Alexander J. Turner

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Education

Ph.D., Harvard University 2012 – 2017
Atmospheric Chemistry, Advisor: Daniel J. Jacob

B.S., University of Colorado at Boulder 2008 – 2012
Mechanical Engineering, Advisor: Daven K. Henze

Professional Experience

Miller Postdoctoral Fellow, University of California at Berkeley 2017 –
Graduate Research Assistant, Harvard University 2012 – 2017
Visiting Scholar, University of California at Berkeley 2014 & 2016
Undergraduate Research Assistant, University of Colorado at Boulder 2010 – 2012
Undergraduate Research Assistant, NOAA Geophysical Fluid Dynamics Lab 2011
Undergraduate Research Assistant, DOE Lawrence Berkeley National Lab 2010

Awards and Fellowships

Miller Fellowship at UC Berkeley	(Postdoctoral Fellowship, *11 Recipients*)	2017 – 2020
Department of Energy CSGF Fellowship	(National Fellowship, *10 Recipients*)	2013 – 2017
Department of Defense NDSEG Fellowship, *declined*	(National Fellowship, *200 Recipients*)	2013
CU Boulder "Outstanding Graduate for Research"	(College Award, *Sole Recipient*)	2012
Vestas Mechanical Engineering Student of the Year	(National Award, *Sole Recipient*)	2010
NOAA Ernest F. Hollings Scholar	(National Scholarship, *100 Recipients*)	2010 – 2012

Peer-Reviewed Publications (*submitted)

h-index = 9, total citations = 296 *(as of 18 Feb. 2018 on Google scholar)*

*20. **Turner, A. J.**, D. J. Jacob, J. Benmergui, J. Brandman, L. White, and C. A. Randles (submitted), Assessing the capability of different satellite observing configurations to resolve the distribution of methane emissions at kilometer scales, *submitted*.

*19. Sheng, J. X., D. J. Jacob, **A. J. Turner**, J. D. Maasakkers, M. P. Sulprizio, A. A. Bloom, A. E. Andrews, and D. Wunch (submitted), High-resolution inversion of methane emissions in the Southeast US using SEAC^{4}RS aircraft observations of atmospheric methane: anthropogenic and wetlands sources, *submitted*.

*18. Sheng, J. X., D. J. Jacob, **A. J. Turner**, J. D. Maasakkers, J. Benmergui, A. A. Bloom, C. Ardnt, R. Gautam, D. Zavala-Araiza, S. P. Hamburg, H. Boesch, and R. J. Parker (submitted), 2010–2015 methane trends over Canada, the United States, and Mexico observed by the GOSAT satellite: contributions from different source sectors, *submitted*.

17. Bloom, A. A., K. Bowman, M. Lee, **A. J. Turner**, R. Schroeder, J. R. Worden, R. J. Weidner, K. McDonald, and D. J. Jacob (2017), A global wetland methane emissions and uncertainty dataset for atmospheric chemical transport models (WetCHARTs version 1.0), *Geosci. Mod. Dev*, *10*, 2141–2156, doi:10.5194/gmd-10-2141-2017.

16. Buchwitz, M, O. Schneising, M. Reuter, J. Heymenn, S. Krautwurst, H. Bovensmann, J. P. Burrows, H. Boesch, R. J. Parker, P. Somkuti, R. G. Detmers, O. P. Hasekamp, I. Aben, A. Butz, C. Frankenberg, and **A. J. Turner** (2017), Satellite-derived methane hotspot emission estimates using a fast data-driven method, *Atmos. Chem. Phys.*, *17*, 5751–5744, doi:10.5194/acp-17-5751-2017.

15. **Turner, A. J.**, C. Frankenberg, P. O. Wennberg, and D. J. Jacob (2017), Ambiguity in the causes for decadal trends in atmospheric methane and hydroxyl, *Proc. Natl. Acad. Sci.*, *114*, 5367–5372, doi:10.1073/pnas.1616020114.

14. Tzompa-Sosa, Z. A., E. V. Fischer, E. Mahieu, B. Franco, C. A. Keller, **A. J. Turner**, D. Helmig, A. Fried, D. Richter, P. Weibring, J. Walega, T. I. Yacovitch, S. C. Herndon, D. R. Blake, F. Hase, J. Hannigan, S. Conway, K. Strong, and M. Schneider (2017), Revisiting global fossil fuel and biofuel emissions of ethane, *J. Geophys. Res.*, *122*, 2493–2512, doi:10.1002/2016JD025767.

13. Bader, W., B. Bovy, S. Conway, K. Strong, D. Smale, **A. J. Turner**, T. Blumenstock, C. Boone, M. C. Coen, A. Coulon, O. Garcia, D. W. T. Griffith, F. Hase, P. Hausmann, N. Jones, P. Krummel, I. Murata, I. Morino, H. Nakajima, S. O'Doherty, C. Paton-Walsh, J. Robinson, R. Sandrin, M. Schneider, C. Servais, R. Sussmann, and E. Mahieu (2017), The recent increase of atmospheric methane from 10 years of ground-based NDACC FTIR observations since 2005, *Atmos. Chem. Phys.*, *17*, 2255–2277, doi:10.5194/acp-17-2255-2017.

12. Maasakkers, J. D., D. J. Jacob, M. Sulprizio, **A. J. Turner**, M. Weitz, T. Wirth, C. Hight, M. DeFigueiredo, M. Desai, R. Schmeltz, L. Hockstad, A. A. Bloom, K. W. Bowman, S. Jeong, and M. L. Fischer (2016), A gridded national inventory of US methane emissions, *Env. Sci. Technol.*, *50*, 13123–13133, doi:10.1021/acs.est.6b02878.

11. Jacob, D. J., **A. J. Turner**, J. D. Maasakkers, J. Sheng, K. Sun, X. Liu, K. Chance, I. Aben, J. McKeever, and C. Frankenberg (2016), Satellite observations of atmospheric methane and their application to constrain emissions, *Atmos. Chem. Phys.*, *16*, 14371–14396, doi:10.5194/acp-16-14371-2016.

10. **Turner, A. J.**, A. A. Shusterman, B. C. McDonald, V. Teige, R. A. Harley, and R. C. Cohen (2016), Network design for quantifying urban CO_2 emissions: assessing trade-offs between precision and network density, *Atmos. Chem. Phys.*, *16*, 13465–13475, doi:10.5194/acp-16-13465-2016.

9. Shusterman, A. A., V. Teige, **A. J. Turner**, C. Newman, J. Kim, and R. C. Cohen (2016), The BErkeley Atmospheric CO_2 Observation Network: Initial Evaluation, *Atmos. Chem. Phys.*, *16*, 13449–13463, doi:10.5194/acp-16-13449-2016.

8. Tan, Z., Q. Zhuang, D. K. Henze, C. Frankenberg, E. Dlugokencky, C. Sweeney, **A. J. Turner**, M. Sasakawa, and T. Machida (2016), Inverse modeling of pan-Arctic methane emissions at high spatial resolution: What can we learn from assimilating satellite retrievals and using different process-based wetland and lake biogeochemical models?, *Atmos. Chem. Phys.*, *16*, 12649–12666, doi:10.5194/acp-16-12649-2016.

7. Bousserez, N., D. K. Henze, B. Rooney, A. Perkins, K. J. Wecht, **A. J. Turner**, V. Natraj, and J. R. Worden (2016), Constraints on methane emissions in North America from future geostationary remote sensing measurements, *Atmos. Chem. Phys.*, *16*, 6175–6190, doi:10.5194/acp-16-6175-2016.

6. **Turner, A. J.**, D. J. Jacob, J. Benmergui, S. C. Wofsy, J. D. Maasakkers, A. Butz, O. Hasekamp, and S. C. Biraud (2016), A large increase in U.S. methane emissions over the past decade inferred from satellite data and surface observations, *Geophys. Res. Lett.*, *43*, doi:10.1002/2016GL067987.

5. Worden, J. R., **A. J. Turner**, A. Bloom, S. S. Kulawik, J. Liu, M. Lee, R. Weidner, K. Bowman, C. Frankenberg, R. J. Parker, and V. H. Payne (2015), Quantifying Lower Tropospheric Methane Concentrations Using Near-IR and Thermal IR Satellite Measurements: Comparison to the GEOS-Chem model, *Atmos. Meas. Tech.*, *8*, 3433–3445, doi:10.5194/amt-8-3433-2015.

4. **Turner, A. J.**, D. J. Jacob, K. J. Wecht, J. D. Maasakkers, E. Lundgren, A. E. Andrews, S. C. Biraud, H. Boesch, K. W. Bowman, N. M. Deutscher, M. K. Dubey, D. W. T. Griffith, F. Hase, A. Kuze, J. Notholt, H. Ohyama, R. Parker, V. H. Payne, R. Sussmann, C. Sweeney, V. A. Velazco, T. Warneke, P. O. Wennberg, and D. Wunch (2015), Estimating global and North American methane emissions with high spatial resolution using GOSAT satellite data, *Atmos. Chem. Phys.*, *15*, 7049–7069, doi:10.5194/acp-15-7049-2015.

3. **Turner, A. J.** and D. J. Jacob (2015), Balancing aggregation and smoothing errors in inverse models, *Atmos. Chem. Phys.*, *15*, 7039–7048, doi:10.5194/acp-15-7039-2015.

2. **Turner, A. J.**, A. M. Fiore, L. W. Horowitz, and M. Bauer (2013), Summertime cyclone frequencies over the Great Lakes Storm Track from 1860–2100: variability, trends, and association with ozone pollution, *Atmos. Chem. Phys.*, *13*, 565–578, doi:10.5194/acp-13-565-2013.

1. **Turner, A. J.**, D. K. Henze, R. V. Martin, and A. Hakami (2012), The spatial extent of source influences on modeled column concentrations of short-lived species, *Geophys. Res. Lett.*, *39*, L12806, doi:10.1029/2012GL051832.

Selected Oral Conference Presentations (†Invited)

2017 AGU Fall Meeting, New Orleans, LA
2017† UN Climate Change Conference (COP23), Bonn, Germany
2017 ACCESS XIV Meeting, Brookhaven National Laboratory
2017† DOE Computational Science Graduate Fellowship Program Review, Washington, DC
2016 AGU Fall meeting, San Francisco, CA
2015 11th International Workshop on Greenhouse Gas Measurements from Space, Caltech
2015 7th International GEOS-Chem Meeting, Harvard University
2015 5th North American Carbon Program Meeting, Washington, DC
2014 AGU Fall Meeting, San Francisco, CA
2013 AGU Fall Meeting, San Francisco, CA
2011 AGU Fall Meeting, San Francisco, CA
2011 5th International GEOS-Chem Meeting, Harvard University

Invited Seminars

2018 University of Washington
2017 Japanese Aerospace Exploration Agency (JAXA)
2017 California Institute of Technology (Caltech)
2016 Massachusetts Institute of Technology (MIT)
2016 NASA Jet Propulsion Laboratory (JPL)
2016 NOAA Earth System Research Laboratory (ESRL)
2016 IBM Thomas J. Watson Research Center
2014 DOE Lawrence Livermore National Laboratory (LLNL)
2014 NOAA Earth System Research Laboratory (ESRL)

Teaching Experience

2014 **Atmospheric Chemistry** (21 students), Harvard University
2011 **Numerical Methods** (100+ students), University of Colorado – *Outstanding Teaching Assistant Award*
2010 **Numerical Methods** (100+ students), University of Colorado
2010 **First-Year Engineering Projects** (25 students), University of Colorado

Service Activities

Proposal reviewer for *NASA*.

Peer reviewer for *Nature Geoscience*, *Geophysical Research Letters*, *Atmospheric Chemistry and Physics*, *Journal of Geophysical Research*, *Atmospheric Measurement Techniques*, *Geoscientific Model Development*, and *Atmospheric Environment*.

Japanese National Institute for Environmental Studies, workshop participant (2017, 2018) and report co-author: *"A guidebook on the use of satellite greenhouse gases observation data for verification of greenhouse gases emission inventories"*.

Harvard University Earth & Planetary Science faculty search: student advisory committee (2017).

Technical Skills

Graduate Coursework:	Inverse Methods, Partial Differential Equations, Stochastic Optimization, Parallel Computing, Environmental Modeling, Atmospheric Chemistry, Aerosols, Spectroscopy, Physics of Climate, Computing Foundations, Classical Thermo., Stat. Thermo., and Fluid Dynamics.
Programming:	Matlab, Python, Julia, R, IDL, Fortran 77/90, Shell Scripting, Keras, Mathematica, html.
Computing Tools:	MPI, CUDA, OpenMP, MapReduce, Unix, Amazon EC2, LaTeX.

Research Grants and Computing Allocations

Development of an efficient method to compute footprints for dense observing systems
150,000 CPU hours, Alexander J. Turner (PI)
- NERSC ERCAP Grant 60675
- Jan 9, 2018 – Jan 7, 2019

OH trends, feedbacks, and variability in the absence of external perturbations
100,000 CPU hours, Alexander J. Turner (PI)
- NERSC ERCAP Grant 60804
- Jan 9, 2018 – Jan 7, 2019

On the utility of satellite observations for constraining fine-scale methane fluxes and super-emitters
400,000 CPU hours, Alexander J. Turner (PI)
- NCAR/CISL Allocation Number: UHAR0006
- May 19, 2017 – May 18, 2018

Estimating urban carbon dioxide fluxes at high resolution from in situ observations
650,000 CPU hours, Alexander J. Turner (PI)
- NERSC ERCAP Grant 87628
- Jan 12, 2014 – Jan 9, 2017