DANIEL J. VARON

Curriculum Vitae | 3 August 2022
✉ danielvaron@g.harvard.edu | varon.org
29 Oxford St | Cambridge, MA 02138

EDUCATION

Ph.D., Atmospheric Chemistry, Harvard University 2015 – 2020
M.Sc., Applied Mathematics
Secondary field in Computational Science & Engineering
Faculty mentor: Daniel Jacob

B.A., English Literature, McGill University 2010 – 2014
First Class Honours
Faculty mentor: David Hensley

B.Sc., Physics, McGill University 2009 – 2014
First Class Honours
Faculty mentors: Shaun Lovejoy, Tracy Webb

PROFESSIONAL EXPERIENCE

Visiting Postdoctoral Research Associate, Princeton University 2021 –
School of Public and International Affairs

Postdoctoral Research Fellow, Harvard University 2020 –
School of Engineering and Applied Sciences
Secondary appointment at GHGSat, Inc.

PUBLICATIONS (*submitted)

h-index = 12, total citations = 588 (as of 10 August, 2022 on Google scholar)

*20. Zhang, Z., E. D. Sherwin, **D. J. Varon**, and A. R. Brandt: Detecting and quantifying methane emissions from oil and gas production: algorithm development with ground-truth calibration based on Sentinel-2 satellite imagery, *Atmos. Meas. Tech. Discuss.*, 2022.

*19. Shen, L., R. Gautam, M. Omara, D. Zavala-Araiza, J. D. Maasakkers, T. Scarpelli, A. Lorente, D. Lyon, J. Sheng, **D. J. Varon**, H. Nesser, Z. Qu, X. Lu, M. P. Sulprizio, S. Hamburg, and D. J. Jacob: Satellite-based quantification of methane emissions from oil and natural gas basins in the United States and Canada, *Atmos. Chem. Phys. Discuss.*, doi:10.5194/acp-2022-155, 2022.

18. Qu, Z., D. J. Jacob, Y. Zhang, L. Shen, **D. J. Varon**, X. Lu, T. Scarpelli, A. Bloom, J. Worden, and R. J. Parker: Attribution of the 2020 surge in atmospheric methane by inverse analysis of GOSAT observations, *Environ. Res. Lett.*, in press, 2022.

17. Chen, Z., D. J. Jacob, H. Nesser, M. P. Sulprizio, A . Lorente, **D. J. Varon**, X. Lu, L. Shen, Z. Qu, E. Penn, and X. Yu: Methane emissions from China: a high-resolution inversion of TROPOMI satellite observations, *Atmos. Chem. Phys. Discuss.*, in press, 2022.

16. Maasakkers, J. D., **D. J. Varon**, A. Elfarsdóttir, J. McKeever, D. Jervis, G. Mahapatra, S. Pandey, A. Lorente, T. Borsdorff, L. R. Foorthuis, B. J. Schuit, P. Tol, T. A. van Kempen, R. van Hees, and I. Aben: Using satellites to uncover large methane emissions from landfills, *Sci. Adv.*, doi:10.1126/sciadv.abn9683, 2022.

15. Jacob, D. J., **D.J. Varon**, D. H. Cusworth, P. E. Dennison, C. Frankenberg, R. Gautam, L. Guanter, J. Kelley, J. McKeever, L.E. Ott, B. Poulter, Z. Qu, A.K. Thorpe, J. R. Worden, and

R. M. Duren: Quantifying methane emissions from the global scale down to point sources using satellite observations of atmospheric methane, *Atmos. Chem. Phys.*, doi:10.5194/acp-22-9617-2022, 2022.

14. **Varon, D.J.**, D. J. Jacob, M. Sulprizio, L. A. Estrada, W. B. Downs, L. Shen, S. E. Hancock, H. Nesser, Z. Qu, E. Penn, Z. Chen, X. Lu, A. Lorente, A. Tewari, and C. A. Randles: Integrated Methane Inversion (IMI 1.0): A user-friendly, cloud-based facility for inferring high-resolution methane emissions from TROPOMI satellite observations, *Geosci. Mod. Dev.*, doi:10.5194/gmd-15-5787-2022, 2022.

13. Sànchez-García, E., J. Gorroño, I. Irakulis-Loitxate, **D. J. Varon**, and L. Guanter: Mapping methane plumes at very high spatial resolution with the WorldView-3 satellite, *Atmos. Meas. Tech.*, doi:10.5194/amt-2021-238, 2022.

12. Guanter, L., I. Irakulis-Loitxate, J. Gorroño, E. Sánchez-García, D. H. Cusworth, **D. J. Varon**, S. Cogliati, and R. Colombo: Mapping methane point emissions with the PRISMA spaceborne imaging spectrometer, *Rem. Sens. Env.*, doi:10.1016/j.rse.2021.112671, 2021.

11. Irakulis, I., L. Guanter, Y. Liu, **D. J. Varon**, J. D. Maasakkers, Y. Zhang, A. K. Thorpe, R. M. Duren, C. Frankenberg, D. Lyon, D. H. Cusworth, Y. Zhang, K. Seg, J. Gorroño, E. Sánchez-Garcia, M. P. Sulprizio, K. Cao, H. Zhu, J. Liang, X. Li, I. Aben, and D. J. Jacob: Satellite-based Survey of Extreme Methane Emissions in the Permian Basin, *Sci. Adv.*, doi:10.1126/sciadv.abf4507, 2021.

10. Lyon, D. R., B. Hmiel, R. Gautam, M. Omara, K. Roberts, Z. R. Barkley, K. J. David, N. L. Miles, V. C. Monteiro, S. J. Richardson, S. Conley, M. L. Smith, D. J. Jacob, L. Shen, **D. J. Varon**, A. Deng, X. Rudelis, N. Sharma, K. T. Story, A. R. Brandt, M. Kang, E. A. Kort, A. J. Marchese, and S. P. Hamburg: Concurrent variation in oil and gas methane emissions and oil price during the COVID-19 pandemic. *Atmos. Chem. Phys.*, doi:10.5194/acp-21-6605-2021, 2021.

9. **Varon, D. J.**, D. Jervis, J. McKeever, I. Spence, D. Gains, and D. J. Jacob: High-frequency monitoring of anomalous methane point sources with multispectral Sentinel-2 satellite observations. *Atmos. Meas. Tech.*, doi:10.5194/amt-14-2771-2021, 2021.

8. Jervis, D., J. McKeever, B. O. A. Durak, J. J. Sloan, D. Gains, **D. J. Varon**, A. Ramier, M. Strupler, and E. Tarrant: The GHGSat-D Imaging Spectrometer. *Atmos. Meas. Tech. Discuss.*, doi:10.5194/amt-14-2127-2021, 2021.

7. Cusworth, D. H., R. M. Duren, A. K. Thorpe, S. Pandey, J. D. Maasakkers, I. Aben, D. Jervis, **D. J. Varon**, D. J. Jacob, C. A. Randles, M. Smith, R. Gautam, M. Omara, G. Schade, P. E. Dennison, C. Frankenberg, D. Gordon, E. Lopinto, and C. E. Miller: Multi-satellite imaging of a gas well blowout enables quantification of total methane emissions. *Geophys. Res. Lett.*, doi:10.1029/2020GL090864, 2020.

6. **Varon, D. J.**, D. J. Jacob, J. McKeever, and D. Jervis: Quantifying time-averaged methane emissions from individual coal mine vents with GHGSat-D satellite observations. *Environ. Sci. Tech.*, doi:10.1021/acs.est.0c01213, 2020.

5. Zhang, Y., R. Gautam, S. Pandey, M. Omara, J. D. Maasakkers, P. Sadavarte, D. Lyon, H. Nesser, M. P. Sulprizio, **D. J. Varon**, R. Zhang, D. Houweling, D. Zavala-Araiza, R. A. Alvarez, A. Lorente, S. P. Hamburg, I. Aben, & D. J. Jacob: Quantifying methane emissions from the largest oil producing basin in the U.S. from space. *Science Advances*, doi:10.1126/sciadv.aaz5120, 2020.

4. Cusworth, D. H., D. J. Jacob, **D. J. Varon**, C. Chan Miller, X. Liu, K. Chance, A. K. Thorpe, R. M. Duren, C. E. Miller, D. R. Thompson, C. Frankenberg, L. Guanter, and C. A. Randles: Potential of next-generation imaging spectrometers to detect and quantify methane point sources from space. *Atmos. Meas. Tech.*, doi:10.5194/amt2019-202, 2019.

3. **Varon, D. J.**, J. McKeever, D. Jervis, J. D. Maasakkers, S. Pandey, S. Houweling, I. Aben, T. Scarpelli, and D. J. Jacob: Satellite discovery of anomalously large methane point sources from oil/gas production. *Geophys. Res. Lett.*, doi:10.1029/2019GL083798, 2019.

2. **Varon, D. J.**, D. J. Jacob, J. McKeever, D. Jervis, B. O. A. Durak, Y. Xia, Y. Huang: Quantifying methane point sources from fine-scale satellite observations of atmospheric methane plumes. *Atmos. Meas. Tech.*, doi:10.5194/amt-11-5673-2018, 2018.

1. Lovejoy, S., D. Schertzer, **D. J. Varon**: Do GCMs predict the climate... or macro-weather? *Earth System Dynamics* 4, 439-454. doi:10.5194/esd-4-439-2013, 2013.

PRESENTATIONS

Invited talks

2021 NASA Jet Propulsion Laboratory, Carbon Club seminar (JPL)
2021 University of Washington, Deptartment of Atmospheric Sciences seminar
2021 Stanford University, Energy Resources Engineering seminar
2019 American Geophysical Union Fall Meeting (U14C-10)
2019 SRON Netherlands Institute for Space Research (SRON)

Conference presentations

2022 American Meteorological Society 102nd Annual Meeting (AMS)
2020 16th International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-16)
2020 MIT A+B Applied Energy Symposium (MITAB)
2019 American Geophysical Fall Meeting (A53F-03)
2019 15th International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-15)
2019 Industrial Methane Measurements Conference (IMM)
2018 14th International Workshop on Greenhouse Gas Measurements from Space (IWGGMS-14)
2017 American Geophysical Union Fall Meeting (A32D-07)

Selected poster presentations

2021 American Geophysical Union Fall Meeting (B25G-1538)
2018 American Geophysical Union Fall Meeting (A43R-3443)

TEACHING EXPERIENCE

Teaching assistant

Atmospheric Chemistry, Harvard University 2017

- Overall teaching score of 4.7/5.0 based on student reviews
- Awarded Harvard Certificate of Distinction in Teaching
- Responsibilities included developing new class materials, leading class discussions, writing and grading all assignments, and meeting with students individually.

MENTORING

Undergraduate students

- Daniel Shen (Harvard), 2021. Sentinel-2 methane retrievals.

AWARDS AND FELLOWSHIPS

Sigma Xi Honor Society 2019
AGU Outstanding Student Presentation Award 2018
Harvard University Certificate of Distinction in Teaching 2017

Stonington Graduate Fellowship of Environmental Science and Engineering	2015
McGill University Dean's Honour List	2014
Numerous B.Sc. research fellowships	2011 – 2013

SERVICE

Convener International Measurements of Methane Emissions from the Fossil Fuel Industries, (A015) AGU Fall Meeting 2020.

Reviewer *Atmospheric Chemistry & Physics*, *Atmospheric Measurement Techniques*, *Environmental Science & Technology*, *Remote Sensing of Environment*, *Geophysical Research Letters*, *Nature Scientific Reports*, *Science of the Total Environment*, *One Earth*, *Environmental Research Letters*

NASA ACCDAM review panel, 2021.

Leader Co-chair, *Methane Subgroup*, Harvard Atmospheric Chemistry Modeling Group (ACMG)

Co-chair, *Machine Learning & Data Science Subgroup*, Harvard ACMG

Member American Geophysical Union

Diversity, Inclusion, and Belonging Subgroup, Harvard ACMG

Organizer *Building an inclusive community in EPS/ESE: Addressing gender-based discrimination and harassment.* Department-wide event, February 2018.

2020 #ShutdownSTEM meeting, Harvard ACMG

Volunteer AstroMcGill astronomy outreach program, 2014