

# HANNAH NESSER

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## EDUCATION

### HARVARD UNIVERSITY

Ph.D. Candidate, School of Engineering and Applied Sciences

CAMBRIDGE, MA

2017 - present

Researches high-resolution, analytic inversions satellite observations of atmospheric methane concentrations.

### YALE UNIVERSITY

B.S., Environmental Engineering, with Distinction

NEW HAVEN, CT

2012 - 2016

Led a senior research team to develop an operational prototype of a portable air quality monitor that measured concentrations of critical pollutants for an EPA SEARCH Center.

### SCHOOL FOR INTERNATIONAL TRAINING

B.S., Environmental Engineering, with Distinction

FORT DAUPHIN, MADAGASCAR

August - December 2014

Conducted research on the mechanical and social feasibility of using biogas as a fuel source for an essential oils still in two remote communities.

## AWARDS

- National Science Foundation Graduate Research Program Fellowship (2017 - 2022)
- Special Commendation for Extraordinary Teaching in Extraordinary Times (COVID-19), awarded to 10% of Harvard instructors based on nomination by students (2020)
- Bok Center Certificate of Distinction in Teaching, awarded to Harvard Teaching Fellows who received an average score of 4.5 or above (2019)
- D. Allan Bromley Prize in Environmental Engineering, awarded to a Senior who has exhibited superior accomplishment and scholarly achievement in Environmental Engineering (2016)
- Richter Summer Fellowship (2015)

## RESEARCH

### HARVARD UNIVERSITY

Advisor: Daniel Jacob

CAMBRIDGE, MA

2017 - present

- Works to improve constraints on the magnitude and distribution of methane emission sources using high-resolution analytic inversions of observations from the TROPOMI instrument aboard the Sentinel-5 Precursor satellite.
- Develops and applies methods to conduct high-resolution analytic inversions at reduced computational cost while preserving information content.
- Implements those methods to improve estimates of methane emission sources at high resolution over North America using TROPOMI observations.

- Served as Design Lead for a senior research team developing a first-generation operational prototype of portable and stationary air quality monitors measuring concentrations of greenhouse gases and EPA criteria pollutants using low-cost sensors. The sensors were designed for deployment in Baltimore, MD as part of an EPA SEARCH Center.

## **TEACHING**

**HARVARD UNIVERSITY | DEPARTMENT OF EARTH AND PLANETARY SCIENCES** **CAMBRIDGE, MA**  
**Atmospheric Chemistry, Teaching Fellow** **Spring 2020**

Taught weekly section and office hours, including material preparation. Created and graded homework assignments. Developed and taught midterm review session. Helped lead the transition to remote learning following COVID-19 adjustments.

**HARVARD UNIVERSITY | DEPARTMENT OF EARTH AND PLANETARY SCIENCES** **CAMBRIDGE, MA**  
**Atmospheric Chemistry, Teaching Fellow** **Spring 2019**

Taught weekly section and office hours, including material preparation. Created and graded homework assignments. Contributed to exam development and graded exams. Developed and taught midterm and final review sessions.

## **PRESENTATIONS**

Reduced-Cost Construction of Jacobian Matrices for High-Resolution Inverse Modeling, presentation at the 2020 AMS meeting, Boston, MA, January 17, 2020.

Reduced Cost Construction of Jacobian Matrices for High-Resolution Inverse Modeling, poster at the 2019 AGU meeting, San Francisco, CA, December 12, 2019.

Decreasing the computational cost of analytic inversions of high-resolution satellite observations, presentation at the Netherlands Institute for Space Research (SRON), Utrecht, Netherlands, June 11, 2019.

## **PUBLICATIONS**

Zhang, Y., P. Sadavarte, R. Gautam, M. Omara, J.D. Maasakkers, S. Pandey, D. Lyon, H. Nesser, M.P. Sulprizio, R. Zhang, S. Houweling, D. Zavala-Araiza, R.A. Alvarez, A.L. Delgado, S.P. Hamburg, I. Aben, and D.J. Jacob, Quantifying methane emissions from the largest oil producing basin in the U.S. from space, *Science Advances*, 6, eaaz5120, 2020.

Maasakkers, J.D., D.J. Jacob, M.P. Sulprizio, T. Scarpelli, H. Nesser, J.-X. Sheng, Y. Zhang, M. Hersher, A.A. Bloom, K.W. Bowman, J.R. Worden, G. Janssens-Maenhout, and R.J. Parker, Global distribution of methane emissions, emission trends, and OH concentrations and trends inferred from an inversion of GOSAT satellite data for 2010-2015, *Atmos. Chem. Phys.*, 19, 7859-7881, 2019.

## **ACTIVITIES**

Co-President, Graduate Environmental Action Team (GrEAT); Volunteer, Harvard Law School Emmet Environmental Law and Policy Clinic.