DANIEL J. VARON

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EDUCATION

Harvard University, Cambridge MA 2015-pres
PhD Environmental Science and Engineering, expected May 2020
Secondary field in Computational Science and Engineering
MSc Applied Mathematics

McGill University, Montréal QC 2009-2014
BSc Physics, First Class Honors
BA English Literature, First Class Honors

PROFESSIONAL EXPERIENCE

GHGSat, Inc. 2016-pres
Research Scientist

SKILLS

Programming Languages
Experienced: Python, MATLAB, Bash
Familiar: C, Fortran, R, Mathematica

Other Technical Skills
Experienced: AWS (EC2, S3), Linux, LaTeX
Familiar: PyTorch, TensorFlow, Spark

Languages
Fluent: English, French

RESEARCH EXPERIENCE

Computer vision for satellite remote sensing 2018-pres
GHGSat Inc., Montréal QC
Research Scientist

Methods development for chemical feature detection in shortwave-infrared satellite imagery. Using U-Nets and VGG-like CNNs to detect and segment point source plumes in noisy GHGSat satellite observations of atmospheric methane. Investigating application of CNNs to infer flux rates from detected methane plumes. Developed gradient boosted decision tree models to denoise satellite methane retrievals based on independent surface reflectance data.

Satellite remote sensing of atmospheric composition 2016-prest
Atmospheric Chemistry Modeling Group, Harvard University
Graduate Research Assistant
Professor Daniel Jacob

Methods development in satellite remote sensing of atmospheric trace gases. Designed novel inverse analysis algorithms for inferring flux rates from high-resolution shortwave-infrared satellite observations of methane plumes, based on large eddy simulations of atmospheric turbulence (Varon et al., 2018). Integrated these algorithms into GHGSat's operational toolchain to enable the discovery by satellite of anomalous methane emissions from individual oil/gas facilities in Central Asia (Varon et al. 2019); this grew from a collaboration I led across three institutions (Harvard, GHGSat, and the Dutch space agency), and sparked an international diplomatic effort to control the emissions. Investigating optimal estimation techniques for improving GHGSat plume detection thresholds through time-averaging (Varon et al., 2020).

Medical physics for radiation oncology 2014-2015
Jewish General Hospital, Montréal QC
Research Assistant
Dr. Tamim Niazi, Dr. Gabriela Stroian

Observational cosmology 2013-2014
McGill University, Montréal QC
Undergraduate Researcher
Professor Tracy Webb

Climate dynamics 2011-2013
McGill University, Montréal QC
Undergraduate Researcher
Professor Shaun Lovejoy

SELECTED PUBLICATIONS

2020 **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. *Environmental Science and Technology*, submitted.

2019 **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. *Geophysical Research Letters*, doi:10.1029/2019GL083798

2018 **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. *Atmospheric Measurement Techniques*, doi:10.5194/amt-11-5673-2018

HONORS & AWARDS

2019 Member of the Sigma Xi Honor Society
2018 American Geophysical Union Outstanding Student Presentation Award
2017 Harvard University Certificate of Distinction in Teaching
2014 McGill University Dean's Honour List

FELLOWSHIPS

Harvard Graduate Consortium on Energy and Environment 2017-pres
Harvard University, Cambridge MA

Stonington Graduate Fellowship of Environmental Science and Engineering 2015
Harvard University, Cambridge MA

TEACHING EXPERIENCE

2017 EPS133 *Atmospheric Chemistry*
Overall teaching score of 4.7/5.0 based on student reviews
Awarded Harvard Certificate of Distinction in Teaching

SELECTED PRESS

The Economist — Using satellites to spot industry's methane leaks
NY Times — A methane leak, seen from space, proves to be far larger than thought
Forbes — Detection of methane leak from space could herald a revolution
Bloomberg — Satellite studying volcanoes finds giant oilfield methane plume