

# DANIEL J. VARON

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## EDUCATION

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**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

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**GHGSat, Inc.** 2016-pres  
Research Scientist

## SKILLS

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### Programming Languages

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

### Other Technical Skills

Experienced: AWS (EC2, S3), Linux,  $\text{\LaTeX}$   
Familiar: PyTorch, TensorFlow, Spark

### Languages

Fluent: English, French

## RESEARCH EXPERIENCE

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**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 random forest 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).

<b>Medical physics for radiation oncology</b> Jewish General Hospital, Montréal QC Research Assistant <i>Dr. Tamim Niazi, Dr. Gabriela Stroian</i>	2014-2015
<b>Observational cosmology</b> McGill University, Montréal QC Undergraduate Researcher <i>Professor Tracy Webb</i>	2013-2014
<b>Climate dynamics</b> McGill University, Montréal QC Undergraduate Researcher <i>Professor Shaun Lovejoy</i>	2011-2013

## SELECTED PUBLICATIONS

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2020	<b>Varon, D. J.</b> , D. J. Jacob, J. McKeever, and D. Jervis: Quantifying time-averaged methane emissions from individual coal mine vents with GHGSat-D satellite observations. <i>in prep.</i>
2019	<b>Varon, D. J.</b> , 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. <i>Geophysical Research Letters</i> , doi:10.1029/2019GL083798
2018	<b>Varon, D. J.</b> , 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. <i>Atmospheric Measurement Techniques</i> , doi:10.5194/amt-11-5673-2018

## HONORS & AWARDS

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2019	Member of the <a href="#">Sigma Xi Honor Society</a>
2018	American Geophysical Union Outstanding Student Presentation Award
2017	Harvard University Certificate of Distinction in Teaching
2014	McGill University Dean's Honour List

## FELLOWSHIPS

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<b>Harvard Graduate Consortium on Energy and Environment</b> Harvard University, Cambridge MA	2017-pres
<b>Stonington Graduate Fellowship of Environmental Science and Engineering</b> Harvard University, Cambridge MA	2015

## TEACHING EXPERIENCE

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2017	EPS133 <i>Atmospheric Chemistry</i> Overall teaching score of 4.7/5.0 based on student reviews Awarded Harvard Certificate of Distinction in Teaching
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## SELECTED PRESS

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