KATHRYN MCKAIN

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EDUCATION

Ph.D. Harvard University, Environmental Science and Engineering, 2015
M.A. Harvard University, Earth and Planetary Sciences, 2013
B.A. Mount Holyoke College, Biology and Chemistry, *summa cum laude*, 2005

PROFESSIONAL EXPERIENCE

Research Scientist, Cooperative Institute for Research in Environmental Sciences, University of Colorado, and NOAA Global Monitoring Laboratory, Boulder, CO
2019-present

- PI of the Aircraft Network within the NOAA Global Greenhouse Gas Reference Network

2015-present

- Lead scientist for the in-situ aircraft measurement program within the Carbon Cycle and Greenhouse Gases Group
- Design and execute research projects and produce datasets and publications related to aircraft measurements of atmospheric greenhouse gases for the purposes of flux quantification, climate prediction, and satellite and model evaluation

Graduate Research Assistant, Harvard University, Cambridge, MA, 2010-2015

- Atmospheric measurements and a modeling to investigate urban greenhouse gas fluxes and trends

Intern, Environmental Protection Agency, Climate Change Division, Washington DC, 2015

- Led a weekly reading group of recent scientific publications on methane emissions from oil and gas to improve internal familiarity with scientific methods and results, and attended all meetings related to greenhouse gas emissions quantification and potential regulations

Research and Development, Feed Resource Recovery, Boston, MA, 2008-2009

- Start-up company focused on anaerobic digestion of supermarket food waste where I conducted technology and industry research, and helped to design and operate a pilot-scale system

Research Assistant, Harvard Forest, Petersham, MA, 2005-2008

- Oversaw the ecological research activities at the Harvard Forest Environmental Monitoring Site, including the collection, analysis, and archiving of multiple long-term datasets on forest carbon cycling

GRANTS

Accelerometer-based turbulence profile sensors for low-cost determination of boundary layer height from small aircraft, CIRES Innovative Research Program, PI: K. McKain, 2019-2020

Toward disentangling causes for the substantial increase of CO_2 seasonal amplitude in the Arctic, NASA Terrestrial Ecology Program, PI: L. Hu, 2019-2022

Collaborative Research: Southern Ocean carbon gas observatory (SCARGO), NSF Office of Polar Programs, PI: B. Stephens, 2019-2021

Establishing WMO Traceability for XCO_2 from OCO-2 using AirCore and Aircraft vertical profiles, NASA Science Team for the OCO Missions, PI: B. Baier, 2018-2021

Airborne seasonal survey of CO_2 and CH_4 across the ABoVE domain, NASA Arctic-Boreal Vulnerability Experiment, PI: C. Sweeney, 2017-2019

Measurements of CH_4 and CO_2 on the Atmospheric Tomography Mission, NASA Earth Venture Suborbital sub-award, PI: K. McKain, 2016-2020

NASA Earth and Space Science Graduate Fellowship, 2014 – 2015

FIELD CAMPAIGNS

- Boeing ecoDemonstrator, Alaska Airlines 737-MAX9, test of sample inlets for greenhouse gas measurements from commercial aircraft, 2021
- Uganda, routine vertical profile measurements in tropical Africa for satellite and model evaluation, Kampala Executive Aviation C206B, 2020-2022
- East Coast Outflow, impact of COVID shutdown on greenhouse gas emissions (ECO-COVID), Scientific Aviation Mooney, April-May, 2020
- Arctic-Boreal Vulnerability Experiment (ABoVE), Airborne Seasonal Survey of CO_2 and CH_4, Scientific Aviation Mooney, Alaska, 2017
- Atmospheric Tomography Mission (ATom), NASA DC8, 2016-2018 [NASA Group Achievement Award]
- North Slope and Prudhoe Bay Oil Field, NOAA Twin Otter, Deadhorse, Alaska, 2016
- O_2/N_2 Ratio and CO_2 Airborne Southern Ocean (ORCAS) Study, NSF Gulfstream-V, Punta Arenas, Chile, 2016
- Study of Emissions and Atmospheric Composition, Clouds and Climate Coupling by Regional Surveys (SEAC^{4}RS), NASA ER2, 2013

PUBLICATIONS

48. Allen HM, Crounse JD, Kim MJ, Teng AP, Ray EA, McKain K, Sweeney C, Wenbnerg P (2022). H_2O_2 and CH_3OOH (MHP) in the remote atmosphere: 1. Global distribution and regional influences. Journal of Geophysical Research: Atmospheres, 127, e2021JD035701, doi: 10.1029/2021JD035701.
47. Deeter M, Francis G, Gille J, Mao D, Martínez-Alonso S, Worden H, Ziskin D, Drummond J, Commane R, Diskin G, **McKain K** (2022) The MOPITT Version 9 CO product: sampling enhancements and validation, Atmos. Meas. Tech., 15, 2325–2344, doi: 10.5194/amt-15-2325-2022.
46. Hegarty JD, Cady-Pereira KE, Payne VH, Kulawik SS, Worden JR, Kantchev V, Worden HM, **McKain K,** Pittman JV, Commane R, Daube BC, Kort EA (2022) Validation and error estimation of AIRS MUSES CO profiles with HIPPO, ATom, and NOAA GML aircraft observations, Atmos. Meas. Tech., 15, 205–223, doi: 10.5194/amt-15-205-2022.
45. Hu L, Montzka SA, Moore F, Hintsa E, Dutton G, Siso MC, Thoning K, Portmann RW, **McKain K**, Sweeney C, Vimont I, Nance D, Hall B, Wofsy S (2022) Continental-scale contributions to the global CFC-11 emission increase between 2012 and 2017, Atmos. Chem. Phys., 22, 2891–2907, doi: 10.5194/acp-22-2891-2022.
44. Lopez-Coto I, Ren X, Karion A, **McKain K**, Sweeney C, Dickerson RR, McDonald BC, Ahn DY, Salawitch RJ, He H, Shepson PB, Whetstone JR (2022) Carbon Monoxide Emissions from the Washington, DC, and Baltimore Metropolitan Area: Recent Trend and COVID-19 Anomaly, Environmental Science & Technology 56 (4), 2172-2180, doi: 10.1021/acs.est.1c06288.
43. Sweeney C, Chatterjee A, Wolter S, **McKain K**, Bogue R, Conley S, Newberger T, Hu L, Ott L, Poulter B, Schiferl L, Weir B, Zhang Z, Miller CE (2022) Using atmospheric trace gas vertical profiles to evaluate model fluxes: a case study of Arctic-CAP observations and GEOS simulations for the ABoVE domain, Atmos. Chem. Phys., 22, 6347–6364, doi: 10.5194/acp-22-6347-2022.
42. Thompson CR, Wofsy SC, Prather MJ, Newman PA, Hanisco TF, Ryerson TB, Fahey DW, Apel EC, Brock CA, Brune WH, Froyd K, Katich JM, Nicely JM, Peischl J, Ray E, Veres PR, Wang S, Allen HM, Asher E, Bian H, Blake D, Bourgeois I, Budney J, Bui TP, Butler A, Campuzano-Jost P, Chang C, Chin M, Commane R, Correa G, Crounse JD, Daube B, Dibb JE, DiGangi JP, Diskin GS, Dollner M, Elkins JW, Fiore AM, Flynn CM, Guo H, Hall SR, Hannun RA, Hills A, Hintsa EJ,

Hodzic A, Hornbrook RS, Huey LG, Jimenez JL, Keeling RF, Kim MJ, Kupc A, Lacey F, Lait LR, Lamarque J, Liu J, **McKain K**, Meinardi S, Miller DO, Montzka SA, Moore FL, Morgan EJ, Murphy DM, Murray LT, Nault BA, Neuman JA, Nguyen L, Gonzalez Y, Rollins A, Rosenlof K, Sargent M, Schill G, Schwarz JP, St. Clair JM, Steenrod SD, Stephens BB, Strahan SE, Strode SA, Sweeney C, Thames AB, Ullmann K, Wagner N, Weber R, Weinzierl B, Wennberg PO, Williamson CJ, Wolfe GM, Zeng L (2022) The NASA Atmospheric Tomography (ATom) Mission: Imaging the Chemistry of the Global Atmosphere, Bulletin of the American Meteorological Society 103, 3, E761-E790, doi: 10.1175/BAMS-D-20-0315.1.

41. Bourgeois I, Peischl J, Neuman JA, Brown SS, Thompson CR, Aikin KC, Allen HM, Angot H, Apel EC, Baublitz CB, Brewer JF, Campuzano-Jost P, Commane R, Crounse JD, Daube BC, DiGangi JP, Diskin GS, Emmons LK, Fiore AM, Gkatzelis GI, Hills A, Hornbrook RS, Huey LG, Jimenez JL, Kim M, Lacey F, **McKain K,** Murray LT, Nault BA, Parrish DD, Ray E, Sweeney C, Tanner D, Wofsy SC, Ryerson TB (2021) Large contribution of biomass burning emissions to ozone throughout the global remote troposphere, Proceedings of the National Academy of Sciences of the United States of America, 118 (52), doi: 10.1073/pnas.2109628118.
40. Chen X, Millet DB, Neuman JA, Veres PR, Ray EA, Commane R, Daube BC, **McKain K**, Schwarz JP, Katich JM, Froyd KD, Schill GP, Kim MJ, Crounse JD, Allen HM, Apel EC, Hornbrook RS, Blake DR, Nault BA, Campuzano-Jost P, Jimenez JL, Dibb JE (2021) HCOOH in the Remote Atmosphere: Constraints from Atmospheric Tomography (ATom) Airborne Observations, ACS Earth and Space Chemistry, 5(6): 1436-1454, doi: 10.1021/acsearthspacechem.1c00049.
39. Gonzalez A, Millet DB, Yu X, Wells KC, Griffis TJ, Baier BC, Campbell PC, Choi Y, DiGangi JP, Gvakharia A, Halliday HS, Kort EA, **McKain K**, Nowak JB,Plant G (2021) Fossil Versus Nonfossil CO Sources in the US: New Airborne Constraints From ACT-America and GEM, Geophysical Research Letters, 48(11), doi: 10.1029/2021gl093361.
38. Gonzalez Y, Commane R, Manninen E, Daube BC, Schiferl LD, McManus JB, **McKain K**, Hintsa EJ, Elkins JW, Montzka SA, Sweeney C, Moore F, Jimenez JL, Campuzano Jost P, Ryerson TB, Bourgeois I, Peischl J, Thompson CR, Ray E, Wennberg PO, Crounse J, Kim M, Allen HM, Newman PA, Stephens BB, Apel EC, Hornbrook RS, Nault BA, Morgan E, Wofsy SC (2021) Impact of stratospheric air and surface emissions on tropospheric nitrous oxide during ATom, Atmos. Chem. Phys., 21, 11113–11132, doi: 10.5194/acp-21-11113-2021.
37. Guo H, Flynn CM, Prather MJ, Strode SA, Steenrod SD, Emmons L, Lacey F, Lamarque JF, Fiore AM, Correa G, Murray LT, Wolfe GM, St. Clair JM, Kim M, Crounse J, Diskin G, DiGangi J, Daube BC, Commane R, **McKain K**, Peischl J, Ryerson TB, Thompson C, Hanisco TF, Blake D, Blake NJ, Apel EC, Hornbrook RS, Elkins JW, Hintsa EJ, Moore FL, Wofsy, S (2021) Heterogeneity and chemical reactivity of the remote troposphere defined by aircraft measurements , Atmos. Chem. Phys., 21, 13729–13746, doi: 10.5194/acp-21-13729-2021.
36. Hu L, Montzka SA, Kaushik A, Andrews AE, Sweeney C, Miller J, Baker IT, Denning S, Campbell E, Shiga YP, Tans P, Siso MC, Crotwell M, **McKain K**, Thoning K, Hall B, Vimont I, Elkins JW, Whelan ME, Suntharalingam P (2021) COS-derived GPP relationships with temperature and light help explain high-latitude atmospheric CO_2 seasonal cycle amplification, Proceedings of the National Academy of Sciences of the United States of America, 118(33), doi: 10.1073/pnas.2103423118.
35. Islam SMN, Jackson PL, Sweeney C, **McKain K**, Frankenberg C, Aben I, Parker RJ, Boesch H, Wunch D (2021) Methane growth rate estimation and its causes in western Canada using satellite observations, Journal of Geophysical Research: Atmospheres, 126, e2020JD033948, doi: 10.1029/2020JD033948.
34. Kulawik SS, Worden JR, Payne VH, Fu D, Wofsy SC, **McKain K**, Sweeney C, Daube BC, Lipton A, Polonsky I, He Y, Cady-Pereira KE, Dlugokencky EJ, Jacob DJ, Yin Y (2021) Evaluation of single-footprint AIRS CH_4 profile retrieval uncertainties using aircraft profile measurements, Atmospheric Measurement Techniques, 14(1): 335-354, doi: 10.5194/amt-2020-145.

33. Liu J, Baskaran L, Bowman K, Schimel D, Bloom AA, Parazoo NC, Oda T, Carroll D, Menemenlis D, Joiner J, Commane R, Daube B, Gatti LV, **McKain K**, Miller JB, Stephens BB, Sweeney C, Wofsy S (2021) Carbon monitoring system flux net biosphere exchange 2020 (CMS-Flux NBE 2020), Earth System Science Data 13 (2): 299-330, doi: 10.5194/essd-13-299-2021.
32. Long MC, Stephens BB, **McKain K**, Sweeney C, Keeling RF, Kort EA, Morgan EJ, Bent JD, Chandra N, Chevallier F, Commane R, Daube BC, Krummel PB Loh Z, Luijkx IT, Munro D, Prabir P, Wouter P, Ramonet M, Rodenbeck C, Stavert A, Tans P, Wofsy SC (2021) Strong Southern Ocean carbon uptake evident in airborne observations, Science 374 (6572): 1275-1280, doi: 10.1126/science.abi4355.
31. Rastogi B, Miller JB, Trudeau M, Andrews AE, Hu L, Mountain M, Nehrkorn T, Baier B, **McKain K**, Mund J, Guan K, Alden CB (2021) Evaluating consistency between total column CO_2 retrievals from OCO-2 and the in situ network over North America: implications for carbon flux estimation, Atmos. Chem. Phys., 21, 14385–14401, doi: 10.5194/acp-21-14385-2021.
30. Sargent MR, Floerchinger C, **McKain K**, Budney J, Gottlieb EW, Hutyra LR, Rudek J, Wofsy SC (2021) Majority of US urban natural gas emissions unaccounted for in inventories, Proceedings of the National Academy of Sciences of the United States of America, 118(44), doi: 10.1073/pnas.2105804118.
29. Yu X, Millet DB, Wells KC, Henze DK, Cao H, Griffis TJ, Kort EA, Plant G, Deventer MJ Kolka RK, Roman DT, Davis KJ, Desai AR, Baier BC, **McKain K**, Czarnetzki AC, Bloom AA (2021) Aircraft-based inversions quantify the importance of wetlands and livestock for Upper Midwest methane emissions, Atmospheric Chemistry and Physics, 21(2): 951-971, doi: 10.5194/acp-21-951-2021.
28. Bourgeois I, Peischl J, Thompson CR, Aikin KC, Campos T, Clark H, Commane R, Daube B, Diskin GW, Elkins JW, Gao R, Gaudel A, Hintsa EJ, Johnson BJ, Kivi R, **McKain K**, Moore FL, Parrish DD, Querel R, Ray E, Sanchez R, Sweeney C, Tarasick DW, Thompson AM, Thouret V, Witte JC, Wofsy SC, Ryerson TB (2020) Global-scale distribution of ozone in the remote troposphere from the ATom and HIPPO airborne field missions, Atmospheric Chemistry and Physics 20 (17): 10611-10635, doi: 10.5194/acp-20-10611-2020.
27. Brune WH, Miller DO, Thams AB, Allen HM, Apel EC, Blake DR, Bui TP, Commane R, Crounse JD, Daube BC, Diskin GS, DiGangi JP, Elkins JW, Hall SR, Hanisco TF, Hannun RA, Hintsa EJ, Hornbrook RS, Kim MJ, **McKain K**, Moore FL, Neuman JA, Nicely JM, Peischl J, Ryerson TB, St Clair JM, Sweeney C, Teng AP, Thomspon C, Ullmann K, Veres PR, Wennber PO, Wolfe G (2020) Journal of Geophysical Research: Atmospheres 125 (1), doi: 10.1029/2019JD031685.
26. Kupc A, Williamson CJ, Hodshire AL, Kazil J, Ray E, Bui TP, Dollner M, Froyd KD, **McKain K**, Rollins A, Schill GP, Thames A, Weinzierl BB, Pierce JR, Brock CA (2020) The potential role of organics in new particle formation and initial growth in the remote tropical troposphere, Atmospheric Chemistry and Physics, 20 (23): 15037-15060, doi: 10.5194/acp-20-15037-2020.
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24. Nalli NR, Tan C, Warner J, Divakarla M, Gambocorta A, Wilson M, Zhu T, Wang T, Wei Z, Pryor K, Kalluri S, Zhou L, Sweeney C, Baier BC, **McKain K**, Wunch D, Deutscher NM, Hase F, Iraci LT, Kivi R, Morino I, Notholt J, Ohyama H, Pollard DF, Te Y, Velazco V, Warneke T, Sussmann R, Rettinger M (2020) Validation of carbon trace gas profile retrivals from the NOAA-unique combined atmospheric processing system for the cross-track infrared sounder, Remote Sensing 12 (19): 3245, doi: 10.3390/rs12193245.
23. Thames AB, Brune WH, Miller DO, Allen HM, Apel EC, Blake DR, Bui TP, Commane R, Crounse JD, Daube BC, Diskin GS, DiGangi JP, Elkins JW, Hall SR, Hanisco TF, Hannun RA, Hintsa E, Hornbrook RS, Kim MJ, **McKain K**, Moore FL, Nicely JM, Peischl J, Ryerson TB, St Clair JM,

Sweeney C, Teng A, Thompson CR, Ullmann K, Wennberg PO, Wolfe GM (2020) Atmospheric Chemistry and Physics, 20 (6), doi: 10.5194/acp-20-4013-2020.

22. Travis KR, Heald CL, Allen HM, Apel EC, Arnold SR, Blake DR, Brune WH, Chen X, Commane R, Crounse JD, Daube BC, Diskin GS, Elkins JW, Evans MJ, Hall SR, Hintsa EJ, Hornbrook RS, Kasibhatla PS, Kim MJ, Luo G, **McKain K**, Millet DB, Moore FL, Peischl J, Ryerson TB, Sherwen T, Thames AB, Ullmann K, Wang X, Wennber PO, Wolfe GM, Yu F (2020) Constraining remote oxidation capacity with ATom observations, Atmospheric Chemistry and Physics, 20 (13): 7753-7781, doi: 10.5194/acp-20-7753-2020.
21. Wang S, Apel EC, Schwantes RH, Bates KH, Jacob DJ, Fischer EV, Hornbrook RS, Hills AJ, Emmons LK, Pan LL, Honomichi S, Tilmes S, Lamarque JF, Yang M, Marandino CA, Saltzman ES, Bruyn W, Kameyama S, Tanimoto H, Omori Y, Hall SR, Ullmann K, Ryerson TB, Thompson CR, Peischl J, Daube BC, Commane R, **McKain K**, Sweeney C, Thames AB, Miller DO, Brune WH, Diskin GS, DiGangi JP, Wofsy SC (2020) Global atmospheric budget of acetone: air-sea exchange and the contribution of hydroxyl radicals, Journal of Geophysical Research: Atmospheres 125 (15), doi: 10.1029/2020JD032553.
20. Asher E, Hornbrook RS, Stephens BB, Kinnison D, Morgan EJ, Keeling RF, Atlas EL, Schauffler SM, Tilmes S, Kort EA, Hoecker-Martinez MS, Long MC, Lamarque JF, Saiz-Lopez A, **McKain K**, Sweeney C, Hills AJ, Apel EC (2019) Novel approaches to improve estimates of short-lived halocarbon emissions during summer from the Southern Ocean using airborne observations, Atmospheric Chemistry and Physics, 19 (22): 14071-14090, doi: 10.5194/acp-19-14071-2019.
19. Crowell S, Baker S, Schuh A, Basu S, Jacobson AR, Chevallier F, Liu J, Deng F, Feng L, **McKain K**, Chatterjee A, Miller JB, Stephens BB, Eldering A, Crisp D, Schmel D, Nassar R, O'Dell CW, Oda T, Sweeney C, Palmer PI, Jones D (2019) The 2015-2016 carbon cycle as seen from OCO-2 and the global in situ network, Atmospheric Chemistry and Physics, 19 (15): 9797-9831, doi: 10.5194/acp-19-9797-2019.
18. Floerchinger C, **McKain K**, Bonin T, Peischl J, Biraud SC, Miller C, Ryerson TB, Wofsy SC, Sweeney C (2019) Methane emissions from oil and gas production on the North Slope of Alaska, Atmospheric Environment 218: 116985, doi: 10.1016/j.atmosenv.2019.116985.
17. Hu L, Andrews A, Thoning K, Sweeney C, Miller JB, Michalak A, Dlugokencky E, Tans P, Shiga Y, Mountain M, Nehrkorn T, Montzka S, **McKain K**, Kofler J, Trudeau M, Michel S, Biraud SC, Fischer ML, Worthy DEJ, Vaughn BH, White JWC, Yadav V, Basu S, van der Velde ER (2019) Enhanced North American carbon uptake associated with El Niño, Science Advances, 5 (6), doi: 10.1126/sciadv.aaw0076.
16. Kulawik SS, Crowel S, Baker D, Liu J, **McKain K**, Sweeney C, Biraud SC, Wofsy S, O'Dell CW, Wennber PO, Wunch D, Roehl CM, Deutscher NM, Kiel M, Griffith DWT, Velazco VA, Notholt J, Warneke T, Petri C, Maziere M, Sha MK, Sussman R, Rettinger M, Pollard DF, Morino I, Uchino O, Hase F, Feist DG, Roche S, Strong K, Kivi R, Iraci L, Shiomi K, Dube MK, Sepulveda E, Rodriguez OEG, Te Y, Jeseck P, Heikkinen P, Dlugokencky EJ, Gunson MR, Eldering A, Crisp D, Fisher B, Osterman GB (2019) Characterization of OCO-2 and ACOS-GOSAT biases and errors for CO_2 flux estimates, Atmospheric Measurement Techniques Discussions, 10.5194/amt-2019-257.
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the global remote troposphere via synthesis of airborne and satellite formaldehyde observations, Proceedings of the National Academy of Sciences, doi: 10.1073/pnas.1821661116.

12. Miles NL, Martins DK, Richardson SJ, Rella CW, Arata C, Lauvaux T, Davis KJ, Barkley ZR, **McKain K**, Sweeney C (2018) Calibration and field testing of cavity ring-down laser spectrometers measuring CH_4, CO_2, and $\delta_{13}CH_4$ deployed on towers in the Marcellus Shale region, Atmospheric Measurement Techniques 11 (3): 1273-1295, doi: 10.5194/amt-11-1273-2018.
11. Sargent M, Barrera Y, Nehrkorn T, Hutyra LR, Gately CK, Jones T, **McKain K**, Sweeney C, Hegarty J, Hardiman B, Wofsy SC (2018) Anthropogenic and biogenic CO_2 fluxes in the Boston urban region, Proceedings of the National Academy of Sciences, 115 (29): 7491-7496, doi: 10.1073/pnas.1803715115.
10. Stephens BB, Long MC, Keeling RF, Kort EA, Sweeney C, Apel EC, Atlas EL, Beaton S, Bent JD, Blake NJ Bresch JF, Casey J, Daube BC, Diao M, Diaz E, Dierssen H, Donets V, Gao BC, Fierach M, Green R, Haag J, Hayman M, Hills AJ, Hoecher-Martinez MS, Honomichi SB, Hornbrook RS, Jensen JB, Li RR, McCubbin I, **McKain K**, Morgan EJ, Nolte S, Powers JG, Rainwater B, Randolph K, Reeves M, Schauffler SM, Smith K, Smith M, Stith J, Stossmeister G, Toohey DW, Watt AS (2018) The O_2/N_2 Ratio and CO_2 Airborne Southern Ocean Study, Bulletin of the American Meteorological Society 99 (2): 381-402, doi: 10.1175/BAMS-D-16-0206.1.
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5. Nehrkorn T, Henderson M, Leidner M, Mountain M, Eluszkiewicz J, **McKain K**, Wofsy S (2013) WRF simulations of the urban circulation in the Salt Lake City area for CO_2 modeling, Journal of Applied Meteorology and Climatology, 52: 323-340, http://journals.ametsoc.org/doi/abs/10.1175/JAMC-D-12-061.1.
4. **McKain K**, Wofsy SC, Nehrkorn T, Eluskiewicz J, Ehleringer J, Stephens B (2012) Assessment of ground-based atmospheric observations for verification of greenhouse gas emissions from an urban region, Proceedings of the National Academy of Sciences 109 (22): 8423-8428, doi: 10.1073/pnas.1116645109, www.pnas.org/content/109/22/8423. (*Selected media coverage: Scientific American, Science)*
3. Urbanski S, Barford C, Wofsy S, Kucharik C, Pyle E, Budney J, **McKain K**, Fitzjarrald D, Czikowsky M, Munger JW (2007) Factors controlling CO_2 exchange on timescales from hourly to decadal at Harvard Forest, Journal of Geophysical Research – Biogeosciences 112: G0202, doi: 10.1029/2006JG000293.
2. **McKain K** (2015) Atmospheric observations and models of greenhouse gas emissions in urban environments, Ph.D. Dissertation, Harvard University.

1. **McKain K** (2005) Methods for measuring carbon accumulation in tree biomass in Northeastern forests, Undergraduate Thesis, Mount Holyoke College.

DATASETS PUBLISHED

Sweeney C, McKain K, Higgs J, Wolter S, Crotwell A, Neff D, Dlugokencky E, Petron G, Madronich M, Moglia E, Crotwell M, Mund J (2021) NOAA Carbon Cycle and Greenhouse Gases Group aircraft-based measurements of CO_2, CH_4, CO, N_2O, H_2 & SF_6 in flask-air samples taken since 1992; obspack_multi-species_1_CCGGAircraftFlask_v2.0_2021-02-09, NOAA Earth System Research Laboratory, Global Monitoring Division. http://dx.doi.org/10.7289/V5N58JMF.

Schuldt K, et al. (2021) Multi-laboratory compilation of atmospheric carbon dioxide data for the period 1957-2020; obspack_co2_1_GLOBALVIEWplus_v7.0_2021-08-18; NOAA Earth System Research Laboratory, Global Monitoring Laboratory, http://doi.org/10.25925/20210801.

Schuldt K, et al. (2021) Multi-laboratory compilation of atmospheric methane data for the period 1983-2020; obspack_ch4_1_GLOBALVIEWplus_v4.0_2021-10-14; NOAA Earth System Research Laboratory, Global Monitoring Laboratory, http://doi.org/10.25925/20211001.

Schuldt K, et al. (2021) Multi-laboratory compilation of atmospheric carbon monoxide data for the period 1989-2020; obspack_co_1_GLOBALVIEWplus_v2.0_2021-12-08; NOAA Earth System Research Laboratory, Global Monitoring Laboratory, http://doi.org/10.25925/20211201.

Sweeney C, McKain K (2019) ABoVE: Atmospheric Profiles of CO, CO_2 and CH_4 Concentrations from Arctic-CAP, 2017. ORNL DAAC, Oak Ridge, Tennessee, USA, https://doi.org/10.3334/ORNLDAAC/1658.

Sweeney C, McKain K, Miller BR, Michel SE (2019) ABoVE: Atmospheric Gas Concentrations from Airborne Flasks, Arctic-CAP, 2017. ORNL DAAC, Oak Ridge, Tennessee, USA, https://doi.org/10.3334/ORNLDAAC/1717.

Wofsy SC, et al. (2018) ATom: Merged Atmospheric Chemistry, Trace Gases, and Aerosols. ORNL DAAC, Oak Ridge, Tennessee, USA. https://doi.org/10.3334/ORNLDAAC/1581.

Sweeney C, McKain, K, Newberger T (2017) ORCAS Picarro Data. Version 1.1. UCAR/NCAR - Earth Observing Laboratory. https://doi.org/10.5065/D69W0CWW.

SELECTED PRESENTATIONS

One year of vertical profile measurements of CO2, CH4, and CO in tropical east Africa, Global Monitoring Annual Conference, Boulder, CO, July 2022.

Development efforts toward increasing density and coverage of aircraft vertical profile measurements of greenhouse gases through ride-along and commercial flight opportunities, Global Monitoring Annual Conference, Boulder, CO, July 2020.

Methane emissions from natural gas distribution and end-use, University of Toronto, Physics Department, Noble Seminar, invited, October 2019.

Southern Ocean CO_2 fluxes and seasonality from atmospheric vertical gradients observed on multiple airborne campaigns, oral presentation, American Meteorological Society Annual Meeting, Austin, TX, January 2018.

Adaptation of a Picarro greenhouse gas analyzer for airborne measurements with expanded altitude range and performance on large-scale aircraft campaigns, oral presentation, 19th WMO/IAEA Meeting on Carbon Dioxide, Other Greenhouse Gases, and Related Measurement Techniques (GGMT-2017), Dubendorf, Switzerland, August 2017.

An Atmospheric Measurement Network and Modeling Framework to Quantify Methane Emissions from Natural Gas Losses in the Boston Urban Region, MIT, Department of Civil and Environmental Engineering, Environmental Sciences Seminar Series, invited, April 2015.

An Atmosphere-based Method for Detection and Quantification of Methane Emissions from Natural Gas Infrastructure in an Urban Environment, AGU Fall Meeting, invited, December 2015.

Characterization of urban methane emissions in Boston, Massachusetts using an observational network and inverse modeling framework, oral presentation, AGU Fall Meeting, December 2012.

OUTREACH AND SELECTED MEDIA COVERAGE

Coverage of our project on Boeing ecoDemonstrator, 2021: Accuweather interview (link), NOAA Research News (link), The Verge (link)

NOAA research scientist profile, 2021 (link)

Harvard School of Engineering and Applied Sciences alumni profile, 2019 (link)

Coverage of our paper on Boston natural gas methane emissions, 2015: Science I & II, Boston Globe, Reuters, CBS News, Christian Science Monitor, Inside Climate News

To improve understanding and encourage discourse about our results on methane emissions in Boston, I made public presentations and participated in meetings at: National Grid (Nov 2013), Boston City Hall (Jan 2015), the Environmental Defense Fund (Jan, Feb 2015), a Department of Energy project workshop (Feb 2015), the Boston Bar Association (May 2015), New England Conference of Public Utility Commissioners (June 2015), a Harvard Law School seminar on oil and gas law (Nov 2015), and submitted testimony to the Massachusetts State Legislature (Nov 2015)

Coverage of our paper on urban emissions verification, 2012: Scientific American, Science

SERVICE

Commerce Children's Center Association Board of Directors, Vice President, 2021-present

NOAA Global Monitoring Laboratory Seminar Series co-organizer, 2019-2020

Peer Review: Geophysical Research Letters, Journal of Geophysical Research – Atmospheres, Proceedings of the National Academy of Sciences, Atmospheric Chemistry and Physics, Atmospheric Measurement Techniques, Atmospheric Environment, Elementa, Urban Ecosystems, Carbon Management

Proposal reviewer for NOAA (2015-2017); panelist for NOAA (2020) and NASA (2022)

TEACHING

Head Teaching Fellow "The Fluid Earth", an undergraduate introductory course on the atmosphere, oceans, and climate system, Harvard College, Spring 2012

Supervised multiple Harvard undergraduate thesis projects, 2005-2008, 2011