G., and Kort, E. A.: A Lagrangian approach towards extracting signals of urban CO₂ emissions from satellite observations of atmospheric column CO₂ (XCO₂): X-Stochastic Time-Inverted Lagrangian Transport model (“X-STILT v1”), *Geosci. Model Dev.*, 11, 4843-4871, <https://doi.org/10.5194/gmd-11-4843-2018>, 2018.

[44] Díaz-Isaac, L. I., Lauvaux, T., and Davis, K. J.: Impact of physical parameterizations and initial conditions on simulated atmospheric transport and CO₂ mole fractions in the US Midwest, *Atmos. Chem. Phys.*, <https://doi.org/10.5194/acp-2018-117>, 2018.

[43] Alvarez, R.A., Zavala-Araiza, D., Lyon, D.R., Allen, D.T., Barkley, Z.R., Brandt, A.R., Davis, K.J., Herndon, S.C., Jacob, D.J., Karion, A., Kort, E.A., Lamb, B.K., Lauvaux, T., Maasakkers, J.D., Marchese, A.J., Omara, M., Pacala, S.W., Peischl, J., Robinson, A.L., Shepson, P., Sweeney, C., Townsend-Small, A., Wofsy, S.C., Hamburg, S.: Assessment of Methane Emissions from the U.S. Oil and Gas Supply Chain, *Science*, <https://doi.org/10.1126/science.aar7204>, 2018.

[42] Ye, X., Lauvaux, T., Kort, E. A., Oda, T., Feng, S., Lin, J. C., et al (2020). Constraining fossil fuel CO₂ emissions from urban areas using OCO-2 observations of total column CO₂. *Journal of Geophysical Research: Atmospheres*, 125, e2019JD030528. <https://doi.org/10.1029/2019JD030528>

[41] Zheng, G., Brantley, S. L., Lauvaux, T., Li, Z. Contextual Spatial Outlier Detection with Metric Learning. *KDD 2017*, 2161-2170, doi:10.1145/3097983.3098143, 2017.

[40] Wu, K., Lauvaux, T., Davis, K. J., Deng, A., Lopez Coto, I., Gurney, K. R., Patarasuk R. Joint inverse estimation of fossil fuel and biogenic CO₂ fluxes in an urban environment: An observing system simulation experiment to assess the impact of multiple uncertainties, *Elem Sci Anth*, 6(1):17, DOI: <http://doi.org/10.1525/elementa.138>, 2018.

[39] Richardson, S. J., Miles, N. L., Davis, K. J., Lauvaux, T., Martins, D. K., Turnbull, J. C., McKain, K., Sweeney, C., Cambaliza, M. O. L. Tower measurement network of in-situ CO₂, CH₄, and CO in support of the Indianapolis FLUX (INFLUX) Experiment. *Elem Sci Anth*, 5, 59. DOI: <http://doi.org/10.1525/elementa.140>, 2017.

[38] Nathan, B., Lauvaux, T., Turnbull, J., Gurney, K. R.: Investigations Into the Use of Multi-Species Measurements for Source Apportionment of the Indianapolis Fossil Fuel CO₂ Signal, *Elem. Sci. Anth.*, DOI: <https://doi.org/10.1525/elementa.131>, 2018.

[37] Miles, N. L., Martins, D. K., Richardson, S. J., Rella, C. W., Arata, C., Lauvaux, T., Davis, K. J., Barkley, Z. R., McKain, K., and Sweeney, C.: Calibration and Field Testing of Cavity Ring-Down Laser Spectrometers Measuring CH₄, CO₂, and δ¹³CH₄ Deployed on Towers in the Marcellus Shale Region, *Atmos. Meas. Tech. Discuss.*, <https://doi.org/10.5194/amt-2017-364>, in review, 2017.

[36] Cao, Y., Cervone, G., Barkely, Z., Lauvaux, T., Deng, A., and Taylor, A.: Influence of Geographic Coordinate System on Weather Simulations of Atmospheric Emissions, *Geosci. Model Dev.*, <https://doi.org/10.5194/gmd-2016-253>, 2017.

[35] Barkley, Z. R., Lauvaux, T., Davis, K. J., Deng, A., Miles, N. L., Richardson, S. J., Cao, Y., Sweeney, C., Karion, A., Smith, M., Kort, E. A., Schwietzke, S., Murphy, T., Cervone, G., Martins, D., and

- Maasackers, J. D.: Quantifying methane emissions from natural gas production in north-eastern Pennsylvania, *Atmos. Chem. Phys.*, 17, 13941-13966, <https://doi.org/10.5194/acp-17-13941-2017>, 2017.
- [34] Gaudet BJ, Lauvaux T, Deng A, Davis KJ. Exploration of the impact of nearby sources on urban atmospheric inversions using large eddy simulation. *Elem Sci Anth.*; 5:60.
DOI: <http://doi.org/10.1525/elementa.247>, 2017.
- [33] Gurney K.R., Liang J., Patarasuk R., O'Keefe D., Huang J., Hutchins M., Lauvaux T., Turnbull J. C., Shepson P. B., Reconciling the differences between a bottom-up and inverse-estimated FFCO₂ emissions estimate in a large US urban area. *Elem. Sci. Anth.* 2017;5:44.
DOI: <http://doi.org/10.1525/elementa.137>, 2017.
- [32] J. K. Hedelius, S. Feng, C. M. Roehl, D. Wunch, P. W. Hillyard, J. R. Podolske, L. T. Iraci, R. Patarasuk, P. Rao, D. O'Keefe, K. R. Gurney, T. Lauvaux, P. O. Wennberg, Emissions and topographic effects on column CO₂ (XCO₂) variations, with a focus on the Southern California Megacity, *J. Geophys. Res. Atmos.*, 122, 7200–7215, doi:10.1002/2017JD026455, 2017.
- [31] Miles, N.L., Richardson, S.J., Lauvaux, T., Davis, K.J., Balashov, N.V., Deng, A., Turnbull, J.C., Sweeney, C., Gurney, K.R., Patarasuk, R., Razlivanov, I., Cambaliza, M.O.L., and Shepson, P.B.: Quantification of urban atmospheric boundary layer greenhouse gas dry mole fraction enhancements: Results from the Indianapolis Flux Experiment (INFLUX), *Elem Sci Anth.* 2017;5:27.
DOI: <http://doi.org/10.1525/elementa.127>, 2017.
- [30] Heimbürger, A.M.F., Harvey, R.M., Shepson, P.B., Stirm, B.H., Gore, C., Turnbull, J., Cambaliza, M.O.L., Salmon, O.E., M. Kerlo, A.E., Lavoie, T.N., Davis, K.J., Lauvaux, T., Karion, A., Sweeney, C., Brewer, W.A., Hardesty, R.M., Gurney, K.R.: Assessing the Optimized Precision of the Aircraft Mass Balance Method for Measurement of Urban Greenhouse Gas Emission Rates Through Averaging, *Elem Sci Anth.* 2017;5:26. DOI: <http://doi.org/10.1525/elementa.134>, 2017.
- [29] Davis, K.J., Deng, A., Lauvaux, T., Miles, N.L., Richardson, S.J., Sarmiento, D., Gurney, K.R., Hardesty, R.M., Bonin, T., Brewer, W.A., Shepson, P.B., Harvey, R.M., Cambaliza, M.O., Sweeney, C., Turnbull, J., Whetstone, J., Karion, A.: The Indianapolis Flux Experiment (INFLUX): A test-bed for developing urban greenhouse gas emission measurements. *Elem Sci Anth.* 2017;5:21.
DOI: <http://doi.org/10.1525/elementa.188>, 2017.
- [28] Oda, T. Lauvaux, T., Lu, D., Rao, P., Miles, N.L., Richardson, S.J., and Gurney, K.R.: On the Impact of Granularity of Space-based Urban CO₂ Emissions in Urban Atmospheric Inversions: A Case Study for Indianapolis, IN, *Elem Sci Anth.* 2017;5:28. DOI: <http://doi.org/10.1525/elementa.146>, 2017.
- [27] Deng, A., Lauvaux, T., Davis, K.J., Gaudet, B.J., Miles, N.L., Richardson, S.J., Wu, K., Sarmiento, D.P., Hardesty, R.M., Bonin, T.A., Brewer, W.A., and Gurney, K.R.: Toward reduced transport errors in a high resolution urban CO₂ inversion system, *Elem Sci Anth.* 2017;5:20.
DOI: <http://doi.org/10.1525/elementa.133>, 2017.
- [26] Sarmiento, D. P., Davis, K. J., Deng, A., Lauvaux, T., Brewer. A., Hardesty, M.: A comprehensive assessment of land surface-atmosphere interactions in a WRF/Urban modeling system for Indianapolis, IN. *Elem Sci Anth.* 2017;5:23. DOI: <http://doi.org/10.1525/elementa.132>, 2017.
- [25] Viatte, C., Lauvaux, T., Hedelius, J. K., Parker, H., Chen, J., Jones, T., Franklin, J. E., Deng, A. J., Gaudet, B., Verhulst, K., Duren, R., Wunch, D., Roehl, C., Dubey, M. K., Wofsy, S., and Wennberg, P.

O.: Methane emissions from dairies in the Los Angeles Basin, *Atmos. Chem. Phys.*, 17, 7509-7528, <https://doi.org/10.5194/acp-17-7509-2017>, 2017.

[24] Bloom, A. A., Lauvaux, T., Worden, J., Yadav, V., Duren, R., Sander, S. P., and Schimel, D. S.: What are the greenhouse gas observing system requirements for reducing fundamental biogeochemical process uncertainty? Amazon wetland CH₄ emissions as a case study, *Atmos. Chem. Phys.*, 16, 15199-15218, doi:10.5194/acp-16-15199-2016, 2016.

[23] Lauvaux T, Miles NL, Deng A, Richardson SJ, Cambaliza MO, Davis KJ, Gaudet B, Gurney KR, Huang J, Karion A, Oda T, Patasarak R, Razlivanov I, Sarmiento D, Shepson P, Sweeney C, Turnbull J, and Wu K: High resolution atmospheric inversion of urban CO₂ emissions during the dormant season of the Indianapolis Flux Experiment (INFLUX), *Journal of Geophys. Res. Atmos.*, 121, doi:10.1002/2015JD024473, 2016.

[22] Feng, S., Lauvaux, T., Newman, S., Rao, P., Ahmadov, R., Deng, A., Díaz-Isaac, L. I., Duren, R. M., Fischer, M. L., Gerbig, C., Gurney, K. R., Huang, J., Jeong, S., Li, Z., Miller, C. E., O'Keeffe, D., Patasarak, R., Sander, S. P., Song, Y., Wong, K. W., and Yung, Y. L.: LA Megacity: a High-Resolution Land-Atmosphere Modelling System for Urban CO₂ Emissions, *Atmos. Chem. Phys.*, doi:10.5194/acp-2016-143, 2016.

[21] Lamb B. K., M. O. L. Cambaliza, K. J. Davis, S. L. Edburg, T. W. Ferrara, C. Floerchinger, A. M. F. Heimbürger, S. Herndon, T. Lauvaux, T. Lavoie, D. R. Lyon, N. Miles, K. R. Prasad, S. Richardson, J. R. Roscioli, O. E. Salmon, P. B. Shepson, B. H. Stirm, and J. Whetstone: Direct and Indirect Measurements and Modeling of Methane Emissions in Indianapolis, Indiana, *Environmental Science & Technology*, 50 (16), 8910-8917, DOI: 10.1021/acs.est.6b01198, 2016.

[20] Karion A, Sweeney C, Kort E, Shepson P.B., Brewer A, Cambaliza M, Conley SA, Davis K, Deng A, Hardesty M, Herndon SC, Lauvaux T, Lavoie T, Lyon D, Newberger T, Pétron G, Rella C, Smith M, Wolter S, Yacovitch TI, and Tans P: Aircraft-Based Estimate of Total Methane Emissions from the Barnett Shale Region, *Environmental Science & Technology*, 49 (13), 8124-8131, DOI: 10.1021/acs.est.5b00217, 2015.

[19] Ogle S, KJ Davis, T. Lauvaux, AE Schuh, D Cooley, TO West, L Heath, N Miles, SJ Richardson, FJ Breidt, J Smith, JL McCarty, KR Gurney, PP Tans, and S Denning: An Approach for Verifying Biogenic Greenhouse Gas Emissions Inventories with Atmospheric CO₂ Concentration Data, *Environmental Research Letters*, 10(3): Article No. 034012, doi:10.1088/1748-9326/10/3/034012, 2015.

[18] Turnbull, J., C. Sweeney, A. Karion, T. Newberger, P. Tans, S. Lehman, K.J. Davis, N.L. Miles, S.J. Richardson, T. Lauvaux, M.O. Cambaliza, P. Shepson, K. Gurney, R. Patasarak, A. Zondervan: Towards quantification and source sector identification of fossil fuel CO₂ emissions from an urban area: Results from the INFLUX experiment. *J. Geophys. Res. Atmos.*, doi: 10.1002/2014JD022555, 2015.

[17] Cambaliza MOL, Shepson PB, Bogner J, Caulton DR, Stirm B, C. Sweeney, S. A. Montzka, K. R. Gurney, K. Spokas, O. E. Salmon, T. N. Lavoie, A. Hendricks, K. Mays, J. Turnbull, B. R. Miller, T. Lauvaux, K. J. Davis, A. Karion, et al. - Quantification and source apportionment of the methane emission flux from the city of Indianapolis. *Elem. Sci. Anth.* 3: 000037 doi: 10.12952/journal.elementa.000037, 2015

- [16] Díaz Isaac, L. I., T. Lauvaux, K. J. Davis, N. L. Miles, S. J. Richardson, A. R. Jacobson, and A. E. Andrews (2014), Model-data comparison of MCI field campaign atmospheric CO₂ mole fractions, *J. Geophys. Res. Atmos.*, 119, doi:10.1002/2014JD021593.
- [15] Cambaliza, M. O. L., Shepson, P. B., Caulton, D. R., Stirm, B., Samarov, D., Gurney, K. R., Turnbull, J., Davis, K. J., Possolo, A., Karion, A., Sweeney, C., Moser, B., Hendricks, A., Lauvaux, T., Mays, K., Whetstone, J., Huang, J., Razlivanov, I., Miles, N. L., and Richardson, S. J.: Assessment of uncertainties of an aircraft-based mass balance approach for quantifying urban greenhouse gas emissions, *Atmos. Chem. Phys.*, 14, 9029-9050, doi:10.5194/acp-14-9029-2014, 2014.
- [14] Lauvaux, T., and K. J. Davis (2014), Planetary boundary layer errors in mesoscale inversions of column-integrated CO₂ measurements, *J. Geophys. Res. Atmos.*, 119, 490-508, doi:10.1002/2013JD020175.
- [13] T. Lauvaux, N.L. Miles, S.J. Richardson, A. Deng, D. Stauffer, K.J. Davis, G. Jacobson, C. Rella, G.-P. Calonder: Urban emissions of CO₂ from Davos, Switzerland: the first real-time monitoring system using an atmospheric inversion technique, *Journal of Applied Meteorology and Climatology*, doi: <http://dx.doi.org/10.1175/JAMC-D-13-038.1>, 2013.
- [12] Wu, L., Bocquet, M., Chevallier, F., Lauvaux, T., & Davis, K. (2013). Hyperparameter estimation for uncertainty quantification in mesoscale carbon dioxide inversions. *Tellus B*, 65. doi:10.3402/tellusb.v65i0.20894
- [11] Schuh, A. E., Lauvaux, T., West, T. O., Denning, A. S., Davis, K. J., Miles, N., Richardson, S., Uliasz, M., Lokupitiya, E., Cooley, D., Andrews, A. and Ogle, S.: Evaluating atmospheric CO₂ inversions at multiple scales over a highly inventoried agricultural landscape. *Global Change Biology*, 19: 1424-1439. doi: 10.1111/gcb.12141, 2013
- [10] Cooley D., Breidt F.J., Ogle S.M., Schuh A., Lauvaux T.: A Constrained Least-Squares Approach to Combine Bottom-Up and Top-Down CO₂ Flux Estimates. *Environmental and Ecological Statistics*, doi: 10.1007/s10651-012-0211-6, 2012.
- [9] Miles, N. L., S. J. Richardson, K. J. Davis, T. Lauvaux, A. E. Andrews, T. O. West, V. Bandaru, and E. Crosson: Large amplitude spatial and temporal gradients in atmospheric boundary layer CO₂ mole fractions detected with a tower-based network in the U.S. upper Midwest, *J. Geophys. Res.*, 117, G01019, doi:10.1029/2011JG001781., 2012.
- [8] T. Lauvaux, Schuh, A.E., Uliasz, M., Richardson, S., Miles, N., Andrews, A.E., Sweeney, C., Diaz, L.I., Martins, D., Shepson, P.B., and Davis, K.J.: Constraining the CO₂ budget of the corn belt: exploring uncertainties from the assumptions in a mesoscale inverse system, *Atmos. Chem. Phys.*, 12, 337-354, doi:10.5194/acp-12-337-2012, 2012.
- [7] T. Lauvaux, Schuh, A., Bocquet, M., Wu, L., Richardson, S., Miles, N., & Davis, K.: Network design for mesoscale inversions of CO₂ sources and sinks. *Tellus B*, 64. doi:10.3402/tellusb.v64i0.17980, 2012.
- [6] Wu, L., M. Bocquet, T. Lauvaux, F. Chevallier, P. Rayner, and K. Davis (2011), Optimal representation of source-sink fluxes for mesoscale carbon dioxide inversion with synthetic data, *J. Geophys. Res.*, 116, D21304, doi:10.1029/2011JD016198.

[5] Dolman, A. J., Noilhan, J., Tolk, L. F., Lauvaux, T., van der Molen, M. K., Gerbig, C., Miglietta, F. & Perez-Landa, G. 2008 The Continental-Scale Greenhouse Gas Balance of Europe.. Freibauer, A., Valentini, R., D. A. J. (ed.). New York: Springer New York, p. 285-308

[4] T. Lauvaux, B. Gioli, C. Sarrat, P. J. Rayner, P. Ciais, F. Chevallier, J. Noilhan, F. Miglietta, Y. Brunet, E. Ceschia, H. Dolman, J. A. Elbers, Gerbig, R. Hutjes, N. Jarosz, D. Legain, M. Uliasz (2009): Bridging the gap between atmospheric concentrations and local ecosystem measurements, *Geophys. Research Lett.*, , 36, L19809, doi:10.1029/2009GL039574.

[3] T. Lauvaux, O. Pannekoucke, C. Sarrat, F. Chevallier, P. Ciais, J. Noilhan, and P. J. Rayner: Structure of the transport uncertainty in mesoscale inversions of CO₂ sources and sinks using ensemble model simulations, *Biogeosciences*, 6, 1089-1102, 2009.

[2] Sarrat, C., Noilhan, J., Lacarrere, P., Donier, S., Dolman, A., Gerbig, C., Hutjes, R., Elbers, J., Gioli, B., Miglietta, F., Neininger, B., Lauvaux, T., Ciais, P., Ramonet, M., Ceschia, E., Bonnefond, J. M.: Mesoscale modeling of the CO₂ interactions between the surface and the atmosphere applied to the April, 2007 CERES field experiment, *Biogeosciences*, 6, 633-646, 2009.

[1] T. Lauvaux, M. Uliasz, C. Sarrat, F. Chevallier, P. Bousquet, C. Lac, K. J. Davis, P. Ciais, A. S. Denning, P. Rayner, Mesoscale inversion: first results from the CERES campaign with synthetic data, *Atmospheric Chemistry and Physics*, 8, 3459-3471, 2008.

Invited Seminars

Lauvaux, T., Feng, S., et al.: Constraining continental carbon exchanges from atmospheric GHG mixing ratios: an uncertainty-based analysis, Keynote Speaker, ICOS Science Conference 2020, 15-17 September 2020, Utrecht, Netherlands.

Lauvaux T, Ye X, Barkley Z, K. J. Davis, S. J. Richardson, N. Miles, B. Nathan: When fossil fuel emissions are no longer perfect in atmospheric inversion systems, Seminar of the European Centre for Medium-Range Forecast, January 7, 2019.

Lauvaux T, Ye X, Barkley Z, K. J. Davis, S. J. Richardson, N. Miles, B. Nathan: Trend detection of urban greenhouse gas emissions by assimilation of ground- and space-based observations, University of Heidelberg, seminar of the Institut für Umweltphysik, November 22, 2018.

Lauvaux T, Ye X, Miles NL, Deng A, Richardson SJ, Nathan B, Davis KJ, Gaudet B, Gurney KR, Oda T, Kort E, Lin J: Atmospheric inversion of urban greenhouse gas emissions, University of California Los Angeles, Department of Atmospheric and Oceanic Sciences, Seminar, October 2017.

Lauvaux T, N. L. Miles, A. Deng, S. J. Richardson, X. Ye, B. Nathan, K. J. Davis, B. Gaudet, K. R. Gurney, T. Oda, P. Shepson, C. Sweeney, J. Turnbull: Atmospheric Monitoring of Urban Greenhouse Gas Emissions Using Ground Network and Satellite Measurements, Laboratory Seminar, Laboratoire des Sciences du Climat et de l'Environnement (LSCE), Gif-sur-Yvette, France, November 2016.

Lauvaux T, N. L. Miles, A. Deng, S. J. Richardson, X. Ye, B. Nathan, K. J. Davis, B. Gaudet, K. R. Gurney, T. Oda, P. Shepson, C. Sweeney, J. Turnbull. Assimilation of in situ and remote sensing atmospheric Greenhouse Gas measurements to quantify emissions from anthropogenic activities, BASC seminar series, University of California Berkeley, September 2016.

Lauvaux T, X. Ye, N. L. Miles, A. Deng, E. Kort, J. Lin, E. Yang, S. J. Richardson, X. Ye, B. Nathan, K. J. Davis, B. Gaudet, K. R. Gurney, T. Oda, P. Shepson, C. Sweeney, J. Turnbull: Atmospheric Inversions of Urban Greenhouse Gas sources and sinks at high resolution, NASA Goddard GMAO seminar, Greenbelt, MD, May 2016.

Workshop organizer

Programme committee member: 5th ICOS Science Conference, Utrecht, 13-15 September, 2022, sponsor: ICOS Head Office (Sweden)

Main organizer: 2nd joint Transcom-IG3IS Inverse Modeling Workshop, Cité Internationale Universitaire de Paris, 15-16 October 2019, 120 participants, sponsor: United Nations World Meteorological Organization.

Science team member

TOSCA program (CNES) - Scientific committee member, proposal reviewer (2024-present)
Member of the Steering Committee of the WMO Integrated Global Greenhouse Gas Information System (IG³IS) program (2020-present), and leader of the IG³IS Cross-cutting activities (2017-present)
NASA Carbon Monitoring System Science Team (2013-2017)
NASA OCO-2 Science Team (2015-present)
NASA OCO-3 Science Team (2017-present)

Manuscript referee

Atmospheric Chemistry and Physics
Atmospheric Environment
Biogeosciences
Elementa: Science of the Anthropocene
Environmental Research Letters
Environmental Science and Technology
Geophysical Research Letters
Journal of Geophysical Research
Journal of Applied Meteorology and Climatology
Quarterly Journal of the Royal Meteorological Society
Nature Climate Change
Nature
Proceedings of the National Academy of Sciences
Remote Sensing
iScience
CHEM

Proposal referee

NASA
NSF
NOAA
DOE
Natural Environment Research Council (United Kingdom)
Office of Environment and Heritage (Australia)

Journal editor

Section Editorial Board Member for *Remote Sensing*, Land Surface Fluxes, Impact Factor: 3.4

Author - Contributor (Books & reports)

Reviewer: South African Council for Scientific and Industrial Research (CSIR): "Shale Gas Development in the Central Karoo: A Scientific Assessment of the Opportunities and Risks", <http://seasgd.csir.co.za/scientific-assessment-chapters/>, July 2016.

Responsible for cross-cutting activities: World Meteorological Organization – Integrated Global Greenhouse Gas Information System (IG³IS), <https://public.wmo.int/en/resources/bulletin/integrated-global-greenhouse-gas-information-system-ig3is>

Scientific committee member: Centre for Energy Law and Policy, Penn State University (2017 – 2018): “Regulation of Methane Emissions from Unconventional Oil and Gas: Current Approaches and Possibilities for Innovation Based on Emerging Science”, <http://celp.psu.edu>

Session chair

Main convener, European Geophysical Union Annual Meeting (Vienna, 2024), AS3.41: Constraining feedbacks between greenhouse gas exchange processes and climate variability using in situ observations and remote sensing

Co-chair, at American Geophysical Union Annual Meeting (San Francisco, 2016), A51K: Understanding and Attributing Greenhouse Gas Fluxes from Urban Systems and Major Hot-Spots

Convener, American Geophysical Union Annual Meeting (New Orleans, 2017), A030: Constraining Biosphere-Atmosphere Exchange Processes using Remote-sensing and In Situ Observations

Convener, American Geophysical Union Annual Meeting (Washington D.C., 2018), A41C: Constraining Biosphere-Atmosphere Exchange Processes using Remote-sensing and In Situ Observations

Co-convener, American Geophysical Union Annual Meeting (San Francisco, 2019), A51E: Constraining Biosphere-Atmosphere Exchange Processes using Remote-sensing and In Situ Observations

Co-convener, European Geophysical Union Annual Meeting (Vienna, 2020), AS3.17: Science-based Greenhouse Gas Emission Estimates in Support of National and Sub-National Climate Change Mitigation

Co-convener, American Geophysical Union Annual Meeting (San Francisco, 2020), A102-105-109-128: Constraining Greenhouse Gas Exchange Processes Using Remote Sensing and in Situ Observations

Guest / Special Issue editor

Principal Investigator, "Quantification of Urban Greenhouse Gas Emissions: The Indianapolis Flux Experiment", in *Elementa Science of the Anthropocene*, 14 articles published.
<https://collections.elementascience.org/quantification-of-urban-greenhouse-gas-emissions/>

Special Issue Editor, "Remote Sensing of Carbon Dioxide and Methane in Earth's Atmosphere", *Remote Sensing* (ISSN 2072-4292), 10 articles published,
https://www.mdpi.com/journal/remotesensing/special_issues/CH4_rs

Society member

American Geophysical Union (2008-present)
European Geophysical Union (2007-2008, 2018-present)

Intellectual property owner

Co-Inventor (Kayrros Inc.)
EUREKA AUTOMATED DETECTION AND QUANTIFICATION OF GAS EMISSIONS, USA
Provisional application, 2020-07-08, 63/049,302

Co-Inventor (Penn State University)
US patent application 2013-3994, "System and method for measurement of temporal changes in trace gas fluxes"

Sole Inventor (France)
Pending patent number 12 57639 registered on 08/06/2012 and deposited by Commissariat à l'Énergie Atomique in Paris

Conferences and Workshops

[59] K. L. Mueller, T. Lauvaux, K. R. Gurney, P. DeCola, S. Gourджи, G. S. Roest and J. R. Whetstone: Atmospheric-based greenhouse gas measurements approaches can help cities achieve their climate and sustainability goals (oral), 16 Dec. 2020, B108-0001, *American Geophysical Union Fall Meeting 2020*, San Francisco.

- [58] A. E. Schuh, T. Oda, T. Lauvaux, and M. Otte: Building Bridges: An Example of Linking Global-Scale CO₂ Fluxes to High-Resolution Urban CO₂ Emissions (oral), 17 Dec. 2020, B108-0008, *American Geophysical Union Fall Meeting 2020*, San Francisco.
- [57] E.G. Yang, E. A. Kort, L. E. Ott, S. Feng, T. Lauvaux: Toward Using Space-Based CO₂ and NO₂ Observations to Estimate Urban CO₂ Emissions (oral), 17 Dec. 2020, A245-02, *American Geophysical Union Fall Meeting 2020*, San Francisco.
- [56] R. Lei, S. Feng, D. Wu, C. O'Dell, J. C. Lin, M. Kiel, A. Eldering, G. Broquet, A. Danjou, T. Oda and T. Lauvaux: Data sampling from space and urban fossil-fuel CO₂ emissions: do we measure often enough? (oral presentation), 16 Dec. 2020, A221-0009, *American Geophysical Union Fall Meeting 2020*, San Francisco.
- [55] S. Pal, K. J Davis, E. V Browell, Y. Choi, J. Digangi, S. Feng, T. Lauvaux, B. Lin, A. R Nehrir, M. D Obland: Greenhouse Gas Variability across Fronts over the Eastern US during an Early versus a Late Summer Campaign (oral presentation), 13 January 2020, *100th American Meteorological Society Annual Meeting*, Boston, MA.
- [54] K. J Davis, N. Balashov, R. R Dickerson, K. Gurney, A. Karion, T. Lauvaux, I. Lopez-Coto, N. Miles, X. Ren, S. Richardson, P. Shepson, J. Turnbull: Progress in quantifying urban greenhouse gas fluxes using atmospheric measurements (oral presentation), 16 January 2020, *100th American Meteorological Society Annual Meeting*, Boston, MA.
- [53] T. Oda, R. Pavlick, T. P. Kurosu, T. Lauvaux, S. Feng, L. Ott, A. E. Schuh, D. Crisp, and A. Eldering: A suite of high-resolution atmospheric carbon dioxide simulations in support of the OCO-3 SAM map-mode observation – how should we use the OCO-3 SAM mode observation? What do we expect from the data?, Oral presentation A54G-03, *American Geophysical Union Fall Meeting 2019*, San Francisco.
- [52] B. Baier, C. Sweeney, J. B. Miller, S. Lehman, B. R Miller, K. J Davis, S. Feng, T. Lauvaux, J. P. DiGangi, Y. Choi, J. B. Nowak and H. S. Halliday: Constraining seasonal biogenic and fossil fuel CO₂ during the ACT-America campaigns: observations using critical tracers and model comparisons, Oral presentation A51E-05, *American Geophysical Union Fall Meeting 2019*, San Francisco.
- [51] A. E. Schuh, R. L. Walko, M. J. Otte, S. Crowell, T. Lauvaux, R. R. Nelson, T. Oda, L. E. Ott: Building a bridge: an example of linking global-scale CO₂ fluxes to high-resolution urban CO₂ emissions, Oral presentation A54G-02, *American Geophysical Union Fall Meeting 2019*, San Francisco.
- [50] K. J. Davis, T. Lauvaux, N. L. Miles, S. J. Richardson, P. Shepson, et al.: Monitoring urban greenhouse gas emissions: Lessons from the NIST greenhouse gas measurements test-bed program, Oral presentation B51E-12, *American Geophysical Union Fall Meeting 2019*, San Francisco.
- [49] T. Lauvaux, K. Mueller, X. Ye, K. Gurney, M. Ramonet, P. Ciais, M. Nishihashi, Y. Terao, K. Davis, S. Richardson, N. Miles, R. Duren, and T. Oda: Urban landscapes and atmospheric GHG inversions: role of environmental and socio-economic drivers on evaluating mitigation policies, Oral presentation at the *European Geophysical Union 2019 meeting*, Vienna, Austria.
- [48] T. Oda, R. Bun, V. Kinakh, S. Feng, T. Lauvaux, J. Wang, R. Kawa, S. Maksyutov, M. Roman, Z. Wang, L. Ott, and S. Pawson: Assessing errors and uncertainties in subnational fossil fuel CO₂ emission

estimates: A case for ODIAC, Oral presentation at the European Geophysical Union 2019 meeting, Vienna, Austria.

[47] T. Lauvaux, A. Deng, K. R. Gurney, B. Nathan, X. Ye, T. Oda, A. Karion, M. Hardesty, R. M. Harvey, S. Richardson, J. R. Whetstone, L. Hutyra, K. J. Davis, A. Brewer, B. J. Gaudet, J. C. Turnbull, C. Sweeney, P. B. Shepson, N. Miles, T. Bonin, K. Wu and N. V. Balashov: Lessons learned from some US and non-US research activities at the city scale in inferring trace gas emissions from urban areas, CHE-VERIFY Joint General Assembly, March 12-14, 2019 (invited speaker).

[46] L. Fowler, H. M. Osofsky, Z. Barkley, S. Blumsack, K. J. Davis, T. Lauvaux, R. Pifer, E. Korkut and C. Marie: Innovations in Regulatory and Economic Approaches to Managing Methane, Oral session PA34B, American Geophysical Union Fall Meeting 2018, Washington DC.

[45] T. Lauvaux, S. Feng, S. Pal, A. Samaddar, K. J. Davis, A. E. Schuh, S. Basu, D. Baker, J. Liu, A. R. Jacobson and A. S. Denning: Implications of jet stream and monsoon flow patterns on regional atmospheric inversions of CO₂ fluxes over North America, Oral session GC13B, American Geophysical Union Fall Meeting 2018, Washington DC.

[44] S. Feng, T. Lauvaux, K. Keller, K. J. Davis, P. J. Rayner, Y. Zhou, C. A. Williams, D. Baker, A. E. Schuh, S. Basu, J. Liu: Quantification of modeled atmospheric CO₂ uncertainty from various sources using ACT-America aircraft data, Oral session A41C-05, American Geophysical Union Fall Meeting 2018, Washington DC.

[43] B. Meadows, K. J. Davis, J. D. W. Barrick, E. Bell, E. V. Browell, J. F. Campbell, J. P. DiGangi, G. Chen, J. T. Dobler, T. Fan, S. Feng, A. Fried, S. A. Kooi, T. Lauvaux, B. Lin, M. J. McGill, N. Miles, A. R. Nehrir, M. D. Obland, C. O'Dell, S. Pal, R. Pauly, C. Sweeney and M. Y. Yang: Overview of Lidar Contributions to the Atmospheric Carbon and Transport - America (ACT-America) Program, American Geophysical Union Fall Meeting 2017, New Orleans.

[42] S. Feng, T. Lauvaux, M. P. Butler, K. Keller, K. J. Davis, A. R. Jacobson, A. E. Schuh, S. Basu, J. Liu, D. Baker, S. Crowell, Y. Zhou and C. A. Williams: The interaction of the flux errors and transport errors in modeled atmospheric carbon dioxide concentrations, Oral session A15M, American Geophysical Union Fall Meeting 2017, New Orleans.

[41] A. D. Torres, G. Keppel-Aleks, S. C. Doney, S. Feng, T. Lauvaux, M. A. Fendrock, and J. Rheuben: Quantifying the imprint of mesoscale and synoptic-scale atmospheric transport on total column carbon dioxide measurements, Oral session A31O, American Geophysical Union Fall Meeting 2017, New Orleans.

[40] D. Wu, J. C. Lin, T. Oda, X. Ye, T. Lauvaux, E. G. Yang and E. A. Kort: Towards Interpreting the Signal of CO₂ Emissions from Megacities by Applying a Lagrangian Receptor-oriented Model to OCO-2 XCO₂ data, Oral session A32D, American Geophysical Union Fall Meeting 2017, New Orleans.

[39] T. Lauvaux, A. Deng, K. R. Gurney, B. Nathan, X. Ye, T. Oda, A. Karion, M. Hardesty, R. M. Harvey, S. Richardson, J. R. Whetstone, L. Hutyra, K. J. Davis, A. Brewer, B. J. Gaudet, J. C. Turnbull, C. Sweeney, P. B. Shepson, N. Miles, T. Bonin, K. Wu and N. V. Balashov: Inter-annual variability and trend detection of urban CO₂, CH₄ and CO emissions, Oral session A14G, American Geophysical Union Fall Meeting 2017, New Orleans.

- [38] T. Oda, L. E. Ott, T. Lauvaux, S. Feng, R. Bun, M. O. Roman, D. F. Baker and S. Pawson: Assessing uncertainties in gridded emissions: A case study for fossil fuel carbon dioxide (FFCO₂) emission data, Oral session A14N, American Geophysical Union Fall Meeting 2017, New Orleans.
- [37] A. Karion, T. Lauvaux, C. Sweeney, W. M. Angevine, K. L. Mueller, S. Gourdj, I. Lopez-Coto, Z. Barkley and J. R. Whetstone: Methane flux estimation in the Barnett Shale: model-based method inter-comparison, Oral session A42E, American Geophysical Union Fall Meeting 2017, New Orleans.
- [36] K. L. Mueller, W. Callahan, K. J. Davis, R. R. Dickerson, R. M. Duren, K. R. Gurney, A. Karion, R. F. Keeling, J. Kim, T. Lauvaux, C. E. Miller, P. B. Shepson, J. C. Turnbull, et al.: Toward a Multi-City Framework for Urban GHG Estimation in the United States: Methods, Uncertainties, and Future Goals, Oral session A14G, American Geophysical Union Fall Meeting 2017, New Orleans.
- [35] Lauvaux T, Ye X, Miles NL, Deng A, Richardson SJ, Nathan B, Davis KJ, Gaudet B, Gurney KR, Oda T, Kort E, Lin J: Assimilation of In-situ and Remote Sensing Atmospheric Greenhouse Gas Measurements to quantify Emissions from Anthropogenic Activities, Meteorology And Climate - Modeling for Air Quality (MAC-MAQ) 2017 Conference, Davis, CA, 13-15 September 2017.
- [34] Li Z, Zheng G, Agarwal A, Xue L, and Lauvaux T: Proceedings of the 2017 SIAM International Conference on Data Mining. 2017, 804-812 , 2017.
- [33] Lauvaux T, A. Schuh, S. Crowell, S. Feng, K.J. Davis, S. Basu, A. Chatterjee, L. Ott, A. Jacobson, A. Andrews, J. Miller, S. Polavarapu, F. Deng, L. Feng, P. Palmer, D. Baker, K. Bowman, J. Liu: Catching butterflies with fishing nets: Are atmospheric greenhouse gas models adapted to current and future observing systems?, North American Carbon Program Meeting, North Bethesda, MD, 27-30 March 2017.
- [32] Lauvaux T, Ye X, Oda T, Kort E, Yang E, Lin J, Wu D: On the Potential of Quantifying Fossil-fuel CO₂ Emissions from Cities with OCO-2 observations, OCO-2 Science Team Meeting, Pasadena, March 2017.
- [31] Lauvaux T, Ye X, Oda T, Kort E, Lin J, Miles NL, Deng A, Richardson SJ, Davis KJ, Gaudet G, Gurney KR: From Indianapolis to Riyadh: Constraining urban GHG emissions using OCO-2 and tower measurements, Satellite GHG measurements Workshop, Tokyo, 28 February 2017.
- [30] Z. Barkley, T. Lauvaux, K. J. Davis, A. Deng, N. L. Miles, S. J. Richardson, D. K. Martins, Y. Cao, C. Sweeney, K. McKain, S. Schwietzke, M. L. Smith and E. A. Kort: Top-down Estimate of Methane Emissions from Natural Gas Production in Northeastern Pennsylvania Using Aircraft and Tower Observations, Oral session A54G, American Geophysical Union Fall Meeting 2016, San Francisco.
- [29] Lauvaux T, S. M. Ogle, K. J. Davis, C. A. Williams, J. Breidt, S. Feng, M. P. Butler: Reconciling atmospheric top-down and inventory methodologies for MRV frameworks to support UNFCCC reporting, Oral session GC41F, American Geophysical Union Fall Meeting 2016, San Francisco.
- [28] J. C. Turnbull, K. J. Davis, A. Deng, T. Lauvaux, N. L. Miles, S. Richardson, D. P. Sarmiento, K. Wu, A. Brewer, R. M. Hardesty, K. McKain, C. Sweeney, K. R. Gurney, J. Liang, D. O'Keeffe, R. Patarasuk, M. O. L. Cambaliza, R. M. Harvey, A. M. F. Heimburger, P. B. Shepson, A. Karion, I. Lopez-Coto, K. Prasad and J. R. Whetstone: Synthesis of urban greenhouse gas emission estimates from

the Indianapolis Flux Experiment (INFLUX), Oral session A53M, American Geophysical Union Fall Meeting 2016, San Francisco.

[27] Ye X, T. Lauvaux, E. Kort, J. Lin, T. Oda, E. Yang, D. Wu. Inverse modeling of fossil fuel CO₂ emissions at urban scale using OCO-2 retrievals of total column CO₂, Oral session A33O, American Geophysical Union Fall Meeting 2016, San Francisco.

[26] Lauvaux T, L. Diaz-Isaac, M. Butler, S. Feng, A. Deng, J. Liu, K. Bowman, K.J. Davis, X. Ye, B. Gaudet, M. Hardesty, A. Brewer. Meteorological and Greenhouse Gas Measurements for the Characterization of Errors in Mesoscale Carbon Inversions, NOAA GMD 2016 Annual meeting, Boulder.

[25] E. A. Kort, E. G. Yang, J. Ware, X. Ye, T. Lauvaux, D. Wu, J. C. Lin and T. Oda: Towards constraining megacity fossil-fuel emissions estimates with OCO-2 observations and Lagrangian modeling, Oral session A53M, American Geophysical Union Fall Meeting 2016, San Francisco.

[24] Cao, Barkley, Cervone, Lauvaux, Deng, Sarmiento. Fusion Geographic Information System Data with State-of-the-art Atmospheric Systems: Application to Methane Source Mapping over the Marcellus Shale formation, (poster) AGU Fall meeting, San Francisco, 2015.

[23] Hopkins, Duren, Miller, Aubrey, Falk, Holland, Hook, Hulley, Johnson, LeKuai, Kuwayama, Lin, Thorpe, Worden, Lauvaux, Jeong, Fischer. Anthropogenic Methane Emissions in California's San Joaquin Valley: Characterizing Large Point Source Emitters, (invited) AGU Fall meeting, San Francisco, 2015.

[22] Butler, Lauvaux, Liu, Deng, Sweeney, Davis, Bowman. A Mesoscale Modeling Framework for Assessing Inversion Uncertainty Due to Atmospheric Transport in XCO₂ Atmospheric Inversions, (poster) AGU Fall meeting, San Francisco, 2015.

[21] Gaudet, Lauvaux, Deng, Davis. Evaluating regional model transport uncertainty using realistic LES simulations. Poster presented at the 5th North American Carbon Program Principal Investigators Meeting, Washington, D.C., January 2015.

[20] Lauvaux T, Miles N L, Davis K J, Richardson S, Deng A, Sarmiento D P, Wu K, Sweeney C, Karion A, Hardesty R M, Brewer A, Turnbull J C, Iraci L T, Hillyard P W, Podolske J R, Gurney K R, Patarasuk R, Cambaliza M O L, Shepson P B, Whetstone J R. Greenhouse Gas Emissions of Indianapolis using a High-Density Surface Tower Network and an Atmospheric Inversion, AGU Fall Meeting 2014.

[19] Turnbull, Cambaliza, Sweeney, Karion, Newberger, Tans, Lehman, Davis, Miles, Richardson, Lauvaux, Shepson, Gurney, Song, Razlivanov. Quantification of urban fossil fuel CO₂ emissions from the Indianapolis Flux Project (INFLUX). Presented at the 9th International Carbon Dioxide Conference, Beijing, China; June 3-7, 2013.

[18] Miles, Cambaliza, Davis, Hardesty, Iraci, Gurney, Karion, Lauvaux, McGowan, Richardson, Sarmiento, Shepson, Sweeney, Turnbull, Whetstone. On network design for the detection of urban greenhouse gas emissions: Results from the Indianapolis Flux Experiment (INFLUX). Presented at the 9th International Carbon Dioxide Conference, Beijing, China; June 3-7, 2013.

- [17] Cambaliza, Shepson, Stirm, Caulton, Miller, Hendricks, Moser, Karion, Sweeney, Turnbull, Davis, Lauvaux, Richardson, Miles, Crosson, Prasad, Whetstone. Methane emission flux from Indianapolis, IN: Identification and contribution of sources to the total citywide emission. Presented at the 2013 annual NOAA GMD Conference, NOAA ESRL, Boulder, CO; May 21-22, 2013.
- [16] Lauvaux T, K.J. Davis, S. Richardson, N. Miles, L.I. Diaz. On the use of remote sensing measurements in regional inversions of carbon sources and sinks, 2012 Fall AGU Meeting, San Francisco.
- [15] Caulton D., P Shepson, M. O. L. Cambaliza, J. P. Sparks, R. Santoro, C. Sweeney, K. J. Davis, T. Lauvaux, R. Howarth, B. Stirm, D. Sarmiento, S. Belmecheri. Quantifying Methane Emissions from Shale Gas Wells in Pennsylvania, 2012 Fall AGU Meeting, San Francisco.
- [14] J. C. Turnbull, M. O. L. Cambaliza, C. Sweeney, A. Karion, T. Newberger, P. P. Tans, S. Lehman, K. J. Davis, N. L. Miles, S. Richardson, T. Lauvaux, P. Shepson, K. R. Gurney, Y. Song, I. N. Razlivanov. Quantification of fossil fuel CO₂ emissions at the urban scale: Results from the Indianapolis Flux Project (INFLUX) (Invited), 2012 Fall AGU Meeting, San Francisco.
- [13] Davis K. J., T. Lauvaux; L. E. McGowan, M. O. L. Cambaliza, R. M Hardesty, L. T. Iraci, K. R. Gurney, P. W. Hillyard, A. Karion, N. L. Miles, J. R. Podolske, I. N. Razlivanov, S. Richardson, D. Sarmiento, P. Shepson, Y. Song, C. Sweeney, J. C. Turnbull, J. R. Whetstone Towards validation of urban GHG emissions using a very high resolution atmospheric inversion in the Indianapolis Flux Experiment, (Invited), 2012 Fall AGU Meeting, San Francisco.
- [12] Lauvaux T, K.J. Davis, L. Wu, M. Bocquet, N.L. Miles, S.J. Richardson, A.E. Schuh, L.E. Diaz, T. Hilton. Network Designs for Regional CO₂ Flux Inversions, NOAA GMD Annual Meeting 2012, Boulder.
- [11] Lauvaux T, G. Jacobson, C. Rella, K. Davis, S. Richardson, N. Miles, A. Deng, G. Calonder, M. Ruesch, M. Lehning and P. DeCola. Urban Greenhouse Gas Emissions Monitoring in Davos, Switzerland, Before, During and After the 2012 World Economic Forum Annual Meeting, NOAA GMD Annual Meeting 2012, Boulder.
- [10] Lauvaux T; L.E. McGowan; K.J. Davis; K.R. Gurney; I. Razlivanov; N.L. Miles; S. Richardson; D. Sarmiento; P.B. Shepson; M.L. Cambaliza; J.C. Turnbull; C. Sweeney; A.E. Schuh; J. Hong; P.J. Rayner. Emission verification from national to local levels using topdown approaches: sampling strategy and modeling performances, American Geophysical Union, Fall Meeting 2011.
- [9] Lauvaux T, L.E. Diaz, N.L. Miles, S.J. Richardson, A.E. Schuh, A.R. Jacobson, A. Andrews, K.J. Davis. Applicability of atmospheric inversions of greenhouse gases at high resolution, (invited) MACC project conference, Utrecht, The Netherlands, 2011.
- [8] Lauvaux T, L.E. Diaz, N.L. Miles, S.J. Richardson, A.E. Schuh, A.R. Jacobson, A. Andrews, K.J. Davis, and C. Sweeney. Regional carbon budget with a high density CO₂ concentration tower network: Mesoscale inversion of CO₂ fluxes at high resolution, (invited) 2nd International Conference on Hydrology delivers Earth System Science to Society, Tokyo, Japan, 2010.
- [7] NASA Terrestrial Ecology Science Team meeting, La Jolla, 2010: Regional carbon budget with a high density concentration tower network: Inversion of CO₂ fluxes in the Mid Continental Intensive

project, T. Lauvaux, L.E. Diaz, N.L. Miles, S.J. Richardson, A.E. Schuh, A.R. Jacobson, A. Andrews, K.J. Davis.

[6] American Geophysical Union, Fall Meeting 2009: The CarboEurope Regional Experiment Strategy: Assessment of the regional carbon balance using inverse and direct methods (Invited talk), Lauvaux, T.; Rascher, U.; Gioli, B.; Hutjes, R.W.; Sarrat, C.; Brunet, Y.; Jarosz, N.; Ceschia, E.; Rayner, P.; Gerbig, C.; Miglietta, F.; Noilhan, J.; Dolman, H.,

[5] YAK Aerosol 2nd Science Meeting, Burduguz, Irkutsk region, Russia, 19-21 June 2007: Toward a mesoscale flux inversion at high resolution in the South West of France, T.Lauvaux, C. Sarrat, F. Chevallier, P. Ciais, M. Uliasz, A. S. Denning, P. Rayner

[4] European Geosciences Union 2007, Vienna: Ensemble model simulations: A new tool to assess transport uncertainties in mesoscale inversions of CO₂ sources and sinks, T. Lauvaux, K. Davis, C. Sarrat, F. Chevallier, M. Uliasz, C. Lac, P. Bousquet, P. Ciais, J. Noilhan, P. Rayner, Geophysical Research Abstracts, Vol. 9, 06718, 2007

[3] Open Science Conference on the GHG Cycle in the Northern Hemisphere Sissi-Lassithi, Crete, 14-18 November 2006, plenary session: Mesoscale inversion: first results from the CERES campaign with synthetic data, T. Lauvaux, C. Sarrat, M. Uliasz, F. Chevallier, J. Noilhan, P. Bousquet, P. J. Rayner.

[2] 7th Plinius Conference on Mediterranean Storms, 2005: A 4-year climatology of water vapour field from GPS data associated with heavy precipitation events over Southern France, Lauvaux, T.; Ricard, D.; Ducrocq, V.; Masson, F

[1] European Geosciences Union Meeting, Nice, 2004: Integrated Water Vapor and gradient monitoring during strong meteorological events: a new tool for nowcasting?, Champollion, C., Masson, F., Walpersdorf, A., Brenot, H., Lauvaux, T., Van Baelen, J., Doerflinger, E. and Collard, P..